Performance Measure Summary

There are several inventory and performance measures listed in the pages of this Urban Area Report for the years from 1982 to 2005. 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 aspects. 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*).

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 2005	
				Delay per Traveler	Total Delay
Colorado Springs, CO	H+	H+	H+	F+	F+
Charleston-North Charleston, SC	H+	H+	H+	F	F+
Bakersfield, CA	L	0	0	0	F+
Columbia, SC	0	L	H	0	F+
Cape Coral, FL	H+	H	H+	F	F+
Little Rock, AR	0	L	0	0	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	0	L	S-	S-
Beaumont, TX	L-	L	L-	S-	S-
Salem, OR	L	0	L	0	S-
Laredo, TX	L-	0	L-	S	S-
Brownsville, TX	L-	L	L-	S-	S-
Boulder, CO	**0**	**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

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 2005 (estimated at $14.60 per hour of person travel and $77.10 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

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	
2005 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 2005 Trends		
Delay per Traveler -	5 Hours	3 Hours
Total Delay -	5 Hours x Average Population	3 Hours x Average Population

The Mobility Data for Boulder, CO

Inventory Measures	2005	2004	2003	2002	2001	2000
Urban Area Information						
Population (1000s)	115	115	115	110	110	110
Rank	85	85	85	85	85	85
Urban Area (square miles)	50	50	50	45	45	45
Popn Density (persons/sq mile)	2,300	2,300	2,300	2,444	2,444	2,444
Peak Travelers (1000s)	63	62	62	58	58	57
Freeway						
Daily Vehicle-Miles of Travel (1000s)	670	685	675	630	600	570
Lane Miles	65	65	65	60	60	55
Arterial Streets						
Daily Vehicle-Miles of Travel (1000s)	1,165	1,160	1,150	1,145	1,140	1,130
Lane Miles	200	200	195	195	195	195
Public Transportation						
Annual Psgr-Miles of Travel (millions)	9	8	8	8	8	8
Annual Unlinked Psgr Trips (millions)	2	2	2	2	2	2
Cost Components						
Value of Time ($/hour)	14.60	14.10	13.75	13.45	13.25	12.85
Commercial Cost ($/hour)	77.10	74.60	72.65	71.05	69.95	68.00
Fuel Cost ($/gallon)	2.32	1.94	1.51	1.39	1.70	1.55
System Performance						
Congested Travel (% of peak VMT)	27	27	27	27	29	30
Congested System (% of lane-miles)	35	35	35	36	39	40
Congested Time (number of "Rush Hours")	5.2	5.2	5.2	5.2	5.0	5.2
Annual Increase Needed To Maintain Constant Congestion Level:						
Lane-Miles	4	5	7	5	6	6
Transit Riders or Carpoolers (millions)	1	1	2	1	2	1
Annual Excess Fuel Consumed						
Total Fuel (1000 gallons)	576	577	561	546	576	566
Rank	84	84	84	83	83	83
Fuel per Peak Traveler (gallons)	9	9	9	9	10	10
Rank	69	72	67	69	68	67
Annual Delay						
Total Delay (1000s of person-hours)	996	994	957	942	990	958
Rank	84	84	84	84	84	83
Delay per Peak Traveler (person-hrs)	16	16	15	16	17	17
Rank	67	68	68	68	65	64
Delay due to Incidents (percent)	53	53	53	53	53	53
Travel Time Index	1.10	1.09	1.09	1.09	1.10	1.10
Rank	60	65	64	67	61	62
Congestion Cost						
Total Cost ($ millions)	17	17	15	15	15	14
Rank	84	84	84	84	84	83
Cost per Peak Traveler ($)	277	266	248	253	267	255
Rank	71	71	70	70	69	69

Note: System Performance statistics for 2000 through 2005 data reflect the effects of operational treatments.

