

Performance Measure Summary – Columbus, OH

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 Columbus OH

Inventory Measures	2007	2006	2005	2004	2003	2002
Urban Area Information						
Population (1000s)	1,225	1,205	1,195	1,195	1,190	1,165
Rank	35	35	35	35	35	35
Urban Area (square miles)	610	610	605	605	600	580
Population Density (persons/sq mile)	2,008	1,975	1,975	1,975	1,983	2,009
Peak Travelers (1000s)	686	670	660	656	650	627
Freeway						
Daily Vehicle-Miles of Travel (1000s)	15,210	15,430	14,960	15,045	14,665	13,900
Lane-Miles	960	960	955	955	955	930
Arterial Streets						
Daily Vehicle-Miles of Travel (1000s)	10,160	10,175	10,440	10,110	9,870	9,690
Lane-Miles	2,150	2,120	2,120	2,020	1,910	1,835
Public Transportation						
Annual Psgr-Miles of Travel (millions)	58	61	60	60	60	68
Annual Unlinked Psgr Trips (millions)	15	15	15	15	16	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)	2.88	2.58	2.24	1.81	1.52	1.38
System Performance	2007	2006	2005	2004	2003	2002
Congested Travel (% of peak VMT)	57	58	59	59	56	52
Congested System (% of lane-miles)	43	43	46	46	45	43
Congested Time (number of "Rush Hours")	7.0	7.2	7.0	7.2	7.0	6.8
Annual Increase Needed to Maintain Constant Congestion Level:						
Lane-miles	46	70	110	115	105	88
Transit Riders or Carpoolers (millions)	13	20	32	34	31	26
Annual Excess Fuel Consumed						
Total Fuel (1000 gallons)	14,519	15,260	15,513	15,656	13,855	12,685
Rank	34	32	31	31	31	32
Fuel per Peak Traveler (gallons)	21	23	24	24	21	20
Rank	39	35	35	32	37	39
Annual Delay						
Total Delay (1000s of person-hours)	20,428	21,348	21,958	22,123	19,749	18,487
Rank	34	34	32	31	33	32
Delay per Peak Traveler (person-hours)	30	32	33	34	30	29
Rank	40	39	36	34	43	43
Delay due to Incidents (percent)	54	54	54	54	54	54
Travel Time Index	1.18	1.19	1.19	1.20	1.18	1.17
Rank	39	37	36	36	39	41
Congestion Cost						
Total Cost (\$ millions)	424	431	422	402	343	311
Rank	35	33	33	32	35	34
Cost per Peak Traveler (\$)	618	643	639	613	527	497
Rank	40	40	38	37	42	43

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 Columbus OH, Continued

Inventory Measures	2001	2000	1999	1998	1997
Urban Area Information					
Population (1000s)	1,140	1,110	1,090	1,065	1,045
Rank	35	35	36	37	37
Urban Area (square miles)	555	530	515	500	485
Population Density (persons/sq mile)	2,054	2,094	2,117	2,130	2,155
Peak Travelers (1000s)	603	578	558	537	518
Freeway					
Daily Vehicle-Miles of Travel (1000s)	13,400	12,000	11,650	11,500	11,315
Lane-Miles	895	860	830	820	815
Arterial Streets					
Daily Vehicle-Miles of Travel (1000s)	9,510	9,300	9,150	9,005	8,850
Lane-Miles	1,750	1,685	1,620	1,550	1,475
Public Transportation					
Annual Psgr-Miles of Travel (millions)	75	76	79	75	71
Annual Unlinked Psgr Trips (millions)	19	19	19	18	18
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)	1.30	1.55	1.14	1.11	1.13
System Performance	2001	2000	1999	1998	1997
Congested Travel (% of peak VMT)	48	43	44	44	44
Congested System (% of lane-miles)	38	37	33	33	34
Congested Time (number of "Rush Hours")	6.8	6.2	6.4	6.4	6.4
Annual Increase Needed to Maintain Constant Congestion Level:					
Lane-miles	91	76	85	93	112
Transit Riders or Carpoolers (millions)	27	22	25	28	34
Annual Excess Fuel Consumed					
Total Fuel (1000 gallons)	12,015	10,677	10,955	10,799	10,556
Rank	32	34	32	32	31
Fuel per Peak Traveler (gallons)	20	18	20	20	20
Rank	37	43	36	32	32
Annual Delay					
Total Delay (1000s of person-hours)	17,730	16,543	16,813	16,528	16,095
Rank	32	32	32	32	30
Delay per Peak Traveler (person-hours)	29	29	30	31	31
Rank	41	41	34	31	32
Delay due to Incidents (percent)	55	55	54	54	53
Travel Time Index	1.17	1.16	1.17	1.17	1.16
Rank	40	40	39	35	38
Congestion Cost					
Total Cost (\$ millions)	297	275	266	256	248
Rank	32	32	32	31	31
Cost per Peak Traveler (\$)	492	475	476	477	478
Rank	43	42	36	32	32

