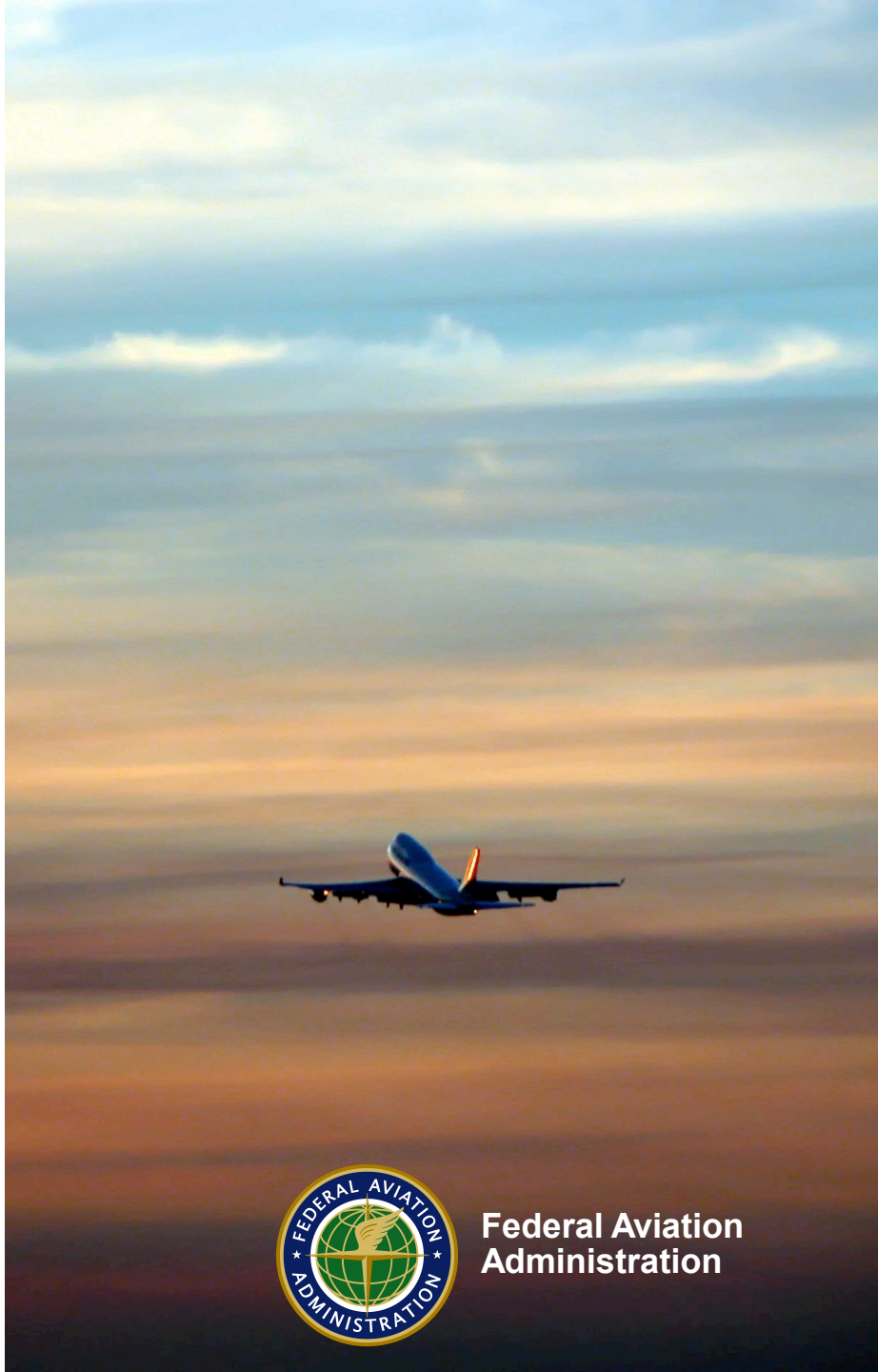
2018 REDAC Fall Meeting

Aircraft Operations for Reduced Noise

By: Chris Dorbian

Date: September 11, 2018

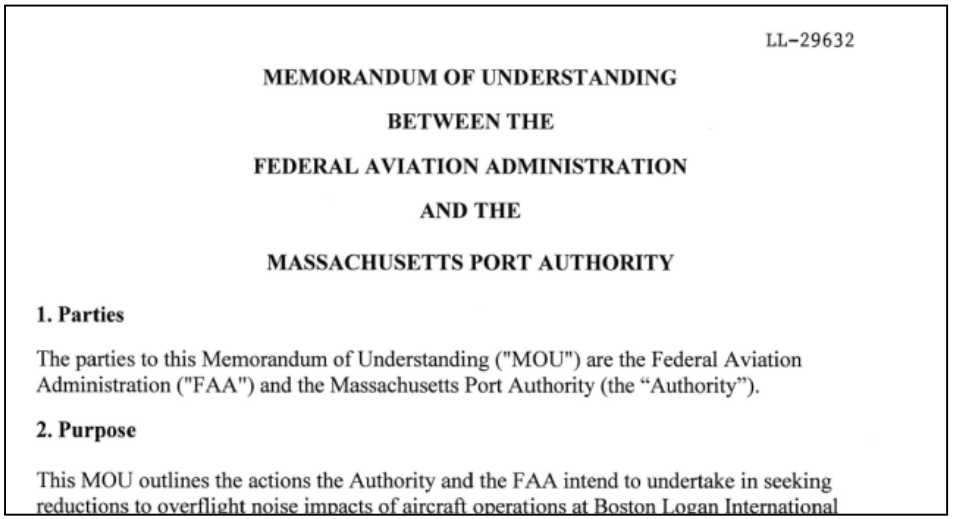


Outline

1. FAA-Massport MOU Update
2. ASCENT Research
3. Airport Technology Research (ATR) - Operations

FAA-Massport MOU Overview

- MOU signed in September 2016 established framework for cooperation between Massport & FAA to explore operational changes to mitigate noise impacts
- MIT developed noise evaluation framework (through ASCENT-23) and is applying it (through Massport funding) to BOS to build and assess procedures
- Massport submitted Block 1 proposal to FAA in December 2017
- FAA is evaluating each change for safety and efficiency; prior to making a decision, will comply with NEPA and any other legal req’ts.



