

Performance Measure Summary – Riverside-San Bernardino, 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 Riverside-San Bernadino CA

Inventory Measures	2007	2006	2005	2004	2003	2002
Urban Area Information						
Population (1000s)	2,030	2,015	1,940	1,855	1,775	1,715
Rank	21	21	21	21	23	23
Urban Area (square miles)	770	740	710	685	660	625
Population Density (persons/sq mile)	2,636	2,723	2,732	2,708	2,689	2,744
Peak Travelers (1000s)	1,102	1,086	1,038	989	941	895
Freeway						
Daily Vehicle-Miles of Travel (1000s)	24,210	24,510	24,020	22,760	20,500	18,500
Lane-Miles	1,115	1,115	1,115	1,050	950	905
Arterial Streets						
Daily Vehicle-Miles of Travel (1000s)	12,945	13,170	12,965	12,000	11,800	11,700
Lane-Miles	2,750	2,700	2,670	2,640	2,620	2,600
Public Transportation						
Annual Psgr-Miles of Travel (millions)	127	123	128	128	121	121
Annual Unlinked Psgr Trips (millions)	23	23	23	24	24	25
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)	78	78	78	75	74	69
Congested System (% of lane-miles)	49	50	50	48	47	45
Congested Time (number of "Rush Hours")	8.0	8.0	8.0	8.0	8.0	8.0
Annual Increase Needed to Maintain Constant Congestion Level:						
Lane-miles	163	206	221	180	135	102
Transit Riders or Carpoolers (millions)	55	71	75	59	42	31
Annual Excess Fuel Consumed						
Total Fuel (1000 gallons)	38,537	38,920	37,414	32,857	28,091	23,597
Rank	19	20	19	20	21	23
Fuel per Peak Traveler (gallons)	35	36	36	33	30	26
Rank	9	9	9	12	14	23
Annual Delay						
Total Delay (1000s of person-hours)	48,135	49,376	47,927	41,321	35,900	31,051
Rank	21	21	21	21	22	23
Delay per Peak Traveler (person-hours)	44	45	46	42	38	35
Rank	14	14	15	21	24	28
Delay due to Incidents (percent)	49	49	49	49	49	49
Travel Time Index	1.36	1.36	1.35	1.32	1.29	1.26
Rank	8	9	8	9	17	22
Congestion Cost						
Total Cost (\$ millions)	1,083	1,062	984	804	662	552
Rank	20	20	20	21	22	23
Cost per Peak Traveler (\$)	983	978	948	813	703	617
Rank	12	12	12	21	23	25

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 Riverside-San Bernadino CA, Continued

Inventory Measures	2001	2000	1999	1998	1997
Urban Area Information					
Population (1000s)	1,630	1,575	1,525	1,485	1,445
Rank	24	24	24	24	24
Urban Area (square miles)	600	580	565	555	550
Population Density (persons/sq mile)	2,717	2,716	2,699	2,676	2,627
Peak Travelers (1000s)	836	795	758	726	695
Freeway					
Daily Vehicle-Miles of Travel (1000s)	17,400	16,600	16,270	15,580	14,940
Lane-Miles	900	880	875	875	875
Arterial Streets					
Daily Vehicle-Miles of Travel (1000s)	11,575	11,220	11,100	11,275	11,210
Lane-Miles	2,575	2,535	2,520	2,515	2,510
Public Transportation					
Annual Psgr-Miles of Travel (millions)	121	144	140	127	116
Annual Unlinked Psgr Trips (millions)	23	23	23	21	18
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)	65	65	62	59	56
Congested System (% of lane-miles)	42	40	40	35	35
Congested Time (number of "Rush Hours")	7.8	7.6	7.6	7.4	7.2
Annual Increase Needed to Maintain Constant Congestion Level:					
Lane-miles	71	47	58	55	49
Transit Riders or Carpoolers (millions)	21	14	16	15	13
Annual Excess Fuel Consumed					
Total Fuel (1000 gallons)	20,982	20,190	18,465	16,741	14,516
Rank	23	23	24	24	25
Fuel per Peak Traveler (gallons)	25	25	24	23	21
Rank	19	22	20	22	29
Annual Delay					
Total Delay (1000s of person-hours)	27,280	26,065	22,906	21,135	18,043
Rank	25	24	27	27	29
Delay per Peak Traveler (person-hours)	33	33	30	29	26
Rank	30	31	34	36	40
Delay due to Incidents (percent)	49	49	49	49	49
Travel Time Index	1.24	1.24	1.22	1.20	1.18
Rank	23	20	23	25	29
Congestion Cost					
Total Cost (\$ millions)	486	452	378	337	288
Rank	23	24	26	26	28
Cost per Peak Traveler (\$)	581	568	499	464	415
Rank	31	30	33	34	38

