

Performance Measure Summary – San Antonio, TX

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 San Antonio TX

Inventory Measures	2007	2006	2005	2004	2003	2002
Urban Area Information						
Population (1000s)	1,450	1,420	1,385	1,365	1,330	1,280
Rank	31	31	31	31	32	32
Urban Area (square miles)	565	565	565	560	545	530
Population Density (persons/sq mile)	2,566	2,513	2,451	2,438	2,440	2,415
Peak Travelers (1000s)	812	790	765	749	726	689
Freeway						
Daily Vehicle-Miles of Travel (1000s)	18,300	18,700	18,600	17,300	16,500	15,905
Lane-Miles	1,105	1,100	1,090	1,080	1,075	1,070
Arterial Streets						
Daily Vehicle-Miles of Travel (1000s)	12,110	12,100	11,400	11,030	10,600	10,430
Lane-Miles	2,295	2,290	2,235	2,190	2,160	2,140
Public Transportation						
Annual Psgr-Miles of Travel (millions)	168	176	181	164	162	191
Annual Unlinked Psgr Trips (millions)	42	43	41	43	40	45
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)	2.92	2.55	2.23	1.83	1.45	1.32
System Performance	2007	2006	2005	2004	2003	2002
Congested Travel (% of peak VMT)	63	63	63	62	55	51
Congested System (% of lane-miles)	45	45	45	45	40	38
Congested Time (number of "Rush Hours")	7.2	7.4	7.4	7.2	6.8	6.6
Annual Increase Needed to Maintain Constant Congestion Level:						
Lane-miles	99	118	92	82	79	74
Transit Riders or Carpoolers (millions)	31	37	29	25	23	21
Annual Excess Fuel Consumed						
Total Fuel (1000 gallons)	21,973	21,630	22,607	20,877	18,157	16,623
Rank	26	27	26	26	27	29
Fuel per Peak Traveler (gallons)	27	27	30	28	25	24
Rank	23	26	20	23	25	28
Annual Delay						
Total Delay (1000s of person-hours)	31,026	31,315	32,419	30,070	26,624	24,577
Rank	27	27	26	27	27	29
Delay per Peak Traveler (person-hours)	38	40	42	40	37	36
Rank	29	25	25	26	29	25
Delay due to Incidents (percent)	53	53	53	53	53	53
Travel Time Index	1.23	1.23	1.24	1.24	1.21	1.20
Rank	32	30	27	27	33	32
Congestion Cost						
Total Cost (\$ millions)	621	603	600	526	446	399
Rank	27	27	27	27	28	30
Cost per Peak Traveler (\$)	765	763	785	701	614	579
Rank	34	30	27	29	33	34

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 San Antonio TX, Continued

Inventory Measures	2001	2000	1999	1998	1997
Urban Area Information					
Population (1000s)	1,260	1,255	1,240	1,235	1,230
Rank	32	32	31	31	31
Urban Area (square miles)	520	505	495	490	485
Population Density (persons/sq mile)	2,423	2,485	2,505	2,520	2,536
Peak Travelers (1000s)	667	654	635	622	610
Freeway					
Daily Vehicle-Miles of Travel (1000s)	15,600	15,775	15,420	14,515	13,730
Lane-Miles	1,065	1,065	1,065	1,065	1,065
Arterial Streets					
Daily Vehicle-Miles of Travel (1000s)	10,340	10,400	9,590	9,495	9,785
Lane-Miles	2,140	2,115	2,100	2,090	2,090
Public Transportation					
Annual Psgr-Miles of Travel (millions)	187	183	184	177	164
Annual Unlinked Psgr Trips (millions)	47	45	45	42	39
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)	1.46	1.47	1.07	1.01	1.12
System Performance	2001	2000	1999	1998	1997
Congested Travel (% of peak VMT)	50	51	47	42	38
Congested System (% of lane-miles)	38	38	38	37	32
Congested Time (number of "Rush Hours")	6.4	6.6	6.2	5.8	5.4
Annual Increase Needed to Maintain Constant Congestion Level:					
Lane-miles	87	136	111	115	135
Transit Riders or Carpoolers (millions)	24	39	31	31	35
Annual Excess Fuel Consumed					
Total Fuel (1000 gallons)	16,191	17,056	14,586	11,688	9,744
Rank	27	26	29	30	34
Fuel per Peak Traveler (gallons)	24	26	23	19	16
Rank	25	19	23	37	42
Annual Delay					
Total Delay (1000s of person-hours)	24,244	25,206	21,230	17,270	14,674
Rank	28	26	29	30	35
Delay per Peak Traveler (person-hours)	36	39	33	28	24
Rank	22	18	28	39	44
Delay due to Incidents (percent)	53	52	52	51	51
Travel Time Index	1.20	1.21	1.18	1.15	1.13
Rank	31	29	37	43	47
Congestion Cost					
Total Cost (\$ millions)	390	397	316	251	212
Rank	29	27	30	32	35
Cost per Peak Traveler (\$)	585	607	498	404	348
Rank	30	21	34	43	47

