

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 Honolulu, HI

Inventory Measures	2005	2004	2003	2002	2001	2000
Urban Area Information						
Population (1000s)	705	700	700	700	700	695
Rank	54	54	54	54	54	52
Urban Area (square miles)	140	140	140	140	140	140
Popn Density (persons/sq mile)	5,036	5,000	5,000	5,000	5,000	4,964
Peak Travelers (1000s)	383	378	376	372	367	359
Freeway						
Daily Vehicle-Miles of Travel (1000s)	6,015	6,000	5,930	5,775	5,740	5,625
Lane Miles	415	415	415	415	410	400
Arterial Streets						
Daily Vehicle-Miles of Travel (1000s)	3,250	3,200	3,175	3,155	3,135	3,115
Lane Miles	505	505	505	505	505	500
Public Transportation						
Annual Psgr-Miles of Travel (millions)	311	287	320	333	371	328
Annual Unlinked Psgr Trips (millions)	69	63	70	75	72	68
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)	2.63	2.38	2.03	1.72	2.00	1.86
System Performance						
Congested Travel (% of peak VMT)	53	50	49	48	48	48
Congested System (% of lane-miles)	48	46	46	46	46	46
Congested Time (number of "Rush Hours")	6.8	6.8	6.6	6.4	6.4	6.6
Annual Increase Needed To Maintain Constant Congestion Level:						
Lane-Miles	11	8	6	2	0	-2
Transit Riders or Carpoolers (millions)	4	3	2	1	0	0
Annual Excess Fuel Consumed						
Total Fuel (1000 gallons)	6,255	5,680	5,466	4,930	5,085	4,966
Rank	53	54	53	56	53	54
Fuel per Peak Traveler (gallons)	16	15	15	13	14	14
Rank	46	48	48	54	52	49
Annual Delay						
Total Delay (1000s of person-hours)	9,342	8,496	8,110	7,252	7,639	7,393
Rank	53	56	56	58	55	56
Delay per Peak Traveler (person-hrs)	24	22	22	20	21	21
Rank	51	52	52	57	54	54
Delay due to Incidents (percent)	53	53	53	52	52	52
Travel Time Index						
Rank	1.22	1.20	1.19	1.18	1.18	1.18
Rank	32	36	36	37	34	35
Congestion Cost						
Total Cost (\$ millions)	166	145	134	116	121	114
Rank	53	56	57	59	55	56
Cost per Peak Traveler (\$)	434	383	355	313	330	316
Rank	52	54	54	59	56	57

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 Honolulu, HI, Continued

Inventory Measures	1999	1998	1997	1996	1995	1994
Urban Area Information						
Population (1000s)	695	700	705	705	700	695
Rank	52	50	48	48	48	48
Urban Area (square miles)	140	140	140	140	140	140
Popn Density (persons/sq mile)	4,964	5,000	5,036	5,036	5,000	4,964
Peak Travelers (1000s)	355	354	351	347	340	334
Freeway						
Daily Vehicle-Miles of Travel (1000s)	5,715	5,725	5,720	5,680	5,635	5,615
Lane Miles	400	400	400	395	390	390
Arterial Streets						
Daily Vehicle-Miles of Travel (1000s)	3,100	3,080	3,100	3,175	3,170	3,090
Lane Miles	500	490	485	480	475	470
Public Transportation						
Annual Psgr-Miles of Travel (millions)	354	378	342	321	337	385
Annual Unlinked Psgr Trips (millions)	67	73	69	70	74	78
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)	1.53	1.63	1.67	1.68	1.57	1.52
System Performance						
Congested Travel (% of peak VMT)	49	51	51	52	52	52
Congested System (% of lane-miles)	46	49	49	49	49	49
Congested Time (number of "Rush Hours")	6.6	6.8	6.8	6.8	7.0	6.8
Annual Increase Needed To Maintain Constant Congestion Level:						
Lane-Miles	2	5	7	15	18	18
Transit Riders or Carpoolers (millions)	1	2	2	5	7	6
Annual Excess Fuel Consumed						
Total Fuel (1000 gallons)	5,251	5,445	5,319	5,760	5,764	5,437
Rank	54	50	48	44	44	44
Fuel per Peak Traveler (gallons)	15	15	15	17	17	16
Rank	49	46	46	41	36	37
Annual Delay						
Total Delay (1000s of person-hours)	7,971	8,172	7,933	8,708	8,809	8,255
Rank	53	51	50	44	43	42
Delay per Peak Traveler (person-hrs)	22	23	23	25	26	25
Rank	55	49	48	42	39	38
Delay due to Incidents (percent)	51	51	51	51	51	51
Travel Time Index						
	1.19	1.20	1.19	1.21	1.21	1.20
Rank	36	29	29	20	17	18
Congestion Cost						
Total Cost (\$ millions)	116	118	113	123	120	109
Rank	54	51	51	45	43	42
Cost per Peak Traveler (\$)	328	335	323	354	354	327
Rank	58	50	50	43	40	40

