

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 Fresno, CA

Inventory Measures	2005	2004	2003	2002	2001	2000
Urban Area Information						
Population (1000s)	615	605	595	585	560	560
Rank	62	63	61	61	63	62
Urban Area (square miles)	195	195	195	190	190	185
Popn Density (persons/sq mile)	3,154	3,103	3,051	3,079	2,947	3,027
Peak Travelers (1000s)	334	327	320	311	293	290
Freeway						
Daily Vehicle-Miles of Travel (1000s)	3,865	3,645	3,280	3,215	2,520	2,550
Lane Miles	290	290	265	260	205	200
Arterial Streets						
Daily Vehicle-Miles of Travel (1000s)	6,470	6,440	6,540	6,510	6,400	6,505
Lane Miles	1,415	1,400	1,395	1,355	1,340	1,325
Public Transportation						
Annual Psgr-Miles of Travel (millions)	32	32	38	38	47	43
Annual Unlinked Psgr Trips (millions)	11	11	11	12	13	13
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)	2.62	2.28	1.78	1.66	1.93	1.72
System Performance						
Congested Travel (% of peak VMT)	37	36	36	36	37	39
Congested System (% of lane-miles)	37	37	38	37	37	38
Congested Time (number of "Rush Hours")	5.4	5.2	5.2	5.2	5.2	5.6
Annual Increase Needed To Maintain Constant Congestion Level:						
Lane-Miles	46	60	61	70	51	63
Transit Riders or Carpoolers (millions)	10	13	12	15	10	13
Annual Excess Fuel Consumed						
Total Fuel (1000 gallons)	4,151	3,921	3,955	3,990	3,739	4,257
Rank	65	63	64	63	64	59
Fuel per Peak Traveler (gallons)	12	12	12	13	13	15
Rank	61	62	54	54	56	46
Annual Delay						
Total Delay (1000s of person-hours)	6,625	6,306	6,383	6,542	6,253	7,047
Rank	64	63	63	63	63	58
Delay per Peak Traveler (person-hrs)	20	19	20	21	21	24
Rank	56	59	57	55	54	47
Delay due to Incidents (percent)	55	55	55	55	54	55
Travel Time Index						
Rank	1.12	1.12	1.12	1.13	1.13	1.15
Rank	55	54	56	54	53	44
Congestion Cost						
Total Cost (\$ millions)	127	116	113	112	107	117
Rank	63	63	62	60	62	55
Cost per Peak Traveler (\$)	381	355	352	360	364	404
Rank	56	57	55	54	54	45

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 Fresno, CA, Continued

Inventory Measures	1999	1998	1997	1996	1995	1994
Urban Area Information						
Population (1000s)	550	545	540	530	525	515
Rank	63	62	62	63	63	64
Urban Area (square miles)	185	185	180	175	170	170
Popn Density (persons/sq mile)	2,973	2,946	3,000	3,029	3,088	3,029
Peak Travelers (1000s)	281	275	269	261	255	247
Freeway						
Daily Vehicle-Miles of Travel (1000s)	2,200	2,025	1,915	1,895	1,885	1,740
Lane Miles	180	170	170	165	165	165
Arterial Streets						
Daily Vehicle-Miles of Travel (1000s)	6,250	6,180	5,940	5,700	5,505	5,480
Lane Miles	1,315	1,305	1,285	1,275	1,270	1,245
Public Transportation						
Annual Psgr-Miles of Travel (millions)	42	38	36	31	30	25
Annual Unlinked Psgr Trips (millions)	11	10	10	9	9	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)	1.59	1.27	1.40	1.21	1.27	1.16
System Performance						
Congested Travel (% of peak VMT)	38	38	33	32	31	29
Congested System (% of lane-miles)	38	38	34	34	34	33
Congested Time (number of "Rush Hours")	5.2	5.2	4.6	4.6	4.4	4.0
Annual Increase Needed To Maintain Constant Congestion Level:						
Lane-Miles	48	41	32	27	23	20
Transit Riders or Carpoolers (millions)	9	8	6	5	4	4
Annual Excess Fuel Consumed						
Total Fuel (1000 gallons)	4,113	3,751	3,066	2,860	2,641	2,397
Rank	59	61	62	62	61	62
Fuel per Peak Traveler (gallons)	15	14	11	11	10	10
Rank	51	51	60	59	60	56
Annual Delay						
Total Delay (1000s of person-hours)	6,881	6,241	5,099	4,742	4,359	4,080
Rank	60	59	62	62	62	62
Delay per Peak Traveler (person-hrs)	24	23	19	18	17	17
Rank	46	50	59	60	57	57
Delay due to Incidents (percent)	55	54	54	54	54	53
Travel Time Index						
Rank	46	45	53	53	52	52
Congestion Cost						
Total Cost (\$ millions)	110	97	79	72	65	58
Rank	55	57	60	61	60	60
Cost per Peak Traveler (\$)	392	354	295	274	253	236
Rank	44	48	56	56	55	56

