MEMORANDUM **VIA EMAIL**

Date: January 31, 2008

To: BOS/TAC Members

From: Stephen Smith [ORIGINAL SIGNED] – Project Consultant

Subject: BOSTON LOGAN AIRPORT NOISE STUDY (BLANS), EXISTING CONDITIONS COMPARATIVE ANALYSIS: 2005 AND 2006

Background

The purpose for the Phase 2 BLANS existing conditions analysis is to use actual data to develop an Integrated Noise Model (INM) model dataset, and use the results as a base for BOS/TAC to reference in order to come to a consensus on the planning validity of the modeling for the future No Action alternative. The Project Consultant (PC) clarified at the May 24, 2007 BOS/TAC meeting, that this base was not to include Runway 14/32 which would be considered in the future No Action analysis. It is also not intended to be used to define existing conditions in accordance with the National Environmental Policy Act (NEPA). If an Environmental Assessment (EA) or Environmental Impact Statement (EIS) is to be conducted in Phase 3, an updated existing condition contour for NEPA purposes would be developed. Based on their understanding of the purpose of developing the 2005 existing conditions, BOS/TAC indicated consensus to assess "existing conditions" for a period when Runway 14/32 was not yet available.

The BLANS Phase 2 scope of work calls for utilizing the full year of data collected for 2005. At the time of finalizing the scope of work, the year 2005 was the most recent full year of data available. At the time the noise modeling protocol was presented, the year 2006 dataset became available. At the BOS/TAC May 24th meeting, BOS/TAC members questioned if the 2005 data still represents existing conditions prior to implementing Runway 14/32 now that a full year of 2006 is available. PC and Independent Consultant (IC) discussed the purpose of using a base set of data to use as a starting point to develop the future No Action dataset. According to the BOS/TAC May 24th meeting notes, the PC proposed a resolution to maintain 2005 as the Phase 2 existing conditions in addition to conducting a comparative analysis between 2005 and 2006 to confirm that 2005 remains as a reasonable reflection of existing conditions prior to implementing Runway 14/32. There was a general consensus in support of the proposed resolution.

As stated in FAA Order 1050.1E, *Environmental Impacts: Policies and Procedures* Section 14.2 all computer model input data should "reasonably reflect" current and forecasted conditions. Although the development of the existing conditions for this Phase of the BLANS is not intended to represent a NEPA defined existing condition, the goal is to determine if the 2005 calendar year, when compared to 2006, "reasonably reflects" the existing conditions on an average annual day prior to the opening of Runway 14/32. The following data was considered in the comparison:

1. Average annual day operations (includes aircraft type)
2. Comparison of day and night annual operations
3. Annual runway use

4. Runway 27 Noise Abatement Departure Procedure (NADP) compliance (requested by BOS/TAC CAC members)
5. Comparison of 65 DNL and higher contours

The methodology used to analyze these data is described below. The results were tabulated and illustrated to better present the findings. Massport's Environmental Data Reports (EDR) for 2005 and 2006 were the primary sources for the data items listed above. Other sources used are noted where appropriate.

Introduction and Methodology

Each of the components addressed in this analysis act together to effect the overall average annual day noise environment surrounding the Boston Logan International Airport (the Airport). Each component addressed below may not contribute to the noise environment in the same manner, but all are important to obtain a depiction of the average annual day aircraft noise levels surrounding the Airport. The 2006 EDR report was published by Massport on September 2007. In conjunction with the 2005 EDR report, the PC used the same source information to conduct the comparisons. In addition, information made available by the FAA related to Runway 27 Area Navigation (RNAV) compliance was reviewed.

Weather data used for baseline noise modeling are 10-year averages of measured temperature, humidity and barometric pressure data. Because a long-term average was used, a discussion of annual weather for 2005 compared to 2006 is not relevant to this analysis. Because actual runway use data is available, wind data used to determine runway availability is not required.

The annual operational data are presented as average annual day (AAD) data compared year to year. The EDR reports for 2005 and 2006 were the primary sources of data for this analysis. The data is used as presented in the reports. The data is used to compare operation levels and time of day distribution data between 2005 and 2006. For runway use, runway use data from the EDR reports for 2000, 2002, 2003, 2004, 2005 and 2006 were applied in order to determine if 2005 runway use patterns reflect a long-term average pattern. Differences were stated where appropriate. PC also reviewed differences in the Runway 27 RNAV departure corridor dispersion in order to determine if improved compliance between 2005 and 2006 would require adjustments to 2005-based INM tracks. PC provides a general qualitative assessment of the 65 DNL and higher contours as illustrated in the 2006 EDR in order to link the differences noted in operational patterns and the cumulative effect each had on the change in contour area. The last section of this document provides PC's conclusion.

1. Average Annual Day Operations

Total numbers of average annual day (AAD) operations for 2005 and 2006 by aircraft category are listed in **Table 1**. The operations are listed by the following aircraft categories: heavy jet, light jet, regional jet/ corporate jet and non-jet. This is consistent with the runway use categories applied in the EDR reports. These categories also provide consistency with INM aircraft categories for varying aircraft types. For further details related to the specific aircraft type for each category, refer to Appendix H of the EDR reports. **Exhibit 1** illustrates the data provided in Table 1. Note that values are rounded to nearest whole number and rounding errors of +/-1 operation occur.

