

# H Noise Abatement

This Appendix provides detailed information, tables and figures in support of Chapter 6, Noise Abatement:

- Logan Airport Integrated Noise Model (INM) Data Inputs
  - Table H-1 – 2002 Annual Operations (converted to daily operations for noise modeling)
  - Table H-2 – 2002 Modeled Runway Use by Aircraft Group
  - Table H-3 – 2002 Modeled Flight Track Usage – Air Carrier Jet Departures and Arrivals
  - Table H-4 – 2002 Modeled Flight Track Usage – Regional Jet Departures and Arrivals
  - Table H-5 – 2002 Modeled Flight Track Usage – Non Jet Departures and Arrivals
  - Figure H-1 – Comparison of Climb Profiles
- Residential Sound Insulation Program
  - Table H-6 – Residential Sound Insulation Program Status
- Noise Exposed Population
  - Table H-7 – Noise Exposed Population by Community
  - Table H-8 – Noise Complaint Line
- Flight Track Monitoring Report
  - Figure H-2 – Logan Airport Flight Gates
  - Table H-9 – Runway 4R Nahant Gate Summary
  - Table H-10 – Runway 4R Shoreline Crossings above 6,000 feet
  - Table H-11 – Runway 9 Gate Summary - Winthrop Gates 1 and 2
  - Table H-12 – Runway 9 Shoreline Crossings above 6,000 feet
  - Table H-13 – Runway 15R Shoreline Crossings above 6,000 feet
  - Table H-14 – Runways 22R/22L Squantum Gate Summary
  - Table H-15 – Runways 15R/22R/22L Gate Summary – North of Hull Peninsula
  - Table H-16 – Runway 22R/22L Shoreline Crossings above 6,000 feet
  - Table H-17 – Runway 33L Gates – Passages Below 3,000 feet

## **2002 EDR**

### LOGAN INTERNATIONAL AIRPORT

---

#### **Logan Airport Integrated Noise Model (INM) Data Inputs**

Through the 2001 EDR, Massport used version 5.0 of the FAA's Integrated Noise Model (INM); as discussed in previous reports, the standard model had been modified to address certain unique propagation characteristics around Logan, namely over-water propagation and hill effects. Beginning in 2002, however, Massport has upgraded its noise model to reflect the more current data base and atmospheric propagation characteristics contained in Version 6.1 of the INM. For consistency with previous modeling efforts approved by FAA, Massport has modified the standard INM modeling procedure to address over-water propagation near Logan Airport and terrain effects in the Orient Heights neighborhood.

#### **2002 Fleet Mix**

As discussed in the 2001 EDR, beginning in 2001, significant improvements in radar analysis and modeling capabilities allowed Massport to rely more heavily on radar data as the primary source of input for noise calculations. This has resulted in a list of approximately 500 different aircraft types found to use Logan Airport during the year, many of them representing the wide variety of small general aviation (GA) corporate jets and propeller aircraft in the U.S. fleet. Beginning with this 2002 EDR, those aircraft types have been mapped to the INM Version 6.1 database, which contains unique noise and performance profiles for more than 245 aircraft types (some of which are military types as well as older Stage 1 and 2 airplanes that no longer operate in the U.S. or do not use Logan Airport). For those types that are not in the database, the radar type is paired with the best available alternative using a standard FAA-approved substitution list. The resulting list of modeled aircraft is presented in Table H-1.

## 2002 EDR

### LOGAN INTERNATIONAL AIRPORT

**Table H-1 2002 Annual Operations (Converted to Daily Operations for Noise Modeling)**

INM Type	Arrivals		Departures		Total
	Day	Night	Day	Night	
<b>Commercial Jet Operations</b>					
717200	2,756	296	2,784	268	6,104
737300	6,555	365	6,469	452	13,841
737400	2,132	154	2,172	114	4,572
737500	3,019	59	2,829	248	6,155
737700	1,191	115	1,109	197	2,612
737800	8,943	2,021	9,433	1,532	21,929
747400	689	3	683	9	1,384
757300	16	0	16	0	32
767300	3,418	86	3,417	87	7,009
767400	27	0	27	0	54
777200	966	23	970	19	1,977
727EM1	2	5	0	7	13
727EM2	1,476	1,026	1,299	1,203	5,004
727QF	2	22	4	19	47
737B2	912	11	909	14	1,846
737N17	4,701	741	5,128	315	10,885
737N9	60	2	36	26	123
74720B	60	1	59	2	122
757PW	7,828	2,428	9,285	971	20,512
757RR	5,582	2,080	6,853	809	15,323
767CF6	2,019	394	2,260	153	4,826
767JT9	976	52	1,021	7	2,056
A300	1,584	1,078	1,683	979	5,324
A310	359	21	247	133	761
A319	11,375	1,251	11,674	952	25,251
A320	7,637	1,620	8,283	974	18,513
A32023	157	507	659	6	1,329
A32123	848	251	1,001	98	2,199
A330	1,252	2	1,241	13	2,508
A340	813	0	724	89	1,626
BAE146	473	0	471	1	945
CL600	62	0	61	1	124
CL601	24,105	1,536	24,414	1,227	51,283
DC1010	778	458	641	595	2,472
DC1030	467	8	462	13	950
DC86HK*	20	265	5	279	568
DC870	230	48	14	264	556
DC93LW	1,521	692	1,480	734	4,428
DC95HW	462	2	400	65	929
EMB135	2	0	2	0	4
EMB145	6,489	105	6,422	172	13,187
F10065	7	0	7	0	13
IA1125	1	0	1	0	1
J328*	12,589	972	12,650	912	27,123
L1011	7	1	7	1	17
LEAR25	9	1	10	0	20
LEAR35	8	9	9	8	34
MD11GE	34	0	31	3	68
MD11PW	21	0	14	7	42
MD82	6,366	894	6,522	738	14,520
MD83	1,418	859	2,056	222	4,555
MD9028	0	14	14	0	28
MU3001	5	0	5	0	9
<b>Grand Total</b>	<b>132,424</b>	<b>20,482</b>	<b>137,969</b>	<b>14,937</b>	<b>305,813</b>

## 2002 EDR

### LOGAN INTERNATIONAL AIRPORT

Table H-1 2002 Annual Operations (Converted to Daily Operations for Noise Modeling) (continued)					
INM Type	Arrivals		Departures		To
	Day	Night	Day	Night	
<b>Commercial Non-Jet Operations</b>					
BEC58P	12,660	307	12,920	47	25,934
DHC6	6,923	377	7,217	83	14,600
DHC8	4,792	9	4,757	44	9,602
GASEPF	4	0	4	0	7
HS748A	1	0	1	0	2
SF340	5,473	278	5,638	113	11,501
Total	29,852	971	30,536	287	61,646
<b>Grand Total</b>	<b>162,276</b>	<b>21,453</b>	<b>168,505</b>	<b>15,224</b>	<b>367,459</b>
<b>General Aviation Operations</b>					
727EM1	5	3	5	3	15
727EM2	83	1	3	82	169
A300	6	2	1	7	16
BEC58P	928	631	1,056	504	3,119
CIT3	348	25	353	21	747
CL600	646	52	651	47	1,396
CL601	125	15	132	9	281
CNA172	142	0	136	6	283
CNA206	104	0	101	2	207
CNA20T	154	94	145	102	495
CNA441	402	30	389	44	865
CNA500	189	6	193	3	391
CNA750	318	41	340	20	719
COMSEP	2	0	2	0	4
DHC6	623	33	600	56	1,313
DHC830	2	0	2	0	3
FAL20	110	9	111	9	239
FAL50*	239	19	239	19	516
FAL900*	198	13	199	12	421
GASEPF	144	10	146	8	309
GASEPV	658	15	585	88	1,346
GII	149	13	155	7	324
GIIB	174	25	186	13	398
GIV	686	49	676	60	1,471
GV	220	17	216	21	473
HS748A	7	2	9	0	17
IA1125	276	20	276	20	592
LEAR25	194	60	240	13	507
LEAR35	2,258	759	2,214	802	6,033
MU3001	1,356	100	1,360	96	2,913
SABR80	7	0	7	0	14
Total	10,752	2,046	10,725	2,073	25,596
<b>Grand Total</b>	<b>173,028</b>	<b>23,499</b>	<b>179,230</b>	<b>17,297</b>	<b>393,055</b>