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 San Antonio TX, Continued

Inventory Measures	1996	1995	1994	1993	1992
Urban Area Information					
Population (1000s)	1,225	1,220	1,210	1,195	1,185
Rank	31	31	31	31	31
Urban Area (square miles)	485	480	480	480	425
Population Density (persons/sq mile)	2,526	2,542	2,521	2,490	2,788
Peak Travelers (1000s)	598	586	572	556	543
Freeway					
Daily Vehicle-Miles of Travel (1000s)	13,275	12,910	12,000	11,340	10,500
Lane-Miles	1,065	1,060	1,055	1,055	1,000
Arterial Streets					
Daily Vehicle-Miles of Travel (1000s)	9,410	8,320	9,040	8,720	8,570
Lane-Miles	2,090	2,090	2,090	2,085	2,075
Public Transportation					
Annual Psgr-Miles of Travel (millions)	157	192	180	156	162
Annual Unlinked Psgr Trips (millions)	39	48	47	45	46
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	1.14	1.03	1.10	1.09
System Performance	1996	1995	1994	1993	1992
Congested Travel (% of peak VMT)	34	30	25	23	22
Congested System (% of lane-miles)	32	30	25	25	25
Congested Time (number of "Rush Hours")	5.0	4.6	4.0	3.6	3.4
Annual Increase Needed to Maintain Constant Congestion Level:					
Lane-miles	146	134	165	128	107
Transit Riders or Carpoolers (millions)	37	32	38	29	23
Annual Excess Fuel Consumed					
Total Fuel (1000 gallons)	8,593	7,101	5,522	4,882	4,715
Rank	36	37	41	41	40
Fuel per Peak Traveler (gallons)	14	12	10	9	9
Rank	44	51	56	59	54
Annual Delay					
Total Delay (1000s of person-hours)	13,070	10,883	8,358	7,720	7,524
Rank	35	37	41	40	39
Delay per Peak Traveler (person-hours)	22	19	15	14	14
Rank	47	53	60	60	57
Delay due to Incidents (percent)	51	51	52	51	51
Travel Time Index	1.12	1.10	1.08	1.07	1.07
Rank	48	53	57	61	58
Congestion Cost					
Total Cost (\$ millions)	186	150	112	101	96
Rank	35	40	41	40	38
Cost per Peak Traveler (\$)	312	256	196	182	178
Rank	51	55	60	61	59

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 San Antonio TX, Continued

Inventory Measures	1991	1990	1989	1988	1987
Urban Area Information					
Population (1000s)	1,180	1,170	1,165	1,165	1,050
Rank	29	28	28	27	31
Urban Area (square miles)	470	470	465	460	460
Population Density (persons/sq mile)	2,511	2,489	2,505	2,533	2,283
Peak Travelers (1000s)	531	518	513	508	455
Freeway					
Daily Vehicle-Miles of Travel (1000s)	9,700	9,280	8,575	8,900	8,770
Lane-Miles	950	900	840	810	780
Arterial Streets					
Daily Vehicle-Miles of Travel (1000s)	8,385	7,935	7,720	7,510	7,300
Lane-Miles	2,060	2,050	1,975	1,920	1,880
Public Transportation					
Annual Psgr-Miles of Travel (millions)	168	187	154	141	146
Annual Unlinked Psgr Trips (millions)	44	42	39	38	38
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)	1.12	1.04	1.07	0.99	0.99
System Performance	1991	1990	1989	1988	1987
Congested Travel (% of peak VMT)	19	20	20	22	21
Congested System (% of lane-miles)	20	22	21	21	20
Congested Time (number of "Rush Hours")	3.0	3.0	3.0	3.6	3.8
Annual Increase Needed to Maintain Constant Congestion Level:					
Lane-miles	76	76	75	107	116
Transit Riders or Carpoolers (millions)	16	16	15	22	24
Annual Excess Fuel Consumed					
Total Fuel (1000 gallons)	3,944	3,867	3,562	3,724	3,826
Rank	42	41	38	36	35
Fuel per Peak Traveler (gallons)	7	7	7	7	8
Rank	60	56	55	54	44
Annual Delay					
Total Delay (1000s of person-hours)	6,437	6,223	5,699	5,724	6,067
Rank	40	39	37	35	34
Delay per Peak Traveler (person-hours)	12	12	11	11	13
Rank	59	58	58	56	44
Delay due to Incidents (percent)	51	51	51	52	51
Travel Time Index	1.07	1.07	1.07	1.07	1.07
Rank	55	55	53	46	43
Congestion Cost					
Total Cost (\$ millions)	80	75	65	62	63
Rank	42	39	40	36	34
Cost per Peak Traveler (\$)	151	144	127	123	139
Rank	60	60	60	56	47