Table 1

Total Average Annual Day Operations

Aircraft Category	2005	2006	% Change
Heavy Jet	60	46	-22%
Light Jet	538	537	0%
Regional Jet/Corporate Jet	352	368	5%
Non Jet	171	161	-6%
Total	1,121	1,113	-1%

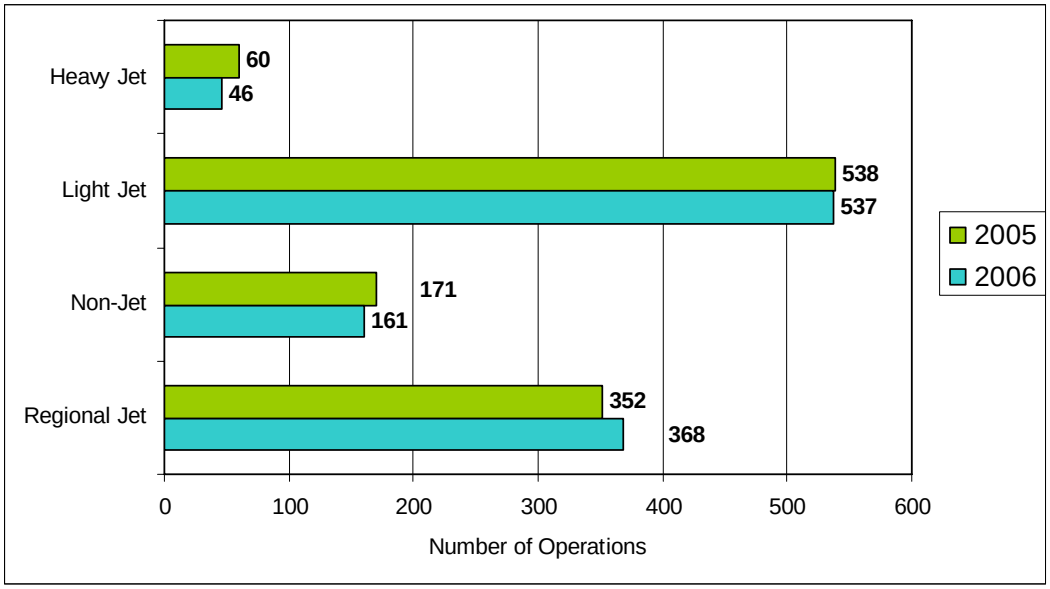
Note: totals Values rounded to nearest whole number; rounding errors of +/-1

Sources: Table H-1 from 2005 and 2006 EDR reports Appendix H for Boston-Logan International Airport.
Prepared by: Wyle Laboratories, 2008

The total number of average annual day operations between 2005 and 2006 are practically the same. When 2005 aircraft categories are compared to 2006, three of the four categories are similar. The Heavy Jet category declined in average annual number of operations by 22 percent, which is consistent with other previous year patterns.

Exhibit 1

Total Average Annual Day Operations



Sources: Table H-1 from 2005 and 2006 EDR reports Appendix H for Boston-Logan International Airport.
Prepared by: Wyle Laboratories, 2008

In order to better understand the effect of the Heavy Jet reduction, one also needs to account for the day/night distribution of the average annual day operations. Time of day distribution is a critical element related to DNL contour size because nighttime operation noise events are weighted by 10 dBA or an equivalent of 10 daytime operations for one nighttime operation. Daytime hours are

defined as those between 7:00 a.m. (0700 hours) and 10:00 p.m. (2200 hours) and nighttime hours are defined as those between 10:00 p.m. (2200 hours) and 7:00 a.m. (0700 hours). **Table 2** presents a comparison of arrivals and departures by time of day. **Exhibit 2** is a further illustration of the data. When 2005 is compared to 2006, the total number of daytime and nighttime operations is fairly consistent.

Table 2

Comparison of Average Annual Day/Night Operations

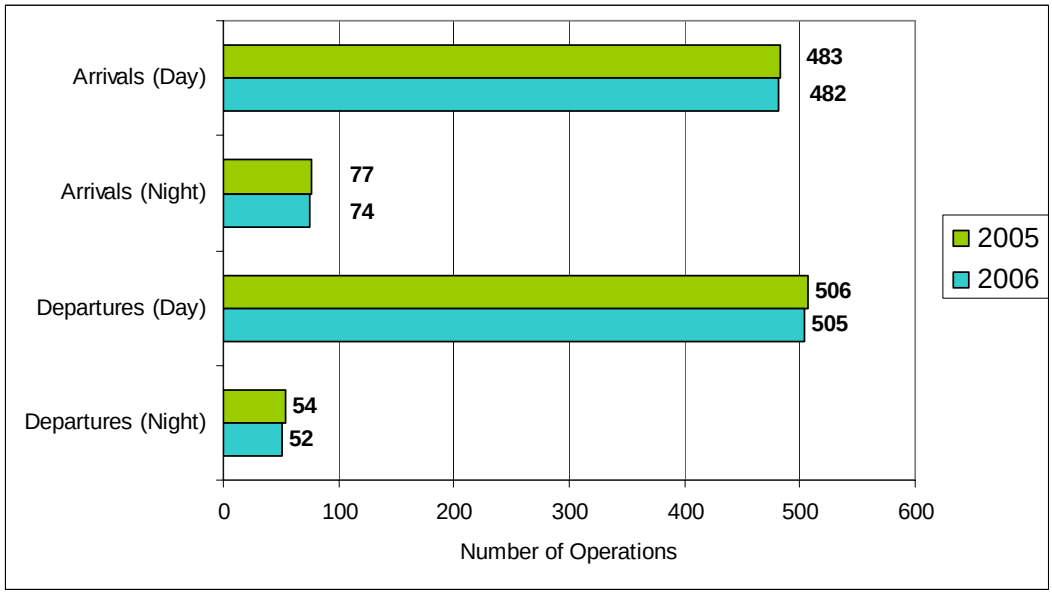
Operation Type	2005	2006
Day Arrivals	483	482
Night Arrivals	77	74
Total Arrivals	560	556
Day Departures	506	505
Night Departures	54	52
Total Departures	560	556
Total Operations	1,121	1,113

Note: Values rounded to nearest whole number; rounding errors of +/-1

Sources: 2005 and 2006 Boston-Logan International Airport EDR Reports
Prepared by: Wyle Laboratories, 2008