\* User Defined Aircraft

## 2002 EDR

### LOGAN INTERNATIONAL AIRPORT

**Table H-2 2002 Modeled Runway Use by Aircraft Group**

Runway	ARRIVALS											
	Heavy Jets - Group A		Heavy Jets - Group B		Light Jets - Group A		Light Jets - Group B		Regional Jets		Turboprops (Non-jets)	
	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
4L	0.0%	0.3%	0.3%	0.0%	3.0%	0.8%	2.8%	0.8%	13.8%	5.5%	23.8%	10.4%
4R	43.7%	26.6%	39.1%	27.1%	35.9%	25.2%	35.4%	27.8%	24.8%	22.7%	13.3%	15.2%
9	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
15L	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.2%	0.1%
15R	0.7%	0.3%	0.7%	0.4%	0.5%	0.2%	0.7%	0.3%	0.8%	0.5%	0.9%	0.7%
22L	21.0%	27.9%	8.7%	21.0%	5.7%	18.4%	9.3%	20.7%	12.7%	17.5%	21.0%	27.4%
22R	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.8%	1.9%
27	17.7%	13.8%	33.2%	19.5%	35.0%	20.7%	32.5%	24.3%	28.1%	23.9%	21.2%	13.1%
33L	17.0%	31.0%	17.9%	31.9%	19.9%	34.6%	19.3%	26.1%	19.8%	29.8%	12.3%	29.8%
33R	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	5.4%	1.5%
	100.0%	100.2%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Runway	DEPARTURES											
	Heavy Jets - Group A		Heavy Jets - Group B		Light Jets - Group A		Light Jets - Group B		Regional Jets		Turboprops (Non-jets)	
	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
4L	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%	16.1%	9.2%
4R	9.9%	3.3%	9.8%	6.0%	5.0%	4.3%	4.4%	1.9%	1.6%	1.9%	0.6%	2.3%
9	5.8%	5.3%	20.7%	16.2%	31.1%	17.4%	30.4%	25.6%	37.0%	23.0%	17.1%	4.8%
15L	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.8%	0.7%
15R	31.6%	45.5%	8.8%	20.7%	4.1%	28.6%	5.0%	7.8%	1.4%	20.7%	3.6%	41.5%
22L	10.2%	4.8%	6.6%	4.0%	3.9%	2.9%	2.8%	2.7%	0.6%	0.8%	1.3%	1.3%
22R	25.1%	20.0%	32.5%	28.3%	35.2%	24.7%	34.8%	35.3%	38.7%	30.6%	40.6%	25.1%
27	4.6%	13.3%	11.2%	15.8%	14.9%	15.8%	15.7%	22.9%	18.6%	18.3%	10.0%	5.5%
33L	12.6%	8.0%	10.5%	9.0%	6.0%	6.3%	6.9%	3.7%	2.2%	4.8%	9.8%	9.3%
33R	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.2%	0.2%
	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

### Flight Tracks

From 1997 through 2001, Massport used a consistent set of modeled flight tracks to represent prototypical flight corridors. Those tracks are documented in the *2001 EDR*.

For 2002, Massport generated an entirely new set of modeled flight tracks based on a full-year sample of radar tracks. These new tracks extend almost 20 miles from the Airport, and include substantially more dispersion than previous versions of the model would support. Massport analyzed flight tracks by the following groups: air carrier jet, regional jet, and non-jet. The methodology involved sorting a year's data by group, runway, and destination, to develop individual flight corridors by runway, aircraft group and destination. The INM reads the radar data and generates a mean track (or "backbone") through the x-y positional data; it then creates "sub-tracks" on either side of the backbone track to represent the dispersion observed in the flight corridor; the placement of the subtracks is based on the statistical distribution of the radar data about the mean (using normal distribution). Almost 377,000 radar tracks were analyzed and resulted in 347 backbone and 1500 subtracks. Figures 6-6 through 6-11 in Chapter 6 depict the radar track and modeled flight tracks for departures and arrivals by air carrier, regional jet, and non-jet operations, respectively.

Tables H-3 through H-6 present the modeled flight track use by aircraft group (air carrier, regional jet, non-jet) for departure and arrival operations, respectively.

## 2002 EDR

### LOGAN INTERNATIONAL AIRPORT

Table H-3 2002 Modeled Flight Track Usage - Air Carrier Jet Departures and Arrivals						
Runway	DEPARTURES			ARRIVALS		
	Track #	Day	Night	Track #	Day	Night
4L				04LACA1	9.3%	48.1%
				04LACA2	9.7%	0.0%
				04LACA3	33.8%	51.9%
				04LACA4	1.3%	0.0%
				04LACA5	1.1%	0.0%
				04LACA6	44.8%	0.0%
4R	04RACD1	33.0%	20.7%	04RACA1	20.8%	27.5%
	04RACD2	8.0%	8.3%	04RACA2	5.2%	0.7%
	04RACD3	14.6%	0.0%	04RACA3	0.5%	1.0%
	04RACD4	27.2%	30.3%	04RACA4	0.7%	0.0%
	04RACD5	17.1%	40.7%	04RACA5	46.6%	38.3%
				04RACA6	0.2%	0.0%
				04RACA7	0.2%	0.0%
				04RACA8	20.8%	27.5%
				04RACA9	5.2%	0.7%
				04RACA10	0.0%	4.2%
9	09ACD1	4.1%	2.2%			
	09ACD2	15.2%	11.9%			
	09ACD3	47.8%	53.4%			
	09ACD4	30.6%	29.1%			
	09ACD5	0.3%	0.9%			
	09ACD6	1.3%	0.0%			
	09ACD7	0.6%	2.4%			
15R	15RACD1	20.8%	16.1%	15RACA1	26.6%	0.0%
	15RACD2	13.0%	7.3%	15RACA2	20.0%	42.1%
	15RACD3	15.2%	3.9%	15RACA3	6.3%	0.0%
	15RACD4	29.4%	17.0%	15RACA4	31.9%	57.9%
	15RACD5	21.6%	55.6%	15RACA5	15.1%	0.0%
22L	22LACD1	22.4%	27.0%	22LACA1	22.7%	24.7%
	22LACD2	13.4%	3.9%	22LACA2	1.4%	3.1%
	22LACD3	15.2%	5.2%	22LACA3	0.9%	0.5%
	22LACD4	27.4%	27.4%	22LACA4	43.8%	67.7%
	22LACD5	21.6%	36.5%	22LACA5	31.2%	0.0%
				22LACA6	0.0%	3.9%
22R	22RACD1	20.7%	17.0%			
	22RACD2	44.5%	53.1%			
	22RACD3	29.4%	26.4%			
	22RACD4	0.4%	2.0%			
	22RACD5	3.2%	0.0%			
	22RACD6	1.2%	0.8%			
	22RACD7	0.5%	0.7%			