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

The Mobility Data for Boulder, CO, Continued

Inventory Measures	1999	1998	1997	1996	1995	1994
Urban Area Information						
Population (1000s)	110	110	110	105	105	105
Rank	85	85	85	85	85	85
Urban Area (square miles)	45	45	45	40	40	40
Popn Density (persons/sq mile)	2,444	2,444	2,444	2,625	2,625	2,625
Peak Travelers (1000s)	56	55	54	51	50	49
Freeway						
Daily Vehicle-Miles of Travel (1000s)	530	500	480	440	425	405
Lane Miles	55	55	50	50	50	50
Arterial Streets						
Daily Vehicle-Miles of Travel (1000s)	1,125	1,115	1,105	1,100	1,090	1,080
Lane Miles	190	190	190	190	185	185
Public Transportation						
Annual Psgr-Miles of Travel (millions)	7	7	6	6	5	5
Annual Unlinked Psgr Trips (millions)	1	1	1	1	1	1
Cost Components						
Value of Time ($/hour)	12.40	12.15	12.00	11.70	11.40	11.05
Commercial Cost ($/hour)	65.80	64.35	63.40	61.95	60.20	58.50
Fuel Cost ($/gallon)	1.16	1.10	1.24	1.36	1.22	1.16
System Performance						
Congested Travel (% of peak VMT)	30	29	30	27	28	25
Congested System (% of lane-miles)	40	40	41	37	36	33
Congested Time (number of "Rush Hours")	5.2	4.8	5.2	4.8	4.8	4.6
Annual Increase Needed To Maintain Constant Congestion Level:						
Lane-Miles	5	5	5	5	6	8
Transit Riders or Carpoolers (millions)	1	1	1	1	1	2
Annual Excess Fuel Consumed						
Total Fuel (1000 gallons)	568	540	565	478	475	411
Rank	82	82	81	81	81	81
Fuel per Peak Traveler (gallons)	10	10	10	9	9	8
Rank	68	67	63	63	61	61
Annual Delay						
Total Delay (1000s of person-hours)	964	921	968	816	811	707
Rank	82	82	81	81	81	81
Delay per Peak Traveler (person-hrs)	17	17	18	16	16	14
Rank	67	66	63	63	61	59
Delay due to Incidents (percent)	53	53	53	53	53	53
Travel Time Index	1.10	1.10	1.11	1.09	1.09	1.08
Rank	62	61	55	60	56	57
Congestion Cost						
Total Cost ($ millions)	14	13	13	11	11	9
Rank	83	82	82	81	81	81
Cost per Peak Traveler ($)	247	235	248	219	214	183
Rank	68	67	63	63	61	60

Note: System Performance statistics for 2000 through 2005 data reflect the effects of operational treatments.

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

The Mobility Data for Boulder, CO, Continued

Inventory Measures	1993	1992	1991	1990	1989	1988
Urban Area Information						
Population (1000s)	100	100	100	100	95	95
Rank	85	85	85	85	85	85
Urban Area (square miles)	35	35	35	35	30	30
Popn Density (persons/sq mile)	2,857	2,857	2,857	2,857	3,167	3,167
Peak Travelers (1000s)	46	46	45	44	42	41
Freeway						
Daily Vehicle-Miles of Travel (1000s)	390	385	375	370	360	330
Lane Miles	50	50	50	50	50	50
Arterial Streets						
Daily Vehicle-Miles of Travel (1000s)	1,070	1,050	1,000	960	920	900
Lane Miles	185	185	180	180	180	175
Public Transportation						
Annual Psgr-Miles of Travel (millions)	5	5	5	4	4	4
Annual Unlinked Psgr Trips (millions)	1	1	1	1	1	1
Cost Components						
Value of Time ($/hour)	10.75	10.50	10.25	10.00	9.25	8.80
Commercial Cost ($/hour)	57.05	55.40	53.80	51.60	48.95	46.70
Fuel Cost ($/gallon)	1.21	1.23	1.19	1.11	1.15	1.06
System Performance						
Congested Travel (% of peak VMT)	24	21	18	17	15	13
Congested System (% of lane-miles)	33	29	25	25	25	21
Congested Time (number of "Rush Hours")	4.4	4.2	4.0	3.6	3.2	3.0
Annual Increase Needed To Maintain Constant Congestion Level:						
Lane-Miles	8	6	5	4	4	4
Transit Riders or Carpoolers (millions)	2	1	1	1	1	1
Annual Excess Fuel Consumed						
Total Fuel (1000 gallons)	396	337	274	247	216	183
Rank	81	82	83	82	83	83
Fuel per Peak Traveler (gallons)	9	7	6	6	5	4
Rank	60	61	61	64	66	68
Annual Delay						
Total Delay (1000s of person-hours)	680	583	477	433	378	323
Rank	81	82	82	82	82	83
Delay per Peak Traveler (person-hrs)	15	13	11	10	9	8
Rank	57	61	61	62	65	66
Delay due to Incidents (percent)	53	53	53	53	53	53
Travel Time Index	1.08	1.07	1.06	1.05	1.05	1.04
Rank	56	58	60	63	64	66
Congestion Cost						
Total Cost ($ millions)	9	7	6	5	4	3
Rank	82	82	83	82	83	83
Cost per Peak Traveler ($)	184	157	128	114	99	81
Rank	58	61	62	63	65	67