Exhibit 2

Comparison of Day-Night Average Annual Day Operations



Source: See Table 4.
Prepared by: Wyle Laboratories, 2008

With the day/night distribution about the same, PC conducted an area equivalent analysis using FAA's Area Equivalent Method (AEM version 7). AEM is a mathematical procedure that provides an estimated change in noise contour area for an airport given the types of aircraft and the number of

operations for each aircraft. The noise contour area reported by AEM is an estimated measure of the size of potential landmass enclosed within a level of noise as produced by a given set of aircraft operations. The AEM is used to develop insight into the potential increase or decrease of noise resulting from a change in aircraft operations. It is to be used when the analysis can assume similar runway and flight track utilization between a basecase and alternative. An indication of 17 percent change or more in the 65 DNL area signifies a potential for a significant change in the 65 DNL area.

For purposes of this evaluation, PC utilizes the AEM to isolate and quantify the effect of the fleet mix operations level change between 2005 and 2006. According to the AEM results using the INM fleet mix data made available in Appendix H of the 2005 and 2006 EDR, the 65 DNL area decreases by six and a half (6.5) percent. This is well below the indication of a significant change (17 percent). The AEM spreadsheet is provided in Attachment 1. Therefore, the fleet mix difference, primarily found with the Heavy Jets, does not cause a significant difference between 2005 and 2006.

2. Annual Runway Use

Annual arrival and departure runway use for 2005 and 2006 are shown in **Table 3** and **Table 4**, respectively. Arrivals and departures are shown for daytime and nighttime hours.

Table 3

Annual Runway Operations – Arrivals

Runway	2005		2006	
	DAY	NIGHT	DAY	NIGHT
04L	10.7%	3.3%	9.2%	3.0%
04R	32.5%	25.3%	28.3%	25.5%
09	0.0%	0.0%	0.0%	0.0%
14	0.0%	0.0%	0.0%	0.0%
15L	0.1%	0.0%	0.0%	0.0%
15R	1.4%	1.2%	1.2%	0.9%
22L	12.0%	16.2%	14.4%	17.2%
22R	0.4%	0.1%	0.6%	0.1%
27	28.4%	24.4%	32.0%	26.6%
32	0.0%	0.0%	0.3%	0.0%
33L	14.2%	29.4%	13.7%	26.5%
33R	0.3%	0.0%	0.4%	0.0%
Total	100.0%	100.0%	100.0%	100.0%

Note: Columns may not add to totals shown because of rounding.

Sources: Appendix H from the 2005 and 2006 Environmental Data Reports for Boston-Logan International Airport
Prepared by: Wyle Laboratories, 2008

Runway use in 2006 was similar to runway use in 2005 except for an increase in the use of Runway 22R for departures in 2006, primarily during nighttime hours. During 2006, about 40 percent of all nighttime departures operated from Runway 22R compared to 29 percent for 2005. Nighttime departures from Runway 15R changed from 17 percent in 2005 to about eight (8) percent in 2006.

Year to year runway use patterns will fluctuate due to numerous variables such as weather and/or runway closures for construction. In order to assess if 2005 reasonably represents average annual day runway use patterns at the Airport, PC reviews other previous years of runway use patterns and compares the average runway use utilization for a series of years to 2005 and 2006.

Table 4

Annual Runway Operations – Departures

Runway	2005		2006	
	DAY	NIGHT	DAY	NIGHT
04L	2.9%	0.6%	2.2%	0.2%
04R	4.7%	3.5%	4.1%	3.4%
09	31.8%	25.6%	28.7%	26.6%
14	0.0%	0.0%	0.0%	0.0%
15L	0.2%	0.1%	0.2%	0.0%
15R	8.0%	17.0%	5.0%	8.2%
22L	1.6%	1.3%	1.1%	0.8%
22R	30.2%	28.6%	38.3%	40.1%
27	13.0%	16.1%	13.6%	15.0%
32	0.0%	0.0%	0.0%	0.0%
33L	7.5%	7.3%	6.8%	5.6%
33R	0.0%	0.0%	0.0%	0.0%
Total	100.0%	100.0%	100.0%	100.0%

Note: Columns may not add to totals shown because of rounding.

Sources: Appendix H from the 2005 and 2006 Environmental Data Reports for Boston-Logan International Airport
Prepared by: Wyle Laboratories, 2008

Table 5 and **Table 6** provide the year-to-year fluctuation in runway use at the Airport for arrivals and departures, respectively. **Exhibit 3** and **Exhibit 4** illustrate the same runway use data for each runway end by daytime and nighttime depicted in Table 5 and Table 6, respectively. When compared to the average use for 2000 and 2002 through 2006, the 2005 runway use pattern more closely reflects the average long-term use patterns compared to 2006. This comparison indicates the possibility of nighttime activity during 2006, such as construction, that altered typical runway use patterns.

To summarize, given the fluctuation in runway usage, the annual arrival and departure runway usage in 2005 reasonably reflects existing condition patterns prior to implanting Runway 14/32. When all the years are averaged, 2005 patterns closely reflect the long-term average.

3. Flight Track Location and Utilization

There are no documented changes in air traffic procedures between 2005 and 2006. Therefore, the location and use of flight routes for 2005 provides a reasonable reflection of existing conditions prior to the implementation of Runway 14/32. Use of flight procedures primarily relate directly to runway use.

According to the May 24th BOS/TAC meeting notes, CAC members inquired about the change in the Runway 27 departure route and the effect in improved compliance of the RNAV procedure on noise modeling. Assessment of the published Runway 27 Noise Abatement Departure Procedure involves a series of five gates, labeled A through E illustrated on **Exhibit 5**. The procedure directs aircraft departing from Runway 27 to proceed to the GARVE "Fly-By" navigational aid, and then change heading to fly through the corridor that intersects each of the gates (corridor is shown as a roughly triangular section on Exhibit 5). This procedure has been in effect for several years.