## 2002 EDR

### LOGAN INTERNATIONAL AIRPORT

**Table H-3 2002 Modeled Flight Track Usage - Air Carrier Jet Departures and Arrivals (continued)**

Runway	DEPARTURES			ARRIVALS		
	Track #	Day	Night	Track #	Day	Night
27	27ACD1	20.1%	14.8%	27ACA1	29.3%	35.2%
	27ACD2	50.3%	63.0%	27ACA2	7.7%	0.0%
	27ACD3	27.1%	21.5%	27ACA3	62.6%	0.0%
	27ACD4	0.8%	0.7%	27ACA4	0.1%	9.4%
	27ACD5	1.3%	0.0%	27ACA5	0.1%	1.9%
	27ACD6	0.4%	0.0%	27ACA6	0.1%	0.0%
				27ACA7	0.1%	0.0%
				27ACA8	0.0%	51.8%
				27ACA9	0.0%	1.7%
33L	33LACD1	1.8%	4.2%	33LACA1	49.4%	29.5%
	33LACD2	2.4%	0.0%	33LACA2	8.5%	1.5%
	33LACD3	6.1%	6.4%	33LACA3	17.4%	29.3%
	33LACD4	34.0%	25.6%	33LACA4	17.4%	29.3%
	33LACD5	28.1%	42.9%	33LACA5	0.1%	0.0%
	33LACD6	1.7%	0.0%	33LACA6	0.1%	0.0%
	33LACD7	25.9%	20.9%	33LACA7	3.5%	0.0%
				33LACA8	3.5%	0.0%
				33LACA9	0.0%	7.5%
				33LACA10	0.0%	2.8%

\* Percentages are for both Heavy Jets – Group A, Heavy Jets – Group B, Light Jets – Group A and Light Jets – Group B.

# 2002 EDR

## LOGAN INTERNATIONAL AIRPORT

Table H-4 2002 Modeled Flight Track Usage - Regional Jet Departures and Arrivals						
Runway	DEPARTURES			ARRIVALS		
	Track #	Day	Night	Track #	Day	Night
4L	4LRJD1	20.0%	0.0%	04LRJA1	0.6%	14.4%
	4LRJD2	15.0%	0.0%	04LRJA2	25.8%	15.0%
	4LRJD3	65.0%	0.0%	04LRJA3	1.2%	0.0%
				04LRJA4	1.2%	0.0%
				04LRJA5	48.7%	18.3%
				04LRJA6	2.4%	0.0%
				04LRJA7	11.3%	13.7%
				04LRJA8	6.5%	19.0%
				04LRJA9	1.7%	19.6%
				04LRJA10	0.7%	0.0%
4R	4RRJD1	4.7%	9.4%	04RRJA1	0.5%	34.4%
	4RRJD2	30.0%	21.9%	04RRJA2	5.5%	8.1%
	4RRJD3	9.8%	25.0%	04RRJA3	6.2%	8.5%
	4RRJD4	35.7%	21.9%	04RRJA4	3.0%	4.3%
	4RRJD5	19.8%	21.9%	04RRJA5	1.0%	0.0%
				04RRJA6	0.5%	0.0%
				04RRJA7	15.8%	23.2%
				04RRJA8	8.0%	11.6%
				04RRJA9	57.3%	0.0%
				04RRJA10	0.7%	0.0%
				04RRJA11	0.4%	0.0%
				04RRJA12	1.0%	0.0%
				04RRJA13	0.0%	6.0%
				04RRJA14	0.0%	3.9%
9	09RJD1	29.0%	28.9%			
	09RJD2	23.0%	15.2%			
	09RJD3	32.5%	33.4%			
	09RJD4	14.3%	22.4%			
	09RJD5	1.3%	0.0%			
15R	15RRJD1	31.3%	21.5%	15RRJA1	58.1%	17.6%
	15RRJD2	32.1%	27.9%	15RRJA2	27.0%	70.6%
	15RRJD3	2.8%	0.0%	15RRJA3	14.9%	11.8%
	15RRJD4	22.8%	11.2%			
	15RRJD5	11.0%	20.2%			
	15RRJD6	0.0%	19.3%			
22L	22LRJD1	11.0%	10.5%	22LRJA1	0.0%	5.8%
	22LRJD2	11.0%	10.5%	22LRJA2	0.0%	14.4%
	22LRJD3	4.4%	10.5%	22LRJA3	0.0%	11.3%
	22LRJD4	7.9%	26.3%	22LRJA4	0.0%	19.8%
	22LRJD5	19.7%	5.3%	22LRJA5	0.0%	9.9%
	22LRJD6	15.4%	15.8%	22LRJA6	0.0%	6.6%
	22LRJD7	30.7%	21.1%	22LRJA7	0.0%	28.8%
				22LRJA8	0.0%	3.5%
				22LRJA11	0.3%	0.0%
				22LRJA12	0.4%	0.0%
				22LRJA13	0.4%	0.0%
				22LRJA14	5.6%	0.0%
				22LRJA15	0.4%	0.0%
				22LRJA21	0.1%	0.0%
				22LRJA22	0.2%	0.0%
				22LRJA23	31.5%	0.0%
				22LRJA31	9.8%	0.0%
				22LRJA32	8.7%	0.0%
				22LRJA33	10.1%	0.0%
				22LRJA34	7.7%	0.0%
				22LRJA41	2.5%	0.0%
			22LRJA42	1.3%	0.0%	
			22LRJA43	1.1%	0.0%	
			22LRJA44	4.9%	0.0%	
			22LRJA45	12.6%	0.0%	
			22LRJA46	2.5%	0.0%	

## 2002 EDR

### LOGAN INTERNATIONAL AIRPORT

Table H-4 2002 Modeled Flight Track Usage - Regional Jet Departures and Arrivals (continued)						
Runway	DEPARTURES			ARRIVALS		
	Track #	Day	Night	Track #	Day	Night
22R	22RRJD1	0.3%	0.7%			
	22RRJD2	2.9%	5.9%			
	22RRJD3	17.0%	8.7%			
	22RRJD6	0.0%	0.8%			
	22RRJD7	0.0%	10.7%			
	22RRJD8	0.0%	19.9%			
	22RRJD9	0.0%	41.1%			
	22RRJD11	0.1%	0.0%			
	22RRJD12	16.5%	0.0%			
	22RRJD21	0.1%	0.0%			
	22RRJD31	0.9%	0.0%			
	22RRJD32	0.8%	0.0%			
	22RRJD33	1.5%	0.0%			
	22RRJD51	9.7%	0.0%			
	22RRJD52	2.4%	0.0%			
	22RRJD53	0.2%	0.0%			
22RRJD61	0.6%	0.0%				
22RRJD91	33.5%	9.1%				
22RRJD92	13.6%	3.1%				
27	27RJD3	13.3%	9.3%	27RJA1	7.0%	4.4%
	27RJD4	13.1%	13.9%	27RJA2	5.5%	4.3%
	27RJD5	36.9%	38.0%	27RJA3	3.1%	16.7%
	27RJD6	34.3%	36.2%	27RJA4	69.5%	62.9%
	27RJD7	0.5%	0.2%	27RJA5	0.2%	0.0%
	27RJD8	1.9%	2.4%	27RJA6	0.2%	0.0%
				27RJA7	13.7%	11.7%
				27RJA8	0.4%	0.0%
				27RJA9	0.4%	0.0%
33L	33LRJD1	26.7%	21.3%	33LRJA1	14.2%	9.8%
	33LRJD2	33.6%	28.7%	33LRJA2	6.1%	4.8%
	33LRJD3	20.7%	27.9%	33LRJA3	1.6%	3.2%
	33LRJD4	5.6%	0.0%	33LRJA4	54.9%	32.8%
	33LRJD5	5.7%	12.3%	33LRJA5	0.8%	0.0%
	33LRJD6	7.7%	9.8%	33LRJA6	0.8%	0.0%
				33LRJA7	14.8%	22.1%
				33LRJA8	0.4%	6.5%
				33LRJA9	0.0%	20.8%
				33LRJA10	6.4%	0.0%

