Performance Measure Summary – Kansas City, MO-KS

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 Kansas City MO-KS

Inventory Measures	2007	2006	2005	2004	2003	2002
Urban Area Information						
Population (1000s)	1,525	1,520	1,500	1,500	1,500	1,475
Rank	29	29	29	29	29	29
Urban Area (square miles)	1,050	1,045	1,045	1,045	1,045	1,035
Population Density (persons/sq mile)	1,452	1,455	1,435	1,435	1,435	1,425
Peak Travelers (1000s)	854	845	828	824	819	794
Freeway						
Daily Vehicle-Miles of Travel (1000s)	21,015	20,820	20,675	20,185	20,185	20,070
Lane-Miles	1,925	1,900	1,870	1,850	1,800	1,770
Arterial Streets						
Daily Vehicle-Miles of Travel (1000s)	13,315	13,000	12,970	12,970	12,980	12,890
Lane-Miles	3,235	3,170	3,125	3,090	3,020	2,940
Public Transportation						
Annual Psgr-Miles of Travel (millions)	63	64	60	56	58	61
Annual Unlinked Psgr Trips (millions)	16	15	15	14	14	16
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 ($/gallon)	2.85	2.54	2.20	1.78	1.43	1.30
System Performance	**2007**	**2006**	**2005**	**2004**	**2003**	**2002**
Congested Travel (% of peak VMT)	21	23	22	25	29	28
Congested System (% of lane-miles)	23	25	25	27	32	30
Congested Time (number of "Rush Hours")	3.6	3.6	3.8	3.6	4.0	4.0
Annual Increase Needed to Maintain Constant Congestion Level:						
Lane-miles	42	50	49	51	70	93
Transit Riders or Carpoolers (millions)	10	12	12	12	17	22
Annual Excess Fuel Consumed						
Total Fuel (1000 gallons)	8,085	9,162	8,637	8,826	10,187	9,681
Rank	49	44	47	46	41	41
Fuel per Peak Traveler (gallons)	9	11	10	11	12	12
Rank	71	67	67	66	59	60
Annual Delay						
Total Delay (1000s of person-hours)	12,703	14,427	13,737	12,896	14,874	14,186
Rank	47	43	45	46	43	43
Delay per Peak Traveler (person-hours)	15	17	17	16	18	18
Rank	70	68	65	70	62	62
Delay due to Incidents (percent)	61	63	62	62	61	60
Travel Time Index	1.07	1.08	1.08	1.08	1.09	1.09
Rank	80	77	77	75	66	69
Congestion Cost						
Total Cost ($ millions)	267	292	265	237	261	243
Rank	46	42	44	46	44	43
Cost per Peak Traveler ($)	312	346	320	288	319	306
Rank	70	68	67	71	62	62

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 Kansas City MO-KS, Continued

Inventory Measures	2001	2000	1999	1998	1997
Urban Area Information					
Population (1000s)	1,425	1,420	1,390	1,375	1,355
Rank	29	29	28	28	28
Urban Area (square miles)	1,030	1,000	975	900	840
Population Density (persons/sq mile)	1,383	1,420	1,426	1,528	1,613
Peak Travelers (1000s)	754	740	712	693	672
Freeway					
Daily Vehicle-Miles of Travel (1000s)	19,350	19,310	18,790	18,225	17,310
Lane-Miles	1,720	1,720	1,720	1,720	1,685
Arterial Streets					
Daily Vehicle-Miles of Travel (1000s)	12,840	12,725	12,705	12,610	12,600
Lane-Miles	2,890	2,810	2,625	2,410	2,265
Public Transportation					
Annual Psgr-Miles of Travel (millions)	69	67	64	63	55
Annual Unlinked Psgr Trips (millions)	17	16	16	16	15
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 ($/gallon)	1.33	1.48	1.02	1.01	1.06
System Performance	**2001**	**2000**	**1999**	**1998**	**1997**
Congested Travel (% of peak VMT)	28	28	28	25	25
Congested System (% of lane-miles)	30	30	30	25	25
Congested Time (number of "Rush Hours")	4.0	4.0	4.0	4.0	4.0
Annual Increase Needed to Maintain Constant Congestion Level:					
Lane-miles	80	108	116	113	145
Transit Riders or Carpoolers (millions)	19	27	29	29	38
Annual Excess Fuel Consumed					
Total Fuel (1000 gallons)	9,729	9,695	10,076	8,534	8,316
Rank	40	38	35	37	38
Fuel per Peak Traveler (gallons)	13	13	14	12	12
Rank	57	59	51	57	57
Annual Delay					
Total Delay (1000s of person-hours)	14,302	14,425	15,518	13,248	13,006
Rank	41	40	34	37	37
Delay per Peak Traveler (person-hours)	19	19	22	19	19
Rank	61	62	53	59	57
Delay due to Incidents (percent)	60	60	61	61	60
Travel Time Index	1.09	1.09	1.10	1.08	1.08
Rank	71	67	63	68	67
Congestion Cost					
Total Cost ($ millions)	243	241	243	204	199
Rank	39	37	33	36	37
Cost per Peak Traveler ($)	323	326	342	294	296
Rank	60	59	55	58	57