Table 5

Annual Runway Operations – Arrivals

Runway	2000		2002		2003		2004		2005		2006		Average	
	DAY	NIGHT	DAY	NIGHT	DAY	NIGHT	DAY	NIGHT	DAY	NIGHT	DAY	NIGHT	DAY	NIGHT
04L	14.2%	3.9%	9.9%	2.2%	10.1%	3.6%	8.5%	2.0%	10.7%	3.3%	9.2%	3.0%	10.4%	3.0%
04R	30.5%	28.2%	28.4%	25.7%	30.8%	27.7%	34.0%	25.9%	32.5%	25.3%	28.3%	25.5%	30.7%	26.4%
09	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
14	0.0%	0.0%	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%	0.1%	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%
15R	1.0%	3.2%	0.8%	0.4%	1.1%	0.9%	1.3%	1.0%	1.4%	1.2%	1.2%	0.9%	1.1%	1.3%
22L	11.0%	12.6%	12.6%	20.7%	12.9%	23.6%	12.1%	18.5%	12.0%	16.2%	14.4%	17.2%	12.5%	18.1%
22R	3.3%	5.0%	0.3%	0.1%	0.4%	0.2%	0.4%	0.0%	0.4%	0.1%	0.6%	0.1%	0.9%	0.9%
27	22.4%	19.3%	29.0%	22.5%	28.1%	21.1%	23.7%	18.8%	28.4%	24.4%	32.0%	26.6%	27.3%	22.1%
32	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.3%	0.0%	0.0%	0.0%
33L	16.2%	27.6%	18.0%	28.2%	15.8%	23.0%	19.6%	33.8%	14.2%	29.4%	13.7%	26.5%	16.2%	28.1%
33R	1.5%	0.3%	1.0%	0.1%	0.7%	0.1%	0.4%	0.0%	0.3%	0.0%	0.4%	0.0%	0.7%	0.1%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Note: Columns may not add to totals shown because of rounding.

Sources: Appendix H from the Environmental Data Reports for Boston-Logan International Airport
Prepared by: Wyle Laboratories, 2008

Table 6

Annual Runway Operations – Departures

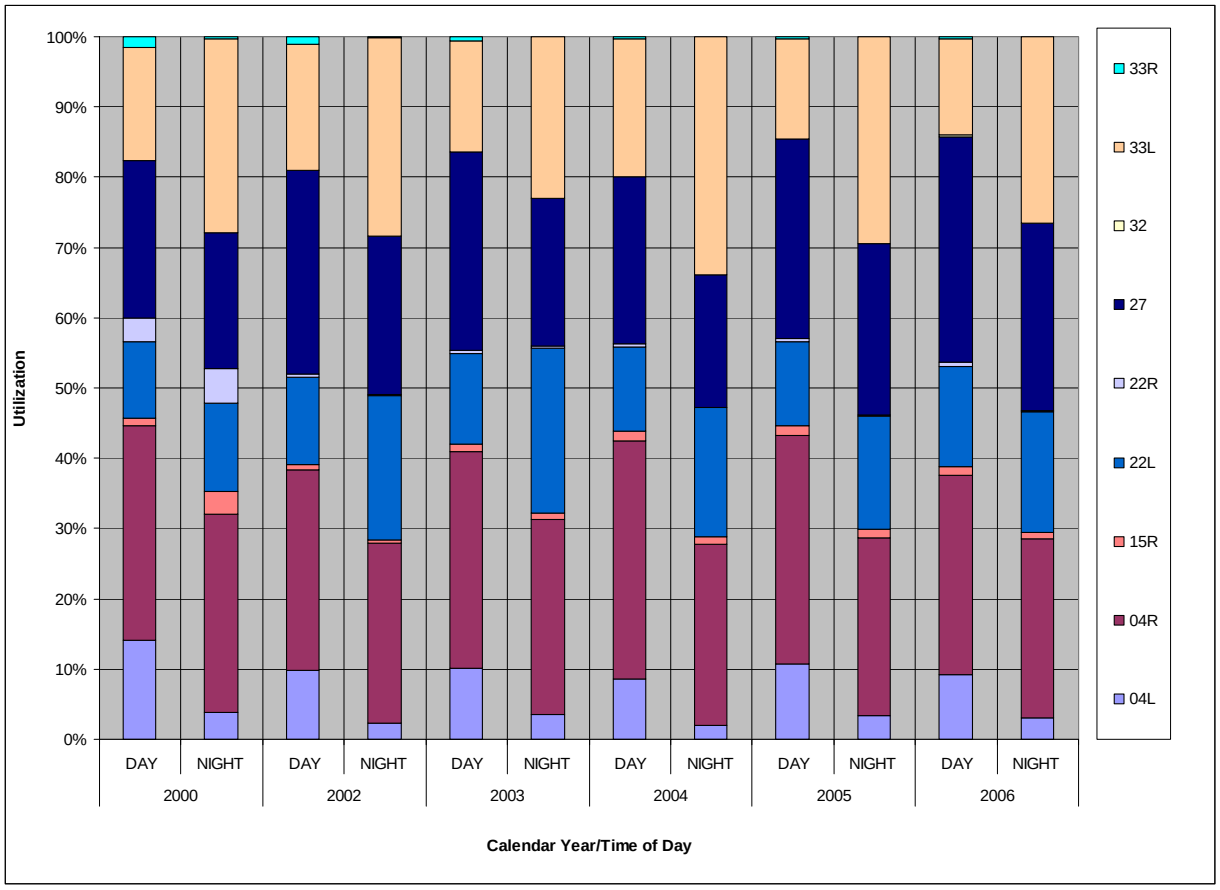
Runway	2000		2002		2003		2004		2005		2006		Average	
	DAY	NIGHT	DAY	NIGHT	DAY	NIGHT	DAY	NIGHT	DAY	NIGHT	DAY	NIGHT	DAY	NIGHT
04L	8.9%	3.6%	3.1%	0.6%	2.6%	0.5%	2.6%	0.3%	2.9%	0.6%	2.2%	0.2%	3.7%	1.0%
04R	6.4%	5.2%	3.3%	2.8%	3.5%	3.5%	5.7%	3.5%	4.7%	3.5%	4.1%	3.4%	4.6%	3.6%
09	28.7%	23.9%	28.8%	20.9%	32.1%	23.1%	27.8%	22.6%	31.8%	25.6%	28.7%	26.6%	29.7%	23.8%
14	0.0%	0.0%	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%	0.2%	0.0%	0.2%	0.1%	0.2%	0.1%	0.2%	0.1%	0.2%	0.0%	0.2%	0.1%
15R	2.7%	12.1%	4.2%	18.0%	5.3%	21.1%	11.7%	20.4%	8.0%	17.0%	5.0%	8.2%	6.1%	16.2%
22L	2.3%	2.4%	2.2%	2.5%	1.8%	2.6%	4.3%	3.3%	1.6%	1.3%	1.1%	0.8%	2.2%	2.1%
22R	31.1%	31.1%	36.7%	31.0%	34.9%	31.2%	23.7%	21.3%	30.2%	28.6%	38.3%	40.1%	32.5%	30.6%
27	12.2%	15.9%	15.0%	18.8%	13.2%	12.9%	16.2%	19.0%	13.0%	16.1%	13.6%	15.0%	13.9%	16.3%
32	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
33L	7.7%	5.8%	6.4%	5.4%	6.4%	5.0%	7.4%	9.4%	7.5%	7.3%	6.8%	5.6%	7.0%	6.4%
33R	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.3%	0.1%	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Note: Columns may not add to totals shown because of rounding.

