

Performance Measure Summary

There are several inventory and performance measures listed in the pages of this Urban Area Report for the years from 1982 to 2005. There is no single performance measure that experts agree “says it all.” The best comparison of congestion levels and trends is done between regions of similar size, over several years, and with a few measures of congestion aspects. 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. A few key points should be recognized by users of the Urban Mobility Report data.

Use the Trends – The multi-year performance measures are better indicators, in most cases, than 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 the top of a few 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*).

Comparison of Several Key Mobility Performance Measures Medium Group – 500,000 to 1 million population urban areas

Urban Area	Delay per Traveler	Travel Time Index	Total Delay	1982 to 2005	
				Delay per Traveler	Total Delay
Jacksonville, FL	H+	H+	H+	F	F+
Nashville-Davidson, TN	H+	0	H+	0	F+
Salt Lake City, UT	0	H	H	0	F+
Raleigh-Durham, NC	H+	H	H+	F+	F+
Richmond, VA	L-	L-	0	S-	S
Louisville, KY-IN	H+	H+	H+	F+	F+
Hartford, CT	L-	L-	L	S	S-
Bridgeport-Stamford, CT-NY	H	H+	H+	F	F+
Charlotte, NC-SC	H+	H+	H+	F+	F+
Austin, TX	H+	H+	H+	F+	F+
Oklahoma City, OK	L-	L-	L	S	S-
Tulsa, OK	L-	L-	L	S-	S-
Tucson, AZ	H+	H+	H+	0	F+
Dayton, OH	L-	L-	L-	S-	S-
Honolulu, HI	L	H+	L	S-	S-
Birmingham, AL	H+	0	H	F+	F+
El Paso, TX-NM	L	0	L	F	S-
Rochester, NY	L-	L-	L-	S-	S-
Springfield, MA-CT	L-	L-	L-	S-	S-
Omaha, NE-IA	L	0	L	0	S-
Sarasota-Bradenton, FL	L	H	L	S-	S-
Allentown-Bethlehem, PA-NJ	L-	L	L-	S-	S-
Akron, OH	L-	L-	L-	S-	S-
Fresno, CA	L-	L	L-	S-	S-
Grand Rapids, MI	L	L-	L-	0	S-
Oxnard-Ventura, CA	H+	H+	0	F+	F+
Albuquerque, NM	H+	0	0	F	S
New Haven, CT	L-	L-	L-	S-	S-
Albany-Schenectady, NY	L-	L-	L-	S-	S-
Toledo, OH-MI	L-	L-	L-	S-	S-

0 – Average congestion levels or average congestion growth

H Higher congestion; H+ Much higher congestion; F Faster congestion growth; F+ Much faster growth

L Lower congestion; L- Much lower congestion; S Slower congestion growth; S- Much slower growth

Performance Measures and Definition of Terms

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

Peak Travelers – Number of travelers (using any travel mode) who begin a trip during the morning or evening peak travel periods (6 to 9 a.m. and 4 to 7 p.m.).

Annual Delay per Traveler – A yearly sum of all the per-trip delays. This measure illustrates the effect of the per-mile congestion as well as the length of each trip. The extra time required to travel in the peak period is divided by the number of travelers who begin a trip during the peak period (6 to 9 a.m. and 4 to 7 p.m.).

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 (60 mph on freeways and 35 mph on arterials) – These values are used as the national comparison thresholds. Other speed values may be appropriate for urban areas or sub-regions.

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

Public Transportation – Regular route service from all public transportation providers in an urban area.

Operations Treatments – Freeway incident management, freeway ramp metering, arterial street signal coordination and arterial street access management.

Congestion Cost – Value of travel delay for 2005 (estimated at \$14.60 per hour of person travel and \$77.10 per hour of truck time) and excess fuel consumption (estimated using state average cost per gallon).

Annual Increase Needed to Maintain Constant Congestion Level – Number of lane-miles that must be added to the road system each year – or – the number of new transit riders or carpoolers that must be added to keep congestion levels the same as the previous year.

