

# Performance Measure Summary - Boston MA-NH-RI

There are several inventory and performance measures listed in the pages of this Urban Area Report for the years from 1982 to 2017. There is no single performance measure that experts agree "says it all". A few key points should be recognized by users of the Urban Mobility Scorecard data.

**Use the trends** - The multi-year performance measures are better indicators, in most cases, than any single year. Examining a few measures over many years reduces the chance that data variations or the estimating procedures may have caused a "spike" in any single year. (5 years is 5 times better than 1 year.)

**Use several measures** - Each performance measure illustrates a different element of congestion. (The view is more interesting from atop several measures.)

**Compare to similar regions** - Congestion analyses that compare areas with similar characteristics (for example, population, growth rate, road and public transportation system design) are usually more insightful than comparisons of different regions. (Los Angeles is not Peoria.)

**Compare ranking changes and performance measure values** - In some performance measures, a small change in the value may cause a significant change in rank from one year to the next. This is the case when there are several regions with nearly the same value. (15 hours is only 1 hour more than 14 hours.)

**Consider the scope of improvement options** - Any improvement project in a corridor within most of the regions will only have a modest effect on the regional congestion level. (To have an effect on areawide congestion, there must be significant change in the system or service.)

## Performance Measures and Definition of Terms

**Travel Time Index** - A measure of congestion that focuses on each trip and each mile of travel. It is calculated as the ratio of travel time in the peak period to travel time in free-flow. A value of 1.30 indicates that a 20-minute free-flow trip takes 26 minutes in the peak.

**Planning Time Index** - A travel time reliability measure that represents the total travel time that should be planned for a trip. Computed with the 95th percentile travel time it represents the amount of time that should be planned for a commute trip to be late for only 1 day a month. If it is computed with the 80th percentile travel time it represents the amount of time that should be planned for a trip to be late for only 1 day a week. A PTI of 2.00 means that for a 20-minute trip in light traffic, 40 minutes should be planned.

**Peak Commuters** - Number of travelers who begin a trip during the morning or evening peak travel periods (6 to 10 a.m. and 3 to 7 p.m.). "Commuters" are private vehicle users unless specifically noted.

**Annual Delay per Commuter** - A yearly sum of all the per-trip delays for those persons who travel in the peak period (6 to 10 a.m. and 3 to 7 p.m.). This measure illustrates the effect of traffic slowdowns as well as the length of each trip.

**Total Delay** - The overall size of the congestion problem. Measured by the total travel time above that needed to complete a trip at free-flow speeds. The ranking of total delay usually follows the population ranking (larger regions usually have more delay).

**Free-Flow Speeds** - These values are derived from time periods with lighter traffic volumes in the INRIX speed database. They are used as the national comparison thresholds. Other speed thresholds may be appropriate for urban project evaluations or sub-region studies.

**Excess Fuel Consumed** - Increased fuel consumption due to travel in congested conditions rather than free-flow conditions.

**Congestion Cost** - Value of travel delay for 2017 (estimated at \$18.29 per hour of person travel and \$59.94 per hour of truck time) and excess fuel consumption estimated using state average cost per gallon.

**Urban Area** - The developed area (population density more than 1,000 persons per square mile) within a metropolitan region. The urban area boundaries change frequently (every year for most growing areas), so increases include both new growth and development that was previously in areas designated as rural.

