

Performance Measure Summary – Columbia, SC

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 Columbia SC

Inventory Measures	2007	2006	2005	2004	2003	2002
Urban Area Information						
Population (1000s)	455	445	440	435	430	425
Rank	78	78	78	78	78	76
Urban Area (square miles)	245	235	230	225	225	220
Population Density (persons/sq mile)	1,857	1,894	1,913	1,933	1,911	1,932
Peak Travelers (1000s)	251	244	240	236	232	226
Freeway						
Daily Vehicle-Miles of Travel (1000s)	5,895	5,770	5,635	5,300	5,075	4,820
Lane-Miles	460	460	460	440	420	405
Arterial Streets						
Daily Vehicle-Miles of Travel (1000s)	5,180	5,035	4,940	4,900	4,805	4,720
Lane-Miles	1,030	1,030	1,025	1,005	985	965
Public Transportation						
Annual Psgr-Miles of Travel (millions)	11.9	13.5	16.1	15.4	8.0	6.4
Annual Unlinked Psgr Trips (millions)	2.3	2.5	2.7	2.6	2.5	2.4
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)	2.82	2.49	2.19	1.83	1.39	1.25
System Performance	2007	2006	2005	2004	2003	2002
Congested Travel (% of peak VMT)	33	28	24	24	24	22
Congested System (% of lane-miles)	35	30	29	29	29	28
Congested Time (number of "Rush Hours")	5.4	5.2	5.0	5.0	5.0	4.8
Annual Increase Needed to Maintain Constant Congestion Level:						
Lane-miles	45	48	48	50	49	47
Transit Riders or Carpoolers (millions)	12	12	12	12	12	11
Annual Excess Fuel Consumed						
Total Fuel (1000 gallons)	3,517	2,938	2,380	2,339	2,274	2,074
Rank	70	72	76	75	73	75
Fuel per Peak Traveler (gallons)	14	12	10	10	10	9
Rank	56	64	67	69	67	70
Annual Delay						
Total Delay (1000s of person-hours)	5,478	4,607	3,748	3,720	3,617	3,380
Rank	70	72	75	74	74	75
Delay per Peak Traveler (person-hours)	22	19	16	16	16	15
Rank	55	63	69	70	66	71
Delay due to Incidents (percent)	55	55	55	55	54	54
Travel Time Index	1.10	1.08	1.07	1.07	1.07	1.07
Rank	64	77	81	81	78	78
Congestion Cost						
Total Cost (\$ millions)	121	99	77	72	67	61
Rank	68	71	73	73	72	70
Cost per Peak Traveler (\$)	482	404	320	305	289	268
Rank	53	62	67	68	66	69

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 Columbia SC, Continued

Inventory Measures	2001	2000	1999	1998	1997
Urban Area Information					
Population (1000s)	420	415	410	405	395
Rank	75	74	74	74	74
Urban Area (square miles)	220	215	251	210	210
Population Density (persons/sq mile)	1,909	1,930	1,633	1,929	1,881
Peak Travelers (1000s)	220	214	208	203	194
Freeway					
Daily Vehicle-Miles of Travel (1000s)	4,600	4,500	4,215	4,035	3,840
Lane-Miles	390	385	385	385	380
Arterial Streets					
Daily Vehicle-Miles of Travel (1000s)	4,610	4,530	4,400	4,290	4,210
Lane-Miles	940	925	900	875	860
Public Transportation					
Annual Psgr-Miles of Travel (millions)	6.4	6.9	7.5	7.6	12.0
Annual Unlinked Psgr Trips (millions)	2.4	2.9	2.9	2.9	3.3
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)	1.38	1.41	1.00	0.97	1.07
System Performance	2001	2000	1999	1998	1997
Congested Travel (% of peak VMT)	20	20	19	16	16
Congested System (% of lane-miles)	28	28	28	26	26
Congested Time (number of "Rush Hours")	4.8	4.8	4.2	4.0	3.6
Annual Increase Needed to Maintain Constant Congestion Level:					
Lane-miles	48	47	50	47	45
Transit Riders or Carpoolers (millions)	12	11	12	11	10
Annual Excess Fuel Consumed					
Total Fuel (1000 gallons)	1,933	1,857	1,642	1,405	1,349
Rank	73	72	76	76	75
Fuel per Peak Traveler (gallons)	9	9	8	7	7
Rank	72	70	73	74	73
Annual Delay					
Total Delay (1000s of person-hours)	3,207	3,049	2,710	2,358	2,311
Rank	74	74	74	75	75
Delay per Peak Traveler (person-hours)	15	14	13	12	12
Rank	70	71	72	74	73
Delay due to Incidents (percent)	54	54	54	53	53
Travel Time Index	1.06	1.06	1.06	1.05	1.05
Rank	82	79	77	81	79
Congestion Cost					
Total Cost (\$ millions)	57	53	44	38	37
Rank	71	72	74	75	74
Cost per Peak Traveler (\$)	259	248	213	186	189
Rank	70	70	71	73	73