LL-29632

MEMORANDUM OF UNDERSTANDING

BETWEEN THE

FEDERAL AVIATION ADMINISTRATION

AND THE

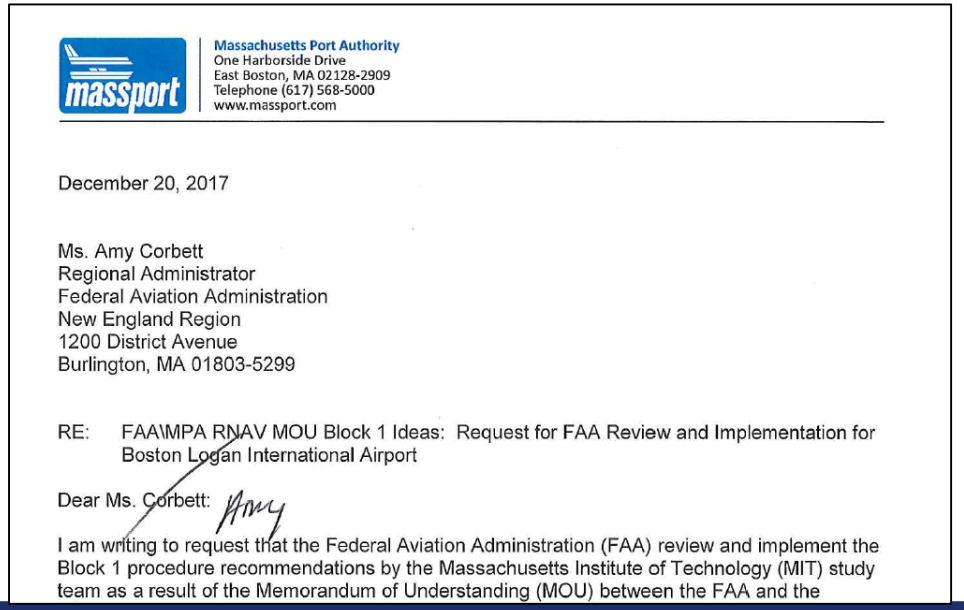
MASSACHUSETTS PORT AUTHORITY

1. Parties

The parties to this Memorandum of Understanding ("MOU") are the Federal Aviation Administration ("FAA") and the Massachusetts Port Authority (the “Authority”).

2. Purpose

This MOU outlines the actions the Authority and the FAA intend to undertake in seeking reductions to overflight noise impacts of aircraft operations at Boston Logan International



massport

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Telephone (617) 568-5000
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December 20, 2017

Ms. Amy Corbett
Regional Administrator
Federal Aviation Administration
New England Region
1200 District Avenue
Burlington, MA 01803-5299

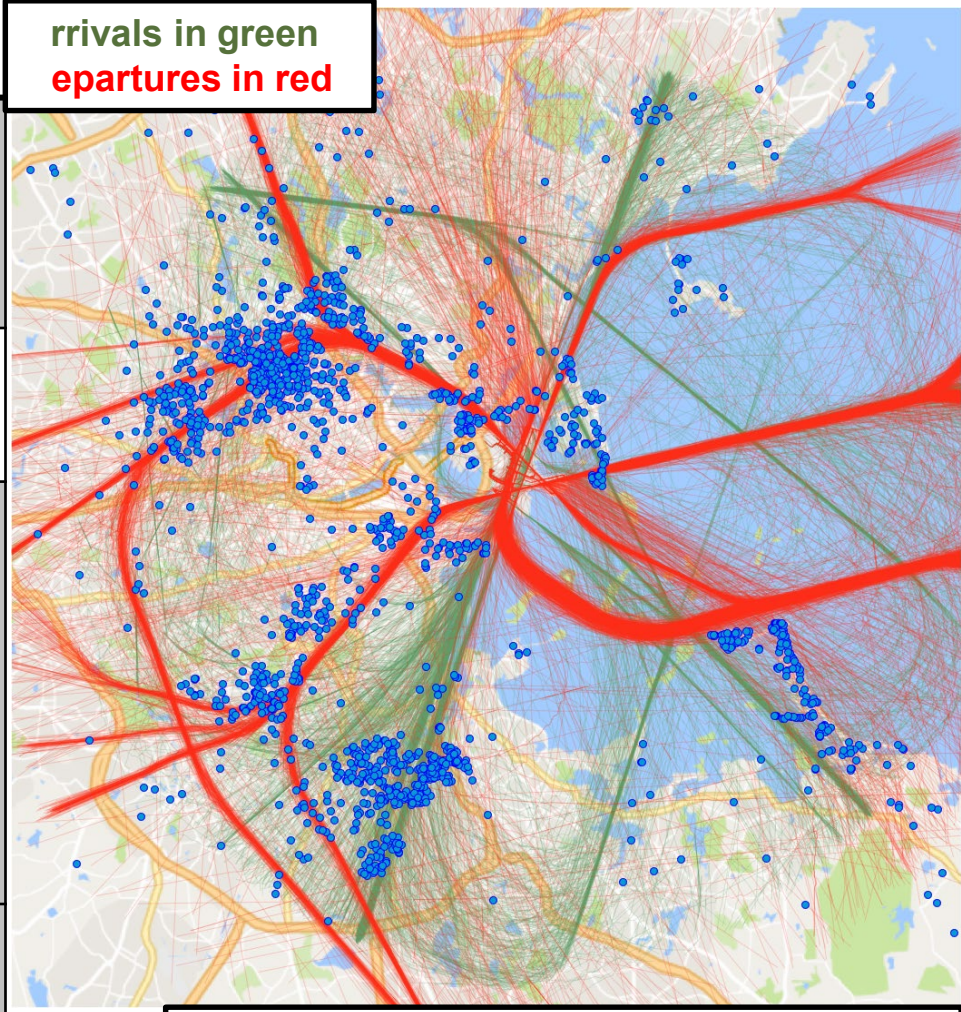
RE: FAA\MPA RNAV MOU Block 1 Ideas: Request for FAA Review and Implementation for Boston Logan International Airport