**Number of Rush Hours** - Time when the road system might have congestion.

# Mobility Data for Boston MA-NH-RI

Inventory Measures	2017	2016	2015	2014	2013	2012
<b>Urban Area Information</b>						
Population (1000s)	4,500	4,475	4,460	4,440	4,395	4,355
Rank	10	10	10	10	10	10
Commuters (1000s)	1,736	1,721	1,714	1,704	1,697	1,695
<b>Daily Vehicle-Miles of Travel (1000s)</b>						
Freeway	44,199	43,608	43,558	41,311	41,470	40,905
Arterial Streets	41,908	41,391	40,506	38,188	36,019	35,240
<b>Cost Components</b>						
Value of Time (\$/hour)	18.12	17.91	17.69	17.67	17.39	17.14
Commercial Cost (\$/hour)	52.14	50.20	46.87	44.82	41.23	39.66
Gasoline (\$/gallon)	2.35	2.17	2.31	3.42	3.58	3.53
Diesel (\$/gallon)	2.55	2.31	2.63	3.65	3.94	3.93
System Performance	2017	2016	2015	2014	2013	2012
<b>Congested Travel (% of peak VMT)</b>	29.5	--	--	--	--	--
<b>Congested System (% of lane-miles)</b>	18.9	--	--	--	--	--
<b>Congested Time (number of "Rush Hours")</b>	4.4	--	--	--	--	--
<b>Annual Excess Fuel Consumed</b>						
Total Fuel (1000 gallons)	74,143	73,316	72,443	71,602	70,862	70,078
Rank	11	11	11	11	11	11
Fuel per Peak Auto Commuter (gallons)	31	31	30	30	29	30
Rank	7	7	7	5	6	4
<b>Annual Delay</b>						
Total Delay (1000s of person-hours)	189,426	184,486	179,172	174,013	169,166	164,282
Rank	11	11	11	11	11	11
Delay per Auto Commuter (pers-hrs)	80	77	75	72	70	69
Rank	6	6	6	6	7	6
<b>Travel Time Index</b>						
Rank	1.30	1.30	1.30	1.29	1.29	1.29
Rank	19	19	19	19	18	17
<b>Commuter Stress Index</b>						
Rank	1.31	--	--	--	--	--
Rank	21	--	--	--	--	--
<b>Freeway Planning Time Index (95th Pctile)</b>						
Rank	1.89	--	--	--	--	--
Rank	20	--	--	--	--	--
<b>Congestion Cost</b>						
Total Cost (\$ millions)	3,829	3,668	3,518	3,481	3,334	3,191
Rank	11	11	11	11	11	11
Cost per Auto Commuter (\$)	1,580	1,550	1,496	1,445	1,419	1,396
Rank	8	8	8	8	8	6
<b>Truck Congestion</b>						
Annual Person-Hours of Delay (000)	7,956	7,748	7,525	7,309	7,105	6,900
Rank	11	11	11	11	11	11
Annual Gallons of Wasted Fuel (000)	15,718	15,543	15,358	15,180	15,023	14,857
Rank	11	11	11	11	11	11
Annual Congestion Cost (\$ million)	404	377	350	343	316	298
Rank	11	11	11	11	11	11

\* Note: Zeroes in the table reflect values less than 0.5.

# Mobility Data for Boston MA-NH-RI

Inventory Measures	2011	2010	2009	2008	2007	2006
<b>Urban Area Information</b>						
Population (1000s)	4,320	4,295	4,250	4,190	4,150	4,100
Rank	10	10	9	9	9	9
Commuters (1000s)	1,678	1,661	1,641	1,611	1,593	1,570
<b>Daily Vehicle-Miles of Travel (1000s)</b>						
Freeway	42,357	42,102	40,700	39,925	40,000	40,300
Arterial Streets	34,942	34,732	34,955	35,060	35,515	35,580
<b>Cost Components</b>						
Value of Time (\$/hour)	16.79	16.28	16.01	16.07	15.47	15.06
Commercial Cost (\$/hour)	44.62	42.50	41.83	40.77	39.30	37.88
Gasoline (\$/gallon)	3.49	2.75	2.27	3.32	2.98	2.67
Diesel (\$/gallon)	3.73	3.04	2.70	4.32	3.53	2.87
System Performance	2011	2010	2009	2008	2007	2006
<b>Congested Travel (% of peak VMT)</b>	--	--	--	--	--	--
<b>Congested System (% of lane-miles)</b>	--	--	--	--	--	--
<b>Congested Time (number of "Rush Hours")</b>	--	--	--	--	--	--
<b>Annual Excess Fuel Consumed</b>						
Total Fuel (1000 gallons)	68,658	67,307	64,002	65,070	67,340	66,440
Rank	11	11	11	12	12	12
Fuel per Peak Auto Commuter (gallons)	29	29	26	26	28	27
Rank	4	4	5	6	5	5
<b>Annual Delay</b>						
Total Delay (1000s of person-hours)	159,476	154,889	144,533	139,946	144,829	142,893
Rank	11	11	11	12	12	12
Delay per Auto Commuter (pers-hrs)	67	65	62	61	64	64
Rank	6	5	5	6	5	5
<b>Travel Time Index</b>						
Rank	1.29	1.28	1.28	1.28	1.29	1.29
Rank	15	16	15	18	15	14
<b>Commuter Stress Index</b>						
Rank	--	--	--	--	--	--
Rank	--	--	--	--	--	--
<b>Freeway Planning Time Index (95th Pctile)</b>						
Rank	--	--	--	--	--	--
Rank	--	--	--	--	--	--
<b>Congestion Cost</b>						
Total Cost (\$ millions)	3,070	2,847	2,591	2,595	2,565	2,441
Rank	11	11	11	12	12	12
Cost per Auto Commuter (\$)	1,398	1,401	1,330	1,275	1,372	1,390
Rank	6	6	7	7	6	6
<b>Truck Congestion</b>						
Annual Person-Hours of Delay (000)	6,698	6,505	6,070	5,878	6,083	6,002
Rank	11	11	11	12	12	12
Annual Gallons of Wasted Fuel (000)	14,556	14,269	13,569	13,795	14,276	14,085
Rank	11	11	11	12	12	12
Annual Congestion Cost (\$ million)	316	286	259	270	260	240
Rank	11	11	11	12	12	12