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 Columbia SC, Continued

Inventory Measures	1996	1995	1994	1993	1992
Urban Area Information					
Population (1000s)	385	370	355	340	340
Rank	74	74	74	74	73
Urban Area (square miles)	205	205	200	200	200
Population Density (persons/sq mile)	1,878	1,805	1,775	1,700	1,700
Peak Travelers (1000s)	186	176	167	157	155
Freeway					
Daily Vehicle-Miles of Travel (1000s)	3,655	3,615	3,280	3,135	2,955
Lane-Miles	375	370	350	340	325
Arterial Streets					
Daily Vehicle-Miles of Travel (1000s)	4,055	3,950	3,850	3,800	3,795
Lane-Miles	845	820	805	805	800
Public Transportation					
Annual Psgr-Miles of Travel (millions)	11.1	12.2	12.1	11.5	11.9
Annual Unlinked Psgr Trips (millions)	3.7	3.3	3.3	3.2	3.5
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)	1.16	1.07	0.95	1.00	1.00
System Performance	1996	1995	1994	1993	1992
Congested Travel (% of peak VMT)	15	14	14	14	14
Congested System (% of lane-miles)	26	26	27	28	28
Congested Time (number of "Rush Hours")	3.4	3.4	3.2	3.0	3.0
Annual Increase Needed to Maintain Constant Congestion Level:					
Lane-miles	43	42	36	33	38
Transit Riders or Carpoolers (millions)	9	9	8	7	8
Annual Excess Fuel Consumed					
Total Fuel (1000 gallons)	1,232	1,096	1,056	1,007	1,027
Rank	75	76	77	74	72
Fuel per Peak Traveler (gallons)	7	6	6	6	7
Rank	72	74	75	72	64
Annual Delay					
Total Delay (1000s of person-hours)	2,101	1,865	1,776	1,680	1,716
Rank	76	76	78	76	73
Delay per Peak Traveler (person-hours)	11	11	11	11	11
Rank	73	73	71	69	65
Delay due to Incidents (percent)	53	53	54	54	54
Travel Time Index	1.05	1.04	1.04	1.04	1.04
Rank	78	81	80	78	77
Congestion Cost					
Total Cost (\$ millions)	33	28	26	24	24
Rank	74	76	73	74	70
Cost per Peak Traveler (\$)	177	161	157	154	157
Rank	69	73	72	67	64

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 Columbia SC, Continued

Inventory Measures	1991	1990	1989	1988	1987
Urban Area Information					
Population (1000s)	335	335	330	330	325
Rank	73	73	72	72	72
Urban Area (square miles)	200	195	195	190	190
Population Density (persons/sq mile)	1,675	1,718	1,692	1,737	1,711
Peak Travelers (1000s)	150	148	145	144	140
Freeway					
Daily Vehicle-Miles of Travel (1000s)	2,740	2,655	2,500	2,485	2,215
Lane-Miles	315	300	285	280	260
Arterial Streets					
Daily Vehicle-Miles of Travel (1000s)	3,750	3,715	3,630	3,550	3,520
Lane-Miles	795	795	795	790	790
Public Transportation					
Annual Psgr-Miles of Travel (millions)	10.6	12.8	11.8	11.9	13.0
Annual Unlinked Psgr Trips (millions)	3.0	3.3	3.2	3.3	4.2
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)	1.06	1.03	1.08	1.00	1.00
System Performance	1991	1990	1989	1988	1987
Congested Travel (% of peak VMT)	13	13	13	11	11
Congested System (% of lane-miles)	24	25	25	21	21
Congested Time (number of "Rush Hours")	3.0	3.0	3.0	3.0	2.9
Annual Increase Needed to Maintain Constant Congestion Level:					
Lane-miles	50	52	61	75	80
Transit Riders or Carpoolers (millions)	10	11	12	15	15
Annual Excess Fuel Consumed					
Total Fuel (1000 gallons)	856	847	810	697	665
Rank	73	73	72	71	70
Fuel per Peak Traveler (gallons)	6	6	6	5	5
Rank	63	63	61	67	63
Annual Delay					
Total Delay (1000s of person-hours)	1,426	1,409	1,350	1,156	1,121
Rank	74	74	72	71	70
Delay per Peak Traveler (person-hours)	9	10	9	8	8
Rank	67	64	65	68	65
Delay due to Incidents (percent)	54	54	54	54	54
Travel Time Index	1.04	1.04	1.04	1.03	1.03
Rank	73	72	71	75	72
Congestion Cost					
Total Cost (\$ millions)	20	19	17	14	13
Rank	72	71	68	70	68
Cost per Peak Traveler (\$)	131	126	117	97	93
Rank	66	64	64	65	63

