Technical Appendices

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E

Activity Levels

This appendix provides detailed tables in support of Chapter 2, *Activity Levels*:

- Table E-1 Logan Airport Historical Air Passenger and Operations Data
- Table E-2 Logan Airport Changes in Domestic Passenger Operations by Carrier
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Table E-1 Logan Airport Historical Air Passenger and Operations Data

Year	Operations	Air Passengers	Year	Operations	Air Passengers
1980	258,167	14,722,363	2001	463,125	24,474,930
1981	251,961	14,827,684	2002	392,079	22,696,141
1982	244,468	15,867,722	2003	373,304	22,791,169
1983	288,956	17,848,797	2004	405,258	26,142,516
1984	318,959	19,417,971	2005	409,066	27,087,905
1985	349,518	20,448,424	2006	406,119	27,725,443
1986	363,995	21,862,718	2007	399,537	28,102,455
1987	414,968	23,369,002	2008	371,604	26,102,651
1988	407,479	23,732,959	2009	345,306	25,512,086
1989	388,797	22,272,860	2010	352,643	27,428,962
1990	424,568	22,878,191	2011	368,987	28,907,938
1991	430,403	21,450,143	2012	354,869	29,235,643
1992	474,378	22,723,138	2013	361,339	30,218,631
1993	493,093	23,579,726	2014	363,797	31,634,445
1994	458,623	24,468,178	2015	372,930	33,449,580
1995	466,327	24,192,095	2016	391,222	36,288,042
1996	456,226	25,134,826	2017	401,371	38,412,419
1997	482,542	25,567,888	2018	424,024	40,941,925
1998	507,449	26,526,708	2019	427,176	42,522,411
1999	494,816	27,052,078			
2000	487,996	27,726,833			

Source: Massport and U.S. Department of Transportation, T-100 Database

Table E-2 Logan Airport Changes in Domestic Passenger Operations by Carrier

Airline	2000	2005	2010	2013	2014	2015	2016	2017	2018	2019	2018-2019 Change	2018-2019 % Change
Scheduled Jet Carriers	**233,993**	**190,991**	**203,052**	**211,176**	**214,854**	**225,629**	**235,381**	**242,404**	**257,626**	**257,103**	**-523**	**-0.2%**
AirTran Airlines	3,090	14,580	13,672									
Alaska Airlines[1]		1,088	1,733	2,661	3,090	3,027	3,256	3,351	6,474	5,920	-554	-8.6%
America West Airlines	5,116	4,467										
American Airlines[2]	30,821	27,712	21,313	22,535	58,222	56,623	55,249	50,766	54,055	50,150	-3,905	-7.2%
American Trans Air	1,448	2,294										
Continental Airlines	16,894	13,546	10,869									
Delta Air Lines[3]	52,954	36,388	28,980	21,139	23,614	30,705	30,476	32,050	35,040	37,496	2,456	7.0%
Frontier Airlines	1,052		1,094					2		1,211	1,211	
Hawaiian Airlines										425	425	
Independence Air		4,676										
JetBlue		15,069	49,981	73,374	76,247	79,364	84,590	93,485	99,929	104,571	4,642	4.6%
Midway Airlines	4,096											
Midwest Airlines	3,726	3,570	1,961									
Northwest Airlines	13,147	9,685										
People Express					170							
Southwest Airlines[4]			13,727	23,701	21,967	21,542	24,436	24,129	23,191	19,907	-3,284	-14.2%
Spirit Airlines			3,023	2,721	2,945	4,896	7,245	8,853	10,269	9,838	-431	-4.2%
Sun Country Airlines	723		313	926	1,027	1,414	1,374	1,391	1,030	288	-742	-72.0%
Trans World Airlines	6,280											
United Airlines[5]	28,092	18,304	16,314	25,214	24,374	24,632	25,031	24,623	27,638	27,297	-341	-1.2%
US Airways[6]	66,554	39,612	36,678	35,613								
Virgin America			3,394	3,292	3,198	3,426	3,724	3,754				
Regional/Commuter Carriers	**160,041**	**137,203**	**94,535**	**79,922**	**76,682**	**70,274**	**68,204**	**68,753**	**74,766**	**79,736**	**4,970**	**6.6%**
America West Express	1,267											
American Eagle	62,140	37,394	15,291	4	5	52	6,418	7,046	5,302	3,731	-1,572	-29.6%
Boutique Air									1,229	1,881	652	53.1%
Cape Air	31,026	25,018	35,899	37,194	35,080	35,994	35,993	33,235	35,523	35,358	-165	-0.5%
Continental Connection			1,809									
Continental Express		12,544	529									
Delta Connection	15,438	26,557	18,445	20,848	20,265	15,466	18,586	22,231	29,045	37,835	8,790	30.3%
MidAtlantic Express												
Midwest/Republic			258									
Northwest Airlink		5,034										
PenAir				4,384	4,382	3,747	3,662	3,438	1,229		-1,229	
Republic Airlines				58	53	34						
Silver Airways									261	416	155	59.4%
United Express		3,178	2,802	5,829	5,628	4,699	3,545	2,803	2,177	516	-1,661	-76.3%
US Airways Express	50,170	27,478	19,502	11,605	11,269	10,282						
Non-Scheduled Operations (Incl. Charter)	**1,008**	**325**	**501**	**200**	**164**	**176**	**158**	**176**	**199**	**109**	**-90**	**-45.2%**
Total Domestic Operations	**395,042**	**328,519**	**298,117**	**291,298**	**291,700**	**296,079**	**303,743**	**311,333**	**332,591**	**336,948**	**4,357**	**1.3%**

Source: Massport

Notes: Excludes general aviation and all-cargo operations.

1 Alaska Airlines includes Virgin America beginning in 2018 (following 2016 acquisition).

2 American Airlines includes US Airways beginning in 2014 (following 2013 merger).

3 Delta Air Lines totals include Northwest Airlines beginning in 2009 (following 2008 merger).

4 Southwest Airlines include AirTran Airways beginning 2012 (following 2011 merger).

5 United Airlines totals include Continental Airlines beginning in 2011 (following 2010 merger).

6 US Airways totals in this chart include America West Airlines beginning in 2006 (following 2005 merger).

Table E-3 Logan Airport Changes in International Passenger Operations by Carrier

Airline	2000	2005	2010	2013	2014	2015	2016	2017	2018	2019	2018-2019 Change	2018-2019 %Change
Scheduled Jet Carriers	**27,427**	**24,550**	**20,771**	**23,301**	**25,065**	**28,225**	**34,752**	**37,522**	**35,551**	**39,284**	**3,733**	**10.5%**
Aer Lingus	1,160	1,016	1,097	1,513	1,933	1,973	2,066	2,011	1,995	1,860	-135	-6.8%
Aeromexico		534				345	580	624	657	16	-641	-97.6%
Air Berlin							192	278				
Air Canada	10,047	5,782	3,895	1,747	1,084	1,686	2,729	3,982	1,111	1,932	821	73.9%
Air Europa								72	2		-2	
Air France	1,046	1,334	995	955	899	910	900	884	828	856	28	3.4%
Air Jamaica		349										
Air One												
Alitalia	729	986	624	542	550	562	558	548	544	550	6	1.1%
American Airlines[1]	4,657	4,672	2,422	447	344	571	533	530	198	183	-15	-7.6%
Astraeus												
Avianca								226	501	218	-283	-56.5%
British Airways	2,159	2,151	2,082	2,573	2,678	2,575	2,702	2,522	2,685	2,650	-35	-1.3%
Canadian Airlines	417											
Cathay Pacific						279	454	652	703	699	-4	-0.6%
Copa Airlines				347	730	646	638	730	1,100	966	-134	-12.2%
Delta Air Lines[2]	733	749	1,675	2,851	3,008	3,122	3,459	3,871	4,034	4,722	688	17.1%
El Al						152	296	298	288	296	8	2.8%
Emirates					600	914	1,382	1,034	734	719	-15	-2.0%
Eurowings							72					
Finnair		44										
FlyGlobespan												
Hainan Airlines					280	744	961	1,032	1,078	1,056	-22	-2.0%
Iberia Airlines			435	404	332	336	412	464	707	859	152	21.5%
Icelandair	726	811	816	1,120	1,227	1,287	1,338	1,265	1,041	1,044	3	0.3%
Japan Airlines				646	731	728	736	730	732	728	-4	-0.5%
JetBlue			2,262	6,138	6,348	6,488	7,146	7,406	7,628	9,520	1,892	24.8%
KLM Royal Dutch Airlines								2		263	263	
Korean Air Lines	314									367	367	
LACSA Airlines												
LATAM									210	476	266	126.7%
Lufthansa	1,140	1,564	1,657	1,723	1,712	1,687	1,728	1,707	1,662	1,703	41	2.5%
Northwest Airlines	744	727										
Norwegian Air Shuttle						34	656	718	928	1,429	501	54.0%
Olympic Airways	256											
Primera Air									238		-238	
Qatar Airways							552	728	734	730	-4	-0.5%
Royal Air Maroc										161	161	
Sabena	724											
SATA International Airlines		315	403	466	533	542	630	844	780	809	29	3.7%
Scandinavian Airlines							500	536	320	369	49	15.3%
SWISS International	926	704	720	720	722	711	1,020	924	942	978	36	3.8%
TACA		327							156	136	-20	-12.8%
TACV - Cabo Verde		154	240	214	186	60			99	112	13	13.1%

Table E-3 Logan Airport Changes in International Passenger Operations by Carrier (Continued)

Airline	2000	2005	2010	2013	2014	2015	2016	2017	2018	2019	2018-2019 Change	2018-2019 % Change
TAP - Air Portugal	200						378	643	642	644	2	0.3%
Thomas Cook Airlines							62	144	104	2	-102	-98.1%
Trans World Airlines												
Turkish Airlines					452	726	658	616	644	674	30	4.7%
United Airlines	728						21	13	14	21	7	50.0%
US Airways		1,607	667	186								
VG Airlines												
Virgin Atlantic Airways	721	724	707	709	716	702	715	764	778	1,361	583	74.9%
WestJet Airlines									12	4	-8	-66.7%
Wow Air						445	678	724	722	171	-551	-76.3%
Regional/Commuter Carriers	**15,594**	**13,112**	**12,494**	**14,378**	**14,720**	**14,153**	**15,204**	**14,597**	**18,081**	**15,149**	**-2,932**	**-16.2%**
Air Canada Regional	4,088	5,120	7,065	9,563	10,364	10,024	9,051	7,497	10,719	8,910	-1,809	-16.9%
American Eagle Airlines	8,975	4,637	2,480									
Delta Connection	2,531	3,355	81	1,082	56	38	32	63	60	50	-10	-16.7%
Porter Airlines			2,868	3,733	4,300	4,091	3,869	3,899	3,840	3,959	119	3.1%
WestJet Encore							2,252	3,138	3,462	2,230	-1,232	-35.6%
Non-Scheduled Operations	**2,141**	**1,068**	**305**	**277**	**185**	**248**	**63**	**65**	**45**	**43**	**-2**	**-4.4%**

Source: Massport.
Note: Excludes general aviation and all-cargo operations.
1 American Airlines includes US Airways beginning in 2014 (following 2013 merger).
2 Delta Air Lines totals include Northwest Airlines beginning in 2009 (following 2008 merger).

Table E-4 Logan Airport Scheduled Passenger Departures by Destination

Destination Airport	Code	2000	2005	2010	2013	2014	2015	2016	2017	2018	2019	2018-2019 Change	2018-2019 % Change
Domestic		**210,069**	**163,684**	**149,961**	**147,076**	**149,208**	**152,211**	**155,482**	**160,980**	**171,257**	**171,986**	**729**	**0.4%**
New York La Guardia	LGA	11,872	13,350	11,705	9,255	9,056	9,352	9,365	11,080	10,889	10,893	4	0.0%
Washington National	DCA	8,474	10,680	9,419	8,360	8,645	8,678	8,629	8,759	8,511	9,246	734	8.6%
Philadelphia	PHL	11,785	7,014	6,548	7,305	8,092	7,971	5,786	5,298	6,099	7,907	1,808	29.6%
Chicago O'Hare	ORD	10,063	7,412	7,403	7,733	7,822	7,401	7,139	6,825	7,492	7,894	402	5.4%
Atlanta	ATL	7,110	6,003	5,548	5,501	5,454	5,192	5,386	6,656	6,991	6,494	-497	-7.1%
New York Newark	EWR	5,206	5,626	3,666	5,702	5,532	5,366	5,239	5,169	5,571	5,926	355	6.4%
Baltimore	BWI	1,773	5,029	7,053	5,737	5,060	4,897	5,731	5,987	5,888	5,658	-230	-3.9%
New York J F Kennedy	JFK	9,899	4,985	7,054	5,919	6,139	6,745	6,971	6,391	6,363	5,472	-892	-14.0%
Los Angeles	LAX	3,647	2,655	3,382	3,603	4,080	4,456	4,650	4,775	5,739	5,248	-490	-8.5%
San Francisco	SFO	3,526	2,591	3,711	4,038	4,305	4,272	4,551	4,796	5,384	5,075	-309	-5.7%
Raleigh/Durham	RDU	3,775	4,110	3,259	3,313	3,634	3,598	3,718	3,748	3,836	4,433	596	15.5%
Orlando	MCO	4,914	3,517	3,179	3,399	2,883	3,057	3,323	4,234	4,046	4,313	267	6.6%
Charlotte	CLT	2,758	3,288	4,180	3,911	3,916	3,920	3,878	3,835	3,960	4,269	309	7.8%
Nantucket	ACK	5,022	3,452	3,884	3,601	3,567	4,311	4,605	4,378	4,158	4,228	70	1.7%
Detroit	DTW	2,937	2,827	2,353	2,340	3,354	3,875	3,932	3,849	3,784	3,615	-169	-4.5%
Pittsburgh	PIT	3,086	2,021	2,312	2,641	2,678	2,457	2,210	2,729	3,842	3,485	-356	-9.3%
Denver	DEN	2,628	1,990	2,812	2,433	2,446	2,611	2,839	2,812	3,117	3,285	169	5.4%
Minneapolis	MSP	3,078	1,791	1,927	2,200	2,322	2,737	2,865	2,801	3,363	3,230	-133	-4.0%
Dallas/Fort Worth	DFW	5,002	3,544	2,938	4,147	3,705	3,406	3,418	3,231	3,157	3,126	-30	-1.0%
Nashville	BNA	642			588	628	688	1,467	2,058	2,525	3,063	538	21.3%
Fort Lauderdale	FLL	3,327	3,065	2,370	2,379	2,173	2,258	2,634	2,709	3,024	3,047	24	0.8%
Tampa	TPA	2,502	1,946	1,246	1,195	1,182	1,177	1,429	2,106	2,526	2,696	170	6.7%
Martha's Vineyard	MVY	3,863	2,231	3,218	2,740	2,793	2,731	2,929	2,572	2,809	2,596	-213	-7.6%
Richmond	RIC	1,537	1,404	1,431	1,723	2,450	2,603	2,338	2,349	2,305	2,369	64	2.8%
Buffalo	BUF	950	1,226	2,181	2,468	2,433	2,203	2,120	2,249	2,529	2,337	-192	-7.6%
Seattle/Tacoma	SEA	458	610	1,001	1,378	1,607	1,625	1,907	2,051	2,373	2,289	-84	-3.6%
Miami	MIA	2,068	2,072	2,238	2,555	2,551	2,520	2,523	2,519	2,485	2,224	-261	-10.5%
Cleveland	CLE	2,797	1,260	1,369	1,501	1,260	2,070	2,098	2,216	2,120	2,202	83	3.9%
Las Vegas	LAS	1,098	1,679	756	813	819	1,162	1,216	1,325	1,604	2,092	488	30.4%
Fort Myers	RSW	949	1,525	1,587	1,806	1,734	1,742	1,938	2,173	2,360	2,060	-300	-12.7%
West Palm Beach	PBI	1,674	1,126	1,450	1,235	1,389	1,650	1,652	1,856	2,136	1,978	-157	-7.4%
Jacksonville	JAX		428	365	593	984	767	701	854	1,597	1,900	304	19.0%
Provincetown	PVC	2,023	1,659	2,410	1,982	1,929	1,957	1,912	1,610	1,795	1,785	-10	-0.5%
Phoenix	PHX	1,386	944	1,348	1,413	1,557	1,569	1,552	1,609	1,842	1,692	-150	-8.1%
Houston Intercontinental	IAH	1,995	1,752	1,717	1,789	1,822	1,831	1,618	1,548	1,582	1,584	2	0.1%
Chicago Midway	MDW	868	1,339	1,756	1,617	1,542	1,531	1,604	1,521	1,580	1,538	-42	-2.7%
Lebanon	LEB			1,734	1,460	1,460	1,460	1,464	1,464	1,460	1,460		
Columbus	CMH	2,708	2,114	972	871	844	1,081	1,591	1,416	1,445	1,453	8	0.6%
Washington Dulles	IAD	8,625	6,139	4,625	2,974	2,714	2,505	2,485	2,484	2,457	1,444	-1,013	-41.2%
Rochester	ROC	3,644	1,181	908	878	882	886	767	806	888	1,369	481	54.2%
Indianapolis	IND	765	2,076	1,121	895	844	1,181	1,595	1,511	1,401	1,356	-44	-3.2%
Rockland	RKD	1,152	1,374	1,301	1,279	1,279	1,372	1,348	1,344	1,341	1,350	9	0.7%
Cincinnati	CVG	2,235	2,637	1,364	1,269	1,239	1,218	1,204	1,229	1,253	1,304	51	4.1%
San Diego	SAN	366	365	571	859	1,030	1,052	1,042	1,046	1,191	1,232	41	3.4%

Table E-4 Logan Airport Scheduled Passenger Departures by Destination (Continued)

Destination Airport	Code	2000	2005	2010	2013	2014	2015	2016	2017	2018	2019	2018-2019 Change	2018-2019 % Change
St. Louis	STL	2,187	1,461	934	748	722	722	745	1,021	1,075	1,227	151	14.1%
Augusta	AUG	584	621	1,000	1,248	1,248	1,248	1,220	1,220	1,217	1,226	9	0.7%
Salt Lake City	SLC	1,094	730	669	584	597	617	1,009	1,156	1,179	1,148	-31	-2.6%
Austin	AUS			365	352	352	444	754	855	1,083	1,122	39	3.6%
Saranac Lake	SLK		800	1,174	1,157	1,095	1,095	1,098	1,098	1,095	1,095		
Massena	MSS									552	1,095	543	98.4%
Bar Harbor	BHB	1,196	1,154	815	1,283	1,156	1,095	1,098	1,111	1,095	1,095		
Rutland	RUT	1,259	643	1,095	1,095	1,095	1,095	1,098	1,098	1,095	1,095		
Charleston	CHS		61		398	474	365	545	593	901	1,034	133	14.8%
Milwaukee	MKE	1,189	2,182	2,213	880	674	854	990	1,059	1,131	1,022	-109	-9.7%
New Orleans	MSY		191	348	339	344	365	527	700	1,029	914	-115	-11.2%
Kansas City	MCI	597	241	313	515	669	661	631	684	1,028	886	-142	-13.8%
Portland	PDX			352	615	494	519	555	599	707	746	40	5.6%
Syracuse	SYR	3,876	1,762	991	626	617	578	314	323	678	695	17	2.6%
Houston	HOU				664	1,325	978	1,032	872	795	665	-130	-16.4%
Savannah	SAV		78			306	365	370	423	524	535	11	2.1%
Dallas Love Field	DAL						153	153	366	365	409	44	11.9%
Long Beach	LGB		853	459	274	270	292	297	353	443	403	-41	-9.2%
Hyannis	HYA	2,274	1,059	1,165	705	731	787	775	697	430	383	-48	-11.1%
Myrtle Beach	MYR	105	265	365	378	383	383	379	375	414	378	-35	-8.6%
Portland (ME)	PWM	6,267	1,394								368	368	
Albany	ALB	3,433	1,073	647	1,183	1,095	1,095	1,098	1,098	1,095	360	-735	-67.1%
Harrisburg	MDT	1,307	886	551	469	434	325	300	314	313	330	17	5.6%
Sarasota/Bradenton	SRQ		30	82	348	181	212	186	248	299	306	7	2.3%
Burbank	BUR									113	299	186	164.5%
San Jose	SJC	842	245	232	205	214	223	236	323	286	278	-8	-2.8%
Norfolk	ORF	838	1,032		613	71			105	344	249	-95	-27.6%
Honolulu	HNL										210	210	
Sacramento	SMF						48	57	75	101	88	-13	-13.1%
Oakland	OAK		853	195	83	83	88	79	71	79	44	-35	-44.4%
Palm Springs	PSP										35	35	
Steamboat Springs Hayden	HDN									4	30	26	580.6%
Atlantic City Pomona	ACY			536	123	153	166	366	123				
Plattsburgh	PBG			1,025	639	787	756	697	627	363		-363	-100.0%
Madison	MSN							9					
Westchester County	HPN	6,065	2,256				263	502	422	116		-116	-100.0%
Presque Isle	PQI	1,835	1,017	991	991	991	991	993	993	491		-491	-100.0%
Akron/Canton	CAK		730	475	557	457	287						
Islip	ISP	4,222	1,581		293	324							
Newport News	PHF		671	549		31							
Memphis	MEM	972	1,034	1,048	313								
Bangor	BGR	6,644	2,946										
Greensboro	GSO	415	1,120										
Trenton	TTN												
Watertown	ART												

Table E-4 Logan Airport Scheduled Passenger Departures by Destination (Continued)

Destination Airport	Code	2000	2005	2010	2013	2014	2015	2016	2017	2018	2019	2018-2019 Change	2018-2019 % Change
Burlington	BTV	5,913	1,632										
Allentown/Bethlehem	ABE	780	626										
Louisville	SDF												
Manchester	MHT												
Dayton	DAY												
Plattsburgh	PLB												
Wilkes-Barre Scranton	AVP	584	420										
Columbia	CAE												
Ithaca	ITH	872											
Elmira/Corning	ELM	441											
Hartford	BDL												
Binghamton	BGM												
Providence	PVD	91											
International		**23,711**	**19,837**	**18,761**	**19,093**	**20,370**	**21,765**	**25,351**	**26,475**	**27,255**	**27,504**	**249**	**0.9%**
Toronto	YYZ	3,691	3,876	3,603	3,306	2,715	2,799	3,702	3,861	3,898	3,671	-227	-5.8%
London Heathrow	LHR	2,187	2,133	2,331	2,134	2,069	2,026	2,058	1,931	2,074	2,336	261	12.6%
Toronto Island	YTZ			1,535	2,009	2,310	2,236	2,018	2,001	2,006	2,032	26	1.3%
Montreal Dorval	YUL	3,401	2,578	2,008	1,833	1,948	2,047	2,092	2,070	2,293	1,721	-572	-25.0%
San Juan	SJU	1,750	1,237	1,294	1,038	1,018	1,068	1,141	1,058	858	1,011	153	17.8%
Paris De Gaulle	CDG	898	853	710	784	780	916	938	895	938	898	-40	-4.2%
Dublin	DUB	223		348	605	653	653	694	816	815	885	70	8.6%
Halifax	YHZ	3,210	1,891	852	704	704	700	955	1,037	1,064	851	-214	-20.1%
Amsterdam	AMS	366	365	457	575	536	579	580	580	579	714	135	23.4%
Bermuda	BDA	550	518	532	501	523	536	510	598	730	695	-35	-4.8%
Aruba	AUA	9	338	407	408	417	417	471	597	647	685	38	5.9%
Ottawa	YOW	2,575	864	744	652	635	630	649	623	648	639	-8	-1.3%
Santo Domingo	SDQ		174	305	339	401	365	519	406	444	627	183	41.1%
Reykjavik Keflavik	KEF	393	361	404	561	614	854	968	964	870	612	-258	-29.7%
Frankfurt	FRA	580	575	548	545	532	536	515	502	474	501	27	5.7%
Zurich	ZRH	523	356	365	365	365	365	366	467	475	501	26	5.4%
Panama City	PTY					365	334	318	366	556	486	-70	-12.5%

Table E-4 Logan Airport Scheduled Passenger Departures by Destination (Continued)

Destination Airport	Code	2000	2005	2010	2013	2014	2015	2016	2017	2018	2019	2018-2019 Change	2018-2019 % Change
Santiago	STI				214	248	206	275	284	383	475	92	23.9%
Lisbon	LIS	44		26	39	39	44	223	362	322	414	92	28.6%
Rome Leonardo Da Vinci-Fiumicino	FCO		135	313	271	258	271	271	275	275	402	127	46.0%
Mexico City	MEX		234				166	292	301	379	369	-9	-2.4%
London Gatwick	LGW	362						161	218	339	365	26	7.6%
Munich	MUC		210	313	348	357	357	357	366	365	365		
Doha	DOH							284	366	365	365		
Tokyo Narita	NRT				352	365	365	357	366	365	365		
Dubai	DXB					306	457	692	518	365	361	-4	-1.2%
Madrid	MAD			218	209	166	166	205	258	249	353	104	41.6%
Hong Kong	HKG						140	227	327	348	348		
Ponta Delgada	PDL	30	39	165	179	209	196	196	314	322	340	17	5.4%
Istanbul	IST					236	365	340	310	322	339	17	5.4%
Cancun	CUN		207	307	225	273	264	326	331	394	333	-61	-15.5%
Beijing/Peking	PEK					136	287	323	366	348	322	-26	-7.4%
Punta Cana	PUJ			95	134	160	174	214	261	273	265	-8	-2.8%
Shannon	SNN	366	737	213	166	348	352	349	331	335	241	-94	-28.2%
Sao Paulo Guarulhos	GRU									105	235	130	123.4%
Shanghai Pu Dong	PVG						83	157	157	196	209	13	6.6%
Copenhagen	CPH							293	314	174	196	23	13.0%
Nassau	NAS		100	180	108	139	136	133	109	136	187	51	37.2%
Seoul Incheon	ICN										184	184	
Barcelona	BCN									100	156	56	55.8%
Tel Aviv	TLV						75	148	157	148	148	0	0.2%
Montego Bay	MBJ		238	126	56	73	56	52	118	121	126	4	3.5%
Port Au Prince	PAP						26	53	62	114	122	8	7.2%
Edinburgh	EDI										92	92	
Vancouver	YVR	366	62						62	135	92	-43	-32.0%
Bogota	BOG								122	252	90	-162	-64.3%
Providenciales	PLS	4	43	39	52	82	86	104	91	94	86	-8	-8.1%
San Salvador	SAL		178							79	86	8	9.8%
Saint Thomas	STT	78	108	125	173	176	184	186	186		83	83	
Casablanca Mohamed V	CMN										79	79	
Barbados	BGI						9	43	74	74	74		
Terceira	TER	44		17	17	17	31	70	70	65	70	4	6.6%
Havana	HAV									9	52	43	498.4%
Manchester	MAN	26	241					31	122	87	48	-39	-44.9%
Praia	RAI		9	121	104	92	30			48	48		
Saint Maarten	SXM			39	61	52	56	91	95		35	35	
Saint Lucia Hewanorra	UVF					9	26	26	22	26	30	4	17.1%
Puerto Plata	POP	4				9	26	26	26	26	30	4	17.1%
Grand Cayman	GCM		31	17	26	26	26	43	26	26	30	4	17.1%
Liberia	LIR					9	26	26	26	26	26		
Ilha Do Sal	SID		56								4	4	
Oslo	OSL							57	61				

Table E-4 Logan Airport Scheduled Passenger Departures by Destination (Continued)

Destination Airport	Code	2000	2005	2010	2013	2014	2015	2016	2017	2018	2019	2018-2019 Change	2018-2019 % Change
Cologne/Bonn	CGN							52					
Dusseldorf	DUS							101	197				
Pointe-A-Pitre	PTP						9	30	26				
London Stansted	STN									96		-96	-100.0%
Fort De France	FDF						9	43	26				
Sao Vicente	VXE			4									
Charlottetown	YYG												
Helsinki	HEL												
Milan Malpensa	MXP	366	343										
Fredericton	YFC		686										
Quebec	YQB	1,229	30										
Glasgow	GLA												
Connaught	NOC												
Stockholm Arlanda	ARN												
Las Palmas	LPA												
Nykoping	NYO		31										
Lerwick Sumburgh	LSI												
Freeport	FPO												
Brussels	BRU	362											
Gander	YQX												
Athens	ATH	74											
Total Scheduled Carrier Departures		**233,779**	**183,520**	**168,726**	**166,171**	**169,579**	**173,974**	**180,838**	**187,454**	**198,512**	**199,491**	**978**	**0.5%**

Source: OAG Schedules.

F

Regional Transportation

This appendix provides detailed tables in support of Chapter 4, *Regional Transportation*:

- Table F-1 Aircraft Operations by Classification for New England's Airports, 2000 to 2019
- Table F-2 Percentage Change in Aircraft Operations by Classification for New England's Airports, 2000 to 2019

Scheduled Passenger Operations by Market and Carrier for New England's Regional Airports

- Table F-3 Scheduled Passenger Operations by Market and Carrier for Bradley International Airport
- Table F-4 Scheduled Passenger Operations by Market and Carrier for T.F. Green Airport
- Table F-5 Scheduled Passenger Operations by Market and Carrier for Manchester-Boston Regional Airport
- Table F-6 Scheduled Passenger Operations by Market and Carrier for Portland International Jetport
- Table F-7 Scheduled Passenger Operations by Market and Carrier for Burlington International Airport
- Table F-8 Scheduled Passenger Operations by Market and Carrier for Bangor International Airport
- Table F-9 Scheduled Passenger Operations by Market and Carrier for Tweed-New Haven Airport
- Table F-10 Scheduled Passenger Operations by Market and Carrier for Worcester Regional Airport
- Table F-11 Scheduled Passenger Operations by Market and Carrier for Hanscom Field
- Table F-12 Scheduled Passenger Operations by Market and Carrier for Portsmouth International Airport

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Table F-1 Aircraft Operations by Classification for New England's Airports, 2000 to 2019

Airport	Bradley International	T.F. Green	Manchester-Boston Regional	Portland International Jetport	Burlington	Bangor	Tweed-New Haven	Worcester Regional	Portsmouth International	Hanscom Field[2]	Subtotal	Logan[3]	Total
2000													
Commercial	132,062	103,750	61,506	47,609	45,745	21,446	5,260	4,029	6,104	6,572	434,083	452,763	886,846
General Aviation[1]	31,863	52,184	45,740	56,571	59,377	34,831	56,200	46,518	31,601	204,512	619,397	35,233	654,630
Military & Other	5,811	2,764	586	2,072	10,241	26,507	328	495	9,973	1,287	60,064	0	60,064
Total	**169,736**	**158,698**	**107,832**	**106,252**	**115,363**	**82,784**	**61,788**	**51,042**	**47,678**	**212,371**	**1,113,544**	**487,996**	**1,601,540**
2001													
Commercial	128,638	100,606	61,669	47,770	47,261	18,286	4,581	5,631	4,485	6,414	425,341	434,386	859,727
General Aviation[1]	30,478	45,095	44,358	62,014	61,986	35,230	56,092	45,464	30,148	197,770	608,635	28,739	637,374
Military & Other	5,913	2,635	607	2,259	11,821	26,623	437	917	8,221	1,252	60,685	0	60,685
Total	**165,029**	**148,336**	**106,634**	**112,043**	**121,068**	**80,139**	**61,110**	**52,012**	**42,854**	**205,436**	**1,094,661**	**463,125**	**1,557,786**
2002													
Commercial	113,194	96,595	62,346	45,899	38,929	24,412	3,827	4,062	5,059	6,603	400,926	366,476	767,402
General Aviation[1]	27,838	45,473	29,549	57,720	59,679	35,711	62,163	52,277	28,333	210,221	608,964	25,596	634,560
Military & Other	6,085	2,587	376	2,162	12,167	27,297	593	418	8,220	1,424	61,329	0	61,329
Total	**147,117**	**144,655**	**92,271**	**105,781**	**110,775**	**87,420**	**66,583**	**56,757**	**41,612**	**218,248**	**1,071,219**	**392,072**	**1,463,291**
2003													
Commercial	103,917	84,301	68,184	42,658	38,293	25,626	3,705	868	4,552	2,956	375,060	344,644	719,704
General Aviation[1]	27,115	42,878	29,552	44,036	50,461	36,706	54,224	55,972	24,866	190,789	556,599	28,660	585,259
Military & Other	4,214	2,496	324	1,449	11,466	32,938	776	378	7,720	1,142	62,903	0	62,903
Total	**135,246**	**129,675**	**98,060**	**88,143**	**100,220**	**95,270**	**58,705**	**57,218**	**37,138**	**194,887**	**994,562**	**373,304**	**1,367,866**
2004													
Commercial	108,823	83,496	75,360	46,474	41,719	24,970	4,501	0	3,981	4,308	393,632	374,022	767,654
General Aviation[1]	32,269	34,878	27,438	41,547	54,709	29,884	58,881	61,343	25,962	175,301	542,212	31,236	573,448
Military & Other	4,100	346	749	1,338	12,404	29,676	1,010	530	7,797	1,195	59,145	0	59,145
Total	**145,192**	**118,720**	**103,547**	**89,359**	**108,832**	**84,530**	**64,392**	**61,873**	**37,740**	**180,804**	**994,989**	**405,258**	**1,400,247**

Table F-1 Aircraft Operations by Classification for New England's Airports, 2000 to 2019 (Continued)

Airport	Bradley International	T.F. Green	Manchester-Boston Regional	Portland International Jetport	Burlington	Bangor	Tweed-New Haven	Worcester Regional	Portsmouth International	Hanscom Field[2]	Subtotal	Logan[3]	Total
2005													
Commercial	119,048	88,374	76,342	42,661	43,987	25,976	6,137	2,727	3,197	3,627	412,076	377,830	789,906
General Aviation[1]	33,341	28,138	26,369	36,191	49,888	30,016	60,893	62,743	25,446	165,424	518,449	31,236	549,685
Military & Other	3,701	241	479	1,405	11,468	24,154	1,063	519	7,669	904	51,603	0	51,603
Total	**156,090**	**116,753**	**103,190**	**80,257**	**105,343**	**80,146**	**68,093**	**65,989**	**36,312**	**169,955**	**982,128**	**409,066**	**1,391,194**
2006													
Commercial	111,341	81,282	67,326	38,663	41,342	23,466	5,177	3,793	3,981	3,057	379,428	374,675	754,103
General Aviation[1]	34,548	25,510	25,074	35,572	44,471	29,848	51,702	56,770	25,962	167,560	497,017	31,444	528,461
Military & Other	4,348	229	738	1,536	9,299	22,359	1,157	609	7,797	1,433	49,505	0	49,505
Total	**150,237**	**107,021**	**93,138**	**75,771**	**95,112**	**75,673**	**58,036**	**61,172**	**37,740**	**172,050**	**925,950**	**406,119**	**1,332,069**
2007													
Commercial	107,097	80,525	69,134	41,450	39,928	22,571	4,594	3,162	4,270	3,477	376,208	370,905	747,113
General Aviation[1]	29,308	22,984	23,959	31,724	47,521	25,542	51,200	61,296	27,000	160,992	481,526	28,632	510,158
Military & Other	5,097	242	644	1,384	9,528	20,949	944	879	8,017	1,438	49,122	0	49,122
Total	**141,502**	**103,751**	**93,737**	**74,558**	**96,977**	**69,062**	**56,738**	**65,337**	**39,287**	**165,907**	**906,856**	**399,537**	**1,306,393**
2008													
Commercial	98,194	73,096	63,505	40,834	37,832	19,282	4,013	2,553	1,347	104	340,760	347,784	688,544
General Aviation[1]	22,908	19,470	16,198	31,869	46,391	27,143	44,642	43,763	31,051	164,195	447,630	23,820	471,450
Military & Other	3,637	187	840	974	9,688	20,449	243	886	7,993	1,590	46,487	0	46,487
Total	**124,739**	**92,753**	**80,543**	**73,677**	**93,911**	**66,874**	**48,898**	**47,202**	**40,391**	**165,889**	**834,877**	**371,604**	**1,206,481**
2009													
Commercial	82,021	62,233	54,336	35,909	31,153	16,485	3,096	2,527	422	0	288,182	333,064	621,246
General Aviation[1]	19,586	19,438	14,354	25,473	32,872	19,558	37,722	41,700	25,161	148,696	384,560	12,242	396,802
Military & Other	2,726	260	1,163	778	8,628	16,267	486	17	6,851	1,215	38,391	0	38,391
Total	**104,333**	**81,931**	**69,853**	**62,160**	**72,653**	**52,310**	**41,304**	**44,244**	**32,434**	**149,911**	**711,133**	**345,306**	**1,056,439**

Table F-1 Aircraft Operations by Classification for New England's Airports, 2000 to 2019 (Continued)

Airport	Bradley International	T.F. Green	Manchester-Boston Regional	Portland International Jetport	Burlington	Bangor	Tweed-New Haven	Worcester Regional	Portsmouth International	Hanscom Field[2]	Subtotal	Logan[3]	Total
2010													
Commercial	80,418	60,128	53,971	35,035	29,538	16,190	3,201	1,629	1,516	0	281,626	337,961	619,587
General Aviation[1]	18,759	21,096	13,636	24,776	36,106	20,142	31,884	41,843	25,674	161,942	395,858	14,682	410,540
Military & Other	3,028	347	933	446	4,776	15,525	381	572	7,707	1,795	35,510	0	35,510
Total	**102,205**	**81,571**	**68,540**	**60,257**	**70,420**	**51,857**	**35,466**	**44,044**	**34,897**	**163,737**	**712,994**	**352,643**	**1,065,637**
2011													
Commercial	86,838	57,194	51,379	35,157	29,166	16,177	3,367	2,017	1,717	750	283,762	340,757	624,519
General Aviation[1]	16,483	21,774	12,497	21,453	42,562	19,503	33,919	44,050	27,056	160,840	400,137	28,230	428,367
Military & Other	3,630	369	874	533	5,890	13,220	310	634	8,158	1,409	35,027	0	35,027
Total	**106,951**	**79,337**	**64,750**	**57,143**	**77,618**	**48,900**	**37,596**	**46,701**	**36,931**	**162,999**	**718,926**	**368,987**	**1,087,913**
2012													
Commercial	79,704	50,301	45,379	33,118	27,067	14,826	3,936	1,639	502	635	257,107	326,755	583,862
General Aviation[1]	15,589	24,781	12,504	20,864	42,352	18,069	34,775	42,655	30,186	164,841	406,616	28,114	434,730
Military & Other	3,726	434	1,073	584	7,079	11,503	416	740	7,917	738	34,210	0	34,210
Total	**99,019**	**75,516**	**58,956**	**54,566**	**76,498**	**44,398**	**39,127**	**45,034**	**38,605**	**166,214**	**697,933**	**354,869**	**1,052,802**
2013													
Commercial	78,213	48,340	43,572	31,076	26,814	14,707	4,094	1,586	560	253	249,215	334,657	583,872
General Aviation[1]	15,192	24,729	11,432	20,021	40,413	15,535	28,794	32,888	28,951	153,706	371,661	26,682	398,343
Military & Other	2,558	435	1,224	471	6,972	11,045	423	593	7,573	529	31,823	0	31,823
Total	**95,963**	**73,504**	**56,228**	**51,568**	**74,199**	**41,287**	**33,311**	**35,067**	**37,084**	**154,488**	**652,699**	**361,339**	**1,014,038**
2014													
Commercial	79,060	44,351	38,674	29,538	26,057	14,428	4,795	2,368	8,278	256	247,805	337,381	585,186
General Aviation[1]	14,752	29,490	12,293	16,535	40,858	15,548	26,273	29,138	24,440	133,437	342,764	26,416	369,180
Military & Other	2,665	1,036	908	560	6,842	11,567	529	956	7,621	602	33,286	0	33,286
Total	**96,477**	**74,877**	**51,875**	**46,633**	**73,757**	**41,543**	**31,597**	**32,462**	**40,339**	**134,295**	**623,855**	**363,797**	**987,652**

Table F-1 Aircraft Operations by Classification for New England's Airports, 2000 to 2019 (Continued)

Airport	Bradley International	T.F. Green	Manchester-Boston Regional	Portland International Jetport	Burlington	Bangor[4]	Tweed-New Haven	Worcester Regional	Portsmouth International	Hanscom Field[2 4]	Subtotal	Logan[3]	Total
2015													
Commercial	76,425	42,417	38,060	30,415	25,178	13,618	6,316	2,414	8,547	220	243,610	344,764	588,374
General Aviation[1]	14,402	22,700	12,934	17,916	41,576	16,487	27,711	35,711	26,848	127,467	343,752	28,166	371,918
Military & Other	2,680	430	811	567	5,912	10,684	685	889	7,499	592	30,749	0	30,749
Total	**93,507**	**65,547**	**51,805**	**48,898**	**72,666**	**40,789**	**34,712**	**39,014**	**42,894**	**128,279**	**618,111**	**372,930**	**991,041**
2016													
Commercial	77,174	43,659	40,589	32,171	26,405	14,603	7,195	2,616	9,435	266	254,113	360,442	614,555
General Aviation[1]	14,460	26,032	14,447	18,334	38,614	16,815	28,811	31,858	29,043	120,891	339,305	30,780	370,085
Military & Other	3,178	397	501	488	6,114	11,271	683	780	8,913	632	32,957	0	32,957
Total	**94,812**	**70,088**	**55,537**	**50,993**	**71,133**	**42,689**	**36,689**	**35,254**	**47,391**	**121,789**	**626,375**	**391,222**	**1,017,597**
2017													
Commercial	78,435	45,831	37,850	32,845	26,684	15,874	6,820	2,925	9,597	295	257,156	370,251	627,407
General Aviation[1]	13,233	26,274	13,169	18,392	34,386	17,157	18,389	26,332	31,555	128,018	326,905	31,120	358,025
Military & Other	3,006	490	697	568	5,080	9,985	574	850	8,150	759	30,159	0	30,159
Total	**94,674**	**72,595**	**51,716**	**51,805**	**66,150**	**43,016**	**25,783**	**30,107**	**49,302**	**129,072**	**614,220**	**401,371**	**1,015,591**

Table F-1 Aircraft Operations by Classification for New England's Airports, 2000 to 2019 (Continued)

Airport	Bradley International	T.F. Green	Manchester-Boston Regional	Portland International Jetport	Burlington	Bangor	Tweed-New Haven	Worcester Regional	Portsmouth International	Hanscom Field[2]	Subtotal	Logan[3]	Total
2018													
Commercial	78,463	49,425	36,085	35,534	28,611	17,241	6,038	3,710	8,709	286	264,102	393,084	657,186
General Aviation[1]	13,280	21,124	15,664	20,717	38,078	16,670	18,220	14,473	30,424	120,945	309,595	30,940	340,535
Military & Other	2,898	399	423	675	3,547	9,758	536	753	7,600	433	27,022	0	27,022
Total	**94,641**	**70,948**	**52,172**	**56,926**	**70,236**	**43,669**	**24,794**	**18,936**	**46,733**	**121,664**	**600,719**	**424,024**	**1,024,743**
2019													
Commercial	76,352	46,393	34,965	35,855	28,413	17,678	6,094	4,441	9,346	426	259,963	398,254	658,217
General Aviation[1]	12,652	23,017	15,762	21,731	40,894	17,117	21,853	15,621	28,742	127,755	325,144	28,922	354,066
Military & Other	2,379	351	412	646	3,963	10,805	483	701	3,457	490	23,687	0	23,687
Total	**91,383**	**69,761**	**51,139**	**58,232**	**73,270**	**45,600**	**28,430**	**20,763**	**41,545**	**128,671**	**608,794**	**427,176**	**1,035,970**

Source: Massport, Federal Aviation Administration (FAA) Tower Counts, and individual airport records.

1 Includes itinerant and local general aviation operations at the regional airports. There are no local (touch-and-go training) operations at Logan Airport.

2 Commercial operations at Hanscom Field include scheduled commercial operations only; other air taxi operations counted as GA.

3 Operations at Logan Airport include international operations.

4 Updated 2016 and 2017 figures for Bangor and Hanscom airports compared to the *2017 ESPR*.

Table F-2 Percentage Change in Aircraft Operations by Classification for New England's Airports, 2000 to 2019

Airport	Bradley International	T.F. Green	Manchester-Boston Regional	Portland International Jetport	Burlington	Bangor	Tweed-New Haven	Worcester Regional	Portsmouth International	Hanscom Field[2]	Subtotal	Logan[3]	Total
2000 to 2001													
Commercial	(2.59%)	(3.03%)	0.27%	0.34%	3.31%	(14.73%)	(12.91%)	39.76%	(26.52%)	(2.40%)	(2.01%)	(4.06%)	(3.06%)
General Aviation[1]	(4.35%)	(13.58%)	(3.02%)	9.62%	4.39%	1.15%	(0.19%)	(2.27%)	(4.60%)	(3.30%)	(1.74%)	(18.43%)	(2.64%)
Military & Other	1.76%	(4.67%)	3.58%	9.03%	15.43%	0.44%	33.23%	85.25%	(17.57%)	(2.72%)	1.03%	-	1.03%
Total	**(2.77%)**	**(6.53%)**	**(1.11%)**	**5.45%**	**4.95%**	**(3.20%)**	**(1.10%)**	**1.90%**	**(10.12%)**	**(3.27%)**	**(1.70%)**	**(5.10%)**	**(2.73%)**
2001 Percent of Total	**10.59%**	**9.52%**	**6.85%**	**7.19%**	**7.77%**	**5.14%**	**3.92%**	**3.34%**	**2.75%**	**13.19%**	**70.27%**	**29.73%**	**100.00%**
2001 to 2002													
Commercial	(12.01%)	(3.99%)	1.10%	(3.92%)	(17.63%)	33.50%	(16.46%)	(27.86%)	12.80%	2.95%	(5.74%)	(15.63%)	(10.74%)
General Aviation[1]	(8.66%)	0.84%	(33.39%)	(6.92%)	(3.72%)	1.37%	10.82%	14.99%	(6.02%)	6.30%	0.05%	(10.94%)	(0.44%)
Military & Other	2.91%	(1.82%)	(38.06%)	(4.29%)	2.93%	2.53%	35.70%	(54.42%)	(0.01%)	13.74%	1.06%	-	1.06%
Total	**(10.85%)**	**(2.48%)**	**(13.47%)**	**(5.59%)**	**(8.50%)**	**9.09%**	**8.96%**	**9.12%**	**(2.90%)**	**6.24%**	**(2.14%)**	**(15.34%)**	**(6.07%)**
2002 Percent of Total	**10.05%**	**9.89%**	**6.31%**	**7.23%**	**7.57%**	**5.97%**	**4.55%**	**3.88%**	**2.84%**	**14.91%**	**73.21%**	**26.79%**	**100.00%**
2002 to 2003													
Commercial	(8.20%)	(12.73%)	9.36%	(7.06%)	(1.63%)	4.97%	(3.19%)	(78.63%)	(10.02%)	(55.23%)	(6.45%)	(5.96%)	(6.22%)
General Aviation[1]	(2.60%)	(5.71%)	0.01%	(23.71%)	(15.45%)	2.79%	(12.77%)	7.07%	(12.24%)	(9.24%)	(8.60%)	11.97%	(7.77%)
Military & Other	(30.75%)	(3.52%)	(13.83%)	(32.98%)	(5.76%)	20.67%	30.86%	(9.57%)	(6.08%)	(19.80%)	2.57%	-	2.57%
Total	**(8.07%)**	**(10.36%)**	**6.27%**	**(16.67%)**	**(9.53%)**	**8.98%**	**(11.83%)**	**0.81%**	**(10.75%)**	**(10.70%)**	**(7.16%)**	**(4.79%)**	**(6.52%)**
2003 Percent of Total	**9.89%**	**9.48%**	**7.17%**	**6.44%**	**7.33%**	**6.96%**	**4.29%**	**4.18%**	**2.72%**	**14.25%**	**72.71%**	**27.29%**	**100.00%**
2003 to 2004													
Commercial	4.72%	(0.95%)	10.52%	8.95%	8.95%	(2.56%)	21.48%	(100.00%)	(12.54%)	45.74%	4.95%	8.52%	6.66%
General Aviation[1]	19.01%	(18.66%)	(7.15%)	(5.65%)	8.42%	(18.59%)	8.59%	9.60%	4.41%	(8.12%)	(2.58%)	8.99%	(2.02%)
Military & Other	(2.71%)	(86.14%)	131.17%	(7.66%)	8.18%	(9.90%)	30.15%	40.21%	1.00%	4.64%	(5.97%)	-	(5.97%)
Total	**7.35%**	**(8.45%)**	**5.60%**	**1.38%**	**8.59%**	**(11.27%)**	**9.69%**	**8.14%**	**1.62%**	**(7.23%)**	**0.04%**	**8.56%**	**2.37%**
2004 Percent of Total	**10.37%**	**8.48%**	**7.39%**	**6.38%**	**7.77%**	**6.04%**	**4.60%**	**4.42%**	**2.70%**	**12.91%**	**71.06%**	**28.94%**	**100.00%**

Table F-2 Percentage Change in Aircraft Operations by Classification for New England's Airports, 2000 to 2019 (Continued)

Airport	Bradley International	T.F. Green	Manchester-Boston Regional	Portland International Jetport	Burlington	Bangor	Tweed-New Haven	Worcester Regional	Portsmouth International	Hanscom Field[2]	Subtotal	Logan[3]	Total
2004 to 2005													
Commercial	9.40%	5.84%	1.30%	(8.20%)	5.44%	4.03%	36.35%	-	(19.69%)	(15.81%)	4.69%	1.02%	2.90%
General Aviation[1]	3.32%	(19.32%)	(3.90%)	(12.89%)	(8.81%)	0.44%	3.42%	2.28%	(1.99%)	(5.63%)	(4.38%)	0.00%	(4.14%)
Military & Other	(9.73%)	(30.35%)	(36.05%)	5.01%	(7.55%)	(18.61%)	5.25%	(2.08%)	(1.64%)	(24.35%)	(12.75%)	-	(12.75%)
Total	**7.51%**	**(1.66%)**	**(0.34%)**	**(10.19%)**	**(3.21%)**	**(5.19%)**	**5.75%**	**6.65%**	**(3.78%)**	**(6.00%)**	**(1.29%)**	**0.94%**	**(0.65%)**
2005 Percent of Total	**11.22%**	**8.39%**	**7.42%**	**5.77%**	**7.57%**	**5.76%**	**4.89%**	**4.74%**	**2.61%**	**12.22%**	**70.60%**	**29.40%**	**100.00%**
2005 to 2006													
Commercial	(6.47%)	(8.02%)	(11.81%)	(9.37%)	(6.01%)	(9.66%)	(15.64%)	39.09%	24.52%	(15.72%)	(7.92%)	(0.84%)	(4.53%)
General Aviation[1]	3.62%	(9.34%)	(4.91%)	(1.71%)	(10.86%)	(0.56%)	(15.09%)	(9.52%)	2.03%	1.29%	(4.13%)	0.67%	(3.86%)
Military & Other	17.48%	(4.98%)	54.07%	9.32%	(18.91%)	(7.43%)	8.84%	17.34%	1.67%	58.52%	(4.07%)	-	(4.07%)
Total	**(3.75%)**	**(8.34%)**	**(9.74%)**	**(5.59%)**	**(9.71%)**	**(5.58%)**	**(14.77%)**	**(7.30%)**	**3.93%**	**1.23%**	**(5.72%)**	**(0.72%)**	**(4.25%)**
2006 Percent of Total	**11.28%**	**8.03%**	**6.99%**	**5.69%**	**7.14%**	**5.68%**	**4.36%**	**4.59%**	**2.83%**	**12.92%**	**69.51%**	**30.49%**	**100.00%**
2006 to 2007													
Commercial	(3.81%)	(0.93%)	2.69%	7.21%	(3.42%)	(3.81%)	(11.26%)	(16.64%)	7.26%	13.74%	(0.85%)	(1.01%)	(0.93%)
General Aviation[1]	(15.17%)	(9.90%)	(4.45%)	(10.82%)	6.86%	(14.43%)	(0.97%)	7.97%	4.00%	(3.92%)	(3.12%)	(8.94%)	(3.46%)
Military & Other	17.23%	5.68%	(12.74%)	(9.90%)	2.46%	(6.31%)	(18.41%)	44.33%	2.82%	0.35%	(0.77%)	-	(0.77%)
Total	**(5.81%)**	**(3.06%)**	**0.64%**	**(1.60%)**	**1.96%**	**(8.74%)**	**(2.24%)**	**6.81%**	**4.10%**	**(3.57%)**	**(2.06%)**	**(1.62%)**	**(1.93%)**
2007 Percent of Total	**10.83%**	**7.94%**	**7.18%**	**5.71%**	**7.42%**	**5.29%**	**4.34%**	**5.00%**	**3.01%**	**12.70%**	**69.42%**	**30.58%**	**100.00%**
2007 to 2008													
Commercial	(8.31%)	(9.23%)	(8.14%)	(1.49%)	(5.25%)	(14.57%)	(12.65%)	(19.26%)	(68.45%)	(97.01%)	(9.42%)	(6.23%)	(7.84%)
General Aviation[1]	(21.84%)	(15.29%)	(32.39%)	0.46%	(2.38%)	6.27%	(12.81%)	(28.60%)	15.00%	1.99%	(7.04%)	(16.81%)	(7.59%)
Military & Other	(28.64%)	(22.73%)	30.43%	(29.62%)	1.68%	(2.39%)	(74.26%)	0.80%	(0.30%)	10.57%	(5.36%)	-	(5.36%)
Total	**(11.85%)**	**(10.60%)**	**(14.08%)**	**(1.18%)**	**(3.16%)**	**(3.17%)**	**(13.82%)**	**(27.76%)**	**2.81%**	**(0.01%)**	**(7.94%)**	**(6.99%)**	**(7.65%)**
2008 Percent of Total	**10.34%**	**7.69%**	**6.68%**	**6.11%**	**7.78%**	**5.54%**	**4.05%**	**3.91%**	**3.35%**	**13.75%**	**69.20%**	**30.80%**	**100.00%**

Table F-2 Percentage Change in Aircraft Operations by Classification for New England's Airports, 2000 to 2019 (Continued)

Airport	Bradley International	T.F. Green	Manchester-Boston Regional	Portland International Jetport	Burlington	Bangor	Tweed-New Haven	Worcester Regional	Portsmouth International	Hanscom Field[2]	Subtotal	Logan[3]	Total
2008 to 2009													
Commercial	(16.47%)	(14.86%)	(14.44%)	(12.06%)	(17.65%)	(14.51%)	(22.85%)	(1.02%)	(68.67%)	(100.00%)	(15.43%)	(4.23%)	(9.77%)
General Aviation[1]	(14.50%)	(0.16%)	(11.38%)	(20.07%)	(29.14%)	(27.94%)	(15.50%)	(4.71%)	(18.97%)	(9.44%)	(14.09%)	(48.61%)	(15.83%)
Military & Other	(25.05%)	39.04%	38.45%	(20.12%)	(10.94%)	(20.45%)	100.00%	(98.08%)	(14.29%)	(23.58%)	(17.42%)	-	(17.42%)
Total	**(16.36%)**	**(11.67%)**	**(13.27%)**	**(15.63%)**	**(22.64%)**	**(21.78%)**	**(15.53%)**	**(6.27%)**	**(19.70%)**	**(9.63%)**	**(14.82%)**	**(7.08%)**	**(12.44%)**
2009 Percent of Total	**9.88%**	**7.76%**	**6.61%**	**5.88%**	**6.88%**	**4.95%**	**3.91%**	**4.19%**	**3.07%**	**14.19%**	**67.31%**	**32.69%**	**100.00%**
2009 to 2010													
Commercial	(1.95%)	(3.38%)	(0.67%)	(2.43%)	(5.18%)	(1.79%)	3.39%	(35.54%)	259.24%	-	(2.27%)	1.47%	(0.27%)
General Aviation[1]	(4.22%)	8.53%	(5.00%)	(2.74%)	9.84%	2.99%	(15.48%)	0.34%	2.04%	8.91%	2.94%	19.93%	3.46%
Military & Other	11.08%	33.46%	(19.78%)	(42.67%)	(44.65%)	(4.56%)	(21.60%)	3264.71%	12.49%	47.74%	(7.50%)	-	(7.50%)
Total	**(2.04%)**	**(0.44%)**	**(1.88%)**	**(3.06%)**	**(3.07%)**	**(0.87%)**	**(14.13%)**	**(0.45%)**	**7.59%**	**9.22%**	**0.26%**	**2.12%**	**0.87%**
2010 Percent of Total	**9.59%**	**7.65%**	**6.43%**	**5.65%**	**6.61%**	**4.87%**	**3.33%**	**4.13%**	**3.27%**	**15.37%**	**66.91%**	**33.09%**	**100.00%**
2010 to 2011													
Commercial	7.98%	(4.88%)	(4.80%)	0.35%	(1.26%)	(0.08%)	5.19%	23.82%	13.26%	-	0.76%	0.83%	0.80%
General Aviation[1]	(12.13%)	3.21%	(8.35%)	(13.41%)	17.88%	(3.17%)	6.38%	5.27%	5.38%	(0.68%)	1.08%	92.28%	4.34%
Military & Other	19.88%	6.34%	(6.32%)	19.51%	23.32%	(14.85%)	(18.64%)	10.84%	5.85%	(21.50%)	(1.36%)	-	(1.36%)
Total	**4.64%**	**(2.74%)**	**(5.53%)**	**(5.17%)**	**10.22%**	**(5.70%)**	**6.01%**	**6.03%**	**5.83%**	**(0.45%)**	**0.83%**	**4.63%**	**2.09%**
2011 Percent of Total	**9.83%**	**7.29%**	**5.95%**	**5.25%**	**7.13%**	**4.49%**	**3.46%**	**4.29%**	**3.39%**	**14.98%**	**66.08%**	**33.92%**	**100.00%**
2012 to 2013													
Commercial	(1.87%)	(3.90%)	(3.98%)	(6.17%)	(0.93%)	(0.80%)	4.01%	(3.23%)	11.55%	(60.16%)	(3.07%)	2.42%	0.00%
General Aviation[1]	(2.55%)	(0.21%)	(8.57%)	(4.04%)	(4.58%)	(14.02%)	(17.20%)	(22.90%)	(4.09%)	(6.75%)	(8.60%)	(5.09%)	(8.37%)
Military & Other	(31.35%)	0.23%	14.07%	(19.35%)	(1.51%)	(3.98%)	1.68%	(19.86%)	(4.35%)	(28.32%)	(6.98%)	-	(6.98%)
Total	**(3.09%)**	**(2.66%)**	**(4.63%)**	**(5.49%)**	**(3.01%)**	**(7.01%)**	**(14.86%)**	**(22.13%)**	**(3.94%)**	**(7.05%)**	**(6.48%)**	**1.82%**	**(3.68%)**
2013 Percent of Total	**9.46%**	**7.25%**	**5.54%**	**5.09%**	**7.32%**	**4.07%**	**3.28%**	**3.46%**	**3.66%**	**15.23%**	**64.37%**	**35.63%**	**100.00%**

Table F-2 Percentage Change in Aircraft Operations by Classification for New England's Airports, 2000 to 2019 (Continued)

Airport	Bradley International	T.F. Green	Manchester-Boston Regional	Portland International Jetport	Burlington	Bangor[4]	Tweed-New Haven	Worcester Regional	Portsmouth International	Hanscom Field[2 4]	Subtotal	Logan[3]	Total
2013 to 2014													
Commercial	1.08%	(8.25%)	(11.24%)	(4.95%)	(2.82%)	(1.90%)	17.12%	49.31%	1378.21%	1.19%	(0.57%)	0.81%	0.23%
General Aviation[1]	(2.90%)	19.25%	7.53%	(17.41%)	1.10%	0.08%	(8.76%)	(11.40%)	(15.58%)	(13.19%)	(7.78%)	(1.00%)	(7.32%)
Military & Other	4.18%	138.16%	(25.82%)	18.90%	(1.86%)	4.73%	25.06%	61.21%	0.63%	13.80%	4.60%	-	4.60%
Total	**0.54%**	**1.87%**	**(7.74%)**	**(9.57%)**	**(0.60%)**	**0.62%**	**(5.15%)**	**(7.43%)**	**8.78%**	**(13.07%)**	**(4.42%)**	**0.68%**	**(2.60%)**
2014 Percent of Total	**9.77%**	**7.58%**	**5.25%**	**4.72%**	**7.47%**	**4.21%**	**3.20%**	**3.29%**	**4.08%**	**13.60%**	**63.17%**	**36.83%**	**100.00%**
2014 to 2015													
Commercial	(3.33%)	(4.36%)	(1.59%)	2.97%	(3.37%)	(5.61%)	31.72%	1.94%	3.25%	(14.06%)	(1.69%)	2.19%	0.54%
General Aviation[1]	(2.37%)	(23.02%)	5.21%	8.35%	1.76%	6.04%	5.47%	22.56%	9.85%	(4.47%)	0.29%	6.62%	0.74%
Military & Other	0.56%	(58.49%)	(10.68%)	1.25%	(13.59%)	(7.63%)	29.49%	(7.01%)	(1.60%)	(1.66%)	(7.62%)	-	(7.62%)
Total	**(3.08%)**	**(12.46%)**	**(0.13%)**	**4.86%**	**(1.48%)**	**(1.81%)**	**9.86%**	**20.18%**	**6.33%**	**(4.48%)**	**(0.92%)**	**2.51%**	**0.34%**
2015 Percent of Total	**9.44%**	**6.61%**	**5.23%**	**4.93%**	**7.33%**	**4.12%**	**3.50%**	**3.94%**	**4.33%**	**12.94%**	**62.37%**	**37.63%**	**100.00%**
2015 to 2016													
Commercial	0.98%	2.93%	6.64%	5.77%	4.87%	7.23%	13.92%	8.37%	10.39%	20.91%	4.31%	4.55%	4.45%
General Aviation[1]	0.40%	14.68%	11.70%	2.33%	(7.12%)	1.99%	3.97%	(10.79%)	8.18%	(5.16%)	(1.29%)	9.28%	(0.49%)
Military & Other	18.58%	(7.67%)	(38.22%)	(13.93%)	3.42%	5.49%	(0.29%)	(12.26%)	18.86%	6.76%	7.18%	-	7.18%
Total	**1.40%**	**6.93%**	**7.20%**	**4.28%**	**(2.11%)**	**4.66%**	**5.70%**	**(9.64%)**	**10.48%**	**(5.06%)**	**1.34%**	**4.90%**	**2.68%**
2016 Percent of Total	**9.32%**	**6.89%**	**5.46%**	**5.01%**	**6.99%**	**4.20%**	**3.61%**	**3.46%**	**4.66%**	**11.97%**	**61.55%**	**38.45%**	**100.00%**
2016 to 2017													
Commercial	1.63%	4.97%	(6.75%)	2.10%	1.06%	8.70%	(5.21%)	11.81%	1.72%	10.90%	1.20%	2.72%	2.09%
General Aviation[1]	(8.49%)	0.93%	(8.85%)	0.32%	(10.95%)	2.03%	(36.17%)	(17.35%)	8.65%	5.90%	(3.65%)	1.10%	(3.26%)
Military & Other	(5.41%)	23.43%	39.12%	16.39%	(16.91%)	(11.41%)	(15.96%)	8.97%	(8.56%)	20.09%	(8.49%)	-	(8.49%)
Total	**(0.15%)**	**3.58%**	**(6.88%)**	**1.59%**	**(7.01%)**	**0.77%**	**(29.73%)**	**(14.60%)**	**4.03%**	**5.98%**	**(1.94%)**	**2.59%**	**(0.20%)**
2017 Percent of Total	**9.32%**	**7.15%**	**5.09%**	**5.10%**	**6.51%**	**4.24%**	**2.54%**	**2.96%**	**4.85%**	**12.71%**	**60.48%**	**39.52%**	**100.00%**

Table F-2 Percentage Change in Aircraft Operations by Classification for New England's Airports, 2000 to 2019 (Continued)

Airport	Bradley International	T.F. Green	Manchester-Boston Regional	Portland International Jetport	Burlington	Bangor	Tweed-New Haven	Worcester Regional	Portsmouth International	Hanscom Field[2]	Subtotal	Logan[3]	Total
2017 to 2018													
Commercial	0.04%	7.84%	(4.66%)	8.19%	7.22%	8.61%	(11.47%)	26.84%	(9.25%)	(2.05%)	2.70%	6.17%	4.75%
General Aviation[1]	0.36%	(19.60%)	18.95%	12.64%	10.74%	(3.21%)	(0.92%)	(45.04%)	(3.58%)	(5.31%)	(5.23%)	(0.58%)	(4.83%)
Military & Other	(3.59%)	(18.57%)	(39.31%)	18.84%	(30.18%)	(2.47%)	(6.62%)	(11.41%)	(6.75%)	(25.34%)	(9.93%)	-	(9.93%)
Total	**(0.03%)**	**(2.27%)**	**0.88%**	**9.89%**	**6.18%**	**1.32%**	**(3.84%)**	**(37.10%)**	**(5.21%)**	**(5.39%)**	**(2.14%)**	**5.64%**	**0.94%**
2019 Percent of Total	**9.24%**	**6.92%**	**5.09%**	**5.56%**	**6.85%**	**4.26%**	**2.42%**	**1.85%**	**4.56%**	**11.87%**	**58.62%**	**41.38%**	**100.00%**
2018 to 2019													
Commercial	(2.69%)	(6.13%)	(3.10%)	0.90%	(0.69%)	2.53%	0.93%	19.70%	7.31%	48.95%	(1.57%)	1.32%	0.16%
General Aviation[1]	(4.73%)	8.96%	0.63%	4.89%	7.40%	2.68%	19.94%	7.93%	(5.53%)	5.63%	5.02%	(6.52%)	3.97%
Military & Other	(17.91%)	(12.03%)	(2.60%)	(4.30%)	11.73%	10.73%	(9.89%)	(6.91%)	(54.51%)	13.16%	(12.34%)	-	(12.34%)
Total	**(3.44%)**	**(1.67%)**	**(1.98%)**	**2.29%**	**4.32%**	**4.42%**	**14.66%**	**9.65%**	**(11.10%)**	**5.76%**	**1.34%**	**0.74%**	**1.10%**
2019 Percent of Total	**8.82%**	**6.73%**	**4.94%**	**5.62%**	**7.07%**	**4.40%**	**2.74%**	**2.00%**	**4.01%**	**12.42%**	**58.77%**	**41.23%**	**100.00%**

Source: Massport, Federal Aviation Administration (FAA) Tower Counts, and individual airport records.

1 Includes itinerant and local general aviation operations at the regional airports. There are no local (touch-and-go training) operations at Logan Airport.

2 Commercial operations at Hanscom Field include scheduled commercial operations only; other air taxi operations counted as GA.

3 Operations at Logan Airport include international operations.

4 Updated 2016 and 2017 figures for Bangor and Hanscom airports compared to the *2017 ESPR*.

Table F-3 Scheduled Passenger Operations by Market and Carrier for Bradley International Airport

			Departures											Departing Seats									
Carrier	**Market**	**Code**	**2000**	**2010**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**'18-'19 Change**	**'18-'19 Pct. Change**	**2000**	**2010**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**'18-'19 Change**	**'18-'19 Pct. Change**
Jet Carriers																								
Aer Lingus	Dublin	DUB						66	305	292	287	-4	-1.5%						11,657	53,934	51,659	56,457	4,798	9.3%
Alaska	Chicago O'Hare	ORD	30									-	-	4,050									-	-
America West	Columbus	CMH	149									-	-	18,441									-	-
America West	Las Vegas	LAS	210									-	-	27,469									-	-
America West	Phoenix	PHX	275									-	-	37,772									-	-
American	Charlotte	CLT				1,763	1,775	1,918	1,982	1,968	2,108	140	7.1%				257,645	244,756	278,511	306,378	298,319	314,805	16,486	5.5%
American	Chicago O'Hare	ORD	2,139					240	671	636	964	328	51.6%	304,855					35,717	102,663	101,714	154,171	52,457	51.6%
American	Dallas/Fort Worth	DFW	1,343	1,052	1,069	1,008	695	678	678	669	590	-79	-11.8%	185,922	160,983	171,017	157,952	103,576	101,001	103,275	107,063	94,400	-12,663	-11.8%
American	Los Angeles	LAX	214		122	243		205	330	301	267	-34	-11.3%	31,244		19,520	38,880		30,588	50,150	48,137	42,578	-5,559	-11.5%
American	Miami	MIA	366	413	396	476	400	365	361	361	352	-9	-2.5%	51,427	63,559	63,360	74,981	59,600	54,342	55,105	57,714	58,050	336	0.6%
American	Philadelphia	PHL				265	31	271	382	842	847	6	0.7%				29,004	3,069	28,245	38,044	93,690	109,517	15,826	16.9%
American	New York J F Kennedy	JFK										-	-										-	-
American	San Juan	SJU	366	365								-	-	69,348	55,856								-	-
American	St. Louis	STL										-	-										-	-
American	Washington National	DCA				103	18	17	4			-	-				12,536	2,196	1,680	567			-	-
Boston-Maine Airways	Fort Lauderdale/Hollywood	FLL										-	-										-	-
Continental	Cleveland	CLE	582									-	-	68,974									-	-
Continental	Houston Intercontinental	IAH	366									-	-	45,790									-	-
Continental	New York Newark	EWR	331									-	-	38,916									-	-
Delta	Atlanta	ATL	2,192	2,099	2,109	2,391	2,374	2,360	2,290	2,335	2,391	56	2.4%	392,835	300,185	319,290	355,968	354,751	354,943	343,403	367,313	386,814	19,501	5.3%
Delta	Boston	BOS	4									-	-	634									-	-
Delta	Cancun	CUN		35	13	17	35	39	35	35	17	-18	-50.6%		5,470	1,973	2,571	5,207	5,956	5,049	5,584	3,086	-2,499	-44.7%
Delta	Cincinnati	CVG	1,464				4					-	-	244,837				471					-	-
Delta	Detroit	DTW		1,003	753	1,053	1,375	1,366	1,333	1,308	1,522	213	16.3%		129,228	110,361	145,867	187,833	184,729	183,762	199,048	190,939	-8,109	-4.1%
Delta	Fort Lauderdale/Hollywood	FLL	732	237								-	-	87,108	33,674								-	-
Delta	Fort Myers	RSW		99								-	-		13,104								-	-
Delta	Las Vegas	LAS		9								-	-		1,394								-	-
Delta	Los Angeles	LAX		83								-	-		13,257								-	-
Delta	Minneapolis	MSP		758	549	605	858	662	803	931	1,007	76	8.1%		99,431	82,545	87,377	114,722	96,039	105,445	129,502	131,162	1,659	1.3%

Table F-3 Scheduled Passenger Operations by Market and Carrier for Bradley International Airport (Continued)

			Departures											Departing Seats									
Carrier	**Market**	**Code**	**2000**	**2010**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**'18-'19 Change**	**'18-'19 Pct. Change**	**2000**	**2010**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**'18-'19 Change**	**'18-'19 Pct. Change**
Delta	New York J F Kennedy	JFK	183									-	-	39,894									-	-
Delta	Orlando	MCO	1,838	261	57			4			9	9	-	218,705	99,129	8,514			471			959	959	-
Delta	Salt Lake City	SLC										-	-										-	-
Delta	Tampa	TPA		813								-	-		33,625								-	-
Delta	West Palm Beach	PBI	732	205								-	-	87,108	37,536								-	-
Frontier	Denver	DEN									96	96	-									17,280	17,280	-
Frontier	Miami	MIA									30											5,477	5,477	-
Frontier	Orlando	MCO									127											28,136	28,136	-
Frontier	Raleigh/Durham	RDU									83											14,966	14,966	-
jetBlue	Washington National	DCA				402	730	714	730	717	349	-368	-51.3%				40,229	85,300	77,600	73,000	71,686	34,914	-36,771	-51.3%
jetBlue	Fort Lauderdale/Hollywood	FLL		101	612	590	590	568	726	739	691	-47	-6.4%		15,086	91,800	87,836	88,479	85,264	108,836	110,371	103,714	-6,657	-6.0%
jetBlue	Fort Myers	RSW			61	181	212	242	242	242	242	-				9,150	27,150	31,800	36,300	36,300	36,300	38,740	2,440	6.7%
jetBlue	Orlando	MCO		101	730	747	730	746	730	730	826	96	13.1%		15,086	109,500	112,071	109,500	111,100	109,500	109,500	123,879	14,379	13.1%
jetBlue	San Juan	SJU			365	405	465	561	587	497	660	163	32.9%			54,793	60,729	69,686	84,150	88,114	74,550	99,043	24,493	32.9%
jetBlue	Tampa	TPA			61	365	365	365	409	417	365	-52	-12.5%			9,150	44,693	48,750	54,750	61,286	62,550	54,750	-7,800	-12.5%
jetBlue	West Palm Beach	PBI			365	365	365	387	365	365	446	81	22.1%			54,750	44,907	45,550	51,929	51,700	54,750	71,737	16,987	31.0%
Laker Airways (Bahamas)	Freeport	FPO	39									-	-	5,850									-	-
Midway Airlines	Raleigh/Durham	RDU	683									-	-	69,213									-	-
Midwest/Republic	Milwaukee	MKE	619									-	-	44,455									-	-
Northwest	Amsterdam	AMS										-	-										-	-
Northwest	Detroit	DTW	1,699									-	-	215,750									-	-
Northwest	Fort Myers	RSW										-	-										-	-
Northwest	Minneapolis	MSP	1,177									-	-	135,570									-	-
Northwest	Orlando	MCO										-	-										-	-
Northwest	Tampa	TPA										-	-										-	-
Northwest	West Palm Beach	PBI										-	-										-	-
Norwegian Air	Edinburgh	EDI							70	26		-26	-100.0%							13,124	4,860		-4,860	-100.0%
Southwest	Atlanta	ATL			174	1,086	172					-	-			20,391	131,627	24,482					-	-

Table F-3 Scheduled Passenger Operations by Market and Carrier for Bradley International Airport (Continued)

			Departures											Departing Seats									
Carrier	**Market**	**Code**	**2000**	**2010**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**'18-'19 Change**	**'18-'19 Pct. Change**	**2000**	**2010**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**'18-'19 Change**	**'18-'19 Pct. Change**
Southwest	Baltimore	BWI	2,841	2,700	2,610	2,448	2,435	2,514	2,486	2,343	2,000	-343	-14.6%	389,158	367,534	372,650	353,791	353,038	372,278	363,930	344,395	294,277	-50,118	-14.6%
Southwest	Chicago Midway	MDW	723	923	967	961	974	966	944	949	883	-66	-6.9%	99,090	126,412	146,270	142,513	147,672	148,701	139,257	148,117	135,369	-12,748	-8.6%
Southwest	Denver	DEN		306	365	374	374	374	404	391	327	-64	-16.3%		41,922	54,860	58,570	61,917	60,234	67,673	66,912	54,781	-12,131	-18.1%
Southwest	Fort Lauderdale/Hollywood	FLL		70	348	369	387	387	387	382	242	-140	-36.6%		9,551	49,521	53,381	57,309	56,240	59,892	58,854	37,591	-21,263	-36.1%
Southwest	Fort Myers	RSW			203	216	212	212	276	227	229	2	0.9%			28,917	30,949	30,586	30,586	42,698	35,041	35,794	752	2.1%
Southwest	Las Vegas	LAS	52	361	245	245	306	306	245	232		-232	-100.0%	7,163	49,398	34,876	35,035	44,037	46,551	40,640	38,879		-38,879	-100.0%
Southwest	Nashville	BNA	672	361								-	-	92,064	49,398								-	-
Southwest	Orlando	MCO	375	1,016	944	975	1,003	999	1,056	995	1,008	12	1.2%	51,336	139,212	136,115	140,866	151,806	156,562	157,068	151,005	154,334	3,329	2.2%
Southwest	Philadelphia	PHL										-	-										-	-
Southwest	St. Louis	STL								153	356										25,225	58,077	32,852	130.2%
Southwest	Tampa	TPA		570	629	656	651	642	712	665	686	21	3.2%		78,129	90,219	93,662	93,905	93,646	108,758	106,234	108,402	2,168	2.0%
Southwest	West Palm Beach	PBI					4	4	9	4	4	-						633	633	1,246	633	633	-	
Spirit	Fort Lauderdale/Hollywood	FLL							184	507	521	14	2.7%							26,680	83,055	83,934	879	1.1%
Spirit	Fort Myers	RSW							61	142	151	9	6.4%							11,102	25,870	27,534	1,664	6.4%
Spirit	Myrtle Beach	MYR							140	258	258	0	-0.1%							25,558	46,025	45,656	-369	-0.8%
Spirit	Orlando	MCO							245	643	696	53	8.2%							37,782	106,128	114,939	8,811	8.3%
Spirit	Tampa	TPA							61	195	212	17	8.8%							11,102	35,412	38,532	3,120	8.8%
Sunworld International	Philadelphia	PHL										-	-										-	-
Trans World Airlines	Portland (ME)	PWM	305									-	-	43,310									-	-
Trans World Airlines	St. Louis	STL	1,460									-	-	206,109									-	-
United	Chicago O'Hare	ORD	2,034	1,296	593	800	554	605	727	897	988	91	10.2%	299,522	198,709	86,911	112,864	72,529	84,972	100,094	122,199	145,068	22,869	18.7%
United	Denver	DEN	366					275	365	365	365	-		46,901					36,838	53,945	54,996	60,713	5,717	10.4%
United	New York Newark	EWR			18				190	226		-226	-100.0%			2,126				27,237	33,464		-33,464	-100.0%
United	San Francisco	SFO	366						75	92		-92	-100.0%	45,384						8,983	11,776		-11,776	-100.0%
United	Washington Dulles	IAD	1,455	1,192	180	222	82	472	430	858	750	-108	-12.6%	173,869	155,750	25,418	32,132	11,182	73,998	64,261	129,208	111,930	-17,278	-13.4%
US Airways	Baltimore	BWI	488									-	-	41,760									-	-
US Airways	Charlotte	CLT	1,464	1,588	1,734							-	-	214,719	228,119	255,885							-	-
US Airways	Fort Lauderdale/Hollywood	FLL	366									-	-	39,232									-	-

Table F-3 Scheduled Passenger Operations by Market and Carrier for Bradley International Airport (Continued)

			Departures											Departing Seats									
Carrier	**Market**	**Code**	**2000**	**2010**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**'18-'19 Change**	**'18-'19 Pct. Change**	**2000**	**2010**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**'18-'19 Change**	**'18-'19 Pct. Change**
US Airways	Orlando	MCO	1,098									-	-	117,696									-	-
US Airways	Philadelphia	PHL	2,148	361	365							-	-	310,118	49,914	49,083							-	-
US Airways	Phoenix	PHX										-	-										-	-
US Airways	Pittsburgh	PIT	1,800									-	-	278,575									-	-
US Airways	Washington Dulles	IAD	732									-	-	86,376									-	-
US Airways	Washington National	DCA	1,329	361	208							-	-	171,891	51,434	25,610							-	-
US Airways	West Palm Beach	PBI	366									-	-	39,232									-	-
USA 3000 Airlines	Cancun	CUN										-	-										-	-
USA 3000 Airlines	Punta Cana	PUJ										-	-										-	-
Subtotal			**38,171**	**18,695**	**16,845**	**19,331**	**18,175**	**19,530**	**22,030**	**23,934**	**23,953**	**19**	**0.1%**	**5,179,671**	**2,622,086**	**2,484,577**	**2,765,786**	**2,604,342**	**2,846,211**	**3,237,541**	**3,607,739**	**3,643,137**	**35,398**	**1.0%**
Regional/ Commuter Carriers																								
Air Canada Express	Montreal Dorval	YUL	1,385	1,021	952	996	1,008	1,038	1,021	684	343	-341	-49.9%	19,392	19,399	17,144	17,925	18,141	18,692	18,381	18,894	17,042	-1,852	-9.8%
Air Canada Express	Toronto	YYZ	1,589	1,287	1,295	1,313	1,395	1,399	1,391	1,352	1,013	-339	-25.1%	61,991	36,960	28,103	25,102	25,118	35,328	40,045	45,448	46,424	976	2.1%
America West Express	Columbus	CMH	450									-	-	22,493									-	-
American Connection	St. Louis	STL										-	-										-	-
American Eagle	Charlotte	CLT				366	290	156	127	157	91	-65	-41.7%				28,940	22,265	11,774	10,062	11,609	6,474	-5,135	-44.2%
American Eagle	Chicago O'Hare	ORD		1,501	1,630	1,622	1,604	1,421	685	718	546	-172	-23.9%		79,594	90,663	115,856	115,366	93,468	43,137	46,412	38,769	-7,643	-16.5%
American Eagle	New York J F Kennedy	JFK	1,460									-	-	48,166									-	-
American Eagle	Philadelphia	PHL				2,234	2,502	2,133	1,684	1,249	914	-335	-26.8%				136,683	146,222	123,285	103,743	73,671	53,306	-20,365	-27.6%
American Eagle	Pittsburgh	PIT				939	782					-	-				67,549	39,086					-	-
American Eagle	Raleigh/Durham	RDU		257								-	-		10,774								-	-
American Eagle	St. Louis	STL										-	-										-	-
American Eagle	Washington National	DCA				2,119	2,125	2,251	2,476	2,184	2,064	-120	-5.5%				141,783	130,975	142,309	147,169	124,991	124,954	-37	0.0%
Continental Connection	Albany	ALB										-	-										-	-
Continental Connection	Binghamton	BGM										-	-										-	-

Table F-3 Scheduled Passenger Operations by Market and Carrier for Bradley International Airport (Continued)

			Departures											Departing Seats									
Carrier	**Market**	**Code**	**2000**	**2010**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**'18-'19 Change**	**'18-'19 Pct. Change**	**2000**	**2010**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**'18-'19 Change**	**'18-'19 Pct. Change**
Continental Connection	Boston	BOS										-	-										-	-
Continental Connection	Buffalo	BUF	89									-	-	1,683									-	-
Continental Connection	Burlington	BTV	4									-	-	84									-	-
Continental Connection	New York J F Kennedy	JFK										-	-										-	-
Continental Connection	New York Newark	EWR		608								-	-		22,485								-	-
Continental Connection	Philadelphia	PHL										-	-										-	-
Continental Connection	Rochester	ROC	93									-	-	1,767									-	-
Continental Connection	Syracuse	SYR	97									-	-	1,851									-	-
Continental Express	Cleveland	CLE	803	1,208								-	-	39,357	60,400								-	-
Continental Express	New York Newark	EWR	1,747	465								-	-	82,365	23,264								-	-
Delta Connection	Atlanta	ATL			4	4	4					-	-			279	288	326					-	-
Delta Connection	Cincinnati	CVG		1,218	895	839	475	300	308	305	313	8	2.6%		61,642	44,757	43,557	25,537	22,800	22,353	22,251	22,679	428	1.9%
Delta Connection	Cleveland	CLE				170	243	266	300	304	313	8	2.8%				11,898	15,450	19,798	22,800	23,106	23,777	672	2.9%
Delta Connection	Columbus	CMH										-	-										-	-
Delta Connection	Detroit	DTW		1,004	1,195	659	313	264	271	78	27	-52	-66.0%		54,265	80,351	45,421	20,860	18,905	20,193	5,939	2,019	-3,919	-66.0%
Delta Connection	Fort Lauderdale/Hollywood	FLL										-	-										-	-
Delta Connection	Fort Myers	RSW										-	-										-	-
Delta Connection	Indianapolis	IND										-	-										-	-
Delta Connection	Minneapolis	MSP		481	812	738	342	539	467	331	345	14	4.3%		36,567	61,035	55,233	25,556	40,845	34,547	25,123	25,844	721	2.9%
Delta Connection	Myrtle Beach	MYR	61									-	-	3,057									-	-
Delta Connection	New York J F Kennedy	JFK		365								-	-		18,250								-	-
Delta Connection	Orlando	MCO				43	35	8	9	13		-13	-100.0%				3,156	2,354	641	662	938		-938	-100.0%
Delta Connection	Raleigh/Durham	RDU		100	270	257	261	253	308	313	313	-			6,136	13,500	12,850	17,611	18,054	23,441	23,454	23,777	323	1.4%
Delta Connection	Tampa	TPA										-	-										-	-
Delta Connection	Washington National	DCA		166								-	-		11,324								-	-

Table F-3 Scheduled Passenger Operations by Market and Carrier for Bradley International Airport (Continued)

			Departures											Departing Seats									
Carrier	**Market**	**Code**	**2000**	**2010**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**'18-'19 Change**	**'18-'19 Pct. Change**	**2000**	**2010**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**'18-'19 Change**	**'18-'19 Pct. Change**
Delta Connection	West Palm Beach	PBI										-	-										-	-
Frontier Express	Milwaukee	MKE		140								-	-		6,313								-	-
Independence Air	Washington Dulles	IAD										-	-										-	-
Midway Airlines	Raleigh/Durham	RDU	1,348									-	-	67,393									-	-
Midwest Connect	Milwaukee	MKE	4									-	-	142									-	-
Northwest Airlink	Detroit	DTW										-	-										-	-
Northwest Airlink	Indianapolis	IND										-	-										-	-
Northwest Airlink	Memphis	MEM										-	-										-	-
Northwest Airlink	Minneapolis	MSP										-	-										-	-
OneJet	Pittsburgh	PIT						289	521	346		-346	-100.0%						2,597	4,344	5,706		-5,706	-100.0%
Shuttle America	Albany	ALB	66									-	-	3,286									-	-
Shuttle America	Bedford	BED	233									-	-	11,671									-	-
Shuttle America	Buffalo	BUF	337									-	-	16,857									-	-
Shuttle America	Islip	ISP	27									-	-	1,329									-	-
Shuttle America	Wilmington	ILG	159									-	-	7,936									-	-
Swissair	New York J F Kennedy	JFK	31									-	-	1,023									-	-
Trans World Airlines	New York J F Kennedy	JFK	1,098									-	-	31,842									-	-
United Express	Chicago O'Hare	ORD		548	1,045	877	904	696	509	617	338	-279	-45.2%		36,797	59,896	47,419	60,980	45,255	34,256	40,539	23,571	-16,967	-41.9%
United Express	Cleveland	CLE			1,127	235						-	-			56,436	11,750						-	-
United Express	Houston	IAH				96	365	361	293	100	352	253	253.7%				7,521	26,998	25,240	20,583	6,982	24,650	17,668	253.1%
United Express	New York Newark	EWR			1,269	853	1,335	1,357	866	533		-533	-100.0%			61,339	38,317	65,086	69,442	39,881	27,903		-27,903	-100.0%
United Express	Washington Dulles	IAD		494	1,280	1,224	1,243	870	965	581	680	99	17.1%		30,270	72,861	68,684	77,783	56,035	61,327	38,720	47,246	8,526	22.0%
US Airways Express	Baltimore	BWI	1,185									-	-	43,850									-	-
US Airways Express	Buffalo	BUF	1,032									-	-	38,200									-	-
US Airways Express	Charlotte	CLT		537	364							-	-		45,043	28,392							-	-

Table F-3 Scheduled Passenger Operations by Market and Carrier for Bradley International Airport (Continued)

			Departures											Departing Seats									
Carrier	**Market**	**Code**	**2000**	**2010**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**'18-'19 Change**	**'18-'19 Pct. Change**	**2000**	**2010**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**'18-'19 Change**	**'18-'19 Pct. Change**
US Airways Express	New York La Guardia	LGA		139								-	-		5,159								-	-
US Airways Express	New York Newark	EWR										-	-										-	-
US Airways Express	Philadelphia	PHL		2,404	2,260							-	-		183,838	133,663							-	-
US Airways Express	Pittsburgh	PIT		939	939							-	-		46,929	77,901							-	-
US Airways Express	Rochester	ROC	937	478								-	-	34,658	16,242								-	-
US Airways Express	Syracuse	SYR	732									-	-	27,084									-	-
US Airways Express	Washington National	DCA		1,334	1,825							-	-		89,629	115,989							-	-
Subtotal			**14,968**	**16,694**	**17,164**	**15,584**	**15,226**	**13,601**	**12,201**	**9,863**	**7,651**	**-2,211**	**-22.4%**	**567,477**	**901,282**	**942,310**	**879,932**	**835,714**	**744,468**	**646,924**	**541,685**	**480,533**	**-61,152**	**-11.3%**
Total			**53,139**	**35,389**	**34,009**	**34,915**	**33,402**	**33,131**	**34,231**	**33,797**	**31,605**	**-2,192**	**-6.5%**	**5,747,148**	**3,523,368**	**3,426,886**	**3,645,718**	**3,440,056**	**3,590,679**	**3,884,465**	**4,149,424**	**4,123,671**	**-25,754**	**-0.6%**

Source: OAG Schedules.

Notes: Allegiant stopped reporting to the OAG in 2009, so Allegiant 2009-2016 statistics from the T100 database; 2017-2019 statistics from OAG, which recommenced reporting.
All Northwest Airlines operations included in Delta Air Lines from 2009 onwards (following 2008 merger).
All Continental Airlines operations included in United Airlines from 2011 onwards (following 2010 merger).
All AirTran Airways operations included in Southwest Airlines from 2012 onwards (following 2011 merger).
All US Airways operations included in American Airlines from 2014 onwards (following 2013 merger).

Table F-4 Scheduled Passenger Operations by Market and Carrier for T.F Green Airport

			Departures											Departing Seats									
Carrier	**Market**	**Code**	**2000**	**2010**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**'18-'19 Change**	**'18-'19 Pct. Change**	**2000**	**2010**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**'18-'19 Change**	**'18-'19 Pct. Change**
Jet Carriers																								
Allegiant Airways	Cincinnati	CVG							13	39	26	-13	-33.1%							2,028	6,954	4,653	-2,301	-33.1%
Allegiant Airways	Punta Gorda	PGD							27	70	100	30	42.9%							4,779	12,390	17,700	5,310	42.9%
Allegiant Airways	St. Petersburg/Clearwater	PIE							19	61		-61	-100.0%							3,363	9,901		-9,901	-100.0%
Allegiant Airways	Savannah	SAV									52	52	-									9,255	9,255	-
American	Charlotte	CLT				1,275	1,176	1,274	1,392	1,465	1,366	-99	-6.7%				196,644	170,310	189,856	213,892	227,561	208,083	-19,478	-8.6%
American	Chicago O'Hare	ORD	1,464									-	-	203,104									-	-
American	Dallas/Fort Worth	DFW										-	-										-	-
American	Miami	MIA									73	73	-									9,362	9,362	-
American	Philadelphia	PHL				347	366	520	995	1,186	914	-272	-22.9%				34,381	36,514	50,988	97,768	131,961	112,780	-19,181	-14.5%
American	Washington National	DCA				77	52					-	-				9,566	6,483					-	-
Continental	Cleveland	CLE	569									-	-	69,771									-	-
Continental	Houston Intercontinental	IAH	366									-	-	45,946									-	-
Continental	New York Newark	EWR	738									-	-	96,448									-	-
Condor	Frankfurt	FRA					22	18				-	-					5,940	4,783				-	-
Delta	Atlanta	ATL	1,464	510	978	993	997	1,060	1,047	1,035	1,043	8	0.8%	207,888	72,461	145,241	148,012	148,078	156,507	155,384	154,567	157,584	3,017	2.0%
Delta	Cincinnati	CVG	732									-	-	103,944									-	-
Delta	Detroit	DTW		414	218	476	707	719	715	414	414	-1	-0.2%		50,065	30,414	62,046	87,078	91,281	90,875	54,004	52,203	-1,800	-3.3%
Delta	Fort Lauderdale/Hollywood	FLL										-	-										-	-
Delta	Minneapolis	MSP		74								-	-		9,211								-	-
Delta	Orlando	MCO	732									-	-	87,108									-	-
Frontier	Atlanta	ATL								39		-39	-100.0%								7,020		-7,020	-100.0%
Frontier	Austin	AUS								35		-35	-100.0%								6,249		-6,249	-100.0%
Frontier	Charlotte	CLT								131	114	-17	-13.1%								30,097	21,569	-8,529	-28.3%
Frontier	Denver	DEN							144	179	74	-104	-58.4%							25,946	35,037	13,397	-21,640	-61.8%
Frontier	Fort Myers	RSW							53	65	56	-8	-13.1%							12,091	14,194	10,106	-4,089	-28.8%
Frontier	Miami	MIA							92	90		-90	-100.0%							16,560	16,200		-16,200	-100.0%
Frontier	Myrtle Beach	MYR								70		-70	-100.0%								16,067		-16,067	-100.0%
Frontier	New Orleans	MSY							39	25		-25	-100.0%							5,914	3,793		-3,793	-100.0%
Frontier	Orlando	MCO							153	308	252	-56	-18.1%							32,140	63,943	50,550	-13,393	-20.9%

Table F-4 Scheduled Passenger Operations by Market and Carrier for T.F Green Airport (Continued)

			Departures											Departing Seats									
Carrier	Market	Code	2000	2010	2013	2014	2015	2016	2017	2018	2019	'18-'19 Change	'18-'19 Pct. Change	2000	2010	2013	2014	2015	2016	2017	2018	2019	'18-'19 Change	'18-'19 Pct. Change
Frontier	Raleigh/Durham	RDU								96	57	-39	-40.8%								22,080	10,234	-11,846	-53.6%
Frontier	Tampa	TPA							39	135	95	-40	-29.5%							9,069	26,151	17,074	-9,077	-34.7%
jetBlue	Fort Lauderdale/Hollywood	FLL			365	365	365	365	365	365	365	-				54,750	54,750	54,750	54,750	54,750	54,750	54,750	-	
jetBlue	Orlando	MCO			713	713	713	713	713	642	598	-43	-6.7%			103,786	106,886	106,886	106,886	106,886	93,850	89,764	-4,086	-4.4%
jetBlue	West Palm Beach	PBI									297	297	-									44,614	44,614	-
Laker Airways (Bahamas)	Freeport	FPO										-	-										-	-
Northwest	Detroit	DTW	1,682									-	-	200,509									-	-
Northwest	Minneapolis	MSP										-	-										-	-
Norwegian Air	Belfast	BFS							35	61		-61	-100.0%							6,642	11,556		-11,556	-100.0%
Norwegian Air	Bergen	BGO							35			-	-							6,642			-	-
Norwegian Air	Cork	ORK							70	117	26	-91	-77.7%							13,257	22,194	4,941	-17,253	-77.7%
Norwegian Air	Dublin	DUB							114	252	222	-31	-12.2%							21,546	47,709	41,711	-5,998	-12.6%
Norwegian Air	Edinburgh	EDI							88	117		-117	-100.0%							16,578	22,194		-22,194	-100.0%
Norwegian Air	Fort De France	FDF							17	26		-26	-100.0%							3,259	4,809		-4,809	-100.0%
Norwegian Air	Pointe-A-Pitre	PTP							17	26		-26	-100.0%							3,259	4,809		-4,809	-100.0%
Norwegian Air	Shannon	SNN							53	148	35	-113	-76.4%							9,936	27,972	6,588	-21,384	-76.4%
SATA Internacional	Ponta Delgada	PDL						9	22	17		-17	-100.0%						1,966	4,852	3,983		-3,983	-100.0%
Southern Airways Express	Nantucket	ACK									96	96	-									868	868	-
Southwest	Baltimore	BWI	3,913	3,260	3,004	2,820	2,793	2,793	2,719	2,602	2,189	-413	-15.9%	535,911	442,637	429,658	411,154	407,651	414,057	401,718	384,098	325,736	-58,362	-15.2%
Southwest	Chicago Midway	MDW	1,072	1,135	992	975	988	996	953	948	828	-121	-12.7%	146,844	153,121	154,633	156,543	158,640	153,783	147,916	147,685	132,158	-15,527	-10.5%
Southwest	Denver	DEN			304	9						-	-			44,281	1,246						-	-
Southwest	Fort Lauderdale/Hollywood	FLL	9	594	479	474	477	485	507	528	446	-82	-15.6%	1,194	81,378	70,413	68,401	70,778	74,477	78,412	81,576	66,813	-14,763	-18.1%
Southwest	Fort Myers	RSW			40	44	48	52	82	91	61	-30	-33.1%			5,520	6,292	7,305	7,918	12,046	13,292	9,109	-4,182	-31.5%
Southwest	Houston	HOU	152									-	-	20,824									-	-
Southwest	Islip	ISP	608									-	-	83,237									-	-
Southwest	Kansas City	MCI	366									-	-	50,142									-	-
Southwest	Las Vegas	LAS		365								-	-		50,005								-	-

Table F-4 Scheduled Passenger Operations by Market and Carrier for T.F Green Airport (Continued)

			Departures											Departing Seats									
Carrier	**Market**	**Code**	**2000**	**2010**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**'18-'19 Change**	**'18-'19 Pct. Change**	**2000**	**2010**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**'18-'19 Change**	**'18-'19 Pct. Change**
Southwest	Nashville	BNA	706	296								-	-	96,702	39,578								-	-
Southwest	Orlando	MCO	955	1,799	1,423	1,419	1,464	1,469	1,390	1,294	1,253	-41	-3.2%	130,855	245,156	210,082	204,947	215,253	219,994	209,238	205,374	198,408	-6,966	-3.4%
Southwest	Philadelphia	PHL		1,402								-	-		192,054								-	-
Southwest	Phoenix	PHX	366	361								-	-	50,142	49,398								-	-
Southwest	Tampa	TPA	745	813	753	748	735	713	673	585	588	3	0.4%	102,065	111,231	107,959	107,481	108,451	107,723	100,790	89,945	92,161	2,216	2.5%
Southwest	West Palm Beach	PBI			31	35	31	31	22	4	4	-				4,433	5,046	4,433	4,433	3,105	775	633	-142	-18.3%
Southwest	Washington National	DCA						122	730	730	752	22	3.0%						19,119	104,390	105,633	109,189	3,555	3.4%
Spirit	Detroit	DTW										-	-										-	-
Spirit	Fort Lauderdale/Hollywood	FLL										-	-										-	-
Spirit	Fort Myers	RSW										-	-										-	-
Sun Country	Las Vegas	LAS									30	30	-									4,929	4,929	-
Sun Country	Minneapolis	MSP									127	127	-									19,746	19,746	-
Sun Country	Nashville	BNA									122	122	-									18,555	18,555	-
Sun Country	New Orleans	MSY									22	22	-									3,518	3,518	-
TACV	Praia	RAI					39	74	65	4		-4	-100.0%					7,739	14,578	13,003	872		-872	-100.0%
United	Chicago O'Hare	ORD	1,477	644	334	320	144	236		57		-57	-100.0%	239,076	82,802	46,258	42,658	17,570	31,940		7,241		-7,241	-100.0%
US Airways	Baltimore	BWI	2,462									-	-	263,921									-	-
US Airways	Charlotte	CLT	977	1,643	1,608							-	-	128,984	233,886	225,454							-	-
US Airways	Fort Lauderdale/Hollywood	FLL										-	-										-	-
US Airways	Orlando	MCO	52									-	-	5,605									-	-
US Airways	Philadelphia	PHL	1,830	1,299	313							-	-	253,015	130,008	30,973							-	-
US Airways	Pittsburgh	PIT	1,339									-	-	185,109									-	-
US Airways	Washington National	DCA	1,333	365	124							-	-	167,278	49,501	14,997							-	-
Subtotal			**26,108**	**14,974**	**11,677**	**11,090**	**11,116**	**11,649**	**13,399**	**14,057**	**12,698**	**-1,359**	**-9.7%**	**3,475,622**	**1,992,492**	**1,678,851**	**1,616,053**	**1,613,859**	**1,705,039**	**1,988,034**	**2,168,485**	**1,918,741**	**-249,744**	**-11.5%**

Table F-4 Scheduled Passenger Operations by Market and Carrier for T.F Green Airport (Continued)

			Departures											Departing Seats									
Carrier	**Market**	**Code**	**2000**	**2010**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**'18-'19 Change**	**'18-'19 Pct. Change**	**2000**	**2010**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**'18-'19 Change**	**'18-'19 Pct. Change**
Regional/ Commuter Carriers																								
Air Canada Express	Toronto	YYZ	989	625	84					140	105	-35	-24.9%	37,482	11,880	1,517					6,986	5,243	-1,743	-24.9%
American Eagle	Charlotte	CLT				175	341	301	187	266	278	12	4.6%				13,971	26,810	25,452	15,629	19,929	20,865	936	4.7%
American Eagle	Chicago O'Hare	ORD						550	717	704	909	205	29.2%						34,650	45,162	51,465	69,117	17,652	34.3%
American Eagle	Detroit	DTW										-	-										-	-
American Eagle	New York J F Kennedy	JFK	1,291									-	-	42,589									-	-
American Eagle	New York La Guardia	LGA	2,756									-	-	90,957									-	-
American Eagle	Raleigh/Durham	RDU										-	-										-	-
American Eagle	Philadelphia	PHL				2,213	2,163	1,982	1,035	791	895	105	13.2%				150,139	142,721	127,895	77,726	58,489	61,358	2,869	4.9%
American Eagle	Washington National	DCA				1,609	1,755	2,112	2,252	2,242	2,247	4	0.2%				111,183	111,865	138,655	148,758	135,774	139,649	3,876	2.9%
Cape Air	Block Island	BID				538	418					-	-				4,846	3,765					-	-
Cape Air	Hyannis	HYA										-	-										-	-
Cape Air	Martha's Vineyard	MVY	1,762	747	501	285	192					-	-	15,861	6,722	4,513	2,561	1,725					-	-
Cape Air	Nantucket	ACK	2,453	681	501	271	244					-	-	22,073	6,128	4,510	2,438	2,196					-	-
Continental Connection	Albany	ALB										-	-										-	-
Continental Connection	Boston	BOS										-	-										-	-
Continental Connection	New York Newark	EWR		427								-	-		31,630								-	-
Continental Connection	Plattsburgh	PLB										-	-										-	-
Continental Connection	Washington Dulles	IAD										-	-										-	-
Continental Express	Cleveland	CLE	699	1,217								-	-	34,936	60,836								-	-
Continental Express	New York Newark	EWR	1,482	1,028								-	-	86,552	51,407								-	-
Delta Connection	Atlanta	ATL		724	70	51	43					-	-		52,959	4,522	3,380	3,001					-	-
Delta Connection	Cincinnati	CVG		43								-	-		2,150								-	-
Delta Connection	Detroit	DTW		1,324	1,748	871	289	324	279	769	804	35	4.6%		78,701	90,191	45,809	18,671	22,103	20,162	56,330	60,218	3,888	6.9%
Delta Connection	Minneapolis	MSP		347	240	170						-	-		26,192	17,380	12,878						-	-

Table F-4 Scheduled Passenger Operations by Market and Carrier for T.F Green Airport (Continued)

			Departures											Departing Seats									
Carrier	**Market**	**Code**	**2000**	**2010**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**'18-'19 Change**	**'18-'19 Pct. Change**	**2000**	**2010**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**'18-'19 Change**	**'18-'19 Pct. Change**
Delta Connection	New York J F Kennedy	JFK										-	-										-	-
Delta Connection	New York La Guardia	LGA	610									-	-	19,520									-	-
Delta Connection	Raleigh/Durham	RDU										-	-										-	-
Delta Connection	Washington National	DCA										-	-										-	-
Independence Air	Washington Dulles	IAD										-	-										-	-
Midway Airlines	Raleigh/Durham	RDU										-	-										-	-
Northwest Airlink	Detroit	DTW										-	-										-	-
Northwest Airlink	Minneapolis	MSP										-	-										-	-
OneJet	Pittsburgh	PIT							87	149		-149	-100.0%							610	1,045		-1,045	-100.0%
United Express	Chicago O'Hare	ORD		455	306	325	605	464	673	610	942	332	54.4%		29,820	19,896	19,443	34,473	24,750	42,292	39,764	51,047	11,283	28.4%
United Express	Cleveland	CLE			875	102						-	-			43,757	5,100						-	-
United Express	New York Newark	EWR			1,213	994	1,356	1,355	1,382	1,255	1,043	-212	-16.9%			65,636	57,558	73,682	64,804	71,607	72,633	54,037	-18,596	-25.6%
United Express	Washington Dulles	IAD	1,468	1,569	1,035	1,031	837	886	782	1,089	1,084	-5	-0.5%	52,832	99,719	65,632	67,077	52,139	55,328	46,877	67,692	66,611	-1,080	-1.6%
US Airways Express	Albany	ALB	679									-	-	12,898									-	-
US Airways Express	Boston	BOS	48									-	-	909									-	-
US Airways Express	Charlotte	CLT		126	166							-	-		10,047	12,857							-	-
US Airways Express	Hyannis	HYA										-	-										-	-
US Airways Express	Nantucket	ACK										-	-										-	-
US Airways Express	New York La Guardia	LGA	2,298	1,222								-	-	84,116	45,225								-	-
US Airways Express	New York Newark	EWR	1,569									-	-	31,176									-	-
US Airways Express	Philadelphia	PHL	366	1,526	2,347							-	-	13,542	107,790	154,401							-	-
US Airways Express	Pittsburgh	PIT										-	-										-	-
US Airways Express	Plattsburgh	PLB	26									-	-	497									-	-
US Airways Express	Washington National	DCA		1,373	1,492							-	-		92,151	107,775							-	-
Subtotal			**18,527**	**13,436**	**10,577**	**8,635**	**8,243**	**7,974**	**7,394**	**8,015**	**8,306**	**291**	**3.6%**	**546,963**	**713,356**	**592,587**	**496,383**	**471,048**	**493,637**	**468,823**	**510,107**	**528,146**	**18,039**	**3.5%**
Total			**44,635**	**28,409**	**22,255**	**19,725**	**19,359**	**19,623**	**20,793**	**22,072**	**21,004**	**-1,068**	**-4.8%**	**4,022,585**	**2,705,848**	**2,271,438**	**2,112,436**	**2,084,907**	**2,198,676**	**2,456,857**	**2,678,592**	**2,446,887**	**-231,705**	**-8.7%**

Source: OAG Schedules.

Notes: Allegiant stopped reporting to the OAG in 2009, so Allegiant 2009-2016 statistics from the T100 database; 2017-2019 statistics from OAG, which recommenced reporting.
All Northwest Airlines operations included in Delta Air Lines from 2009 onwards (following 2008 merger).
All Continental Airlines operations included in United Airlines from 2011 onwards (following 2010 merger).
All AirTran Airways operations included in Southwest Airlines from 2012 onwards (following 2011 merger).
All US Airways operations included in American Airlines from 2014 onwards (following 2013 merger).

