Performance Measure Summary – Sacramento, CA

There are several inventory and performance measures listed in the pages of this Urban Area Report for the years from 1982 to 2007. 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. 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*).

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 2007 (estimated at $15.47 per hour of person travel and $102.12 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.

The Mobility Data for Sacramento CA

Inventory Measures	2007	2006	2005	2004	2003	2002
Urban Area Information						
Population (1000s)	1,860	1,840	1,750	1,690	1,650	1,560
Rank	22	22	24	25	26	27
Urban Area (square miles)	445	445	435	435	430	420
Population Density (persons/sq mile)	4,180	4,135	4,023	3,885	3,837	3,714
Peak Travelers (1000s)	1,001	983	928	891	865	805
Freeway						
Daily Vehicle-Miles of Travel (1000s)	15,955	15,805	15,415	14,600	13,900	13,225
Lane-Miles	825	825	785	750	725	705
Arterial Streets						
Daily Vehicle-Miles of Travel (1000s)	14,135	14,455	14,305	13,525	12,310	12,035
Lane-Miles	2,390	2,375	2,345	2,235	2,190	2,140
Public Transportation						
Annual Psgr-Miles of Travel (millions)	167	165	142	142	140	137
Annual Unlinked Psgr Trips (millions)	36	35	33	32	31	29
Cost Components						
Value of Time ($/hour)	15.47	15.06	14.58	14.10	13.73	13.43
Commercial Cost ($/hour)	102.12	98.77	94.06	86.24	82.38	79.96
Fuel Cost ($/gallon)	3.24	2.88	2.62	2.28	1.78	1.66
System Performance	**2007**	**2006**	**2005**	**2004**	**2003**	**2002**
Congested Travel (% of peak VMT)	76	78	79	79	78	75
Congested System (% of lane-miles)	56	60	60	60	60	56
Congested Time (number of "Rush Hours")	7.8	7.8	8.0	8.0	7.8	7.8
Annual Increase Needed to Maintain Constant Congestion Level:						
Lane-miles	114	141	145	127	92	76
Transit Riders or Carpoolers (millions)	37	46	48	42	29	23
Annual Excess Fuel Consumed						
Total Fuel (1000 gallons)	28,358	29,849	28,710	27,095	24,195	21,507
Rank	22	22	22	22	23	24
Fuel per Peak Traveler (gallons)	28	30	31	30	28	27
Rank	20	18	17	14	17	18
Annual Delay						
Total Delay (1000s of person-hours)	39,197	41,279	39,875	37,312	33,089	29,391
Rank	23	23	23	23	24	24
Delay per Peak Traveler (person-hours)	39	42	43	42	38	37
Rank	24	23	21	21	24	23
Delay due to Incidents (percent)	51	51	51	51	51	51
Travel Time Index	1.32	1.33	1.32	1.32	1.31	1.28
Rank	12	12	12	9	10	14
Congestion Cost						
Total Cost ($ millions)	806	811	753	670	569	494
Rank	23	23	23	23	24	24
Cost per Peak Traveler ($)	805	825	811	752	659	614
Rank	28	26	25	24	27	26

Note: System Performance statistics for 2000 through 2007 data reflect the effects of operational treatments.
Note: Zeroes in the table reflect values less than 0.5.

