

Delta Air Lines' Efforts in Noise Reduction

ANE Symposium

Kallie Glover
Performance Engineer
Delta Air Lines



Outline

- Noise Reduction Efforts
 - Fleet Technology
 - Flight Operations
 - Airport Initiatives
 - Community and Committee Involvement
 - Sustainability in Air Travel

Fleet Technology

- New Features Considered
 - Fuel Savings
 - Maintenance Expense/Reliability
 - Noise Level
- Incoming Fleets
 - A220
 - Stage 4 (Upgraded to Stage 5 in 2020)
 - PW1521GA
 - A330-900
 - Stage 5
 - Trent 7000-72
 - A350
 - Stage 5
 - Trent XWB-84



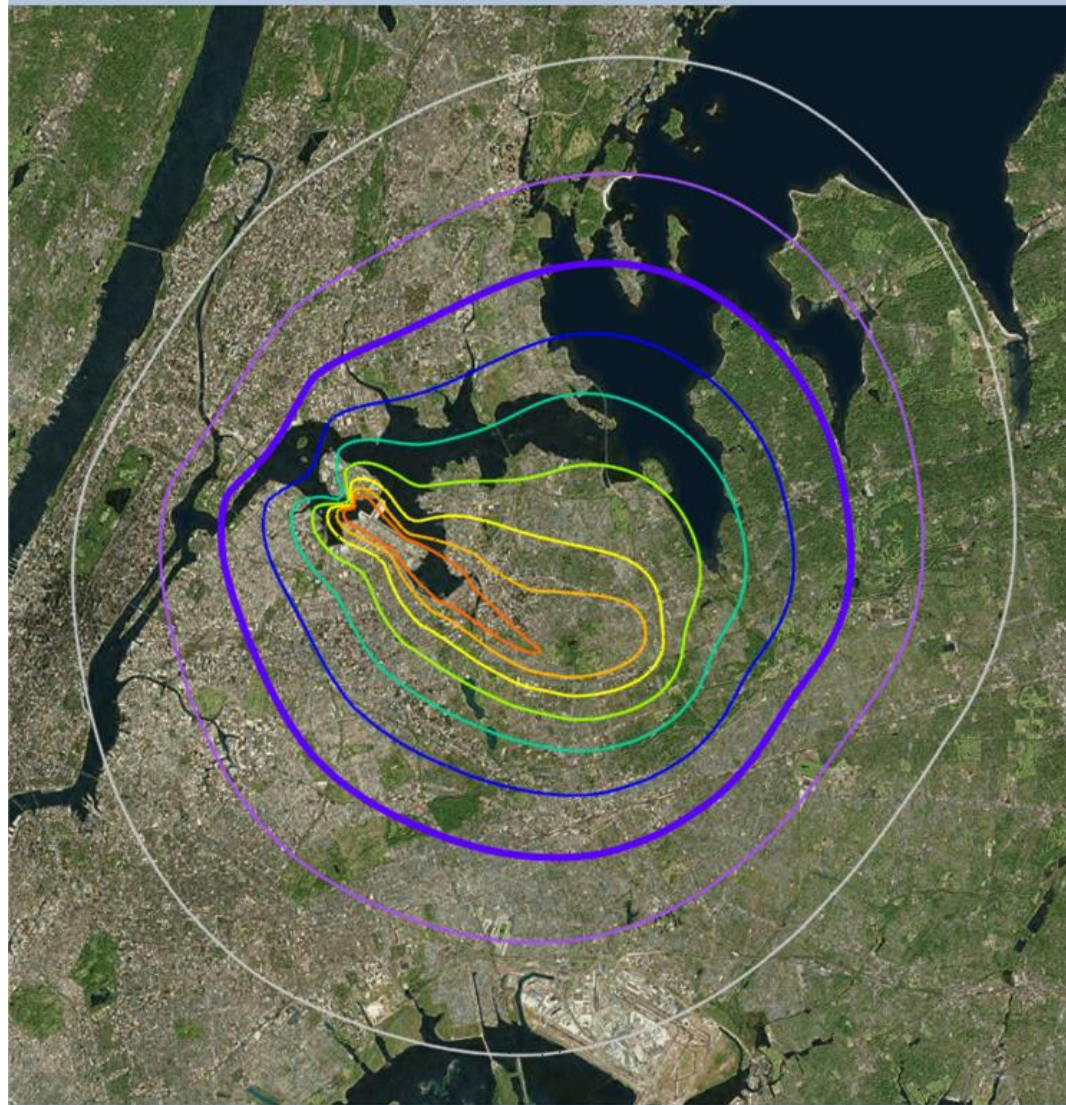
A220-100



A330-900

MD-88 LGA-ATL RWY 13 Departure

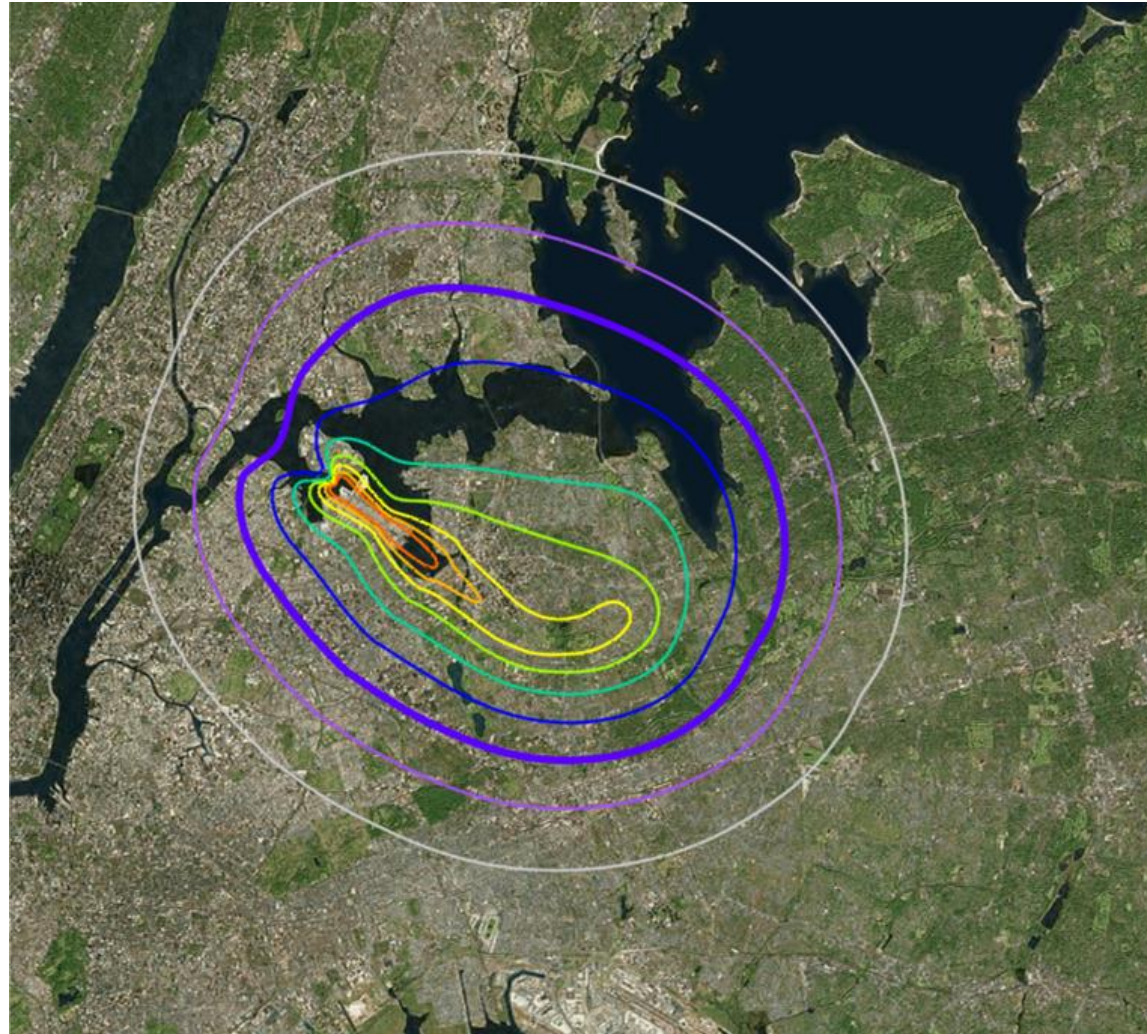
- MD-88
 - 149 seats
 - EIS: 13Feb87
 - JT8D-219
- SEL



- Sound Exposure Level Comparison
- Single flight departure from RWY 13
- LGA 5 Departure with Flushing Climb/ turn West or Southwest tracks

