

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 Medium Group – 500,000 to 1 million population urban areas

Urban Area	Delay per Traveler	Travel Time Index	Total Delay	1982 to 2005	
				Delay per Traveler	Total Delay
Jacksonville, FL	H+	H+	H+	F	F+
Nashville-Davidson, TN	H+	0	H+	0	F+
Salt Lake City, UT	0	H	H	0	F+
Raleigh-Durham, NC	H+	H	H+	F+	F+
Richmond, VA	L-	L-	0	S-	S
Louisville, KY-IN	H+	H+	H+	F+	F+
Hartford, CT	L-	L-	L	S	S-
Bridgeport-Stamford, CT-NY	H	H+	H+	F	F+
Charlotte, NC-SC	H+	H+	H+	F+	F+
Austin, TX	H+	H+	H+	F+	F+
Oklahoma City, OK	L-	L-	L	S	S-
Tulsa, OK	L-	L-	L	S-	S-
Tucson, AZ	H+	H+	H+	0	F+
Dayton, OH	L-	L-	L-	S-	S-
Honolulu, HI	L	H+	L	S-	S-
Birmingham, AL	H+	0	H	F+	F+
El Paso, TX-NM	L	0	L	F	S-
Rochester, NY	L-	L-	L-	S-	S-
Springfield, MA-CT	L-	L-	L-	S-	S-
Omaha, NE-IA	L	0	L	0	S-
Sarasota-Bradenton, FL	L	H	L	S-	S-
Allentown-Bethlehem, PA-NJ	L-	L	L-	S-	S-
Akron, OH	L-	L-	L-	S-	S-
Fresno, CA	L-	L	L-	S-	S-
Grand Rapids, MI	L	L-	L-	0	S-
Oxnard-Ventura, CA	H+	H+	0	F+	F+
Albuquerque, NM	H+	0	0	F	S
New Haven, CT	L-	L-	L-	S-	S-
Albany-Schenectady, NY	L-	L-	L-	S-	S-
Toledo, OH-MI	L-	L-	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	
	Above 1M Population	Below 1M Population
2005 Values Delay per Traveler - Travel Time Index - Total Delay -	5 Hours 5 Index Points 5 Hours x Average Population	3 Hours 3 Index Points 3 Hours x Average Population
1982 to 2005 Trends Delay per Traveler - Total Delay -	5 Hours 5 Hours x Average Population	3 Hours 3 Hours x Average Population

The Mobility Data for Akron, OH

Inventory Measures	2005	2004	2003	2002	2001	2000
Urban Area Information						
Population (1000s)	615	610	590	580	570	560
Rank	62	62	62	62	61	62
Urban Area (square miles)	390	385	375	370	370	365
Popn Density (persons/sq mile)	1,577	1,584	1,573	1,568	1,541	1,534
Peak Travelers (1000s)	334	329	317	308	299	290
Freeway						
Daily Vehicle-Miles of Travel (1000s)	5,555	5,650	5,435	5,335	5,350	5,320
Lane Miles	430	430	430	430	430	425
Arterial Streets						
Daily Vehicle-Miles of Travel (1000s)	3,960	4,025	3,990	3,990	4,005	4,005
Lane Miles	1,185	1,180	1,175	1,125	1,120	1,120
Public Transportation						
Annual Psgr-Miles of Travel (millions)	26	29	27	31	23	29
Annual Unlinked Psgr Trips (millions)	7	7	7	8	7	8
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)	2.24	1.81	1.52	1.38	1.30	1.55
System Performance						
Congested Travel (% of peak VMT)	29	30	26	27	27	27
Congested System (% of lane-miles)	29	29	28	31	31	31
Congested Time (number of "Rush Hours")	4.8	5.0	4.6	4.4	4.4	4.6
Annual Increase Needed To Maintain Constant Congestion Level:						
Lane-Miles	7	12	6	8	17	28
Transit Riders or Carpoolers (millions)	1	3	1	2	3	6
Annual Excess Fuel Consumed						
Total Fuel (1000 gallons)	2,340	2,517	2,249	2,343	2,448	2,515
Rank	74	71	72	69	68	68
Fuel per Peak Traveler (gallons)	7	8	7	8	8	9
Rank	76	73	74	72	73	70
Annual Delay						
Total Delay (1000s of person-hours)	3,293	3,554	3,242	3,416	3,588	3,675
Rank	76	73	73	72	69	69
Delay per Peak Traveler (person-hrs)	10	11	10	11	12	13
Rank	80	76	77	75	73	73
Delay due to Incidents (percent)	54	54	55	55	55	55
Travel Time Index						
Rank	1.07	1.08	1.07	1.08	1.08	1.08
Rank	76	71	74	70	70	71
Congestion Cost						
Total Cost (\$ millions)	62	63	56	57	59	59
Rank	75	72	73	73	69	68
Cost per Peak Traveler (\$)	185	192	176	186	197	206
Rank	80	78	78	75	73	74