## 2002 EDR

### LOGAN INTERNATIONAL AIRPORT

Table H-5 2002 Modeled Flight Track Usage - Non-Jet Departures and Arrivals						
Runway	DEPARTURES			ARRIVALS		
	Track #	Day	Night	Track #	Day	Night
4L	04LNJD1	33.5%	40.4%	04LNJA1	2.5%	0.0%
	04LNJD2	23.0%	19.1%	04LNJA2	27.2%	28.0%
	04LNJD3	43.5%	40.4%	04LNJA3	1.2%	0.0%
				04LNJA4	6.5%	0.0%
				04LNJA5	13.4%	0.0%
				04LNJA6	0.4%	0.0%
				04LNJA7	6.5%	0.0%
				04LNJA8	0.3%	0.0%
				04LNJA9	11.8%	0.0%
				04LNJA10	1.2%	0.0%
				04LNJA11	17.6%	43.3%
				04LNJA12	3.8%	0.0%
				04LNJA13	0.0%	28.7%
				04LNJA14	1.0%	0.0%
				04LNJA15	2.8%	0.0%
				04LNJA16	1.6%	0.0%
				04LNJA17	2.3%	0.0%
4R	04RNJD1	10.6%	75.0%	04RNJA1	9.1%	10.3%
	04RNJD2	6.9%	10.0%	04RNJA2	4.4%	0.0%
	04RNJD3	12.2%	15.0%	04RNJA3	26.0%	14.9%
	04RNJD4	24.3%	0.0%	04RNJA4	12.1%	0.0%
	04RNJD5	46.0%	0.0%	04RNJA5	20.5%	10.3%
				04RNJA6	28.0%	16.4%
				04RNJA7	0.0%	48.1%
9	09NJD1	1.1%	0.0%	09NJA1	33.3%	0.0%
	09NJD2	0.9%	0.0%	09NJA2	33.3%	0.0%
	09NJD3	3.7%	0.0%	09NJA3	33.3%	0.0%
	09NJD4	0.7%	0.0%			
	09NJD5	4.2%	0.0%			
	09NJD6	36.9%	0.0%			
	09NJD7	52.4%	0.0%			
	09NJD8	0.0%	100.0%			
15L	15LNJD1	54.5%	0.0%	15LNJA1	70.6%	0.0%
	15LNJD2	45.5%	0.0%	15LNJA2	11.8%	0.0%
				15LNJA3	17.6%	0.0%
15R	15RNJD1	91.1%	5.1%	15RNJA1	22.8%	0.0%
	15RNJD2	1.9%	0.0%	15RNJA2	31.3%	0.0%
	15RNJD3	2.1%	0.0%	15RNJA3	15.4%	0.0%
	15RNJD4	2.5%	0.0%	15RNJA4	15.9%	0.0%
	15RNJD5	2.4%	0.0%	15RNJA5	8.9%	0.0%
	15RNJD6	0.0%	94.9%	15RNJA6	5.7%	0.0%

## 2002 EDR

### LOGAN INTERNATIONAL AIRPORT

Table H-5 2002 Modeled Flight Track Usage - Non-Jet Departures and Arrivals (continued)						
Runway	DEPARTURES			ARRIVALS		
	Track #	Day	Night	Track #	Day	Night
22L	22LNJD1	9.7%	0.0%	22LNJA1	23.6%	16.3%
	22LNJD2	87.5%	0.0%	22LNJA2	0.5%	0.0%
	22LNJD3	2.8%	0.0%	22LNJA3	2.1%	0.0%
	22LNJD4	0.0%	100.0%	22LNJA4	1.0%	0.0%
				22LNJA5	7.2%	0.0%
				22LNJA6	0.2%	0.0%
				22LNJA7	21.5%	10.1%
				22LNJA8	1.5%	0.0%
				22LNJA9	28.0%	45.2%
				22LNJA10	3.0%	0.0%
				22LNJA11	0.0%	28.4%
				22LNJA12	11.3%	0.0%
22R	22RNJD1	37.3%	13.5%	22RNJA1	19.6%	0.0%
	22RNJD2	13.7%	54.3%	22RNJA2	10.0%	0.0%
	22RNJD3	4.8%	0.0%	22RNJA3	9.6%	0.0%
	22RNJD4	11.1%	8.1%	22RNJA4	28.8%	0.0%
	22RNJD5	8.6%	0.0%	22RNJA5	19.2%	0.0%
	22RNJD6	0.4%	0.0%	22RNJA6	12.9%	0.0%
	22RNJD7	21.7%	24.2%			
	22RNJD8	1.7%	0.0%			
	22RNJD9	0.5%	0.0%			
	22RNJD10	0.2%	0.0%			
27	27NJD1	75.2%	0.0%	27NJA1	5.4%	0.0%
	27NJD2	3.8%	0.0%	27NJA2	62.2%	68.3%
	27NJD3	9.7%	100.0%	27NJA3	9.6%	5.4%
	27NJD4	6.0%	0.0%	27NJA4	1.9%	0.0%
	27NJD5	3.1%	0.0%	27NJA5	3.4%	0.0%
	27NJD6	0.8%	0.0%	27NJA6	3.1%	0.0%
	27NJD7	1.4%	0.0%	27NJA7	0.9%	0.0%
				27NJA8	1.4%	0.0%
				27NJA9	2.2%	0.0%
				27NJA10	2.1%	0.0%
				27NJA11	2.3%	0.0%
				27NJA12	5.4%	17.0%
				27NJA13	0.0%	9.4%
33L	33LNJD1	4.0%	0.0%	33LNJA1	18.4%	8.1%
	33LNJD2	29.9%	60.0%	33LNJA2	11.3%	0.0%
	33LNJD3	19.0%	12.5%	33LNJA3	18.5%	18.6%
	33LNJD4	38.0%	27.5%	33LNJA4	6.8%	0.0%
	33LNJD5	9.1%	0.0%	33LNJA5	24.6%	14.6%
			33LNJA6	20.3%	0.0%	
			33LNJA7	0.0%	58.7%	
33R	33RNJD1	66.7%	0.0%	33RNJA1	10.4%	0.0%
	33RNJD2	33.3%	0.0%	33RNJA2	2.5%	0.0%
				33RNJA3	1.2%	0.0%
				33RNJA4	82.0%	100.0%
				33RNJA5	1.7%	0.0%
				33RNJA6	2.3%	0.0%