Note: System Performance statistics for 2000 through 2005 data reflect the effects of operational treatments.

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

The Mobility Data for Boulder, CO, Continued

Inventory Measures	1987	1986	1985	1984	1983	1982
Urban Area Information						
Population (1000s)	90	90	85	85	80	80
Rank	85	85	85	85	85	85
Urban Area (square miles)	30	30	25	25	20	20
Popn Density (persons/sq mile)	3,000	3,000	3,400	3,400	4,000	4,000
Peak Travelers (1000s)	39	39	36	36	34	33
Freeway						
Daily Vehicle-Miles of Travel (1000s)	380	360	350	310	275	250
Lane Miles	50	50	50	50	45	40
Arterial Streets						
Daily Vehicle-Miles of Travel (1000s)	880	875	870	860	855	825
Lane Miles	175	175	170	170	170	170
Public Transportation						
Annual Psgr-Miles of Travel (millions)	4	5	5	5	5	5
Annual Unlinked Psgr Trips (millions)	1	1	1	1	1	1
Cost Components						
Value of Time ($/hour)	8.50	8.20	8.00	7.75	7.45	7.20
Commercial Cost ($/hour)	44.85	43.30	42.50	41.05	39.35	38.10
Fuel Cost ($/gallon)	1.06	1.04	1.36	1.37	1.41	1.47
System Performance						
Congested Travel (% of peak VMT)	13	13	13	11	12	12
Congested System (% of lane-miles)	21	21	20	17	17	17
Congested Time (number of "Rush Hours")	3.2	3.0	3.0	3.0	3.0	3.0
Annual Increase Needed To Maintain Constant Congestion Level:						
Lane-Miles	8	- -	- -	- -	- -	- -
Transit Riders or Carpoolers (millions)	1	- -	- -	- -	- -	- -
Annual Excess Fuel Consumed						
Total Fuel (1000 gallons)	181	170	173	139	143	134
Rank	83	81	81	82	81	81
Fuel per Peak Traveler (gallons)	5	4	5	4	4	4
Rank	63	61	55	60	51	52
Annual Delay						
Total Delay (1000s of person-hours)	316	295	300	240	250	232
Rank	83	82	81	82	81	81
Delay per Peak Traveler (person-hrs)	8	8	8	7	7	7
Rank	61	60	54	60	51	51
Delay due to Incidents (percent)	53	53	53	53	53	53
Travel Time Index	1.04	1.04	1.04	1.03	1.04	1.04
Rank	64	64	60	63	57	56
Congestion Cost						
Total Cost ($ millions)	3	3	3	2	2	2
Rank	83	82	81	83	81	81
Cost per Peak Traveler ($)	81	74	80	63	68	62
Rank	62	61	54	61	51	50

