

Performance Measure Summary - Worcester MA-CT

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 Worcester MA-CT

Inventory Measures	2017	2016	2015	2014	2013	2012
Urban Area Information						
Population (1000s)	495	495	495	490	485	480
Rank	80	80	80	80	80	80
Commuters (1000s)	248	248	248	245	247	245
Daily Vehicle-Miles of Travel (1000s)						
Freeway	6,916	7,020	7,343	6,392	6,225	5,680
Arterial Streets	5,825	5,436	5,018	5,489	5,056	4,780
Cost Components						
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
Congested Travel (% of peak VMT)	9.4	--	--	--	--	--
Congested System (% of lane-miles)	6.9	--	--	--	--	--
Congested Time (number of "Rush Hours")	0.7	--	--	--	--	--
Annual Excess Fuel Consumed						
Total Fuel (1000 gallons)	5,849	5,709	5,575	5,443	5,374	5,168
Rank	77	77	77	78	77	78
Fuel per Peak Auto Commuter (gallons)	17	17	17	17	18	17
Rank	68	68	65	65	54	61
Annual Delay						
Total Delay (1000s of person-hours)	14,173	13,655	12,993	12,463	12,085	11,411
Rank	78	78	78	79	78	79
Delay per Auto Commuter (pers-hrs)	43	42	41	40	40	39
Rank	63	62	63	63	60	61
Travel Time Index						
Rank	1.14	1.14	1.14	1.14	1.14	1.13
Rank	80	80	80	80	78	85
Commuter Stress Index						
Rank	1.15	--	--	--	--	--
Rank	78	--	--	--	--	--
Freeway Planning Time Index (95th Pctile)						
Rank	1.24	--	--	--	--	--
Rank	87	--	--	--	--	--
Congestion Cost						
Total Cost (\$ millions)	287	272	256	250	239	223
Rank	79	78	79	79	79	79
Cost per Auto Commuter (\$)	823	798	757	720	705	675
Rank	54	56	56	59	60	63
Truck Congestion						
Annual Person-Hours of Delay (000)	595	574	546	523	508	479
Rank	78	78	78	79	78	79
Annual Gallons of Wasted Fuel (000)	1,240	1,210	1,182	1,154	1,139	1,096
Rank	77	77	77	77	77	78
Annual Congestion Cost (\$ million)	30	28	26	25	23	21
Rank	79	79	77	79	79	79

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

Mobility Data for Worcester MA-CT

Inventory Measures	2011	2010	2009	2008	2007	2006
Urban Area Information						
Population (1000s)	475	470	460	455	450	445
Rank	80	80	80	79	79	78
Commuters (1000s)	242	238	232	229	225	222
Daily Vehicle-Miles of Travel (1000s)						
Freeway	5,764	5,751	5,700	5,675	5,730	5,550
Arterial Streets	4,740	4,729	4,716	4,730	4,825	4,830
Cost Components						
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	2.82	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
Congested Travel (% of peak VMT)	--	--	--	--	--	--
Congested System (% of lane-miles)	--	--	--	--	--	--
Congested Time (number of "Rush Hours")	--	--	--	--	--	--
Annual Excess Fuel Consumed						
Total Fuel (1000 gallons)	5,209	5,156	5,004	5,309	5,208	5,094
Rank	78	78	78	78	78	76
Fuel per Peak Auto Commuter (gallons)	18	19	16	18	18	18
Rank	49	40	54	49	49	47
Annual Delay						
Total Delay (1000s of person-hours)	11,394	11,172	10,740	10,854	10,647	10,414
Rank	78	78	79	78	78	77
Delay per Auto Commuter (pers-hrs)	40	39	39	38	38	38
Rank	49	53	47	47	48	45
Travel Time Index						
Rank	1.13	1.13	1.13	1.13	1.13	1.13
Rank	84	83	84	86	85	82
Commuter Stress Index						
Rank	--	--	--	--	--	--
Rank	--	--	--	--	--	--
Freeway Planning Time Index (95th Pctile)						
Rank	--	--	--	--	--	--
Rank	--	--	--	--	--	--
Congestion Cost						
Total Cost (\$ millions)	220	207	193	202	189	179
Rank	79	79	79	79	78	77
Cost per Auto Commuter (\$)	694	703	686	688	702	706
Rank	61	60	63	54	59	57
Truck Congestion						
Annual Person-Hours of Delay (000)	479	469	451	456	447	437
Rank	78	78	79	78	77	77
Annual Gallons of Wasted Fuel (000)	1,104	1,093	1,061	1,126	1,104	1,080
Rank	78	78	78	78	78	76
Annual Congestion Cost (\$ million)	23	21	19	21	19	18
Rank	79	79	79	78	78	74