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 Honolulu, HI, Continued

Inventory Measures	1993	1992	1991	1990	1989	1988
Urban Area Information						
Population (1000s)	690	685	670	665	665	660
Rank	48	48	48	47	45	45
Urban Area (square miles)	135	135	135	135	135	135
Popn Density (persons/sq mile)	5,111	5,074	4,963	4,926	4,926	4,889
Peak Travelers (1000s)	327	321	310	303	301	296
Freeway						
Daily Vehicle-Miles of Travel (1000s)	5,505	5,555	5,365	5,225	5,155	4,940
Lane Miles	390	390	380	370	360	360
Arterial Streets						
Daily Vehicle-Miles of Travel (1000s)	3,070	2,935	2,785	2,700	2,690	2,615
Lane Miles	465	460	450	450	445	440
Public Transportation						
Annual Psgr-Miles of Travel (millions)	358	350	339	344	329	318
Annual Unlinked Psgr Trips (millions)	77	74	73	74	73	73
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)	1.50	1.47	1.46	1.36	1.36	1.26
System Performance						
Congested Travel (% of peak VMT)	51	48	45	48	47	45
Congested System (% of lane-miles)	49	46	44	46	43	43
Congested Time (number of "Rush Hours")	6.8	6.6	6.6	6.4	6.6	6.2
Annual Increase Needed To Maintain Constant Congestion Level:						
Lane-Miles	22	30	35	33	34	33
Transit Riders or Carpoolers (millions)	8	10	12	11	12	11
Annual Excess Fuel Consumed						
Total Fuel (1000 gallons)	5,380	5,304	4,714	4,723	4,685	4,347
Rank	39	37	37	35	34	34
Fuel per Peak Traveler (gallons)	16	17	15	16	16	15
Rank	29	27	29	28	21	22
Annual Delay						
Total Delay (1000s of person-hours)	8,331	8,293	7,371	7,233	7,251	6,758
Rank	39	37	36	35	33	34
Delay per Peak Traveler (person-hrs)	25	26	24	24	24	23
Rank	31	29	31	29	25	22
Delay due to Incidents (percent)	52	52	52	52	52	54
Travel Time Index						
	1.20	1.20	1.18	1.19	1.19	1.18
Rank	16	14	18	15	14	12
Congestion Cost						
Total Cost (\$ millions)	107	104	90	86	80	71
Rank	39	37	36	36	34	34
Cost per Peak Traveler (\$)	328	324	292	285	267	240
Rank	36	31	33	30	26	25