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

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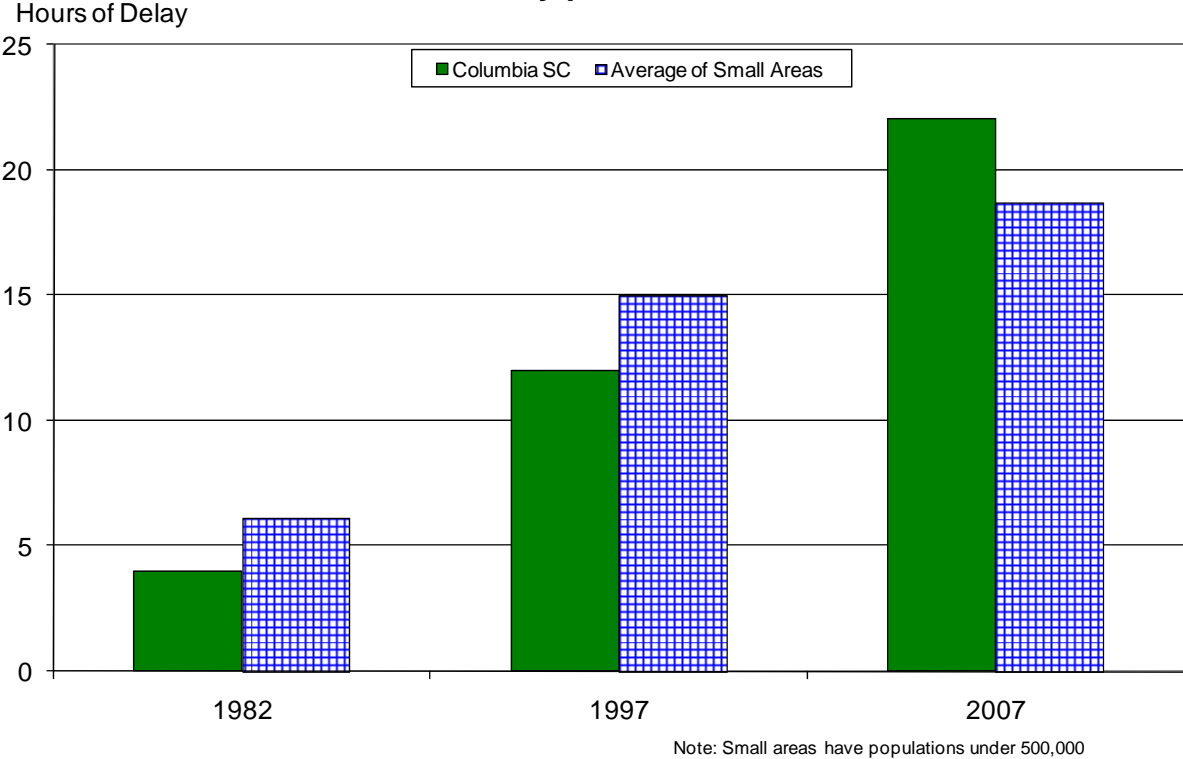
The Mobility Data for Columbia SC, Continued

