

Wig Zamore, 13 Highland Avenue #3, Somerville MA 02143

617-625-5630 and [wigzamore@gmail.com](mailto:wigzamore@gmail.com)

Thursday, July 13, 2017

## UPDATE on **LOGAN AIRPORT ISSUES** to Somerville Board of Aldermen

### Committees:

Logan CAC - Somerville Representative and Executive Committee as Vice President

MassPort CAC - Somerville Representative, Board Member and Chair of Environment and Health

### Meetings 2016 and 2017 to Date:

MassPort CAC - 36, Logan CAC - 29, Air Inc. - 9, Other - 4, **Total not counting research - 78**

### Community Field Work:

Belmont (BU SHP practicum), Milton (Facilitated professional study with Tufts Mobile Lab)

Chelsea (Advice to elected officials and City Manager re potential study)

East Boston's AIR Inc. and STEP (Somerville) initiated and supported **Airport Impacts 101**

### Academics and Conferences:

Co-author of *Hudda 2016 ES&T Aviation Emissions Impact Ambient Ultrafine Particle Concentrations in the Greater Boston Area* and presenter in Rome at ISEE in August 2016 (see over)

Scheduled to present new paper, similar topic, in Sydney Australia at ISEE in September 2017

Organizer of **Airport Impacts 101 Conference**, Assembly Square, Somerville, November 2016 (see separate agenda) – Perhaps the most comprehensive community airport impacts conference ever.

Over 100 attendees from over 30 Logan impacted communities. Presenters from London, Montreal, Los Angeles and the Boston science community. **Online SOON.**

A few other research projects just now in formation

### CAC Updates:

Logan CAC is winding down. Annual EDR and the Terminal E ENF were important 2017 1qdocuments

MassPort CAC is in middle of search for **full-time Executive Director** and **\$500,000 annual budget**

All three committees – Executive, Aviation, Health and Environment - undertaking **Boston Logan Airport Noise Study review** with an eye to charting most important next steps

**MIT (Hansman group)** working on FAA and MassPort funded two phase study looking at short and long-term tactics to provide community noise relief. For Runway 33 Left departures short term could be revised climb protocols that would diminish climb noise more quickly with distance from Logan. Long term could be more dispersion in the middle of the R33L RNAV, including over Somerville.

## Aviation Emissions Impact Ambient Ultrafine Particle Concentrations in the Greater Boston Area

N. Hudda,<sup>†</sup> M. C. Simon,<sup>†</sup> W. Zamore,<sup>‡</sup> D. Brugge,<sup>§</sup> and J. L. Durant<sup>\*,†</sup>

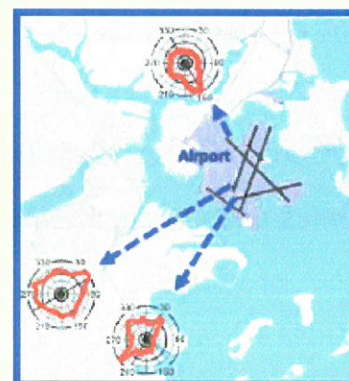
<sup>†</sup>Department of Civil and Environmental Engineering, Tufts University, Medford, Massachusetts 02155, United States

<sup>‡</sup>Somerville Transportation Equity Partnership, Somerville, Massachusetts 02145, United States

<sup>§</sup>Department of Public Health and Community Medicine, Tufts University, Boston, Massachusetts 02111, United States

### Supporting Information

**ABSTRACT:** Ultrafine particles are emitted at high rates by jet aircraft. To determine the possible impacts of aviation activities on ambient ultrafine particle number concentrations (PNCs), we analyzed PNCs measured from 3 months to 3.67 years at three sites within 7.3 km of Logan International Airport (Boston, MA). At sites 4.0 and 7.3 km from the airport, average PNCs were 2- and 1.33-fold higher, respectively, when winds were from the direction of the airport compared to other directions, indicating that aviation impacts on PNC extend many kilometers downwind of Logan airport. Furthermore, PNCs were positively correlated with flight activity after taking meteorology, time of day and week, and traffic volume into account. Also, when winds were from the direction of the airport, PNCs increased with increasing wind speed, suggesting that buoyant aircraft exhaust plumes were the likely source. Concentrations of other pollutants [CO, black carbon (BC), NO, NO<sub>2</sub>, NO<sub>x</sub>, SO<sub>2</sub>, and fine particulate matter (PM<sub>2.5</sub>)] decreased with increasing wind speed when winds were from the direction of the airport, indicating a different dominant source (likely roadway traffic emissions). Except for oxides of nitrogen, other pollutants were not correlated with flight activity. Our findings point to the need for PNC exposure assessment studies to take aircraft emissions into consideration, particularly in populated areas near airports.



# Airport Impacts 101

For Policy Leaders, Students, and Concerned Citizens

**Please Distribute Broadly and Register As Soon as Possible at:**

<https://www.eventbrite.com/e/airport-impacts-101-perspectives-on-environmental-health-tickets-28528867611>

## Airport Impacts 101 Agenda and Speaker Bios

Saturday, November 5<sup>th</sup> 2016, 8:30 AM to 4:00 PM

Partners Healthcare, Assembly Square, Somerville MA

**8:30 AM Registration and Light Breakfast**

**9:00 AM Logan Airport Health Study**

**Emerging Environmental Concerns**

Wig Zamore, for Air Inc. and STEP

Mayor Joseph Curtatone, City of Somerville

Kathleen Brown, Environmental Health & Engineering

**10:00 AM Aviation Noise Impacts**

**Community Metrics, Annoyance and Mapping**

Sanford Fidell, Fidell Associates, post BB&N

Erica Walker, Harvard School of Public Health

Audrey Smargiassi, University of Montreal

**12:00 PM Lunch**

**1:00 PM Aviation Air Pollution**

**Global, Regional, and Local**

Philip Wolfe, Massachusetts Institute of Technology

Rick Miake-Lye, Aerodyne Research Inc.