Dear Ms. Corbett:

I am writing to request that the Federal Aviation Administration (FAA) review and implement the Block 1 procedure recommendations by the Massachusetts Institute of Technology (MIT) study team as a result of the Memorandum of Understanding (MOU) between the FAA and the

Block 1 Final Recommendations

Proc. ID D = Dep. A = Arr.	Procedure	Primary Benefits
1-D1	Restrict target climb speed for jet departures from Runways 33L and 27 to 220 knots or minimum safe airspeed in clean configuration, whichever is higher.	Reduced airframe and total noise during climb below 10,000 ft (beyond immediate airport vicinity)
1-D2	Modify RNAV SID from Runway 15R to move tracks further to the north away from populated areas.	Departure flight paths moved north away from Hull
1-D3	Modify RNAV SID from Runway 22L and 22R to initiate turns sooner after takeoff and move tracks further to the north away from populated areas.	Departure flight paths moved north away from Hull and South Boston
1-D3a	*Option A*: Climb to intercept course (VI-CF) procedure	
1-D3b	*Option B*: Climb to altitude, then direct (VA-DF) procedure	
1-D3c	*Option C*: Heading-based procedure	
1-A1	Implement an overwater RNAV approach procedure with RNP overlay to Runway 33L that follows the ground track of the jetBlue RNAV Visual procedure as closely as possible.	Arrival flight paths moved overwater instead of over the Hull peninsula and points further south
1-A1a	*Option A*: Published instrument approach procedure	
1-A1b	*Option B*: Public distribution of RNAV Visual procedure	



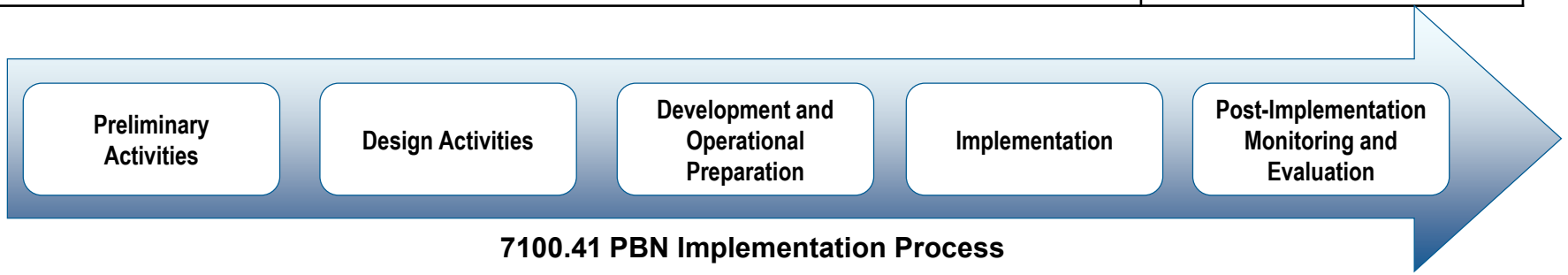
Track Data: ASDE-X from 12 days of operation, 2015-2016
Complaint Data: August 2015– July 2016
Each marker represents a unique complaint address

Current Status – Massport Block 1

Milestone	Date
Massport Block 1 submission to FAA	December 2017
PBN Full Work Group (FWG) Kickoff Design Meeting (face-to-face) • Initiated Phase 2 (Design Activities) of 7100.41 PBN implementation process • MIT presented recommendations and supporting research • FWG conducted initial assessment and preliminary design work	May 2018
PBN FWG Second Design Meeting (face-to-face) • FWG conducted detailed assessment and design work • Some recommendations found to be infeasible, in which case FWG worked to come up with alternatives	July 2018
PBN FWG Remote Meeting • Will seek consensus from Boston Air Route Traffic Control Center (ZBW) on newly designed Standard Terminal Arrival Routes (STARs) that tie into approach concepts	August 2018
PBN FWG Face-to-Face Meeting (if needed)	October 2018

Next Steps – Massport Block 1

Milestone	Date
Once FWG findings/recommendations finalized, PBN Co-leads brief Regional Administrator and Massport	TBD
Massport (with FAA support) briefs Massport Community Advisory Committee	TBD
Once agreement reached between all parties on procedure concepts to implement, continue 7100.41 process • Phase 3 (Development & Operational Preparation) includes notification and training, implementation planning, Aeronautical Information Services (AJV-5) development, and ends with submission for publication and FWG-set implementation date	TBD
Repeat for Massport Block 2 submission • Note that some Block 2 concepts (e.g. Rwy 22L overwater arrival), have been pulled into Block 1	TBD