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 Riverside-San Bernadino CA, Continued

Inventory Measures	1996	1995	1994	1993	1992
Urban Area Information					
Population (1000s)	1,430	1,420	1,410	1,395	1,380
Rank	24	24	24	24	24
Urban Area (square miles)	545	545	535	535	530
Population Density (persons/sq mile)	2,624	2,606	2,636	2,607	2,604
Peak Travelers (1000s)	676	662	647	629	613
Freeway					
Daily Vehicle-Miles of Travel (1000s)	14,985	14,780	14,015	13,690	13,605
Lane-Miles	860	860	855	815	795
Arterial Streets					
Daily Vehicle-Miles of Travel (1000s)	11,200	11,175	11,150	11,100	10,750
Lane-Miles	2,500	2,485	2,455	2,415	2,305
Public Transportation					
Annual Psgr-Miles of Travel (millions)	92	81	86	83	75
Annual Unlinked Psgr Trips (millions)	17	15	13	12	12
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)	56	54	50	51	47
Congested System (% of lane-miles)	35	32	28	28	27
Congested Time (number of "Rush Hours")	7.4	7.2	7.2	7.2	7.2
Annual Increase Needed to Maintain Constant Congestion Level:					
Lane-miles	56	96	119	151	166
Transit Riders or Carpoolers (millions)	15	26	31	40	45
Annual Excess Fuel Consumed					
Total Fuel (1000 gallons)	14,747	13,575	11,993	13,762	13,636
Rank	26	25	25	22	20
Fuel per Peak Traveler (gallons)	22	21	19	22	22
Rank	23	21	26	14	14
Annual Delay					
Total Delay (1000s of person-hours)	17,921	16,274	14,608	16,970	16,503
Rank	27	28	28	25	24
Delay per Peak Traveler (person-hours)	26	25	23	27	27
Rank	38	40	40	27	25
Delay due to Incidents (percent)	49	49	49	49	48
Travel Time Index	1.18	1.17	1.15	1.18	1.18
Rank	27	26	32	19	17
Congestion Cost					
Total Cost (\$ millions)	280	248	215	246	235
Rank	27	27	28	24	23
Cost per Peak Traveler (\$)	413	375	333	391	384
Rank	34	38	37	25	19

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

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The Mobility Data for Riverside-San Bernadino CA, Continued

Inventory Measures	1991	1990	1989	1988	1987
Urban Area Information					
Population (1000s)	1,350	1,285	1,190	1,120	1,075
Rank	25	25	26	30	30
Urban Area (square miles)	525	515	510	500	495
Population Density (persons/sq mile)	2,571	2,495	2,333	2,240	2,172
Peak Travelers (1000s)	590	553	508	474	452
Freeway					
Daily Vehicle-Miles of Travel (1000s)	13,460	12,380	11,735	10,575	9,865
Lane-Miles	780	740	725	700	695
Arterial Streets					
Daily Vehicle-Miles of Travel (1000s)	10,650	10,150	9,370	9,150	8,900
Lane-Miles	2,215	2,110	1,980	1,900	1,840
Public Transportation					
Annual Psgr-Miles of Travel (millions)	74	48	31	30	23
Annual Unlinked Psgr Trips (millions)	12	10	8	8	7
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)	47	46	46	40	33
Congested System (% of lane-miles)	23	23	23	22	20
Congested Time (number of "Rush Hours")	7.4	7.2	7.2	6.6	6.2
Annual Increase Needed to Maintain Constant Congestion Level:					
Lane-miles	187	166	136	144	146
Transit Riders or Carpoolers (millions)	52	46	37	38	38
Annual Excess Fuel Consumed					
Total Fuel (1000 gallons)	12,942	11,009	9,933	7,872	5,488
Rank	20	22	20	24	26
Fuel per Peak Traveler (gallons)	22	20	20	17	12
Rank	11	13	12	16	26
Annual Delay					
Total Delay (1000s of person-hours)	15,580	13,069	11,481	9,577	6,747
Rank	23	25	26	26	33
Delay per Peak Traveler (person-hours)	26	24	23	20	15
Rank	22	27	27	27	39
Delay due to Incidents (percent)	46	47	47	47	48
Travel Time Index	1.17	1.16	1.15	1.13	1.09
Rank	18	19	21	21	35
Congestion Cost					
Total Cost (\$ millions)	214	173	144	114	77
Rank	23	24	24	26	30
Cost per Peak Traveler (\$)	363	312	284	240	171
Rank	18	26	26	27	39