A320 LGA-DEN RWY 13 Departure

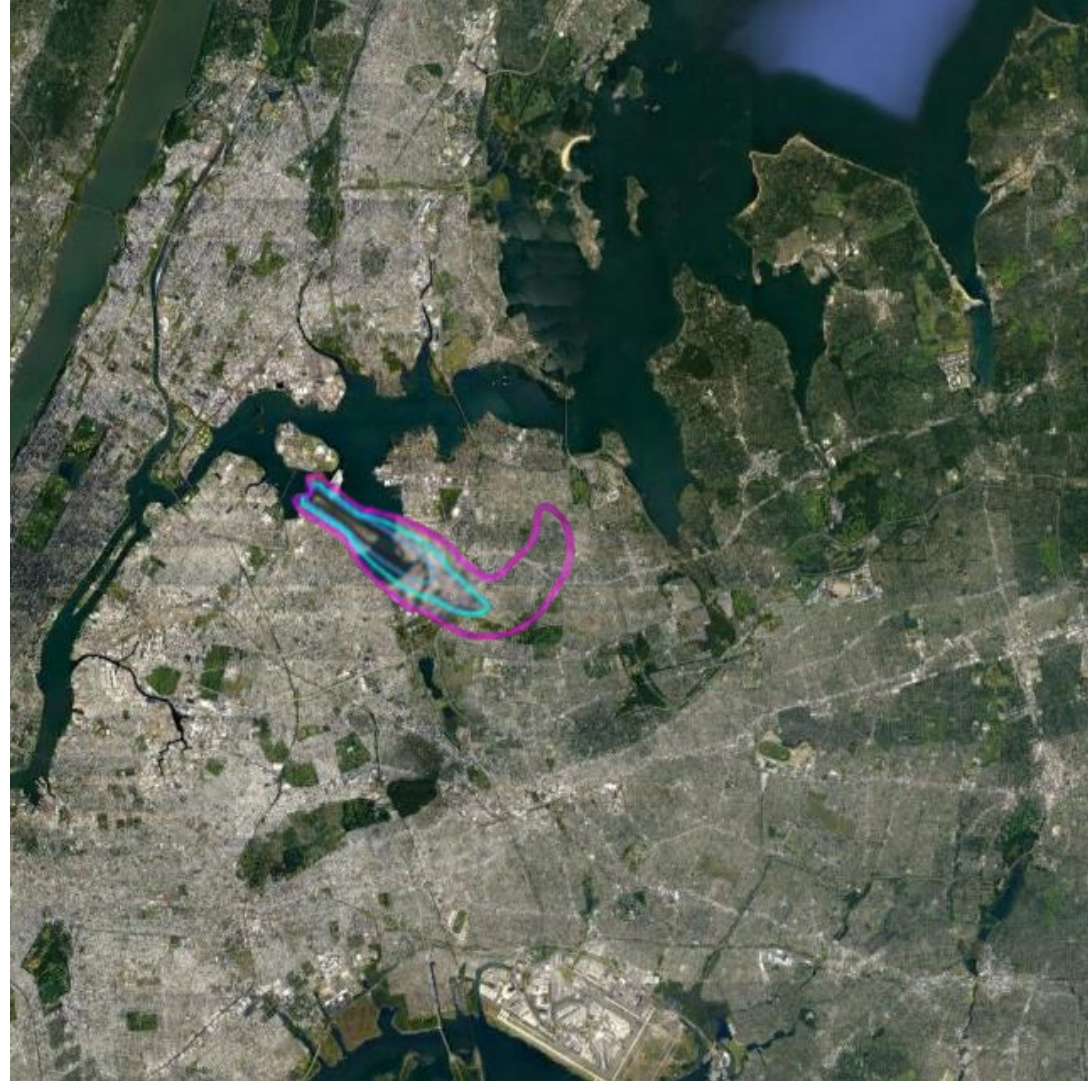
- A320
 - 160 seats
 - EIS: 1Aug90
 - CFM56-5-A3
 - SEL



- Sound Exposure Level Comparison
- Single flight departure from RWY 13
- LGA 5 Departure with Flushing Climb/ turn West or Southwest tracks

A220 LGA-DEN RWY 13 Departure

- A220-100
 - 109 seats
 - EIS: 20Oct18
 - PW1521GA
 - SEL
 - 75 dB
 - 80 dB
 - 85 dB
 - 90 dB