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.

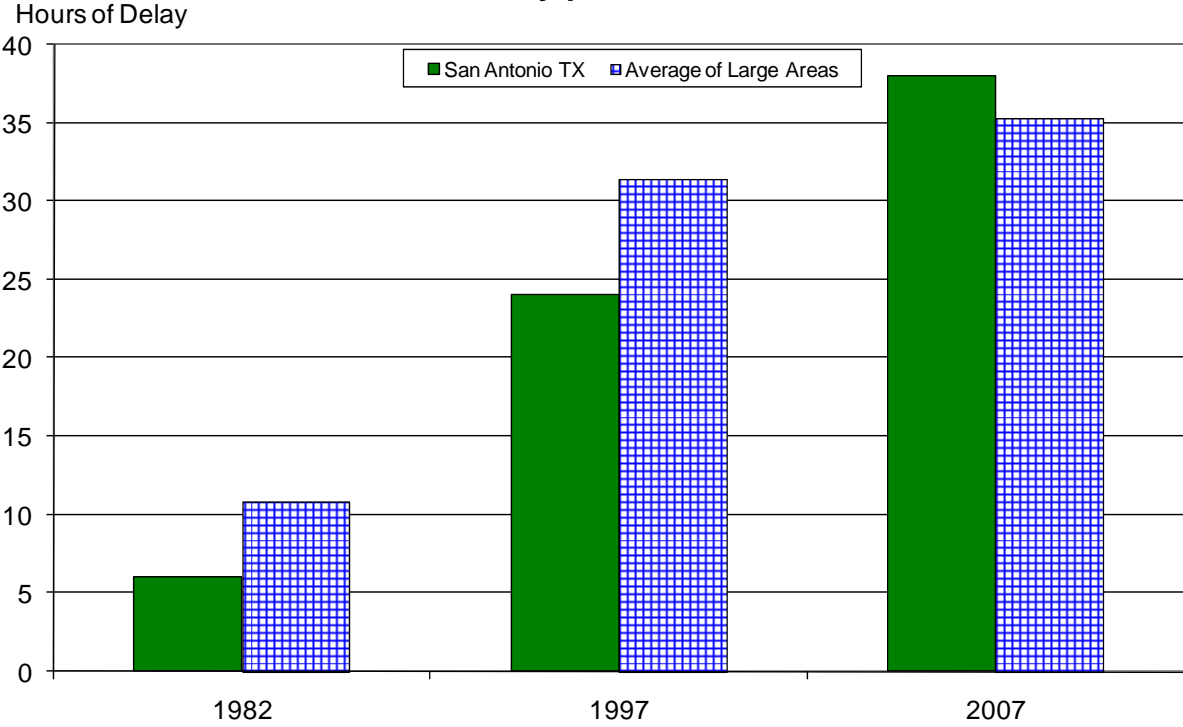
The Mobility Data for San Antonio TX, Continued