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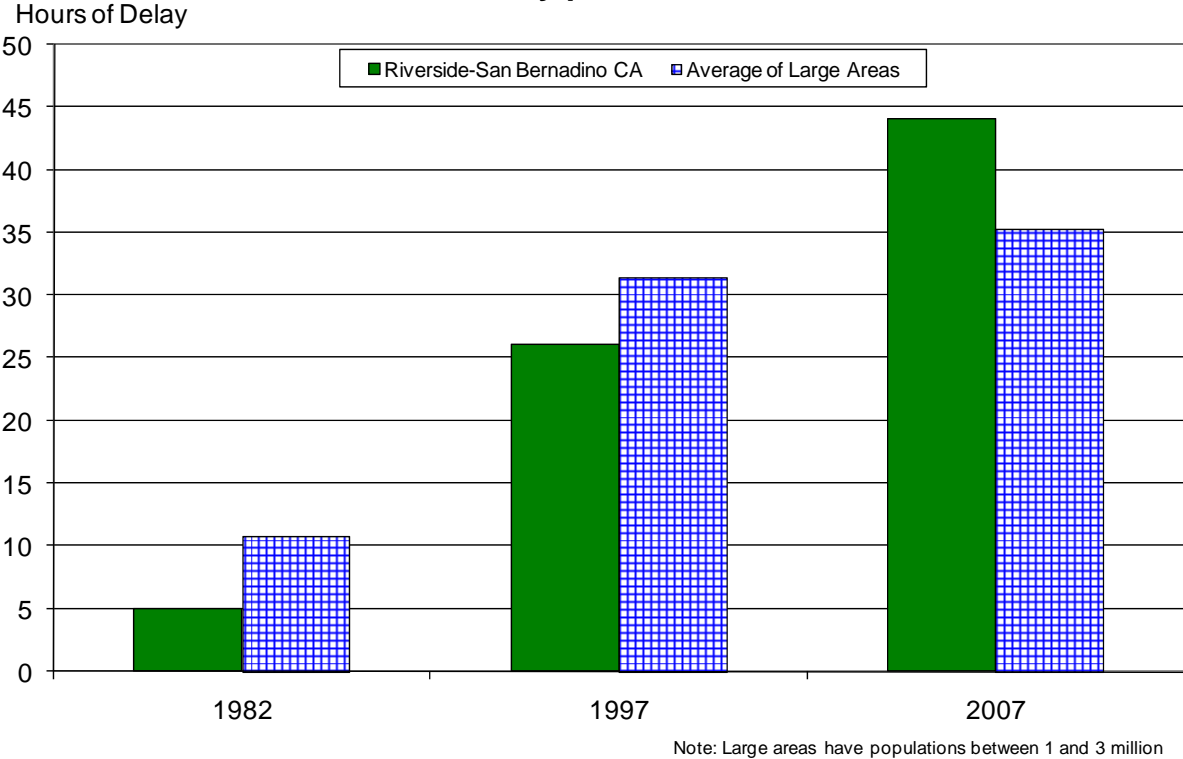
The Mobility Data for Riverside-San Bernadino CA, Continued