The Mobility Data for Sacramento CA, Continued

Inventory Measures	2001	2000	1999	1998	1997
Urban Area Information					
Population (1000s)	1,470	1,425	1,390	1,355	1,300
Rank	28	28	28	29	29
Urban Area (square miles)	415	410	405	400	395
Population Density (persons/sq mile)	3,542	3,476	3,432	3,388	3,291
Peak Travelers (1000s)	747	713	684	656	619
Freeway					
Daily Vehicle-Miles of Travel (1000s)	12,650	12,170	11,490	11,140	10,470
Lane-Miles	690	685	680	680	680
Arterial Streets					
Daily Vehicle-Miles of Travel (1000s)	11,725	11,510	11,350	11,295	11,680
Lane-Miles	2,120	2,050	2,010	1,945	1,920
Public Transportation					
Annual Psgr-Miles of Travel (millions)	147	148	146	132	120
Annual Unlinked Psgr Trips (millions)	30	30	30	29	26
Cost Components					
Value of Time ($/hour)	13.22	12.85	12.43	12.17	11.98
Commercial Cost ($/hour)	80.88	80.75	74.23	72.61	74.32
Fuel Cost ($/gallon)	1.93	1.72	1.59	1.27	1.40
System Performance	**2001**	**2000**	**1999**	**1998**	**1997**
Congested Travel (% of peak VMT)	74	71	70	67	64
Congested System (% of lane-miles)	56	55	55	54	51
Congested Time (number of "Rush Hours")	7.6	7.6	7.4	7.4	7.2
Annual Increase Needed to Maintain Constant Congestion Level:					
Lane-miles	43	55	37	40	26
Transit Riders or Carpoolers (millions)	13	16	11	12	8
Annual Excess Fuel Consumed					
Total Fuel (1000 gallons)	20,202	18,420	16,533	15,490	14,449
Rank	25	25	25	26	26
Fuel per Peak Traveler (gallons)	27	26	24	24	23
Rank	17	19	20	18	21
Annual Delay					
Total Delay (1000s of person-hours)	27,569	25,664	23,410	22,396	21,675
Rank	24	25	26	26	26
Delay per Peak Traveler (person-hours)	37	36	34	34	35
Rank	18	22	25	25	20
Delay due to Incidents (percent)	51	52	52	52	52
Travel Time Index	1.27	1.25	1.23	1.22	1.21
Rank	16	18	19	19	20
Congestion Cost					
Total Cost ($ millions)	465	420	363	335	320
Rank	25	26	27	27	26
Cost per Peak Traveler ($)	623	589	531	511	518
Rank	21	25	27	28	23

Note: System Performance statistics for 2000 through 2007 data reflect the effects of operational treatments.
Note: Zeroes in the table reflect values less than 0.5.

The Mobility Data for Sacramento CA, Continued

Inventory Measures	1996	1995	1994	1993	1992
Urban Area Information					
Population (1000s)	1,260	1,240	1,220	1,205	1,190
Rank	30	30	30	30	30
Urban Area (square miles)	395	395	390	390	383
Population Density (persons/sq mile)	3,190	3,139	3,128	3,090	3,107
Peak Travelers (1000s)	590	572	554	537	524
Freeway					
Daily Vehicle-Miles of Travel (1000s)	10,755	10,550	10,645	10,280	10,115
Lane-Miles	680	680	700	700	700
Arterial Streets					
Daily Vehicle-Miles of Travel (1000s)	11,845	10,910	10,675	10,505	10,965
Lane-Miles	1,900	1,875	1,845	1,820	1,800
Public Transportation					
Annual Psgr-Miles of Travel (millions)	117	108	103	97	103
Annual Unlinked Psgr Trips (millions)	26	24	24	22	23
Cost Components					
Value of Time ($/hour)	11.71	11.37	11.06	10.78	10.47
Commercial Cost ($/hour)	74.17	71.54	69.53	67.77	66.19
Fuel Cost ($/gallon)	1.21	1.27	1.16	1.23	1.28
System Performance	**1996**	**1995**	**1994**	**1993**	**1992**
Congested Travel (% of peak VMT)	64	64	63	59	58
Congested System (% of lane-miles)	53	53	51	50	45
Congested Time (number of "Rush Hours")	7.4	7.2	7.2	6.8	7.0
Annual Increase Needed to Maintain Constant Congestion Level:					
Lane-miles	39	20	23	28	75
Transit Riders or Carpoolers (millions)	12	6	7	8	22
Annual Excess Fuel Consumed					
Total Fuel (1000 gallons)	15,284	13,588	13,708	12,172	12,283
Rank	25	24	24	25	23
Fuel per Peak Traveler (gallons)	26	24	25	23	23
Rank	11	13	10	11	10
Annual Delay					
Total Delay (1000s of person-hours)	23,062	20,166	20,325	18,335	18,699
Rank	24	24	24	24	22
Delay per Peak Traveler (person-hours)	39	35	37	34	36
Rank	13	15	11	14	11
Delay due to Incidents (percent)	52	52	52	52	52
Travel Time Index	1.22	1.20	1.20	1.19	1.18
Rank	16	18	15	17	17
Congestion Cost					
Total Cost ($ millions)	332	282	276	242	240
Rank	24	24	24	25	22
Cost per Peak Traveler ($)	563	494	499	451	458
Rank	17	18	13	15	13

Note: System Performance statistics for 2000 through 2007 data reflect the effects of operational treatments.
Note: Zeroes in the table reflect values less than 0.5.