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

Mobility Data for Worcester MA-CT

Inventory Measures	2005	2004	2003	2002	2001	2000
Urban Area Information						
Population (1000s)	435	430	425	420	420	415
Rank	78	78	77	77	75	75
Commuters (1000s)	215	211	208	202	199	194
Daily Vehicle-Miles of Travel (1000s)						
Freeway	5,645	5,515	5,260	5,150	5,075	5,000
Arterial Streets	4,865	4,780	4,760	4,700	4,600	4,470
Cost Components						
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
Congested Travel (% of peak VMT)	--	--	--	--	--	--
Congested System (% of lane-miles)	--	--	--	--	--	--
Congested Time (number of "Rush Hours")	--	--	--	--	--	--
Annual Excess Fuel Consumed						
Total Fuel (1000 gallons)	4,832	4,651	4,457	4,279	4,121	3,925
Rank	76	75	75	75	75	75
Fuel per Peak Auto Commuter (gallons)	17	17	16	16	15	14
Rank	48	46	49	42	47	50
Annual Delay						
Total Delay (1000s of person-hours)	9,878	9,509	9,112	8,747	8,424	8,025
Rank	76	75	75	74	74	73
Delay per Auto Commuter (pers-hrs)	37	36	36	36	35	34
Rank	48	52	50	45	45	49
Travel Time Index						
Rank	1.12	1.12	1.12	1.11	1.11	1.11
Rank	86	84	82	84	84	80
Commuter Stress Index						
Rank	--	--	--	--	--	--
Rank	--	--	--	--	--	--
Freeway Planning Time Index (95th Pctile)						
Rank	--	--	--	--	--	--
Rank	--	--	--	--	--	--
Congestion Cost						
Total Cost (\$ millions)	163	150	138	129	123	114
Rank	75	75	75	74	74	74
Cost per Auto Commuter (\$)	693	688	677	662	647	635
Rank	58	58	58	58	56	58
Truck Congestion						
Annual Person-Hours of Delay (000)	415	399	383	367	354	337
Rank	76	75	75	74	74	73
Annual Gallons of Wasted Fuel (000)	1,024	986	945	907	874	832
Rank	76	75	75	75	75	75
Annual Congestion Cost (\$ million)	16	14	13	12	11	10
Rank	75	75	75	74	73	74

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

Mobility Data for Worcester MA-CT

Inventory Measures	1999	1998	1997	1996	1995	1994
Urban Area Information						
Population (1000s)	415	410	405	400	395	390
Rank	73	73	73	72	72	72
Commuters (1000s)	191	186	181	176	171	166
Daily Vehicle-Miles of Travel (1000s)						
Freeway	4,900	4,750	4,650	4,500	4,350	4,225
Arterial Streets	4,350	4,270	4,190	4,075	4,000	3,900
Cost Components						
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
Congested Travel (% of peak VMT)	--	--	--	--	--	--
Congested System (% of lane-miles)	--	--	--	--	--	--
Congested Time (number of "Rush Hours")	--	--	--	--	--	--
Annual Excess Fuel Consumed						
Total Fuel (1000 gallons)	3,731	3,523	3,343	3,115	2,857	2,661
Rank	74	74	74	74	74	74
Fuel per Peak Auto Commuter (gallons)	14	13	12	12	11	10
Rank	42	42	47	38	41	45
Annual Delay						
Total Delay (1000s of person-hours)	7,626	7,202	6,834	6,368	5,841	5,439
Rank	73	74	73	73	74	74
Delay per Auto Commuter (pers-hrs)	32	31	30	29	27	26
Rank	57	56	56	54	57	55
Travel Time Index						
Rank	1.10	1.10	1.10	1.09	1.09	1.08
Rank	84	80	80	79	77	80
Commuter Stress Index						
Rank	--	--	--	--	--	--
Rank	--	--	--	--	--	--
Freeway Planning Time Index (95th Pctile)						
Rank	--	--	--	--	--	--
Rank	--	--	--	--	--	--
Congestion Cost						
Total Cost (\$ millions)	103	96	90	82	73	66
Rank	74	74	73	74	74	74
Cost per Auto Commuter (\$)	625	602	580	551	525	499
Rank	57	59	56	55	57	55
Truck Congestion						
Annual Person-Hours of Delay (000)	320	302	287	267	245	228
Rank	73	74	73	73	74	74
Annual Gallons of Wasted Fuel (000)	791	747	709	660	606	564
Rank	74	74	74	74	74	74
Annual Congestion Cost (\$ million)	9	9	8	7	7	6
Rank	74	72	73	74	71	73