Sources: Appendix H from the 2005 and 2006 Environmental Data Reports for Boston-Logan International Airport
Prepared by: Wyle Laboratories, 2008

Exhibit 3

Annual Runway Use – Arrivals



Source: Table 2: Annual Runway Use-Arrivals
Prepared by: Wyle Laboratories, 2008

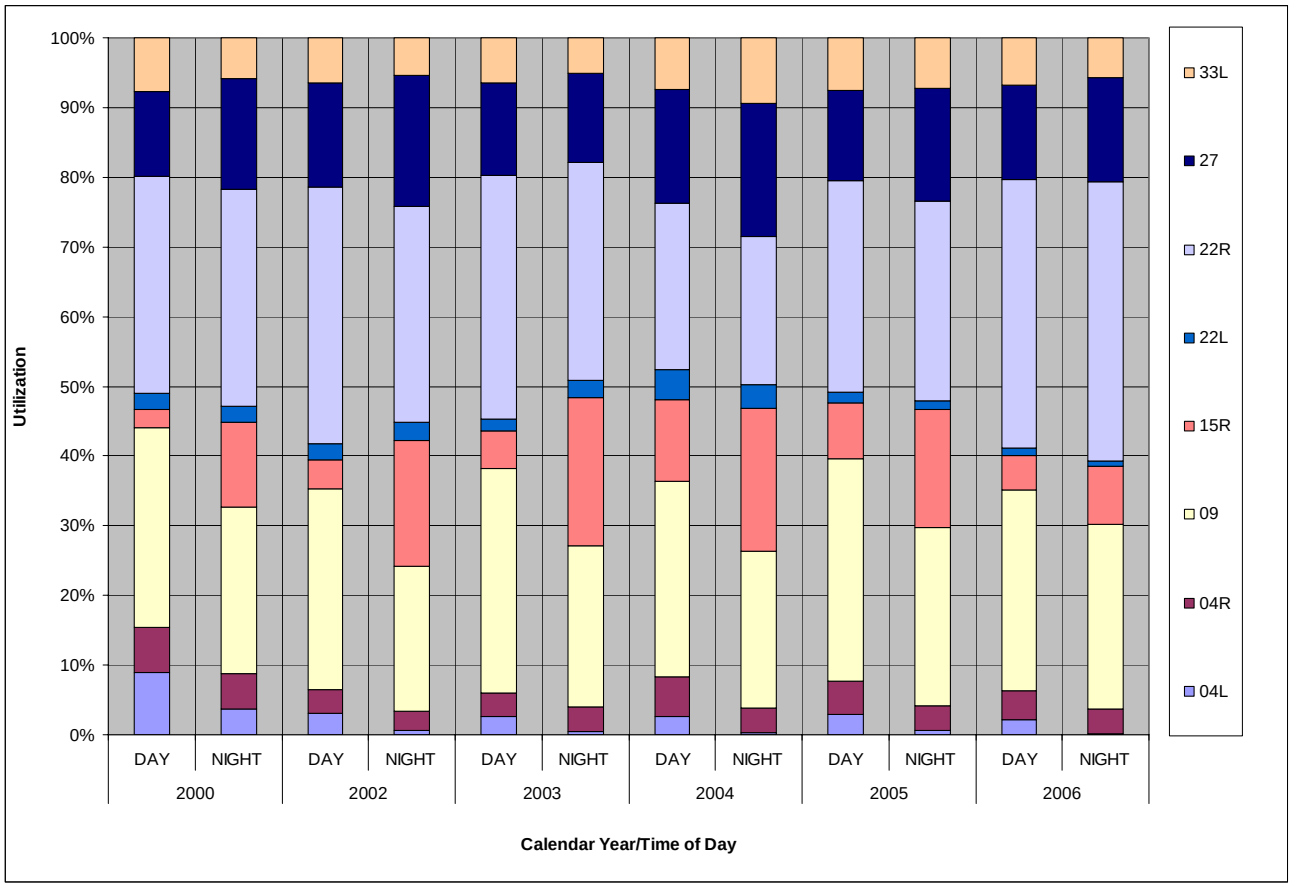
Massport and the FAA track the use of this procedure and keeps a record of monthly compliance. Compliance is determined for each gate; a flight track can either be inside the corridor (i.e., in compliance), or west or east of the corridor (i.e., not in compliance). The percentage of tracks inside the corridor for each gate is shown in **Table 7** as an average of the monthly percentages for each year. The average percentage of flights inside the corridor and standard deviation (based on monthly percentages) are shown for 2005 and 2006. The percentages are higher for the farther-away gates mainly because they are wider and the pilots have more time to get the aircraft on course. It is perhaps more difficult for a pilot to fly through a close-in gate during the initial stages of climb-out.