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 Columbus OH, Continued

Inventory Measures	1996	1995	1994	1993	1992
Urban Area Information					
Population (1000s)	1,025	1,010	995	985	950
Rank	36	36	35	35	36
Urban Area (square miles)	475	470	440	400	350
Population Density (persons/sq mile)	2,158	2,149	2,261	2,463	2,714
Peak Travelers (1000s)	500	485	471	458	435
Freeway					
Daily Vehicle-Miles of Travel (1000s)	10,980	10,650	10,330	10,060	9,460
Lane-Miles	810	810	805	800	780
Arterial Streets					
Daily Vehicle-Miles of Travel (1000s)	8,375	7,735	7,215	6,825	6,435
Lane-Miles	1,405	1,365	1,330	1,305	1,280
Public Transportation					
Annual Psgr-Miles of Travel (millions)	73	75	85	88	87
Annual Unlinked Psgr Trips (millions)	18	18	18	17	18
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)	1.28	1.12	1.08	1.09	1.11
System Performance	1996	1995	1994	1993	1992
Congested Travel (% of peak VMT)	43	43	39	38	35
Congested System (% of lane-miles)	34	37	35	35	32
Congested Time (number of "Rush Hours")	6.2	5.8	5.6	5.4	5.0
Annual Increase Needed to Maintain Constant Congestion Level:					
Lane-miles	106	95	107	105	93
Transit Riders or Carpoolers (millions)	32	28	31	29	25
Annual Excess Fuel Consumed					
Total Fuel (1000 gallons)	9,620	8,900	7,845	6,966	5,801
Rank	32	31	32	34	35
Fuel per Peak Traveler (gallons)	19	18	17	15	13
Rank	33	31	32	35	39
Annual Delay					
Total Delay (1000s of person-hours)	14,650	13,225	11,758	10,399	8,721
Rank	33	34	35	34	35
Delay per Peak Traveler (person-hours)	29	27	25	23	20
Rank	32	33	34	38	38
Delay due to Incidents (percent)	53	52	52	52	53
Travel Time Index	1.16	1.15	1.14	1.13	1.11
Rank	36	36	37	34	41
Congestion Cost					
Total Cost (\$ millions)	223	193	167	144	117
Rank	32	33	33	34	35
Cost per Peak Traveler (\$)	445	399	355	313	269
Rank	31	33	35	39	39

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The Mobility Data for Columbus OH, Continued

Inventory Measures	1991	1990	1989	1988	1987
Urban Area Information					
Population (1000s)	920	870	855	840	840
Rank	36	36	36	36	36
Urban Area (square miles)	315	310	305	305	305
Population Density (persons/sq mile)	2,921	2,806	2,803	2,754	2,754
Peak Travelers (1000s)	414	385	376	366	364
Freeway					
Daily Vehicle-Miles of Travel (1000s)	9,200	9,030	8,350	8,155	7,915
Lane-Miles	775	770	760	760	755
Arterial Streets					
Daily Vehicle-Miles of Travel (1000s)	6,140	5,810	5,380	5,105	4,825
Lane-Miles	1,260	1,245	1,220	1,185	1,155
Public Transportation					
Annual Psgr-Miles of Travel (millions)	89	94	84	94	89
Annual Unlinked Psgr Trips (millions)	18	20	19	19	19
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)	1.13	1.06	1.08	1.00	1.00
System Performance	1991	1990	1989	1988	1987
Congested Travel (% of peak VMT)	31	30	25	22	19
Congested System (% of lane-miles)	30	30	28	28	23
Congested Time (number of "Rush Hours")	4.8	4.6	3.8	3.6	3.2
Annual Increase Needed to Maintain Constant Congestion Level:					
Lane-miles	100	120	104	115	128
Transit Riders or Carpoolers (millions)	26	30	25	27	30
Annual Excess Fuel Consumed					
Total Fuel (1000 gallons)	5,014	4,752	3,610	2,916	2,290
Rank	35	34	37	40	41
Fuel per Peak Traveler (gallons)	12	12	10	8	6
Rank	40	38	42	46	53
Annual Delay					
Total Delay (1000s of person-hours)	7,555	7,166	5,374	4,385	3,428
Rank	35	36	41	42	46
Delay per Peak Traveler (person-hours)	18	19	14	12	9
Rank	43	40	48	52	61
Delay due to Incidents (percent)	53	54	54	54	54
Travel Time Index	1.10	1.10	1.08	1.07	1.05
Rank	41	40	47	46	58
Congestion Cost					
Total Cost (\$ millions)	99	90	64	49	37
Rank	35	34	41	41	46
Cost per Peak Traveler (\$)	238	233	169	133	101
Rank	41	41	48	53	59