\* Note: Zeroes in the table reflect values less than 0.5.

# Mobility Data for Boston MA-NH-RI

Inventory Measures	2005	2004	2003	2002	2001	2000
<b>Urban Area Information</b>						
Population (1000s)	4,050	4,000	3,960	3,930	3,920	3,900
Rank	9	10	10	10	10	8
Commuters (1000s)	1,542	1,517	1,499	1,484	1,478	1,464
<b>Daily Vehicle-Miles of Travel (1000s)</b>						
Freeway	40,675	38,585	37,300	36,000	35,200	34,100
Arterial Streets	35,540	34,600	34,000	32,865	32,500	32,000
<b>Cost Components</b>						
Value of Time (\$/hour)	14.58	14.10	13.73	13.43	13.22	12.85
Commercial Cost (\$/hour)	36.51	35.19	33.92	32.69	31.51	30.38
Gasoline (\$/gallon)	2.28	2.02	1.53	1.40	1.70	1.58
Diesel (\$/gallon)	2.56	2.05	1.64	1.45	1.65	1.61
System Performance	2005	2004	2003	2002	2001	2000
<b>Congested Travel (% of peak VMT)</b>	--	--	--	--	--	--
<b>Congested System (% of lane-miles)</b>	--	--	--	--	--	--
<b>Congested Time (number of "Rush Hours")</b>	--	--	--	--	--	--
<b>Annual Excess Fuel Consumed</b>						
Total Fuel (1000 gallons)	65,444	64,172	63,258	62,230	60,908	58,954
Rank	12	12	11	10	10	10
Fuel per Peak Auto Commuter (gallons)	28	26	26	27	26	25
Rank	5	5	5	4	4	3
<b>Annual Delay</b>						
Total Delay (1000s of person-hours)	140,750	138,015	136,049	133,838	130,994	126,792
Rank	12	12	12	11	11	11
Delay per Auto Commuter (pers-hrs)	64	64	64	63	62	61
Rank	5	5	5	5	5	5
<b>Travel Time Index</b>						
Rank	1.29	1.29	1.29	1.29	1.28	1.28
Rank	13	13	11	10	10	9
<b>Commuter Stress Index</b>						
Rank	--	--	--	--	--	--
Rank	--	--	--	--	--	--
<b>Freeway Planning Time Index (95th Pctile)</b>						
Rank	--	--	--	--	--	--
Rank	--	--	--	--	--	--
<b>Congestion Cost</b>						
Total Cost (\$ millions)	2,308	2,173	2,058	1,971	1,914	1,796
Rank	12	12	12	11	11	11
Cost per Auto Commuter (\$)	1,416	1,436	1,454	1,461	1,449	1,441
Rank	6	6	6	6	6	6
<b>Truck Congestion</b>						
Annual Person-Hours of Delay (000)	5,912	5,797	5,714	5,621	5,502	5,325
Rank	12	12	12	11	11	11
Annual Gallons of Wasted Fuel (000)	13,874	13,605	13,411	13,193	12,912	12,498
Rank	12	12	11	10	10	10
Annual Congestion Cost (\$ million)	225	207	192	180	173	162
Rank	12	12	12	11	10	10

\* Note: Zeroes in the table reflect values less than 0.5.

