

## Appendix E Air Quality



305540 2012 INM Operation for Air Quality Analysis  
 2012 Operations  
 Average Annual Day  
 bln 9/30/13

Group	Sector	EDMS	Engine Type	Departures		Arrivals		Annual LTOs	Annual TGOs
				Day	Night	Day	Night		
1	CIV	Cessna 500 citation 1	JT15D-1	0.65	0.03	0.62	0.05	248	0
2	CIV	Beechjet 400	JT15D-5	1.93	0.11	1.94	0.10	746	0
3	CIV	Bombadier Learjet 35	TFE731-2-2B	5.37	0.32	5.20	0.49	2,084	0
3M	MIL	Falcon 200	CF700-2D	0.07	0.00	0.07	0.00	27	0
5	CIV	Bombadier Learjet 25	CJ610-6	0.05	0.01	0.05	0.01	19	0
7	CIV	Gulfstream -IIB	SPEY MK511	0.09	0.01	0.10	0.00	36	0
8	CIV	Gulfstream IV	TAY-MK611-8	3.62	0.28	3.47	0.43	1,427	0
9	CIV	Bombadier Challenger 600	ALF 502L-2	2.52	0.10	2.45	0.17	960	0
10	CIV	Bombadier Challenger 601	CF34-3A	4.42	0.22	4.13	0.51	1,697	0
11	CIV	Boeing 747-100	CF6-45A	0.01	0.02	0.01	0.01	8	0
11M	MIL	Desault Falcon 50	TFE731-3	0.00	0.00	0.00	0.00	0	0
14	CIV	Douglas DC-9	JT8D-7	0.08	0.02	0.07	0.04	38	0
15M	MIL	Boeing 707 320B	TF33-P-100	0.02	0.00	0.02	0.00	10	0
17	CIV	Aerospatiale SA-365N Dauphin	250B17B	9.96	0.19	9.92	0.23	3,715	0
18	CIV	Gulfstream I	Rda.7	0.00	0.00	0.00	0.00	1	0
19	CIV	De havalland DHC-6-100 Twin Otter	PT6A-20	2.53	0.02	2.52	0.03	934	0
20	CIV	Cessna 441	TPE331-8	4.97	0.11	4.97	0.12	1,862	0
20M	MIL	Cessna 441	TPE331-8	0.01	0.00	0.01	0.00	4	0
22	CIV	Israel IAI-1125 Astra	TFE731-2/2A	0.50	0.03	0.49	0.04	194	0
25	CIV	Cessna 650 Citation V	TFE731-3	0.16	0.01	0.16	0.01	62	0
21	CIV	Cessna 150 Series	O-200	172.08	0.38	171.80	0.67	28,023	35,098
21M	MIL	Cessna 150 Series	O-200	0.20	0.00	0.20	0.00	73	0
26	CIV	Falcon 50/900	TFE731-3	1.83	0.08	1.80	0.11	700	0
29	CIV	Beech King Air 90	PT6A-60	0.93	0.06	0.94	0.05	362	0
30	CIV	Saab 340	CT7-5A2	0.00	0.00	0.00	0.00	1	0
32	CIV	727-100	JT8D-15	0.00	0.00	0.00	0.00	1	0
33	CIV	SD 330 Sherpa	PT6A-45	0.92	0.04	0.90	0.05	350	0
34	CIV	Boeing 737-100 series Freighter	JT8D-17	0.07	0.00	0.05	0.01	24	0
35	CIV	Dornier 328-100	PW119B	0.02	0.00	0.02	0.00	9	0
36	CIV	Airbus A320 200 Series	CFM56-5B4/P	0.02	0.00	0.02	0.01	8	0
37	CIV	Bombadier Global Express	BR700-710A2-20	2.00	0.12	1.89	0.23	775	0
39	CIV	Gulfstream II	SPEY MK511-8	0.03	0.00	0.04	0.00	13	0
40	CIV	Cessna 750 Citation X	AE3007C TYPE 2	1.95	0.08	1.89	0.13	742	0
41	CIV	Boeing 737-800	CFM56-7B27	0.17	0.08	0.14	0.11	94	0
42	CIV	Boeing 757-200 Series	RB211-535E4	0.02	0.01	0.02	0.00	8	0
43	CIV	Eclipse 500	PW610F	1.74	0.09	1.66	0.17	672	0
44	CIV	Cessna 525C Citation Jet	JT15D-1	1.11	0.03	1.11	0.03	418	0
45	CIV	Cessna 560 Citation V	JT15D-5	1.05	0.02	1.05	0.03	395	0
46	CIV	Cessna 560 Citation Excel\	JT15D-5	2.76	0.12	2.73	0.15	1,055	0
47	CIV	Bombadier Learjet 60	TFE731-2/2A	0.83	0.04	0.82	0.05	320	0
48	CIV	Cessna 680 Citation Sovereign	PW306B	1.17	0.07	1.17	0.07	453	0
				<b>225.88</b>	<b>2.72</b>	<b>224.46</b>	<b>4.14</b>	<b>48,567.8</b>	<b>35,098.0</b>
				Arrivals	<b>228.60</b>	Departures	<b>228.60</b>		
						Total	<b>457.19</b>		