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). The annual change in miles traveled, therefore, includes both new travel due to growth and travel that previously occurred in areas designated as rural.

Number of Rush Hours – Time when system might have congestion

Key Mobility Performance Measure Labels

Note: Designation of an urban area congestion problem as “Much higher”, “Much faster growth”, etc. is determined using a general indicator of the accuracy of the congestion estimates. For regions with the same indicator label, there may be no difference in congestion levels. Different values are used for the indicators in regions over 1 million population and below 1 million population.

Measures	Differences Within These Values May Not Indicate a Difference in Congestion Level	
	Above 1M Population	Below 1M Population
2005 Values Delay per Traveler - Travel Time Index - Total Delay -	5 Hours 5 Index Points 5 Hours x Average Population	3 Hours 3 Index Points 3 Hours x Average Population
1982 to 2005 Trends Delay per Traveler - Total Delay -	5 Hours 5 Hours x Average Population	3 Hours 3 Hours x Average Population

The Mobility Data for Bridgeport-Stamford, CT-NY

Inventory Measures	2005	2004	2003	2002	2001	2000
Urban Area Information						
Population (1000s)	870	865	860	850	820	800
Rank	47	47	47	46	46	46
Urban Area (square miles)	475	475	470	470	455	440
Popn Density (persons/sq mile)	1,832	1,821	1,830	1,809	1,802	1,818
Peak Travelers (1000s)	472	467	462	451	430	414
Freeway						
Daily Vehicle-Miles of Travel (1000s)	10,380	10,200	10,000	10,170	9,700	9,300
Lane Miles	605	600	600	600	590	580
Arterial Streets						
Daily Vehicle-Miles of Travel (1000s)	6,180	6,185	6,200	6,090	5,860	5,620
Lane Miles	1,375	1,375	1,375	1,375	1,350	1,325
Public Transportation						
Annual Psgr-Miles of Travel (millions)	28	31	33	33	28	26
Annual Unlinked Psgr Trips (millions)	10	10	10	11	10	10
Cost Components						
Value of Time (\$/hour)	14.60	14.10	13.75	13.45	13.25	12.85
Commercial Cost (\$/hour)	77.10	74.60	72.65	71.05	69.95	68.00
Fuel Cost (\$/gallon)	2.35	2.08	1.60	1.46	1.77	1.70
System Performance						
Congested Travel (% of peak VMT)	61	60	60	60	57	56
Congested System (% of lane-miles)	41	41	39	39	38	38
Congested Time (number of "Rush Hours")	7.4	7.2	7.2	7.2	7.2	7.0
Annual Increase Needed To Maintain Constant Congestion Level:						
Lane-Miles	42	50	62	78	72	62
Transit Riders or Carpoolers (millions)	12	15	17	22	20	17
Annual Excess Fuel Consumed						
Total Fuel (1000 gallons)	11,500	10,610	11,097	11,313	10,095	9,711
Rank	39	40	39	37	38	37
Fuel per Peak Traveler (gallons)	24	23	24	25	23	23
Rank	34	35	30	26	28	27
Annual Delay						
Total Delay (1000s of person-hours)	14,510	13,300	14,111	14,289	13,111	12,431
Rank	43	45	45	42	45	44
Delay per Peak Traveler (person-hrs)	31	28	31	32	31	30
Rank	40	45	38	37	38	36
Delay due to Incidents (percent)	56	56	56	56	56	56
Travel Time Index						
Rank	1.22	1.21	1.22	1.22	1.21	1.21
Rank	32	34	31	29	30	29
Congestion Cost						
Total Cost (\$ millions)	280	244	248	245	222	204
Rank	43	44	45	42	42	43
Cost per Peak Traveler (\$)	592	522	537	543	517	492
Rank	40	41	39	36	35	36

Note: System Performance statistics for 2000 through 2005 data reflect the effects of operational treatments.