Table F-5 Scheduled Passenger Operations by Market and Carrier for Manchester-Boston Regional Airport

			Departures											Departing Seats									
Carrier	**Market**	**Code**	**2000**	**2010**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**'18-'19 Change**	**'18-'19 Pct. Change**	**2000**	**2010**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**'18-'19 Change**	**'18-'19 Pct. Change**
Jet Carriers																								
American	Charlotte	CLT							52			-	-							6,674			-	-
American	Philadelphia	PHL								562	155	-407	-72.5%								55,652	18,005	-37,647	-67.6%
Boston-Maine Airways	Myrtle Beach	MYR										-	-										-	-
Boston-Maine Airways	Portsmouth	PSM										-	-										-	-
Boston-Maine Airways	Sanford	SFB										-	-										-	-
Continental	Cleveland	CLE	130									-	-	16,151									-	-
Continental	New York Newark	EWR	462									-	-	62,358									-	-
Delta	Atlanta	ATL	244	275	463	459	365	365	365	361	271	-90	-24.9%	34,648	39,050	69,307	68,468	53,545	54,212	55,172	50,903	40,520	-10,383	-20.4%
Delta	Cincinnati	CVG										-	-										-	-
Delta	Detroit	DTW		796			122	87	26	61		-61	-100.0%		89,289			14,414	9,881	2,829	6,710		-6,710	-100.0%
Delta	New York - LGA	LGA					4					-	-					596					-	-
Northwest	Detroit	DTW	1,609									-	-	194,058									-	-
Northwest	Minneapolis	MSP										-	-										-	-
Southwest	Baltimore	BWI	2,828	2,891	2,726	2,494	2,476	2,576	2,393	2,061	1,947	-113	-5.5%	387,397	393,093	387,879	364,979	363,524	383,914	353,543	306,438	286,174	-20,264	-6.6%
Southwest	Chicago Midway	MDW	706	1,144	1,010	984	948	996	922	896	822	-74	-8.3%	96,702	155,466	158,820	157,501	148,825	153,459	143,869	140,510	124,338	-16,172	-11.5%
Southwest	Denver	DEN			304							-	-			43,211							-	-
Southwest	Fort Lauderdale/Hollywood	FLL		9	90		4			4		-4	-100.0%		1,194	12,793		633			613		-613	-100.0%
Southwest	Kansas City	MCI	366									-	-	50,142									-	-
Southwest	Las Vegas	LAS		365	61	9	9					-	-		50,005	8,723	1,246	1,246					-	-
Southwest	Nashville	BNA	397									-	-	54,389									-	-
Southwest	Orlando	MCO	410	1,125	831	752	743	765	764	768	638	-130	-16.9%	56,111	154,145	123,873	109,202	113,888	118,422	115,387	121,091	100,116	-20,974	-17.3%
Southwest	Philadelphia	PHL		1,411								-	-		192,456								-	-
Southwest	Phoenix	PHX		322								-	-		44,114								-	-
Southwest	Tampa	TPA		782	466	470	479	487	461	470	439	-30	-6.4%		107,173	68,120	67,509	70,529	71,922	67,276	73,837	69,350	-4,486	-6.1%
United	Chicago O'Hare	ORD	1,403									-	-	221,523									-	-
United	Portland (ME)	PWM	57									-	-	7,241									-	-

Table F-5 Scheduled Passenger Operations by Market and Carrier for Manchester-Boston Regional Airport (Continued)

			Departures											Departing Seats									
Carrier	**Market**	**Code**	**2000**	**2010**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**'18-'19 Change**	**'18-'19 Pct. Change**	**2000**	**2010**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**'18-'19 Change**	**'18-'19 Pct. Change**
US Airways	Baltimore	BWI	1,782									-	-	191,078									-	-
US Airways	Charlotte	CLT		365								-	-		52,560								-	-
US Airways	Orlando	MCO	52									-	-	5,605									-	-
US Airways	Philadelphia	PHL	1,821	365	351							-	-	222,331	33,132	34,791							-	-
US Airways	Pittsburgh	PIT	1,085									-	-	139,837									-	-
US Airways	Washington National	DCA	675									-	-	82,085									-	-
Subtotal			**14,026**	**9,850**	**6,302**	**5,168**	**5,150**	**5,276**	**4,983**	**5,181**	**4,272**	**-910**	**-17.6%**	**1,821,657**	**1,311,677**	**907,518**	**768,905**	**767,200**	**791,810**	**744,750**	**755,753**	**638,505**	**-117,249**	**-15.5%**
Regional/ Commuter Carriers																								
Air Canada Express	Montreal Dorval	YUL										-	-										-	-
Air Canada Express	Toronto	YYZ	339	707								-	-	5,616	13,441								-	-
American Eagle	Charlotte	CLT				496	730	734	809	1,135	1,288	153	13.5%				37,761	54,688	60,890	67,927	85,018	92,149	7,131	8.4%
American Eagle	Chicago O'Hare	ORD									428	428	-									26,964	26,964	-
American Eagle	New York La Guardia	LGA	1,833									-	-	60,480									-	-
American Eagle	Philadelphia	PHL			2,295	2,237	2,090	2,066	1,420	1,759	339	23.9%				149,598	152,206	136,795	129,174	81,818	97,028	15,210	18.6%	
American Eagle	Washington National	DCA			1,198	1,152	1,304	1,316	1,146	1,161	14	1.3%				77,065	74,008	85,620	84,908	80,357	80,532	175	0.2%	
Boston-Maine Airways	Bangor	BGR										-	-										-	-
Boston-Maine Airways	Martha's Vineyard	MVY										-	-										-	-
Boston-Maine Airways	Nantucket	ACK										-	-										-	-
Boston-Maine Airways	New London/Groton	GON										-	-										-	-
Boston-Maine Airways	Portsmouth	PSM										-	-										-	-
Boston-Maine Airways	Saint John	YSJ										-	-										-	-
Continental Connection	Albany	ALB	80									-	-	1,515									-	-
Continental Connection	New York J F Kennedy	JFK										-	-										-	-

Table F-5 Scheduled Passenger Operations by Market and Carrier for Manchester-Boston Regional Airport (Continued)

			Departures											Departing Seats									
Carrier	**Market**	**Code**	**2000**	**2010**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**'18-'19 Change**	**'18-'19 Pct. Change**	**2000**	**2010**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**'18-'19 Change**	**'18-'19 Pct. Change**
Continental Connection	New York Newark	EWR		141								-	-		9,483								-	-
Continental Connection	Plattsburgh	PLB										-	-										-	-
Continental Connection	Rochester	ROC	44									-	-	841									-	-
Continental Connection	Syracuse	SYR	22									-	-	421									-	-
Continental Connection	Westchester County	HPN										-	-										-	-
Continental Express	Cleveland	CLE	593	1,178								-	-	29,614	58,921								-	-
Continental Express	New York Newark	EWR	1,028	1,267								-	-	64,944	63,336								-	-
Delta Connection	Atlanta	ATL	488	90	51	59						-	-	24,400	6,300	3,843	4,484						-	-
Delta Connection	Bangor	BGR	244									-	-	12,200									-	-
Delta Connection	Cincinnati	CVG	1,673									-	-	83,657									-	-
Delta Connection	Detroit	DTW		499	1,510	1,296	912	935	961	939	1,043	104	11.0%		32,795	75,507	69,261	51,960	60,782	69,124	68,596	75,566	6,970	10.2%
Delta Connection	New York J F Kennedy	JFK										-	-										-	-
Delta Connection	New York La Guardia	LGA	727		1,165	1,140	970	804	789	598	326	-272	-45.4%	36,357		66,132	63,202	55,968	49,250	48,605	35,805	18,350	-17,455	-48.7%
Delta Connection	Minneapolis	MSP										-	-										-	-
Independence Air	Washington Dulles	IAD										-	-										-	-
Northwest Airlink	Detroit	DTW										-	-										-	-
Northwest Airlink	Minneapolis	MSP										-	-										-	-
United Express	Chicago O'Hare	ORD		1,040	695	857	779	718	750	488		-488	-100.0%		67,675	39,114	49,854	42,976	39,887	39,041	24,400		-24,400	-100.0%
United Express	Cleveland	CLE			740	111						-	-			36,986	5,564						-	-
United Express	New York Newark	EWR			1,120	965	1,304	1,284	982	939	244	-694	-74.0%			54,604	44,824	60,052	59,682	49,324	47,773	13,226	-34,547	-72.3%
United Express	Washington Dulles	IAD		1,104	90						763	763	-		55,951	5,444						45,133	45,133	-
US Airways Express	Boston	BOS										-	-										-	-
US Airways Express	Charlotte	CLT		153	417							-	-		13,146	32,885							-	-

Table F-5 Scheduled Passenger Operations by Market and Carrier for Manchester-Boston Regional Airport (Continued)

			Departures											Departing Seats									
Carrier	**Market**	**Code**	**2000**	**2010**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**'18-'19 Change**	**'18-'19 Pct. Change**	**2000**	**2010**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**'18-'19 Change**	**'18-'19 Pct. Change**
US Airways Express	New York La Guardia	LGA	2,583	1,381								-	-	96,936	49,420								-	-
US Airways Express	Philadelphia	PHL		2,116	2,004							-	-		140,277	126,552							-	-
US Airways Express	Pittsburgh	PIT										-	-										-	-
US Airways Express	Washington National	DCA		1,039	1,252							-	-		81,095	84,499							-	-
Subtotal			**9,655**	**10,716**	**9,045**	**8,417**	**8,084**	**7,869**	**7,673**	**6,665**	**7,012**	**347**	**5.2%**	**416,980**	**591,840**	**525,567**	**501,613**	**491,858**	**492,906**	**488,103**	**423,766**	**448,948**	**25,182**	**5.9%**
Total			**23,681**	**20,566**	**15,347**	**13,585**	**13,234**	**13,145**	**12,656**	**11,846**	**11,283**	**-563**	**-4.7%**	**2,238,636**	**1,903,517**	**1,433,085**	**1,270,518**	**1,259,058**	**1,284,716**	**1,232,853**	**1,179,520**	**1,087,453**	**-92,067**	**-7.8%**

Source: OAG Schedules.
Notes: All Northwest Airlines operations included in Delta Air Lines from 2009 onwards (following 2008 merger).
All Continental Airlines operations included in United Airlines from 2011 onwards (following 2010 merger).
All AirTran Airways operations included in Southwest Airlines from 2012 onwards (following 2011 merger).
All US Airways operations included in American Airlines from 2014 onwards (following 2013 merger).

Table F-6 Scheduled Passenger Operations by Market and Carrier for Portland International Jetport

			Departures											Departing Seats									
Carrier	**Market**	**Code**	**2000**	**2010**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**'18-'19 Change**	**'18-'19 Pct. Change**	**2000**	**2010**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**'18-'19 Change**	**'18-'19 Pct. Change**
Jet Carriers																								
American	Charlotte	CLT				374	365	487	730	656	730	74	11.3%				46,341	45,504	62,336	93,963	86,100	97,818	11,718	13.6%
American	Philadelphia	PHL				92				537	410	-127	-23.7%				9,108				53,163	49,532	-3,631	-6.8%
American	Washington National	DCA					30	4	22			-	-					3,720	567	2,156			-	-
AirTran	Atlanta	ATL		92								-	-		10,764								-	-
AirTran	Baltimore	BWI		944								-	-		112,951								-	-
AirTran	Orlando	MCO		52								-	-		6,503								-	-
Cape Air	Boston	BOS									368	368	-									3,312	3,312	-
Continental	Cleveland	CLE										-	-										-	-
Continental	New York Newark	EWR										-	-										-	-
Delta	Atlanta	ATL	732	424	737	693	714	710	655	684	680	-4	-0.6%	103,944	60,167	109,750	103,571	107,000	106,660	99,378	107,560	104,422	-3,137	-2.9%
Delta	Cincinnati	CVG	1,089									-	-	154,658									-	-
Delta	Detroit	DTW						74	113	88	205	118	134.4%						8,124	12,446	9,633	22,581	12,949	134.4%
Delta	New York La Guardia	LGA			239	79	30				74	74	-			35,374	11,750	3,300				9,024	9,024	-
Frontier	Denver	DEN								61	87	26	42.3%								10,924	15,737	4,813	44.1%
Frontier	Fort Myers	RSW								13	61	47	360.9%								2,587	12,617	10,030	387.7%
Frontier	Orlando	MCO								83	174	91	109.7%								15,571	34,940	19,369	124.4%
Frontier	Raleigh/Durham	RDU								57	87	30	53.4%								10,260	15,737	5,477	53.4%
Frontier	Tampa	TPA								22	73	51	235.3%								3,934	13,191	9,257	235.3%
Independence Air	Washington Dulles	IAD										-	-										-	-
jetBlue	New York J F Kennedy	JFK		1,201	1,307	1,332	1,295	1,198	1,223	1,209	311	-898	-74.3%		128,936	130,671	133,200	130,314	119,800	122,286	121,136	31,086	-90,050	-74.3%
jetBlue	Orlando	MCO		212								-	-		21,214								-	-
Northwest	Detroit	DTW	523									-	-	52,105									-	-
Southwest	Baltimore	BWI			1,005	1,084	1,106	1,175	1,226	1,235	1,297	61	5.0%			136,588	152,939	158,358	168,423	183,430	184,326	188,717	4,391	2.4%
Southwest	Orlando	MCO				4	4	4	9	9		-9	-100.0%				633	633	633	1,246	1,246		-1,246	-100.0%
Southwest	Chicago Midway	MDW				9	9	9		22	17	-4	-20.3%				1,246	1,246	1,246		3,546	2,771	-775	-21.9%
Trans World Airlines	Hartford	BDL	305									-	-	43,310									-	-

Table F-6 Scheduled Passenger Operations by Market and Carrier for Portland International Jetport (Continued)

			Departures											Departing Seats									
Carrier	**Market**	**Code**	**2000**	**2010**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**'18-'19 Change**	**'18-'19 Pct. Change**	**2000**	**2010**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**'18-'19 Change**	**'18-'19 Pct. Change**
United	Chicago O'Hare	ORD	728					66		327	301	-26	-7.9%	88,996					8,066		44,205	38,151	-6,055	-13.7%
United	Denver	DEN									26	26	-									3,943	3,943	-
United	Manchester	MHT	366									-	-	53,802									-	-
United	New York Newark	EWR						9		313	162	-151	-48.2%						1,196		42,286	20,935	-21,351	-50.5%
United	Washington Dulles	IAD						18		171		-171	-100.0%						2,657		23,903		-23,903	-100.0%
US Airways	Charlotte	CLT		395	365							-	-		48,688	45,260							-	-
US Airways	Philadelphia	PHL	1,312									-	-	163,051									-	-
US Airways	Pittsburgh	PIT	1,081									-	-	137,472									-	-
US Airways	Washington National	DCA										-	-										-	-
Subtotal			**6,135**	**3,320**	**3,653**	**3,667**	**3,553**	**3,754**	**3,978**	**5,487**	**5,065**	**-422**	**-7.7%**	**797,338**	**389,224**	**457,644**	**458,788**	**450,075**	**479,708**	**514,905**	**720,381**	**664,514**	**-55,867**	**-7.8%**
Regional/ Commuter Carriers																								
Air Canada Express	Montreal Dorval	YUL	344									-	-	4,734									-	-
Air Canada Express	Toronto	YYZ		481	97							-	-		9,142	1,741							-	-
America West	New York Newark	EWR	52									-	-	2,457									-	-
American Eagle	Boston	BOS	3,804									-	-	125,518									-	-
American Eagle	Charlotte	CLT				26	143	243	61	165	73	-92	-55.6%			2,065	11,666	20,898	4,233	12,407	5,068	-7,339	-59.2%	
American Eagle	Chicago O'Hare	ORD								244	297	53	21.8%								15,372	22,594	7,222	47.0%
American Eagle	New York La Guardia	LGA	2,033							546	582	37	6.8%	67,084							25,244	33,467	8,223	32.6%
American Eagle	Philadelphia	PHL				1,986	2,148	2,066	2,066	1,528	1,277	-251	-16.4%			125,325	141,789	120,072	118,721	86,532	78,745	-7,788	-9.0%	
American Eagle	Washington National	DCA				1,426	1,613	1,707	1,724	1,635	1,721	86	5.2%			99,757	107,469	113,463	120,501	101,267	117,417	16,150	15.9%	
Continental Connection	Albany	ALB										-	-										-	-
Continental Connection	Boston	BOS	204									-	-	3,871									-	-
Continental Connection	New York Newark	EWR		1,426								-	-		105,503								-	-
Continental Connection	Presque Isle	PQI										-	-										-	-
Continental Express	Cleveland	CLE	425	188								-	-	20,378	9,400								-	-
Continental Express	New York Newark	EWR	1,429	4								-	-	70,393	200								-	-

Table F-6 Scheduled Passenger Operations by Market and Carrier for Portland International Jetport (Continued)

			Departures											Departing Seats									
Carrier	**Market**	**Code**	**2000**	**2010**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**'18-'19 Change**	**'18-'19 Pct. Change**	**2000**	**2010**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**'18-'19 Change**	**'18-'19 Pct. Change**
Delta Connection	Atlanta	ATL		350								-	-		25,532								-	-
Delta Connection	Boston	BOS										-	-										-	-
Delta Connection	Cincinnati	CVG										-	-										-	-
Delta Connection	Detroit	DTW		1,217	1,249	1,061	896	840	817	838	738	-100	-11.9%		62,320	62,436	60,448	59,315	60,354	59,080	62,502	54,368	-8,134	-13.0%
Delta Connection	New York J F Kennedy	JFK		270						858	979	121	14.1%		13,500						63,700	61,579	-2,121	-3.3%
Delta Connection	New York La Guardia	LGA	475	786	1,202	1,231	1,284	1,332	1,561	1,332	1,061	-270	-20.3%	15,191	41,440	80,898	80,103	76,325	80,582	100,527	88,797	70,234	-18,563	-20.9%
Delta Connection	Minneapolis	MSP										-	-										-	-
Independence Air	Washington Dulles	IAD										-	-										-	-
Lufthansa German Airlines	Washington Dulles	IAD	31									-	-	1,550									-	-
Northwest Airlink	Detroit	DTW	484									-	-	33,366									-	-
Northwest Airlink	Minneapolis	MSP										-	-										-	-
Starlink Aviation	Yarmouth	YQI		521								-	-		9,386								-	-
Swissair	Boston	BOS	31									-	-	1,023									-	-
Ulendo Airlink	Bar Harbor	BHB						18				-	-						886				-	-
Ulendo Airlink	Halifax	YHZ							40			-	-							2,156			-	-
Ulendo Airlink	Islip	ISP						18				-	-						886				-	-
Ulendo Airlink	Melbourne	MLB						83	104	112	22	-90	-80.7%						5,173	5,237	5,600	1,079	-4,521	-80.7%
Ulendo Airlink	Sarasota/Bradenton	SRQ						17	104	130	74	-56	-43.0%						906	5,763	6,521	3,714	-2,807	-43.0%
Ulendo Airlink	Vero Beach	VRB								39	39	0	0.4%								1,964	1,971	7	0.4%
United Express	Chicago O'Hare	ORD		1,249	1,045	1,038	1,029	964		615	612	-3	-0.5%		82,273	65,872	63,099	64,054	53,558		32,506	36,374	3,868	11.9%
United Express	Cleveland	CLE			298							-	-			14,886							-	-
United Express	New York Newark	EWR			1,630	1,470	1,779	2,035		1,529	1,594	66	4.3%			102,156	92,953	108,900	113,044		81,721	83,131	1,410	1.7%
United Express	Washington Dulles	IAD	996	1,078	750	689	560	572		792	1,079	287	36.3%	49,779	64,767	39,624	37,949	35,213	35,764		43,504	62,337	18,833	43.3%

Table F-6 Scheduled Passenger Operations by Market and Carrier for Portland International Jetport (Continued)

			Departures											Departing Seats									
Carrier	**Market**	**Code**	**2000**	**2010**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**'18-'19 Change**	**'18-'19 Pct. Change**	**2000**	**2010**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**'18-'19 Change**	**'18-'19 Pct. Change**
US Airways Express	Bangor	BGR	231									-	-	8,558									-	-
US Airways Express	Boston	BOS	2,229									-	-	42,359									-	-
US Airways Express	Charlotte	CLT		88	35							-	-		5,323	2,777							-	-
US Airways Express	New York La Guardia	LGA	1,218	1,647								-	-	43,901	78,477								-	-
US Airways Express	Philadelphia	PHL		1,947	2,131							-	-		133,521	137,137							-	-
US Airways Express	Pittsburgh	PIT										-	-										-	-
US Airways Express	Plattsburgh	PLB	48									-	-	909									-	-
US Airways Express	Presque Isle	PQI										-	-										-	-
US Airways Express	Washington National	DCA	1,089	1,043	1,408							-	-	33,976	83,302	100,248							-	-
US Airways Express	Westchester County	HPN	65									-	-	1,235									-	-
Subtotal			**15,187**	**12,296**	**9,843**	**8,927**	**9,452**	**9,895**	**6,477**	**10,364**	**10,150**	**-214**	**-2.1%**	**526,282**	**724,086**	**607,775**	**561,699**	**604,731**	**605,586**	**416,218**	**627,639**	**632,078**	**4,440**	**0.7%**
Total			**21,322**	**15,615**	**13,496**	**12,594**	**13,005**	**13,649**	**10,455**	**15,851**	**15,215**	**-636**	**-4.0%**	**1,323,619**	**1,113,310**	**1,065,419**	**1,020,487**	**1,054,806**	**1,085,294**	**931,123**	**1,348,020**	**1,296,593**	**-51,427**	**-3.8%**

Source: OAG Schedules.

Notes: All Northwest Airlines operations included in Delta Air Lines from 2009 onwards (following 2008 merger).
All Continental Airlines operations included in United Airlines from 2011 onwards (following 2010 merger).
All AirTran Airways operations included in Southwest Airlines from 2012 onwards (following 2011 merger).
All US Airways operations included in American Airlines from 2014 onwards (following 2013 merger).

Table F-7 Scheduled Passenger Operations by Market and Carrier for Burlington International Airport

			Departures											Departing Seats									
Carrier	**Market**	**Code**	**2000**	**2010**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**'18-'19 Change**	**'18-'19 Pct. Change**	**2000**	**2010**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**'18-'19 Change**	**'18-'19 Pct. Change**
Jet Carriers																								
AirTran	Baltimore	BWI										-	-										-	-
Allegiant Air	Orlando/Sanford	SFB				94	104	95	18			-	-				15,873	17,880	16,452	3,065			-	-
American	Philadelphia	PHL				116				686		-686	-100.0%				11,470				67,872		-67,872	-100.0%
Continental	New York Newark	EWR										-	-										-	-
Delta	Atlanta	ATL			153	92	92	110	341	365	284	-81	-22.3%			21,394	13,708	13,708	15,202	38,852	45,507	35,086	-10,421	-22.9%
Frontier	Denver	DEN									92	92	-									16,509	16,509	-
Frontier	Orlando	MCO									48	48	-									8,589	8,589	-
jetBlue	New York J F Kennedy	JFK	244	1,434	1,365	1,244	1,156	1,182	1,189	1,160	1,095	-65	-5.6%	39,528	180,286	143,907	124,357	115,600	118,157	118,871	116,250	109,500	-6,750	-5.8%
jetBlue	Orlando	MCO		330								-	-		33,014								-	-
Northwest	Detroit	DTW										-	-										-	-
United	Chicago O'Hare	ORD	815				113	345	202	429	401	-29	-6.7%	105,509				13,777	45,877	27,228	60,402	51,273	-9,129	-15.1%
United	Denver	DEN									26	26	-									3,769	3,769	-
United	New York Newark	EWR								322	86	-236	-73.4%								47,394	11,453	-35,940	-75.8%
United	Portland (ME)	PWM										-	-										-	-
US Airways	Philadelphia	PHL	1,098		26							-	-	150,338		2,546							-	-
US Airways	Pittsburgh	PIT	732									-	-	103,568									-	-
US Airways	Washington National	DCA										-	-										-	-
Subtotal			**2,889**	**1,764**	**1,543**	**1,546**	**1,465**	**1,732**	**1,750**	**2,962**	**2,030**	**-932**	**-31.5%**	**398,943**	**213,300**	**167,847**	**165,408**	**160,965**	**195,688**	**188,016**	**337,424**	**236,178**	**-101,246**	**-30.0%**
Regional/ Commuter Carriers																								
America West	New York Newark	EWR	166									-	-	7,889									-	-
American Eagle	Boston	BOS	3,094									-	-	102,111									-	-
American Eagle	Charlotte	CLT					122	378	627	730	730	-						9,516	29,858	48,996	53,094	54,750	1,656	3.1%
American Eagle	Chicago O'Hare	ORD								244	240	-4	-1.8%								13,931	15,102	1,171	8.4%
American Eagle	New York La Guardia	LGA						18	21			-	-						886	1,064			-	-
American Eagle	Philadelphia	PHL				1,823	1,921	1,933	1,734	988	1,531	544	55.0%				110,129	126,772	103,725	103,662	58,638	91,729	33,092	56.4%
American Eagle	Washington National	DCA				1,276	1,339	1,394	1,386	1,151	1,082	-69	-6.0%				89,462	86,015	96,228	97,867	81,270	81,694	425	0.5%

Table F-7 Scheduled Passenger Operations by Market and Carrier for Burlington International Airport (Continued)

			Departures											Departing Seats									
Carrier	**Market**	**Code**	**2000**	**2010**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**'18-'19 Change**	**'18-'19 Pct. Change**	**2000**	**2010**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**'18-'19 Change**	**'18-'19 Pct. Change**
Continental Connection	Albany	ALB										-	-										-	-
Continental Connection	Boston	BOS	244									-	-	4,628									-	-
Continental Connection	Buffalo	BUF	4									-	-	84									-	-
Continental Connection	Hartford	BDL										-	-										-	-
Continental Connection	New York Newark	EWR		405								-	-		30,002								-	-
Continental Connection	Plattsburgh	PLB	213									-	-	4,039									-	-
Continental Connection	Plattsburgh International	PBG										-	-										-	-
Continental Connection	Poughkeepsie	POU	66									-	-	1,262									-	-
Continental Connection	Washington Dulles	IAD										-	-										-	-
Continental Connection	Westchester County	HPN										-	-										-	-
Continental Express	Cleveland	CLE	322	366								-	-	16,064	18,286								-	-
Continental Express	New York Newark	EWR	1,458	1,020								-	-	70,203	51,000								-	-
Continental Express	Westchester County	HPN										-	-										-	-
Delta Connection	Atlanta	ATL			61	273	273	255	59	31	142	111	359.4%			4,636	20,701	20,748	19,369	4,484	2,356	10,825	8,469	359.4%
Delta Connection	Boston	BOS										-	-										-	-
Delta Connection	Cincinnati	CVG										-	-										-	-
Delta Connection	Detroit	DTW		1,227	1,223	1,201	1,004	1,005	1,000	1,013	1,092	79	7.8%		61,417	61,224	60,043	57,053	55,842	51,402	55,441	63,857	8,415	15.2%
Delta Connection	New York J F Kennedy	JFK		1,336						612	1,036	424	69.3%		67,071						45,706	59,240	13,534	29.6%
Delta Connection	New York La Guardia	LGA	355		1,279	1,248	1,257	1,151	1,073	1,000	759	-241	-24.1%	11,351		83,899	82,592	76,339	69,396	60,573	58,113	49,916	-8,197	-14.1%
Independence Air	Washington Dulles	IAD										-	-										-	-
Lufthansa German Airlines	Washington Dulles	IAD	31									-	-	1,550									-	-
Northwest Airlink	Detroit	DTW										-	-										-	-
Northwest Airlink	Minneapolis	MSP										-	-										-	-
Porter Airlines	Toronto Island Apt	YTZ			56	47	39	22	26	26		-26	-100.0%			3,910	3,308	2,886	1,607	1,903	1,903		-1,903	-100.0%

Table F-7 Scheduled Passenger Operations by Market and Carrier for Burlington International Airport (Continued)

			Departures											Departing Seats									
Carrier	**Market**	**Code**	**2000**	**2010**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**'18-'19 Change**	**'18-'19 Pct. Change**	**2000**	**2010**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**'18-'19 Change**	**'18-'19 Pct. Change**
Swissair	Boston	BOS	31									-	-	1,023									-	-
United Express	Chicago O'Hare	ORD		1,353	1,396	1,402	1,144	794	895	706	814	108	15.3%		84,431	84,669	85,350	63,845	42,348	50,322	35,279	43,814	8,536	24.2%
United Express	Cleveland	CLE			409	73						-	-			20,464	3,636						-	-
United Express	New York Newark	EWR			1,456	1,281	1,569	1,705	1,710	1,388	1,507	119	8.6%			85,373	82,670	96,340	94,246	89,273	72,093	81,616	9,523	13.2%
United Express	Washington Dulles	IAD	1,477	1,130	910	892	738	795	815	1,062	1,156	94	8.9%	73,843	61,988	48,930	50,633	41,127	48,150	47,274	66,445	72,344	5,899	8.9%
US Airways Express	Boston	BOS	2,404									-	-	48,139									-	-
US Airways Express	Charlotte	CLT										-	-										-	-
US Airways Express	New York La Guardia	LGA	2,074	1,680								-	-	76,749	62,144								-	-
US Airways Express	Philadelphia	PHL		1,903	1,803							-	-		128,140	111,615							-	-
US Airways Express	Pittsburgh	PIT										-	-										-	-
US Airways Express	Plattsburgh	PLB	2,427									-	-	46,116									-	-
US Airways Express	Poughkeepsie	POU	718									-	-	13,639									-	-
US Airways Express	Saranac Lake	SLK	44									-	-	841									-	-
US Airways Express	Washington National	DCA	988	1,043	1,347							-	-	31,574	77,625	100,348							-	-
US Airways Express	Wilkes-Barre Scranton	AVP	22									-	-	415									-	-
Subtotal			**16,138**	**11,461**	**9,941**	**9,516**	**9,405**	**9,450**	**9,346**	**8,950**	**10,089**	**1,140**	**12.7%**	**511,521**	**642,104**	**605,069**	**588,524**	**580,640**	**561,655**	**556,820**	**544,268**	**624,887**	**80,619**	**14.8%**
Total			**19,028**	**13,225**	**11,484**	**11,062**	**10,870**	**11,182**	**11,096**	**11,912**	**12,120**	**208**	**1.7%**	**910,464**	**855,404**	**772,916**	**753,932**	**741,605**	**757,343**	**744,836**	**881,692**	**861,065**	**-20,627**	**-2.3%**

Source: OAG Schedules.

Notes: Allegiant stopped reporting to the OAG in 2009, so Allegiant 2009-2016 statistics from the T100 database; 2017-2019 statistics from OAG, which recommenced reporting.
All Northwest Airlines operations included in Delta Air Lines from 2009 onwards (following 2008 merger).
All Continental Airlines operations included in United Airlines from 2011 onwards (following 2010 merger).
All AirTran Airways operations included in Southwest Airlines from 2012 onwards (following 2011 merger).
All US Airways operations included in American Airlines from 2014 onwards (following 2013 merger).

Table F-8 Scheduled Passenger Operations by Market and Carrier for Bangor International Airport

			Departures											Departing Seats										
Carrier	**Market**	**Code**	**2000**	**2010**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**'18-'19 Change**	**'18-'19 Pct. Change**	**2000**	**2010**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**'18-'19 Change**	**'18-'19 Pct. Change**
Jet Carriers																								
Allegiant Airways	Orlando/Sanford	SFB		181	165	153	180	182	184	144	209	65	45.3%		27,150	27,335	26,536	31,156	31,730	31,221	24,218	34,512	10,294	42.5%
Allegiant Airways	Punta Gorda	PGD				33						-	-				5,478						-	-
Allegiant Airways	St. Petersburg/Clearwater	PIE		107	115	119	134	143	136	118	165	47	40.2%		16,050	19,090	20,501	23,531	25,201	23,926	20,424	27,619	7,195	35.2%
Delta	Detroit	DTW					175	180				-	-					19,334	19,769				-	-
Delta	New York J F Kennedy	JFK							74	79		-79	-100.0%							8,171	8,674		-8,674	-100.0%
Pan American Airways	Allentown/Bethlehem	ABE										-	-										-	-
Pan American Airways	Baltimore	BWI										-	-										-	-
Pan American Airways	Pittsburgh	PIT	285									-	-	42,729									-	-
Pan American Airways	Portsmouth	PSM	389									-	-	58,414									-	-
Pan American Airways	Sanford	SFB										-	-										-	-
United	Chicago O'Hare	ORD								13	17	4	32.6%								1,682	2,231	549	32.6%
Subtotal			**674**	**288**	**280**	**305**	**489**	**505**	**394**	**354**	**392**	**38**	**10.7%**	**101,143**	**43,200**	**46,425**	**52,515**	**74,021**	**76,700**	**63,318**	**54,998**	**64,362**	**9,363**	**17.0%**
Regional/ Commuter Carriers																								
American Eagle	Boston	BOS	4,670									-	-	154,115									-	-
American Eagle	Charlotte	CLT							13	153	210	57	37.1%							828	9,639	15,729	6,090	63.2%
American Eagle	Chicago O'Hare	ORD								22	148	126	578.4%								1,377	9,400	8,023	582.6%
American Eagle	New York La Guardia	LGA	382					35	44	214	210	-4	-1.8%	12,606					1,757	3,322	9,422	9,253	-170	-1.8%
American Eagle	Philadelphia	PHL				1,496	1,452	1,447	1,551	1,504	1,579	75	5.0%				94,849	91,163	85,549	84,057	95,487	83,467	-12,020	-12.6%
American Eagle	Washington National	DCA				791	771	900	952	1,009	984	-25	-2.5%				41,033	40,260	47,737	60,581	60,159	55,962	-4,197	-7.0%
Boston-Maine Airways	Halifax	YHZ										-	-										-	-
Boston-Maine Airways	Manchester	MHT										-	-										-	-
Boston-Maine Airways	Portsmouth	PSM										-	-										-	-
Boston-Maine Airways	Saint John	YSJ										-	-										-	-

Table F-8 Scheduled Passenger Operations by Market and Carrier for Bangor International Airport (Continued)

			Departures											Departing Seats									
Carrier	**Market**	**Code**	**2000**	**2010**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**'18-'19 Change**	**'18-'19 Pct. Change**	**2000**	**2010**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**'18-'19 Change**	**'18-'19 Pct. Change**
Continental Connection	Albany	ALB										-	-										-	-
Continental Express	New York Newark	EWR										-	-										-	-
Delta Connection	Atlanta	ATL										-	-										-	-
Delta Connection	Boston	BOS										-	-										-	-
Delta Connection	Cincinnati	CVG	1,342									-	-	67,100									-	-
Delta Connection	Detroit	DTW		975	706	711	279	204			9	9	-		50,540	46,371	47,269	19,614	14,863			662	662	-
Delta Connection	New York J F Kennedy	JFK		180					354	408		-408	-100.0%		9,000					26,882	31,019		-31,019	-100.0%
Delta Connection	New York La Guardia	LGA		537	1,153	975	976	1,007	1,008	1,008	1,192	184	18.2%		26,958	71,955	59,239	57,025	58,761	60,323	59,863	62,269	2,406	4.0%
Delta Connection	Minneapolis	MSP										-	-										-	-
Northwest Airlink	Boston	BOS	27									-	-	797									-	-
Northwest Airlink	Detroit	DTW										-	-										-	-
Northwest Airlink	Minneapolis	MSP										-	-										-	-
Pan American Airways	Portsmouth	PSM										-	-										-	-
Pan American Airways	Saint John	YSJ										-	-										-	-
United Express	Chicago O'Hare	ORD				245	215	206	280	310	306	-4	-1.4%				16,170	14,190	13,624	19,682	21,720	21,420	-300	-1.4%
United Express	New York Newark	EWR						123	490	730	870	140	19.2%						6,150	26,444	39,540	44,370	4,830	12.2%
US Airways Express	Boston	BOS	1,942									-	-	36,906									-	-
US Airways Express	New York La Guardia	LGA	35	1,017								-	-	1,295	44,051								-	-
US Airways Express	Philadelphia	PHL	428	1,156	1,564							-	-	15,836	68,510	101,167							-	-
US Airways Express	Pittsburgh	PIT										-	-										-	-
US Airways Express	Portland (ME)	PWM	231									-	-	8,558									-	-
US Airways Express	Presque Isle	PQI	299									-	-	6,224									-	-
US Airways Express	Washington National	DCA		31	883							-	-		1,529	47,981							-	-
Subtotal			**9,357**	**3,896**	**4,307**	**4,218**	**3,693**	**3,922**	**4,692**	**5,359**	**5,508**	**149**	**2.8%**	**303,436**	**200,587**	**267,474**	**258,560**	**222,252**	**228,441**	**282,119**	**328,226**	**302,531**	**-25,695**	**-7.8%**
Total			**10,031**	**4,184**	**4,587**	**4,523**	**4,182**	**4,427**	**5,086**	**5,713**	**5,900**	**187**	**3.3%**	**404,579**	**243,787**	**313,899**	**311,075**	**296,273**	**305,141**	**345,437**	**383,225**	**366,893**	**-16,332**	**-4.3%**

Source: OAG Schedules.

Notes: Allegiant stopped reporting to the OAG in 2009, Allegiant 2009-2016 statistics from the T100 database; 2017-2019 statistics from OAG, which recommenced reporting.
All Northwest Airlines operations included in Delta Air Lines from 2009 onwards (following 2008 merger).
All Continental Airlines operations included in United Airlines from 2011 onwards (following 2010 merger).
All AirTran Airways operations included in Southwest Airlines from 2012 onwards (following 2011 merger).
All US Airways operations included in American Airlines from 2014 onwards (following 2013 merger).

Table F-9 Scheduled Passenger Operations by Market and Carrier for Tweed-New Haven Airport

			Departures											Departing Seats									
Carrier	**Market**	**Code**	**2000**	**2010**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**'18-'19 Change**	**'18-'19 Pct. Change**	**2000**	**2010**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**'18-'19 Change**	**'18-'19 Pct. Change**
Regional/ Commuter Carriers																								
American Eagle	Philadelphia	PHL				1,356	1,222	1,121	1,021	1,034	1,036	2	0.2%				50,161	49,657	63,913	53,712	51,707	67,725	16,018	31.0%
American Eagle	Charlotte	CLT									52	52	-									3,402	3,402	-
Delta Connection	Cincinnati	CVG										-	-										-	-
Boston-Maine Airways	Baltimore	BWI										-	-										-	-
Boston-Maine Airways	Bedford	BED										-	-										-	-
Boston-Maine Airways	Elmira/Corning	ELM										-	-										-	-
Boston-Maine Airways	Portsmouth	PSM										-	-										-	-
Southern Airways Express	Nantucket	ACK									39	39	-									355	355	-
US Airways Express	Philadelphia	PHL	1,773	1,608	1,399							-	-	65,612	59,491	51,768							-	-
US Airways Express	Washington National	DCA	937									-	-	34,658									-	-
Total			**2,710**	**2,929**	**1,222**	**1,399**	**1,356**	**1,121**	**1,021**	**1,034**	**1,128**	**93**	**9.0%**	**2,710**	**100,270**	**59,491**	**51,768**	**50,161**	**49,657**	**63,913**	**53,712**	**51,707**	**71,482**	**19,775**	**38.2%**

Source: OAG Schedules.
Notes: All Northwest Airlines operations included in Delta Air Lines from 2009 onwards (following 2008 merger).
All Continental Airlines operations included in United Airlines from 2011 onwards (following 2010 merger).
All AirTran Airways operations included in Southwest Airlines from 2012 onwards (following 2011 merger).
All US Airways operations included in American Airlines from 2014 onwards (following 2013 merger).

Table F-10 Scheduled Passenger Operations by Market and Carrier for Worcester Regional Airport

			Departures											Departing Seats									
Carrier	**Market**	**Code**	**2000**	**2010**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**'18-'19 Change**	**'18-'19 Pct. Change**	**2000**	**2010**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**'18-'19 Change**	**'18-'19 Pct. Change**
Jet Carriers																								
Allegiant Airways	Sanford	SFB										-	-										-	-
Boston-Maine Airways	Allentown/Bethlehem	ABE										-	-										-	-
Boston-Maine Airways	Portsmouth	PSM										-	-										-	-
Boston-Maine Airways	Sanford	SFB										-	-										-	-
Direct Air	Myrtle Beach	MYR		73								-	-		9,782								-	-
Direct Air	Orlando/Sanford	SFB		144								-	-		21,937								-	-
Direct Air	Punta Gorda	PGD		94								-	-		14,541								-	-
Direct Air	West Palm Beach	PBI		13								-	-		1,872								-	-
jetBlue	Fort Lauderdale/Hollywood	FLL			61	365	365	365	365	365	365	-				6,100	36,500	36,500	36,500	36,500	36,500	36,500	-	
jetBlue	New York J F Kennedy	JFK								245	365	120	49.0%								24,500	36,500	12,000	49.0%
jetBlue	Orlando	MCO			61	365	365	365	365	365	365	-				6,100	36,500	36,500	36,500	36,500	36,500	36,500	-	
Subtotal				**324**	**122**	**730**	**730**	**730**	**730**	**975**	**1,095**	**120**	**12.3%**		**48,132**	**12,200**	**73,000**	**73,000**	**73,000**	**73,000**	**97,500**	**109,500**	**12,000**	**12.3%**
Regional/ Commuter Carriers																								
American Eagle	Chicago O'Hare	ORD										-	-										-	-
American Eagle	New York J F Kennedy	JFK	552									-	-	18,216									-	-
American Eagle	Philadelphia	PHL								184	494	310	168.6%								9,200	24,714	15,514	168.6%
Delta Connection	Atlanta	ATL	670									-	-	33,500									-	-
Delta Connection	Detroit	DTW									153	153	-									7,650	7,650	-
US Airways Express	Philadelphia	PHL	1,464									-	-	54,168									-	-
Subtotal			**2,686**							**184**	**647**	**463**	**251.8%**	**105,884**							**9,200**	**32,364**	**23,164**	**251.8%**
Total			**2,686**	**324**	**122**	**730**	**730**	**730**	**730**	**1,159**	**1,742**	**583**	**50.3%**	**105,884**	**48,132**	**12,200**	**73,000**	**73,000**	**73,000**	**73,000**	**106,700**	**141,864**	**35,164**	**33.0%**

Source: OAG Schedules.
Notes: All Northwest Airlines operations included in Delta Air Lines from 2009 onwards (following 2008 merger).
All Continental Airlines operations included in United Airlines from 2011 onwards (following 2010 merger).
All AirTran Airways operations included in Southwest Airlines from 2012 onwards (following 2011 merger).
All US Airways operations included in American Airlines from 2014 onwards (following 2013 merger).

Table F-11 Scheduled Passenger Operations by Market and Carrier for Hanscom Field

			Departures											Departing Seats										
Carrier	**Market**	**Code**	**2000**	**2010**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**'18-'19 Change**	**'18-'19 Pct. Change**	**2000**	**2010**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**'18-'19 Change**	**'18-'19 Pct. Change**
Regional/ Commuter Carriers																								
Boston-Maine Airways	Elmira/Corning	ELM										-	-										-	-
Boston-Maine Airways	Hyannis	HYA										-	-										-	-
Boston-Maine Airways	Manchester	MHT										-	-										-	-
Boston-Maine Airways	Martha's Vineyard	MVY										-	-										-	-
Boston-Maine Airways	Nantucket	ACK										-	-										-	-
Boston-Maine Airways	New Haven	HVN										-	-										-	-
Boston-Maine Airways	New London/Groton	GON										-	-										-	-
Boston-Maine Airways	Portsmouth	PSM										-	-										-	-
Boston-Maine Airways	Trenton	TTN										-	-										-	-
Pan American Airways	Atlantic City Pomona Field	ACY										-	-										-	-
Pan American Airways	Martha's Vineyard	MVY										-	-										-	-
Pan American Airways	New York Newark	EWR										-	-										-	-
Pan American Airways	Portsmouth	PSM										-	-										-	-
Pan American Airways	Westchester County	HPN										-	-										-	-
Shuttle America	Buffalo	BUF	1,119									-	-	55,950									-	-
Shuttle America	Hartford	BDL	173									-	-	8,636									-	-
Shuttle America	New York La Guardia	LGA	523									-	-	26,143									-	-
Shuttle America	Trenton	TTN	2,062									-	-	103,093									-	-
Streamline	Trenton	TTN										-	-										-	-
US Airways	Martha's Vineyard	MVY										-	-										-	-
US Airways	Nantucket	ACK										-	-										-	-
US Airways	New York La Guardia	LGA										-	-										-	-
US Airways	Philadelphia	PHL										-	-										-	-
US Airways	Trenton	TTN										-	-										-	-
US Airways	Westchester County	HPN										-	-										-	-
Total			**3,876**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**-**	**-**	**193,821**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**-**	**-**

Source: OAG Schedules.
Notes: All US Airways operations included in American Airlines from 2014 onwards (following 2013 merger).
Last scheduled flight based on OAG schedules was flown in 2011 on Streamline Air (a subsidiary of Charter Air Transport – based at Hanscom Field) to Trenton, NJ

Table F-12 Scheduled Passenger Operations by Market and Carrier for Portsmouth International Airport

			Departures											Departing Seats									
Carrier	**Market**	**Code**	**2000**	**2010**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**'18-'19 Change**	**'18-'19 Pct. Change**	**2000**	**2010**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**'18-'19 Change**	**'18-'19 Pct. Change**
Jet Carriers																								
Allegiant Airways	Fort Lauderdale/Hollywood	FLL					27	43	35			-	-					4,779	7,611	6,177			-	-
Allegiant Airways	Orlando/Sanford	SFB			16	83	95	100	135	109	135	26	23.7%			2,656	14,242	16,111	17,062	22,498	18,500	22,062	3,562	19.3%
Allegiant Airways	Punta Gorda	PGD				22	35	48	99	83	144	61	73.0%				3,652	5,909	8,496	17,496	14,691	25,412	10,721	73.0%
Allegiant Airways	Savannah	SAV									26	26	-									4,653	4,653	-
Allegiant Airways	St. Petersburg/Clearwater	PIE						13	39			-	-						2,158	6,474			-	-
Allegiant Airways	Myrtle Beach	MYR							34	26	26	-								5,644	4,653	4,653	-	
Boston-Maine Airways	Fort Lauderdale/Hollywood	FLL										-	-										-	-
Boston-Maine Airways	Hartford	BDL										-	-										-	-
Boston-Maine Airways	Newburgh	SWF										-	-										-	-
Boston-Maine Airways	Sanford	SFB										-	-										-	-
Frontier	Orlando	MCO								13	78	64	483.9%								2,391	15,913	13,521	565.4%
Pan American Airways	Allentown/Bethlehem	ABE	93									-	-	13,950									-	-
Pan American Airways	Bangor	BGR	389									-	-	58,414									-	-
Pan American Airways	Gary	GYY	51									-	-	7,714									-	-
Pan American Airways	Manchester	MHT										-	-										-	-
Pan American Airways	New York Newark	EWR										-	-										-	-
Pan American Airways	Pittsburgh	PIT	261									-	-	39,171									-	-
Pan American Airways	Sanford	SFB	296									-	-	44,400									-	-
Pan American Airways	Santo Domingo	SDQ										-	-										-	-
Pan American Airways	St. Petersburg/Clearwater	PIE										-	-										-	-
Pan American Airways	Worcester	ORH										-	-										-	-
Skybus	Columbus	CMH										-	-										-	-
Skybus	Greensboro	GSO										-	-										-	-
Skybus	Punta Gorda	PGD										-	-										-	-
Skybus	Saint Augustine	UST										-	-										-	-
Subtotal			**1,091**	**0**	**16**	**105**	**157**	**204**	**342**	**232**	**409**	**177**	**76.4%**	**163,650**	**0**	**2,656**	**17,894**	**26,799**	**35,327**	**58,289**	**40,235**	**72,692**	**32,458**	**80.7%**

Table F-12 Scheduled Passenger Operations by Market and Carrier for Portsmouth International Airport (Continued)

			Departures											Departing Seats									
Carrier	**Market**	**Code**	**2000**	**2010**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**'18-'19 Change**	**'18-'19 Pct. Change**	**2000**	**2010**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**'18-'19 Change**	**'18-'19 Pct. Change**
Regional/ Commuter Carriers																								
Boston-Maine Airways	Baltimore	BWI										-	-										-	-
Boston-Maine Airways	Bangor	BGR										-	-										-	-
Boston-Maine Airways	Bedford	BED										-	-										-	-
Boston-Maine Airways	Hyannis	HYA										-	-										-	-
Boston-Maine Airways	Manchester	MHT										-	-										-	-
Boston-Maine Airways	Martha's Vineyard	MVY										-	-										-	-
Boston-Maine Airways	Nantucket	ACK										-	-										-	-
Boston-Maine Airways	New Haven	HVN										-	-										-	-
Boston-Maine Airways	New London/Groton	GON										-	-										-	-
Boston-Maine Airways	Saint John	YSJ										-	-										-	-
Boston-Maine Airways	Trenton	TTN										-	-										-	-
Boston-Maine Airways	Westchester County	HPN										-	-										-	-
Pan American Airways	Atlantic City Pomona Field	ACY										-	-										-	-
Pan American Airways	Baltimore	BWI										-	-										-	-
Pan American Airways	Bangor	BGR										-	-										-	-
Pan American Airways	Bedford	BED										-	-										-	-
Pan American Airways	Martha's Vineyard	MVY										-	-										-	-
Pan American Airways	Saint John	YSJ										-	-										-	-
Subtotal												**-**	**-**										**-**	**-**
Total			**1,091**	**0**	**0**	**0**	**157**	**204**	**342**	**232**	**409**	**177**	**76.4%**	**163,650**	**0**	**0**	**0**	**26,799**	**35,327**	**58,289**	**40,235**	**72,692**	**32,458**	**80.7%**

Source: OAG Schedules.

Notes: Allegiant stopped reporting to the OAG in 2009, Allegiant 2009-2016 statistics from the T100 database; 2017-2019 statistics from OAG, which recommenced reporting..

All Northwest Airlines operations included in Delta Air Lines from 2009 onwards (following 2008 merger).

All Continental Airlines operations included in United Airlines from 2011 onwards (following 2010 merger).

All AirTran Airways operations included in Southwest Airlines from 2012 onwards (following 2011 merger).

All US Airways operations included in American Airlines from 2014 onwards (following 2013 merger).

G

Ground Access to and from Logan Airport

This appendix provides information in support of Chapter 5, *Ground Access to and from Logan Airport*:

- Table G-1A Logan Express Bus Service Ridership (Annual)
- Table G-1B Logan Express Back Bay Service Ridership (Annual)
- Table G-2 Water Transportation Services Ridership to and from Logan Airport (Annual)
- Table G-3 Massachusetts Bay Transportation Authority (MBTA) Airport Station Passengers
- Table G-4 Annual Taxi Dispatches (Tickets Sold)
- Table G-5A On-Airport Commercial Parking Rates, 2010-2019 (Terminal Area Facilities)
- Table G-5B On-Airport Commercial Parking Rates, 2010-2019 (Economy Parking)
- Table G-6 Logan Airport Employee Parking Supply
- Table G-7 Logan Airport Commercial Parking Supply
- Table G-8 2018 Existing Conditions – Airport-Related Traffic, On-Airport Link Attributes, Traffic Assignment, and Vehicle Miles Traveled (VMT) Summary
- Table G-9 2019 Existing Conditions – Airport-Related Traffic, On-Airport Link Attributes, Traffic Assignment, and Vehicle Miles Traveled (VMT) Summary
- Volumetric Model Traffic Roadway Network
- March 2018 Logan Airport Parking Space Inventory, submitted to Massachusetts Department of Environmental Protection (also known as the *Parking Freeze Report*)
- September 2018 Logan Airport Parking Space Inventory, submitted to Massachusetts Department of Environmental Protection (also known as the *Parking Freeze Report*)
- March 2019 Logan Airport Parking Space Inventory, submitted to Massachusetts Department of Environmental Protection (also known as the *Parking Freeze Report*)
- September 2019 Logan Airport Parking Space Inventory, submitted to Massachusetts Department of Environmental Protection (also known as the *Parking Freeze Report*)

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Table G-1A Logan Express Bus Service Ridership

	Ridership			Percent Change		
Service Year	**Air Passengers**	**Employees**	**Total**	**Air Passengers**	**Employees**	**Total**
Framingham						
1992	207,847	7,573	215,420	4.3%	21.3%	4.8%
1993	229,064	12,307	241,371	10.2%	62.5%	12.0%
1994	250,342	17,352	267,694	9.3%	41.0%	10.9%
1995	274,754	21,129	295,883	9.8%	21.8%	10.5%
1996	325,665	22,932	348,597	18.5%	8.5%	17.8%
1997	316,306	29,871	346,175	(2.9%)	30.3%	(0.7%)
1998	337,007	33,971	370,978	6.5%	13.7%	7.2%
1999	345,715	31,946	380,661	3.5%	(6.0%)	2.6%
2000	371,560	34,508	406,068	6.6%	8.0%	6.7%
2001	354,521	38,740	393,261	(4.6%)	12.3%	(3.2%)
2002	342,746	42,441	385,187	(3.3%)	8.7%	(2.1%)
2003	310,024	55,979	366,003	(9.5%)	31.9%	(5.0%)
2004	323,931	54,763	378,694	4.5%	(2.2%)	3.5%
2005	318,125	57,569	375,694	(1.8%)	5.1%	(0.8%)
2006	349,022	60,764	409,789	9.7%	5.5%	9.1%
2007	311,299	57,252	368,551	(2.1%)[5]	(0.6%)[5]	(1.9%)[5]
2008	276,112	57,797	333,909	(11.3%)	1.0%	(9.4%)
2009	264,233	59,840	324,073	(4.3%)	3.5%	(2.9%)
2010	272,190	62,226	334,416	3.0%	4.0%	3.2%
2011[1]	272,301	68,228	340,529	0.0%	9.6%	1.8%
2012	279,603	82,951	362,554	2.7%	21.6%	6.5%
2013	295,654	84,008	379,662	5.7%	1.3%	4.7%
2014	303,646	87,488	391,134	2.7%	4.1%	3.0%
2015	345,680	82,943	428,623	13.8%	(5.2%)	9.6%
2016	406,253	92,642	498,895	17.5%	11.7%	16.4%
2017	434,906	99,639	534,545	7.1%	7.6%	7.2%
2018	**463,377**	**114,151**	**577,528**	**6.5%**	**14.6%**	**8.0%**
2019	**486,507**	**129,704**	**616,211**	**5.0%**	**13.6%**	**6.7%**

Table G-1A Logan Express Bus Service Ridership (Continued)						
	Ridership			**Percent Change**		
Service Year	**Air Passengers**	**Employees**	**Total**	**Air Passengers**	**Employees**	**Total**
Braintree						
1992	186,217	9,694	195,911	10.6%	16.6%	10.8%
1993	205,209	22,768	227,977	10.2%	134.9%	16.4%
1994	247,636	37,489	285,125	20.7%	64.7%	25.1%
1995	264,579	70,723	335,302	6.8%	88.7%	17.6%
1996	335,232	103,519	438,751	26.7%	46.4%	30.1%
1997	300,006	135,340	435,346	(10.5%)	30.7%	(0.8%)
1998	300,005	156,105	456,110	0.0%	15.3%	4.8%
1999	328,818	125,286	454,105	9.6%	(19.7%)	(0.5%)
2000	355,932	149,687	505,619	8.2%	19.5%	11.3%
2001	345,249	156,240	501,489	(3.0%)	4.4%	(0.8%)
2002	323,115	190,360	513,475	(6.4%)	21.8%	2.4%
2003	301,013	216,765	517,778	(6.8%)	13.9%	0.8%
2004	318,100	208,566	526,666	5.7%	(3.8%)	1.7%
2005	307,659	189,531	497,190	(3.2%)	(9.1%)	(5.5%)
2006	333,413	202,983	536,396	8.4%	7.1%	7.9%
2007	300,715	196,955	497,670	(2.3%)5	3.9%[5]	0.1%[5]
2008	252,289	221,591	473,880	(16.1%)	12.5%	(4.8%)
2009	231,151	234,908	466,059	(8.4%)	6.0%	(1.7%)
2010	231,422	251,443	482,865	0.1%	7.0%	3.6%
2011[1]	233,521	285,515	519,036	0.9%	13.6%	7.5%
2012	247,346	314,542	561,888	5.9%	10.2%	8.3%
2013	268,154	320,329	588,483	8.4%	1.8%	4.7%
2014	296,975	313,334	610,309	10.7%	(2.2%)	3.7%
2015	313,576	311,695	625,271	5.6%	(0.5%)	2.5%
2016	329,043	326,115	655,158	4.9%	4.6%	4.8%
2017	345,401	349,435	694,836	5.0%	7.2%	6.1%
2018	**370,654**	**371,813**	**742,467**	**7.3%**	**6.4%**	**6.9%**
2019	**407,090**	**413,405**	**820,495**	**9.8%**	**11.2%**	**10.5%**

Table G-1A Logan Express Bus Service Ridership (Continued)

	Ridership			Percent Change		
Service Year	**Air Passengers**	**Employees**	**Total**	**Air Passengers**	**Employees**	**Total**
Woburn[2]						
1992[3]	3,052	91	3,143	NA	NA	-
1993	59,635	5,027	64,662	NA	NA	-
1994	119,567	9,082	128,649	100.5%	80.7%	99.0%
1995	150,147	13,376	163,523	25.6%	47.3%	27.1%
1996	190,566	17,322	207,888	26.9%	29.5%	27.1%
1997	199,715	20,018	219,733	4.8%	15.6%	5.7%
1998	208,286	22,876	231,162	4.3%	14.3%	5.2%
1999	191,454	23,495	214,949	(8.1%)	2.7%	(7.0%)
2000	195,744	27,522	223,266	2.2%	17.1%	3.9%
2001	177,375	38,318	215,530	(9.4%)	39.2%	(3.4%)
2002	161,145	73,277	234,422	(9.2%)	91.0%	8.7%
2003	164,980	103,963	268,943	(2.4%)	41.9%	14.7%
2004	172,110	111,326	283,436	4.3%	7.1%	5.4%
2005	163,227	110,961	274,188	(5.1%)	(0.3%)	(3.2%)
2006	167,341	121,672	289,013	2.5%	9.7%	5.4%
2007	149,149	123,066	272,215	(8.6%)[5]	10.9%[5]	(0.7%)[5]
2008	129,385	122,777	252,162	(13.3%)	(0.2%)	(7.4%)
2009	113,607	121,633	235,240	(12.2%)	(0.9%)	(6.7%)
2010	115,257	127,120	242,377	1.5%	4.5%	3.0%
2011[1]	118,232	151,029	269,261	2.6%	18.8%	11.1%
2012	126,549	188,747	315,296	7.0%	25.0%	17.1%
2013	140,407	192,289	332,696	11.0%	1.9%	5.5%
2014	156,045	194,341	350,386	11.1%	1.1%	5.3%
2015	163,469	191,242	354,711	4.8%	(1.6%)	1.2%
2016	170,704	197,568	368,272	4.4%	3.3%	3.8%
2017	176,485	209,194	385,679	3.4%	5.9%	4.7%
2018	**178,398**	**226,698**	**405,096**	**1.1%**	**8.4%**	**5.0%**
2019	**184,031**	**240,047**	**424,078**	**3.2%**	**5.9%**	**4.7%**

Table G-1A Logan Express Bus Service Ridership (Continued)

	Ridership			Percent Change		
Service Year	**Air Passengers**	**Employees**	**Total**	**Air Passengers**	**Employees**	**Total**
Peabody						
2001[4]	8,151	3,097	11,248	NA	NA	NA
2002	28,626	20,629	49,255	NA	NA	NA
2003	32,318	23,425	55,743	21.4%	13.6%	13.2%
2004	43,389	33,642	77,031	34.3%	43.6%	38.2%
2005	51,023	39,599	87,622	17.6%	17.7%	13.7%
2006	42,142	32,632	74,774	(17.4%)	(17.6%)	(14.7%)
2007	36,367	26,949	63,316	(28.7%)[5]	(31.9%)[5]	(27.7%)[5]
2008	30,887	30,596	61,483	(15.1%)	13.5%	(2.9%)
2009	27,856	32,220	60,076	(9.8%)	5.3%	(2.3%)
2010	25,543	26,231	51,744	(8.3%)	(18.6%)	(13.8%)
2011[1]	25,555	31,741	57,296	0.0%	21.0%	10.7%
2012	27,542	37,909	65,451	7.8%	19.4%	14.2%
2013	28,790	38,067	66,857	4.5%	0.4%	2.1%
2014	31,485	36,848	68,333	9.4%	(3.2%)	2.2%
2015	37,478	36,125	73,603	19.0%	(2.0%)	7.7%
2016	40,872	36,143	77,015	9.1%	0.0%	4.6%
2017	46,117	37,233	83,350	12.8%	3.0%	8.2%
2018	**50,821**	**37,953**	**88,774**	**10.2%**	**1.9%**	**6.5%**
2019	**53,635**	**40,928**	**94,563**	**5.5%**	**7.8%**	**6.5%**

Table G-1A Logan Express Bus Service Ridership (Continued)

	Ridership			Percent Change		
Service Year	**Air Passengers**	**Employees**	**Total**	**Air Passengers**	**Employees**	**Total**
Total System Ridership						
1992	397,116	17,358	414,474	8.0%	19.2%	8.5%
1993	493,908	39,832	533,740	24.4%	129.5%	28.8%
1994	617,545	63,923	681,468	25.0%	60.5%	27.7%
1995	689,480	105,228	794,708	11.6%	64.6%	16.6%
1996	851,463	143,773	995,236	23.4%	36.6%	25.2%
1997	816,015	185,229	1,001,254	(4.2%)	28.8%	0.6%
1998	845,598	212,952	1,058,550	3.6%	15.0%	5.7%
1999	868,987	180,727	1,049,714	2.7%	(15.2%)	(0.8%)
2000	923,236	211,717	1,134,953	6.2%	17.1%	8.1%
2001	885,296	236,395	1,121,691	(4.1%)	11.7%	(1.2%)
2002	855,632	326,707	1,182,339	(3.4%)	38.2%	5.4%
2003	808,335	400,132	1,208,467	(5.5%)	22.5%	2.2%
2004	857,530	408,297	1,265,827	6.1%	2.0%	2.2%
2005	837,034	397,660	1,234,694	(2.4%)	(2.6%)	(2.4%)
2006	891,918	418,051	1,309,969	6.6%	5.1%	6.1%
2007	797,530	404,222	1,201,752	(4.7%)[5]	1.7%[5]	(2.7%)[5]
2008	688,673	432,761	1,121,434	(13.6%)	7.1%	(6.7%)
2009	636,847	448,601	1,085,448	(7.5%)	3.7%	(3.2%)
2010	644,412	467,020	1,111,432	1.2%	4.1%	2.4%
2011[1]	649,609	536,513	1,186,122	0.8%	14.9%	6.7%
2012	681,040	624,149	1,305,189	4.8%	16.3%	10.0%
2013	733,005	634,693	1,367,698	8.0%	2.0%	5.0%
2014	788,151	632,011	1,420,162	7.5%	(0.4%)	3.8%
2015	860,203	622,005	1,482,208	9.1%	-1.6%	4.4%
2016	946,872	652,468	1,599,340	10.1%	4.9%	7.9%
2017	1,002,909	695,504	1,698,410	5.9%	6.6%	6.2%
2018	**1,063,250**	**750,615**	**1,813,865**	**6.0%**	**7.9%**	**6.8%**
2019	**1,131,263**	**824,084**	**1,955,347**	**6.4%**	**9.8%**	**7.8%**

Notes: January 23, 2008: I-90/Ted Williams Tunnel opens to all traffic.
NA Not applicable.
1 Changes to employee parking and bus fares were implemented in October 2011.
2 Woburn Express moved from Mishawum Station to the Anderson Regional Transportation Center (ARTC) in Woburn in May 2001.
3 Reflects a partial year of operation. Woburn Logan Express service was implemented in November 1992.
4 Reflects a partial year of operation. The Peabody Logan Express service commenced in September 2001.
5 Percent comparison between 2007 and 2005. The I-90 Ted Williams Tunnel closures in 2006 resulted in atypical ridership.

Table G-1B Logan Express Back Bay Service Ridership[1]		
	Ridership	**Percent Change**
Service Year		
2014	152,892	NA
2015	290,796	NA
2016	216,329	(25.6%)
2017	137,326	(36.5%)
2018	**118,663**	**(13.6%)**
2019	**250,477**	**111.1%**

Source: Massport.

1 Back Bay Logan Express service commenced in April 2014. Only total ridership available.

Table G-2 Water Transportation Services Ridership to and from Logan Airport

	Rowes Wharf/Fan Pier Water Shuttle	Private Water Taxi (on-demand)	Harbor Express (Hingham-Hull-Boston Logan)[1]	Boston Logan Water Shuttle (Long Wharf)	Total
1990	181,530	NS	NS	NS	181,530
1991	142,500	NS	NS	NS	142,500
1992	133,297	NS	NS	NS	133,297
1993	159,525	NS	NS	NS	159,525
1994	209,057	NS	NS	NS	209,057
1995	203,829	NS	NS	NS	203,829
1996	159,992	3,364	11,781	NS	175,137
1997	132,542	6,299	71,309	NS	210,150
1998	124,836	9,243	101,174	NS	235,253
1999	122,211	17,252	98,539	NS	238,002
2000	128,097	26,335	83,243	NS	237,675
2001	107,400	29,642	82,704	NS	219,746
2002	75,304	36,736	66,471	NS	178,511
2003	26,480[2]	35,724[3]	61,849	5,722[4]	129,775
2004	NS	54,540	58,788	3,202[5]	116,530
2005	NS	44,975	51,960	NS	96,935
2006	NS	63,639	70,998	NS	134,637
2007	NS	50,737	59,460	NS	110,197
2008	NS	48,630	48,003	NS	96,633
2009	NS	50,734	37,861	NS	88,595
2010	NS	54,382	34,794	NS	89,176
2011	NS	58,879	33,403	NS	92,282
2012	NS	60,840	30,337	NS	91,177
2013	NS	70,378	21,952	NS	92,303
2014	NS	67,479	19,340	NS	86,819
2015	NS	70,798	7,748	NS	78,546
2016	NS	74,788	7,757	NS	82,545
2017	NS	83,689	7,424	NS	91,113
2018	**NS**	**77,813**	**6,609**	**NS**	**84,422**
2019	**NS**	**61,071**	**7,467**	**NS**	**68,538**

Source: Massport.

Notes: Figures from 2003 – 2007 have been revised from previous documents.

NS Operation not in service.

1 Service to Quincy was discontinued in 2013 and now operates between Hingham/Hull/Boston (Long Wharf)/Logan.

2 Rowes Wharf Water Shuttle operated from January to June only in 2003.

3 Operated from May to October only in 2003.

4 Long Wharf Boston Logan Water Shuttle operated from August to December in 2003.

5 Joint operation with City Water Taxi began on August 16, 2003.

Table G-3 Massachusetts Bay Transportation Authority (MBTA) Airport Station Passengers

Year	Entrances	Exits	Total Turnstile Count[1]	Percent Change
1990	NA	NA	2,854,317	-
1991	NA	NA	2,515,293	(11.9%)
1992	NA	NA	2,626,572	4.2%
1993	NA	NA	2,604,980	(0.8%)
1994	NA	NA	3,108,734	19.3%
1995	NA	NA	3,040,868	(2.2%)
1996	NA	NA	2,974,850	(2.2%)
1997[2]	NA	NA	2,774,268	(6.7%)
1998	NA	NA	2,850,367	2.7%
1999	NA	NA	2,974,045	4.3%
2000	NA	NA	3,019,086	1.5%
2001	NA	NA	2,896,638	(4.1%)
2002	NA	NA	2,670,594	(7.8%)
2003[3]	1,300,272	1,275,627	2,575,899	(3.6%)
2004	1,373,861	1,366,511	2,740,372	6.4%
2005	NA	NA	NA	NA
2006	NA	NA	NA	NA
2007[4]	1,412,055	--	2,524,079	--
2008[5]	2,212,111	--	3,647,394	56.7%
2009[5]	2,329,370	--	3,750,549	5.3%
2010[5]	2,270,241	--	3,629,193	(2.5%)
2011	2,277,311	NA	NA	0.3%
2012	2,442,085	NA	NA	7.2%
2013	2,597,306	NA	NA	6.3%
2014	2,378,965	NA	NA	(8.4%)[6]
2015	2,122,597	NA	NA	(10.8%)[6]
2016	2,240,744	NA	NA	5.6%
2017	2,197,783	NA	NA	(1.9%)
2018	**2,295,250**	**NA**	**NA**	**4.4%**
2019	**1,635,147**	**NA**	**NA**	**(28.8%)**

Source: MBTA.

Notes: Total Turnstile count figures include Logan Airport bound (turnstile exits) and non-Logan Airport bound (turnstile entrances) passengers.

NA Data not available

1 As stated in the *Logan Airport 1999 ESPR*, Massport believes that ridership estimates through 2005 from the old Airport Station were understated because many travelers that were destined for the Airport with baggage had been observed to avoid the turnstiles and exit the old Airport Station via the wide gate (designed for handicapped access) that did not have the capability to count passengers.

2 Airport Station was closed on six weekends during September and October 1997 due to construction.

3 Airport Station was closed on eight weekend days during 2003.

4 Automated fare collection and new fare gates implemented beginning January 2007. Station access to Bremen Street Park opened June 2007. Exits are undercounted.

5 Exits are undercounted, as some exits occur through exit doors rather than turnstiles.

6 Due to the closure of Government Center Station in 2014, it is possible that passengers who would normally take the Blue Line to the Green Line switched to alternate modes for their trips.

Table G-4 Annual Taxi Dispatches (Tickets Sold)		
Year	**Total (yearly tickets sold)**	**Percent Change**
1990	1,330,418	-
1991	1,208,611	(9.2%)
1992	1,266,033	4.8%
1993	1,336,603	5.6%
1994	1,409,505	5.5%
1995	1,499,869	6.4%
1996	1,721,093	14.7%
1997	1,827,244	6.2%
1998	1,888,281	3.3%
1999	1,955,895	3.6%
2000	2,140,724	9.4%
2001	1,789,736	(16.4%)
2002	1,679,508	(6.2%)
2003	1,562,076	(7.0%)
2004	1,713,696	9.7%
2005	1,769,876	3.3%
2006	1,857,609	5.0%
2007	1,925,817	3.7%
2008	1,749,730	(9.1%)
2009	1,630,333	(6.8%)
2010	1,829,961	12.1%
2011	1,937,743	6.0%
2012	2,022,239	4.4%
2013	2,131,371	5.0%
2014	2,237,793	5.0%
2015	2,302,059	2.9%
2016	2,420,391	5.1%
2017	1,975,174	(18.4%)
2018	**1,697,831**	**(14.0%)**
2019	**1,573,627**	**(7.3%)**

Source: Massport.

Table G-5A On-Airport Commercial Parking Rates, 2010-2019 (Terminal Area Facilities[1])

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
0 to 30 minutes	$3	$3	$3	$3	$3	$3	$3	N/A	**N/A**	**N/A**
31 minutes to 1 hour	$6	$6	$6	$6	$6	$6	$6	N/A	**N/A**	**N/A**
0 minutes to 1 hour							N/A	$7	**$7**	**$8**
1 to 1.5 hours	$9	$9	$9	$9	$11	$10	$12	N/A	**N/A**	**N/A**
1.5 to 2 hours	$12	$12	$12	$12	$14	$14	$17	N/A	**N/A**	**N/A**
1 to 2 hours							N/A	$19	**$19**	**$21**
2 to 3 hours	$15	$15	$17	$17	$19	$19	$22	$24	**$24**	**$26**
3 to 4 hours	$18	$18	$21	$21	$23	$23	$26	$28	**$28**	**$30**
4 to 7 hours	$22	$22	$25	$25	$27	$27	$30	$32	**$32**	**$34**
7 to 24 hours (Daily)	$24	$24	$27	$27	$29	$29	$32	$35	**$35**	**$38**
Additional days 0 to 6 hours	$12	$12	$14	$14	$15	$15	$16	$18	**$18**	**$19**
Additional day(s) 6 to 24 hours	$24	$24	$27	$27	$29	$29	$32	$35	**$35**	**$38**

1 Central/West Parking Garage, Terminal B Garage, Terminal E Lots

Table G-5B On-Airport Commercial Parking Rates, 2010-2019 (Economy Parking)

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Daily Rate	$18	$18	$18	$18	$20	$20	$23	$26	**$26**	**$29**
Additional days 0 to 6 hours	$9	$9	$9	$9	$10	$10	$12	$13	**$13**	**$15**
Additional days 6 to 24 hours	$18	$18	$18	$18	$20	$20	$23	$26	**$26**	**$29**
Weekly Rate (6-7 days)	$108	$108	$108	$108	$120	$120	$138	N/A	**N/A**	**N/A**

Source: Massport.

Table G-6 Logan Airport Employee Parking Supply

	Number of Spaces											
Location	**March 2014**	**September 2014**	**March 2015**	**September 2015**	**March 2016**	**September 2016**	**March 2017**	**October 2017**	**March 2018**	**October 2018**	**March 2019**	**October 2019**
Terminal Area	857	868	868	865	865	865	865	865	**865**	**865**	**865**	**901**
North Service Area	883	883	881	876	876	876	876	876	**876**	**876**	**876**	**833**
Southwest Service Area	4	4	14	16	16	16	16	16	**16**	**16**	**16**	**16**
South Service Area	681	681	674	665	665	665	665	665	**665**	**665**	**665**	**695**
Airside (Fire/Rescue)	0	0	0	0	0	0	0	0	**0**	**0**	**0**	**0**
Total spaces in service	2,425	2,436	2,437	2,422	2,422	2,422	2,422	2,422	**2,422**	**2,422**	**2,422**	**2,445**
Total spaces out of service	248	237	236	251	26	26	26	26	**26**	**26**	**26**	**3**
Total employee spaces	2,673	2,673	2,673	2,673	2,448	2,448	2,448	2,448	**2,448**	**2,448**	**2,448**	**2,448**

Source: Logan Airport Parking Space Inventory submitted to Massachusetts Department of Environmental Protection (MassDEP), March and September 2014, 2015, 2016, 2017 (September 2017 was revised in October 2017). 2018 and, 2019.

Table G-7 Logan Airport Commercial Parking Supply

Location	Number of Spaces											
	Mar 2014	Sep 2014	Mar 2015	Sept 2015	Mar 2016	Sep 2016	Mar 2017	Oct 2017	Mar 2018	Sep 2018	Mar 2019	Sep 2019
Terminal Area												
Central Garage and West Garage	10,267	10,267	10,267	10,340	11,954	11,954	11,954	11,954	**11,954**	**11,954**	**11,954**	**10,964**
Terminal B Garage	2,254	2,254	2,254	2,201	2,212	2,212	2,212	2,212	**2,212**	**2,212**	**2,212**	**2,212**
Terminal E Lot 1	275	275	243	237	237	237	237	237	**237**	**237**	**237**	**237**
Terminal E Lot 2	248	248	248	249	249	249	249	249	**249**	**249**	**249**	**203**
Terminal E Lot 3 (Gulf Lot)	219	219	219	217	217	217	217	217	**217**	**217**	**217**	**93**
Signature (General Aviation)	35	35	35	35	35	35	35	35	**35**	**35**	**35**	**35**
Logan Airport Hilton	235	235	35	35	235	235	235	235	**235**	**235**	**235**	**63**
North Service Area												
Economy Garage	2,809	2,809	2,809	2,864	2,864	2,864	2,864	2,864	**2,864**	**2,864**	**2,864**	**2,864**
Overflow Green Lot (Wood Island)	0	0	235	242	0	0	0	0	**0**	**0**	**0**	**0**
South Service Area												
Harborside Hyatt Conference Center and Hotel	270	270	270	270	270	270	270	270	**270**	**270**	**270**	**270**
Overflow Blue Lot (Harborside Dr.)	0	0	315	339	367	367	367	367	**367**	**0**	**0**	**0**
Southwest Service Area												
Overflow Red Lot (Tomahawk Dr.)	0	0	282	282	0	0	0	0	**0**	**0**	**0**	**100**
Massport In-Service Parking Supply (lined spaces)	16,072	16,072	16,872	16,971	18,100	18,100	18,100	18,100	**18,100**	**18,100**	**18,100**	**18,100**
Total spaces in service[1]	16,612	16,612	17,212	17,311	18,640	18,640	18,640	18,640	**18,640**	**18,273**	**18,273**	**17,041**
Total spaces out of service	1,803	1,803	1,203	1,104	-	-	-	5,000	**5,000**	**5,367**	**5,367**	**6,599**
Total commercial spaces	18,415	18,415	18,415	18,415	18,640	18,640	18,640	23,640	**23,640**	**23,640**	**23,640**	**23,640**

Source: Logan Airport Parking Space Inventory submitted to MassDEP, March and September 2014, 2015, 2016, 2017 (September 2017 was revised in October 2017), 2018, and 2019.

1 Total spaces in service includes Signature (General Aviation), Logan Airport Hilton, Harborside Hyatt Conference Center and Hotel, and overflow lots (Overflow Green Lot, Overflow Red Lot, etc.) from previous years.

Table G-8 2018 Existing Conditions – Airport-Related Traffic, On-Airport Link Attributes, Traffic Assignment and Vehicle Miles Traveled (VMT) Summary

Link Name	Link Distance (ft)	Link Speed (mph)	VOLUME				VMT			
			AM Peak	PM Peak	High 8-Hour	AWDT	AM Peak	PM Peak	High 8-Hour	AWDT
1	344	27	1,103	1,365	9,396	21,118	72	89	612	1,376
2	496	29	752	718	5,279	13,988	71	67	496	1,314
3	1,347	20	483	785	5,302	12,034	123	200	1,353	3,070
4	1,166	27	1,017	1,468	10,238	22,849	225	324	2,261	5,046
5	378	24	1,500	2,253	15,540	34,884	107	161	1,113	2,497
6	441	31	713	700	4,388	11,820	60	58	366	987
7	896	23	787	1,553	11,152	23,064	133	263	1,892	3,914
8	644	27	1,778	1,845	12,887	30,195	217	225	1,572	3,683
9	1,214	26	631	569	4,280	9,552	145	131	984	2,196
10	1,303	25	1,159	1,314	8,906	21,250	286	324	2,198	5,244
11	421	24	76	237	1,788	4,910	6	19	143	391
12	236	31	104	249	1,752	3,121	5	11	78	140
13	1,311	31	154	438	3,114	5,614	38	109	773	1,394
14	750	26	1,854	2,083	14,675	35,105	263	296	2,084	4,987
15	441	23	1,580	2,529	19,037	41,610	132	211	1,590	3,475
16	1,724	23	22	56	423	880	7	18	138	287
17	644	19	205	612	4,442	9,576	25	75	542	1,168
18	354	26	1,147	1,277	8,607	20,643	77	86	577	1,384
19	687	15	12	37	299	607	2	5	39	79
20	94	15	86	250	1,627	3,235	2	4	29	58
27	187	5	22	56	423	880	1	2	15	31
28	124	6	22	56	423	880	1	1	10	21
29	226	31	154	486	3,816	8,517	7	21	163	365
30	1,070	5	154	486	3,816	8,447	31	98	773	1,712
31	385	32	154	486	3,816	8,517	11	35	278	621
34	181	23	154	486	3,816	8,447	5	17	131	290
35	248	26	154	486	3,816	8,447	7	23	179	397
36	89	21	154	486	3,816	8,447	3	8	64	142
50	353	33	98	283	1,735	3,228	7	19	116	216
51	717	26	98	283	1,735	3,228	13	38	236	438
52	403	33	73	252	1,968	4,107	6	19	150	313
54	612	32	73	252	1,968	4,107	8	29	228	476
55	194	26	124	373	2,420	4,644	5	14	89	171
60	331	26	124	373	2,420	4,644	8	23	152	291

Table G-8 2018 Existing Conditions – Airport-Related Traffic, On-Airport Link Attributes, Traffic Assignment and Vehicle Miles Traveled (VMT) Summary (Continued)

Link Name	Link Distance (ft)	Link Speed (mph)	VOLUME				VMT			
			AM Peak	PM Peak	High 8-Hour	AWDT	AM Peak	PM Peak	High 8-Hour	AWDT
61	224	9	26	90	685	1,416	1	4	29	60
62	218	24	196	256	1,881	4,368	8	11	78	180
64	232	5	170	166	1,196	2,952	7	7	53	130
65	593	26	294	539	3,617	7,597	33	61	406	853
66	465	25	212	381	2,472	5,467	19	34	218	482
90	582	6	99	342	2,653	5,523	11	38	292	609
107	260	20	27	20	157	468	1	1	8	23
108	389	24	108	154	1,088	2,383	8	11	80	176
109	114	27	51	197	1,547	2,811	1	4	33	61
110	169	28	51	197	1,547	2,811	2	6	50	90
112	237	30	51	197	1,547	2,811	2	9	69	126
113	565	17	212	381	2,472	5,467	23	41	264	585
114	609	32	97	175	1,057	2,198	11	20	122	254
115	451	29	14	10	73	230	1	1	6	20
116	399	22	153	231	1,446	3,161	12	17	109	239
117	283	22	56	56	388	963	3	3	21	52
118	295	29	14	10	73	230	1	1	4	13
119	240	12	62	87	561	1,142	3	4	25	52
120	365	30	118	143	949	2,105	8	10	66	146
121	356	17	14	10	73	230	1	1	5	16
122	486	16	18	29	259	619	2	3	24	57
123	486	18	40	28	204	579	4	3	19	53
126	631	20	27	20	157	468	3	2	19	56
127	652	24	108	154	1,088	2,383	13	19	134	294
128	257	32	40	28	204	579	2	1	10	28
129	257	18	18	29	259	619	1	1	13	30
132	361	23	52	83	617	1,416	4	6	42	97
133	236	27	108	154	1,088	2,383	5	7	49	107
134	1,521	30	171	445	3,152	5,773	49	128	908	1,663
135	1,542	27	98	141	970	2,074	29	41	283	606
139	96	14	25	63	460	948	0	1	8	17
140	295	27	249	288	2,179	4,786	14	16	122	267
142	257	29	260	486	3,469	6,605	13	24	169	322
144	518	9	224	331	2,529	5,955	22	33	248	584

Table G-8 2018 Existing Conditions – Airport-Related Traffic, On-Airport Link Attributes, Traffic Assignment and Vehicle Miles Traveled (VMT) Summary (Continued)

Link Name	Link Distance (ft)	Link Speed (mph)	VOLUME				VMT			
			AM Peak	PM Peak	High 8-Hour	AWDT	AM Peak	PM Peak	High 8-Hour	AWDT
145	195	22	47	69	686	1,261	2	3	25	47
146	463	22	43	48	436	927	4	4	38	81
147	230	22	226	261	2,194	5,511	10	11	96	240
148	794	22	62	106	893	1,918	9	16	134	288
149	661	21	100	324	2,409	4,406	13	41	302	552
150	281	21	28	142	1,084	1,875	2	8	58	100
151	360	21	28	138	1,032	1,804	2	9	70	123
153	66	31	1	3	52	71	0	0	1	1
154	173	33	4	25	303	406	0	1	10	13
155	258	30	182	212	1,818	5,370	9	10	89	262
156	645	26	182	205	1,703	4,500	22	25	208	550
157	218	22	0	7	115	870	0	0	5	36
158	185	24	209	498	4,554	7,434	7	17	160	260
159	354	17	209	505	4,668	8,304	14	34	313	557
160	470	28	3	45	295	449	0	4	26	40
161	94	15	185	250	1,998	4,949	3	4	36	88
162	50	15	3	40	266	404	0	0	3	4
163	66	15	182	209	1,732	4,545	2	3	22	57
164	367	33	7	42	502	672	1	3	35	47
168	380	15	3	43	281	428	0	3	20	31
169	293	12	3	43	281	428	0	2	16	24
174	502	10	97	276	3,221	4,347	9	26	306	413
175	640	9	238	276	2,491	7,949	29	33	302	964
176	319	22	970	1,466	11,896	25,072	59	89	719	1,515
177	286	22	1,437	1,587	10,753	25,448	78	86	582	1,378
178	353	18	873	1,190	8,674	20,725	58	80	580	1,386
179	348	32	1,199	1,311	8,262	17,499	79	86	545	1,153
180	366	18	913	1,422	10,163	21,713	63	99	704	1,505
181	453	8	190	188	1,368	3,388	16	16	117	291
182	119	8	190	188	1,368	3,388	4	4	31	76
183	50	8	190	188	1,368	3,388	2	2	13	32
184	54	8	190	188	1,368	3,388	2	2	14	35
185	62	8	277	404	3,883	6,791	3	5	46	80
186	39	8	87	215	2,514	3,403	1	2	19	25

Table G-8 2018 Existing Conditions – Airport-Related Traffic, On-Airport Link Attributes, Traffic Assignment and Vehicle Miles Traveled (VMT) Summary (Continued)

Link Name	Link Distance (ft)	Link Speed (mph)	VOLUME				VMT			
			AM Peak	PM Peak	High 8-Hour	AWDT	AM Peak	PM Peak	High 8-Hour	AWDT
193	138	9	238	276	2,491	7,949	6	7	65	208
194	932	21	238	276	2,491	7,949	42	49	440	1,403
195	79	10	3	43	281	428	0	1	4	6
196	49	10	10	60	707	944	0	1	7	9
197	83	5	13	103	989	1,372	0	2	16	22
198	692	5	7	64	532	762	1	8	70	100
199	70	27	7	64	532	762	0	1	7	10
204	2,022	8	277	404	3,883	6,791	106	155	1,487	2,601
205	71	26	188	401	4,024	6,302	3	5	54	85
206	142	26	209	498	4,554	7,434	6	13	122	200
207	859	33	99	237	2,020	4,167	16	39	329	678
208	284	32	278	177	1,263	3,382	15	9	68	182
209	80	18	606	986	6,824	14,454	9	15	103	219
210	71	11	606	986	6,824	14,454	8	13	92	194
211	390	18	884	1,162	8,087	17,836	65	86	597	1,317
212	117	18	606	986	6,824	14,454	13	22	151	320
213	1,344	22	1,786	2,612	18,837	42,438	455	665	4,795	10,802
214	449	32	1,297	1,548	10,282	21,666	110	132	874	1,842
215	1,110	32	1	17	218	2,367	0	4	46	498
216	905	32	713	683	4,170	9,453	122	117	715	1,620
217	1,050	32	234	655	4,557	8,278	47	130	906	1,646
218	581	25	793	976	7,885	18,546	87	107	868	2,041
219	1,063	32	393	278	2,045	4,913	79	56	412	989
220	415	32	626	503	3,798	8,843	49	39	298	695
221	698	33	233	225	1,752	3,931	31	30	232	520
222	1,920	29	50	55	396	948	18	20	144	345
223	1,564	28	1,187	1,254	9,930	23,459	351	371	2,941	6,949
224	377	29	139	296	2,226	4,224	10	21	159	302
225	551	29	116	265	1,981	3,636	12	28	207	379
226	788	33	23	31	245	588	4	5	37	88
227	1,303	33	206	200	1,602	3,570	51	49	395	881
228	580	30	1,382	1,247	8,483	19,435	152	137	932	2,135
229	1,653	31	331	296	2,580	5,981	103	93	808	1,873
230	2,058	29	1,051	952	5,904	13,454	410	371	2,301	5,244

Table G-8 2018 Existing Conditions – Airport-Related Traffic, On-Airport Link Attributes, Traffic Assignment and Vehicle Miles Traveled (VMT) Summary (Continued)

Link Name	Link Distance (ft)	Link Speed (mph)	VOLUME				VMT			
			AM Peak	PM Peak	High 8-Hour	AWDT	AM Peak	PM Peak	High 8-Hour	AWDT
231	1,300	20	240	798	6,230	13,331	59	196	1,534	3,282
232	736	26	537	496	4,182	9,551	75	69	583	1,331
233	488	28	1,101	1,007	6,299	14,402	102	93	582	1,331
234	449	28	434	592	4,973	11,752	37	50	423	999
235	310	14	348	499	4,174	10,030	20	29	245	589
236	310	11	86	93	800	1,722	5	5	47	101
237	105	5	116	265	1,981	3,636	2	5	39	72
239	186	22	60	201	1,514	3,098	2	7	53	109
240	145	10	247	235	1,825	4,161	7	6	50	114
241	578	10	307	436	3,340	7,259	34	48	366	795
246	175	5	256	256	1,998	4,518	8	8	66	150
248	39	5	86	226	1,665	3,458	1	2	12	26
249	128	5	307	436	3,340	7,259	7	11	81	176
250	484	5	307	436	3,340	7,259	28	40	306	665
265	2,458	28	319	264	2,469	6,443	148	123	1,150	3,000
266	752	28	410	568	4,793	11,249	58	81	683	1,602
267	1,323	28	410	572	4,810	11,275	103	143	1,205	2,825
268	1,252	31	423	624	5,341	12,379	100	148	1,266	2,935
270	1,005	17	133	473	3,715	7,666	25	90	707	1,459
271	954	15	89	257	1,664	3,303	16	46	301	597
272	656	23	156	464	3,213	6,473	19	58	399	804
273	485	7	325	631	4,409	9,426	30	58	405	866
274	1,244	27	420	748	5,987	13,303	99	176	1,411	3,134
276	649	27	417	741	5,950	13,235	51	91	731	1,627
277	2,473	25	325	437	3,626	8,430	152	205	1,698	3,948
278	573	32	345	342	3,153	7,945	37	37	342	862
279	458	21	269	464	3,374	7,582	23	40	293	658
280	295	25	60	205	1,531	3,124	3	11	86	175
281	440	21	60	205	1,531	3,124	5	17	128	260
282	76	21	-	4	17	26	-	0	0	0
283	697	21	123	148	1,207	2,671	16	19	159	353
284	690	20	487	690	5,141	11,537	64	90	672	1,508
285	91	20	266	480	3,466	7,737	5	8	60	133
286	464	20	667	1,169	9,080	20,119	59	103	798	1,768

Table G-8 2018 Existing Conditions – Airport-Related Traffic, On-Airport Link Attributes, Traffic Assignment and Vehicle Miles Traveled (VMT) Summary (Continued)

Link Name	Link Distance (ft)	Link Speed (mph)	VOLUME				VMT			
			AM Peak	PM Peak	High 8-Hour	AWDT	AM Peak	PM Peak	High 8-Hour	AWDT
287	229	29	667	1,169	9,080	20,119	29	51	394	873
288	500	10	667	1,169	9,080	20,119	63	111	860	1,905
289	738	26	1,408	1,862	14,692	32,435	197	260	2,054	4,533
290	190	27	1,238	1,516	12,246	26,659	45	55	441	959
291	494	32	278	177	1,263	3,382	26	17	118	316
292	689	26	960	1,340	10,983	23,277	125	175	1,433	3,037
293	325	29	2,260	2,321	15,205	35,652	139	143	936	2,194
294	396	25	654	772	5,222	11,052	49	58	392	829
295	1,017	30	1,607	1,549	9,983	24,600	309	298	1,923	4,738
296	162	19	170	346	2,445	5,775	5	11	75	177
297	140	19	170	346	2,445	5,775	5	9	65	153
298	951	12	401	522	3,644	6,921	72	94	656	1,246
299	805	14	205	464	3,179	7,534	31	71	485	1,149
300	518	16	209	258	1,843	4,458	21	25	181	437
301	749	7	206	255	1,823	4,416	29	36	259	626
302	652	15	654	772	5,222	11,052	81	95	645	1,365
308	319	13	182	188	1,375	3,376	11	11	83	204
309	281	7	190	188	1,368	3,376	10	10	73	180
310	555	27	519	731	6,628	12,608	55	77	697	1,325
311	208	17	932	1,422	11,648	24,577	37	56	459	968
312	125	17	510	967	8,241	16,317	12	23	195	386
313	332	27	592	732	5,278	14,218	37	46	332	894
314	440	27	1,669	1,667	11,070	26,998	139	139	923	2,250
315	215	16	603	867	6,316	15,214	25	35	257	620
316	543	17	190	176	1,296	3,244	20	18	133	334
317	180	14	441	608	4,355	10,669	15	21	148	364
318	221	11	352	548	4,006	9,577	15	23	168	401
319	2,544	9	542	737	5,374	12,954	261	355	2,589	6,241
321	628	14	182	188	1,375	3,376	22	22	164	402
322	181	12	88	60	350	1,092	3	2	12	37
323	58	12	88	60	350	1,092	1	1	4	12
325	406	12	88	60	350	1,092	7	5	27	84
327	463	13	30	70	618	1,319	3	6	54	116
328	79	16	30	70	618	1,319	0	1	9	20

Table G-8 2018 Existing Conditions – Airport-Related Traffic, On-Airport Link Attributes, Traffic Assignment and Vehicle Miles Traveled (VMT) Summary (Continued)

Link Name	Link Distance (ft)	Link Speed (mph)	VOLUME				VMT			
			AM Peak	PM Peak	High 8-Hour	AWDT	AM Peak	PM Peak	High 8-Hour	AWDT
329	103	16	30	70	618	1,319	1	1	12	26
331	179	11	542	737	5,374	12,954	18	25	182	439
332	993	5	1,197	1,005	6,080	13,758	225	189	1,144	2,587
334	366	24	1,015	817	4,705	10,382	70	57	326	720
335	583	29	952	854	5,691	14,259	105	94	628	1,574
336	428	27	510	967	8,241	16,317	41	78	668	1,323
340	273	20	-	12	72	144	-	1	4	7
341	66	16	-	12	72	144	-	0	1	2
342	48	29	-	12	72	144	-	0	1	1
344	82	12	-	12	72	144	-	0	1	2
345	25	5	190	176	1,296	3,244	1	1	6	15
347	303	7	190	188	1,368	3,388	11	11	79	194
348	146	22	717	813	5,380	12,739	20	22	149	352
349	67	22	182	186	1,356	3,326	2	2	17	42
350	446	5	182	186	1,356	3,326	15	16	115	281
354	50	8	190	188	1,368	3,388	2	2	13	32
355	88	13	182	171	1,236	3,143	3	3	21	52
356	113	13	485	719	4,942	11,006	10	15	106	236
361	248	17	3	3	20	42	0	0	1	2
363	230	22	91	304	2,324	4,805	4	13	101	209
364	256	19	91	304	2,324	4,805	4	15	113	233
367	337	32	934	1,270	8,206	16,644	60	81	524	1,062
368	868	11	1,197	1,005	6,080	13,758	197	165	1,000	2,262
369	167	15	1,077	935	5,792	12,780	34	30	183	404
370	96	15	460	499	3,654	8,756	8	9	66	159
371	141	20	413	691	5,020	11,970	11	18	134	320
					Logan Airport VMT		**9,452**	**12,447**	**91,450**	**205,344**

Source: VHB.
Notes: AWDT = Average annual weekday daily traffic.

Table G-9 2019 Existing Conditions – Airport-Related Traffic, On-Airport Link Attributes, Traffic Assignment and Vehicle Miles Traveled (VMT) Summary

Link Name	Link Distance (ft)	Link Speed (mph)	VOLUME				VMT			
			AM Peak	PM Peak	High 8-Hour	AWDT	AM Peak	PM Peak	High 8-Hour	AWDT
1	344	27	1,146	1,361	9,810	21,423	75	89	639	1,396
2	496	29	760	772	5,594	14,456	71	72	525	1,358
3	1,347	20	503	705	5,102	12,196	128	180	1,302	3,111
4	1,166	27	1,068	1,478	10,535	23,994	236	326	2,326	5,299
5	378	24	1,571	2,184	15,637	36,190	112	156	1,119	2,591
6	441	31	780	636	4,683	12,385	65	53	391	1,034
7	896	23	791	1,548	10,954	23,805	134	263	1,859	4,040
8	644	27	1,821	1,876	13,670	31,162	222	229	1,667	3,801
9	1,214	26	602	565	4,303	9,908	138	130	989	2,278
10	1,303	25	1,231	1,348	9,663	21,861	304	333	2,385	5,395
11	421	24	85	256	1,733	4,717	7	20	138	376
12	236	31	68	239	1,460	2,705	3	11	65	121
13	1,311	31	122	450	2,898	5,347	30	112	720	1,328
14	750	26	1,906	2,133	15,403	35,879	271	303	2,188	5,096
15	441	23	1,541	2,459	18,334	42,769	129	205	1,531	3,572
16	1,724	23	22	56	434	880	7	18	142	287
17	644	19	183	644	4,160	9,116	22	79	507	1,112
18	354	26	1,219	1,311	9,367	21,254	82	88	628	1,425
19	687	15	12	37	296	607	2	5	39	79
20	94	15	94	270	1,841	3,685	2	5	33	66
27	187	5	22	56	434	880	1	2	15	31
28	124	6	22	56	434	880	1	1	10	21
29	226	31	134	591	3,715	8,323	6	25	159	356
30	1,070	5	134	591	3,715	8,314	27	120	753	1,685
31	385	32	134	591	3,715	8,323	10	43	271	607
34	181	23	134	591	3,715	8,314	5	20	127	285
35	248	26	134	591	3,715	8,314	6	28	174	391
36	89	21	134	591	3,715	8,314	2	10	63	140
50	353	33	91	237	1,629	3,052	6	16	109	204
51	717	26	91	237	1,629	3,052	12	32	221	415
52	403	33	77	242	1,943	3,834	6	19	148	293
54	612	32	77	242	1,943	3,834	9	28	225	444
55	194	26	135	425	2,907	5,711	5	16	107	210
60	331	26	149	489	3,356	6,717	9	31	210	421

Table G-9 2019 Existing Conditions – Airport-Related Traffic, On-Airport Link Attributes, Traffic Assignment and Vehicle Miles Traveled (VMT) Summary (Continued)

Link Name	Link Distance (ft)	Link Speed (mph)	VOLUME				VMT			
			AM Peak	PM Peak	High 8-Hour	AWDT	AM Peak	PM Peak	High 8-Hour	AWDT
61	224	9	18	84	583	1,305	1	4	25	55
62	218	24	194	238	1,745	4,149	8	10	72	171
64	232	5	178	163	1,224	2,982	8	7	54	131
65	593	26	325	643	4,519	9,561	37	72	507	1,074
66	465	25	225	394	3,000	6,015	20	35	264	530
90	582	6	121	430	3,221	6,492	13	47	355	716
107	260	20	26	20	153	461	1	1	8	23
108	389	24	88	99	749	1,835	7	7	55	135
109	114	27	38	184	1,280	2,491	1	4	28	54
110	169	28	38	184	1,280	2,491	1	6	41	80
112	237	30	38	184	1,280	2,491	2	8	57	112
113	565	17	225	394	3,000	6,015	24	42	321	644
114	609	32	257	251	1,881	4,484	30	29	217	517
115	451	29	14	10	73	230	1	1	6	20
116	399	22	305	287	2,154	5,238	23	22	163	396
117	283	22	49	36	273	754	3	2	15	40
118	295	29	14	10	73	230	1	1	4	13
119	240	12	53	46	351	789	2	2	16	36
120	365	30	102	82	624	1,543	7	6	43	107
121	356	17	14	10	73	230	1	1	5	16
122	486	16	14	32	233	595	1	3	21	55
123	486	18	40	25	188	534	4	2	17	49
126	631	20	26	20	153	461	3	2	18	55
127	652	24	88	99	749	1,835	11	12	92	227
128	257	32	40	25	188	534	2	1	9	26
129	257	18	14	32	233	595	1	2	11	29
132	361	23	51	82	624	1,409	4	6	43	96
133	236	27	88	99	749	1,835	4	4	33	82
134	1,521	30	140	456	2,943	5,508	40	131	848	1,587
135	1,542	27	80	85	641	1,535	23	25	187	448
139	96	14	25	62	471	948	0	1	9	17
140	295	27	243	236	1,863	4,483	14	13	104	250
142	257	29	257	539	3,593	7,010	13	26	175	341
144	518	9	206	217	1,647	4,249	20	21	162	417

Table G-9 2019 Existing Conditions – Airport-Related Traffic, On-Airport Link Attributes, Traffic Assignment and Vehicle Miles Traveled (VMT) Summary (Continued)

Link Name	Link Distance (ft)	Link Speed (mph)	VOLUME				VMT			
			AM Peak	PM Peak	High 8-Hour	AWDT	AM Peak	PM Peak	High 8-Hour	AWDT
145	195	22	67	90	635	1,342	2	3	23	50
146	463	22	60	60	430	988	5	5	38	87
147	230	22	252	285	2,220	5,706	11	12	97	249
148	794	22	46	68	573	1,457	7	10	86	219
149	661	21	20	90	614	1,270	3	11	77	159
150	281	21	25	122	799	1,638	1	7	43	87
151	360	21	23	118	761	1,565	2	8	52	107
153	66	31	1	5	39	73	0	0	0	1
154	173	33	8	34	243	426	0	1	8	14
155	258	30	191	227	1,863	5,575	9	11	91	272
156	645	26	190	217	1,744	4,627	23	27	213	565
157	218	22	0	10	120	948	0	0	5	39
158	185	24	332	644	4,029	7,687	12	23	141	269
159	354	17	332	655	4,148	8,635	22	44	278	579
160	470	28	6	41	246	486	1	4	22	43
161	94	15	197	258	1,990	5,113	3	5	35	91
162	50	15	6	37	222	438	0	0	2	4
163	66	15	191	221	1,768	4,675	2	3	22	58
164	367	33	13	57	407	708	1	4	28	49
168	380	15	6	39	235	463	0	3	17	33
169	293	12	6	39	235	463	0	2	13	26
174	502	10	251	486	2,884	4,814	24	46	274	458
175	640	9	353	342	2,683	8,063	43	41	325	977
176	319	22	935	1,595	11,130	25,576	56	96	672	1,545
177	286	22	1,575	1,568	10,906	25,539	85	85	591	1,383
178	353	18	684	1,109	8,246	20,761	46	74	551	1,388
179	348	32	1,222	1,226	8,223	17,475	81	81	542	1,152
180	366	18	938	1,315	10,527	23,192	65	91	730	1,608
181	453	8	198	185	1,398	3,418	17	16	120	293
182	119	8	198	185	1,398	3,418	4	4	32	77
183	50	8	198	185	1,398	3,418	2	2	13	32
184	54	8	198	185	1,398	3,418	2	2	14	35
185	62	8	432	589	3,703	7,235	5	7	43	85
186	39	8	233	404	2,306	3,817	2	3	17	28

Table G-9 2019 Existing Conditions – Airport-Related Traffic, On-Airport Link Attributes, Traffic Assignment and Vehicle Miles Traveled (VMT) Summary (Continued)

Link Name	Link Distance (ft)	Link Speed (mph)	VOLUME				VMT			
			AM Peak	PM Peak	High 8-Hour	AWDT	AM Peak	PM Peak	High 8-Hour	AWDT
193	138	9	353	342	2,683	8,063	9	9	70	211
194	932	21	353	342	2,683	8,063	62	60	474	1,423
195	79	10	6	39	235	463	0	1	4	7
196	49	10	18	82	578	998	0	1	5	9
197	83	5	24	121	813	1,460	0	2	13	23
198	692	5	12	68	439	816	2	9	58	107
199	70	27	12	68	439	816	0	1	6	11
204	2,022	8	432	589	3,703	7,235	165	225	1,418	2,771
205	71	26	321	584	3,675	6,829	4	8	49	92
206	142	26	324	615	3,825	7,257	9	17	103	195
207	859	33	87	246	1,865	4,248	14	40	303	691
208	284	32	236	153	1,174	3,006	13	8	63	162
209	80	18	609	878	7,127	15,708	9	13	108	238
210	71	11	609	878	7,127	15,708	8	12	96	211
211	390	18	845	1,030	8,301	18,714	62	76	613	1,382
212	117	18	609	878	7,127	15,708	14	19	158	348
213	1,344	22	1,622	2,424	18,773	43,953	413	617	4,778	11,188
214	449	32	1,309	1,472	10,087	21,723	111	125	858	1,847
215	1,110	32	1	26	303	2,391	0	5	64	503
216	905	32	779	610	4,380	9,994	134	105	751	1,713
217	1,050	32	168	650	4,147	7,792	33	129	825	1,549
218	581	25	750	911	7,380	18,964	83	100	812	2,087
219	1,063	32	379	241	1,799	4,546	76	49	362	915
220	415	32	632	472	3,623	8,878	50	37	285	698
221	698	33	253	231	1,824	4,332	33	30	241	573
222	1,920	29	50	54	382	924	18	20	139	336
223	1,564	28	1,129	1,152	9,179	23,511	334	341	2,719	6,964
224	377	29	143	360	2,523	4,879	10	26	180	348
225	551	29	123	328	2,302	4,328	13	34	240	452
226	788	33	20	32	222	551	3	5	33	82
227	1,303	33	223	208	1,664	3,959	55	51	411	977
228	580	30	1,537	1,169	8,739	20,807	169	128	960	2,286
229	1,653	31	340	293	2,431	6,115	106	92	761	1,914
230	2,058	29	1,196	876	6,308	14,693	466	341	2,459	5,727

Table G-9 2019 Existing Conditions – Airport-Related Traffic, On-Airport Link Attributes, Traffic Assignment and Vehicle Miles Traveled (VMT) Summary (Continued)

Link Name	Link Distance (ft)	Link Speed (mph)	VOLUME				VMT			
			AM Peak	PM Peak	High 8-Hour	AWDT	AM Peak	PM Peak	High 8-Hour	AWDT
231	1,300	20	189	903	5,778	12,593	47	222	1,423	3,100
232	736	26	563	501	4,095	10,073	79	70	571	1,404
233	488	28	1,247	930	6,690	15,616	115	86	618	1,443
234	449	28	446	587	5,101	12,352	38	50	434	1,050
235	310	14	355	502	4,422	10,737	21	29	260	630
236	310	11	91	85	679	1,616	5	5	40	95
237	105	5	121	322	2,252	4,217	2	6	45	84
239	186	22	61	197	1,503	2,922	2	7	53	103
240	145	10	331	409	2,898	6,880	9	11	80	189
241	578	10	328	437	3,400	7,483	36	48	372	819
246	175	5	274	262	2,046	4,883	9	9	68	162
248	39	5	91	219	1,663	3,295	1	2	12	24
249	128	5	328	437	3,400	7,483	8	11	82	181
250	484	5	328	437	3,400	7,483	30	40	312	686
265	2,458	28	246	342	2,368	6,121	115	159	1,102	2,849
266	752	28	309	623	4,330	10,507	44	89	617	1,497
267	1,323	28	309	627	4,347	10,533	77	157	1,089	2,639
268	1,252	31	321	743	4,976	11,603	76	176	1,180	2,751
270	1,005	17	113	566	3,754	7,777	21	108	715	1,480
271	954	15	97	276	1,878	3,753	18	50	339	678
272	656	23	187	573	4,080	8,192	23	71	507	1,018
273	485	7	364	727	5,242	11,037	33	67	482	1,014
274	1,244	27	398	727	5,966	13,670	94	171	1,406	3,221
276	649	27	395	721	5,929	13,602	49	89	729	1,672
277	2,473	25	332	440	3,967	9,216	156	206	1,858	4,316
278	573	32	275	430	3,124	7,765	30	47	339	843
279	458	21	283	456	3,518	7,977	25	40	305	692
280	295	25	68	230	1,723	3,378	4	13	96	189
281	440	21	68	230	1,723	3,378	6	19	144	281
282	76	21	-	4	17	26	-	0	0	0
283	697	21	138	158	1,256	2,926	18	21	166	386
284	690	20	481	664	4,900	11,551	63	87	640	1,510
285	91	20	244	446	3,163	7,362	4	8	55	127
286	464	20	652	1,213	9,370	21,200	57	107	823	1,863

Table G-9 2019 Existing Conditions – Airport-Related Traffic, On-Airport Link Attributes, Traffic Assignment and Vehicle Miles Traveled (VMT) Summary (Continued)

Link Name	Link Distance (ft)	Link Speed (mph)	VOLUME				VMT			
			AM Peak	PM Peak	High 8-Hour	AWDT	AM Peak	PM Peak	High 8-Hour	AWDT
287	229	29	652	1,213	9,370	21,200	28	53	406	919
288	500	10	652	1,213	9,370	21,200	62	115	887	2,008
289	738	26	1,354	1,969	14,176	32,575	189	275	1,981	4,553
290	190	27	1,205	1,680	11,545	26,571	43	60	415	956
291	494	32	236	153	1,174	3,006	22	14	110	281
292	689	26	969	1,527	10,371	23,565	126	199	1,353	3,075
293	325	29	2,478	2,278	16,353	37,477	153	140	1,007	2,307
294	396	25	714	757	5,734	11,857	54	57	430	889
295	1,017	30	1,764	1,520	10,619	25,620	340	293	2,045	4,935
296	162	19	150	289	2,631	6,004	5	9	81	184
297	140	19	150	289	2,631	6,004	4	8	70	159
298	951	12	441	532	3,860	7,539	80	96	695	1,358
299	805	14	168	345	3,267	8,170	26	53	498	1,246
300	518	16	215	226	1,795	4,599	21	22	176	451
301	749	7	212	224	1,775	4,557	30	32	252	647
302	652	15	714	757	5,734	11,857	88	94	708	1,464
308	319	13	190	185	1,400	3,406	11	11	85	206
309	281	7	198	185	1,398	3,406	11	10	74	181
310	555	27	745	966	6,202	13,328	78	101	652	1,401
311	208	17	930	1,586	10,965	25,036	37	62	432	986
312	125	17	436	1,106	7,648	16,522	10	26	181	391
313	332	27	883	773	5,762	15,099	56	49	362	949
314	440	27	1,891	1,644	11,464	27,513	158	137	955	2,293
315	215	16	383	793	6,077	14,982	16	32	247	610
316	543	17	198	173	1,314	3,274	20	18	135	337
317	180	14	224	561	4,169	10,237	8	19	142	349
318	221	11	168	528	3,902	9,433	7	22	163	395
319	2,544	9	366	713	5,299	12,839	176	344	2,553	6,186
321	628	14	190	185	1,400	3,406	23	22	166	405
322	181	12	56	33	267	803	2	1	9	28
323	58	12	56	33	267	803	1	0	3	9
325	406	12	56	33	267	803	4	3	21	62
327	463	13	16	60	499	1,102	1	5	44	97
328	79	16	16	60	499	1,102	0	1	7	16

Table G-9 2019 Existing Conditions – Airport-Related Traffic, On-Airport Link Attributes, Traffic Assignment and Vehicle Miles Traveled (VMT) Summary (Continued)

Link Name	Link Distance (ft)	Link Speed (mph)	VOLUME				VMT			
			AM Peak	PM Peak	High 8-Hour	AWDT	AM Peak	PM Peak	High 8-Hour	AWDT
329	103	16	16	60	499	1,102	0	1	10	21
331	179	11	366	713	5,299	12,839	12	24	180	435
332	993	5	1,072	932	6,257	13,926	202	175	1,177	2,619
334	366	24	881	748	4,857	10,520	61	52	337	729
335	583	29	980	862	5,738	13,948	108	95	634	1,540
336	428	27	436	1,106	7,648	16,522	35	90	620	1,339
340	273	20	-	12	84	144	-	1	4	7
341	66	16	-	12	84	144	-	0	1	2
342	48	29	-	12	84	144	-	0	1	1
344	82	12	-	12	84	144	-	0	1	2
345	25	5	198	173	1,314	3,274	1	1	6	16
347	303	7	198	185	1,398	3,418	11	11	80	196
348	146	22	911	782	5,726	13,565	25	22	158	375
349	67	22	190	183	1,384	3,356	2	2	18	43
350	446	5	190	183	1,384	3,356	16	15	117	283
354	50	8	198	185	1,398	3,418	2	2	13	32
355	88	13	190	168	1,264	3,173	3	3	21	53
356	113	13	595	690	5,048	11,407	13	15	108	244
361	248	17	3	2	20	42	0	0	1	2
363	230	22	63	281	1,962	4,387	3	12	85	191
364	256	19	63	281	1,962	4,387	3	14	95	213
367	337	32	929	1,165	7,849	16,323	59	74	501	1,042
368	868	11	1,072	932	6,257	13,926	176	153	1,029	2,289
369	167	15	1,008	872	5,702	12,413	32	28	180	393
370	96	15	499	489	3,482	9,054	9	9	63	165
371	141	20	185	621	4,764	11,708	5	17	127	313
					Logan Airport VMT		**9,477**	**12,577**	**91,336**	**209,900**

Source: VHB.
Notes: AWDT = Average annual weekday daily traffic.

