

Performance Measure Summary – Louisville, KY

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 Louisville KY-IN

Inventory Measures	2007	2006	2005	2004	2003	2002
Urban Area Information						
Population (1000s)	915	915	905	900	890	875
Rank	47	47	47	47	47	45
Urban Area (square miles)	470	470	470	470	465	450
Population Density (persons/sq mile)	1,947	1,947	1,926	1,915	1,914	1,944
Peak Travelers (1000s)	503	501	491	486	478	465
Freeway						
Daily Vehicle-Miles of Travel (1000s)	12,085	11,925	11,800	11,730	11,500	11,000
Lane-Miles	800	780	750	725	720	705
Arterial Streets						
Daily Vehicle-Miles of Travel (1000s)	8,570	8,550	8,545	8,705	8,495	8,140
Lane-Miles	1,540	1,520	1,515	1,505	1,480	1,450
Public Transportation						
Annual Psgr-Miles of Travel (millions)	63.4	56.7	56.9	57.3	49.0	51.2
Annual Unlinked Psgr Trips (millions)	15.7	15.0	15.4	15.5	13.3	15.0
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	2.56	2.24	1.83	1.44	1.33
System Performance	2007	2006	2005	2004	2003	2002
Congested Travel (% of peak VMT)	55	58	59	60	57	54
Congested System (% of lane-miles)	47	52	52	52	50	48
Congested Time (number of "Rush Hours")	7.0	7.0	7.2	7.2	7.2	7.2
Annual Increase Needed to Maintain Constant Congestion Level:						
Lane-miles	36	47	40	47	44	37
Transit Riders or Carpoolers (millions)	11	15	12	15	14	11
Annual Excess Fuel Consumed						
Total Fuel (1000 gallons)	13,024	14,036	14,239	14,787	13,474	12,601
Rank	35	35	34	32	33	33
Fuel per Peak Traveler (gallons)	26	28	29	30	28	27
Rank	31	22	22	14	17	18
Annual Delay						
Total Delay (1000s of person-hours)	19,015	19,934	20,238	21,158	19,337	18,243
Rank	38	36	36	33	35	35
Delay per Peak Traveler (person-hours)	38	40	41	44	40	39
Rank	29	25	27	16	19	20
Delay due to Incidents (percent)	56	56	56	57	56	56
Travel Time Index	1.20	1.22	1.23	1.23	1.22	1.21
Rank	35	33	29	29	30	31
Congestion Cost						
Total Cost (\$ millions)	409	416	404	398	348	320
Rank	37	36	35	33	33	32
Cost per Peak Traveler (\$)	813	830	822	819	728	690
Rank	25	24	23	17	20	20

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 Louisville KY-IN, Continued

Inventory Measures	2001	2000	1999	1998	1997
Urban Area Information					
Population (1000s)	860	850	840	830	830
Rank	45	44	44	44	43
Urban Area (square miles)	435	420	410	400	400
Population Density (persons/sq mile)	1,977	2,024	2,049	2,075	2,075
Peak Travelers (1000s)	451	439	429	419	413
Freeway					
Daily Vehicle-Miles of Travel (1000s)	10,400	10,200	10,035	9,900	9,600
Lane-Miles	690	680	670	665	665
Arterial Streets					
Daily Vehicle-Miles of Travel (1000s)	8,095	8,445	8,350	8,210	7,985
Lane-Miles	1,435	1,420	1,415	1,375	1,330
Public Transportation					
Annual Psgr-Miles of Travel (millions)	57.6	58.7	66.5	63.0	67.6
Annual Unlinked Psgr Trips (millions)	16.6	15.9	17.4	16.9	16.4
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)	1.40	1.48	1.09	1.06	1.12
System Performance	2001	2000	1999	1998	1997
Congested Travel (% of peak VMT)	50	53	53	53	49
Congested System (% of lane-miles)	47	48	48	48	45
Congested Time (number of "Rush Hours")	7.0	7.0	7.0	7.0	6.8
Annual Increase Needed to Maintain Constant Congestion Level:					
Lane-miles	34	56	60	68	84
Transit Riders or Carpoolers (millions)	10	17	18	21	26
Annual Excess Fuel Consumed					
Total Fuel (1000 gallons)	11,123	12,159	11,887	11,361	10,550
Rank	33	31	31	31	32
Fuel per Peak Traveler (gallons)	25	28	28	27	26
Rank	19	15	13	12	12
Annual Delay					
Total Delay (1000s of person-hours)	16,370	18,144	17,898	16,901	16,095
Rank	33	31	31	31	30
Delay per Peak Traveler (person-hours)	36	41	42	40	39
Rank	22	15	12	11	11
Delay due to Incidents (percent)	55	55	55	55	55
Travel Time Index	1.19	1.21	1.21	1.20	1.19
Rank	32	29	25	25	26
Congestion Cost					
Total Cost (\$ millions)	283	308	286	265	251
Rank	33	31	31	30	30
Cost per Peak Traveler (\$)	629	701	667	632	608
Rank	20	14	13	11	12