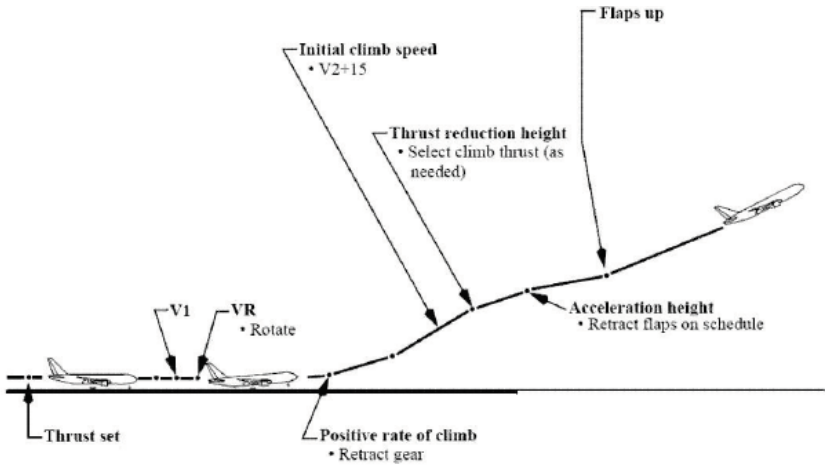


7100.41 PBN Implementation Process

Reduced Speed Climb Status

- Reduced speed climb concept (Massport Rec 1-D1) being worked separately due to national implications that fall outside of normal 7100.41 FWG scope

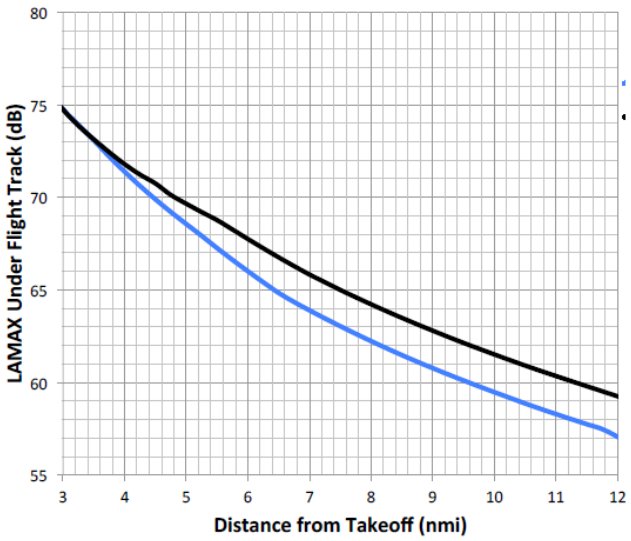
- FAA has formed an internal work group to evaluate this concept
  - Led by ATO Eastern Service Center – Operations Support Group
  - Cross-organizational participation
  - Kickoff meeting held in August



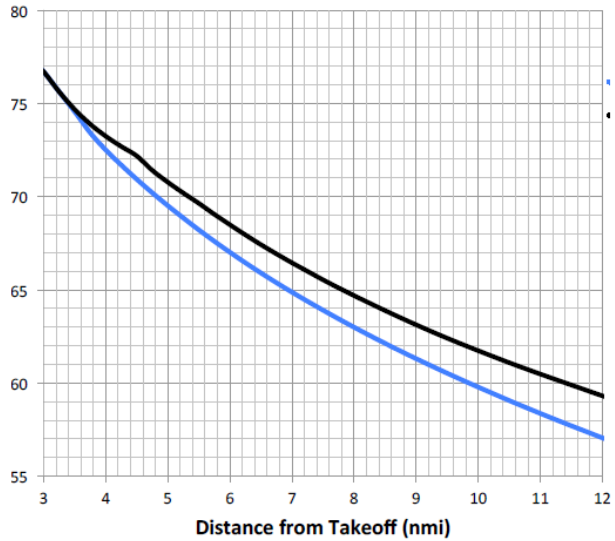
- **Baseline**: Typical profile includes thrust reduction at 1,000' AGL followed by an **acceleration to 250 kt climb speed** and **flap retraction**

- **Recommended procedure:** Thrust reduction at 1,000' AGL followed by an **acceleration to 220 kt climb speed or minimum safe airspeed in clean configuration, whichever is greater** until a TBD altitude (i.e. 6,000' or 10,000')

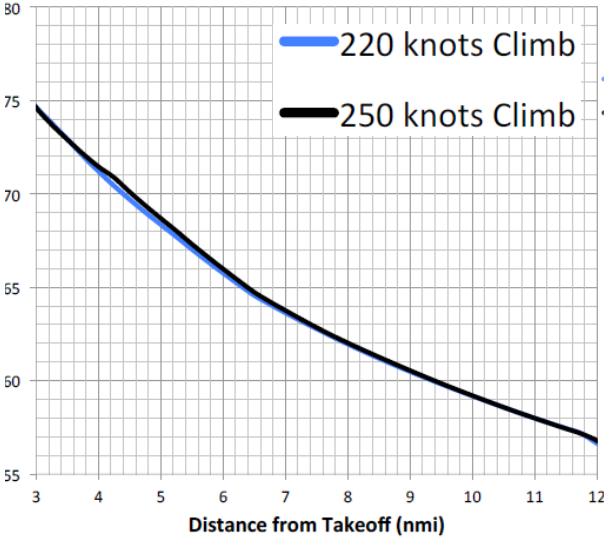
Reduced Speed Climb – Modeling Inputs/Assumptions Sensitivity



CASE 1
TASOPT/BADA4
(no Tones, Conv Aero)



CASE 2
NPSS/FLOPS
(no Tones, Conv Aero)



CASE 4
TASOPT/BADA4
(no Tones, Clean Aero)

- MIT working with NASA/Boeing to validate modeling inputs/assumptions
- Modeled noise benefit for reduced speed climb dependent on wing cleanliness assumption, for which there is very little validation data