VISSIM 2011 logan network map	Project: 2011 Logan Network
File: 2011 logan network map.inp	Scenario: Network Map
Simulation Time: 0.0	

NSA/NCA

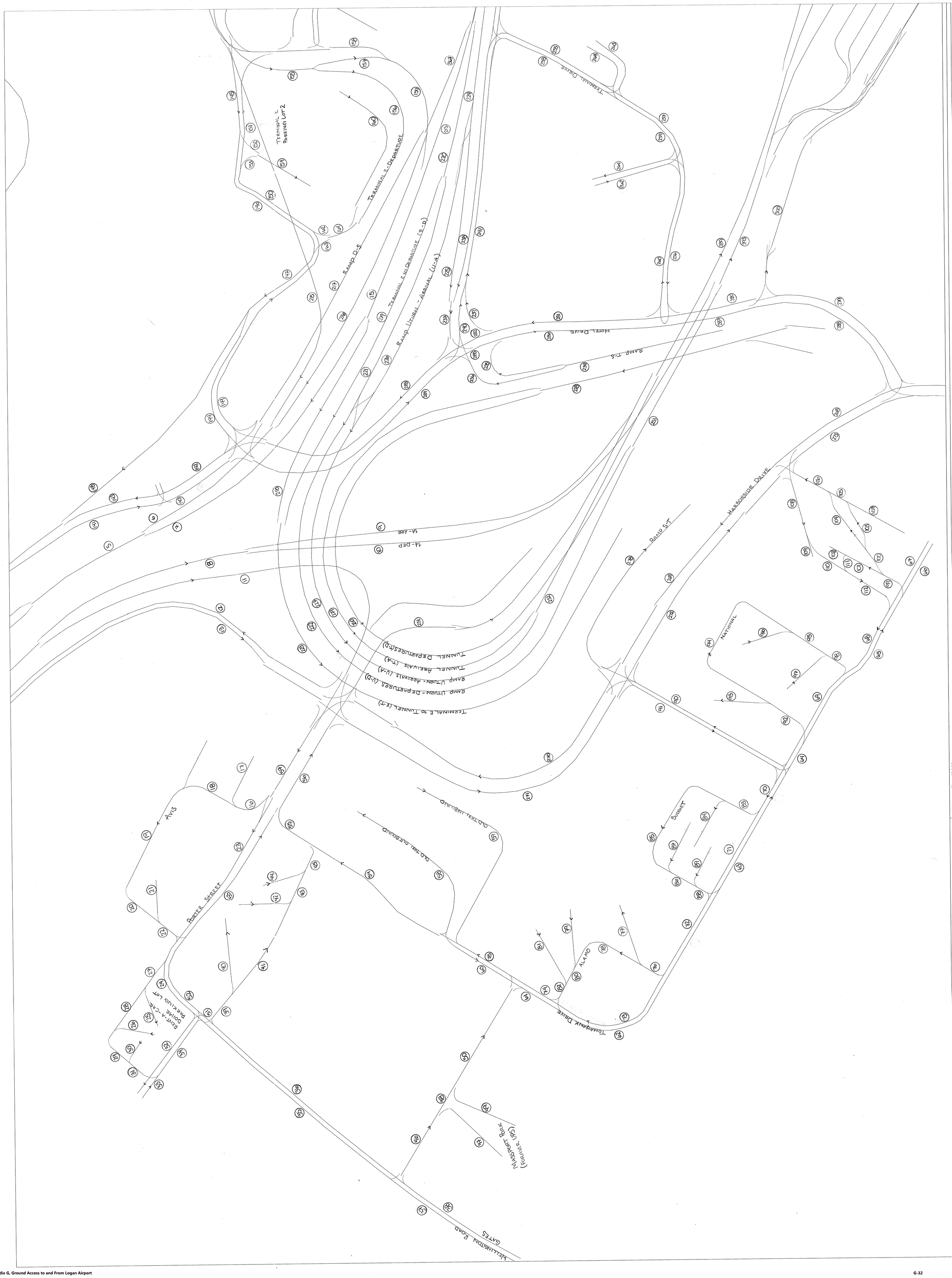
VISSIM Logan printable version
File: logan printable version.inp
Simulation Time: 0 h

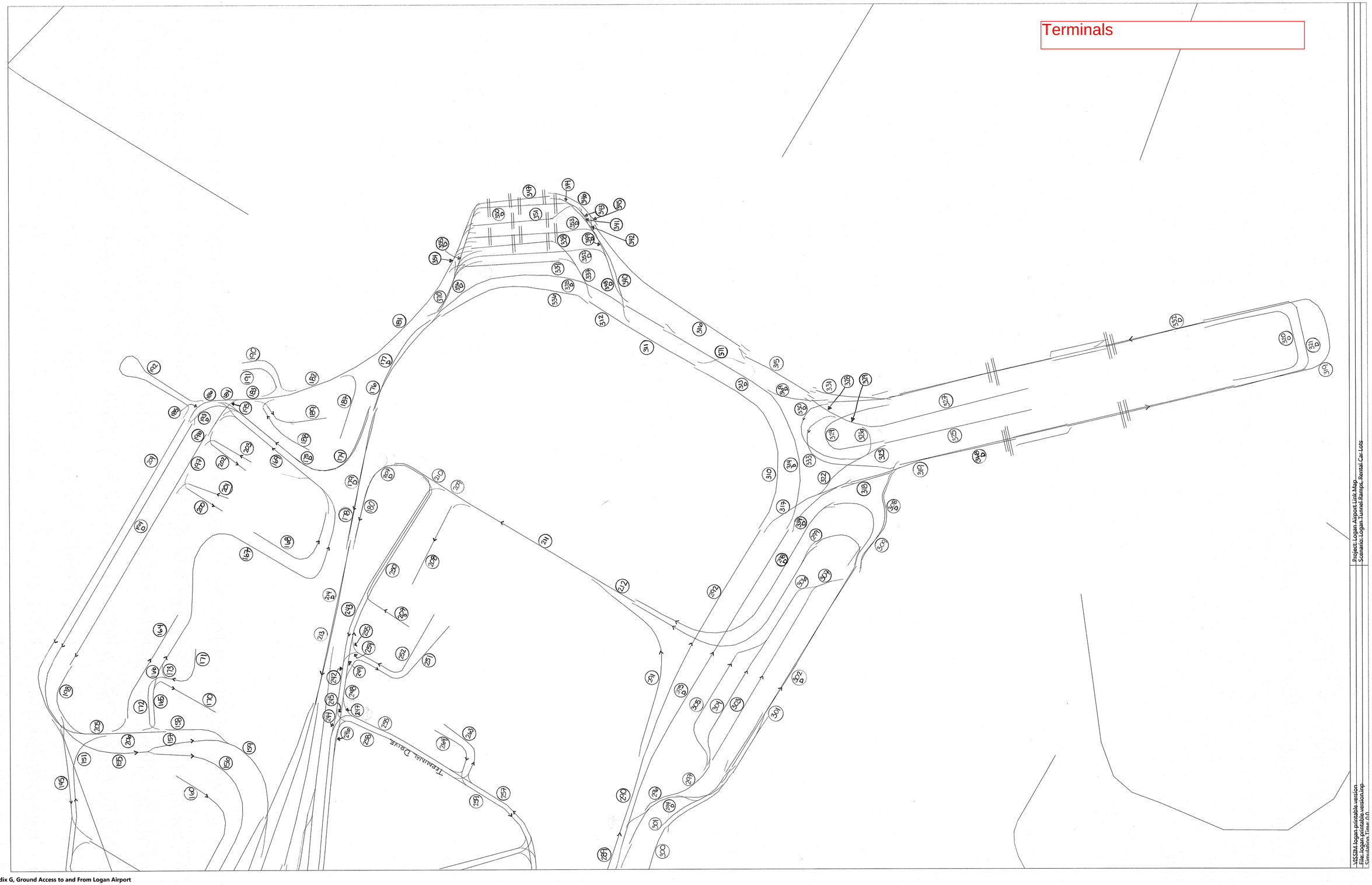
Project: Logan Airport Link Map
Scenario: Logan North, North Cargo Area

SCT 18
RT 14-18
RT 14-08
SCT 08
ECONOMY BUS DRIVEWAY
COTTAGE STREET
SERVICE ROAD
RAMP 14-38
ECONOMY PRIMARY DRIVE
BOSCOM STREET
LOVELL
FRANKFORT STREET


SCA
Project: Logan Airport Map Link
Scenario: Harborside Drive
VISSIM logan printable version
File: logan printable version.inp
Simulation Time: 0.0

SWSA/Service Roadways




Terminals
Terminal Drive
VISSIM Logan printable version
File: Logan_Printable_Version.inp
Simulated Time: 4H
Project: Logan Airport Link Map
Scenario: Logan Tunnel Ramps_Rental Car Lots

Massachusetts Port Authority
One Harborside Drive, Suite 200-S
East Boston, MA 02128-2909
Telephone: 617-568-5000
www.massport.com

March 15, 2018

Christine Kirby, Director, Air & Climate Division
Massachusetts Department of Environmental Protection
Bureau of Air & Waste
One Winter Street
Boston, MA 02108

Re: Logan Airport Parking Space Inventory

Dear Ms. Kirby:

In compliance with the reporting requirements of 310 CMR 7.30(3)(a), enclosed please find the following Massachusetts Port Authority (Massport) submissions for Logan Airport (the Airport):

- Commercial Parking Space Inventory;
- Employee Parking Space Inventory; and
- Location Map.

The attachments provide the quantity, physical distribution, and allocation of commercial and employee parking spaces on the Airport, as defined by 310 CMR 7.30, as amended, effective as of June 30, 2017. These inventory tables represent information provided by the Aviation Department and are supported by comprehensive field checks and counts conducted in March, 2018.

The Revised Logan Airport Parking Space Inventory reflects the 310 CMR 7.30, as amended, and effective on June 30, 2017. Accordingly, the Commercial Parking Space Inventory totals 23,640 parking spaces; the Employee Parking Space Inventory totals 2,448 parking spaces; and the total inventory of parking spaces at the Airport is 26,088. Additionally, for your information, we continue to provide information on rental car parking spaces, also attached.

The attached Logan Airport Parking Space Inventory reflects Massport's successful management of its parking program, within the requirements of 310 CMR 7.30, as amended.

If you have any questions, please call me at 617-568-3689.

Sincerely,

Hayes Morrison
Deputy Director - Maritime, Land Use, and
Transportation Planning
Strategic & Business Planning Department

cc: D. Conroy, EPA
L. Gilmore, MPA
S. Dalzell, MPA
M. Kalowski, MPA

Commercial Parking Space Inventory
Logan International Airport
March 2018 Submission

Commercial Parking Spaces

Old Map ID#	Map ID#	Location of Commercial Parking Areas	Mar-18 Number of Spaces
		Terminal Area and Economy Spaces	
C1a	C1	Central Garage	7179
C1b	C2	West Garage	3076
		West Garage Expansion	1699
C2	C3	Terminal B Garage	2212
C8a	C5	Terminal E Lot 1	237
C8b	C6	Terminal E Lot 2	249
C9	C7	Terminal E Lot 3 (fka "Gulf Station" Lot)	217
	C12	Blue Lot	367
C6	C8	Economy Garage	2864
		subtotal	18100
		Overflow Commercial Spaces	
	C11	Red Lot (Tomahawk Dr.)	
	C13	Green Lot (Wood Island)	
		subtotal	0
		Hotel Spaces	
C4	C4a ~~& C4b~~	Logan Airport Hilton Hotel (one lot)	235
C7a	C10	Harborside Hyatt Conference Center	270
		subtotal	505
		General Aviation Spaces	
C5	C9	Signature (General Aviation Terminal)	35
		subtotal	35

Total In-Service Commercial Parking Spaces	**18,640**
Total Designated Commercial Parking Spaces	**23,640**
Total Commercial Parking Spaces	**23,640**
Total Employee Parking Spaces *(see table on next page)*	**2,448**
TOTAL PARKING FREEZE SPACES	**26,088**

Employee Parking Space Inventory
Logan International Airport
March 2018 Submission

Employee Parking Spaces

Area		Map ID#	Location of Employee Parking Areas	Mar-18 Number of Spaces
Terminal	Terminal Area	E81	West Garage	98
Terminal		E26	Airport Tower/Administration (parking in Central Garage)	521
Terminal		E20	Terminal C Pier A (Old Terminal D) (two lots)	122
Terminal		E18	Massport Facilities 1 (Heating Plant)	92
Terminal		E34	Hilton Hotel employee lot	28
Terminal		E86	Gulf Gas Station	4
North	North Service Area	E68a	LSG Sky Chefs (Bldg. 68), main lot	25
North		E68b	LSG Sky Chefs (Bldg. 68), overflow lot	126
North		E1	Flight Kitchen Building 1 (and nearby lot)	80
North		E40	Lovell Street Lot (contractor trailer)	25
North		E53	Green Bus Depot (Bus Maintenance Facility)	12
North		E11a	North Cargo Building 11, TSA lot	93
North		E11b	North Cargo Building 11, State Police lot	136
North		E43	North Gate & EMS Trailer (EMS Station A7)	21
North		E8	North Cargo Building 8	114
North		E5	US Airways Administration/Hangar (Bldg. 5)	75
airside		*N/A*	Massport Facilities 2 (airside, Bldg. 3)	0
North		E4	Massport Facilities 3 (landside, Bldg. 4)	69
North		E13	UPS (Cargo Building 13)	44
North		E94	United Aircraft Maintenance (Buildings 93 & 94)	56
SW	SWSA	E59	Bus/Limo Pool Lot	4
SW		E60	Rental Car Center (Customer Service Center)	4
SW		E72	Taxi Pool Lot	8
South	South Service Area	E84	Bird Island Flats / Logan Office Center (LOC) Garage	416
South		E63	South Cargo Building 63	16
South		E62	South Cargo Building 62	43
South		E58	South Cargo Building 58	23
South		E57	South Cargo Building 57	44
South		E56	South Cargo Building 56	39
South		E78	Fire-Rescue HQ & Amelia Earhart Terminal/Hangar	84
airside		*N/A*	*ARFF Satellite Station* [1]	0

[1] This facility is located on the airfield and is not shown in the map. No employee parking spaces are provided.

Total In-Service Employee Parking Spaces	**2,422**
Total Designated Employee Parking Spaces	**26**
Total Employee Parking Spaces	**2,448**
Total Commercial Parking Spaces *(see table on previous page)*	**23,640**
TOTAL PARKING SPACES	**26,088**
TOTAL PARKING FREEZE SPACES	26,088

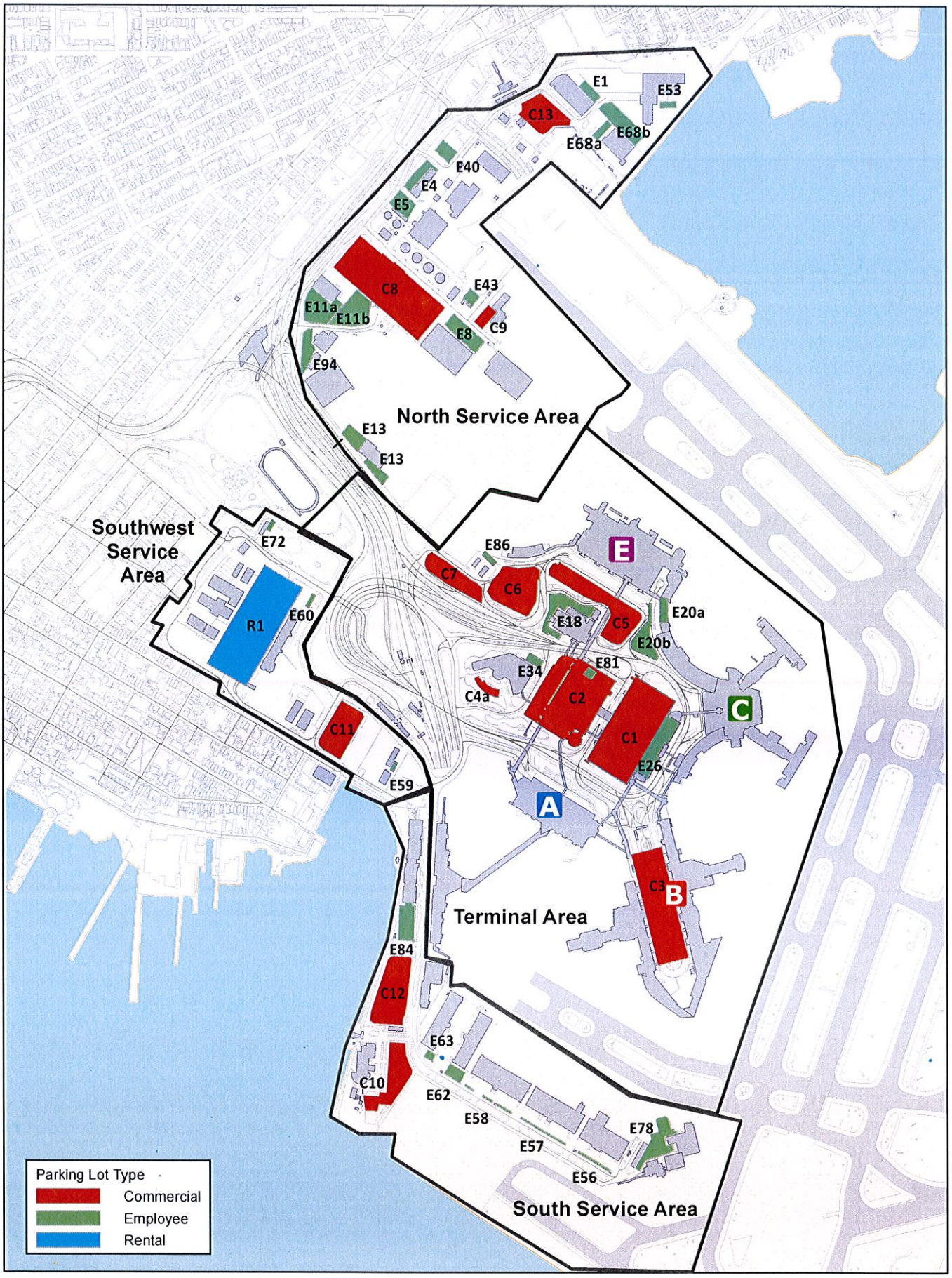
SUMMARY

TOTAL COMMERCIAL PARKING SPACES	***23,640***
TOTAL EMPLOYEE PARKING SPACES	***2,448***
TOTAL PARKING FREEZE SPACES	***26,088***

For Information Only:
Rental Car Spaces Inventory
Logan International Airport
March 2018 Submission

Rental Car Company Parking Spaces

Map ID#		Number of Spaces
R1	Rental Car Center (RCC)	5,020
Total Rental Car Spaces		**5,020**



Massachusetts Port Authority
Strategic and Business Planning
September 2016

N

0 0.075 0.15 0.3 Miles

Logan Airport Parking Space Inventory

Projection: Lambert Conformal Conic **Coordinate System:** NAD 1983 State Plane Massachusetts Mainland FIPS 2001 (Meter)

Massachusetts Port Authority
One Harborside Drive, Suite 200-S
East Boston, MA 02128-2909
Telephone: 617-568-5000
www.massport.com

September 18, 2018

Christine Kirby, Director, Air & Climate Division
Massachusetts Department of Environmental Protection
Bureau of Air & Waste
One Winter Street
Boston, MA 02108

Re: Logan Airport Parking Space Inventory

Dear Ms. Kirby:

In compliance with the reporting requirements of 310 CMR 7.30(3)(a), enclosed please find the Massachusetts Port Authority (Massport) submissions for the Logan Airport (the Airport) Parking Space Inventory:

- Commercial Parking Space Inventory;
- Employee Parking Space Inventory; and
- Location Map.

The attachments provide the quantity, physical distribution, and allocation of commercial and employee parking spaces on the Airport, as defined by 310 CMR 7.30, as amended, effective as of June 30, 2017. These inventory tables represent information provided by the Aviation Department and are supported by comprehensive field checks and counts conducted in September, 2018.

The Commercial Parking Space Inventory totals 23,640 parking spaces; the Employee Parking Space Inventory totals 2,448 parking spaces; and the total inventory of parking spaces at the Airport is 26,088. The in-service commercial parking spaces total 18,273 and the in-service employee parking spaces total 2,448 spaces. The current supply of in-service commercial spaces has been reduced by closing of the 367 space Blue Lot for construction of a relocated taxi pool. Additionally, for your information, we continue to provide information on rental car parking spaces, also attached.

The attached Logan Airport Parking Space Inventory reflects Massport's successful management of its parking program, within the requirements of 310 CMR 7.30, as amended.

If you have any questions, please call me at 617-568-3689.

Sincerely,

Hayes Morrison
Deputy Director - Maritime, Land Use, and
Transportation Planning
Strategic & Business Planning Department

cc: D. Conroy, EPA
L. Gilmore, MPA
S. Dalzell, MPA
M. Kalowski, MPA

Commercial Parking Spaces

Old Map ID#	Map ID#	Location of Commercial Parking Areas	Sep-18 Number of Spaces
		Terminal Area and Economy Spaces	
C1a	C1	Central Garage	7179
C1b	C2	West Garage	3076
		West Garage Expansion	1699
C2	C3	Terminal B Garage	2212
C8a	C5	Terminal E Lot 1	237
C8b	C6	Terminal E Lot 2	249
C9	C7	Terminal E Lot 3 (fka "Gulf Station" Lot)	217
	C12	Blue Lot	0
C6	C8	Economy Garage	2864
		subtotal	17733
		Overflow Commercial Spaces	
	C11	Red Lot (Tomahawk Dr.)	
	C13	Green Lot (Wood Island)	
		subtotal	0
		Hotel Spaces	
C4	C4a ~~& C4b~~	Logan Airport Hilton Hotel (one lot)	235
C7a	C10	Harborside Hyatt Conference Center	270
		subtotal	505
		General Aviation Spaces	
C5	C9	Signature (General Aviation Terminal)	35
		subtotal	35
	Total In-Service Commercial Parking Spaces		**18,273**
	Total Designated Commercial Parking Spaces		**5,367**
	Total Commercial Parking Spaces		**23,640**
	Total Employee Parking Spaces *(see table on next page)*		**2,448**
	TOTAL PARKING FREEZE SPACES		**26,088**

Employee Parking Spaces

Sep-18

Area		Map ID#	Location of Employee Parking Areas	Number of Spaces
Terminal	Terminal Area	E81	West Garage	98
Terminal		E26	Airport Tower/Administration (parking in Central Garage)	521
Terminal		E20	Terminal C Pier A (Old Terminal D) (two lots)	122
Terminal		E18	Massport Facilities 1 (Heating Plant)	92
Terminal		E34	Hilton Hotel employee lot	28
Terminal		E86	Gulf Gas Station	4
North	North Service Area	E68a	LSG Sky Chefs (Bldg. 68), main lot	25
North		E68b	LSG Sky Chefs (Bldg. 68), overflow lot	126
North		E1	Flight Kitchen Building 1 (and nearby lot)	80
North		E40	Lovell Street Lot (contractor trailer)	25
North		E53	Green Bus Depot (Bus Maintenance Facility)	12
North		E11a	North Cargo Building 11, TSA lot	93
North		E11b	North Cargo Building 11, State Police lot	136
North		E43	North Gate & EMS Trailer (EMS Station A7)	21
North		E8	North Cargo Building 8	114
North		E5	US Airways Administration/Hangar (Bldg. 5)	75
airside		*N/A*	Massport Facilities 2 (airside, Bldg. 3)	0
North		E4	Massport Facilities 3 (landside, Bldg. 4)	69
North		E13	UPS (Cargo Building 13)	44
North		E94	United Aircraft Maintenance (Buildings 93 & 94)	56
SW	SWSA	E59	Bus/Limo Pool Lot	4
SW		E60	Rental Car Center (Customer Service Center)	4
SW		E72	Taxi Pool Lot	8
South	South Service Area	E84	Bird Island Flats / Logan Office Center (LOC) Garage	416
South		E63	South Cargo Building 63	16
South		E62	South Cargo Building 62	43
South		E58	South Cargo Building 58	23
South		E57	South Cargo Building 57	44
South		E56	South Cargo Building 56	39
South		E78	Fire-Rescue HQ & Amelia Earhart Terminal/Hangar	84
airside		*N/A*	*ARFF Satellite Station* [1]	0

[1] This facility is located on the airfield and is not shown in the map. No employee parking spaces are provided.

Total In-Service Employee Parking Spaces	**2,422**
Total Designated Employee Parking Spaces	**26**
Total Employee Parking Spaces	**2,448**
Total Commercial Parking Spaces *(see table on previous page)*	**23,640**
TOTAL PARKING SPACES	**26,088**
TOTAL PARKING FREEZE SPACES	**26,088**

SUMMARY

TOTAL COMMERCIAL PARKING SPACES	***23,640***
TOTAL EMPLOYEE PARKING SPACES	***2,448***
TOTAL PARKING FREEZE SPACES	***26,088***

Rental Car Company Parking Spaces

Map ID#		Number of Spaces
R1	Rental Car Center (RCC)	5,020
Total Rental Car Spaces		**5,020**

Massachusetts Port Authority
One Harborside Drive, Suite 200-S
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March 28, 2019

Christine Kirby, Director, Air & Climate Division
Massachusetts Department of Environmental Protection
Bureau of Air & Waste
One Winter Street
Boston, MA 02108

Re: Logan Airport Parking Space Inventory

Dear Ms. Kirby:

In compliance with the reporting requirements of 310 CMR 7.30(3)(a), enclosed please find the Massachusetts Port Authority (Massport) submissions for the Logan Airport (the Airport) Parking Space Inventory:

- Commercial Parking Space Inventory;
- Employee Parking Space Inventory; and
- Location Map.

The attachments provide the quantity, physical distribution, and allocation of commercial and employee parking spaces on the Airport, as defined by 310 CMR 7.30, as amended, effective as of June 30, 2017. These inventory tables represent information provided by the Aviation Department and are supported by comprehensive field checks and counts conducted in March, 2019.

The Commercial Parking Space Inventory totals 23,640 parking spaces; the Employee Parking Space Inventory totals 2,448 parking spaces; and the total inventory of parking spaces at the Airport is 26,088. The in-service commercial parking spaces total 18,273 and the in-service employee parking spaces total 2,448 spaces. There were no changes to the parking inventory between our last report in September 2018 and this current inventory. Additionally, for your information, we continue to provide information on rental car parking spaces, also attached.

The attached Logan Airport Parking Space Inventory reflects Massport's successful management of its parking program, within the requirements of 310 CMR 7.30, as amended.

If you have any questions, please call me at 617-568-3689.

Sincerely,

Hayes Morrison
Deputy Director - Maritime, Land Use, and Transportation Planning
Strategic & Business Planning Department

cc: D. Conroy, EPA
L. Gilmore, MPA
S. Dalzell, MPA
C. McDonald, MPA

Commercial Parking Space Inventory
Logan International Airport
March 2019 Submission

Commercial Parking Spaces

Old Map ID#	Map ID#	Location of Commercial Parking Areas	Mar-19 Number of Spaces
		Terminal Area and Economy Spaces	
C1a	C1	Central Garage	7179
C1b	C2	West Garage	3076
		West Garage Expansion	1699
C2	C3	Terminal B Garage	2212
C8a	C5	Terminal E Lot 1	237
C8b	C6	Terminal E Lot 2	249
C9	C7	Terminal E Lot 3 (fka "Gulf Station" Lot)	217
	C12	Blue Lot	0
C6	C8	Economy Garage	2864
		subtotal	17733
		Overflow Commercial Spaces	
	C11	Red Lot (Tomahawk Dr.)	
	C13	Green Lot (Wood Island)	
		subtotal	0
		Hotel Spaces	
C4	C4a ~~& C4b~~	Logan Airport Hilton Hotel (one lot)	235
C7a	C10	Harborside Hyatt Conference Center	270
		subtotal	505
		General Aviation Spaces	
C5	C9	Signature (General Aviation Terminal)	35
		subtotal	35
		Total In-Service Commercial Parking Spaces	**18,273**
		Total Designated Commercial Parking Spaces	**5,367**
		Total Commercial Parking Spaces	**23,640**
		Total Employee Parking Spaces *(see table on next page)*	**2,448**
		TOTAL PARKING FREEZE SPACES	**26,088**

Employee Parking Space Inventory
Logan International Airport
March 2019 Submission

Employee Parking Spaces

Area		Map ID#	Location of Employee Parking Areas	Mar-19 Number of Spaces
Terminal	Terminal Area	E81	West Garage	98
Terminal		E26	Airport Tower/Administration (parking in Central Garage)	521
Terminal		E20	Terminal C Pier A (Old Terminal D) (two lots)	122
Terminal		E18	Massport Facilities 1 (Heating Plant)	92
Terminal		E34	Hilton Hotel employee lot	28
Terminal		E86	Gulf Gas Station	4
North	North Service Area	E68a	LSG Sky Chefs (Bldg. 68), main lot	25
North		E68b	LSG Sky Chefs (Bldg. 68), overflow lot	126
North		E1	Flight Kitchen Building 1 (and nearby lot)	80
North		E40	Lovell Street Lot (contractor trailer)	25
North		E53	Green Bus Depot (Bus Maintenance Facility)	12
North		E11a	North Cargo Building 11, TSA lot	93
North		E11b	North Cargo Building 11, State Police lot	136
North		E43	North Gate & EMS Trailer (EMS Station A7)	21
North		E8	North Cargo Building 8	114
North		E5	US Airways Administration/Hangar (Bldg. 5)	75
airside		*N/A*	Massport Facilities 2 (airside, Bldg. 3)	0
North		E4	Massport Facilities 3 (landside, Bldg. 4)	69
North		E13	UPS (Cargo Building 13)	44
North		E94	United Aircraft Maintenance (Buildings 93 & 94)	56
SW	SWSA	E59	Bus/Limo Pool Lot	4
SW		E60	Rental Car Center (Customer Service Center)	4
SW		E72	Taxi Pool Lot	8
South	South Service Area	E84	Bird Island Flats / Logan Office Center (LOC) Garage	416
South		E63	South Cargo Building 63	16
South		E62	South Cargo Building 62	43
South		E58	South Cargo Building 58	23
South		E57	South Cargo Building 57	44
South		E56	South Cargo Building 56	39
South		E78	Fire-Rescue HQ & Amelia Earhart Terminal/Hangar	84
airside		*N/A*	*ARFF Satellite Station* [1]	0

[1] This facility is located on the airfield and is not shown in the map. No employee parking spaces are provided.

Total In-Service Employee Parking Spaces	**2,422**
Total Designated Employee Parking Spaces	**26**
Total Employee Parking Spaces	**2,448**
Total Commercial Parking Spaces *(see table on previous page)*	**23,640**
TOTAL PARKING SPACES	**26,088**
TOTAL PARKING FREEZE SPACES	26,088

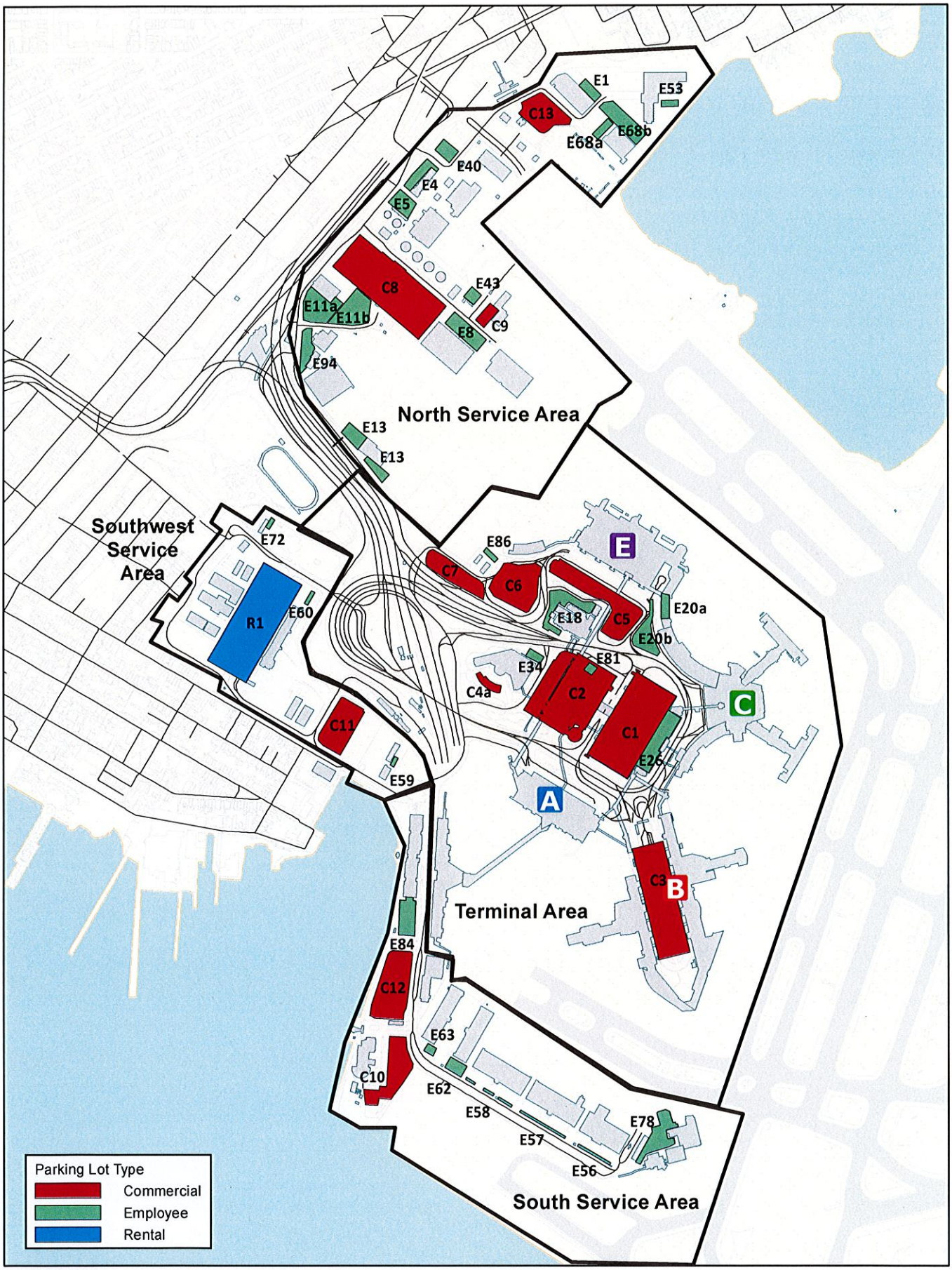
SUMMARY

TOTAL COMMERCIAL PARKING SPACES	***23,640***
TOTAL EMPLOYEE PARKING SPACES	***2,448***
TOTAL PARKING FREEZE SPACES	***26,088***

For Information Only:
Rental Car Spaces Inventory
Logan International Airport
March 2019 Submission

Rental Car Company Parking Spaces

Map ID#		Number of Spaces
R1	Rental Car Center (RCC)	5,020
Total Rental Car Spaces		**5,020**



Massachusetts Port Authority
Strategic and Business Planning
September 2016

Logan Airport Parking Space Inventory

N
0 0.075 0.15 0.3 Miles

Projection: Lambert Conformal Conic **Coordinate System:** NAD 1983 State Plane Massachusetts Mainland FIPS 2001 (Meter)

Massachusetts Port Authority
One Harborside Drive, Suite 200-S
East Boston, MA 02128-2909
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September 20, 2019

Christine Kirby, Director, Air & Climate Division
Massachusetts Department of Environmental Protection
Bureau of Air & Waste
One Winter Street
Boston, MA 02108

Re: Logan Airport Parking Space Inventory

Dear Ms. Kirby:

In compliance with the reporting requirements of 310 CMR 7.30(3)(a), enclosed please find the Massachusetts Port Authority (Massport) submissions for the Logan Airport (the Airport) Parking Space Inventory:

- Commercial Parking Space Inventory;
- Employee Parking Space Inventory; and
- Location Map.

The attachments provide the quantity, physical distribution, and allocation of commercial and employee parking spaces on the Airport, as defined by 310 CMR 7.30, as amended, effective as of June 30, 2017. These inventory tables represent information provided by the Aviation Department and are supported by comprehensive field checks and counts conducted in September 2019.

The Commercial Parking Space Inventory totals 23,640 parking spaces; the Employee Parking Space Inventory totals 2,448 parking spaces; and the total inventory of parking spaces at the Airport is 26,088. The in-service commercial parking spaces total 17,041 and the in-service employee parking spaces total 2,445 spaces. The inventory of in-service spaces has changed since our last filing in March due to reconfiguration of both employee and commercial parking space locations to accommodate several ongoing and upcoming construction projects including: Terminal E project, Ride App (TNC) lot relocation, and relocation of the taxi pool. Additionally, for your information, we continue to provide information on rental car parking spaces, also attached.

The attached Logan Airport Parking Space Inventory reflects Massport's successful management of its parking program, within the requirements of 310 CMR 7.30, as amended.

If you have any questions, please call me at 617-568-3689.

Sincerely,

Hayes Morrison
Deputy Director - Maritime, Land Use, and Transportation Planning
Strategic & Business Planning Department

cc: D. Conroy, EPA
L. Gilmore, MPA
M. Hadley, MPA
S. Dalzell, MPA
C. McDonald, MPA

Employee Parking Space Inventory
Logan International Airport
September 2019 Submission

Employee Parking Spaces

Area		Map ID#	Location of Employee Parking Areas	Sep-19 Number of Spaces
Terminal	Terminal Area	E81	West Garage	52
Terminal		E26	Airport Tower/Administration Parking	603
Terminal		E20	Terminal C Pier A (Old Terminal D) (two lots)	122
Terminal		E18	Massport Facilities 1 (Heating Plant)	92
Terminal		E34	Hilton Hotel employee lot	28
Terminal		E86	Nouria Gas Station	4
North	North Service Area	E68a	LSG Sky Chefs (Bldg. 68), main lot	25
North		E68b	LSG Sky Chefs (Bldg. 68), overflow lot	126
North		E1	Flight Kitchen Building 1 (and nearby lot)	80
North		E40	Lovell Street Lot (contractor trailer)	25
North		E53	Green Bus Depot (Bus Maintenance Facility)	12
North		E11a	North Cargo Building 11, TSA lot	93
North		E11b	North Cargo Building 11, State Police lot	136
North		E43	North Gate & EMS Trailer (EMS Station A7)	21
North		E8	North Cargo Building 8	114
North		E5	US Airways Administration/Hangar (Bldg. 5)	35
airside		*N/A*	Massport Facilities 2 (airside, Bldg. 3)	0
North		E4	Massport Facilities 3 (landside, Bldg. 4)	69
North		E13	UPS (E Lot 3)	41
North		E94	United Aircraft Maintenance (Buildings 93 & 94)	56
SW	SWSA	E59	Bus/Limo Pool Lot	4
SW		E60	Rental Car Center (Customer Service Center)	4
SW		E72	Taxi Pool Lot	8
South	South Service Area	E84	Bird Island Flats / Logan Office Center (LOC) Garage	416
South		E63	South Cargo Building 63	16
South		E62	South Cargo Building 62	43
South		E58	South Cargo Building 58	23
South		E57	South Cargo Building 57	44
South		E56	South Cargo Building 56	39
South		E78	Fire-Rescue HQ & Amelia Earhart Terminal/Hangar	114
airside		*N/A*	*ARFF Satellite Station* [1]	0

[1] This facility is located on the airfield and is not shown in the map. No employee parking spaces are provided.

Total In-Service Employee Parking Spaces	**2,445**
Total Designated Employee Parking Spaces	**3**
Total Employee Parking Spaces	**2,448**
Total Commercial Parking Spaces *(see table on previous page)*	**23,640**
TOTAL PARKING SPACES	**26,088**
TOTAL PARKING FREEZE SPACES	**26,088**

SUMMARY

TOTAL COMMERCIAL PARKING SPACES	***23,640***
TOTAL EMPLOYEE PARKING SPACES	***2,448***
TOTAL PARKING FREEZE SPACES	***26,088***

Commercial Parking Space Inventory
Logan International Airport
September 2019 Submission

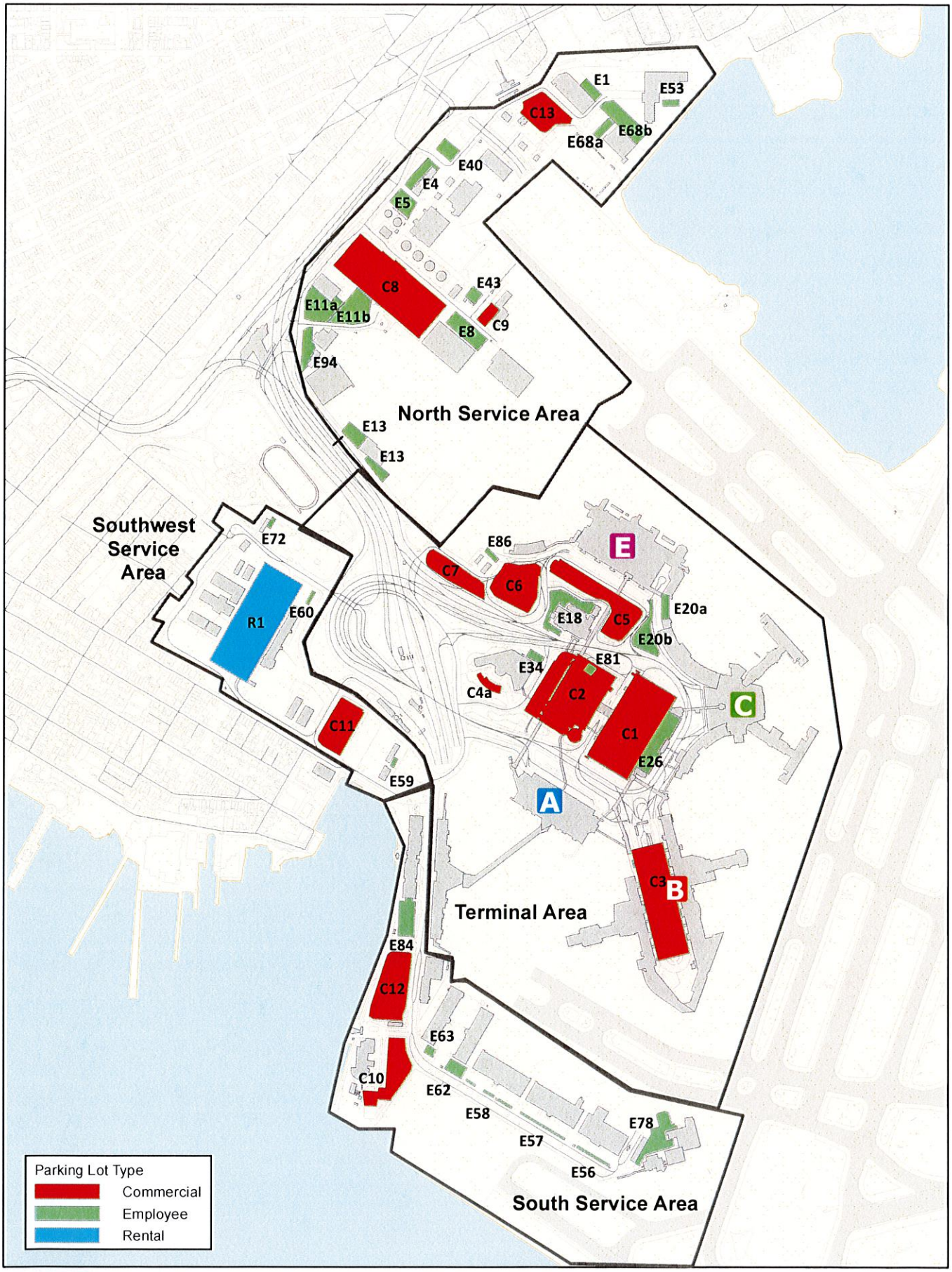
Commercial Parking Spaces

Old Map ID#	Map ID#	Location of Commercial Parking Areas	Sep-19 Number of Spaces
		Terminal Area and Economy Spaces	
C1a	C1	Central Garage	6311
C1b	C2	West Garage	2954
		West Garage Expansion	1699
C2	C3	Terminal B Garage	2212
C8a	C5	Terminal E Lot 1	237
C8b	C6	Terminal E Lot 2	203
C9	C7	Terminal E Lot 3 (fka "Gulf Station" Lot)	93
	C12	Blue Lot	0
C6	C8	Economy Garage	2864
		subtotal	16573
		Overflow Commercial Spaces	
	C11	Red Lot (Tomahawk Dr.)	100
	C13	Green Lot (Wood Island)	
		subtotal	100
		Hotel Spaces	
C4	C4a ~~& C4b~~	Logan Airport Hilton Hotel (one lot)	63
C7a	C10	Harborside Hyatt Conference Center	270
		subtotal	333
		General Aviation Spaces	
C5	C9	Signature (General Aviation Terminal)	35
		subtotal	35
		Total In-Service Commercial Parking Spaces	**17,041**
		Total Designated Commercial Parking Spaces	**6,599**
		Total Commercial Parking Spaces	**23,640**
		Total Employee Parking Spaces *(see table on next page)*	**2,448**
		TOTAL PARKING FREEZE SPACES	**26,088**

For Information Only:
Rental Car Spaces Inventory
Logan International Airport
September 2019 Submission

Rental Car Company Parking Spaces

Map ID#		Number of Spaces
R1	Rental Car Center (RCC)	5,020
Total Rental Car Spaces		**5,020**



Massachusetts Port Authority
Strategic and Business Planning
September 2016

0 0.075 0.15 0.3 Miles

Projection: Lambert Conformal Conic Coordinate System: NAD 1983 State Plane Massachusetts Mainland FIPS 2001 (Meter)

Logan Airport Parking Space Inventory

H

Noise Abatement

This appendix provides detailed information, tables, and figures in support of Chapter 6, *Noise Abatement*. The contents of this appendix are summarized below.

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- Table H-5a 2019 Modeled Runway Use by Aircraft Group
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  - Table H-20a Runway 15R Shoreline Crossings Above 6,000 feet for 2017
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- Table H-21b Runways 22R and 22L Squantum 2 Gate Summary for 2018
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- Table H-22a Runways 22R and 22L Squantum 2 Gate Summary for 2017
- Table H-22b Runways 22R and 22L Squantum 2 Gate Summary for 2018
- Table H-22c Runways 22R and 22L Squantum 2 Gate Summary for 2019
- Table H-23a Runways 22R and 22L Hull 1 Gate Summary for 2017
- Table H-23b Runways 22R and 22L Hull 1 Gate Summary for 2018
- Table H-23c Runways 22R and 22L Hull 1 Gate Summary for 2019
- Table H-24a Runways 22R and 22L Shoreline Crossings Above 6,000 Feet for 2017
- Table H-24b Runways 22R and 22L Shoreline Crossings Above 6,000 Feet for 2018
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  - Table H-26 2018 and 2019 DNL Levels for Census Block Group Locations within DNL 50 dB
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  - Table H-26b Runway 33L Gates — Passages Below 3,000 Feet for 2018
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Fundamentals of Acoustics and Environmental Noise

This section introduces the fundamentals of acoustics and noise terminology as well as the effects of noise on human activity and community annoyance.

Introduction to Acoustics and Noise Terminology

Chapter 6, *Noise Abatement* of this *2018/2019 Environmental Data Report (EDR)* relies largely on a measure of cumulative noise exposure over an entire calendar year, in terms of a metric called the Day-Night Average Sound Level (DNL). However, DNL does not always provide a sufficient description of noise for many purposes. Other measures are available to address essentially any issue of concern. This section introduces the following acoustic metrics, which are all related to DNL, but provide bases for evaluating a broad range of noise situations. These metrics include:

- Decibel (dB)
- A-Weighted Decibel (dBA)
- Sound Exposure Level (SEL)
- Equivalent Sound Level (Leq)

- Time Above (TA)
- Time Above, Night (TAN)
- DNL

The Decibel (dB)

All sounds come from a sound source – a musical instrument, a voice speaking, or an airplane that passes overhead. It takes energy to produce sound. The sound energy produced by any sound source is transmitted through the air in the form of sound waves – tiny, quick oscillations of pressure just above and just below atmospheric pressure. These oscillations, or sound pressures, impinge on the ear, creating the sound we hear.

Our ears are sensitive to a wide range of sound pressures. The loudest sounds that we hear without pain have about one million times more energy than the quietest sounds we hear. However, our ears are incapable of detecting small differences in these pressures. Thus, to match how we hear this sound energy, we compress the total range of sound pressures to a more meaningful range by introducing the concept of sound pressure level (SPL). SPL is a measure of the sound pressure of a given noise source relative to a standard reference value (typically the quietest sound that a young person with good hearing can detect). SPLs are measured in decibels (abbreviated dB). Decibels are logarithmic quantities – logarithms of the squared ratio of two pressures, the numerator being the pressure of the sound source of interest, and the denominator being the reference pressure (the quietest sound we can hear).

The logarithmic conversion of sound pressure to SPL means that the quietest sound we can hear (the reference pressure) has a SPL of about zero dB, while the loudest sounds we hear without pain have SPLs of about 120 dB. Most sounds in our day-to-day environment have SPLs from 30 to 100 dB.

Because decibels are logarithmic quantities, they do not behave like regular numbers with which we are more familiar. For example, if two sound sources each produce 100 dB and they are operated together, they produce only 103 dB – not 200 dB as we might expect. Four equal sources operating simultaneously result in a total SPL of 106 dB. In fact, for every doubling of the number of equal sources, the SPL goes up another three decibels. A tenfold increase in the number of sources makes the SPL go up 10 dB. A hundredfold increase makes the level go up 20 dB, and it takes a thousand equal sources to increase the level 30 dB.

If one source is much louder than another source, the two sources together will produce the same SPL (and sound to our ears) as if the louder source were operating alone. For example, a 100-dB source plus an 80-dB source produces 100 dB when operating together. The louder source "masks" the quieter one, but if the quieter source gets louder, it will have an increasing effect on the total SPL. When the two sources are equal, as described above, they produce a level 3 dB above the sound of either one by itself.

From these basic concepts, note that one hundred 80 dB sources will produce a combined level of 100 dB; if a single 100-dB source is added, the group will produce a total SPL of 103 dB. Clearly, the loudest source has the greatest effect on the total decibel level.

A-Weighted Decibel (dBA)

Another important characteristic of sound is its frequency, or "pitch." This is the rate of repetition of the sound pressure oscillations as they reach our ear. Formerly expressed in cycles per second, frequency is now expressed in units known as Hertz (Hz).

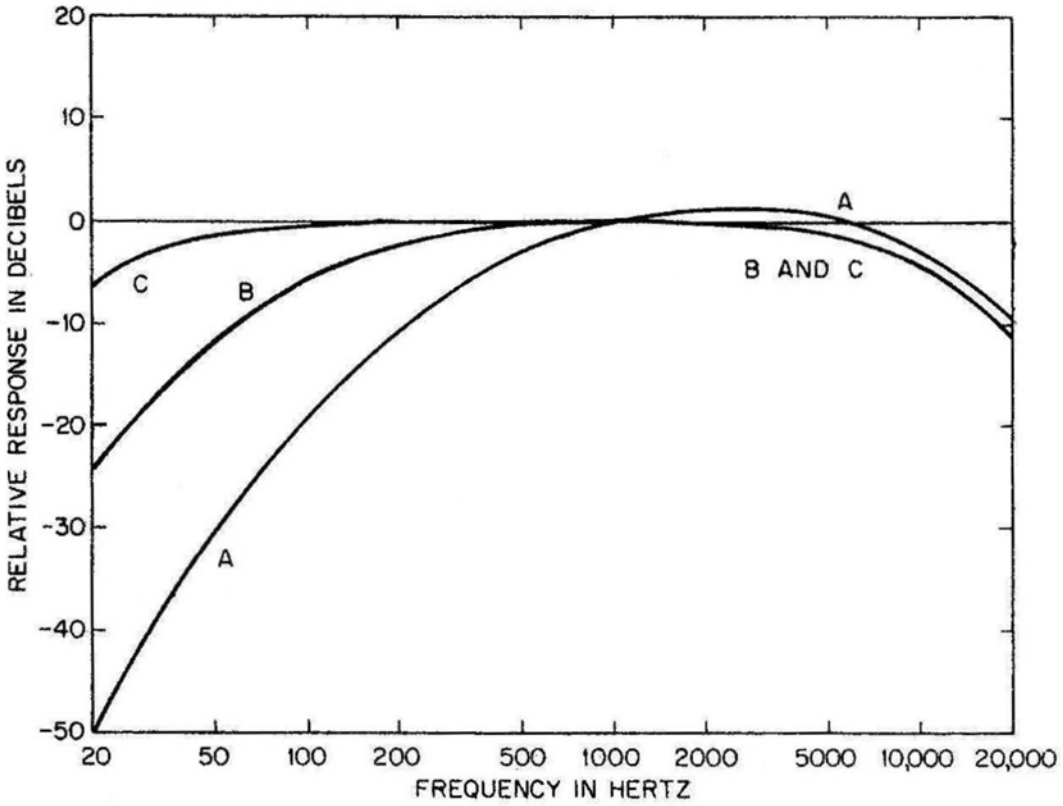
Most people hear from about 20 Hz to about 10,000 to 15,000 Hz. People respond to sound most readily when the predominant frequency is in the range of normal conversation, around 1,000 to 2,000 Hz. Acousticians have developed "filters" to match our ears' sensitivity and help us to judge the relative loudness of sounds made up of different frequencies. The so-called "A" filter does the best job of matching the sensitivity of our ears to most environmental noises. SPLs measured through this filter are referred to as A-weighted levels (dBA). A-weighting significantly de-emphasizes noise at low and very high frequencies (below about 500 Hz and above about 10,000 Hz) where we do not hear as well. Because this filter generally matches our ears' sensitivity, sounds having higher A-weighted sound levels are usually judged louder than those with lower A-weighted sound levels, a relationship which does not always hold true for unweighted levels. It is for these reasons that A-weighted sound levels are normally used to evaluate environmental noise.

Other weighting networks include the B and C filters. They correspond to different level ranges of the ear. The rarely used B-weighting attenuates low frequencies (those less than 500 Hz), but to a lesser degree than A-weighting. C weighting is nearly flat throughout the audible frequency range, hardly de-emphasizing low frequency noise. C-weighted levels can be preferable in evaluating sounds whose low-frequency components are responsible for secondary effects such as the shaking of a building, window rattle, or perceptible vibrations. Uses include the evaluation of blasting noise, artillery fire, and in some cases, aircraft noise inside buildings. **Figure H-1** compares these various weighting networks.

Because of the correlation with our hearing, the A-weighted level has been adopted as the basic measure of environmental noise by the U.S. Environmental Protection Agency (EPA) and by nearly every other federal and state agency concerned with community noise. **Figure H-2** presents typical A-weighted sound levels of several common environmental sources.

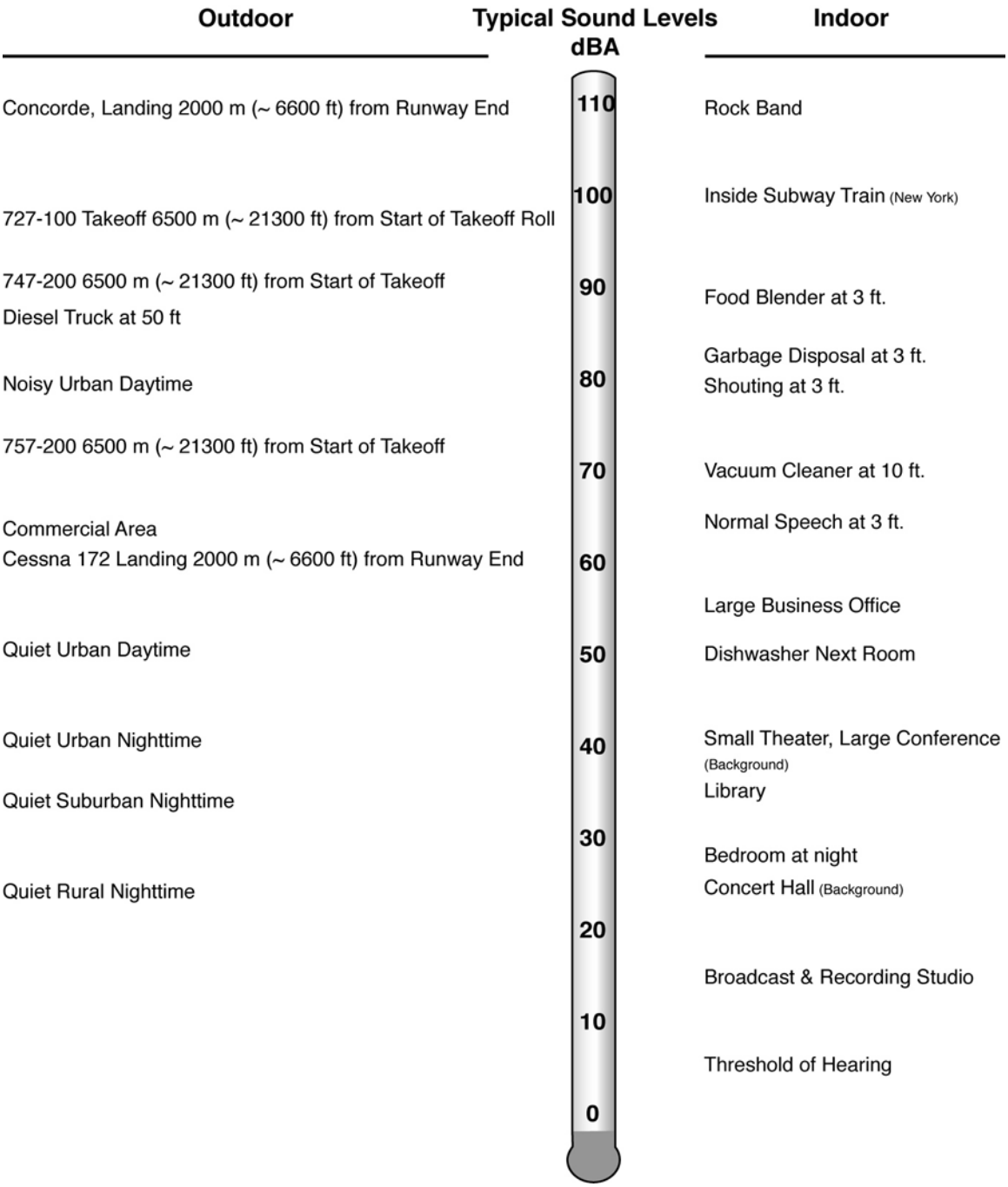
An additional dimension to environmental noise is that A-weighted levels vary with time. For example, the sound level increases as an aircraft approaches, then falls and blends into the background as the aircraft recedes into the distance (though even the background varies as birds chirp or the wind blows, or a vehicle passes by). **Figure H-3** illustrates this concept.

Figure H-1 Frequency-Response Characteristics of Various Weighting Networks



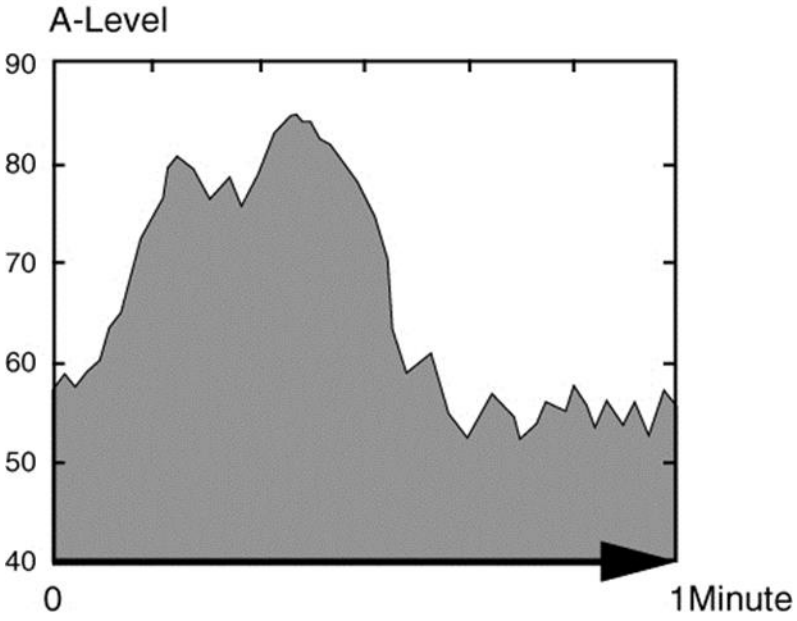
Source: Harris, Cyril M., editor; Handbook of Acoustical Measurements and Noise Control, (Chapter 5, "Acoustical Measurement Instruments"; Johnson, Daniel L.; Marsh, Alan H.; and Harris, Cyril M.); New York; McGraw-Hill, Inc.; 1991; p. 5.13.

Figure H-2 Common Environmental Sound Levels, in dBA



Source: HMMH (Aircraft noise levels from FAA Advisory Circular 36-3H)
Note: dBA – A-weighted decibel.

Figure H-3 Variations in the A-Weighted Sound Level Over Time



Source: HMMH.

Maximum A-Weighted Noise Level (L_{max})

The variation in noise level over time often makes it convenient to describe a particular noise "event" by its maximum sound level, abbreviated as L_{max}. In the figure above, it is approximately 85 dBA.

The maximum level describes only one dimension of an event; it provides no information on the cumulative noise exposure. In fact, two events with identical maxima may produce very different total exposures. One may be of very short duration, while the other may continue for an extended period and be judged much more annoying. The next measure corrects for this deficiency.

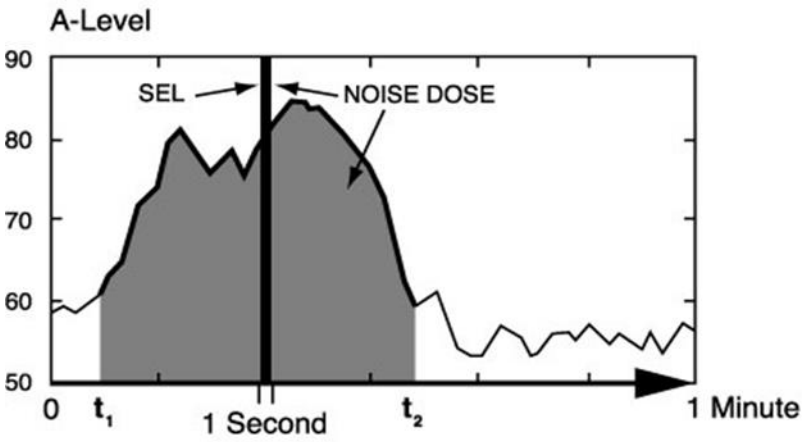
Sound Exposure Level (SEL)

The most frequently used measure of noise exposure for an individual aircraft noise event (and the measure that Part 150[1] specifies for this purpose) is the SEL. SEL is a measure of the total noise energy produced during an event, from the time when the A-weighted sound level first exceeds a threshold level (normally just above the background or ambient noise) to the time that the sound level drops back down below the threshold. To allow comparison of noise events with very different durations, SEL "normalizes" the duration in every case to one second; that is, it is expressed as the steady noise level with just a one-second duration that includes the same amount of noise energy as the actual longer duration, time-varying noise. In lay terms, SEL "squeezes" the entire noise event into one second.

1 "Part 150" refers to Federal Aviation Regulations (FAR) Part 150, discussed in detail in the Regulatory Framework Section of this Appendix.

Figure H-4 depicts this transformation. The shaded area represents the energy included in an SEL measurement for the noise event, where the threshold is set to 60 dBA. The dark shaded vertical bar, which is 90 dBA high and just one second long (wide), contains the same sound energy as the full event.

Figure H-4 Sound Exposure Level (SEL)



Source: HMMH.

Because the SEL is normalized to one second, it will always be larger than the L_{max} for an event longer than one second. In this case, the SEL is 90 dB; the L_{max} is approximately 85 dBA. For most aircraft overflights, the SEL is normally on the order of 7 to 12 dB higher than L_{max}. Because SEL considers duration, longer exposure to relatively slow, quiet aircraft, such as propeller models, can have the same or higher SEL than shorter exposure to faster, louder planes, such as corporate jets.

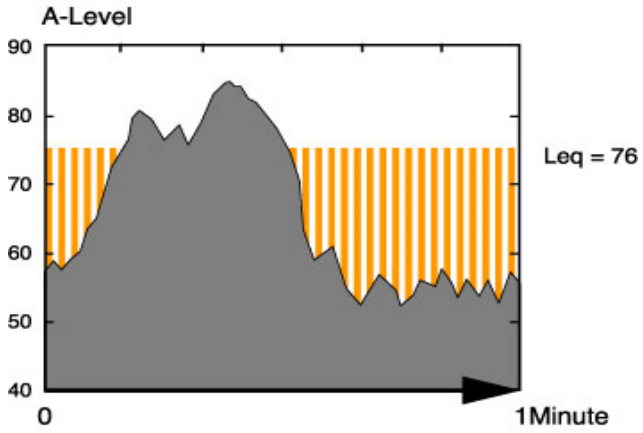
Equivalent Sound Level (L_{eq})

The L_{max} and SEL quantify the noise associated with individual events. The remaining metrics in this section describe longer-term cumulative noise exposure that can include many events.

The Equivalent Sound Level (L_{eq}) is a measure of exposure resulting from the accumulation of A-weighted sound levels over a particular period of interest (e.g., an hour, an eight-hour school day, nighttime, or a full 24-hour day). Because the length of the period can differ, the applicable period should always be identified or clearly understood when discussing the metric. Such durations are often identified through a subscript, for example $L_{eq(8)}$ or $L_{eq(24)}$.

L_{eq} is equivalent to the constant sound level over the period of interest that contains as much sound energy as the actual time-varying level. This is illustrated in **Figure H-5**. Both the solid and striped shaded areas have a one-minute L_{eq} value of 76 dB. It is important to recognize, however, that the two signals (the constant one and the time-varying one) would sound very different in real life. Also, be aware that the "average" sound level suggested by L_{eq} is not an arithmetic value, but a logarithmic, or "energy-averaged" sound level. Thus, loud events dominate L_{eq} measurements.

Figure H-5 Example of a One Minute Equivalent Sound Level (L_{eq})



Source: HMMH.

In airport noise studies, L_{eq} is often presented for consecutive one-hour periods to illustrate how the exposure rises and falls throughout a 24-hour period, and how individual hours are affected by unusual activity, such as rush hour traffic or a few loud aircraft.

Time Above (TA)

TA is a metric that gives the duration, in minutes, for which aircraft-related noise exceeds a specified A-weighted sound level during a given period. The measure is referred to generally as TA. For this *2018/2019 EDR*, three threshold sound levels are used in the analysis: 65, 75, and 85 dBA. These times are computed using the Federal Aviation Administration (FAA)-approved Aviation Environmental Design Tool (AEDT).

Time Above Night (TAN)

Identical to TA, except it is computed for only the 9-hour period between 10:00 PM and 7:00 AM. The TAN is also developed using three threshold sound levels 65, 75, and 85 dBA.

Day-Night Average Sound Level (DNL)

Virtually all studies of aircraft noise rely on a slightly more complicated measure of noise exposure that describes cumulative noise exposure during an average annual day: the DNL. The Environmental Protection Agency (EPA) identified DNL as the most appropriate means of evaluating airport noise based on the following considerations:[2]

1. The measure should be applicable to the evaluation of pervasive long-term noise in various defined areas and under various conditions over long periods.

2 Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety," U. S. EPA Report No. 550/9-74-004, March 1974.

2. The measure should correlate well with known effects of the noise environment and on individuals and the public.

3. The measure should be simple, practical, and accurate. In principal, it should be useful for planning as well as for enforcement or monitoring purposes.

4. The required measurement equipment, with standard characteristics, should be commercially available.

5. The measure should be closely related to existing methods currently in use.

6. The single measure of noise at a given location should be predictable, within an acceptable tolerance, from knowledge of the physical events producing the noise.

7. The measure should lend itself to small, simple monitors, which can be left unattended in public areas for long periods.

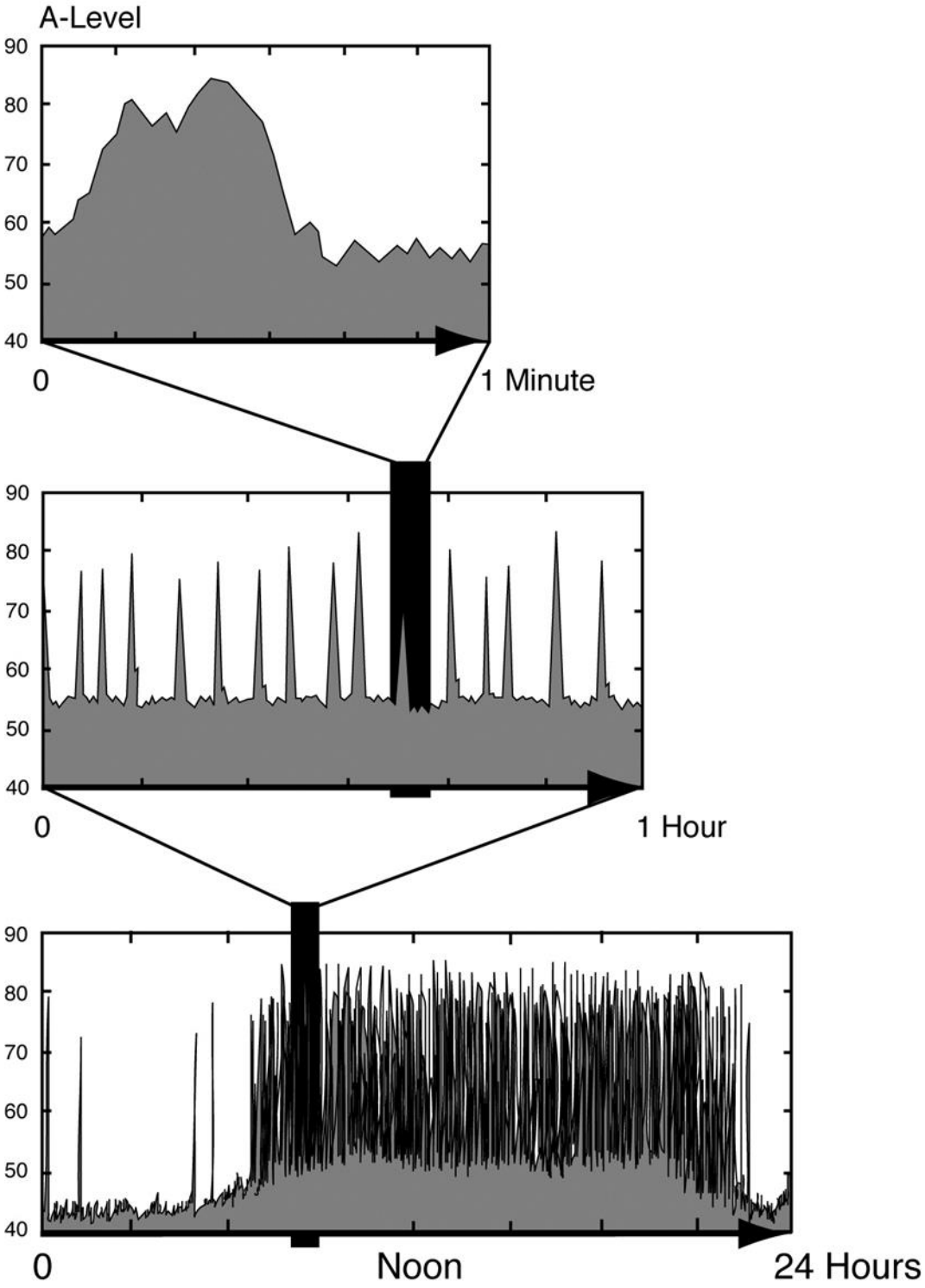
Most federal agencies dealing with noise have formally adopted DNL. The Federal Interagency Committee on Noise (FICON) reaffirmed the appropriateness of DNL in 1992. The FICON summary report stated; "There are no new descriptors or metrics of sufficient scientific standing to substitute for the present DNL cumulative noise exposure metric."

The DNL represents noise as it occurs over a 24-hour period, with one important exception: DNL treats nighttime noise differently from daytime noise. In determining DNL, it is assumed that the A-weighted levels occurring at night (defined as 10:00 PM to 7:00 AM) are 10 dB louder than they really are. This 10-dB penalty is applied to account for greater sensitivity to nighttime noise, and the fact that events at night are often perceived to be more intrusive because nighttime ambient noise is less than daytime ambient noise.

Figure H-4 illustrated the A-weighted sound level due to an aircraft fly-over as it changed with time. The top frame of **Figure H-6** repeats this figure. The shaded area reflects the noise dose that a listener receives during the one-minute period of the sample. The center frame of **Figure H-6** includes this one-minute sample within a full hour. The shaded area represents the noise during that hour with 16 noise events, each producing an SEL. Similarly, the bottom frame includes the one-hour interval within a full 24 hours. Here the shaded area represents the listener's noise dose over a complete day. Note that several overflights occur at a time when the background noise drops some 10 dB, to approximately 45 dBA.

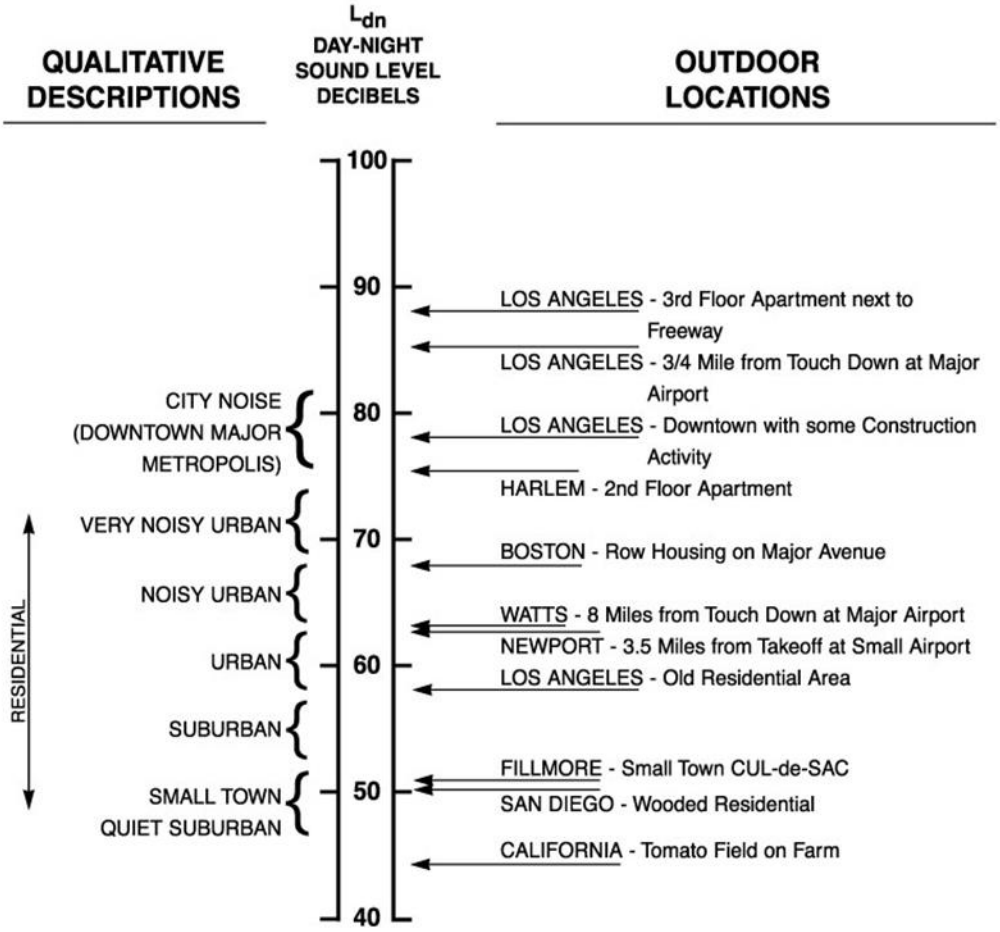
DNL can be measured or estimated. Measurements are practical only for obtaining DNL values for relatively limited numbers of points, and, in the absence of a permanently installed monitoring system, only for relatively short time periods. Most airport noise studies are based on computer-generated DNL estimates, determined by accounting for all the SELs from individual events, which comprise the total noise dose at a given location. Computed DNL values are often depicted in terms of equal-exposure noise contours (much as topographic maps have contours of equal elevation). **Figure H-7** depicts typical DNL values for a variety of noise environments.

Figure H-6 Daily Noise Dose



Source: HMMH.

Figure H-7 Examples of Day-Night Average Sound Levels (DNL)



Source: U.S. Environmental Protection Agency (EPA), Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety, March 1974, p. 14.

In 2015, the FAA began a multi-year effort to update the scientific evidence on the relationship between aircraft noise exposure and its effects on communities around airports.[3] This was the most comprehensive study using a single noise survey ever undertaken in the United States, polling communities surrounding 20 airports nationwide. The FAA Reauthorization Act of 2018 under Section 188 and 173, required FAA to complete the evaluation of alternative metrics to the DNL standard within one year. The Section 188 and 173 Report to Congress was delivered on April 14, 2020[4] and concluded that while no single noise metric can cover all situations, DNL provides the most comprehensive way to consider the range of factors influencing exposure to aircraft noise. In addition, use of supplemental metrics is both encouraged and supported to further disclose and aid in the public understanding of community noise impacts. The full

3 Federal Aviation Administration. Press Release – FAA To Re-Evaluate Method for Measuring Effects of Aircraft Noise. https://www.faa.gov/news/press_releases/news_story.cfm?newsId=18774

4 Federal Aviation Administration. Report to Congress on an evaluation of alternative noise metrics. https://www.faa.gov/about/plans_reports/congress/media/Day-Night_Average_Sound_Levels_COMPLETED_report_w_letters.pdf

study supporting these reports is expected to be released in the fall of 2020. If changes are warranted in the use of DNL, which DNL level to assess or the use of supplemental metrics, FAA will propose revised policy and related guidance and regulations, subject to interagency coordination, as well as public review and comment.

The Effects of Aircraft Noise on People

To residents around airports, aircraft noise can be an annoyance and a nuisance. It can interfere with conversation and listening to television, it can disrupt classroom activities in schools, and it can disrupt sleep. Relating these effects to specific noise metrics helps in the understanding of how and why people react to their environment.

Speech Interference

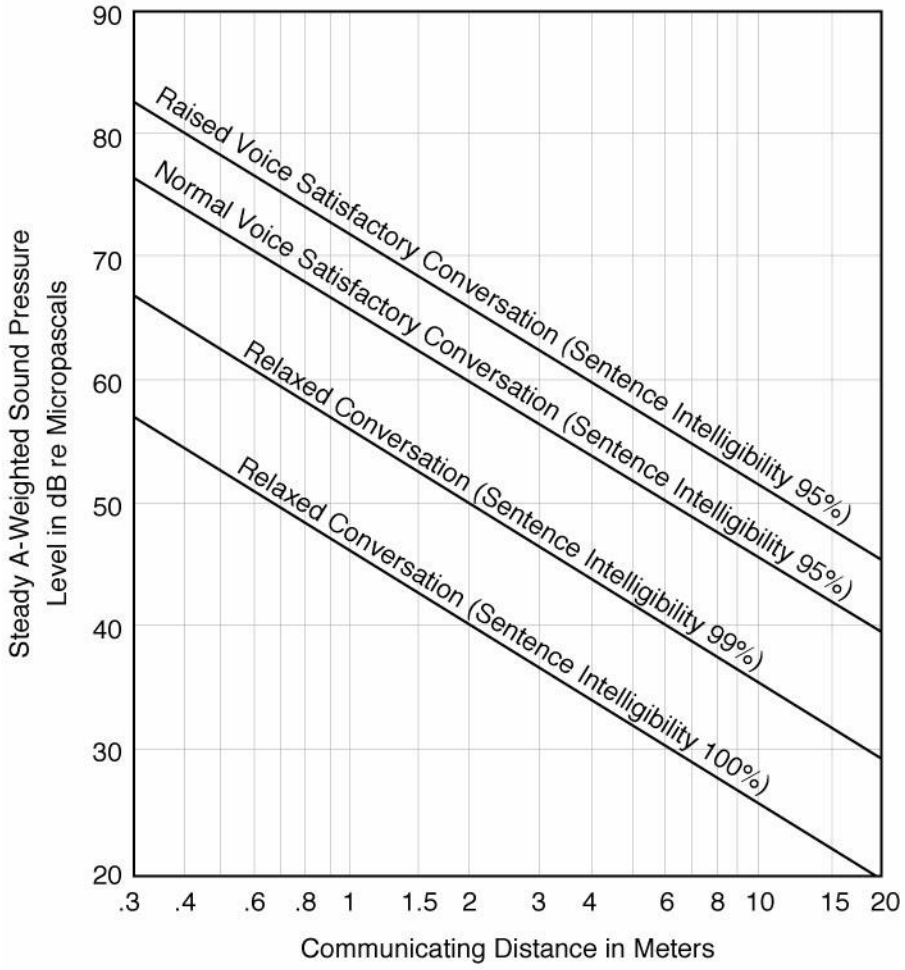
A primary effect of aircraft noise is its tendency to drown out or "mask" speech, making it difficult to carry on a normal conversation. The sound level of speech decreases as the distance between a talker and listener increases. As the background sound level increases, it becomes harder to hear speech. **Figure H-8** presents typical distances between talker and listener for satisfactory outdoor conversations, in the presence of different steady A-weighted background noise levels for raised, normal, and relaxed voice effort. As the background level increases, the talker must raise his/her voice, or the individuals must get closer together to continue talking.

As indicated in the figure, "satisfactory conversation" does not always require hearing every word; 95 percent intelligibility is acceptable for many conversations. Listeners can infer a few unheard words when they occur in a familiar context. However, in relaxed conversation, we have higher expectations of hearing speech and generally require closer to 100 percent intelligibility. Any combination of talker-listener distances and background noise that falls below the bottom line in **Figure H-8** (thus assuring 100 percent intelligibility) represents an ideal environment for outdoor speech communication and is considered necessary for acceptable indoor conversation as well.

One implication of the relationships in **Figure H-8** is that for typical communication at distances of 3 or 4 feet (1 to 1.5 meters), acceptable outdoor conversations can be carried on in a normal voice as long as the background noise outdoors is less than about 65 dBA. If the noise exceeds this level, as might occur when an aircraft passes overhead, intelligibility would be lost unless vocal effort were increased, or communication distance were decreased.

Indoors, typical distances, voice levels, and intelligibility expectations generally require a background level less than 45 dBA. With windows partly open, housing generally provides about 12 dBA of interior-to-exterior noise level reduction. Thus, if the outdoor sound level is 60 dBA or less, there is a reasonable chance that the resulting indoor sound level will afford acceptable conversation inside. With windows closed, 24 dB of attenuation is typical.

Figure H-8 Outdoor Speech Intelligibility



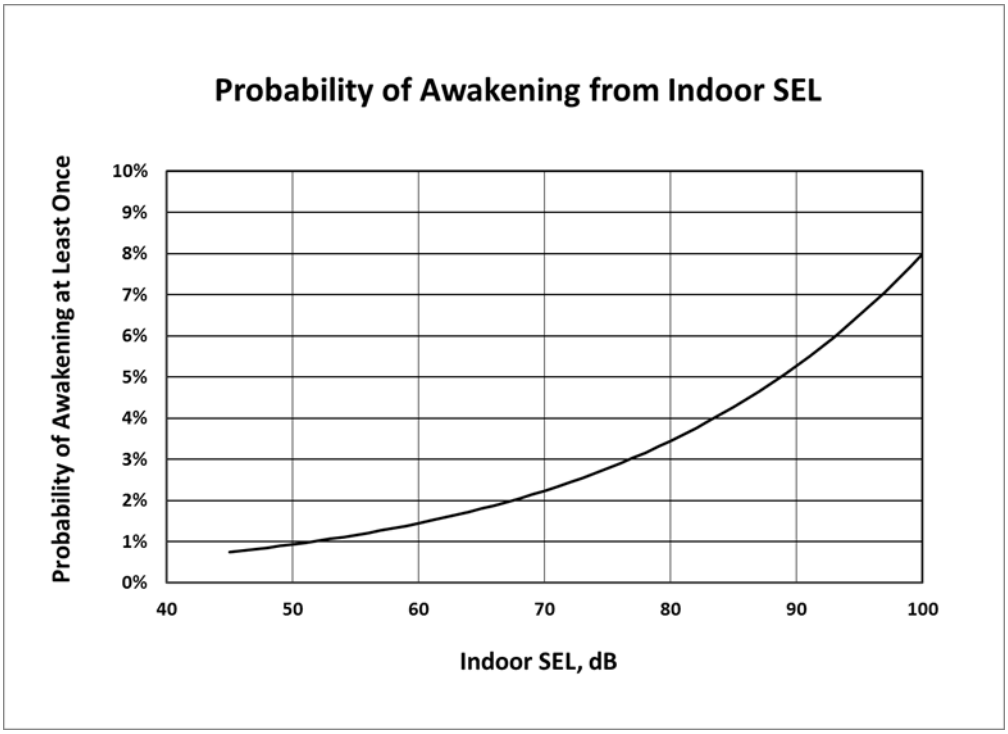
Source: U.S. Environmental Protection Agency (EPA), Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety, March 1974, p. D-5.

Sleep Interference

Research on sleep disruption from noise has led to widely varying observations. In part, this is because (1) sleep can be disturbed without awakening, (2) the deeper the sleep the more noise it takes to cause arousal, and (3) the tendency to awaken increases with age, and other factors. **Figure H-9** shows one such relationship from recent research conducted in the U.S. – the probability that a group of people will be awakened at least once when exposed to a given indoor SEL.

For example, an indoor SEL of 80 dB results in approximately 3.5 percent of the exposed population being awakened. If windows are open in the bedroom on a warm evening and a house provides a typical outside-to-inside noise level reduction of around 15 dB, which suggests it takes an SEL of about 95 dB outdoors to awaken 3.5 percent of the population. The American National Standards Institute (ANSI) has extended this concept further and developed a standard (ANSI S12.9-2008/Part 6) for computing the percentage of the population that is likely to be awakened by multiple noise events occurring throughout the night. The Federal Interagency Committee on Aviation Noise (FICAN) subsequently endorsed the standard as the best available means of estimating behavioral awakenings from aircraft noise.

Figure H-9 Probability of Awakening at Least Once from Indoor Noise Event



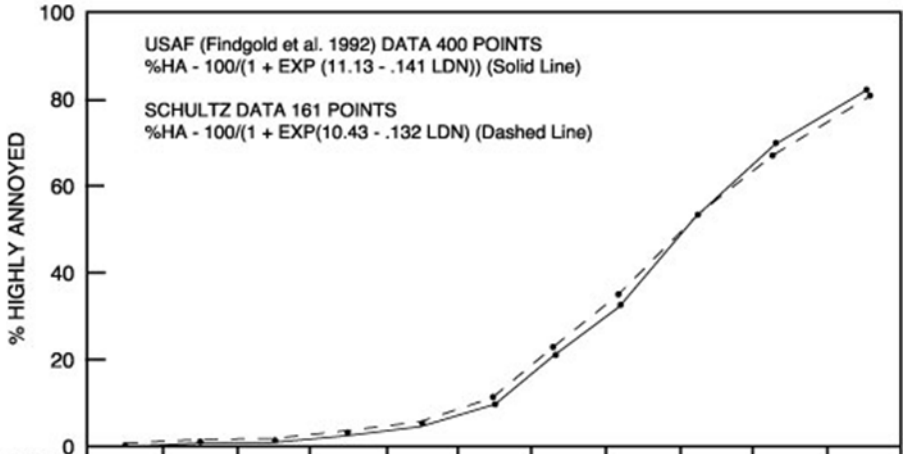
Source: American National Standards Institute (ANSI) S12.9-2008/Part 6, Quantities and Procedures for Description and Measurement of Environmental Sound — Part 6: Methods for Estimation of Awakenings Associated with Outdoor Noise Events Heard in Homes; Equation 1.

Community Annoyance

Social survey data make it clear that individual reactions to noise vary widely for a given noise level. Nevertheless, as a group, people's aggregate response is predictable and relates well to measures of cumulative noise exposure such as DNL. **Figure H-10** shows a widely recognized relationship between environmental noise and annoyance. Based on data from 18 surveys conducted worldwide, the curve indicates that at levels as low as DNL 55, approximately 5.0 percent of the people will still be highly annoyed, with the percentage increasing more rapidly as exposure increases above DNL 65 dB.

Separate work by the EPA has shown that overall community reaction to a noise environment can also be related to DNL. This relationship is shown in **Figure H-11**. Levels have been normalized to the same set of exposure conditions to permit valid comparisons between ambient noise environments. Data summarized in **Figure H-11** suggest that little reaction would be expected for intrusive noise levels five decibels below the ambient, while widespread complaints can be expected as intruding noise exceeds background levels by about 5 dB. Vigorous action is likely when the background is exceeded by 20 dB.

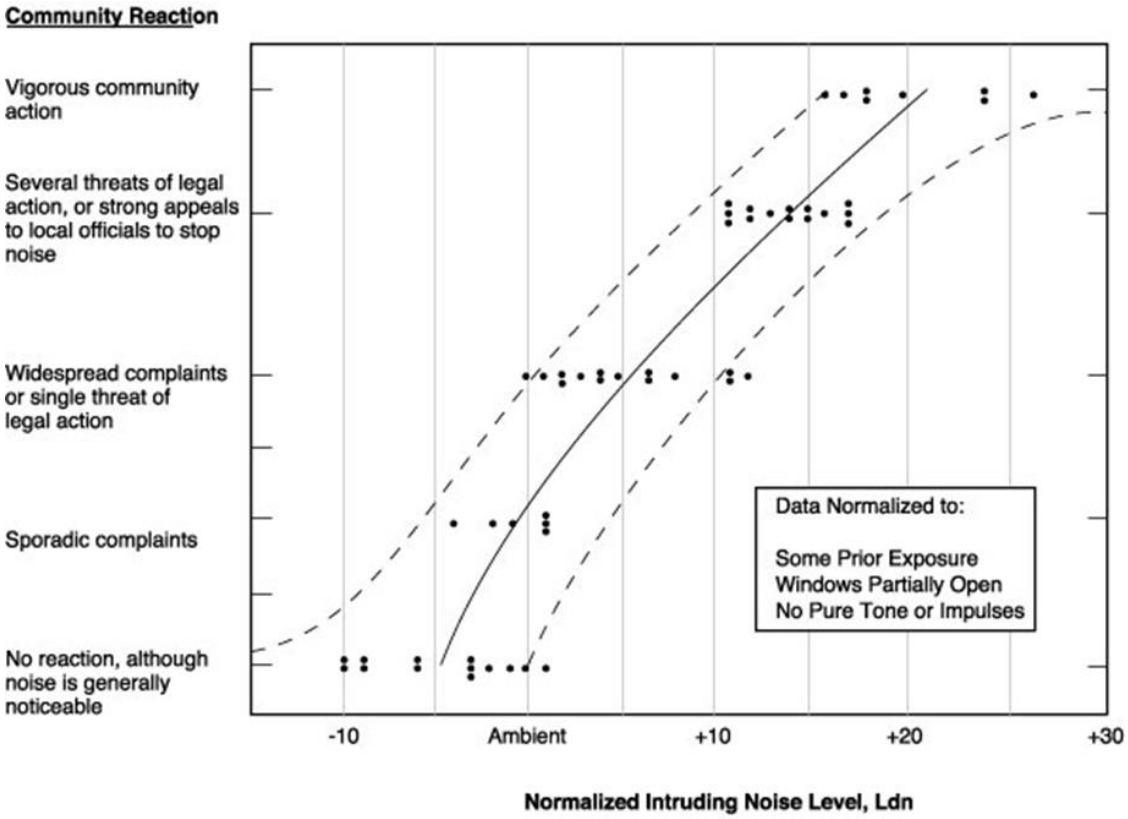
Figure H-10 Percentage of People Highly Annoyed



Day - Night Average Sound Level in dB		40	45	50	55	60	65	70	75	80	85	100
Calculated %HA Points	USAF	0.41	0.831	1.66	3.31	6.48	12.29	22.1	36.47	53.74	70.16	82.64
	SCHULTZ	0.576	1.11	2.12	4.03	7.52	13.59	23.32	37.05	53.25	68.78	81

Source: Federal Interagency Committee on Aviation Noise (FICON). "Federal Agency Review of Selected Airport Noise Analysis Issues." August 1992. (From data provided by USAF Armstrong Laboratory). pp. 3-6.

Figure H-11 Community Reaction as a Function of Outdoor DNL



Source: Wyle Laboratories, "Community Noise," prepared for the U.S. Environmental Protection Agency, Office of Noise Abatement and Control, Washington, D.C., December 1971, pg. 63.
Note: DNL - Day-Night Average Sound Level.

Regulatory Framework

Logan Airport Noise Abatement Rules and Regulations

Massport's primary mechanism for reducing noise impacts from Logan Airport's operations is the Noise Rules.[5] The Noise Rules were designed to reduce noise impacts by encouraging use of quieter aircraft by requiring decreased use of noisier aircraft and by limiting nighttime activity by louder Stage 2 types. Many secondary goals aimed at limiting noise in specific areas also were stated.

Specific provisions of the Noise Rules, which continue to serve these goals, include:

- Limiting cumulative noise exposure at Logan Airport (as measured by Massport's cumulative noise index [CNI]) to a maximum of 156.5 Effective Perceived Noise Decibels (EPNdB);
- Maximizing use of Stage 3 aircraft;
- Restricting nighttime operations by Stage 2 aircraft;

5 The Logan International Airport Noise Abatement Rules and Regulations, effective July 1, 1986, are codified at 740 Code of Massachusetts Regulations (CMR) 24.01 et seq (also known as the Noise Rules).

- Placing limitations on times and locations of engine run-ups and use of auxiliary power units (APU); and
- Restricting use of certain runways by noisier aircraft and time of day.

These restrictions and limitations are subject to FAA implementation and safe operation of the Airport and airspace.

Federal Aviation Regulation (FAR) Part 36

Logan Airport operates within a framework of federal aviation regulations that limits an airport operator's ability to control noise. For example, FAA's FAR Part 36[6] sets noise limits for aircraft certification and the procedures by which aircraft noise emission levels must be measured to determine compliance. The regulation defines noise emission limits for turbojets, turboprops, and helicopters, classifying turbojets into categories referred to as stages based on noise levels at each of three locations: takeoff, landing, and to the side of the runway during takeoff (sideline). The categories are:

- Stage 1 aircraft are the oldest and usually have the loudest operations, having preceded the existence of any noise emission regulation. Rare examples include old, restored civil or military aircraft. There are no Stage 1 aircraft operating at Logan Airport.
- Stage 2 aircraft are less old and less noisy than Stage 1; they were the first aircraft types required to meet a noise limit. A subsequent regulation, FAR Part 91 (described below), prohibits the operation of a Stage 2 aircraft in the continental U.S. unless its takeoff weight is 75,000 pounds or less. FAA Reauthorization bill of 2012 also mandated the phase out of Stage 2 aircraft with a takeoff weight less than 75,000 pounds by the end of 2015. Thus, there are no longer any Stage 2 aircraft operating at Logan Airport.
- Stage 3 aircraft were certified for service before 2006 and have relatively quiet jets, although some are Stage 2 aircraft that have been re-engined, or have been fitted with hushkits, enabling them to meet Stage 3 noise limits.
- Stage 4 aircraft are required to operate with a cumulative noise level at least 10 dB quieter than Stage 3 aircraft at three prescribed measurement points. Jet aircraft certificated after January 1, 2006 must meet the Stage 4 limits. Although not required, the majority of aircraft in the 2018 and 2019 Logan Airport fleets would also meet the Stage 4 noise limits if they were recertificated.
- Stage 5 aircraft are the newest and quietest aircraft. All aircraft certificated after January 1, 2018 must meet Stage 5 limits, which are a cumulative 7 dB below Stage 4 and 17 dB below Stage 3 aircraft. The Boeing 787, 747-8, and Airbus A350 and A380 are examples of aircraft that meet the new limits. About 15 percent of aircraft in the 2018 and 2019 Logan Airport fleets would meet Stage 5 noise limits.

6 14 CFR Part 36, "Noise Standards: Aircraft Type and Air Worthiness Certification."

FAR Part 150

First implemented in February 1981, FAR Part 150[7] defines procedures that an airport operator must follow if it chooses to conduct and implement an airport noise and land use compatibility plan. Part 150 Noise Compatibility studies require the use of DNL to evaluate the airport noise environment. FAR Part 150 identifies noise compatibility guidelines for different land uses depending on their sensitivity. Key values include a DNL of 75 dB, above which no residences, schools, hospitals, or churches are considered compatible, and a DNL of 65 dB, above which those land uses are considered compatible only if they are sound insulated.

Noise abatement or mitigation measures that an airport operator must consider in a Part 150 study include acquisition of incompatible land, construction of noise barriers, sound insulation of buildings, implementation of a preferential runway program, use of noise abatement flight tracks, implementation of airport use restrictions, and any other actions that would have a beneficial effect on the public.

While Massport has implemented variations of these and additional measures at Logan Airport, Massport has not filed an official Part 150 noise compatibility study with FAA because all of Logan Airport's program elements, while regularly reviewed and updated, preceded the promulgation of Part 150 and are effectively grandfathered under the regulation.

FAR Parts 91 and 161

The Airport Noise and Capacity Act of 1990 (ANCA)[8] directed the U.S. Secretary of Transportation to undertake three key noise-related actions:

- Establish a schedule for a phase out of Part 36 Stage 2 aircraft by the year 2000
- Establish a program for FAA review of all new airport noise and access restrictions limiting operations of Stage 2 aircraft: and
- Establish a program for FAA review and approval of any restriction that limits operations of Stage 3 aircraft, including public notice requirements.

FAA addressed these requirements through amendment of an existing federal regulation, "Part 91,"[9] and establishment of a new regulation, "Part 161."[10] ANCA effectively ended Massport's pursuit of any additional operational restrictions outside of this program.

Amendment to Part 91

FAA establishes and regulates operating noise limits for civil aircraft operation in Subpart I, "Operating Noise Limits," of 14 CFR Part 91, "General Operating and Flight Rules." The noise limits are based on aircraft noise certification criteria set forth in 14 CFR Part 36, described above.

In 1976, FAA ordered a phase out of all Stage 1 aircraft with a maximum gross takeoff weight (MGTOW) over 75,000 pounds, to be completed on January 1, 1985. After that date, Stage 1 civil aircraft over

7 14 CFR Part 150, "Airport Noise Compatibility Planning."

8 Pub. L. No. 101-508, 104 Stat. 1388, as recodified at 49 United States Code 47521- 47533.

9 14 CFR Part 91, "General Operating and Flight Rules."

10 14 CFR Part 161, "Notice and Approval of Airport Noise and Access Restrictions."

75,000 pounds MGTOW were banned from operating in the U.S. (with limited exemptions related to commercial service at "small communities," which has since expired in 1988). ANCA required a similar phase out of Stage 2 aircraft over 75,000 pounds by December 31, 1999. The 75,000-pound weight limit exempted most "business" (or "corporate") jets and a very small number of the very smallest "air carrier" type jets until December 31, 2015 when a full ban took effect.[11] Aircraft operators responded to the Stage 1 and 2 phase-outs by retiring their non-compliant aircraft or modifying some of their aircraft to meet the more stringent standards. The modifications undertaken include installation of quieter engines, noise-reducing physical modifications to the airframe and/or existing engines, and limitation of operating weights and procedures to meet the applicable Part 36 limits. Some former Stage 2 airline aircraft that were "recertificated" as Stage 3 with these modifications still operate at Logan Airport, but are generally declining due to the aircrafts' age and high operating costs (in particular due to the generally low fuel efficiency of these older aircraft).

From 2006 to 2017, as airlines add new aircraft, Stage 4 aircraft have been added to their fleets. The Stage 4 noise standard applies to any new jet aircraft type designs over 12,500 pounds requiring FAA approval after January 1, 2006. The International Civil Aviation Organization (ICAO) has also adopted the same regulation for international operators, but neither FAA nor ICAO have indicated there will be restrictions on the remaining recertificated Stage 3 aircraft from carrier fleets.

ICAO and FAA adopted a higher standard of noise classification called Stage 5 (Chapter 14 for ICAO) which was effective for new aircraft type certification after December 31, 2017 and December 31, 2020, depending on the weight of the aircraft.[12]

Part 161

FAA implemented the ANCA requirements related to notice, analysis, and approval of use restrictions affecting Stage 2 and 3 aircraft through the establishment of a new regulation, 14 CFR Part 161, "Notice and Approval of Airport Noise and Access Restrictions." In simple terms, Part 161 requires an airport operator that proposes to implement a restriction on Stage 2 or 3 aircraft operations to undertake, document, and publicize certain benefit-cost analyses, comparing the noise benefits of the restriction to its economic costs. Operators must obtain specific FAA approvals of the analysis, documentation, and notice processes, and – for Stage 3 restrictions – approval of the restriction itself.

Part 161 and ANCA define more demanding requirements and explicit guidance for Stage 3 restrictions. To implement a Stage 3 restriction, formal FAA approval is required. FAA's role for Stage 2 restrictions is limited to commenting on compliance with Part 161 notice and analysis procedural requirements. Part 161 provides guidance regarding appropriate information to provide in support of these findings. While Part 161 does not require this information for a Stage 2 restriction, Part 161 states that it would be "useful." Moreover, FAA has required airports to provide this same information for Stage 2 restrictions (and even for Stage 1 restrictions pursued under FAR Part 150), on the grounds that they are required for airports to comply with grant assurance 22(a), "Economic Nondiscrimination," which states that an airport operator "will make its airport available as an airport for public use on reasonable terms and without

11 FAA Modernization and Reform Act of 2012 sets a January 1, 2016 ban of Stage 2 aircraft less than 75,000 lbs.

12 The Final Rule was published on October 4, 2017.

unjust discrimination to all types, kinds, and classes of aeronautical activities, including commercial aeronautical activities offering services to the public at the Airport."[13]

Although several (on the order of a dozen) airports have embarked on efforts to adopt both Stage 2 and 3 restrictions in the past two decades, FAA has found that only one, Naples Municipal Airport, a general aviation (GA) airport in Naples, Florida, has fully complied with Part 161 analysis, notice, and documentation requirements for a ban on Stage 2 jet operations. FAA found the airport was in violation of prior to FAA grant assurances. The airport operator successfully sued FAA to overturn that ruling and has implemented the restriction.

ANCA and Part 161 specifically exempt Stage 3 use restrictions that were effective on or before October 1, 1990 and Stage 2 restrictions that were proposed before that date. The Logan Airport Noise Rules were promulgated in 1986; therefore, ANCA and Part 161 have no bearing on their continued implementation in their current form. Any future proposals to make the rules more stringent regarding Stage 2 operations or to restrict Stage 3 operations in any way would almost certainly trigger Part 161 notice, analysis, and approval processes for Stage 3 restrictions. In 2006, Massport requested an opinion from FAA regarding the pursuit of a Part 161 waiver or exemption to allow Massport to implement a curfew of nighttime operations of hush-kitted Stage 3 aircraft. FAA informed Massport that a waiver or exemption from the requirements of Part 161 is not authorized under, or consistent with, federal statutory and regulatory requirements. A copy of FAA's letter to Massport was provided in Appendix H, *Noise Abatement* in the *2005 EDR*.

Logan Airport Noise Modeling

To relate portions of the foregoing discussion to the specific noise environment around Logan Airport for this *2018/2019 EDR*, Massport has developed DNL noise contours, TA noise metrics, and population counts for 2018 and 2019 using the latest version of the FAA's AEDT, version 3c, and a proprietary AEDT pre-processor. The pre-processor software takes radar data from individual flights occurring throughout the year, and structures it into a form usable as input to the AEDT. The AEDT serves as the computational "engine" for calculating noise. Prior to 2016, Massport used the FAA's INM with a pre-processor called RealContours™ which operated in a similar manner.

Standard AEDT input methodology involves development of operational inputs and calculation of the DNL for a prototypical average annual day.[14] This approach requires manually collecting, refining, and entering the enormous amount of data averaged over a full year of activity at an airport. Typically, the model inputs may include an aircraft fleet mix with several dozen representative aircraft types, on the order of 100 to 300 representative flight tracks (common for a facility the size of Logan Airport), and runway use and flight track use percentages for three or four categories of aircraft types with similar

13 FAA Order 5190.6(b), "Airport Compliance Manual" Chapter 13, Section 14, paragraph (a). To be approved, restrictions must meet the following six statutory criteria: 1) The proposed restriction is reasonable, nonarbitrary, and nondiscriminatory. 2) The proposed restriction does not create an undue burden on interstate or foreign commerce. 3) The proposed restriction maintains safe and efficient use of the navigable airspace. 4) The proposed restriction does not conflict with any existing federal statute or regulation. 5) The applicant has provided adequate opportunity for public comment on the proposed restriction. 6) The proposed restriction does not create an undue burden on the national aviation system.

14 Guidance on Using the Aviation Environmental Design Tool (AEDT) to Conduct Environmental Modeling for FAA Actions Subject to NEPA, October 27, 2017, Section 3.2, p. 13

performance characteristics. This normal approach to noise modeling meets accepted professional standards and reduces the effort and cost that would be associated with manually entering the parameters for every actual operation. However, it represents a significant simplification of the extraordinary diversity of actual aircraft operations over a year.

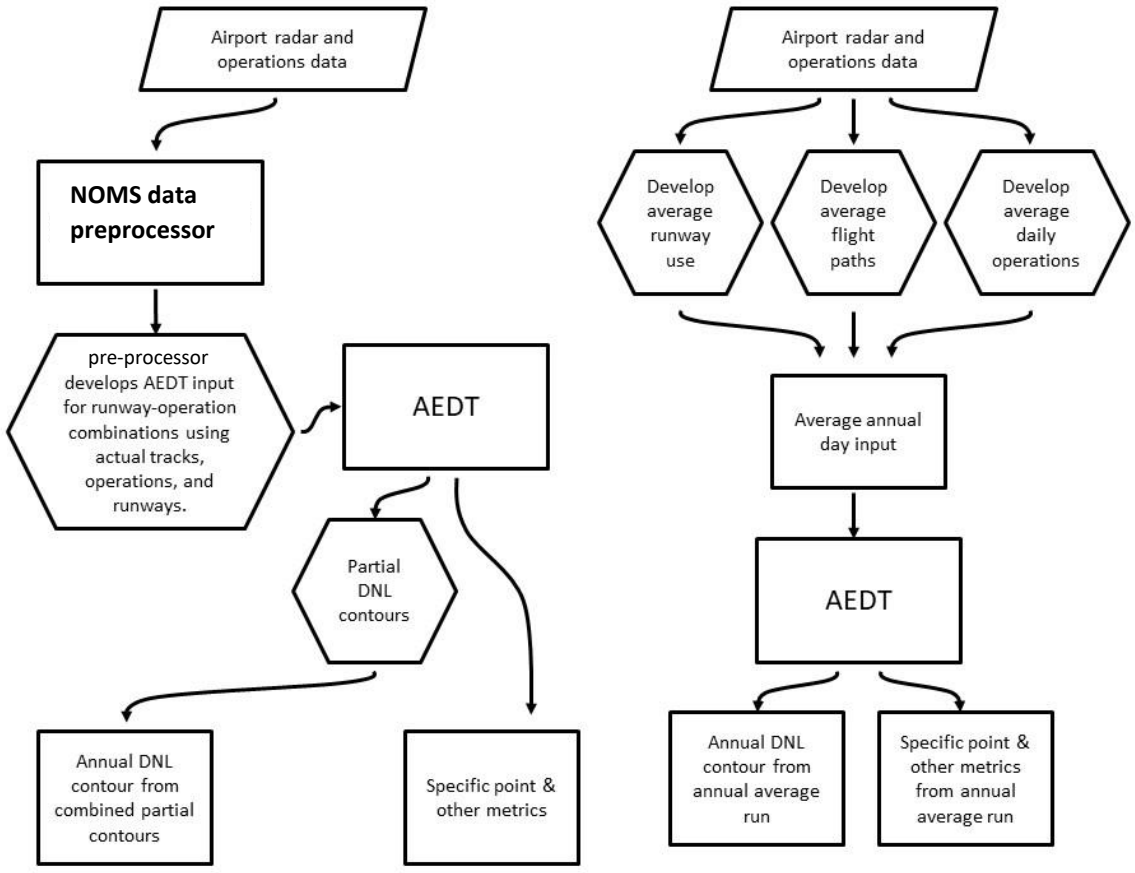
Instead of relying on consolidated data summaries, Massport takes maximum possible advantage of both AEDT's capabilities and the investment that Massport has made in its Noise and Operations Management System (NOMS). The AEDT pre-processor improves the precision of modeling by utilizing operations monitoring results in these key areas:

- Directly converts the flight track for every identified aircraft operation to an AEDT track, rather than assigning multiple operations to a limited number of prototypical tracks.
- Models each operation on the specific runway that it actually used, rather than applying a generalized distribution to broad ranges of aircraft types.
- Models each operation in the time period that it occurred, which realistically represent delays that occur during the year, rather than relying on scheduled flight times.
- Selects the specific airframe and engine combination to model, on an operation-by-operation basis, based on the registration data for each flight wherever possible; otherwise, based on the published compositions of the fleets of the specific airlines operating at Logan Airport.