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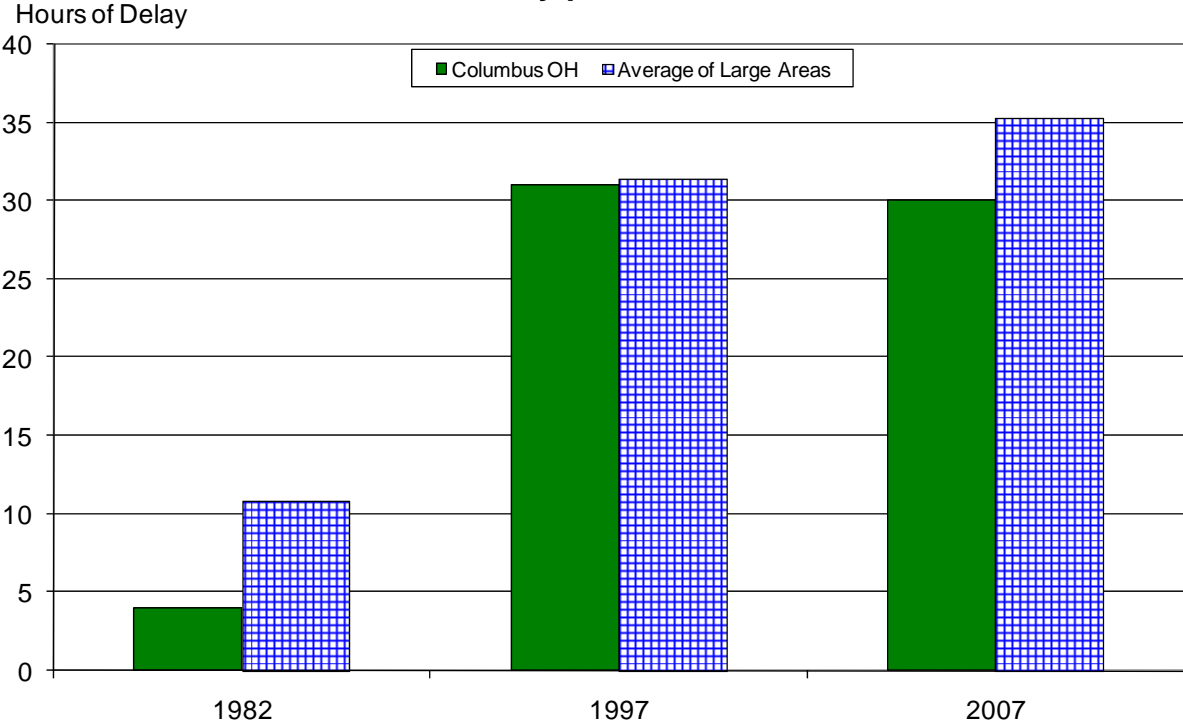
The Mobility Data for Columbus OH, Continued