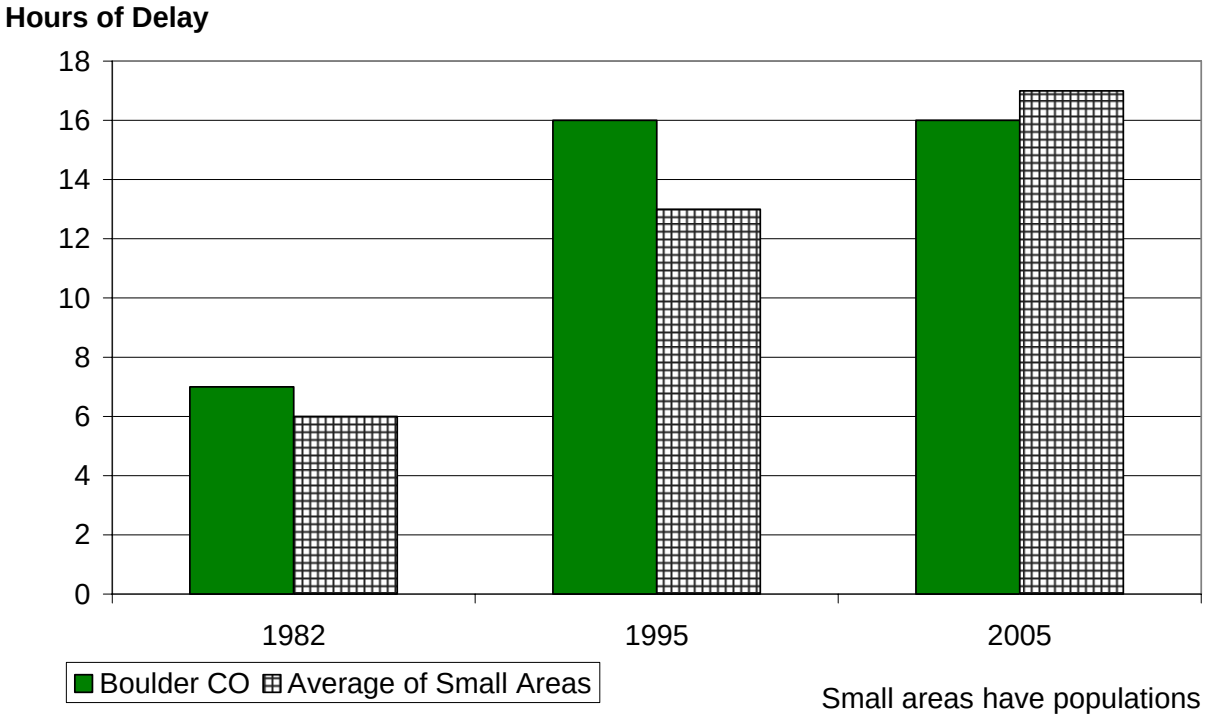
Note: System Performance statistics for 2000 through 2005 data reflect the effects of operational treatments.

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

Benefits From Public Transportation Service and Operations Strategies for Boulder, CO