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 Honolulu, HI, Continued

Inventory Measures	1987	1986	1985	1984	1983	1982
Urban Area Information						
Population (1000s)	620	595	590	590	585	570
Rank	46	48	49	49	49	49
Urban Area (square miles)	130	130	120	120	115	115
Popn Density (persons/sq mile)	4,769	4,577	4,917	4,917	5,087	4,957
Peak Travelers (1000s)	276	263	259	257	253	243
Freeway						
Daily Vehicle-Miles of Travel (1000s)	4,540	4,105	3,965	3,865	3,700	3,320
Lane Miles	360	350	350	340	340	330
Arterial Streets						
Daily Vehicle-Miles of Travel (1000s)	2,600	2,555	2,555	2,505	2,455	2,410
Lane Miles	440	435	435	435	435	405
Public Transportation						
Annual Psgr-Miles of Travel (millions)	335	349	338	408	408	408
Annual Unlinked Psgr Trips (millions)	73	76	75	81	81	81
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)	1.26	1.23	1.61	1.62	1.66	1.74
System Performance						
Congested Travel (% of peak VMT)	39	35	31	29	29	28
Congested System (% of lane-miles)	41	39	37	35	37	37
Congested Time (number of "Rush Hours")	5.6	5.0	4.8	4.8	4.4	4.0
Annual Increase Needed To Maintain Constant Congestion Level:						
Lane-Miles	36	--	--	--	--	--
Transit Riders or Carpoolers (millions)	11	--	--	--	--	--
Annual Excess Fuel Consumed						
Total Fuel (1000 gallons)	3,430	2,873	2,626	2,505	2,419	2,036
Rank	36	36	37	34	33	34
Fuel per Peak Traveler (gallons)	12	11	10	10	10	8
Rank	27	31	32	25	21	23
Annual Delay						
Total Delay (1000s of person-hours)	5,531	4,564	4,295	4,142	4,041	3,365
Rank	36	37	35	34	33	34
Delay per Peak Traveler (person-hrs)	20	17	17	16	16	14
Rank	26	30	31	25	20	24
Delay due to Incidents (percent)	53	53	54	54	54	54
Travel Time Index						
Rank	1.15	1.13	1.12	1.12	1.12	1.11
Rank	15	16	15	14	12	12
Congestion Cost						
Total Cost (\$ millions)	56	45	42	39	37	30
Rank	36	37	35	34	33	34
Cost per Peak Traveler (\$)	204	170	163	154	147	124
Rank	27	31	32	28	21	25

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

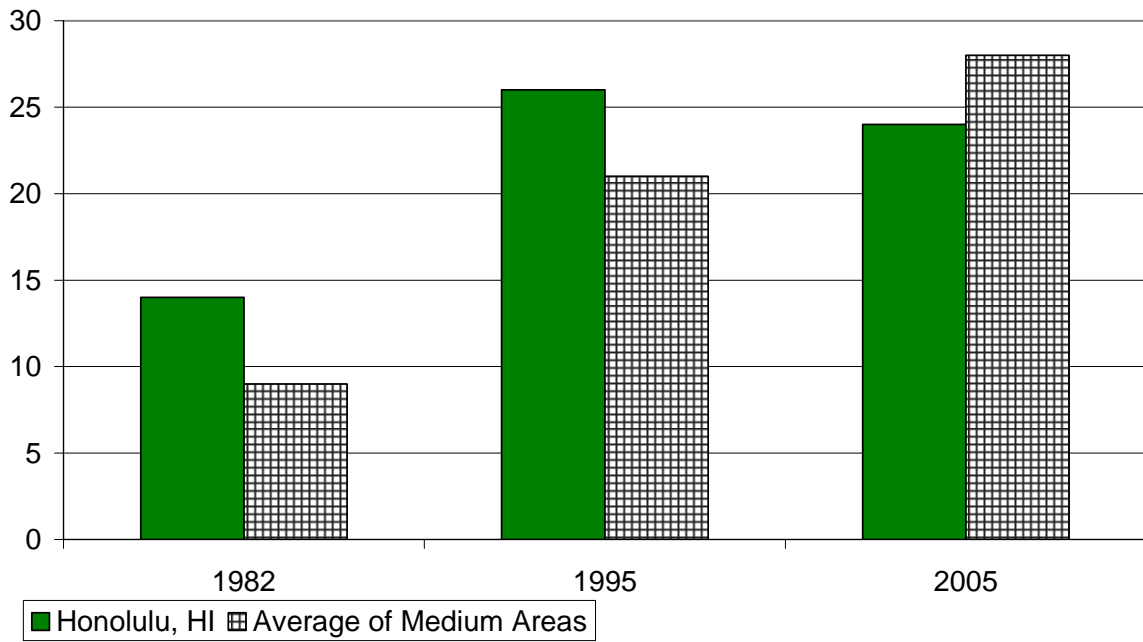
Note: Zeroes in the table reflect values less than 0.5.