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 Kansas City MO-KS, Continued

Inventory Measures	1996	1995	1994	1993	1992
Urban Area Information					
Population (1000s)	1,340	1,330	1,320	1,300	1,200
Rank	28	26	26	26	29
Urban Area (square miles)	800	770	750	720	635
Population Density (persons/sq mile)	1,675	1,727	1,760	1,806	1,890
Peak Travelers (1000s)	654	638	624	605	550
Freeway					
Daily Vehicle-Miles of Travel (1000s)	16,940	15,960	15,260	14,900	13,240
Lane-Miles	1,675	1,655	1,625	1,605	1,570
Arterial Streets					
Daily Vehicle-Miles of Travel (1000s)	12,585	12,510	12,365	12,050	11,730
Lane-Miles	2,000	1,955	1,945	1,915	1,890
Public Transportation					
Annual Psgr-Miles of Travel (millions)	51	52	54	74	57
Annual Unlinked Psgr Trips (millions)	15	15	15	16	16
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 ($/gallon)	1.22	1.04	0.95	0.98	0.96
System Performance	**1996**	**1995**	**1994**	**1993**	**1992**
Congested Travel (% of peak VMT)	23	22	20	19	15
Congested System (% of lane-miles)	23	23	20	20	18
Congested Time (number of "Rush Hours")	4.2	4.0	3.8	3.8	3.2
Annual Increase Needed to Maintain Constant Congestion Level:					
Lane-miles	165	152	151	154	130
Transit Riders or Carpoolers (millions)	46	42	40	41	33
Annual Excess Fuel Consumed					
Total Fuel (1000 gallons)	7,531	6,566	6,403	6,048	3,984
Rank	39	41	38	37	43
Fuel per Peak Traveler (gallons)	12	10	10	10	7
Rank	54	58	56	52	64
Annual Delay					
Total Delay (1000s of person-hours)	12,008	10,469	10,809	10,069	6,451
Rank	38	39	36	36	43
Delay per Peak Traveler (person-hours)	18	16	17	17	12
Rank	59	59	56	52	64
Delay due to Incidents (percent)	60	59	60	59	58
Travel Time Index	1.08	1.07	1.07	1.07	1.05
Rank	64	66	65	61	73
Congestion Cost					
Total Cost ($ millions)	181	152	152	139	86
Rank	37	38	37	35	44
Cost per Peak Traveler ($)	277	238	244	229	157
Rank	57	59	55	55	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 Kansas City MO-KS, Continued

Inventory Measures	1991	1990	1989	1988	1987
Urban Area Information					
Population (1000s)	1,160	1,160	1,155	1,145	1,140
Rank	31	29	29	28	27
Urban Area (square miles)	610	610	610	600	590
Population Density (persons/sq mile)	1,902	1,902	1,893	1,908	1,932
Peak Travelers (1000s)	522	514	508	499	494
Freeway					
Daily Vehicle-Miles of Travel (1000s)	12,520	12,555	12,370	12,220	11,920
Lane-Miles	1,520	1,470	1,420	1,380	1,340
Arterial Streets					
Daily Vehicle-Miles of Travel (1000s)	11,185	10,615	10,100	9,535	8,820
Lane-Miles	1,870	1,840	1,825	1,795	1,755
Public Transportation					
Annual Psgr-Miles of Travel (millions)	71	71	72	57	55
Annual Unlinked Psgr Trips (millions)	19	19	19	19	18
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 ($/gallon)	1.01	0.98	1.11	1.02	1.03
System Performance	**1991**	**1990**	**1989**	**1988**	**1987**
Congested Travel (% of peak VMT)	13	13	13	13	10
Congested System (% of lane-miles)	16	16	16	16	16
Congested Time (number of "Rush Hours")	3.0	3.0	3.0	3.0	2.9
Annual Increase Needed to Maintain Constant Congestion Level:					
Lane-miles	149	182	224	246	256
Transit Riders or Carpoolers (millions)	36	44	54	58	60
Annual Excess Fuel Consumed					
Total Fuel (1000 gallons)	3,331	3,354	3,281	3,211	2,242
Rank	46	45	41	38	42
Fuel per Peak Traveler (gallons)	6	7	6	6	5
Rank	63	56	61	59	63
Annual Delay					
Total Delay (1000s of person-hours)	5,468	5,580	5,553	5,302	3,695
Rank	46	44	38	37	43
Delay per Peak Traveler (person-hours)	10	11	11	11	7
Rank	65	61	58	56	68
Delay due to Incidents (percent)	57	58	58	58	57
Travel Time Index	1.04	1.04	1.04	1.04	1.03
Rank	73	72	71	68	72
Congestion Cost					
Total Cost ($ millions)	71	70	66	60	41
Rank	46	42	39	37	40
Cost per Peak Traveler ($)	136	136	131	121	82
Rank	62	61	59	57	66