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 Louisville KY-IN, Continued

Inventory Measures	1996	1995	1994	1993	1992
Urban Area Information					
Population (1000s)	825	825	825	820	815
Rank	42	42	41	41	40
Urban Area (square miles)	395	395	390	390	385
Population Density (persons/sq mile)	2,089	2,089	2,115	2,103	2,117
Peak Travelers (1000s)	406	401	396	389	381
Freeway					
Daily Vehicle-Miles of Travel (1000s)	9,210	8,665	8,175	7,850	7,110
Lane-Miles	665	645	625	625	600
Arterial Streets					
Daily Vehicle-Miles of Travel (1000s)	7,855	7,690	7,770	7,495	7,215
Lane-Miles	1,300	1,275	1,250	1,220	1,210
Public Transportation					
Annual Psgr-Miles of Travel (millions)	58.3	58.3	81.5	73.1	72.0
Annual Unlinked Psgr Trips (millions)	17.9	19.8	25.2	22.2	24.9
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)	1.25	1.14	1.01	1.05	1.03
System Performance	1996	1995	1994	1993	1992
Congested Travel (% of peak VMT)	48	45	44	43	39
Congested System (% of lane-miles)	45	43	43	40	38
Congested Time (number of "Rush Hours")	6.6	6.2	6.2	6.0	5.4
Annual Increase Needed to Maintain Constant Congestion Level:					
Lane-miles	98	104	105	95	73
Transit Riders or Carpoolers (millions)	30	31	31	27	20
Annual Excess Fuel Consumed					
Total Fuel (1000 gallons)	9,783	8,549	8,465	7,862	6,704
Rank	31	35	30	30	32
Fuel per Peak Traveler (gallons)	24	21	21	20	18
Rank	16	21	17	17	22
Annual Delay					
Total Delay (1000s of person-hours)	15,056	13,291	13,422	12,599	10,848
Rank	32	33	31	31	32
Delay per Peak Traveler (person-hours)	37	33	34	32	28
Rank	16	19	14	15	20
Delay due to Incidents (percent)	55	55	55	55	55
Travel Time Index	1.18	1.16	1.17	1.16	1.15
Rank	27	31	26	26	26
Congestion Cost					
Total Cost (\$ millions)	232	197	192	176	146
Rank	31	32	30	27	31
Cost per Peak Traveler (\$)	571	490	485	452	383
Rank	15	20	14	14	20

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

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The Mobility Data for Louisville KY-IN, Continued