The Mobility Data for Sacramento CA, Continued

Inventory Measures	1991	1990	1989	1988	1987
Urban Area Information					
Population (1000s)	1,165	1,100	1,065	1,050	995
Rank	30	31	32	33	34
Urban Area (square miles)	365	360	355	350	340
Population Density (persons/sq mile)	3,192	3,056	3,000	3,000	2,926
Peak Travelers (1000s)	503	468	449	440	414
Freeway					
Daily Vehicle-Miles of Travel (1000s)	9,640	9,265	9,300	8,880	8,245
Lane-Miles	670	650	650	650	650
Arterial Streets					
Daily Vehicle-Miles of Travel (1000s)	11,325	11,350	11,065	10,805	9,915
Lane-Miles	1,795	1,755	1,735	1,730	1,725
Public Transportation					
Annual Psgr-Miles of Travel (millions)	106	98	85	82	85
Annual Unlinked Psgr Trips (millions)	23	20	18	17	14
Cost Components					
Value of Time ($/hour)	10.17	9.75	9.25	8.83	8.48
Commercial Cost ($/hour)	64.55	62.47	59.16	56.03	54.62
Fuel Cost ($/gallon)	1.11	1.14	1.14	1.05	1.05
System Performance	**1991**	**1990**	**1989**	**1988**	**1987**
Congested Travel (% of peak VMT)	56	54	54	48	39
Congested System (% of lane-miles)	45	44	40	40	35
Congested Time (number of "Rush Hours")	7.0	7.2	7.0	6.6	5.8
Annual Increase Needed to Maintain Constant Congestion Level:					
Lane-miles	107	123	143	155	132
Transit Riders or Carpoolers (millions)	32	37	42	45	35
Annual Excess Fuel Consumed					
Total Fuel (1000 gallons)	12,701	12,301	11,871	9,750	7,111
Rank	21	19	19	20	22
Fuel per Peak Traveler (gallons)	25	26	26	22	17
Rank	9	8	7	9	13
Annual Delay					
Total Delay (1000s of person-hours)	19,986	19,693	18,959	15,944	11,699
Rank	20	19	19	19	21
Delay per Peak Traveler (person-hours)	40	42	42	36	28
Rank	8	7	5	7	13
Delay due to Incidents (percent)	52	52	52	52	52
Travel Time Index	1.19	1.19	1.18	1.15	1.12
Rank	13	14	15	19	22
Congestion Cost					
Total Cost ($ millions)	246	233	213	170	120
Rank	20	19	19	20	22
Cost per Peak Traveler ($)	489	499	475	387	290
Rank	9	8	8	9	13

Note: System Performance statistics for 2000 through 2007 data reflect the effects of operational treatments.
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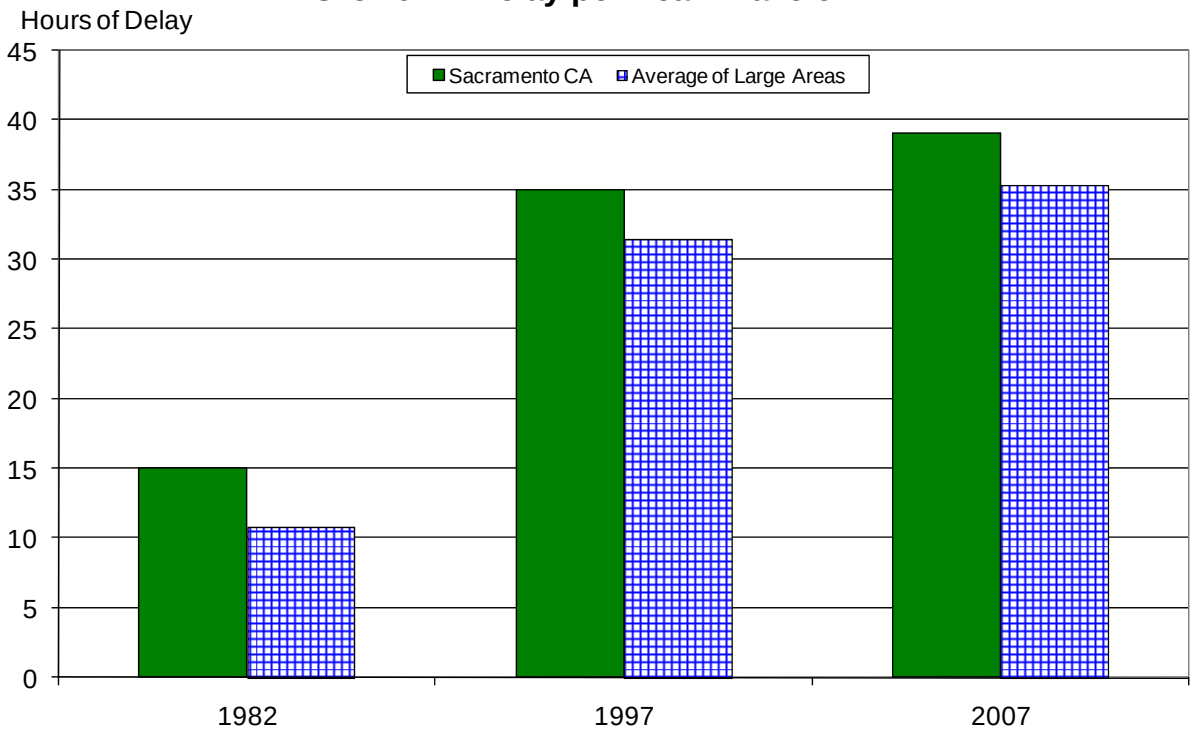
The Mobility Data for Sacramento CA, Continued