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 Akron, OH, Continued

Inventory Measures	1999	1998	1997	1996	1995	1994
Urban Area Information						
Population (1000s)	550	545	540	535	535	530
Rank	63	62	62	62	62	61
Urban Area (square miles)	360	360	355	350	350	350
Popn Density (persons/sq mile)	1,528	1,514	1,521	1,529	1,529	1,514
Peak Travelers (1000s)	281	275	269	263	260	254
Freeway						
Daily Vehicle-Miles of Travel (1000s)	5,245	5,210	5,100	4,775	4,635	4,715
Lane Miles	425	420	420	415	415	415
Arterial Streets						
Daily Vehicle-Miles of Travel (1000s)	4,050	4,040	3,995	4,105	3,900	3,770
Lane Miles	1,110	1,105	1,100	1,080	1,075	1,075
Public Transportation						
Annual Psgr-Miles of Travel (millions)	24	25	24	21	21	20
Annual Unlinked Psgr Trips (millions)	7	8	7	7	6	7
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)	1.14	1.11	1.13	1.28	1.12	1.08
System Performance						
Congested Travel (% of peak VMT)	27	27	26	23	22	23
Congested System (% of lane-miles)	31	31	31	30	30	34
Congested Time (number of "Rush Hours")	4.4	4.4	4.2	3.8	3.6	3.6
Annual Increase Needed To Maintain Constant Congestion Level:						
Lane-Miles	28	41	55	57	51	58
Transit Riders or Carpoolers (millions)	6	9	12	12	10	11
Annual Excess Fuel Consumed						
Total Fuel (1000 gallons)	2,573	2,550	2,378	2,008	1,607	1,860
Rank	68	64	64	65	69	65
Fuel per Peak Traveler (gallons)	9	9	9	8	6	7
Rank	71	69	69	69	73	67
Annual Delay						
Total Delay (1000s of person-hours)	3,801	3,761	3,509	3,042	2,443	2,830
Rank	68	67	66	65	69	67
Delay per Peak Traveler (person-hrs)	14	14	13	12	9	11
Rank	72	69	69	69	76	70
Delay due to Incidents (percent)	55	55	55	54	53	54
Travel Time Index						
Rank	1.08	1.08	1.08	1.07	1.06	1.07
Rank	69	69	69	70	72	67
Congestion Cost						
Total Cost (\$ millions)	59	57	53	45	35	39
Rank	68	67	64	65	69	64
Cost per Peak Traveler (\$)	209	208	197	170	134	153
Rank	71	69	69	70	73	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 Akron, OH, Continued

