

Performance Measure Summary – Rochester, NY

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 Rochester NY

Inventory Measures	2007	2006	2005	2004	2003	2002
Urban Area Information						
Population (1000s)	745	745	725	710	690	675
Rank	53	53	54	54	55	55
Urban Area (square miles)	450	450	425	400	385	370
Population Density (persons/sq mile)	1,656	1,656	1,706	1,775	1,792	1,824
Peak Travelers (1000s)	410	408	394	383	371	358
Freeway						
Daily Vehicle-Miles of Travel (1000s)	6,000	6,050	5,950	5,875	5,775	5,650
Lane-Miles	545	540	530	525	520	510
Arterial Streets						
Daily Vehicle-Miles of Travel (1000s)	5,535	5,100	4,800	4,550	4,275	4,050
Lane-Miles	1,570	1,545	1,520	1,490	1,460	1,425
Public Transportation						
Annual Psgr-Miles of Travel (millions)	42.2	43.1	43.7	45.7	50.9	51.2
Annual Unlinked Psgr Trips (millions)	12.2	12.6	13.1	12.8	13.6	13.9
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)	3.19	2.82	2.40	2.14	1.62	1.49
System Performance	2007	2006	2005	2004	2003	2002
Congested Travel (% of peak VMT)	19	21	20	20	20	19
Congested System (% of lane-miles)	24	20	20	20	20	20
Congested Time (number of "Rush Hours")	3.4	3.4	3.2	3.2	3.0	3.0
Annual Increase Needed to Maintain Constant Congestion Level:						
Lane-miles	74	73	69	69	57	48
Transit Riders or Carpoolers (millions)	14	13	12	12	10	8
Annual Excess Fuel Consumed						
Total Fuel (1000 gallons)	2,441	2,445	2,252	2,142	1,995	1,827
Rank	75	78	78	77	76	76
Fuel per Peak Traveler (gallons)	6	6	6	6	5	5
Rank	83	84	83	81	86	85
Annual Delay						
Total Delay (1000s of person-hours)	4,038	3,834	3,484	3,302	3,089	2,779
Rank	75	77	77	77	76	76
Delay per Peak Traveler (person-hours)	10	9	9	9	8	8
Rank	83	85	86	86	87	87
Delay due to Incidents (percent)	58	58	58	58	58	58
Travel Time Index	1.06	1.07	1.06	1.06	1.06	1.06
Rank	85	83	84	85	83	82
Congestion Cost						
Total Cost (\$ millions)	81	74	64	58	52	45
Rank	76	77	79	77	76	76
Cost per Peak Traveler (\$)	197	182	163	151	140	127
Rank	84	85	86	86	87	87

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 Rochester NY, Continued

Inventory Measures	2001	2000	1999	1998	1997
Urban Area Information					
Population (1000s)	665	650	640	635	630
Rank	56	57	57	57	56
Urban Area (square miles)	355	345	340	340	335
Population Density (persons/sq mile)	1,873	1,884	1,882	1,868	1,881
Peak Travelers (1000s)	348	336	327	321	314
Freeway					
Daily Vehicle-Miles of Travel (1000s)	5,600	5,510	5,365	5,260	5,235
Lane-Miles	505	505	500	500	500
Arterial Streets					
Daily Vehicle-Miles of Travel (1000s)	3,800	3,610	3,445	3,465	3,350
Lane-Miles	1,405	1,390	1,380	1,380	1,370
Public Transportation					
Annual Psgr-Miles of Travel (millions)	42.0	40.8	43.0	43.0	41.5
Annual Unlinked Psgr Trips (millions)	13.0	13.2	13.1	13.7	13.2
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)	1.72	1.64	1.19	1.15	1.31
System Performance	2001	2000	1999	1998	1997
Congested Travel (% of peak VMT)	19	18	18	17	18
Congested System (% of lane-miles)	20	24	24	20	21
Congested Time (number of "Rush Hours")	3.0	3.0	2.9	2.9	2.9
Annual Increase Needed to Maintain Constant Congestion Level:					
Lane-miles	38	29	24	30	26
Transit Riders or Carpoolers (millions)	6	5	4	5	4
Annual Excess Fuel Consumed					
Total Fuel (1000 gallons)	1,747	1,735	1,658	1,461	1,649
Rank	77	76	75	75	73
Fuel per Peak Traveler (gallons)	5	5	5	5	5
Rank	86	83	83	82	79
Annual Delay					
Total Delay (1000s of person-hours)	2,639	2,721	2,661	2,248	2,520
Rank	76	76	76	76	74
Delay per Peak Traveler (person-hours)	8	8	8	7	8
Rank	86	85	84	85	83
Delay due to Incidents (percent)	58	58	59	58	60
Travel Time Index	1.06	1.06	1.06	1.05	1.06
Rank	82	79	77	81	76
Congestion Cost					
Total Cost (\$ millions)	43	43	40	33	37
Rank	77	76	76	76	74
Cost per Peak Traveler (\$)	124	129	122	104	119
Rank	87	86	87	87	83