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 Fresno, CA, Continued

Inventory Measures	1993	1992	1991	1990	1989	1988
Urban Area Information						
Population (1000s)	500	490	475	460	450	430
Rank	64	64	65	65	65	67
Urban Area (square miles)	165	160	150	145	135	130
Popn Density (persons/sq mile)	3,030	3,063	3,167	3,172	3,333	3,308
Peak Travelers (1000s)	237	229	219	210	203	193
Freeway						
Daily Vehicle-Miles of Travel (1000s)	1,710	1,690	1,625	1,580	1,500	1,395
Lane Miles	160	160	155	155	155	155
Arterial Streets						
Daily Vehicle-Miles of Travel (1000s)	5,440	5,350	5,295	5,250	5,220	5,130
Lane Miles	1,230	1,225	1,225	1,225	1,225	1,205
Public Transportation						
Annual Psgr-Miles of Travel (millions)	27	26	29	28	33	28
Annual Unlinked Psgr Trips (millions)	8	9	9	9	9	8
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	1.28	1.11	1.14	1.14	1.05
System Performance						
Congested Travel (% of peak VMT)	30	26	26	25	24	20
Congested System (% of lane-miles)	33	28	28	28	28	24
Congested Time (number of "Rush Hours")	4.2	4.0	4.0	3.8	3.6	3.2
Annual Increase Needed To Maintain Constant Congestion Level:						
Lane-Miles	26	222	32	34	41	44
Transit Riders or Carpoolers (millions)	5	39	5	6	7	7
Annual Excess Fuel Consumed						
Total Fuel (1000 gallons)	2,398	2,117	2,018	1,945	1,824	1,522
Rank	62	62	59	58	56	60
Fuel per Peak Traveler (gallons)	10	9	9	9	9	8
Rank	53	52	48	48	48	48
Annual Delay						
Total Delay (1000s of person-hours)	4,057	3,675	3,489	3,399	3,193	2,681
Rank	61	61	57	57	55	59
Delay per Peak Traveler (person-hrs)	17	16	16	16	16	14
Rank	53	52	47	47	43	45
Delay due to Incidents (percent)	53	53	53	53	53	53
Travel Time Index						
Rank	47	49	50	51	48	50
Congestion Cost						
Total Cost (\$ millions)	57	50	46	43	38	30
Rank	57	57	56	54	54	55
Cost per Peak Traveler (\$)	238	217	208	207	187	156
Rank	50	49	46	46	40	45