Neelakshi Hudda, Tufts University

**2:30 PM Aviation Health Endpoints Today**

**Moving Toward a Better Future**

Jon Levy, Boston University School of Public Health

Anna Hansell, Imperial College, London

Wrap Up Discussion and Next Steps

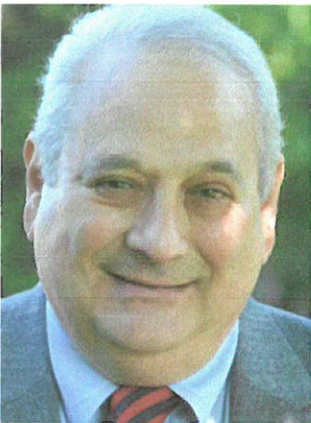
**4:00 PM Post Event Refreshment**

# Airport Impacts 101

For Policy Leaders, Students, and Concerned Citizens



**Kathleen Brown** is a Senior Scientist in the Advanced Analytics division of Environmental Health & Engineering in Needham, MA. Dr. Brown's work focuses on exposure assessment, indoor air quality and public health. She has conducted personal exposure studies as well as indoor and outdoor air pollution studies. On behalf of Air Inc. of Jeffries Point, East Boston, Dr. Brown led the EH&E review of the MA DPH **Logan Health Study**. When initiated by an act of the MA Legislature in 2000, the Logan Health Study was a groundbreaking effort. It was finished in 2014, following some delays due to funding gaps, surrounded by a growing wave of new research into the environmental health impacts of aviation. Along with Dr. David MacIntosh (EH&E), Dr. Helen Suh (Tufts) and Wig Zamore, Kathleen came up with a short list of suggested next steps to recommend to the community and to MassPort. **Kathleen will discuss the Logan Health Study, her review of it and suggested next steps.**



**Sandy Fidell** is one of the world's experts in the field of transportation noise annoyance and community tolerance levels. Dr. Fidell began his transportation noise research and consulting work in the Los Angeles office of Bolt, Beranek, and Newman (BBN) in 1968. In 33 years at BBN, he directed theoretical, laboratory, and field research in many areas of psychoacoustics and environmental acoustics. He has continued his research, consulting, and expert witness work on community response to noise and acoustic signal detection after forming Fidell Associates in 2001. Dr. Fidell's career work lies at the epicenter of our evolving understanding of community noise annoyance. He has worked on airport noise controversies in Atlanta, Chicago, Denver, Los Angeles, Minneapolis, Phoenix, San Francisco, St. Louis, Seattle, Vancouver, and Washington, D.C., among others. **Sandy will discuss the history of noise annoyance metrics, stressing the human effect side and understanding of community tolerance levels.**



**Erica Walker** is an environmental epidemiology doctoral student who has been bicycling around Boston, measuring noise levels at over 400 sites in the city. She has found that the noisiest neighborhoods in daytime are East Boston and Dorchester's Savin Hill. Noisy upstairs neighbors and the pounding of their children's feet initially triggered the idea for Erica's research. She realized that many other urban residents are affected by noise and changed her life focus from arts and crafts to urban studies and environmental health. She completed a Master's thesis at Tufts on community noise in Somerville. Now at Harvard's TH Chan School of Public Health, Erica is especially interested in low frequency sound and infrasound vibrations. She recently published a paper in *Environmental Research* on short term noise exposure and cardiovascular and stress responses in healthy men. **Erica will discuss her very personal approach to noise research and her findings to date.**

# Airport Impacts 101

For Policy Leaders, Students, and Concerned Citizens



**Audrey Smargiassi** is an associate professor in the Department of Environmental and Occupational Health at the School of Public Health of the University of Montreal. Dr. Smargiassi has deep expertise on health risks and population impacts of environmental exposures such as air and noise pollution, and climate change. She has directed the development of varying approaches to estimate exposure of large populations (i.e. statistical, numerical, using GIS and satellite imagery), to heat, ozone and fine particles, and to environmental noise, across varying time periods and regions of Québec. She has directed studies to assess health risks related to co-exposures of transportation related air and noise pollution. She is currently directing multidisciplinary work aimed at assessing health impacts of varying

transportation and land use scenarios. **The aim of Audrey's research is to provide evidence for the mitigation of the health impacts of environmental exposures and to orient health protection programs. She will present her work on environmental noise with emphasis on aviation impacts.**



**Philip J. Wolfe** is a young post-doctoral associate who has three MIT graduate degrees and specializes in building and using aviation related air and noise pollution models at global, regional and local scales. (But do not fear the MIT association as he is a calm and composed speaker.) Dr. Wolfe is a close associate of Steven Barrett who runs MIT's Aviation and Environment program. Some of Philip's papers have looked at the impacts of alternative fuels but most have focused on the connection between aviation noise and air pollution emissions, economic outcomes and policy implications. He has a nice publication on lead still remaining in some aviation fuel and hopefully, may include a slide about that. **Philip will focus on some of his global, regional and local study findings, including societal costs and benefits at those various scales of time and space, critical considerations for policy leaders.**



**Richard C. Miake-Lye** is a Principal Scientist, Center Director, and Vice President at Aerodyne Research Inc., based in Billerica MA, who works on understanding the environmental impact of airplanes. Dr. Miake-Lye focuses on the physical and chemical evolution of exhaust flowing from propulsion systems. He was a lead author of the chapter on aircraft emissions for the IPCC report "Aviation and the Global Atmosphere". Aerodyne makes some of the most advanced air pollution instruments in the world and their measurement technology is being applied to characterizing particle and gaseous emissions from aircraft engines to understand the effects of the commercial aviation fleet, both existing and planned, on both the global atmosphere and as a contributor to regional air quality. ARI and Rick often make use of a multi-instrument mobile lab - such as the one pictured to the left on deployment at the Atlanta/Hartsfield International

airport, measuring in-service aircraft emissions. **Rick will discuss characteristics of airplane emissions, including particles and nitrogen oxides, at low and high thrust.**