Note: Groups 21 and 21M are modeled with a mix of single engine piston aircraft: 75% GASEPF and 25% GASEPV.

**305540 2012 Hanscom ESPR**  
**INM Operation for Air Quality Analysis**  
**2020 Operations**  
**Average Annual Day**

Group	Sector	EDMS	Engine Type	Departures		Arrivals		Annual LTOs	Annual TGOs
				Day	Night	Day	Night		
1	CIV	Cessna 500 citation 1	JT15D-1	0.87	0.05	0.85	0.08	338	0
2	CIV	Beechjet 400	JT15D-5	2.72	0.15	2.64	0.24	1,053	0
3	CIV	Bombadier Learjet 35	TFE731-2-2B	7.47	0.42	7.24	0.65	2,888	0
3M	MIL	Falcon 200	CF700-2D	0.24	0.00	0.24	0.00	89	0
8	CIV	Gulfstream IV	TAY MK611-8	5.32	0.30	5.16	0.46	2,058	0
9	CIV	Bombadier Challenger 600	ALF 502L-2	3.24	0.18	3.14	0.28	1,254	0
10	CIV	Bombadier Challenger 601	CF34-3A	6.29	0.36	6.10	0.55	2,433	0
15M	MIL	Boeing 707 320B	TF33-P-100	0.09	0.00	0.09	0.00	33	0
17	CIV	Aerospatiale SA-365N Dauphin	250B17B	10.03	0.20	10.00	0.23	3,743	0
19	CIV	De havalland DHC-6-100 Twin Otter	PT6A-20	3.10	0.07	3.08	0.09	1,160	0
20	CIV	Cessna 441	TPE331-8	5.17	0.12	5.16	0.12	1,936	0
20M	MIL	Cessna 441	TPE331-8	0.04	0.00	0.04	0.00	13	0
22	CIV	Israel IAI-1125 Astra	TFE731-2/2A	0.59	0.03	0.57	0.05	228	0
21	CIV	Cessna 150 Series	O-200	160.56	0.35	160.28	0.63	23,795	35,098
21M	MIL	Cessna 150 Series	O-200	0.65	0.00	0.65	0.01	239	0
26	CIV	Falcon 50/900	TFE731-3	2.40	0.14	2.32	0.21	927	0
29	CIV	Beech King Air 90	PT6A-60	0.97	0.04	0.96	0.05	369	0
33	CIV	SD 330 Sherpa	PT6A-45	0.96	0.04	0.95	0.05	367	0
37	CIV	Bombadier Global Express	BR700-710A2-20	2.73	0.15	2.65	0.24	1,057	0
40	CIV	Cessna 750 Citation X	AE3007C Type 2	2.84	0.16	2.75	0.25	1,097	0
41	CIV	Boeing 737-800	CFM56-7B27	0.47	0.03	0.46	0.04	183	0
43	CIV	Eclipse 500	PW610F	2.32	0.13	2.24	0.20	896	0
44	CIV	Cessna 525C Citation Jet	JT15D-1	1.70	0.10	1.65	0.15	658	0
45	CIV	Cessna 560 Citation V	JT15D-5	1.47	0.08	1.43	0.13	570	0
46	CIV	Cessna 560 Citation Excel	JT15D-5	3.87	0.22	3.75	0.34	1,497	0
47	CIV	Bombadier Learjet 60	TFE 731-2/2A	1.18	0.07	1.15	0.10	457	0
48	CIV	Cessna 680 Citation Sovereign	PW306B	1.77	0.10	1.72	0.15	685	0
				<b>229.09</b>	<b>3.48</b>	<b>227.26</b>	<b>5.32</b>	<b>50,023.8</b>	<b>35,098.0</b>
				Arrivals	<b>232.57</b>	Departures	<b>232.57</b>		
						Total	<b>465.15</b>		