Figure H-12 provides a schematic representation of Massport's annual noise modeling process compared to the standard AEDT process. The flow chart on the left depicts data from the NOMS system being used as noise model inputs, while the flow chart on the right illustrates the development of a simplified average annual day that would be otherwise necessary.

For 2018, the AEDT noise model used 417,022 flights from the NOMS that retained suitable data. For 2019, the number of usable flights was 410,663.

Figure H-12 Schematic Noise Modeling Process (using NOMS data pre-processor vs. standard AEDT use)



Source: Federal Aviation Administration (FAA), HMMH.

AEDT Noise Analysis

Logan Airport presents a set of unique challenges to modeling software, and over the course of many years, Massport has addressed these challenges by developing a series of adjustments and customizations to better represent the operations, conditions, and terrain that affect noise at Logan Airport. These adjustments have historically been incorporated into INM analyses:

- ***Custom profiles***. The analysis has developed custom climbing and descent profiles based on radar altitude data, rather than using default profiles built into INM. This results in more accurate aircraft thrust calculations, which in turn affects an aircraft's noise emissions.
- ***Daily weather data***. Noise calculations have used average weather conditions for each day to determine aircraft performance and sound propagation.

- ***Hill effect adjustment***. Due to discrepancies between noise monitor data and INM calculations in the Orient Heights area close to the Airport, adjustments have been included to improve the accuracy of calculations in areas with direct line-of-sight exposure to the airfield.
- ***Over-water adjustment***. The INM calculations assume that noise is absorbed as it propagates over ground. However, Logan Airport is mostly surrounded by water, which reflects rather than absorbs the sound. This results in higher noise levels in areas near the Airport. An adjustment has been used that allows the INM to assume higher aircraft noise emissions when they are close to the ground.

In 2015, FAA released its next-generation environmental analysis software, the AEDT version 2B.[15] AEDT incorporates the computational engines of the legacy tools INM and the Emissions and Dispersion Modeling System (EDMS) and provides a unified database back end and graphical user interface. With a common set of aircraft and airport data that are updated regularly, AEDT ensures that noise and emissions analyses can be performed with up-to-date information.

Massport first explored the use of AEDT for the *2015 EDR* and adopted AEDT as its ongoing noise model beginning with the *2016 EDR*. In transitioning from INM to AEDT, Massport has investigated how to implement the historical adjustments in the new software. While the Massachusetts state EDR/Environmental Status and Planning Report (ESPR) process does not require FAA approval, Massport wishes to perform analysis to FAA standards. Massport has held numerous meetings with FAA since the release of AEDT to get approval for adjustments to AEDT. The following is a summary of the proposed measures to address the adjustments previously implemented in INM, and FAA's response.

- ***Altitude control codes***. This feature of AEDT performs a similar function to the custom profiles used previously, using altitude data to more accurately calculate aircraft thrust levels. Since this is a capability built into AEDT, **FAA approval is implicit** and was not requested.
- ***Aircraft weight adjustment***. It has been determined that aircraft takeoff weights, based on Department of Transportation T-100 data, do not always match the weight assumptions made by AEDT. Consequently, an adjustment has been made to more accurately represent takeoff weight, and therefore aircraft thrust during takeoff. Massport utilized the new alternative weight departure profiles added in AEDT 3b and available in AEDT 3c if they were available for an aircraft in the AEDT. **FAA concurs with this approach**.
- ***Annual weather***. AEDT by default uses 30-year average weather for the Airport. Massport has proposed using an annual average for the year under study to better capture year-to-year variations in weather.[16] **FAA concurs with this approach**.
- ***Hill effects***. Massport has proposed including the adjustments previously used in INM. **FAA does not concur with this approach**. There are ongoing research studies to develop modifications to the AEDT model and FAA recommends waiting until those methods are available.
- ***Over water adjustment***. Massport explored other options including the existing INM adjustment method. Massport proposed including the adjustments previously used in INM. **FAA does not concur with this approach**. There are ongoing research studies to develop modifications to the AEDT model and FAA recommends waiting until those methods are available.

15 AEDT 2A was released in 2013 and replaced the NIRS model for airspace analysis. AEDT 2B replaces, AEDT 2A, INM and EDMS.

16 Daily weather is currently not an option in AEDT modeling inputs, however Massport will continue to request that FAA allow for such an option.

Massport will continue to work with FAA to address these issues and to incorporate enhancements to AEDT as they become available. In March 2017, the Airport Cooperative Research Program (ACRP) published an FAA-sponsored study entitled "Improving AEDT Noise Modeling of Ground Surfaces." The study recommends a methodology and provides guidance for implementation in AEDT, however at the time of this study, FAA has not recommended the method for use with AEDT or incorporated the ACRP study information into the AEDT.

In March 2018, ACRP published "Enhanced AEDT Modeling of Aircraft Arrival and Departure Profiles Volume 1: Guidance."[17] It highlights new data with alternate default profiles for specific aircraft and new methodology available to model users to customize flight profiles in greater detail than was previously available. The study recommends a methodology and provides guidance for implementation in AEDT, however at the time of this study, FAA has not recommended the method for use with AEDT or incorporated the ACRP study information into the AEDT.

At this time, FAA has concurred with adjustments for annual average weather and the adjustment of aircraft stage length, but disapproved adjustments for over-water effects and elevated terrain line-of-sight exposure. Massport has performed the AEDT analyses for 2018 and 2019 using only FAA-approved adjustments.

FAA's AEDT version 2c Service Pack 2 (AEDT 2c SP2) was released for general use on March 13, 2017; it was the version used to generate the 2016 DNL contours and accompanying noise analyses. AEDT version 2d was released on September 27, 2017. FAA guidance states that an airport noise modeling project should use the most current model version available at the time the project begins. Massport used AEDT 2d for the 2017 DNL contours and accompanying noise analyses. AEDT version 3b was released on September 24, 2019. AEDT version 3c was originally released on March 6, 2020 and re-released on June 19, 2020. Massport used the re-released AEDT version 3c for all of the 2018 and 2019 noise modeling contained in this EDR.

The updates to AEDT 2d primarily focused on aircraft performance modeling and emissions calculations. Six new aircraft types were added to the AEDT database since version 2d; four of these (the A350-941, the G650ER, the A320-271N, and the FAL900EX) are included in the 2018 and 2019 noise modeling. Data for three other aircraft types (737MAX8, 737800, and 767300) were updated. In May 2020, the FAA released data for a 767-300ER aircraft which could be incorporated into AEDT 3c. This is a new aircraft type in addition to the 767-300 already in the model. Massport evaluated the 2018 and 2019 data and determined that over 60 percent of the 767-300 fleet would use this type if available in the AEDT. Therefore, Massport included this type in the 2018 and 2019 AEDT modeling as the U_7673ER type.

The most significant changes in the model from AEDT 2d to AEDT 3c are reduced thrust/alternative weight aircraft performance profiles. Further updates to the aircraft noise and performance (ANP) model from versions 3b to 3c include a physics-based thrust calculation for approach, a new fuel burn calculation method, and aircraft acceleration parameters at altitudes higher than 10,000 feet.

17 Airport Cooperative Research Program Web-Only Document 36: Enhanced AEDT Modeling of Aircraft Arrival and Departure Profiles, Volume 1: Guidance. http://www.trb.org/Main/Blurbs/178074.aspx.

The differences between AEDT 3c and AEDT 2d with regard to DNL contour results are minimal. The following sections of this appendix provide several tables describing the AEDT input data for 2018 and 2019. Where possible, the data for 2017 are included for comparison.

2018/2019 Radar Data

Logan Airport's radar data provide the key to the AEDT pre-processor system. The Passive Surveillance Radar System (PASSUR) radar dataset was used for the *2004 ESPR* through the *2008 EDR*. For the *2009 EDR* through the *2014 EDR*, Massport used the radar data from its Harris NOMS system. These radar data are obtained from a multilateration system of eight sensors deployed around the Airport. The positioning data from these sensors are correlated to provide better, more accurate coverage of aircraft (in areas where the traditional FAA radar has limitations) and provide a more complete set of points to define each track. Traditional radar provides points every four to five seconds where the multilateration system provides data every second.

In 2015, the Massport system switched to FAA's NextGen data feed, which integrates the Automatic Dependent Surveillance Broadcast (ADS-B) feed with multiple redundant real-time FAA surveillance sources into a single fused data feed. The NextGen data is a "multisensor based" subscription data source that aggregates all available surveillance sources, including:

- FAA En Route Radars;
- FAA Terminal Radars;
- FAA Airport Surface Detection Equipment X Band (ASDE-X) Systems;
- FAA Aircraft Situational Display to Industry (ASDI) Oceanic and Canadian Tracks only; and
- Harris ADS-B Data Feed.

Logan Airport is supported by an FAA ASDE-X system which provides highly accurate one-second data points for aircraft situational awareness on the Airport and within at least 5 miles of the Airport. These data are fused with the other sources and provided to the Massport NOMS system in a geo-referenced data format. The geo-referenced radar data are imported into the AEDT model, which is built on a geo-referenced platform to retain accuracy of the data for modeling.

The system was able to collect 365 complete days of data for both 2018 and 2019 with approximately 98 and 97 percent (respectively) of these tracks (417,022 out of the total 424,865 in 2018 and 410,663 out of the total 424,268 in 2019) usable for the development of the noise exposure contours.

Fleet Mix

The 2018 and 2019 radar data were first processed to establish a baseline set of operations. After processing, the operations from these tracks were then scaled upwards by airline and aircraft type to match the reported totals provided by Massport for the respective year. **Tables H-1a** (2019), **H-1b** (2018), and **H-1c** (2017 for comparison) provide the scaled annual operations, by Aircraft Noise and Performance (ANP) aircraft type. Each ANP type listed in **Tables H-1a, H1-b,** and **H-1c** is also mapped to a Runway Use group based on its weight and performance characteristics described in the Runway Use section below.

Regional jets (RJ) are defined as those aircraft with 90 or fewer seats, consistent with the categorization in Chapter 2, *Activity Levels*.[18] For years prior to 2010, the RJs in this report were classified as aircraft with less than 100 seats. When RJs first started gaining popularity, the aircraft types available were typically 50 seats or less with the traditional air carrier jet being 100 seats and higher. As newer aircraft types have become available, the smaller 35 to 50 seat types have been replaced by 70 to 99-seat types, with the 90 and above seat types flying many of the traditional air carrier routes. The majority of the newer types fall into two categories: the 70- to 75-seat category, which remain categorized as RJs, and the 91- to 99-seat category, which are categorized as air carrier jets. The Embraer 190 falls into this category and is now in the Light Jet B group.

18 U.S. Code, 2006 Edition, Supplement 3, Title 49 – Transportation Subtitle VII – Aviation Programs Part A – Air Commerce and Safety, Subpart II, Economic Regulation, Chapter 417 - Operations or Carriers, Subchapter III - Regional Air Service Incentive Program, Sec. 41762 – Definitions – defines RJ air carrier service to be aircraft with a maximum of 75 seats. Therefore, this report categorizes aircraft with 70-75 seats and below as RJ and aircraft with 90 seats and higher aircraft as air carrier (Note: there are no types with 75 to 90 seats).

Table H-1a 2019 Annual Modeled Operations

		Arrivals		Departures		
ANP Type	**Group**	**Day**	**Night**	**Day**	**Night**	**Total**
Commercial Jet Operations						
7478	Heavy Jet A	210	0	209	1	419
747400	Heavy Jet A	277	3	274	6	559
A340-211	Heavy Jet A	358	4	146	216	725
A340-642	Heavy Jet A	308	4	295	16	623
A380-841	Heavy Jet A	201	0	201	0	402
A380-861	Heavy Jet A	160	0	3	157	320
767300	Heavy Jet B	14	1	11	4	30
767400	Heavy Jet B	50	1	49	2	102
777200	Heavy Jet B	1,058	295	1,003	350	2,707
777300	Heavy Jet B	1	0	1	0	2
767CF6	Heavy Jet B	87	40	6	121	254
767JT9	Heavy Jet B	120	17	3	134	273
7773ER	Heavy Jet B	848	127	40	935	1,949
7878R	Heavy Jet B	1,867	42	1,396	514	3,819
A300-622R	Heavy Jet B	410	665	615	460	2,151
A330-301	Heavy Jet B	2,082	4	1,709	377	4,172
A330-343	Heavy Jet B	1,576	445	1,224	797	4,043
A350-941	Heavy Jet B	250	1	242	9	502
DC1010	Heavy Jet B	30	10	24	16	81
DC1030	Heavy Jet B	18	13	14	17	63
MD11GE	Heavy Jet B	38	6	44	1	89
MD11PW	Heavy Jet B	13	3	15	1	32
U_7673ER	Heavy Jet B	2,455	841	2,147	1,148	6,590
717200	Light Jet A	1,656	390	1,482	564	4,093
737800	Light Jet A	15,886	6,442	18,296	4,033	44,658
MD9025	Light Jet A	3	0	3	0	6
MD9028	Light Jet A	1	1	1	1	4
737300	Light Jet B	1	0	1	0	2
737400	Light Jet B	24	12	24	12	71
737700	Light Jet B	5,763	1,973	6,263	1,474	15,473
757300	Light Jet B	289	20	278	31	618
737MAX8	Light Jet B	192	191	228	154	765
737N17	Light Jet B	1	0	0	1	2
757PW	Light Jet B	2,842	1,098	3,113	826	7,879
757RR	Light Jet B	1,767	598	2,128	237	4,730
A319-131	Light Jet B	6,840	1,220	6,820	1,241	16,121
A320-211	Light Jet B	3,642	1,047	4,252	437	9,380
A320-232	Light Jet B	17,864	6,681	20,414	4,131	49,090
A320-271N	Light Jet B	507	206	508	204	1,425

Table H-1a 2019 Annual Modeled Operations (Continued)

		Arrivals		Departures		
ANP Type	**Group**	**Day**	**Night**	**Day**	**Night**	**Total**
Commercial Jet Operations, continued						
A321-232	Light Jet B	17,276	6,158	19,398	4,036	46,868
EMB190	Light Jet B	29,533	6,367	29,873	6,027	71,800
MD83	Light Jet B	5	0	4	1	10
CL600	RJ	783	19	745	58	1,605
CNA750	RJ	1	0	1	0	2
CRJ9-ER	RJ	5,246	560	5,159	646	11,610
CRJ9-LR	RJ	733	30	625	138	1,526
EMB145	RJ	18	0	17	1	36
EMB14L	RJ	1,655	119	1,763	11	3,549
EMB170	RJ	5,264	375	5,204	436	11,279
EMB175	RJ	8,863	1,033	8,972	924	19,792
FAL20	RJ	1	1	2	0	3
G650ER	RJ	1	0	1	0	2
GV	RJ	2	0	2	0	3
LEAR35	RJ	7	5	8	3	24
Commercial Jets Subtotal		**139,096**	**37,071**	**145,257**	**30,910**	**352,334**
Commercial Non-Jet Operations						
BEC58P	Non-jet	17,514	165	17,608	71	35,358
CNA208	Non-jet	1,126	12	1,118	20	2,276
DHC6	Non-jet	5	12	16	0	33
DHC830	Non-jet	3,764	152	3,727	189	7,833
GASEPV	Non-jet	2	0	2	0	4
SF340	Non-jet	208	0	208	0	416
Commercial Non-Jet Operations Subtotal		**22,619**	**341**	**22,681**	**279**	**45,920**
Commercial Aircraft Total		**161,715**	**37,412**	**167,938**	**31,189**	**398,254**
General Aviation Operations						
A109	Helicopter	7	0	7	0	14
B206L	Helicopter	11	0	11	0	21
B407	Helicopter	22	2	20	4	48
B427	Helicopter	1	0	1	0	2
B429	Helicopter	8	14	11	11	43
B430	Helicopter	3	1	4	0	8
EC130	Helicopter	34	2	30	6	72
H500D	Helicopter	2	0	2	0	4
R44	Helicopter	20	1	19	2	43
S76	Helicopter	148	28	135	41	351

Table H-1a 2019 Annual Modeled Operations (Continued)

		Arrivals		Departures		
ANP Type	**Group**	**Day**	**Night**	**Day**	**Night**	**Total**
General Aviation Operations, continued						
SA330J	Helicopter	193	24	191	26	434
SA350D	Helicopter	3	0	2	1	6
SA355F	Helicopter	31	1	32	0	64
SA365N	Helicopter	5	1	5	1	12
747400	Heavy Jet A	1	0	1	0	2
747SP	Heavy Jet A	1	0	1	0	2
A340-211	Heavy Jet A	1	0	0	1	2
A340-642	Heavy Jet A	2	0	2	0	4
777300	Heavy Jet B	2	1	3	0	6
7773ER	Heavy Jet B	0	1	0	1	2
7878R	Heavy Jet B	1	0	1	0	2
A330-301	Heavy Jet B	1	0	1	0	2
A330-343	Heavy Jet B	1	0	1	0	2
C17	Heavy Jet B	1	0	1	0	2
U_7673ER	Heavy Jet B	1	0	1	0	2
737800	Light Jet A	0	1	1	0	2
727EM1	Light Jet A	1	0	0	1	2
737400	Light Jet B	23	4	18	9	54
737700	Light Jet B	5	0	5	0	10
757PW	Light Jet B	0	1	0	1	2
757RR	Light Jet B	1	0	1	0	2
A319-131	Light Jet B	4	0	3	1	8
A321-232	Light Jet B	0	1	1	0	2
EMB190	Light Jet B	1	0	1	0	2
MD81	Light Jet B	1	0	1	0	2
BD-700-1A10	RJ	325	36	319	41	720
BD-700-1A11	RJ	140	17	143	14	314
CIT3	RJ	25	0	25	0	50
CL600	RJ	1,506	139	1,535	110	3,290
CL601	RJ	278	25	279	23	604
CNA500	RJ	46	3	43	6	97
CNA510	RJ	195	9	191	13	407
CNA525C	RJ	388	60	383	65	897
CNA55B	RJ	904	79	920	63	1,966
CNA560E	RJ	2	1	3	0	6
CNA560U	RJ	679	50	687	42	1,458
CNA560XL	RJ	334	14	334	14	695
CNA680	RJ	1,104	72	1,126	51	2,353
CNA750	RJ	873	70	889	54	1,886
CRJ9-ER	RJ	0	1	1	0	2

Table H-1a 2019 Annual Modeled Operations (Continued)

		Arrivals		Departures		
ANP Type	**Group**	**Day**	**Night**	**Day**	**Night**	**Total**
General Aviation Operations, continued						
ECLIPSE500	RJ	11	1	11	1	23
EMB145	RJ	29	3	29	3	64
FAL20	RJ	4	0	3	1	8
FAL900EX	RJ	283	21	278	26	608
G650ER	RJ	174	28	190	12	405
GIIB	RJ	6	1	7	0	14
GIV	RJ	564	77	568	73	1,282
GV	RJ	398	42	400	40	879
IA1125	RJ	180	21	185	15	401
LEAR25	RJ	1	0	1	0	2
LEAR35	RJ	837	135	861	110	1,942
MU3001	RJ	314	22	311	25	672
1900D	Non-jet	1	0	1	0	2
BEC58P	Non-jet	426	26	426	26	904
C130	Non-jet	4	0	4	0	8
CNA172	Non-jet	24	2	26	0	52
CNA182	Non-jet	75	0	75	0	149
CNA206	Non-jet	5	0	5	0	10
CNA208	Non-jet	1,137	99	1,138	99	2,473
CNA441	Non-jet	17	3	16	4	41
COMSEP	Non-jet	317	34	335	17	703
DHC6	Non-jet	780	81	749	112	1,722
DHC8	Non-jet	2	0	2	0	4
EMB120	Non-jet	0	1	0	1	2
GASEPF	Non-jet	15	0	15	0	29
GASEPV	Non-jet	204	12	209	8	434
HS748A	Non-jet	2	0	2	0	4
PA28	Non-jet	23	2	25	0	50
PA30	Non-jet	1	0	1	0	2
PA31	Non-jet	26	0	25	1	52
PA42	Non-jet	2	1	2	1	6
	General Aviation Total	**13,191**	**1,270**	**13,286**	**1,175**	**28,922**
	Grand Total	**174,907**	**38,681**	**181,224**	**32,364**	**427,176**

Source: HMMH, 2020.
Notes: ANP - Aircraft Noise and Performance.
BEC58P is the AEDT substitution for the Cessna 402.
The CRJ9-ER in the RJ category is the CRJ700 aircraft.
Annual operations modeled in the 2019 annual contour.
Some totals may not match due to rounding.

Table H-1b 2018 Annual Modeled Operations

		Arrivals		Departures		
ANP Type	**Group**	**Day**	**Night**	**Day**	**Night**	**Total**
Commercial Jet Operations						
74720B	Heavy Jet A	0	1	0	1	2
747400	Heavy Jet A	280	28	272	36	616
7478	Heavy Jet A	285	0	285	0	569
A340-211	Heavy Jet A	304	2	139	167	612
A340-642	Heavy Jet A	245	0	127	118	490
A380-841	Heavy Jet A	88	1	88	1	178
A380-861	Heavy Jet A	2	0	0	2	4
767300	Heavy Jet B	27	0	23	4	54
767400	Heavy Jet B	10	3	8	5	26
767CF6	Heavy Jet B	96	30	3	123	252
767JT9	Heavy Jet B	108	30	8	130	275
777200	Heavy Jet B	932	194	852	274	2,251
7773ER	Heavy Jet B	870	116	123	863	1,972
7878R	Heavy Jet B	1,684	9	1,393	300	3,386
A300-622R	Heavy Jet B	455	540	642	352	1,990
A310-304	Heavy Jet B	30	1	17	14	62
A330-301	Heavy Jet B	2,033	10	1,725	319	4,087
A330-343	Heavy Jet B	985	8	432	561	1,986
A350-941	Heavy Jet B	630	3	399	235	1,267
DC1010	Heavy Jet B	46	22	50	18	136
DC1030	Heavy Jet B	7	5	7	5	24
MD11GE	Heavy Jet B	62	11	54	19	146
MD11PW	Heavy Jet B	30	3	23	10	66
U_7673ER	Heavy Jet B	2,222	822	2,146	898	6,089
717200	Light Jet A	1,861	325	1,621	564	4,371
DC93LW	Light Jet A	0	1	0	1	2
MD9025	Light Jet A	185	6	150	41	382
MD9028	Light Jet A	63	1	54	10	128
737300	Light Jet B	1	0	1	0	2
737400	Light Jet B	47	14	36	24	121
737700	Light Jet B	6,606	2,250	7,035	1,820	17,711
737800	Light Jet B	20,542	7,363	23,471	4,434	55,809
737MAX8	Light Jet B	573	174	621	127	1,496
757300	Light Jet B	67	30	74	23	194
757PW	Light Jet B	2,551	830	2,721	659	6,760
757RR	Light Jet B	771	680	1,285	166	2,902
A319-131	Light Jet B	7,811	1,172	7,739	1,244	17,965
A320-211	Light Jet B	4,106	1,369	5,082	393	10,950
A320-232	Light Jet B	17,720	6,780	20,222	4,277	48,999

Table H-1b 2018 Annual Modeled Operations (Continued)

		Arrivals		Departures		
ANP Type	**Group**	**Day**	**Night**	**Day**	**Night**	**Total**
Commercial Jet Operations, continued						
A320-271N	Light Jet B	170	36	172	34	411
A321-232	Light Jet B	14,198	5,489	16,099	3,588	39,374
EMB190	Light Jet B	28,021	4,677	27,711	4,987	65,396
MD83	Light Jet B	133	5	134	4	276
BD-700-1A10	RJ	1	0	0	1	2
CL600	RJ	2,209	28	2,103	134	4,474
CNA750	RJ	1	0	1	0	2
CRJ9-ER	RJ	7,314	994	7,139	1,169	16,616
CRJ9-LR	RJ	63	10	56	17	146
EMB145	RJ	183	7	183	7	379
EMB14L	RJ	2,865	196	2,772	289	6,123
EMB170	RJ	2,197	103	2,183	117	4,601
EMB175	RJ	5,965	935	6,151	749	13,800
FAL20	RJ	1	0	1	0	2
LEAR35	RJ	6	4	5	5	21
Commercial Jets Subtotal		**137,658**	**35,319**	**143,636**	**29,341**	**345,954**
Commercial Non-Jet Operations						
BEC58P	Non-jet	17,433	329	17,659	103	35,523
CNA208	Non-jet	802	6	795	13	1,617
DHC6	Non-jet	2	15	17	0	34
DHC8	Non-jet	5	0	5	0	10
DHC830	Non-jet	4,067	160	3,994	234	8,456
SF340	Non-jet	745	0	745	0	1,490
Commercial Non-Jet Operations Subtotal		**23,054**	**511**	**23,215**	**350**	**47,130**
Commercial Aircraft Total		**160,712**	**35,830**	**166,851**	**29,691**	**393,084**
General Aviation Operations						
A109	Helicopter	10	0	7	3	20
B206L	Helicopter	8	1	7	2	18
B407	Helicopter	27	0	25	2	55
B427	Helicopter	1	0	1	0	2
B429	Helicopter	23	0	18	5	45
B430	Helicopter	2	0	2	0	4
EC130	Helicopter	24	5	24	6	59
R44	Helicopter	14	0	14	0	27
S76	Helicopter	199	26	183	41	449
SA330J	Helicopter	191	8	175	24	398

Table H-1b 2018 Annual Modeled Operations (Continued)

		Arrivals		Departures		
ANP Type	**Group**	**Day**	**Night**	**Day**	**Night**	**Total**
General Aviation Operations, continued						
SA350D	Helicopter	17	0	15	2	33
SA355F	Helicopter	28	1	28	1	59
SA365N	Helicopter	4	0	3	1	8
747400	Heavy Jet A	1	0	1	0	2
767300	Heavy Jet B	2	0	0	2	4
C17	Heavy Jet B	1	0	1	0	2
727EM1	Light Jet A	1	0	1	0	2
727EM2	Light Jet A	1	0	1	0	2
737700	Light Jet B	2	0	2	0	4
MD81	Light Jet B	3	2	0	5	10
BD-700-1A10	RJ	307	35	317	25	684
BD-700-1A11	RJ	192	15	189	18	414
CIT3	RJ	22	2	22	2	47
CL600	RJ	1,461	132	1,484	108	3,185
CL601	RJ	302	45	311	36	694
CNA500	RJ	35	4	38	1	78
CNA510	RJ	133	8	133	8	282
CNA525C	RJ	470	62	470	62	1,064
CNA55B	RJ	813	61	830	44	1,748
CNA560E	RJ	34	4	36	2	76
CNA560U	RJ	822	64	829	57	1,772
CNA560XL	RJ	356	24	355	25	758
CNA680	RJ	897	57	891	64	1,909
CNA750	RJ	1,024	97	1,043	78	2,242
ECLIPSE500	RJ	11	1	12	0	24
EMB145	RJ	59	5	55	9	127
FAL20	RJ	3	0	3	0	6
FAL900EX	RJ	303	32	307	29	670
G650ER	RJ	207	33	220	21	480
GIIB	RJ	6	2	7	1	16
GIV	RJ	611	79	606	84	1,380
GV	RJ	435	34	422	46	937
IA1125	RJ	155	12	159	9	335
LEAR25	RJ	1	0	0	1	2
LEAR35	RJ	1,026	131	1,039	118	2,315
MU3001	RJ	442	28	436	34	941
1900D	Non-jet	2	1	3	0	6
BEC58P	Non-jet	509	22	507	24	1,062
CNA172	Non-jet	18	1	19	0	37
CNA182	Non-jet	115	0	115	0	229

Table H-1b 2018 Annual Modeled Operations (Continued)

		Arrivals		Departures		
ANP Type	**Group**	**Day**	**Night**	**Day**	**Night**	**Group**
General Aviation Operations, continued						
CNA206	Non-jet	22	0	22	0	43
CNA208	Non-jet	1,228	146	1,270	103	2,748
CNA441	Non-jet	25	3	23	6	57
COMSEP	Non-jet	331	33	344	20	729
DHC6	Non-jet	876	91	864	103	1,934
DO328	Non-jet	2	0	2	0	4
GASEPF	Non-jet	9	0	9	0	18
GASEPV	Non-jet	280	7	280	7	574
PA28	Non-jet	28	0	28	0	57
PA30	Non-jet	1	0	1	0	2
PA31	Non-jet	26	0	25	1	53
	General Aviation Total	**14,156**	**1,314**	**14,234**	**1,236**	**30,940**
	Grand Total	**174,868**	**37,143**	**181,085**	**30,927**	**424,024**

Source: HMMH, 2020.
Notes: ANP - Aircraft Noise and Performance.
BEC58P is the AEDT substitution for the Cessna 402.
The CRJ9-ER in the RJ category is the CRJ700 aircraft.
Annual operations modeled in the 2018 annual contour.
Some totals may not match due to rounding.

Table H-1c 2017 Annual Modeled Operations

		Arrivals		Departures		
ANP Type	**Group**	**Day**	**Night**	**Day**	**Night**	**Total**
Commercial Jet Operations						
74720B	Heavy Jet A	2	2	2	1	6
747400	Heavy Jet A	428	18	375	71	891
7478	Heavy Jet A	343	0	341	2	686
A340-211	Heavy Jet A	189	4	107	87	387
A340-642	Heavy Jet A	97	1	81	17	197
A380-861	Heavy Jet A	90	0	88	2	179
767300	Heavy Jet B	1,619	627	1,496	750	4,493
767400	Heavy Jet B	14	3	12	5	34
767CF6	Heavy Jet B	29	11	8	32	80
767JT9	Heavy Jet B	52	13	2	63	130
777200	Heavy Jet B	1,024	182	1,105	101	2,412
777300	Heavy Jet B	16	1	8	9	34
7773ER	Heavy Jet B	841	160	228	773	2,002
7878R	Heavy Jet B	1,614	27	1,345	296	3,282
A300-622R	Heavy Jet B	374	639	572	441	2,025
A310-304	Heavy Jet B	436	47	244	239	966
A330-301	Heavy Jet B	2,463	12	2,094	381	4,949
A330-343	Heavy Jet B	1,565	13	751	827	3,157
DC1010	Heavy Jet B	168	97	199	66	531
DC1030	Heavy Jet B	16	7	15	8	46
MD11GE	Heavy Jet B	52	14	45	21	132
MD11PW	Heavy Jet B	23	4	21	6	54
717200	Light Jet A	2,282	468	2,151	598	5,499
MD9025	Light Jet A	476	25	490	11	1,002
MD9028	Light Jet A	238	12	246	4	501
737300	Light Jet B	1,193	432	1,349	275	3,250
737400	Light Jet B	14	9	9	15	47
737500	Light Jet B	0	2	0	2	4
737700	Light Jet B	6,696	2,064	7,339	1,421	17,520
737800	Light Jet B	18,826	6,821	20,999	4,649	51,295
7378MAX	Light Jet B	16	0	15	1	32
757300	Light Jet B	716	313	772	257	2,059
757PW	Light Jet B	1,303	505	1,258	547	3,612
757RR	Light Jet B	2,165	491	2,396	263	5,316
A319-131	Light Jet B	8,914	1,633	9,053	1,494	21,094
A320-211	Light Jet B	3,691	1,144	4,452	383	9,670
A320-232	Light Jet B	17,318	6,766	20,347	3,737	48,169
A321-232	Light Jet B	8,619	3,132	10,286	1,465	23,502
EMB190	Light Jet B	28,627	4,399	28,269	4,757	66,053
MD83	Light Jet B	503	72	534	42	1,151

Table H-1c 2017 Annual Modeled Operations (Continued)

		Arrivals		Departures		
ANP Type	**Group**	**Day**	**Night**	**Day**	**Night**	**Total**
Commercial Jet Operations, continued						
CL600	RJ	4,614	125	4,442	296	9,477
CRJ9-ER	RJ	6,024	548	5,842	730	13,144
EMB145	RJ	314	28	303	39	684
EMB14L	RJ	1,060	28	1,012	76	2,176
EMB170	RJ	1,588	167	1,615	140	3,509
EMB175	RJ	4,533	708	4,575	667	10,483
LEAR35	RJ	1	1	1	1	4
Commercial Jets Subtotal		**131,184**	**31,779**	**136,894**	**26,069**	**325,926**
Commercial Non-Jet Operations						
BEC58P	Non-jet	16,256	361	16,557	61	33,235
DHC8	Non-jet	43	0	43	0	87
DHC830	Non-jet	3,400	158	3,323	236	7,117
PA42	Non-jet	190	3	193	0	386
SF340	Non-jet	1,719	0	1,719	0	3,438
Commercial Non-Jet Operations Subtotal		**21,609**	**522**	**21,835**	**296**	**44,264**
Commercial Aircraft Total		**152,793**	**32,302**	**158,729**	**26,366**	**370,190**
General Aviation Operations						
A109	Helicopter	17	1	17	1	36
B206L	Helicopter	2	0	2	0	4
B407	Helicopter	2	0	2	0	4
B429	Helicopter	4	0	4	0	8
B430	Helicopter	2	0	2	0	4
EC130	Helicopter	8	0	8	1	17
H500D	Helicopter	1	0	1	0	2
S76	Helicopter	116	11	107	20	254
SA330J	Helicopter	170	9	166	13	358
SA350D	Helicopter	3	0	3	0	6
SA355F	Helicopter	2	0	2	0	4
SA365N	Helicopter	2	0	2	0	4
747400	Heavy Jet A	0	1	0	1	2
747SP	Heavy Jet A	1	1	2	1	6
767300	Heavy Jet B	2	0	2	0	4
A330-301	Heavy Jet B	2	0	2	0	4
727EM1	Light Jet A	2	0	1	1	4
727EM2	Light Jet A	0	1	1	0	2
737400	Light Jet B	18	8	20	6	51

Table H-1c 2017 Annual Modeled Operations (Continued)

		Arrivals		Departures		
ANP Type	**Group**	**Day**	**Night**	**Day**	**Night**	**Total**
General Aviation Operations, continued						
737700	Light Jet B	12	1	12	1	26
737N17	Light Jet B	0	1	0	1	2
757300	Light Jet B	1	0	0	1	2
757RR	Light Jet B	0	1	1	0	2
A319-131	Light Jet B	3	0	2	1	6
A320-211	Light Jet B	1	0	1	0	2
EMB190	Light Jet B	3	1	4	0	8
MD81	Light Jet B	1	2	0	3	6
BD-700-1A10	RJ	351	35	347	39	772
BD-700-1A11	RJ	97	14	103	8	220
CIT3	RJ	30	2	28	4	64
CL600	RJ	1,269	103	1,289	83	2,745
CL601	RJ	203	21	208	16	448
CNA500	RJ	138	17	146	10	311
CNA510	RJ	86	10	85	11	192
CNA525C	RJ	266	51	293	23	633
CNA55B	RJ	629	60	634	54	1,377
CNA560E	RJ	148	9	151	7	315
CNA560U	RJ	904	77	918	64	1,963
CNA560XL	RJ	202	13	202	13	430
CNA680	RJ	619	46	639	26	1,330
CNA750	RJ	1,465	148	1,493	119	3,225
ECLIPSE500	RJ	40	0	39	1	79
EMB145	RJ	31	2	33	0	66
EMB14L	RJ	22	1	24	0	47
GIV	RJ	575	49	578	47	1,249
GV	RJ	491	73	519	45	1,128
IA1125	RJ	182	9	184	8	382
LEAR35	RJ	1,177	129	1,178	128	2,611
MU3001	RJ	473	27	470	30	1,000
1900D	Non-jet	4	0	4	0	8
BEC58P	Non-jet	705	44	703	46	1,498
CNA172	Non-jet	29	0	29	0	58
CNA182	Non-jet	71	1	71	1	143
CNA206	Non-jet	20	0	20	0	40
CNA208	Non-jet	1,272	267	1,441	98	3,078
CNA441	Non-jet	37	5	41	2	85
COMSEP	Non-jet	352	52	375	30	808
DHC6	Non-jet	856	97	854	98	1,905
DHC8	Non-jet	2	0	2	0	4

Table H-1c 2017 Annual Modeled Operations (Continued)

		Arrivals		Departures		
ANP Type	**Group**	**Day**	**Night**	**Day**	**Night**	**Total**
General Aviation						
DO328	Non-jet	7	0	7	0	13
EMB120	Non-jet	2	0	2	0	4
GASEPF	Non-jet	21	0	21	0	41
GASEPV	Non-jet	208	6	205	9	428
PA28	Non-jet	23	0	23	0	45
PA30	Non-jet	7	1	8	0	15
PA42	Non-jet	25	0	24	2	51
SF340	Non-jet	770	2	767	5	1,545
	General Aviation Total	**14,180**	**1,410**	**14,514**	**1,077**	**31,181**
	Grand Total	**166,974**	**33,712**	**173,243**	**27,443**	**401,371**

Source: HMMH, 2018.
Notes: ANP - Aircraft Noise and Performance.
BEC58P is the AEDT substitution for the Cessna 402.
The CRJ9-ER in the RJ category is the CRJ700 aircraft.
Annual operations modeled in the 2017 annual contour.
Some totals may not match due to rounding.

In the calculation of DNL, annual operations data are scaled to represent an average annual day by dividing by the 365 days in a year. To compare operations between years, it is simpler to look at category totals. **Tables H-2a, H-2b,** and **H-2c** summarizes the numbers of average daily operations by categories of aircraft operating at Logan Airport from 1990 through 2019. Operations are summarized by operator category (commercial/GA), aircraft category, and day or night operation (night defined as 10:00 PM to 7:00 AM, consistent with the definition of DNL). GA operations were not included in the noise modeling prior to 1998 and commercial jet operations were not separated until 1999.

Table H-2a Modeled Daily Operations[1] by Commercial and General Aviation (GA) Aircraft – 1990 to 2000

		1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Commercial Aircraft												
Stage 2 Jets[2]	Day	312.40	N/A	228.89	203.34	189.40	156.90	132.40	108.46	84.93	83.30	5.13
	Night	19.99	N/A	13.13	7.44	10.10	5.50	4.79	7.75	5.92	6.66	0.26
	Total	**332.39**	N/A	**242.02**	**210.78**	**199.50**	**162.40**	**137.19**	**116.21**	**90.85**	**89.96**	**5.39**
Stage 3 Jets	Day	288.89	N/A	384.49	418.99	425.70	429.40	439.81	505.08	541.43	597.28	727.09
	Night	57.25	N/A	58.29	65.47	62.80	69.00	80.16	85.06	95.54	98.59	103.66
	Total	**346.14**	N/A	**442.78**	**484.46**	**488.50**	**498.40**	**519.97**	**590.14**	**636.97**	**695.87**	**830.75**
Air Carrier Jets	Day	N/A[3]	N/A	N/A[3]	N/A[3]	N/A[3]	N/A[3]	N/A[3]	N/A[3]	N/A[3]	569.18	648.95
	Night	N/A[3]	N/A	N/A[3]	N/A[3]	N/A[3]	N/A[3]	N/A[3]	N/A[3]	N/A[3]	96.21	99.79
	Total	**N/A[3]**	N/A	**N/A[3]**	**N/A[3]**	**N/A[3]**	**N/A[3]**	**N/A[3]**	**N/A[3]**	**N/A[3]**	**665.39**	**748.74**
Regional Jets[5]	Day	N/A[3]	N/A	N/A[3]	N/A[3]	N/A[3]	N/A[3]	N/A[3]	N/A[3]	N/A[3]	28.10	78.14
	Night	N/A[3]	N/A	N/A[3]	N/A[3]	N/A[3]	N/A[3]	N/A[3]	N/A[3]	N/A[3]	2.38	3.87
	Total	**N/A[3]**	N/A	**N/A[3]**	**N/A[3]**	**N/A[3]**	**N/A[3]**	**N/A[3]**	**N/A[3]**	**N/A[3]**	**30.48**	**82.01**
Non-jets	Day	444.41	N/A	411.84	598.16	541.97	526.85	505.31	514.7	552.56	448.82	409.62
	Night	11.72	N/A	69.32	46.84	13.59	11.14	13.73	27.27	21.86	16.63	21.58
	Total	**456.13**	N/A	**481.16**	**645.00**	**555.56**	**537.99**	**519.04**	**541.97**	**574.42**	**465.45**	**431.20**
Total Commercial Operations												
Operations	Day	1045.70	N/A	1,025.22	1,220.49	1,157.07	1,113.15	1,077.52	1,128.24	1,178.92	1,129.90	1,141.84
	Night	88.96	N/A	140.74	119.75	86.49	85.64	98.68	120.08	123.32	121.88	125.51
	Total	**1,134.66**	N/A	**1,165.96**	**1,340.24**	**1,243.56**	**1,198.79**	**1,176.20**	**1,248.32**	**1,302.24**	**1,251.78**	**1,267.35**
GA Aircraft												
Stage 2 Jets[2]	Day	N/A[4]	N/A	N/A[4]	N/A[4]	N/A[4]	N/A[4]	N/A[4]	N/A[4]	5.25	9.89	7.29
	Night	N/A[4]	N/A	N/A[4]	N/A[4]	N/A[4]	N/A[4]	N/A[4]	N/A[4]	0.40	0.74	0.64
	Total	**N/A[4]**	N/A	**N/A[4]**	**N/A[4]**	**N/A[4]**	**N/A[4]**	**N/A[4]**	**N/A[4]**	**5.65**	**10.63**	**7.93**
Stage 3 Jets	Day	N/A[4]	N/A	N/A[4]	N/A[4]	N/A[4]	N/A[4]	N/A[4]	N/A[4]	30.54	48.46	40.08
	Night	N/A[4]	N/A	N/A[4]	N/A[4]	N/A[4]	N/A[4]	N/A[4]	N/A[4]	4.21	6.55	3.21
	Total	**N/A[4]**	N/A	**N/A[4]**	**N/A[4]**	**N/A[4]**	**N/A[4]**	**N/A[4]**	**N/A[4]**	**34.75**	**55.01**	**43.29**
Non-jets	Day	N/A[4]	N/A	N/A[4]	N/A[4]	N/A[4]	N/A[4]	N/A[4]	N/A[4]	37.29	19.36	34.57
	Night	N/A[4]	N/A	N/A[4]	N/A[4]	N/A[4]	N/A[4]	N/A[4]	N/A[4]	16.28	18.89	1.83
	Total	**N/A[4]**	N/A	**N/A[4]**	**N/A[4]**	**N/A[4]**	**N/A[4]**	**N/A[4]**	**N/A[4]**	**53.57**	**38.25**	**36.40**

Table H-2a Modeled Daily Operations1 by Commercial and General Aviation (GA) Aircraft – 1990 to 2000 (Continued)

		1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Total GA Operations												
Operations	Day	N/A[4]	N/A	N/A[4]	N/A[4]	N/A[4]	N/A[4]	N/A[4]	N/A[4]	73.08	77.71	81.94
	Night	N/A[4]	N/A	N/A[4]	N/A[4]	N/A[4]	N/A[4]	N/A[4]	N/A[4]	20.89	26.17	5.68
	Total	**N/A[4]**	N/A	**N/A[4]**	**N/A[4]**	**N/A[4]**	**N/A[4]**	**N/A[4]**	**N/A[4]**	**93.97**	**103.88**	**87.62**
Overall totals												
Total	Day	1,045.70	N/A	1,025.22	1,220.49	1,157.07	1,113.15	1,077.52	1,128.24	1,252.00	1,207.61	1,223.78
	Night	88.96	N/A	140.74	119.75	86.49	85.64	98.68	120.08	144.21	148.05	131.19
	Total[4]	**1,134.66**	N/A	**1,165.96**	**1,340.24**	**1,243.56**	**1,198.79**	**1,176.20**	**1,248.32**	**1,396.21**	**1,355.66**	**1,354.97**

Table H-2b Modeled Daily Operations[1] by Commercial and General Aviation (GA) Aircraft – 2001 to 2011

		2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Commercial Aircraft												
Stage 2 Jets[2]	Day	1.18	0.05	0.08	0.03	0.05	0.03	0.03	0.01	0.00	0.01	0.01
	Night	0.05	0.00	0.00	0.01	0.01	0.00	0.01	0.01	0.00	0.01	0.00
	Total	**1.23**	**0.05**	**0.08**	**0.05**	**0.06**	**0.03**	**0.04**	**0.02**	**0.00**	**0.02**	**0.01**
Stage 3 Jets	Day	756.24	740.75	717.85	772.39	765.76	767.55	748.13	699.39	667.45	674.25	684.19
	Night	109.77	97.04	92.69	113.24	113.66	114.81	118.29	114.30	103.05	107.92	109.38
	Total	**866.01**	**837.79**	**810.54**	**885.63**	**879.42**	**882.36**	**866.42**	**813.69**	**770.50**	**782.17**	**793.57**
Air Carrier Jets	Day	569.99	500.70	461.06	518.96	505.48	490.63	472.39	443.15	422.92	521.64	571.03
	Night	101.30	83.52	72.69	89.24	91.99	92.71	96.28	89.89	82.21	93.98	99.17
	Total	**671.29**	**584.22**	**533.75**	**608.20**	**597.47**	**583.34**	**568.66**	**533.04**	**505.14**	**615.62**	**670.2**
Regional Jets[5]	Day	186.25	240.05	256.80	253.43	260.34	276.95	275.77	256.24	244.53	152.61	113.16
	Night	8.47	13.52	19.99	24.00	21.68	22.11	22.03	24.40	20.84	13.94	10.21
	Total	**194.72**	**253.57**	**276.79**	**277.43**	**282.01**	**299.06**	**297.80**	**280.64**	**265.37**	**166.55**	**123.37**
Non-jets	Day	317.62	165.45	135.18	133.24	148.77	140.81	145.27	132.52	136.43	138.53	135.18
	Night	10.97	3.45	2.41	3.03	3.02	3.26	3.47	4.00	5.56	5.21	4.73
	Total	**328.58**	**168.89**	**137.59**	**136.28**	**151.79**	**144.07**	**148.73**	**136.52**	**141.99**	**143.74**	**139.91**

Table H-2b Modeled Daily Operations[1] by Commercial and General Aviation (GA) Aircraft – 2001 to 2011 (Continued)

		2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Total Commercial Operations												
Operations	Day	1,075.04	906.25	853.10	905.66	914.59	908.41	893.43	831.92	804.77	812.78	819.39
	Night	120.79	100.49	95.10	116.29	116.68	118.09	121.77	118.31	108.65	113.13	114.11
	Total	**1,195.82**	**1,006.73**	**948.20**	**1,021.95**	**1,031.27**	**1,026.51**	**1,015.19**	**950.23**	**913.42**	**925.91**	**933.5**
GA Aircraft												
Stage 2 Jets[2]	Day	5.15	3.65	2.84	0.94	2.29	1.90	1.24	0.36	0.09	0.27	0.08
	Night	0.50	0.41	0.26	0.14	0.25	0.17	0.19	0.03	0.01	0.04	0.00
	Total	**5.65**	**4.08**	**3.10**	**1.08**	**2.54**	**2.07**	**1.43**	**0.38**	**0.10**	**0.30**	**0.08**
Stage 3 Jets	Day	34.23	37.83	46.21	53.72	58.84	61.08	54.82	43.98	22.31	27.80	52.51
	Night	3.28	6.42	6.98	8.37	9.33	6.57	6.39	4.52	2.28	3.21	5.35
	Total	**37.51**	**44.25**	**53.19**	**62.09**	**68.16**	**67.65**	**61.21**	**48.49**	**23.59**	**31.01**	**57.87**
Non-jets	Day	37.31	17.36	17.81	16.95	14.00	15.05	11.98	15.13	8.19	8.19	18.18
		2001	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
	Night	1.92	4.45	4.40	5.20	4.75	1.39	3.61	1.08	0.74	0.72	1.29
	Total	**39.23**	**21.81**	**22.21**	**22.14**	**18.75**	**16.44**	**15.58**	**16.20**	**8.93**	**8.92**	**19.48**
Total GA Operations												
Operations	Day	76.68	58.84	66.88	71.60	75.12	78.03	68.04	59.46	30.46	36.26	70.78
	Night	5.71	11.29	11.64	13.71	14.33	8.13	10.19	5.62	3.08	3.97	6.65
	Total	**82.39**	**70.13**	**78.52**	**85.31**	**89.46**	**86.15**	**78.22**	**65.05**	**33.54**	**40.22**	**77.43**
Overall totals												
Total	Day	1,151.72	965.09	919.98	977.27	989.71	986.43	961.46	891.39	834.33	849.03	890.16
	Night	126.50	111.78	106.74	130.00	131.02	126.22	131.96	123.93	111.70	117.10	120.76
	Total[4]	**1,278.21**	**1,076.86**	**1,026.72**	**1,107.26**	**1,120.73**	**1,112.66**	**1,093.42**	**1,015.31**	**946.03**	**966.13**	**1,010.92**

Table H-2c	Modeled Daily Operations[1] by Commercial and General Aviation (GA) Aircraft – 2012 to 2019										
		2012	**2013**	**2014**	**2015**	**2016[6]**	**2017**	**2018**	**2019**	**Change 2017 to 2018**	**Change 2018 to 2019**
Commercial Aircraft											
Stage 2 Jets[2]	Day	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Night	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Total	**0.01**	**0.01**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	0.00	0.00
Stage 3 Jets	Day	649.22	667.65	670	685.92	713.65	734.46	770.67	779.05	36.21	8.38
	Night	106.55	115.91	123.6	130.96	142.16	158.49	177.15	186.25	18.66	9.10
	Total	**755.77**	**783.56**	**793.61**	**816.88**	**855.81**	**892.95**	**947.82**	**965.30**	54.87	17.48
Air Carrier Jets	Day	530.76	546.27	556.59	585.55	620.45	636.04	657.25	655.57	21.21	-1.68
	Night	98.68	107.17	115.84	126.36	134.93	148.75	164.09	174.30	15.34	10.21
	Totals	**629.44**	**653.44**	**672.43**	**711.92**	**755.38**	**784.79**	**821.34**	**829.87**	36.54	8.53
Regional Jets[5]	Day	118.46	121.38	113.41	100.36	93.20	98.42	113.42	123.48	15.00	10.06
	Night	7.87	8.74	7.77	4.6	7.23	9.74	13.06	11.95	3.32	(1.12)
	Total	**126.33**	**130.12**	**121.18**	**104.96**	**100.43**	**108.16**	**126.48**	**135.43**	18.33	8.94
Non-jets	Day	133.92	132.33	128.45	125.27	125.88	119.03	126.76	124.11	7.74	(2.66)
	Night	3.06	3.21	2.28	2.41	3.01	2.24	2.36	1.70	0.11	(0.66)
	Total	**136.98**	**135.54**	**130.73**	**127.68**	**128.89**	**121.27**	**129.12**	**125.81**	7.85	(3.31)
Total Commercial Operations											
Operations	Day	783.14	799.99	798.45	811.19	839.53	853.49	897.44	903.16	43.95	5.72
		2012	**2013**	**2014**	**2015**	**2016[6]**	**2017**	**2018**	**2019**	**Change 2017 to 2018**	**Change 2018 to 2019**
	Night	109.62	119.12	125.88	133.37	145.17	160.73	179.51	187.95	18.78	8.44
	Total	**892.76**	**919.12**	**924.33**	**944.56**	**984.70**	**1,014.22**	**1,076.94**	**1,091.11**	62.72	14.16
GA Aircraft											
Stage 2 Jets[2]	Day	0.25	0.31	0.00	0.28	0.00	0.00	0.00	0.00	0.00	0.00
	Night	0.04	0.02	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00
	Total	**0.29**	**0.33**	**0.00**	**0.30**	**0.00**	**0.00**	**0.00**	**0.00**	0.00	0.00
Stage 3 Jets	Day	52.93	51.21	52.64	51.82	51.82	52.19	55.77	53.17	3.69	(2.60)
	Night	7.20	5.10	4.65	4.28	4.59	4.56	5.08	4.79	0.52	(0.29)
	Total	**60.13**	**56.31**	**57.29**	**56.10**	**56.41**	**56.75**	**60.85**	**57.96**	4.21	(2.89)

Table H-2c	Modeled Daily Operations1 by Commercial and General Aviation (GA) Aircraft – 2012 to 2019 (Continued)										
		2012	**2013**	**2014**	**2015**	**2016[6]**	**2017**	**2018**	**2019**	**Change 2017 to 2018**	**Change 2018 to 2019**
Non-jets	Day	15.16	13.06	13.95	19.31	25.92	26.43	22.01	19.37	(4.42)	(2.64)
	Night	1.29	1.15	1.13	1.46	1.87	2.25	1.91	1.90	(0.34)	0.00
	Total	**16.45**	**14.22**	**15.08**	**20.77**	**27.79**	**28.68**	**23.92**	**21.28**	(4.76)	(2.64)
Total GA Operations											
Operations	Day	68.35	64.58	66.59	71.40	77.75	78.61	77.78	72.54	(0.72)	(5.24)
	Night	8.52	6.28	5.78	5.77	6.46	6.81	6.99	6.70	0.17	(0.29)
	Total	**76.86**	**70.85**	**72.37**	**77.17**	**84.21**	**85.43**	**84.77**	**79.24**	(0.55)	(5.53)
Overall Totals											
Total	Day	851.49	864.57	865.05	882.59	917.28	932.10	975.22	975.70	43.22	0.49
	Night	118.13	125.40	131.66	139.14	151.63	167.54	186.49	194.64	18.95	8.15
	Total[4]	**969.61**	**989.97**	**996.70**	**1,021.73**	**1,068.91**	**1,099.65**	**1,161.71**	**1,170.35**	62.17	8.64

Source: Massport's Noise Monitoring System and Revenue Office numbers, HMMH 2020.

Notes: N/A - Not available. Data from 1991 not available. Sums may be off slightly due to rounding. Negative numbers shown in parentheses ( ).

1 Includes scheduled and unscheduled operations.

2 Stage 2 aircraft are no longer permitted, effective December 31, 2015.

3 Regional Jet (RJ) operations were not tracked separately prior to 1999.

4 Totals prior to 1998 do not include GA operations.

5 RJ prior to 2010 was a jet with 100 seats or less. RJ in 2010 is a jet with less than 80 seats.

6 Minor errors reported for 2016 data in *2016 EDR* have been corrected in this table.

Commercial Jet Aircraft by Part 36 Stage Category

As described in the Regulatory Framework section of this appendix, jet aircraft are classified into categories referred to as stages based on noise levels. The heavier the aircraft, the more noise it is permitted to make within limits. Aircraft are allowed to be recertificated to the higher standard when modifications are made to the aircraft engine or design. Because of the substantial differences in noise between Stage 2, recertificated Stage 3, Stage 3, Stage 4, and Stage 5 aircraft, Massport tracks operations by these separate categories to follow their trends. **Table H-3** shows the percentage of commercial jet operations by stage category from 1998 through 2019.

One of the most significant changes occurring after the economic downturn in 2001 was the almost immediate retirement of the re-certificated Stage 3 aircraft from airlines' fleets due to their high operating costs. This type of accelerated retirement was not as prevalent during the 2008 to 2009 economic downturn since the major airlines no longer operated these aircraft.

Nighttime Operations

Massport tracks flights that operate in the defined nighttime period between the hours of 10:00 PM to 7:00 AM, when each flight is penalized 10 dB in calculations of DNL. **Table H-4** shows this nighttime activity by different groups of aircraft. Nighttime flights by commercial jet operators increased by 11.8 percent in 2018 and 5.1 percent in 2019 over the previous year, respectively. This follows increases of 6.6 percent in 2014, 5.9 percent in 2015, 8.9 percent in 2016, and 11.5 percent in 2017. Commercial non-jet operations increased slightly in 2018 and then decreased again in 2019, remaining, on average, less than four operations per night since 2012. GA nighttime traffic also remained fairly steady in 2018 and 2019, with, on average, less than seven operations per night since 2012. Overall, nighttime operations at Logan Airport increased by 11.3 percent in 2018 and 4.4 percent in 2019 over the previous year, respectively, after increasing 5.0 percent in 2014, 5.7 percent in 2015, 9.3 percent in 2016, and 10.2 percent in 2017. As in years past, the majority of 2017 nighttime operations (between 10:00 PM and 7:00 AM) occurred either before midnight or after 5:00 AM.

Table H-3 Percentage of Commercial Jet Operations by Part 36 Stage Category – 1998 to 2019

	Stage 5 Requirements[1]	Stage 4 Requirements[2]	Stage 3[3]	Recertificated Stage 3[4]	Stage 2 Greater than 75,000 lbs.	Total
1998	N/A	N/A	65.9%	21.7%	12.4%	100%
1999	N/A	N/A	70.0%	21.0%	9.0%	100%
2000	N/A	N/A	75.0%	24.0%	1.0%	100%
2001	N/A	N/A	86.3%	13.6%	0.1%	100%
2002	N/A	N/A	92.8%	7.2%	0.0%	100%
2003	N/A	N/A	95.8%	4.1%	0.0%	100%
2004	N/A	N/A	97.8%	2.2%	0.0%	100%
2005	N/A	N/A	98.0%	2.0%	0.0%	100%
2006	N/A	N/A	98.6%	1.4%	0.0%	100%
2007	N/A	N/A	98.9%	1.1%	0.0%	100%
2008	N/A	N/A	99.1%	0.9%	0.0%	100%
2009	N/A	87.8%	11.3%	0.9%	0.0%	100%
2010	N/A	93.2%	5.7%	1.1%	0.0%	100%
2011	N/A	95.5%	4.0%	0.5%	0.0%	100%
2012	N/A	95.8%	4.1%	0.1%	0.0%	100%
2013	N/A	97.4%	2.6%	0.0%	0.0%	100%
2014	N/A	97.4%	2.6%	0.0%	0.0%	100%
2015	N/A	96.7%	3.3%	0.0%	0.0%	100%
2016	17.8%	79.2%	3.0%	0.0%	0.0%	100%
2017	17.7%	79.8%	2.4%	0.0%	0.0%	100%
2018	15.5%	83.0%	1.5%	0.0%	0.0%	100%
2019	15.2%	82.9%	2.0%	0.0%	0.0%	100%

Source: Massport and Federal Aviation Administration (FAA) radar data, HMMH 2020.

Notes: N/A – not applicable.

1 This column includes operations by aircraft that would qualify as Stage 5 recertificated. Aircraft with maximum takeoff weight greater than 121,254 lbs certificated after January 1, 2018 must meet Stage 5 standards. The percent of Logan Airport operations in aircraft meeting Stage 5 requirements was not determined prior to 2016.

2 Aircraft that meet Stage 4 requirements are aircraft that are either certificated Stage 4 or would qualify if recertificated. Certificated Stage 4 aircraft were not available until 2006 and the percent of Logan Airport operations in aircraft that meet Stage 4 requirements was not determined prior to 2009.
Values less than 0.05% appear as 0.0% due to rounding.

3 Certificated Stage 3 aircraft are originally manufactured meeting Stage 3 requirements under Federal Regulation Part 36. This column includes only operations by Certificated Stage 3 aircraft that do not meet higher certification standards.

4 Recertificated Stage 3 aircraft are aircraft originally manufactured as a certified Stage 1 or 2 aircraft under Federal Regulation Part 36, which either have been treated with hushkits or have been re-engineered to meet Stage 3 requirements.

Table H-4 Modeled Nighttime Operations at Logan Airport – 1990 to 2019

	Commercial Jets	Commercial Non-Jets	General Aviation	Total
1990	77.24	11.72	N/A	88.96
1991	N/A	N/A	N/A	N/A
1992	71.42	69.32	N/A	140.74
1993	72.91	46.84	N/A	119.75
1994	72.90	13.59	N/A	86.49
1995	74.50	11.14	N/A	85.64
1996	84.95	13.73	N/A	98.68
1997	92.81	27.27	N/A	120.08
1998	101.46	21.86	20.89[1]	144.21
1999	105.25	16.63	26.17	148.05
2000	103.92	21.58	5.68	131.19
2001	109.82	10.97	5.71	126.50
2002	97.04	3.45	11.29	111.78
2003	92.69	2.41	11.64	106.74
2004	113.26	3.03	13.71	130.00
2005	113.67	3.02	14.33	131.02
2006	114.81	3.26	8.13	126.22
2007	118.30	3.47	10.19	131.96
2008	114.31	4.00	5.62	123.93
2009	103.05	5.56	3.08	111.70
2010	107.93	5.21	3.97	117.10
2011	109.38	4.73	6.65	120.76
2012	106.55	3.06	8.52	118.13
2013	115.91	3.21	6.28	125.40
2014	123.60	2.28	5.78	131.66
2015	130.96	2.41	5.77	139.14
2016[2]	142.16	3.01	6.48	151.63
2017	158.49	2.24	6.81	167.55
2018	177.15	2.36	6.99	186.49
2019	186.25	1.70	6.70	194.64
Change (2017 to 2018)	18.66	0.12	0.18	18.95
Percent Change	11.8%	5.2%	2.6%	11.3%
Change (2018 to 2019)	9.10	(0.66)	(0.29)	8.15
Percent Change	5.1%	(27.9%)	(4.2%)	4.4%

Source: Massport, HMMH, 2020.

Notes: GA – general aviation; N/A - not available. Negative numbers shown in parentheses ( ).

1 Previously reported as N/A. 1998 was the first year GA operations were reported and included in the total nighttime operations.

2 Minor errors reported for 2016 data in *2016 EDR* have been corrected in this table.

Runway Use

Using radar data, the AEDT pre-processor determines which runway was used, the specific aircraft type, and time classification (daytime or nighttime) for each flight. Massport compares annual runway use to previous years using a variety of summary tables with different perspectives.

The first summary of daytime and nighttime runway usages presented here is broken into six representative aircraft groups with similar runway requirements. The list below provides example aircraft types from each group:

- Heavy Jet A – B747s, A340s, A380s;
- Heavy Jet B – B767s, B777s, B787s, A300s, A310s, A330s, A350s, MD-11s;
- Light Jet A – B717s, B737-800s, MD-90s;
- Light Jet B – B737s, B757s, A319s, A320s, MD-80s, E190;
- Regional Jet (RJ) – E135, E145, E170, E175, CRJ2, CRJ7, CRJ9, J328 and Corporate Jets; and
- Turboprops and Piston Aircraft (non-jets).

Tables H-5a and **H-5b** show the runway use summary from the modeled 2019 and 2018 noise conditions, respectively. **Table H-5c** shows the corresponding summary from the modeled 2017 noise conditions for comparison. The turbojet aircraft in the table were grouped into the different categories for reporting purposes. Because the DNL contours developed using the NOMS data with the AEDT pre-processor reflect the actual use of the runways by each flight, they accurately represent Logan Airport's noise environment. The modeled runway use for each particular aircraft type may be different from the overall group runway use presented in **Tables H-5a, H-5b,** and **H-5c**.

Comparing **Table H-5a** (2019) with the similar **Table H-5b** (2018) shows the largest changes were in the Heavy Jet A group, nighttime arrivals and Light Jet A group, nighttime departures. All categories (except Heavy Jet A) show less use of Runway 22L and greater use of Runway 33L for arrivals. All categories show less use of Runway 22R and greater use of Runway 33L for departures.

In turn, comparing **Table H-5b** (2018) to **Table H-5c** (2017) shows that the largest changes were increases in the use of Runway 4R-22L for arrivals and of Runways 4R, 22L, and 22R for departures with corresponding decreases in the use of Runways 33L and 27 for both arrivals and departures. Runway 4R-22L was closed for 35 days in 2017, which explains its lower annual usage that year, rebounding in the following year when it was again available.

Table H-5a 2019 Modeled Runway Use by Aircraft Group

	Heavy Jet A		Heavy Jet B		Light Jet A		Light Jet B		Regional Jets		Non-Jets	
ARRIVALS												
Runway	**Day (%)**	**Night (%)**	**Day (%)**	**Night (%)**	**Day (%)**	**Night (%)**	**Day (%)**	**Night (%)**	**Day (%)**	**Night (%)**	**Day (%)**	**Night (%)**
04L	0.14	0.00	0.28	0.20	2.50	0.20	4.13	0.43	8.29	0.82	25.54	3.23
04R	43.39	18.26	41.08	23.40	33.71	21.16	28.00	18.26	28.38	23.16	12.61	19.15
9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15L	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.00
15R	0.40	0.00	0.50	0.20	0.46	0.17	0.59	0.16	0.45	0.16	2.21	11.34
22L	29.50	54.49	26.96	35.61	22.79	39.34	28.80	38.74	24.80	40.25	25.93	30.05
22R	0.00	0.00	0.00	0.00	0.01	0.02	0.01	0.00	0.03	0.09	2.96	3.97
27	4.35	9.25	15.18	3.61	31.39	17.66	24.24	16.48	19.87	22.07	4.05	11.37
32	0.00	0.00	0.00	0.00	0.00	0.00	1.85	0.00	5.67	0.00	12.95	0.00
33L	22.22	18.00	16.01	36.98	9.14	21.46	12.40	25.94	12.51	13.44	7.62	16.14
33R	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.04	4.74
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
DEPARTURES												
Runway	**Day (%)**	**Night (%)**	**Day (%)**	**Night (%)**	**Day (%)**	**Night (%)**	**Day (%)**	**Night (%)**	**Day (%)**	**Night (%)**	**Day (%)**	**Night (%)**
04L	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	20.55	12.27
04R	16.26	10.06	11.93	4.01	8.80	5.80	3.33	2.25	0.21	0.43	2.92	2.30
9	5.74	0.77	18.92	15.05	26.49	16.25	32.97	20.55	38.51	26.27	18.72	8.00
14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15L	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15R	30.91	44.27	10.36	18.83	3.47	14.32	2.06	10.59	0.49	6.28	2.24	23.67
22L	6.48	3.86	4.74	1.99	3.55	3.53	1.47	1.26	0.06	0.60	0.06	0.16
22R	14.29	11.44	24.63	32.62	25.82	20.47	28.80	29.41	30.37	33.04	29.61	29.59
27	0.08	0.00	6.85	1.86	10.55	23.13	11.56	20.33	11.27	20.64	5.16	3.55
32	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
33L	26.23	29.61	22.58	25.64	21.32	16.50	19.80	15.61	19.09	12.74	20.73	20.46
33R	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
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

Source: Massport, HMMH, 2020.
Notes: Nighttime for noise modeling is defined as 10:00 PM to 7:00 AM.
Values may not add to 100 percent due to rounding.

Table H-5b 2018 Modeled Runway Use by Aircraft Group

	Heavy Jet A		Heavy Jet B		Light Jet A		Light Jet B		Regional Jets		Non-Jets	
ARRIVALS												
Runway	**Day (%)**	**Night (%)**	**Day (%)**	**Night (%)**	**Day (%)**	**Night (%)**	**Day (%)**	**Night (%)**	**Day (%)**	**Night (%)**	**Day (%)**	**Night (%)**
04L	0.41	0.00	0.17	0.00	4.94	0.00	4.01	0.15	10.17	0.40	26.26	3.47
04R	43.03	28.17	41.68	22.71	31.10	27.10	31.92	21.55	27.04	24.10	13.76	22.37
9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15L	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.00
15R	0.59	0.00	0.51	0.22	0.24	0.00	0.51	0.10	0.47	0.00	2.38	4.81
22L	32.74	28.15	28.92	40.68	31.14	42.48	29.29	42.13	28.61	45.41	29.39	38.16
22R	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.03	0.03	3.12	3.21
27	6.67	9.36	15.75	2.60	25.60	18.97	23.81	13.78	19.56	18.17	4.78	7.73
32	0.00	0.00	0.00	0.00	0.00	0.00	1.16	0.00	4.48	0.03	9.38	0.00
33L	16.55	34.32	12.97	33.79	6.98	11.44	9.30	22.29	9.66	11.85	6.41	16.68
33R	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.43	3.58
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
DEPARTURES												
Runway	**Day (%)**	**Night (%)**	**Day (%)**	**Night (%)**	**Day (%)**	**Night (%)**	**Day (%)**	**Night (%)**	**Day (%)**	**Night (%)**	**Day (%)**	**Night (%)**
04L	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	20.81	9.42
04R	9.22	3.68	10.80	3.31	0.44	0.16	4.85	3.24	0.55	0.38	4.15	1.70
9	5.72	5.52	17.96	12.94	35.77	27.48	31.33	19.41	37.62	25.36	19.27	10.60
14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00
15L	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15R	34.78	43.27	13.46	24.78	0.44	4.71	2.33	13.43	0.31	7.31	2.11	21.59
22L	8.67	3.07	5.40	2.11	0.00	0.49	1.98	1.66	0.05	0.44	0.04	0.14
22R	17.79	19.95	28.02	33.01	35.71	39.02	33.32	33.13	36.14	39.03	34.30	36.41
27	1.43	0.00	4.55	0.61	11.36	26.02	9.50	16.65	9.34	18.85	4.37	4.11
32	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
33L	22.40	24.52	19.80	23.24	16.29	2.11	16.71	12.47	15.98	8.63	14.92	16.03
33R	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
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

Source: Massport, HMMH, 2020.
Notes: Nighttime for noise modeling is defined as 10:00 PM to 7:00 AM.
Values may not add to 100 percent due to rounding.

Table H-5c 2017 Modeled Runway Use by Aircraft Group

	Heavy Jet A		Heavy Jet B		Light Jet A		Light Jet B		Regional Jets		Non-Jets	
ARRIVALS												
Runway	**Day (%)**	**Night (%)**	**Day (%)**	**Night (%)**	**Day (%)**	**Night (%)**	**Day (%)**	**Night (%)**	**Day (%)**	**Night (%)**	**Day (%)**	**Night (%)**
04L	1.47	0.00	2.33	1.49	3.56	1.85	4.66	1.65	8.90	2.26	16.96	4.03
04R	30.73	22.06	30.11	13.13	25.28	12.55	22.76	12.06	18.54	14.18	9.72	9.78
09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15L	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.18	0.29
15R	7.22	3.59	6.30	3.33	5.05	3.22	4.78	3.30	4.17	2.64	4.60	4.00
22L	24.67	24.39	22.88	27.48	23.82	25.74	22.27	24.73	23.09	27.40	25.32	27.22
22R	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.04	0.00	2.55	1.15
27	8.07	3.44	20.44	5.42	30.98	22.43	29.99	25.94	23.61	31.74	7.27	14.64
32	0.00	0.00	0.00	0.00	0.00	0.00	1.48	0.01	6.08	0.16	14.15	0.00
33L	27.84	46.52	17.94	49.16	11.31	34.21	14.06	32.31	15.58	21.63	9.82	30.42
33R	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	7.43	8.47
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
DEPARTURES												
Runway	**Day (%)**	**Night (%)**	**Day (%)**	**Night (%)**	**Day (%)**	**Night (%)**	**Day (%)**	**Night (%)**	**Day (%)**	**Night (%)**	**Day (%)**	**Night (%)**
04L	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	15.17	6.42
04R	5.64	3.86	7.13	2.05	0.65	0.36	2.66	1.31	0.16	0.35	3.74	0.81
09	6.44	4.92	14.85	10.10	29.26	17.65	27.13	15.25	31.70	19.35	17.44	9.02
14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.07	0.00
15L	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15R	30.52	26.79	16.32	21.90	1.33	10.22	3.25	14.61	0.40	9.29	1.51	20.17
22L	6.25	0.84	4.37	1.09	0.26	0.36	1.39	0.62	0.03	0.11	0.03	0.16
22R	17.15	16.44	23.02	21.32	30.93	25.66	28.77	19.97	31.84	26.24	30.73	22.78
27	1.90	0.00	7.42	1.54	17.81	35.64	13.04	28.26	14.62	28.33	6.95	5.51
32	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
33L	32.10	47.15	26.91	41.99	19.75	10.11	23.76	19.98	21.25	16.35	24.37	35.14
33R	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
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

Source: Massport, HMMH, 2018.
Notes: Night for noise modeling is defined as 10:00 PM to 7:00 AM.
Values may not add to 100 percent due to rounding.

While **Tables H-5a** through **H-5c** present runway use by aircraft groups, **Tables H-6a, H-6b,** and **H-6c** present the total runway use (jets and non-jets) by runway and time of day. The first section of the table displays the number of operations on each runway by time period for an average day. The second section displays the same information for the entire year and the last section displays the percent that each runway is used for a given operation type and time of day.

Table H-6a shows that on an average day in 2019, Runways 9 and 22R were balanced for the most departures (167 each, per day and night combined) and Runway 22L had the most arrivals (almost 170 per day and night combined). **Table H-6b** shows that on an average day in 2018, Runway 22R alone had the most departures (over 195 per day and night combined) and Runway 22L was the leading arrival runway (183 per day and night combined). In comparison, **Table H-6c** shows that on an average day in 2017, Runway 22R had the most departures (with almost 155 per day and night combined) while Runway 27 was the dominant arrival runway (with over 135 per day and night combined).

Table H-6a Summary of Jet and Non-Jet Aircraft Runway Use: 2019

	Runway												
	4L	**4R**	**9**	**14**	**15L**	**15R**	**22L**	**22R**	**27**	**32**	**33L**	**33R**	**Total**
2019 Daily Operations													
Dep Day	14.8	18.9	150.7	0.0	0.0	12.6	7.1	141.9	50.6	0.0	100.0	0.0	496.5
Dep Night	0.2	2.6	17.0	0.0	0.0	11.2	1.5	25.5	15.4	0.0	15.3	0.0	88.6
Arr Day	36.8	131.2	0.0	0.0	0.1	3.8	129.4	2.2	98.1	18.7	56.2	4.3	480.6
Arr Night	0.5	20.4	0.0	0.0	0.0	0.4	40.4	0.1	16.9	0.0	25.8	0.1	104.5
Total Daily Operations	52.2	173.1	167.7	0.0	0.1	27.9	178.3	169.7	181.0	18.7	197.3	4.4	1,170.3
2019 Annual Operations													
Dep Day	5,384	6,882	55,019	0	1	4,593	2,586	51,805	18,452	0	36,511	0	181,234
Dep Night	79	953	6,197	0	0	4,087	530	9,303	5,624	0	5,581	0	32,354
Arr Day	13,417	47,882	0	0	23	1,375	47,237	791	35,794	6,822	20,506	1,581	175,429
Arr Night	172	7,450	0	0	0	138	14,733	31	6,180	0	9,422	32	38,159
Total Annual Operations	19,052	63,167	61,216	0	24	10,193	65,087	61,930	66,050	6,822	72,020	1,614	427,176
2019 Percentage Operations													
Dep Day	3%	4%	30%	0%	<1%	3%	1%	29%	10%	0%	20%	0%	100%
Dep Night	<1%	3%	19%	0%	0%	13%	2%	29%	17%	0%	17%	0%	100%
Arr Day	8%	27%	0%	0%	<1%	1%	27%	<1%	20%	4%	12%	1%	100%
Arr Night	<1%	20%	0%	0%	0%	<1%	39%	<1%	16%	0%	25%	<1%	100%

Source: Massport Noise Office and HMMH 2020.

Notes: These data reflect actual counts or percentages of aircraft operations on each runway end. They should not be confused with effective runway use, which is used by the Preferential Runway Advisory System (PRAS) to derive recommendations for use of a particular runway.
Runway 14-32 is unidirectional: there are no arrivals to Runway 14 and no departures from Runway 32.
Values may not add to 100 percent due to rounding.

Table H-6b Summary of Jet and Non-Jet Aircraft Runway Use: 2018

	Runway												
	4L	**4R**	**9**	**14**	**15L**	**15R**	**22L**	**22R**	**27**	**32**	**33L**	**33R**	**Total**
2018 Daily Operations													
Dep Day	15.5	21.1	148.4	0.0	0.0	12.8	7.5	167.0	42.0	0.0	81.7	0.0	496.1
Dep Night	0.2	2.4	16.1	0.0	0.0	12.4	1.3	28.6	12.3	0.0	11.4	0.0	84.7
Arr Day	39.8	138.4	0.0	0.0	0.1	3.8	140.0	2.4	93.6	14.0	43.8	3.3	479.1
Arr Night	0.2	22.3	0.0	0.0	0.0	0.2	43.0	0.1	13.8	0.0	22.1	0.1	101.8
Total Daily Operations	55.7	184.2	164.5	0.0	0.1	29.2	191.8	198.1	161.6	14.0	159.1	3.4	1,161.7
2018 Annual Operations													
Dep Day	5,667	7,693	54,176	7	0	4,673	2,755	60,956	15,326	0	29,832	0	181,085
Dep Night	66	881	5,879	0	0	4,517	478	10,457	4,476	0	4,173	0	30,927
Arr Day	14,519	50,508	0	0	26	1,375	51,083	858	34,173	5,127	16,001	1,198	174,868
Arr Night	89	8,137	0	0	0	77	15,691	30	5,022	1	8,067	31	37,143
Total Annual Operations	20,341	67,220	60,055	7	26	10,642	70,006	72,300	58,996	5,128	58,073	1,229	424,024
2018 Percentage Operations													
Dep Day	3%	4%	30%	<1%	0%	3%	2%	34%	8%	0%	16%	0%	100%
Dep Night	<1%	3%	19%	0%	0%	15%	2%	34%	14%	0%	13%	0%	100%
Arr Day	8%	29%	0%	0%	<1%	1%	29%	<1%	20%	3%	9%	1%	100%
Arr Night	<1%	22%	0%	0%	0%	<1%	42%	<1%	14%	<1%	22%	<1%	100%

Source: Massport Noise Office and HMMH 2020.

Notes: These data reflect actual counts or percentages of aircraft operations on each runway end. They should not be confused with effective runway use, which is used by the Preferential Runway Advisory System (PRAS) to derive recommendations for use of a particular runway.
Runway 14-32 is unidirectional: there are no arrivals to Runway 14 and no departures from Runway 32.
Values may not add to 100 percent due to rounding.

Table H-6c Summary of Jet and Non-Jet Aircraft Runway Use: 2017

	Runway												
	4L	**4R**	**9**	**14**	**15L**	**15R**	**22L**	**22R**	**27**	**32**	**33L**	**33R**	**Total**
2017 Daily Operations													
Dep Day	11.1	12.4	122.0	0.1	0.0	15.5	5.3	138.9	57.6	0.0	111.8	0.0	474.6
Dep Night	0.1	1.0	11.1	0.0	0.0	11.5	0.5	15.8	17.9	0.0	17.4	0.0	75.2
Arr Day	32.5	94.1	0.0	0.0	1.6	21.8	105.1	1.9	112.7	18.8	63.6	5.4	457.5
Arr Night	1.6	11.3	0.0	0.0	0.0	3.0	23.3	0.0	22.9	0.0	30.0	0.2	92.4
Total Daily Operations	45.4	118.8	133.1	0.1	1.6	51.8	134.1	156.6	211.1	18.8	222.8	5.6	1,099.6
2017 Annual Operations													
Dep Day	4,058	4,524	44,529	19	0	5,653	1,922	50,703	21,012	0	40,822	0	173,243
Dep Night	40	357	4,051	0	0	4,181	170	5,761	6,550	0	6,333	0	27,443
Arr Day	11,867	34,355	0	0	575	7,957	38,366	689	41,130	6,848	23,229	1,957	166,974
Arr Night	595	4,122	0	0	3	1,103	8,488	12	8,357	7	10,939	86	33,712
Total Annual Operations	16,560	43,358	48,580	19	578	18,895	48,947	57,164	77,050	6,855	81,323	2,043	401,371
2017 Percentage Operations													
Dep Day	2%	3%	26%	<1%	0%	3%	1%	29%	12%	0%	24%	0%	100%
Dep Night	<1%	1%	15%	0%	0%	15%	1%	21%	24%	0%	23%	0%	100%
Arr Day	7%	21%	0%	0%	<1%	5%	23%	<1%	25%	4%	14%	1%	100%
Arr Night	2%	12%	0%	0%	<1%	3%	25%	<1%	25%	<1%	32%	<1%	100%

Source: Massport Noise Office and HMMH 2018.

Notes: These data reflect actual counts or percentages of aircraft operations on each runway end. They should not be confused with effective runway use, which is used by the Preferential Runway Advisory System (PRAS) to derive recommendations for use of a particular runway.
Runway 14-32 is unidirectional: there are no arrivals to Runway 14 and no departures from Runway 32.
Values may not add to 100 percent due to rounding.

Runway use can also be presented in terms of percent of total operations. **Table H-7** presents the 2019, 2018 and 2017 runway use for all operations which use Logan Airport, supplementing the information in **Tables H-5a, H5-5b,** and **H-5c** that separate runway use by aircraft group and time of day, and the data in **Tables H-6a, H-6b,** and **H-6c** which total the runway use by operation type and time of day.

For 2019, Runway 33L was the most active, with primarily jet departures, followed almost equally by five other runways: Runways 27, 22L, 4R, 22R, and 9. For 2018, Runway 22R was the most active, with primarily jet departures, followed by Runway 22L with primarily jet arrivals. In 2017, Runway 33L was the runway with the highest activity (a mix of jet arrivals and departures) with Runway 27 a very close second. Non-jets use Runways 4L and 22L most for arrivals, and Runway 22R most for departures; this was the case for each of the three years shown in **Table H-7**.

Table H-7 Total 2019, 2018, and 2017 Modeled Runway Use by All Operations

	Jet Arrivals		Non-Jet Arrivals		Jet Departures		Non-Jet Departures		All Operations
	Day	Night	Day	Night	Day	Night	Day	Night	
Runway				**2019 Operations**					
4L	1.6%	<0.1%	1.6%	<0.1%	0.0%	0.0%	1.3%	<0.1%	**4.5%**
4R	10.4%	1.7%	0.8%	<0.1%	1.4%	0.2%	0.2%	<0.1%	**14.8%**
9	0.0%	0.0%	0.0%	0.0%	11.7%	1.4%	1.1%	<0.1%	**14.3%**
14	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	**0.0%**
15L	0.0%	0.0%	<0.1%	0.0%	0.0%	0.0%	<0.1%	0.0%	**<0.1%**
15R	0.2%	<0.1%	0.1%	<0.1%	0.9%	0.9%	0.1%	<0.1%	**2.4%**
22L	9.5%	3.4%	1.6%	<0.1%	0.6%	0.1%	<0.1%	<0.1%	**15.2%**
22R	<0.1%	<0.1%	0.2%	<0.1%	10.3%	2.1%	1.8%	<0.1%	**14.5%**
27	8.1%	1.4%	0.2%	<0.1%	4.0%	1.3%	0.3%	<0.1%	**15.5%**
32	0.8%	0.0%	0.8%	0.0%	0.0%	0.0%	0.0%	0.0%	**1.6%**
33L	4.3%	2.2%	0.5%	<0.1%	7.3%	1.3%	1.3%	<0.1%	**16.9%**
33R	0.0%	0.0%	0.4%	<0.1%	0.0%	0.0%	0.0%	0.0%	**0.4%**
Total	34.9%	8.8%	6.1%	0.2%	36.3%	7.4%	6.1%	0.2%	**100.0%**
Runway				**2018 Operations**					
4L	1.7%	<0.1%	1.7%	<0.1%	<0.1%	0.0%	1.3%	<0.1%	**4.8%**
4R	11.0%	1.9%	0.9%	<0.1%	1.5%	0.2%	0.3%	<0.1%	**15.9%**
9	0.0%	0.0%	0.0%	0.0%	11.5%	1.4%	1.2%	<0.1%	**14.2%**
14	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	<0.1%	0.0%	**<0.1%**
15L	0.0%	0.0%	<0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	**<0.1%**
15R	0.2%	<0.1%	0.2%	<0.1%	1.0%	1.0%	0.1%	<0.1%	**2.5%**
22L	10.2%	3.6%	1.9%	0.1%	0.6%	0.1%	<0.1%	<0.1%	**16.5%**
22R	<0.1%	<0.1%	0.2%	<0.1%	12.2%	2.4%	2.2%	0.1%	**17.1%**
27	7.8%	1.2%	0.3%	<0.1%	3.3%	1.0%	0.3%	<0.1%	**13.9%**
32	0.6%	<0.1%	0.6%	0.0%	0.0%	0.0%	0.0%	0.0%	**1.2%**
33L	3.4%	1.9%	0.4%	<0.1%	6.1%	1.0%	1.0%	<0.1%	**13.7%**
33R	0.0%	0.0%	0.3%	<0.1%	0.0%	0.0%	0.0%	0.0%	**0.3%**
Total	34.9%	8.6%	6.4%	0.2%	36.3%	7.1%	6.4%	0.2%	**100.0%**

Table H-7 Total 2019, 2018, and 2017 Modeled Runway Use by All Operations (Continued)

	Jet Arrivals		Non-Jet Arrivals		Jet Departures		Non-Jet Departures		All Operations
	Day	Night	Day	Night	Day	Night	Day	Night	
Runway	**2017 Operations**								
4L	1.8%	0.1%	1.1%	<0.1%	0.0%	0.0%	1.0%	<0.1%	**4.1%**
4R	7.9%	1.0%	0.6%	<0.1%	0.9%	0.1%	0.2%	<0.1%	**10.8%**
9	0.0%	0.0%	0.0%	0.0%	9.9%	1.0%	1.2%	<0.1%	**12.1%**
14	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	<0.1%	0.0%	**<0.1%**
15L	0.0%	0.0%	0.1%	<0.1%	0.0%	0.0%	0.0%	0.0%	**0.1%**
15R	1.7%	0.3%	0.3%	<0.1%	1.3%	1.0%	0.1%	<0.1%	**4.7%**
22L	7.9%	2.0%	1.7%	0.1%	0.5%	<0.1%	<0.1%	<0.1%	**12.2%**
22R	<0.1%	0.0%	0.2%	<0.1%	10.6%	1.4%	2.0%	<0.1%	**14.2%**
27	9.8%	2.0%	0.5%	<0.1%	4.8%	1.6%	0.5%	<0.1%	**19.2%**
32	0.8%	<0.1%	0.9%	0.0%	0.0%	0.0%	0.0%	0.0%	**1.7%**
33L	5.1%	2.6%	0.6%	0.1%	8.5%	1.5%	1.6%	0.1%	**20.3%**
33R	0.0%	0.0%	0.5%	<0.1%	0.0%	0.0%	0.0%	0.0%	**0.5%**
Total	35.0%	8.1%	6.6%	0.3%	36.5%	6.7%	6.7%	0.2%	**100.0%**

Source: Massport, HMMH, 2020.
Notes: Night for noise modeling is defined as 10:00 PM to 7:00 AM.
Nighttime runway restrictions are from 11:00 PM to 6:00 AM.
Values may not add to 100 percent due to rounding.

Table H-8 presents a historical summary of runway use by jets. Since 2009, the radar data have been analyzed with Massport's Harris NOMS. Data from 2001 through 2008 were compiled with Massport's PreFlight™ software, an analysis package used to access fleet, day/night splits, and runway use information from radar data. Data prior to 2001 were derived from Massport's original noise monitoring system, supplemented with field records. Note that Logan Airport Noise Rules prevent arrivals to Runway 22R and departures from Runway 4L by jet aircraft except for certain circumstances.

Table H-8 Summary of Jet Aircraft Runway Use – 1990 to 2019

Runway	4L	4R	9	14[1]	15R	22L	22R	27	32[1]	33L
1990										
Departures	0%[2]	3%	21%	N/A	10%	2%	36%	20%	N/A	7%
Arrivals	1%	25%	0%	N/A	2%	14%	0%	28%	N/A	29%
1992[2]										
Departures	0%	6%	31%	N/A	7%	2%	38%	10%	N/A	6%
Arrivals	1%	37%	0%	N/A	3%	12%	0%	30%	N/A	17%
1993										
Departures	0%	9%	33%	N/A	7%	3%	40%	4%	N/A	4%
Arrivals	2%	44%	0%	N/A	1%	11%	0%	28%	N/A	15%
1994										
Departures	0%	9%	33%	N/A	4%	3%	32%	12%	N/A	5%
Arrivals	3%	42%	0%	N/A	1%	8%	0%	27%	N/A	19%
1995										
Departures	0%	8%	36%	N/A	5%	5%	29%	11%	N/A	5%
Arrivals	3%	41%	0%	N/A	2%	8%	0%	27%	N/A	17%
1996										
Departures	0%	8%	32%	N/A	5%	6%	33%	12%	N/A	5%
Arrivals	2%	38%	0%	N/A	2%	11%	0%	29%	N/A	18%
1997										
Departures	0%	8%	30%	N/A	5%	6%	31%	15%	N/A	5%
Arrivals	2%	36%	0%	N/A	2%	9%	0%	30%	N/A	20%
1998										
Departures	0%	8%	35%	N/A	6%	5%	28%	14%	N/A	5%
Arrivals	2%	41%	0%	N/A	2%	7%	0%	28%	N/A	19%
1999										
Departures	0%	8%	31%	N/A	5%	4%	30%	15%	N/A	6%
Arrivals	3%	37%	0%	N/A	2%	10%	0%	28%	N/A	21%
2000										
Departures	0%	8%	35%	N/A	4%	3%	30%	15%	N/A	6%
Arrivals	4%	40%	0%	N/A	1%	7%	0%	28%	N/A	20%

Table H-8 Summary of Jet Aircraft Runway Use – 1990 to 2019 (Continued)										
Runway	**4L**	**4R**	**9**	**14[1]**	**15R**	**22L**	**22R**	**27**	**32[1]**	**33L**
2001										
Departures	0%	7%	34%	N/A	4%	3%	35%	12%	N/A	5%
Arrivals	5%	36%	0%	N/A	1%	8%	0%	32%	N/A	18%
2002										
Departures	0%	4%	31%	N/A	6%	3%	35%	16%	N/A	6%
Arrivals	6%	31%	0%	N/A	1%	12%	0%	30%	N/A	21%
2003										
Departures	0%	4%	33%	N/A	7%	2%	34%	14%	N/A	6%
Arrivals	7%	33%	0%	N/A	1%	14%	0%	28%	N/A	18%
2004										
Departures	0%	5%	34%	N/A	10%	4%	24%	18%	N/A	6%
Arrivals	6%	34%	0%	N/A	1%	12%	0%	24%	N/A	23%
2005										
Departures	0%	5%	36%	N/A	7%	1%	31%	13%	N/A	7%
Arrivals	8%	33%	0%	N/A	1%	11%	0%	29%	N/A	17%
2006										
Departures	0%	4%	33%	0%	3%	1%	40%	13%	0%	6%
Arrivals	7%	29%	0%	0%	1%	14%	0%	33%	0.2%	16%
2007										
Departures	0%	5%	31%	0%	4%	1%	33%	7%	0%	19%
Arrivals	5%	31%	0%	0%	1%	15%	0%	36%	2%	11%
2008										
Departures	0%	6%	33%	<1%	3%	<1%	36%	6%	0%	16%
Arrivals	6%	30%	0%	0%	2%	17%	0%	33%	2%	11%
2009[3]										
Departures	0%	7%	32%	0%	3%	2%	34%	6%	0%	16%
Arrivals	7%	31%	0%	0%	3%	17%	0%	30%	1%	11%
2010										
Departures	0%	4%	28%	<1%	8%	2%	31%	10%	0%	17%
Arrivals	5%	28%	0%	0%	1%	15%	0%	32%	1%	16%
2011[4]										
Departures	0%	6%	36%	<1%	5%	2%	36%	7%	0%	7%
Arrivals	7%	37%	0%	0%	<1%	16%	0%	28%	1%	11%
2012[4]										
Departures	0%	6%	33%	<1%	5%	3%	38%	6%	0%	9%
Arrivals	6%	34%	0%	0%	1%	16%	0%	33%	<1%	9%
2013										
Departures	<1%	5%	30%	<1%	5%	2%	35%	12%	0%	12%
Arrivals	6%	29%	0%	0%	1%	16%	<1%	32%	1%	15%

Table H-8 Summary of Jet Aircraft Runway Use – 1990 to 2019 (Continued)

Runway	4L	4R	9	14[1]	15R	22L	22R	27	32[1]	33L
2014										
Departures	0%	5%	31%	<1%	5%	2%	28%	13%	0%	17%
Arrivals	5%	30%	0%	0%	2%	25%	<1%	21%	1%	16%
2015										
Departures	0%	4%	29%	<1%	5%	2%	32%	12%	0%	15%
Arrivals	5%	29%	0%	0%	2%	25%	<1%	23%	1%	16%
2016[5]										
Departures	0%	4%	30%	0%	6%	2%	27%	13%	0%	18%
Arrivals	4%	31%	0%	0%	1%	24%	<1%	23%	1%	16%
2017[6]										
Departures	0%	2%	25%	0%	5%	1%	28%	15%	0%	23%
Arrivals	5%	21%	0%	0%	5%	23%	<1%	27%	2%	18%
2018										
Departures	<1%	4%	30%	0%	5%	2%	34%	10%	0%	16%
Arrivals	4%	30%	0%	0%	<1%	32%	<1%	21%	1%	12%
2019										
Departures	0%	4%	30%	0%	4%	2%	28%	12%	0%	20%
Arrivals	4%	28%	0%	0%	<1%	29%	<1%	22%	2%	15%

Source: HMMH 2020, Massport Noise Office.

Notes: These data reflect actual percentages of jet aircraft operations on each runway end. They should not be confused with effective runway use, which is used by the Preferential Runway Advisory System (PRAS) to derive recommendations for use of a particular runway. Effective runway percentages include a factor of 10 applied to nighttime operations so that use of a runway at night more closely reflects its effect on total noise exposure.
Jet aircraft are not able to use Runway 15L or 33R due to its length of only 2,557 feet.
Values may not add to 100 percent due to rounding.
N/A - not available.

1 Runway 14-32 opened in late November 2006. (Runway 14-32 is unidirectional with no arrivals to Runway 14 and no departures from Runway 32.)

2 The *1990 Final Generic Environmental Impact Report* was published and submitted to the Secretary of Environmental Affairs in July 1993. It included modeled operations and resulting noise contours for 1987, 1990, and a 1996-forecast year. The *1993 Annual Update* published in July 1994 included operations and contours for 1992 and 1993. 1991 data are not available.

3 Runway 9-27 had extended weekend closings for resurfacing during 2009.

4 Runway 15R-33L was closed for 3 months in 2011 and in 2012.

5 Runway 4L-22Rwas closed for 31 days in 2016.

6 Runway 4R-22L was closed for 35 days in 2017, with limited availability for Runway 4R arrivals for about 80 additional days.

Since runway use plays such a key role in determining noise the aircraft noise distribution in the Airport's environment, Massport also tracks the level of traffic off each runway end by combining counts of operations that overfly the same general area. The total operations and percentages shown for 2017 through 2019 in **Table H-9** represent the amount of activity experienced off each runway end for a given year.

Table H-9 Runway Usage by Runway End

		2017		2018		2019	
Runway End	**Operation(s)[1]**	**Total Flights**	**% of Total[2]**	**Total Flights**	**% of Total[2]**	**Total Flights**	**% of Total[2]**
04L	R4L A + R22R D	68,925	**17.2%**	86,021	**20.3%**	74,697	**17.5%**
04R	R4R A + R22L D	40,570	**10.1%**	61,879	**14.6%**	58,449	**13.7%**
9	R9 A + R27 D	27,562	**6.9%**	19,802	**4.7%**	24,076	**5.6%**
14	N/A	0	**0.0%**	0	**0.0%**	0	**0.0%**
15L	R15L A + R33R D	578	**0.1%**	26	**0.0%**	23	**0.0%**
15R	R15R A + R33L D	56,216	**13.9%**	35,457	**8.4%**	43,606	**10.2%**
22L	R22L A + R4R D	51,735	**12.9%**	75,347	**17.8%**	69,805	**16.3%**
22R	R22R A + R4L D	4,799	**1.2%**	6,620	**1.6%**	6,285	**1.5%**
27	R27 A + R9 D	98,068	**24.5%**	99,250	**23.4%**	103,191	**24.2%**
32	R32 A + R14 D	6,874	**1.7%**	5,135	**1.2%**	6,822	**1.6%**
33L	R33L A + R15R D	44,001	**10.9%**	33,259	**7.8%**	38,607	**9.0%**
33R	R33R A + R15L D	2,043	**0.5%**	1,229	**0.3%**	1,615	**0.4%**
All		401,371	**100.0%**	424,024	**100.0%**	427,176	**100.0%**

Source: HMMH 2020, Massport Noise Office.

Notes: N/A – not applicable.
Runway 14-32 is unidirectional: there are no arrivals to Runway 14 and no departures from Runway 32. The 15 operations shown in this row for 2016 are non-jet departures which were most likely erroneously associated with Runway 32 by the computer algorithm.

1 A=Arrivals; D=Departures.

2 Percentages are rounded to the nearest tenth.

Flight Tracks

The AEDT pre-processor converts each radar track to an AEDT model track and then models the scaled aircraft operation on that track. This method keeps the modeled lateral and vertical dispersion of the aircraft types consistent with the radar data and ensures that anomalies in the departure paths are captured in the pre-processor system. **Table H-10** lists the number of flight tracks used in the modeling process for 2017, 2018 and 2019. A sample of flight tracks from 2018 and 2019 are displayed in **Figures 6-4** through **6-10** in Chapter 6, *Noise Abatement*.

Table H-10 Total Count of Flight Tracks Modeled with AEDT (2017, 2018, and 2019)

	Runway											
	4L	**4R**	**9**	**14**	**15L**	**15R**	**22L**	**22R**	**27**	**32**	**33L**	**33R**
2019												
Departures	5,392	7,660	60,003	0	1	8,481	3,042	59,892	23,548	0	41,222	0
Arrivals	13,149	52,055	0	0	23	1,421	58,33	819	39,151	6,634	28,222	1,610
2018												
Departures	5,718	8,559	60,032	7	0	9,190	3,230	71,355	19,790	0	33,970	0
Arrivals	14,254	56,777	0	0	25	1,350	64,554	870	37,831	5,033	23,244	1,203
2017												
Departures	4,098	4,881	48,580	19	0	9,484	2,093	56,463	27,562	0	47,155	0
Arrivals	12,462	38,477	0	0	578	8,711	46,854	701	49,488	6,855	34,167	2,043

Source: HMMH, 2020; Harris Noise and Operational Monitoring System (NOMS) data.

Annual Model Results and Status of Mitigation Programs

Noise Exposed Population

Table H-11 presents the noise-exposed population by community through 2019. This table includes population within the DNL 60 to 65 dB 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.

Table H-11 Noise-Exposed Population by Community

Year	Census Data	80+ dB	75+ dB	70-75 dB DNL	65-70 dB DNL[1]	Total (65+)	60-65 dB DNL
BOSTON[2]							
1990	1980	0	0	1,778	28,970	30,748	N/A
1992	1980	0	0	800	4,316	5,116	N/A
1993	1980	0	0	264	2,820	3,084	N/A
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 [3]	1990	0	58	364	11,632	12,054	45,948
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
2003	2000	0	0	164	1,730	1,894	21,763
2004 [4]	2000	0	65	192	4,142	4,399	24,473
2005 [4]	2000	0	65	104	2,020	2,189	17,661
2006 [4]	2000	0	65	99	1,054	1,218	14,866
2007 [4,5]	2000	0	0	169	4,094	4,263	21,446
2008 [4,5]	2000	0	5	0	3,487	3,492	18,890
2009 [4,5]	2000	0	5	67	937	1,009	12,284
2010 [4,5]	2010	0	0	0	689	689	17,646
2011 [4,5]	2010	0	0	0	331	331	11,600
2012 [4,5]	2010	0	0	0	421	421	11,037
2013 [4,5]	2010	0	0	0	612	612	14,835
2014 [4,5]	2010	0	0	34	4,151	4,185	23,343
2015 [4,5]	2010	0	0	110	7,225	7,365	32,309
2016 [4,5]	2010	0	0	0	4,031	4,031	20,806
2017 [4,5]	2010	0	0	14	4,720	4,734	24,595
2018 [4,5]	2010	0	0	11	2,228	2,239	23,445
2019 [4,5]	2010	0	0	7	4,029	4,036	25,163
CHELSEA							
1990	1980	0	0	0	4,813	4,813	N/A
1992	1980	0	0	0	3,952	3,952	N/A
1993	1980	0	0	0	0	0	N/A
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	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
2003	2000	0	0	0	0	0	3,591
2004 [4]	2000	0	0	0	0	0	7,756
2005 [4]	2000	0	0	0	0	0	5,772
2006 [4]	2000	0	0	0	0	0	2,477
2007 [4,5]	2000	0	0	0	0	0	9,774
2008 [4,5]	2000	0	0	0	0	0	7,793

Table H-11 Noise-Exposed Population by Community (Continued)

Year	Census Data	80+ dB	75+ dB	70-75 dB DNL	65-70 dB DNL[1]	Total (65+)	60-65 dB DNL
CHELSEA							
2009 [4,5]	2000	0	0	0	0	0	5,462
2010 [4,5]	2010	0	0	0	0	0	4,897
2011 [4,5]	2010	0	0	0	0	0	0
2012 [4,5]	2010	0	0	0	0	0	0
2013 [4,5]	2010	0	0	0	0	0	3,485
2014 [4,5]	2010	0	0	0	0	0	9,236
2015 [4,5]	2010	0	0	0	0	0	0
2016 [4,5]	2010	0	0	0	0	0	12,110
2017 [4,5]	2010	0	0	0	65	65	13,900
2018 [4,5]	2010	0	0	0	0	0	10,526
2019 [4,5]	2010	0	0	0	0	0	12,650
EVERETT							
1990	1980	0	0	0	0	0	N/A
1992	1980	0	0	0	0	0	N/A
1993	1980	0	0	0	0	0	N/A
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	2000	0	0	0	0	0	0
2001	2000	0	0	0	0	0	0
2002	2000	0	0	0	0	0	0
2003	2000	0	0	0	0	0	0
2004 [4]	2000	0	0	0	0	0	0
2005 [4]	2000	0	0	0	0	0	0
2006 [4]	2000	0	0	0	0	0	0
2007 [4,5]	2000	0	0	0	0	0	0
2008 [4,5]	2000	0	0	0	0	0	0
2009 [4,5]	2000	0	0	0	0	0	0
2010 [4,5]	2010	0	0	0	0	0	0
2011 [4,5]	2010	0	0	0	0	0	0
2012 [4,5]	2010	0	0	0	0	0	0
2013 [4,5]	2010	0	0	0	0	0	0
2014 [4,5]	2010	0	0	0	0	0	0
2015 [4,5]	2010	0	0	0	0	0	0
2016 [4,5]	2010	0	0	0	0	0	0
2017 [4,5]	2010	0	0	0	0	0	924
2018 [4,5]	2010	0	0	0	0	0	0
2019 [4,5]	2010	0	0	0	0	0	0
MEDFORD							
1990	1980	0	0	0	0	0	N/A
1992	1980	0	0	0	0	0	N/A
1993	1980	0	0	0	0	0	N/A
1994	1990	0	0	0	0	0	0
1995	1990	0	0	0	0	0	0
1996	1990	0	0	0	0	0	0

Table H-11 Noise-Exposed Population by Community (Continued)

Year	Census Data	80+ dB	75+ dB	70-75 dB DNL	65-70 dB DNL[1]	Total (65+)	60-65 dB DNL
MEDFORD							
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	2000	0	0	0	0	0	0
2001	2000	0	0	0	0	0	0
2002	2000	0	0	0	0	0	0
2003	2000	0	0	0	0	0	0
2004 [4]	2000	0	0	0	0	0	0
2005 [4]	2000	0	0	0	0	0	0
2006 [4]	2000	0	0	0	0	0	0
2007 [4,5]	2000	0	0	0	0	0	0
2008 [4,5]	2000	0	0	0	0	0	0
2009 [4,5]	2000	0	0	0	0	0	0
2010 [4,5]	2010	0	0	0	0	0	0
2011 [4,5]	2010	0	0	0	0	0	0
2012 [4,5]	2010	0	0	0	0	0	0
2013 [4,5]	2010	0	0	0	0	0	0
2014 [4,5]	2010	0	0	0	0	0	0
2015 [4,5]	2010	0	0	0	0	0	0
2016 [4,5]	2010	0	0	0	0	0	0
2017 [4,5]	2010	0	0	0	0	0	0
2018 [4,5]	2010	0	0	0	0	0	0
2019 [4,5]	2010	0	0	0	0	0	0
QUINCY							
1990	1980	0	0	0	0	0	N/A
1992	1980	0	0	0	0	0	N/A
1993	1980	0	0	0	0	0	N/A
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	2000	0	0	0	0	0	636
2001	2000	0	0	0	0	0	610
2002	2000	0	0	0	0	0	610
2003	2000	0	0	0	0	0	610
2004 [4]	2000	0	0	0	0	0	610
2005 [4]	2000	0	0	0	0	0	610
2006 [4]	2000	0	0	0	0	0	610
2007 [4,5]	2000	0	0	0	0	0	0
2008 [4,5]	2000	0	0	0	0	0	0
2009 [4,5]	2000	0	0	0	0	0	0
2010 [4,5]	2010	0	0	0	0	0	0
2011 [4,5]	2010	0	0	0	0	0	0
2012 [4,5]	2010	0	0	0	0	0	0
2013 [4,5]	2010	0	0	0	0	0	0
2014 [4,5]	2010	0	0	0	0	0	0

Table H-11 Noise-Exposed Population by Community (Continued)

Year	Census Data	80+ dB	75+ dB	70-75 dB DNL	65-70 dB DNL[1]	Total (65+)	60-65 dB DNL
QUINCY							
2015 [4,5]	2010	0	0	0	0	0	0
2016 [4,5]	2010	0	0	0	0	0	0
2017 [4,5]	2010	0	0	0	0	0	0
2018 [4,5]	2010	0	0	0	0	0	0
2019 [4,5]	2010	0	0	0	0	0	0
REVERE							
1990	1980	0	0	0	4,274	4,274	N/A
1992	1980	0	0	0	3,848	3,848	N/A
1993	1980	0	0	0	4,617	4,617	N/A
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	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
2003	2000	0	0	0	2,994	2,994	2,227
2004 [4]	2000	0	0	82	2,969	3,051	2,678
2005 [4]	2000	0	0	82	2,540	2,622	2,731
2006 [4]	2000	0	0	82	2,540	2,622	2,698
2007 [4,5]	2000	0	0	0	2,450	2,450	2,853
2008 [4,5]	2000	0	0	0	2,434	2,434	1,802
2009 [4,5]	2000	0	0	0	2,512	2,512	1,452
2010 [4,5]	2010	0	0	0	2,413	2,413	2,473
2011 [4,5]	2010	0	0	0	2,547	2,547	3,123
2012 [4,5]	2010	0	0	0	2,762	2,762	3,191
2013 [4,5]	2010	0	0	0	2,505	2,505	2,791
2014 [4,5]	2010	0	0	0	2,832	2,832	3,829
2015 [4,5]	2010	0	0	0	3,789	3,789	3,385
2016 [4,5]	2010	0	0	0	2,376	2,376	3,508
2017 [4,5]	2010	0	0	0	2,362	2,362	2,899
2018 [4,5]	2010	0	0	0	2,362	2,362	2,899
2019 [4,5]	2010	0	0	0	3,484	3,484	3,733
WINTHROP							
1990	1980	0	676	1,211	2,420	4,307	N/A
1992	1980	0	626	1,146	2,488	4,262	N/A
1993	1980	0	648	1,211	1,773	3,632	N/A
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	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

Table H-11 Noise-Exposed Population by Community (Continued)

Year	Census Data	80+ dB	75+ dB	70-75 dB DNL	65-70 dB DNL[1]	Total (65+)	60-65 dB DNL
WINTHROP							
2003	2000	0	0	339	1,956	2,295	7,386
2004 [4]	2000	0	2	337	1,649	1,988	6,508
2005 [4]	2000	0	39	347	1,280	1,666	6,353
2006 [4]	2000	0	39	416	1,288	1,743	6,845
2007 [4,5]	2000	0	0	247	1,139	1,386	6,749
2008 [4,5]	2000	0	0	244	1,409	1,653	6,547
2009 [4,5]	2000	0	0	171	643	814	4,221
2010 [4,5]	2010	0	0	130	598	728	3,720
2011 [4,5]	2010	0	0	130	939	1069	4,303
2012 [4,5]	2010	0	0	200	1,186	1,386	5,305
2013 [4,5]	2010	0	0	130	1,060	1,190	5,466
2014 [4,5]	2010	0	0	130	1,775	1,905	6,456
2015 [4,5]	2010	0	0	320	2,623	2,943	6,375
2016 [4,5]	2010	0	0	130	913	1,403	5,062
2017 [4,5]	2010	0	0	125	647	772	4,656
2018 [4,5]	2010	0	0	51	1,170	1,221	5,586
2019 [4,5]	2010	0	0	96	1,152	1,248	5,621

Table H-11 Noise-Exposed Population by Community (Continued)

Year	Census Data	80+ dB	75+ dB	70-75 dB DNL	65-70 dB DNL[1]	Total (65+)	60-65 dB DNL
All Communities							
1990	1980	0	676	2,989	40,477	44,142	NA
1992	1980	0	628	2,352	14,604	17,584	NA
1993	1980	0	648	1,475	9,210	11,333	NA
1994	1990	0	523	1,608	16,421	18,552	49,016
1995	1990	0	588	2,462	18,031	21,081	52,896
1996	1990	0	523	1,922	17,997	20,442	59,574
1997	1990	0	523	2,378	23,536	26,437	73,691
1998	1990	0	577	2,102	20,617	23,296	70,062
1999[3]	1990	0	411	1,900	20,838	23,149	64,379
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
2003	2000	0	0	503	6,680	7,183	35,577
2004 [4]	2000	0	67	611	8,760	9,438	41,975
2005 [4]	2000	0	104	533	5,840	6,477	33,127
2006 [4]	2000	0	104	597	4,882	5,583	27,496
2007 [4,5]	2000	0	0	416	7,683	8,099	40,822
2008 [4,5]	2000	0	5	244	7,330	7,579	35,122
2009 [4,5]	2000	0	5	238	4,092	4,335	23,419
2010 [4,5]	2010	0	0	130	3,700	3,830	28,736
2011 [4,5]	2010	0	0	130	3,817	3,947	19,026
2012 [4,5]	2010	0	0	200	4,369	4,569	19,533
2013 [4,5]	2010	0	0	130	4,177	4,307	26,577
2014 [4,5]	2010	0	0	164	8,758	8,922	42,864
2015 [4,5]	2010	0	0	430	13,667	14,097	52,748
2016 [4,5]	2010	0	0	130	7,320	7,450	41,486
2017 [4,5]	2010	0	0	139	7,794	7,933	46,974
2018 [4,5]	2010	0	0	62	6,972	7,034	43,270
2019 [4,5]	2010	0	0	103	8,665	8,768	47,167

Source: Data prepared for Massport by HMMH 2020.