Inventory Measures	1986	1985	1984	1983	1982
Urban Area Information					
Population (1000s)	835	835	835	835	835
Rank	36	36	36	36	35
Urban Area (square miles)	305	305	305	305	305
Population Density (persons/sq mile)	2,738	2,738	2,738	2,738	2,738
Peak Travelers (1000s)	358	356	353	351	347
Freeway					
Daily Vehicle-Miles of Travel (1000s)	7,565	6,960	6,805	6,550	6,200
Lane-Miles	750	750	740	735	735
Arterial Streets					
Daily Vehicle-Miles of Travel (1000s)	4,515	4,175	3,835	3,420	3,010
Lane-Miles	1,110	1,085	1,065	1,030	1,005
Public Transportation					
Annual Psgr-Miles of Travel (millions)	113	122	125	125	125
Annual Unlinked Psgr Trips (millions)	24	26	26	26	26
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)	16	14	13	12	10
Congested System (% of lane-miles)	21	18	15	15	13
Congested Time (number of "Rush Hours")	3.0	2.8	2.8	2.7	2.6
Annual Increase Needed to Maintain Constant Congestion Level:					
Lane-miles	--	--	--	--	--
Transit Riders or Carpoolers (millions)	--	--	--	--	--
Annual Excess Fuel Consumed					
Total Fuel (1000 gallons)	1,850	1,490	1,284	1,095	963
Rank	44	51	50	51	52
Fuel per Peak Traveler (gallons)	5	4	4	3	3
Rank	61	60	58	64	58
Annual Delay					
Total Delay (1000s of person-hours)	2,826	2,291	1,944	1,647	1,500
Rank	48	52	54	57	55
Delay per Peak Traveler (person-hours)	8	6	6	5	4
Rank	62	67	63	66	69
Delay due to Incidents (percent)	54	54	55	55	55
Travel Time Index	1.05	1.04	1.04	1.03	1.03
Rank	55	59	55	63	62
Congestion Cost					
Total Cost (\$ millions)	29	24	20	16	15
Rank	47	51	53	55	52
Cost per Peak Traveler (\$)	82	68	57	47	42
Rank	62	66	67	68	70

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.

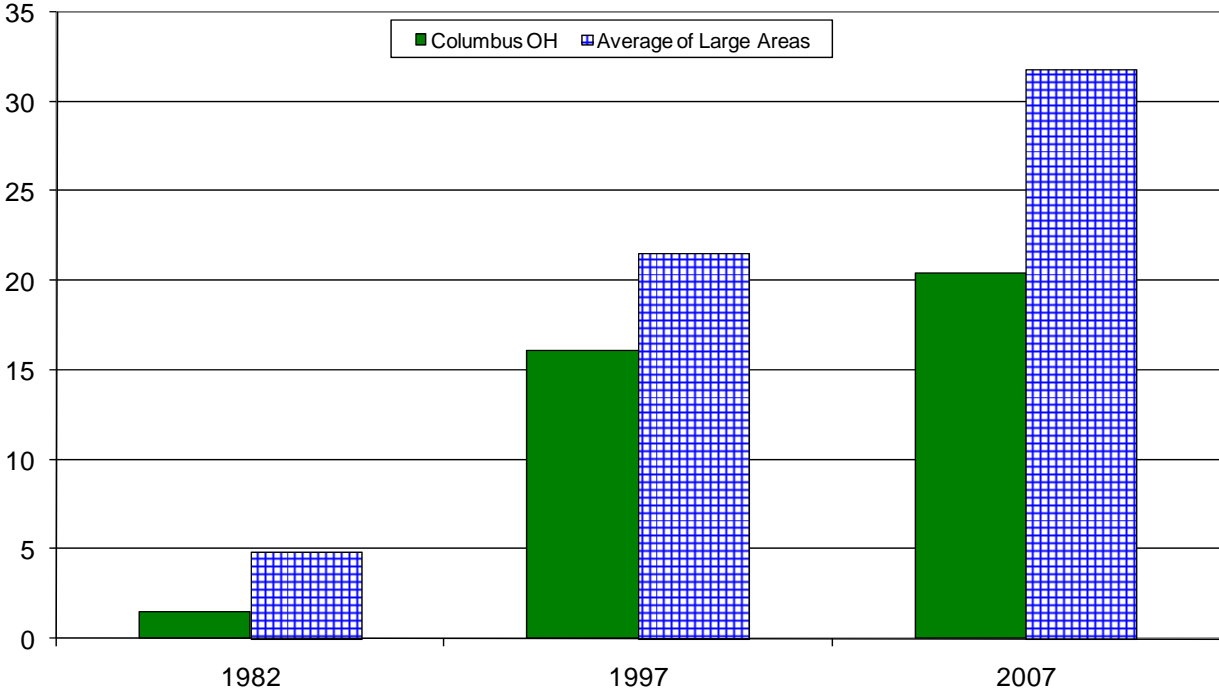
Growth in Delay per Peak Traveler



Note: Large areas have populations between 1 and 3 million

Annual Hours of Delay (millions)