## 2002 EDR

### LOGAN INTERNATIONAL AIRPORT

#### Climb Profiles

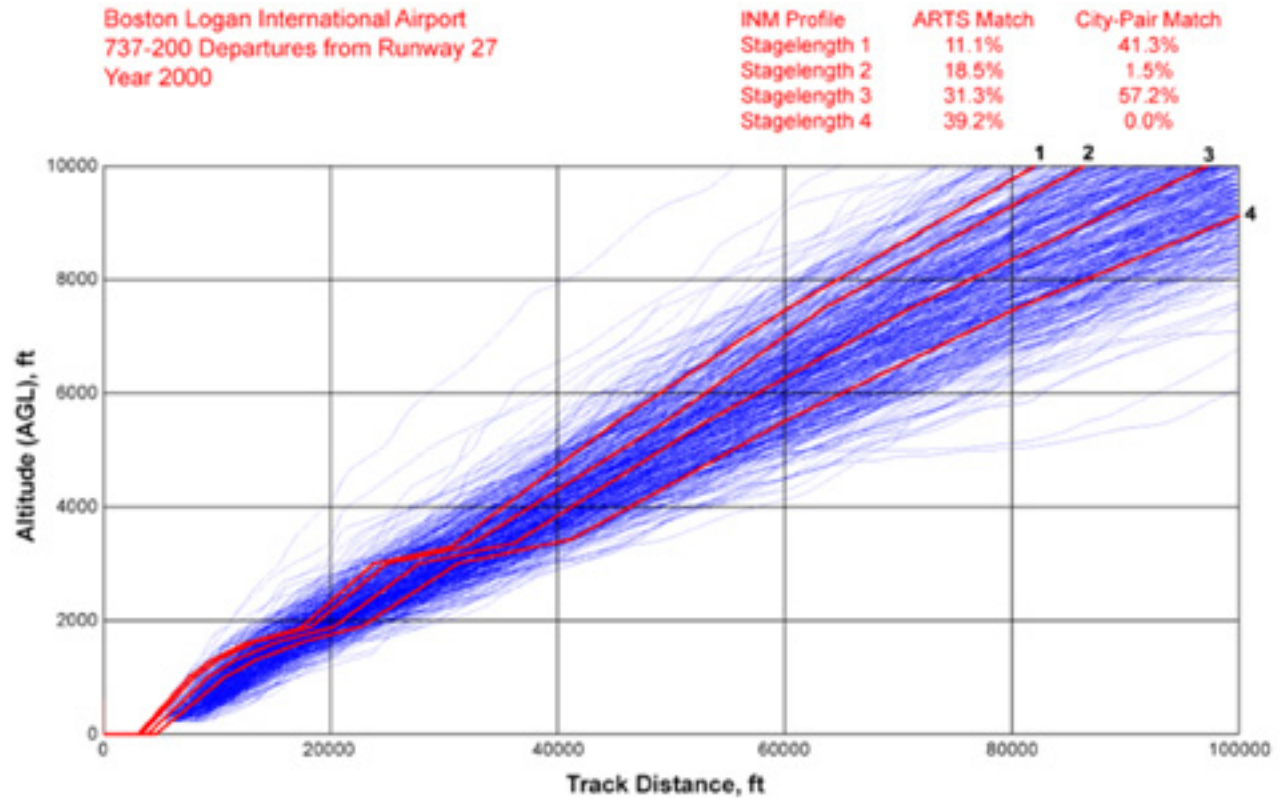
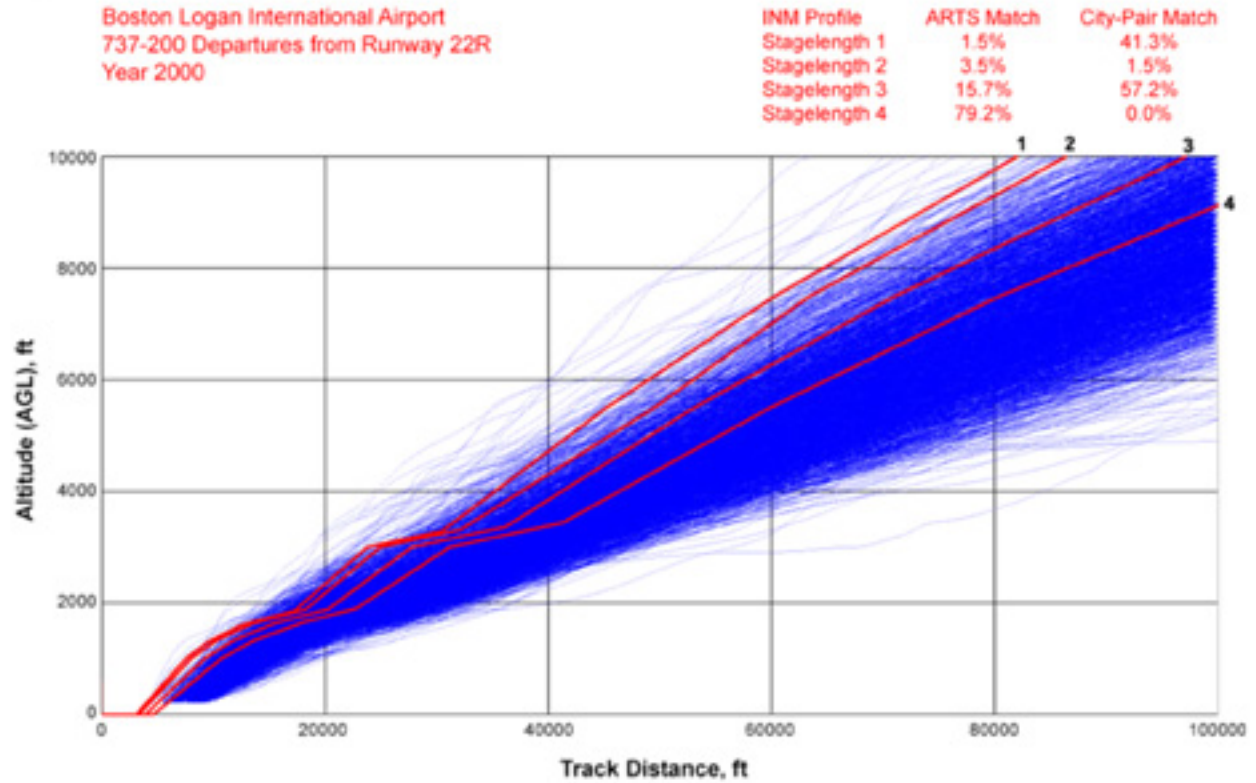
Another important element of noise modeling is the climb profile assumed for aircraft departures. The INM uses a concept called “stagelength” to model climb profile, based on the assumption that aircraft that are flying longer distances will carry more fuel (i.e., weight) and therefore not climb as well. For prior analyses, Massport relied on published destination data to determine the assigned stagelength for modeling purposes by using city-pair combinations (e.g., flights from Logan to LaGuardia are less than 500 nautical miles and therefore assigned “Stagelength 1”). However, with better access to radar data, Massport now has the ability to analyze actual climb profile data and use the observed data to model climb profiles. For 2002, Massport processed all data and used a least squares fit to the closest INM aircraft profile. This allowed Massport to assign the most appropriate stagelength for each departure off each runway.

Figure H-7 depicts the results of a sample of year 2000 departures from Runway 22R and 27 and illustrates some of the precision lost by using the city-pair matching. As shown in the upper half of the figure, approximately 41 percent of departures from Runway 22R were assigned to Stagelength 1 based on their city-pair distance; however, as shown by the plot of climb profiles, the central tendency of the profile data is much lower than that assumed for stagelength 1. This is probably due to the fact that noise abatement procedures from Runway 22R require aircraft to execute a sharp left-hand turn, thereby reducing the aircraft’s climb performance in the turn. The lower part of Figure H-1 shows that for Runway 27, the noise abatement turn does not degrade climb performance as significantly as that from Runway 22R, and assignments based on actual profiles more closely match the city-pair analysis.

# 2002 EDR

## LOGAN INTERNATIONAL AIRPORT

**Figure H-1 Comparison of Climb Profiles**



## 2002 EDR

### LOGAN INTERNATIONAL AIRPORT

---

#### Residential Sound Insulation Program

In 2002, Massport completed sound insulation of 205 residential buildings containing 354 dwelling units, resulting in a total of 3,641 residential buildings and 7,356 dwelling units that have been sound insulated since 1986 when the innovative program was first implemented. Table H-6 lists the yearly progress of this mitigation effort.