Notes: dB – decibel; DNL - Day-Night Average Sound Level; N/A – not available.
South End is included in Boston totals.

1 65 dB DNL is the federally defined noise criterion.

2 Boston includes portions of Dorchester, East Boston, Roxbury, South Boston.

3 Boston population by community changed in 1999 due to employment of more accurate hill effects methodology and reporting change.

4 All results from 2004 to 2015 are from the RealContours™ modeling system with INM.
All results from 2016 to 2019 are from AEDT using the proprietary pre-processor.

5 2018 and 2019 noise analysis uses AEDT version 3c, 2017 used AEDT version 2d, 2016 used AEDT version 2c SP2, 2012 through 2015 used INM version 7.0d, 2011 used INM version 7.0c, 2008 through 2010 used INM version 7.0b, 2007 used INM version 7.01, and 1990 and 2000 used earlier versions of INM.

Cumulative Noise Index (CNI)

Massport reports total annual fleet noise at Logan Airport, defined in the Logan Airport Noise Rules by a metric referred to as the CNI. The CNI is a single number representing the sum of the entire set of single-event noise levels experienced at the Airport over a full year of operation, weighted similarly to DNL so that activity occurring at night is penalized by adding an extra 10 dB to each event. This penalty is mathematically equivalent to multiplying the number of nighttime events by each aircraft by a factor of ten. The Logan Airport Noise Rules define CNI in terms of Effective Perceived Noise Level (EPNL) and require that the index be computed for the fleet of commercial aircraft operating at Logan Airport throughout the year. In addition, in EDRs and ESPRs, Massport reports partial CNI values of noise at Logan Airport, so that various subsets of the fleet (cargo, night operations, passenger jets, etc.) are identified (see **Table H-12**). The Noise Rules, adopted by Massport following public hearings held in February 1986, established a CNI limit of 156.5 EPNdB. The CNI generally has decreased since 1990, remaining below that cap, with changes from year to year on the order of a few tenths of a decibel. The 2018 and 2019 CNI remains well below the cap of 156.5 EPNL.

Table H-12 Cumulative Noise Index (EPNL) – 1990 to 2019 (limit 156.5)

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Full CNI (Entire Commercial Jet Fleet)	**156.4**	**155.8**	**155.5**	**155.3**	**155.4**	**155.3**	**155.1**	**154.8**	**154.7**	**154.9**	**154.7**
Total Passenger Jets	155.2	154.8	154.6	154.4	154.4	154.2	154.1	153.9	153.7	153.9	153.6
Total Cargo Jets	150.1	148.9	148.0	147.9	148.3	148.8	148.6	147.5	147.9	148.0	148.2
Total Daytime	152.5	152.1	152.4	152.1	152.1	151.6	151.2	150.8	150.4	150.4	149.5
Total Nighttime	154.4	153.4	152.6	152.4	152.6	152.9	152.9	152.5	152.7	153.1	153.1
Total Stage 2 Jets	N/A	N/A	N/A	N/A	151.0	150.2	149.4	149.2	147.7	147.1	124.7
Total Stage 3 Jets	N/A	N/A	N/A	N/A	153.4	153.8	153.8	153.4	153.8	154.2	154.7
Daytime Stage 2	N/A	N/A	N/A	N/A	149.0	148.5	147.6	146.5	145.2	144.1	122.6
Nighttime Stage 2	N/A	N/A	N/A	N/A	146.7	145.1	144.8	145.8	144.1	144.0	120.5
Daytime Stage 3	N/A	N/A	N/A	N/A	149.1	148.8	148.7	148.8	148.9	149.2	149.5
Nighttime Stage 3	N/A	N/A	N/A	N/A	151.4	152.1	152.2	151.5	152.1	152.5	153.1
Passenger Jet Stage 2	N/A	N/A	N/A	N/A	150.5	149.9	149.2	148.9	147.5	146.8	124.2
Passenger Jet Stage 3	N/A	N/A	N/A	N/A	152.2	152.3	152.3	152.2	152.6	153.0	153.6
Cargo Jet Stage 2	N/A	N/A	N/A	N/A	141.5	137.4	136.8	137.4	139.0	134.5	114.8
Cargo Jet Stage 3	N/A	N/A	N/A	N/A	147.3	148.5	148.3	147.0	147.3	147.9	148.2
Daytime Passenger	N/A	152.0	152.2	152.0	152.0	151.5	151.1	150.6	150.1	150.1	149.3
Nighttime Passenger	N/A	151.6	150.9	150.6	150.8	151.0	151.0	151.1	151.2	151.6	151.6
Daytime Cargo	137.1	137.1	137.6	135.2	136.1	138.0	136.7	136.2	138.0	138.2	137.5
Nighttime Cargo	149.9	148.6	147.6	147.6	148.0	148.4	148.3	147.1	147.5	147.6	147.8
Daytime Passenger Stage 2	N/A	N/A	N/A	N/A	148.9	148.4	147.6	146.5	145.0	143.9	122.3
Daytime Passenger Stage 3	N/A	N/A	N/A	N/A	149.0	148.5	148.4	148.5	148.6	149.0	149.2
Nighttime Passenger Stage 2	N/A	N/A	N/A	N/A	149.0	148.5	148.4	148.5	142.8	143.7	119.8
Nighttime Passenger Stage 3	N/A	N/A	N/A	N/A	149.4	149.9	150.1	149.8	150.5	150.8	151.6
Daytime Cargo Stage 2	N/A	N/A	N/A	N/A	128.3	126.7	124.6	126.4	131.6	131.5	111.1
Daytime Cargo Stage 3	N/A	N/A	N/A	N/A	135.3	137.7	136.4	135.7	136.9	137.1	137.5
Nighttime Cargo Stage 2	N/A	N/A	N/A	N/A	141.3	137.0	136.5	137.0	138.2	131.5	112.3
Nighttime Cargo Stage 3	N/A	N/A	N/A	N/A	147.0	148.1	148.0	146.6	146.9	147.5	147.8

Table H-12 Cumulative Noise Index (EPNL) – 1990 to 2019 (limit 156.5) (Continued)

	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Full CNI (Entire Commercial Jet Fleet)	**154.1**	**153.2**	**152.7**	**153.4**	**153.2**	**152.6**	**152.7**	**152.9**	**152.3**	**151.9**	**152.1**
Total Passenger Jets	152.9	151.8	151.3	152.2	152.1	151.4	151.5	151.9	151.1	150.9	150.6
Total Cargo Jets	147.8	147.4	147.1	147.0	146.6	146.5	146.4	146.1	145.9	145.1	146.7
Total Daytime	149.0	148.5	148.0	148.5	148.2	147.5	147.2	147.6	147.1	146.8	146.9
Total Nighttime	152.4	151.3	150.9	151.7	151.6	151.0	151.2	151.4	150.7	150.3	150.6
Total Stage 2 Jets	121.5	114.3	114.1	118.1	N/A	N/A	N/A	N/A	N/A	113.6	110.8
Total Stage 3 Jets	154.1	153.2	152.7	153.4	153.2	152.0	152.7	152.9	152.3	151.9	152.1
Daytime Stage 2	119.3	111.2	113.7	109.4	N/A	N/A	N/A	N/A	N/A	103.6	N/A
Nighttime Stage 2	117.3	111.4	103.2	117.5	N/A	N/A	N/A	N/A	N/A	113.1	110.8
Daytime Stage 3	149.0	148.5	148.0	148.5	148.2	147.5	147.2	147.6	147.1	146.8	146.9
Nighttime Stage 3	152.4	151.3	150.9	151.7	151.6	151.0	151.2	151.4	150.7	150.3	150.6
Passenger Jet Stage 2	116.3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Passenger Jet Stage 3	152.9	151.8	151.3	152.2	152.1	151.4	151.5	151.9	151.1	150.9	150.6
Cargo Jet Stage 2	119.9	114.3	114.1	118.1	NA	NA	NA	NA	NA	113.6	110.8
Cargo Jet Stage 3	147.8	147.4	147.1	147.0	146.6	146.5	146.4	146.1	145.9	145.1	146.7
Daytime Passenger	148.7	148.2	147.7	148.2	147.9	147.2	146.9	147.3	146.8	146.6	146.5
Nighttime Passenger	150.8	149.4	148.8	150.0	150.1	149.3	149.7	150.0	149.1	149.0	148.5
Daytime Cargo	137.1	137.0	136.2	135.7	135.8	135.5	135.8	135.8	135.2	134.5	136.6
Nighttime Cargo	147.4	147.0	146.8	146.7	146.2	146.1	146.0	145.6	145.5	144.7	146.3
Daytime Passenger Stage 2	115.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Daytime Passenger Stage 3	148.7	148.2	147.7	148.2	147.9	147.2	146.9	147.3	146.8	146.6	146.5
Nighttime Passenger Stage 2	110.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Nighttime Passenger Stage 3	150.8	149.4	148.8	150.0	150.1	149.3	149.7	150,.0	149.1	149.0	148.5
Daytime Cargo Stage 2	117.3	111.2	113.7	109.4	N/A	N/A	N/A	N/A	N/A	103.6	N/A
Daytime Cargo Stage 3	137.0	137.0	136.1	135.7	135.8	135.5	135.8	135.8	135.2	134.4	136.6
Nighttime Cargo Stage 2	116.4	111.4	103.2	117.5	N/A	N/A	N/A	N/A	N/A	113.1	110.8
Nighttime Cargo Stage 3	147.4	147.0	146.8	146.7	146.2	146.1	146.0	145.6	145.5	144.7	146.3

Table H-12 Cumulative Noise Index (EPNL) – 1990 to 2017 (limit 156.5) (Continued)

	2012	2013	2014	2015	2016	2017	2018	2019	Change 2017 to 2018	Change 2018 to 2019
Full CNI (Entire Commercial Jet Fleet)	**152.2**	**152.3**	**152.9**	**152.7**	**152.6**	**153.1**	**153.4**	**153.5**	**0.3**	**0.1**
Total Passenger Jets	151.3	151.4	151.7	152.0	152.0	152.6	153.0	153.1	0.4	0.1
Total Cargo Jets	144.9	145.1	144.5	144.2	143.8	143.4	142.9	143.0	(0.5)	0.1
Total Daytime	147.0	147.0	147.1	147.2	147.0	147.5	147.6	147.7	0.1	0.1
Total Nighttime	150.6	150.8	151.0	151.2	151.2	151.7	152.1	152.2	0.4	0.1
Total Stage 2 Jets	104.9	111.3	N/A	N/A	N/A	NA	N/A	N/A	N/A	N/A
Total Stage 3 Jets	152.2	152.3	152.5	152.7	152.6	153.1	153.4	153.5	0.3	0.1
Daytime Stage 2	104.9	101.4	N/A	N/A	N/A	NA	N/A	N/A	N/A	N/A
Nighttime Stage 2	N/A	110.8	N/A	N/A	N/A	NA	N/A	N/A	N/A	N/A
Daytime Stage 3	147.0	147.0	147.1	147.2	147.0	147.5	147.6	147.7	0.1	0.1
Nighttime Stage 3	150.6	150.8	151.0	151.2	151.2	151.7	152.1	152.2	0.4	0.1
Passenger Jet Stage 2	104.9	101.4	N/A	N/A	N/A	NA	N/A	N/A	N/A	N/A
Passenger Jet Stage 3	151.3	151.4	151.7	152.0	152.0	152.6	153.0	153.1	0.4	0.1
Cargo Jet Stage 2	N/A	110.8	N/A	N/A	N/A	NA	N/A	N/A	N/A	N/A
Cargo Jet Stage 3	144.9	145.1	144.5	144.2	143.8	143.4	142.9	143.0	(0.5)	0.1
Daytime Passenger	146.8	146.8	146.9	147.0	146.8	147.3	147.5	147.6	0.2	0.1
Nighttime Passenger	149.4	149.6	150.0	150.3	150.4	151.1	151.6	151.7	0.5	0.1
Daytime Cargo	134.0	133.6	134.9	134.4	133.8	133.9	133.6	133.4	(0.3)	(0.2)
Nighttime Cargo	144.5	144.8	144.0	143.7	143.4	142.8	142.3	142.5	(0.5)	0.2
Daytime Passenger Stage 2	104.9	101.4	N/A	N/A	N/A	NA	N/A	N/A	N/A	N/A
Daytime Passenger Stage 3	146.8	146.8	146.9	147.0	146.8	147.3	147.5	147.6	0.2	0.1
Nighttime Passenger Stage 2	N/A	N/A	N/A	N/A	N/A	NA	N/A	N/A	N/A	N/A
Nighttime Passenger Stage 3	149.4	149.6	150.0	150.3	150.4	151.1	151.6	151.7	0.5	0.1
Daytime Cargo Stage 2	N/A	N/A	N/A	N/A	N/A	NA	N/A	N/A	N/A	N/A
Daytime Cargo Stage 3	134.0	133.6	134.9	134.4	133.8	133.9	133.6	133.4	(0.3)	(0.2)
Nighttime Cargo Stage 2	N/A	110.8	N/A	N/A	N/A	NA	N/A	N/A	N/A	N/A
Nighttime Cargo Stage 3	144.5	144.8	144.0	143.7	143.4	142.8	142.3	142.5	(0.5)	0.2

Source: HMMH, 2020.

Notes: CNI – cumulative noise index; EPNL - Effective Perceived Noise Level; N/A – not available.
General aviation (GA) aircraft and non-jet aircraft are not included in the calculations. Negative numbers are shown in parentheses ( ).

Residential Sound Insulation Program (RSIP)

In 2018 and 2019, no new dwelling units received sound insulation from Massport, with a total of 5,467 residential buildings and 11,515 dwelling units that have been sound insulated since 1986 when the program was first implemented. **Table H-13** lists the yearly progress of this mitigation effort.

Following FAA's approval of model adjustments based on the effects of terrain (discussed in the *1999 ESPR*), Massport submitted, and the New England Region of FAA approved, a new sound insulation program. The revised contour, approved for a two-year period beginning in 1999, included dwelling units in East Boston, South Boston, and Winthrop that previously had not been eligible for insulation. Massport received notice of FAA funding for $5 million. Subsequently, Massport updated its program contour, first with the *2001 EDR* contour and more recently with the Logan Airside Improvements Project approved contour. These updates allowed Massport to continue the program with yearly additional funds through 2014.

The Logan Airside Improvements Project incorporated runway use changes due to the new Runway 14-32 which opened in late November 2006. The Logan Airside Improvements Project update expanded the focus of the sound insulation program into Chelsea to satisfy the mitigation commitments made in the Airside Improvements Program Record of Decision (ROD). Massport also utilized a program where they have contacted property owners that are still eligible within the RSIP boundaries that had previously declined to participate. Owners have been offered a second chance to participate in the program.

As of 2015, the FAA requires airports to use the AEDT model to establish eligibility for sound insulation; therefore, Massport has submitted an AEDT-derived noise exposure map to be kept on file with the FAA. The FAA requires that a submitted sound insulation program contour should represent current operational conditions; generally, the contour year should match the date of the document submittal. Massport developed a 2019 Noise Exposure Map (NEM) contour (including block rounding) representing pre-COVID conditions to comply with this requirement and submitted it to FAA in the summer of 2020. Once accepted by the FAA, Massport will reach out to eligible homeowners to discuss potential mitigation options for their homes.

In January 2020, Massport's CEO sent a letter to the FAA Associate Administrator requesting that Massport and the FAA work together to address re-treatment of homes that were sound insulated during the early years of the program to upgrade eligible homes to newer more effective and durable materials (**Figure H-13**). The Associate Administrator responded that the FAA is exploring limited circumstances under which Massport might be able to mitigate homes that had been mitigated before the FAA first issued sound insulation standards in 1993 (**Figure H-14**). The status of the initiative will be reported in future EDRs.

Table H-13 Residential Sound Insulation Program (RSIP) Status (1986-2019)

Construction Year	Residential Buildings[1]	Dwelling Units[2]
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
2002	205	354
2003	230	468
2004	320	791
2005	314	471
2006	286	827
2007	160	548
2008	94	388
2009	111	287
2010	56	83
2011	62	114
2012[3]	0	0
2013	45	76
2014	48	106
2015	0	0
2016	0	0
2017	0	0
2018	0	0
2019	0	0
Total	**5,467**	**11,515**

Source: Massport, 2020.
1 Includes multiple units.
2 Individual units.
3 Federal funding was delayed in 2012.

Table H-14 provides a list of all schools that have been treated under Massport's sound insulation program. To date, Massport has provided sound insulation to 36 schools at a cost of over $8 million.

Table H-14 Schools Treated Under Massport Sound Insulation Program

Boston:	
East Boston	**Winthrop**
East Boston High	Winthrop Jr. High School
St. Mary's Star of the Sea	E. B. Newton
St. Dominic Savio High	A. T. Cummings (Ctr.) School
St. Lazarus	*3 Winthrop Schools*
James Otis	
Samuel Adams	
Curtis Guild	**Revere**
Dante Alighieri	Beachmont School
P.J. Kennedy	*1 Revere School*
Donald McKay	
Hugh Roe O'Donnell	
E Boston Central Catholic	**Chelsea**
Manassah Bradley	Shurtleff School
13 East Boston Schools	Williams School
	St. Rose Elementary
South Boston	St. Stanislaus
St. Augustine	Chelsea High School
Cardinal Cushing	*5 Chelsea Schools*
Patrick Gavin	
St. Bridgid's	**36 Total Schools**
Oliver Hazard Perry	
Condon School	
6 South Boston Schools	
Roxbury and Dorchester	
Samuel Mason	
Dearborn Middle	
Ralph Waldo Emerson	
Lewis Middle	
Nathan Hale Elem.	
Phillis Wheatley Elem.	
Davis Ellis Elem.	
Henry L. Higginson	
8 Roxbury and Dorchester Schools	
27 Total Boston Schools	

Source: Massport, 2015.

Figure H-13 Massport Residential Sound Treatment Request

Massachusetts Port Authority
Lisa S. Wieland, Chief Executive Officer
One Harborside Drive, Suite 200S
East Boston, MA 02128-2090
Telephone (617) 568-1003
www.massport.com

January 28, 2020

D. Kirk Shaffer
Associate Administrator for Airports
Federal Aviation Administration
Office of the Associate Administrator for Airports (ARP)
800 Independence Avenue SW
Washington, D.C. 20591

Subject: Residential Sound Treatment and Old Window Technology

Dear Associate Administrator Shaffer:

The Massachusetts Port Authority (Massport) and the FAA have a strong, historic partnership implementing one of the most successful airport noise mitigation sound treatment programs in the nation. Since 1984, when Massport and the FAA first collaborated on testing noise mitigation strategies for homes, we have sound insulated over 11,000 dwellings and 36 schools in 7 communities most affected by aircraft noise. I am writing today to formally request that our two agencies work together to address the first generation treatments (dating from 1984 to 1993) located in our highest noise-impacted communities.

Boston Logan International Airport has been experiencing tremendous growth due to a strong economy and a vibrant airline industry. Over the past five years, traffic at Logan has increased by over 10 million passengers. This level of growth requires Massport, with support from the FAA and our airline partners, to invest in new infrastructure at Logan Airport. A critical part of our success in proposing and implementing key projects at an urban airport in close proximity to residential communities is our ability to address aircraft noise and air emissions impacts.

One area of community engagement around noise impacts has been the re-treatment of homes that were sound insulated during the early years of the residential soundproofing program. The composite structures and materials that were used then are no longer in use. The structures and materials used in window and door treatments today are more effective and durable.

The FAA's current policy does not allow the re-treatment of homes that were previously sound insulated under the program. I respectfully request that the FAA revisit this policy for those homes that were treated between 1984 and 1993 with the old technology and continue to fall within the latest 65 DNL contour. This request targets a narrow set of eligible homes with the highest noise exposure and whose owners have not been able to update their structures to take advantage of the vast improvements in the efficiency and effectiveness of window and door treatments.

I look forward to further discussions with you on this critical community engagement effort.

Sincerely,

Lisa S. Wieland
Chief Executive Officer

cc: Winsome Lenfert, (FAA), Gail Latrell (FAA), Ed Freni, Flavio Leo, Senator Edward Markey, Senator Elizabeth Warren, Congresswoman Katherine Clark, Congresswoman Ayanna Pressley

Figure H-14 FAA Response to Massport Residential Sound Treatment Request

U.S. Department
of Transportation
Federal Aviation Administration

Office of the Associate Administrator
for Airports

800 Independence Ave, SW.
Washington, DC 20591

MAR 1 1 2020

Ms. Lisa S. Wieland
Chief Executive Officer
Massachusetts Port Authority
One Harborside Drive, Suite 200S
East Boston, MA 02128

Dear Ms. Wieland:

Thank you for your January 28 letter concerning the Massachusetts Port Authority's (Massport) Residential Sound Insulation Program associated with General Edward Lawrence Logan International Airport (BOS). Specifically, you asked the Federal Aviation Administration (FAA) to reconsider the possibilities of Airport Improvement Program (AIP) funding for noise mitigation for homes that had been sound insulated between 1985 and 1993.

It is my understanding that my staff and Massport representatives discussed this request on February 20 and that this discussion included a potential path forward that may allow us to revisit our previous conclusions for a narrow set of homes insulated prior to 1993.

We are exploring limited circumstances under which Massport might be able to mitigate homes that had been mitigated before the FAA first issued sound insulation standards in 1993. We believe those homes could be considered unmitigated because of the uncertainty of whether the doors, windows, and other insulation installed would have achieved sufficient interior noise reduction as those manufactured and installed consistent with FAA standards. The FAA does not consider the aging of treatments or homes, depreciation, or the passage of time as factors for eligibility.

In addition to the pre-1993 time period, Massport would have to verify that the homes potentially eligible for mitigation remain inside the day/night average sound level 65 decibel (dB) contour, have an interior noise level greater than 45 dB (established through current interior noise measuring protocols), and otherwise meet current AIP eligibility requirements and FAA standards.

Finally, AIP funds for sound insulation are limited, and an eligibility finding does not guarantee funding.

Figure H-14 FAA Response to Massport Residential Sound Treatment Request (Continued)

My staff will contact your staff to schedule additional meetings to continue these discussions. In the meantime, if you require further assistance, please contact the New England Regional Airports Division at (781) 238-7600.

I trust this information is helpful.

Sincerely,

D. Kirk Shaffer
Associate Administrator
for Airports

Noise Complaints

Table H-15 presents a detailed list by community of the total noise complaints made in 2017, 2018, and 2019, which can be filed either on Massport's Noise Complaint Line, through a form on Massport's website, or through the PublicVue flight track portal. The Noise Complaint Line provides individuals the ability to express their concerns about 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 times 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, run-up, 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 FAA will receive a copy of the report.

In 2018, Massport received 71,381 noise complaints from 82 communities, an increase from 59,343 noise complaints from 95 communities in 2017. In 2019, the number of complaint calls rose to 268,929 from 86 communities. The number of individual complainants decreased from 4,269 callers in 2017 to 2,178 callers in 2018, and then increased again to 2,669 callers in 2019. The increase in complaints from 2017 to 2018 was 20 percent, but the decrease in number of individual callers was almost 49 percent. From 2018 to 2019 the number of complaints rose 277 percent while the number of individual callers rose 23 percent.

Recent technological advances in both Massport's noise complaint phone system and online complaint tracking system, as well as the incorporation of third-party complaint applications, have made it easier for community members to file a complaint and to receive information about particular noise events. In late 2018, Massport added the option to submit complaints through the Airnoise button[19] which has dramatically increased complaints logged in the system. In 2017, the average number of complaints per individual caller (the ratio of calls to callers) was 13.9. This ratio increased to an average 32.8 complaints per caller throughout 2018 and then to an average 100.8 complaints per caller in 2019.

Figure H-15 shows the call and callers data graphically. Massport's website, http://www.massport.com/logan-airport/about-logan/noise-abatement/complaints/), provides for additional general questions and answers regarding the Noise Complaint Line.

19 Airnoise is a subscription service that allows the user to file a noise complaint by clicking a button. The system finds the aircraft closest to the complainer and then files a detailed noise complaint directly with Massport. https://www.airnoise.io/

Table H-15 Noise Complaint Line Summary

Town Name	2017 Calls	2017 Callers	2018 Calls	2018 Callers	2019 Calls	2019 Callers	Change in number of calls, 2017 to 2018	Change in number of calls, 2018 to 2019
Acton	2	2	0	0	0	0	(2)	0
Andover	4	2	1	1	0	0	(3)	(1)
Arlington	2,252	137	1,264	50	7,021	77	(988)	5,757
Belmont	1,129	102	698	43	1,132	41	(431)	434
Beverly	15	4	62	4	13	6	47	(49)
Billerica	8	5	2	1	2	2	(6)	0
Bolton	0	0	0	0	1	1	0	1
Boston	186	59	23	17	162	27	(163)	139
Boxford	0	0	0	0	10	4	0	10
Braintree	29	4	28	6	126	5	(1)	98
Brewster	1	1	0	0	0	0	(1)	0
Brighton	2	2	2	2	0	0	0	(2)
Brockton	0	0	5	2	8	2	5	3
Brookline	4	3	6	4	2	2	2	(4)
Burlington	22	14	4	3	0	0	(18)	(4)
Cambridge	1,657	211	1,118	131	1,958	142	(539)	840
Canton	19	7	6	2	5	2	(13)	(1)
Carlisle	3	1	0	0	0	0	(3)	0
Charlestown	31	16	24	12	65	14	(7)	41
Chelmsford	1	1	501	1	1,931	2	500	1,430
Chelsea	428	117	237	58	1,605	47	(191)	1,368
Cohasset	214	13	685	9	975	9	471	290
Danvers	0	0	21	4	2	2	21	(19)
Dedham	4	3	12	6	2	2	8	(10)
Dorchester	519	60	52	16	28	15	(467)	(24)
Dover	10	3	4	3	8	1	(6)	4
Dunstable	3	1	0	0	0	0	(3)	0
Duxbury	1	1	0	0	287	2	(1)	287
East Boston	312	97	148	56	3,803	70	(164)	3,655
East Bridgewater	0	0	2	1	0	0	2	(2)
Easton	1	1	0	0	0	0	(1)	0
Essex	0	0	1	1	4	2	1	3
Everett	335	118	9	5	58	23	(326)	49
Framingham	2	2	8	2	8	1	6	0
Gloucester	10	2	3	2	2	2	(7)	(1)
Groton	88	1	2	1	7	2	(86)	5
Groveland	1	1	0	0	0	0	(1)	0
Hamilton	53	22	61	12	187	11	8	126

Table H-15 Noise Complaint Line Summary (Continued)

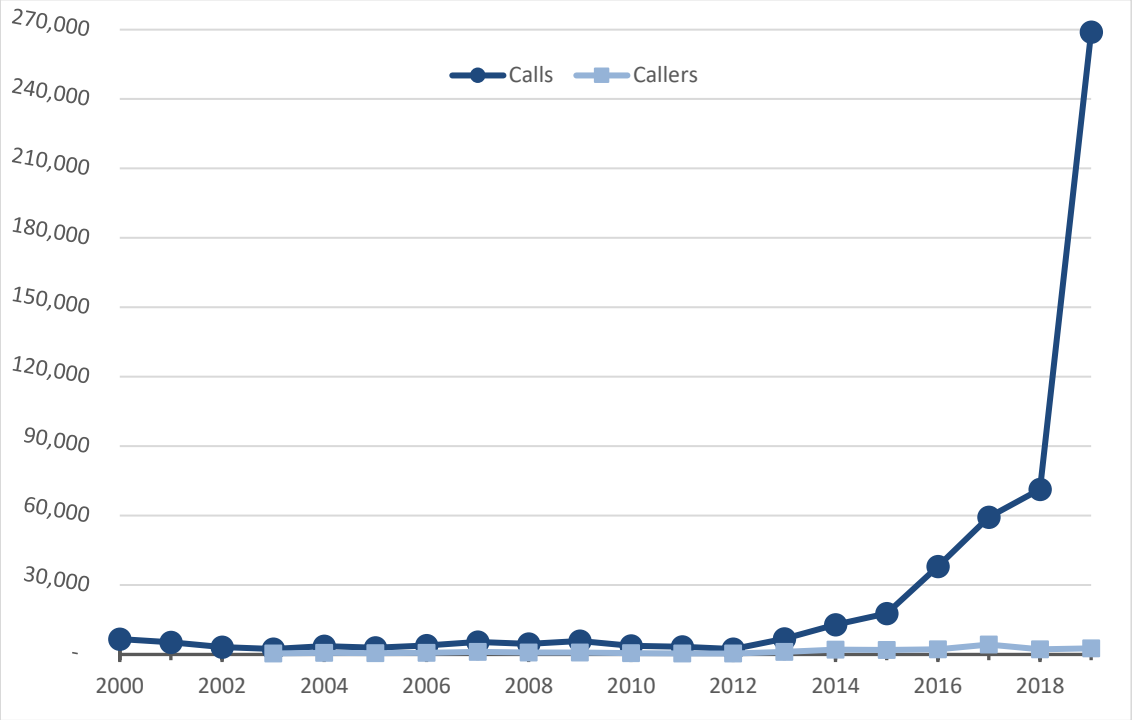
Town Name	2017 Calls	2017 Callers	2018 Calls	2018 Callers	2019 Calls	2019 Callers	Change in number of calls, 2017 to 2018	Change in number of calls, 2018 to 2019
Hanover	3	2	2	2	0	0	(1)	(2)
Hingham	67	27	14	7	15	6	(53)	1
Holbrook	10	2	6	4	1	1	(4)	(5)
Hopkinton	0	0	1	1	0	0	1	(1)
Hull	1,500	175	1,024	101	1,047	97	(476)	23
Hyde Park	132	20	1,308	9	1,514	11	1,176	206
Ipswich	104	28	71	9	139	8	(33)	68
Jamaica Plain	2,016	274	8,395	111	17,132	108	6,379	8,737
Lexington	0	0	0	0	1	1	0	1
Lincoln	114	1	0	0	0	0	(114)	0
Lowell	1	1	0	0	0	0	(1)	0
Lynn	276	10	206	18	60	21	(70)	(146)
Lynnfield	1	1	0	0	2	1	(1)	2
Malden	1,987	96	823	36	15,414	34	(1,164)	14,591
Manchester	1	1	2	2	0	0	1	(2)
Marblehead	18	4	70	3	1,291	14	52	1,221
Marshfield	13	6	14	5	5	4	1	(9)
Mattapan	4	2	1	1	1	1	(3)	0
Medfield	1	1	0	0	2	2	(1)	2
Medford	7,856	745	5,857	328	98,021	712	(1,999)	92,164
Melrose	5	2	7	1	1,967	4	2	1,960
Middleton	4	2	12	6	5	2	8	(7)
Millis	132	1	63	1	12	1	(69)	(51)
Milton	23,940	486	34,902	314	41,575	219	10,962	6,673
Nahant	117	18	59	16	73	20	(58)	14
Natick	1	1	0	0	2	1	(1)	2
Needham	36	8	22	1	9	3	(14)	(13)
Newington	0	0	0	0	5	1	0	5
Newton	319	25	152	17	208	18	(167)	56
North Easton	0	0	3	2	0	0	3	(3)
North Reading	0	0	1	1	0	0	1	(1)
Norton	0	0	0	0	2	2	0	2
Norwell	7	4	2	2	2	1	(5)	0
Norwood	1	1	1	1	2	1	0	1
Peabody	61	6	58	11	29	10	(3)	(29)
Pembroke	5	1	0	0	3	1	(5)	3
Quincy	44	33	22	15	7	6	(22)	(15)
Randolph	3	2	9	2	3	3	6	(6)

Table H-15 Noise Complaint Line Summary (Continued)

Town Name	2017 Calls	2017 Callers	2018 Calls	2018 Callers	2019 Calls	2019 Callers	Change in number of calls, 2017 to 2018	Change in number of calls, 2018 to 2019
Reading	13	9	0	0	1	1	(13)	1
Revere	134	47	164	52	291	95	30	127
Roslindale	2,094	203	1,289	101	2,975	78	(805)	1,686
Roxbury	891	36	990	13	5,151	24	99	4,161
Salem	6	3	23	8	82	16	17	59
Saugus	4	2	28	2	1	1	24	(27)
Scituate	8	6	901	5	946	5	893	45
Sharon	3	3	1	1	56	2	(2)	55
Shirley	1	1	0	0	0	0	(1)	0
Somerville	3,762	309	2,565	150	28,070	229	(1,197)	25,505
South Boston	1,792	78	605	36	448	48	(1,187)	(157)
South End	786	135	1,724	43	5,309	27	938	3,585
Stoneham	2	2	3	3	3	3	1	0
Stoughton	21	3	9	1	65	1	(12)	56
Sudbury	105	1	26	1	21	2	(79)	(5)
Swampscott	4	3	11	9	8	6	7	(3)
Topsfield	2	2	0	0	33	2	(2)	33
Waban	1	1	0	0	0	0	(1)	0
Wakefield	47	7	26	3	23	2	(21)	(3)
Waltham	6	5	0	0	3	3	(6)	3
Watertown	818	65	250	28	3,709	28	(568)	3,459
Wellesley	1	1	0	0	0	0	(1)	0
Wenham	116	11	377	6	537	5	261	160
West Roxbury	1,104	56	2,358	23	5,239	27	1,254	2,881
Westwood	157	3	223	4	192	2	66	(31)
Weymouth	92	5	130	12	152	7	38	22
Whitman	2	1	0	0	0	0	(2)	0
Wilmington	3	3	1	1	2	1	(2)	1
Winchester	895	111	936	16	9,143	15	41	8,207
Winthrop	293	128	611	171	8,121	201	318	7,510
Woburn	55	30	34	7	387	8	(21)	353
Total	**59,343**	**4,269**	**71,381**	**2,178**	**268,929**	**2,669**	12,038	197,548

Source: Massport, HMMH 2020.
Note: Negative numbers are shown in parentheses ( ).

Figure H-15 Noise Complaint Line Calls and Callers by Year



Source: Massport and HMMH, 2020

AEDT Correspondence

Massport engaged in an extensive process with FAA New England Region and the FAA Office of Environment and Energy (AEE-100) upon the release of AEDT. This process was to develop and gain concurrence on the use of Logan Airport specific modifications to the AEDT model and inputs. Meetings and discussion were held in 2016 and 2017 to determine what adjustments Massport could make to the AEDT model to account for Logan Airport's unique terrain. The complete set of correspondence which determined the AEDT adjustments for the 2016 DNL contours is provided in the *2016 EDR Appendix H*.

In August 2017, the FAA expressed concurrence, in principal, with two of Massport's four requested adjustments; that response letter is included in the *2017 ESPR Appendix H*. For the 2018 and 2019 noise modeling, Massport applied the two allowed adjustments, using the same methodology as 2016 and 2017, however for the stagelength modifications, Massport utilized the new alternate weight profiles for AEDT types that had available profiles in AEDT 3c.

Flight Track Monitoring Report

As part of its ongoing commitment to mitigate noise at Logan Airport, Massport has undertaken evaluating 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 fly. That remains the responsibility of FAA, while the individual pilots are responsible for safely executing 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 FAA's Tower Order (BOS TWR 7040.1).

Since 2002, Massport has prepared annual reports for flight track monitoring. Prior to 2002, Massport had issued semi-annual reports, an outgrowth of the Flight Track Monitoring Program study. That study was contained in the *Generic Environmental Impact Report* filed with Massachusetts Environmental Policy Act (MEPA) in July 1996 and was the subject of two Community Working Group workshops in September and October 1996. The annual flight track monitoring reports are published in Appendix H, *Noise Abatement* in the annual EDR or ESPR. The information for 2017 is repeated in this report for reference. The period covered by this *2018/2019 EDR* is January 1, 2018 through December 31, 2019, with each calendar year tabulated separately.

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, 2020 through December 31, 2020 and will be included in the next EDR.

FAA Air Traffic Control (ATC) 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 FAA air traffic controllers in meeting their designated responsibilities to be "a good neighbor, while meeting our operational objectives/ responsibilities to the National Airspace System." Section 7.a.3 of the Order, subtitled "Turbojet Departure Noise Abatement Procedures," states that all turbojet departures shall be issued the Standard Instrument Departure (SID) procedure appropriate for the departure runway. Logan Airport has ten published SIDs; nine area navigation (RNAV) SIDs and one conventional SID.

The conventional SID is for aircraft that are not equipped to fly RNAV procedures. The conventional SID uses terms such as "BOS 2 DME" to indicate where aircraft should turn. Here, BOS refers to an aid to navigation known as the BOSTON VORTAC, a radio beacon physically located on Logan Airport near the eastern shoreline between the ends of Runways 27 and 33L (indicated by a circle on **Figure H-16**). 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 two nautical miles away from the BOS. Pilots are then "vectored" or assigned to fly a magnetic heading given by and at the discretion of FAA air traffic controller to maintain the safe separation of aircraft. All altitudes in feet listed below (unless otherwise noted) are in mean sea level (MSL) and indicate the aircraft altitude used both by the pilot in the cockpit and the air traffic controller on the ground.

During 2010, several of the conventional-only (or radar vector) and RNAV procedures from the *Boston Logan Airport Noise Study Categorical Exclusion* (CATEX)[20] were implemented. There are eight RNAV procedures for departures from Logan Airport. These eight procedures are used by aircraft departing Runways 4R, 9, 15R, 22L, 22R, 27, and 33L (Runways 27 and 33L were added in 2014). These procedures primarily affected departures flying over the North and South shores and were designed to increase the amount of jet traffic crossing back over land above 6,000 feet to minimize noise impacts to communities. A ninth RNAV procedure, which is used by Runway 27, has been modified several times.

Figure H-16 presents the gates used in the analysis for the Flight Track Monitoring Report. These gates are virtual vertical planes, which are used in the analysis to capture the aircraft flight paths. The gates are defined using geographic coordinates for each end of the gate, along with a floor and a ceiling altitude. The gates also capture direction of flights (in or out). The edges of each gate in **Figure H-16** point in the direction that the aircraft is coming from. This information is used to evaluate the performance of the flight procedures off each runway end and is presented below.

The RNAV procedures are still captured by the original flight track monitoring gates. Traffic crossing over the North Shore passes through the Marblehead, Swampscott and Revere Gates and traffic passing over the South Shore passes through the Hull 2, Hull 3, and Cohasset Gates. Turbojets departing Runway 27 on the RNAV pass through the Runway 27 gates and the Runway 33L RNAV flight tracks still pass between the Somerville and Everett gates as expected. The following pages examine the jet aircraft gate crossing data by departure runway.

20 Federal Aviation Administration (FAA) *Boston Logan Airport Noise Study Categorical Exclusion Record of Decision* (CATEX ROD), Issued October 16, 2007.

Figure H-16 Logan Airport Flight Track Monitor Gates

Figure H-16

Statistical Analyses of Flight Tracks - Runway 4R

The Nahant Gate (**Figure H-16**) 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-16a, H-16b, and H-16c show that Runway 4R departures for 2017, 2018 and 2019 were consistently concentrated with 99.5 percent "over the Causeway," about 0.1 or 0.2 percent over the south end of the gate, and about 0.4 or 0.5 percent over the north end of the gate.

Table H-16a Runway 4R Nahant Gate Summary for 2017

	Number of Tracks Through Gate Segment	Percentage of Tracks Through Gate Segment
North End of Gate	18	0.5%
Over Causeway	3,798	99.5%
South End of Gate	3	0.1%
Total	**3,819**	**100.0%**

Source: Massport, HMMH 2018.

Table H-16b Runway 4R Nahant Gate Summary for 2018

	Number of Tracks Through Gate Segment	Percentage of Tracks Through Gate Segment
North End of Gate	34	0.5%
Over Causeway	7,332	99.5%
South End of Gate	16	0.2%
Total	**7,382**	**100.0%**

Source: Massport, HMMH 2020.

Table H-16c Runway 4R Nahant Gate Summary for 2019

	Number of Tracks Through Gate Segment	Percentage of Tracks Through Gate Segment
North End of Gate	25	0.4%
Over Causeway	6,794	99.5%
South End of Gate	7	0.1%
Total	**6,826**	**100.0%**

Source: Massport, HMMH 2020.

Tables H-17a, H-17b, and **H-17c** show how many of the shoreline crossings following departure from Runway 4R were above 6,000 feet. For 2017, 96.1 percent of the flights were above 6,000 feet compared to 97.0 percent in 2018 and 94.5 percent in 2019. The Swampscott gate had the lowest percent of flights above 6,000 feet in all three years, with only 16.9 percent in 2017, 19.7 percent in 2018, and 13.3 percent in 2019. The crossing percentage meeting the altitude stipulation for this gate is historically lower than for the other shoreline gates due to its proximity to the Airport. As seen in **Figure H-16**, the Swampscott gate is adjacent to the Nahant gate and aircraft would therefore have to climb very quickly to be above 6,000 feet when crossing the gate. Less than 5 percent of Runway 4R departures in any given year cross the shoreline at the Swampscott gate.

Table H-17a Runway 4R Shoreline Crossings Above 6,000 Feet for 2017

	Number of Tracks Through Gate	Number Above 6,000 ft	Percentage Above 6,000 ft
Swampscott Gate	83	14	16.9%
Marblehead Gate	1,538	1,509	98.1%
Hull 2 Gate	160	160	100.0%
Hull 3 Gate	608	07	99.8%
Cohasset Gate	124	124	100.0%
Total	**2,513**	**2,414**	**96.1%**

Source: Massport, HMMH 2018.

Table H-17b Runway 4R Shoreline Crossings Above 6,000 Feet for 2018

	Number of Tracks Through Gate	Number Above 6,000 ft	Percentage Above 6,000 ft
Swampscott Gate	122	24	19.7%
Marblehead Gate	2,919	2,872	98.4%
Hull 2 Gate	358	358	100.0%
Hull 3 Gate	1,153	1,152	99.9%
Cohasset Gate	335	335	100.0%
Total	**4,887**	**4,741**	**97.0%**

Source: Massport, HMMH 2020.

Table H-17c Runway 4R Shoreline Crossings Above 6,000 Feet for 2019

	Number of Tracks Through Gate	Number Above 6,000 ft	Percentage Above 6,000 ft
Swampscott Gate	211	28	13.3%
Marblehead Gate	2,716	2,652	97.6%
Hull 2 Gate	355	355	100.0%
Hull 3 Gate	865	865	100.0%
Cohasset Gate	347	346	99.7%
Total	**4,494**	**4,246**	**94.5%**

Source: Massport, HMMH 2020.

Statistical Analyses of Flight Tracks - Runway 9

The Winthrop 1 and Winthrop 2 gates (**Figure H-16**) 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-18a, **H-18b,** and **H-18c** show how many tracks turned prior to the BOS 2 DME. Northbound turns before BOS 2 DME pass through the Winthrop 1 Gate. Southbound traffic would pass through the Winthrop 2 Gate. In 2017, there were a total of 65 such turns and in 2018 and 2019, 42 and 79 tracks crossed these gates respectively. The compliance rate for avoiding the early turns was 99.8 percent in 2017 and 99.9 percent in both 2018 and 2019.

Table H-18a Runway 9 Gate Summary — Winthrop Gates 1 and 2 for 2017

	Number of Tracks Through Gate	Percent Turning Before BOS 2 DME
Winthrop 1 Gate	37	0.1%
Winthrop 2 Gate	28	0.1%
Neither gate	43,771	99.8%
Total	**43,836**	**100%**

Source: Massport, HMMH 2018.
Note: DME – distance measuring equipment.

Table H-18b Runway 9 Gate Summary — Winthrop Gates 1 and 2 for 2018

	Number of Tracks Through Gate	Percent Turning Before BOS 2 DME
Winthrop 1 Gate	26	<0.1%
Winthrop 2 Gate	16	<0.1%
Neither gate	54,692	99.9%
Total	**54,734**	**100 %**

Source: Massport, HMMH 2020.

Table H-18c Runway 9 Gate Summary — Winthrop Gates 1 and 2 for 2019

	Number of Tracks Through Gate	Percent Turning Before BOS 2 DME
Winthrop 1 Gate	66	0.1%
Winthrop 2 Gate	13	0.0%
Neither gate	56,179	99.9%
Total	**56,258**	**100%**

Source: Massport, HMMH 2020.

Tables H-19a, H-19b, and **H-19c** indicate that 99.4 percent of Runway 9 departures were above 6,000 feet when crossing the shoreline in 2018 and 99.9 in 2019, compared with 99.5 percent in 2017. In any given year, approximately 65 percent of aircraft departing Runway 9 that cross back over the shoreline do so over the South Shore, as opposed to about 35 percent over the North Shore.

The percentages above 6,000 feet remained fairly constant from 2017 to 2019, with the exception of the Revere gate. The percentage above 6,000 feet fell from 72.7 percent in 2017 to 66.7 percent in 2018 and then to 13.0 percent in 2019. The number of flights through the Revere gate more than tripled from 33 in 2017 to 115 in 2019.

Table H-19a Runway 9 Shoreline Crossings Above 6,000 Feet for 2017

	Number of Tracks Through Gate	Number Above 6,000 ft	Percentage Above 6,000 ft
Revere Gate	33	24	72.7%
Swampscott Gate	470	435	92.6%
Marblehead Gate	10,645	10,628	99.8%
Hull 2 Gate	1,656	1,648	99.5%
Hull 3 Gate	3,393	3,327	98.1%
Cohasset Gate	15,441	15,427	99.9%
Total	**31,638**	**31,489**	**99.5%**

Source: Massport, HMMH 2018.

Table H-19b Runway 9 Shoreline Crossings Above 6,000 Feet for 2018

	Number of Tracks Through Gate	Number Above 6,000 ft	Percentage Above 6,000 ft
Revere Gate	51	34	66.7%
Swampscott Gate	638	586	91.8%
Marblehead Gate	13,862	13,828	99.8%
Hull 2 Gate	2,215	2,211	99.8%
Hull 3 Gate	4,584	4,477	97.7%
Cohasset Gate	19,092	19,083	100.0%
Total	**40,442**	**40,219**	**99.4%**

Source: Massport, HMMH 2020.

Table H-19c Runway 9 Shoreline Crossings Above 6,000 Feet for 2019

	Number of Tracks Through Gate	Number Above 6,000 ft	Percentage Above 6,000 ft
Revere Gate	115	15	13.0%
Swampscott Gate	1,245	1,116	89.6%
Marblehead Gate	13,318	13,268	99.6%
Hull 2 Gate	2,836	2,824	99.6%
Hull 3 Gate	5,698	5,586	98.0%
Cohasset Gate	18,089	18,065	99.9%
Total	**37,017**	**36,811**	**99.4%**

Source: Massport, HMMH 2020.

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 over the shore through the Swampscott and Marblehead Gates (**Figure H-16**) to the north, or through the Hull 2, Hull 3, and Cohasset Gates to the south. The initial turn and success rate in avoidance of Hull overflights is shown in **Tables H-20a, H-20b,** and **H-20c**. The vast majority (98.6 percent in 2017 and over 99.4 percent in 2018 and 2019) of jets departing from Runway 15R cross the portion of the Hull 1 gate that is north of the Hull peninsula, as intended.

Table H-20a Runways 15R Hull 1 Gate Summary for 2017

	Number of Tracks Through Gate Segment	Percentage of Tracks Through Gate Segment
North of Hull Peninsula	9,104	98.6%
Over Hull	130	1.4%
Total	**9,234**	**100.0%**

Source: Massport, HMMH 2018.

Table H-20b Runways 15R Hull 1 Gate Summary for 2018

	Number of Tracks Through Gate Segment	Percentage of Tracks Through Gate Segment
North of Hull Peninsula	8,351	99.5%
Over Hull	42	0.5%
Total	**8,393**	**100.0%**

Source: Massport, HMMH 2020.

Table H-20c Runways 15R Hull 1 Gate Summary for 2019

	Number of Tracks Through Gate Segment	Percentage of Tracks Through Gate Segment
North of Hull Peninsula	7,680	99.4%
Over Hull	44	0.6%
Total	**7,724**	**100.0%**

Source: Massport, HMMH 2020.

Tables H-21a, H-21b, and **H-21c** indicate that 98.9 percent of Runway 15R departures were above 6,000 feet when crossing the shoreline in 2019 and over 99 percent 2017 and 2018. The proportion of flights over 6,000 feet is usually lowest at the Hull 3 gate, due to that gate's proximity to the runway end. Very few departures from Runway 15R cross back over the Hull 2 gate, which is even closer to the runway end and requires a tight turn with rapid climb to achieve.

Table H-21a Runway 15R Shoreline Crossings Above 6,000 Feet for 2017

	Number of Tracks Through Gate	Number Above 6,000 ft	Percentage Above 6,000 ft
Swampscott Gate	280	277	98.9%
Marblehead Gate	2,771	2,770	100.0%
Hull 2 Gate	16	16	100.0%
Hull 3 Gate	266	237	89.1%
Cohasset Gate	2,246	2,242	99.8%
Total	**5,579**	**5,542**	**99.3%**

Source: Massport, HMMH 2018.

Table H-21b Runway 15R Shoreline Crossings Above 6,000 Feet for 2018

	Number of Tracks Through Gate	Number Above 6,000 ft	Percentage Above 6,000 ft
Swampscott Gate	229	227	99.1%
Marblehead Gate	2,226	2,225	100.0%
Hull 2 Gate	11	11	100.0%
Hull 3 Gate	199	178	89.4%
Cohasset Gate	2,007	2,005	99.9%
Total	**4,672**	**4,646**	**99.4%**

Source: Massport, HMMH 2020.

Table H-21c Runway 15R Shoreline Crossings Above 6,000 Feet for 2019

	Number of Tracks Through Gate	Number Above 6,000 ft	Percentage Above 6,000 ft
Swampscott Gate	323	318	98.5%
Marblehead Gate	1,961	1,959	99.9%
Hull 2 Gate	2	1	50.0%
Hull 3 Gate	247	211	85.4%
Cohasset Gate	1,850	1,845	99.7%
Total	**4,383**	**4,334**	**98.9%**

Source: Massport, HMMH 2020.

Statistical Analyses of Flight Tracks - Runways 22R and 22L

The Squantum 2 and Hull 1 Gates (**Figure H-16**) are used to monitor the turn to 140 degrees over Boston Harbor and then passage north of Hull. The shoreline gates are used to monitor shoreline crossings, as for Runways 4R, 9, and 15R above.

Tables H-22a, H-22b, and **H-22c** show the dispersion of the jet departures from Runways 22R and 22L as they pass through the Squantum 2 Gate. The first segment of the 27,000-foot wide gate is the northernmost segment and is primarily over Boston Harbor. The subsequent segments extend southward toward Quincy. The percentage of tracks passing through the first two segments of this gate, representing compliance with the noise abatement procedures, was about 93 percent for all three years shown.

Table H-22a Runways 22R and 22L Squantum 2 Gate[1] Summary for 2017

	Number of Tracks Through Gate Segment	Percentage of Tracks Through Gate Segment
0 - 12,000 ft	4,425	8.9%
12,000 - 14,000 ft	42,067	84.3%
14,000 - 21,000 ft	3,361	6.7%
21,000 - 27,000 ft	66	0.1%
Total	**49,919**	**100.0%**

Source: Massport, HMMH 2018.
1 The 27,000-foot wide Squantum 2 Gate is divided into four segments, identified in this table by distance from the northernmost point.

Table H-22b Runways 22R and 22L Squantum 2 Gate[1] Summary for 2018

	Number of Tracks Through Gate Segment	Percentage of Tracks Through Gate Segment
0 - 12,000 ft	2,423	3.8%
12,000 - 14,000 ft	56,884	89.0%
14,000 - 21,000 ft	4,575	7.2%
21,000 - 27,000 ft	65	0.1%
Total	**63,947**	**100.0%**

Source: Massport, HMMH 2020.
1 The 27,000-foot wide Squantum 2 Gate is divided into four segments, identified in this table by distance from the northernmost point.

Table H-22c Runways 22R and 22L Squantum 2 Gate[1] Summary for 2019

	Number of Tracks Through Gate Segment	Percentage of Tracks Through Gate Segment
0 - 12,000 ft	1,496	2.7%
12,000 - 14,000 ft	49,460	90.4%
14,000 - 21,000 ft	3,744	6.8%
21,000 - 27,000 ft	23	0.0%
Total	**54,723**	**100.0%**

Source: Massport, HMMH 2017.
1 The 27,000-foot wide Squantum 2 Gate is divided into four segments, identified in this table by distance from the northernmost point.

Massport uses the Hull 1 Gate to monitor departures from Runways 22R and 22L as well as from Runway 15R as they make their initial turn over Boston Harbor. **Tables H-23a**, **H-23b,** and **H-23c** indicate that the percent of tracks crossing north of the Hull peninsula as they passed through the Hull 1 Gate were close to 99 percent for all three years shown.

Table H-23a Runways 22R and 22L Hull 1 Gate Summary for 2017

	Number of Tracks Through Gate Segment	Percentage of Tracks Through Gate Segment
North of Hull Peninsula	49,304	99.0%
Over Hull	521	1.0%
Total	**49,825**	**100.0%**

Source: Massport, HMMH 2018.

Table H-23b Runways 22R and 22L Hull 1 Gate Summary for 2018

	Number of Tracks Through Gate Segment	Percentage of Tracks Through Gate Segment
North of Hull Peninsula	63,606	99.1%
Over Hull	594	0.9%
Total	**64,200**	**100.0%**

Source: Massport, HMMH 2020.

Table H-23c Runways 22R and 22L Hull 1 Gate Summary for 2019

	Number of Tracks Through Gate Segment	Percentage of Tracks Through Gate Segment
North of Hull Peninsula	54,073	98.9%
Over Hull	598	1.1%
Total	**54,671**	**100.0%**

Source: Massport, HMMH 2020.

Tables H-24a, **H-24b,** and **H-24c** indicate the percent of Runway 22R and 22L departures that were above 6,000 feet when crossing the shoreline. Combined compliance for all the gates was 99.8 percent for all three years shown, with over 90 percent compliance at each individual gate. The Hull 2 gate, closest to the Airport on the south shore, had the fewest crossings and also the lowest compliance rate.

Table H-24a Runways 22R and 22L Shoreline Crossings Above 6,000 Feet for 2017

	Number of Tracks Through Gate	Number Above 6,000 ft	Percentage Above 6,000 ft
Revere Gate	58	55	94.8%
Swampscott Gate	797	796	99.9%
Marblehead Gate	12,645	12,639	100.0%
Hull 2 Gate	36	33	91.7%
Hull 3 Gate	1,608	1,565	97.3%
Cohasset Gate	19,978	19,963	99.9%
Total	**35,122**	**35,051**	**99.8%**

Source: Massport, HMMH 2018.

Table H-24b Runways 22R and 22L Shoreline Crossings Above 6,000 Feet for 2018

	Number of Tracks Through Gate	Number Above 6,000 ft	Percentage Above 6,000 ft
Revere Gate	62	62	100.0%
Swampscott Gate	1,432	1,430	99.9%
Marblehead Gate	16,337	16,331	100.0%
Hull 2 Gate	39	37	94.9%
Hull 3 Gate	2,678	2,617	97.7%
Cohasset Gate	25,046	25,039	100.0%
Total	**45,594**	**45,516**	**99.8%**

Source: Massport, HMMH 2020.

Table H-24c Runways 22R and 22L Shoreline Crossings Above 6,000 Feet for 2019

	Number of Tracks Through Gate	Number Above 6,000 ft	Percentage Above 6,000 ft
Revere Gate	96	96	100.0%
Swampscott Gate	2,017	2,017	100.0%
Marblehead Gate	13,237	13,233	100.0%
Hull 2 Gate	44	40	90.9%
Hull 3 Gate	3,560	3,484	97.9%
Cohasset Gate	19,402	19,395	100.0%
Total	**38,356**	**38,265**	**99.8%**

Source: Massport, HMMH 2020.

Statistical Analyses of Flight Tracks - Runway 27

On September 15, 1996, FAA implemented a new departure procedure for Runway 27 called the WYLYY RNAV procedure. In accordance with the provisions of the ROD issued for the Runway 27 Environmental Impact Statement, Massport has been providing on-going radar flight track data and analysis to FAA with respect to the procedure.

In 2012, for the first time since 1997 when flight track monitoring began, each gate (Gates A through E) averaged over 68 percent for every month in which the Airport had all runways open and for the annual average. The percent of flight tracks through all gates (a number tracked but not required per the 1996 ROD) rounded up to 68 percent for the last two months of 2011 and continued for all of 2012. FAA had discussed these data internally and concluded that acceptable flight track dispersion had been achieved and that no subsequent action by FAA is required per the 1996 ROD requirements.[21]

Massport continues to provide annual data monitoring this flight corridor. **Table H-25a** presents the conformance results for 2017 and **Tables H-25b** and **H-25c** do so for 2018 and 2019 respectively. Gate A is closest to the Airport, with each subsequently labeled gate further from the runway. The gates increase in width as the distance is increased along the flight path, together forming a noise abatement corridor. A consistent percentage of traffic through each gate means that flights are not entering the corridor late or exiting the corridor too early. The average percentage of tracks through the entire corridor rose from 84.9 percent in 2017 to 86.9 percent in 2018 and then to 89.2 percent in 2019. The average percent through each gate increased from 94.0 percent in 2017 to 98.7 percent for both 2018 and 2019.

Table H-25a Runway 27 Corridor Percent of Tracks Through Each Gate for 2017

Month	Total # of Tracks	Total # of Tracks Through All Gates	Percent of Tracks Through All Gates	Gate A	Gate B	Gate C	Gate D	Gate E	Average Percent Through Each Gate
				1,400[1]	2,200[1]	2,900[1]	4,700[1]	6,300[1]	
January	2,257	1,811	80.2%	1,843	2,012	2,060	2,079	2,074	89.2%
February	1,883	1,597	84.8%	1,635	1,797	1,844	1,858	1,847	95.4%
March	2,513	2,140	85.2%	2,198	2,428	2,468	2,485	2,467	95.9%
April	1,152	954	82.8%	983	1,063	1,082	1,089	1,082	92.0%
May	2,200	1,894	86.1%	1,925	2,113	2,168	2,183	2,179	96.1%
June	2,412	2,131	88.3%	2,165	2,331	2,381	2,397	2,386	96.7%
July	1,922	1,729	90.0%	1,762	1,860	1,901	1,909	1,898	97.1%
August	2,335	1,956	83.8%	1,994	2,109	2,169	2,186	2,170	91.0%
September	2,377	2,110	88.8%	2,149	2,292	2,348	2,367	2,353	96.8%
October	1,627	1,426	87.6%	1,452	1,569	1,593	1,613	1,605	96.3%
November	2,177	1,762	80.9%	1,795	1,991	2,038	2,048	2,036	91.0%
December	2,776	2,240	80.7%	2,314	2,533	2,589	2,610	2,573	90.9%
Average	**2,136**	**1,813**	**84.9%**	**1,851**	**2,008**	**2,053**	**2,069**	**2,056**	**94.0%**

Source: Massport, HMMH 2018.

1 The numbers below the gate names indicate the width of each gate, in feet.

21 Logan Airport Runway 27 Advisory Committee Meeting - January 23, 2012 meeting minutes.

Table H-25b Runway 27 Corridor Percent of Tracks Through Each Gate for 2018

Month	Total # of Tracks	Total # of Tracks Through All Gates	Percent of Tracks Through All Gates	Gate A	Gate B	Gate C	Gate D	Gate E	Average Percent Through Each Gate
				1,400[1]	2,200[1]	2,900[1]	4,700[1]	6,300[1]	
January	1,761	1,504	85.4%	1,534	1,707	1,742	1,756	1,754	99.6%
February	1,724	1,470	85.3%	1,504	1,669	1,702	1,717	1,706	99.0%
March	1,711	1,452	84.9%	1,490	1,666	1,700	1,702	1,688	98.7%
April	1,987	1,710	86.1%	1,748	1,893	1,942	1,971	1,964	98.8%
May	1,273	1,118	87.8%	1,157	1,215	1,233	1,251	1,243	97.6%
June	1,477	1,308	88.6%	1,342	1,415	1,454	1,466	1,459	98.8%
July	816	674	82.6%	697	727	764	792	802	98.3%
August	916	827	90.3%	852	882	893	902	897	97.9%
September	360	326	90.6%	331	350	356	359	358	99.4%
October	1,471	1,280	87.0%	1,311	1,412	1,441	1,462	1,453	98.8%
November	1,665	1,455	87.4%	1,488	1,616	1,645	1,658	1,652	99.2%
December	2,772	2,425	87.5%	2,493	2,693	2,733	2,749	2,733	98.6%
Average	**1,494**	**1,296**	**86.9%**	**1,329**	**1,437**	**1,467**	**1,482**	**1,476**	**98.7%**

Source: Massport, HMMH 2020.

Table H-25c Runway 27 Corridor Percent of Tracks Through Each Gate for 2019

Month	Total # of Tracks	Total # of Tracks Through All Gates	Percent of Tracks Through All Gates	Gate A	Gate B	Gate C	Gate D	Gate E	Average Percent Through Each Gate
				1,400[1]	2,200[1]	2,900[1]	4,700[1]	6,300[1]	
January	2,033	1,781	87.6%	1,823	1,969	2,004	2,018	2,012	99.6%
February	2,385	2,124	89.1%	2,177	2,315	2,360	2,364	2,352	99.0%
March	1,323	1,180	89.2%	1,208	1,290	1,314	1,317	1,307	98.7%
April	1,915	1,658	86.6%	1,705	1,831	1,881	1,896	1,884	98.8%
May	1,311	1,161	88.6%	1,195	1,268	1,293	1,304	1,298	97.6%
June	1,228	1,090	88.8%	1,117	1,196	1,210	1,219	1,211	98.8%
July	1,311	1,203	91.8%	1,230	1,278	1,300	1,305	1,292	98.3%
August	1,303	1,175	90.2%	1,210	1,267	1,284	1,292	1,276	97.9%
September	1,941	1,750	90.2%	1,793	1,886	1,917	1,931	1,917	99.4%
October	1,445	1,307	90.4%	1,346	1,411	1,434	1,431	1,419	98.8%
November	2,710	2,411	89.0%	2,437	2,639	2,682	2,698	2,691	99.2%
December	2,445	2,176	89.0%	2,217	2,371	2,421	2,435	2,426	98.6%
Average	**1,779**	**1,585**	**89.2%**	**1,622**	**1,727**	**1,758**	**1,768**	**1,757**	**98.7%**

Source: Massport, HMMH 2020.

Statistical Analyses of Flight Tracks — Runway 33L

The Somerville and Everett Gates (**Figure H-16**) extend from BOS 2 DME to BOS 5 DME and are used to monitor the departure procedure for Runway 33L. 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.

Tables H-26a, **H-26b,** and **H-26c** indicate that the percentage of jet aircraft departing from Runway 33L tracks and turning before BOS 5 DME while still below 3,000 feet increased from 1.5 percent in 2017 and 2018 to 1.9 percent in 2019.

Table H-26a Runway 33L Gates — Passages Below 3,000 Feet for 2017

	Number of Tracks Through Gate	Number Turning Below 3,000 ft	Percentage Through Gate When Below 3,000 ft
Everett Gate	316	262	0.6%
Somerville Gate	462	357	0.9%
Neither gate	39,727		
Total	**40,347**	**619**	**1.5%**

Source: Massport, HMMH 2018.

Table H-26b Runway 33L Gates — Passages Below 3,000 Feet for 2018

	Number of Tracks Through Gate	Number Turning Below 3,000 ft	Percentage Through Gate When Below 3,000 ft
Everett Gate	185	136	0.5%
Somerville Gate	405	323	1.1%
Neither gate	29,241		
Total	**29,831**	**459**	**1.5%**

Source: Massport, HMMH 2020.

Table H-26c Runway 33L Gates — Passages Below 3,000 Feet for 2019

	Number of Tracks Through Gate	Number Turning Below 3,000 ft	Percentage Through Gate When Below 3,000 ft
Everett Gate	251	211	0.6%
Somerville Gate	596	499	1.4%
Neither gate	35,673		
Total	**36,520**	**710**	**1.9%**

Source: Massport, HMMH 2020.

2018 and 2019 DNL Levels for Census Block Group Locations

Table H-26 reports the DNL value for each Census block group down to DNL 50 dB, computed with AEDT for 2018 and 2019. A Census Block Group represents the outer limits of a group of US Census Blocks. The Average Block DNL provided below is the arithmetic average of the DNL modeled at each US Census Block in that group. The DNL at centroid represents the DNL modeled at the geographic center of the US Census Block Group.

Table H-26 2018 and 2019 DNL Levels for Census Block Group Locations within DNL 50 dB

U.S. Census 2010 Block Group				2018		2019	
Block Group ID	Name	Population	Housing units	Average Block DNL	DNL at centroid	Average Block DNL	DNL at centroid
250173561002	Arlington	1460	681	49.1	49.1	49.9	49.9
250173567011	Arlington	1316	610	49.1	49.2	49.9	50.0
250250105002	Back Bay	1099	744	49.7	49.7	50.4	50.4
250250105003	Back Bay	992	674	50.1	50.1	50.8	50.8
250250105003	Back Bay	992	674	50.1	50.1	50.8	50.8
250250106001	Back Bay	1559	1383	49.8	49.6	50.5	50.3
250250106002	Back Bay	1299	942	50.1	50.2	50.9	51.0
250250107021	Back Bay	663	482	49.7	50.0	50.4	50.7
250250107022	Back Bay	775	465	49.0	49.0	49.6	49.6
250250107023	Back Bay	962	696	50.0	50.0	50.7	50.6
250250108011	Back Bay	664	354	49.6	49.6	50.3	50.2
250250108012	Back Bay	964	678	49.1	49.1	49.7	49.7
250250707001	Back Bay	1161	644	51.2	51.2	52.0	52.0
250250707001	Back Bay	1161	644	51.2	51.2	52.0	52.0
250250708003	Back Bay	1072	612	50.6	50.7	51.4	51.5
250250708003	Back Bay	1072	612	50.6	50.7	51.4	51.5
250250201011	Beacon Hill	767	480	50.1	50.1	50.7	50.7
250250201012	Beacon Hill	896	691	49.6	49.6	50.2	50.1
250250201013	Beacon Hill	1268	821	50.4	50.5	51.0	51.1
250250201014	Beacon Hill	1262	822	50.0	50.0	50.6	50.6
250250202001	Beacon Hill	1266	897	50.4	50.4	50.9	51.0
250250202002	Beacon Hill	1259	847	50.1	50.0	50.6	50.6
250250202003	Beacon Hill	1124	734	49.6	49.6	50.1	50.1
250250203021	Beacon Hill	1181	721	50.9	51.0	51.5	51.6
250250303003	Beacon Hill	1305	503	52.1	52.0	52.6	52.5
250250303003	Beacon Hill	1305	503	52.1	52.0	52.6	52.5
250250701013	Beacon Hill	494	381	52.6	52.5	53.2	53.2
250250701013	Beacon Hill	494	381	52.6	52.5	53.2	53.2
250250104053	Brighton	626	355	49.5	49.6	50.3	50.4
250173548001	Cambridge	911	444	49.9	49.9	50.7	50.7

Table H-26 2018 and 2019 DNL Levels for Census Block Group Locations within DNL 50 dB (Continued)

U.S. Census 2010 Block Group				2018		2019	
Block Group ID	Name	Population	Housing units	Average Block DNL	DNL at centroid	Average Block DNL	DNL at centroid
250173548002	Cambridge	992	533	49.1	49.2	49.9	50.0
250173549001	Cambridge	1126	535	49.7	49.7	50.5	50.6
250173549002	Cambridge	3201	1231	49.4	49.4	50.3	50.3
250173549003	Cambridge	1731	866	49.6	49.1	50.5	49.9
250173550001	Cambridge	671	331	49.8	49.7	50.6	50.6
250173550002	Cambridge	1183	645	50.0	50.0	50.9	50.9
250173550003	Cambridge	835	437	49.9	50.0	50.8	50.9
250250401001	Charlestown	958	555	51.3	51.4	51.8	51.9
250250401002	Charlestown	1210	684	50.7	50.7	51.3	51.4
250250402001	Charlestown	775	304	52.9	53.0	53.6	53.7
250250402002	Charlestown	831	423	51.8	51.8	52.5	52.5
250250403001	Charlestown	739	334	51.9	51.8	52.6	52.5
250250403002	Charlestown	1247	662	51.1	51.0	51.7	51.7
250250403003	Charlestown	657	366	51.0	51.1	51.7	51.7
250250403004	Charlestown	617	320	51.3	51.4	52.0	52.1
250250403005	Charlestown	622	355	50.4	50.4	51.2	51.1
250250404011	Charlestown	1689	766	50.0	49.8	50.7	50.5
250250404012	Charlestown	750	456	50.2	50.0	50.9	50.6
250250406001	Charlestown	863	485	50.0	51.0	50.8	51.8
250250406002	Charlestown	1581	843	50.7	50.7	51.4	51.5
250250408011	Charlestown	1061	530	52.3	52.4	53.0	53.0
250250408012	Charlestown	828	263	53.7	55.1	54.4	55.9
250250408013	Charlestown	2011	1296	53.4	53.6	54.0	54.2
250251601011	Chelsea	1332	353	61.4	61.3	62.5	62.4
250251601012	Chelsea	1372	438	59.3	59.3	60.2	60.2
250251601013	Chelsea	1730	568	61.0	62.1	61.9	63.1
250251601014	Chelsea	2092	539	58.2	58.2	59.0	59.0
250251601015	Chelsea	1025	261	62.8	63.0	64.0	64.2
250251602001	Chelsea	1336	357	60.6	60.7	61.7	61.8
250251602002	Chelsea	1210	374	61.8	61.9	63.0	63.1
250251602003	Chelsea	1497	494	62.4	62.7	63.7	63.9
250251603001	Chelsea	1469	913	60.0	59.5	61.2	60.6
250251603002	Chelsea	596	366	61.5	61.5	62.7	62.6
250251604001	Chelsea	933	344	59.1	58.8	60.2	59.9
250251604002	Chelsea	1783	683	60.4	60.3	61.6	61.5
250251605011	Chelsea	2097	646	54.9	54.8	55.8	55.6

Table H-26 2018 and 2019 DNL Levels for Census Block Group Locations within DNL 50 dB (Continued)

U.S. Census 2010 Block Group				2018		2019	
Block Group ID	Name	Population	Housing units	Average Block DNL	DNL at centroid	Average Block DNL	DNL at centroid
250251605012	Chelsea	1231	396	55.4	55.6	56.1	56.3
250251605013	Chelsea	774	233	56.7	56.6	57.6	57.5
250251605014	Chelsea	754	392	55.7	55.6	56.5	56.5
250251605015	Chelsea	748	304	54.5	54.7	55.3	55.5
250251605021	Chelsea	1703	623	54.2	55.5	54.7	56.0
250251605022	Chelsea	1359	477	52.6	54.7	52.9	54.9
250251605023	Chelsea	1398	488	55.1	54.8	55.8	55.5
250251606011	Chelsea	2158	1005	52.4	52.0	52.9	52.5
250251606012	Chelsea	1905	563	53.3	53.2	53.9	53.9
250251606021	Chelsea	1290	470	52.4	52.2	53.2	53.0
250251606022	Chelsea	795	304	50.4	50.2	51.0	50.8
250251606023	Chelsea	825	346	49.0	49.1	49.5	49.6
250251606024	Chelsea	780	271	50.5	50.5	51.0	51.0
250251606025	Chelsea	985	409	51.2	51.1	51.9	51.7
250250701011	Chinatown	850	529	55.9	56.9	56.7	57.7
250250701011	Chinatown	850	529	55.9	56.9	56.7	57.7
250250702001	Chinatown	1460	599	54.7	54.7	55.5	55.6
250250702003	Chinatown	2625	647	53.5	53.4	54.3	54.2
250250702003	Chinatown	2625	647	53.5	53.4	54.3	54.2
250250801001	Dorchester	2612	450	55.4	55.8	56.2	56.6
250250801001	Dorchester	2612	450	55.4	55.8	56.2	56.6
250250907001	Dorchester	1218	518	51.8	52.0	52.2	52.4
250250907002	Dorchester	1253	644	52.9	53.0	53.4	53.5
250250907003	Dorchester	1153	526	52.1	52.1	52.5	52.5
250250907004	Dorchester	651	302	54.0	54.6	54.6	55.2
250250907004	Dorchester	651	302	54.0	54.6	54.6	55.2
250250909011	Dorchester	1627	606	52.5	52.2	52.5	52.3
250250909012	Dorchester	2103	1034	53.8	54.7	53.8	54.6
250250910011	Dorchester	650	248	49.7	49.6	49.9	49.9
250250910012	Dorchester	743	363	49.9	49.7	50.1	49.8
250250910013	Dorchester	682	335	50.8	52.0	50.9	51.9
250250910014	Dorchester	667	369	51.2	50.8	51.3	50.9
250250911001	Dorchester	1395	625	51.0	50.9	51.2	51.2
250250911002	Dorchester	1007	465	50.4	50.3	50.6	50.5
250250911003	Dorchester	929	325	50.3	50.4	50.6	50.7

Table H-26 2018 and 2019 DNL Levels for Census Block Group Locations within DNL 50 dB (Continued)

U.S. Census 2010 Block Group				2018		2019	
Block Group ID	Name	Population	Housing units	Average Block DNL	DNL at centroid	Average Block DNL	DNL at centroid
250250911004	Dorchester	713	254	50.4	50.4	50.7	50.7
250250911005	Dorchester	817	297	51.1	51.0	51.4	51.4
250250912001	Dorchester	1081	451	51.7	51.8	52.2	52.3
250250912002	Dorchester	1411	492	50.8	50.9	51.2	51.3
250250912003	Dorchester	742	296	51.6	51.7	52.1	52.2
250250913001	Dorchester	1368	480	52.8	52.8	53.3	53.3
250250913002	Dorchester	1131	388	53.8	53.8	54.5	54.5
250250913002	Dorchester	1131	388	53.8	53.8	54.5	54.5
250250914001	Dorchester	1672	584	52.0	52.2	52.6	52.8
250250915001	Dorchester	1978	744	50.7	50.5	51.1	50.9
250250915002	Dorchester	1494	547	50.6	50.5	51.0	51.0
250250915003	Dorchester	898	362	49.7	49.6	50.1	50.0
250250918001	Dorchester	1517	517	50.4	50.4	50.9	50.8
250250918002	Dorchester	1002	340	50.0	50.2	50.5	50.7
250250918003	Dorchester	933	357	50.2	50.2	50.7	50.7
250250919001	Dorchester	1042	329	50.0	50.0	50.5	50.5
250250919002	Dorchester	709	280	49.2	49.2	49.7	49.6
250250919003	Dorchester	1522	551	49.3	49.4	49.8	49.9
250250921011	Dorchester	1113	467	52.1	52.2	52.1	52.1
250250921013	Dorchester	729	321	51.5	52.9	51.5	52.8
250250921014	Dorchester	1008	397	49.7	49.9	49.7	49.9
250251006011	Dorchester	1094	488	53.6	53.6	53.5	53.5
250251006012	Dorchester	898	382	52.0	51.8	51.9	51.7
250251006013	Dorchester	1218	535	50.3	50.3	50.2	50.3
250251006031	Dorchester	1306	556	57.2	57.6	57.0	57.4
250251006032	Dorchester	598	284	59.6	60.2	59.4	59.9
250251007001	Dorchester	1050	484	55.8	55.8	55.6	55.6
250251007002	Dorchester	1027	526	57.7	59.0	57.4	58.7
250251007003	Dorchester	672	290	57.4	57.6	57.2	57.4
250251007004	Dorchester	856	371	54.3	54.5	54.2	54.3
250251007005	Dorchester	717	303	53.6	53.6	53.4	53.4
250251008001	Dorchester	663	272	49.7	49.6	49.7	49.6
250251008002	Dorchester	929	378	51.4	51.4	51.3	51.3
250251008003	Dorchester	899	412	51.7	51.7	51.5	51.6
250251008004	Dorchester	1117	666	51.9	53.1	51.8	52.9

Table H-26 2018 and 2019 DNL Levels for Census Block Group Locations within DNL 50 dB (Continued)

U.S. Census 2010 Block Group				2018		2019	
Block Group ID	Name	Population	Housing units	Average Block DNL	DNL at centroid	Average Block DNL	DNL at centroid
250251008005	Dorchester	807	461	50.2	50.0	50.1	49.9
250251008006	Dorchester	1131	513	49.6	49.4	49.5	49.4
250250203011	Downtown Boston	350	205	50.1	49.8	50.6	50.3
250250203012	Downtown Boston	1673	1209	50.0	49.9	50.5	50.4
250250203031	Downtown Boston	878	693	50.5	50.5	50.9	50.9
250250203032	Downtown Boston	1343	365	51.1	50.7	51.5	51.1
250250203033	Downtown Boston	1179	789	50.2	50.2	50.7	50.7
250250301001	Downtown Boston	1053	790	52.2	52.3	52.7	52.7
250250301002	Downtown Boston	901	587	51.9	51.9	52.3	52.3
250250302001	Downtown Boston	1665	1103	52.1	52.0	52.5	52.5
250250303001	Downtown Boston	1757	1283	54.5	55.0	54.9	55.5
250250303002	Downtown Boston	1262	696	53.4	53.5	53.9	54.0
250250303004	Downtown Boston	548	465	53.1	53.4	53.7	54.0
250250304001	Downtown Boston	1519	994	52.9	52.7	53.3	53.1
250250304002	Downtown Boston	932	665	52.7	52.6	53.1	53.0
250250305001	Downtown Boston	704	442	53.5	53.2	53.9	53.6
250250305002	Downtown Boston	1025	687	53.3	53.2	53.7	53.6
250250305003	Downtown Boston	809	527	52.9	52.9	53.3	53.3
250250701012	Downtown Boston	303	90	53.5	53.5	54.2	54.2
250250701014	Downtown Boston	1887	941	52.7	52.8	53.5	53.5
250250701015	Downtown Boston	451	161	53.1	53.1	53.9	53.8
250250701016	Downtown Boston	366	325	53.3	53.3	54.1	54.1
250250701017	Downtown Boston	1102	701	54.3	54.5	55.1	55.2
250250701018	Downtown Boston	449	246	54.7	54.9	55.4	55.6
250250702002	Downtown Boston	1133	444	55.1	55.2	56.0	56.1
250250703001	Downtown Boston	1065	804	52.0	51.8	52.8	52.6
250250703002	Downtown Boston	733	449	52.8	52.8	53.6	53.6
250250501011	Eagle Hill East Boston	1713	534	61.1	61.6	62.0	62.6
250250501012	Eagle Hill East Boston	1472	632	59.5	58.9	60.4	59.8
250250501013	Eagle Hill East Boston	1930	684	60.6	60.4	61.4	61.3
250250502001	Eagle Hill East Boston	2189	757	59.5	59.5	60.2	60.2
250250502002	Eagle Hill East Boston	1151	445	59.0	58.9	59.7	59.6
250250502003	Eagle Hill East Boston	836	283	62.6	62.5	63.5	63.4
250250502004	Eagle Hill East Boston	1055	349	62.8	62.8	63.7	63.7
250250507001	Eagle Hill East Boston	1684	617	59.2	59.5	59.7	60.0

Table H-26 2018 and 2019 DNL Levels for Census Block Group Locations within DNL 50 dB (Continued)

U.S. Census 2010 Block Group				2018		2019	
Block Group ID	Name	Population	Housing units	Average Block DNL	DNL at centroid	Average Block DNL	DNL at centroid
250250507001	Eagle Hill East Boston	1684	617	59.2	59.5	59.7	60.0
250250507002	Eagle Hill East Boston	1344	484	61.0	61.0	61.7	61.6
250250507003	Eagle Hill East Boston	1476	505	62.3	62.4	63.0	63.0
250250509011	Eagle Hill East Boston	1283	420	66.1	66.5	67.2	67.7
250250509012	Eagle Hill East Boston	1964	717	63.9	63.5	65.0	64.5
250250509013	Eagle Hill East Boston	918	309	63.8	64.4	64.8	65.6
250250503001	East Boston	727	282	57.0	56.2	57.4	56.7
250250503002	East Boston	1524	759	56.2	55.9	56.5	56.2
250250504001	East Boston	637	237	57.1	57.0	57.4	57.3
250250504002	East Boston	1735	797	57.8	57.8	58.0	58.1
250250505001	East Boston	1857	702	59.6	59.5	59.9	59.7
250250506001	East Boston	1248	494	58.3	58.4	58.8	58.8
250250506002	East Boston	815	312	57.7	58.0	58.1	58.4
250250510001	East Boston	2039	855	64.4	64.2	64.6	64.4
250250510002	East Boston	962	462	60.8	58.5	60.7	58.7
250250510003	East Boston	1088	467	63.3	62.9	63.8	63.4
250250511013	East Boston	1537	621	63.0	62.7	63.0	62.7
250250511013	East Boston	1537	621	63.0	62.7	63.0	62.7
250259813002	East Boston	389	244	60.6	78.7	60.9	78.2
250173421011	Everett	1483	567	49.7	49.8	50.4	50.5
250173421012	Everett	1067	389	50.2	50.3	50.9	51.0
250173421014	Everett	943	362	50.1	50.0	50.7	50.6
250173422011	Everett	2830	1066	49.0	48.9	49.8	49.7
250173422012	Everett	2438	996	49.8	49.7	50.5	50.5
250173423001	Everett	1327	495	51.3	51.1	52.1	51.9
250173423002	Everett	1555	596	52.1	52.1	53.0	52.9
250173423003	Everett	2137	858	53.5	53.5	54.5	54.4
250173423004	Everett	1807	805	52.3	52.4	53.2	53.4
250173424001	Everett	1878	847	55.5	55.3	56.5	56.3
250173424002	Everett	1132	480	55.9	56.4	56.9	57.5
250173424003	Everett	905	346	56.7	55.7	57.8	56.8
250173424004	Everett	1348	517	57.4	58.0	58.5	59.2
250173424005	Everett	792	363	53.0	52.9	53.9	53.8
250173425001	Everett	2428	941	50.4	50.6	51.1	51.3
250173425002	Everett	2169	870	53.0	52.8	53.8	53.7

Table H-26 2018 and 2019 DNL Levels for Census Block Group Locations within DNL 50 dB (Continued)

U.S. Census 2010 Block Group				2018		2019	
Block Group ID	Name	Population	Housing units	Average Block DNL	DNL at centroid	Average Block DNL	DNL at centroid
250173425003	Everett	2200	970	55.2	55.2	56.1	56.2
250173426001	Everett	1125	395	52.3	52.2	53.1	53.0
250173426002	Everett	904	347	53.9	54.2	54.7	55.1
250173426003	Everett	2336	941	53.0	53.1	53.9	53.9
250235001011	Hull	1502	828	56.0	57.0	55.8	56.7
250235001012	Hull	819	452	53.0	52.8	52.7	52.5
250235001013	Hull	1381	726	51.1	51.8	51.0	51.8
250235001041	Hull	1207	626	50.2	53.9	50.3	54.4
250235001042	Hull	919	488	50.5	53.6	51.0	54.2
250235001043	Hull	792	470	49.9	50.4	50.5	51.0
250235001044	Hull	1464	731	49.7	49.6	50.1	50.0
250251404007	Hyde Park	1172	463	48.8	48.8	49.5	49.5
250250812001	Jamaica Plain	2130	813	48.8	48.7	49.6	49.6
250250814003	Jamaica Plain	1164	548	49.4	49.7	50.3	50.5
250250814003	Jamaica Plain	1164	548	49.4	49.7	50.3	50.5
250251201041	Jamaica Plain	516	252	49.8	49.4	50.6	50.2
250251201042	Jamaica Plain	799	351	49.2	49.2	50.0	50.1
250251202011	Jamaica Plain	1147	611	50.2	50.3	51.0	51.1
250251202012	Jamaica Plain	1841	894	51.4	51.4	52.2	52.3
250251202013	Jamaica Plain	451	221	51.3	51.3	52.1	52.1
250251203013	Jamaica Plain	1543	554	51.9	52.2	52.8	53.0
250251203013	Jamaica Plain	1543	554	51.9	52.2	52.8	53.0
250251204001	Jamaica Plain	856	424	49.8	49.9	50.7	50.7
250251204002	Jamaica Plain	676	363	50.0	50.0	50.8	50.9
250251204003	Jamaica Plain	895	466	49.3	49.3	50.1	50.1
250251205001	Jamaica Plain	824	334	49.5	49.5	50.3	50.3
250251205003	Jamaica Plain	774	301	49.0	48.9	49.9	49.8
250259810001	Jamaica Plain	22	5	49.4	49.1	50.2	49.9
250259810001	Jamaica Plain	22	5	49.4	49.1	50.2	49.9
250250512001	Jefferies Point	32	19	61.1	59.5	61.2	59.7
250250512002	Jefferies Point	1548	692	60.1	59.7	60.3	59.9
250250512003	Jefferies Point	799	449	58.9	59.0	59.1	59.1
250092051001	Lynn	1192	534	53.0	53.0	52.7	52.7
250092051002	Lynn	1077	413	53.6	53.7	53.2	53.4
250092051003	Lynn	919	361	55.5	55.7	55.1	55.3

Table H-26 2018 and 2019 DNL Levels for Census Block Group Locations within DNL 50 dB (Continued)

U.S. Census 2010 Block Group				2018		2019	
Block Group ID	Name	Population	Housing units	Average Block DNL	DNL at centroid	Average Block DNL	DNL at centroid
250092051004	Lynn	1527	556	55.5	55.9	55.1	55.5
250092051005	Lynn	637	264	56.2	56.5	55.8	56.1
250092052001	Lynn	806	410	54.1	54.5	53.6	54.1
250092052002	Lynn	714	277	56.4	56.6	56.0	56.2
250092052003	Lynn	1510	564	56.4	56.4	56.0	56.0
250092052004	Lynn	1435	511	57.1	57.3	56.7	56.9
250092052005	Lynn	854	385	53.8	54.6	53.4	54.2
250092053001	Lynn	1586	591	49.9	50.3	49.5	49.9
250092053002	Lynn	909	352	50.8	50.3	50.4	49.9
250092055001	Lynn	2054	736	53.5	52.5	53.1	52.1
250092055002	Lynn	2552	961	57.9	57.8	57.5	57.4
250092058001	Lynn	1044	362	53.0	53.5	52.7	53.1
250092058002	Lynn	1089	342	53.6	53.7	53.3	53.4
250092058003	Lynn	1179	435	52.3	51.2	52.0	50.9
250092059001	Lynn	1743	598	53.4	53.5	53.0	53.2
250092059002	Lynn	1262	443	52.5	52.5	52.2	52.2
250092059003	Lynn	1345	502	50.7	50.4	50.3	50.1
250092060001	Lynn	1443	478	57.3	57.5	57.0	57.2
250092060002	Lynn	1916	642	55.9	56.4	55.6	56.0
250092061001	Lynn	1793	797	57.7	57.9	57.4	57.6
250092061002	Lynn	2051	665	58.3	58.5	58.0	58.1
250092062001	Lynn	1128	327	55.9	56.0	55.5	55.7
250092062002	Lynn	2267	786	57.6	57.8	57.2	57.5
250092062003	Lynn	1859	573	56.4	56.4	56.1	56.1
250092063001	Lynn	712	250	53.4	54.1	53.0	53.7
250092063002	Lynn	991	316	51.7	51.4	51.4	51.1
250092063003	Lynn	1030	379	52.7	52.7	52.4	52.4
250092063004	Lynn	1040	367	54.8	55.0	54.5	54.7
250092064001	Lynn	1018	363	50.1	49.9	49.8	49.7
250092064002	Lynn	1847	722	49.5	49.5	49.2	49.2
250092064004	Lynn	1342	493	51.7	51.4	51.4	51.1
250092065003	Lynn	1148	394	50.0	49.9	49.8	49.6
250092067004	Lynn	1182	684	49.7	49.8	49.5	49.6
250092068001	Lynn	1754	685	52.3	52.2	52.0	51.9
250092068002	Lynn	1792	914	54.3	54.2	54.0	53.9

Table H-26 2018 and 2019 DNL Levels for Census Block Group Locations within DNL 50 dB (Continued)

U.S. Census 2010 Block Group				2018		2019	
Block Group ID	Name	Population	Housing units	Average Block DNL	DNL at centroid	Average Block DNL	DNL at centroid
250092069001	Lynn	641	549	51.7	51.7	51.5	51.5
250092069002	Lynn	1910	1005	50.0	49.8	49.8	49.7
250092069003	Lynn	1414	838	51.6	51.3	51.4	51.2
250092070001	Lynn	963	585	57.4	55.4	57.2	55.2
250092070002	Lynn	1235	456	58.6	58.9	58.3	58.6
250092071001	Lynn	1446	444	56.8	57.2	56.4	56.8
250092071002	Lynn	992	307	58.3	58.5	58.0	58.1
250092071003	Lynn	1075	342	55.7	55.7	55.3	55.4
250092072001	Lynn	1212	391	57.8	60.0	57.5	59.6
250092072002	Lynn	1727	789	58.8	59.1	58.5	58.8
250173411024	Malden	557	336	48.8	48.5	49.8	49.5
250173412002	Malden	976	386	49.8	50.0	50.8	50.9
250173412003	Malden	1070	451	52.1	52.3	53.1	53.3
250173412004	Malden	978	383	52.0	52.0	53.0	53.0
250173412005	Malden	1693	713	50.5	50.7	51.5	51.6
250173412006	Malden	976	362	49.7	49.6	50.7	50.6
250173412006	Malden	976	362	49.7	49.6	50.7	50.6
250173414003	Malden	1802	702	49.2	49.3	50.0	50.1
250173414004	Malden	1612	603	49.6	49.6	50.5	50.5
250173414005	Malden	769	389	51.4	52.0	52.3	52.9
250250924004	Mattapan	1142	413	50.5	50.6	51.1	51.2
250250924005	Mattapan	721	276	50.4	50.4	51.0	51.1
250250924005	Mattapan	721	276	50.4	50.4	51.0	51.1
250251001001	Mattapan	167	61	49.8	50.0	50.4	50.7
250251001004	Mattapan	964	298	49.2	49.2	49.9	49.8
250251001006	Mattapan	1320	492	49.1	49.0	49.8	49.6
250259811004	Mattapan	400	128	50.2	50.3	51.0	51.0
250173391001	Medford	617	243	48.4	49.5	49.6	50.8
250173391002	Medford	1460	603	51.0	51.0	52.3	52.3
250173391003	Medford	1169	691	51.5	51.7	52.6	52.9
250173391004	Medford	1797	1041	50.5	50.8	51.6	51.9
250173391005	Medford	1399	446	49.5	49.7	50.6	50.9
250173394001	Medford	1033	529	49.6	49.4	50.5	50.3
250173394002	Medford	626	251	50.0	50.0	50.9	50.9
250173394003	Medford	785	373	49.7	49.8	50.6	50.7

Table H-26 2018 and 2019 DNL Levels for Census Block Group Locations within DNL 50 dB (Continued)

U.S. Census 2010 Block Group				2018		2019	
Block Group ID	Name	Population	Housing units	Average Block DNL	DNL at centroid	Average Block DNL	DNL at centroid
250173394004	Medford	882	420	49.4	49.3	50.3	50.1
250173395001	Medford	2710	553	50.9	51.2	51.9	52.1
250173395002	Medford	1312	547	51.9	52.1	52.9	53.1
250173395003	Medford	641	283	50.7	50.7	51.7	51.7
250173395004	Medford	736	307	50.9	50.9	51.8	51.9
250173396001	Medford	797	392	52.2	52.1	53.2	53.0
250173396002	Medford	813	371	52.4	52.4	53.3	53.3
250173396003	Medford	757	369	52.0	52.1	52.9	53.0
250173396004	Medford	827	363	51.8	51.9	52.7	52.8
250173396005	Medford	885	377	51.4	51.4	52.3	52.3
250173396006	Medford	945	443	51.1	51.2	52.0	52.1
250173397001	Medford	552	280	52.9	53.7	53.9	54.7
250173397002	Medford	1678	670	52.6	52.8	53.5	53.7
250173397003	Medford	785	357	53.0	53.1	54.0	54.1
250173397004	Medford	863	377	52.0	52.0	52.9	52.9
250173398011	Medford	2101	1369	56.0	56.4	57.1	57.5
250173398012	Medford	617	263	55.5	55.6	56.7	56.8
250173398013	Medford	808	375	55.4	55.6	56.5	56.7
250173398014	Medford	884	363	54.7	54.6	55.8	55.7
250173398021	Medford	1308	586	54.8	55.1	55.9	56.3
250173398022	Medford	2498	1096	54.0	54.7	55.2	55.8
250173398023	Medford	751	294	53.3	53.3	54.5	54.5
250173399001	Medford	1651	719	53.1	53.4	54.2	54.4
250173399002	Medford	950	380	53.2	53.1	54.3	54.3
250173399003	Medford	939	425	51.7	51.6	52.7	52.7
250173399004	Medford	759	346	52.7	52.7	53.9	53.9
250173399005	Medford	872	342	52.2	52.2	53.3	53.3
250173400001	Medford	1033	435	51.1	51.2	52.2	52.2
250173400002	Medford	848	376	51.5	51.5	52.7	52.7
250173400003	Medford	713	303	52.1	52.2	53.3	53.4
250173401003	Medford	1611	504	48.6	48.4	49.7	49.5
250173401004	Medford	1483	609	50.5	50.5	51.6	51.7
250173401006	Medford	826	310	49.5	49.5	50.7	50.7
250214161011	Milton	771	280	53.8	53.8	53.5	53.4
250214161012	Milton	1969	732	54.7	55.5	54.3	55.2

Table H-26 2018 and 2019 DNL Levels for Census Block Group Locations within DNL 50 dB (Continued)

U.S. Census 2010 Block Group				2018		2019	
Block Group ID	Name	Population	Housing units	Average Block DNL	DNL at centroid	Average Block DNL	DNL at centroid
250214161013	Milton	1818	663	50.7	51.5	50.5	51.3
250214164001	Milton	789	302	53.2	56.6	53.0	56.3
250214164004	Milton	797	280	50.0	51.1	49.7	50.8
250214164005	Milton	1028	348	55.1	56.0	54.8	55.6
250214164006	Milton	978	357	53.7	55.7	53.4	55.4
250214164007	Milton	1002	386	54.7	57.2	54.5	57.0
250250511011	Orient Heights	1602	598	59.5	58.8	59.5	58.8
250250511012	Orient Heights	1949	741	57.9	57.6	57.8	57.5
250250511014	Orient Heights	1005	385	60.9	59.3	60.9	59.3
250092106001	Peabody	1586	705	51.5	52.3	51.2	51.9
250092106002	Peabody	692	270	51.0	51.0	50.5	50.6
250092106003	Peabody	1194	491	51.5	53.0	51.0	52.5
250092106004	Peabody	623	250	51.8	53.0	51.4	52.5
250092107001	Peabody	1247	522	50.7	50.8	50.4	50.5
250092107002	Peabody	865	411	51.3	51.4	51.0	51.0
250092107003	Peabody	1199	523	51.8	51.9	51.5	51.5
250092107004	Peabody	690	281	51.5	51.5	51.2	51.2
250092108001	Peabody	1337	547	50.2	50.3	50.0	50.0
250092108002	Peabody	1111	613	50.8	50.8	50.5	50.5
250092108003	Peabody	2121	1233	50.5	50.6	50.1	50.2
250092109002	Peabody	878	362	49.9	50.0	49.6	49.6
250092109003	Peabody	1813	844	50.1	50.5	49.8	50.1
250214172001	Quincy	2743	1256	52.1	52.5	51.9	52.3
250214172006	Quincy	1055	475	49.7	49.2	49.5	49.0
250214173001	Quincy	1781	1180	53.5	55.3	53.4	55.1
250214173002	Quincy	900	630	53.8	54.8	53.6	54.5
250214175023	Quincy	887	337	50.9	51.1	50.7	51.0
250251701002	Revere	1012	384	49.6	49.7	49.9	50.0
250251701003	Revere	773	320	50.2	50.2	50.5	50.5
250251704001	Revere	1102	485	51.8	50.8	51.8	50.8
250251704002	Revere	1151	506	51.0	51.2	50.9	51.1
250251705011	Revere	1934	1112	55.2	55.7	55.1	55.6
250251705012	Revere	1501	814	55.8	55.9	55.7	55.9
250251705021	Revere	1134	550	60.5	60.8	60.4	60.7
250251705022	Revere	1684	998	59.5	60.7	59.3	60.6

Table H-26 2018 and 2019 DNL Levels for Census Block Group Locations within DNL 50 dB (Continued)

U.S. Census 2010 Block Group				2018		2019	
Block Group ID	Name	Population	Housing units	Average Block DNL	DNL at centroid	Average Block DNL	DNL at centroid
250251706011	Revere	1351	557	49.5	49.6	49.5	49.6
250251706012	Revere	1413	573	51.2	51.8	51.4	51.9
250251706013	Revere	1387	497	50.0	49.9	50.1	50.0
250251706014	Revere	954	380	51.1	51.1	51.1	51.2
250251707011	Revere	788	431	56.0	57.1	55.9	57.0
250251707012	Revere	1311	622	60.7	61.0	60.6	60.9
250251707021	Revere	1146	352	54.4	54.3	54.3	54.2
250251707022	Revere	1474	509	55.9	55.7	55.9	55.6
250251707023	Revere	1658	547	52.8	52.9	52.8	52.9
250251707024	Revere	959	358	54.0	54.4	54.0	54.3
250251707025	Revere	1391	553	56.7	56.4	56.6	56.3
250251708001	Revere	1815	797	65.7	66.8	65.5	66.6
250251708002	Revere	1359	577	64.8	66.8	64.6	66.6
250251708003	Revere	967	419	63.7	65.2	63.6	65.1
250251708004	Revere	977	424	64.3	62.9	64.2	62.9
250259815021	Revere	9	3	60.3	55.7	60.2	55.7
250251101031	Roslindale	568	325	51.6	51.4	52.4	52.2
250251101032	Roslindale	733	257	50.2	50.1	50.9	50.9
250251101033	Roslindale	653	241	50.5	50.3	51.3	51.2
250251101034	Roslindale	620	289	50.8	50.8	51.6	51.6
250251101035	Roslindale	1440	666	51.1	51.0	51.9	51.9
250251101036	Roslindale	583	271	51.0	51.0	51.8	51.8
250251101037	Roslindale	863	304	50.5	50.5	51.3	51.3
250251102011	Roslindale	2051	874	49.8	49.9	50.6	50.6
250251103011	Roslindale	1134	403	50.4	50.5	51.2	51.3
250251103012	Roslindale	1271	552	50.9	50.9	51.7	51.7
250251104011	Roslindale	2011	733	50.4	50.4	51.2	51.2
250251104012	Roslindale	1555	629	50.3	50.4	51.0	51.1
250251104031	Roslindale	905	426	49.7	49.7	50.5	50.4
250251104032	Roslindale	783	314	49.9	49.9	50.6	50.6
250251104033	Roslindale	657	258	49.0	49.1	49.8	49.9
250251104034	Roslindale	975	377	49.6	49.7	50.3	50.4
250251104035	Roslindale	989	392	49.0	49.1	49.8	49.8
250251105011	Roslindale	849	367	49.0	48.9	49.6	49.6
250251105012	Roslindale	1498	631	49.0	49.0	49.6	49.7

Table H-26 2018 and 2019 DNL Levels for Census Block Group Locations within DNL 50 dB (Continued)

U.S. Census 2010 Block Group				2018		2019	
Block Group ID	Name	Population	Housing units	Average Block DNL	DNL at centroid	Average Block DNL	DNL at centroid
250251105021	Roslindale	1311	589	49.5	49.6	50.2	50.3
250251105022	Roslindale	1855	810	49.7	49.8	50.4	50.5
250251105023	Roslindale	640	285	49.3	49.3	50.0	50.0
250251106073	Roslindale	1586	734	49.4	49.5	50.2	50.3
250251401062	Roslindale	506	238	49.1	49.1	49.7	49.7
250259803001	Roslindale	338	2	52.3	52.5	53.1	53.3
250259803001	Roslindale	338	2	52.3	52.5	53.1	53.3
250259811003	Roslindale	6	5	51.4	51.6	52.2	52.4
250250801002	Roxbury	738	294	55.0	55.0	55.8	55.8
250250803001	Roxbury	1769	791	54.6	54.6	55.4	55.4
250250804011	Roxbury	1265	526	53.8	53.9	54.7	54.8
250250804011	Roxbury	1265	526	53.8	53.9	54.7	54.8
250250804012	Roxbury	1445	723	52.1	52.2	52.9	53.0
250250806012	Roxbury	600	220	50.9	50.7	51.7	51.5
250250806013	Roxbury	459	242	52.0	52.2	52.8	53.1
250250813001	Roxbury	1661	806	52.4	52.4	53.2	53.3
250250813002	Roxbury	1749	690	51.0	51.1	51.8	51.9
250250813003	Roxbury	1350	615	50.8	50.4	51.7	51.3
250250814001	Roxbury	1067	558	51.6	51.7	52.4	52.5
250250814002	Roxbury	772	355	50.2	50.2	51.0	51.1
250250815001	Roxbury	788	351	51.9	51.9	52.8	52.7
250250815002	Roxbury	1346	554	52.6	52.7	53.5	53.5
250250817001	Roxbury	619	225	54.0	54.1	54.8	55.0
250250817002	Roxbury	893	430	54.1	54.1	54.9	55.0
250250817003	Roxbury	780	291	53.4	53.3	54.2	54.1
250250817004	Roxbury	887	355	53.4	53.4	54.2	54.2
250250817005	Roxbury	641	298	53.3	53.3	54.2	54.2
250250818001	Roxbury	1157	577	54.5	54.5	55.3	55.4
250250818002	Roxbury	921	442	54.6	54.6	55.4	55.4
250250818003	Roxbury	820	369	54.2	54.2	55.0	55.0
250250819001	Roxbury	906	453	53.7	53.9	54.6	54.7
250250819002	Roxbury	617	259	53.4	53.5	54.2	54.3
250250819003	Roxbury	600	257	53.3	53.4	54.2	54.2
250250819004	Roxbury	992	428	53.3	53.3	54.1	54.1
250250820001	Roxbury	1292	566	53.6	53.6	54.4	54.4

Table H-26 2018 and 2019 DNL Levels for Census Block Group Locations within DNL 50 dB (Continued)

U.S. Census 2010 Block Group				2018		2019	
Block Group ID	Name	Population	Housing units	Average Block DNL	DNL at centroid	Average Block DNL	DNL at centroid
250250820002	Roxbury	682	298	53.6	53.7	54.4	54.4
250250820003	Roxbury	841	414	53.8	53.9	54.6	54.7
250250821001	Roxbury	1228	526	53.2	53.2	53.9	54.0
250250821002	Roxbury	1553	579	52.9	52.9	53.7	53.6
250250821003	Roxbury	2244	1012	53.5	53.5	54.3	54.3
250250901001	Roxbury	1631	655	52.1	52.1	52.8	52.8
250250901002	Roxbury	531	237	51.2	51.2	51.8	51.8
250250901003	Roxbury	693	303	51.3	51.3	51.9	51.9
250250901004	Roxbury	1099	414	50.4	50.3	51.1	50.9
250250901005	Roxbury	617	249	49.9	49.9	50.5	50.5
250250902001	Roxbury	673	244	51.2	51.0	51.8	51.6
250250902002	Roxbury	626	278	51.5	51.9	52.2	52.6
250250902003	Roxbury	934	308	52.0	52.2	52.6	52.9
250250903001	Roxbury	891	333	52.3	52.1	52.9	52.7
250250903002	Roxbury	1310	513	52.8	52.3	53.5	53.0
250250903003	Roxbury	978	422	53.0	53.1	53.7	53.8
250250904001	Roxbury	871	311	53.7	53.7	54.4	54.4
250250904002	Roxbury	1155	435	53.5	53.5	54.2	54.2
250250904003	Roxbury	763	254	54.1	54.1	54.8	54.8
250250904004	Roxbury	870	294	54.5	54.5	55.2	55.2
250250906001	Roxbury	1094	351	54.8	54.8	55.6	55.6
250250906002	Roxbury	1254	442	54.8	55.0	55.6	55.7
250250914002	Roxbury	1069	355	53.0	52.9	53.6	53.5
250250924002	Roxbury	1089	417	49.2	49.2	49.7	49.8
250250924003	Roxbury	1688	711	50.3	50.2	50.9	50.8
250251203011	Roxbury	1166	443	51.0	50.8	51.9	51.7
250251203012	Roxbury	855	331	52.1	52.1	52.9	53.0
250251203014	Roxbury	1231	567	51.0	50.9	51.8	51.7
250092047011	Salem	785	328	52.7	54.3	52.4	53.9
250092047024	Salem	862	347	49.7	49.4	49.4	49.2
250173501032	Somerville	1210	520	53.1	53.3	54.1	54.2
250173501041	Somerville	2119	793	51.0	51.1	51.9	52.0
250173501042	Somerville	2584	947	51.8	51.8	52.7	52.8
250173501043	Somerville	1188	485	50.3	50.5	51.1	51.4
250173501044	Somerville	1384	673	50.6	50.6	51.5	51.6

Table H-26 2018 and 2019 DNL Levels for Census Block Group Locations within DNL 50 dB (Continued)

U.S. Census 2010 Block Group				2018		2019	
Block Group ID	Name	Population	Housing units	Average Block DNL	DNL at centroid	Average Block DNL	DNL at centroid
250173502001	Somerville	1376	586	49.6	49.7	50.5	50.5
250173502002	Somerville	603	233	48.7	48.7	49.6	49.5
250173502003	Somerville	1385	533	48.7	48.8	49.6	49.7
250173502004	Somerville	1410	594	48.7	48.7	49.6	49.6
250173502005	Somerville	749	315	49.5	49.5	50.4	50.4
250173502006	Somerville	1044	502	49.7	49.8	50.6	50.6
250173503001	Somerville	965	454	50.2	49.6	51.0	50.5
250173503002	Somerville	627	304	49.4	49.5	50.3	50.4
250173503003	Somerville	849	390	50.4	50.5	51.3	51.3
250173504001	Somerville	1006	368	51.5	51.7	52.4	52.6
250173504002	Somerville	1232	565	50.7	50.7	51.5	51.5
250173504003	Somerville	1017	462	50.0	50.1	50.8	50.9
250173504004	Somerville	1464	721	50.5	50.5	51.3	51.3
250173504005	Somerville	849	392	51.1	51.1	51.9	52.0
250173505001	Somerville	818	390	50.8	50.9	51.7	51.7
250173505002	Somerville	811	382	50.8	50.8	51.7	51.7
250173506001	Somerville	1656	2	51.3	51.3	52.2	52.2
250173506002	Somerville	939	371	50.8	50.8	51.7	51.7
250173506003	Somerville	813	231	50.5	50.6	51.4	51.5
250173506004	Somerville	1164	487	51.1	51.1	52.0	52.0
250173507001	Somerville	907	602	48.9	48.6	49.7	49.5
250173507002	Somerville	974	390	49.5	49.3	50.4	50.2
250173507003	Somerville	1007	461	50.0	50.1	50.9	51.0
250173507004	Somerville	1375	760	49.7	49.7	50.6	50.5
250173507005	Somerville	861	460	50.1	50.1	51.0	51.0
250173507006	Somerville	924	443	50.3	50.3	51.2	51.2
250173508001	Somerville	971	485	50.4	50.5	51.3	51.3
250173508002	Somerville	857	435	50.4	50.5	51.3	51.3
250173509001	Somerville	803	398	49.6	49.7	50.5	50.5
250173509002	Somerville	1209	535	49.0	49.1	49.8	49.9
250173509003	Somerville	1302	715	49.9	50.0	50.8	50.9
250173510005	Somerville	1056	484	49.0	49.1	49.8	49.9
250173514031	Somerville	763	309	49.9	49.9	50.8	50.7
250173514032	Somerville	1017	391	49.2	49.1	50.0	50.0
250173514033	Somerville	587	321	49.3	49.3	50.1	50.1

Table H-26 2018 and 2019 DNL Levels for Census Block Group Locations within DNL 50 dB (Continued)

U.S. Census 2010 Block Group				2018		2019	
Block Group ID	Name	Population	Housing units	Average Block DNL	DNL at centroid	Average Block DNL	DNL at centroid
250173514034	Somerville	1042	369	49.0	49.0	49.9	49.9
250173514035	Somerville	619	288	49.1	49.1	49.9	50.0
250250601011	South Boston	881	441	61.5	61.6	61.3	61.5
250250601012	South Boston	633	350	60.7	60.7	60.6	60.6
250250601013	South Boston	981	496	61.0	61.0	60.9	60.9
250250601014	South Boston	721	397	60.0	60.0	59.8	59.9
250250602001	South Boston	821	419	58.3	58.4	58.1	58.2
250250602002	South Boston	1095	580	57.4	57.1	57.3	57.0
250250603011	South Boston	1285	741	56.2	56.1	56.2	56.1
250250603012	South Boston	699	345	55.9	55.8	55.8	55.7
250250603013	South Boston	1092	561	56.5	56.3	56.5	56.4
250250604001	South Boston	1021	542	55.1	55.2	55.3	55.4
250250604002	South Boston	988	530	55.1	55.2	55.2	55.3
250250604003	South Boston	842	466	54.7	54.7	54.8	54.8
250250604004	South Boston	1093	669	54.4	54.3	54.6	54.6
250250604005	South Boston	960	336	55.3	55.2	55.7	55.6
250250605011	South Boston	699	375	57.4	57.4	57.4	57.4
250250605012	South Boston	868	508	56.4	56.5	56.6	56.6
250250605013	South Boston	717	431	56.4	56.4	56.6	56.7
250250605014	South Boston	631	295	59.2	58.9	59.1	58.8
250250605015	South Boston	656	333	56.6	56.5	56.9	56.9
250250606001	South Boston	2357	1530	58.9	62.0	59.5	62.7
250250607001	South Boston	741	253	58.1	58.1	58.8	58.8
250250607002	South Boston	1152	383	57.6	57.6	58.2	58.3
250250608001	South Boston	655	333	55.9	55.9	56.3	56.3
250250608002	South Boston	757	396	56.1	56.1	56.6	56.6
250250608003	South Boston	886	470	57.0	57.0	57.5	57.5
250250608004	South Boston	1666	943	56.4	56.6	56.9	57.2
250250610001	South Boston	1033	544	55.0	55.0	55.4	55.3
250250610002	South Boston	1164	471	54.6	54.6	55.0	54.9
250250610003	South Boston	901	393	54.7	54.4	55.1	54.8
250250611011	South Boston	617	278	53.9	54.0	54.4	54.4
250250611012	South Boston	1615	756	53.2	53.0	53.6	53.4
250250612001	South Boston	1702	1158	58.7	58.6	59.5	59.4
250250612002	South Boston	627	383	55.5	56.5	56.1	57.1

Table H-26 2018 and 2019 DNL Levels for Census Block Group Locations within DNL 50 dB (Continued)

U.S. Census 2010 Block Group				2018		2019	
Block Group ID	Name	Population	Housing units	Average Block DNL	DNL at centroid	Average Block DNL	DNL at centroid
250250612003	South Boston	911	470	54.6	54.6	55.1	55.1
250259812021	South Boston	207	0	61.9	62.5	61.9	62.4
250250703003	South End	992	707	51.9	52.1	52.7	52.9
250250703004	South End	1119	746	52.9	52.9	53.7	53.7
250250704021	South End	1723	680	54.4	55.3	55.3	56.2
250250705001	South End	1700	1018	54.4	54.4	55.2	55.2
250250705002	South End	999	524	53.4	53.4	54.2	54.3
250250705003	South End	1393	803	53.8	53.9	54.7	54.7
250250705004	South End	1368	721	53.3	53.3	54.1	54.2
250250706001	South End	1127	667	52.6	52.5	53.4	53.3
250250706002	South End	1113	642	51.9	51.9	52.7	52.7
250250707002	South End	1200	722	51.2	51.2	52.0	52.0
250250708001	South End	1594	965	51.4	51.5	52.2	52.3
250250708002	South End	1040	579	50.8	50.8	51.6	51.6
250250708001	South End	1594	965	51.4	51.5	52.2	52.3
250250708002	South End	1040	579	50.8	50.8	51.6	51.6
250250709001	South End	2166	1231	52.9	52.8	53.7	53.6
250250709002	South End	1163	567	52.4	52.4	53.2	53.3
250250711011	South End	1498	928	55.1	55.1	55.9	55.9
250250711012	South End	1424	750	54.4	55.1	55.2	55.9
250250711013	South End	831	507	54.3	54.5	55.1	55.3
250250712011	South End	1899	819	55.9	56.2	56.7	57.0
250250712012	South End	1232	578	55.2	55.4	56.1	56.3
250250805001	South End	1076	460	51.3	51.4	52.1	52.2
250250805002	South End	2020	863	52.2	52.3	53.0	53.2
250250806011	South End	3212	458	50.5	50.1	51.3	50.9
250251801011	Winthrop	1207	584	54.2	54.0	54.2	53.9
250251801012	Winthrop	1215	724	52.7	52.9	52.7	52.9
250251801013	Winthrop	2344	1194	55.3	55.8	55.2	55.7
250251802001	Winthrop	1471	610	59.7	60.1	59.6	60.0
250251802002	Winthrop	647	299	57.7	57.7	57.7	57.7
250251802003	Winthrop	648	336	59.2	59.4	59.2	59.3
250251802004	Winthrop	1343	549	61.4	63.1	61.4	63.0
250251803011	Winthrop	652	258	60.8	60.8	60.8	60.7
250251803012	Winthrop	778	322	62.1	62.1	62.1	62.2

Table H-26 2018 and 2019 DNL Levels for Census Block Group Locations within DNL 50 dB (Continued)

U.S. Census 2010 Block Group				2018		2019	
Block Group ID	Name	Population	Housing units	Average Block DNL	DNL at centroid	Average Block DNL	DNL at centroid
250251803013	Winthrop	834	351	61.4	61.7	61.6	61.8
250251803014	Winthrop	760	297	63.9	64.8	63.8	64.7
250251804001	Winthrop	876	435	58.4	57.8	58.4	57.8
250251804002	Winthrop	839	347	59.2	59.1	59.3	59.2
250251805001	Winthrop	1273	613	56.3	56.0	56.4	56.0
250251805002	Winthrop	572	271	65.0	67.0	65.1	67.2

Source: HMMH, 2020.