The data shows that compliance with the NADP was higher in 2006 than in 2005. The average improvement ranged from 1.1 percent to 2.8 percent. Note that this improvement is, in most cases, within the standard deviation of the monthly averages for each year. When constructing INM normalized tracks, an INM modeler attempts to capture at least 90 percent of the radar tracks as means to define a statistically significant INM track. According to the percentage of operations in compliance with the defined corridor, the definition of an INM track location and dispersion

representing this corridor would be practically identical for 2005 and 2006. Therefore, INM tracks defined via 2005 radar data will still provide a reasonable reflection of 2006 conditions.

Exhibit 4

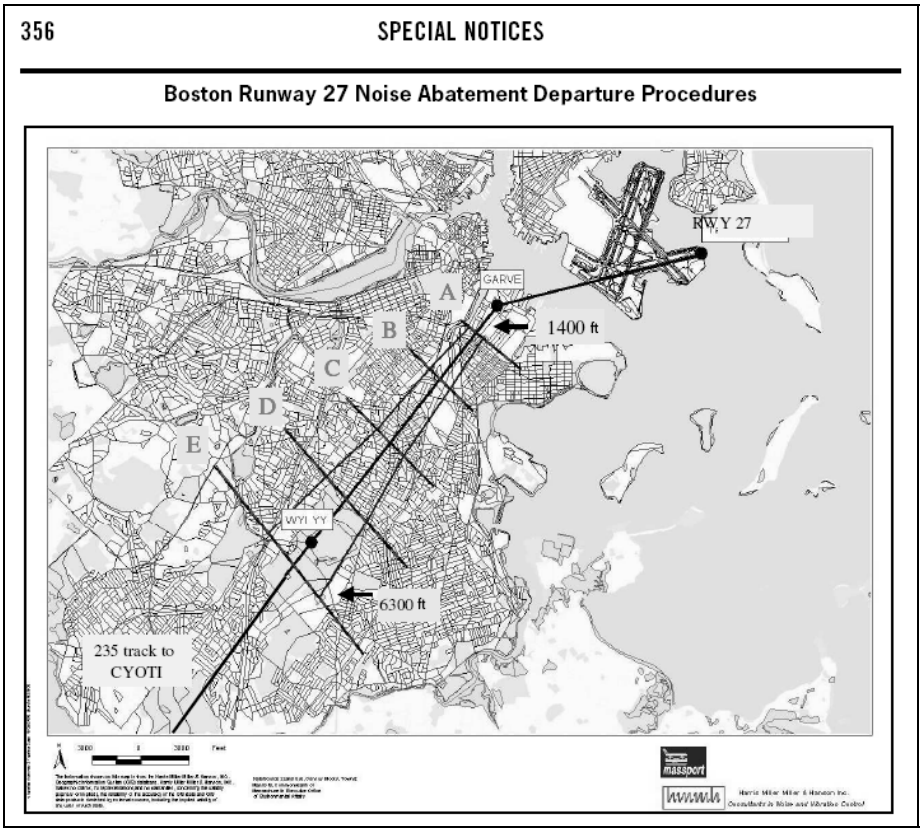
Annual Runway Use – Departures



Source: Table 3: Annual Runway Use-Departures
Prepared by: Wyle Laboratories, 2008

Exhibit 5

Published Runway 27 NADP



Source: http://www.faa.gov/airports_airtraffic/airports/regional_guidance/new_england/environmental/logan_documents, August 31, 2007
Prepared by: Wyle Laboratories, 2007

Table 7

Runway 27 – Percentage of Departures Inside Corridor

Year	Statistic	Gate A	Gate B	Gate C	Gate D	Gate E
2005	Monthly Average	60.4%	70.2%	84.4%	91.6%	87.5%
	Standard Deviation	2.4%	2.3%	2.4%	2.2%	2.8%
2006	Monthly Average	63.2%	72.5%	85.6%	92.7%	89.6%
	Standard Deviation	1.8%	1.6%	1.7%	1.3%	1.9%
	Change in Average Percentage	+2.8%	+2.3%	+1.2%	+1.1%	+2.1%

Source: Runway 27 Analysis - Percentage of Departures Inside and Outside of Corridor, March 19, 2007 (Massport 2007)
Prepared by: Wyle Laboratories, 2007

4. DNL Contour Comparison

The 2006 EDR report provides a comparison of the 65 DNL contours for the 2005 and 2006. This map is reproduced as **Exhibits 6** below. Comparison of the two contours provide a cumulative result related to the changes in annual average runway use, numbers of operations, and fleet mix discussed in the above sections. PC reviews the two contours to confirm that the overall shape and size was similar, and identify the overall effect of the differences in runway use, number of operations and fleet mix.