<b>Construction Year*</b>	<b>Residential Buildings*</b>	<b>Dwelling Units**</b>
1986	4	8
1987	43	51
1988	102	159
1989	94	133
1990	121	200
1991	175	360
1992	197	354
1993	318	654
1994	310	542
1995	372	753
1996	323	577
1997	364	808
1998	328	806
1999	330	718
2000	195	601
2001	260	278
<b>2002</b>	<b>205</b>	<b>354</b>
<b>Total</b>	<b>3,641</b>	<b>7,356</b>

\* Residential building - includes multiple units

\*\* Dwelling units - individual units

Following the FAA's approval of model adjustments based on the effects of terrain (discussed in the 1999 ESRP) Massport submitted, and the New England Region of the FAA approved, a new sound insulation program. The new contour, approved for a two-year period, includes dwelling units in East Boston, South Boston, and Winthrop that had not been previously eligible for insulation. Massport has subsequently received notice of FAA funding in the amount of \$5 million allowing treatment of approximately 400 units. The program is underway.

---

#### Noise Exposed Population

Table H-7 presents the noise exposed population by community for 2002. This table includes population within the 60-65 dB DNL contours, although a DNL of 65 dB is the Federally-defined noise criterion used as a guideline to identify when residential land use is considered incompatible with aircraft noise.

## 2002 EDR

### LOGAN INTERNATIONAL AIRPORT

Table H-7 Noise-Exposed Population by Community							
Year	Census Data	80+ DNL	75-80 DNL	70-75 DNL	*65-70 DNL	Total (65+)	60-65 DNL
<b>BOSTON**</b>							
1994	1990	0	106	265	7,698	8,069	30,895
1995	1990	0	106	851	8,815	9,772	33,765
1996	1990	0	106	374	8,775	9,255	40,992
1997	1990	0	106	719	13,857	14,682	54,804
1998	1990	0	58	580	10,877	11,515	52,201
1999	1990	0	58	364	11,632	12,054	45,948
2000	1990	0	58	183	7,880	8,121	32,474
2000	2000	0	0	234	9,014	9,248	35,785
2001	2000	0	0	315	6,515	6,700	27,778
2002	2000	0	0	132	2,625	2,757	23,225
<b>CHELSEA</b>							
1994	1990	0	0	0	0	0	8,510
1995	1990	0	0	0	95	95	9,750
1996	1990	0	0	0	0	0	8,744
1997	1990	0	0	0	0	0	10,001
1998	1990	0	0	0	0	0	9,222
1999	1990	0	0	0	95	95	9,249
2000	1990	0	0	0	0	0	5,622
2000	2000	0	0	0	0	0	7,361
2001	2000	0	0	0	0	0	4,508
2002	2000	0	0	0	0	0	3,995
<b>EVERETT</b>							
1994	1990	0	0	0	0	0	0
1995	1990	0	0	0	0	0	0
1996	1990	0	0	0	0	0	0
1997	1990	0	0	0	0	0	0
1998	1990	0	0	0	0	0	0
1999	1990	0	0	0	0	0	0
2000	1990	0	0	0	0	0	0
2000	2000	0	0	0	0	0	0
2001	2000	0	0	0	0	0	0
2002	2000	0	0	0	0	0	0
<b>MEDFORD</b>							
1994	1990	0	0	0	0	0	0
1995	1990	0	0	0	0	0	0
1996	1990	0	0	0	0	0	0
1997	1990	0	0	0	0	0	0
1998	1990	0	0	0	0	0	0
1999	1990	0	0	0	0	0	0
2000	1990	0	0	0	0	0	0
2000	2000	0	0	0	0	0	0
2001	2000	0	0	0	0	0	0
2002	2000	0	0	0	0	0	0

Sources: Data prepared for Massport by Harris Miller Miller & Hanson, Inc.

\* 65 DNL is the Federally-defined noise criterion.

\*\* Portions of Dorchester, East Boston, Roxbury, South Boston, and the South End are included in Boston totals;

\*\*\* Boston population by community change from in 1999 due to hill effects methodology and reporting change.

## 2002 EDR

### LOGAN INTERNATIONAL AIRPORT

Table H-7 Noise-Exposed Population by Community (continued)							
Year	Census Data	80+ DNL	75-80 DNL	70-75 DNL	*65-70 DNL	Total (65+)	60-65 DNL
<b>QUINCY</b>							
1994	1990	0	0	0	0	0	0
1995	1990	0	0	0	0	0	0
1996	1990	0	0	0	0	0	0
1997	1990	0	0	0	0	0	0
1998	1990	0	0	0	0	0	0
1999	1990	0	0	0	0	0	0
2000	1990	0	0	0	0	0	0
2000	2000	0	0	0	0	0	636
2001	2000	0	0	0	0	0	610
2002	2000	0	0	0	0	0	610
<b>REVERE</b>							
1994	1990	0	0	0	3,569	3,569	2,099
1995	1990	0	0	0	3,364	3,364	2,304
1996	1990	0	0	172	3,292	3,464	2,505
1997	1990	0	0	0	3,293	3,293	2,047
1998	1990	0	0	0	3,168	3,168	2,132
1999	1990	0	0	128	3,165	3,293	2,047
2000	1990	0	0	0	2,552	2,552	2,386
2000	2000	0	0	0	2,496	2,496	3,100
2001	2000	0	0	0	2,496	2,496	3,100
2002	2000	0	0	0	2,822	2,822	2,399
<b>WINTHROP</b>							
1994	1990	0	417	1,343	5,154	6,914	7,512
1995	1990	0	482	1,611	5,757	7,850	7,077
1996	1990	0	417	1,376	5,930	7,723	7,333
1997	1990	0	417	1,659	6,386	8,462	6,839
1998	1990	0	519	1,522	6,572	8,613	6,507
1999	1990	0	353	1,408	5,946	7,707	7,135
2000	1990	0	277	991	5,240	6,508	7,296
2000	2000	0	247	1,070	4,684	6,001	7,776
2001	2000	0	244	683	4,123	5,050	8,104
2002	2000	0	2	481	2,247	2,730	7,921
<b>All Communities</b>							
1994	1990	0	523	1608	16421	18,552	49,016
1995	1990	0	588	2462	18031	21,081	52,896
1996	1990	0	523	1,922	17997	20,442	59,574
1997	1990	0	523	2378	23536	26,437	73,691
1998	1990	0	577	2102	20617	23,296	70,062
1999	1990	0	411	1900	20838	23,149	64,379
2000	1990	0	335	1,174	15,672	17,181	47,778
2000	2000	0	247	1,304	16,194	17,745	54,190
2001	2000	0	244	998	13,004	14,246	43,616
2002	2000	0	2	613	7,694	8,309	38,150

Sources: Data prepared for Massport by Harris Miller Miller & Hanson, Inc.

\* 65 DNL is the Federally-defined noise criterion.

\*\* Portions of Dorchester, East Boston, Roxbury, South Boston, and the South End are included in Boston totals;

\*\*\* Boston population by community change from in 1999 due to hill effects methodology and reporting change.

Table H-8 presents a summary by community of the total complaints made in 2002 to Massport's Noise Complaint Line. The Noise Complaint Line provides individuals the ability to express their concerns about

## 2002 EDR

### LOGAN INTERNATIONAL AIRPORT

aviation noise (activities) or to ask questions regarding noise at Logan Airport. Callers ask a range of questions such as "Why is this runway in use?"; "What time do the planes stop flying?" ; and "Was that aircraft off-course?"

The Noise Abatement Office (NAO) staff documents noise line complaints by obtaining information from the caller about the nature of the complaint, time of the occurrence, location of caller's residence, and the activity that was disturbed. The NAO uses the collected information to determine the probable activity responsible for the complaint and writes a letter report to the complainant. The letter includes the original complaint, a response that identifies the activity responsible for the call (arrivals, departures, runup, etc.), meteorological information at the time of the call (a major factor in aviation activities), runways in use at the time of the call, and a notice that the FAA will receive a copy of the report.