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Air Quality/Emissions Reduction

This appendix provides the following detailed information and data tables in support of Chapter 7, *Air Quality/Emissions Reduction*:

- Fundamentals of Air Quality
  - Table I-1 National Ambient Air Quality Standards (NAAQS)
- Sources of Airport Air Emissions
  - Table I-2 Airport-Related Sources of Air Emissions
  - Table I-3 Attainment, Nonattainment, and Maintenance Area Designations
- State Implementation Plans (SIPs)
- Aircraft Fleet and Operational Data Used in AEDT
  - Table I-4 2018 Fleet Mix and Annual Landing and Takeoff Cycles (LTOs) by Aircraft Type
  - Table I-5 2019 Fleet Mix and Annual Landing and Takeoff Cycles (LTOs) by Aircraft Type
- Ground Service Equipment (GSE)/Auxiliary Power Unit (APU) Time-in-Mode (TIM) Survey
  - Table I-6 Ground Service Equipment (GSE)/Auxiliary Power Unit (APU) Time-in-Mode (TIM) (minutes)
- Ground Service Equipment (GSE)/Alternative Fuels Conversion
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- Motor Vehicle Emissions
  - Table I-8 MOVES2014b Sample Input File for 2018
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- Fuel Storage and Handling
  - Table I-12 Fuel Storage and Handling Fuel Throughputs by Fuel Category (gallons)
- Stationary Sources
  - Table I-13 Stationary Source Fuel Throughputs by Fuel Category (gallons)
- 1993 – 2009 Criteria Air Pollutant Emissions Inventories
  - Table I-14 Estimated VOC Emissions (kg/day) at Logan Airport 1993-2001
  - Table I-15 Estimated VOC Emissions (kg/day) at Logan Airport 2002-2009
  - Table I-16 Estimated NO_X Emissions (kg/day) at Logan Airport 1993-2001
  - Table I-17 Estimated NO_X Emissions (kg/day) at Logan Airport 2002-2009
  - Table I-18 Estimated CO Emissions (kg/day) at Logan Airport 1993-2001
  - Table I-19 Estimated CO Emissions (kg/day) at Logan Airport 2002-2009
  - Table I-20 Estimated $PM_{10}/PM_{2.5}$ Emissions (kg/day) at Logan Airport 2005-2009
- Greenhouse Gas (GHG) Emissions Inventory for 2018 and 2019
  - Table I-21 Logan Airport Greenhouse Gas (GHG) Inventory Input Data and Information for 2018 and 2019
  - Table I-22 Greenhouse Gas (GHG) Emission Factors for 2018
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  - Table I-25 Greenhouse Gas (GHG) Emissions (MMT CO_2eq) for 2019
  - Table I-26 Logan Airport Greenhouse Gas (GHG) Emissions Compared to Massachusetts Totals
- 2007-2019 Greenhouse Gas (GHG) Emissions Inventories
  - Table I-27 Comparison of Estimated Total Greenhouse Gas (GHG) Emissions (MMT of CO_2eq) at Logan Airport – 2007 through 2019

Fundamentals of Air Quality

This section contains a general summary of air quality and air emissions with a particular emphasis on airport-related emissions where appropriate. This material is intended to supplement and provide background information for the materials contained in Chapter 7, *Air Quality/Emissions Reduction*.

Pollutant Types and Standards

The U.S. Environmental Protection Agency (EPA) has established National Ambient Air Quality Standards (NAAQS) for a select group of "criteria air pollutants" designed to protect public health, the environment, and the quality of life from the detrimental effects of air pollution. Listed alphabetically, these pollutants are briefly described below:

- **Carbon monoxide (CO)** is a colorless, odorless, tasteless gas. It may temporarily accumulate, especially in cool, calm weather conditions, when fuel use reaches a peak and CO is chemically most stable due to the low temperatures. CO from natural sources usually dissipates quickly, posing no threat to human health. Transportation sources (e.g., motor vehicles), energy generation, and open burning are among the predominant anthropogenic (i.e., man-made) sources of CO.
- **Lead (Pb)** in the atmosphere is generated from industrial sources including waste oil and solid waste incineration, iron and steel production, lead smelting, and battery and lead manufacturing. The lead content of motor vehicle emissions, which was the major source of lead in the past, has significantly declined with the widespread use of unleaded fuel. Low-lead fuel used in some general aviation (GA) aircraft is still a source of airport-related lead.
- **Nitrogen dioxide (NO_2)**, nitric oxide (NO), and the nitrate radical (NO_3) are collectively called oxides of nitrogen (NO_X). These three compounds are interrelated, often changing from one form to another in chemical reactions, and NO_2 is the compound commonly measured for comparison to the NAAQS. NO_X is generally emitted as NO, which is oxidized to NO_2. The principal man-made source of NO_X is fuel combustion in motor vehicles and power plants – aircraft engines are also a source. Reactions of NO_X with other atmospheric chemicals can lead to formation of ozone (O_3) and acidic precipitation.
- **Ozone (O_3)** is a secondary pollutant, formed from daytime reactions of NO_X and volatile organic compounds (VOCs) in the presence of sunlight. VOCs, which are a subset of hydrocarbons (HC) and have no NAAQS, are released in industrial processes and from evaporation of gasoline and solvents. Sources of NO_X are discussed above.
- **Particulate matter (PM)** comprises very small particles of dirt, dust, soot, or liquid droplets called aerosols. The NAAQS for PM is segregated by sizes (i.e., less than 10 and less than 2.5 microns as PM_{10} and $PM_{2.5}$, respectively). PM is formed as an exhaust product in the internal combustion engine or can be generated from the breakdown and dispersion of other solid materials (e.g., fugitive dust).
- **Sulfur oxides (SO_X)** are primarily composed of sulfur dioxide (SO_2) which is emitted in natural processes and by man-made sources such as combustion of sulfur-containing fuels and sulfuric acid manufacturing.

The NAAQS for these criteria air pollutants are subdivided into the Primary Standards (designed to protect human health) and the Secondary Standards (designed to protect the environment and human welfare) and are listed below in **Table I-1**. Exceedances of these values constitute violations of the NAAQS.

Table I-1 National Ambient Air Quality Standards (NAAQS)

Pollutant	Primary/ Secondary	Averaging Time	Standard ppm	Standard µg/m³	Form
Carbon Monoxide (CO)	Primary	1-hour	35	40,000	Not to be exceeded more than once a year.
		8-hour	9	10,000	Not to be exceeded more than once a year.
Lead (Pb)	Primary and Secondary	Rolling 3-Month Average	—	0.15	Not to exceed this level. Final rule October 2008.
Nitrogen Dioxide (NO_2)	Primary	1-hour	0.100	188	The 3-year average of the 98th percentile of the daily maximum 1-hour average at each monitor within an area must not exceed 0.100 ppm.
	Primary and Secondary	Annual	0.053	100	Not to exceed this level.
Ozone (O_3)	Primary and Secondary	8-hour[1]	0.070	—	Annual fourth-highest daily maximum 8-hour concentration, averaged over 3 years.
Particulate Matter with a diameter ≤10µm (PM_{10})	Primary and Secondary	24-hour	—	150	Not to be exceeded more than once a year on average over 3 years.
Particulate Matter with a diameter ≤2.5µm ($PM_{2.5}$)	Primary and Secondary	24-hour	—	35	The 3-year average of the 98th percentile for each population-oriented monitor within an area is not to exceed this level.
	Primary	Annual	—	12	The 3-year average of the weighted annual mean from single or multiple monitors within an area is not to exceed this level.
	Secondary	Annual	—	15	The 3-year average of the weighted annual mean from single or multiple monitors within an area is not to exceed this level.
Sulfur Dioxide (SO_2)	Primary	1-hour	0.075	196	Final rule signed June 2, 2010. The 3-year average of the 99th percentile of the daily maximum 1-hour average at each monitor within an area must not exceed this level.
	Secondary	3-hour	0.5	1,300	Not to be exceeded more than once a year.

Source: EPA, https://www.epa.gov/criteria-air-pollutants/naaqs-table, 2020.
Note: There is no NAAQS standard for NO_X. µg/m³ - micrograms per cubic meter; ppm - parts per million.
1 Final rule signed October 1, 2015, and effective December 28, 2015. The previous (2008) O_3 standard additionally remains in effect in some areas. Revocation of the 2008 standard and transitioning to the new standard will be achieved over the next three years.

Sources of Airport Air Emissions

Almost all large metropolitan airports generate air emissions from the following general source categories: aircraft, auxiliary power unit (APUs), ground service equipment (GSE), and motor vehicles traveling to, from, and moving about the airport; fuel storage and transfer facilities; a variety of stationary sources (e.g., steam boilers, back-up generators, snow melters, etc.); an assortment of aircraft maintenance activities (e.g., painting, cleaning, repair, etc.); routine airfield, roadway, and building maintenance activities (e.g., painting, cleaning, repair, etc.); and periodic construction activities for new projects or improvements to existing facilities.

Table I-2 provides a summary listing of airport-related sources of air emissions, the associated pollutants, and their characteristics.

Table I-2 Airport-related Sources of Air Emissions

Sources	Emissions	Characteristics
Aircraft	CO, NO_2, PM, SO_2 and VOCs	Exhaust products of fuel combustion that vary depending on aircraft engine type, number of engines, power setting, and period of operation. Emissions are also emitted by an aircraft's auxiliary power unit (APU).
Motor vehicles	CO, NO_2, PM, SO_2 and VOCs	Exhaust products of fuel combustion from patron and employee traffic approaching, departing, and moving about the airport site. Emissions vary depending on vehicle type, distance traveled, operating speed, and ambient conditions.
Ground service equipment (GSE)	CO, NO_2, PM, SO_2 and VOCs	Exhaust products of fuel combustion from service trucks, tow tugs, belt loaders, and other portable equipment.
Fuel storage and handling	VOCs	Formed from the evaporation and vapor displacement of fuel from storage tanks and fuel handling facilities. Emissions vary with fuel usage, type of storage tank, refueling method, fuel type, vapor recovery, climate, and ambient temperature.
Stationary sources	CO, NO_2, PM, SO_2 and VOCs	Exhaust products of fossil fuel combustion from boilers dedicated to indoor heating requirements and emissions from incinerators used for waste reduction. Emissions are generally well controlled with operational techniques and post-burn collection methods. Sources include boilers and hot water generators, emergency generators, incinerators, paint booth and surface coating operations, welding operations, and firefighting facilities.

Table I-2 Airport-related Sources of Air Emissions (Continued)

Sources	Emissions	Characteristics
Construction Activities[1]	CO, NO_2, PM, SO_2 and VOCs	Construction projects may have associated emissions from dust generated during excavation and land clearing, exhaust emissions from construction equipment and motor vehicles, and evaporative emissions from asphalt paving and painting. The amount of particulate emissions varies with the material type, the amount of area exposed, and meteorology. The construction of airport and airfield improvement projects at airports represents temporary sources of emissions.

Source: KBE, 2020.
Notes: CO - carbon monoxide; NO_2 - nitrogen dioxide; PM - particulate matter; and SO_2 - sulfur dioxide; VOC - volatile organic compounds.
1 Air emissions associated with construction activities at Logan Airport were not computed for the 2018 and 2019 analyses.

EPA, state, and local air quality agencies maintain outdoor air monitoring networks to measure air quality conditions and gauge compliance with the NAAQS. Based upon the data collected by these agencies, all areas throughout the country are designated by EPA with respect to their compliance with the NAAQS. **Table I-3** provides the definitions of each of these designations.

Table I-3 Attainment, Nonattainment, and Maintenance Area Designations

Attainment	Attainment/Maintenance	Nonattainment Area	Unclassifiable
Any area that meets the National Ambient Air Quality Standards (NAAQS) established for all of the criteria air pollutants.	Any area that is in transition from formerly being a Nonattainment area to an Attainment area (also called Maintenance).	Any area that does not meet (or that contributes to ambient air quality in a nearby area that does not meet) one or more of the NAAQS.	Any area that cannot be classified on the basis of available information as meeting or not meeting the NAAQS.

Source: EPA, https://www.epa.gov/green-book, 2020.

For O_3, CO, PM_{10}, and $PM_{2.5}$, the Nonattainment designations are further classified by the severity, or degree, of the violation of the NAAQS. For example, in the case of O_3, these classifications range from highest to lowest as extreme, severe, serious, marginal, and moderate.

The Nonattainment designation of an area has a bearing on the emission control measures required and the time periods allotted by which a State Implementation Plan (SIP) must demonstrate Attainment of the NAAQS. It is also important to note that the degree of Nonattainment determines the thresholds of emissions that are considered to be "*de minimis,*" or levels below (i.e., within) which a formal General Conformity determination is not required.

Finally, the boundaries of Nonattainment areas are generally determined based on Core Based Statistical Areas (CBSA) as defined by U.S. census data (air monitoring station locations and contributing emission sources also play a role). However, Nonattainment areas for localized pollutants, such as lead and CO, typically only comprise a partial CBSA or a local "hot-spot." By comparison, regional pollutants such as O_3 can encompass multiple CBSAs and can extend across state lines.

State Implementation Plans (SIPs)

For the purposes of this summary explanation of SIPs, it is sufficient to characterize SIPs as the principal instrument by which a state formulates and implements its strategies for bringing Nonattainment or Maintenance areas into compliance with the NAAQS. In equally broad terms, the SIP contains the necessary emission limitations, control measures and timetables for achieving this objective. Therefore, the SIP development process is delegated to state air quality agencies that may in turn rely on regional, county, and local agencies to help prepare emission inventories that include airport-related emissions. A listing of the most current SIPs applicable to the Boston area are provided in Chapter 7, *Air Quality/Emissions Reduction*.

Aircraft Fleet and Operational Data used in AEDT

The Federal Aviation Administration (FAA) Aviation Environmental Design Tool (AEDT, Version 3c)[1], which is the most current, was used in support of the 2018 and 2019 air quality analyses.

Tables I-4 and **I-5** contain the data that were used in AEDT 3c to represent actual conditions at Logan Airport in 2018 and 2019, respectively. These data include aircraft type, engine type, and the number of annual landing and takeoff cycles (LTOs). The aircraft are divided into four categories: air carrier (AC), cargo (CA), commuter (CO), and general aviation (GA). Airport wide taxi/delay times of 27.27 and 28.01 minutes were assumed for 2018 and 2019, respectively. These data were obtained from the FAA Aviation System Performance Metrics (ASPM) database for each applicable year.[2]

1 FAA, Aviation Environmental Design Tool (AEDT), https://aedt.faa.gov/.

2 Federal Aviation Administration (FAA). 2017. FAA Aviation System Performance Metrics (ASPM) Database. https://aspm.faa.gov/.

Table I-4 2018 Fleet Mix and Annual Landing and Takeoff Cycles (LTOs) by Aircraft Type

Aircraft Type	Engine	LTOs	Description
Air Carrier Aircraft			
Embraer ERJ190-LR	CF34-10E6	29,944	AC
Airbus A320-200 Series	V2527-A5	13,657	AC
Airbus A321-100 Series	V2533-A5	12,995	AC
Boeing 737-800 Series	CFM56-7B27	10,245	AC
Airbus A320-200 Series	V2527-A5 SelectOne™ Upgrade Package	10,140	AC
Boeing 737-900-ER	CFM56-7B27E/B1	6,896	AC
Boeing 737-800 Series	CFM56-7B26	5,814	AC
Airbus A321-100 Series	CFM56-5B3/P	4,681	AC
Boeing 737-700 Series	CFM56-7B22	4,221	AC
Boeing 737-700 Series	CFM56-7B24	3,530	AC
Airbus A319-100 Series	V2522-A5	3,205	AC
Boeing 767-300 Series	PW4060	665	AC
Airbus A320-200 Series	CFM56-5A3	2,731	AC
Boeing 737-800 Series	CFM56-7B24/3	2,433	AC
Airbus A319-100 Series	CFM56-5A5	2,385	AC
Embraer ERJ190	CF34-8E5	2,344	AC
Boeing 757-200 Series	PW2037	2,268	AC
Airbus A319-100 Series	CFM56-5B6/P	1,767	AC
Boeing 717-200 Series	BR700-715C1-30	1,605	AC
Boeing 787-9 Dreamliner	Trent 1000-J3	1,561	AC
Airbus A320-200 Series	CFM56-5-A1	1,206	AC
Boeing 757-200 Series	RB211-535E4B	1,196	AC
Airbus A319-100 X/LR	V2524-A5 SelectOne™ Upgrade Package	1,113	AC
Boeing 777-300 ER	GE90-115B	986	AC
Airbus A321-200 Series	CFM56-5B3/P	903	AC
Airbus A330-300 Series	Trent 772	871	AC
Airbus A330-300 Series	CF6-80E1A4	867	AC
Boeing 737-700 Series	CFM56-7B24/3	835	AC

Table I-4 2018 Fleet Mix and Annual Landing and Takeoff Cycles (LTOs) by Aircraft Type

Aircraft Type	Engine	LTOs	Description
Boeing 737-900-ER	CFM56-7B26/3	745	AC
Air Carrier Aircraft (Continued)			
Boeing 737-900-ER	CFM56-7B26/3	745	AC
Airbus A320-200 Series	CFM56-5B4	682	AC
Boeing 757-200 Series	PW2040	652	AC
Airbus A320-200 Series	V2527E-A5	647	AC
Airbus A350-900 series	Trent XWB-84	633	AC
Boeing 717-200 Series	BR700-715A1-30	580	AC
Boeing 737-900 Series	CFM56-7B26	573	AC
Airbus A330-200 Series	CF6-80E1A4	558	AC
Airbus A320-200 Series	CFM56-5B4/P	549	AC
Airbus A321-NEO	CFM56-5B2/3	539	AC
Boeing 777-200 Series	GE90-85B	510	AC
Airbus A321-200 Series	CFM56-5B3/3	505	AC
Boeing 737-8	LEAP-1B28/28B2/28B1/28B3	430	AC
Boeing 737-800 Series	CFM56-7B26/3	430	AC
Embraer ERJ190-LR	CF34-10E5A1	410	AC
Airbus A330-300 Series	PW4168A	370	AC
Boeing 757-200 Series	PW2043	356	AC
Boeing 737-8	LEAP-1B27	317	AC
Boeing 737-900-ER	CFM56-7B26	311	AC
Boeing 747-8	GEnx-2B67	284	AC
Boeing 747-400 Series	RB211-524H-T	278	AC
Airbus A340-600 Series	Trent 556-61	245	AC
Airbus A320-200 Series	CFM56-5B3/3	244	AC
Boeing 737-800 Series	CFM56-7B24	228	AC
Boeing 737-800 Series	CFM56-7B27E/B1	222	AC
Boeing 777-200 Series	PW4090	198	AC
Airbus A330-200 Series	CF6-80E1A3	196	AC
Boeing MD-90	V2525-D5	189	AC
Airbus A340-300 Series	CFM56-5C4	178	AC

Table I-4 2018 Fleet Mix and Annual Landing and Takeoff Cycles (LTOs) by Aircraft Type

Aircraft Type	Engine	LTOs	Description
Boeing 767-200 Series Freighter	JT9D-7R4D, -7R4D1	174	AC
Air Carrier Aircraft (Continued)			
Airbus A320-NEO	PW1127G-JM	169	AC
Boeing 777-200 Series	Trent 895	156	AC
Boeing 757-200 Series Freighter	RB211-535E4	146	AC
Boeing 777-200 Series	GE90-76B	142	AC
Boeing MD-88	JT8D-219	138	AC
Boeing 737-700 Series	CFM56-7B20	131	AC
Boeing 737-700 Series	CFM56-7B26	128	AC
Airbus A319-100 X/LR	CFM56-5B7/3	127	AC
Airbus A340-300 Series	CFM56-5C4/P	127	AC
Boeing 757-200 Series	RB211-535E4	109	AC
Airbus A319-100 Series	CFM56-5B3/3	104	AC
Boeing 757-200 Series Freighter	PW2040	102	AC
Airbus A319-100 X/LR	V2527-A5M SelectOne™ Upgrade Package	102	AC
Airbus A319-100 Series	CFM56-5B6/3	93	AC
Boeing 787-8 Dreamliner	GENX-1B64	90	AC
Airbus A380-800 Series	Trent 970-84	89	AC
Boeing 767-200 Series	CF6-80C2B7F	87	AC
Boeing 757-300 Series	RB211-535E4B	82	AC
Airbus A319-100 Series	V2527-A5	74	AC
Airbus A330-200 Series	CF6-80E1A2	68	AC
Boeing MD-90	V2528-D5	66	AC
Airbus A321-200 Series	CFM56-5B1	64	AC
Airbus A320-200 Series	CFM56-5B4/3	63	AC
Boeing 777-200-ER	GE90-94B	63	AC
Boeing 737-400 Series	CFM56-3C-1	61	AC
Airbus A330-200 Series	Trent 772	53	AC
Boeing 777-200-ER	GE90-90B	50	AC
Airbus A320-200 Series	V2522-D5	46	AC
Boeing 787-8 Dreamliner	Trent 1000-CE3	43	AC

Table I-4 2018 Fleet Mix and Annual Landing and Takeoff Cycles (LTOs) by Aircraft Type

Aircraft Type	Engine	LTOs	Description
Airbus A330-300 Series	CF6-80E1A2	38	AC
Air Carrier Aircraft (Continued)			
Airbus A320-NEO	LEAP-1A26/26E1	36	AC
Airbus A310-300 Series	CF6-80C2A2	31	AC
Boeing 747-400 Series	RB211-524G-T	28	AC
Boeing 767-300 Series	PW4060	25	AC
Boeing MD-11 Freighter	PW4062	14	AC
Airbus A330-200 Series	PW4168A	13	AC
Boeing 767-400	CF6-80C2B8F	13	AC
Airbus A319-100 Series	CFM56-5B4/2P	12	AC
Airbus A320-200 Series	V2527-A5E SelectOne™ Upgrade Package	9	AC
Boeing 757-300 Series	RB211-535E4B	8	AC
Boeing 737-800 Series	CFM56-7B27/3	8	AC
Boeing 737-700 Series	CFM56-7B27	7	AC
Boeing 757-300 Series	PW2040	7	AC
Boeing MD-81	JT8D-219	5	AC
Boeing 777-200 Series	GE90-90B	4	AC
Boeing 777-200 Series	Trent 892	3	AC
Boeing 737-700 Series	CFM56-7B27/3	3	AC
Airbus A380-800 Series	GP7270	2	AC
Boeing 747-400 ER	CF6-80C2B5F	1	AC
Antonov 124 Ruslan	JT9D-7Q	1	AC
Airbus A320-200 Series	CFM56-5B4/2P	1	AC
Boeing DC-9-10 Series	JT8D-9 series	1	AC
Airbus A340-200 Series	CFM56-5C4	1	AC
Airbus A319-100 Series	CFM56-5B7/P	1	AC
Boeing 737-300 Series	CFM56-3C-1	1	AC
Airbus A330-300 Series	PW4158	1	AC
Boeing 737-700 Series	CFM56-7B26/3	1	AC
Boeing 747-8F	GEnx-2B67	1	AC
Boeing 737-600 Series	CFM56-7B22	1	AC

Table I-4 2018 Fleet Mix and Annual Landing and Takeoff Cycles (LTOs) by Aircraft Type

Aircraft Type	Engine	LTOs	Description
Airbus A320-NEO	PW1127GA-JM	1	AC
Air Carrier Aircraft (Continued)			
Boeing 747-400 Series	CF6-80C2B1F	1	AC
Boeing 727-100 Series	JT8D-17R	1	AC
Boeing 727-200 Series	JT8D-17R	1	AC
Boeing C-17A	PW2041	1	AC
Total Air Carrier Aircraft LTOs		**146,352**	
Cargo Aircraft			
Boeing 767-300 Series	CF6-80C2B6F	2,380	CA
Airbus A300B4-600 Series	PW4158	631	CA
Airbus A300F4-600 Series	CF6-80C2A5F	327	CA
Boeing MD-11 Freighter	CF6-80C2D1F	72	CA
Boeing MD-10-1 Freighter	CF6-6D	68	CA
Airbus A300F4-600 Series	CF6-80C2A5	37	CA
Boeing MD-11 Freighter	PW4060	20	CA
Boeing MD-10-30	CF6-50C2	12	CA
Boeing 767-300 Series	CF6-80C2B6F	4	CA
Boeing 757-200 Series Freighter	PW2037	2	CA
Boeing 767-200 Series Freighter	CF6-80A	2	CA
Boeing 747-400 Series Freighter	CF6-80C2B1F	1	CA
Total Cargo Aircraft LTOs		**3,556**	
Commuter Aircraft			
Cessna 402	TIO-540-J2B2	17,879	CO
Bombardier CRJ-900	CF34-8C5	5,786	CO
Embraer ERJ175	CF34-8E5	3,562	CO
Bombardier de Havilland Dash 8 Q400	PW150A	2,517	CO
Embraer ERJ175	CF34-8E5A1	2,287	CO
Bombardier CRJ-200	CF34-3B	2,247	CO
Bombardier CRJ-700	CF34-8C1	1,695	CO

Table I-4 2018 Fleet Mix and Annual Landing and Takeoff Cycles (LTOs) by Aircraft Type

Aircraft Type	Engine	LTOs	Description
Embraer ERJ140-LR	AE3007A1/3	1,686	CO
Commuter Aircraft (Continued)			
Embraer ERJ170	CF34-8E5	1,654	CO
DeHavilland DHC-8-200	PW150A	1,644	CO
Embraer ERJ175-LR	CF34-8E5	1,051	CO
Embraer ERJ170-LR	CF34-8E5	646	CO
Bombardier CRJ-900	CF34-8C5A1	615	CO
Embraer ERJ145-LR	AE3007A1P	544	CO
Embraer ERJ145-LR	AE3007A1	491	CO
Embraer ERJ145-LR	AE3007A	339	CO
Embraer ERJ145-XR	AE3007A1E	190	CO
Bombardier CRJ-900-ER	CF34-8C5A1	141	CO
Bombardier CRJ-705-LR	CF34-8C5	73	CO
Bombardier de Havilland Dash 8 Q300	PW123	67	CO
Bombardier CRJ-700	CF34-8C5	41	CO
Bombardier CRJ-700	CF34-8C5B1	30	CO
Bombardier de Havilland Dash 8 Q100	PW120A	5	CO
Bombardier Challenger 850	CF34-3B	1	CO
Total Commuter Aircraft LTOs		**45,191**	
General Aviation Aircraft			
Pilatus PC-12	PT6A-67	1,070	GA
Pilatus PC-12	PT6A-67B	853	GA
Cessna 560 Citation Excel	JT15D-5, -5A, -5B	816	GA
Bombardier Challenger 350	HTF7350 (AS907-2-1A)	777	GA
Embraer 505	PW530	746	GA
Dassault Falcon 2000	PW308C Build Spec 1289	625	GA
Saab 340-B	CT7-9B	614	GA
Raytheon Super King Air 300	PT6A-67A	598	GA
Bombardier Challenger 300	HTF7350 (AS907-2-1A)	500	GA
Cessna 680-A Citation Latitude	PW306B	480	GA

Table I-4 2018 Fleet Mix and Annual Landing and Takeoff Cycles (LTOs) by Aircraft Type

Aircraft Type	Engine	LTOs	Description
Raytheon Beechjet 400	JT15D-5, -5A, -5B	450	GA
General Aviation Aircraft (Continued)			
Cessna 525 CitationJet	PW4090	391	GA
Cessna 560 Citation XLS	PW306B	380	GA
Gulfstream G350	TAY 611-8C	367	GA
Cirrus SR22	TIO-540-J2B2	352	GA
Raytheon Hawker 800	TFE731-2/2A	330	GA
Cessna 750 Citation X	AE3007C1	327	GA
Gulfstream G500	BR700-710C4-11	325	GA
Bombardier Challenger 600	CF34-3A1	309	GA
Cessna 680 Citation Sovereign	PW306B	293	GA
Bombardier Global Express	BR700-710A2-20	278	GA
Gulfstream G650	BR700-725A1-12	240	GA
Raytheon Super King Air 200	PT6A-41	231	GA
Sikorsky S-76 Spirit	T700-GE-700	226	GA
Cessna 208 Caravan	PT6A-114	213	GA
Bombardier Global 5000 Business	BR700-710A2-20	206	GA
Kaman SH-2 Seasprite	T700-GE-401 -401C	199	GA
Bombardier Learjet 60	PW306A	198	GA
Dassault Falcon 900-EX	TFE731-2/2A	178	GA
Gulfstream IV-SP	TAY Mk611-8	152	GA
Cessna 525C CitationJet	PW610F	141	GA
Cessna 680 Citation Sovereign	PW308C Build Spec 1289	132	GA
Piper PA-32 Cherokee Six	TIO-540-J2B2	131	GA
Saab 340-A	CT7-9B	131	GA
Bombardier Challenger 605	CF34-3B	123	GA
Raytheon Beech Baron 58	TIO-540-J2B2	116	GA
Raytheon Beech 99	TPE331-6	116	GA
Dassault Falcon 50-EX	TFE731-2/2A	106	GA
Bombardier Learjet 35	TFE731-3	105	GA
Bombardier Learjet 35	TFE731-2-2B	105	GA

Table I-4 2018 Fleet Mix and Annual Landing and Takeoff Cycles (LTOs) by Aircraft Type

Aircraft Type	Engine	LTOs	Description
Embraer Legacy 450 (EMB-545)	HTF7500E (AS907-3-1E-A3)	104	GA
General Aviation Aircraft (Continued)			
Bombardier Learjet 45	TFE731-2/2A	102	GA
Cessna 182	IO-360-B	97	GA
Raytheon Hawker 800	TFE731-3	96	GA
Piper PA-34 Seneca	TSIO-360C	94	GA
Gulfstream G280	HTF7250G (AS907-2-1G)	90	GA
Raytheon Beech Bonanza 36	TIO-540-J2B2	88	GA
Gulfstream G450	TAY Mk611-8	87	GA
Cessna 750 Citation X	PW308A	85	GA
Cessna S550 Citation S/II	PW610F	82	GA
Bombardier Learjet 45	TFE731-2-2B	78	GA
Gulfstream G550	BR700-710A1-10	76	GA
Gulfstream G200	TFE731-2/2A	75	GA
Falcon 7X	PW307A	72	GA
Cessna 414	TIO-540-J2B2	68	GA
Bombardier Challenger 604	CF34-3B	66	GA
Bombardier Global 6000 Business	BR700-710A2-20	64	GA
Gulfstream G150	TFE731-3	59	GA
Gulfstream G500	BR700-710A1-10	50	GA
Raytheon Hawker 4000 Horizon	PW308A	49	GA
Honda HA-420 Hondajet	PW610F	48	GA
Bombardier Learjet 75	TFE731-3	48	GA
Bombardier Challenger 300	HTF7000 (AS907-1-1A)	40	GA
Cessna 560 Citation V	JT15D-5, -5A, -5B	39	GA
Cessna 560 Citation V	PW530	38	GA
Embraer ERJ135-LR	AE3007A1/3	37	GA
Cessna 421 Piston	IO-360-B	37	GA
Bombardier Challenger 601	CF34-3A	37	GA
Cessna 525 CitationJet	JT15D-1 series	36	GA
Dassault Falcon 900-EX	TFE731-3	34	GA

Table I-4 2018 Fleet Mix and Annual Landing and Takeoff Cycles (LTOs) by Aircraft Type

Aircraft Type	Engine	LTOs	Description
Embraer 500	HTF7500E (AS907-3-1E-A3)	32	GA
General Aviation Aircraft (Continued)			
Cessna 560 Citation V	JT15D-5C	31	GA
Eurocopter AS 355NP	250B17B	30	GA
Piper PA-28 Cherokee Series	IO-320-D1AD	29	GA
Piper PA-27 Aztec	TIO-540-J2B2	28	GA
Piper PA-31 Navajo	TIO-540-J2B2	28	GA
Bell 407 / Rolls-Royce 250-C47B	250B17B	27	GA
Piper PA46 Meridian	TIO-540-J2B2	27	GA
Raytheon Hawker 1000	PW306A	26	GA
Mooney M20-K	TSIO-360C	25	GA
Embraer Legacy 500 (EMB-550)	HTF7500E (AS907-3-1E-A3)	24	GA
Cessna 650 Citation III	TFE731-2/2A	23	GA
Eurocopter EC-T2 (CPDS)	TPE331-3	23	GA
EADS Socata TBM-700	PT6A-64	23	GA
Cessna 208 Caravan	TPE331-12B	23	GA
Bombardier Learjet 31	TFE731-3	23	GA
Bell 429	TPE331-1	23	GA
Cessna 210 Centurion	TIO-540-J2B2	22	GA
Dassault Falcon 100	TFE731-3	22	GA
Pilatus PC-24	PW610F	22	GA
Cessna 206	TIO-540-J2B2	21	GA
Raytheon Premier I	PW308C Build Spec 1289	20	GA
Embraer ERJ135 Legacy Business	AE3007A1E	20	GA
Gulfstream G200	PW306A	19	GA
Cessna 172 Skyhawk	O-320	18	GA
Dassault Falcon 50-EX	TFE731-3	17	GA
Aerospatiale SA-350D Astar (AS-350)	TPE331-3	16	GA
Cessna 182 R (FAS)	IO-360-B	16	GA
Raytheon Beech 99	PT6A-28	16	GA
Bombardier Learjet 55	TFE731-3	16	GA

Table I-4 2018 Fleet Mix and Annual Landing and Takeoff Cycles (LTOs) by Aircraft Type

Aircraft Type	Engine	LTOs	Description
Piper PA-31T Cheyenne	PT6A-135A	15	GA
General Aviation Aircraft (Continued)			
Robinson R44 Raven / Lycoming O-540-F1B5	TIO-540-J2B2	14	GA
Cessna 340	TIO-540-J2B2	14	GA
Gulfstream G100	TFE731-2/2A	14	GA
Gulfstream V-SP	BR700-710A1-10	13	GA
Eclipse 500 / PW610F	PW610F	12	GA
Cirrus SR20	IO-360-B	12	GA
Piper PA46-TP Meridian	PT6A-42	12	GA
Dassault Falcon 8X	PW307D	12	GA
Dornier 328 Jet	PW306B	11	GA
Piaggio P.180 Avanti	PT6A-60	10	GA
Agusta A-109	250B17B	10	GA
Bombardier Learjet 40	TFE731-2/2A	9	GA
Bell 206 JetRanger	250B17B	9	GA
Aerostar PA-60	TIO-540-J2B2	8	GA
Dassault Falcon 200	TFE731-3	7	GA
Cessna 441 Conquest II	TPE331-10UK	7	GA
Embraer ERJ135 Legacy Business	AE3007A1P	7	GA
SOCATA TBM 850	PT6A-66	6	GA
Eurocopter EC-130	TPE331-3	6	GA
Piper PA-28 Cherokee Series	O-320	6	GA
Bombardier Learjet 36	TFE731-2-2B	5	GA
Bombardier Learjet 45-XR	TFE731-2-2B	5	GA
CESSNA CITATION 510	PW610F	5	GA
Beech 95 (FAS)	TIO-540-J2B2	5	GA
Piper PA-24 Comanche	TIO-540-J2B2	5	GA
Gulfstream III (FAS)	SPEY Mk511	5	GA
Cessna 310	TIO-540-J2B2	4	GA
Raytheon Beech 60 Duke	PT6A-36	4	GA
Eurocopter EC-155B1	T400-CP-400	4	GA

Table I-4 2018 Fleet Mix and Annual Landing and Takeoff Cycles (LTOs) by Aircraft Type

Aircraft Type	Engine	LTOs	Description
Gulfstream II-B	SPEY Mk511	3	GA
General Aviation Aircraft (Continued)			
Gulfstream G100	TFE731-3	3	GA
Raytheon Beech 1900-D	PT6A-67D	3	GA
Cessna 335/340 (FAS)	TIO-540-J2B2	3	GA
Dassault Falcon 20-F	CF700-2D	3	GA
Raytheon King Air 100	TPE331-6	3	GA
Bell 430	250B17B	2	GA
Raytheon Beech 55 Baron	TIO-540-J2B2	2	GA
Cessna 500 Citation I	PW530	2	GA
Gulfstream Aerospace Gulfstream G500 (G-7)	PW814GA	2	GA
Gulfstream G600	PW815GA	2	GA
Piaggio P.180 Avanti	PT6A-66	2	GA
Beechcraft 76 Duchess	TIO-540-J2B2	2	GA
Dornier 328-100 Series	PW119B	2	GA
Grumman AA-5A/B (FAS)	O-320	2	GA
Raytheon Super King Air 300	PT6A-60A	2	GA
Mitsubishi MU-2	TPE331-5A	2	GA
Israel IAI-1124-A Westwind II	TFE731-3	2	GA
Rockwell Commander 690	TPE331-3	2	GA
Bombardier Challenger 601	CF34-3A1	1	GA
Dassault Falcon 20-D	CF700-2D	1	GA
Raytheon Beech 99	PT6A-36	1	GA
Bell 427	TPE331-1	1	GA
Cessna 170 (FAS)	IO-360-B	1	GA
Cessna Aircraft Company 180F	IO-360-B	1	GA
Cessna 501 Citation ISP	PW610F	1	GA
Cessna 700 Citation Longitude	HTF7000 (AS907-1-1A)	1	GA
Diamond DA40	IO-360-B	1	GA
Diamond DA42 Twin Star	IO-360-B	1	GA
Lancair Evolution (FAS)	TIO-540-J2B2	1	GA

Table I-4 2018 Fleet Mix and Annual Landing and Takeoff Cycles (LTOs) by Aircraft Type

Aircraft Type	Engine	LTOs	Description
Gulfstream American GA-7 Cougar (FAS)	O-320	1	GA
General Aviation Aircraft (Continued)			
Bombardier Learjet 24-XR	CJ610-2C	1	GA
Maule MT-7-235	TIO-540-J2B2	1	GA
Ryan Navion F	TIO-540-J2B2	1	GA
Fairchild SA-227-AC Metro III	PW125B	1	GA
Bombardier Learjet 70	TFE731-3	1	GA
Total General Aviation Aircraft LTOs		**16,913**	
Total Fleet LTOs		**212,012**	

Source: KBE and HMMH, 2020.
Notes: LTOs – landing and takeoff cycles; AC – Air carrier; CA – Cargo; CO – commuter; and GA – general aviation.

Table I-5 2019 Fleet Mix and Annual Landing and Takeoff Cycles (LTOs) by Aircraft Type

Aircraft Type	Engine	LTOs	Description
Air Carrier Aircraft			
Embraer ERJ190-LR	CF34-10E6	32,468	AC
Airbus A321-100 Series	V2533-A5	15,262	AC
Airbus A320-200 Series	V2527-A5	14,630	AC
Airbus A320-200 Series	V2527-A5 SelectOne™ Upgrade Package	9,101	AC
Boeing 737-800 Series	CFM56-7B27	7,922	AC
Airbus A321-100 Series	CFM56-5B3/P	6,490	AC
Boeing 737-800 Series	CFM56-7B26	5,533	AC
Boeing 737-900-ER	CFM56-7B27E/B1	5,291	AC
Boeing 737-700 Series	CFM56-7B22	3,423	AC
Airbus A319-100 Series	V2522-A5	3,065	AC
Boeing 757-200 Series	PW2037	3,052	AC
Boeing 737-700 Series	CFM56-7B24	2,859	AC
Embraer ERJ190	CF34-8E5	2,598	AC
Boeing 757-200 Series	RB211-535E4B	2,163	AC
Airbus A319-100 Series	CFM56-5B6/P	2,026	AC
Airbus A320-200 Series	CFM56-5A3	1,907	AC
Boeing 737-800 Series	CFM56-7B24/3	1,852	AC
Airbus A319-100 Series	CFM56-5A5	1,849	AC
Boeing 717-200 Series	BR700-715C1-30	1,503	AC
Airbus A330-300 Series	Trent 772	1,400	AC
Boeing 777-300 ER	GE90-115B	976	AC
Boeing 787-9 Dreamliner	GEnx-1B76A/P2	932	AC
Airbus A330-300 Series	CF6-80E1A4	884	AC
Airbus A320-200 Series	CFM56-5-A1	881	AC
Embraer ERJ190-LR	CF34-10E5A1	835	AC
Airbus A320-200 Series	CFM56-5B4	781	AC
Boeing 787-9 Dreamliner	Trent 1000-J3	744	AC
Boeing 737-700 Series	CFM56-7B24/3	731	AC
Airbus A319-100 X/LR	V2524-A5 SelectOne™ Upgrade Package	728	AC

Table I-5 2019 Fleet Mix and Annual Landing and Takeoff Cycles (LTOs) by Aircraft Type

Aircraft Type	Engine	LTOs	Description
Air Carrier Aircraft (Continued)			
Airbus A321-NEO	CFM56-5B2/3	696	AC
Airbus A320-200 Series	CFM56-5B4/P	668	AC
Boeing 757-200 Series	PW2040	667	AC
Airbus A321-200 Series	CFM56-5B3/P	663	AC
Airbus A320-200 Series	V2527E-A5	599	AC
Boeing 767-300 Series	PW4060	570	AC
Boeing 717-200 Series	BR700-715A1-30	543	AC
Boeing 777-200 Series	GE90-85B	507	AC
Boeing 737-900-ER	CFM56-7B26/3	461	AC
Boeing 737-800 Series	CFM56-7B26/3	458	AC
Airbus A320-NEO	LEAP-1A26/26E1	402	AC
Airbus A330-300 Series	PW4168A	376	AC
Airbus A320-200 Series	CFM56-5B3/3	373	AC
Airbus A330-200 Series	CF6-80E1A4	366	AC
Airbus A340-600 Series	Trent 556-61	312	AC
Airbus A320-NEO	PW1127G-JM	308	AC
Boeing 737-900 Series	CFM56-7B26	292	AC
Boeing 757-300 Series	RB211-535E4B	290	AC
Airbus A330-200 Series	PW4168A	282	AC
Boeing 777-200 Series	Trent 895	272	AC
Boeing 737-900-ER	CFM56-7B26	272	AC
Boeing 737-8	LEAP-1B28/28B2/28B1/28B3	266	AC
Airbus A350-900 series	Trent XWB-84	251	AC
Airbus A340-300 Series	CFM56-5C4	238	AC
Airbus A330-300 Series	CF6-80E1A2	224	AC
Airbus A330-200 Series	CF6-80E1A3	224	AC
Airbus A330-200 Series	Trent 772	215	AC
Boeing 747-8	GEnx-2B67	208	AC
Boeing 777-200 Series	GE90-76B	204	AC
Airbus A380-800 Series	Trent 970-84	201	AC

Table I-5 2019 Fleet Mix and Annual Landing and Takeoff Cycles (LTOs) by Aircraft Type

Aircraft Type	Engine	LTOs	Description
Air Carrier Aircraft (Continued)			
Boeing 757-200 Series	PW2043	200	AC
Airbus A320-200 Series	V2522-D5	200	AC
Airbus A321-200 Series	CFM56-5B3/3	186	AC
Boeing 777-200-ER	GE90-90B	179	AC
Boeing 737-800 Series	CFM56-7B24	174	AC
Boeing 777-200-ER	GE90-94B	169	AC
Airbus A380-800 Series	GP7270	160	AC
Airbus A319-100 Series	CFM56-5B3/3	152	AC
Airbus A321-200 Series	CFM56-5B1	137	AC
Boeing 747-400 Series	RB211-524H-T	137	AC
Airbus A330-900N Series (Neo)	Trent7000-72C	135	AC
Boeing 767-200 Series	CF6-80C2B7F	133	AC
Boeing 757-200 Series	RB211-535E4	131	AC
Boeing 767-200 Series Freighter	JT9D-7R4D, -7R4D1	131	AC
Airbus A340-300 Series	CFM56-5C4/P	126	AC
Boeing 747-400 Series	CF6-80C2B1F	124	AC
Boeing 787-8 Dreamliner	Trent 1000-CE3	121	AC
Boeing 737-8	LEAP-1B27	116	AC
Boeing 787-8 Dreamliner	GENX-1B64	109	AC
Boeing 737-700 Series	CFM56-7B26	106	AC
Airbus A319-100 X/LR	V2527-A5M SelectOne™ Upgrade Package	82	AC
Airbus A320-200 Series	CFM56-5B4/3	79	AC
Boeing 737-700 Series	CFM56-7B20	79	AC
Airbus A319-100 Series	CFM56-5B6/3	77	AC
Boeing 757-200 Series Freighter	RB211-535E4	72	AC
Boeing 737-400 Series	CFM56-3C-1	63	AC
Boeing 737-800 Series	CFM56-7B27E/B1	56	AC
Boeing 767-400	CF6-80C2B8F	51	AC
Airbus A319-100 X/LR	CFM56-5B7/3	44	AC
Boeing MD-11 Freighter	CF6-80C2D1F	44	AC

Table I-5 2019 Fleet Mix and Annual Landing and Takeoff Cycles (LTOs) by Aircraft Type

Aircraft Type	Engine	LTOs	Description
Air Carrier Aircraft (Continued)			
Airbus A319-100 Series	V2527-A5	37	AC
Boeing MD-10-30	CF6-50C2	32	AC
Boeing 757-200 Series Freighter	PW2040	20	AC
Boeing 747-400 Series	RB211-524G-T	19	AC
Boeing 757-300 Series	RB211-535E4B	18	AC
Boeing 777-200 Series	PW4090	16	AC
Airbus A320-200 Series	V2527-A5E SelectOne™ Upgrade Package	15	AC
Boeing 737-9	LEAP-1B28/28B2/28B1/28B3	13	AC
Boeing 767-300 Series	PW4060	10	AC
Boeing 737-700 Series	CFM56-7B27/3	9	AC
Boeing MD-11 Freighter	PW4062	8	AC
Boeing 737-700 Series	CFM56-7B27	5	AC
Boeing 787-10 Dreamliner	Trent 1000-N3	4	AC
Boeing 777-200-LR	GE90-110B1	4	AC
Boeing MD-88	JT8D-219	4	AC
Boeing 777-200 Series	Trent 892	4	AC
Boeing 737-800 Series	CFM56-7B27/3	3	AC
Boeing MD-90	V2525-D5	3	AC
Airbus A330-200 Series	CF6-80E1A2	3	AC
Airbus A319-100 Series	CFM56-5B4/2P	3	AC
Boeing 777-200 Series	GE90-90B	3	AC
Airbus A320-NEO	PW1127GA-JM	3	AC
Boeing MD-90	V2528-D5	2	AC
Airbus A340-500 Series	Trent 556-61	2	AC
Boeing 767-300 Series	CF6-80C2B6	2	AC
Boeing 757-300 Series	PW2040	2	AC
AIRBUS A-400M	TYNE	1	AC
Embraer ERJ190	CF34-10E7-B	1	AC
Boeing 747-8F	GEnx-2B67	1	AC
Boeing 757-200 Series Freighter	PW2037	1	AC

Table I-5 2019 Fleet Mix and Annual Landing and Takeoff Cycles (LTOs) by Aircraft Type

Aircraft Type	Engine	LTOs	Description
Air Carrier Aircraft (Continued)			
Boeing 737-300 Series Freighter	CFM56-3C-1	1	AC
Boeing 747-400 Series Freighter	PW4056	1	AC
Boeing MD-83	JT8D-219	1	AC
Boeing MD-81	JT8D-219	1	AC
Boeing C-17A	PW2041	1	AC
Boeing 767-300 Series	PW4x52	1	AC
Boeing 727-100 Series	JT8D-17R	1	AC
Total Air Carrier Aircraft LTOs		**147,122**	
Cargo Aircraft			
Boeing 767-300 Series	CF6-80C2B6F	2,726	CA
Airbus A300B4-600 Series	PW4158	681	CA
Airbus A300F4-600 Series	CF6-80C2A5F	370	CA
Boeing MD-10-1 Freighter	CF6-6D	40	CA
Airbus A300F4-600 Series	CF6-80C2A5	25	CA
Boeing MD-11 Freighter	PW4060	9	CA
Boeing 767-300 Series	CF6-80C2B6F	2	CA
Boeing 747-SP	RB211-524D4	1	CA
Boeing 737-200 Series	JT8D-17AR	1	CA
Total Cargo Aircraft LTOs		**3,855**	
Commuter Aircraft			
Cessna 402	TIO-540-J2B2	17,718	CO
Bombardier CRJ-900	CF34-8C5	5,650	CO
Embraer ERJ175	CF34-8E5	5,387	CO
Embraer ERJ170	CF34-8E5	3,999	CO
Bombardier de Havilland Dash 8 Q400	PW150A	2,760	CO
Embraer ERJ175-LR	CF34-8E5	2,501	CO
Embraer ERJ175	CF34-8E5A1	2,008	CO
Embraer ERJ170-LR	CF34-8E5	1,640	CO

Table I-5 2019 Fleet Mix and Annual Landing and Takeoff Cycles (LTOs) by Aircraft Type

Aircraft Type	Engine	LTOs	Description
Commuter Aircraft (Continued)			
DeHavilland DHC-8-200	PW150A	1,065	CO
Embraer ERJ145-LR	AE3007A1	895	CO
Bombardier CRJ-200	CF34-3B	809	CO
Bombardier CRJ-705-LR	CF34-8C5	763	CO
Embraer ERJ145-LR	AE3007A	594	CO
Bombardier CS100	PW1524G	527	CO
Embraer ERJ140-LR	AE3007A1/3	195	CO
Bombardier CRJ-700	CF34-8C1	136	CO
Bombardier de Havilland Dash 8 Q300	PW123	92	CO
Embraer ERJ145-LR	AE3007A1P	90	CO
Embraer ERJ145-XR	AE3007A1E	18	CO
Bombardier CRJ-700	CF34-8C5B1	14	CO
Bombardier CRJ-700	CF34-8C5	7	CO
Bombardier Challenger 850	CF34-3B	3	CO
Dassault Falcon 20-F	CF700-2D	3	CO
DeHavilland DHC-8-100	PW123	2	CO
Bombardier (Canadair) CRJ200 ExecLiner	CF34-3A1	2	CO
Bombardier Learjet 36	TFE731-2-2B	2	CO
Total Commuter Aircraft LTOs		**46,880**	
General Aviation Aircraft			
Pilatus PC-12	PT6A-67	1,190	GA
Pilatus PC-12	PT6A-67B	941	GA
Bombardier Challenger 350	HTF7350 (AS907-2-1A)	844	GA
Embraer 505	PW530	804	GA
Cessna 680-A Citation Latitude	PW306B	767	GA
Cessna 560 Citation Excel	JT15D-5, -5A, -5B	692	GA
Raytheon Super King Air 300	PT6A-67A	552	GA
Bombardier Challenger 300	HTF7350 (AS907-2-1A)	529	GA
Dassault Falcon 2000	PW308C Build Spec 1289	518	GA

Table I-5 2019 Fleet Mix and Annual Landing and Takeoff Cycles (LTOs) by Aircraft Type

Aircraft Type	Engine	LTOs	Description
General Aviation Aircraft (Continued)			
Gulfstream G350	TAY 611-8C	374	GA
Cessna 560 Citation XLS	PW306B	347	GA
Cirrus SR22	TIO-540-J2B2	338	GA
Gulfstream G500	BR700-710C4-11	331	GA
Raytheon Beechjet 400	JT15D-5, -5A, -5B	326	GA
Cessna 525 CitationJet	PW4090	302	GA
Raytheon Hawker 800	TFE731-2/2A	299	GA
Bombardier Global Express	BR700-710A2-20	287	GA
Cessna 750 Citation X	AE3007C1	278	GA
Bombardier Challenger 600	CF34-3A1	271	GA
Cessna 680 Citation Sovereign	PW306B	266	GA
Cessna 208 Caravan	PT6A-114	217	GA
Kaman SH-2 Seasprite	T700-GE-401 -401C	217	GA
Saab 340-B	CT7-9B	208	GA
Gulfstream G650	BR700-725A1-12	203	GA
Raytheon Super King Air 200	PT6A-41	186	GA
Sikorsky S-76 Spirit	T700-GE-700	175	GA
Embraer Legacy 450 (EMB-545)	HTF7500E (AS907-3-1E-A3)	169	GA
Dassault Falcon 900-EX	TFE731-2/2A	167	GA
Bombardier Global 5000 Business	BR700-710A2-20	157	GA
Raytheon Beech Baron 58	TIO-540-J2B2	152	GA
Cessna 525C CitationJet	PW610F	146	GA
Bombardier Learjet 60	PW306A	142	GA
Gulfstream IV-SP	TAY Mk611-8	135	GA
Bombardier Challenger 605	CF34-3B	133	GA
Gulfstream G280	HTF7250G (AS907-2-1G)	127	GA
Piper PA-32 Cherokee Six	TIO-540-J2B2	112	GA
Cessna 680 Citation Sovereign	PW308C Build Spec 1289	106	GA
Dassault Falcon 50-EX	TFE731-2/2A	106	GA
Raytheon Hawker 800	TFE731-3	104	GA

Table I-5 2019 Fleet Mix and Annual Landing and Takeoff Cycles (LTOs) by Aircraft Type

Aircraft Type	Engine	LTOs	Description
General Aviation Aircraft (Continued)			
Raytheon Beech 99	TPE331-6	102	GA
Cessna 750 Citation X	PW308A	91	GA
Bombardier Learjet 35	TFE731-2-2B	90	GA
Pilatus PC-24	PW610F	83	GA
Piper PA-34 Seneca	TSIO-360C	83	GA
Falcon 7X	PW307A	83	GA
Bombardier Learjet 45	TFE731-2/2A	74	GA
Bombardier Global 6000 Business	BR700-710A2-20	72	GA
Bombardier Learjet 35	TFE731-3	66	GA
Gulfstream G500	BR700-710A1-10	63	GA
Bombardier Learjet 75	TFE731-3	60	GA
Gulfstream G200	TFE731-2/2A	59	GA
Cessna S550 Citation S/II	PW610F	56	GA
Raytheon Beech Bonanza 36	TIO-540-J2B2	56	GA
Cessna 182	IO-360-B	55	GA
Bombardier Challenger 604	CF34-3B	52	GA
Piper PA-31 Navajo	TIO-540-J2B2	51	GA
Cessna 525 CitationJet	JT15D-1 series	44	GA
Cessna 414	TIO-540-J2B2	42	GA
Gulfstream G450	TAY Mk611-8	42	GA
Gulfstream G150	TFE731-3	40	GA
Embraer Legacy 500 (EMB-550)	HTF7500E (AS907-3-1E-A3)	39	GA
Honda HA-420 Hondajet	PW610F	37	GA
Gulfstream G550	BR700-710A1-10	36	GA
Embraer 500	HTF7500E (AS907-3-1E-A3)	34	GA
Cessna 421 Piston	IO-360-B	34	GA
Raytheon Hawker 1000	PW306A	33	GA
Eurocopter AS 355NP	250B17B	32	GA
Bombardier Learjet 45	TFE731-2-2B	32	GA
Raytheon Hawker 4000 Horizon	PW308A	29	

Table I-5 2019 Fleet Mix and Annual Landing and Takeoff Cycles (LTOs) by Aircraft Type

Aircraft Type	Engine	LTOs	Description
General Aviation Aircraft (Continued)			
Piper PA46 Meridian	TIO-540-J2B2	26	GA
Dassault Falcon 900-EX	TFE731-3	26	GA
Eurocopter EC-T2 (CPDS)	TPE331-3	25	GA
Piper PA-28 Cherokee Series	IO-320-D1AD	25	GA
Cessna 650 Citation III	TFE731-2/2A	25	GA
Bell 407 / Rolls-Royce 250-C47B	250B17B	24	GA
Cessna 560 Citation V	JT15D-5C	24	GA
Gulfstream G100	TFE731-2/2A	22	GA
Cessna 172 Skyhawk	O-320	22	GA
Bombardier Challenger 601	CF34-3A	22	GA
Bell 429	TPE331-1	22	GA
Robinson R44 Raven / Lycoming O-540-F1B5	TIO-540-J2B2	22	GA
Gulfstream G200	PW306A	22	GA
Bombardier Learjet 31	TFE731-3	20	GA
Bombardier Challenger 300	HTF7000 (AS907-1-1A)	20	GA
Bombardier Learjet 40	TFE731-2/2A	19	GA
Embraer ERJ135-LR	AE3007A1/3	18	GA
Bombardier Learjet 55	TFE731-3	16	GA
Cessna 208 Caravan	TPE331-12B	15	GA
Piper PA-27 Aztec	TIO-540-J2B2	15	GA
Raytheon Beech 99	PT6A-28	15	GA
Mooney M20-K	TSIO-360C	15	GA
Cessna 210 Centurion	TIO-540-J2B2	15	GA
Piper PA-31T Cheyenne	PT6A-135A	13	GA
Piper PA-24 Comanche	TIO-540-J2B2	13	GA
Cirrus SR20	IO-360-B	13	GA
Cessna 560 Citation V	JT15D-5, -5A, -5B	13	GA
Cessna 182 R (FAS)	IO-360-B	12	GA
Eurocopter EC-130	TPE331-3	11	GA
Embraer ERJ135 Legacy Business	AE3007A1E	11	GA

Table I-5 2019 Fleet Mix and Annual Landing and Takeoff Cycles (LTOs) by Aircraft Type

Aircraft Type	Engine	LTOs	Description
General Aviation Aircraft (Continued)			
Bombardier Learjet 45-XR	TFE731-2-2B	11	GA
Piper PA-28 Cherokee Series	O-320	10	GA
Bell 206 JetRanger	250B17B	10	GA
Bombardier Learjet 70	TFE731-3	10	GA
Eclipse 500 / PW610F	PW610F	9	GA
Beech 95 (FAS)	TIO-540-J2B2	9	GA
Raytheon Premier I	PW308C Build Spec 1289	9	GA
Gulfstream G100	TFE731-3	9	GA
Dassault Falcon 8X	PW307D	7	GA
Piaggio P.180 Avanti	PT6A-60	7	GA
Gulfstream III (FAS)	SPEY Mk511	7	GA
Cessna 340	TIO-540-J2B2	7	GA
Bombardier Challenger 601	CF34-3A1	7	GA
Agusta A-109	250B17B	7	GA
Gulfstream Aerospace Gulfstream G500 (G-7)	PW814GA	6	GA
DAHER TBM 900/930	PT6A-66	6	GA
Eurocopter EC-155B1	T400-CP-400	6	GA
Dassault Falcon 100	TFE731-3	6	GA
Dassault Falcon 50-EX	TFE731-3	6	GA
Raytheon Beech 55 Baron	TIO-540-J2B2	6	GA
Cessna 185 Skywagon	IO-360-B	5	GA
Cessna 206	TIO-540-J2B2	5	GA
SOCATA TBM 850	PT6A-66	5	GA
Gulfstream V-SP	BR700-710A1-10	5	GA
EADS Socata TBM-700	PT6A-64	5	GA
Piper PA46-TP Meridian	PT6A-42	5	GA
Cessna 310	TIO-540-J2B2	5	GA
Cessna 177 (FAS)	IO-360-B	4	GA
Embraer ERJ135 Legacy Business	AE3007A1P	4	GA
Cessna 500 Citation I	PW530	4	GA

Table I-5 2019 Fleet Mix and Annual Landing and Takeoff Cycles (LTOs) by Aircraft Type

Aircraft Type	Engine	LTOs	Description
General Aviation Aircraft (Continued)			
Bell 430	250B17B	4	GA
Piper PA-23 Apache/Aztec	TIO-540-J2B2	4	GA
Dassault Falcon 200	TFE731-3	3	GA
Diamond DA40	IO-360-B	3	GA
Aerospatiale SA-350D Astar (AS-350)	TPE331-3	3	GA
Cessna 560 Citation V	PW530	3	GA
Israel IAI-1124-A Westwind II	TFE731-3	3	GA
Raytheon King Air 100	TPE331-6	3	GA
Piper PA-42 Cheyenne Series	TPE331-14B	3	GA
Raytheon Super King Air 300	PT6A-60A	3	GA
Dornier 328 Jet	PW306B	3	GA
Aerostar PA-60	TIO-540-J2B2	3	GA
Dassault Falcon 20-D	CF700-2D	2	GA
Grumman AA-5A/B (FAS)	O-320	2	GA
CIRRUS SF-50 Vision	PW610F	2	GA
Cessna Aircraft Company 180F	IO-360-B	2	GA
Mitsubishi MU-2	TPE331-5A	2	GA
Rockwell Commander 690	TPE331-3	2	GA
Raytheon Beech 99	PT6A-36	2	GA
Saab 2000	PW127-A	2	GA
Fairchild SA-227-AC Metro III	PW125B	2	GA
Lockheed C-130 Hercules	T56 series III	2	GA
Hughes 500D	250B17B	2	GA
Bombardier CS300	PW1524G	1	GA
Diamond DV-20 Katana (FAS)	O-320	1	GA
Cessna 303 Crusader (FAS)	TIO-540-J2B2	1	GA
DeHavilland DHC-6-100 Twin Otter	PT6A-65R	1	GA
Cessna 501 Citation ISP	PW610F	1	GA
CESSNA CITATION 510	PW610F	1	GA
Gulfstream G600	PW815GA	1	GA

Table I-5 2019 Fleet Mix and Annual Landing and Takeoff Cycles (LTOs) by Aircraft Type

Aircraft Type	Engine	LTOs	Description
General Aviation Aircraft (Continued)			
Bombardier Global 7000 Business	BIZMEDIUMJET_F	1	GA
Cessna 425 Conquest I	PT6A-135A	1	GA
Bell 427	TPE331-1	1	GA
Bombardier Learjet 24-XR	CJ610-2C	1	GA
Piper PA-30 Twin Comanche	IO-320-D1AD	1	GA
Mitsubishi MU-300 Diamond	JT15D-5, -5A, -5B	1	GA
Cessna 150 Series	O-200	1	GA
Embraer EMB120 Brasilia	PW118B	1	GA
Cessna 441 Conquest II	TPE331-10UK	1	GA
Antonov 12 Cub	T56 series I	1	GA
Rockwell Commander 500	TIO-540-J2B2	1	GA
Rockwell Sabreliner 65	TFE731-3	1	GA
Raytheon Beech 1900-D	PT6A-67D	1	GA
Total General Aviation Aircraft LTOs		**15,731**	
Total Fleet LTOs		**213,588**	

Source: KBE and HMMH, 2020.
Notes: LTOs – landing and takeoff cycles; AC – Air carrier; CA – Cargo; CO – commuter; and GA – general aviation.

Ground Service Equipment (GSE)/Auxiliary Power Unit (APU) Time-in-Mode (TIM) Survey

The most recent GSE/APU time-in-mode (TIM) survey conducted at Logan Airport was performed on June 27-28, 2017, and was used in support of the *2018/2019 EDR* as well as the *2017 Environmental Status and Planning Report (ESPR)*. The purpose of a GSE/APU TIM survey is to provide up-to-date operating times, which directly affects GSE/APU emissions. The survey prior to the 2017 TIM survey was conducted in 2012 in support of the *2011 ESPR*.

The TIM is the average time that GSE and APUs operate during a single aircraft LTO cycle. The surveyed TIM is used in place of the default TIM values in AEDT, thus yielding emissions that best reflect the conditions at Logan Airport. The 2017 TIM survey focused on the most prevalent airlines (e.g., Southwest, JetBlue, American, Delta, and United) and the most common aircraft t types, such as narrow body air carriers (e.g., A320, A321, B737, B757, etc.) and large commuter aircraft (e.g., ERJ170, ERJ190, CRJ700, CRJ900, etc.). The TIMs are provided in **Table I-6** for GSE and APUs.

Table I-6 Ground Service Equipment (GSE)/Auxiliary Power Unit (APU) Time-in-Mode (TIM) (minutes)

Source	Narrow-Body Air Carriers	Large Commuter Aircraft
Aircraft Tractor	6.37	7.13
Baggage Tractor	27.23	17.43
Belt Loader	26.85	14.88
Cabin Service Truck	2.07	0.53
Catering Truck	11.30	13.28
Hydrant Truck	3.73	2.53
Lavatory Truck	4.82	2.45
Service Truck	0.12	0.57
Water Service Truck	1.65	0.75
APUs	16.63	14.70

Source: GSE TIM survey conducted by KBE with assistance from Massport (security escorts) on June 27-28, 2017.
Note: APUs – auxiliary power units.

Furthermore, APU operating times for wide body air carriers, small commuter aircraft and GA aircraft were assumed to have a TIM of 8.9 minutes per LTO. This data was based on the TIM survey conducted at Logan Airport in 2012. Cargo aircraft APU TIM data was based on AEDT defaults (i.e., 26 minutes per LTO).

Ground Service Equipment (GSE) Alternative Fuels Conversion

For the 2018 and 2019 analyses, GSE emissions were calculated using AEDT emission factors in combination with the 2017 TIM survey and the GSE fuel types obtained from the 2018 and 2019 Logan Airport Vehicle Aerodrome Permit Applications. In this way, the most up-to-date GSE fleet operational and fuel mix characteristics (including alternative fuels and electric-powered GSE) are used. **Table I-7** presents the emission reductions of criteria air pollutants/precursor pollutants due to the use of GSE alternative fueled vehicles (AVFs) from 2000 to 2019.

Table I-7 Ground Service Equipment (GSE) Alternative Fuel Conversion Summary (kg/day)

Year	Pollutant	Percent Reduction	Emissions without Reduction	Reduction from AFVs	Emissions with Reduction
2000	VOCs	13.72%	178	24	154
	NO_X	9.87%	369	36	333
	CO	12.88%	6,124	789	5,335
2001	VOCs	13.72%	166	23	143
	NO_X	9.87%	338	33	305
	CO	12.88%	5,960	768	5,193
2002	VOCs	13.6%	286	39	247
	NO_X	8.0%	350	28	322
	CO	16.3%	6,174	1,004	5,170
2003	VOCs	13.8%	263	36	227
	NO_X	8.0%	316	25	291
	CO	16.4%	5,692	934	4,758
2004	VOCs	11.9%	212	25	187
	NO_X	6.6%	357	24	333
	CO	15.4%	4,236	650	3,586
2005	VOCs	12.2%	203	25	178
	NO_X	6.9%	335	23	312
	CO	15.4%	4,175	643	3,531
	$PM_{10}/PM_{2.5}$	9.9%	11	1	10

Table I-7 Ground Service Equipment (GSE) Alternative Fuel Conversion Summary (kg/day)

Year	Pollutant	Percent Reduction	Emissions without Reduction	Reduction from AFVs	Emissions with Reduction
2006	VOCs	10.7%	86	9	77
	NO_X	7.5%	324	24	300
	CO	13.8%	1,841	255	1,586
	$PM_{10}/PM_{2.5}$	10.8%	10	1	9
2007	VOCs	8.2%	85	7	78
	NO_X	5.1%	315	16	299
	CO	10.4%	2,124	220	1,904
	$PM_{10}/PM_{2.5}$	5.9%	10	<1	10
2008	VOCs	8.3%	72	6	66
	NO_X	4.8%	270	13	257
	CO	10.2%	1,792	183	1,609
	$PM_{10}/PM_{2.5}$	5.6%	16	<1	15
2009	VOCs	8.2%	61	5	56
	NO_X	4.8%	230	11	219
	CO	10.0%	1,516	152	1,364
	$PM_{10}/PM_{2.5}$	3.5%	14	<1	14
2010	VOCs	7.5%	53	4	49
	NO_X	3.9%	206	8	198
	CO	8.5%	1,335	113	1,222
	$PM_{10}/PM_{2.5}$	2.5%	13	<1	13
2011	VOCs	13.2%	38	5	33
	NO_X	7.5%	188	14	173
	CO	16.7%	834	139	694
	$PM_{10}/PM_{2.5}$	5.5%	14	1	13

Table I-7 Ground Service Equipment (GSE) Alternative Fuel Conversion Summary (kg/day)

Year	Pollutant	Percent Reduction	Emissions without Reduction	Reduction from AFVs	Emissions with Reduction
2012	VOCs	11.8%	34	4	30
	NO_X	6.8%	176	12	164
	CO	16.3%	738	120	618
	$PM_{10}/PM_{2.5}$	4.9%	13	<1	13
2013	VOCs	10.3%	29	3	26
	NO_X	6.5%	155	10	145
	CO	15.9%	634	101	533
	$PM_{10}/PM_{2.5}$	5.0%	12	<1	12
2014	VOCs	11.5%	26	3	23
	NO_X	5.6%	142	8	134
	CO	15.4%	572	88	484
	$PM_{10}/PM_{2.5}$	4.8%	12	<1	12
2015	VOCs	4.5%	22	1	21
	NO_X	5.2%	135	7	128
	CO	15.2%	521	79	442
	$PM_{10}/PM_{2.5}$	14.3%	14	2	12
2016	VOCs	9.0%	26	2	24
	NO_X	3.8%	173	6	167
	CO	13.5%	560	67	493
	$PM_{10}/PM_{2.5}$	2.6%	15	<1	15
2017	VOCs	8.7%	24	2	22
	NO_X	3.6%	148	5	143
	CO	13.7%	548	66	483
	$PM_{10}/PM_{2.5}$	3.8%	14	<1	14

Table I-7 Ground Service Equipment (GSE) Alternative Fuel Conversion Summary (kg/day)

Year	Pollutant	Percent Reduction	Emissions without Reduction	Reduction from AFVs	Emissions with Reduction
2018	VOCs	8.0%	23	2	21
	NO_X	3.1%	154	5	149
	CO	12.3%	487	60	428
	$PM_{10}/PM_{2.5}$	2.0%	14	<1	14
2019	VOCs	6.6%	22	1	21
	NO_X	2.5%	152	4	148
	CO	11.5%	449	52	397
	$PM_{10}/PM_{2.5}$	1.7%	14	<1	14

Source: KBE and Massport, 2020.

Notes: CO - carbon monoxide; NO_X - nitrogen oxides; $PM_{10}/PM_{2.5}$ - PM_{10} is particulate matter 10 micrometers or less in diameter, $PM_{2.5}$ is particulate matter 2.5 micrometers or less in diameter; and VOC - volatile organic compounds. AFVs – alternative fuel vehicles. The 2000 and 2001 analyses used EDMS v4.03. The 2002 and 2003 analyses used EDMS v4.11, which used updated emission factors from the NONROAD2002 Model. The 2004 analysis used EDMS v4.21, which again used emission factors from EPA NONROAD2002 Model. The 2005 analysis used EDMS v4.5, which used emission factors from EPA NONROAD2002 Model. The 2006 analysis used EDMS v5.0.1, which used emission factors from EPA NONROAD2005 Model. The 2007 analysis used EDMS v5.0.2, which used emission factors from EPA NONROAD2005 Model. The 2008 analysis used EDMS v5.1, which used emission factors from EPA NONROAD2005 Model. The 2009 analysis used EDMS v5.1.2, which used emission factors from EPA NONROAD2005 Model. The 2010, 2011, and 2012 analyses used EDMS v5.1.3, which used emission factors from EPA NONROAD2005 Model. The 2013, 2014, 2015 analyses used EDMS v5.1.4.1, which used emission factors from EPA NONROAD2005. The 2016 analysis used AEDT2c SP2, which used emission factors from EPA NONROAD2008 Model. The 2017 analysis used AEDT 2d, which used emission factors from EPA NONROAD2008 Model. The 2018 and 2019 analysis used AEDT 3c, which used emission factors from EPA MOVES2014b.

Motor Vehicle Emissions

For the 2018 and 2019 analyses, EPA's most current motor vehicle emission factor model MOVES (i.e., MOVES, Version 2014b)[3] was used. The resultant emission factors were multiplied by average daily vehicle miles traveled (VMT) to calculate daily emissions. The on-Airport traffic data are summarized in the VMT analyses of Appendix G, *Ground Access to and from Logan Airport.*[4] Further, MOVES was used to obtain vehicle emissions at idle to estimate parking and curbside motor vehicle emissions. Idling emissions are determined for a unit of time and multiplied by total idling time to reach the associated emissions. The 2018 and 2019 MOVES input/output files used in the emissions inventories are included as **Tables I-8** and **I-9**, and **Tables I-10** and **I-11**, respectively**.**

3 U.S. Environmental Protection Agency, MOVES Emissions Model, http://www.epa.gov/otaq/models/moves/.

4 Due to the new roadway configuration of the Ted Williams Tunnel, through-traffic no longer traverses Airport property. Therefore, as of 2003, emissions from these vehicles are no longer included as part of the Logan Airport emissions inventory.

Table I-8 MOVES2014b Sample Input File for 2018

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    </geographicselections>
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        <aggregateBy key="Hour"/>
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    </offroadvehiclesccs>
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```
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```
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A[
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Source: KBE and Massport, 2020.

Table I-9 MOVES2014b Sample Output File for 2018

MasterKey,MOVESRunID,iterationID,yearID,monthID,dayID,hourID,stateID,countyID,zoneID,linkID,pollutantID,processID,sourceTypeID,regClassId,fuelTypeID,modelYearID,roadTypeID,SCC,emissionQuant,activityTypeID,activity,emissionRate,massUnits,distanceUnits
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mi
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mi
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g,mi
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mi

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mi
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Source: KBE and Massport, 2020.

Table I-10 MOVES2014b Sample Input File for 2019

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    <timespan>
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        <month id="1"/>
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Exhaust"/>
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Power Exhaust"/>
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Running Exhaust"/>
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		<pollutantprocessassociation pollutantkey="3" pollutantname="Oxides of Nitrogen (NOx)" processkey="90"
processname="Extended Idle Exhaust"/>
		<pollutantprocessassociation pollutantkey="3" pollutantname="Oxides of Nitrogen (NOx)" processkey="91" processname="Auxiliary
Power Exhaust"/>
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processname="Running Exhaust"/>
		<pollutantprocessassociation pollutantkey="100" pollutantname="Primary Exhaust PM10  - Total" processkey="2"
processname="Start Exhaust"/>
		<pollutantprocessassociation pollutantkey="100" pollutantname="Primary Exhaust PM10  - Total" processkey="15"
processname="Crankcase Running Exhaust"/>
		<pollutantprocessassociation pollutantkey="100" pollutantname="Primary Exhaust PM10  - Total" processkey="16"
processname="Crankcase Start Exhaust"/>
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processname="Crankcase Extended Idle Exhaust"/>
		<pollutantprocessassociation pollutantkey="100" pollutantname="Primary Exhaust PM10  - Total" processkey="90"
processname="Extended Idle Exhaust"/>
		<pollutantprocessassociation pollutantkey="100" pollutantname="Primary Exhaust PM10  - Total" processkey="91"
processname="Auxiliary Power Exhaust"/>
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processname="Running Exhaust"/>
		<pollutantprocessassociation pollutantkey="110" pollutantname="Primary Exhaust PM2.5 - Total" processkey="2"
processname="Start Exhaust"/>
		<pollutantprocessassociation pollutantkey="110" pollutantname="Primary Exhaust PM2.5 - Total" processkey="15"
processname="Crankcase Running Exhaust"/>
		<pollutantprocessassociation pollutantkey="110" pollutantname="Primary Exhaust PM2.5 - Total" processkey="16"
processname="Crankcase Start Exhaust"/>
		<pollutantprocessassociation pollutantkey="110" pollutantname="Primary Exhaust PM2.5 - Total" processkey="17"
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processname="Extended Idle Exhaust"/>
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processname="Brakewear"/>
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Exhaust"/>
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Power Exhaust"/>
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Exhaust"/>
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Exhaust"/>
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        <pollutantprocessassociation pollutantkey="31" pollutantname="Sulfur Dioxide (SO2)" processkey="16" processname="Crankcase
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Power Exhaust"/>
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Permeation"/>
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Extended Idle Exhaust"/>
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Idle Exhaust"/>
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Power Exhaust"/>
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processname="Crankcase Start Exhaust"/>
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processname="Crankcase Extended Idle Exhaust"/>
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        <fueltype selected="false"/>
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        <emissionprocess selected="false"/>
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        <movesvehicletype selected="false"/>
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    </savedata>

    <donotexecute>

    </donotexecute>

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Source: KBE and Massport, 2020.

Table I-11 MOVES2014b Sample Output File for 2019

MasterKey,MOVESRunID,iterationID,yearID,monthID,dayID,hourID,stateID,countyID,zoneID,linkID,pollutantID,processID,sourceTypeID,regClassId,fuelTypeID,modelYearID,roadTypeID,SCC,emissionQuant,activityTypeID,activity,emissionRate,massUnits,distanceUnits
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71486996114254,g,mi
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016222000122070312,g,mi
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11469942331314,g,mi
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3599853515625,g,mi
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19970703125,g,mi
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10119628906,g,mi
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70056152344,g,mi
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171658471226692,g,mi
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842495173215866,g,mi
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09652370214462,g,mi

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9761657715,g,mi
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1378288269043,g,mi
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"1,1,2019,1,5,7,25,25025,250250,1,21,0,0,0,0,00",1,1,2019,1,5,7,25,25025,250250,1,79,NULL,21,0,0,0,0,00,0.1508028507232666,1,1,0.1508028507232666,g,mi
"1,1,2019,1,5,7,25,25025,250250,1,21,0,0,0,0,00",1,1,2019,1,5,7,25,25025,250250,1,31,NULL,21,0,0,0,0,00,0.006246080156415701,1,1,0.006246080156415701,g,mi
"1,1,2019,1,5,7,25,25025,250250,1,21,0,0,0,0,00",1,1,2019,1,5,7,25,25025,250250,1,5,NULL,21,0,0,0,0,00,0.003840405959635973,1,1,0.003840405959635973,g,mi
"1,1,2019,1,5,7,25,25025,250250,1,21,0,0,0,0,00",1,1,2019,1,5,7,25,25025,250250,1,3,NULL,21,0,0,0,0,00,0.14933012425899506,1,1,0.14933012425899506,g,mi
"1,1,2019,1,5,7,25,25025,250250,1,21,0,0,0,0,00",1,1,2019,1,5,7,25,25025,250250,1,2,NULL,21,0,0,0,0,00,3.128002405166626,1,1,3.128002405166626,g,mi
"1,1,2019,1,5,7,25,25025,250250,1,21,0,0,0,0,00",1,1,2019,1,5,7,25,25025,250250,1,1,NULL,21,0,0,0,0,00,0.15459434688091278,1,1,0.15459434688091278,g,mi

Source: KBE and Massport, 2020.

Fuel Storage and Handling

As in previous years, VOC emissions from fuel storage and handling were calculated using methods based on EPA's AP-42[5] document. Calculations account for evaporative emissions from breathing losses, working losses, and spillage from aboveground storage tanks, underground storage tanks, and aircraft refueling. **Table I-12** presents the fuel storage and handling fuel throughputs by fuel category used in the analyses.

Stationary Sources

Stationary source emissions include the Central Heating and Cooling Plant, emergency generators, snow melters, space heaters, boilers and those associated with the fire training facility. Emission factors from EPA's AP-42 and/or NO_X Reasonably Available Control Technology (RACT) compliance testing were combined with the actual 2018 and 2019 fuel throughputs of the stationary sources to obtain emissions of VOCs, NO_X, CO, and $PM_{10}/PM_{2.5}$. Notably, in 2003, additional information became available on the type of fire training fuel used at Logan Airport (i.e., Tek Flame®). Emissions from these activities were calculated using default emission factors from AEDT and actual annual fuel usages.

Title V of the 1990 Clean Air Act (CAA) Amendments requires facilities with air emissions to document their emissions and obtain a single permit combining all sources. The permitting program ensures that all emission sources are accounted for, the proper permits have been received, and permit conditions are being followed. A Title V Air Operating Permit covers all of the stationary sources at Logan Airport including boilers, emergency generators, snow melters, fire training, cooling towers, paint booths, deicing facilities, and storage tanks. **Table I-13** presents Logan Airport's stationary sources fuel throughputs by fuel category.

5 EPA, Compilation of Air Pollutant Emission Factors, AP-42, https://www.epa.gov/air-emissions-factors-and-quantification/ap-42-compilation-air-emissions-factors.

Table I-12	Fuel Storage and Handling Fuel Throughputs by Fuel Category (gallons)						
Fuel Category	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**
Jet Fuel	354,095,516	441,901,932	416,748,819	358,190,362	319,439,910	373,996,141	368,645,392
Aviation Gas	99,726	90,922	60,691	35,111	32,515	34,717	52,487
Auto Gas	7,200,000	7,569,206	6,181,472	5,754,740	5,436,322	5,803,442	5,903,424
Diesel	768,106	839,751	1,239,904	1,067,847	1,030,185	1,078,665	1,567,688
Heating Oil No. 2	480,733	494,500	582,283	340,492	370,903	381,852	367,899
Heating Oil No. 6	1,600,893	1,555,527	1,641,693	1,079,283	1,122,975	2,940,752	3,098,126

Fuel Category	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**
Jet Fuel	364,450,864	367,585,187	345,631,788	327,358,619	335,693,997	340,421,373	343,731,127
Aviation Gas	35,098	29,067	25,037	18,238	15,268	14,064	12,306
Auto Gas	6,028,931	6,022,237	5,693,178	5,736,724	5,696,505	5,487,952	6,694,626
Diesel	1,164,493	1,141,335	1,071,707	1,121,241	1,168,761	1,099,720	878,499
Heating Oil No. 2	259,768	423,181	303,143	409,049	319,727	384,906	210,794
Heating Oil No. 6	1,396,529	1,073,260	16,385	368,690	9,010	11,285	6,786

Fuel Category	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**
Jet Fuel	349,397,940	370,222,342	374,985,216	456,003,328	484,310,931	507,833,269	542,314,657
Aviation Gas	14,422	12,514	10,225	10,654	11,075	8,559	7,608
Auto Gas	6,800,936	7,007,591	7,432,165	7,794,957	7,737,865	6,739,001	7,411,444
Diesel	1,094,714	1,178,805	1,473,720	1,233,200	1,272,828	1,404,583	1,270,852
Heating Oil No. 2	289,665	289,956	294,704	520,977	213,279	25,664	20,000
Heating Oil No. 6[1]	17,721	77,146	0	0	0	0	0

Source: Massport, 2020.

1 Effective November 2014, Massport no longer uses No. 6 heating oil at the Central Heating and Cooling Plant as it was replaced with No. 2 heating oil.

Table I-13 Stationary Source Fuel Throughputs by Fuel Category (gallons)

Fuel Category	1999	2000	2001	2002	2003	2004	2005
Natural Gas (ft^3)	183,943,000	283,720,049	199,500,000	268,359,282	201,714,114	62,610,000	92,460,000
Heating Oil No. 2	480,733	494,500	582,283	340,492	370,903	381,852	367,899
Heating Oil No. 6[1]	1,600,893	1,555,527	1,641,693	1,079,283	1,122,975	2,940,752	3,098,126
Diesel Fuel[2]	57,441	N/A	N/A	N/A	N/A	67,198	77,848
Fire Training Fuel[3]	23,000	N/A	N/A	N/A	13,719	12,227	8,105

Fuel Category	2006	2007	2008	2009	2010	2011	2012
Natural Gas (ft^3)	112,390,000	338,430,000	458,680,000	430,810,000	449,640,000	479,830,000	360,523,000
Heating Oil No. 2	259,768	423,181	303,143	409,050	319,727	384,906	210,794
Heating Oil No. 6[1]	1,396,529	1,073,260	16,385	368,690	9,010	11,285	6,786
Diesel Fuel[2]	77,848	258,606	146,718	145,778	116,511	218,081	42,109
Fire Training Fuel[3]	5,000	8,631	5,971	3,510	800	3,810	2,587

Fuel Category	2013	2014	2015	2016	2017	2018	2019
Natural Gas (ft^3)	402,496,000	418,805,000	463,170,000	429,502,000	491,356,303	422,549,485	515,029,176
Heating Oil No. 2	289,665	289,956	294,704	520,977	115,878	25,664	52,491
Heating Oil No. 6[1]	17,721	77,146	0	0	0	0	0
Diesel Fuel[2]	231,130	124,480	381,581	90,850	157,243	220,928	165,208
Fire Training Fuel[3]	5,400	3,753	7,619	6,153	5,211	7,366	7,375

Source: Massport, 2020.

N/A Not available.

1 Effective November 2014, Massport no longer uses No. 6 heating oil at the Central Heating and Cooling Plant as it was replaced with No. 2 heating oil.

2 Diesel fuel was from the stationary snow melter usage. Starting in 2007, portable snow melter usage was also included. Starting in 2018 and 2019 emergency generators usage was also included.

3 Fire training fuel used in 1999-2002 was Jet A Fuel while in 2003 through 2015 it was Tek-Flame®. Starting in 2012 AvGas usage was also included. In 2018 and 2019 AvGas usage amounts to 1,159 gallons and 1,001 gallons, respectively.

1993 – 2009 Criteria Air Pollutant Emissions Inventories

Tables I-14 and **I-15** present the estimated VOC emissions for Logan Airport for the years 1993 through 2001 and 2002 through 2009, respectively. The emissions inventories from 2010 to 2019 are presented in *Chapter 7, Air Quality/Emissions Reduction*.

Table I-14 Estimated VOC Emissions (kg/day) at Logan Airport 1993-2001[1]

Aircraft/GSE Model:	**Logan Dispersion Modeling System (LDMS)**					**EDMS v3.22**	**EDMS v4.21**	**EDMS v4.03**	
Motor Vehicle Model:	**MOBILE5a**					**MOBILE 5a_h**	**MOBILE 6.2.03**	**MOBILE 6.0**	
Year:	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999[2]**	**2000**	**2001**
Aircraft Sources									
Air carriers	1,958	1,554	1,407	1,390	1,227	736	653	514	374
Commuter aircraft	943	543	531	622	498	154	196	140	113
Cargo aircraft	89	244	236	214	207	43	318	207	149
General aviation	51	48	36	24	27	13	141	42	43
Total aircraft sources	3,041	2,389	2,210	2,250	1,959	946	1,308	903	679
Ground Support Equipment[3]	636	533	521	497	530	145	243	153	143
Motor Vehicles									
Ted Williams Tunnel through-traffic	N/A	N/A	N/A	N/A	N/A	N/A	15	12	10
Parking/curbside	173	148	127	102	102	118	101	89	77
On-airport vehicles[4]	238	215	179	223	205	258	256	206	170
Total motor vehicle sources	411	363	306	325	307	376	372	307	257
Other Sources									
Fuel storage/handling	408	434	318	356	381	372	352	412	372
Miscellaneous sources[5]	5	5	5	6	6	2	16	2	2
Total other sources	413	439	323	362	387	374	368	414	374
Total Airport Sources	**4,501**	**3,724**	**3,360**	**3,434**	**3,183**	**1,841**	**2,291**	**1,777**	**1,453**

Source: KBE and Massport. 2020.

Notes: GSE – ground service equipment; N/A - not available; VOC – volatile organic compound.

kg/day Kilograms per day. One kg/day is approximately equivalent to 0.40234 tons per year (tpy).

1 The emissions inventory for 1990 is shown in Chapter 7, *Air Quality/Emissions Reduction*. Emission inventories for 1991 and 1992 were not prepared.

2 Year 1999 emissions were last re-calculated using EDMS v4.21 in the *2004 ESPR* Air Quality Analysis.

3 Beginning in 1996 and later, emissions include vehicles and equipment converted to alternative fuels. Auxiliary power unit (APU) emissions are also included.

4 1999 emissions inventory include reductions attributable to compressed natural gas (CNG) shuttle buses.

5 Includes the Central Heating and Cooling Plant, emergency electricity generation, and other stationary sources. Fire training emissions were included in 1999. Diesel snow melter usage was added in 1999.

Table I-15 Estimated VOC Emissions (kg/day) at Logan Airport 2002-2009

Aircraft/GSE Model:	**EDMS v4.11**		**EDMS v4.21**	**EDMS v4.5**		**EDMS v5.0.1**	**EDMS v5.0.2**		**EDMS v5.1**		**EDMS v5.1.2**
Motor Vehicle Model:	**MOBILE 6.0**	**MOBILE 6.2.01**	**MOBILE 6.2.03**								
Year:	**2002**	**2003**	**2004**	**2005**	**2006**		**2007**		**2008**		**2009**	
Aircraft Sources												
Air carriers	248	208	292	271	227	511	435	381	324	286	237	235
Commuter aircraft	75	95	127	140	125	371	479	409	253	176	131	133
Cargo aircraft	127	94	110	41	19	46	129	112	107	70	71	71
General aviation	52	61	127	147	147	236	226	206	201	171	78	78
Total aircraft sources	502	458	656	599	518	1,164[1]	1,269	1,108	885	703	517	517
Ground Support Equipment[2]	247	227	187	178	167	77	78	78	66	66	56	56
Motor Vehicles												
Ted Williams Tunnel through-traffic[3]	9	0	0	0	0	0	0	0	0	0	0	0
Parking/curbside[4]	51	45	38	37	33	33	31	31	25	25	22	22
On-airport vehicles	152	135	129	118	106	106	104	104	82	82	71	71
Total motor vehicle sources	212	180	167	155	139	139	135	135	107	107	93	93
Other Sources												
Fuel storage/handling	329	297	341	340	336	336	338	338	320	320	307	307
Miscellaneous sources[5]	2	3	9	13	8	8	14	14	13	12	7	7
Total other sources	331	300	350	353	344	344	352	352	333	332	314	314
Total Airport Sources	**1,292**	**1,165**	**1,360**	**1,285**	**1,168**	**1,724**	**1,834**	**1,673**	**1,391**	**1,208**	**980**	**980**

Source: KBE and Massport, 2020.
Notes: GSE – ground service equipment; VOC – volatile organic compound.
Years 2006 to 2009 were computed with previous years EDMS version to provide for a common basis of comparison.
Kg/day Kilograms per day. One kg/day is equivalent to approximately 0.40234 tons per year (tpy).
1 The 2006 increase in aircraft VOC emissions is largely attributable to the addition of aircraft main engine startup emissions.
2 GSE emissions include aircraft auxiliary power units (APUs) as well as vehicles and equipment converted to alternative fuels.
3 Due to the new roadway configuration and opening of the Ted Williams Tunnel there was no Ted Williams Tunnel through-traffic at Logan Airport beginning in 2003.
4 Parking/curbside is based on vehicle miles traveled (VMT) analysis.
5 Includes the Central Heating and Cooling Plant, emergency electricity generation, snow melter usage, and other stationary sources.

Tables I-16 and **I-17** present the estimated NO_X emissions for Logan Airport for the years 1993 through 2001 and 2002 through 2009, respectively. The emissions inventories from 2010 to 2019 are presented in *Chapter 7, Air Quality/Emissions Reduction*.

Table I-16 Estimated NO_X Emissions (kg/day) at Logan Airport 1993-2001[1]

Aircraft/GSE Model:	**Logan Dispersion Modeling System (LDMS)**					**EDMS v3.22**	**EDMS v4.21**	**EDMS v4.03**	
Motor Vehicle Model:	**MOBILE5a**					**MOBILE 5a_h**	**MOBILE 6.2.03**	**MOBILE 6.0**	
Year:	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999[2]**	**2000**	**2001**
Aircraft Sources									
Air carriers	4,271	4,317	3,861	3,781	4,150	4,471	4,183	4,202	3,707
Commuter aircraft	202	158	192	137	159	203	166	125	233
Cargo aircraft	213	257	332	363	262	254	286	284	267
General aviation	13	13	17	18	21	5	12	49	34
Total aircraft sources	4,699	4,745	4,402	4,299	4,592	4,933	4,647	4,660	4,241
Ground Support Equipment[3]	722	617	607	588	622	317	444	333	305
Motor Vehicles									
Ted Williams Tunnel through-traffic	N/A	N/A	N/A	N/A	N/A	N/A	28	26	22
Parking/curbside	25	24	24	24	24	37	39	52	46
On-airport vehicles[4]	240	239	229	257	244	372	449	425	369
Total motor vehicle sources	265	263	253	281	268	409	516	503	437
Other Sources									
Fuel storage/handling[5]	0	0	0	0	0	0	0	0	0
Miscellaneous sources[6]	278	330	320	275	244	284	165	211	185
Total other sources	278	330	320	275	244	284	165	211	185
Total Airport Sources	**5,964**	**5,955**	**5,582**	**5,443**	**5,726**	**5,943**	**5,772**	**5,707**	**5,168**

Source: KBE and Massport, 2020.
Notes: GSE – ground service equipment; N/A – not available; NO_X – oxides of nitrogen.
Kg/day Kilograms per day. One kg/day is approximately equivalent to 0.40234 tons per year (tpy).
1 The emissions inventory for 1990 is shown in Chapter 7, *Air Quality/Emissions Reduction*. Emission inventories for 1991 and 1992 were not prepared.
2 Year 1999 emissions were last re-calculated using EDMS v4.21 in the 2004 ESPR Air Quality Analysis.
3 Beginning in 1996 and later, emissions include vehicles and equipment converted to alternative fuels. Auxiliary power unit (APU) emissions are also included.
4 1999 emissions inventory include reductions attributable to compressed natural gas (CNG) shuttle buses.
5 Fuel storage and handling facilities are not sources of NO_X emissions.
6 Includes the Central Heating and Cooling Plant, emergency electricity generation, and other stationary sources. Fire training emissions were included in 1999. Diesel snow melter usage was added in 1999.

Table I-17 Estimated NO_X Emissions (kg/day) at Logan Airport 2002-2009

Aircraft/GSE Model:	**EDMS v4.11**		**EDMS v4.21**	**EDMS v4.5**		**EDMS v5.0.1**	**EDMS v5.0.2**		**EDMS v5.1**		**EDMS v5.1.2**
Motor Vehicle Model:	**MOBILE 6.0**	**MOBILE 6.2.01**	**MOBILE 6.2.03**								
Year:	**2002**	**2003**	**2004**	**2005**	**2006**		**2007**		**2008**		**2009**
Aircraft Sources											
Air carriers	2,721	2,479	2,949	2,880	2,849	3,044	3,120	3,121	3,031	3,031	2,944	2,952
Commuter aircraft	208	185	245	225	195	256	353	354	319	319	309	234
Cargo aircraft	246	213	215	211	192	125	248	248	233	233	215	204
General aviation	38	45	49	50	49	60	56	56	43	43	27	23
Total aircraft sources	3,213	2,922	3,458	3,366	3,285	3,485	3,777	3,779	3,626	3,626	3,495	3,413
Ground Support Equipment[1]	322	291	333	312	280	300	299	299	257	257	219	219
Motor Vehicles												
Ted Williams Tunnel through-traffic[2]	20	0	0	0	0	0	0	0	0	0	0	0
Parking/curbside[3]	32	28	21	22	19	19	18	18	15	15	13	13
On-airport vehicles	341	302	267	269	238	238	233	233	182	182	153	153
Total motor vehicle sources	393	330	288	291	257	257	251	251	197	197	166	166
Other Sources												
Fuel storage/handling[4]	0	0	0	0	0	0	0	0	0	0	0	0
Miscellaneous sources[5]	175	151	211	218	109	109	128	128	124	124	181	181
Total other sources	175	151	211	218	109	109	128	128	124	124	181	181
Total Airport Sources	**4,103**	**3,694**	**4,290**	**4,187**	**3,931**	**4,151**	**4,455**	**4,457**	**4,204**	**4,204**	**4,061**	**3,979**

Source: KBE and Massport, 2020.

Notes: GSE – ground service equipment; NO_X – oxides of nitrogen.
Years 2006 to 2009 were computed with previous years EDMS version to provide for a common basis of comparison.

Kg/day Kilograms per day. One kg/day is approximately equivalent to 0.40234 tons per year (tpy).

1 GSE emissions include auxiliary power units (APUs) as well as vehicles and equipment converted to alternative fuels.

2 Due to the new roadway configuration and opening of the Ted Williams Tunnel there was no Ted Williams Tunnel through-traffic at Logan Airport beginning in 2003.

3 Parking/curbside data is based on vehicle miles traveled (VMT) analysis.

4 Fuel storage/handling facilities are not a source of NO_X emissions.

5 Includes the Central Heating and Cooling Plant, emergency electricity generation, snow melter usage, and other stationary sources.

Tables I-18 and **I-19** present the estimated CO emissions for Logan Airport for the years 1993 through 2001 and 2002 through 2009, respectively. The emissions inventories from 2010 to 2019 are presented in *Chapter 7, Air Quality/Emissions Reduction*.

Table I-18 Estimated CO Emissions (kg/day) at Logan Airport 1993-2001[1]

Aircraft/GSE Model:	**Logan Dispersion Modeling System (LDMS)**					**EDMS v3.22**	**EDMS v4.21**	**EDMS v4.03**	
Motor Vehicle Model:	**MOBILE5a**					**MOBILE 5a_h**	**MOBILE 6.2.03**	**MOBILE 6.0**	
Year:	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999[2]**	**2000**	**2001**
Aircraft Sources									
Air carriers	5,663	4,660	4,691	4,812	4,698	3,079	3,754	2,994	2,475
Commuter aircraft	1,309	927	934	859	770	482	1,404	1,188	1,072
Cargo aircraft	344	572	598	580	514	218	503	400	323
General aviation	353	356	339	549	654	269	940	295	407
Total aircraft sources	7,669	6,515	6,562	6,800	6,636	4,048	6,601	4,877	4,277
Ground Support Equipment[3]	7,482	6,187	6,029	5,740	6,098	5,113	4,532	5,335	5,193
Motor Vehicles									
Ted Williams Tunnel through-traffic	N/A	N/A	N/A	N/A	N/A	N/A	151	133	121
Parking/curbside	952	820	650	644	586	772	437	495	440
On-airport vehicles[4]	1,575	1,451	1,087	1,514	1,283	1,883	2,547	2,245	2,001
Total motor vehicle sources	2,527	2,271	1,737	2,158	1,869	2,655	3,135	2,873	2,562
Other Sources									
Fuel storage/handling[5]	0	0	0	0	0	0	0	0	0
Miscellaneous sources[6]	26	30	29	39	37	37	168	27	24
Total other sources	26	30	29	39	37	37	168	27	24
Total Airport Sources	**17,704**	**15,003**	**14,357**	**14,737**	**14,640**	**11,853**	**14,436**	**13,112**	**12,056**

Source: KBE and Massport, 2020.
Notes: CO – carbon monoxide; GSE – ground service equipment; N/A – not available.
Kg/day Kilograms per day. One kg/day is approximately equivalent to 0.40234 tons per year (tpy).
1 The emissions inventory for 1990 is shown in Chapter 7, *Air Quality/Emission Reduction*. Emission inventories for 1991 and 1992 were not prepared.
2 Year 1999 emissions were last re-calculated using EDMS v4.21 in the 2004 ESPR Air Quality Analysis.
3 Beginning in 1996 and later, emissions include vehicles and equipment converted to alternative fuels. Auxiliary power unit (APU) emissions are also included.
4 1999 emission inventory include reductions attributable to compressed natural gas (CNG) shuttle buses.
5 Fuel storage and handling facilities are not sources of CO emissions.
6 Includes the Central Heating and Cooling Plant, emergency electricity generation, and other stationary sources. Fire training emissions were included in 1999. Diesel snow melter usage was added in 1999.

Table I-19 Estimated CO Emissions (kg/day) at Logan Airport 2002-2009

Aircraft/GSE Model:	EDMS v4.11		EDMS v4.21	EDMS v4.5		EDMS v5.0.1	EDMS v5.0.2		EDMS v5.1		EDMS v5.1.2
Motor Vehicle Model:	**MOBILE 6.0**	**MOBILE 6.2.01**	**MOBILE 6.2.03**								
Year:	**2002**	**2003**	**2004**	**2005**	**2006**		**2007**		**2008**		**2009**	
Aircraft Sources												
Air carriers	2,156	2,128	2,985	2,895	2,828	3,167	2,973	2,973	2,710	2,710	2,460	2,448
Commuter aircraft	783	846	1,010	1,010	950	1,587	2,484	2,484	2,436	2,436	2,364	2,795
Cargo aircraft	285	209	229	174	138	158	241	241	255	255	256	266
General aviation	256	276	416	437	398	442	401	403	345	345	145	150
Total aircraft sources	3,480	3,459	4,640	4,516	4,314	5,354	6,099	6,101	5,746	5,746	5,225	5,659
Ground Support Equipment[1]	5,170	4,758	3,586	3,531	3,409	1,586	1,904	1,904	1,609	1,609	1,364	1,364
Motor Vehicles												
Ted Williams Tunnel through-traffic[2]	112	0	0	0	0	0	0	0	0	0	0	0
Parking/curbside[3]	295	253	180	179	144	144	139	139	117	117	107	107
On-airport vehicles	1,872	1,685	1,412	1,290	1,036	1,036	1,038	1,038	834	834	740	740
Total motor vehicle sources	2,279	1,938	1,592	1,469	1,180	1,180	1,177	1,177	951	951	847	847
Other Sources												
Fuel storage/handling[4]	0	0	0	0	0	0	0	0	0	0	0	0
Miscellaneous sources[5]	23	22	33	40	24	24	51	51	55	55	55	55
Total other sources	23	22	33	40	24	24	51	51	55	55	55	55
Total Airport Sources	**10,952**	**10,177**	**9,851**	**9,556**	**8,927**	**8,144**	**9,231**	**9,233**	**8,361**	**8,361**	**7,491**	**7,925**

Source: KBE and Massport, 2020.
Notes: CO – carbon monoxide; GSE – ground service equipment.
Kg/day Kilograms per day. One kg/day is approximately equivalent to 0.40234 tons per year (tpy).
Years 2006 to 2009 were computed with previous years EDMS version to provide for a common basis of comparison.
1 GSE emissions include auxiliary power units (APUs) as well as vehicles and equipment converted to alternative fuels.
2 Due to the new roadway configuration and opening of the Ted Williams Tunnel there was no Ted Williams Tunnel through-traffic at Logan Airport beginning in 2003.
3 Parking/curbside information is based on vehicle miles traveled (VMT) analysis.
4 Fuel storage/handling facilities are not a source of carbon monoxide (CO) emissions.
5 Includes the Central Heating and Cooling Plant, emergency electricity generation, snow melter usage, and other stationary sources.