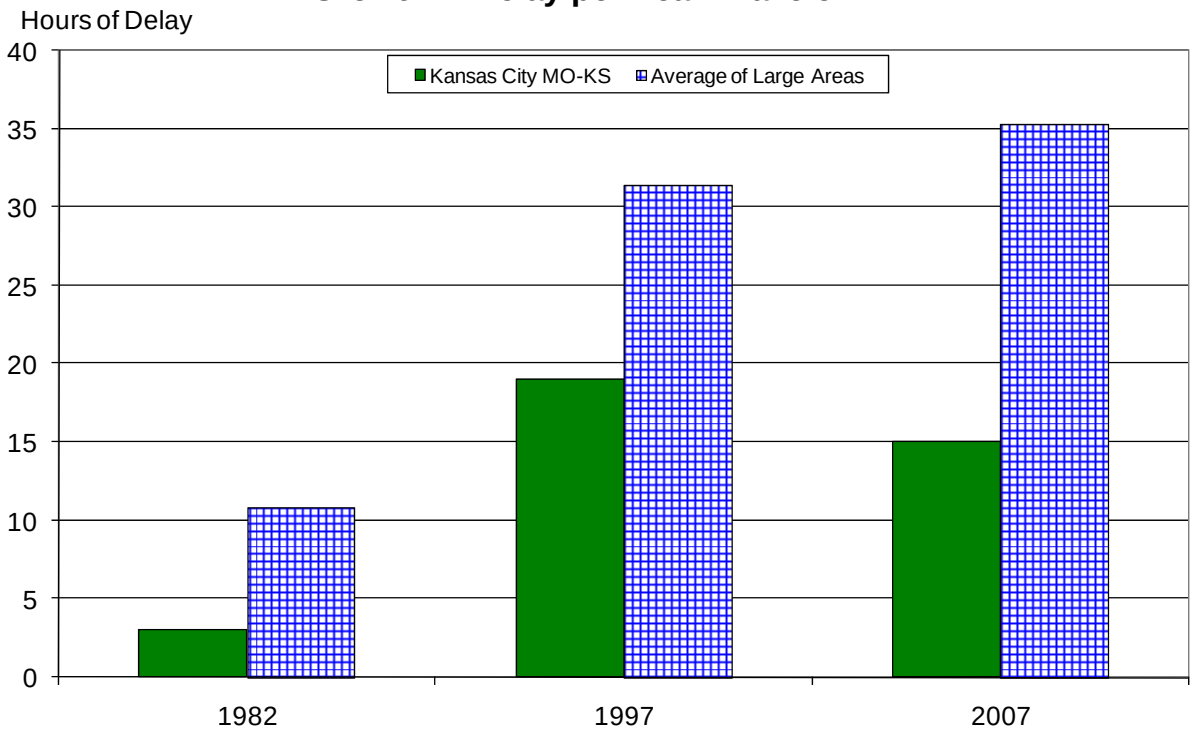
Note: System Performance statistics for 2000 through 2007 data reflect the effects of operational treatments.
Note: Zeroes in the table reflect values less than 0.5.