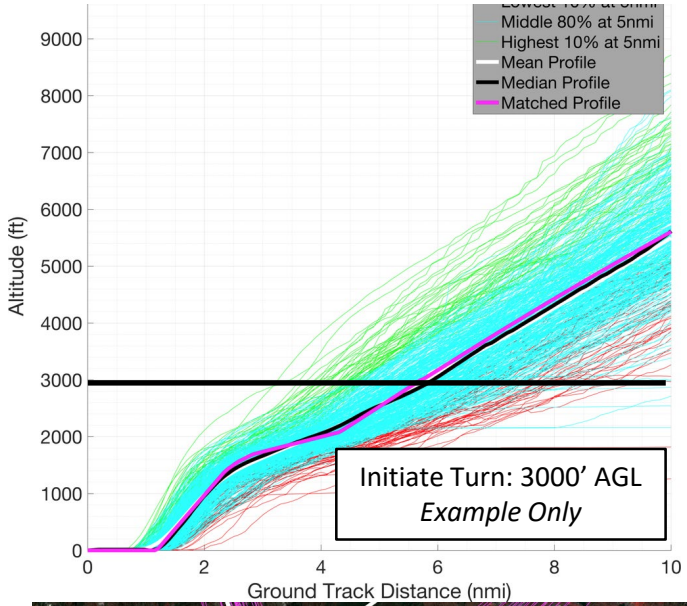
ASCENT Project 44 – Aircraft Noise Abatement Procedure Modeling and Validation

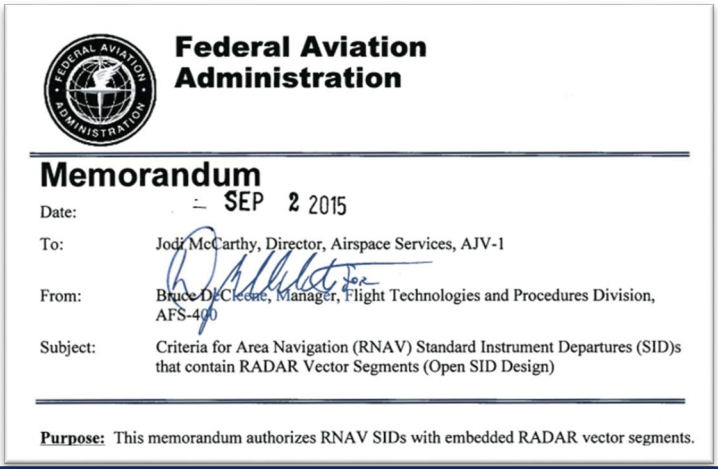
- Objective: Develop test plans and conduct a measurement campaign of aircraft operations to assess the impact of aircraft speed and configuration on noise
- Validate/improve both noise concepts and noise modeling methods
- Awarded to MIT; grant processing ongoing
- Discussions ongoing with NASA, operators, and manufacturers on potential collaboration

Image Source: DLR

ASCENT Project 23 – Dispersion Analysis

- MIT exploring multiple mechanisms for introducing systemic dispersion, including:
  - Open SIDs (in operation at CLT, LAX)
  - ATC instruction (e.g., vectoring, direct-to based on altitude, etc.)
  - Divergent headings off runway
- Discussing with local ATC facilities
- Also exploring ways to assess and communicate the noise impact of dispersion





Federal Aviation Administration

Memorandum

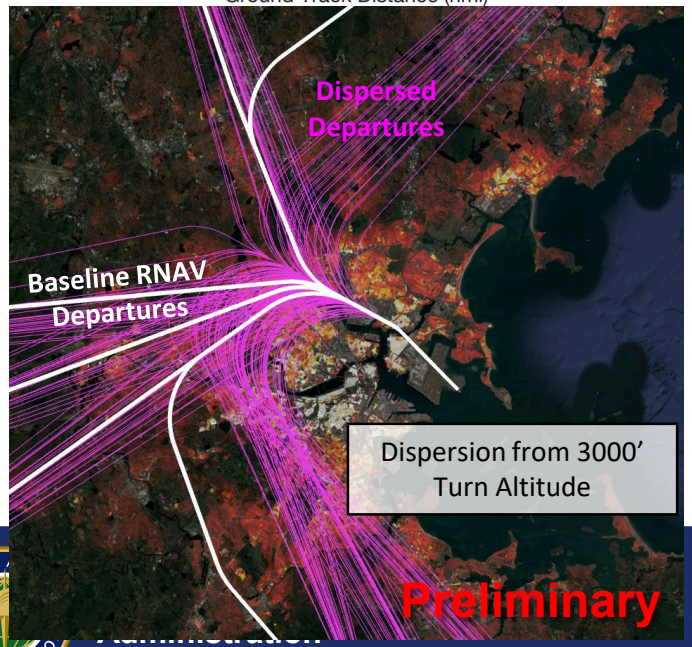
Date: SEP 2 2015

To: Jodi McCarthy, Director, Airspace Services, AJV-1

From: Bruce DeCleene, Manager, Flight Technologies and Procedures Division, AFS-400