Note: Groups 21 and 21M are modeled with a mix of single engine piston aircraft: 75% GASEPF and 25% GASEPV.

**305540 2012 Hanscom ESPR  
INM Operation for Air Quality Analysis  
2030 Operations  
Average Annual Day**

Group	Sector	EDMS	Engine Type	Departures		Arrivals		Annual LTOs	Annual TGOs
				Day	Night	Day	Night		
1	CIV	Cessna 500 citation 1	JT15D-1	1.17	0.07	1.13	0.10	451	0
2	CIV	Beechjet 400	JT15D-5	3.64	0.21	3.53	0.32	1,406	0
3	CIV	Bombadier Learjet 35	TFE731-2-2B	10.00	0.57	9.69	0.87	3,856	0
3M	MIL	Falcon 200	CF700-2D	0.24	0.00	0.24	0.00	89	0
8	CIV	Gulfstream IV	JAYMK611-8	7.13	0.40	6.91	0.62	2,748	0
9	CIV	Bombadier Challenger 600	ALF502L-2	4.34	0.25	4.21	0.38	1,674	0
10	CIV	Bombadier Challenger 601	CF34-3A	8.42	0.48	8.16	0.74	3,248	0
15M	MIL	Boeing 707 320B	TF33-P-100	0.09	0.00	0.09	0.00	33	0
17	CIV	Aerospatiale SA-365N Dauphin	250B17B	10.06	0.20	10.02	0.23	3,743	0
19	CIV	De havalland DHC-6-100 Twin Otter	PT6A-20	4.38	0.79	4.36	0.10	1,757	0
20	CIV	Cessna 441	TPE331-8	5.84	0.13	5.83	0.14	2,180	0
20M	MIL	Cessna 441	TPE331-8	0.04	0.00	0.04	0.00	13	0
22	CIV	Israel IAI-1125 Astra	TFE731-2/2A	0.79	0.04	0.77	0.07	305	0
21	CIV	Cessna 150 Series	O-200	176.78	0.44	176.44	0.78	29,585	35,098
21M	MIL	Cessna 150 Series	O-200	0.65	0.00	0.65	0.01	239	0
26	CIV	Falcon 50/900	TFE731-3	3.21	0.18	3.11	0.28	1,237	0
29	CIV	Beech King Air 90	PT6A-60	1.04	0.04	1.02	0.06	394	0
33	CIV	SD 330 Sherpa	PT6A-45	1.08	0.04	1.07	0.06	412	0
37	CIV	Bombadier Global Express	BR700-710A2-20	3.66	0.21	3.54	0.32	1,410	0
40	CIV	Cessna 750 Citation X	AE3007C TYPE 2	3.80	0.21	3.68	0.33	1,464	0
41	CIV	Boeing 737-800	CFM56-7B27	0.63	0.04	0.61	0.06	244	0
43	CIV	Eclipse 500	PW610F	3.10	0.18	3.01	0.27	1,196	0
44	CIV	Cessna 525C Citation Jet	JT15D-1	2.28	0.13	2.21	0.20	878	0
45	CIV	Cessna 560 Citation V	JT15D-5	1.97	0.11	1.91	0.17	761	0
46	CIV	Cessna 560 Citation Excel\	JT15D-5	5.18	0.29	5.02	0.45	1,999	0
47	CIV	Bombadier Learjet 60	TFE731-2/2A	1.58	0.09	1.53	0.14	610	0
48	CIV	Cessna 680 Citation Sovereign	PW306B	2.37	0.13	2.30	0.21	915	0
				<b>263.48</b>	<b>5.22</b>	<b>261.09</b>	<b>6.90</b>	<b>62,848.0</b>	<b>35,098.0</b>
				Arrivals	<b>268.70</b>	Departures	<b>267.99</b>		
						Total	<b>536.69</b>		

Note: Groups 21 and 21M are modeled with a mix of single engine piston aircraft: 75% GASEPF and 25% GASEPV.