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 Rochester NY, Continued

Inventory Measures	1996	1995	1994	1993	1992
Urban Area Information					
Population (1000s)	625	625	620	620	620
Rank	56	54	53	51	51
Urban Area (square miles)	335	330	330	325	325
Population Density (persons/sq mile)	1,866	1,894	1,879	1,908	1,908
Peak Travelers (1000s)	308	304	298	294	290
Freeway					
Daily Vehicle-Miles of Travel (1000s)	5,325	5,265	5,020	4,900	4,765
Lane-Miles	500	495	495	495	485
Arterial Streets					
Daily Vehicle-Miles of Travel (1000s)	3,205	3,205	3,245	3,155	3,235
Lane-Miles	1,370	1,360	1,340	1,325	1,315
Public Transportation					
Annual Psgr-Miles of Travel (millions)	40.6	40.3	43.2	47.1	50.8
Annual Unlinked Psgr Trips (millions)	12.9	13.7	13.8	14.4	14.9
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)	1.37	1.27	1.15	1.21	1.24
System Performance	1996	1995	1994	1993	1992
Congested Travel (% of peak VMT)	17	17	15	15	15
Congested System (% of lane-miles)	20	20	19	19	19
Congested Time (number of "Rush Hours")	2.9	2.9	2.8	2.8	2.8
Annual Increase Needed to Maintain Constant Congestion Level:					
Lane-miles	49	63	82	96	99
Transit Riders or Carpoolers (millions)	8	10	13	15	15
Annual Excess Fuel Consumed					
Total Fuel (1000 gallons)	1,497	1,472	1,265	1,186	1,192
Rank	72	71	72	71	70
Fuel per Peak Traveler (gallons)	5	5	4	4	4
Rank	79	79	81	80	81
Annual Delay					
Total Delay (1000s of person-hours)	2,265	2,221	1,953	1,818	1,822
Rank	74	73	73	72	71
Delay per Peak Traveler (person-hours)	7	7	7	6	6
Rank	82	81	82	83	83
Delay due to Incidents (percent)	60	60	58	58	58
Travel Time Index	1.05	1.05	1.05	1.04	1.04
Rank	78	78	77	78	77
Congestion Cost					
Total Cost (\$ millions)	33	31	26	24	24
Rank	74	73	73	74	70
Cost per Peak Traveler (\$)	108	103	89	83	82
Rank	82	81	86	84	83