Benefits From Public Transportation Service and Operations Strategies for Honolulu, HI

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	29	29	29	18	18	--
Service Patrols						
Percent of Roadway Miles	--	--	--	--	--	--
Annual Delay Reduction (1000 hours)	16	14	13	6	7	--
Arterial Signal Coordination						
Percent of Roadway Miles	51	46	46	46	46	46
Annual Delay Reduction (1000 hours)	90	71	72	72	70	72
Arterial Access Management						
Percent of Roadway Miles	33	33	32	30	29	28
Annual Delay Reduction (1000 hours)	136	121	130	121	85	90
HOV Lanes						
Daily Passenger-miles of Travel (1000s)	--	--	--	--	--	--
HOV User Delay Savings	--	--	--	--	--	--
Total Effect of Operations Treatments						
Annual Delay Reduction (1000 hours)	241	206	214	199	161	162
Annual Delay Saved per Peak Traveler (hours)	1	1	1	1	0	0
Annual Congestion Cost Savings (\$million)	4.3	3.5	3.5	3.2	2.6	2.5
Travel Time Index with Strategies	1.218	1.198	1.192	1.175	1.182	1.180
Travel Time Index (Base)	1.222	1.201	1.196	1.179	1.185	1.183
Public Transportation Service						
Existing Service						
Annual Passenger-miles of Travel (million)	311	287	320	333	371	328
Unlinked Passenger Trips (million)	69	63	70	75	72	68
Travel Time Index (combined road and transit)	1.190	1.174	1.166	1.151	1.155	1.156
Condition if Public Transportation Service were Discontinued						
Travel Time Index	1.262	1.239	1.241	1.227	1.235	1.233
Annual Delay Increase (1000 hours)	2,711	2,454	2,869	2,977	3,134	2,925
Annual Delay Increase per Peak Traveler (hours)	7	6	8	8	9	8
Annual Congestion Cost Increase (\$million)	47.6	41.3	46.6	47.1	49.0	44.4

Growth in Delay per Peak Traveler

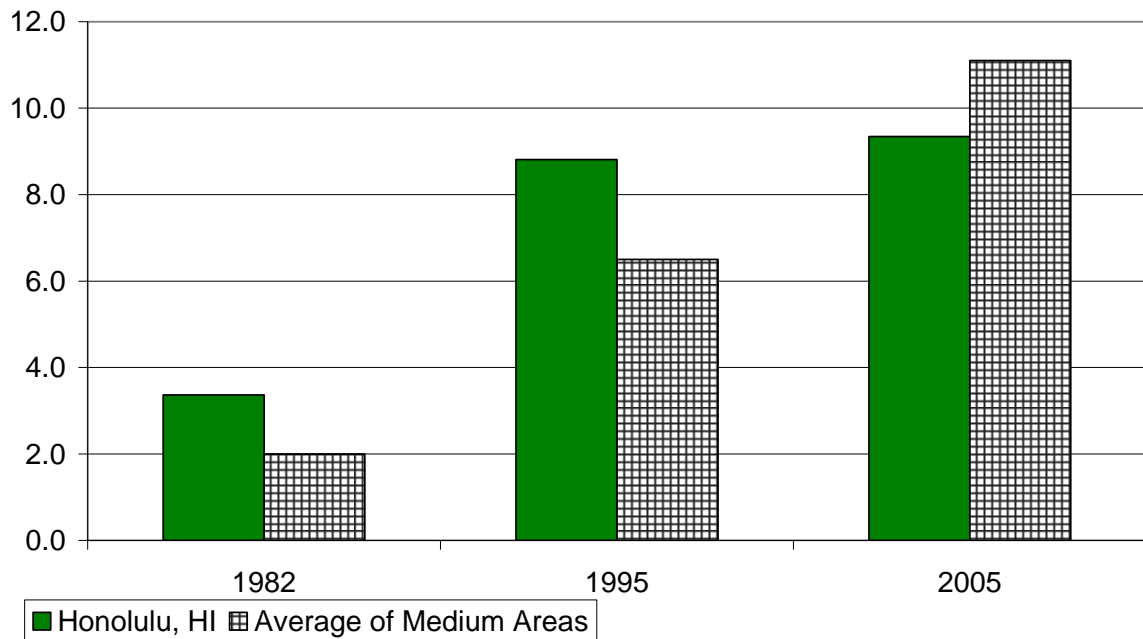
Hours of Delay



Medium areas have populations between 0.5 and 1 million

Annual Hours of Delay (million)

Growth in Total Delay



Medium areas have populations between 0.5 and 1 million