**Hanscom ESPR  
2012 Mesoscale Analysis - Hanscom Traffic**

Link	Distance (miles)	AM Peak	PM Peak	ADT	Daily VMT	Vehicle Speeds (mph)	Vehicle Emission Factors 2012					
							CO (g/mile)	CO2 (g/mile)	VOC (g/mile)	NOX (g/mile)	PM10 (g/mile)	PM2.5 (g/mile)
Airport Road	0.32	0	0	0	0	30	10.143	561.3	0.329	0.758	0.0358	0.0204
Bedford Road	0.35	12	18	180	63	35	10.15	561.3	0.313	0.751	0.0358	0.0204
Concord Trnpke	0.6	25	22	250	150	40	10.714	561.3	0.303	0.803	0.0358	0.0204
Hanscom Drive	0.65	125	107	1250	812.5	30	10.143	561.3	0.329	0.758	0.0358	0.0204
Hartwell Ave	1.24	10	5	100	124	40	10.714	561.3	0.303	0.803	0.0358	0.0204
Hartwell Road	1.62	0	0	0	0	25	10.294	561.3	0.352	0.785	0.0358	0.0204
Mass Ave	0.36	12	9	120	43.2	35	10.15	561.3	0.313	0.751	0.0358	0.0204
Old Bedford Road 1	0.31	3	2	30	9.3	30	10.143	561.3	0.329	0.758	0.0358	0.0204
Old Bedford Road 2	0.49	37	9	370	181.3	30	10.143	561.3	0.329	0.758	0.0358	0.0204
Old Mass Ave	0.53	10	5	100	53	35	10.15	561.3	0.313	0.751	0.0358	0.0204
Route 2A (1)	0.46	45	16	450	207	40	10.714	561.3	0.303	0.803	0.0358	0.0204
Route 2A (2)	1.67	23	16	230	384.1	40	10.714	561.3	0.303	0.803	0.0358	0.0204
Route 2A (3)	1.08	48	38	480	518.4	40	10.714	561.3	0.303	0.803	0.0358	0.0204
Route 2A (4)	0.23	60	56	600	138	40	10.714	561.3	0.303	0.803	0.0358	0.0204
Route 2A (5)	0.92	125	51	1250	1150	40	10.714	561.3	0.303	0.803	0.0358	0.0204
Route 2A (6)	0.11	65	53	650	71.5	40	10.714	561.3	0.303	0.803	0.0358	0.0204
Route 2A (7)	0.15	55	46	550	82.5	40	10.714	561.3	0.303	0.803	0.0358	0.0204
Route 2A (8)	0.18	43	37	430	77.4	40	10.714	561.3	0.303	0.803	0.0358	0.0204
Route 62 (1)	1.46	0	0	0	0	35	10.15	561.3	0.313	0.751	0.0358	0.0204
Route 62 (2)	1.64	15	9	150	246	35	10.15	561.3	0.313	0.751	0.0358	0.0204
Route 62 (3)	1.12	15	9	150	168	30	10.143	561.3	0.329	0.758	0.0358	0.0204
Route 4/225 (1)	2.1	0	0	0	0	35	10.15	561.3	0.313	0.751	0.0358	0.0204
Route 4/225 (2)	0.56	2	2	20	11.2	40	10.714	561.3	0.303	0.803	0.0358	0.0204
Route 4/225 (3)	0.16	0	0	0	0	25	10.294	561.3	0.352	0.785	0.0358	0.0204
South Road (1)	0.58	0	0	0	0	30	10.143	561.3	0.329	0.758	0.0358	0.0204
South Road (2)	0.85	0	0	0	0	30	10.143	561.3	0.329	0.758	0.0358	0.0204
Virginia Road	2.13	23	9	230	489.9	30	10.143	561.3	0.329	0.758	0.0358	0.0204

1. AM and PM peak volumes are Hanscom Traffic only.
2. ADT based on worst case AM or PM hours which represent approximately 10 percent of daily traffic.
3. Vehicle emissions in kg/yr were based on daily emissions and scaled by 365 days.
4. Total kg/1000 kg were divided by 1,000 for consistency with 2005 ESPR.