Inventory Measures	1986	1985	1984	1983	1982
Urban Area Information					
Population (1000s)	1,030	1,005	985	970	955
Rank	33	32	32	33	33
Urban Area (square miles)	495	485	475	470	465
Population Density (persons/sq mile)	2,081	2,072	2,074	2,064	2,054
Peak Travelers (1000s)	428	415	404	395	385
Freeway					
Daily Vehicle-Miles of Travel (1000s)	8,940	8,200	7,865	6,795	6,290
Lane-Miles	690	690	685	680	680
Arterial Streets					
Daily Vehicle-Miles of Travel (1000s)	8,870	8,760	8,650	8,260	7,880
Lane-Miles	1,805	1,760	1,720	1,680	1,600
Public Transportation					
Annual Psgr-Miles of Travel (millions)	25	29	29	29	29
Annual Unlinked Psgr Trips (millions)	8	7	7	7	7
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)	30	24	23	18	16
Congested System (% of lane-miles)	20	17	17	16	16
Congested Time (number of "Rush Hours")	5.6	5.0	4.8	3.8	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)	3,946	2,604	2,370	1,483	1,303
Rank	30	37	36	41	42
Fuel per Peak Traveler (gallons)	9	6	6	4	3
Rank	36	49	44	55	58
Annual Delay					
Total Delay (1000s of person-hours)	4,936	3,598	3,127	2,057	1,820
Rank	34	39	38	49	48
Delay per Peak Traveler (person-hours)	12	9	8	5	5
Rank	46	55	54	66	62
Delay due to Incidents (percent)	48	50	50	50	50
Travel Time Index	1.07	1.05	1.04	1.03	1.03
Rank	43	51	55	63	62
Congestion Cost					
Total Cost (\$ millions)	54	39	33	21	18
Rank	34	38	38	46	45
Cost per Peak Traveler (\$)	126	94	82	53	47
Rank	48	56	55	66	64

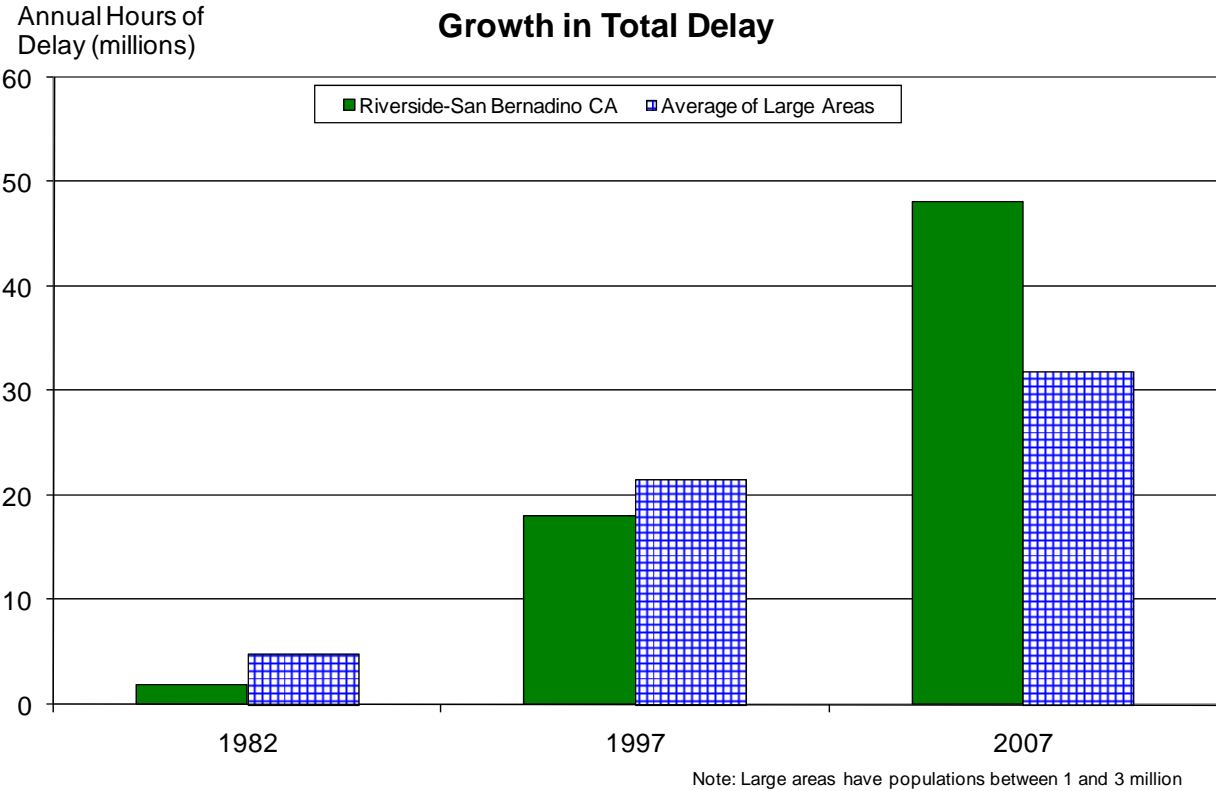
Note: System Performance statistics for 2000 through 2007 data reflect the effects of operational treatments.