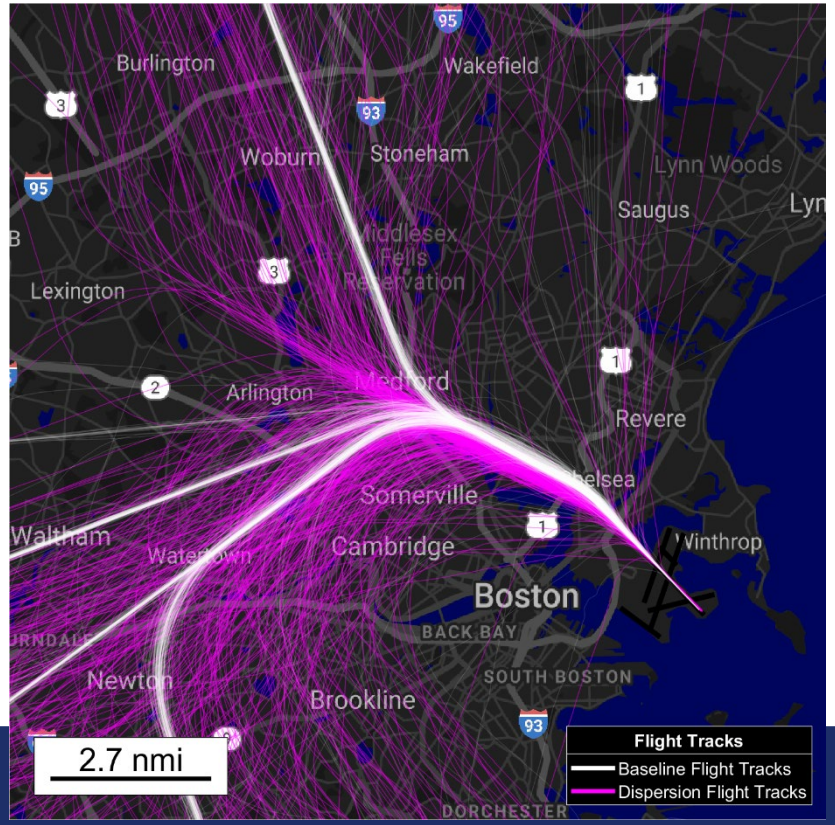
Subject: Criteria for Area Navigation (RNAV) Standard Instrument Departures (SID)s that contain RADAR Vector Segments (Open SID Design)

Purpose: This memorandum authorizes RNAV SIDs with embedded RADAR vector segments.



Controller-Based Dispersion

- Peak day track comparison: 9/10/2010 and 5/18/2017
- 2010 counts normalized to 2017 data by aircraft type / flow direction bin
  - 2010 tracks either double-counted or dropped to match 2017 counts



2010

Northbound	Total
TA	8
B757	13
A320	31
B737	23
OJ	2
LRJ	20
SRJ	43

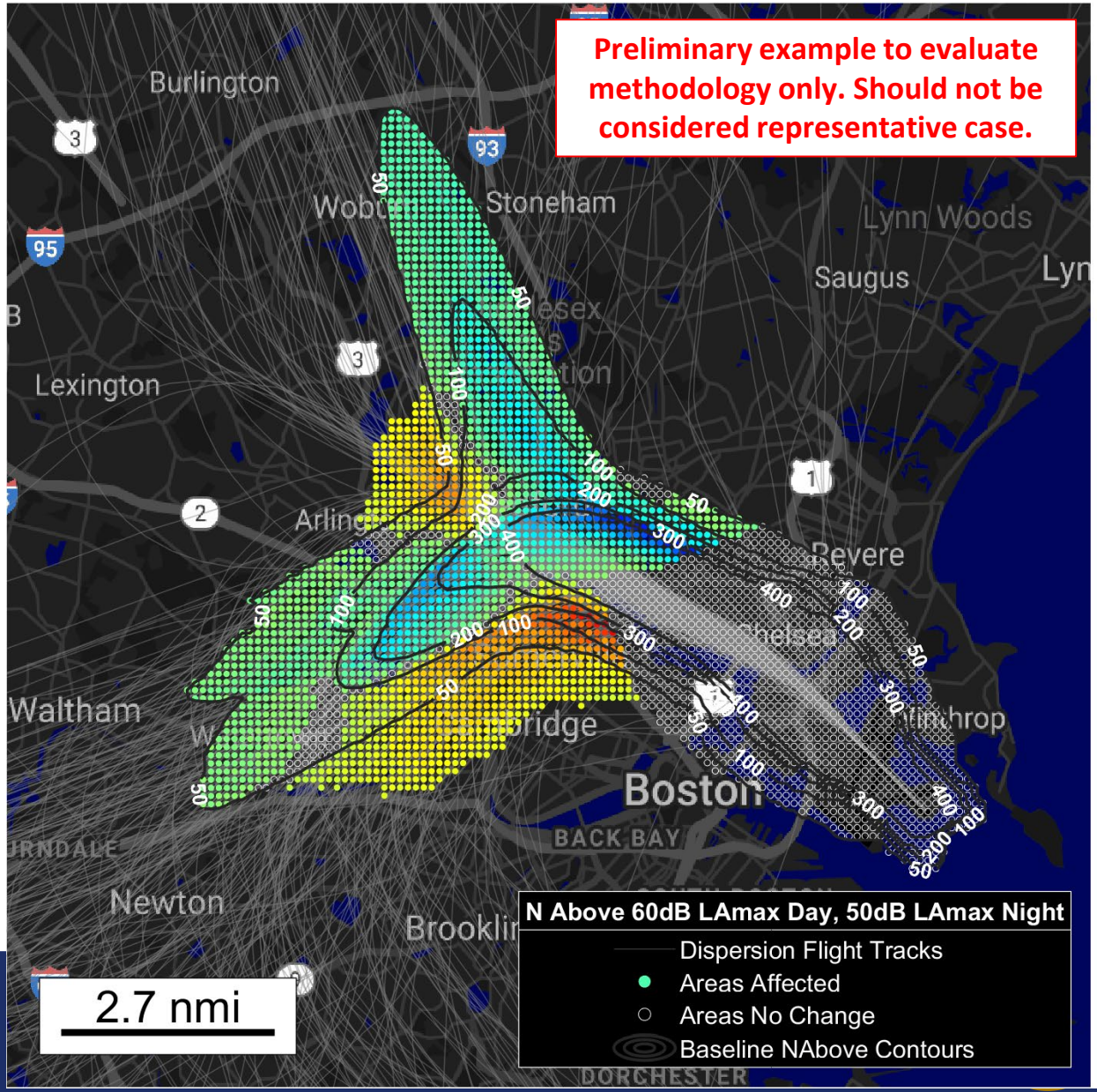
Southbound	Total
TA	9
B757	25
A320	62
B737	41
OJ	19
LRJ	73
SRJ	60