# Airport Impacts 101

For Policy Leaders, Students, and Concerned Citizens



**Neelakshi Hudda's** post-doctoral work at the University of Southern California on the full extent of elevated ultrafine particle concentrations in Los Angeles neighborhoods downwind of LAX caused an immediate sea change in the study of and health concerns for ultrafine particle concentrations near large airports. Dr. Hudda's LAX papers resulted in rapid new study of Pearson Airport in Toronto, Schiphol Airport in Amsterdam, and Logan Airport in Boston, among others. In Boston, Neelakshi was able to use several years of existing high quality air pollution data collected in Chelsea, Dorchester and Roxbury during Tufts University and community partner research into near roadway air pollution, cardiovascular biomarkers and other health indicators. She found a significant relationship between Logan aviation activities, wind direction and elevated neighborhood pollution levels. **Neelakshi will discuss her own and others' work in this rapidly emerging field of environmental study related to aviation.**



**Jon Levy** is one of the foremost environmental health risk analysts in the United States and a key advisor to EPA on the impact of the Clean Air Act on health, the economy, and the environment. Dr. Levy's research centers on air pollution exposure assessment and health risk assessment, with a focus on urban environments and issues of equity. Major topics include evaluating spatial patterns of air pollution, developing methods to quantify health benefits associated with emissions controls, and developing methods for community-based cumulative risk assessment that include both chemical and non-chemical stressors. Jon has studied many aspects of airport related pollution patterns looking at noise, nitrogen oxides, black carbon and ultrafine particles. He is a co-author of the paper, "**Residential exposure to aircraft noise and hospital admissions for cardiovascular diseases**" that appeared in the *British Medical Journal* in October 2013. When this important study of 89 US airports and noise exposures was released, Jon remarked, "Our study emphasizes that interventions that reduce noise exposures could reduce cardiovascular risks among people living near airports." **Jon will discuss his US based research into aviation related air and noise pollution, and the associated health risks.**

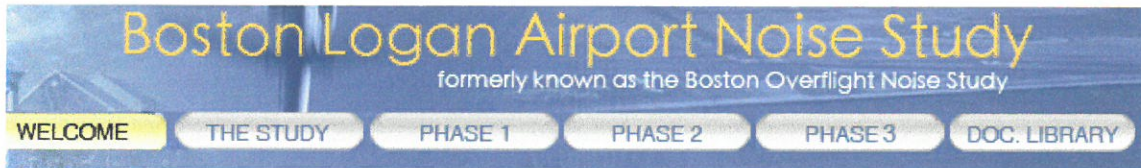


**Anna Hansell** is one of Europe's most experienced researchers in transportation related environmental noise and air pollution, and the associated health effects of both roadway and aviation exposures. She is assistant director of the Small Area Health Statistics Unit at Imperial College, London, where she oversees databases containing over 300 million patient records and works on local, national and international research. Dr. Hansell's areas of focus include all cause and cardiovascular mortality as well as environmental determinants of chronic respiratory disease. Her studies include research into the relationship and relative impacts of noise annoyance and noise levels on health outcomes. Anna and her co-investigators have worked hard to tease out the overlapping spatial patterns of urban air and noise pollution, and their distinct health effects, and on other important aspects of urban form such as road intersection density and access to green space. She is first author of the paper, "**Aircraft noise and cardiovascular disease near London Heathrow Airport**" which also appeared in *BMJ* in October 2013. **Anna will present her Europe based research into aviation related air and noise pollution, and the associated health risks.**

# BOSTON LOGAN AIRPORT NOISE STUDY **BLANS** is under REVIEW NOW

By the MassPort CAC Executive, Aviation and Environment Committees

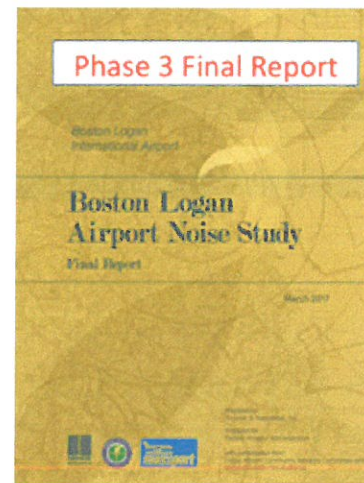
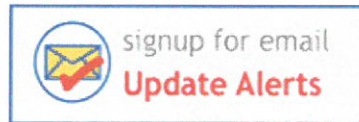
WEBSITE <http://www.bostonoverflight.com/>



Text Size:

## WELCOME TO THE BOSTON LOGAN AIRPORT NOISE STUDY (BLANS) WEBSITE

The Boston Logan Airport Noise Study (BLANS) is a cooperative and unique effort undertaken by the [Federal Aviation Administration \(FAA\)](#), the [Massachusetts Port Authority \(Massport\)](#) and the Logan Airport [Community Advisory Committee \(CAC\)](#). CAC members represent more than 30 of the 90 communities within the 20-nautical mile radius [study area](#) around Boston Logan International Airport.



(Revised May 1, 2017)

The primary focus of the Boston Logan Airport Noise Study is to determine viable means to reduce noise from aircraft operations at, to and from Boston Logan International Airport without diminishing airport safety and efficiency. Currently, participation primarily consists of FAA, Massport and local government appointed members of CAC who strive to:

1. keep you informed on current progress,
2. provide you access to information used by the three parties for decision-making, and
3. give you a means to contact a representative to share your concerns and seek answers to questions.

We encourage you to navigate through the website to learn more about the study and how to stay informed. If you have any additional questions, please [contact members of the Boston Logan Airport Study](#)