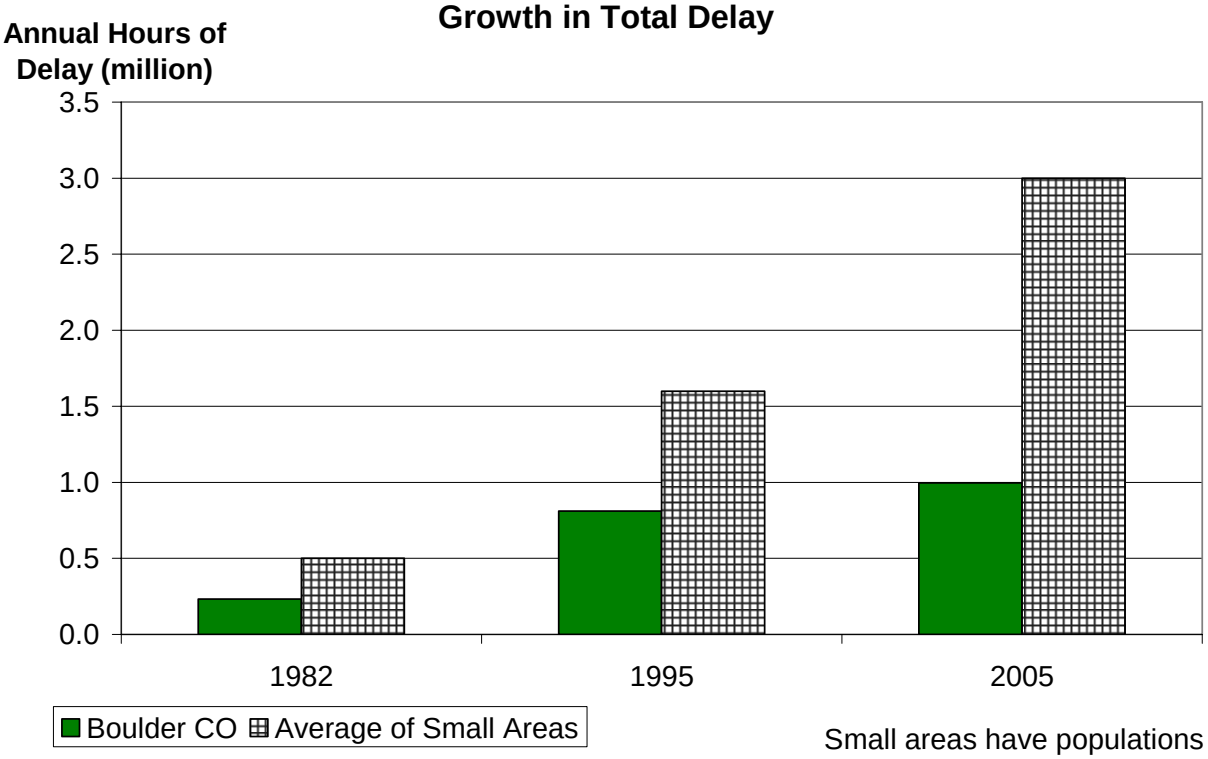
Operations Strategies	2005	2004	2003	2002	2001	2000
Freeway Ramp Metering						
Percent of Roadway Miles	--	--	--	--	--	--
Annual Delay Reduction (1000 hours)	--	--	--	--	--	--
Freeway Incident Management						
Cameras						
Percent of Roadway Miles	--	--	--	--	--	--
Service Patrols						
Percent of Roadway Miles	--	--	--	--	--	--
Annual Delay Reduction (1000 hours)	--	--	--	--	--	--
Arterial Signal Coordination						
Percent of Roadway Miles	44	35	35	35	35	35
Annual Delay Reduction (1000 hours)	13	10	11	9	7	13
Arterial Access Management						
Percent of Roadway Miles	30	30	31	30	30	30
Annual Delay Reduction (1000 hours)	21	31	43	35	45	28
HOV Lanes						
Daily Passenger-miles of Travel (1000s)	--	--	--	--	--	--
HOV User Delay Savings	--	--	--	--	--	--
Total Effect of Operations Treatments						
Annual Delay Reduction (1000 hours)	34	41	54	44	51	41
Annual Delay Saved per Peak Traveler (hours)	1	1	1	1	1	1
Annual Congestion Cost Savings ($million)	0.6	0.7	0.9	0.7	0.8	0.6
Travel Time Index with Strategies	1.095	1.095	1.093	1.093	1.100	1.101
Travel Time Index (Base)	1.098	1.098	1.097	1.097	1.105	1.105
Public Transportation Service						
Existing Service						
Annual Passenger-miles of Travel (million)	9	8	8	8	8	8
Unlinked Passenger Trips (million)	2	2	2	2	2	2
Travel Time Index (combined road and transit)	1.093	1.092	1.091	1.091	1.098	1.099
Condition if Public Transportation Service were Discontinued						
Travel Time Index	1.100	1.100	1.099	1.099	1.107	1.106
Annual Delay Increase (1000 hours)	35	40	37	37	39	27
Annual Delay Increase per Peak Traveler (hours)	1	1	1	1	1	0
Annual Congestion Cost Increase ($million)	0.6	0.7	0.6	0.6	0.6	0.4

Growth in Delay per Peak Traveler



Small areas have populations under 0.5 million

Growth in Total Delay



Small areas have populations under 0.5 million