Inventory Measures	1986	1985	1984	1983	1982
Urban Area Information					
Population (1000s)	1,035	1,005	980	980	960
Rank	31	32	33	32	32
Urban Area (square miles)	455	450	440	440	430
Population Density (persons/sq mile)	2,275	2,233	2,227	2,227	2,233
Peak Travelers (1000s)	444	428	415	412	398
Freeway					
Daily Vehicle-Miles of Travel (1000s)	8,710	8,420	7,780	7,150	6,835
Lane-Miles	775	755	740	740	715
Arterial Streets					
Daily Vehicle-Miles of Travel (1000s)	7,255	6,725	6,505	6,385	6,155
Lane-Miles	1,865	1,850	1,835	1,820	1,800
Public Transportation					
Annual Psgr-Miles of Travel (millions)	140	136	131	131	131
Annual Unlinked Psgr Trips (millions)	37	36	34	34	34
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)	0.97	1.27	1.28	1.31	1.37
System Performance	1986	1985	1984	1983	1982
Congested Travel (% of peak VMT)	21	20	16	14	11
Congested System (% of lane-miles)	21	18	16	15	14
Congested Time (number of "Rush Hours")	3.8	3.6	3.0	2.9	2.8
Annual Increase Needed to Maintain Constant Congestion Level:					
Lane-miles	--	--	--	--	--
Transit Riders or Carpoolers (millions)	--	--	--	--	--
Annual Excess Fuel Consumed					
Total Fuel (1000 gallons)	3,990	3,398	2,370	2,234	1,678
Rank	29	31	36	35	36
Fuel per Peak Traveler (gallons)	9	8	6	5	4
Rank	36	37	44	47	53
Annual Delay					
Total Delay (1000s of person-hours)	6,349	5,398	3,764	3,592	2,568
Rank	31	31	35	35	37
Delay per Peak Traveler (person-hours)	14	13	9	9	6
Rank	40	37	51	47	55
Delay due to Incidents (percent)	51	51	52	52	52
Travel Time Index	1.08	1.07	1.05	1.05	1.04
Rank	37	39	47	44	50
Congestion Cost					
Total Cost (\$ millions)	64	55	37	34	24
Rank	31	33	35	35	36
Cost per Peak Traveler (\$)	144	129	90	83	61
Rank	42	42	52	51	55

Note: System Performance statistics for 2000 through 2007 data reflect the effects of operational treatments.

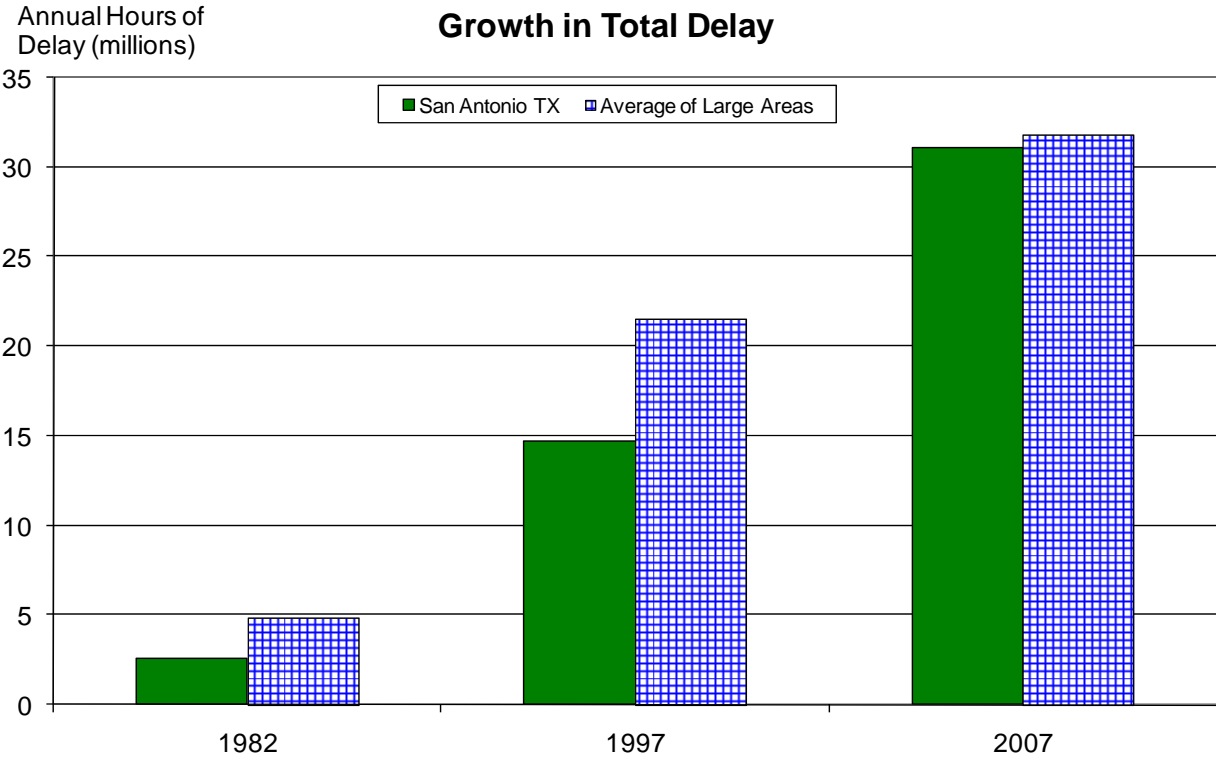
Note: Zeroes in the table reflect values less than 0.5.