# Mobility Data for Boston MA-NH-RI

Inventory Measures	1999	1998	1997	1996	1995	1994
<b>Urban Area Information</b>						
Population (1000s)	3,875	3,880	3,760	3,700	3,680	3,655
Rank	9	7	7	7	7	7
Commuters (1000s)	1,452	1,448	1,397	1,372	1,359	1,344
<b>Daily Vehicle-Miles of Travel (1000s)</b>						
Freeway	33,000	32,000	30,600	29,875	29,860	29,495
Arterial Streets	31,600	30,500	29,500	28,300	27,000	25,600
<b>Cost Components</b>						
Value of Time (\$/hour)	12.43	12.17	11.98	11.71	11.37	11.06
Commercial Cost (\$/hour)	29.28	28.89	28.50	28.12	27.75	27.38
Gasoline (\$/gallon)	1.13	1.08	1.28	1.31	1.22	1.07
Diesel (\$/gallon)	1.19	1.21	1.33	1.37	1.28	1.12
System Performance	1999	1998	1997	1996	1995	1994
<b>Congested Travel (% of peak VMT)</b>	--	--	--	--	--	--
<b>Congested System (% of lane-miles)</b>	--	--	--	--	--	--
<b>Congested Time (number of "Rush Hours")</b>	--	--	--	--	--	--
<b>Annual Excess Fuel Consumed</b>						
Total Fuel (1000 gallons)	56,049	55,303	51,232	46,988	43,872	42,506
Rank	10	9	9	10	10	9
Fuel per Peak Auto Commuter (gallons)	23	25	23	20	19	19
Rank	6	2	3	7	7	5
<b>Annual Delay</b>						
Total Delay (1000s of person-hours)	120,544	118,941	110,184	101,056	94,355	91,417
Rank	10	9	10	10	10	10
Delay per Auto Commuter (pers-hrs)	58	57	55	51	48	47
Rank	5	5	5	5	6	7
<b>Travel Time Index</b>						
Rank	9	9	9	10	13	11
<b>Commuter Stress Index</b>						
Rank	--	--	--	--	--	--
<b>Freeway Planning Time Index (95th Pctile)</b>						
Rank	--	--	--	--	--	--
<b>Congestion Cost</b>						
Total Cost (\$ millions)	1,630	1,575	1,446	1,301	1,178	1,107
Rank	10	9	9	10	10	10
Cost per Auto Commuter (\$)	1,418	1,431	1,345	1,262	1,216	1,213
Rank	6	6	6	7	7	6
<b>Truck Congestion</b>						
Annual Person-Hours of Delay (000)	5,063	4,996	4,628	4,244	3,963	3,840
Rank	10	9	10	10	10	10
Annual Gallons of Wasted Fuel (000)	11,882	11,724	10,861	9,961	9,301	9,011
Rank	10	9	9	10	10	9
Annual Congestion Cost (\$ million)	144	141	130	118	108	102
Rank	10	9	9	10	10	9

\* Note: Zeroes in the table reflect values less than 0.5.

# Mobility Data for Boston MA-NH-RI

Inventory Measures	1993	1992	1991	1990	1989	1988
<b>Urban Area Information</b>						
Population (1000s)	3,640	3,630	3,620	3,610	3,600	3,560
Rank	7	7	7	7	7	7
Commuters (1000s)	1,336	1,327	1,320	1,311	1,296	1,269
<b>Daily Vehicle-Miles of Travel (1000s)</b>						
Freeway	29,500	29,865	29,340	29,300	29,685	28,000
Arterial Streets	24,500	24,000	23,600	23,000	22,500	21,750
<b>Cost Components</b>						
Value of Time (\$/hour)	10.78	10.47	10.17	9.75	9.25	8.83
Commercial Cost (\$/hour)	27.02	26.66	26.30	25.95	25.60	25.26
Gasoline (\$/gallon)	1.15	1.14	1.23	1.04	1.06	0.98
Diesel (\$/gallon)	1.20	1.21	1.29	1.06	1.05	0.97
System Performance	1993	1992	1991	1990	1989	1988
<b>Congested Travel (% of peak VMT)</b>	--	--	--	--	--	--
<b>Congested System (% of lane-miles)</b>	--	--	--	--	--	--
<b>Congested Time (number of "Rush Hours")</b>	--	--	--	--	--	--
<b>Annual Excess Fuel Consumed</b>						
Total Fuel (1000 gallons)	40,580	39,324	38,902	38,647	37,043	35,069
Rank	8	8	7	6	6	6
Fuel per Peak Auto Commuter (gallons)	18	16	16	17	16	15
Rank	5	7	5	3	3	4
<b>Annual Delay</b>						
Total Delay (1000s of person-hours)	87,275	84,574	83,666	83,117	79,669	75,423
Rank	10	10	7	7	7	7
Delay per Auto Commuter (pers-hrs)	45	44	44	44	43	41
Rank	7	7	5	4	4	4
<b>Travel Time Index</b>						
Rank	15	15	13	9	11	9
<b>Commuter Stress Index</b>						
Rank	--	--	--	--	--	--
<b>Freeway Planning Time Index (95th Pctile)</b>						
Rank	--	--	--	--	--	--
<b>Congestion Cost</b>						
Total Cost (\$ millions)	1,035	977	945	896	820	743
Rank	10	9	7	7	7	7
Cost per Auto Commuter (\$)	1,190	1,188	1,211	1,258	1,276	1,271
Rank	6	6	5	3	3	4
<b>Truck Congestion</b>						
Annual Person-Hours of Delay (000)	3,666	3,552	3,514	3,491	3,346	3,168
Rank	10	10	7	7	7	7
Annual Gallons of Wasted Fuel (000)	8,603	8,337	8,247	8,193	7,853	7,435
Rank	8	8	7	6	6	6
Annual Congestion Cost (\$ million)	97	93	92	88	83	77
Rank	10	8	7	7	7	7