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

The Mobility Data for Bridgeport-Stamford, CT-NY, Continued

Inventory Measures	1999	1998	1997	1996	1995	1994
Urban Area Information						
Population (1000s)	785	775	760	750	735	725
Rank	45	45	45	45	45	45
Urban Area (square miles)	425	415	410	390	370	350
Popn Density (persons/sq mile)	1,847	1,867	1,854	1,923	1,986	2,071
Peak Travelers (1000s)	401	391	378	369	357	348
Freeway						
Daily Vehicle-Miles of Travel (1000s)	9,000	8,700	8,400	8,100	7,985	7,700
Lane Miles	570	560	555	550	540	535
Arterial Streets						
Daily Vehicle-Miles of Travel (1000s)	5,430	5,210	5,005	4,860	4,750	4,610
Lane Miles	1,310	1,295	1,260	1,230	1,205	1,180
Public Transportation						
Annual Psgr-Miles of Travel (millions)	25	25	22	22	19	21
Annual Unlinked Psgr Trips (millions)	9	9	9	9	8	8
Cost Components						
Value of Time (\$/hour)	12.40	12.15	12.00	11.70	11.40	11.05
Commercial Cost (\$/hour)	65.80	64.35	63.40	61.95	60.20	58.50
Fuel Cost (\$/gallon)	1.24	1.22	1.39	1.47	1.34	1.18
System Performance						
Congested Travel (% of peak VMT)	55	55	54	50	51	49
Congested System (% of lane-miles)	38	41	41	38	38	38
Congested Time (number of "Rush Hours")	6.8	6.6	6.4	6.2	6.2	6.0
Annual Increase Needed To Maintain Constant Congestion Level:						
Lane-Miles	60	56	45	43	33	19
Transit Riders or Carpoolers (millions)	16	15	11	11	8	5
Annual Excess Fuel Consumed						
Total Fuel (1000 gallons)	9,318	8,428	7,416	6,312	6,402	5,714
Rank	39	39	41	43	42	40
Fuel per Peak Traveler (gallons)	23	22	20	17	18	16
Rank	29	31	36	37	35	36
Annual Delay						
Total Delay (1000s of person-hours)	11,951	10,720	9,455	7,933	8,026	7,163
Rank	43	44	46	48	44	44
Delay per Peak Traveler (person-hrs)	30	27	25	21	22	21
Rank	40	42	42	50	44	47
Delay due to Incidents (percent)	56	56	55	55	55	54
Travel Time Index						
Rank	30	31	37	40	36	37
Congestion Cost						
Total Cost (\$ millions)	186	163	143	118	116	99
Rank	44	44	46	46	44	44
Cost per Peak Traveler (\$)	463	415	378	319	323	285
Rank	39	41	42	48	43	46

Note: System Performance statistics for 2000 through 2005 data reflect the effects of operational treatments.