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 Rochester NY, Continued

Inventory Measures	1991	1990	1989	1988	1987
Urban Area Information					
Population (1000s)	615	615	615	610	605
Rank	51	51	51	49	48
Urban Area (square miles)	320	320	315	315	310
Population Density (persons/sq mile)	1,922	1,922	1,952	1,937	1,952
Peak Travelers (1000s)	284	280	278	274	269
Freeway					
Daily Vehicle-Miles of Travel (1000s)	4,480	4,355	4,005	3,705	3,600
Lane-Miles	470	460	460	450	440
Arterial Streets					
Daily Vehicle-Miles of Travel (1000s)	3,010	2,805	2,645	2,520	2,520
Lane-Miles	1,280	1,245	1,220	1,200	1,175
Public Transportation					
Annual Psgr-Miles of Travel (millions)	46.5	47.9	55.7	50.1	57.5
Annual Unlinked Psgr Trips (millions)	14.9	15.4	15.7	16.0	17.8
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)	1.21	1.07	1.13	1.04	1.05
System Performance	1991	1990	1989	1988	1987
Congested Travel (% of peak VMT)	15	13	12	10	10
Congested System (% of lane-miles)	19	17	17	17	17
Congested Time (number of "Rush Hours")	2.7	2.7	2.5	2.4	2.4
Annual Increase Needed to Maintain Constant Congestion Level:					
Lane-miles	83	71	63	59	55
Transit Riders or Carpoolers (millions)	12	10	9	8	7
Annual Excess Fuel Consumed					
Total Fuel (1000 gallons)	1,123	1,030	906	645	660
Rank	69	68	68	75	71
Fuel per Peak Traveler (gallons)	4	4	3	2	2
Rank	77	74	80	84	81
Annual Delay					
Total Delay (1000s of person-hours)	1,736	1,672	1,461	1,048	1,097
Rank	70	69	70	75	71
Delay per Peak Traveler (person-hours)	6	6	5	4	4
Rank	81	78	81	84	79
Delay due to Incidents (percent)	57	57	57	56	55
Travel Time Index	1.04	1.04	1.04	1.03	1.03
Rank	73	72	71	75	72
Congestion Cost					
Total Cost (\$ millions)	22	20	17	11	12
Rank	70	69	68	76	70
Cost per Peak Traveler (\$)	77	72	61	42	43
Rank	83	83	83	85	81

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.

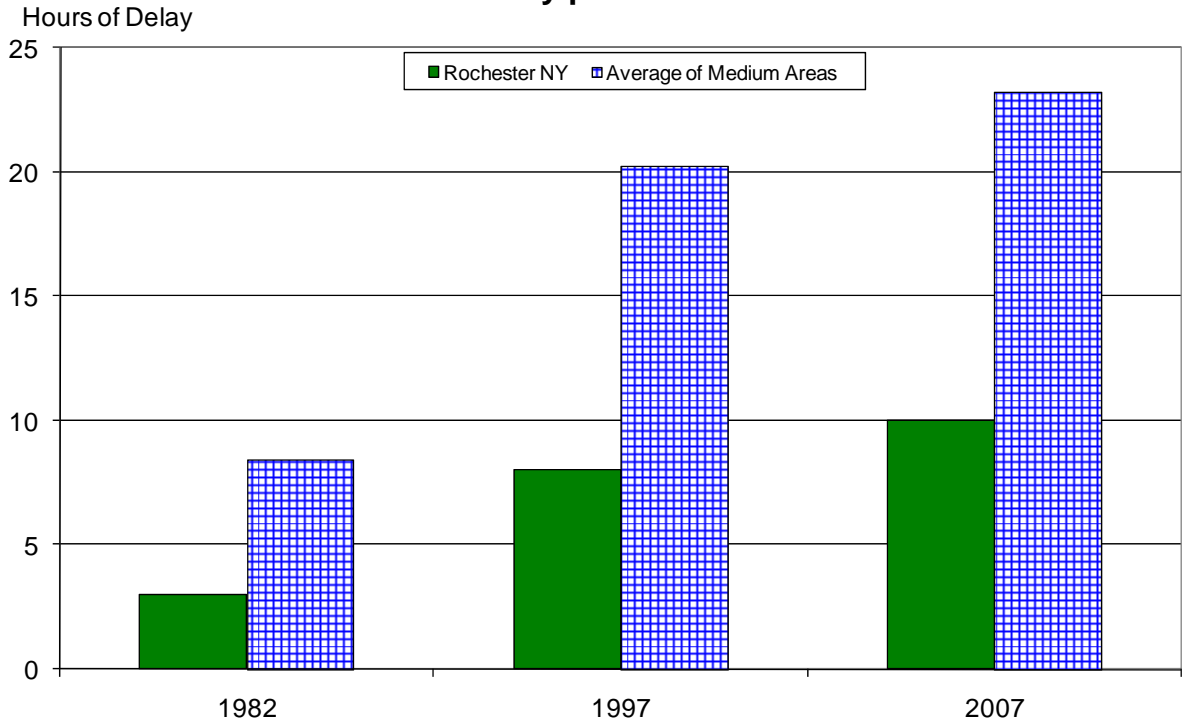
The Mobility Data for Rochester NY, Continued