Inventory Measures	1986	1985	1984	1983	1982
Urban Area Information					
Population (1000s)	325	320	320	315	315
Rank	72	72	72	72	72
Urban Area (square miles)	185	185	180	180	175
Population Density (persons/sq mile)	1,757	1,730	1,778	1,750	1,800
Peak Travelers (1000s)	139	136	135	132	130
Freeway					
Daily Vehicle-Miles of Travel (1000s)	1,800	1,655	1,445	1,400	1,375
Lane-Miles	250	240	230	220	215
Arterial Streets					
Daily Vehicle-Miles of Travel (1000s)	3,410	3,380	3,205	2,900	2,595
Lane-Miles	790	790	780	755	705
Public Transportation					
Annual Psgr-Miles of Travel (millions)	12.0	12.0	12.0	12.0	12.0
Annual Unlinked Psgr Trips (millions)	4.2	4.2	4.2	4.2	4.2
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)	0.98	1.28	1.29	1.32	1.38
System Performance	1986	1985	1984	1983	1982
Congested Travel (% of peak VMT)	10	10	10	8	8
Congested System (% of lane-miles)	20	20	20	17	16
Congested Time (number of "Rush Hours")	2.7	2.7	2.6	2.5	2.4
Annual Increase Needed to Maintain Constant Congestion Level:					
Lane-miles	--	--	--	--	--
Transit Riders or Carpoolers (millions)	--	--	--	--	--
Annual Excess Fuel Consumed					
Total Fuel (1000 gallons)	563	558	485	342	300
Rank	72	70	70	75	76
Fuel per Peak Traveler (gallons)	4	4	4	3	2
Rank	65	60	58	64	72
Annual Delay					
Total Delay (1000s of person-hours)	987	984	847	582	508
Rank	71	70	70	74	76
Delay per Peak Traveler (person-hours)	7	7	6	4	4
Rank	64	61	63	71	69
Delay due to Incidents (percent)	53	53	53	53	53
Travel Time Index	1.03	1.03	1.03	1.02	1.02
Rank	71	69	66	74	74
Congestion Cost					
Total Cost (\$ millions)	11	11	9	6	5
Rank	70	69	69	74	74
Cost per Peak Traveler (\$)	79	83	69	47	41
Rank	63	58	63	68	71

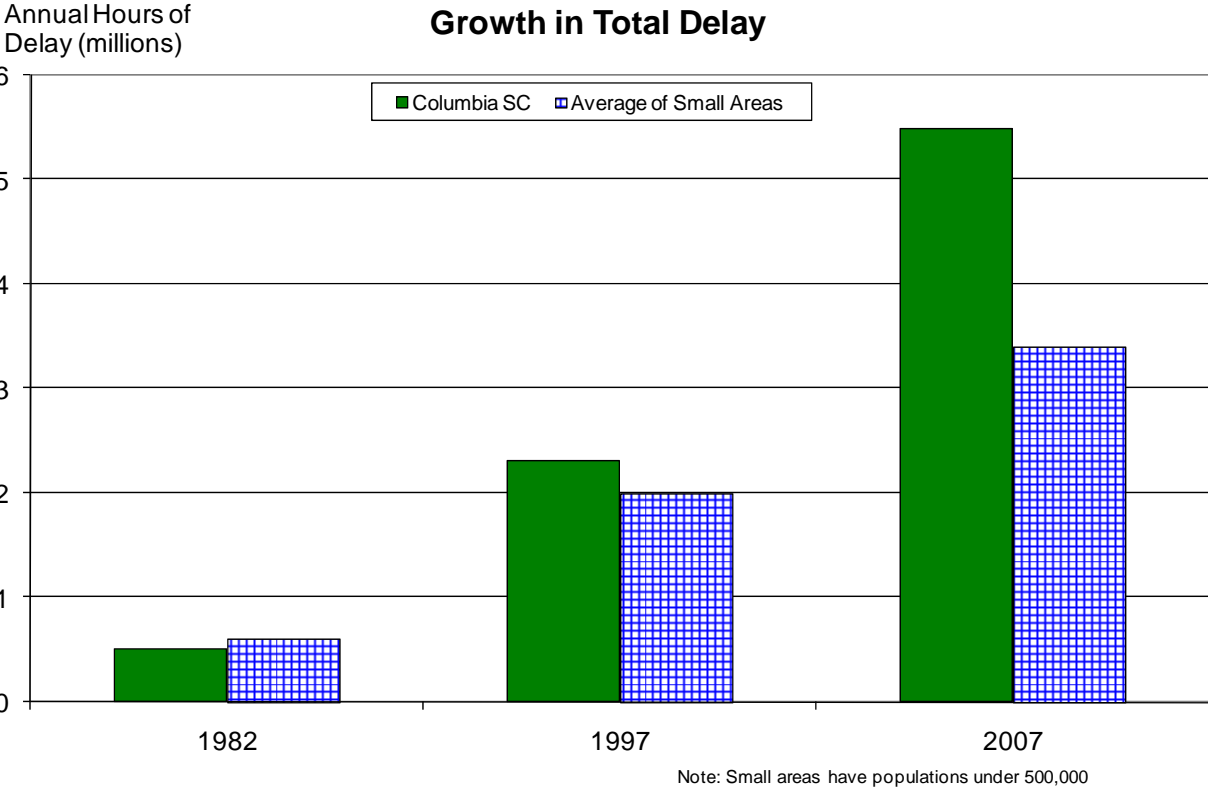
Note: System Performance statistics for 2000 through 2007 data reflect the effects of operational treatments.