The Mobility Data for Kansas City MO-KS, Continued

Inventory Measures	1986	1985	1984	1983	1982
Urban Area Information					
Population (1000s)	1,135	1,130	1,100	1,095	1,090
Rank	27	27	28	28	28
Urban Area (square miles)	580	570	560	555	550
Population Density (persons/sq mile)	1,957	1,982	1,964	1,973	1,982
Peak Travelers (1000s)	487	481	465	460	452
Freeway					
Daily Vehicle-Miles of Travel (1000s)	10,905	10,190	9,380	8,985	8,425
Lane-Miles	1,300	1,280	1,250	1,250	1,225
Arterial Streets					
Daily Vehicle-Miles of Travel (1000s)	8,215	7,530	6,720	6,010	5,520
Lane-Miles	1,725	1,680	1,645	1,600	1,570
Public Transportation					
Annual Psgr-Miles of Travel (millions)	56	54	55	55	55
Annual Unlinked Psgr Trips (millions)	18	18	19	19	19
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 ($/gallon)	1.00	1.31	1.33	1.36	1.42
System Performance	**1986**	**1985**	**1984**	**1983**	**1982**
Congested Travel (% of peak VMT)	10	8	7	7	6
Congested System (% of lane-miles)	16	14	14	13	13
Congested Time (number of "Rush Hours")	2.8	2.7	2.5	2.4	2.3
Annual Increase Needed to Maintain Constant Congestion Level:					
Lane-miles	- -	- -	- -	- -	- -
Transit Riders or Carpoolers (millions)	- -	- -	- -	- -	- -
Annual Excess Fuel Consumed					
Total Fuel (1000 gallons)	1,908	1,554	1,261	1,015	884
Rank	43	48	52	54	58
Fuel per Peak Traveler (gallons)	4	3	3	2	2
Rank	65	71	67	73	72
Annual Delay					
Total Delay (1000s of person-hours)	3,102	2,682	2,075	1,665	1,465
Rank	44	49	51	56	56
Delay per Peak Traveler (person-hours)	6	6	4	4	3
Rank	69	67	72	71	76
Delay due to Incidents (percent)	57	57	56	55	55
Travel Time Index	1.03	1.03	1.02	1.02	1.02
Rank	71	69	76	74	74
Congestion Cost					
Total Cost ($ millions)	33	29	22	17	14
Rank	43	48	51	52	56
Cost per Peak Traveler ($)	67	60	46	36	32
Rank	69	71	72	75	79

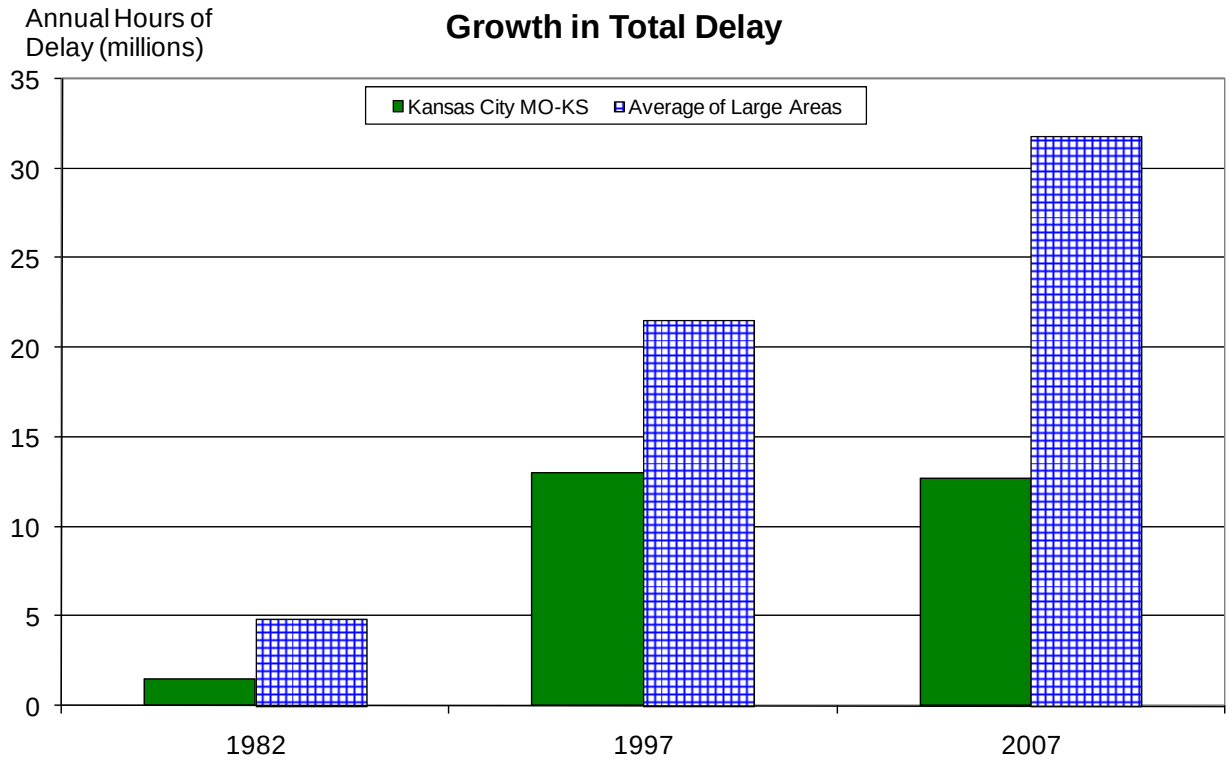
Note: System Performance statistics for 2000 through 2007 data reflect the effects of operational treatments.
Note: Zeroes in the table reflect values less than 0.5.