Inventory Measures	1986	1985	1984	1983	1982
Urban Area Information					
Population (1000s)	955	910	870	845	830
Rank	34	34	34	35	36
Urban Area (square miles)	330	320	280	280	280
Population Density (persons/sq mile)	2,894	2,844	3,107	3,018	2,964
Peak Travelers (1000s)	393	372	353	341	330
Freeway					
Daily Vehicle-Miles of Travel (1000s)	7,700	7,250	6,825	6,140	5,725
Lane-Miles	640	630	630	630	630
Arterial Streets					
Daily Vehicle-Miles of Travel (1000s)	9,235	8,825	8,410	8,215	8,130
Lane-Miles	1,720	1,715	1,715	1,690	1,690
Public Transportation					
Annual Psgr-Miles of Travel (millions)	89	99	97	97	97
Annual Unlinked Psgr Trips (millions)	16	17	17	17	17
Cost Components					
Value of Time ($/hour)	8.18	8.03	7.75	7.43	7.20
Commercial Cost ($/hour)	52.63	55.80	54.65	52.70	52.13
Fuel Cost ($/gallon)	1.03	1.35	1.36	1.39	1.46
System Performance	**1986**	**1985**	**1984**	**1983**	**1982**
Congested Travel (% of peak VMT)	35	29	27	23	21
Congested System (% of lane-miles)	30	29	29	27	27
Congested Time (number of "Rush Hours")	5.4	4.8	4.2	3.6	3.2
Annual Increase Needed to Maintain Constant Congestion Level:					
Lane-miles	- -	- -	- -	- -	- -
Transit Riders or Carpoolers (millions)	- -	- -	- -	- -	- -
Annual Excess Fuel Consumed					
Total Fuel (1000 gallons)	5,633	4,497	3,806	3,297	2,883
Rank	24	26	27	27	27
Fuel per Peak Traveler (gallons)	14	12	11	10	9
Rank	13	17	18	18	20
Annual Delay					
Total Delay (1000s of person-hours)	9,067	7,398	6,301	5,510	4,908
Rank	24	27	27	29	27
Delay per Peak Traveler (person-hours)	23	20	18	16	15
Rank	15	17	20	19	20
Delay due to Incidents (percent)	52	52	52	52	52
Travel Time Index	1.10	1.08	1.07	1.07	1.06
Rank	24	35	34	32	37
Congestion Cost					
Total Cost ($ millions)	90	74	62	52	45
Rank	26	27	27	30	28
Cost per Peak Traveler ($)	229	200	175	153	137
Rank	19	20	22	22	23