Inventory Measures	1986	1985	1984	1983	1982
Urban Area Information					
Population (1000s)	600	600	600	620	640
Rank	47	47	47	44	42
Urban Area (square miles)	310	310	305	300	290
Population Density (persons/sq mile)	1,935	1,935	1,967	2,067	2,207
Peak Travelers (1000s)	265	263	261	268	273
Freeway					
Daily Vehicle-Miles of Travel (1000s)	3,425	3,265	3,120	2,870	2,760
Lane-Miles	435	430	425	415	405
Arterial Streets					
Daily Vehicle-Miles of Travel (1000s)	2,520	2,570	2,400	2,350	2,415
Lane-Miles	1,155	1,120	1,085	1,075	1,050
Public Transportation					
Annual Psgr-Miles of Travel (millions)	53.5	54.6	58.3	58.3	58.3
Annual Unlinked Psgr Trips (millions)	17.8	16.8	18.2	18.2	18.2
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)	1.02	1.34	1.35	1.38	1.44
System Performance	1986	1985	1984	1983	1982
Congested Travel (% of peak VMT)	10	9	8	8	8
Congested System (% of lane-miles)	17	17	16	16	16
Congested Time (number of "Rush Hours")	2.3	2.3	2.2	2.2	2.2
Annual Increase Needed to Maintain Constant Congestion Level:					
Lane-miles	--	--	--	--	--
Transit Riders or Carpoolers (millions)	--	--	--	--	--
Annual Excess Fuel Consumed					
Total Fuel (1000 gallons)	616	550	446	403	411
Rank	69	72	71	72	71
Fuel per Peak Traveler (gallons)	2	2	2	2	2
Rank	80	78	73	73	72
Annual Delay					
Total Delay (1000s of person-hours)	1,028	892	737	689	703
Rank	70	73	72	72	72
Delay per Peak Traveler (person-hours)	4	3	3	3	3
Rank	78	82	79	78	76
Delay due to Incidents (percent)	55	56	55	54	54
Travel Time Index	1.03	1.03	1.02	1.02	1.02
Rank	71	69	76	74	74
Congestion Cost					
Total Cost (\$ millions)	10	9	7	7	7
Rank	71	71	72	71	70
Cost per Peak Traveler (\$)	39	35	28	25	24
Rank	81	82	84	83	84