Table I-20 Estimated $PM_{10}/PM_{2.5}$ Emissions (kg/day) at Logan Airport, 2005-2009[1]

Aircraft/GSE Model:	EDMS v4.5		EDMS v5.0.1		EDMS v5.0.2		EDMS v5.1		EDMS v5.1.2
Motor Vehicle Model:	**MOBILE 6.2.03**								
Year:	**2005**	**2006**		**2007**		**2008**		**2009**	
Aircraft Sources									
Air carriers	25	25	38	35	67	63	42	43	36
Commuter aircraft	1	1	2	6	14	11	6	5	5
Cargo aircraft	2	3	2	3	6	5	4	4	3
General aviation	2	2	2	2	5	5	4	2	2
Total aircraft sources	30	31	44	46	92	84	56	54	46
Ground Support Equipment[2]	11	9	9	10	10	8	15	14	14
Motor Vehicles									
Parking/curbside[3]	1	1	1	<1	<1	<1	<1	<1	<1
On-airport vehicles	8	8	8	9	9	7	7	6	6
Total motor vehicle sources	9	9	9	9	9	7	7	6	6
Other Sources									
Fuel storage/handling[4]	0	0	0	0	0	0	0	0	0
Miscellaneous sources[5]	34	16	16	17	17	3	3	5	5
Total other sources	34	16	16	17	17	3	3	5	5
Total Airport Sources	**84**	**65**	**78**	**82**	**128**	**102**	**81**	**79**	**71**

Source: KBE and Massport, 2020.
Notes: GSE – ground service equipment; PM – particulate matter.
Kg/day Kilograms per day. One kg/day is approximately equivalent to 0.40234 tons per year (tpy);
Years 2006 to 2009 were computed with previous years EDMS version to provide for a common basis of comparison.
1 2005 is the first year that $PM_{10}/PM_{2.5}$ emissions were included in the Logan Airport ESPR/EDR emission inventories.
2 GSE emissions include auxiliary power units (APUs) as well as vehicles and equipment converted to alternative fuels.
3 Parking/curbside is based on vehicle miles traveled (VMT) analysis.
4 Fuel storage and handling facilities are not sources of PM emissions.
5 Includes the Central Heating and Cooling Plant, emergency electricity generation, fire training, snow melters, and other stationary sources.

Greenhouse Gas (GHG) Emissions Inventory for 2018 and 2019

The Massachusetts Executive Office of Energy and Environmental Affairs (EEA) has published the *MEPA Greenhouse Gas Emissions Policy and Protocol*.[6] These guidelines require that certain projects undergoing review under the Massachusetts Environmental Policy Act (MEPA) quantify the greenhouse gas (GHG) emissions generated by proposed projects, and identify measures to avoid, minimize, or mitigate such emissions.[7] Even though the *2018/2019 EDR* does not assess any proposed projects and is therefore not subject to the GHG policy, Massport has prepared an emission inventory of GHG emissions directly and indirectly associated with Logan Airport.

In April 2009, the Transportation Research Board Airport Cooperative Research Program (ACRP); published the *Guidebook on Preparing Airport Greenhouse Gas Emission Inventories (ACRP Report 11)*, which provides recommended instructions to airport operators on how to prepare an airport-specific GHG emissions inventory.[8] The 2018 and 2019 GHG emissions estimates include aircraft (within the ground taxi/delay and up to 3,000 feet), GSE, APU, motor vehicles, a variety of stationary sources, and electricity usage. Aircraft cruise emissions over the 3,000-foot level were not included. This work was accomplished following the EEA guidelines and uses emission factors considered appropriate for this application that have been approved by the EPA and are available within the GHG Emissions Factors Hub database.[9]

Methodology

Airport GHG emissions are calculated in much the same way as criteria pollutants,[10] through the use of input data such as activity levels or material throughput rates (i.e., fuel usage, VMT, electrical consumption) that are applied to appropriate emission factors (i.e., in units of GHG emissions per gallon of fuel).

In this case, the input data were either based on Massport records, or data and information derived from the latest version of the FAA AEDT. **Table I-21** summarizes the data and information used in the 2018 and 2019 GHG emission inventories.

Massport will update the GHG Emissions Inventory for Logan Airport annually.

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6 Revised MEPA Greenhouse Gas Emissions Policy and Protocol, Massachusetts Executive Office of Energy and Environmental Affairs, effective May 10, 2010, See https://www.mass.gov/files/documents/2016/08/rp/ghg-policy-final-summary.pdf for the full report.

7 These GHGs are comprised primarily of carbon dioxide (CO_2), methane (CH_4), nitrous oxides (N_2O), and three groups of fluorinated gases (i.e., sulfur hexafluoride [SF_6], hydrofluorocarbons [HFCs], and perfluorocarbons [PFCs]). GHG emission sources associated with airports are generally limited to CO_2, CH_4, and N_2O.

8 Transportation Research Board, Airport Cooperative Research Panel, ACRP Report 11, Project 02-06, Guidebook on Preparing Airport Greenhouse Gas Emissions Inventories (in production). See http://onlinepubs.trb.org/onlinepubs/acrp/acrp_rpt_011.pdf for the full report.

9 Environmental Protection Agency, GHG Emissions Factors Hub (26 March, 2020), https://www.epa.gov/climateleadership/center-corporate-climate-leadership-ghg-emission-factors-hub. The most recent version of the Emission Factors Hub includes updates to emission factors for stationary and mobile combustion sources, new electricity emission factors from EPA's Emissions & Generation Resource Integrated Database (eGRID2018) and the IPCC Fifth Assessment Report (AR4/AR5).

10 Criteria pollutants are pollutants for which there are National Ambient Air Quality Standards (NAAQS) (i.e., carbon monoxide, sulfur dioxide, nitrogen dioxide, etc.).

Table I-21 Logan Airport Greenhouse Gas (GHG) Inventory Input Data and Information for 2018 and 2019

Activity		Fuel Type	2018 Usage	2019 Usage	Units	Source
Aircraft						
Aircraft Taxi		Jet A[1]	22,209,425	23,392,796	gallons	AEDT 3c
		AvGas[2]	70,646	71,724	gallons	AEDT 3c
Engine Startup		Jet A	507,895	516,103	gallons	AEDT 3c
Aircraft AGL to 3,000 feet		Jet A[1]	25,812,938	26,594,677	gallons	AEDT 3c
		AvGas[2]	150,823	149,154	gallons	AEDT 3c
Aircraft Support Equipment						
Ground Service Equipment (GSE)		Diesel	728,539	766,075	gallons	Massport
		Gasoline	888,921	944,648	gallons	Massport
		Propane	4,055	4,000	gallons	Massport
		CNG	0	0	ft^3	Massport
Auxiliary Power Units (APU)		Jet A	1,349,044	1,412,480	gallons	AEDT 3c
Motor Vehicles						
On-airport Vehicles		Composite[3]	73,955,618	76,581,855	VMT	Massport
On-airport Parking/Curbsides		Composite[3]	1,355,975	1,314730	hours	Massport
Massport Shuttle Bus		CNG	308,700	293,340	GEG	Massport
		Diesel	Defleeted in 2014	Defleeted in 2014	gallons	Massport
Massport Express Bus		Diesel	421,952	451,280	gallons	Massport
NABI Articulated Buses		Diesel	367,562	311,800	gallons	Massport
Massport Fire Rescue		Diesel	15,000	10,000	gallons	Massport
Agricultural Equipment		Diesel	84,149	78,825	gallons	Massport
Massport Fleet Vehicles	Honda Civic, etc.	CNG	300	0	GEG	Massport
	Fueled Onsite	Gasoline	269,009	256,120	gallons	Massport
		Diesel	84,192	88,064	gallons	Massport
	Fueled Offsite	Gasoline	85,814	87,687	gallons	Massport
Off-airport Vehicles	Public	Composite[3]	215,263,407	233,600,994	VMT	Massport
	Airport Employees	Composite[3]	5,624,374	5,840,086	VMT	Massport
	Tenant Employees	Composite[3]	50,619,369	52,560,770	VMT	Massport

Table I-21 Logan Airport Greenhouse Gas (GHG) Inventory Input Data and Information for 2018 and 2019 (Continued)

Activity		Fuel Type	2018 Usage	2019 Usage	Units	Source
Stationary Sources						
Boilers and Space Heaters		No. 2 Oil	25,664	52,491	gallons	Massport
		No. 6 Oil	0	0	gallons	Massport
		Natural Gas	417	511	million ft^3	Massport
Generators		ULSD	33,142	40,075	gallons	Massport
		Natural Gas	0.5	0	million ft^3	Massport
Snow melters		ULSD	187,786	125,133	gallons	Massport
		Natural Gas	5.5	4.1	million ft^3	Massport
Fire Training Facility		Tekflame	6,207	6,374	gallons	Massport
		AvGas	1,159	1,001	gallons	Massport
Electrical Consumption	Massport	-	15,859,750	15,331,545	kWh	Massport
	Tenant/Common Area	-	171,020,250	165,324,455	kWh	Massport

Sources: Massport and KBE, 2020.
Notes: AGL – above ground level; AvGas – Aviation Gasoline; CNG – compressed natural gas; ft^3 – cubic feet; GEG – gasoline equivalent gallons; kWh – kilowatt hours; ULSD – ultra low sulfur diesel; VMT – vehicle miles traveled.
1 Jet A density of 6.84 pounds per gallon.
2 AvGas density of 6.0 pounds per gallon.
3 Composite means gasoline, diesel, and ethanol fueled motor vehicles.

Emission factors were obtained from the most recent versions of EPA's MOVES, and GHG Emission Factors Hub. **Tables I-22** and **I-23** present emission factors for carbon dioxide (CO_2), nitrous oxide (N_2O), and methane (CH_4), for 2018 and 2019, respectively.

Table I-22 Greenhouse Gas (GHG) Emission Factors for 2018

Sources	Fuel	CO_2	N_2O	CH_4	Units
Aircraft[1]	Jet A	21.5	0.00066	-[4]	lb/gallon
	AvGas	18.3	0.00024	0.01556	lb/gallon
Ground Support Equipment (GSE)/ Auxiliary Power Units (APUs)[1]	Diesel	22.5	0.00018	0.00090	lb/gallon
	Gasoline	19.4	0.00018	0.00084	lb/gallon
	CNG	120	0.00023	0.00226	lb/1000 ft^3
	Propane	12.6	0.00011	0.00060	lb/gallon
	Jet A	21.5	0.00066	-[4]	lb/gallon
Motor Vehicles[1,2]	Composite	515	0.00004	0.00373	g/mile
	Composite	4,498	0.00021	0.01645	g/hour-vehicle
	CNG	120	0.00023	0.00226	lb/1000 ft^3
	Diesel (on-road)	22.5	0.00018	0.00090	lb/gallon
	Diesel (off-road)	22.5	0.00108	0.00062	lb/gallon
	Gasoline	19.4	0.00018	0.00084	lb/gallon
Stationary Sources[1]	No. 2 Oil	22.5	0.00018	0.00090	lb/gallon
	No. 6 Oil	24.8	0.00020	0.00099	lb/gallon
	Natural Gas	120	0.00023	0.00226	lb/1000 ft^3
	ULSD	22.5	0.00018	0.00090	lb/gallon
Fire Training Facility[1]	Tekflame[3]	12.6	0.00011	0.00060	lb/gallon
	AvGas	18.3	0.00024	0.01556	lb/gallon
Electrical Consumption[1]	-	0.52	0.00001	0.00008	lb/kW-hr

Sources: Massport and KBE, 2020.

Notes: CH_4 – methane; CNG – compressed natural gas; CO_2 – carbon dioxide; g- grams; ft^3 – cubic feet; kWh – kilowatt hour; lb – pound; N_2O – nitrous oxides; ULSD – Ultra Low Sulfur Diesel.

1 EPA, GHG Emissions Factors Hub (March 2020), https://www.epa.gov/climateleadership/center-corporate-climate-leadership-ghg-emission-factors-hub.

2 EPA, MOVES2014b, http://www.epa.gov/otaq/models/moves/.

3 As propane.

4 Contributions of CH_4 emissions from commercial aircraft are reported as zero. Years of scientific measurement campaigns conducted at the exhaust exit plane of commercial aircraft gas turbine engines have repeatedly indicated that CH_4 emissions are consumed over the full emission flight envelope [Reference: Aircraft Emissions of Methane and Nitrous Oxide during the Alternative Aviation Fuel Experiment, Santoni et al., Environ. Sci. Technol., July 2011, Volume 45, pp. 7075-7082]. As a result, EPA published that: "…methane is no longer considered to be an emission from aircraft gas turbine engines burning Jet A at higher power settings and is, in fact, consumed in net at these higher powers." [Reference: EPA, Recommended Best Practice for Quantifying Speciated Organic Gas Emissions from Aircraft Equipped with Turbofan, Turbojet, and Turboprop Engines, May 27, 2009 [EPA-420-R-09-901], http://www.epa.gov/otaq/aviation.htm]. In accordance with the following statements in the 2006 IPCC Guidelines (IPCC 2006), FAA does not calculate CH_4 emissions for either the domestic or international bunker commercial aircraft jet fuel emissions inventories. "Methane (CH_4) may be emitted by gas turbines during idle and by older technology engines, but recent data suggest that little or no CH_4 is emitted by modern engines." "Current scientific understanding does not allow other gases (e.g., N_2O and CH_4) to be included in calculation of cruise emissions." (IPCC 1999).

Table I-23 Greenhouse Gas (GHG) Emission Factors for 2019

Sources	Fuel	CO_2	N_2O	CH_4	Units
Aircraft[1]	Jet A	21.5	0.00066	-[4]	lb/gallon
	AvGas	18.3	0.00024	0.01556	lb/gallon
Ground Support Equipment (GSE)/ Auxiliary Power Units (APUs)[1]	Diesel	22.5	0.00018	0.00090	lb/gallon
	Gasoline	19.4	0.00018	0.00084	lb/gallon
	CNG	120.0	0.00023	0.00226	lb/1000 ft^3
	Propane	12.6	0.00011	0.00060	lb/gallon
	Jet A	21.5	0.00066	-[4]	lb/gallon
Motor Vehicles[1,2]	Composite	502	0.00005	0.00370	g/mile
	Composite	4,386	0.00017	0.01516	g/hour-vehicle
	CNG	120.0	0.00023	0.00226	lb/1000 ft^3
	Diesel (on-road)	22.5	0.00018	0.00090	lb/gallon
	Diesel (off-road)	22.5	0.00108	0.00062	lb/gallon
	Gasoline	19.4	0.00018	0.00084	lb/gallon
Stationary Sources[1]	No. 2 Oil	22.5	0.00018	0.00090	lb/gallon
	No. 6 Oil	24.8	0.00020	0.00099	lb/gallon
	Natural Gas	120.0	0.00023	0.00226	lb/1000 ft^3
	ULSD	22.5	0.00018	0.00090	lb/gallon
Fire Training Facility[1]	Tekflame[3]	12.6	0.00011	0.00060	lb/gallon
	AvGas	18.3	0.00024	0.01556	lb/gallon
Electrical Consumption[1]	-	0.52	0.00001	0.00008	lb/kW-hr

Sources: Massport and KBE, 2020.

Notes: CH_4 – methane; CNG – compressed natural gas; CO_2 – carbon dioxide; g- grams; ft^3 – cubic feet; kWh – kilowatt hour; lb – pound; N_2O – nitrous oxides; ULSD – Ultra Low Sulfur Diesel.

1 EPA, GHG Emissions Factors Hub (March 2020), https://www.epa.gov/climateleadership/center-corporate-climate-leadership-ghg-emission-factors-hub.

2 EPA, MOVES2014b, http://www.epa.gov/otaq/models/moves/.

3 As propane.

4 Contributions of CH_4 emissions from commercial aircraft are reported as zero. Years of scientific measurement campaigns conducted at the exhaust exit plane of commercial aircraft gas turbine engines have repeatedly indicated that CH_4 emissions are consumed over the full emission flight envelope [Reference: Aircraft Emissions of Methane and Nitrous Oxide during the Alternative Aviation Fuel Experiment, Santoni et al., Environ. Sci. Technol., July 2011, Volume 45, pp. 7075-7082]. As a result, EPA published that: "…methane is no longer considered to be an emission from aircraft gas turbine engines burning Jet A at higher power settings and is, in fact, consumed in net at these higher powers." [Reference: EPA, Recommended Best Practice for Quantifying Speciated Organic Gas Emissions from Aircraft Equipped with Turbofan, Turbojet, and Turboprop Engines, May 27, 2009 [EPA-420-R-09-901], http://www.epa.gov/otaq/aviation.htm]. In accordance with the following statements in the 2006 IPCC Guidelines (IPCC 2006), FAA does not calculate CH_4 emissions for either the domestic or international bunker commercial aircraft jet fuel emissions inventories. "Methane (CH_4) may be emitted by gas turbines during idle and by older technology engines, but recent data suggest that little or no CH_4 is emitted by modern engines." "Current scientific understanding does not allow other gases (e.g., N_2O and CH_4) to be included in calculation of cruise emissions." (IPCC 1999).

Results

Tables I-24 ad **I-25** present the results of the 2018 and 2019 GHG emissions inventory for Logan Airport, respectively. The results are presented in million metric tons of CO_2 equivalent (MMT CO_2eq) by emission source (i.e., aircraft, GSE, motor vehicles, and stationary sources) and compound (i.e., CO_2, N_2O, and CH_4).

Table I-24 Greenhouse Gas (GHG) Emissions (MMT CO_2eq) for 2018

Activity	CO_2	N_2O	CH_4	Total
Aircraft Sources				
Aircraft Taxi	0.22	<0.01	<0.01	0.22
Engine Startup	<0.01	<0.01	-	<0.01
Aircraft AGL to 3,000 feet	0.25	<0.01	<0.01	0.26
Aircraft Support Equipment				
Ground Service Equipment (GSE)	0.02	<0.01	<0.01	0.02
Auxilary Power Unit (APU)	0.01	<0.01	-	0.01
Motor Vehicles				
On-airport Vehicles	0.04	<0.01	<0.01	0.04
On-airport Parking/Curbsides	0.01	<0.01	<0.01	0.01
Massport Shuttle Buses	0.01	<0.01	<0.01	0.01
Massport Fleet Vehicles	0.01	<0.01	<0.01	0.01
Off-airport Vehicles (Public)	0.11	<0.01	<0.01	0.11
Off-airport Vehicles (Airport Employees)	<0.01	<0.01	<0.01	<0.01
Off-airport Vehicles (Tenant Employees)	0.03	<0.01	<0.01	0.03
Stationary Sources				
Boilers	0.02	<0.01	<0.01	0.02
Generators, Snow melters, etc.	<0.01	<0.01	<0.01	<0.01
Fire Training Facility	<0.01	<0.01	<0.01	<0.01
Electrical Consumption	0.04	<0.01	<0.01	0.04
Total Airport Sources	**0.77**	**<0.01**	**<0.01**	**0.78**

Sources: Massport and KBE, 2020.
Notes: AGL – above ground level; CH_4 – methane; CO_2 – carbon dioxide; MMT CO_2eq - million metric tons of CO_2 equivalent (1 metric ton = 1.1 short tons); N_2O – nitrous oxides.

Table I-25 Greenhouse Gas (GHG) Emissions (MMT CO_2eq) for 2019

Activity	CO_2	N_2O	CH_4	Total
Aircraft Sources				
Aircraft Taxi	0.23	<0.01	<0.01	0.23
Engine Startup	0.01	<0.01	<0.01	0.01
Aircraft AGL to 3,000 feet	0.26	<0.01	<0.01	0.26
Aircraft Support Equipment				
Ground Service Equipment (GSE)	0.02	<0.01	<0.01	0.02
Auxilary Power Unit (APU)	0.01	<0.01	-	0.01
Motor Vehicles				
On-airport Vehicles	0.04	<0.01	<0.01	0.04
On-airport Parking/Curbsides	0.01	<0.01	<0.01	0.01
Massport Shuttle Buses	0.01	<0.01	<0.01	0.01
Massport Fleet Vehicles	0.01	<0.01	<0.01	0.01
Off-airport Vehicles (Public)	0.12	<0.01	<0.01	0.12
Off-airport Vehicles (Airport Employees)	<0.01	<0.01	<0.01	<0.01
Off-airport Vehicles (Tenant Employees)	0.03	<0.01	<0.01	0.03
Stationary Sources				
Boilers	0.03	<0.01	<0.01	0.03
Generators, Snow melters, etc.	<0.01	<0.01	<0.01	<0.01
Fire Training Facility	<0.01	<0.01	<0.01	<0.01
Electrical Consumption	0.04	<0.01	<0.01	0.04
Total Airport Sources	**0.80**	**<0.01**	**<0.01**	**0.81**

Sources: Massport and KBE, 2020.

Notes: AGL – above ground level; CH_4 – methane; CO_2 – carbon dioxide; MMT CO_2eq - million metric tons of CO_2 equivalent (1 metric ton = 1.1 short tons); N_2O – nitrous oxides.

Table I-26 compares the total GHG emission from Logan Airport to the total GHG emissions for Massachusetts for the years 2018 and 2019. Massachusetts state totals are based on the *Massachusetts Annual Greenhouse Gas Emissions Inventory: 1990-2017* report.

Table I-26 Logan Airport Greenhouse Gas (GHG) Emissions Compared to Massachusetts Totals[1]

	CO_2	N_2O	CH_4	Totals
Logan Airport Emissions (2018)[2]	0.77	<0.01	<0.01	0.78
Logan Airport Emissions (2019)[2]	0.80	<0.01	<0.01	0.81
Massachusetts[3,4]	71.0	0.6	1.7	73.3
Percent of Logan Airport to Massachusetts[5]	1%	<1%	<1%	1%

Sources: Massport and KBE, 2020.
Notes: CH_4 – methane; CO_2 – carbon dioxide; N_2O – nitrous oxides.
1 Totals expressed in units of million metric tons of CO_2 equivalents (MMT CO_2eq): 1 metric ton = 1.1 short tons.
2 Total from Massport, tenants, and public categories.
3 MassDEP, Massachusetts Annual Greenhouse Gas Emissions Inventory: 1990-2017, available at https://www.mass.gov/lists/massdep-emissions-inventories#greenhouse-gas-baseline,-inventory-&-projection.
4 Totals include CO_2, CH_4, N_2O and other GHG gases.
5 Percentages represent the relative amount Logan Airport-related emissions compared to the state totals.

2007-2019 Greenhouse Gas (GHG) Emissions Inventories

Table I-27 provides a comparison between Airport-related GHG emissions from 2009 through 2019. Total GHG emissions in 2018 are approximately 10 percent higher than 2017 levels, and 2019 are 4 percent higher than 2018 levels. To equally compare to previous years, the 2018 and 2019 emissions are summarized in a manner similar to previous years.

Table I-27 Comparison of Estimated Total Greenhouse Gas (GHG) Emissions (MMT of CO_2eq) at Logan Airport – 2007 through 2019[1]

Source	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Direct Emissions[2]													
Aircraft[3]	0.22	0.21	0.19	0.18	0.19	0.19	0.19	0.20	0.21	0.19	0.21	0.22	0.24
GSE/APUs	0.08	0.08	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.01	0.03	0.03	0.03
Motor vehicles[4]	0.03	0.03	0.03	0.03	0.04	0.03	0.05	0.05	0.05	0.05	0.05	0.06	0.06
Other sources[5]	0.04	0.03	0.03	0.03	0.03	0.02	0.03	0.03	0.03	0.03	0.03	0.03	0.03
Total Direct Emissions	**0.37**	**0.35**	**0.27**	**0.27**	**0.28**	**0.26**	**0.29**	**0.29**	**0.32**	**0.29**	**0.32**	**0.34**	**0.36**
Indirect Emissions[6]													
Aircraft[7]	0.18	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.18	0.22	0.24	0.26	0.26
Motor vehicles[8]	0.05	0.05	0.05	0.05	0.06	0.05	0.08	0.07	0.08	0.09	0.10	0.14	0.15
Electrical consumption[9]	0.09	0.08	0.07	0.07	0.08	0.08	0.06	0.06	0.06	0.06	0.05	0.04	0.04
Total Indirect Emissions	**0.32**	**0.30**	**0.29**	**0.29**	**0.30**	**0.30**	**0.31**	**0.30**	**0.32**	**0.36**	**0.39**	**0.44**	**0.45**
Total Emissions[10]	**0.69**	**0.65**	**0.56**	**0.56**	**0.58**	**0.57**	**0.60**	**0.60**	**0.63**	**0.65**	**0.71**	**0.78**	**0.81**
Percent of State Totals[11]	**<1**	**<1**	**<1**	**<1**	**<1**	**<1**	**<1**	**<1**	**<1**	**<1**	**<1**	**1**	**1**

Sources: Massport and KBE, 2020.

Notes: APU – Auxiliary Power Unit; CH_4 – methane; CO_2 – carbon dioxide; GSE- Ground Service Equipment; N_2O – nitrous oxides. Totals may not add exactly due to rounding.

1 MMT – million metric tons of CO_2 equivalents (1 MMT = 1.1M Short Tons). CO_2 equivalents (CO_2eq) are bases for reporting the three primary GHGs (e.g., CO_2, N_2O and CH_4) in common units. Quantities are reported as "rounded" and truncated values for ease of addition.

2 Direct emissions are those that occur in areas located within the Airport's geographic boundaries.

3 Direct aircraft emissions-based engine start-up, taxi-in, taxi-out and ground-based delay emissions.

4 Direct motor vehicle emissions based on on-site vehicle miles traveled (VMT).

5 Other sources include Central Heating and Cooling Plant, emergency generators, snow melters, space heaters and live fire training activities.

6 Indirect emissions are those that occur off the Airport site.

7 Indirect aircraft emissions are based on take-off, climb-out and landing emissions which occur up to an altitude of 3,000 ft., the limits of the landing and takeoff (LTO) cycle.

8 Indirect motor vehicle emissions based on off-site Airport-related VMT and an average round trip distance of approximately 60 miles.

9 Electrical consumption emissions occur off-airport at power generating plants.

10 Total Emissions = Direct + Indirect.

11 Percentage based on relative amount of Airport total of direct emissions to statewide total from MassDEP, Massachusetts Annual Greenhouse Gas Emissions Inventory: 1990-2017, available at https://www.mass.gov/lists/massdep-emissions-inventories#greenhouse-gas-baseline,-inventory-&-projection.

J

Environmental Compliance and Management/Water Quality

This appendix provides detailed information in support of Chapter 8, *Environmental Compliance and Management/Water Quality*:

- Table J-1 Logan Airport National Pollutant Discharge Elimination System (NPDES) Permit (No. MA0000787) Stormwater Outfall Monitoring Requirements (2007)
- Table J-2 Fire Training Facility NPDES Permit (No. MA0032751) Stormwater Outfall Monitoring Requirements (2014)
- Table J-3 Logan Airport 2018 Monthly Monitoring Results for First Quarter — North, West, and Maverick Street Stormwater Outfalls
- Table J-4 Logan Airport 2018 Monthly Monitoring Results for First Quarter — Porter Street Stormwater Outfall
- Table J-5 Logan Airport 2018 Monthly Monitoring Results for Second Quarter — North, West, and Maverick Street Stormwater Outfalls
- Table J-6 Logan Airport 2018 Monthly Monitoring Results for Second Quarter — Porter Street Stormwater Outfall
- Table J-7 Logan Airport 2018 Monthly Monitoring Results for Third Quarter — North, West, and Maverick Street Stormwater Outfalls
- Table J-8 Logan Airport 2018 Monthly Monitoring Results for Third Quarter — Porter Street Stormwater Outfall
- Table J-9 Logan Airport 2018 Monthly Monitoring Results for Fourth Quarter — North, West, and Maverick Street Stormwater Outfalls
- Table J-10 Logan Airport 2018 Monthly Monitoring Results for Fourth Quarter — Porter Street Stormwater Outfall
- Table J-11 Logan Airport 2018 Quarterly Wet Weather Monitoring Results — North, West, Maverick Street, and Porter Street Stormwater Outfalls
- Table J-12 Logan Airport 2018 Quarterly Wet Weather Monitoring Results — Northwest and Runway/Perimeter Stormwater Outfalls

- Figure J-1 Massachusetts Contingency Plan Sites (Closed)
- Sustainable Massport Monthly Newsletters, 2018 and 2019

  February 2018: Sustainable Transportation

  March 2018: Water Resources and Conservation

  April 2018: Health and Wellness

  May 2018: Parks and Open Space

  June 2018: Air Quality and Greenhouse Gas Reduction

  July 2018: Natural Resources

  August 2018: Climate Change Adaptation and Resiliency

  September 2018: Community Partnerships

  October 2018: Energy Efficiency

  November 2018: Waste Management and Recycling

  December 2018: Sustainable Tenants

  August 2019: Sustainability Highlights

  October 2019: Sustainable Massport Newsletter

Table J-1 Logan Airport National Pollutant Discharge Elimination System (NPDES) Permit (No. MA0000787) Stormwater Outfall Monitoring Requirements (2007)

Monitoring Event	**North Outfall 001**		**West Outfall 002**		**Maverick Outfall 003**	
	Field Measurement	**Laboratory Analysis**	**Field Measurement**	**Laboratory Analysis**	**Field Measurement**	**Laboratory Analysis**
Monthly Dry Weather	Not Required	Oil and Grease TSS[1] Benzene Surfactant Fecal Coliform *Enterococcus*	Not Required	Oil and Grease TSS[1] Benzene Surfactant Fecal Coliform *Enterococcus*	Not Required	Oil and Grease TSS[1] Benzene Surfactant Fecal Coliform *Enterococcus*
Monthly Wet Weather	pH Flow Rate[6]	Oil and Grease TSS[1] Benzene[2] Surfactant Fecal Coliform *Enterococcus*	pH Flow Rate[6]	Oil and Grease TSS[1] Benzene[2] Surfactant Fecal Coliform *Enterococcus*	pH Flow Rate[6]	Oil and Grease TSS[1] Benzene[2] Surfactant Fecal Coliform *Enterococcus*
Quarterly Wet Weather	pH Flow Rate[6]	PAHs[3]: - Benzo(a)anthracene - Benzo(a)pyrene - Benzo(b)fluoranthene - Benzo(k)fluoranthene - Chrysene -Dibenzo(a,h)anthracene - Indeno(1,2,3-cd)pyrene - Naphthalene	pH Flow Rate[6]	PAHs[3]: - Benzo(a)anthracene - Benzo(a)pyrene - Benzo(b)fluoranthene - Benzo(k)fluoranthene - Chrysene -Dibenzo(a,h)anthracene - Indeno(1,2,3-cd)pyrene - Naphthalene	pH Flow Rate[6]	PAHs[3]: - Benzo(a)anthracene - Benzo(a)pyrene - Benzo(b)fluoranthene - Benzo(k)fluoranthene - Chrysene -Dibenzo(a,h)anthracene - Indeno(1,2,3-cd)pyrene - Naphthalene
Deicing Episode (2/Deicing Season)	Not Required	Ethylene Glycol Propylene Glycol BOD5[4] COD[5] Total Ammonia Nitrogen Nonylphenol Tolyltriazole	Not Required	Ethylene Glycol Propylene Glycol BOD5[4] COD[5] Total Ammonia Nitrogen Nonylphenol Tolyltriazole	Not Required	Not Required
Whole Effluent Toxicity (1st and 3rd Year Deicing Season)	Not Required	Menidia beryllina Arbacia punctulata	Not Required	Menidia beryllina Arbacia punctulata	Not Required	Not Required
Treatment System Sampling (Internal Outfalls)[7]	pH Quantity, Gallons	Oil and Grease TSS[1] Benzene[2]	Not Required	Not Required	Not Required	Not Required

Table J-1 Logan Airport NPDES Permit (No. MA0000787) Stormwater Outfall Monitoring Requirements (2007) (Continued)

Monitoring Event	Northwest Outfall 005		Porter Outfall 003 (3 upstream locations)		Select Runway/Perimeter Outfalls	
	Field Measurement	**Laboratory Analysis**	**Field Measurement**	**Laboratory Analysis**	**Field Measurement**	**Laboratory Analysis**
Monthly Dry Weather	Not Required	Not Required	Not Required	Oil and Grease TSS[1] Benzene Surfactant Fecal Coliform *Enterococcus*	Not Required	Not Required
Monthly Wet Weather	Not Required	Not Required	pH Flow Rate	Oil and Grease TSS[1] Benzene[2] Surfactant Fecal Coliform *Enterococcus*	Not Required	Not Required
Quarterly Wet Weather	pH Flow Rate[6]	Oil and Grease TSS[1] Benzene[2]	pH Flow Rate[6]	PAHs[3]: - Benzo(a)anthracene - Benzo(a)pyrene - Benzo(b)fluoranthene - Benzo(k)fluoranthene - Chrysene -Dibenzo(a,h)anthracene - Indeno(1,2,3-cd)pyrene - Naphthalene	pH	Oil and Grease TSS[1] Benzene[2]
Deicing Episode (2/Deicing Season)	Not Required	Not Required	Not Required	Ethylene Glycol Propylene Glycol BOD5[4] COD[5] Total Ammonia Nitrogen Nonylphenol Tolytriazole	Not Required	Ethylene Glycol Propylene Glycol BOD5[4] COD[5] Total Ammonia Nitrogen Nonylphenol Tolytriazole
Whole Effluent Toxicity (1st and 3rd Year Deicing Season)	Not Required	Not Required	Not Required	Menidia beryllina Arbacia punctulata	Not Required	Not Required
Treatment System Sampling (Internal Outfalls)[7]	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required

Source: Massport

Notes: Requirements are from NPDES Permit MA0000787, issued July 31, 2007.

1 TSS - Total Suspended Solids

2 Benzene must be collected with HDPE bailer.

3 PAH - Polycyclic Aromatic Hydrocarbons

4 BOD - Biological Oxygen Demand

5 COD - Chemical Oxygen Demand

6 Flow Rate will be estimated based on measured precipitation and the hydraulic model developed for the Logan Airport drainage system.

7 Outfalls 001D and 001E samples collected by Swissport.

Table J-2 Fire Training Facility NPDES Permit (No. MA0032751) Stormwater Outfall Monitoring Requirements (2014)

Monitoring Event	**Outfall Serial Number 001**	
	Field Measurement	**Laboratory Analysis**
Each Discharge Event[1]	Flow Rate[2] pH	TSS[3] Oil and Grease[4] Total BTEX[5] Toluene Benzene Ethylbenzene Xylene PAHs[5,6]
Whole Effluent Toxicity (once per year during discharge event)	Not Required	Acute Toxicity[7]

Source: Massport

Notes: Requirements are from NPDES Permit MA0032751, issued November 1, 2006.
All samples, except for wet testing, shall be collected after treatment and prior to discharge from above ground holding tank.

1 Flows from more than one training session may be held in treatment train for several weeks. Treatment and subsequent discharge through Outfall 001 is usually triggered by tank levels. Sampling will be conducted during each discharge event with the sampling point after the GAC unit and prior to discharge from the above ground holding tank. Each sample shall be a composite of three equally weighted (same volume) grab samples taken at the bottom, middle, and top of the above ground tank.

2 Total flow volume shall be reported monthly in gallons and the maximum flow rate in gallons per minute shall be reported for each month.

3 TSS - Total Suspended Solids

4 Oil and grease is measured using EPA Method 1664.

5 BTEX and PAH compounds shall be analyzed using EPA approved methods. Testing method used and method detection level for each parameter will be included in each DMR submittal.

6 PAH - Polycyclic Aromatic Hydrocarbons

7 The permittee shall conduct one acute toxicity test per year. The test results shall be submitted by the last day of the full month following completion of the test in accordance with protocols defined in the permit.

Table J-3 Logan Airport 2018 Monthly Monitoring Results for First Quarter — North, West, and Maverick Street Stormwater Outfalls

	Date	Event	Maximum Daily Flow (MGD)	Average Monthly Flow (MGD)	pH (S.U.)	Oil and Grease (mg/L)	TSS (mg/L)	Benzene (µg/L)	Surfactants (mg/L)	Fecal Coliform (cfu/100mL)	*Enterococcus* (cfu/100mL)	*Klebsiella*[1] (cfu/100mL)
001A – North Outfall	1/17/2018[2]	Wet Weather	6.957	1.152	7.88	7.90	**150**	<2.0	0.390	30	300	NA
002A – West Outfall	1/17/2018[2]	Wet Weather	23.085	2.035	8.05	<4.0	100	4.70	0.340	1,300	390	NA
004A – Maverick Street Outfall	1/17/2018[2]	Wet Weather	1.179	0.096	7.57	<4.0	10	<1.0	0.120	1,900	730	NA
001C – North Outfall	1/3/2018	Dry Weather				<4.0	27	<1.0	0.090	<10	<10	NA
002C – West Outfall	1/3/2018	Dry Weather				<4.0	22	<1.0	0.320	820	70	NA
004C – Maverick Street Outfall	1/3/2018	Dry Weather				<4.0	13	<1.0	0.060	20	10	NA
001A – North Outfall	2/25/2018	Wet Weather	1.479	1.131	7.44	<4.0	14	<1.0	0.100	NA	NA	NA
002A – West Outfall	2/25/2018	Wet Weather	6.246	1.313	6.71	<4.0	27	<2.5	0.150	NA	NA	NA
004A – Maverick Street Outfall	2/25/2018	Wet Weather	0.181	0.012	6.40	<4.0	51	<1.0	0.120	NA	NA	NA
001C – North Outfall	2/15/2018	Dry Weather				<4.0	**220**	<1.0	0.090	<10	<10	NA
002C – West Outfall	2/15/2018	Dry Weather				<4.0	14	<1.0	0.090	430	190	NA
004C – Maverick Street Outfall	2/15/2018	Dry Weather				<4.0	<5.0	<1.0	0.070	110	50	NA
001A – North Outfall	---	Wet Weather	7.408	1.047	NS	NS	NS	NS	NS	NS	NS	NS
002A – West Outfall	---	Wet Weather	21.908	1.937	NS	NS	NS	NS	NS	NS	NS	NS
004A – Maverick Street Outfall	---	Wet Weather	1.938	0.085	NS	NS	NS	NS	NS	NS	NS	NS
001C – North Outfall	3/19/2018	Dry Weather				<4.0	24	<1.0	0.070	<10	<10	NA
002C – West Outfall	3/19/2018	Dry Weather				<4.0	25	<1.0	0.050	<10	50	NA
004C – Maverick Street Outfall	3/19/2018	Dry Weather				<4.0	<5.0	<1.0	<0.050	<10	<10	NA
Requirements are from NPDES Permit MA0000787, issued July 31, 2007.												
Discharge Limitations												
Maximum Daily			Report	Report	6.0 to 8.5	15 mg/L	100 mg/L	Report	Report	Report	Report	
Average Monthly			Report	Report	6.0 to 8.5	—	Report	Report	Report	Report	Report	

Source: Massport.
Notes: Flow rates were estimated for outfalls 001, 002, and 004 by using the SWMM model developed for Logan Airport.
1 *Klebsiella* is an indication of non-fecal coliform bacteria and is tested for at the North Outfall when fecal coliform concentration exceeds 5,000 cfu/100ml.
2 January 2018 wet weather bacteria samples were collected on 1/23/2018.
NA Not Analyzed
NS Not Sampled
TSS Total Suspended Solids

Table J-4 Logan Airport 2018 Monthly Monitoring Results for First Quarter — Porter Street Stormwater Outfall

	Date	Event	Maximum Daily Flow (MGD)	Average Monthly Flow (MGD)	pH (S.U.)	Oil and Grease (mg/L)	TSS (mg/L)	Benzene (µg/L)	Surfactants (mg/L)	Fecal Coliform (cfu/100mL)	*Enterococcus* (cfu/100mL)
003 - Porter Street Outfall 1	1/17/2018[1]	Wet Weather	---	---	7.69	<4.0	300	<1.0	0.290	1,900	2,300
003 - Porter Street Outfall 2	1/17/2018[1]	Wet Weather	---	---	6.75	19	170	<1.0	0.110	<10	20
003 - Porter Street Outfall 3	1/17/2018[1]	Wet Weather	---	---	7.61	<4.0	210	<1.0	0.060	220	110
003 - Porter Street Outfall Average		Wet Weather	4.318	0.354	7.35	6.3	227	0.0	0.153	75	172
003 - Porter Street Outfall 1	1/3/2018	Dry Weather				<4.0	220	<1.0	0.200	<10	310
003 - Porter Street Outfall 2	1/3/2018	Dry Weather				<4.0	54	<1.0	0.090	<10	<10
003 - Porter Street Outfall 3	1/3/2018	Dry Weather				<4.0	12	<1.0	0.130	<10	20
003 - Porter Street Outfall Average		Dry Weather				0.0	95	0.0	0.140	0.0	18
003 - Porter Street Outfall 1	2/25/2018	Wet Weather	---	---	6.35	<4.0	46	<1.0	0.210	NA	NA
003 - Porter Street Outfall 2	2/25/2018	Wet Weather	---	---	6.20	<4.0	32	<1.0	0.050	NA	NA
003 - Porter Street Outfall 3	2/25/2018	Wet Weather	---	---	6.12	<4.0	54	<1.0	0.070	NA	NA
003 - Porter Street Outfall Average		Wet Weather	0.432	0.094	6.22	0.0	44	0.0	0.110	NA	NA
003 - Porter Street Outfall 1	2/15/2018	Dry Weather				<4.0	7.0	<1.0	0.220	<10	<10
003 - Porter Street Outfall 2	2/15/2018	Dry Weather				<4.0	81	<1.0	0.120	<10	<10
003 - Porter Street Outfall 3	2/15/2018	Dry Weather				<4.0	5.7	<1.0	0.150	<10	<10
003 - Porter Street Outfall Average		Dry Weather				0.0	31	0.0	0.163	1.0	1.0
003 - Porter Street Outfall 1	---	Wet Weather	---	---	NS	NS	NS	NS	NS	NS	NS
003 - Porter Street Outfall 2	---	Wet Weather	---	---	NS	NS	NS	NS	NS	NS	NS
003 - Porter Street Outfall 3	---	Wet Weather	---	---	NS	NS	NS	NS	NS	NS	NS
003 - Porter Street Outfall Average		Wet Weather	3.708	0.325	NS	NS	NS	NS	NS	NS	NS
003 - Porter Street Outfall 1	3/19/2018	Dry Weather				<4.0	28	<1.0	0.130	160	100
003 - Porter Street Outfall 2	3/19/2018	Dry Weather				<4.0	17	<1.0	0.160	<10	10
003 - Porter Street Outfall 3	3/19/2018	Dry Weather				<4.0	52	<1.0	0.110	<10	20
003 - Porter Street Outfall Average		Dry Weather				0.0	32	0.0	0.133	5.4	27.1
Requirements are from NPDES Permit MA0000787, issued July 31, 2007.											
Discharge Limitations											
Maximum Daily			Report	Report	6.0 to 8.5	Report	Report	Report	Report	Report	Report
Average Monthly			Report	Report	6.0 to 8.5	—	Report	Report	Report	Report	Report

Source: Massport.

Notes: Flow rates were estimated for outfalls 001, 002, 003 and 004 by using the SWMM model developed for Logan Airport.
For averaging calculations, a value of zero was employed for those results measured below the laboratory detection limit. For geometric mean calculations (fecal coliform and Enterococcus) a value of 1 was employed for those results measured below the laboratory detection limit.

1 January 2018 wet weather bacteria samples were collected on 1/23/2018.

TSS Total Suspended Solids

NA Not Analyzed

NS Not Sampled

Table J-5 Logan Airport 2018 Monthly Monitoring Results for Second Quarter — North, West, and Maverick Street Stormwater Outfalls

	Date	Event	Maximum Daily Flow (MGD)	Average Monthly Flow (MGD)	pH (S.U.)	Oil and Grease (mg/L)	TSS (mg/L)	Benzene (µg/L)	Surfactants (mg/L)	Fecal Coliform (cfu/100mL)	*Enterococcus* (cfu/100mL)	*Klebsiella*[1] (cfu/100mL)
001A – North Outfall	4/19/2018	Wet Weather	5.275	0.548	6.60	<4.0	6.6	<1.0	0.180	10	60	NA
002A – West Outfall	4/19/2018	Wet Weather	16.566	1.653	7.07	<4.0	30	<1.0	0.070	40	40	NA
004A – Maverick Street Outfall	4/19/2018	Wet Weather	1.308	0.094	6.97	<4.0	11	<1.0	0.070	20	80	NA
001C – North Outfall	4/10/2018	Dry Weather				<4.0	26	<10	<0.050	<10	<10	NA
002C – West Outfall	4/10/2018	Dry Weather				<4.0	11	<1.0	<0.050	<10	30	NA
004C – Maverick Street Outfall	4/10/2018	Dry Weather				<4.0	8.8	<1.0	<0.050	20	20	NA
001A – North Outfall	---	Wet Weather	3.305	0.206	NS	NS	NS	NS	NS	NS	NS	NS
002A – West Outfall	---	Wet Weather	7.636	0.661	NS	NS	NS	NS	NS	NS	NS	NS
004A – Maverick Street Outfall	---	Wet Weather	0.771	0.024	NS	NS	NS	NS	NS	NS	NS	NS
001C – North Outfall	5/11/2018	Dry Weather				<4.0	19	<1.0	0.090	<10	<10	NA
002C – West Outfall	5/11/2018	Dry Weather				<4.0	10	<1.0	0.190	740	60	NA
004C – Maverick Street Outfall	5/11/2018	Dry Weather				<4.0	10	<1.0	<0.050	130	10	NA
001A – North Outfall	6/4/2018	Wet Weather	4.046	0.315	7.17	<4.0	48	<1.0	0.160	1,200	3,500	NA
002A – West Outfall	6/4/2018	Wet Weather	13.23	1.057	6.96	5.1	43	<1.0	0.290	7,100	3,500	NA
004A – Maverick Street Outfall	6/4/2018	Wet Weather	1.027	0.058	7.09	<4.0	**220**	<1.0	0.310	1,500	3,700	NA
001C – North Outfall	6/12/2018	Dry Weather				<4.0	6.3	<1.0	0.080	20	10	NA
002C – West Outfall	6/12/2018	Dry Weather				<4.0	16	<1.0	0.080	1,600	150	NA
004C – Maverick Street Outfall	6/12/2018	Dry Weather				<4.0	9.6	<1.0	<0.050	620	310	NA
Requirements are from NPDES Permit MA0000787, issued July 31, 2007.												
Discharge Limitations												
Maximum Daily			Report	Report	6.0 to 8.5	15 mg/L	100 mg/L	Report	Report	Report	Report	
Average Monthly			Report	Report	6.0 to 8.5	—	Report	Report	Report	Report	Report	

Source: Massport.
Notes: Flow rates were estimated for outfalls 001, 002, 003 and 004 by using the SWMM model developed for Logan Airport.
1 *Klebsiella* is an indication of non-fecal coliform bacteria and is tested for at the North Outfall when fecal coliform concentration exceeds 5,000 cfu/100ml.
TSS Total Suspended Solids
NA Not Analyzed
NS Not Sampled

Table J-6 Logan Airport 2018 Monthly Monitoring Results for Second Quarter — Porter Street Stormwater Outfall

	Date	Event	Maximum Daily Flow (MGD)	Average Monthly Flow (MGD)	pH (S.U.)	Oil and Grease (mg/L)	TSS (mg/L)	Benzene (µg/L)	Surfactants (mg/L)	Fecal Coliform (cfu/100mL)	*Enterococcus* (cfu/100mL)
003 - Porter Street Outfall 1	4/19/2018	Wet Weather	---	---	6.92	<4.0	29	<1.0	0.090	90	80
003 - Porter Street Outfall 2	4/19/2018	Wet Weather	---	---	6.43	<4.0	8.7	<1.0	0.050	<10	210
003 - Porter Street Outfall 3	4/19/2018	Wet Weather	---	---	6.25	<4.0	8.7	<1.0	0.050	<10	80
003 - Porter Street Outfall Average		Wet Weather	3.327	0.33	6.53	0.0	15	0.0	0.063	4.5	110
003 - Porter Street Outfall 1	4/10/2018	Dry Weather				<4.0	2,400	<1.0	0.080	<10	50
003 - Porter Street Outfall 2	4/10/2018	Dry Weather				<4.0	15	<1.0	0.050	<10	10
003 - Porter Street Outfall 3	4/10/2018	Dry Weather				<4.0	7.6	<1.0	0.050	<10	<10
003 - Porter Street Outfall Average		Dry Weather				0.0	808	0.0	0.060	1.0	7.9
003 - Porter Street Outfall 1	---	Wet Weather	---	---	NS	NS	NS	NS	NS	NS	NS
003 - Porter Street Outfall 2	---	Wet Weather	---	---	NS	NS	NS	NS	NS	NS	NS
003 - Porter Street Outfall 3	---	Wet Weather	---	---	NS	NS	NS	NS	NS	NS	NS
003 - Porter Street Outfall Average		Wet Weather	1.707	0.135	NS	NS	NS	NS	NS	NS	NS
003 - Porter Street Outfall 1	5/11/2018	Dry Weather				<4.0	24	<1.0	0.080	<10	10
003 - Porter Street Outfall 2	5/11/2018	Dry Weather				<4.0	11	<1.0	0.330	30	210
003 - Porter Street Outfall 3	5/11/2018	Dry Weather				<4.0	<5.0	<1.0	0.140	<10	1,100
003 - Porter Street Outfall Average		Dry Weather				0.0	12	0.0	0.183	3.1	132
003 - Porter Street Outfall 1	6/4/2018	Wet Weather	---	---	7.01	<4.0	24	<1.0	0.130	5,300	4,300
003 - Porter Street Outfall 2	6/4/2018	Wet Weather	---	---	6.59	<4.0	8	<1.0	<0.050	10	470
003 - Porter Street Outfall 3	6/4/2018	Wet Weather	---	---	6.34	<4.0	31	<1.0	0.060	810	670
003 - Porter Street Outfall Average		Wet Weather	2.167	0.216	6.65	0.0	16	0.0	0.063	350	1110
003 - Porter Street Outfall 1	6/12/2018	Dry Weather				<4.0	22	<1.0	0.050	50	90
003 - Porter Street Outfall 2	6/12/2018	Dry Weather				<4.0	20	<1.0	0.060	<10	<10
003 - Porter Street Outfall 3	6/12/2018	Dry Weather				<4.0	5.3	<1.0	0.080	<10	10
003 - Porter Street Outfall Average		Dry Weather				0.0	12	0.0	0.063	3.7	10
Requirements are from NPDES Permit MA0000787, issued July 31, 2007.											
Discharge Limitations											
Maximum Daily			Report	Report	6.0 to 8.5	Report	Report	Report	Report	Report	Report
Average Monthly			Report	Report	6.0 to 8.5	—	Report	Report	Report	Report	Report

Source: Massport.

Notes: Flow rates were estimated for outfalls 001, 002, 003, and 0034 by using the SWMM model developed for Logan Airport.
For averaging calculations, a value of zero was employed for those results measured below the laboratory detection limit. For geometric mean calculations (fecal coliform and Enterococcus) a value of 1 was employed for those results measured below the laboratory detection limit.

TSS Total Suspended Solids

NS Not Sampled

Table J-7 Logan Airport 2018 Monthly Monitoring Results for Third Quarter — North, West, and Maverick Street Stormwater Outfalls

	Date	Event	Maximum Daily Flow (MGD)	Average Monthly Flow (MGD)	pH (S.U.)	Oil and Grease (mg/L)	TSS (mg/L)	Benzene (µg/L)	Surfactants (mg/L)	Fecal Coliform (cfu/100mL)	*Enterococcus* (cfu/100mL)	*Klebsiella*[1] (cfu/100mL)
001A – North Outfall	---	Wet Weather	7.575	0.408	NS	NS	NS	NS	NS	NS	NS	NS
002A – West Outfall	---	Wet Weather	24.939	1.398	NS	NS	NS	NS	NS	NS	NS	NS
004A – Maverick Street Outfall	---	Wet Weather	2.517	0.098	NS	NS	NS	NS	NS	NS	NS	NS
001C – North Outfall	7/5/2018	Dry Weather				<4.0	7.7	<1.0	0.070	70	30	NA
002C – West Outfall	7/5/2018	Dry Weather				<4.0	7.3	<1.0	0.100	2,500	3,500	NA
004C – Maverick Street Outfall	7/5/2018	Dry Weather				<4.0	<5.0	<1.0	0.050	140	70	NA
001A – North Outfall	8/22/2018	Wet Weather	4.513	0.444	7.38	<4.0	6	<1.0	0.100	4,600	2,500	NA
002A – West Outfall	8/22/2018	Wet Weather	16.078	1.582	8.05	<4.0	15	<1.0	0.130	>80,000	4,300	NA
004A – Maverick Street Outfall	8/22/2018	Wet Weather	1.095	0.094	7.55	<4.0	10	<1.0	0.220	24,000	3,600	NA
001C – North Outfall	8/3/2018	Dry Weather				<4.0	5.9	<2.0	0.070	<10	30	NA
002C – West Outfall	8/3/2018	Dry Weather				<4.0	13	<1.0	<0.050	6,000	710	NA
004C – Maverick Street Outfall	8/3/2018	Dry Weather				<4.0	9.9	<2.0	<0.050	140	60	NA
001A – North Outfall	9/18/2018	Wet Weather	3.807	0.539	6.96	<4.0	7.1	<1.0	0.060	3,200	>80,000	NA
002A – West Outfall	9/18/2018	Wet Weather	12.981	1.919	7.09	<4.0	10	<1.0	0.060	3,100	>80,000	NA
004A – Maverick Street Outfall	9/18/2018	Wet Weather	0.960	0.111	7.16	<4.0	<5.0	<1.0	0.060	3,000	9,000	NA
001C – North Outfall	9/7/2018	Dry Weather				<4.0	21	<1.0	0.410	4,500	480	NA
002C – West Outfall	9/7/2018	Dry Weather				<4.0	11	<1.0	0.280	21,000	6,700	NA
004C – Maverick Street Outfall	9/7/2018	Dry Weather				<4.0	11	<1.0	0.080	800	100	NA
Requirements are from NPDES Permit MA0000787, issued July 31, 2007.												
Discharge Limitations												
Maximum Daily			Report	Report	6.0 to 8.5	15 mg/L	100 mg/L	Report	Report	Report	Report	Report
Average Monthly			Report	Report	6.0 to 8.5	—	Report	Report	Report	Report	Report	Report

Source: Massport
Notes: Flow rates were estimated for outfalls 001, 002, and 004 by using the SWMM model developed for Logan Airport.
1 *Klebsiella* is an indication of non-fecal coliform bacteria and is tested for at the North Outfall when fecal coliform concentration exceeds 5,000 cfu/100ml.
TSS Total Suspended Solids
NA Not Analyzed
NS Not Sampled

Table J-8 Logan Airport 2018 Monthly Monitoring Results for Third Quarter — Porter Street Stormwater Outfall

	Date	Event	Maximum Daily Flow (MGD)	Average Monthly Flow (MGD)	pH (S.U.)	Oil and Grease (mg/L)	TSS (mg/L)	Benzene (µg/L)	Surfactants (mg/L)	Fecal Coliform (cfu/100mL)	*Enterococcus* (cfu/100mL)
003 - Porter Street Outfall 1	---	Wet Weather	---	---	NS	NS	NS	NS	NS	NS	NS
003 - Porter Street Outfall 2	---	Wet Weather	---	---	NS	NS	NS	NS	NS	NS	NS
003 - Porter Street Outfall 3	---	Wet Weather	---	---	NS	NS	NS	NS	NS	NS	NS
003 - Porter Street Outfall Average		Wet Weather	6.331	0.364	NS	NS	NS	NS	NS	NS	NS
003 - Porter Street Outfall 1	7/5/2018	Dry Weather				<4.0	24	<1.0	0.110	3,400	190
003 - Porter Street Outfall 2	7/5/2018	Dry Weather				<4.0	8	<1.0	<0.050	10	10
003 - Porter Street Outfall 3	7/5/2018	Dry Weather				<4.0	<5.0	<1.0	0.090	<10	20
003 - Porter Street Outfall Average		Dry Weather				0.0	11	0.0	0.067	32.4	34
003 - Porter Street Outfall 1	8/22/2018	Wet Weather	---	---	8.36	<4.0	6	<1.0	0.090	>80,000	5,300
003 - Porter Street Outfall 2	8/22/2018	Wet Weather	---	---	8.03	<4.0	<5.0	<1.0	0.050	20	100
003 - Porter Street Outfall 3	8/22/2018	Wet Weather	---	---	7.82	<4.0	6	<1.0	0.090	510	5,000
003 - Porter Street Outfall Average		Wet Weather	3.214	0.335	8.07	0.0	4	0.0	0.077	934	1,384
003 - Porter Street Outfall 1	8/3/2018	Dry Weather				<4.0	30	<1.0	0.100	12,000	590
003 - Porter Street Outfall 2	8/17/2018	Dry Weather				<4.0	<5.0	<1.0	0.050	130	140
003 - Porter Street Outfall 3	8/3/2018	Dry Weather				6	460	<2.0	0.050	<10	60
003 - Porter Street Outfall Average		Dry Weather				2.0	163	0.0	0.067	116	170
003 - Porter Street Outfall 1	9/18/2018	Wet Weather	---	---	7.00	<4.0	7.3	<1.0	0.110	11,000	8,000
003 - Porter Street Outfall 2	9/18/2018	Wet Weather	---	---	7.21	<4.0	<5.0	<1.0	<0.050	10	110
003 - Porter Street Outfall 3	9/18/2018	Wet Weather	---	---	6.97	<4.0	<5.0	<1.0	<0.050	50	2,500
003 - Porter Street Outfall Average		Wet Weather	2.751	0.416	7.06	0.0	2.4	0.0	0.037	177	1,301
003 - Porter Street Outfall 1	9/7/2018	Dry Weather				<4.0	25	<1.0	0.330	600	1,400
003 - Porter Street Outfall 2	9/7/2018	Dry Weather				<4.0	12	<1.0	0.140	<10	400
003 - Porter Street Outfall 3	9/7/2018	Dry Weather				<4.0	<5.0	<1.0	0.100	220	350
003 - Porter Street Outfall Average		Dry Weather				0.0	12	0.0	0.190	51	581
Requirements are from NPDES Permit MA0000787, issued July 31, 2007.											
Discharge Limitations											
Maximum Daily			Report	Report	6.0 to 8.5	Report	Report	Report	Report	Report	Report
Average Monthly			Report	Report	6.0 to 8.5	—	Report	Report	Report	Report	Report

Source: Massport.

Notes: Flow rates were estimated for outfall 003 by using the SWMM model developed for Logan Airport.
For averaging calculations, a value of zero was employed for those results measured below the laboratory detection limit. For geometric mean calculations (fecal coliform and Enterococcus) a value of 1 was employed for those results measured below the laboratory detection limit.

TSS Total Suspended Solids

NS Not Sampled

Table J-9 Logan Airport 2018 Monthly Monitoring Results for Fourth Quarter — North, West, and Maverick Street Stormwater Outfalls

	Date	Event	Maximum Daily Flow (MGD)	Average Monthly Flow (MGD)	pH (S.U.)	Oil and Grease (mg/L)	TSS (mg/L)	Benzene (µg/L)	Surfactants (mg/L)	Fecal Coliform (cfu/100mL)	*Enterococcus* (cfu/100mL)	*Klebsiella*[1] (cfu/100mL)
001A – North Outfall	10/23/2018	Wet Weather	3.671	0.351	7.42	<4.0	13.0	<1.0	0.080	NA	NA	NA
002A – West Outfall	10/23/2018	Wet Weather	12.231	1.251	7.30	<4.0	81	<1.0	0.100	NA	NA	NA
004A – Maverick Street Outfall	10/23/2018	Wet Weather	0.965	0.069	6.51	<4.0	**110**	<1.0	0.100	NA	NA	NA
001C – North Outfall	10/17/2018	Dry Weather				<4.0	21	<1.0	0.100	370	1,500	NA
002C – West Outfall	10/17/2018	Dry Weather				<4.0	12	<1.0	0.050	18,000	5,600	NA
004C – Maverick Street Outfall	10/17/2018	Dry Weather				<4.0	12	<1.0	<0.050	5,100	370	NA
001A – North Outfall	11/13/2018	Wet Weather	5.262	1.072	6.67	<4.0	<5.0	<1.0	<0.050	580	3,500	NA
002A – West Outfall	11/13/2018	Wet Weather	19.345	3.797	6.69	<4.0	14	<1.0	<0.050	180	1,000	NA
004A – Maverick Street Outfall	11/13/2018	Wet Weather	1.266	0.239	6.72	<4.0	6.7	<1.0	<0.050	220	690	NA
001C – North Outfall	11/30/2018	Dry Weather				<4.0	16	<1.0	0.060	<10	40	NA
002C – West Outfall	11/30/2018	Dry Weather				<4.0	18	<1.0	<0.050	260	100	NA
004C – Maverick Street Outfall	11/30/2018	Dry Weather				<4.0	8.1	<1.0	<0.050	50	40	NA
001A – North Outfall	12/21/2018	Wet Weather	2.444	0.289	7.57	<4.0	18	<1.0	0.140	10	160	NA
002A – West Outfall	12/21/2018	Wet Weather	7.729	0.957	8.21	5.9	46	<1.0	0.340	1,400	2,100	NA
004A – Maverick Street Outfall	12/21/2018	Wet Weather	0.568	0.042	6.34	<4.0	64	<1.0	0.090	60	350	NA
001C – North Outfall	12/6/2018	Dry Weather				<4.0	14	<1.0	0.050	<10	<10	NA
002C – West Outfall	12/6/2018	Dry Weather				4.9	15	<1.0	0.060	2,900	1,400	NA
004C – Maverick Street Outfall	12/6/2018	Dry Weather				<4.0	8.4	<1.0	<0.050	710	410	NA
Requirements are from NPDES Permit MA0000787, issued July 31, 2007.												
Discharge Limitations												
Maximum Daily			Report	Report	6.0 to 8.5	15 mg/L	100 mg/L	Report	Report	Report	Report	Report
Average Monthly			Report	Report	6.0 to 8.5	—	Report	Report	Report	Report	Report	Report

Source: Massport.
Notes: Flow rates were estimated for outfalls 001, 002, and 004 by using the SWMM model developed for Logan Airport.
1 *Klebsiella* is an indication of non-fecal coliform bacteria and is tested for at the North Outfall when fecal coliform concentration exceeds 5,000 cfu/100ml.
TSS Total Suspended Solids
NA Not Analyzed

Table J-10 Logan Airport 2018 Monthly Monitoring Results for Fourth Quarter — Porter Street Stormwater Outfall

	Date	Event	Maximum Daily Flow (MGD)	Average Monthly Flow (MGD)	pH (S.U.)	Oil and Grease (mg/L)	TSS (mg/L)	Benzene (µg/L)	Surfactants (mg/L)	Fecal Coliform (cfu/100mL)	*Enterococcus* (cfu/100mL)
003 - Porter Street Outfall 1	10/23/2018	Wet Weather	---	---	7.10	<4.0	22.0	<1.0	0.110	NA	NA
003 - Porter Street Outfall 2	10/23/2018	Wet Weather	---	---	6.77	<4.0	14.0	<1.0	0.130	NA	NA
003 - Porter Street Outfall 3	10/23/2018	Wet Weather	---	---	6.61	<4.0	5.9	<1.0	<0.050	NA	NA
003 - Porter Street Outfall Average		Wet Weather	2.548	0.275	6.83	0.0	14.0	0.0	0.080	NA	NA
003 - Porter Street Outfall 1	10/17/2018	Dry Weather				<4.0	19	<1.0	0.100	280	730
003 - Porter Street Outfall 2	10/17/2018	Dry Weather				<4.0	<5.0	<1.0	<0.050	<10	190
003 - Porter Street Outfall 3	10/17/2018	Dry Weather				<4.0	<5.0	<1.0	0.120	80	220
003 - Porter Street Outfall Average		Dry Weather				0.0	6.3	0.0	0.073	28	312
003 - Porter Street Outfall 1	11/13/2018	Wet Weather	---	---	6.82	<4.0	<5.0	<1.0	<0.050	<10	1,900
003 - Porter Street Outfall 2	11/13/2018	Wet Weather	---	---	6.63	<4.0	<5.0	<1.0	<0.050	<10	40
003 - Porter Street Outfall 3	11/13/2018	Wet Weather	---	---	6.78	<4.0	<5.0	<1.0	<0.050	<10	1,200
003 - Porter Street Outfall Average		Wet Weather	3.944	0.812	6.74	0.0	0.0	0.0	0.000	1	450
003 - Porter Street Outfall 1	11/30/2018	Dry Weather				<4.0	7	<1.0	0.130	10	160
003 - Porter Street Outfall 2	11/30/2018	Dry Weather				<4.0	<5.0	<1.0	<0.050	10	110
003 - Porter Street Outfall 3	11/30/2018	Dry Weather				<4.0	10	<1.0	0.100	<10	<10
003 - Porter Street Outfall Average		Dry Weather				0.0	5.6	0.0	0.077	4.6	26
003 - Porter Street Outfall 1	12/21/2018	Wet Weather	---	---	7.00	<4.0	36	<1.0	0.140	510	1,300
003 - Porter Street Outfall 2	12/21/2018	Wet Weather	---	---	6.57	<4.0	5.7	<1.0	0.050	<10	120
003 - Porter Street Outfall 3	12/21/2018	Wet Weather	---	---	6.85	<4.0	<5.0	<1.0	0.060	<10	390
003 - Porter Street Outfall Average		Wet Weather	1.398	0.196	6.81	0.0	13.9	0.0	0.083	8	393
003 - Porter Street Outfall 1	12/6/2018	Dry Weather				<4.0	<5.0	<1.0	0.130	<10	<10
003 - Porter Street Outfall 2	12/6/2018	Dry Weather				<4.0	10	<1.0	<0.050	<10	1,700
003 - Porter Street Outfall 3	12/6/2018	Dry Weather				<4.0	<5.0	<1.0	0.090	<10	280
003 - Porter Street Outfall Average		Dry Weather				0.0	3.2	0.0	0.073	1.0	78
Requirements are from NPDES Permit MA0000787, issued July 31, 2007.											
Discharge Limitations											
Maximum Daily			Report	Report	6.0 to 8.5	Report	Report	Report	Report	Report	Report
Average Monthly			Report	Report	6.0 to 8.5	—	Report	Report	Report	Report	Report

Source: Massport.

Notes: Flow rates were estimated for outfall 003 using the SWMM model developed for Logan Airport.
For averaging calculations, a value of zero was employed for those results measured below the laboratory detection limit. For geometric mean calculations (fecal coliform and Enterococcus) a value of 1 was employed for those results measured below the laboratory detection limit.

TSS Total Suspended Solids

NA Not Analyzed

Table J-11 Logan Airport 2018 Quarterly Wet Weather Monitoring Results – North, West, Maverick Street, and Porter Street Stormwater Outfalls

	Date	pH (S.U.)	Benzo(a)-anthracene (µg/L)	Benzo(a)-pyrene (µg/L)	Benzo(b)-fluoranthene (µg/L)	Benzo(k)-fluoranthene (µg/L)	Chrysene (µg/L)	Dibenzo(a,h,)-anthracene (µg/L)	Indeno(1,2,3-cd)-pyrene (µg/L)	Naphthalene (µg/L)	Total PAHs (µg/L)
001Q - North Outfall	1/17/2018	7.88	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	ND
002Q - West Outfall	1/17/2018	8.05	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	5.5	5.5
004Q - Maverick Street Outfall	1/17/2018	7.57	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	ND
003Q - Porter Street Outfall 1	1/17/2018	7.69	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	ND
003Q - Porter Street Outfall 2	1/17/2018	6.75	<2.0	<2.0	3.0	<2.0	2.2	<2.0	<2.0	<2.0	5.2
003Q - Porter Street Outfall 3	1/17/2018	7.61	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	ND
003Q - Porter Street Outfall Average		7.35	0.0	0.0	1.0	0.0	0.7	0.0	0.0	0.0	1.7
001Q - North Outfall	6/28/2018	7.10	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	ND
002Q - West Outfall	6/28/2018	7.32	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	ND
004Q - Maverick Street Outfall	6/28/2018	7.25	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	ND
003Q - Porter Street Outfall 1	6/28/2018	7.31	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	ND
003Q - Porter Street Outfall 2	6/28/2018	7.43	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	ND
003Q - Porter Street Outfall 3	6/28/2018	7.18	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	ND
003Q - Porter Street Outfall Average		7.31	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
001Q - North Outfall	9/18/2018	6.96	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	ND
002Q - West Outfall	9/18/2018	7.09	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	ND
004Q - Maverick Street Outfall	9/18/2018	7.16	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	ND
003Q - Porter Street Outfall 1	9/18/2018	7.00	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	ND
003Q - Porter Street Outfall 2	9/18/2018	7.21	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	ND
003Q - Porter Street Outfall 3	9/18/2018	6.97	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	ND
003Q - Porter Street Outfall Average		7.06	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
001Q - North Outfall	11/13/2018	6.67	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	ND
002Q - West Outfall	11/13/2018	6.69	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	ND
004Q - Maverick Street Outfall	11/13/2018	6.72	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	ND
003Q - Porter Street Outfall 1	11/13/2018	6.82	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	ND
003Q - Porter Street Outfall 2	11/13/2018	6.63	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	ND
003Q - Porter Street Outfall 3	11/13/2018	6.78	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	ND
003Q - Porter Street Outfall Average		6.74	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Requirements are from NPDES Permit MA0000787, issued July 31, 2007.											
Discharge Limitations											
Maximum Daily		6.0 to 8.5	Report	Report	Report	Report	Report	Report	Report	Report	Total

Source: Massport
Notes: For averaging calculations, a value of zero was employed for those results measures below the laboratory detection limit.
PAHs Polynuclear Aromatic Hydrocarbons
ND Not Detected

Table J-12 Logan Airport 2018 Quarterly Wet Weather Monitoring Results – Northwest and Runway/Perimeter Stormwater Outfalls

	Date	Maximum Daily Flow (MGD)	Average Monthly Flow (MGD)	pH (SU)	Oil and Grease (mg/L)	TSS (mg/L)	Benzene (µg/L)
005Q - Northwest Outfall	1/17/2018[1]	0.698	0.066	7.97	<4.0	15	<2.0
006Q- Runway/ Perimeter Outfall (A9)	1/17/2018[1]	0.543	0.058	8.13	<4.0	10	<1.0
006Q- Runway/ Perimeter Outfall (A15)	1/17/2018[1]	0.209	0.020	8.34	<4.0	12	<1.0
006Q- Runway/ Perimeter Outfall (A16)	1/17/2018[1]	0.210	0.020	8.46	<4.0	6.3	<1.0
006Q- Runway/ Perimeter Outfall (A21)	1/17/2018[1]	4.281	0.429	7.93	<4.0	14	<1.0
006Q- Runway/ Perimeter Outfall (A23)	1/17/2018[1]	0.436	0.044	8.03	<4.0	23	<1.0
006Q- Runway/ Perimeter Outfall (A33)	1/17/2018[1]	0.278	0.032	5.95	<4.0	31	<1.0
006Q- Runway/ Perimeter Outfall (A38)	1/17/2018[1]	0.620	0.059	8.78	<4.0	16	<1.0
006Q- Runway/Perimeter Outfall Average		0.940	0.095	7.95	0.0	16	0.0
005Q - Northwest Outfall	6/28/2018	0.537	0.041	5.21	<4.0	26	<1.0
006Q- Runway/ Perimeter Outfall (A9)	6/28/2018	0.264	0.027	7.74	<4.0	<5.0	<1.0
006Q- Runway/ Perimeter Outfall (A16)	6/28/2018	0.109	0.009	7.49	<4.0	<5.0	<1.0
006Q- Runway/ Perimeter Outfall (A19)	6/28/2018	0.044	0.004	7.99	<4.0	9.6	<1.0
006Q- Runway/ Perimeter Outfall (A21)	6/28/2018	2.299	0.194	7.70	<4.0	<5.0	<1.0
006Q- Runway/ Perimeter Outfall (A23)	6/28/2018	0.203	0.020	7.94	<4.0	10	<1.0
006Q- Runway/ Perimeter Outfall (A33)	6/28/2018	0.150	0.018	8.24	<4.0	8.5	<1.0
006Q- Runway/ Perimeter Outfall (A38)	6/28/2018	0.311	0.024	7.90	<4.0	6.9	<1.0
006Q- Runway/Perimeter Outfall Average		0.483	0.042	7.86	0.0	5.0	0.0
005Q - Northwest Outfall	9/18/2018	0.521	0.073	NS	NS	NS	NS
006Q- Runway/ Perimeter Outfall (A9)	9/18/2018	0.237	0.041	NS	NS	NS	NS
006Q- Runway/ Perimeter Outfall (A16)	9/18/2018	0.104	0.015	NS	NS	NS	NS
006Q- Runway/ Perimeter Outfall (A19)	9/18/2018	0.045	0.006	NS	NS	NS	NS
006Q- Runway/ Perimeter Outfall (A21)	9/18/2018	1.964	0.313	7.2	<4.0	6	<1.0
006Q- Runway/ Perimeter Outfall (A23)	9/18/2018	0.186	0.032	7.32	<4.0	8	<1.0
006Q- Runway/ Perimeter Outfall (A34)	9/18/2018	0.724	0.107	7.02	<4.0	6	<1.0
006Q- Runway/ Perimeter Outfall (A38)	9/18/2018	0.280	0.039	7.07	<4.0	<5.0	<1.0
006Q- Runway/Perimeter Outfall Average		0.506	0.079	7.15	0.0	5.1	0.0
005Q - Northwest Outfall	11/13/2018	0.697	0.141	6.57	<4.0	36	<1.0
006Q- Runway/ Perimeter Outfall (A9)	11/13/2018	0.400	0.096	6.63	<4.0	<5.0	<1.0
006Q- Runway/ Perimeter Outfall (A16)	11/13/2018	0.162	0.033	6.13	<4.0	<5.0	<1.0
006Q- Runway/ Perimeter Outfall (A20)	11/13/2018	0.168	0.040	6.47	<4.0	<5.0	<1.0
006Q- Runway/ Perimeter Outfall (A21)	11/13/2018	3.525	0.700	6.73	<4.0	<5.0	<1.0
006Q- Runway/ Perimeter Outfall (A23)	11/13/2018	0.297	0.073	6.41	<4.0	<5.0	<1.0
006Q- Runway/ Perimeter Outfall (A33)	11/13/2018	0.227	0.062	5.9	<4.0	6.3	<1.0
006Q- Runway/ Perimeter Outfall (A38)	11/13/2018	0.493	0.090	6.78	<4.0	190	<1.0
006Q- Runway/Perimeter Outfall Average		0.753	0.156	6.44	0.0	28	0.0
Discharge Limitations		Report	Report	Report	Report	Report	Report

Source: Massport

Notes: For averaging calculations, a value of zero was employed for those results measures below the laboratory detection limit.
Requirements are from NPDES Permit MA 0000787, issued July 31, 2007.

1 January 2018 wet weather bacteria samples were collected on 1/23/2018.

TSS Total Suspended Solids

Table J-13 Logan Airport January 2018 Wet Weather Deicing Monitoring Results – North, West, Porter Street, and Runway/Perimeter Stormwater Outfalls

	Date	Ethylene Glycol, Total (mg/L)	Propylene Glycol, Total (mg/L)	BOD5 (mg/L)	COD (mg/L)	Ammonia Nitrogen (mg/L)	Nonylphenol (µg/L)	4-Methyl-1-H-benzotriazole (µg/L)	5-Methyl-1-H-benzotriazole (µg/L)	Tolytriazole (µg/L)
001B - North Outfall	1/17/2018	<800	12,400	14,000	28,000	0.733	<0.02	22.67	37.21	59.88
002B - West Outfall	1/17/2018	<400	11,400	13,000	21,000	0.921	<0.02	16.29	17.92	34.21
003B - Porter Street Outfall 1	1/17/2018	2.88	22.9	59	1,300	1.21	<0.02	2.27	3.33	5.60
003B - Porter Street Outfall 2	1/17/2018	9.66	134	220	450	0.087	<0.02	6.73	9.71	16.44
003B - Porter Street Outfall 3	1/17/2018	<2.00	2.96	12	56	0.251	<0.02	<1.00	<1.00	ND
003B - Porter Street Outfall Average		4.18	53	97	602	0.52	0.00	3.00	4.35	7.35
006B- Runway/ Perimeter (A9)	1/17/2018	<2.00	<2.00	7.7	40	0.389	<0.02	3.36	1.08	4.44
006B- Runway/ Perimeter (A15)	1/17/2018	<2.00	<2.00	50	70	0.110	<0.02	3.37	0.62 J	3.99 J
006B- Runway/ Perimeter (A16)	1/17/2018	<2.00	<2.00	17	50	0.457	<0.02	2.68	0.42 J	3.10 J
006B- Runway/ Perimeter (A21)	1/17/2018	<2.00	<2.00	<10	460	0.661	<0.02	3.48	1.13	4.61
006B- Runway/ Perimeter (A23)	1/17/2018	<2.00	<2.00	26	160	1.18	<0.02	8.19	1.58	9.77
006B- Runway/ Perimeter (A33)	1/17/2018	<2.00	<2.00	99	150	3.11	<0.02	10.50	4.60	15.10
006B- Runway/ Perimeter (A38)	1/17/2018	<2.00	<2.00	13	330	0.166	<0.02	<1.00	<1.00	ND
006B- Runway/Perimeter Outfall Average		0.00	0.00	30	180	0.868	0.00	4.51	1.35	5.86
Requirements are from NPDES Permit MA0000787, issued July 31, 2007.										
Discharge Limitations										
Average Monthly		Report	Report	Report	Report	Report	Report	Report	Report	Report
Maximum Daily		Report	Report	Report	Report	Report	Report	Report	Report	Report

Source: Massport
Notes: For averaging calculations, a value of zero was employed for those results measured below the laboratory detection limit.
J = value is an estimate calculated by the lab from the response factors of the other two triazole compounds.
Tolytriazole concentrations calculated as sum of 4-Methly-1-H-benzotriazole and 5-Methyl-1-H-benzotriazole.
BOD5 Five-day Biochemical Oxygen Demand
COD Chemical Oxygen Demand
ND Not Detected

Table J-14 Logan Airport March 2018 Wet Weather Deicing Monitoring Results – North, West, Porter Street, and Runway/Perimeter Stormwater Outfalls

	Date	Ethylene Glycol, Total (mg/L)	Propylene Glycol, Total (mg/L)	BOD5 (mg/L)	COD (mg/L)	Ammonia Nitrogen (mg/L)	Nonylphenol (µg/L)	4-Methyl-1-H-benzotriazole (µg/L)	5-Methyl-1-H-benzotriazole (µg/L)	Tolytriazole (µg/L)
001B - North Outfall	3/22/2018	<200	5,250	5,200	12,000	0.364	<0.02	<1.00	102.21	102.21
002B - West Outfall	3/22/2018	<200	2,970	3,100	5,700	1.460	<0.02	<1.00	20.97	20.97
003B - Porter Street Outfall 1	3/22/2018	2.68	3.8	27	610	1.47	<0.02	<1.00	4.64	4.64
003B - Porter Street Outfall 2	3/22/2018	10.70	5	50	230	<0.075	<0.02	<1.00	11.29	11.29
003B - Porter Street Outfall 3	3/22/2018	<2.00	<2.00	<5.0	95	0.212	<0.02	<1.00	<1.00	ND
003B - Porter Street Outfall Average		4.46	2.99	26	312	0.56	0.00	0.00	5.31	5.31
006B- Runway/ Perimeter (A9)	3/22/2018	5.77	<2.00	340	450	0.881	<0.02	<1.00	49.79	49.79
006B- Runway/ Perimeter (A16)	3/22/2018	6.84	11.1	540	680	<0.075	<0.02	<1.00	17.93	17.93
006B- Runway/ Perimeter (A20)	3/22/2018	<10	261	1,200	2,000	<0.075	<0.02	<1.00	72.08	72.08
006B- Runway/ Perimeter (A21)	3/22/2018	5.91	99.1	1,000	2,900	0.352	<0.02	<1.00	84.95	84.95
006B- Runway/ Perimeter (A23)	3/22/2018	2.57	15.9	830	1,700	0.50	<0.02	<1.00	52.48	52.48
006B- Runway/ Perimeter (A33)	3/22/2018	<10	268	920	2,300	0.149	<0.02	<1.00	26.79	26.79
006B- Runway/ Perimeter (A38)	3/22/2018	<2.00	<2.00	<5.0	140	0.253	<0.02	<1.00	<1.00	ND
006B- Runway/Perimeter Outfall Average		3.01	93.6	690	1,453	0.305	0.00	0.00	43.43	43.43
Requirements are from NPDES Permit MA0000787, issued July 31, 2007.										
Discharge Limitations										
Average Monthly		Report	Report	Report	Report	Report	Report	Report	Report	Report
Maximum Daily		Report	Report	Report	Report	Report	Report	Report	Report	Report

Source: Massport.
Notes: For averaging calculations, a value of zero was employed for those results measured below the laboratory detection limit.
Tolytriazole concentrations calculated as sum of 4-Methly-1-H-benzotriazole and 5-Methyl-1-H-benzotriazole.
BOD5 Five-day Biochemical Oxygen Demand
COD Chemical Oxygen Demand
ND Not Detected

Table J-15 Logan Airport 2019 Monthly Monitoring Results for First Quarter — North, West, and Maverick Street Stormwater Outfalls

	Date	Event	Maximum Daily Flow (MGD)	Average Monthly Flow (MGD)	pH (S.U.)	Oil and Grease (mg/L)	TSS (mg/L)	Benzene (µg/L)	Surfactants (mg/L)	Fecal Coliform (cfu/100mL)	*Enterococcus* (cfu/100mL)	*Klebsiella* (cfu/100mL)
001A – North Outfall	1/24/2019	Wet Weather	6.095	0.679	7.76	<4.0	26	<1.0	0.070	40	1,200	NA
002A – West Outfall	1/24/2019	Wet Weather	13.616	1.593	7.39	4.0	36	<1.0	0.090	110	2,800	NA
004A – Maverick Street Outfall	1/24/2019	Wet Weather	1.089	0.071	7.41	5.3	48	<1.0	0.110	40	710	NA
001C – North Outfall	1/15/2019	Dry Weather				<4.0	14	<1.0	0.050	<10	10	NA
002C – West Outfall	1/15/2019	Dry Weather				<4.0	9.0	<1.0	<0.050	90	<10	NA
004C – Maverick Street Outfall	1/15/2019	Dry Weather				<4.0	13	<1.0	<0.050	20	10	NA
001A – North Outfall	2/7/2019	Wet Weather	2.328	0.484	6.73	<4.0	12	<1.0	<0.050	10	350	NA
002A – West Outfall	2/7/2019	Wet Weather	7.438	0.965	6.84	<4.0	30	<1.0	0.090	100	1,400	NA
004A – Maverick Street Outfall	2/7/2019	Wet Weather	0.504	0.035	6.38	<4.0	7.4	<1.0	<0.050	230	260	NA
001C – North Outfall	---	Dry Weather				NS	NS	NS	NS	NS	NS	NS
002C – West Outfall	---	Dry Weather				NS	NS	NS	NS	NS	NS	NS
004C – Maverick Street Outfall	---	Dry Weather				NS	NS	NS	NS	NS	NS	NS
001A – North Outfall	3/22/2019	Wet Weather	2.987	0.623	G	<4.0	16	<1.0	0.080	60	240	NA
002A – West Outfall	3/22/2019	Wet Weather	10.677	1.069	6.44	**19**	**590**	<1.0	0.680	440	440	NA
004A – Maverick Street Outfall	3/22/2019	Wet Weather	0.634	0.036	8.50	<4.0	29	<1.0	0.110	530	290	NA
001C – North Outfall	3/8/2019	Dry Weather				<4.0	24	<1.0	0.070	70	490	NA
002C – West Outfall	3/8/2019	Dry Weather				<4.0	17	<1.0	0.060	70	100	NA
004C – Maverick Street Outfall	3/8/2019	Dry Weather				<4.0	7.0	<1.0	<0.050	40	<10	NA
Requirements are from NPDES Permit MA0000787, issued July 31, 2007.												
Discharge Limitations												
Maximum Daily			Report	Report	6.0 to 8.5	15 mg/L	100 mg/L	Report	Report	Report	Report	
Average Monthly			Report	Report	6.0 to 8.5	—	Report	Report	Report	Report	Report	

Source: Massport.
Notes: Flow rates were estimated for outfalls 001, 002, and 004 by using the SWMM model developed for Logan Airport.
1 *Klebsiella* is an indication of non-fecal coliform bacteria and is tested for at the North Outfall when fecal coliform concentration exceeds 5,000 cfu/100ml.
NA Not Analyzed
NS Not Sampled
G Equipment failure
TSS Total Suspended Solids

Table J-16 Logan Airport 2019 Monthly Monitoring Results for First Quarter — Porter Street Stormwater Outfall

	Date	Event	Maximum Daily Flow (MGD)	Average Monthly Flow (MGD)	pH (S.U.)	Oil and Grease (mg/L)	TSS (mg/L)	Benzene (µg/L)	Surfactants (mg/L)	Fecal Coliform (cfu/100mL)	*Enterococcus* (cfu/100mL)
003 - Porter Street Outfall 1	1/24/2019	Wet Weather	---	---	7.98	<4.0	32	<1.0	0.100	50	370
003 - Porter Street Outfall 2	1/24/2019	Wet Weather	---	---	8.06	160	400	<1.0	<0.050	10	70
003 - Porter Street Outfall 3	1/24/2019	Wet Weather	---	---	7.83	14	89	<1.0	0.100	<10	60
003 - Porter Street Outfall Average		Wet Weather	2.501	0.295	7.96	58	174	0.0	0.067	7.9	116
003 - Porter Street Outfall 1	1/15/2019	Dry Weather				<4.0	14	<1.0	0.110	<10	<10
003 - Porter Street Outfall 2	1/15/2019	Dry Weather				<4.0	19	<1.0	<0.050	<10	10
003 - Porter Street Outfall 3	1/15/2019	Dry Weather				<4.0	20	<1.0	0.080	<10	10
003 - Porter Street Outfall Average		Dry Weather				0.0	18	0.0	0.063	1.0	4.6
003 - Porter Street Outfall 1	2/7/2019	Wet Weather	---	---	6.75	<4.0	19	<1.0	0.050	1,900	2,100
003 - Porter Street Outfall 2	2/7/2019	Wet Weather	---	---	6.72	<4.0	43	<1.0	0.050	30	40
003 - Porter Street Outfall 3	2/7/2019	Wet Weather	---	---	6.78	<4.0	<5.0	<1.0	<0.050	<10	30
003 - Porter Street Outfall Average		Wet Weather	1.477	0.188	6.75	<4.0	20.67	0.0	0.033	38.5	136
003 - Porter Street Outfall 1	---	Dry Weather				NS	NS	NS	NS	NS	NS
003 - Porter Street Outfall 2	---	Dry Weather				NS	NS	NS	NS	NS	NS
003 - Porter Street Outfall 3	---	Dry Weather				NS	NS	NS	NS	NS	NS
003 - Porter Street Outfall Average		Dry Weather				NS	NS	NS	NS	NS	NS
003 - Porter Street Outfall 1	3/22/2019	Wet Weather	---	---	6.62	<4.0	36	<1.0	0.120	270	1,100
003 - Porter Street Outfall 2	3/22/2019	Wet Weather	---	---	G	<4.0	13	<1.0	0.090	<10	<10
003 - Porter Street Outfall 3	3/22/2019	Wet Weather	---	---	6.30	<4.0	<5.0	<1.0	0.080	<10	550
003 - Porter Street Outfall Average		Wet Weather	2.404	0.180	6.46	4.0	18	1.0	0.097	30	182
003 - Porter Street Outfall 1	3/8/2019	Dry Weather				<4.0	8.6	<1.0	0.090	<10	<10
003 - Porter Street Outfall 2	3/8/2019	Dry Weather				<4.0	85	<1.0	0.220	<10	<10
003 - Porter Street Outfall 3	3/8/2019	Dry Weather				<4.0	<5.0	<1.0	0.080	<10	10
003 - Porter Street Outfall Average		Dry Weather				4.0	33	1.0	0.130	10	10
Requirements are from NPDES Permit MA0000787, issued July 31, 2007.											
Discharge Limitations											
Maximum Daily			Report	Report	6.0 to 8.5	Report	Report	Report	Report	Report	Report
Average Monthly			Report	Report	6.0 to 8.5	—	Report	Report	Report	Report	Report

Source: Massport.

Notes: Flow rates were estimated for outfalls 001, 002, 003 and 004 by using the SWMM model developed for Logan Airport.
For averaging calculations, a value of zero was employed for those results measured below the laboratory detection limit. For geometric mean calculations (fecal coliform and Enterococcus) a value of 1 was employed for those results measured below the laboratory detection limit. For averaging calculations beginning March 2019, the reporting limit was employed for those results measured below the laboratory detection limit. For geometric mean calculations (fecal coliform and Enterococcus) beginning in March 2019, the reporting limit was employed for those results measured below the laboratory detection limit.

TSS Total Suspended Solids

NS Not Sampled

G Equipment failure

Table J-17 Logan Airport 2019 Monthly Monitoring Results for Second Quarter — North, West, and Maverick Street Stormwater Outfalls

	Date	Event	Maximum Daily Flow (MGD)	Average Monthly Flow (MGD)	pH (S.U.)	Oil and Grease (mg/L)	TSS (mg/L)	Benzene (µg/L)	Surfactants (mg/L)	Fecal Coliform (cfu/100mL)	*Enterococcus* (cfu/100mL)	*Klebsiella*[1] (cfu/100mL)
001A – North Outfall	4/26/2019	Wet Weather	7.599	0.713	6.07	<4.0	18	<1.0	0.184	620	570	NA
002A – West Outfall	4/26/2019	Wet Weather	21.949	2.450	6.11	<4.0	14	<1.0	<0.050	610	1,100	NA
004A – Maverick Street Outfall	4/26/2019	Wet Weather	2.066	0.152	6.34	<4.0	10	<1.0	0.254	1,100	410	NA
001C – North Outfall	4/12/2019	Dry Weather				<4.0	19	<1.0	0.110	<10	20	NA
002C – West Outfall	4/12/2019	Dry Weather				<4.0	13	<1.0	0.070	820	50	NA
004C – Maverick Street Outfall	4/12/2019	Dry Weather				<4.0	6.1	<1.0	<0.050	2,600	190	NA
001A – North Outfall	5/28/2019	Wet Weather	2.486	0.296	6.90	<4.0	18	<1.0	0.070	30	40	NA
002A – West Outfall	5/28/2019	Wet Weather	6.131	0.992	6.48	<4.0	10	<1.0	0.070	20	40	NA
004A – Maverick Street Outfall	5/28/2019	Wet Weather	0.600	0.044	6.44	<4.0	<5.0	<1.0	0.080	1,300	1,300	NA
001C – North Outfall	5/9/2019	Dry Weather				<4.0	19	<1.0	0.150	40	60	NA
002C – West Outfall	5/9/2019	Dry Weather				<4.0	17	<1.0	0.080	40	40	NA
004C – Maverick Street Outfall	5/9/2019	Dry Weather				<4.0	<5	<1.0	<0.050	6,500	630	NA
001A – North Outfall	6/6/2019	Wet Weather	4.328	0.478	7.43	<4.0	22	<1.0	0.28	1,600	100	NA
002A – West Outfall	6/6/2019	Wet Weather	13.808	1.730	6.75	<4.0	20	<1.0	0.140	560	460	NA
004A – Maverick Street Outfall	6/6/2019	Wet Weather	1.318	0.106	6.75	<4.0	10	<1.0	<0.050	560	670	NA
001C – North Outfall	6/5/2019	Dry Weather				<4.0	8.1	<1.0	0.130	40	90	NA
002C – West Outfall	6/5/2019	Dry Weather				<4.0	16	<1.0	0.060	780	490	NA
004C – Maverick Street Outfall	6/5/2019	Dry Weather				<4.0	13	<1.0	0.060	20	90	NA
Requirements are from NPDES Permit MA0000787, issued July 31, 2007.												
Discharge Limitations												
Maximum Daily			Report	Report	6.0 to 8.5	15 mg/L	100 mg/L	Report	Report	Report	Report	
Average Monthly			Report	Report	6.0 to 8.5	—	Report	Report	Report	Report	Report	

Source: Massport.
Notes: Flow rates were estimated for outfalls 001, 002, 003 and 004 by using the SWMM model developed for Logan Airport.
1 *Klebsiella* is an indication of non-fecal coliform bacteria and is tested for at the North Outfall when fecal coliform concentration exceeds 5,000 cfu/100ml.
TSS Total Suspended Solids
NA Not Analyzed

Table J-18 Logan Airport 2019 Monthly Monitoring Results for Second Quarter — Porter Street Stormwater Outfall

	Date	Event	Maximum Daily Flow (MGD)	Average Monthly Flow (MGD)	pH (S.U.)	Oil and Grease (mg/L)	TSS (mg/L)	Benzene (µg/L)	Surfactants (mg/L)	Fecal Coliform (cfu/100mL)	*Enterococcus* (cfu/100mL)
003 - Porter Street Outfall 1	4/26/2019	Wet Weather	---	---	6.24	<4.0	19	<1.0	0.050	330	2,900
003 - Porter Street Outfall 2	4/26/2019	Wet Weather	---	---	6.46	<4.0	<5.0	<1.0	<0.050	<10	20
003 - Porter Street Outfall 3	4/26/2019	Wet Weather	---	---	6.35	<4.0	12	<1.0	<0.050	<10	290
003 - Porter Street Outfall Average		Wet Weather	3.173	0.476	6.35	4.0	12	1.0	0.050	32	256
003 - Porter Street Outfall 1	4/12/2019	Dry Weather				<4.0	9.3	<1.0	0.110	<10	50
003 - Porter Street Outfall 2	4/12/2019	Dry Weather				<4.0	26	<1.0	0.110	<10	<10
003 - Porter Street Outfall 3	4/12/2019	Dry Weather				<4.0	9.0	<1.0	0.130	<10	20
003 - Porter Street Outfall Average		Dry Weather				4.0	15	1.0	0.117	10	21.5
003 - Porter Street Outfall 1	5/28/2019	Wet Weather	---	---	6.90	<4.0	25	<1.0	0.200	1,200	1,100
003 - Porter Street Outfall 2	5/28/2019	Wet Weather	---	---	NS	NS	NS	NS	NS	NS	NS
003 - Porter Street Outfall 3	5/28/2019	Wet Weather	---	---	7.22	<4.0	6.1	<1.0	0.140	20	280
003 - Porter Street Outfall Average		Wet Weather	1.686	0.220	7.06	4.0	15.55	1.0	0.170	155	555
003 - Porter Street Outfall 1	5/9/2019	Dry Weather				<4.0	8.3	<1.0	0.180	<10	30
003 - Porter Street Outfall 2	5/9/2019	Dry Weather				<4.0	5.9	<1.0	0.120	<10	10
003 - Porter Street Outfall 3	5/9/2019	Dry Weather				<4.0	<5.0	<1.0	0.090	<10	10
003 - Porter Street Outfall Average		Dry Weather				4.0	6.0	1.0	0.130	10	14.4
003 - Porter Street Outfall 1	6/6/2019	Wet Weather	---	---	7.04	<4.0	8.3	<1.0	0.190	5,800	1,000
003 - Porter Street Outfall 2	6/6/2019	Wet Weather	---	---	8.04	<4.0	<5.0	<1.0	0.090	<10	80
003 - Porter Street Outfall 3	6/6/2019	Wet Weather	---	---	6.78	<4.0	35	<1.0	0.060	50	540
003 - Porter Street Outfall Average		Wet Weather	3.161	0.394	7.29	4.0	16.1	1.0	0.113	143	351
003 - Porter Street Outfall 1	6/5/2019	Dry Weather				<4.0	11	<1.0	0.100	40	450
003 - Porter Street Outfall 2	6/5/2019	Dry Weather				<4.0	130	<1.0	0.080	<10	10
003 - Porter Street Outfall 3	6/5/2019	Dry Weather				9.4	59	<1.0	0.200	20	100
003 - Porter Street Outfall Average		Dry Weather				5.8	67	1.0	0.127	20	76.6
Requirements are from NPDES Permit MA0000787, issued July 31, 2007.											
Discharge Limitations											
Maximum Daily			Report	Report	6.0 to 8.5	Report	Report	Report	Report	Report	Report
Average Monthly			Report	Report	6.0 to 8.5	—	Report	Report	Report	Report	Report

Source: Massport.

Notes: Flow rates were estimated for outfalls 001, 002, 003 and 004 by using the SWMM model developed for Logan Airport.
For averaging calculations beginning March 2019, the reporting limit was employed for those results measured below the laboratory detection limit. For geometric mean calculations (fecal coliform and Enterococcus) beginning in March 2019, the reporting limit was employed for those results measured below the laboratory detection limit.

TSS Total Suspended Solids

NS Not Sampled

Table J-19 Logan Airport 2019 Monthly Monitoring Results for Third Quarter — North, West, and Maverick Street Stormwater Outfalls

	Date	Event	Maximum Daily Flow (MGD)	Average Monthly Flow (MGD)	pH (S.U.)	Oil and Grease (mg/L)	TSS (mg/L)	Benzene (µg/L)	Surfactants (mg/L)	Fecal Coliform (cfu/100mL)	*Enterococcus* (cfu/100mL)	*Klebsiella*[1] (cfu/100mL)
001A – North Outfall	7/12/2019	Wet Weather	4.710	0.629	6.19	<4.0	<5.0	<1.0	0.110	20,000	4,300	NA
002A – West Outfall	7/12/2019	Wet Weather	16.324	2.204	7.11	<4.0	16	<1.0	0.130	5,200	20,000	NA
004A – Maverick Street Outfall	7/12/2019	Wet Weather	1.282	0.132	6.76	<4.0	6.8	<1.0	0.110	>80,000	1,600	NA
001C – North Outfall	7/26/2019	Dry Weather				<4.0	18	<1.0	0.050	4,000	700	NA
002C – West Outfall	7/26/2019	Dry Weather				<4.0	16	<1.0	0.050	9,000	630	NA
004C – Maverick Street Outfall	7/26/2019	Dry Weather				<4.0	9.5	<1.0	0.060	60	100	NA
001A – North Outfall	8/29/2019	Wet Weather	4.368	0.392	7.09	<4.0	<5.0	<1.0	0.070	3,300	9,000	NA
002A – West Outfall	8/29/2019	Wet Weather	17.385	1.427	7.14	<4.0	9.7	<1.0	0.070	7,400	21,000	NA
004A – Maverick Street Outfall	8/29/2019	Wet Weather	1.471	0.108	6.89	<4.0	<5.0	<1.0	0.080	>80,000	3,500	NA
001C – North Outfall	8/5/2019	Dry Weather				<4.0	19	<1.0	0.060	130	40	NA
002C – West Outfall	8/5/2019	Dry Weather				<4.0	8.4	<1.0	0.070	40	380	NA
004C – Maverick Street Outfall	8/5/2019	Dry Weather				<4.0	11	<1.0	<0.050	40	10	NA
001A – North Outfall	---	Wet Weather	3.850	0.224	NS	NS	NS	NS	NS	NS	NS	NS
002A – West Outfall	---	Wet Weather	11.379	0.776	NS	NS	NS	NS	NS	NS	NS	NS
004A – Maverick Street Outfall	---	Wet Weather	0.992	0.039	NS	NS	NS	NS	NS	NS	NS	NS
001C – North Outfall	9/10/2019	Dry Weather				<4.0	6.0	<1.0	0.050	30	60	NA
002C – West Outfall	9/10/2019	Dry Weather				<4.0	7.5	<1.0	0.060	32,000	480	NA
004C – Maverick Street Outfall	9/10/2019	Dry Weather				<4.0	6.8	<1.0	<0.050	300	200	NA
Requirements are from NPDES Permit MA0000787, issued July 31, 2007.												
Discharge Limitations												
Maximum Daily			Report	Report	6.0 to 8.5	15 mg/L	100 mg/L	Report	Report	Report	Report	Report
Average Monthly			Report	Report	6.0 to 8.5	—	Report	Report	Report	Report	Report	Report

Source: Massport.
Notes: Flow rates were estimated for outfalls 001, 002, and 004 by using the SWMM model developed for Logan Airport.
1 *Klebsiella* is an indication of non-fecal coliform bacteria and is tested for at the North Outfall when fecal coliform concentration exceeds 5,000 cfu/100ml.
TSS Total Suspended Solids
NA Not Analyzed
NS Not Sampled

Table J-20 Logan Airport 2019 Monthly Monitoring Results for Third Quarter — Porter Street Stormwater Outfall

	Date	Event	Maximum Daily Flow (MGD)	Average Monthly Flow (MGD)	pH (S.U.)	Oil and Grease (mg/L)	TSS (mg/L)	Benzene (µg/L)	Surfactants (mg/L)	Fecal Coliform (cfu/100mL)	*Enterococcus* (cfu/100mL)
003 - Porter Street Outfall 1	7/12/2019	Wet Weather	---	---	6.36	<4.0	8.7	<1.0	0.120	3,000	6,700
003 - Porter Street Outfall 2	7/12/2019	Wet Weather	---	---	6.99	<4.0	<5.0	<1.0	<0.050	50	4,700
003 - Porter Street Outfall 3	7/12/2019	Wet Weather	---	---	6.35	<4.0	68	<1.0	0.170	500	2,500
003 - Porter Street Outfall Average		Wet Weather	3.617	0.479	6.57	4.0	27.23	1.0	0.113	422	4,286
003 - Porter Street Outfall 1	7/26/2019	Dry Weather				<4.0	8.5	<1.0	0.060	730	1,700
003 - Porter Street Outfall 2	7/26/2019	Dry Weather				<4.0	5.4	<1.0	<0.050	<10	<10
003 - Porter Street Outfall 3	7/26/2019	Dry Weather				<4.0	<5.0	<1.0	0.080	<10	<10
003 - Porter Street Outfall Average		Dry Weather				4.0	6.0	1.0	0.063	41.8	55.4
003 - Porter Street Outfall 1	8/29/2019	Wet Weather	---	---	6.97	<4.0	6.8	<1.0	0.070	7,900	22,000
003 - Porter Street Outfall 2	8/29/2019	Wet Weather	---	---	7.18	<4.0	<5.0	<1.0	<0.050	70	140
003 - Porter Street Outfall 3	8/29/2019	Wet Weather	---	---	6.59	<4.0	<5.0	<1.0	0.080	360	3,500
003 - Porter Street Outfall Average		Wet Weather	2.463	0.288	6.91	4.0	5.6	1.0	0.067	584	2,209
003 - Porter Street Outfall 1	8/5/2019	Dry Weather				<4.0	31	<1.0	0.100	3,500	550
003 - Porter Street Outfall 2	8/5/2019	Dry Weather				<4.0	17	<1.0	<0.050	<10	<10
003 - Porter Street Outfall 3	8/5/2019	Dry Weather				<4.0	7.1	<1.0	0.120	10	60
003 - Porter Street Outfall Average		Dry Weather				4.0	18	1.0	0.090	70	69
003 - Porter Street Outfall 1	---	Wet Weather	---	---	NS	NS	NS	NS	NS	NS	NS
003 - Porter Street Outfall 2	---	Wet Weather	---	---	NS	NS	NS	NS	NS	NS	NS
003 - Porter Street Outfall 3	---	Wet Weather	---	---	NS	NS	NS	NS	NS	NS	NS
003 - Porter Street Outfall Average		Wet Weather	2.204	0.170	NS	NS	NS	NS	NS	NS	NS
003 - Porter Street Outfall 1	9/10/2019	Dry Weather				<4.0	20	<1.0	0.050	180	2,100
003 - Porter Street Outfall 2	9/10/2019	Dry Weather				<4.0	<5.0	<1.0	<0.050	100	180
003 - Porter Street Outfall 3	9/10/2019	Dry Weather				<4.0	7.0	<1.0	0.080	30	550
003 - Porter Street Outfall Average		Dry Weather				4.0	11	1.0	0.060	81	592
Requirements are from NPDES Permit MA0000787, issued July 31, 2007.											
Discharge Limitations											
Maximum Daily			Report	Report	6.0 to 8.5	Report	Report	Report	Report	Report	Report
Average Monthly			Report	Report	6.0 to 8.5	—	Report	Report	Report	Report	Report

Source: Massport.

Notes: Flow rates were estimated for outfall 003 by using the SWMM model developed for Logan Airport.
For averaging calculations beginning March 2019, the reporting limit was employed for those results measured below the laboratory detection limit. For geometric mean calculations (fecal coliform and Enterococcus) beginning in March 2019, the reporting limit was employed for those results measured below the laboratory detection limit.

TSS Total Suspended Solids

NS Not Sampled

Table J-21 Logan Airport 2019 Monthly Monitoring Results for Fourth Quarter — North, West, and Maverick Street Stormwater Outfalls

	Date	Event	Maximum Daily Flow (MGD)	Average Monthly Flow (MGD)	pH (S.U.)	Oil and Grease (mg/L)	TSS (mg/L)	Benzene (µg/L)	Surfactants (mg/L)	Fecal Coliform (cfu/100mL)	*Enterococcus* (cfu/100mL)	*Klebsiella*[1] (cfu/100mL)
001A – North Outfall	10/23/2019	Wet Weather	4.800	0.432	7.21	<4.0	7.1	<1.0	0.060	3,400	23,000	NA
002A – West Outfall	10/23/2019	Wet Weather	14.612	1.513	7.54	<4.0	7.5	<1.0	0.120	730	18,000	NA
004A – Maverick Street Outfall	10/23/2019	Wet Weather	1.067	0.089	6.95	<4.0	6.7	<1.0	0.060	1,700	690	NA
001C – North Outfall	10/1/2019	Dry Weather				<4.0	14.0	<1.0	0.140	400	620	NA
002C – West Outfall	10/1/2019	Dry Weather				<4.0	11.0	<1.0	0.090	110	260	NA
004C – Maverick Street Outfall	10/1/2019	Dry Weather				<4.0	8.2	<1.0	0.050	5,500	460	NA
001A – North Outfall	---	Wet Weather	5.168	0.351	NS	NS	NS	NS	NS	NS	NS	NS
002A – West Outfall	---	Wet Weather	16.125	1.235	NS	NS	NS	NS	NS	NS	NS	NS
004A – Maverick Street Outfall	---	Wet Weather	1.164	0.064	NS	NS	NS	NS	NS	NS	NS	NS
001C – North Outfall	11/4/2019	Dry Weather				<4.0	6.7	<1.0	0.050	60	30	NA
002C – West Outfall	11/4/2019	Dry Weather				<4.0	8.1	<1.0	0.070	270	60	NA
004C – Maverick Street Outfall	11/4/2019	Dry Weather				<4.0	7.8	<1.0	0.050	<10	10	NA
001A – North Outfall	12/9/2019	Wet Weather	4.549	0.869	7.26	6.1	30	<2.0	0.150	500	2,200	NA
002A – West Outfall	12/9/2019	Wet Weather	16.512	2.334	7.40	4.1	74	<1.0	0.080	550	1,500	NA
004A – Maverick Street Outfall	12/9/2019	Wet Weather	1.136	0.133	7.39	<4.0	16	<1.0	0.070	270	420	NA
001C – North Outfall	12/20/2019	Dry Weather				<4.0	24.0	<5.0	0.080	40	70	NA
002C – West Outfall	12/20/2019	Dry Weather				<4.0	15.0	<2.0	0.070	<10	<10	NA
004C – Maverick Street Outfall	12/20/2019	Dry Weather				<4.0	30	<1.0	<0.050	<10	<10	NA
Requirements are from NPDES Permit MA0000787, issued July 31, 2007.												
Discharge Limitations												
Maximum Daily			Report	Report	6.0 to 8.5	15 mg/L	100 mg/L	Report	Report	Report	Report	Report
Average Monthly			Report	Report	6.0 to 8.5	—	Report	Report	Report	Report	Report	Report

Source: Massport.
Notes: Flow rates were estimated for outfalls 001, 002, and 004 by using the SWMM model developed for Logan Airport.
1 *Klebsiella* is an indication of non-fecal coliform bacteria and is tested for at the North Outfall when fecal coliform concentration exceeds 5,000 cfu/100ml.
TSS Total Suspended Solids
NA Not Analyzed
NS Not Sampled

Table J-22 Logan Airport 2019 Monthly Monitoring Results for Fourth Quarter — Porter Street Stormwater Outfall

	Date	Event	Maximum Daily Flow (MGD)	Average Monthly Flow (MGD)	pH (S.U.)	Oil and Grease (mg/L)	TSS (mg/L)	Benzene (µg/L)	Surfactants (mg/L)	Fecal Coliform (cfu/100mL)	*Enterococcus* (cfu/100mL)
003 - Porter Street Outfall 1	10/23/2019	Wet Weather	---	---	7.95	<4.0	18	<1.0	0.060	1,100	6,400
003 - Porter Street Outfall 2	10/23/2019	Wet Weather	---	---	7.02	<4.0	<5.0	<1.0	<0.050	280	80
003 - Porter Street Outfall 3	10/23/2019	Wet Weather	---	---	7.19	<4.0	<5.0	<1.0	0.080	30	1,100
003 - Porter Street Outfall Average		Wet Weather	3.171	0.322	7.39	4.0	9.3	1.0	0.063	210	826
003 - Porter Street Outfall 1	10/1/2019	Dry Weather				<4.0	18	<1.0	0.150	150	1,000
003 - Porter Street Outfall 2	10/1/2019	Dry Weather				<4.0	<5.0	<1.0	0.060	<10	250
003 - Porter Street Outfall 3	10/1/2019	Dry Weather				<4.0	<5.0	<1.0	0.070	30	660
003 - Porter Street Outfall Average		Dry Weather				4.0	9.0	1.0	0.093	35.6	548
003 - Porter Street Outfall 1	---	Wet Weather	---	---	NS	NS	NS	NS	NS	NS	NS
003 - Porter Street Outfall 2	---	Wet Weather	---	---	NS	NS	NS	NS	NS	NS	NS
003 - Porter Street Outfall 3	---	Wet Weather	---	---	NS	NS	NS	NS	NS	NS	NS
003 - Porter Street Outfall Average		Wet Weather	0.256	3.423	NS	NS	NS	NS	NS	NS	NS
003 - Porter Street Outfall 1	11/4/2019	Dry Weather				<4.0	45	<1.0	0.090	150	40
003 - Porter Street Outfall 2	11/4/2019	Dry Weather				<4.0	36	<1.0	<0.050	330	70
003 - Porter Street Outfall 3	11/4/2019	Dry Weather				<4.0	<5.0	<1.0	0.090	<10	150
003 - Porter Street Outfall Average		Dry Weather				4.0	29	1.0	0.077	79	75
003 - Porter Street Outfall 1	12/9/2019	Wet Weather	---	---	6.98	4.1	120	<1.0	0.110	>80,000	3,800
003 - Porter Street Outfall 2	12/9/2019	Wet Weather	---	---	8.04	6.5	15	<1.0	0.060	20	360
003 - Porter Street Outfall 3	12/9/2019	Wet Weather	---	---	7.77	<4.0	7	<1.0	<0.050	70	650
003 - Porter Street Outfall Average		Wet Weather	3.528	0.456	7.60	4.9	47.4	1.0	0.073	482	962
003 - Porter Street Outfall 1	12/20/2019	Dry Weather				<4.0	28	<1.0	0.110	1,600	330
003 - Porter Street Outfall 2	12/20/2019	Dry Weather				5.9	20	<1.0	0.090	<10	<10
003 - Porter Street Outfall 3	12/20/2019	Dry Weather				<4.0	8.7	<1.0	0.090	<10	<10
003 - Porter Street Outfall Average		Dry Weather				4.6	19	1.0	0.097	54	32
Requirements are from NPDES Permit MA0000787, issued July 31, 2007.											
Discharge Limitations											
Maximum Daily			Report	Report	6.0 to 8.5	Report	Report	Report	Report	Report	Report
Average Monthly			Report	Report	6.0 to 8.5	—	Report	Report	Report	Report	Report

Source: Massport.