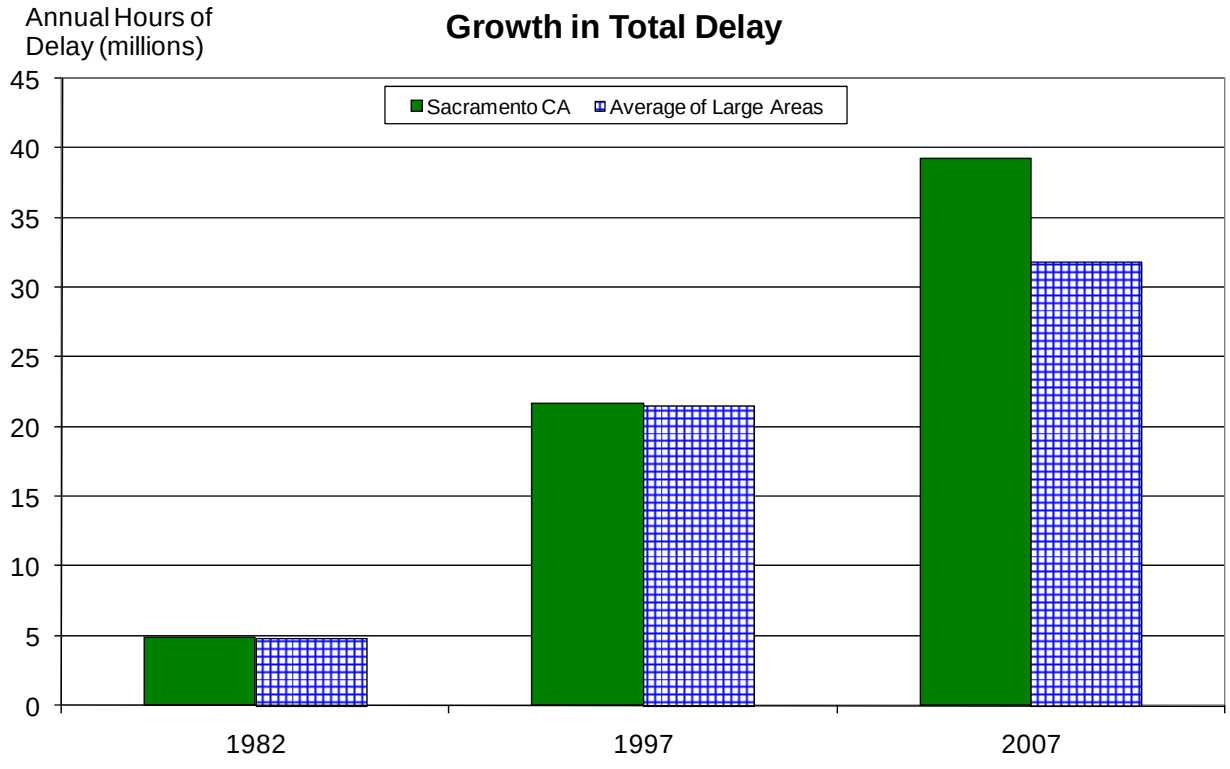
Note: System Performance statistics for 2000 through 2007 data reflect the effects of operational treatments.
Note: Zeroes in the table reflect values less than 0.5.

Growth in Delay per Peak Traveler



Note: Large areas have populations between 1 and 3 million

Growth in Total Delay



Note: Large areas have populations between 1 and 3 million

Benefits from Public Transportation Service and Operations Strategies in Sacramento CA

Operations Strategies	2007	2006	2005	2004
Freeway Ramp Metering				
Percent of Roadway Miles	75	75	78	82
Annual Delay Reduction (1000 hours)	773	700	690	654
Freeway Incident Management				
Cameras				
Percent of Roadway Miles	50	50	52	57
Service Patrols				
Percent of Roadway Miles	100	100	100	100
Annual Delay Reduction (1000 hours)	1,724	1,689	1,236	1,188
Arterial Signal Coordination				
Percent of Roadway Miles	82	81	80	84
Annual Delay Reduction (1000 hours)	224	233	238	242
Arterial Access Management				
Percent of Roadway Miles	31	24	21	22
Annual Delay Reduction (1000 hours)	508	516	440	600
HOV Lanes				
Daily Passenger-miles of travel (1000s)	450	435	426	438
HOV User Delay Savings	648	636	579	608
Total Effect of Operations Treatments				
Annual Delay Reduction (1000 hours)	3,877	3,773	3,184	3,292
Annual Delay Saved per Peak Traveler (hours)	4	4	3	4
Annual Congestion Cost Savings ($million)	80.7	75.4	61.2	59.8
Travel Time Index with Strategies	1.316	1.332	1.324	1.323
Travel Time Index (Base)	1.349	1.365	1.353	1.354
Public Transportation Service	**2007**	**2006**	**2005**	**2004**
Existing Service				
Annual Passenger-miles of travel (million)	167	165	142	142
Unlinked Passenger Trips (million)	36	35	33	32
Travel Time Index (combined road and transit)	1.343	1.359	1.347	1.349
Condition if Public Transportation Service were Discontinued				
Travel Time Index	1.358	1.375	1.360	1.362
Annual Increase				
Delay (1000 hours)	1,865	1,905	1,567	1,584
Delay per Peak Traveler (hours)	2	2	2	2
Congestion Cost ($million)	37.0	36.2	28.4	27.3