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Growth in Delay per Peak Traveler



Growth in Total Delay



**Benefits from Public Transportation Service and Operations Strategies in
Columbia SC**

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	39	39	35	20
Service Patrols				
Percent of Roadway Miles	69	69	69	74
Annual Delay Reduction (1000 hours)	91	78	41	46
Arterial Signal Coordination				
Percent of Roadway Miles	19	19	20	19
Annual Delay Reduction (1000 hours)	6	5	11	9
Arterial Access Management				
Percent of Roadway Miles	5	5	5	4
Annual Delay Reduction (1000 hours)	1	2	10	9
HOV Lanes				
Daily Passenger-miles of travel (1000s)	--	--	--	--
HOV User Delay Savings	--	--	--	--
Total Effect of Operations Treatments				
Annual Delay Reduction (1000 hours)	98	85	62	63
Annual Delay Saved per Peak Traveler (hours)	0	0	0	0
Annual Congestion Cost Savings (\$million)	2.4	2.0	1.4	1.3
Travel Time Index with Strategies	1.097	1.082	1.068	1.069
Travel Time Index (Base)	1.100	1.085	1.069	1.071
Public Transportation Service	2007	2006	2005	2004
Existing Service				
Annual Passenger-miles of travel (million)	11.9	13.5	16.1	15.4
Unlinked Passenger Trips (million)	2.3	2.5	2.7	2.6
Travel Time Index (combined road and transit)	1.099	1.084	1.069	1.070
Condition if Public Transportation Service were Discontinued				
Travel Time Index	1.102	1.085	1.071	1.071
Annual Increase				
Delay (1000 hours)	170	65	146	43
Delay per Peak Traveler (hours)	1	0	1	0
Congestion Cost (\$million)	3.9	1.4	3.1	0.8

**Benefits from Public Transportation Service and Operations Strategies in
Columbia SC, 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	14	14	--	--
Service Patrols				
Percent of Roadway Miles	74	74	74	--
Annual Delay Reduction (1000 hours)	41	30	25	--
Arterial Signal Coordination				
Percent of Roadway Miles	18	19	19	14
Annual Delay Reduction (1000 hours)	8	7	13	6
Arterial Access Management				
Percent of Roadway Miles	4	4	4	4
Annual Delay Reduction (1000 hours)	9	3	5	19
HOV Lanes				
Daily Passenger-miles of travel (1000s)	--	--	--	--
HOV User Delay Savings	--	--	--	--
Total Effect of Operations Treatments				
Annual Delay Reduction (1000 hours)	57	40	43	25
Annual Delay Saved per Peak Traveler (hours)	0	0	0	0
Annual Congestion Cost Savings (\$million)	1.1	0.8	0.8	0.4
Travel Time Index with Strategies	1.069	1.065	1.063	1.061
Travel Time Index (Base)	1.071	1.066	1.064	1.062
Public Transportation Service	2003	2002	2001	2000
Existing Service				
Annual Passenger-miles of travel (million)	8.0	6.4	6.4	6.9
Unlinked Passenger Trips (million)	2.5	2.4	2.4	2.9
Travel Time Index (combined road and transit)	1.071	1.066	1.064	1.062
Condition if Public Transportation Service were Discontinued				
Travel Time Index	1.070	1.066	1.064	1.061
Annual Increase				
Delay (1000 hours)	7	-9	19	-7
Delay per Peak Traveler (hours)	0	0	0	0
Congestion Cost (\$million)	0.1	-0.2	0.3	-0.1

**Comparison of Several Key Mobility Performance Measures
Small Group – less than 500,000 population urban areas**

Urban Area	Delay per Traveler	Travel Time Index	Total Delay	1982 to 2007	
				Delay per Traveler	Total Delay
Knoxville, TN	H+	H	H+	F	F+
Charleston-North Charleston, SC	H+	H+	H+	F+	F+
Cape Coral, FL	H+	H+	H+	F+	F+
Columbia, SC	H	0	H+	F+	F+
Wichita, KS	L-	L-	L-	S-	S-
Little Rock, AR	H	0	H	F+	F+
Spokane WA	L-	L-	L-	S-	S-
Pensacola, FL-AL	H+	H	H+	F+	F+
Corpus Christi, TX	L-	L-	L-	S-	S-
Anchorage, AK	L-	L	L-	S-	S-
Eugene, OR	L-	L	L-	S-	S-
Salem, OR	L	0	L	0	S-
Beaumont, TX	L-	L-	L-	S-	S-
Laredo, TX	L	H	L-	0	S-
Brownsville, TX	L-	L	L-	S-	S-
Boulder, CO	L-	0	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

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 -	5 Hours 5 Index Points 5 Hours x Average 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