In 2002, Massport received a total of 3,243 noise complaints from 51 communities, a reduction of 38% from 2001, when the NAO received 5,265 complaints. Among communities with more than 100 annual complaints, the greatest reductions were in Revere, East Boston, Winthrop, Jamaica Plain, and Hingham; there were increases in complaints in Cohasset and Hull. Refer to Massport's website, [www.massport.com](http://www.massport.com) for additional general questions and answers regarding the Noise Complaint Line.

Table H-8 Noise Complaint Line					
Community	Calls	Community	Calls	Community	Calls
Arlington.....	8	Malden .....	3	Braintree .....	4
Belmont.....	1	Medford.....	12	Brookline.....	10
Boston.....	24	Revere .....	32	Cohasset.....	310
Charlestown.....	7	Somerville .....	56	Dedham .....	2
Dorchester .....	27	Watertown.....	6	Milton .....	23
East Boston .....	110	Winthrop.....	271	Quincy.....	6
Hyde Park.....	22	Hingham.....	634	Weymouth.....	199
Jamaica Plain .....	505	Hull.....	77	Acton.....	2
Roslindale .....	17	Marshfield .....	1	Andover.....	1
Roxbury .....	123	Plymouth .....	1	Billerica .....	1
South Boston .....	72	Scituate .....	2	Boxborough.....	1
South End.....	210	Beverly.....	4	Canton .....	1
West Roxbury .....	19	Lynn .....	2	Manchester .....	1
Cambridge .....	265	Lynnfield.....	8	Stoneham.....	1
Chelsea.....	50	Marblehead .....	1	Westborough.....	1
Everett .....	30	Nahant .....	75	Westwood .....	1
Lexington .....	1	Salem.....	1	Woburn .....	2
				<b>TOTAL</b>	<b>3,243</b>

Source: Massport NAO

# 2002 EDR

## LOGAN INTERNATIONAL AIRPORT

### Flight Track Monitoring Report

#### 1. Introduction

---

As part of its ongoing commitment to mitigate noise at Logan Airport, Massport has undertaken to evaluate the flight tracks of turbojet aircraft engaged in the implementation of established FAA noise abatement procedures. As is true for any airport operator, however, Massport has no authority to control where individual aircraft actually fly. That remains the responsibility of the Federal Aviation Administration (FAA), while the individual pilots are responsible for safely executing the FAA's instructions. The flight procedures, which are used by the Air Traffic Control (ATC) staff at Boston Tower to achieve desired noise abatement tracks, are contained in the FAA's Tower Order BOS TWR 7040.1.

This is the first annual report for Flight track monitoring; previously Massport has issued semi-annual reports, an outgrowth of the Flight Track Monitoring Program study. That study was contained in the GEIR filed with MEPA in July of 1996, and was the subject of two Community Working Group (CWG) workshops in September and October of 1996. The time period covered by this report is January 1 through December 31, 2002. Massport's consultants prepared the work.

The purpose of the ongoing monitoring program is to identify any systematic changes in flight tracks that may occur and to reduce flight track dispersion, where appropriate. The next report will cover the period January 1, 2003 through December 31, 2003.

#### 2. FAA Air Traffic Control Procedures

---

FAA Tower Order BOS TWR 7040.1 entitled "Noise Abatement" describes the series of noise abatement policies, rules, regulations, and the procedures to be followed by the FAA air traffic controllers in meeting their designated responsibilities to be "a good neighbor and to meet ... operational objectives within the context of mitigating noise whenever circumstances permit." Section 8(e) of the Order, subtitled "Turbojet Departure and Arrival Noise Abatement Procedures" lists the specific procedures that apply to each major departure runway. They are paraphrased below.

Note in the descriptions that follow that terms such as "BOS 2 DME" are used frequently. Here, BOS refers to an aid to navigation known as the BOSTON VORTAC, a radio beacon physically located on the airport near the eastern shoreline between the ends of Runways 27 and 33L. DME refers to "Distance Measuring Equipment", a co-located aid to navigation that provides pilots with a cockpit display of the number of nautical miles that the aircraft is from the designated radio beacon. Thus, BOS 2 DME means an aircraft should be 2 nautical miles away from the BOSTON VORTAC. The term "vectored" means the pilot is assigned to fly a magnetic heading given by and at the discretion of the FAA air traffic controller in order to maintain the safe separation of aircraft. "MSL" means feet above mean sea level--the indicator of aircraft altitude used both by the pilot in the cockpit and the air traffic controller on the ground.

- For departures from Runway 4R, the noise abatement procedure in the Tower Order is: Fly runway heading until the BOS 4 DME, then a heading of 090 degrees until clear of Nahant, then southbound. The departure may be vectored westbound to pass north of Hull and above 6,000 MSL by Deer Island. Otherwise, the

## 2002 EDR

### LOGAN INTERNATIONAL AIRPORT

departures shall be vectored south to cross the shoreline westbound south of the Hull peninsula in the vicinity of the 10-mile range mark above 6,000 MSL. Traffic that is vectored northbound shall cross the shoreline at or above 6,000 MSL in the vicinity of Marblehead Harbor.

- For Runway 9, the procedure is: Fly runway heading until at least the BOS 2 DME before turning. The westbound traffic shall be south of the Hull peninsula in the vicinity of the 10-mile range mark and cross the shoreline above 6,000 MSL. Traffic that is vectored northbound must cross the shoreline at or above 6,000 MSL in the vicinity of Marblehead Harbor.
- For Runway 15R, the procedure is: Fly runway heading to the BOS 1 DME then turn left to 120 degrees. North and south shoreline crossings shall be the same as for Runway 9 [that is, at or above 6,000 MSL].
- For Runway 22R: Turn left to a heading of 140 degrees; upon radar identification, Departure Control [an FAA air traffic control position] will continue the turn east to pass north of the Hull peninsula. The north and south shoreline crossings shall be the same as for Runway 9. [Departures from Runway 22L, occurring far less often than those from Runway 22R, follow this same procedure although the Tower Order does not specify instructions for Runway 22L per se].
- For Runway 27: Fly heading 275 until BOS 2.2 DME, then turn left heading 235 degrees until BOS 6 DME, then on course.
- For Runway 33L: Maintain runway heading to the BOS 2 DME, then turn left heading 315 degrees until leaving 3,000 feet [MSL] or reaching the BOS 5 DME.

These brief procedural statements form the basis of the verbal instructions and flight clearances that are passed from controller to pilot in order to achieve reduced noise in the communities surrounding Logan while also maintaining the safe and efficient flow of aircraft in and out of the airport. However, the consistency with which these procedures can be implemented varies due to air traffic demands, controller workloads, weather conditions, and other operational factors, as noted in the Flight Track Monitoring Program Study.

### 3. Statistical Analyses of Flight Tracks - Runway 4R

---

The Nahant Gate (Figure H-2) monitors aircraft after the first turn at 4 DME. The Swampscott and Marblehead Gates monitor northbound shoreline crossings, while the Hull 2, Hull 3, and Cohasset Gates monitor southbound shoreline crossings.

Tables H-9 and H-10 show the results of the analyses. Table H-9 shows the dispersion of the jet departures on Runway 4R as they pass through the Nahant Gate. Table H-9 shows that Runway 4R departures were concentrated, with 89.9% "over the Causeway", and less than 1% in the south end of the gate. Table H-10 shows how many of the shoreline crossings from Runway 4R were above 6,000 feet. The percentages show improvement over 2001, with 67.0% above 6,000 feet at Swampscott (compared with 37.7% in 2001), and an overall percentage of 94.3% (compared with 87.6%).