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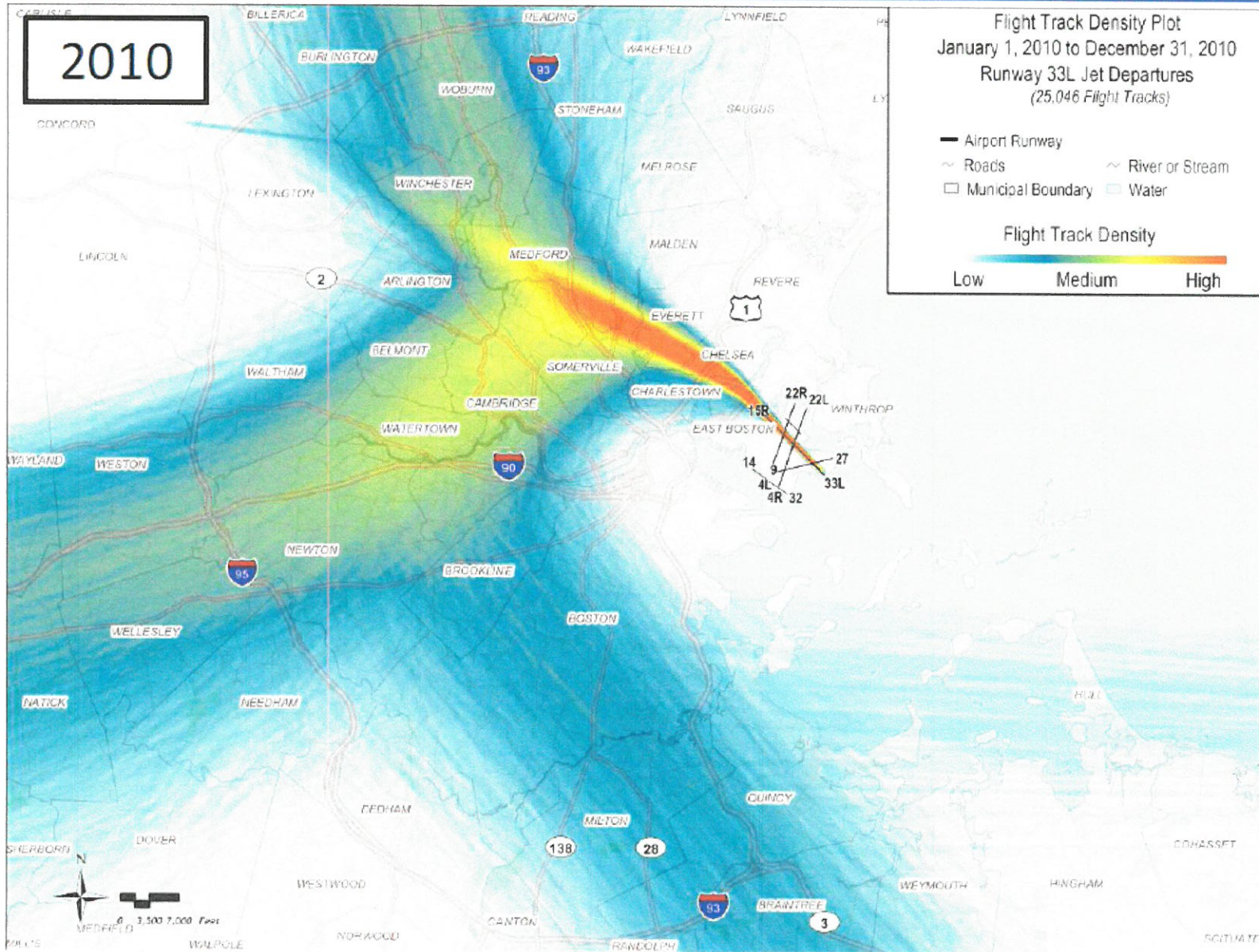
[Glossary Q-T](#)

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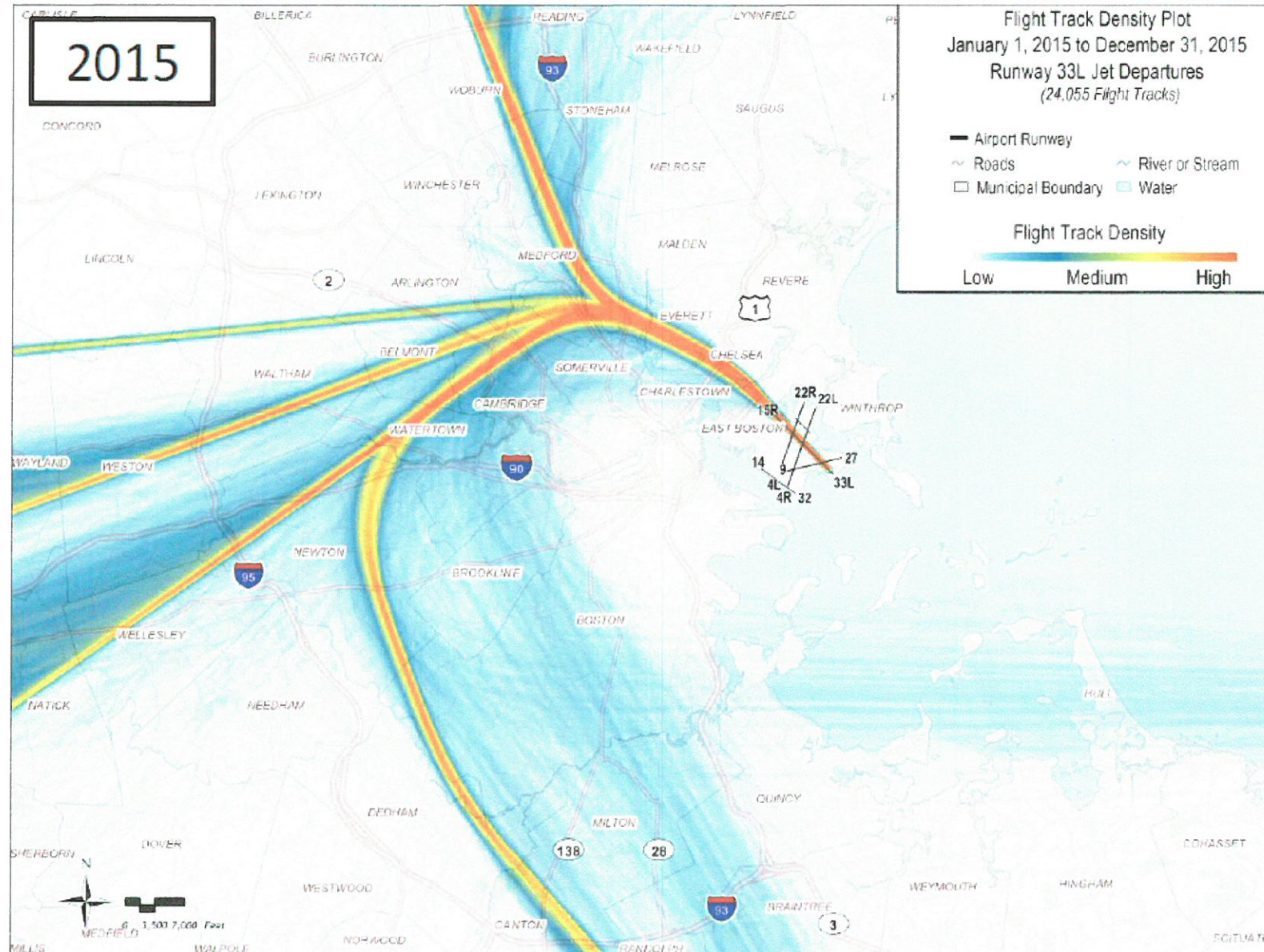
[Project Team Participant Login](#)