**Hanscom ESPR  
2020 Mesoscale Analysis - Hanscom Traffic**

Link	Distance (miles)	AM Peak	PM Peak	ADT	Daily VMT	Vehicle Speeds (mph)	Vehicle Emission Factors 2020					
							CO (g/mile)	CO2 (g/mile)	VOC (g/mile)	NOX (g/mile)	PM10 (g/mile)	PM2.5 (g/mile)
Airport Road	0.32	0	0	0	0	30	8.593	569.37	0.212	0.263	0.0285	0.0137
Bedford Road	0.35	16	24	240	84	35	8.601	569.37	0.2	0.26	0.0285	0.0137
Concord Trnpke	0.6	30	30	300	180	40	8.835	569.37	0.192	0.267	0.0285	0.0137
Hanscom Drive	0.65	167	149	1670	1085.5	30	8.593	569.37	0.212	0.263	0.0285	0.0137
Hartwell Ave	1.24	13	6	130	161.2	40	8.835	569.37	0.192	0.267	0.0285	0.0137
Hartwell Road	1.62	0	0	0	0	25	8.708	569.37	0.229	0.272	0.0285	0.0137
Mass Ave	0.36	16	12	160	57.6	35	8.601	569.37	0.2	0.26	0.0285	0.0137
Old Bedford Road 1	0.31	5	6	60	18.6	30	8.593	569.37	0.212	0.263	0.0285	0.0137
Old Bedford Road 2	0.49	50	11	500	245	30	8.593	569.37	0.212	0.263	0.0285	0.0137
Old Mass Ave	0.53	13	6	130	68.9	35	8.601	569.37	0.2	0.26	0.0285	0.0137
Route 2A (1)	0.46	59	22	590	271.4	40	8.835	569.37	0.192	0.267	0.0285	0.0137
Route 2A (2)	1.67	31	22	310	517.7	40	8.835	569.37	0.192	0.267	0.0285	0.0137
Route 2A (3)	1.08	65	52	650	702	40	8.835	569.37	0.192	0.267	0.0285	0.0137
Route 2A (4)	0.23	81	77	810	186.3	40	8.835	569.37	0.192	0.267	0.0285	0.0137
Route 2A (5)	0.92	87	70	870	800.4	40	8.835	569.37	0.192	0.267	0.0285	0.0137
Route 2A (6)	0.11	87	70	870	95.7	40	8.835	569.37	0.192	0.267	0.0285	0.0137
Route 2A (7)	0.15	73	63	730	109.5	40	8.835	569.37	0.192	0.267	0.0285	0.0137
Route 2A (8)	0.18	57	59	590	106.2	40	8.835	569.37	0.192	0.267	0.0285	0.0137
Route 62 (1)	1.46	0	5	50	73	35	8.601	569.37	0.2	0.26	0.0285	0.0137
Route 62 (2)	1.64	19	11	190	311.6	35	8.601	569.37	0.2	0.26	0.0285	0.0137
Route 62 (3)	1.12	19	11	190	212.8	30	8.593	569.37	0.212	0.263	0.0285	0.0137
Route 4/225 (1)	2.1	3	0	30	63	35	8.601	569.37	0.2	0.26	0.0285	0.0137
Route 4/225 (2)	0.56	0	3	30	16.8	40	8.835	569.37	0.192	0.267	0.0285	0.0137
Route 4/225 (3)	0.16	0	0	0	0	25	8.708	569.37	0.229	0.272	0.0285	0.0137
South Road (1)	0.58	0	0	0	0	30	8.601	569.37	0.212	0.263	0.0285	0.0137
South Road (2)	0.85	0	0	0	0	30	8.601	569.37	0.212	0.263	0.0285	0.0137
Virginia Road	2.13	45	11	450	958.5	30	8.601	569.37	0.212	0.263	0.0285	0.0137

1. AM and PM peak volumes are Hanscom Traffic only.
2. ADT based on worst case AM or PM hours which represent approximately 10 percent of daily traffic.
3. Vehicle emissions in kg/yr were based on daily emissions and scaled by 365 days.
4. Total kg/1000 kg were divided by 1,000 for consistency with 2005 ESPR.