Inventory Measures	1991	1990	1989	1988	1987
Urban Area Information					
Population (1000s)	810	810	805	805	790
Rank	40	40	39	38	39
Urban Area (square miles)	380	380	375	375	370
Population Density (persons/sq mile)	2,132	2,132	2,147	2,147	2,135
Peak Travelers (1000s)	374	369	364	361	352
Freeway					
Daily Vehicle-Miles of Travel (1000s)	6,560	6,265	6,130	5,980	5,530
Lane-Miles	590	590	590	565	540
Arterial Streets					
Daily Vehicle-Miles of Travel (1000s)	6,810	6,305	6,000	5,970	6,200
Lane-Miles	1,205	1,205	1,150	1,125	1,125
Public Transportation					
Annual Psgr-Miles of Travel (millions)	81.8	77.3	97.2	90.2	89.0
Annual Unlinked Psgr Trips (millions)	22.8	21.9	27.7	24.7	23.4
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)	1.04	1.06	1.10	1.02	1.02
System Performance	1991	1990	1989	1988	1987
Congested Travel (% of peak VMT)	34	31	28	29	31
Congested System (% of lane-miles)	37	37	35	35	37
Congested Time (number of "Rush Hours")	5.0	4.2	4.0	4.2	4.2
Annual Increase Needed to Maintain Constant Congestion Level:					
Lane-miles	70	70	68	60	58
Transit Riders or Carpoolers (millions)	18	17	17	15	14
Annual Excess Fuel Consumed					
Total Fuel (1000 gallons)	5,443	4,284	4,122	4,201	4,415
Rank	34	38	36	35	30
Fuel per Peak Traveler (gallons)	15	12	11	12	13
Rank	26	38	37	28	23
Annual Delay					
Total Delay (1000s of person-hours)	8,922	6,917	6,907	7,044	7,377
Rank	34	37	34	33	29
Delay per Peak Traveler (person-hours)	24	19	19	19	21
Rank	27	40	34	29	23
Delay due to Incidents (percent)	55	55	55	55	55
Travel Time Index	1.13	1.10	1.10	1.11	1.11
Rank	29	40	37	30	27
Congestion Cost					
Total Cost (\$ millions)	117	87	83	80	81
Rank	34	36	33	33	29
Cost per Peak Traveler (\$)	311	236	228	223	231
Rank	29	39	35	30	24

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

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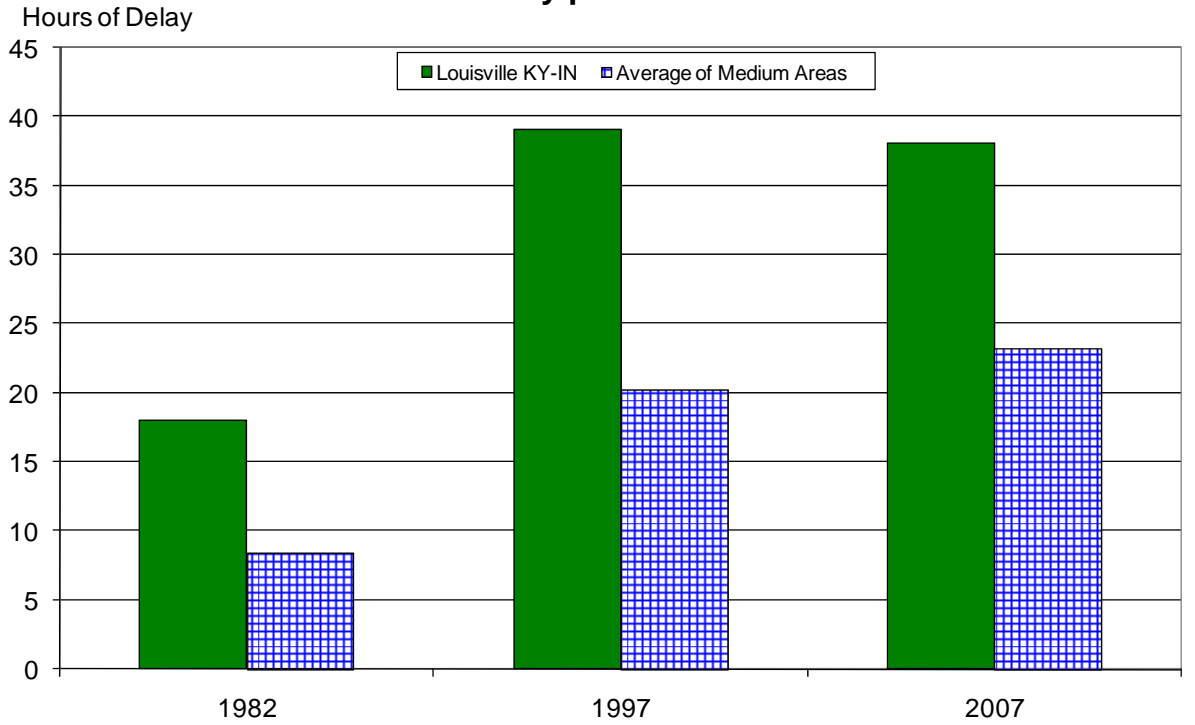
The Mobility Data for Louisville KY-IN, Continued