- Sound Exposure Level Comparison
- Single flight departure from RWY 13
- LGA 5 Departure with Flushing Climb/ turn West or Southwest tracks

Population Impact

- Fleet specific number of residents surrounding LGA within 65-90 dB contours

Contour (dB)	MD88 158 seats	A320 157 seats	ERJ-175 76 seats	B717 110 seats	B757 168-199 seats	A220-100 109 seats
65	4,042,934	2,345,385	1,745,121	1,631,556	1,155,393	1,113,044
75	1,649,970	692,820	500,040	352,080	269,237	109,610
85	358,560	73,980	47,250	5,670	4,897	4,396
95	1,035	0	0	0	0	0

- MD88 – A320 comparison
 - 2,940,314 residents surrounding LGA experience a reduction in noise
- B717 – A220 comparison
 - 762,256 residents surrounding LGA experience a reduction in noise

SNA A220 Qualification

NMS	Limits		A220 Noise Readings						Margins	
	Class A (dB SENEL)	Class E (dB SENEL)	9/2 (dB)	9/3 (dB)	9/4 (dB)	9/5 (dB)	9/6 (dB)	AVG (dB)	Class A (dB)	Class E (dB)
1S	102.5	94.1	85.5	85.4	86.8	87.8	87.1	86.52	15.98	7.58
2S	101.8	93.5	86.4	86.3	86.6	87.3	89.3	87.18	14.62	6.32
3S	101.1	90.3	85.7	84.3	-	87.2	86.7	85.98	15.125	4.325
4S	94.8	86.6	80.4	78.2	81.8	81.7	80	80.42	14.38	6.18
5S	95.3	87.2	-	78.6	79.2	79.9	81.4	79.78	15.525	7.425
6S	96.8	87.2	80.5	80.3	82.1	82.7	83.1	81.74	15.06	5.46
7S	93.7	86.6	-	-	77.8	77.9	78.9	78.2	15.5	8.4

A220-100 Class E Testing – September 2019

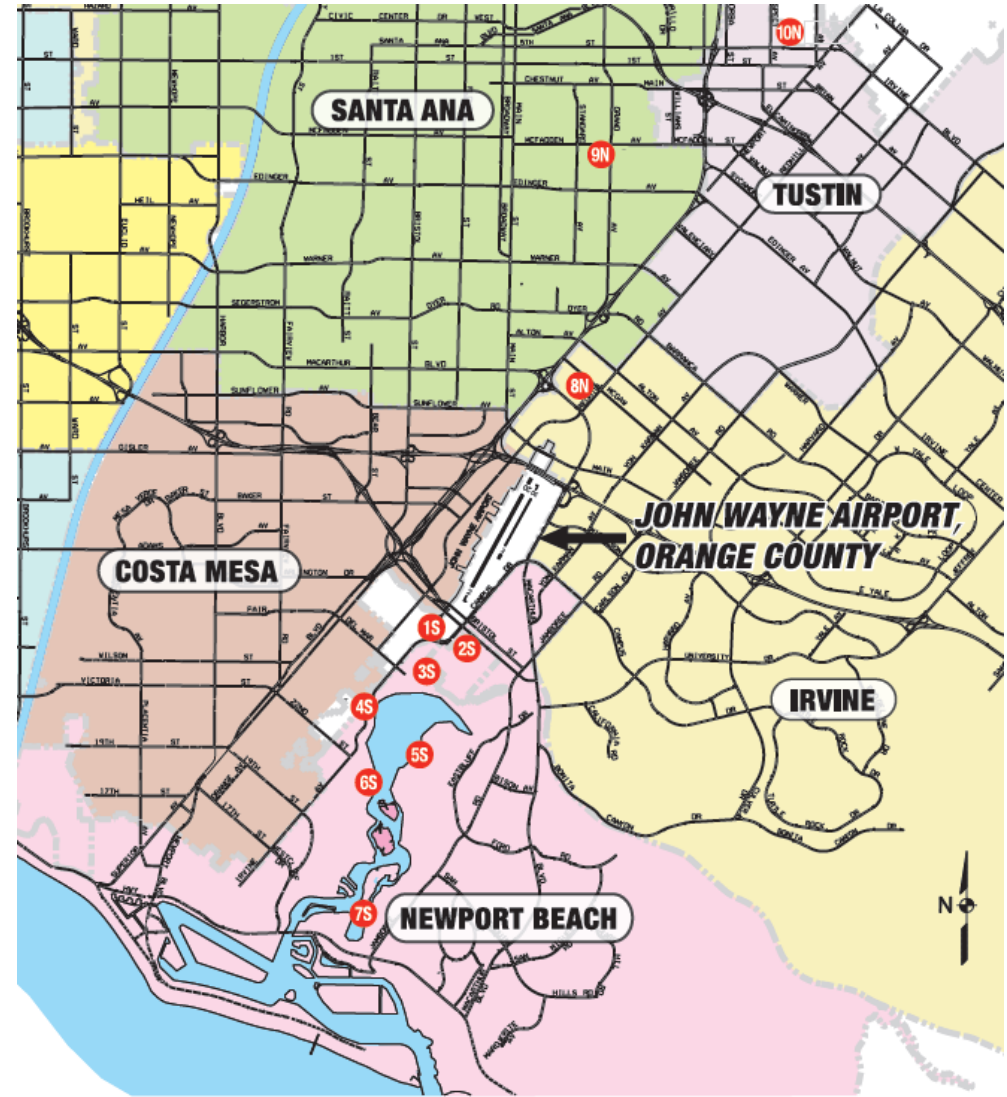
Carrier	AC Type	Class	Weight # Deps	1S	2S	3S	4S	5S	6S	7S
DL	B712	E	107,778 Parameter 377 Count	92.3 374	92.5 368	88.4 373	80.1 270	79.7 272	81.7 355	78.9 208