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

Mobility Data for Worcester MA-CT

Inventory Measures	1993	1992	1991	1990	1989	1988
Urban Area Information						
Population (1000s)	390	385	380	375	370	365
Rank	72	71	71	71	71	71
Commuters (1000s)	164	159	155	150	147	144
Daily Vehicle-Miles of Travel (1000s)						
Freeway	4,100	4,000	3,910	3,800	3,720	3,650
Arterial Streets	3,870	3,800	3,710	3,650	3,600	3,525
Cost Components						
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
Congested Travel (% of peak VMT)	--	--	--	--	--	--
Congested System (% of lane-miles)	--	--	--	--	--	--
Congested Time (number of "Rush Hours")	--	--	--	--	--	--
Annual Excess Fuel Consumed						
Total Fuel (1000 gallons)	2,492	2,329	2,119	1,980	1,814	1,674
Rank	73	74	75	74	73	71
Fuel per Peak Auto Commuter (gallons)	10	9	7	8	7	7
Rank	38	45	57	35	39	27
Annual Delay						
Total Delay (1000s of person-hours)	5,095	4,762	4,333	4,047	3,709	3,422
Rank	74	73	75	72	71	71
Delay per Auto Commuter (pers-hrs)	24	23	22	21	19	18
Rank	58	58	53	52	55	52
Travel Time Index						
Rank	1.08	1.07	1.07	1.07	1.06	1.06
Rank	77	82	81	76	80	74
Commuter Stress Index						
Rank	--	--	--	--	--	--
Rank	--	--	--	--	--	--
Freeway Planning Time Index (95th Pctile)						
Rank	--	--	--	--	--	--
Rank	--	--	--	--	--	--
Congestion Cost						
Total Cost (\$ millions)	61	55	49	44	38	34
Rank	73	73	74	72	71	71
Cost per Auto Commuter (\$)	479	470	435	425	411	395
Rank	53	50	53	52	53	55
Truck Congestion						
Annual Person-Hours of Delay (000)	214	200	182	170	156	144
Rank	74	73	75	72	69	71
Annual Gallons of Wasted Fuel (000)	528	494	449	420	385	355
Rank	73	74	75	74	73	71
Annual Congestion Cost (\$ million)	6	5	5	4	4	4
Rank	72	73	70	71	69	64

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

Mobility Data for Worcester MA-CT

Inventory Measures	1987	1986	1985	1984	1983	1982
Urban Area Information						
Population (1000s)	360	355	350	345	340	335
Rank	71	71	71	72	71	71
Commuters (1000s)	141	138	135	132	129	126
Daily Vehicle-Miles of Travel (1000s)						
Freeway	3,600	3,525	3,480	3,400	3,320	3,280
Arterial Streets	3,480	3,400	3,360	3,300	3,260	3,225
Cost Components						
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
Congested Travel (% of peak VMT)	--	--	--	--	--	--
Congested System (% of lane-miles)	--	--	--	--	--	--
Congested Time (number of "Rush Hours")	--	--	--	--	--	--
Annual Excess Fuel Consumed						
Total Fuel (1000 gallons)	1,444	1,303	1,116	950	817	683
Rank	72	72	73	74	75	76
Fuel per Peak Auto Commuter (gallons)	6	5	5	3	4	2
Rank	32	40	32	61	35	55
Annual Delay						
Total Delay (1000s of person-hours)	2,953	2,664	2,282	1,942	1,671	1,396
Rank	72	73	74	75	75	76
Delay per Auto Commuter (pers-hrs)	16	15	13	11	10	8
Rank	55	55	56	64	64	73
Travel Time Index						
Rank	1.05	1.05	1.04	1.04	1.03	1.03
Rank	79	74	81	75	80	76
Commuter Stress Index						
Rank	--	--	--	--	--	--
Rank	--	--	--	--	--	--
Freeway Planning Time Index (95th Pctile)						
Rank	--	--	--	--	--	--
Rank	--	--	--	--	--	--
Congestion Cost						
Total Cost (\$ millions)	28	25	21	17	14	12
Rank	72	72	74	74	73	75
Cost per Auto Commuter (\$)	367	340	295	255	233	193
Rank	57	58	61	64	65	74
Truck Congestion						
Annual Person-Hours of Delay (000)	124	112	96	82	70	59
Rank	72	73	74	73	73	76
Annual Gallons of Wasted Fuel (000)	306	276	237	201	173	145
Rank	72	72	73	74	75	76
Annual Congestion Cost (\$ million)	3	3	2	2	2	1
Rank	69	67	73	70	66	75

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