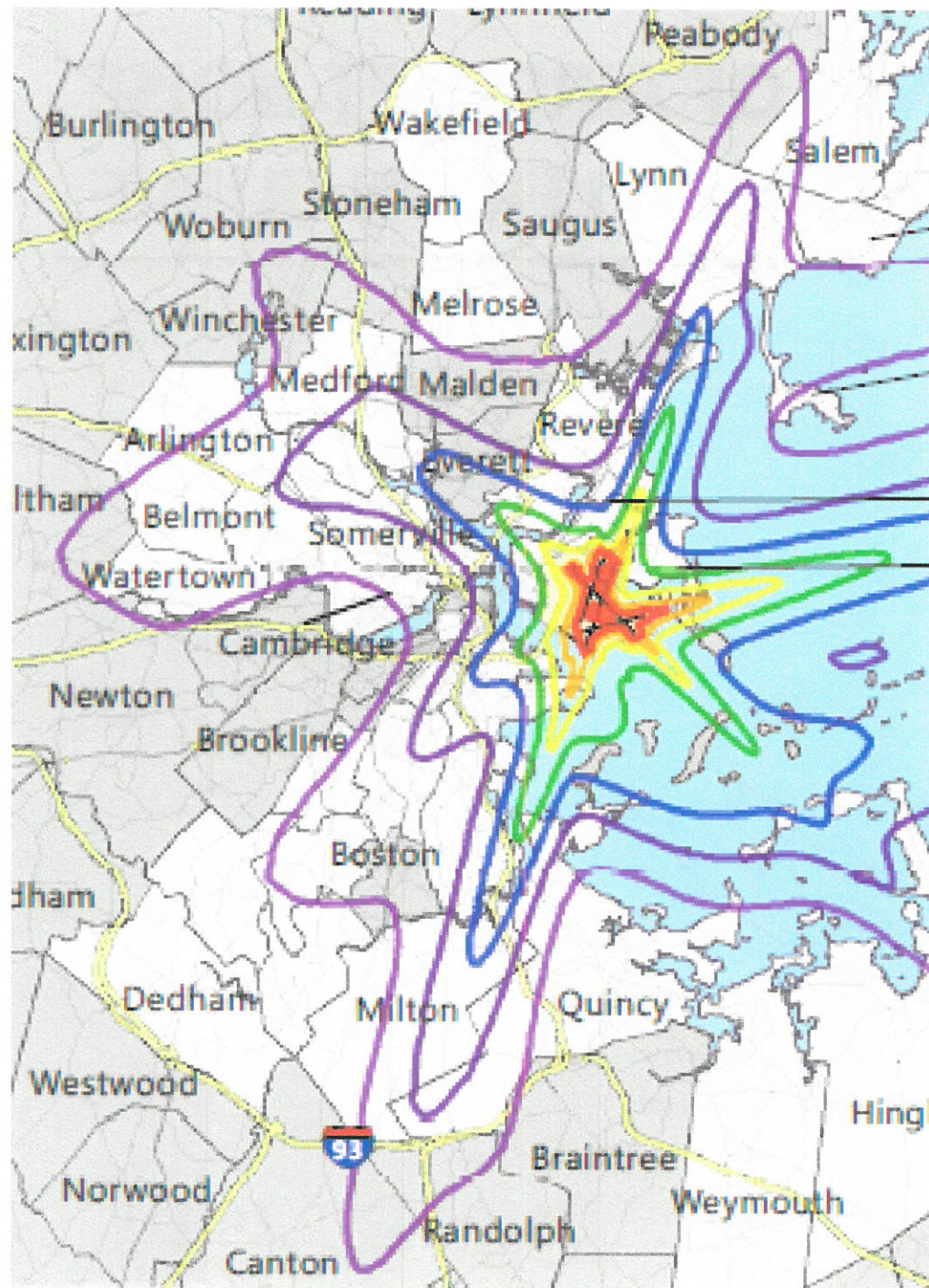
[Email Alert Signup Form](#)

# Runway 33L Departures: 2010-2015


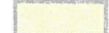






# Runway 33L Departures: 2010-2015





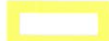






**LEGEND**

-  Logan Airport Runways
-  Airport Property
-  Interstate HWY
-  U.S. Route
-  Major Road
-  20 Nautical Mile BLANS Study Area
-  Municipal Boundary
-  CAC Represented Communities
-  Water Features