SNA Noise and Capacity Reports: July 2019 – September 2019

Carrier	AC Type	Class	Weight # Deps	1S	2S	3S	4S	5S	6S	7S
DL	A220	E	116,815 Parameter 368 Count	87.9 365	87.9 345	86.3 361	81.0 312	80.1 288	80.9 299	78.0 36

SNA Noise and Capacity Reports: October 2019 – December 2019

	1S	2S	3S	4S	5S	6S	7S
Noise Reduction with the A220:	4.4	4.6	2.1	-0.9	-0.4	0.8	0.9



SNA Noise Monitor Locations

A220 Benefits

- Pratt & Whitney GTF technology engines
 - PW1521GA
 - Geared turbofan
 - 12 to 1 bypass ratio
 - Lower engine weight
 - Better fuel efficiency
 - Lower emissions
 - Smaller noise footprint
- Currently operating as regular aircraft at 24 Delta stations
- 95 ordered
 - 30 delivered to date



Mayor
Diane Brooks Dixon
Mayor Pro Tem
Will O'Neill
Council Members
Brad Avery
Joy Brenner
Marshall "Duffy" Duffield
Jeff Herdman
Kevin Muldoon

CITY OF NEWPORT BEACH
100 Civic Center Drive
Newport Beach, California 92660
949 544-3004 | 949 644-3039 FAX
newportbeachca.gov

November 12, 2019

Mr. Joe Esposito
Senior Vice President, Network Planning
Delta Air Lines, Inc.
Dept. 661
P. O. Box 20706
Atlanta, GA 30320-6001

Via e-mail to: joe.esposito@delta.com

RE: Delta Air Lines' use of quiet, efficient A220-100s at John Wayne Airport

Dear Mr. Esposito:

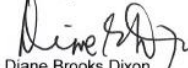
I'm writing on behalf of the City of Newport Beach (City) to express our appreciation for Delta Air Lines investment in fleet modernization and its recent decision to fly A220-100 aircraft for its five daily nonstops between John Wayne Airport (JWA) and Salt Lake City.

A large section of our community is located directly under the JWA departure corridor and as such, the City has long sought solutions to mitigate the noise and air quality impacts associated with aircraft overflights. While our efforts have been productive, we recognize the greatest benefits have and will come from improved aircraft technology.

At JWA, the A220-100 replaced Delta's B717-200 aircraft, and our community immediately realized the benefits of the A220's higher climb rate and quieter engine technology. To demonstrate, during its first flights here, the A220-100 measured **five to eight decibels lower** than acceptable noise limits at some JWA noise monitoring stations. These results were cause to celebrate in Newport Beach and we have shared the good news with our community on multiple occasions and will continue to do so.

The City applauds Delta's commitment to fleet modernization and its goal of replacing 20 percent of its older, less-efficient aircraft by next year. While some may focus on the operational and passenger benefits of such an investment, we contend it's equally important to highlight the environmental and community-friendly advantages of your newer aircraft technology. As stated earlier, we believe it is the best, long-term solution for relieving the noise and emissions impacts on communities such as ours, and commend Delta Air Lines for its leadership in fleet modernization. Thank you.