# 2002 EDR

## LOGAN INTERNATIONAL AIRPORT

<b>Table H-9 Runway 4R Nahant Gate Summary</b>			
	<b>Number of Tracks Through Gate Segment</b>	<b>Total Number of Tracks Through Gate</b>	<b>Percentage of Tracks Through Gate Segment</b>
North End of Gate	543	5880	9.2%
Over Causeway	5288	5880	89.9%
South End of Gate	49	5880	0.8%
Total	5880	5880	100.0%

<b>Table H-10 Runway 4R Shoreline Crossings Above 6,000 feet</b>			
	<b>Number of Tracks Through Gate</b>	<b>Number Above 6000 Feet</b>	<b>Percentage Above 6000 Feet</b>
Swampscott Gate	491	329	67.0%
Marblehead Gate	933	904	96.9%
Hull 2 Gate	531	531	100.0%
Hull 3 Gate	982	981	99.9%
Cohasset Gate	450	448	99.6%
Total	3387	3193	94.3%

#### 4. Statistical Analyses of Flight Tracks - Runway 9

The Winthrop 1 and Winthrop 2 gates (Figure H-2) monitor early turns for Departures off Runway 9. The Revere, Swampscott, or Marblehead Gates monitor northbound shoreline crossings, while the Hull 2, Hull 3, or Cohasset Gates monitor southbound shoreline crossings.

Tables H-11 and H-12 show the results of the analyses. Table H-11 shows how many tracks turned prior to the BOS 2 DME. Northbound turns before BOS 2 DME pass through the Winthrop 1 Gate. In 2002, there were a total of 15 such turns, or about 0.5%. Table H-12 indicates that 97.9% of Runway 9 departures were 6,000 feet when crossing the shoreline, as compared with 98.0% in 2001.

# 2002 EDR

## LOGAN INTERNATIONAL AIRPORT

<b>Table H-11 Runway 9 Gate Summary - Winthrop Gates 1 and 2</b>			
	<b>Number of Departure Tracks</b>	<b>Number of Tracks Through Gate</b>	<b>Percent Turning Before BOS 2 DME</b>
Winthrop 1 Gate	30019	15	0.0%
Winthrop 2 Gate	30019	165	0.5%
Total	30019	180	0.6%

<b>Table H-12 Runway 9 Shoreline Crossings Above 6,000 Feet</b>			
	<b>Number of Tracks Through Gate</b>	<b>Number Above 6000 Feet</b>	<b>Percentage Above 6000 Feet</b>
Revere Gate	148	130	87.8%
Swampscott Gate	5337	5136	96.2%
Marblehead Gate	6986	6932	99.2%
Hull 2 Gate	5832	5699	97.7%
Hull 3 Gate	18559	18132	97.7%
Cohasset Gate	3209	3207	99.9%
Total	40071	39236	97.9%

### 5. Statistical Analyses of Flight Tracks - Runway 15R

After takeoff, Runway 15R departures turn left approximately 30 degrees to avoid Hull, head out over Boston Harbor, and return back over the shore through the Swampscott and Marblehead Gates (Figure H-2) to the north, or through the Hull 2, Hull 3, and Cohasset Gates to the south.

Table H-13 shows the results of the analysis. Table H-13 shows that 88.6% of all Runway 15R departures crossed the shoreline above 6,000 feet. Runway 15R has the lowest percentages of departures meeting the shoreline crossing goal of 6,000 feet.

<b>Table H-13 Runway 15R Shoreline Crossings Above 6,000 feet</b>			
	<b>Number of Tracks Through Gate</b>	<b>Number Above 6000 Feet</b>	<b>Percentage Above 6000 Feet</b>
Swampscott Gate	9	992	99.1%
Marblehead Gate	4	799	99.5%
Hull 2 Gate	42	353	89.4%
Hull 3 Gate	611	2411	79.8%
Cohasset Gate	9	711	98.8%
Total	5941	5266	88.6%

# 2002 EDR

## LOGAN INTERNATIONAL AIRPORT

### 6. Statistical Analyses of Flight Tracks - Runways 22R/22L

The Squantum 2 and Hull 1 Gates (Figure H-2) are used to monitor the turn to 140 degrees over Boston Harbor and north of Hull. The shoreline gates are used to monitor shoreline crossings, as for Runways 4R, 9, and 15R above.

Tables H-14, H-15, and H-16 show the results of the analyses. Table H-14 shows the dispersion of the jet departures from Runways 22R/22L as they pass through the Squantum 2 Gate. Table H-15 shows that 95.6% of the tracks were north of the Hull peninsula as they passed through the Hull 1 Gate. This percentage is higher than in 2001. Table H-16 shows that 98.2% of the shoreline crossings from Runways 22R/22L were above 6,000 feet; as compared with 93.8% in 2001.

<b>Table H-14 Runways 22R/22L Squantum 2 Gate Summary</b>			
	<b>Number of Tracks Through Gate Segment</b>	<b>Total Number of Tracks Through Gate</b>	<b>Percentage of Tracks Through Gate Segment</b>
0 - 12,000 ft	44239	57244	77.3%
12,000 - 14,000 ft	8073	57244	14.1%
14,000 - 21,000 ft	4752	57244	8.3%
21,000 - 27,000 ft	160	57244	0.3%
Total	57244	57244	100.0%

<b>Table H-15 Runways 15R/22R/22L Gate Summary - North of Hull Peninsula</b>			
	<b>Number of Tracks Through Gate</b>	<b>Number of Tracks North of Hull Peninsula</b>	<b>Percentage of Tracks North of Hull Peninsula</b>
Hull 1 Gate	65462	62591	95.6%

<b>Table H-16 Runways 22R/22L Shoreline Crossings Above 6,000 Feet</b>			
	<b>Number of Tracks Through Gate</b>	<b>Number Above 6000 Feet</b>	<b>Percentage Above 6000 Feet</b>
Revere Gate	1634	1620	99.1%
Swampscott Gate	9603	9589	99.9%
Marblehead Gate	3705	3701	99.9%
Hull 2 Gate	3652	3477	95.2%
Hull 3 Gate	25441	24799	99.9%
Cohasset Gate	3773	3769	98.2%
Total	47808	46955	98.2%

# 2002 EDR

## LOGAN INTERNATIONAL AIRPORT

### 7. Runway 27

---

On September 15, 1996, the FAA implemented a new departure procedure for Runway 27. In accordance with the provisions of the Record of Decision issued for the Runway 27 EIS, Massport has been providing on-going radar flight track data and analysis to the FAA with respect to the new procedure. Once the FAA has completed its review and made any changes needed to achieve the objectives of the procedure, Massport will commence on-going monitoring and reporting with respect to Runway 27.

### 8. Statistical Analyses of Flight Tracks - Runway 33L

---

The Somerville and Everett Gates (Figure H-2) extend from BOS 2 DME to BOS 5 DME and are used to monitor the departure procedure for Runway 33L.

Table H-17 shows the results of the analyses. The table indicates that 6.5% of tracks turned prior to either achieving 3,000 feet or reaching the BOS 5 DME. Turns to the left prior to the BOS 5 DME would pass through the Somerville Gate. Turns to the right prior to the BOS 5 DME would pass through the Everett Gate. The performance in this table is similar to 2001.

<b>Table H-17 Runway 33L Gates - Passages Below 3,000 feet</b>			
	<b>Number of Departure Tracks</b>	<b>Number of Tracks Turning Before BOS 5 DME Below 3,000 ft</b>	<b>Percentage of Tracks Turning Before BOS 5 DME Below 3,000 ft</b>
Everett Gate	8570	358	4.2%
Somerville Gate	8570	201	2.3%
Total	8570	559	6.5%