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

The Mobility Data for Bridgeport-Stamford, CT-NY, Continued

Inventory Measures	1993	1992	1991	1990	1989	1988
Urban Area Information						
Population (1000s)	720	715	715	715	715	715
Rank	45	45	44	43	42	42
Urban Area (square miles)	330	310	310	310	305	305
Popn Density (persons/sq mile)	2,182	2,306	2,306	2,306	2,344	2,344
Peak Travelers (1000s)	341	335	330	326	323	321
Freeway						
Daily Vehicle-Miles of Travel (1000s)	7,480	7,455	7,150	7,300	7,400	7,370
Lane Miles	525	520	520	515	515	510
Arterial Streets						
Daily Vehicle-Miles of Travel (1000s)	4,505	4,430	4,345	4,300	4,255	4,210
Lane Miles	1,145	1,110	1,085	1,060	1,040	1,010
Public Transportation						
Annual Psgr-Miles of Travel (millions)	20	23	22	15	14	20
Annual Unlinked Psgr Trips (millions)	9	10	9	7	8	9
Cost Components						
Value of Time (\$/hour)	10.75	10.50	10.25	10.00	9.25	8.80
Commercial Cost (\$/hour)	57.05	55.40	53.80	51.60	48.95	46.70
Fuel Cost (\$/gallon)	1.23	1.26	1.23	1.12	1.21	1.12
System Performance						
Congested Travel (% of peak VMT)	47	48	43	45	44	45
Congested System (% of lane-miles)	38	38	33	33	33	30
Congested Time (number of "Rush Hours")	5.8	6.0	5.6	5.8	6.0	6.0
Annual Increase Needed To Maintain Constant Congestion Level:						
Lane-Miles	12	16	18	28	46	59
Transit Riders or Carpoolers (millions)	3	4	5	7	12	16
Annual Excess Fuel Consumed						
Total Fuel (1000 gallons)	5,108	5,063	4,376	4,385	4,473	4,549
Rank	40	39	40	37	35	33
Fuel per Peak Traveler (gallons)	15	15	13	13	14	14
Rank	39	32	36	35	29	24
Annual Delay						
Total Delay (1000s of person-hours)	6,469	6,599	5,710	5,587	5,489	5,616
Rank	46	41	44	43	40	36
Delay per Peak Traveler (person-hrs)	19	20	17	17	17	17
Rank	48	39	44	43	39	35
Delay due to Incidents (percent)	54	54	54	54	56	55
Travel Time Index						
Rank	39	35	37	35	28	27
Congestion Cost						
Total Cost (\$ millions)	87	86	73	69	65	63
Rank	45	42	43	42	38	35
Cost per Peak Traveler (\$)	255	258	220	211	200	195
Rank	48	40	44	42	39	35

Note: System Performance statistics for 2000 through 2005 data reflect the effects of operational treatments.

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

The Mobility Data for Bridgeport-Stamford, CT-NY, Continued

Inventory Measures	1987	1986	1985	1984	1983	1982
Urban Area Information						
Population (1000s)	715	710	710	710	705	705
Rank	42	41	41	41	40	40
Urban Area (square miles)	305	300	300	300	300	295
Popn Density (persons/sq mile)	2,344	2,367	2,367	2,367	2,350	2,390
Peak Travelers (1000s)	318	314	312	309	305	301
Freeway						
Daily Vehicle-Miles of Travel (1000s)	7,125	6,700	6,500	6,040	5,575	5,470
Lane Miles	510	510	505	505	500	500
Arterial Streets						
Daily Vehicle-Miles of Travel (1000s)	4,195	4,160	4,100	4,040	4,010	3,975
Lane Miles	995	980	970	950	935	925
Public Transportation						
Annual Psgr-Miles of Travel (millions)	14	1	2	2	2	2
Annual Unlinked Psgr Trips (millions)	9	8	8	7	7	7
Cost Components						
Value of Time (\$/hour)	8.50	8.20	8.00	7.75	7.45	7.20
Commercial Cost (\$/hour)	44.85	43.30	42.50	41.05	39.35	38.10
Fuel Cost (\$/gallon)	1.12	1.09	1.43	1.44	1.48	1.55
System Performance						
Congested Travel (% of peak VMT)	43	38	36	32	27	26
Congested System (% of lane-miles)	30	29	29	29	27	27
Congested Time (number of "Rush Hours")	5.8	5.4	5.2	4.4	3.8	3.8
Annual Increase Needed To Maintain Constant Congestion Level:						
Lane-Miles	56	--	--	--	--	--
Transit Riders or Carpoolers (millions)	15	--	--	--	--	--
Annual Excess Fuel Consumed						
Total Fuel (1000 gallons)	4,350	3,662	3,034	2,464	2,009	1,939
Rank	32	34	33	36	36	35
Fuel per Peak Traveler (gallons)	14	12	10	8	7	6
Rank	21	27	33	34	38	36
Annual Delay						
Total Delay (1000s of person-hours)	5,572	4,913	3,984	3,259	2,727	2,634
Rank	35	35	36	38	40	35
Delay per Peak Traveler (person-hrs)	18	16	13	11	9	9
Rank	33	33	40	45	45	44
Delay due to Incidents (percent)	55	56	56	55	56	56
Travel Time Index						
Rank	24	26	32	35	39	37
Congestion Cost						
Total Cost (\$ millions)	60	51	41	33	26	25
Rank	35	35	36	38	39	35
Cost per Peak Traveler (\$)	188	161	132	106	86	82
Rank	31	33	37	43	43	42

Note: System Performance statistics for 2000 through 2005 data reflect the effects of operational treatments.