Inventory Measures	1986	1985	1984	1983	1982
Urban Area Information					
Population (1000s)	785	785	780	780	770
Rank	39	37	37	37	38
Urban Area (square miles)	365	360	360	360	360
Population Density (persons/sq mile)	2,151	2,181	2,167	2,167	2,139
Peak Travelers (1000s)	347	345	339	337	329
Freeway					
Daily Vehicle-Miles of Travel (1000s)	4,930	4,430	4,330	4,415	4,045
Lane-Miles	505	455	455	445	420
Arterial Streets					
Daily Vehicle-Miles of Travel (1000s)	6,105	5,950	5,670	5,610	5,845
Lane-Miles	1,110	1,105	1,090	1,090	1,065
Public Transportation					
Annual Psgr-Miles of Travel (millions)	87.9	83.5	102.2	102.2	102.2
Annual Unlinked Psgr Trips (millions)	24.6	25.3	31.6	31.6	31.6
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)	0.99	1.30	1.31	1.34	1.41
System Performance	1986	1985	1984	1983	1982
Congested Travel (% of peak VMT)	29	28	25	26	28
Congested System (% of lane-miles)	36	35	35	35	35
Congested Time (number of "Rush Hours")	4.0	4.0	3.6	3.8	4.2
Annual Increase Needed to Maintain Constant Congestion Level:					
Lane-miles	--	--	--	--	--
Transit Riders or Carpoolers (millions)	--	--	--	--	--
Annual Excess Fuel Consumed					
Total Fuel (1000 gallons)	3,921	3,637	3,109	3,182	3,457
Rank	32	29	30	29	25
Fuel per Peak Traveler (gallons)	11	11	9	9	11
Rank	27	22	27	23	12
Annual Delay					
Total Delay (1000s of person-hours)	6,599	6,143	5,308	5,407	5,956
Rank	30	28	30	30	25
Delay per Peak Traveler (person-hours)	19	18	16	16	18
Rank	24	24	24	19	13
Delay due to Incidents (percent)	55	54	54	54	54
Travel Time Index	1.11	1.11	1.09	1.10	1.11
Rank	20	19	23	17	9
Congestion Cost					
Total Cost (\$ millions)	70	66	55	54	58
Rank	29	28	30	28	25
Cost per Peak Traveler (\$)	201	191	162	161	177
Rank	24	25	26	19	13

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.