**Noise Exposure, DNL Contours**

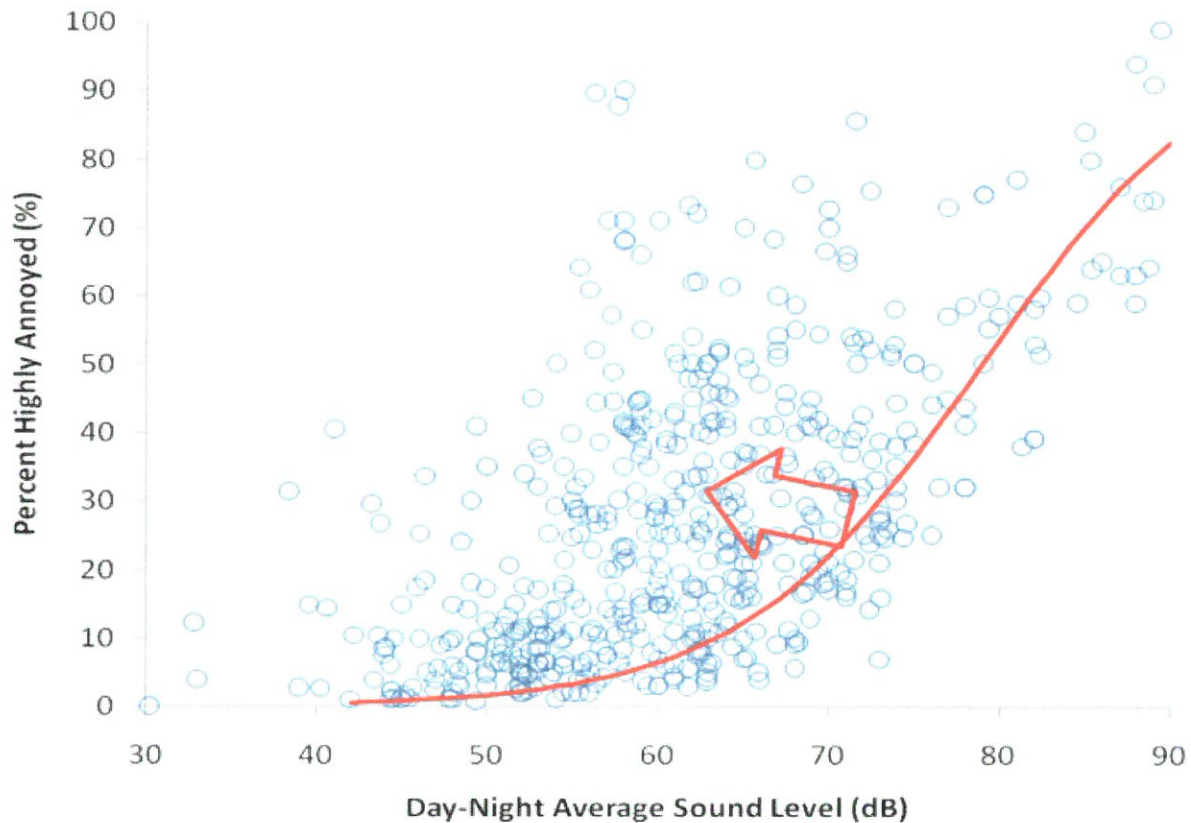
-  2015 Baseline DNL 45 dBA
-  2015 Baseline DNL 50 dBA
-  2015 Baseline DNL 55 dBA
-  2015 Baseline DNL 60 dBA
-  2015 Baseline DNL 65 dBA
-  2015 Baseline DNL 70 dBA
-  2015 Baseline DNL 75 dBA

**NOTES**

DNL = Day-Night Average Sound Level

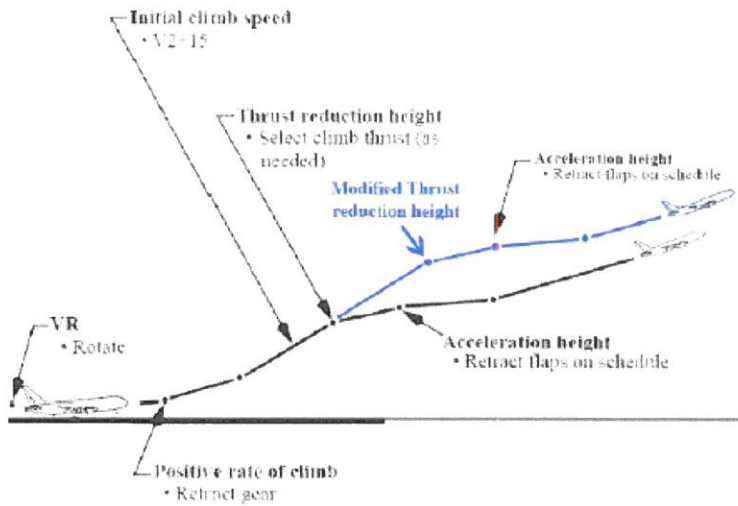
# FIELD MEASUREMENTS OF AIRCRAFT NOISE ANNOYANCE IN RELATION TO FICON CURVE

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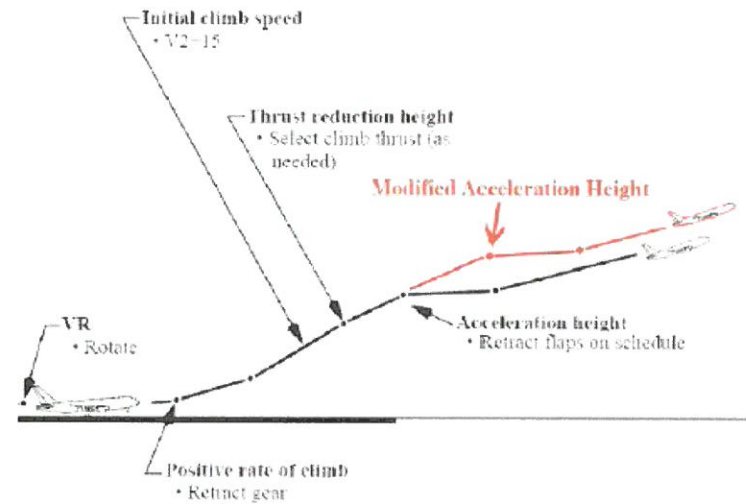