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

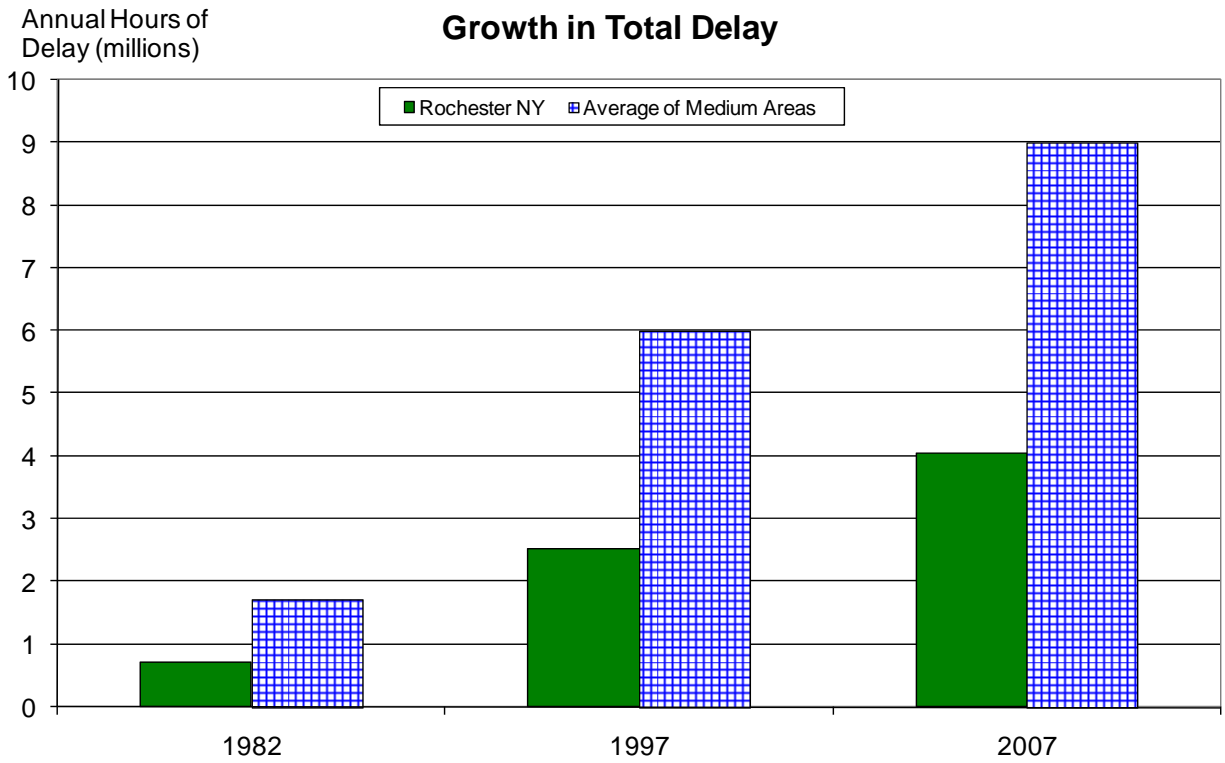
Note: Zeroes in the table reflect values less than 0.5.

Growth in Delay per Peak Traveler



Note: Medium areas have populations between 0.5 and 1 million

Growth in Total Delay



Note: Medium areas have populations between 0.5 and 1 million

**Benefits from Public Transportation Service and Operations Strategies in
Rochester NY**

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	17	17	18	18
Service Patrols				
Percent of Roadway Miles	33	33	36	36
Annual Delay Reduction (1000 hours)	59	57	55	53
Arterial Signal Coordination				
Percent of Roadway Miles	76	76	77	77
Annual Delay Reduction (1000 hours)	44	36	29	27
Arterial Access Management				
Percent of Roadway Miles	14	14	15	15
Annual Delay Reduction (1000 hours)	10	6	35	32
HOV Lanes				
Daily Passenger-miles of travel (1000s)	--	--	--	--
HOV User Delay Savings	--	--	--	--
Total Effect of Operations Treatments				
Annual Delay Reduction (1000 hours)	113	98	118	113
Annual Delay Saved per Peak Traveler (hours)	0	0	0	0
Annual Congestion Cost Savings (\$million)	2.3	1.9	2.2	2.0
Travel Time Index with Strategies	1.063	1.066	1.063	1.062
Travel Time Index (Base)	1.065	1.067	1.065	1.063
Public Transportation Service	2007	2006	2005	2004
Existing Service				
Annual Passenger-miles of travel (million)	42.2	43.1	43.7	45.7
Unlinked Passenger Trips (million)	12.2	12.6	13.1	12.8
Travel Time Index (combined road and transit)	1.064	1.067	1.064	1.063
Condition if Public Transportation Service were Discontinued				
Travel Time Index	1.066	1.070	1.066	1.066
Annual Increase				
Delay (1000 hours)	146	224	161	212
Delay per Peak Traveler (hours)	0	1	0	1
Congestion Cost (\$million)	2.9	4.3	3.0	3.7