2017

Northbound	Day	Night	Total
TA	6	2	8
B757	2	0	2
A320	40	6	46
B737	32	7	39
OJ	3	0	3
LRJ	35	2	37
SRJ	26	0	26

Southbound	Day	Night	Total
TA	8	1	9
B757	5	0	5
A320	87	11	98
B737	46	11	57
OJ	6	1	7
LRJ	87	7	94
SRJ	52	4	56

Change in N_{Above} Exposure



N_{Above} Thresholds:
60dB $L_{A,max}$ Day
50dB $L_{A,max}$ Night

Population Exposure

Change In N Above	Population Exposure
+200x	290
+150x	2,070
+100x	20,566
+50x	77,428
-50x	65,338
-100x	19,167
-150x	4,914
-200x	1,844

Greatest increase
+202 overflights

Greatest reduction
-231 overflights

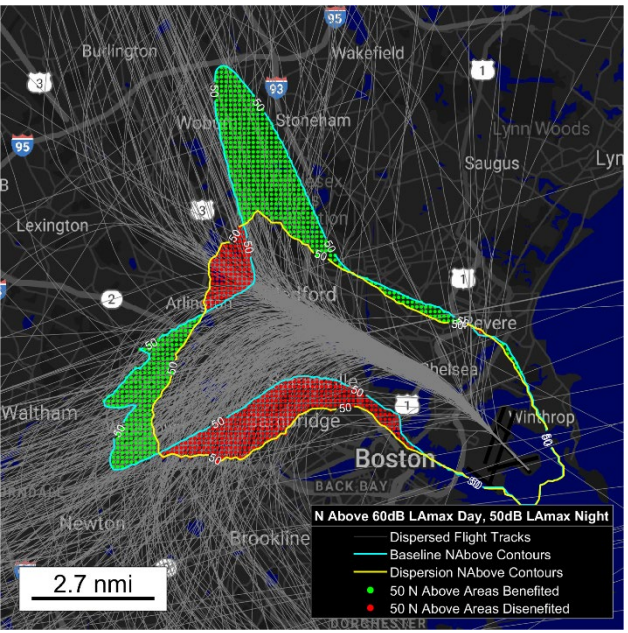
Change in N_{Above} Contours

Population Exposure

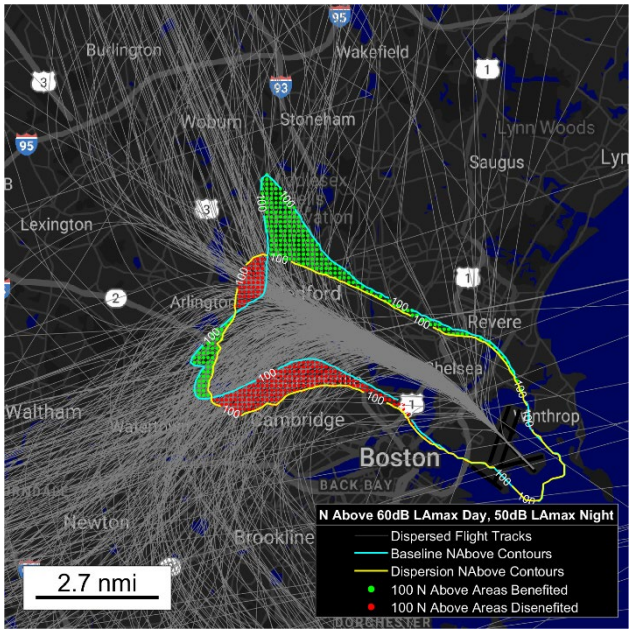
N Above	50x	100x	200x
Baseline	336,643	204,039	146,522
Dispersion	356,960	240,225	121,301
Baseline - Dispersion	-20,317	-36,186	25,221

N_{Above} Thresholds:
60dB $L_{A,max}$ Day
50dB $L_{A,max}$ Night

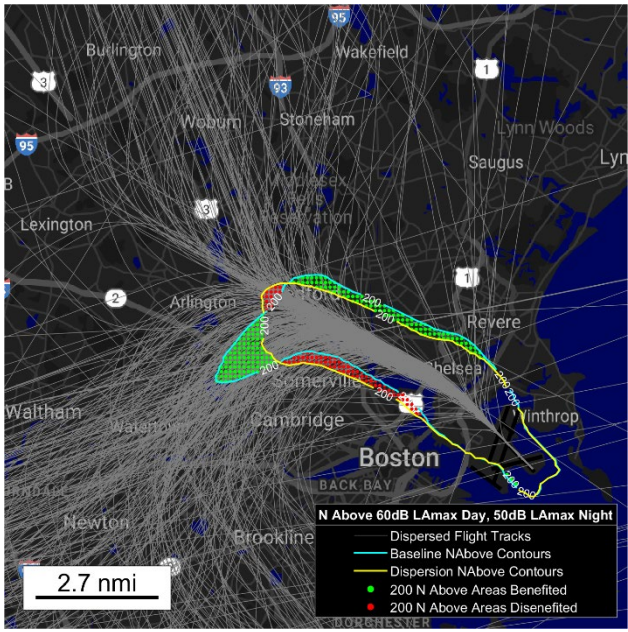
50 N Above



100 N Above



200 N Above



Preliminary example to evaluate methodology only. Should not be considered representative case.