Benefits from Public Transportation Service and Operations Strategies in Sacramento CA, Continued

Operations Strategies	2003	2002	2001	2000
Freeway Ramp Metering				
Percent of Roadway Miles	85	87	87	86
Annual Delay Reduction (1000 hours)	522	503	459	379
Freeway Incident Management				
Cameras				
Percent of Roadway Miles	58	--	--	--
Service Patrols				
Percent of Roadway Miles	100	100	97	88
Annual Delay Reduction (1000 hours)	1,018	827	697	532
Arterial Signal Coordination				
Percent of Roadway Miles	84	86	89	89
Annual Delay Reduction (1000 hours)	203	191	207	203
Arterial Access Management				
Percent of Roadway Miles	22	23	23	24
Annual Delay Reduction (1000 hours)	520	401	408	401
HOV Lanes				
Daily Passenger-miles of travel (1000s)	400	343	226	230
HOV User Delay Savings	544	434	246	211
Total Effect of Operations Treatments				
Annual Delay Reduction (1000 hours)	2,807	2,356	2,017	1,725
Annual Delay Saved per Peak Traveler (hours)	3	3	3	2
Annual Congestion Cost Savings ($million)	49.1	40.3	34.6	28.7
Travel Time Index with Strategies	1.309	1.281	1.272	1.253
Travel Time Index (Base)	1.337	1.306	1.293	1.271
Public Transportation Service	**2003**	**2002**	**2001**	**2000**
Existing Service				
Annual Passenger-miles of travel (million)	140	137	147	147
Unlinked Passenger Trips (million)	31	29	30	30
Travel Time Index (combined road and transit)	1.332	1.301	1.288	1.266
Condition if Public Transportation Service were Discontinued				
Travel Time Index	1.346	1.315	1.302	1.279
Annual Increase				
Delay (1000 hours)	1,524	1,473	1,479	1,356
Delay per Peak Traveler (hours)	2	2	2	2
Congestion Cost ($million)	25.9	24.5	24.5	21.7

Comparison of Several Key Mobility Performance Measures
Large Group – 1 million to 3 million population urban areas

Urban Area	Delay per Traveler	Travel Time Index	Total Delay	1982 to 2007	
				Delay per Traveler	Total Delay
San Diego, CA	H+	H+	H+	F+	F+
Minneapolis-St., Paul MN	H	0	H+	F+	F+
Baltimore, MD	H+	H+	H+	F+	F+
Tampa-St. Petersburg, FL	H+	H+	H+	0	F+
St. Louis, MO-IL	L-	L-	0	S-	S
Denver-Aurora, CO	H+	H+	H+	F	F+
Riverside-San Bernardino, CA	H+	H+	H+	F+	F+
Sacramento, CA	H	H+	H	0	F+
Pittsburgh, PA	L-	L-	L-	S-	S-
Portland, OR-WA	0	H	0	0	F
Cleveland, OH	L-	L-	L-	S-	S-
San Jose, CA	H+	H+	H+	F	F+
Cincinnati, OH-KY-IN	L-	L	L	S	S-
Virginia Beach, VA	L	L	L	S-	S-
Kansas City, MO-KS	L-	L-	L-	S-	S-
Milwaukee, WI	L-	L-	L-	S-	S-
San Antonio, TX	H	0	0	F+	F
Las Vegas, NV	H+	H	0	F+	F+
Orlando, FL	H+	H	H	F+	F+
Providence, RI-MA	L	L	L	0	S-
Columbus, OH	L	L	L	0	S-
Buffalo, NY	L-	L-	L-	S-	S-
New Orleans, LA	L-	L	L-	S-	S-
Charlotte, NC-SC	H	0	L	F	S-
Indianapolis, IN	H	0	L	S	S-
Jacksonville, FL	H	0	L	0	S-
Austin, TX	H	H	L	F	S-
Memphis, TN-MS-AR	L-	L-	L-	S	S-
Raleigh-Durham, NC	0	L	L-	0	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

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	
2007 Values	**Above 1M Population**	**Below 1M Population**
Delay per Traveler -	5 Hours	3 Hours
Travel Time Index -	5 Index Points	3 Index Points
Total Delay -	5 Hours x Average Population	3 Hours x Average Population
1982 to 2007 Trends		
Delay per Traveler -	5 Hours	3 Hours
Total Delay -	5 Hours x Average Population	3 Hours x Average Population