Massport and FAA RNAV Pilot Study Overview Briefing to Massport CAC

December 8, 2016



Contents

- FAA/Massport RNAV MOU Context
- Boston Logan Context
- FAA RNAV MOU, Overview
- Q&A

FAA/Massport RNAV MOU Context

An outcome of RNAV is concentration of flights...

Example- Departures - Runway R33L



FAA and Massport MOU on RNAV Pilot Study

- RNAV Procedures Nationwide Deployment by FAA
- Overflight noise versus concentration
- December 3rd public meeting in Milton
- Discussions with communities and elected
- Engagement with FAA
 - National Issue
 - Specific solutions to test
 - National model to address RNAV related issues
- Near-term actionable ideas tested and, if successful, applied to other runways and nationwide (12 to 18 month process)
- Massport CAC as the conduit for review and input
- Massport CAC opportunity to add ideas
 - Narrow focus on RNAV, limited and prioritized by the CAC

Boston Logan Context

Boston Logan International Airport

- Largest Commercial Airport in New England Region
- Over \$13 Billion in Annual Economic Impact
- Over 17,000 Direct Jobs
 - About 80% Private Sector
- Over 100,000 Total Direct/Indirect Jobs
- Origin and destination airport- over 90% of passengers originate or end trips from Boston
- Served by all major airlines and not a major connecting hub
- Extensive domestic and international nonstop service. Varied aircraft fleet mix
- Demand is driven primarily by local socioeconomic conditions



Boston Logan is an urban airport

- The airport has been operating for over 90 years
- The FAA is responsible for choosing which runways to use
- For safety, aircraft land and depart into the wind
- Current and forecasted weather is primary
- Other operational factors include runway closures, fleet mix, efficiency



Wind and weather patterns are the primary driver of the number of hours and flights a particular runway's configuration is used by the FAA. Depending on the runways in use, different neighborhoods/communities are overflown. Based on wind/weather, the FAA uses Logan runways in combinations to safely and efficiently meet demand. Based on which configuration the FAA selects, different communities are impacted

Southeast Flow

R15R\L and 9

SE



Although flights fluctuate year to year, over the long term Logan Airport is serving more passengers on fewer flights



For Example...

- 2014 to 2015 Flights up +2.5% and Passengers up +5.7%
- 2008 to 2009 flights down -7.1% and passengers down -2.3%

New engine technology has reduced noise by greater than 95% since the 1980s. About 97% of Logan's fleet meets engine stage 4 standards, the strictest noise and emissions designation



In the 1980s a typical aircraft at Logan was the B727-200. Today a typical aircraft is the A320 or B737-8. Point Shirley is located in Winthrop. Reflecting new engine technology and a reduction of total flights, Logan's noise emissions contours have shrunk significantly over the last decades



Note: 65db DNL is FAA's designation of significant noise exposure.



Source Maggoot NOBS (FRA MuRL 4L, Office of Geographic and Environmental Information Marciss): Commonweal Affairs, ISD Department of Agriculture, National Agriculture Imagery Program (NAP) 2010 2012 - 65 dB DNL Contour 2000 - 65 dB DNL Contour 1990 - 65 dB DNL Contour Comparison of 65 dB DNL Contours - 1990, 2000 and 2012

Figure

Because of Logan's urban location, Massport has developed a comprehensive noise abatement program.

- Noise abatement departure procedures
- Late night opposite direction operations
- Decibel restriction on R4L departures and 22R arrivals
- Unidirectional/Wind restriction use R14/32
- Residential and School Soundproofing Program
- Engine run-up restrictions
 - Limited time
 - Specific locations
- Encourage use of single engine taxiing and reverse thrust

- 24/7 noise complaint line 617-561-3333
- State of the art Noise Monitoring System
- Near live flight tracking on website
 - http://www.massport.com/environment/environmental_re porting/Noise%20Abatement/overview.aspx



Existing noise abatement procedures benefiting communities. But these may impact other communities...

- R22R and R22L are primary SW departure runways
- Peak use is during summer periods
- Busiest departure runway flow in 2015, 34% of all departures or about 54,000 jet flights



Existing noise abatement procedures benefiting communities (cont.)