# Potential Modifications to Climb Profiles

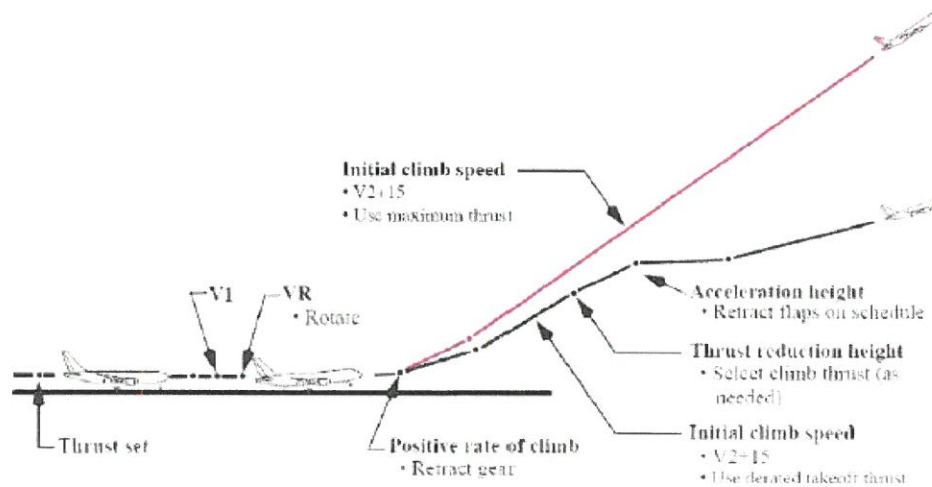
## Higher Thrust Reduction Height



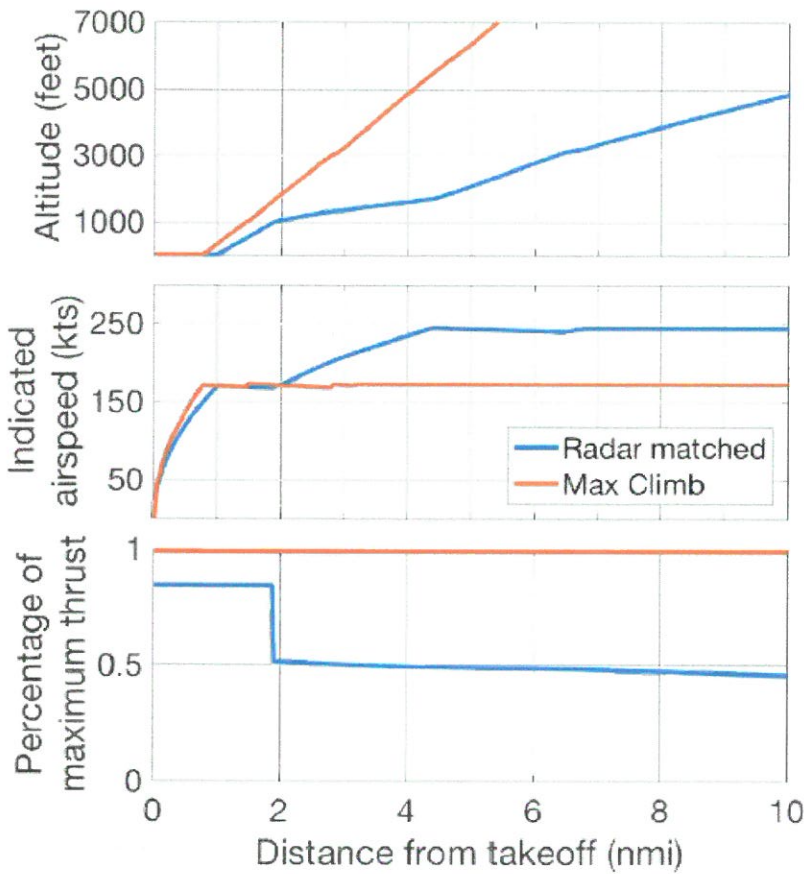
## Higher Acceleration Height



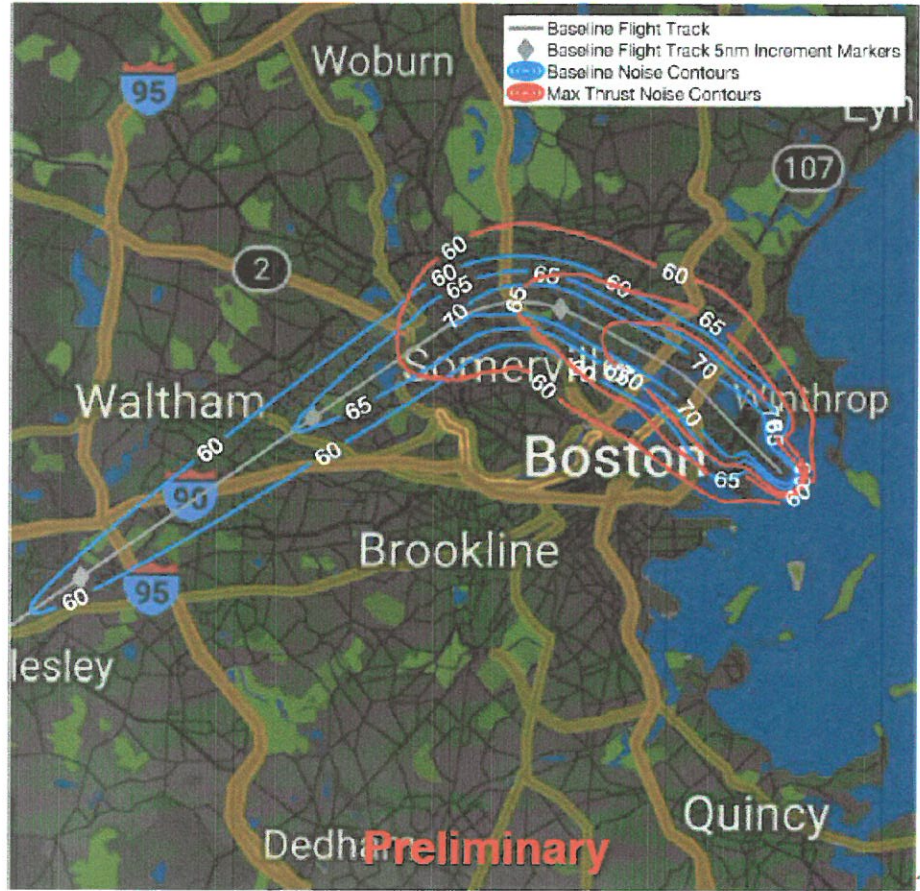
## Maximum Performance Climb



# 737-800: Maximum Thrust, Reduced-Speed Climb

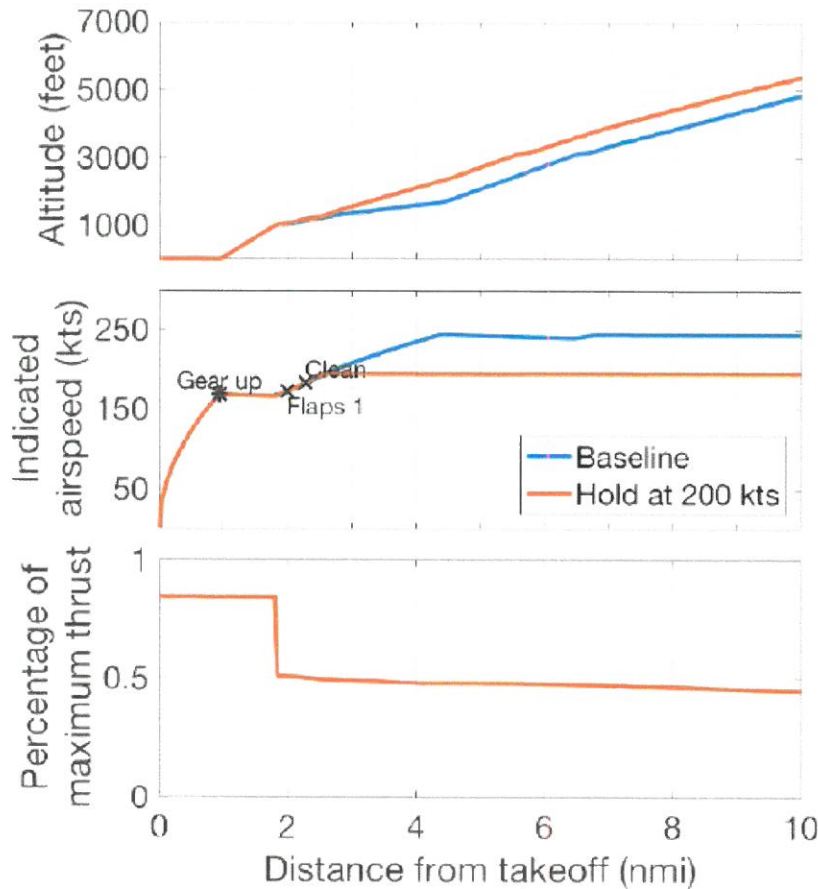


|                    |  |
|--------------------|--|
| <b>Aircraft</b>    | B737-800   |
| <b>Metric</b>      | $L_{A,MAX}$  |
| <b>Noise Model</b> | ANOPP  |
| <b>Notes</b>       | Runway 33L: Maintain Maximum Climb Thrust & $V_2$ to 10,000' |

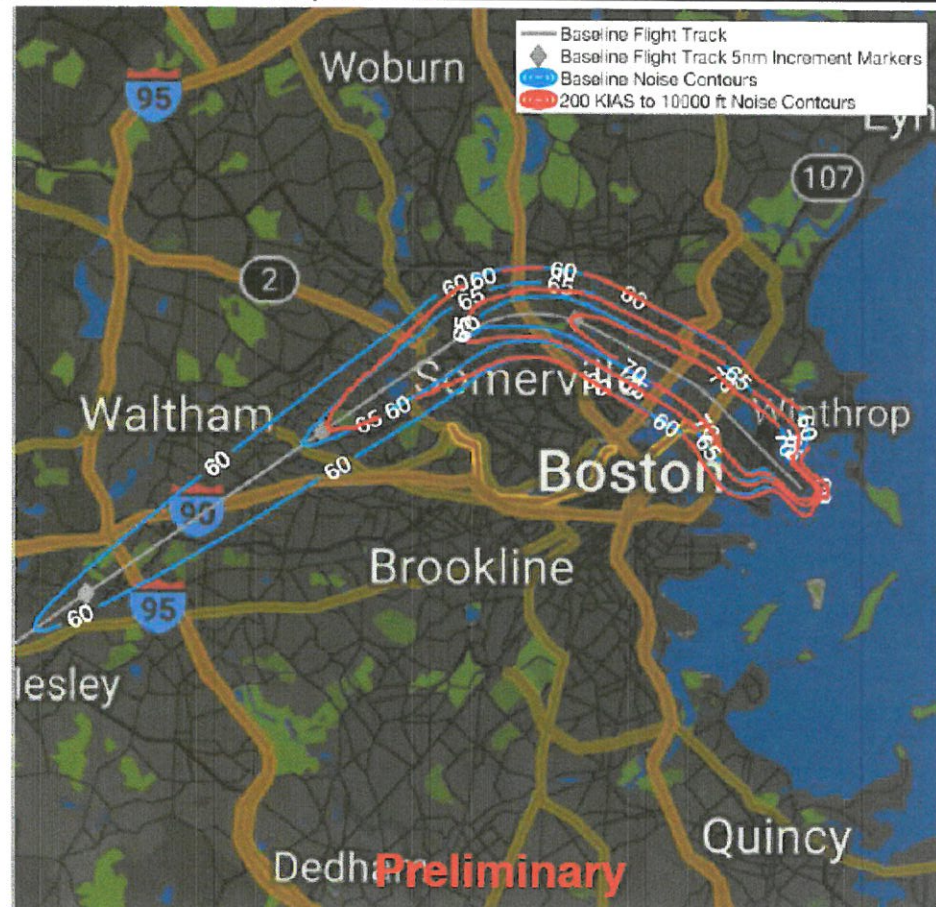




# 737-800: Delayed Acceleration Climb – 200 knots



|                    |  |
|--------------------|--|
| <b>Aircraft</b>    | B737-800   |
| <b>Metric</b>      | $L_{A,MAX}$  |
| <b>Noise Model</b> | ANOPP  |
| <b>Notes</b>       | Runway 33L: Maintain Standard Climb Thrust & 200 KIAS to 10,000' |



# Introducing Open SID Concept

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- Open SIDs are RNAV departure procedures that allow for embedded ATC radar vector segments.
  - Vectoring can be used to guide an aircraft to join an RNAV track, remove an aircraft from an RNAV track, or a combination of both.
- Open SIDs were authorized by an FAA memo signed in 2015.



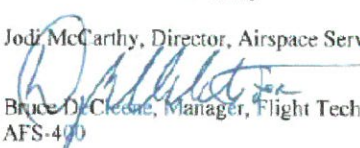
## Federal Aviation Administration

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### Memorandum

Date: SEP 2 2015

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

From:  Bruce D. Ciesie, 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)

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