The contours will change shape and size from year to year; this is consistent with the changes in operations and runway usage shown in the previous sections of this memo. For example, the 65 DNL contour for 2006 is slightly larger than 2005 to the north and east of the Airport due to slight increases in arrival operations to Runways 22L and 27, respectively. As stated in Section 2, the slight change in runway use is not reflective of a continuing pattern. In fact, 2006 runway use patterns differ when compared to the long-term average runway use pattern and 2005 is more similar. The overall size of the 65 DNL and higher contour for 2006 is slightly smaller than 2005. As described in Section 1, the overall size reduction appears to be caused by the reduction of Heavy Jet operations, although the decrease is not considered significant according to the AEM analysis conducted by PC and the contour area published in the 2006 EDR.

In summary, a visual inspection of the 65 DNL contours does not reveal anything that would indicate that 2005 does not reasonably reflect existing conditions prior to the use of Runway 14/32.

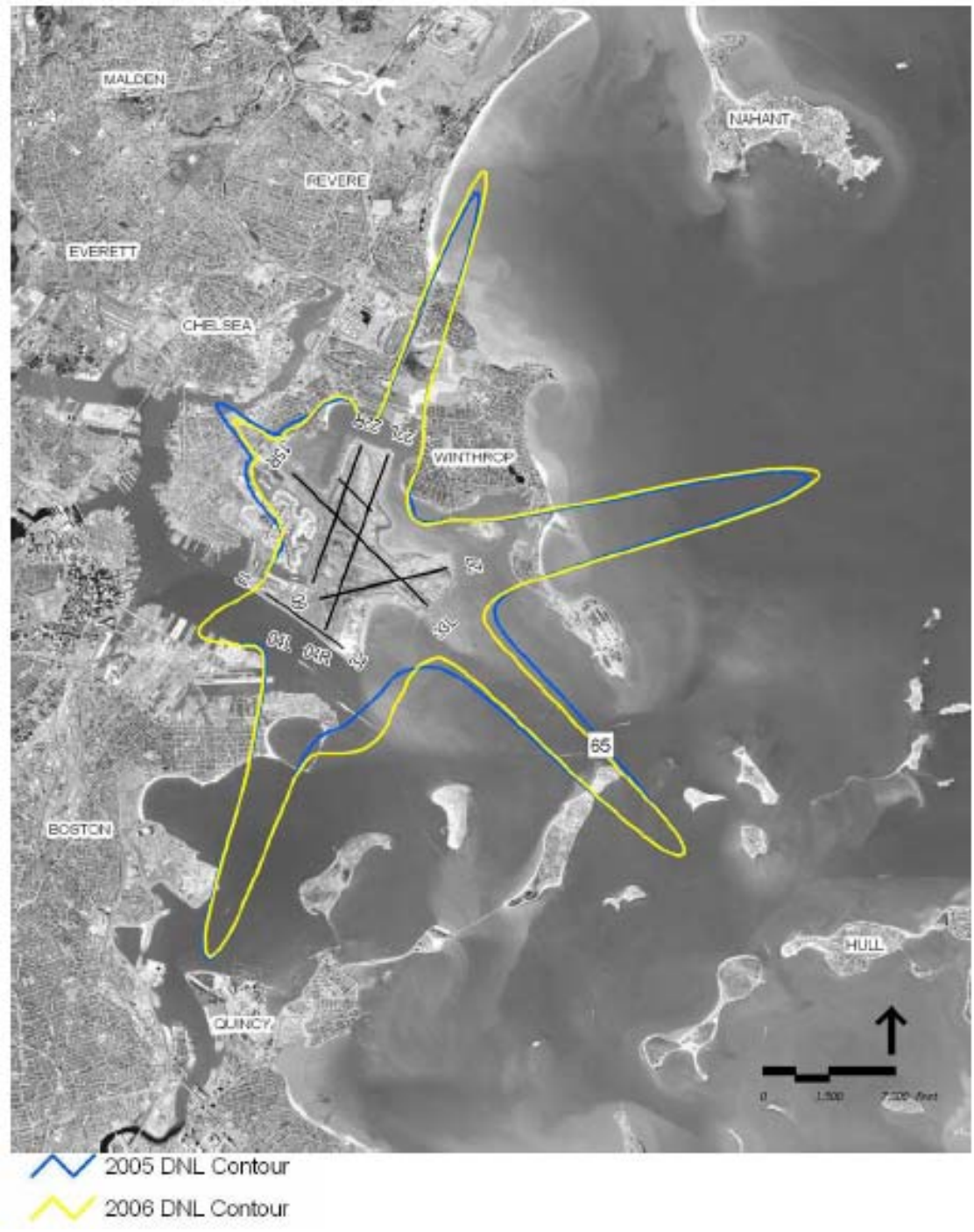
6. Summary

The following data is included in this analysis: average annual day operations, comparison of day/night distribution, annual runway use, and Runway 27 NADP compliance. These data contribute to the annual 65 DNL contours shown in Exhibits 6.

The analysis of operations by aircraft type categories and by day/night splits shows that 2005 provides a reasonable reflection of conditions that occurred just prior to the implementation of Runway 14/32. Given the fluctuation in runway usage between 2005 and 2006, the two years were compared to a long-term average runway use pattern defined by 2000, 2002, 2003, 2004, 2005 and 2006. The 2005 runway use pattern provides a reasonable reflection of annual average runway use patterns at the Airport when infrequent activities such as construction are not occurring.

Exhibit 6

Comparisons of 2006 and 2005 65 DNL and Higher contours from EDR



Source: 2006 Environmental Data Report for Boston-Logan International Airport, Chapter 6, Massport 2007

The inspection of the changes in 65 DNL contours between 2005 and 2006 does not reveal anything that would indicate that 2005 does not reasonably reflect existing conditions prior to implementing Runway 14/32.