Inventory Measures	1993	1992	1991	1990	1989	1988
Urban Area Information						
Population (1000s)	530	525	520	520	520	515
Rank	59	59	58	58	55	56
Urban Area (square miles)	345	345	345	345	340	340
Popn Density (persons/sq mile)	1,536	1,522	1,507	1,507	1,529	1,515
Peak Travelers (1000s)	251	246	240	237	235	231
Freeway						
Daily Vehicle-Miles of Travel (1000s)	4,580	4,230	4,140	4,145	4,105	3,870
Lane Miles	415	415	415	415	415	415
Arterial Streets						
Daily Vehicle-Miles of Travel (1000s)	3,520	3,365	3,215	3,070	2,910	2,725
Lane Miles	1,075	1,070	1,070	1,070	1,065	1,065
Public Transportation						
Annual Psgr-Miles of Travel (millions)	26	24	22	20	20	21
Annual Unlinked Psgr Trips (millions)	7	8	8	7	7	7
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)	1.09	1.11	1.13	1.06	1.08	1.00
System Performance						
Congested Travel (% of peak VMT)	20	16	13	13	12	10
Congested System (% of lane-miles)	32	27	22	22	21	19
Congested Time (number of "Rush Hours")	3.2	2.9	2.8	2.8	2.8	2.7
Annual Increase Needed To Maintain Constant Congestion Level:						
Lane-Miles	62	69	57	75	55	53
Transit Riders or Carpoolers (millions)	12	12	10	13	9	8
Annual Excess Fuel Consumed						
Total Fuel (1000 gallons)	1,488	1,195	958	917	856	680
Rank	67	67	68	68	67	69
Fuel per Peak Traveler (gallons)	6	5	4	4	4	3
Rank	72	74	77	76	72	78
Annual Delay						
Total Delay (1000s of person-hours)	2,273	1,876	1,507	1,439	1,366	1,101
Rank	68	67	70	69	68	71
Delay per Peak Traveler (person-hrs)	9	8	6	6	6	5
Rank	74	75	78	77	75	78
Delay due to Incidents (percent)	53	54	54	54	54	53
Travel Time Index						
Rank	71	70	75	74	74	77
Congestion Cost						
Total Cost (\$ millions)	30	24	19	18	16	12
Rank	68	67	70	70	69	71
Cost per Peak Traveler (\$)	121	100	80	75	67	51
Rank	73	75	77	77	75	78

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 Akron, OH, Continued

Inventory Measures	1987	1986	1985	1984	1983	1982
Urban Area Information						
Population (1000s)	515	515	515	515	515	515
Rank	55	54	53	53	52	52
Urban Area (square miles)	335	335	330	330	330	330
Popn Density (persons/sq mile)	1,537	1,537	1,561	1,561	1,561	1,561
Peak Travelers (1000s)	229	228	226	224	222	220
Freeway						
Daily Vehicle-Miles of Travel (1000s)	3,435	3,390	3,255	3,290	3,160	2,745
Lane Miles	415	415	415	415	410	380
Arterial Streets						
Daily Vehicle-Miles of Travel (1000s)	2,615	2,715	2,395	2,555	2,380	2,120
Lane Miles	1,065	1,055	1,050	1,040	1,040	990
Public Transportation						
Annual Psgr-Miles of Travel (millions)	16	17	24	5	5	5
Annual Unlinked Psgr Trips (millions)	7	8	8	2	2	2
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)	1.00	0.98	1.28	1.29	1.32	1.38
System Performance						
Congested Travel (% of peak VMT)	8	7	7	7	6	5
Congested System (% of lane-miles)	19	19	19	19	16	16
Congested Time (number of "Rush Hours")	2.4	2.4	2.3	2.4	2.3	2.2
Annual Increase Needed To Maintain Constant Congestion Level:						
Lane-Miles	65	--	--	--	--	--
Transit Riders or Carpoolers (millions)	9	--	--	--	--	--
Annual Excess Fuel Consumed						
Total Fuel (1000 gallons)	477	437	377	393	310	265
Rank	73	73	72	72	73	76
Fuel per Peak Traveler (gallons)	2	2	2	2	1	1
Rank	80	81	81	79	81	81
Annual Delay						
Total Delay (1000s of person-hours)	755	721	606	636	497	427
Rank	73	73	73	71	73	77
Delay per Peak Traveler (person-hrs)	3	3	3	3	2	2
Rank	82	81	81	80	81	82
Delay due to Incidents (percent)	53	53	53	54	54	54
Travel Time Index						
Rank	81	83	81	82	83	83
Congestion Cost						
Total Cost (\$ millions)	8	7	6	6	5	4
Rank	73	73	73	71	73	77
Cost per Peak Traveler (\$)	34	31	27	28	21	18
Rank	82	81	81	80	81	82