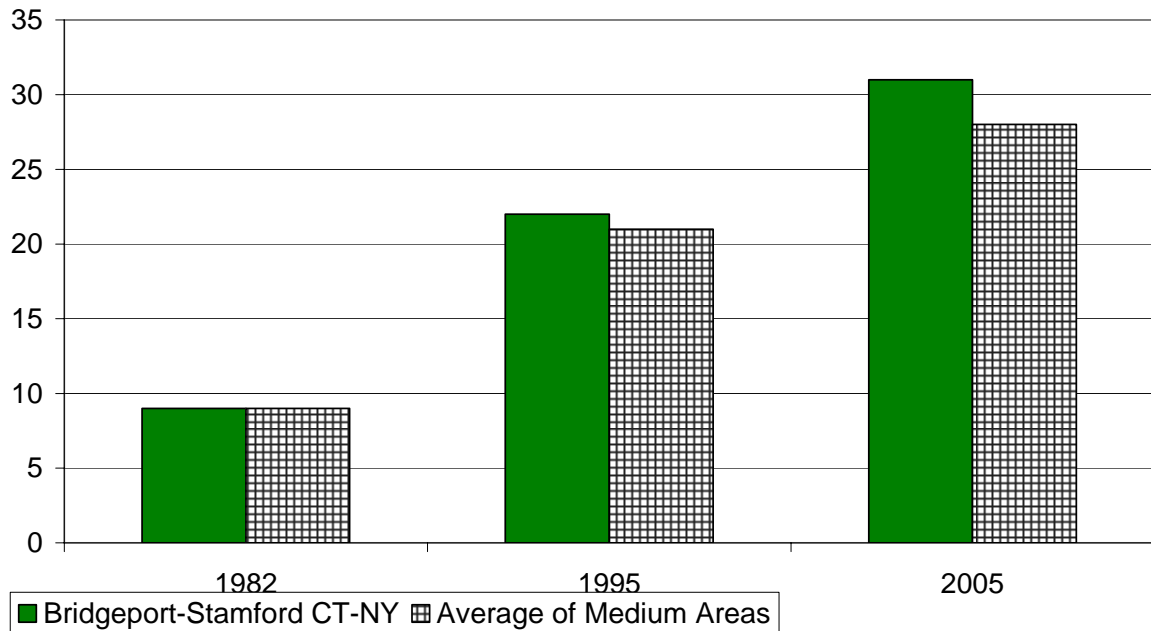
Note: Zeroes in the table reflect values less than 0.5.

Benefits From Public Transportation Service and Operations Strategies for Bridgeport-Stamford, CT-NY