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Growth in Delay per Peak Traveler



Growth in Total Delay



**Benefits from Public Transportation Service and Operations Strategies in
Riverside-San Bernadino CA**

Operations Strategies	2007	2006	2005	2004
Freeway Ramp Metering				
Percent of Roadway Miles	52	52	51	57
Annual Delay Reduction (1000 hours)	1,799	1,852	1,917	1,651
Freeway Incident Management				
Cameras				
Percent of Roadway Miles	72	72	71	79
Service Patrols				
Percent of Roadway Miles	34	34	33	37
Annual Delay Reduction (1000 hours)	1,385	1,396	1,123	1,035
Arterial Signal Coordination				
Percent of Roadway Miles	73	74	71	68
Annual Delay Reduction (1000 hours)	171	198	229	303
Arterial Access Management				
Percent of Roadway Miles	27	27	27	26
Annual Delay Reduction (1000 hours)	335	418	423	391
HOV Lanes				
Daily Passenger-miles of travel (1000s)	940	890	871	854
HOV User Delay Savings	1,815	1,683	1,595	1,403
Total Effect of Operations Treatments				
Annual Delay Reduction (1000 hours)	5,505	5,547	5,287	4,782
Annual Delay Saved per Peak Traveler (hours)	5	5	5	5
Annual Congestion Cost Savings (\$million)	123.5	118.8	107.8	92.5
Travel Time Index with Strategies	1.364	1.361	1.352	1.324
Travel Time Index (Base)	1.403	1.399	1.388	1.359
Public Transportation Service	2007	2006	2005	2004
Existing Service				
Annual Passenger-miles of travel (million)	127	123	128	128
Unlinked Passenger Trips (million)	23	23	23	24
Travel Time Index (combined road and transit)	1.399	1.395	1.384	1.355
Condition if Public Transportation Service were Discontinued				
Travel Time Index	1.409	1.404	1.394	1.365
Annual Increase				
Delay (1000 hours)	1,397	1,386	1,463	1,301
Delay per Peak Traveler (hours)	1	1	1	1
Congestion Cost (\$million)	27.7	26.5	26.8	22.4

**Benefits from Public Transportation Service and Operations Strategies in
Riverside-San Bernadino CA, Continued**

Operations Strategies	2003	2002	2001	2000
Freeway Ramp Metering				
Percent of Roadway Miles	62	63	63	64
Annual Delay Reduction (1000 hours)	1,889	1,535	1,366	1,185
Freeway Incident Management				
Cameras				
Percent of Roadway Miles	84	85	78	70
Service Patrols				
Percent of Roadway Miles	38	39	45	50
Annual Delay Reduction (1000 hours)	898	714	711	757
Arterial Signal Coordination				
Percent of Roadway Miles	69	69	70	71
Annual Delay Reduction (1000 hours)	348	324	328	180
Arterial Access Management				
Percent of Roadway Miles	26	23	23	19
Annual Delay Reduction (1000 hours)	420	308	413	451
HOV Lanes				
Daily Passenger-miles of travel (1000s)	837	821	804	789
HOV User Delay Savings	1,244	1,026	967	964
Total Effect of Operations Treatments				
Annual Delay Reduction (1000 hours)	4,799	3,907	3,785	3,538
Annual Delay Saved per Peak Traveler (hours)	5	4	5	4
Annual Congestion Cost Savings (\$million)	88.4	69.7	67.3	61.5
Travel Time Index with Strategies	1.294	1.260	1.240	1.241
Travel Time Index (Base)	1.331	1.291	1.271	1.272
Public Transportation Service	2003	2002	2001	2000
Existing Service				
Annual Passenger-miles of travel (million)	121	121	121	144
Unlinked Passenger Trips (million)	24	25	23	22
Travel Time Index (combined road and transit)	1.328	1.288	1.267	1.268
Condition if Public Transportation Service were Discontinued				
Travel Time Index	1.336	1.297	1.277	1.279
Annual Increase				
Delay (1000 hours)	1,185	1,242	1,130	1,272
Delay per Peak Traveler (hours)	1	1	1	2
Congestion Cost (\$million)	19.3	19.7	17.8	19.9

**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