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 Fresno, CA, Continued

Inventory Measures	1987	1986	1985	1984	1983	1982
Urban Area Information						
Population (1000s)	410	400	385	370	360	345
Rank	68	68	67	67	67	68
Urban Area (square miles)	130	125	120	110	105	100
Popn Density (persons/sq mile)	3,154	3,200	3,208	3,364	3,429	3,450
Peak Travelers (1000s)	182	177	169	161	156	147
Freeway						
Daily Vehicle-Miles of Travel (1000s)	1,370	1,385	1,335	1,270	1,150	1,100
Lane Miles	155	155	155	150	145	140
Arterial Streets						
Daily Vehicle-Miles of Travel (1000s)	1,980	4,800	4,715	4,550	4,410	4,245
Lane Miles	1,180	1,160	1,150	1,145	1,130	1,110
Public Transportation						
Annual Psgr-Miles of Travel (millions)	29	29	28	25	25	25
Annual Unlinked Psgr Trips (millions)	9	9	9	8	8	8
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)	1.05	1.03	1.35	1.36	1.39	1.46
System Performance						
Congested Travel (% of peak VMT)	11	17	16	16	16	15
Congested System (% of lane-miles)	19	19	18	18	18	18
Congested Time (number of "Rush Hours")	2.3	3.0	3.0	2.9	2.9	2.8
Annual Increase Needed To Maintain Constant Congestion Level:						
Lane-Miles	-119	--	--	--	--	--
Transit Riders or Carpoolers (millions)	-10	--	--	--	--	--
Annual Excess Fuel Consumed						
Total Fuel (1000 gallons)	373	1,237	1,073	1,085	999	947
Rank	77	60	59	57	57	53
Fuel per Peak Traveler (gallons)	2	7	6	7	6	6
Rank	81	47	47	40	40	37
Annual Delay						
Total Delay (1000s of person-hours)	641	2,247	1,873	1,973	1,799	1,705
Rank	77	56	57	54	51	50
Delay per Peak Traveler (person-hrs)	4	13	11	12	12	12
Rank	80	43	45	39	37	34
Delay due to Incidents (percent)	54	53	53	53	53	53
Travel Time Index						
Rank	70	50	51	47	45	44
Congestion Cost						
Total Cost (\$ millions)	7	23	20	20	17	16
Rank	76	56	55	53	51	50
Cost per Peak Traveler (\$)	38	133	116	124	112	109
Rank	79	42	44	37	35	33

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

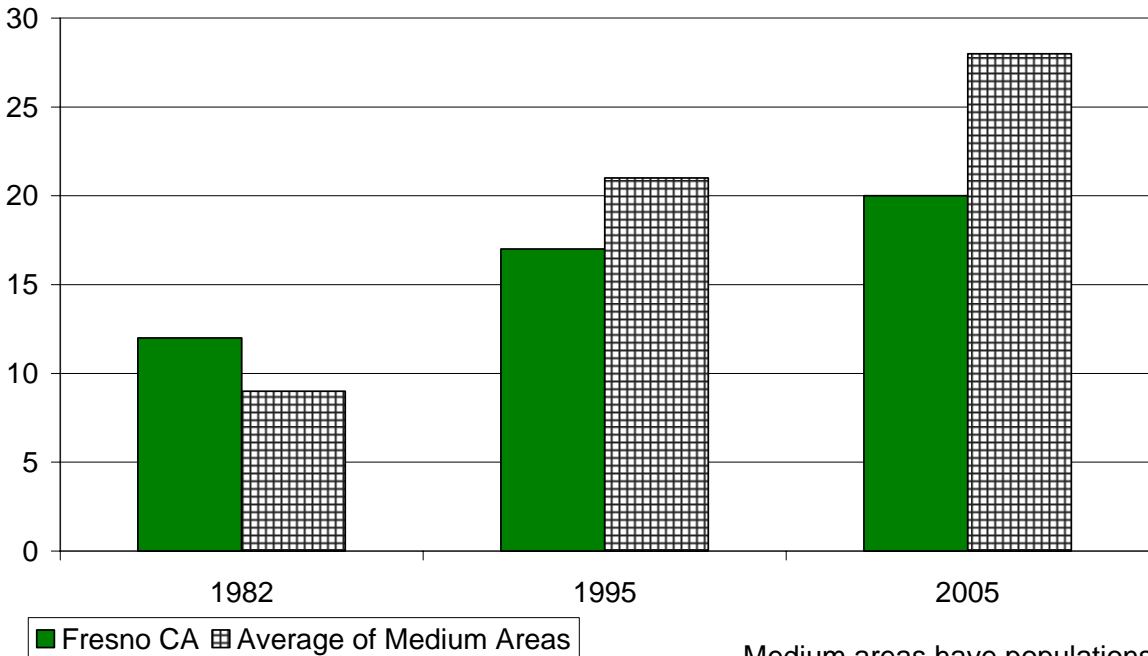
Note: Zeroes in the table reflect values less than 0.5.