ATR – Noise Abatement Procedure Usage and Effectiveness

- Objective: Develop recommendations and best practices for more effective and frequently-used noise abatement procedures

Runway Use

- Preferential
- Nighttime
- Opposite Direction
- Rotational

Departures

- Initial Heading
- Routing Downstream
- Nighttime

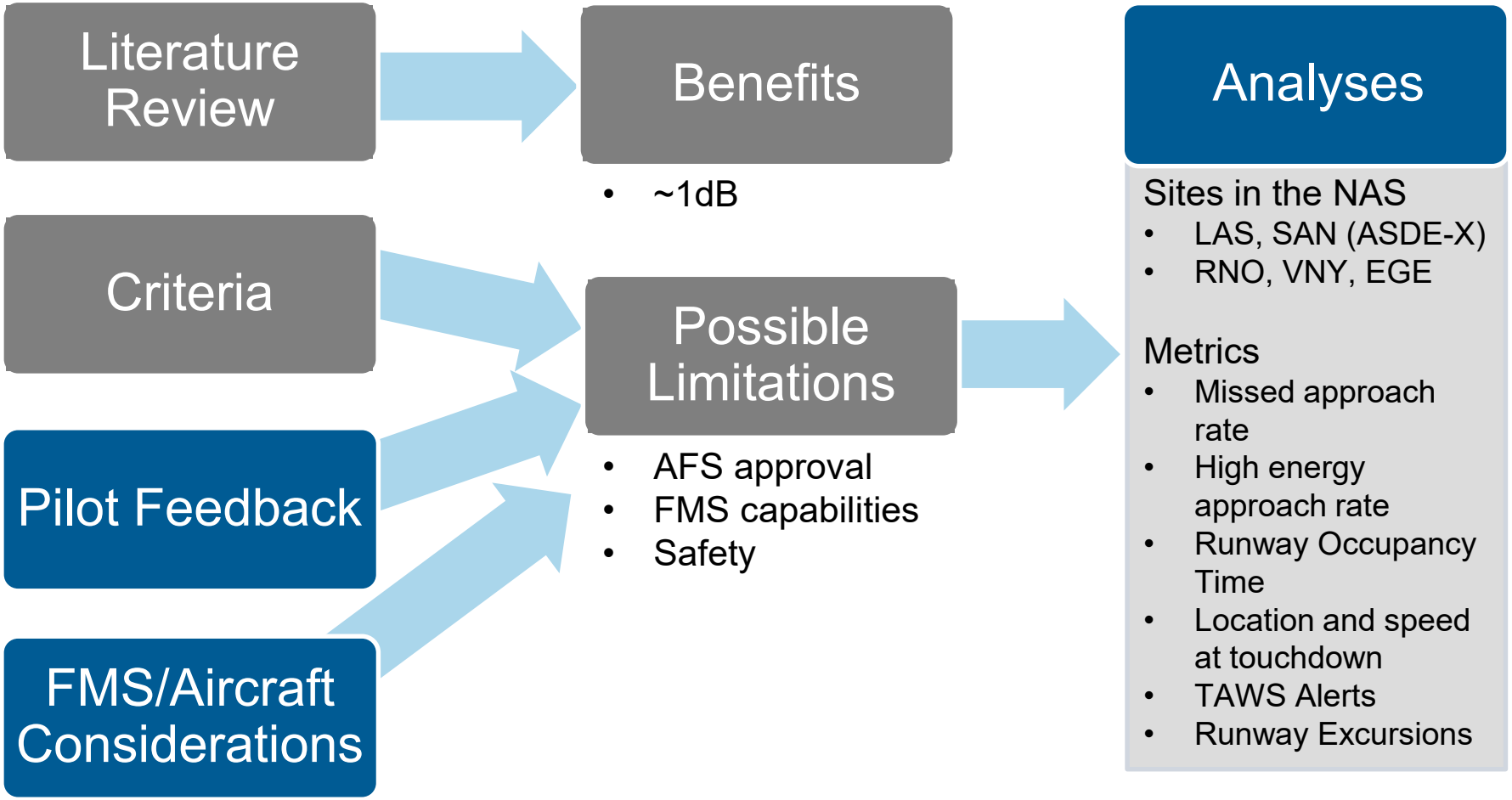
Arrivals

- Arrival Procedures
- Nighttime

- Analyzing data for these concepts at select locations
- Determining appropriate level of investigation

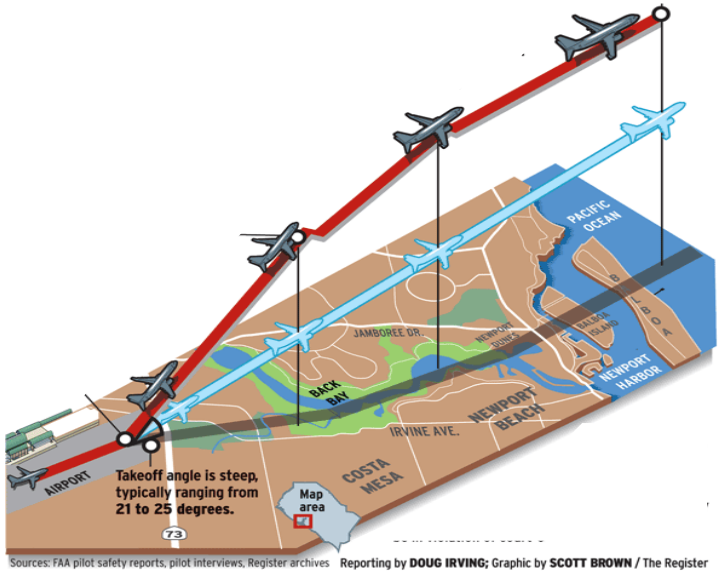
ATR – Steeper Noise Abatement Operational Feasibility

- Objective: Gain better understanding of the operational constraints on implementing steeper approaches for noise mitigation in the US



Closing Observations

- Despite considerable reductions in overall population exposure, aviation noise remains a concern in many areas
- FAA is exploring operational opportunities to reduce the noise from the current fleet
- Addressing noise concerns requires a balanced approach
- Key Questions:
  - How do we operationalize research outcomes?
  - How do we better incorporate noise considerations into procedure design process?
  - How do we engage with all stakeholders?



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Office of Environment and Energy

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