Sincerely,


Diane Brooks Dixon
Mayor


cc: Newport Beach City Council
Supervisor Michelle Steel, Orange County Board of Supervisors
Barry Rondinella, Director, John Wayne Airport

Letter of appreciation for A220 operation in SNA

Flight Operations

- Company Page – Communication to the Crews
 - Curfew Restrictions
 - Noise Abatement Departure Procedures
 - SAN - LOC or RNAV Rwy 27 Approach
 - Note to prevent missed approaches
 - BOS – Flight Track Monitoring System notice
- Airport Initiatives
 - FLL Technical Committee
 - SAN ANAC Meetings
 - SNA Airline Roundtable Discussions
 - Quarterly Noise Reports
 - Fly Quiet Program
- Continuous Pilot Education

KSAN/SAN
15 NOV 19



SAN DIEGO, CALIF
SAN DIEGO INTL

EFSR

GATE INFORMATION

Communications
 Station Operations: 131.45 Delta Operations

Gates: 34-38, 45-51

SPECIAL NOTES

Airport Pictorial Requirement

- Prior to arrival or departure from this airport, crews will review applicable sections of the airport pictorials provided in the REF tab.
- The captain may waive this requirement if less than 12 calendar months from last entry/exit or pictorial review.

Curfew Restrictions

- **Takeoff Curfew Restrictions:** 2330-0630 LT
 - Coordinate with Flight Control in advance of any potential takeoff curfew restriction violations.
- **Runway Closed:** 0000-0500 LT
 - Required maintenance performed on the runway.
 - Contact Flight Control 30 minutes prior to landing for runway status update.

DEPARTURES

Pushback Clearance: Required. Contact Ramp.

- Between 0000-0600 LT contact Ground.

Departure Procedures

Noise Abatement Procedure Rwy 27: Do not turn north of heading 293° until crossing departure end of runway.

ZZOOO Departure: If unable to cross JORRJ at or above 14,000' advise ATC and expect vectors.

ARRIVALS

Speed Restrictions

- Cross LUCKI at 230 KTS max.
- Cross REEBO at 160 KTS max.

Approach Procedures

CAUTION

Parking garage on short final to Rwy 27.


LOC or RNAV Rwy 27 Approach

- Due to a steeper than normal glide path, be proactive to avoid unstable approach.
 - Configure and slow early to meet stabilized approach criteria
- **A220, A319/320/321, MD88/90:** Be in landing configuration
- PAPI or VNAV/PROF must be used for visual descent from the

LOC Rwy 27 Non-GPS aircraft: Request to start approach at V

GATE INFO / SPECIAL NOTES / DEPT / ARVL 1

KBOS/BOS 17 MAY 19



DEPARTURES continued

WDR

Rwy 15R, Rwys 22L/R and Rwy 27 Departures With Ships In The Channel

- Takeoff weights provide obstacle clearance for ships up to 85' in height.
- Rwy 15R SHP, Rwys 22L/R SHP and Rwy 27 SHP takeoff weights provide obstacle clearance for ships up to 176' in height.
 - ATC will halt departures if ships exceeding 176' in height are in the takeoff zone.
 - When using takeoff weights that do not indicate "SHP", the absence of tall ships (exceeding 85' in height) in the channel must be verified either visually or via Tower.
 - When verification is not obtainable, "SHP" data must be used or another runway must be requested.

Rwy 33L

- No data available for full length departure.
 - Use WDR data for Rwy 33L - C intersection departure.

Standard Taxi

- Do not taxi beyond Spot 7 without clearance from Ground.
- Use all engine taxi when exiting alley near A9 and A10.

Noise Abatement Procedures

- The airport uses a Flight Track Monitoring System to ensure compliance with the published procedures.
 - Deviations will be plotted and forwarded to Flight Operations requesting an explanation.

BOSTON, MASS
 LOGAN INTL

SAN and BOS Company Pages

Sustainability in Air Travel

- Committing \$1 billion over the next 10 years toward a journey to mitigate all emissions from our global business
- Starting March 1, 2020
 - Carbon reduction
 - Carbon removal
 - Stakeholder engagement
- Greenhouse gas emissions capped at 2012 levels
- Fleet renewal with aircraft 25% more fuel efficient than the aircraft they are replacing



Thank You!



DELTA AIR LINES, INC.