Benefits From Public Transportation Service and Operations Strategies for Fresno, CA

Operations Strategies	2005	2004	2003	2002	2001	2000
Freeway Ramp Metering						
Percent of Roadway Miles	81	81	89	90	92	83
Annual Delay Reduction (1000 hours)	11	11	5	9	8	11
Freeway Incident Management						
Cameras						
Percent of Roadway Miles	54	54	59	57	66	60
Service Patrols						
Percent of Roadway Miles	36	36	40	41	45	43
Annual Delay Reduction (1000 hours)	57	54	54	55	43	82
Arterial Signal Coordination						
Percent of Roadway Miles	59	60	62	63	65	67
Annual Delay Reduction (1000 hours)	32	30	32	42	44	51
Arterial Access Management						
Percent of Roadway Miles	45	45	45	47	47	46
Annual Delay Reduction (1000 hours)	363	348	393	305	289	437
HOV Lanes						
Daily Passenger-miles of Travel (1000s)	--	--	--	--	--	--
HOV User Delay Savings	--	--	--	--	--	--
Total Effect of Operations Treatments						
Annual Delay Reduction (1000 hours)	464	443	484	411	384	582
Annual Delay Saved per Peak Traveler (hours)	1	1	2	1	1	2
Annual Congestion Cost Savings (\$million)	8.9	8.1	8.5	7.0	6.5	9.6
Travel Time Index with Strategies	1.124	1.119	1.124	1.126	1.129	1.145
Travel Time Index (Base)	1.131	1.126	1.131	1.133	1.135	1.155
Public Transportation Service						
Existing Service						
Annual Passenger-miles of Travel (million)	32	32	38	38	47	43
Unlinked Passenger Trips (million)	11	11	11	12	13	13
Travel Time Index (combined road and transit)	1.121	1.117	1.121	1.123	1.125	1.142
Condition if Public Transportation Service were Discontinued						
Travel Time Index	1.134	1.130	1.135	1.137	1.140	1.161
Annual Delay Increase (1000 hours)	259	270	300	317	344	421
Annual Delay Increase per Peak Traveler (hours)	1	1	1	1	1	1
Annual Congestion Cost Increase (\$million)	4.9	4.9	5.3	5.4	5.9	6.9

Growth in Delay per Peak Traveler

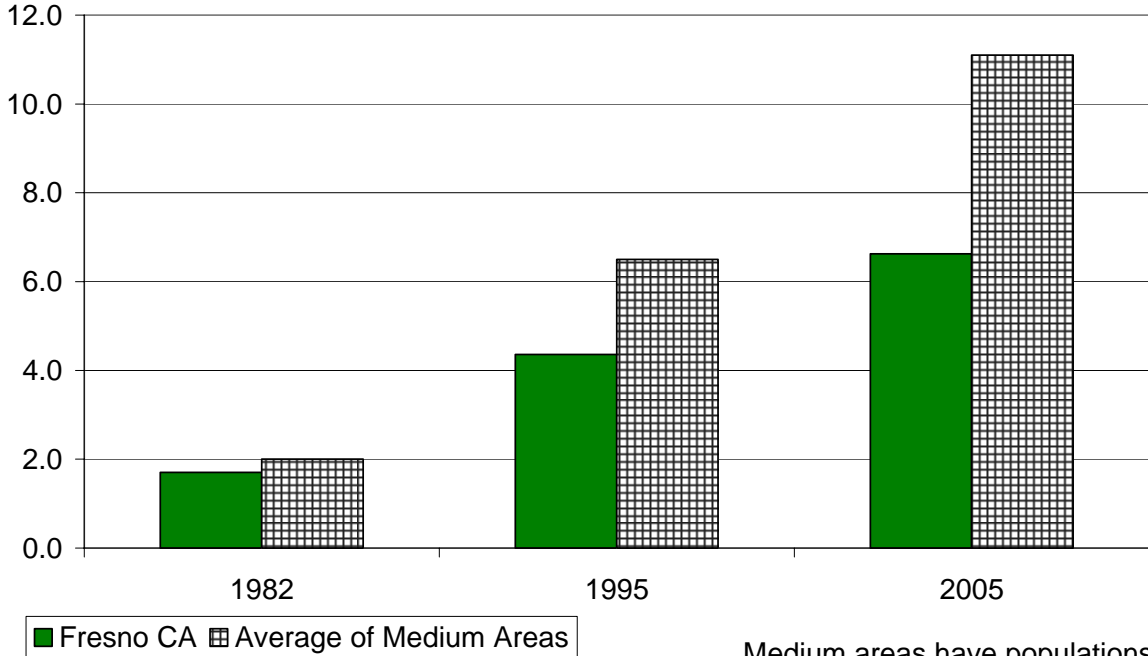
Hours of Delay



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