Growth in Delay per Peak Traveler



Note: Large areas have populations between 1 and 3 million

Growth in Total Delay



Note: Large areas have populations between 1 and 3 million

Benefits from Public Transportation Service and Operations Strategies in Kansas City MO-KS

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	16	16	16	16
Service Patrols				
Percent of Roadway Miles	42	44	43	44
Annual Delay Reduction (1000 hours)	350	509	438	383
Arterial Signal Coordination				
Percent of Roadway Miles	56	57	58	58
Annual Delay Reduction (1000 hours)	13	43	16	41
Arterial Access Management				
Percent of Roadway Miles	14	14	14	14
Annual Delay Reduction (1000 hours)	124	179	148	77
HOV Lanes				
Daily Passenger-miles of travel (1000s)	--	--	--	--
HOV User Delay Savings	--	--	--	--
Total Effect of Operations Treatments				
Annual Delay Reduction (1000 hours)	486	731	602	501
Annual Delay Saved per Peak Traveler (hours)	1	1	1	1
Annual Congestion Cost Savings ($million)	10.1	14.6	11.5	9.2
Travel Time Index with Strategies	1.071	1.083	1.078	1.081
Travel Time Index (Base)	1.073	1.086	1.080	1.084
Public Transportation Service	**2007**	**2006**	**2005**	**2004**
Existing Service				
Annual Passenger-miles of travel (million)	63	64	60	56
Unlinked Passenger Trips (million)	16	15	15	14
Travel Time Index (combined road and transit)	1.073	1.085	1.080	1.083
Condition if Public Transportation Service were Discontinued				
Travel Time Index	1.074	1.086	1.081	1.084
Annual Increase				
Delay (1000 hours)	240	215	268	170
Delay per Peak Traveler (hours)	0	0	0	0
Congestion Cost ($million)	5.0	4.3	5.1	3.0

Benefits from Public Transportation Service and Operations Strategies in Kansas City MO-KS, 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	--	--	--	--
Service Patrols				
Percent of Roadway Miles	45	46	47	47
Annual Delay Reduction (1000 hours)	398	342	354	364
Arterial Signal Coordination				
Percent of Roadway Miles	60	61	62	64
Annual Delay Reduction (1000 hours)	72	80	63	67
Arterial Access Management				
Percent of Roadway Miles	15	14	14	14
Annual Delay Reduction (1000 hours)	101	109	77	82
HOV Lanes				
Daily Passenger-miles of travel (1000s)	--	--	--	--
HOV User Delay Savings	--	--	--	--
Total Effect of Operations Treatments				
Annual Delay Reduction (1000 hours)	571	531	494	513
Annual Delay Saved per Peak Traveler (hours)	1	1	1	1
Annual Congestion Cost Savings ($million)	10.0	9.1	8.4	8.5
Travel Time Index with Strategies	1.094	1.090	1.092	1.092
Travel Time Index (Base)	1.097	1.092	1.095	1.095
Public Transportation Service	**2003**	**2002**	**2001**	**2000**
Existing Service				
Annual Passenger-miles of travel (million)	58	61	69	67
Unlinked Passenger Trips (million)	14	16	17	16
Travel Time Index (combined road and transit)	1.096	1.092	1.095	1.095
Condition if Public Transportation Service were Discontinued				
Travel Time Index	1.099	1.095	1.096	1.098
Annual Increase				
Delay (1000 hours)	501	456	227	494
Delay per Peak Traveler (hours)	1	1	0	1
Congestion Cost ($million)	8.8	7.8	3.8	8.2

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	
2007 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 2007 Trends		
Delay per Traveler -	5 Hours	3 Hours
Total Delay -	5 Hours x Average Population	3 Hours x Average Population