\* Note: Zeroes in the table reflect values less than 0.5.

# Mobility Data for Boston MA-NH-RI

Inventory Measures	1987	1986	1985	1984	1983	1982
<b>Urban Area Information</b>						
Population (1000s)	3,530	3,510	3,500	3,485	3,475	3,450
Rank	7	7	7	7	6	6
Commuters (1000s)	1,247	1,229	1,215	1,199	1,185	1,166
<b>Daily Vehicle-Miles of Travel (1000s)</b>						
Freeway	26,845	25,000	23,980	22,750	21,775	20,670
Arterial Streets	21,220	20,905	20,960	20,640	20,485	20,240
<b>Cost Components</b>						
Value of Time (\$/hour)	8.48	8.18	8.03	7.75	7.43	7.20
Commercial Cost (\$/hour)	24.93	24.60	24.27	23.94	23.63	23.31
Gasoline (\$/gallon)	0.98	0.96	1.25	1.27	1.30	1.35
Diesel (\$/gallon)	0.97	0.95	1.24	1.25	1.28	1.34
System Performance	1987	1986	1985	1984	1983	1982
<b>Congested Travel (% of peak VMT)</b>	--	--	--	--	--	--
<b>Congested System (% of lane-miles)</b>	--	--	--	--	--	--
<b>Congested Time (number of "Rush Hours")</b>	--	--	--	--	--	--
<b>Annual Excess Fuel Consumed</b>						
Total Fuel (1000 gallons)	33,191	31,353	29,500	27,300	25,159	24,453
Rank	6	7	7	7	8	7
Fuel per Peak Auto Commuter (gallons)	15	14	13	12	10	10
Rank	3	3	4	4	4	5
<b>Annual Delay</b>						
Total Delay (1000s of person-hours)	71,383	67,430	63,446	58,714	54,110	52,591
Rank	7	8	7	8	9	7
Delay per Auto Commuter (pers-hrs)	40	38	36	34	31	31
Rank	5	6	8	10	11	10
<b>Travel Time Index</b>						
Rank	11	11	11	12	13	12
<b>Commuter Stress Index</b>						
Rank	--	--	--	--	--	--
<b>Freeway Planning Time Index (95th Pctile)</b>						
Rank	--	--	--	--	--	--
<b>Congestion Cost</b>						
Total Cost (\$ millions)	678	620	582	522	465	441
Rank	7	8	7	8	9	7
Cost per Auto Commuter (\$)	1,256	1,230	1,178	1,130	1,090	1,094
Rank	4	5	4	5	5	5
<b>Truck Congestion</b>						
Annual Person-Hours of Delay (000)	2,998	2,832	2,665	2,466	2,273	2,209
Rank	7	8	7	8	9	7
Annual Gallons of Wasted Fuel (000)	7,036	6,647	6,254	5,788	5,334	5,184
Rank	6	7	7	7	8	7
Annual Congestion Cost (\$ million)	72	67	64	59	54	52
Rank	7	8	8	8	8	7

\* Note: Zeroes in the table reflect values less than 0.5.