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
San Antonio TX**

Operations Strategies	2007	2006	2005	2004
Freeway Ramp Metering				
Percent of Roadway Miles	--	--	--	--
Annual Delay Reduction (1000 hours)	--	--	--	--
Freeway Incident Management				
Cameras				
Percent of Roadway Miles	52	52	52	53
Service Patrols				
Percent of Roadway Miles	90	91	92	93
Annual Delay Reduction (1000 hours)	1,099	1,114	1,282	1,204
Arterial Signal Coordination				
Percent of Roadway Miles	70	69	66	64
Annual Delay Reduction (1000 hours)	170	173	171	161
Arterial Access Management				
Percent of Roadway Miles	8	8	6	6
Annual Delay Reduction (1000 hours)	117	74	76	113
HOV Lanes				
Daily Passenger-miles of travel (1000s)	--	--	--	--
HOV User Delay Savings	--	--	--	--
Total Effect of Operations Treatments				
Annual Delay Reduction (1000 hours)	1,386	1,361	1,529	1,478
Annual Delay Saved per Peak Traveler (hours)	2	2	2	2
Annual Congestion Cost Savings (\$million)	27.8	26.3	28.3	25.8
Travel Time Index with Strategies	1.233	1.226	1.245	1.238
Travel Time Index (Base)	1.243	1.236	1.255	1.249
Public Transportation Service	2007	2006	2005	2004
Existing Service				
Annual Passenger-miles of travel (million)	168	176	181	164
Unlinked Passenger Trips (million)	42	43	41	43
Travel Time Index (combined road and transit)	1.240	1.232	1.251	1.245
Condition if Public Transportation Service were Discontinued				
Travel Time Index	1.250	1.241	1.262	1.255
Annual Increase				
Delay (1000 hours)	1,455	1,311	1,450	1,349
Delay per Peak Traveler (hours)	2	2	2	2
Congestion Cost (\$million)	29.0	25.2	26.8	23.6

**Benefits from Public Transportation Service and Operations Strategies in
San Antonio TX, Continued**

Operations Strategies	2003	2002	2001	2000
Freeway Ramp Metering				
Percent of Roadway Miles	--	--	--	--
Annual Delay Reduction (1000 hours)	--	--	--	--
Freeway Incident Management				
Cameras				
Percent of Roadway Miles	53	53	44	35
Service Patrols				
Percent of Roadway Miles	93	94	--	--
Annual Delay Reduction (1000 hours)	1,133	1,034	76	57
Arterial Signal Coordination				
Percent of Roadway Miles	56	47	44	45
Annual Delay Reduction (1000 hours)	86	97	77	94
Arterial Access Management				
Percent of Roadway Miles	6	6	6	6
Annual Delay Reduction (1000 hours)	58	90	110	53
HOV Lanes				
Daily Passenger-miles of travel (1000s)	--	--	--	--
HOV User Delay Savings	--	--	--	--
Total Effect of Operations Treatments				
Annual Delay Reduction (1000 hours)	1,277	1,221	263	204
Annual Delay Saved per Peak Traveler (hours)	2	2	0	0
Annual Congestion Cost Savings (\$million)	21.3	19.7	4.2	3.3
Travel Time Index with Strategies	1.215	1.201	1.199	1.208
Travel Time Index (Base)	1.224	1.210	1.201	1.210
Public Transportation Service	2003	2002	2001	2000
Existing Service				
Annual Passenger-miles of travel (million)	162	191	187	183
Unlinked Passenger Trips (million)	40	45	47	45
Travel Time Index (combined road and transit)	1.220	1.205	1.197	1.206
Condition if Public Transportation Service were Discontinued				
Travel Time Index	1.232	1.222	1.211	1.218
Annual Increase				
Delay (1000 hours)	1,393	2,065	1,800	1,485
Delay per Peak Traveler (hours)	2	3	3	2
Congestion Cost (\$million)	23.4	33.4	28.9	23.4

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