**Hanscom ESPR  
2030 Mesoscale Analysis - Hanscom Traffic**

Link	Distance (miles)	AM Peak	PM Peak	ADT	Daily VMT	Vehicle Speeds (mph)	Vehicle Emission Factors 2030					
							CO (g/mile)	CO2 (g/mile)	VOC (g/mile)	NOX (g/mile)	PM10 (g/mile)	PM2.5 (g/mile)
Airport Road	0.32	0	0	0	0	30	8.313	569.4	0.192	0.166	0.0274	0.0127
Bedford Road	0.35	27	48	480	168	35	8.321	569.4	0.181	0.163	0.0274	0.0127
Concord Trnpke	0.6	62	60	620	372	40	8.548	569.4	0.173	0.168	0.0274	0.0127
Hanscom Drive	0.65	291	296	2960	1924	30	8.313	569.4	0.192	0.166	0.0274	0.0127
Hartwell Ave	1.24	25	13	250	310	40	8.548	569.4	0.173	0.168	0.0274	0.0127
Hartwell Road	1.62	0	0	0	0	25	8.42	569.4	0.208	0.172	0.0274	0.0127
Mass Ave	0.36	27	25	270	97.2	35	8.321	569.4	0.181	0.163	0.0274	0.0127
Old Bedford Road 1	0.31	10	14	140	43.4	30	8.313	569.4	0.192	0.166	0.0274	0.0127
Old Bedford Road 2	0.49	82	27	820	401.8	30	8.313	569.4	0.192	0.166	0.0274	0.0127
Old Mass Ave	0.53	25	13	250	132.5	35	8.321	569.4	0.181	0.163	0.0274	0.0127
Route 2A (1)	0.46	102	44	1020	469.2	40	8.548	569.4	0.173	0.168	0.0274	0.0127
Route 2A (2)	1.67	53	44	530	885.1	40	8.548	569.4	0.173	0.168	0.0274	0.0127
Route 2A (3)	1.08	115	104	1150	1242	40	8.548	569.4	0.173	0.168	0.0274	0.0127
Route 2A (4)	0.23	141	152	1520	349.6	40	8.548	569.4	0.173	0.168	0.0274	0.0127
Route 2A (5)	0.92	151	143	1510	1389.2	40	8.548	569.4	0.173	0.168	0.0274	0.0127
Route 2A (6)	0.11	151	123	1510	166.1	40	8.548	569.4	0.173	0.168	0.0274	0.0127
Route 2A (7)	0.15	100	129	1290	193.5	40	8.548	569.4	0.173	0.168	0.0274	0.0127
Route 2A (8)	0.18	0	11	110	19.8	40	8.548	569.4	0.173	0.168	0.0274	0.0127
Route 62 (1)	1.46	34	27	340	496.4	35	8.321	569.4	0.181	0.163	0.0274	0.0127
Route 62 (2)	1.64	34	27	340	557.6	35	8.321	569.4	0.181	0.163	0.0274	0.0127
Route 62 (3)	1.12	7	0	70	78.4	30	8.313	569.4	0.192	0.166	0.0274	0.0127
Route 4/225 (1)	2.1	0	4	40	84	35	8.321	569.4	0.181	0.163	0.0274	0.0127
Route 4/225 (2)	0.56	0	0	0	0	40	8.548	569.4	0.173	0.168	0.0274	0.0127
Route 4/225 (3)	0.16	0	0	0	0	25	8.42	569.4	0.208	0.172	0.0274	0.0127
South Road (1)	0.58	0	0	0	0	30	8.313	569.4	0.192	0.166	0.0274	0.0127
South Road (2)	0.85	0	0	0	0	30	8.313	569.4	0.192	0.166	0.0274	0.0127
Virginia Road	2.13	83	27	830	1767.9	30	8.313	569.4	0.192	0.166	0.0274	0.0127

1. AM and PM peak volumes are Hanscom Traffic only.
2. ADT based on worst case AM or PM hours which represent approximately 10 percent of daily traffic.
3. Vehicle emissions in kg/yr were based on daily emissions and scaled by 365 days.
4. Total kg/1000 kg were divided by 1,000 for consistency with 2005 ESPR.