In conclusion, no aspect of the 2005 data justifies modifications to ensure a base dataset for purposes of this study reasonably reflects existing conditions prior to implementing Runway 14/32. Therefore, PC recommends continuing the use of 2005 data for purposes of Phase 2 alternative analysis.

cc: 06-06-0376-5.3
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Attachment 1

2005/2006 AEM Analysis

Area Equivalent Method (AEM) Version 7.0

Airport Name/Code:	BOS - 2005 (Base) vs. 2006 (Alternative)

DNL (dBA)	Baseline Area (sq.mi.)	Alternative Area (sq.mi.)	Change in Area (sq.mi.)
65	11.7	10.9	-6.5%

	BASE Case		ALTERNATIVE Case	
Aircraft Type	Daytime LTO Cycles	Nighttime LTO Cycles	Daytime LTO Cycles	Nighttime LTO Cycles
1900D			50.75	2.12
707				
707120				
707320	0.02			
707QN				
717200	45.78	3.74	52.18	5.75
720				
720B				
727100				
727200				
727D15				
727D17	1.48	1.44		
727EM1	2.02	4.15	0.22	0.40
727EM2	0.01	0.01	2.67	6.13
727Q15				
727Q7				
727Q9			0.02	0.02
727QF	0.00		0.07	0.05
737				
737300	53.25	5.48	13.84	1.70
7373B2			13.86	1.98
737400	10.54	1.05	5.05	1.16
737500	17.08	0.94	21.81	1.39
737700	5.71	1.86	9.54	4.19
737800	32.41	6.79	16.61	3.52
737D17				
737N17	2.43	1.15	1.51	0.33
737N9			0.19	0.01
737QN				
747100				
74710Q				
747200		0.01		
74720A				
74720B	4.07	0.08	5.23	0.17

	BASE Case		ALTERNATIVE Case	
Aircraft Type	Daytime LTO Cycles	Nighttime LTO Cycles	Daytime LTO Cycles	Nighttime LTO Cycles
747400			0.07	
747SP				
757300	0.76	0.51	0.82	0.62
757PW	95.51	17.54	62.67	11.90
757RR			34.41	6.03
767300	7.97	0.56	5.31	0.29
767400	0.04	0.01		
767CF6	1.51	1.35	0.23	0.02
767JT9				
777200	7.34	0.19	7.02	0.27
777300				
A300-622R	8.73	5.57	3.15	5.04
A300B4-203	0.18	0.22	0.01	0.01
A310-304	1.37	0.55	0.55	0.48
A319-131	83.75	12.14	85.35	10.76
A320-211			10.07	3.49
A320-232	53.90	15.42	51.39	13.44
A321-232				
A330-301	7.21	0.04	6.70	0.07
A330-343			0.11	0.01
A340-211	6.70	0.55	6.54	0.45
A7D				
BAC111	0.01	0.01		
BAE146	0.02			
BAE300				
BEC58P	71.32	4.55	77.12	1.38
C130		0.01		
C130E				
CIT3	1.33	0.09	0.91	0.07
CL600	99.82	7.87	3.97	0.29
CL601	113.48	12.15	115.35	8.41
CNA172	0.34	0.01	0.42	
CNA206	0.55	0.01	0.66	
CNA20T			0.05	
CNA441	1.38	0.13	1.68	0.18
CNA500	2.10	0.18	1.97	0.11
CNA55B	2.90	0.44		
CNA750	3.64	0.41	3.77	0.49
COMJET				
COMSEP				
CONCRD				
CVR580			0.01	
DC1010	3.23	2.19	1.52	1.39
DC1030			0.96	0.84
DC1040				
DC3				
DC6				
DC820				

	BASE Case		ALTERNATIVE Case	
Aircraft Type	Daytime LTO Cycles	Nighttime LTO Cycles	Daytime LTO Cycles	Nighttime LTO Cycles
DC850				
DC860				
DC870			0.07	0.15
DC8QN	0.06	0.32		0.02
DC910				
DC930				
DC93LW	1.12	0.90	0.53	0.01
DC950				
DC95HW	2.78	0.02	1.10	0.02
DC9Q7				
DC9Q9				
DHC6	63.38	2.31	2.54	0.21
DHC6QP				
DHC7				
DHC8	13.74	0.28	8.58	0.03
DHC830	1.42	0.01	0.79	
EMB120	0.02	0.01	0.02	
EMB145	50.13	2.01	99.23	7.55
EMB14L	4.92	0.38	67.56	6.66
F10062				
F10065				
F16A				
F16GE				
F16PW0				
F16PW9				
F28MK2				
F28MK4				
F4C				
FAL20	3.16	0.32	3.26	0.34
GASEPF	1.01	0.03	0.94	0.13
GASEPV	3.31	0.30	2.48	0.08
GII	0.78	0.09	0.30	0.01
GIIB	1.02	0.12	1.40	0.14
GIV	4.45	0.41	4.46	0.48
GV	1.56	0.14	2.08	0.18
HS748A			0.02	
IA1125	2.27	0.16	3.01	0.21
KC135				
KC135B				
KC135R				
L1011	0.01			
L10115				
L188				
LEAR25	0.47	0.06	0.21	0.03
LEAR35	16.15	5.26	15.37	1.75
MD11GE	0.07	0.01	0.01	0.03
MD11PW			0.01	
MD81	13.56	1.11	0.24	0.03

	BASE Case		ALTERNATIVE Case	
Aircraft Type	Daytime LTO Cycles	Nighttime LTO Cycles	Daytime LTO Cycles	Nighttime LTO Cycles
MD82	22.11	3.29	18.18	3.20
MD83	16.04	3.46	53.82	7.95
MD9025				
MD9028				
MU3001	14.53	1.17	18.68	2.19
PA28			0.24	
PA30				
PA31			0.53	0.04
SABR80				
SD330	0.11	0.01	2.66	0.32
SF340	7.16	0.15	7.25	0.17