**Benefits from Public Transportation Service and Operations Strategies in
Rochester NY, 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	18	18	--	--
Service Patrols				
Percent of Roadway Miles	12	12	12	12
Annual Delay Reduction (1000 hours)	21	17	15	15
Arterial Signal Coordination				
Percent of Roadway Miles	76	76	76	73
Annual Delay Reduction (1000 hours)	23	27	28	27
Arterial Access Management				
Percent of Roadway Miles	15	14	14	14
Annual Delay Reduction (1000 hours)	29	32	41	30
HOV Lanes				
Daily Passenger-miles of travel (1000s)	--	--	--	--
HOV User Delay Savings	--	--	--	--
Total Effect of Operations Treatments				
Annual Delay Reduction (1000 hours)	73	76	84	73
Annual Delay Saved per Peak Traveler (hours)	0	0	0	0
Annual Congestion Cost Savings (\$million)	1.2	1.2	1.3	1.1
Travel Time Index with Strategies	1.060	1.056	1.056	1.057
Travel Time Index (Base)	1.061	1.058	1.057	1.058
Public Transportation Service	2003	2002	2001	2000
Existing Service				
Annual Passenger-miles of travel (million)	50.9	51.2	42.0	40.8
Unlinked Passenger Trips (million)	13.6	13.9	13.0	13.2
Travel Time Index (combined road and transit)	1.060	1.057	1.056	1.058
Condition if Public Transportation Service were Discontinued				
Travel Time Index	1.063	1.061	1.058	1.060
Annual Increase				
Delay (1000 hours)	209	222	130	129
Delay per Peak Traveler (hours)	1	1	0	0
Congestion Cost (\$million)	3.5	3.6	2.1	2.0

**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 2007	
				Delay per Traveler	Total Delay
Nashville-Davidson, TN	H+	0	H+	F	F+
Salt Lake City, UT	H	H+	H+	F	F+
Richmond, VA	L	L-	H	0	F+
Louisville, KY-IN	H+	H+	H+	F+	F+
Hartford, CT	L	L	H	F	F+
Bridgeport-Stamford, CT-NY	H+	H+	H+	F+	F+
Oklahoma City, OK	H	L	H+	F+	F+
Tulsa, OK	0	L	0	0	F
Tucson, AZ	H+	H+	H+	F	F+
Dayton, OH	L-	L-	L-	S-	S-
Rochester, NY	L-	L-	L-	S-	S-
Birmingham, AL	H+	0	H+	F+	F+
Lancaster-Palmdale, CA	L-	L	L-	S-	S-
Honolulu, HI	H	H+	H	S	S
El Paso, TX-NM	L	L	L	0	S
Oxnard-Ventura, CA	H+	H+	H+	F+	F+
Sarasota-Bradenton, FL	H	H+	0	S-	0
Springfield, MA-CT	L-	L-	L-	S-	S-
Omaha, NE-IA	H	H	0	F+	F
Fresno, CA	L	0	L	S-	S-
Allentown-Bethlehem, PA-NJ	0	0	L	S	S-
Akron, OH	L-	L-	L-	S-	S-
Grand Rapids, MI	0	L	L	0	S
Albany-Schenectady, NY	L	L	L	0	S-
Albuquerque, NM	H+	H	H	F+	F+
New Haven, CT	L	L	L-	0	S-
Indio-Cathedral City-Palm Springs, CA	L-	0	L-	S-	S-
Toledo, OH-MI	L-	L-	L-	S	S-
Poughkeepsie-Newburgh, NY	L-	L-	L-	S-	S-
Bakersfield, CA	L-	L-	L-	S-	S-
Colorado Springs, CO	0	0	L	F	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