Growth in Total Delay



Note: Large areas have populations between 1 and 3 million

**Benefits from Public Transportation Service and Operations Strategies in
Columbus OH**

Operations Strategies	2007	2006	2005	2004
Freeway Ramp Metering				
Percent of Roadway Miles	8	8	8	8
Annual Delay Reduction (1000 hours)	43	46	41	43
Freeway Incident Management				
Cameras				
Percent of Roadway Miles	19	19	19	19
Service Patrols				
Percent of Roadway Miles	94	94	94	94
Annual Delay Reduction (1000 hours)	763	823	781	807
Arterial Signal Coordination				
Percent of Roadway Miles	48	49	42	33
Annual Delay Reduction (1000 hours)	36	46	63	48
Arterial Access Management				
Percent of Roadway Miles	14	14	11	11
Annual Delay Reduction (1000 hours)	160	170	246	272
HOV Lanes				
Daily Passenger-miles of travel (1000s)	--	--	--	--
HOV User Delay Savings	--	--	--	--
Total Effect of Operations Treatments				
Annual Delay Reduction (1000 hours)	1,002	1,085	1,130	1,170
Annual Delay Saved per Peak Traveler (hours)	1	2	2	2
Annual Congestion Cost Savings (\$million)	21.8	22.9	22.6	22.0
Travel Time Index with Strategies	1.182	1.190	1.195	1.199
Travel Time Index (Base)	1.190	1.199	1.204	1.208
Public Transportation Service	2007	2006	2005	2004
Existing Service				
Annual Passenger-miles of travel (million)	58	61	60	60
Unlinked Passenger Trips (million)	15	15	15	15
Travel Time Index (combined road and transit)	1.189	1.197	1.203	1.207
Condition if Public Transportation Service were Discontinued				
Travel Time Index	1.192	1.201	1.207	1.211
Annual Increase				
Delay (1000 hours)	451	418	555	435
Delay per Peak Traveler (hours)	1	1	1	1
Congestion Cost (\$million)	9.5	8.5	10.8	8.0

**Benefits from Public Transportation Service and Operations Strategies in
Columbus OH, Continued**

Operations Strategies	2003	2002	2001	2000
Freeway Ramp Metering				
Percent of Roadway Miles	8	8	3	1
Annual Delay Reduction (1000 hours)	36	32	33	8
Freeway Incident Management				
Cameras				
Percent of Roadway Miles	17	17	17	17
Service Patrols				
Percent of Roadway Miles	94	96	--	--
Annual Delay Reduction (1000 hours)	628	577	15	14
Arterial Signal Coordination				
Percent of Roadway Miles	31	32	33	35
Annual Delay Reduction (1000 hours)	45	32	40	44
Arterial Access Management				
Percent of Roadway Miles	11	10	10	10
Annual Delay Reduction (1000 hours)	325	236	212	110
HOV Lanes				
Daily Passenger-miles of travel (1000s)	--	--	--	--
HOV User Delay Savings	--	--	--	--
Total Effect of Operations Treatments				
Annual Delay Reduction (1000 hours)	1,034	877	301	176
Annual Delay Saved per Peak Traveler (hours)	2	1	0	0
Annual Congestion Cost Savings (\$million)	18.5	15.4	4.9	2.9
Travel Time Index with Strategies	1.179	1.170	1.165	1.157
Travel Time Index (Base)	1.188	1.177	1.168	1.159
Public Transportation Service	2003	2002	2001	2000
Existing Service				
Annual Passenger-miles of travel (million)	60	68	75	76
Unlinked Passenger Trips (million)	16	16	19	19
Travel Time Index (combined road and transit)	1.186	1.176	1.166	1.157
Condition if Public Transportation Service were Discontinued				
Travel Time Index	1.190	1.180	1.171	1.162
Annual Increase				
Delay (1000 hours)	463	458	520	539
Delay per Peak Traveler (hours)	1	1	1	1
Congestion Cost (\$million)	8.2	7.9	8.8	9.0

**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	
	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