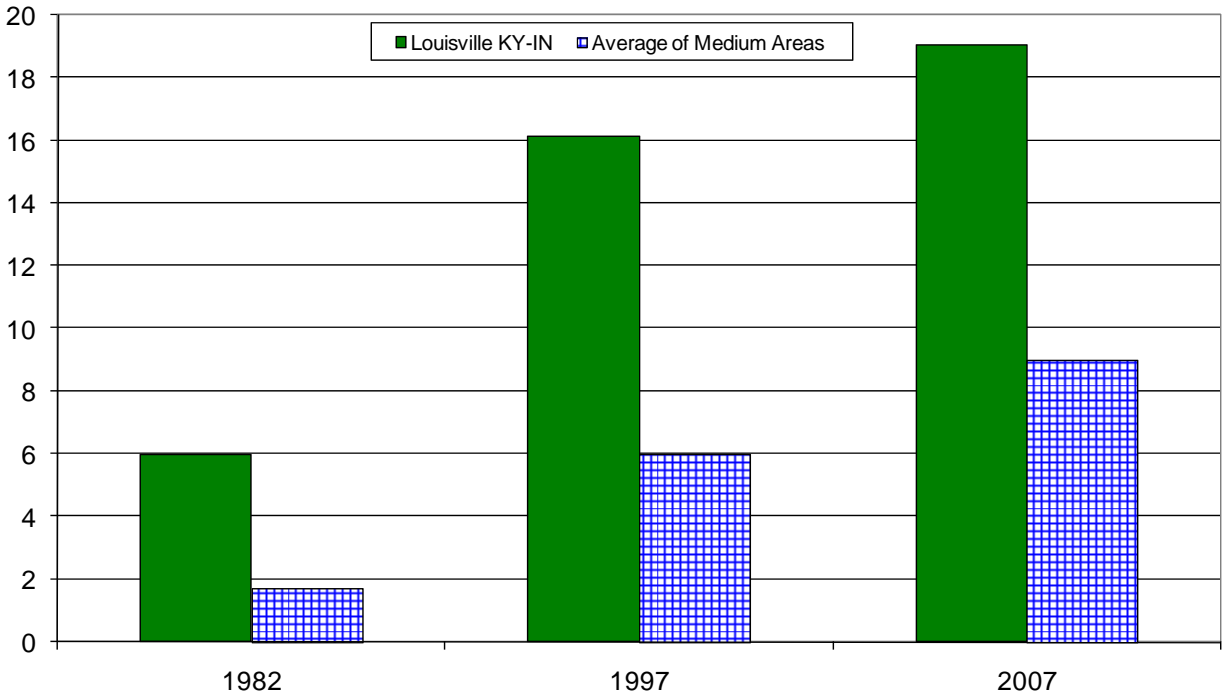
Growth in Delay per Peak Traveler



Note: Medium areas have populations between 0.5 and 1 million

Annual Hours of Delay (millions)

Growth in Total Delay



Note: Medium areas have populations between 0.5 and 1 million

**Benefits from Public Transportation Service and Operations Strategies in
Louisville KY-IN**

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	45	45	42	42
Service Patrols				
Percent of Roadway Miles	44	43	45	45
Annual Delay Reduction (1000 hours)	417	457	527	585
Arterial Signal Coordination				
Percent of Roadway Miles	65	66	66	66
Annual Delay Reduction (1000 hours)	103	102	113	112
Arterial Access Management				
Percent of Roadway Miles	10	9	9	9
Annual Delay Reduction (1000 hours)	162	127	108	141
HOV Lanes				
Daily Passenger-miles of travel (1000s)	--	--	--	--
HOV User Delay Savings	--	--	--	--
Total Effect of Operations Treatments				
Annual Delay Reduction (1000 hours)	682	686	748	837
Annual Delay Saved per Peak Traveler (hours)	1	1	2	2
Annual Congestion Cost Savings (\$million)	14.9	14.6	15.2	16.0
Travel Time Index with Strategies	1.201	1.220	1.225	1.233
Travel Time Index (Base)	1.208	1.227	1.233	1.242
Public Transportation Service	2007	2006	2005	2004
Existing Service				
Annual Passenger-miles of travel (million)	63.4	56.7	56.9	57.3
Unlinked Passenger Trips (million)	15.7	15.0	15.4	15.5
Travel Time Index (combined road and transit)	1.206	1.225	1.231	1.240
Condition if Public Transportation Service were Discontinued				
Travel Time Index	1.210	1.230	1.235	1.244
Annual Increase				
Delay (1000 hours)	501	505	442	513
Delay per Peak Traveler (hours)	1	1	1	1
Congestion Cost (\$million)	10.9	10.6	8.9	9.7

**Benefits from Public Transportation Service and Operations Strategies in
Louisville KY-IN, 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	42	18	18	--
Service Patrols				
Percent of Roadway Miles	46	47	47	49
Annual Delay Reduction (1000 hours)	488	424	325	351
Arterial Signal Coordination				
Percent of Roadway Miles	68	69	70	70
Annual Delay Reduction (1000 hours)	126	109	98	120
Arterial Access Management				
Percent of Roadway Miles	9	9	9	9
Annual Delay Reduction (1000 hours)	90	93	91	99
HOV Lanes				
Daily Passenger-miles of travel (1000s)	--	--	--	--
HOV User Delay Savings	--	--	--	--
Total Effect of Operations Treatments				
Annual Delay Reduction (1000 hours)	705	627	513	571
Annual Delay Saved per Peak Traveler (hours)	1	1	1	1
Annual Congestion Cost Savings (\$million)	12.9	11.2	9.1	9.9
Travel Time Index with Strategies	1.216	1.211	1.191	1.208
Travel Time Index (Base)	1.223	1.217	1.197	1.214
Public Transportation Service	2003	2002	2001	2000
Existing Service				
Annual Passenger-miles of travel (million)	49.0	51.2	57.6	58.7
Unlinked Passenger Trips (million)	13.3	15.0	16.6	15.9
Travel Time Index (combined road and transit)	1.222	1.216	1.195	1.212
Condition if Public Transportation Service were Discontinued				
Travel Time Index	1.225	1.219	1.201	1.217
Annual Increase				
Delay (1000 hours)	394	352	573	491
Delay per Peak Traveler (hours)	1	1	1	1
Congestion Cost (\$million)	7.1	6.2	10.0	8.4

**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