Notes: Flow rates were estimated for outfall 003 by using the SWMM model developed for Logan Airport.
For averaging calculations beginning March 2019, the reporting limit was employed for those results measured below the laboratory detection limit. For geometric mean calculations (fecal coliform and Enterococcus) beginning in March 2019, the reporting limit was employed for those results measured below the laboratory detection limit.

TSS Total Suspended Solids

NS Not Sampled

Table J-23 Logan Airport 2019 Quarterly Wet Weather Monitoring Results – North, West, Maverick Street, and Porter Street Stormwater Outfalls

	Date	pH (S.U.)	Benzo(a)-anthracene (µg/L)	Benzo(a)-pyrene (µg/L)	Benzo(b)-fluoranthene (µg/L)	Benzo(k)-fluoranthene (µg/L)	Chrysene (µg/L)	Dibenzo(a,h,)-anthracene (µg/L)	Indeno(1,2,3-cd)-pyrene (µg/L)	Naphthalene (µg/L)	Total PAHs (µg/L)
001Q - North Outfall	3/22/2019	G	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
002Q - West Outfall	3/22/2019	6.44	<20	20	37	<20	25	<20	21	<20	103.0
004Q - Maverick Street Outfall	3/22/2019	8.50	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
003Q - Porter Street Outfall 1	3/22/2019	6.62	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
003Q - Porter Street Outfall 2	3/22/2019	G	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
003Q - Porter Street Outfall 3	3/22/2019	6.30	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
003Q - Porter Street Outfall Average		6.46	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
001Q - North Outfall	6/6/2019	7.43	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
002Q - West Outfall	6/6/2019	6.75	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
004Q - Maverick Street Outfall	6/6/2019	6.75	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
003Q - Porter Street Outfall 1	6/6/2019	7.04	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
003Q - Porter Street Outfall 2	6/6/2019	8.04	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
003Q - Porter Street Outfall 3	6/6/2019	6.78	3.5	2.7	3.9	<2.0	3.1	<2.0	<2.0	<2.0	13.2
003Q - Porter Street Outfall Average		7.29	2.5	2.2	2.6	2.0	2.4	2.0	2.0	2.0	5.7
001Q - North Outfall	10/23/2019	7.21	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
002Q - West Outfall	10/23/2019	7.54	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
004Q - Maverick Street Outfall	10/23/2019	6.95	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
003Q - Porter Street Outfall 1	10/23/2019	7.95	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
003Q - Porter Street Outfall 2	10/23/2019	7.02	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
003Q - Porter Street Outfall 3	10/23/2019	7.19	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
003Q - Porter Street Outfall Average		7.39	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Requirements are from NPDES Permit MA0000787, issued July 31, 2007.											
Discharge Limitations											
Maximum Daily		6.0 to 8.5	Report	Report	Report	Report	Report	Report	Report	Report	Total

Source: Massport
Notes: For averaging calculations starting March 2019, the reporting limit was employed for those results measured below the laboratory detection limit.
PAHs Polynuclear Aromatic Hydrocarbons
G Equipment failure

Table J-24 Logan Airport 2019 Quarterly Wet Weather Monitoring Results – Northwest and Runway/Perimeter Stormwater Outfalls

	Date	Maximum Daily Flow (MGD)	Average Monthly Flow (MGD)	pH (SU)	Oil and Grease (mg/L)	TSS (mg/L)	Benzene (µg/L)
005Q - Northwest Outfall	3/22/2019	0.361	0.033	7.29	<4.0	36	<1.0
006Q- Runway/ Perimeter Outfall (A9)	3/22/2019	0.282	0.033	G	<4.0	5.4	<1.0
006Q- Runway/ Perimeter Outfall (A16)	3/22/2019	0.095	0.010	G	<4.0	<5.0	<1.0
006Q- Runway/ Perimeter Outfall (A19)	3/22/2019	0.039	0.004	G	<4.0	<5.0	<1.0
006Q- Runway/ Perimeter Outfall (A21)	3/22/2019	2.172	0.232	G	<4.0	7.5	<1.0
006Q- Runway/ Perimeter Outfall (A23)	3/22/2019	0.235	0.025	G	<4.0	<5.0	<1.0
006Q- Runway/ Perimeter Outfall (A33)	3/22/2019	0.175	0.025	G	<4.0	9.2	<1.0
006Q- Runway/ Perimeter Outfall (A38)	3/22/2019	0.279	0.029	G	<4.0	17	<1.0
006Q- Runway/Perimeter Outfall Average		0.468	0.051	G	4.0	7.7	1.0
005Q - Northwest Outfall	6/6/2019	0.779	0.071	NS	NS	NS	NS
006Q- Runway/ Perimeter Outfall (A9)	6/6/2019	0.227	0.039	6.01	<4.0	5.5	<1.0
006Q- Runway/ Perimeter Outfall (A10)	6/6/2019	0.494	0.049	7.25	<4.0	<5.0	<1.0
006Q- Runway/ Perimeter Outfall (A15)	6/6/2019	0.173	0.017	8.05	<4.0	10	<1.0
006Q- Runway/ Perimeter Outfall (A21)	6/6/2019	2.772	0.329	7.26	<4.0	5.2	<1.0
006Q- Runway/ Perimeter Outfall (A23)	6/6/2019	0.170	0.028	7.39	<4.0	6.7	<1.0
006Q- Runway/ Perimeter Outfall (A34)	6/6/2019	1.340	0.137	7.09	<4.0	10	<1.0
006Q- Runway/ Perimeter Outfall (A40)	6/6/2019	3.924	0.398	6.74	<4.0	7	<1.0
006Q- Runway/Perimeter Outfall Average		1.300	0.142	7.11	4.0	7.1	1.0
005Q - Northwest Outfall	10/23/2019	0.637	0.057	6.92	<4.0	13	<1.0
006Q- Runway/ Perimeter Outfall (A8)	10/23/2019	0.357	0.030	7.53	<4.0	5.5	<1.0
006Q- Runway/ Perimeter Outfall (A21)	10/23/2019	2.856	0.227	7.61	<4.0	<5.0	<1.0
006Q- Runway/ Perimeter Outfall (A22)	10/23/2019	1.547	0.124	7.20	<4.0	<5.0	<1.0
006Q- Runway/ Perimeter Outfall (A23)	10/23/2019	0.253	0.024	7.46	<4.0	<5.0	<1.0
006Q- Runway/ Perimeter Outfall (A31)	10/23/2019	0.241	0.020	7.43	<4.0	6.0	<1.0
006Q- Runway/ Perimeter Outfall (A34)	10/23/2019	1.046	0.093	7.76	<4.0	<5.0	<1.0
006Q- Runway/ Perimeter Outfall (A38)	10/23/2019	0.401	0.029	6.38	<4.0	<5.0	<1.0
006Q- Runway/Perimeter Outfall Average		0.957	0.078	7.34	4.0	5.2	1.0
Discharge Limitations		Report	Report	Report	Report	Report	Report

Source: Massport

Notes: For averaging calculations starting March 2019, the reporting limit was employed for those results measured below the laboratory detection limit.
Requirements are from NPDES Permit MA 0000787, issued July 31, 2007.

TSS Total Suspended Solids

G Equipment failure

NS Not sampled

Table J-25 Logan Airport February 2019 Wet Weather Deicing Monitoring Results – North, West, Porter Street, and Runway/Perimeter Stormwater Outfalls

	Date	Ethylene Glycol, Total (mg/L)	Propylene Glycol, Total (mg/L)	BOD5 (mg/L)	COD (mg/L)	Ammonia Nitrogen (mg/L)	Nonylphenol (µg/L)	4-Methyl-1-H-benzotriazole (µg/L)	5-Methyl-1-H-benzotriazole (µg/L)	Tolytriazole (µg/L)
001B - North Outfall	2/12/2019	<2.00	<2.00	120	210	1.93	<0.02	25.42	22.71	48.13
002B - West Outfall	2/12/2019	<2.00	<2.00	57	200	1.71	0.472	20.25	15.91	36.16
003B - Porter Street Outfall 1	2/12/2019	<2.00	<2.00	<50	770	1.78	1.380	2.66	2.61	5.27
003B - Porter Street Outfall 2	2/12/2019	<2.00	6.20	150	210	0.096	<0.02	39.47	90.16	129.63
003B - Porter Street Outfall 3	2/12/2019	<2.00	<2.00	<2.0	48	1.81	<0.02	<2.50	<2.50	ND
003B - Porter Street Outfall Average	2/12/2019	0.00	2.07	50	343	1.23	0.46	14.04	30.92	44.97
006B- Runway/ Perimeter (A9)	2/21/2019	<2.00	<2.00	11	34	0.619	<0.04	2.17	0.90 J	3.07
006B- Runway/ Perimeter (A15)	2/21/2019	<2.00	<2.00	5.1	65	0.258	<0.02	1.56	<2.50	1.56
006B- Runway/ Perimeter (A21)	2/21/2019	<2.00	<2.00	11	99	1.04	<0.02	2.81	0.63 J	3.44
006B- Runway/ Perimeter (A22)	2/21/2019	<2.00	<2.00	12	38	2.46	<0.02	4.05	0.80 J	4.85
006B- Runway/ Perimeter (A26)	2/21/2019	<2.00	<2.00	10	24	0.569	<0.02	3.12	0.54 J	3.66
006B- Runway/ Perimeter (A34)	2/21/2019	<2.00	<2.00	12	72	3.54	NA	NA	NA	NA
006B- Runway/ Perimeter (A38)	2/21/2019	<2.00	<2.00	<2.0	52	0.365	<0.04	<2.50	<2.50	ND
006B- Runway/Perimeter Outfall Average		0.00	0.00	8.7	55	1.26	0.00	2.29	0.48	2.76
Requirements are from NPDES Permit MA0000787, issued July 31, 2007.										
Discharge Limitations										
Average Monthly		Report	Report	Report	Report	Report	Report	Report	Report	Report
Maximum Daily		Report	Report	Report	Report	Report	Report	Report	Report	Report

Source: Massport
Notes: For averaging calculations, a value of zero was employed for those results measured below the laboratory detection limit.
J = value is an estimate calculated by the lab from the response factors of the other two triazole compounds.
Tolytriazole concentrations calculated as sum of 4-Methly-1-H-benzotriazole and 5-Methyl-1-H-benzotriazole.
BOD5 Five-day Biochemical Oxygen Demand
COD Chemical Oxygen Demand
ND Not Detected
NA Not Analyzed

Table J-26 Logan Airport February 2019 Wet Weather Deicing Monitoring Results – North, West, Porter Street, and Runway/Perimeter Stormwater Outfalls

	Date	Ethylene Glycol, Total (mg/L)	Propylene Glycol, Total (mg/L)	BOD5 (mg/L)	COD (mg/L)	Ammonia Nitrogen (mg/L)	Nonylphenol (µg/L)	4-Methyl-1-H-benzotriazole (µg/L)	5-Methyl-1-H-benzotriazole (µg/L)	Tolytriazole (µg/L)
001B - North Outfall	2/28/2019	<400	11,800	5,700	26,000	0.50	<0.02	15.90	18.18	34.08
002B - West Outfall	2/28/2019	<400	17,000	48,000	49,000	1.23	<0.02	19.22	17.96	37.18
003B - Porter Street Outfall 1	2/28/2019	<2.00	45.3	67	1,400	1.99	<0.02	6.83	7.34	14.17
003B - Porter Street Outfall 2	2/28/2019	<20.0	507	810	1,700	0.358	<0.02	13.01	15.82	28.83
003B - Porter Street Outfall 3	2/28/2019	<100	2,480	2,100	6,300	0.662	<0.02	5.04	5.16	10.20
003B - Porter Street Outfall Average		0.0	1,011	992	3,133	1.00	0.00	8.29	9.44	17.73
006B- Runway/ Perimeter (A9)	2/28/2019	<2.00	2.4	33	62	0.54	<0.02	7.12	5.28	12.40
006B- Runway/ Perimeter (A14)	2/28/2019	<2.00	<2.00	39	140	6.900	<0.02	23.18	10.47	33.65
006B- Runway/ Perimeter (A15)	2/28/2019	<2.00	<2.00	4.3	<20	0.314	<0.02	6.51	<2.50	6.51
006B- Runway/ Perimeter (A21)	2/28/2019	<2.00	<2.00	24	100	1.12	<0.04	3.26	2.49	5.75
006B- Runway/ Perimeter (A22)	2/28/2019	<2.00	<2.00	17	220	2.04	<0.02	9.02	5.59	14.61
006B- Runway/ Perimeter (A34)	2/28/2019	<2.00	<2.00	36	74	3.28	<0.02	12.77	6.75	19.52
006B- Runway/ Perimeter (A38)	2/28/2019	<2.00	<2.00	<2.0	67	0.289	<0.02	<2.50	<2.50	ND
006B- Runway/Perimeter Outfall Average	2/28/2019	0.00	0.34	21.9	95	2.07	0.00	8.84	4.37	13.21
Requirements are from NPDES Permit MA0000787, issued July 31, 2007.										
Discharge Limitations										
Average Monthly		Report	Report	Report	Report	Report	Report	Report	Report	Report
Maximum Daily		Report	Report	Report	Report	Report	Report	Report	Report	Report

Source: Massport.
Notes: For averaging calculations, a value of zero was employed for those results measured below the laboratory detection limit.
Tolytriazole concentrations calculated as sum of 4-Methly-1-H-benzotriazole and 5-Methyl-1-H-benzotriazole.
BOD5 Five-day Biochemical Oxygen Demand
COD Chemical Oxygen Demand
ND Not Detected

Table J-27 Logan Airport Stormwater Outfall NPDES Water Quality Monitoring Results – 1993 to 2019

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
# / # = Number of samples at or below NPDES limits / Total number of samples taken[1]																							
Oil and Grease (mg/L)																							
North Outfall	30/31	35/36	33/35	29/35	30/35	35/36	29/30	34/36	28/28	36/36	30/32	32/34	33/35	33/33	29/29	23/23	24/24	24/24	24/24	21/21	20/20	21/21	19/20
West Outfall	29/30	36/36	34/34	36/36	34/35	36/36	30/30	35/35	27/28	36/36	31/32	33/34	35/35	32/33	28/28	22/23	24/24	24/24	22/24	21/21	21/21	21/21	19/19
Maverick Street Outfall	29/29	36/36	35/35	36/36	35/35	35/36	30/30	34/34	26/28	35/36	32/32	34/34	35/35	32/33	29/29	22/23	20/21	19/19	23/23	15/15	4/4	20/20	18/18
Settable Solids[2] (mg/L)																							
North Outfall	19/19	34/35	34/35	32/35	31/34	34/36	30/30	34/36	29/29	32/36	32/32	34/34	33/35	32/34	22/22	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
West Outfall	19/19	32/36	34/34	35/36	34/34	35/36	29/30	36/36	27/28	36/36	31/32	34/34	32/35	33/33	22/22	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
TSS (mg/L)																							
North Outfall	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6/6	24/24	24/24	22/23	24/24	21/21	20/21	21/21	20/20
West Outfall	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5/6	24/24	24/24	23/23	22/24	20/22	21/21	20/21	18/19
Maverick Street Outfall	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4/6	22/24	20/21	18/19	20/23	14/15	4/4	19/20	18/18
pH																							
North Outfall	34/35	33/36	35/35	35/35	35/35	36/36	30/30	36/36	29/29	36/36	32/32	34/34	35/35	34/34	26/26	12/12	16/16	11/11	12/12	9/9	8/8	8/8	8/8
West Outfall	34/34	28/36	33/34	35/36	35/35	36/36	30/30	36/36	29/29	36/36	32/32	34/34	35/35	33/33	26/26	12/12	16/16	11/11	12/12	9/9	9/9	8/8	8/8
Porter Street Outfall	35/35	30/36	34/34	36/36	35/35	36/36	30/30	36/36	28/28	36/36	32/32	34/34	35/35	33/33	22/22	21/21	48/48	24/24	23/23	26/27	24/27	24/24	19/23
Maverick Street Outfall	35/35	35/36	35/35	36/36	34/35	36/36	30/30	35/35	28/28	36/36	32/32	34/34	35/35	33/33	26/26	10/10	16/16	10/10	11/11	6/6	2/2	7/7	7/7

Table J-27 Logan Airport Stormwater Outfall NPDES Water Quality Monitoring Results – 1993 to 2019 (Continued)

	2016	2017	2018	2019
# / # = Number of samples at or below NPDES limits / Total number of samples taken[1]				
Oil and Grease (mg/L)				
North Outfall	23/23	23/23	21/21	21/21
West Outfall	23/23	22/22	20/21	19/20
Maverick Street Outfall	23/23	23/23	21/21	21/21
Settable Solids[2] (mg/L)				
North Outfall	N/A	N/A	N/A	N/A
West Outfall	N/A	N/A	N/A	N/A
TSS (mg/L)				
North Outfall	23/23	23/23	19/21	21/21
West Outfall	23/23	22/22	21/21	20/21
Maverick Street Outfall	22/23	23/23	19/21	21/21
pH				
North Outfall	10/11	8/8	9/9	9/9
West Outfall	11/11	7/7	9/9	10/10
Porter Street Outfall	33/33	33/33	27/27	28/28
Maverick Street Outfall	10/11	8/8	9/9	10/10

Source: Massport

Notes: Sampling requirements changed in 2007 with the issuance of a new NPDES permit. Results through 2007 are based on NPDES Permit MA0000787, issued March 1, 1978. Stormwater outfall water quality monitoring results collected in accordance with the requirements of former NPDES permit. A portion of the Porter Street Drainage Area was incorporated into the West Drainage Area as part of roadway construction projects at Logan Airport.

N/A Not Analyzed

1 The total number of samples at each outfall varies year to year. In some years, fewer samples are taken due to factors such as construction, weather, and/or tidal conditions.

2 Settleable solids analyses were replaced with TSS in 2008.

Table J-28 Logan Airport Oil and Hazardous Material Spills[1] and Jet Fuel Handling – 1990 to 2019

Year	Total Number of all Spills	Total Number of all Spills >10 gallons	Total Volume of all Spills (Gallons)	Estimated Volume of Jet Fuel Handled (Gallons)	Total Volume of Jet Fuel Spilled (Gallons)
1990	173	N/A	N/A	438,100,000	3,745
1991	186	N/A	N/A	N/A	2,471
1992	195	N/A	N/A	N/A	4,355
1993	188	N/A	N/A	451,900,000	3,131
1994	217	N/A	N/A	476,700,000	4,046
1995	161	N/A	N/A	309,200,000	21,412[2]
1996	159	N/A	N/A	346,700,000	1,321
1997	147	N/A	N/A	377,488,161	2,029[3]
1998	191	N/A	N/A	387,224,004	10,047[4]
1999	196	43	7,151	425,937,051	7,012[5]
2000	136	20	1,318	441,901,932	1,227
2001	139	37	1,924	416,748,819	1,771
2002	101	16	653	358,190,362	559
2003	128	19	10,364	319,439,910	10,188[6]
2004	126	18	894	373,996,141	574
2005	97	15	2,319	368,645,932	585
2006	92	11	752	364,450,864	644
2007	108	7	604	367,585,187	361
2008	99	20	944	345,631,788	662
2009	95	6	1004	327,358,619	915
2010	87	15	476	335,693,997	360
2011	108	12	572	340,421,373	337
2012	132	5	593	343,731,127	439
2013	94	6	452	349,397,940	351
2014	129	17	2,785	370,222,342	785
2015	196	16	1,278	374,985,216	885
2016	231	14	1,158	456,003,328	558
2017	176	8	2,310[7]	472,229,047	315

Table J-28 Logan Airport Oil and Hazardous Material Spills[1] and Jet Fuel Handling – 1990 to 2019 (Continued)

Year	Total Number of all Spills	Total Number of all Spills >10 gallons	Total Volume of all Spills (Gallons)	Estimated Volume of Jet Fuel Handled (Gallons)	Total Volume of Jet Fuel Spilled (Gallons)
2018	189	8	7,660	521,056,895	7,383
2019	152	22	799	542,314,657	514

Source: Massport Fire-Rescue Department.

Notes:

N/A Not available.

1 Materials include: jet fuel, hydraulic oil, diesel fuel, gasoline, and other materials such as glycol and paint.

2 One tenant spill, which occurred on October 15, 1995, totaled 18,000 gallons (84 percent of the annual spill total). The spill did not enter the Airport's storm drain system.

3 On October 23, 1997, a fuel line on an aircraft failed, resulting in the release of approximately 2,500 gallons, all but 60 gallons of which were recovered in drums before reaching the ground. Only the 60 gallons is included in the 1997 total.

4 Includes a 7,200-gallon spill that was discovered on September 2, 1998, and a 1,300-gallon spill that occurred on June 3, 1998. Neither spill entered the Airport's storm drain system.

5 Includes a 5,000-gallon spill, none of which entered the Airport's storm drainage system.

6 In 2003, one fuel spill comprised 9,460 gallons or 94 percent of the total volume of the MassDEP/MCP reportable spills that year. The fuel spill was contained and did not enter the drainage system.

7 Includes 1,750 gallons of deicing fluid.

Table J-29 Type and Quantity of Oil and Hazardous Material Spills at Logan Airport – 1999 to 2019

	Jet Fuel			Hydraulic Oil			Diesel Fuel			Gasoline			Other		
Year	No. of Spills	Quantity (Gallons)	No. of Spills ≥ 10 Gallons	No. of Spills	Quantity (Gallons)	No. of Spills ≥ 10 Gallons	No. of Spills	Quantity (Gallons)	No. of Spills ≥ 10 Gallons	No. of Spills	Quantity (Gallons)	No. of Spills ≥ 10 Gallons	No. of Spills	Quantity (Gallons)	No. of Spills ≥ 10 Gallons
1999	151	7,012	40	24	67	1	13	49	2	5	7	0	3	16	0
2000	115	1,227	18	8	59	2	3	11	0	8	16	0	2	5	0
2001	104	1,771	32	21	92	3	5	30	1	6	26	1	3	5	0
2002	79	559	15	7	38	0	8	37	18	4	8	0	3	11	0
2003	89	10,188	15	15	91	3	15	30	0	7	24	0	2	31	1
2004	82	574	12	17	189	4	14	52	0	7	26	0	6[1]	53[2]	2[3]
2005	66	585	12	14	78	1	7	1,610	2	7	45	0	3[4]	1	0
2006	65	644	9	10	25	0	6	57	1	4	9	0	7	17	1
2007	66	361	4	16	37	0	16	57	1	3	8	0	7	141[5]	2
2008	74	662	19	15	56	2	5	14	0	1	7	0	4	205[6]	1
2009	95	915	6	21	51	0	9	20	0	3	3	0	11	15	0
2010	54	360	12	17	50	1	5	56	2	2	3	0	7	7	0
2011	69	337	10	21	149	1	7	55	1	4	16	0	7	15	0
2012	80	439	4	25	79	1	17	38	0	2	12	0	8	25	0
2013	56	351	5	15	51	0	13	32	0	2	<2	0	7	10	0
2014	81	785	13	24	98	1	17	1,810	2	4	9	0	3	83	1
2015	110	885	10	43	149	3	16	151	2	7	46	1	20	47	0
2016	94	558	8	73	224	4	30	300	2	6	12	0	28	64	0
2017	103	315	5	36	101	1	13	59	2	4	14	0	20	1,821[7]	0
2018	111	7,383[8]	6	39	93	0	14	127	2	2	5	0	23	52	0
2019	77	514	17	41	156	3	13	57	1	9	41	1	12	31	0

Source: Massport

1 Includes two Unknown spills (14 gallons), plus one spill of each of the following: Ethylene Glycol, Propylene Glycol, AVGAS, and Paint.

2 Ethylene Glycol (25 gallons), Propylene Glycol (10 gallons), AVGAS (1 gallon) and Paint (3 gallons).

3 One spill of Ethylene Glycol; one spill of Propylene Glycol.

4 Includes two spills of an unknown substance and volume.

5 Includes one spill of motor oil (4 gallons); one spill of kerosene (5 gallons); one spill of cooking oil (120 gallons); one spill of fuel oil (10 gallons); one spill from a battery (1 gallon); two spills of an unknown substance (1 gallon).

6 Includes one spill of transformer oil (200 gallons).

7 Includes 1,750 gallons of deicing fluid (vehicle accident).

8 7,000 gallons of jet fuel were released during a construction related incident involving a fuel hydrant installation project.

Table J-30 Massport Contingency Plan (MCP) Closed Sites at Logan Airport

Location (RTN) and MassDEP Reporting Status	Action/Status
1. North Outfall (3-4837) – CLOSED 12/27/2012	
Phase II and Phase III Reports filed in March 1997	Indicated petroleum contamination present at the site was likely the result of decades of airport operation; risk assessment reported no significant risk to human health, or to the aquatic and avian community.
RAO submitted in March 1998	Class C RAO using a Temporary Solution (periodic site monitoring and assessment); remediation steps included (not limited to) installation of a new fuel distribution system and decommissioning of certain fuel lines, and natural biodegradation processes; goal is to have petroleum contamination reduced to an area less than 1,000 square feet. Installation of the new fuel distribution system and decommissioning of sections of the old system were completed. Massport initiated site evaluation to document the reduction of petroleum contamination following the decommissioning of the North Fuel Farm and fuel distribution system.
Post Class C RAO evaluation report submitted in December 2002	Massport has eliminated substantial hazards at this site and submitted a Class C RAO statement. In accordance with applicable regulations, Massport will conduct a periodic evaluation at five-year intervals until a Permanent Solution has been achieved. The next periodic evaluation was scheduled for 2007.
2004	Evaluation report indicated that a "Condition of No Significant Risk" has not been achieved at this site. Massport scheduled another assessment in 2007.
2005	No change in status for 2005.
2006	Massport prepared the five-year review of the Class C RAO for this site, which was due in December 2007.
2007	Massport completed its five-year review of the Class C RAO and transmitted it to MassDEP in December 2007. It was determined that a "Condition of No Significant Risk" has not been achieved at this site at this time. The next five-year re-evaluation will be conducted in 2012.
2008	No change in status.
2009	No change in status.
2010	No change in status.
2011	No change in status. Massport provided updated data for the MassDEP website.
2012	Response Action Outcome submitted to MassDEP on December 27, 2012. No further MCP response action is required.
2. Former Robie Park (3-10027) - CLOSED 09/21/2016	
2005	A Phase I was completed in 2005 with a RAO retraction. The RAO had been completed by the former property owner.
2006	No change in status for 2006.
2007	No change in status for 2007.
2008	A Phase II Scope of Work was prepared on May 9, 2008. A RAM Plan was submitted to MassDEP on September 16, 2008.
2009	A Phase V Remedy Operation Status Plan was submitted on March 31, 2010.
2010	Two Remedy Operation Status Reports were submitted on September 29, 2010 and March 28, 2011. The next status report was scheduled for September 30, 2011.
2011	Phase IV Project Status Reports 2 and 3 were submitted in March and September 2011, respectively.
2012	Phase V Status Reports 4 and 5 were submitted in March and September 2012, respectively.
2013	Phase V Status Reports 6 and 7 were submitted in March and September 2013, respectively.
2014	Phase V Status Reports 8 and 9 were submitted in March and September 2014, respectively.
2015	Phase V Reports 10 and 11 were submitted in March and September 2015, respectively.
2016	A Permanent Solution Statement was submitted in 2016.
3. Former Robie Property (3-23493) - CLOSED 01/04/2010	
2005	A Phase I was completed in 2005.
2006	No change in status for 2006.
2007	No change in status for 2007.
2008	A Phase II was submitted to MassDEP on October 21, 2008.
2009	An Activity and Use Limitation (AUL) was recorded with the Suffolk County Registry of Deeds for the site on December 16, 2009.

Table J-30 Massport Contingency Plan (MCP) Closed Sites at Logan Airport (Continued)

Location (RTN) and MassDEP Reporting Status	Action/Status
3. Former Robie Property (3-23493) - CLOSED 01/04/2010 (Continued)	
2010	A Class A-3 RAO was submitted on January 4, 2010, corresponding with the recording of an AUL. On May 21, 2010, a RAM Plan for the Economy Parking Structure was submitted. The first RAM Status Report was submitted on September 21, 2010. An AUL Amendment was recorded on December 9, 2010.
2011	A RAM Completion Statement was submitted on March 15, 2011. Regulatory closure has been achieved. No further response actions are required.
4. Tomahawk Drive (3-27068) - CLOSED 08/20/2008	
2007	Release notification form submitted in August 2007.
2008	A Class B-1 RAO was submitted to MassDEP on January 9, 2009. No further response actions were required.
2009	No further response actions were required.
2011	No further response actions required.
5. Southwest Service Area Overflow Lot/Tomahawk Drive (3-28792) – CLOSED 10/18/2018	
2009	Release notification form was submitted to MassDEP/BWSC on October 8, 2009.
2010	A Class B-1 RAO was submitted to MassDEP on October 18, 2010. No further response actions required.
2011	No further response actions required.
6. Taxiway D (3-29716) – CLOSED 12/21/2011	
2010	Release notification form was submitted on December 22, 2010.
2011	A Class A-1 RAO was submitted on December 23, 2011. No further response actions required.
7. West Outfall Release (3-29792) – CLOSED 02/07/2012	
2011	Release notification form was submitted on April 8, 2011. Two IRA Status Reports were submitted to MassDEP on June 9 and December 5, 2011. A RAO was submitted on February 13, 2012. No further response actions required.
8. Hertz Parking Lot Site (3-30260) – CLOSED 09/05/2012	
2011	Release notification form was submitted on August 29, 2011. A RAM Plan was submitted to MassDEP on September 1, 2011.
2012	A Class A-2 RAO was submitted on September 10, 2012. No Further response actions required.
9. Former Butler Aviation Hangar (3-30654) – CLOSED 11/12/2014	
2012	Verbal notification of a release was provided to MassDEP on February 14, 2012, when Rental Car Center construction encountered an unidentified underground storage, and a Release Notification Form was submitted on April 23, 2012. An IRA Plan was submitted May 21, 2012 and IRA Status Reports were submitted on June 18 and December 26, 2012.
2013	Phase I Report and Tier Classification submitted February 21, 2013 and IRA Completion Report submitted on July 11, 2013.
2014	A Permanent Solution Statement was submitted in October 2014. No further response actions required.
10. Southwest Service Area/Porter Street @ Harborside Drive (3-32022) – CLOSED 11/20/2017	
2014	MassDEP notified of 72-hour Reportable Condition on March 10, 2014
2015	Phase I Report and Tier Classification submitted March 9, 2015.
2016	Permanent Solution Statement scheduled to be submitted in 2017
2017	A Permanent Solution Statement and AUL were submitted November 2017.
11. Former Hangar Building 16 (3-32351) – CLOSED 01/21/2016	
2014	Release Notification Form Submitted August 4, 2014.
2015	A RAM Plan was submitted on January 29, 2015; a Phase I Report and Tier Classification were submitted on August 3, 2015; a RAM Completion Report was submitted November 16, 2015; and a Permanent Solution Statement was submitted on January 21, 2016. No further response actions are required.

Source: Massport

Notes: RTN = Release Tracking Number. This list includes Massport MCP sites only. Additional sites are the responsibility of Logan Airport tenants. Refer to Figure 8-2 in Chapter 8, *Environmental Compliance and Management/Water Quality,* for location of active MCP sites.

AUL Activity and Use Limitation
FDS Fuel Distribution System
IRA Immediate Response Action
MCP Massachusetts Contingency Plan
Phase I Initial Site Investigation
Phase II Comprehensive Site Assessment
Phase III Identification, Evaluation, and Selection of Comprehensive Remedial Actions
Phase IV Implementation of Selected Remediation Action
Phase V Operation, Maintenance and/or Monitoring
RAM Release Abatement Measure
RAO Response Action Outcome

FIGURE J-1 **Massachusetts Contingency Plan Sites (Closed)**

2018/2019 Environmental Data Report

1. North Outfall (3-4837)
2. Former Robie Park (3-10027)
3. Former Robie Property (3-23493)
4. Tomahawk Drive (3-27068)
5. Southwest Service Area Overflow Lot/ Tomahawk Drive (3-28792)
6. Taxiway D (3-29716)
7. West Outfall Release (3-29792)
8. Hertz Parking Lot Site (3-30260)
9. Former Butler Aviation Hangar (3-30654)
10. Southwest Service Area/Porter Street @ Harborside Drive (3-32022)
11. Former Hangar Building 16 (3-32351)

0 450 900 1800 Feet

February is sustainable transportation month as part of Sustainable Massport. Massport is dedicated to providing Massport staff multiple ways to get to work without having to drive their own vehicle. Every car that isn't coming to Logan or other Massport facilities, reduces stress on existing roadways and reduces greenhouse gas emissions.

How to Put the Brakes on Driving Alone to Work

Transit and Vanpool Discounts

- All full, part-time, and job share employees are eligible for 50% reduction off the cost of their public transportation commuting costs, up to $100 per month.
- Employees can take advantage of this program either through reimbursement or on a pretax basis from your paycheck.
- Eligible mass transportation options include MBTA transit, Logan Express buses, Inner Harbor Ferry, Commuter Boat, vanpool and privately operated scheduled buses. For more information, please contact Emily Navarro at x3937, except regarding Vanpools. Matt Carrai of Rideshare by Enterprise can be contacted at Matthew.d.carrai@ehi.com or 508-259-8959 for information on establishing a vanpool.

Massport Shuttles

- Shuttles circulate the airport, making it easy to connect to the Blue Line (Airport Station), the Silver Line, Logan Express, privately operated scheduled buses, and water transportation
- Shuttles run during the work week between the LOC, Terminal C and the Blue Line every 15 minutes from 7:30 - 9:30 AM and 2:00 - 6:00 PM.

Logan Express

- Employee discounts on fares and parking are available at all Logan Express locations, including Framingham, Braintree, Woburn, and Peabody. Discounts are also available on the Back Bay Logan Express.
- For tickets, please contact Emily Navarro at x3937.

Water transportation

- Massport employees can ride the water taxi free of charge Monday – Friday from 7:15 – 9:15 AM and 3:30 – 5:30 PM with a Massport badge all-year round.
- Pre-paid vouchers are also available for work-related travel during other hours. For more information, contact Jamila Richardson at x1756.
- Valid for transportation between the following docks: Logan, Long Wharf, Central Wharf, Rowes Wharf, Moakley Court House, and World Trade Center.

Biking or Walking

- Massport offers bike racks around Logan airport and at other facilities for convenient bike parking.
- Shower facilities are available at the LOC (for badged employees) and may be available at other facilities (check with your supervisor for access and availability).

The Recycling Corner

Test Your Recycling Knowledge! Take our short quiz and find out if you are an expert on the dos and don'ts of recycling at Massport. All of your responses will be anonymous.

TAKE THE QUIZ

Massport's Sustainability Mission:

"Massport will maintain its role as an innovative industry leader through continuous improvement in operational efficiency, facility design and construction, and environmental stewardship while engaging passengers, employees, and the community in a sustainable manner."

Massport's Sustainability Mission
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SUSTAINABLE MASSPORT MONTHLY NEWSLETTER

March 2018: Water Resources and Conservation

March is Water Resources and Conservation month as part of *Sustainable Massport*! Massport has taken significant steps to track and reduce water at our facilities. At Hanscom Field, a tenant project by Boston MedFlight built a new hangar reusing on-site groundwater to minimize dust created during construction.

Water Reuse Project at Hanscom Field

Conserve Water at Home

There are easy steps you can do at home to reduce your own water use.

- Turn off the tap while brushing your teeth or shaving: save 4-10 gallons a day.
- Never use your toilet as a wastebasket: save 1.5-4 gallons per flush.
- Don't take marathon showers: five minutes will get you clean. Save 3-7 gallons per shower.
- Close your tub drain before turning on the water: save 3 gallons or more.
- Fill your bathtub only halfway: save 5 gallons or more. You will save hot water costs, too.
- Faucets typically use 2 to 5 gallons per minute. Installing a low-flow faucet aerator can reduce the flow by as much as 25% or up to a gallon and a half per minute.

The Massachusetts Water Resource Authority (MWRA) provides information about water conservation at www.MWRA.com, and will also provide a water saving kit if you live in a MWRA customer community.

In 1986, MWRA customers used a total of 330 million gallons of water per day. Thanks to daily water conservation efforts, demand has been reduced to 195 million gallons per day in 2017. Saving water keeps supplies level and has helped the region control water, sewer and energy costs.

Massport's Sustainability Mission
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SUSTAINABLE MASSPORT MONTHLY NEWSLETTER

April 2018: Health and Wellness

April is Health and Wellness month as part of *Sustainable Massport*! In its commitment to enhancing the health and well-being of its employees, Massport is currently offering the following programs:

Employee Health and Wellness

- **HR Open House** will be held on Wednesday, April 11 from 11-2 @ LOC. Open Enrollment will run April 4-May 2 with an effective date of July 1st.
- **Health & Wellness related classes** are available in April and throughout the year as a part of the Health & Wellness Incentive Program including:
  - April 4 - Post-Overdose Response
  - April 11 - Diabetes Awareness
  - April 24 – Work Addiction

healthport

- The Human Resources Department would like to remind employees about the partnership we have with Blue Cross Blue Shield of Massachusetts (BCBS) that brings **all** of our employees (including those who do not have health coverage through BCBS) a health & wellness online offering via BCBS's **wellness website** www.ahealthyme.com/login. If you need assistance with creating an account, please contact Tonya Walker at extension 7436.
  - *A few of the website highlights include:*
    - A health assessment that looks at eight different areas of your health and provides you with a personalized wellness score
    - Self-paced on-line workshops on a wide range of topics
    - Tools to help you stay on a healthy track, including nutrition and exercise logs, a recipe library, and a meal planner

ahealthyme℠
Everything to live a healthier life

Community Events

- **East Boston Little League Opening Day** will be held on April 28th at Massport's Festa Field.

Massport's Sustainability Mission

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SUSTAINABLE MASSPORT MONTHLY NEWSLETTER

May 2018: Parks and Open Space

May is Parks and Open Space month, as part of Sustainable Massport. Massport owns and operates over 30 acres of parks that provide open space, playgrounds, and waterfront views to our neighbors. In addition, our parks also provide critical environmental benefits such as tree canopy and carbon absorption that protect human health and physical property.

Massport parks and open space have offer a great benefit to the community and employees including events and activities for the whole family.

East Boston Parks

- Take a lunch time walk to Piers Park, Navy Fuel Pier, Neptune Road Buffer, Maverick Mothers Pocket Park, and the East Boston Greenway
- The Sailing Center located at Piers Park had its opening day on April 28, and local residents enjoyed sailboat rides and learned about the summer programs at the center
- Starting in July, Zumix, a local non-profit, will be holding free concerts at Piers Park every Sunday at 6pm through the end of August
- The water fountain at Bremen Park will start on the first day of summer vacation for Boston public schools
- Bremen Park has a community gardens section where residents grow flowers, fruit and vegetables all summer long

Piers Park in Bloom

South Boston Parks

- Food trucks operate at South Boston Maritime Park five days a week, Monday – Friday. The trucks are stationed on Northern Avenue from 11:00AM-3:00PM. In addition to the trucks, corn hole boards and Adirondack chairs are in the park for all to enjoy.

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SUSTAINABLE MASSPORT MONTHLY NEWSLETTER

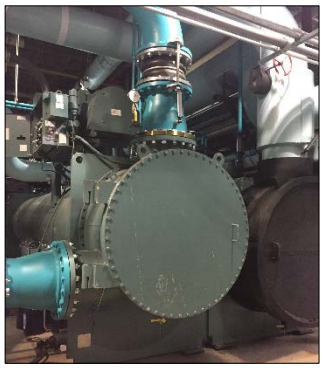
June 2018: Air Quality and Greenhouse Gas Reduction

June is Air Quality and Greenhouse Gas Reduction month, as part of Sustainable Massport. As Massport upgrades our buildings and operations, we are making great strides to invest in air quality and greenhouse gas reduction improvement technologies. These critical improvements will benefit neighboring communities and improve the efficiency of Massport operations.

Examples of air quality improvements and greenhouse gas reductions related projects at Massport include:

Boston Logan International Airport

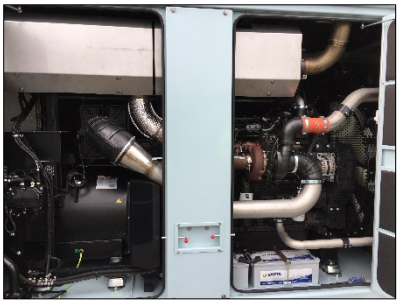
- 2 new chillers at the Central Heating and Cooling Plant are 30% more efficient than their replacements
    - Last year, new cooling tower extensions were installed at the plant, increase cooling capacity by 15%
- As part of the relocation of the taxi lot to Harborside Drive, Massport is installing four fast charging electrical vehicle charging stations at the new taxi lot.
- 65 new dual charging stations for airline ground service equipment will be installed as part of the Terminal B Optimization project in early 2019.



New Chiller at Central Heating and Cooling Plant

Conley Terminal

- Five rubber tired gantry (RTG) cranes are being upgraded to tier four engines this summer. Air quality improvements from these upgrades will result in a 90% reduction in nitrous oxides and a 13% reduction in particulate matter.



RTG crane engine

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SUSTAINABLE MASSPORT MONTHLY NEWSLETTER

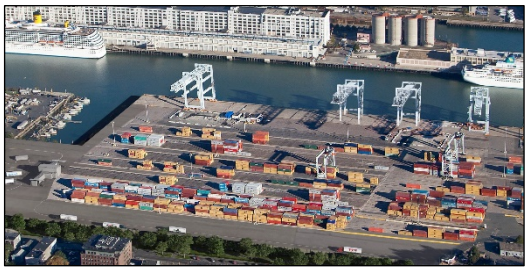
July 2018: Natural Resources

July is Natural Resources month, as part of *Sustainable Massport*. Massport's natural resources, including wetlands, creeks, woods, tidal salt marshes, and mud flats, provide habitat for a wide variety of plants and wildlife. Massport continuously seeks to protect our regions' natural resources while maintaining safe aircraft and vessel operations.

Snowy Owl Trap and Relocation

The Massport Wildlife Management Department partners with a certified airport wildlife biologist to assess and manage all wildlife at Logan Airport. Between November 2017 and July 2018, 94 snowy owls have been trapped and relocated from Logan's airfield through a cooperative relationship between Mass Audubon, the USDA-APHIS Wildlife Services, and Massport. Since the early 1990's, this partnership helped to protect snowy owls, improved our understanding of the species, and promoted aviation safety. Before releasing them back into the wild, researchers attach bands and transmitters to the owls. This allows researchers to learn more about their migratory and behavioral patterns, which had been relatively unknown due to their remote Artic habitat.

Berth 10 at Conley Terminal Soil Remediation



Berth 10 Rendering

The new Berth 10 project at Conley Terminal will restore a former oil terminal to active marine use by removing dilapidated pier structures and constructing a new modern facility. In addition to constructing a pile-supported concrete pier and installing new cranes, this project will remove oil-impacted soil and install a new bulkhead to contain any remaining contamination onsite and prevent oil from seeping into the harbor. Oil-impacted soils will be excavated from the shoreline and dredged from the harbor at Berth 10. In addition to constructing the steel bulkhead, the project will create an additional containment barrier behind the bulkhead using a soil stabilization method.

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SUSTAINABLE MASSPORT MONTHLY NEWSLETTER

August 2018: Climate Change Adaptation and Resiliency

August is Climate Change Adaptation and Resiliency month as part of *Sustainable Massport.* The Boston region is in the middle of Hurricane Season (June 1 – November 30) and Massport has been implementing various resilience measures to ensure that staff and facilities are protected from potential effects of severe weather. Examples of efforts include enhancing critical infrastructure through permanent and temporary flood-proofing as well as conducting exercises to increase operational preparedness for storms.

The March Nor'easter

In March 2018, a nor'easter heavily impacted the Boston region. In preparation, Massport deployed temporary flood barriers at Maritime properties. This was Massport's first 'real-life' emergency deployment of barriers. Barrier installations were successful and effectively protected assets from surrounding floodwaters.

High Water at the Fish Pier

Test Deployment of Temporary Flood Barriers

The team has been developing strategies to continuously improve the program and address issues encountered during the March nor'easter, such as communication and logistical challenges. Some resilience initiatives include:

- Conducting a test deployment of temporary flood barriers at the MPA Pumping Station (Electrical Telecom Building) at Logan Airport in June. Routine trainings help to increase efficiency and preparedness for deployments.
- Developing a *Massport Flood Resiliency Application* through internal collaboration to improve communication and logistics during deployments.
- Evaluating 'next level' priorities and opportunities for improving flood and disaster resiliency at vulnerable locations

Test Deployment at the Fish Pier

Be Prepared at Home

It is important to be prepared for storms at home too! The *Red Cross Flood and Hurricane Safety Checklists* provide resources and tips that can help to keep your family and home safe. Additional resources are available on the Massport Resiliency Sharepoint Page.

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SUSTAINABLE MASSPORT MONTHLY NEWSLETTER

September 2018: Community Partnerships

September is Community Partnerships month as part of *Sustainable Massport*! The support and well-being of the broader community and its schools is an important component of Logan Airport's sustainability goals. Community investment enhances the communities' ability to prosper and invest in their own development. In recognition of all the valuable community work undertaken this summer by dedicated Massport staff, here are highlights of the programs and projects we support.

Massport Backpack Program

Each summer, Massport coordinates a backpack drive for homeless and in-need children between the ages of 4 and 17. This year, Massport sponsored children at the Crossroads Family Center in East Boston, the Joseph M. Tierney Learning Center in South Boston and Heading Home in Charlestown. In August, 65 children received backpacks filled with school supplies and a new outfit for their first day of school- our highest response yet by Massport employees! This program is invaluable in strengthening the children's self-esteem, encourages them to look forward to the new school year, and sends a strong message that others care about them and their education.

Massport Food Drive

Each fall, Massport coordinates a food drive to help those less fortunate. For the upcoming Thanksgiving season, Massport is assisting three organizations: The Crossroads Family Center, The Winthrop Food Pantry and The South Boston Community Health Center (SBCHC) Food Pantry. Collections will begin on Monday, October 8, 2018 and end on Friday, November 9, 2018. An announcement will be made in October with the full details of the Massport Food Drive.

"Love Your Block" Neighborhood Cleanup

Massport proudly supports the City of Boston's "Love Your Block" neighborhood cleanup initiative. Each spring, Massport employees volunteer time to help beautify our neighboring communities by cleaning streets, painting, planting and weeding.

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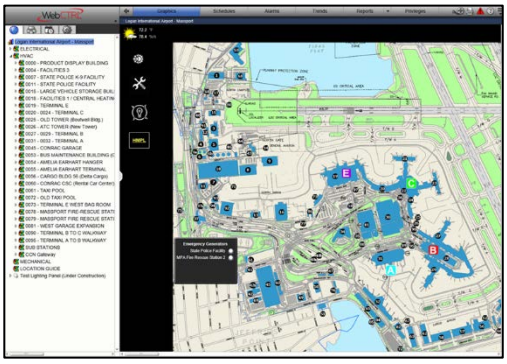
SUSTAINABLE MASSPORT MONTHLY NEWSLETTER

October 2018: Energy Efficiency

October is Energy Efficiency Month as part of *Sustainable Massport*! As Massport builds and upgrades facilities to keep up with passenger growth, we continue to invest in sustainable and energy reduction systems.

Master Building Control

Massport is expanding the ability to monitor and control all Logan Airport building operations remotely through a Master Building Control System (MBCS). This ensures peak operational performance of all HVAC and lighting systems, while expanding the opportunity to reduce energy consumption. Massport is converting and integrating our older building control systems onto the MBCS and new building systems are installed on the MBCS. As the MBCS encompasses more operations, staff are being trained to monitor the system remotely to more easily ensure peak performance for lighting and HVAC systems. The MBCS will also provide the opportunity for Massport to retro-commission the HVAC and lighting systems to reduce energy use.



Online Portal for Master Building Control System

Lighting Retrofits

- Conley Container Terminal recently retrofitted their high mast yard lighting with LEDs, cutting their energy use by half and resulting in over 175,000 kWh of energy savings.
- Since 2016, Massport has retrofitted over 6,200 lighting fixtures with energy efficient LEDs at Boston Logan Airport. The retrofits included lighting in the terminals, parking garages, streetlights, and airport facilities as part of a program designed to reduce energy use and improve lighting performance. The result is annual savings of 2,600 MWh of annual savings and a reduction of 890 metric tons of greenhouse gas (GHG) emissions!

Retrofitting streetlights with LEDs

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SUSTAINABLE MASSPORT MONTHLY NEWSLETTER
November 2018: Waste Management and Recycling

November is Waste Management and Recycling Month as part of *Sustainable Massport*! Massport has been developing solutions to encourage waste reduction, reduce the level of contamination in the recycling stream, and increase the amount of materials properly recycled, despite industry-wide challenges.

Logan Airport Waste Assessment

Massport is conducting a comprehensive waste assessment of Logan Airport to augment our understanding of the waste streams, identify challenges, and develop recommendations for improving the waste management and recycling program. A robust plan is being developed, which will identify multi-pronged strategies to successfully implement recommended initiatives and promote continuous improvement of the waste management and diversion system.

Team conducts waste audit

Prevent Contamination and Recycle Right

Contamination occurs when improper items are placed into recycling containers. A small amount of contamination can cause all of the materials within a container to be diverted as trash to landfills--- even if there are 'good' recyclable items mixed in there! Therefore, it is important to learn what you can and cannot put into single-stream recycling.

If you are unsure if an item is recyclable, please throw it in the trash.

✓ Please DO place these items in your blue bins!

Metal

Food and Beverage Cans
empty and rinse

Plastic

Bottles, Jars, Jugs and Tubs
empty and replace cap

Glass

Bottles and Jars
empty and rinse

Paper & Cardboard

Mixed Paper, Newspaper, Magazines, Boxes
empty and flatten

⃠ Please do NOT place these common contaminants in your blue bins!

FOOD / LIQUID

PLASTIC BAGS

PLASTIC WRAP/FILM

FOOD/CANDY WRAPPERS

STYROFOAM

PAPER CUPS

STRAWS

PLASTIC UTENSILS

Questions? Contact Lauren Laskey (llaskey@massport.com; 617-568-3542)

ission

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SUSTAINABLE MASSPORT MONTHLY NEWSLETTER
December 2018: Sustainable Tenants

December is Tenant Month as part of *Sustainable Massport*! Massport is proud to support our tenants' sustainable business initiatives. Examples of sustainable tenants at Logan Airport include but are not limited to: Legal Sea Foods and the Hilton Hotel.

Legal Sea Foods

To help protect the environment, Legal Sea Foods has adopted a variety of sustainable practices at Logan Airport. In May 2018, Legal Sea Foods eliminated the use of Styrofoam boxes for seafood deliveries to their six restaurants at the Airport. This initiative has significant environmental benefits by preventing roughly 20,000 non-recyclable Styrofoam boxes from entering landfill each year. In addition, their new cardboard box delivery method will contribute to improving the recycling rate at the Airport. In an effort to reduce the use of single-use plastics, the restaurants began offering paper, compostable straws in July 2018.

Hilton Hotel

The Hilton Hotel at Logan Airport has implemented a variety of sustainability initiatives to reduce environmental impacts. In March 2018, the hotel initiated a large-scale composting program for food waste collected in kitchens. Within the first six months, the program helped to divert more than 95,000 lbs. of organic materials from landfill. This equals 47.5 tons or almost 10 elephants! Compost created through this program is used to enrich soil and grow fresh vegetable gardens at roughly 50 schools and colleges in the region.

In addition to these efforts, Hilton aims to minimize the use of disposable plastic materials by providing guests with compostable alternatives for straws, cups, and more.

For more resources, visit the Massport Recycling Sharepoint Page: http://sharepoint/CapitalPrograms/Sustainability/SitePages/Recycling.aspx

Sustainability Highlights

sustainable massport 2.0

August 2019

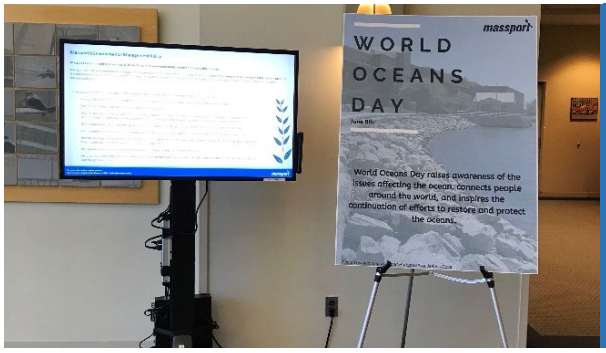
Inspired by feedback from the 2019 Sustainable Massport 2.0 charrettes, this newsletter highlights some of Massport's recent sustainability accomplishments and ongoing initiatives.

Environmental Engagement

Hazardous Waste Collection Event
In honor of Earth Day (April 22), this event provided Massport employees and Logan tenants with the opportunity to recycle and safely dispose of household hazardous waste for free. Over 100 people participated and more than 8,800 pounds of waste was collected (e.g., electronics, batteries, oil).

Harborwalk Clean-Up
Massport conducted a week-long cleanup of the Logan Harborwalk at Jeffries Cove in April to help protect Boston Harbor's important natural resources and wildlife. The team collected roughly 1 ton of debris that had washed up along the shore.

Love Your Block
Demonstrating commitment to community and the environment, many Massport employees participated in Love Your Block Community Cleanups in May, helping to cleanup and beautify neighborhoods in South Boston and East Boston.



Environmental Awareness
To celebrate *World Environment Day* (June 5) and *World Oceans Day* (June 8), educational slideshows were displayed as an opportunity for employees to learn more about each awareness day, Massport's supporting initiatives, and how to help make a difference. Slideshows are available on the Sustainability Sharepoint page.

To suggest ideas for future environmental engagement opportunities, please reach out to:
Peter DeBruin (PDeBruin@massport.com, 617-568-3583) or Lauren Laskey (llaskey@massport.com, 617-568-3542)

Project Highlights

- Massport successfully passed the *ISO 14001 for Environmental Management System (EMS)* audits for Hanscom Field (April) and Logan (May). The EMS aims to minimize the impact of operations on the environment through the continuous improvement of environmental performance and the implementation of mitigation and pollution prevention measures. The EMS process for Maritime will begin this fall.

- To foster a sustainable culture in the workplace, the Sustainability Meeting Guidelines and Checklist have been revised to encourage sustainable practices in the workplace. These documents are available on the Sustainability Sharepoint page.

- In March, Massport achieved LEED Gold certification for the Terminal B–Gates 37/38 Connector. This project reduced lighting power consumption by 52%, potable water usage by 28%, and diverted 72% of construction waste from landfill. Additionally, 23% of building materials were manufactured from recycled content, 100% of wood products were sustainably sourced (FSC certified), and 34% of the materials used in the project were manufactured regionally within 500 miles of the site. Massport is pursuing LEED certifications for several projects as well as evaluating other green building certifications to further enhance performance.

- To reduce emissions, electric ground support equipment (eGSE) charging infrastructure is being installed at Logan. There are more than 115 eGSE at the Airport. American Airlines has committed to buying another 99 eGSE by 2022; JetBlue will acquire 94 eGSE by 2023. Landside charging stations for electric vehicles (EVs) are also being installed across the Authority. There are 77 EV charging ports at Logan, and 56 more are planned for installation by 2020. Massport is seeking funding for additional airside and landside charging stations. Massport also recently replaced 12 pool vehicles with EVs and aims to continue expanding the electric fleet.

- Massport has been continuously enhancing resiliency efforts. The Flood Operations Plans for Logan and Maritime were updated to reflect recent lessons learned and evolving preparedness strategy. Logan flood barrier crates were also relocated from storage in S. Boston to Logan to reduce operational response time and increase preparedness. In addition, the design is now complete and construction will begin on enhancing existing flood resiliency at the Fish Pier while reducing operational impact of barrier deployments. Massport also recently initiated a program definition study to evaluate flood resiliency for the next tier of critical assets at Massport's coastal assets.

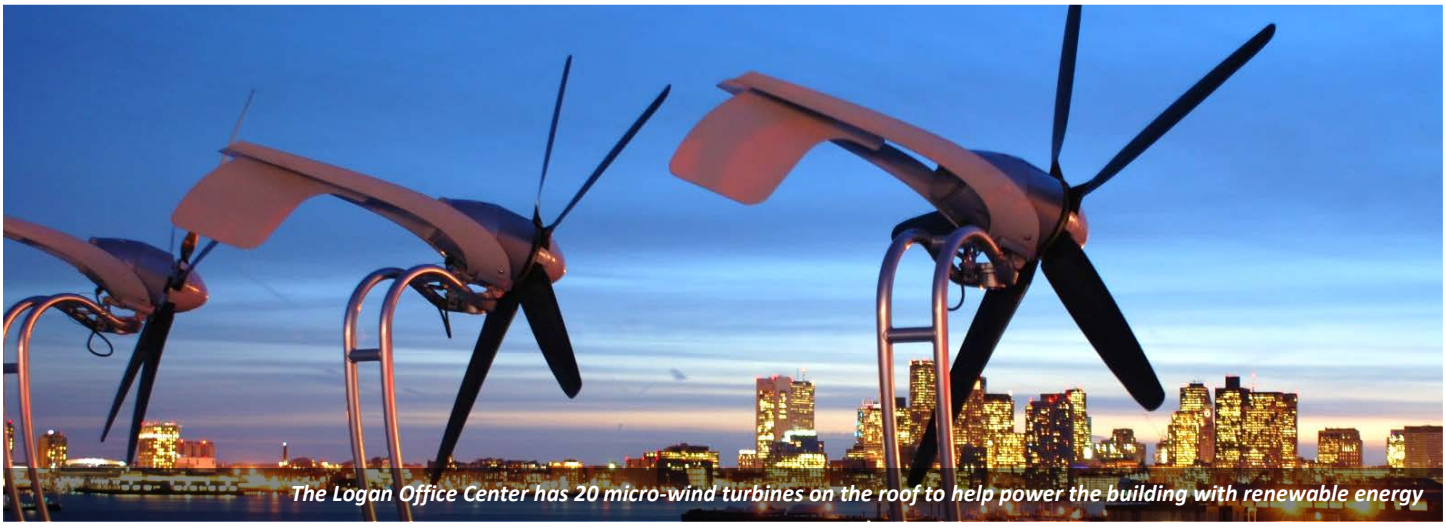
Next Steps

- The Sustainable Massport 2.0 Report is being finalized.
- The Sustainable and Resiliency Design Guidelines are being revised to make it more user friendly, incorporating the latest best practices, incorporating project tracking mechanisms such as an interactive project checklist and initiation form. Sustainable guidelines for tenant construction are also being developed.
- Massport is in the process of expanding the liquid collection program in Logan terminals to improve the diversion and waste management system.
- The 2019 Annual Sustainability and Resiliency Report will be released this fall
- A tabletop exercise modeling a Category 3 hurricane impact at Logan and Maritime facilities is being planned.

VOL 43, ISSUE 4, OCTOBER 2019

SUSTAINABLE MASSPORT NEWSLETTER

This quarterly newsletter aims to enhance communication and visibility of Massport's recent sustainability accomplishments, and ongoing initiatives as well as to provide educational resources.



The Logan Office Center has 20 micro-wind turbines on the roof to help power the building with renewable energy

Mark Your Calendar

October:

Energy Awareness Month

November:

Nov. 15: America Recycles Day

Nov. 21: World Fisheries Day

Sustainability Tip

***In honor of Energy Awareness Month*, learn more about energy efficiency programs, incentives, and products that could help you save energy and money in your home at:**
www.mass.gov/energy-efficiency-for-your-home

Continued Commitment:

Demonstrating ongoing commitment to protecting the environment, Massport successfully passed the *ISO 14001 for Environmental Management System (EMS)* audits for Hanscom Field (April) and Logan Airport (May). This represents a significant achievement in environmental management and performance!

The EMS aims to minimize the impact of operations on the environment through the continuous improvement of environmental performance and the implementation of mitigation and pollution prevention measures. This includes but is not limited to investing in and monitoring strategies to conserve energy, improve efficiency of lighting and heating systems, protect water resources, enhance recycling, and more.

In 2001, Hanscom Field became the first U.S. airport to attain ISO 14001 certification. Logan Airport facilities first became certified in 2006. While Conley Terminal achieved its initial EMS certification in 2003, the EMS has been expanded to all Marine Operations with the addition of Flynn Cruiseport and Fish Pier in 2017.

The annual process of maintaining the EMS certification for Marine Operations is currently underway and will continue through December.

Massport Receives $3.1 Million VALE Grant for Electrification Initiative!

Massport is investing in a number of initiatives to reduce emissions. This includes a comprehensive, Logan-wide initiative by Massport and airlines to install electric charging infrastructure as airlines replace their ground services equipment (GSE) with electric powered versions. **Logan Airport recently received a $3,051,925 grant from the FAA's Voluntary Airport Low Emissions (VALE) Program to support the airside electrification initiative.** The grant will fund infrastructure for about 43 charging stations at Terminal C, the Airport's busiest terminal. Massport will match the grant by covering about 25% of the cost.

Massport is installing charging stations at all of the terminals as airlines work to replace appropriate vehicles by 2028 with commercially available electric substitutes. This latest investment builds on the existing 23 electric chargers at Terminal A, 5 in place and 55 under construction at Terminal B, and 2 in place at Terminal E. All terminals will have charging stations installed over the next few years. There are currently more than 115 eGSE at the Airport. Many airlines have made laudable commitments to electrify their fleets. It is estimated that conversion to electric equipment will **reduce emissions by nearly 178,000 tons of carbon dioxide** over the lifetime of the equipment!

Landside charging stations for electric vehicles (EVs) are also being installed across the Authority. There are 77 EV charging ports at Logan, and 56 more are planned for installation by 2020. Massport is seeking funding for additional airside and landside charging stations.

Massport also recently replaced 12 pool vehicles at the Logan Office Center with electric alternatives, which will help to reduce emissions associated with Massport's fleet operations. Massport strives to continue expanding the fleet with environmentally responsible, electric vehicles.

GOING FOR THE GOLD

In March 2019, Massport achieved Leadership in Energy and Environmental Design (LEED) Gold certification for the Logan Airport Terminal B– Gates 37/38 Connector project.

Among other benefits, this project reduced lighting energy consumption by 52%, potable water usage by 28%, and diverted 72% of construction waste from landfill.

Massport is in the process of evaluating additional green building certifications to further enhance performance

Love Your Block

Demonstrating commitment to the community and the environment, many Massport employees participated in the Love Your Block Community Cleanups in May, helping to cleanup and beautify neighborhoods in South Boston and East Boston.

Harborwalk Clean-Up

Massport conducted a week-long cleanup of the Logan Harborwalk at Jeffries Cove in April to help protect Boston Harbor's important natural resources and wildlife. The team collected roughly 1 ton of maritime debris that had washed up along the shore.

Hazardous Waste Collection Event

In honor of Earth Day (April 22), this event provided Massport employees and Logan tenants with the opportunity to recycle and safely dispose of household hazardous waste for free. Over 100 people participated and more than 8,800 pounds of waste was collected (e.g., electronics, batteries, oil).

Help to conserve energy by turning off lights when you are not in your office and if you are the last to leave a conference room! *To learn more about methods for conducting sustainable meetings and being more eco-friendly in the workplace, read the latest edition of Massport's Sustainable Meeting Guidelines, which are available on the Sustainability Sharepoint page or by reaching out to sustainability@massport.com*

Resilient Massport

Massport continues to enhance climate resiliency through efforts such as:

- The Flood Operations Plans for Logan and Maritime were updated to reflect recent lessons learned and evolving preparedness strategy.
- Logan flood barrier crates were relocated from storage in S. Boston to Logan to reduce operational response time and increase preparedness.
- The design is now complete and construction will begin on enhancing existing flood resiliency at the Fish Pier while reducing operational impact of barrier deployments.
- Massport recently initiated a program definition study to evaluate flood resiliency for the next tier of critical assets at Massport's coastal assets.

The Recycling Corner: Common Contaminants — Food & Drink Cartons

Cartons CANNOT be recycled in mixed recycling containers!

Examples: juice, soup, and milk cartons

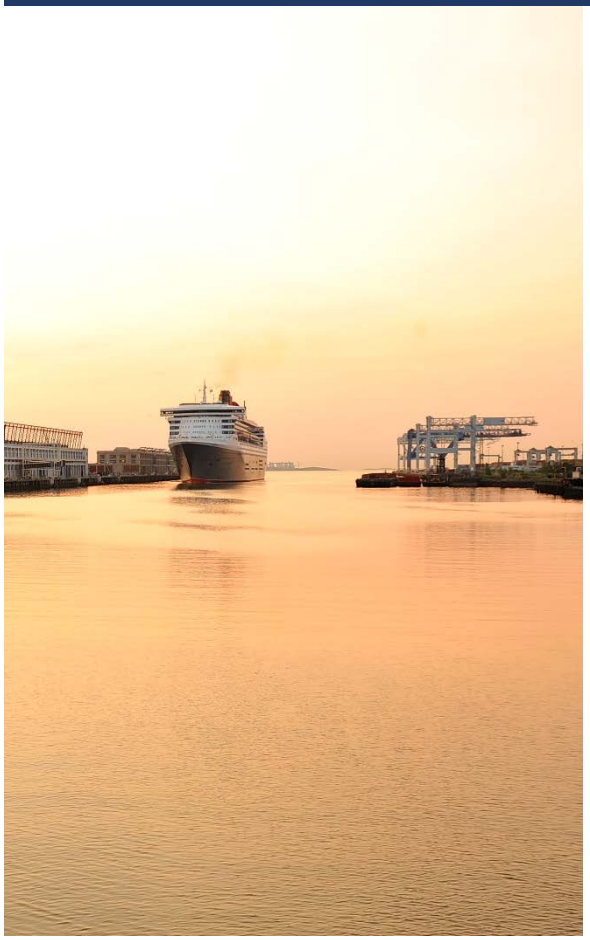
There is a wax or plastic lining on these items that is extremely difficult to separate during the recycling process.

massport Recycles

Please place these items into the **TRASH**

Additional recycling resources are available on the MADEP Recycle Smart website: https://recyclesmartma.org

On The Horizon…



- Massport is finalizing the Sustainable Massport 2.0 Report, highlighting the environmental vision of over 130 stakeholders.
- The Sustainable and Resiliency Design Guidelines are being revised to make it more user friendly, incorporating the latest best practices, and project tracking mechanisms such as an interactive project checklist and initiation form. Sustainable guidelines for tenant construction are also under development.
- Massport is in the process of expanding the liquid collection program in Logan terminals to improve the diversion and waste management system.
- The 2019 Annual Sustainability and Resiliency Report will be released this Fall.
- A tabletop exercise modeling a Category 3 hurricane impact at Logan and Maritime facilities is being planned for early 2020.

Please direct any questions, comments, or suggestions for future newsletters to: sustainability@massport.com, or
Peter DeBruin, Climate Mitigation & Resiliency Manager: pdebruin@massport.com, 617-568-3583
Lauren Laskey, Sustainability Planner: llaskey@massport.com, 617-568-3542

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Peak Period Pricing Monitoring Reports

- 2018 Peak Period Pricing Monitoring Report
- 2019 Peak Period Pricing Monitoring Report
- Memorandum from Edward C. Freni, Massport Director of Aviation, to the Boston Airline Committee (BAC), Regarding Boston-Logan International Airport Peak Period Surcharge Regulation Monitoring Report. Dated June 5, 2019
- 2020 Peak Period Pricing Monitoring Report

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BOSTON-LOGAN INTERNATIONAL AIRPORT MONITORING REPORT ON SCHEDULED AND NON-SCHEDULED FLIGHT ACTIVITY

Peak Period Surcharge Regulation 740 CMR 27:00: Massachusetts Port Authority

Report Number:	**015**
Monitoring Period:	**Through Sept. 2018**
Report Issue Date:	**May 2018**

Note: This report reflects the Boston-Logan Airport flight activity monitoring under 740 CMR 27.03 Peak Period Surcharge Regulation on Aircraft Operations at Boston-Logan International Airport.

Findings: This report includes actual and projected activity data **through September 2018**. Current and projected near-term flight levels at Boston Logan are well below Logan's good weather (VFR) throughput of approximately 120 flights per hour. **As a result, average VFR delays are projected to be minimal and well below the 15 minutes threshold through the analysis period.**

In the event demand conditions at the airport change significantly from the current projection, Massport will issue updates to this report.

Attachments

Table 1: Summary Overview of Peak Period Surcharge Program

Table 2: Summary Overview of Forecast Methodology

Table 3: Projected Aircraft Operations at Logan Airport Projected

Table 4: Projected Hourly Operations, Average Weekday

Table 5: Forecast Logan Average Weekday Operations

Massport Contact:

Mr. Flavio Leo
Director, Aviation Planning and Strategy
617-568-3528
fleo@massport.com

Table 1: Summary Overview of Peak Period Surcharge Program

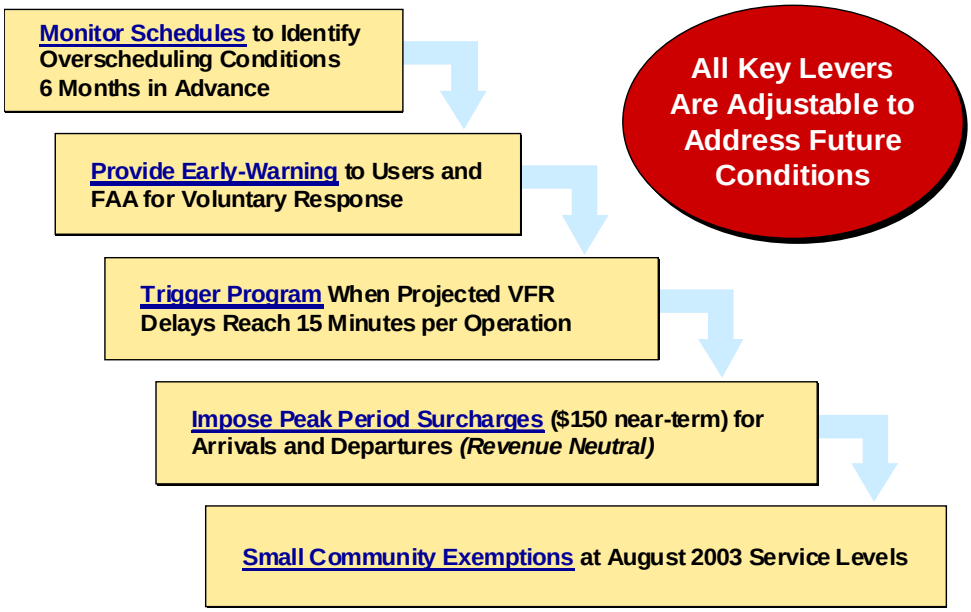

Table 2: Summary Overview of Forecast Methodology

- Scheduled passenger airline flights represent about 93 percent of total aircraft operations. Passenger airline activity for the Spring and Summer periods were projected based on published advance airline schedules
- Forecasts of monthly activity for other segments (GA, Cargo, Charter) are based on the past three months of actual flight volume and historic patterns of monthly seasonality
- Day-of-week and time of day distributions for non-scheduled segments are based on analysis of Logan radar data
- Projections for each segment were combined to produce the forecast pattern of hourly flight activity for an average weekday, Saturday, and Sunday for the period from February through September

Table 3: Aircraft Operations at Logan Airport

Note: Actual Operations are based on Massport data/air carrier reports and reflect flight cancellations due to weather and other operational impacts. Projections, scheduled activity only.

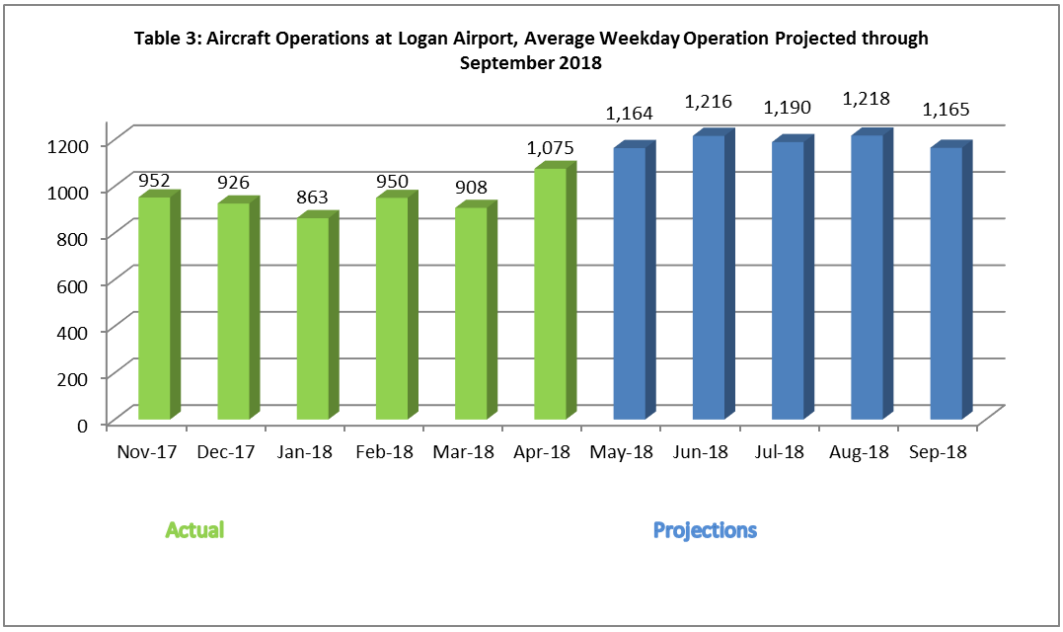

Table 4: Projected Hourly Operations

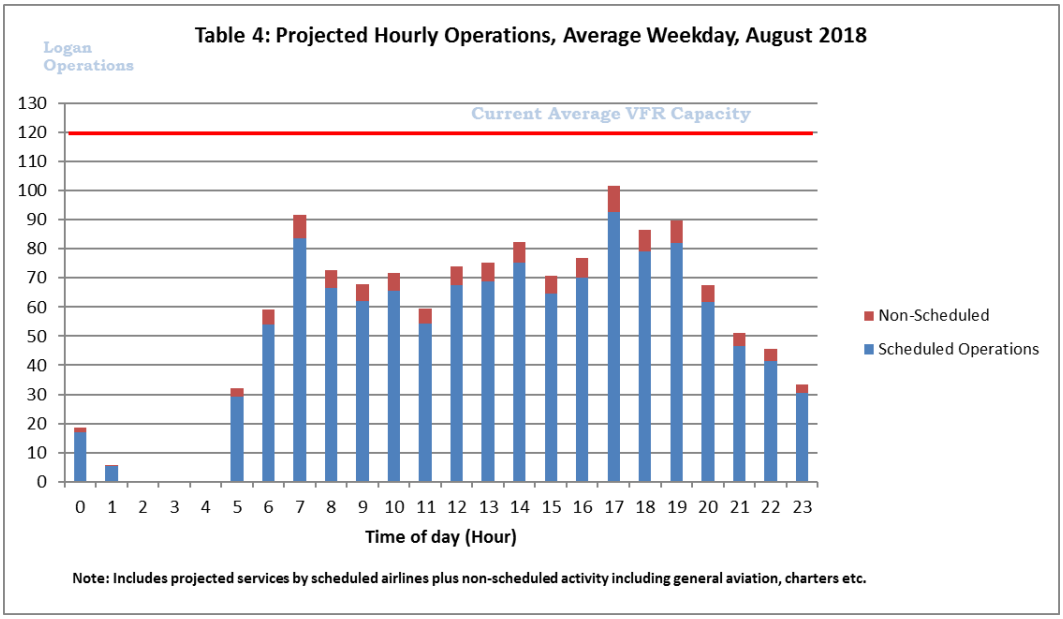

Table 5: Forecast Logan Average Weekday Operations, *Feb. – Sep.*

Forecast Daily Operations								
Hour Range	Feb-18	Mar-18	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18
0	12	16	20	20	19	16	17	17
1	4	6	8	4	6	6	5	5
2	1	2	2	0	0	0	0	0
3	0	1	1	0	0	0	0	0
4	4	2	3	0	0	0	0	2
5	20	18	24	27	29	30	29	21
6	47	42	51	59	58	52	54	55
7	59	53	65	73	80	82	84	78
8	55	50	61	64	66	66	66	62
9	56	56	63	65	71	63	62	65
10	48	46	56	64	67	63	66	64
11	45	46	50	48	52	54	54	53
12	44	45	49	66	67	66	68	65
13	53	51	60	73	69	65	69	68
14	54	53	58	67	70	72	75	71
15	55	49	56	64	67	64	65	62
16	56	52	56	70	70	69	70	68
17	58	57	64	84	93	90	93	93
18	64	60	67	76	73	73	79	79
19	60	53	66	75	75	79	82	75
20	54	52	62	49	61	61	62	53
21	43	39	51	51	52	46	47	49
22	35	34	48	38	41	42	42	37
23	24	27	35	27	30	29	30	25
Total	**950**	**908**	**1,075**	**1,164**	**1,216**	**1,190**	**1,218**	**1,165**

February - April are actual data
May - September is forecast scheduled activity only

BOSTON-LOGAN INTERNATIONAL AIRPORT MONITORING REPORT ON SCHEDULED AND NON-SCHEDULED FLIGHT ACTIVITY

Peak Period Surcharge Regulation 740 CMR 27:00: Massachusetts Port Authority

Report Number:	**016**
Monitoring Period:	**Through Sept. 2019**
Report Issue Date:	**June 2019**

Note: This report reflects the Boston-Logan Airport flight activity monitoring under 740 CMR 27.03 Peak Period Surcharge Regulation on Aircraft Operations at Boston-Logan International Airport.

Findings: This report includes actual and projected activity data **through September 2019**. Current and projected near-term flight levels at Boston Logan are well below Logan's good weather (VFR) throughput of approximately 120 flights per hour. **As a result, average VFR delays are projected to be minimal and well below the 15 minutes threshold through the analysis period.**

In the event demand conditions at the airport change significantly from the current projection, Massport will issue updates to this report.

Attachments

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Mr. Flavio Leo
Director, Aviation Planning and Strategy
617-568-3528
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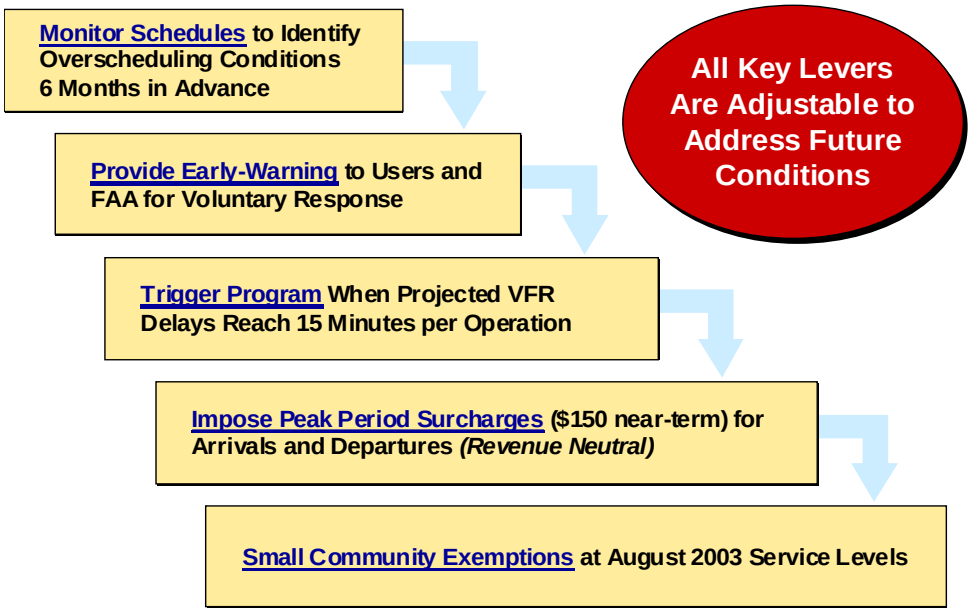

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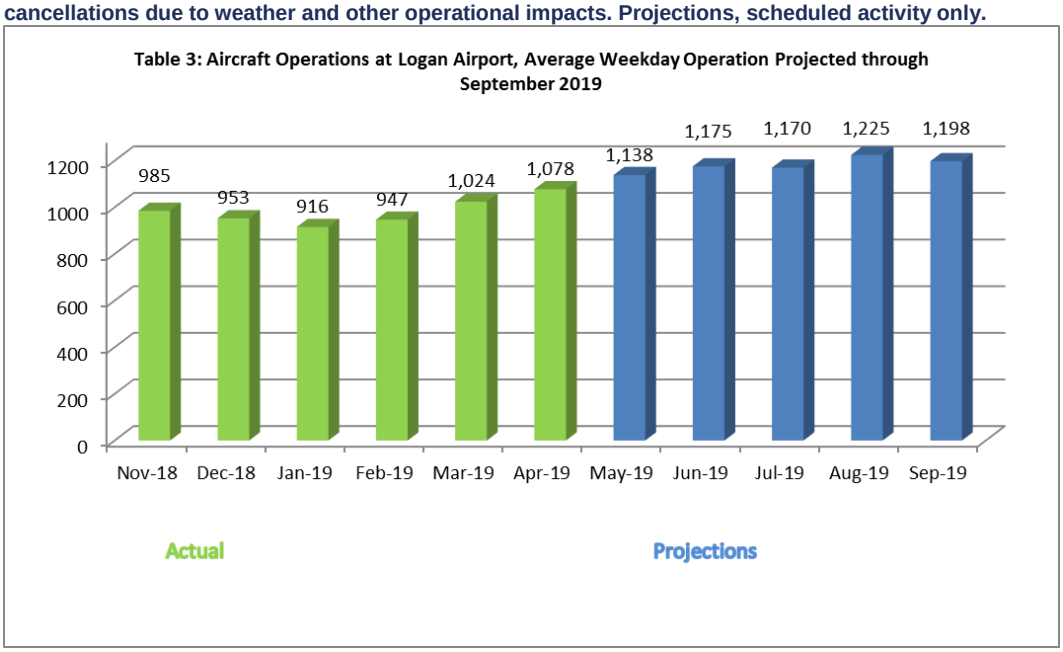
Note: Actual Operations are based on Massport data/air carrier reports and reflect flight cancellations due to weather and other operational impacts. Projections, scheduled activity only.



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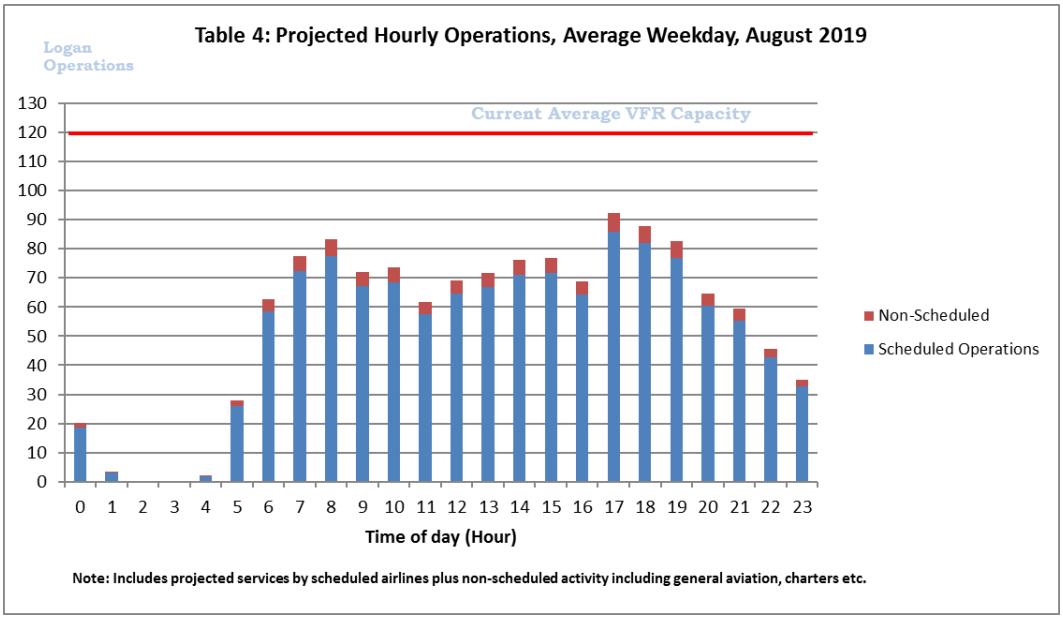

Table 5: Forecast Logan Average Weekday Operations, *Feb. – Sep.*

Forecast Daily Operations								
Hour Range	**Feb-19**	**Mar-19**	**Apr-19**	**May-19**	**Jun-19**	**Jul-19**	**Aug-19**	**Sep-19**
0	14	15	17	16	15	15	19	11
1	6	7	7	5	5	5	3	4
2	2	2	2	0	0	0	0	0
3	2	2	1	0	0	0	0	0
4	4	4	4	4	3	2	2	2
5	19	23	27	25	26	27	26	20
6	44	49	51	50	55	55	59	55
7	56	59	61	71	69	68	72	71
8	50	54	61	68	74	73	78	81
9	53	57	61	68	66	65	67	61
10	50	56	62	64	65	63	69	69
11	49	53	57	50	52	55	58	57
12	47	44	48	59	62	62	65	64
13	49	53	55	58	62	62	67	68
14	54	56	55	74	69	71	71	70
15	54	57	57	66	73	70	72	70
16	58	60	62	52	58	62	64	69
17	57	63	61	87	83	82	86	83
18	59	68	69	81	80	78	82	81
19	57	59	61	65	70	75	77	71
20	48	60	60	49	57	57	60	61
21	46	51	57	55	54	51	55	54
22	45	41	47	42	44	41	43	41
23	26	31	35	30	32	31	33	34
Total	**947**	**1,024**	**1,078**	**1,138**	**1,175**	**1,170**	**1,225**	**1,198**
	February - Apr are actual data							
	May - September is forecast data							

massport
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Telephone (617) 568-5000
www.massport.com

June 5, 2019

Boston Airline Committee (BAC)
c/o Kevin Costello
Director Infrastructure, Properties & Development
jetBlue Airways Corporation
27-01 Queens Plaza North
Long Island City, New York 11101

Re: Boston-Logan International Airport Peak Period Surcharge Regulation Monitoring Report

Dear Mr. Costello:

The Massachusetts Port Authority (Massport) has completed the Peak Period Pricing Monitoring Report for 2019, in compliance with Massport's Peak Period Surcharge Regulation (740 CMR 27.03) ("Regulation"). The Regulation requires that Massport monitor published scheduled and expected non-scheduled aircraft activity at Logan and report to airfield-users the implication of the total projected aircraft activity on Logan's good weather delays. I have attached a copy of the Monitoring Report.

The Monitoring Report includes historical and projected activity data for the 2019 spring and summer season. The report concludes that current and projected near-term flight levels at Boston-Logan are well below Logan's good weather (VFR) throughput of approximately 120 flights per hour. As a result, average VFR (good weather) delays based on the expected demand are projected to be minimal through the analysis period and well below the 15 minutes threshold of the Peak Period Surcharge Regulation.

Please forward a copy of this Monitoring Report to the BAC membership. If you have any questions please feel free to contact Flavio Leo at 617-568-3528 or Greg Zanni at 617-561-3372.

Sincerely,

Edward C. Freni
Director of Aviation

cc: Todd Smith, Daniel Gallagher, Greg Zanni, Flavio Leo

BOSTON-LOGAN INTERNATIONAL AIRPORT MONITORING REPORT ON SCHEDULED AND NON-SCHEDULED FLIGHT ACTIVITY

Peak Period Surcharge Regulation 740 CMR 27:00: Massachusetts Port Authority

Report Number:	**017**
Monitoring Period:	**June-July 2020**
Report Issue Date:	**June 2020**

Note: This report reflects the Boston-Logan Airport flight activity monitoring under 740 CMR 27.03 Peak Period Surcharge Regulation on Aircraft Operations at Boston-Logan International Airport.

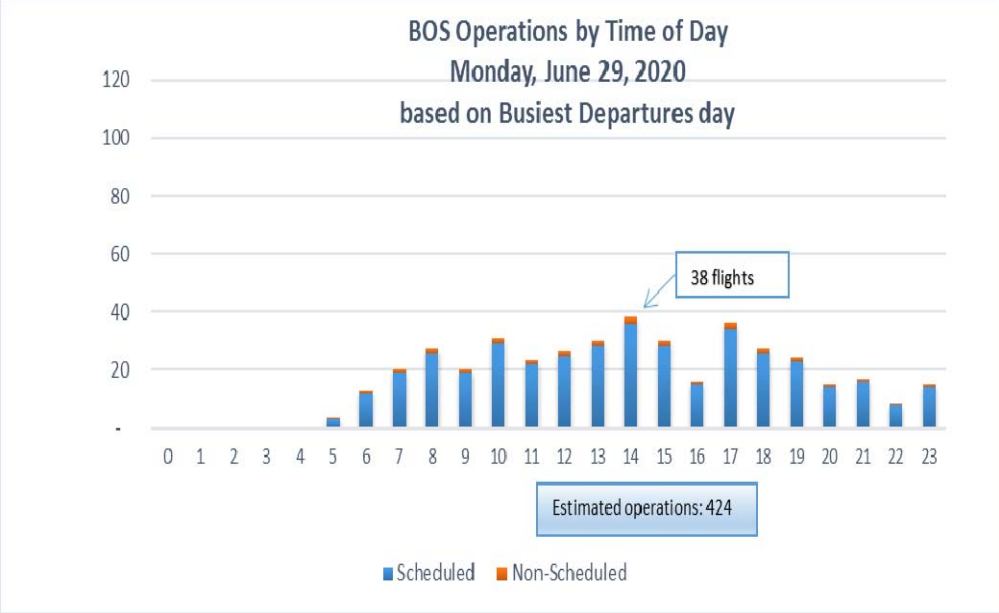
Due to the Corona virus disruption, significant drop in flight operations, and continued uncertainty in flight schedules, this report is limited to reporting on traffic at Logan for June and July 2020. In the event demand conditions change significantly from expected, updates to this report will be issued.

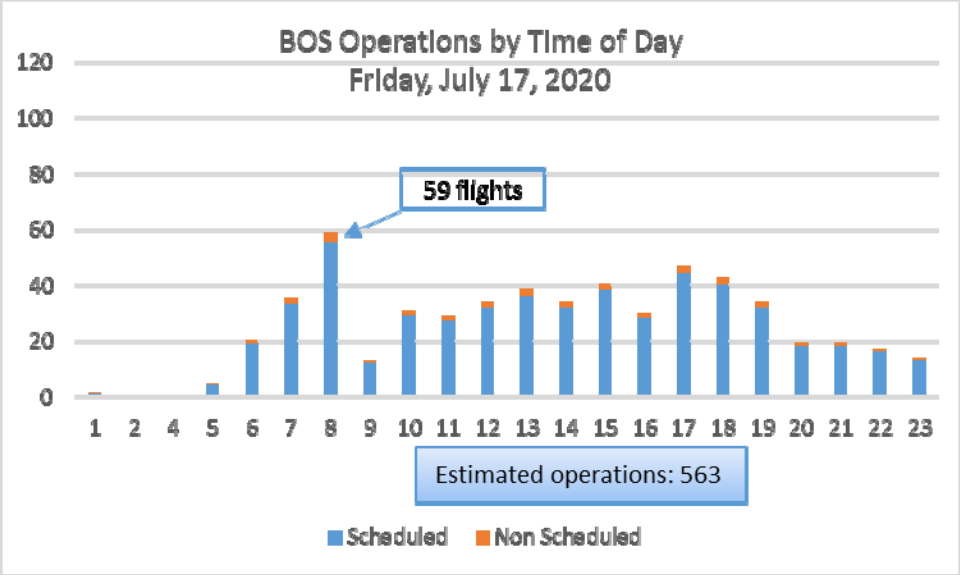
Findings: Current and projected near-term flight levels at Boston Logan are well below Logan's good weather (VFR) throughput of approximately 120 flights per hour. **As a result, average VFR delays are projected to be minimal and well below the 15 minutes threshold through the analysis period.**

Massport Contact:

Mr. Flavio Leo
Director, Aviation Planning and Strategy
617-568-3528
fleo@massport.com

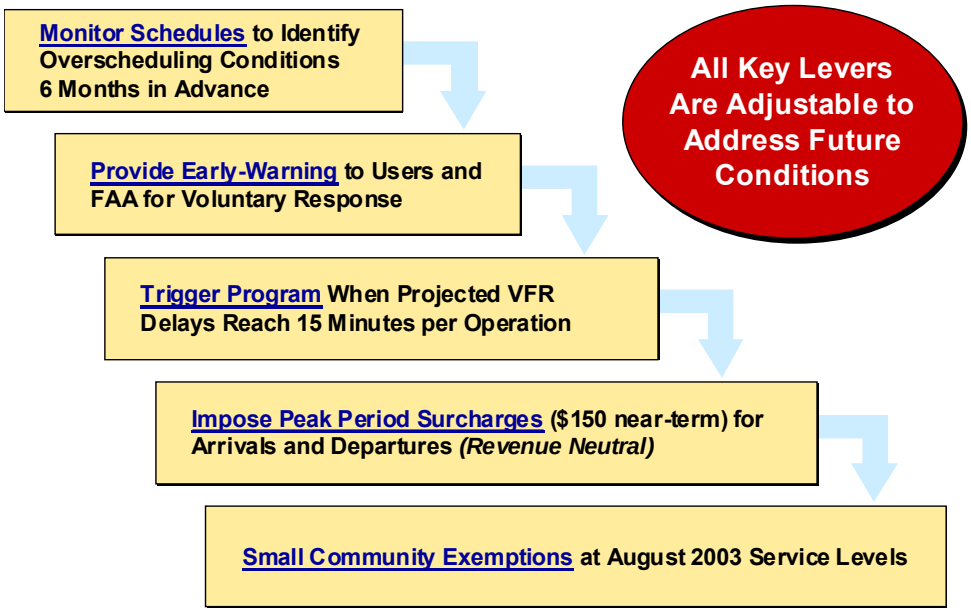
Projected Traffic June and July*





*Note due to the Corona virus disruption, air carrier schedules are subject to change.

Table 1: Summary Overview of Peak Period Surcharge Program



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Reduced/Single Engine Taxiing at Logan Airport Memoranda

This Appendix provides detailed information in support of Chapter 7, *Air Quality/ Emissions Reduction:*

- Memorandum from Edward C. Freni, Massport Director of Aviation, to the Boston Logan Airline Committee, Regarding Single/Reduced-Engine Taxiing and Other Strategies to Reduce Aircraft-Generated Emissions and Noise at Boston Logan. Dated May 22, 2018
- Memorandum from Edward C. Freni, Massport Director of Aviation, to the Boston Logan Airline Committee, Regarding Update on Single/Reduced-Engine Taxiing and Other Strategies to Reduce Aircraft-Generated Emissions and Noise at Boston Logan. Dated June 12, 2019

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Massachusetts Port Authority
One Harborside Drive
East Boston, MA 02128-2909
Telephone (617) 568-5000
www.massport.com

To: Boston Airline Committee

From: Edward C. Freni
Director of Aviation

Date: May 22, 2018

RE: Single/Reduced-Engine Taxiing and Other Strategies to Reduce Aircraft-Generated Emissions and Noise at Boston Logan

As an important user of Boston-Logan International Airport ("Boston Logan"), you are an essential partner in our efforts to ensure that Boston Logan operates in the safest, most dependable and environmentally responsible manner. Although the aviation industry has been highly successful in reducing noise and emissions, there are additional opportunities to further reduce aircraft noise and emissions including: 1. Single/reduced-engine taxiing, 2. Use of idle-reverse thrust, and 3. Retrofitting older A320 aircraft with "vortex generators" to reduce aircraft noise.

We understand that single or reduced-engine taxiing is being voluntarily implemented by the vast majority of air carriers at Boston Logan. I write to you to encourage your continued use of this fuel-saving emissions reduction strategy, subject to pilot discretion and to the extent consistent with your established operating safety procedures.

I also encourage your use of idle reverse thrust (or to minimize the use of reverse thrust) on landing, as a second operational measure, again, only at the discretion of the pilot and consistent with your established operational safety procedures. This measure provides noise relief to our nearest neighbors and, at the same time, provides companion benefits to you, such as reducing fuel burn and engine wear. Clearly, the use of this procedure must be consistent with operational conditions at Boston Logan, including runway surface conditions and whether LAHSO is in use.

Finally, I urge you to continue recent industry efforts to retrofit A320 family aircraft with "vortex generators" to reduce airframe noise unique to this aicraft. Although the A320 is a fully noise-compliant/modern aircraft, this is an excellent example of additional, incremental actions we can take as an industry to reduce impacts on the environment. Attached please find more information related to this technology.

Thank you for your continued work to enhance Boston Logan's operational safety and efficiency, while improving its environmental footprint. If you have any questions or would like to discuss any aspect of this letter, please feel free to contact me or Mr. Flavio Leo, Director of Planning and Strategy, at 617-568-3528.

Edward C. Freni
Director of Aviation

Attachment

An even quieter approach: Airbus introduces air flow deflectors on the A320 Family

Building on the A320 Family's established reputation for quiet operations, Airbus is reducing noise levels even further for its popular single-aisle product line with the introduction of small underwing air flow deflectors. Positioned just ahead of underwing cavities for the fuel over-pressure protection system, these devices prevent the cavities from generating a "whistling" sound which can sometimes be heard on the ground when the engines are at idle during final approach. Air flow deflectors were implemented in production A320 jetliners this spring and are also available as a retrofit modification.

Massachusetts Port Authority
One Harborside Drive
East Boston, MA 02128-2909
Telephone (617) 568-5000
www.massport.com

To: Boston Airline Committee

From: Edward C. Freni
Director of Aviation

Date: June 12, 2019

RE: Update on Single/Reduced-Engine Taxiing and Other Strategies to Reduce Aircraft-Generated Emissions and Noise at Boston Logan

As an important user of Boston-Logan International Airport ("Boston Logan"), you are an essential partner in our efforts to ensure that Boston Logan operates in the safest, most dependable and environmentally responsible manner. Although the aviation industry has been highly successful in reducing noise and emissions, there are additional opportunities to further reduce our environmental footprint.

One action air carriers are taking to reduce noise is the retrofitting of the A320 family of aircraft to reduce airframe noise. I want to congratulate jetBlue in their announcement to retrofit their A320s aircraft with "vortex generators" to reduce airframe noise unique to this airplane type (see attachment). This initiative will provide meaningful reductions in noise that generates community complaints. If your airline is also working towards this retrofit please let us know. I strongly urge you to consider this important improvement to the noise emissions of this family of aircraft.

I understand that single or reduced-engine taxiing is being voluntarily implemented by the vast majority of air carriers at Boston Logan. I write to you to encourage your continued use of this fuel-saving emissions reduction strategy, subject to pilot discretion and to the extent consistent with your established operating safety procedures.

Finally, I encourage your use of idle reverse thrust (or to minimize the use of reverse thrust) on landing, as a second operational measure, again, only at the discretion of the pilot and consistent with your established operational safety procedures. This measure provides noise relief to our nearest neighbors and, at the same time, provides companion benefits to you, such as reducing fuel burn and engine wear. The use of this procedure must be consistent with operational conditions at Boston Logan, including runway surface conditions and whether LAHSO is in use.

Thank you for your continued work to enhance Boston Logan's operational safety and efficiency, while improving its environmental footprint. If you have any questions or would like to discuss any aspect of this letter, please feel free to contact me or Mr. Flavio Leo, Director of Planning and Strategy, at 617-568-3528.

Attachment

JetBlue has committed to add vortex generators to its 138 remaining Airbus A320 family aircraft through 2021

East Boston
TIMES-FREE PRESS

Page 10 THE EAST BOSTON TIMES-FREE PRESS Wednesday, October 17, 2018

Massport and community applaud JetBlue's plans to retrofit airbus fleet with noise reducing generators

Last week, JetBlue announced plans to retrofit their entire Airbus fleet with noise-reducing vortex generators. JetBlue is the largest operator at Logan International Airport and this move reflects the partnership between Massport and the airline to reduce aircraft noise to benefit surrounding communities. Massport understands concerns about aircraft noise and has continuously been involved in community discussions with residents and elected officials regarding overflights.

"While the airline industry has benefited from advances in technology and efficiency leading to quieter planes and engines, the work is never done," said Joe Bertapelle, Director Strategic Airspace Programs, JetBlue. "We're pleased to incorporate this advancement across our Airbus fleet and contribute to our communities in a meaningful way as good corporate citizens."

Beginning in 2015, the airline began taking delivery of new aircraft with vortex generators already installed as standard equipped Airbus family aircraft. JetBlue is committing to add the devices to its 138 remaining Airbus A320 family aircraft through 2021. The small devices disrupt wind over ports on the wing which can produce a "whistling" tone during approach into an airport.

Vortex generators will be installed on 130 existing JetBlue A320 aircraft and 8 JetBlue A321 aircraft during their existing scheduled heavy checks with the full fleet wide install expected to be complete in 2021. All future Airbus orders will be delivered with vortex generators already installed.

This extraordinary commitment is a testament to years of advocacy by local elected officials, and JetBlue's ongoing support for the communities where its customers and crewmembers live and work, paralleled JetBlue's own research on the effectiveness of vortex generators.

"Thank you to JetBlue for its leadership in implementing noise-reduction technologies to its entire Airbus fleet," said House Speaker Robert DeLeo. "I'm encouraged that the airline is taking this important step on this issue- one I have advocated for since I was a municipal official. I encourage the other airlines that fly in and out of Logan Airport to follow JetBlue's example."

Working with the community and elected officials, Massport has made efforts over the years in various areas to mitigate the effects of aircraft noise. Currently, Massport and the FAA are working on a groundbreaking RNAV Study led by technical experts at MIT to develop test projects to determine the possibility of noise reducing procedures at Logan. Working with the public and the statutorily created Massport Community Advisory Committee (Massport CAC), Massport has completed an initial phase called Block 1 and are in Block 2. Block 1 resulted in recommendations, which were technically less complex and did not result in shifting of noise from one community to another. Block 2 is looking at ideas that are more complex and that may shift noise.

"JetBlue's new technology to reduce airplane noise will have a positive impact on the communities impacted by flights arriving at Logan," said Senator Joseph Boncore. "This is a great move for the airline and a win for those who have advocated on this issue over the years."

"I'm pleased with JetBlue's efforts to implement noise-reduction technology across its Airbus fleet," Rep. Adrian Madaro said. "Noise pollution has long been a top quality of life concern for residents of East Boston. This investment in a step in the right direction and I implore other airlines to make noise reduction a priority as well."

The Massport CAC spearheaded that Massport prioritize this noise reduction implementation.

In December of 2015, East Boston resident John Nucci was named by Boston Mayor Marty Walsh as a representative of the City of Boston to the Massport CAC. That committee unanimously elected him as their appointment to the Massport Board of Directors.

"As a lifelong resident of East Boston, I know how important it is that Massport push the airlines to develop noise reducing benefits for the surrounding communities," said Massport CAC member and Board member John Nucci. "After hearing from the membership of the Massport CAC, as their appointment to the Massport Board, I was pleased to advocate for the retrofit of fleets to include noise-reducing vortex generators. JetBlue's actions are a positive outcome for all."

"At Massport, we are continuously engaged with the surrounding communities of Logan Airport and appreciate their feedback regarding airplane noise," said Massport CEO Thomas P. Glynn. "We think this is a great step JetBlue is taking toward reducing airplane noise and we are thankful to the airline for making this a priority."

"After hearing from the membership of the Massport CAC, as their appointment to the Massport Board, I was pleased to advocate for the retrofit of fleets to include noise-reducing vortex generators. JetBlue's actions are a positive outcome for all."

jetBlue

JetBlue to Retrofit Airbus Fleet with Vortex Generators

Oct 10, 2018

NEW YORK--(BUSINESS WIRE)-- JetBlue (NASDAQ: JBLU), New York's Hometown Airline™, today announces plans to retrofit its entire Airbus fleet with noise-reducing vortex generators. This move reflects JetBlue's continued commitment to the communities where its customers and crewmembers live and work. Beginning in 2015, JetBlue began taking delivery of new aircraft with vortex generators already installed. JetBlue is committing to add the devices to its 138 remaining Airbus A320 family aircraft through 2021. The small devices disrupt wind over ports on the wing which can produce a "whistling" tone during approach into an airport.

"While the airline industry has benefited from advances in technology and efficiency leading to quieter planes and engines, the work is never done," said Joe Bertapelle, Director Strategic Airspace Programs, JetBlue. "We're pleased to incorporate this advancement across our Airbus fleet and contribute to our communities in a meaningful way as good corporate citizens."

Vortex generators will be installed on 130 existing JetBlue A320 aircraft and eight JetBlue A321 aircraft during their existing scheduled heavy checks with the full fleet wide install expected to be complete in 2021. All future Airbus orders will be delivered with vortex generators already installed. The cost to retrofit the full Airbus fleet is less than $1 million.

About JetBlue

JetBlue is New York's Hometown Airline®, and a leading carrier in Boston, Fort Lauderdale - Hollywood, Los Angeles (Long Beach), Orlando, and San Juan. JetBlue carries more than 40 million customers a year to 103 cities in the U.S., Caribbean, and Latin America with an average of 1,000 daily flights. For more information please visit www.jetblue.com.

View source version on businesswire.com: https://www.businesswire.com/news/home/20181010005816/en/

JetBlue Corporate Communications
Tel: +1.718.709.3089
corpcomm@jetblue.cc

Source: JetBlue