- Depart 15R, Land 33L, Late night (about midnight to 5AM)
- However, procedure does result in overflights to South Shore
- Second CAT III Runway R33L, alternative option to R4R



Massport has been advocating to modify A320s to reduce airframe noise... Massachusetts Port Authority One Harborside Drive East Boston, MA 02128-2909

The Boston GlobeTweet Share



JESSICA RINALDI/GLOBE FILE/FILE 2014

A plane taking off from Logan Airport.

By Johanna SeltzGLOBE CORRESPONDENT NOVEMBER 11, 2016

Selectmen in Milton, where overhead airplane noise is a major issue, have asked the top executives at five airlines using Logan Airport to retrofit their Airbus aircraft with a device that significantly reduces noise on the ground and eliminates a particularly annoying high-pitched whine.



Telephone (617) 568-5000 www.massport.com

- To: **Boston Airline Committee**
- From: Edward C. Freni Director of Aviation
- Date: May 18, 2016

Single/Reduced-Engine Taxiing and Other Strategies to Reduce Aircraft- Generated RE: Emissions and Noise at Boston Logan

As an important user of Boston-Logan International Airport ("Boston Logan"), you are an essential partner in our efforts to ensure that Boston Logan operates in the safest, most dependable and environmentally responsible manner feasible. Our success in implementing physical and technological improvements and piloting cutting-edge safety enhancements at Boston Logan is based, in part, on continuing to evaluate and promote operational measures with the potential to reduce environmental impacts from various landside and airside operations.

Important measures that have been identified are:

- 1.) Single/reduced-engine taxiing,
- Use of idle-reverse thrust, and
- 3.) Retrofitting older A320 aircraft with "vortex generators" to reduce aircraft noise.

Based on outreach to the Logan air carrier community, it is clear that single- or reducedengine taxiing is being voluntarily implemented by the vast majority of air carriers at Boston Logan. I write to you again to encourage your continued use of this fuel-saving emissions reduction strategy, subject to pilot discretion and to the extent consistent with your established operating safety procedures.

I also encourage your use of idle reverse thrust (or minimize the use of reverse thrust) on landing, as a second operational measure, again, only at the discretion of the pilot and only to the extent consistent with your established operational safety procedures. This measure provides noise relief to our nearest neighbors and, at the same time, provides companion benefits to you, such as reducing fuel burn and engine wear. Clearly, the use of this procedure must be consistent with operational conditions at Boston Logan, including runway surface conditions and whether LAHSO is in use.

Finally, Lagain want to share with you information regarding recent industry efforts to retrofit A320 aircraft with "vortex generators" to reduce airframe noise. Although the A320 is a fully noise-compliant/modern aircraft, this is an excellent example of additional, incremental actions we can take as an industry to reduce operational impacts on the environment. Attached please find more information related to this technology.

At the Community's Request, Massport Conducted Noise Surveys in Milton and Belmont to Analyze Actual Aircraft Noise from R33L Departures with RNAV in place...

- Survey Locations: Brush Hill Rd, Milton and Louise Rd, Belmont
- Peak use of R33L (Winter 2014)
- Confirmed FAA modeling analysis and projections of noise, flight corridor and altitudes

Summary of results from noise survey measurements Brush Hill Rd, Milton





...Noise Monitoring in Belmont and Watertown

Belmont February 22, 2014 – March 20, 2014

- All Logan Airport Noise 44.5 DNL
- R33L Departures Only 44.1 DNL
- Non Aviation Noise 45.0 DNL

Watertown January 7, 2015 - February 4, 2015

- All Logan Airport Noise 44.3 DNL
- R33L Departures Only 43.8 DNL
- Non Aviation Noise 49.8 DNL





FAA engagement...

- Boston Logan Overflight Noise Study (BLANS)
 - Mitigation commitment, over ten years and grant funded
- In response to community concerns, the FAA extended the R4L RNAV development process for Logan's runway
 - R4L is a visual runway, RNAV will improve guidance to pilots
- In October, agrees to conduct targeted RNAV Study

Massport is experiencing a spike in noise complaints...