Operations Strategies	2005	2004	2003	2002	2001	2000
Freeway Ramp Metering						
Percent of Roadway Miles	--	--	--	--	--	--
Annual Delay Reduction (1000 hours)	--	--	--	--	--	--
Freeway Incident Management						
Cameras						
Percent of Roadway Miles	42	42	42	42	42	43
Service Patrols						
Percent of Roadway Miles	47	47	47	42	42	43
Annual Delay Reduction (1000 hours)	465	374	424	401	353	332
Arterial Signal Coordination						
Percent of Roadway Miles	45	45	44	29	24	25
Annual Delay Reduction (1000 hours)	89	91	88	80	84	80
Arterial Access Management						
Percent of Roadway Miles	7	7	7	7	6	6
Annual Delay Reduction (1000 hours)	51	58	50	46	80	82
HOV Lanes						
Daily Passenger-miles of Travel (1000s)	--	--	--	--	--	--
HOV User Delay Savings	--	--	--	--	--	--
Total Effect of Operations Treatments						
Annual Delay Reduction (1000 hours)	604	522	562	528	517	494
Annual Delay Saved per Peak Traveler (hours)	1	1	1	1	1	1
Annual Congestion Cost Savings (\$million)	11.8	9.7	10.0	9.2	8.8	8.1
Travel Time Index with Strategies	1.224	1.208	1.221	1.225	1.208	1.209
Travel Time Index (Base)	1.233	1.215	1.229	1.233	1.215	1.216
Public Transportation Service						
Existing Service						
Annual Passenger-miles of Travel (million)	28	31	33	33	28	26
Unlinked Passenger Trips (million)	10	10	10	11	10	10
Travel Time Index (combined road and transit)	1.223	1.206	1.219	1.223	1.206	1.206
Condition if Public Transportation Service were Discontinued						
Travel Time Index	1.237	1.220	1.234	1.237	1.220	1.222
Annual Delay Increase (1000 hours)	324	368	424	412	349	376
Annual Delay Increase per Peak Traveler (hours)	1	1	1	1	1	1
Annual Congestion Cost Increase (\$million)	6.4	7.0	7.7	7.3	6.1	6.3

Growth in Delay per Peak Traveler

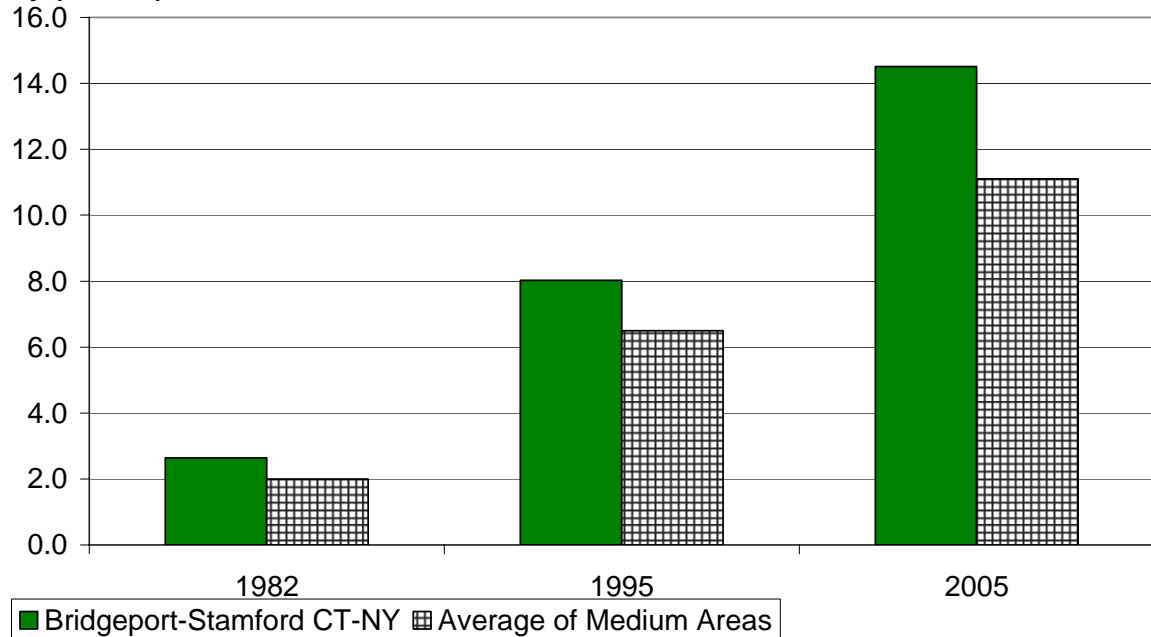
Hours of Delay



Medium areas have populations between 0.5 and 1 million

Growth in Total Delay

Annual Hours of Delay (million)



Medium areas have populations between 0.5 and 1 million