	• •	
Town	Complainants	Complaints
Milton	401	15,662
Hull	173	1,021
Medford	134	1,261
Somerville	118	1,215
Cambridge	110	1,590
Winthrop	76	206
Arlington	70	1,422
East Boston	56	145
Belmont	54	336
Roslindale	54	194
Other	460	3,341
Total	1,706	26,393

Towns By Complaints and Complainants

Source: Massport January to September 2016. Calls where received from 77 communities.

Research shows that the number of noise complaints often originate from a small number of callers...

TABLE 1. SUMMARY OF AIRPORT NOISE COMPLAINTS

Time

Airport	period covered	Total number of complaints	Evidence of concentration	Portland International	2015	688	5 individuals accounted for 420 complaints (61	
Ronald Reagan Washington National Airport (DCA)	2015	8,760	2 individuals at 1 residence in NW DC accounted for 6,852 com- plaints (78 percent). ⁴	Airport (PDX)			percent). ⁹ 1,338 households in total lodged complaints. While	
Denver International Airport (DEN)	2015	4,870	1 individual in Strasburg, CO, 30 miles from the air- port, accounted for 3,555 complaints (73 percent). 4 callers accounted for 4,653 complaints (96 per- cent). A total of 42 house- holds complained. ⁵	Phoenix Sky Harbor International Airport (PHX)	2015	24,247	data is not available by household, the airport received 3,814 complaints from 13 households in zip code 85258, for an average of 293 calls per house- hold. ¹⁰	
Washington Dulles International Airport (IAD)	2015	1,223	1 individual in Poolesville, MD, 13 miles away from the airport, accounted for 1,024 complaints (84 percent). ⁶	Seattle-Tacoma International Airport (SEA)	2014	1,006	3 individuals accounted for 648 complaints (64 percent). Top caller accounted for 42 percent of total. ¹¹	
Las Vegas McCarran International Airport (LAS)	2015	3,963	1 individual accounted for 450 calls in September 2015 (98 percent of monthly total). ⁷	San Francisco	1		53 Portola Valley, CA, individuals accounted for 25,259 complaints during	
Los Angeles International Airport (LAX) 12/8/2016	2015	8,862	1 individual in Monterey Park, CA, accounted for 489 complaints during June 2015 (50 percent of monthly total). The top 3 callers accounted for 88 percent of June com- plaints ⁸	International Airport (SFO)	2015 George	890,376 e Mason Ur	the month of October 2015, for an average of 477 calls per person in that month. ¹² niversity, Mercatus Cente	

This is also true at Boston Logan. For example, January to September 2016, ten Milton callers accounted for 73% of the Milton calls. Two individuals accounted for almost 50% of the Milton calls



Number of complaints do not necessarily correlate to number of flights over a community

Number I		
of Flights	Community	Total 2015
1	East Boston	124,858
2	Winthrop	109,607
3	S. Boston	99,057
4	Hull	90,241
5	Milton	67,747
6	Lynn	59 <i>,</i> 237
7	Dorchester	52,733
8	Quincy	50 <i>,</i> 588
9	Randolph	46,099
10	Revere	46,092
11	Winchester	44,416
12	Cohasset	43,310
13	Medford	35,188
14	Chelsea	26,642
15	Belmont	18,369

<u>Note</u>: The data is a representative sample of communities geographically around Boston Logan. This table <u>IS NOT</u> intended as a complete ranking.

<u>Source:</u> Massport December-2015 HMMH 2016 Analysis. The Overflight numbers are based on the Jet Runway Use data published by the Noise Office.

Overflights - Principals

- Safety for passengers and people on the ground
- Weather as factor
- Data driven
- Regional fairness across metropolitan region
- Massport CAC as regional voice
- FAA MOU to test five experiments

Massport and FAA RNAV MOU Update

Overview of Technical Process and Five Pilot Tests- Ideas reflect input from communities close to Boston Logan

- 1. <u>Persistence of RNAV departures</u>- Study pre and post RNAV concentration changes and feasibility of modifying departure paths off of existing RNAV SIDs. The objective is to provide noise relief, not introduce new noise while retaining the safety and efficiency benefits of the RNAV. Case study R33L departures.
- 2. <u>Increasing aircraft altitudes, Departures</u>- Leveraging the precision of RNAV to increase overall aircraft altitudes on departures. Case study R33L departures.
- **3.** <u>Increase aircraft altitudes, Arrivals-</u> Leveraging the precision of RNAV to increase overall aircraft altitudes on arrivals. Case study R4R arrivals.
- 4. <u>RNAV separation requirements</u>- Currently departure and arrival procedures require a separation of 3 miles for head-to-head operations. This effort would identify keeping/enhancing the safety requirement but examine how to incorporate compatible land use into the procedure development. Case studies: R27 Arrival and R22L/R22R departure procedure or the R15R departure procedure.
- 5. <u>Alternative RNAV Special designs for R4R arrivals</u> –Test RNAV design(s) that could be utilized during peak or offpeak periods if not possible during peak period. This pilot will examine Runway 4R Arrivals (e.g. following the Southeast Expressway as a potential for compatible land use) as a case study. Part of this examination will also review any new noise that would be introduced by this procedure.

<u>Apply alternative metrics</u> – Use single event modeled noise data to develop supplemental metric(s) to measure and track concentration of flights due to RNAV technology. These metrics would better identify the potential for community impacts associated with proposed procedural changes. Supplemental metric will be provided as additional evaluation tools as part the the analysis for this Study.

Departures R33L – Decreased overflights to Boston/ areas of Somerville and Cambridge but increased concentration to areas of Somerville, Cambridge, Belmont, Watertown, Arlington, etc.



FAA separation between RW22R/22L Departures and RW27 Arrivals results in noise to Point Allerton, Hull





Runway 33L RNAV Special designed by jetBlue is currently underutilized by late night carriers

- 33L Jet Arrivals June
 2015 through October
 2015, 00:00 to 06:00
- 154 out of 2,261 operations used LVA, 6.8%
- Work ongoing with FAA and airlines, utilization has increased

Look for opportunities to increase altitude on departures...

Profile View of RW33L Departures July - 2016



Look for opportunities to increase altitude on arrivals...

Profile View of RW4R Arrivals July - 2016



Arrivals R4R – Downwind and Final, Minimal Change

Runway 4R and 4L Jet Arrivals Comparison April 2010 Vs. April 2015 Post RNAV

Runway	RW4R		RW4L		
Year	2010	2015	2010	2015	
# of Arrival	3,863	3,800	835	580	
Ave Altitude (Over Milton)	2,104'	2,225'	2,455'	2,421'	
Standard Deviation	611'	657'	668'	581'	
% of total Arrivals in April	31.8%	29%	6.9%	4.4%	



Curved approach over compatible land use....



Critical Steps

- MOU with FAA Identifies roles and responsibilities
 - Commitment of resources to effort
- MOU Technical Team
 - MIT
 - HMMH
 - Ex-FAA Manager
- Coordinate with Massport CAC at important milestones
 - October 7th Announcement with FAA and elected officials
 - Massport Press Release
 - Briefing to CAC Executive Committee 10/24
 - Briefing to CAC Aviation Committee 11/2
 - Massport briefing to Executive Committee 11/29
 - Briefing to full Massport CAC 12/08

Project Schedule

Preliminary/Subject to Change

٠	FAA/ Massport Discussions	Winter – Fall 2016		
٠	Announcement	Oct 2016		
•	Consultant Team Organization	Fall 2016		
•	Historical Flight Comparison\Analysis	Dec to Feb 2016		
•	Block 1 Procedure Opportunity	Feb 2017		
	 lower complexity, benefits with minimal/no negative impacts 			
	 DNL and Alternative Metrics (single event above threshold) 			
•	Block 1 Recommendations	Apr 2017		
•	Block 2 Procedure Opportunity	Jun 2017		
	 More complexity, benefits and potential negative impacts 			
	 DNL and Alternative Metrics (single event above threshold) 			
٠	Block 2 Recommendations	Fall 2017		
٠	FAA Review Process	Ongoing/TBD		
٠	Implementation/Final Report	TBD		

Review\Input MPA CAC At Key Milestones

Q&A