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

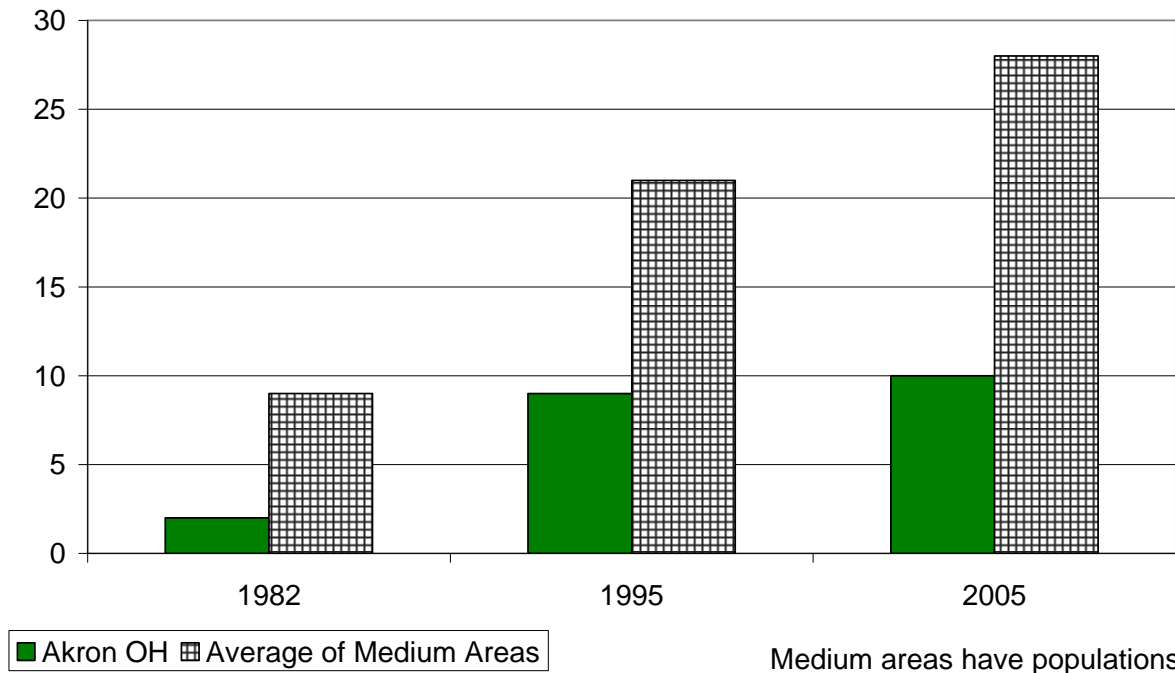
Note: Zeroes in the table reflect values less than 0.5.

Benefits From Public Transportation Service and Operations Strategies for Akron, OH

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	15	12	6	6	5	5
Annual Delay Reduction (1000 hours)	3	2	2	1	2	1
Arterial Access Management						
Percent of Roadway Miles	7	7	7	6	6	6
Annual Delay Reduction (1000 hours)	9	11	2	15	13	20
HOV Lanes						
Daily Passenger-miles of Travel (1000s)	--	--	--	--	--	--
HOV User Delay Savings	--	--	--	--	--	--
Total Effect of Operations Treatments						
Annual Delay Reduction (1000 hours)	12	13	4	16	15	21
Annual Delay Saved per Peak Traveler (hours)	0	0	0	0	0	0
Annual Congestion Cost Savings (\$million)	0.2	0.2	0.1	0.3	0.2	0.3
Travel Time Index with Strategies	1.074	1.079	1.072	1.076	1.079	1.082
Travel Time Index (Base)	1.075	1.079	1.072	1.076	1.080	1.082
Public Transportation Service						
Existing Service						
Annual Passenger-miles of Travel (million)	26	29	27	31	23	29
Unlinked Passenger Trips (million)	7	7	7	8	7	8
Travel Time Index (combined road and transit)	1.074	1.078	1.071	1.075	1.079	1.081
Condition if Public Transportation Service were Discontinued						
Travel Time Index	1.077	1.081	1.074	1.079	1.082	1.084
Annual Delay Increase (1000 hours)	133	110	103	168	129	126
Annual Delay Increase per Peak Traveler (hours)	0	0	0	1	0	0
Annual Congestion Cost Increase (\$million)	2.5	2.0	1.8	2.8	2.1	2.1

Growth in Delay per Peak Traveler

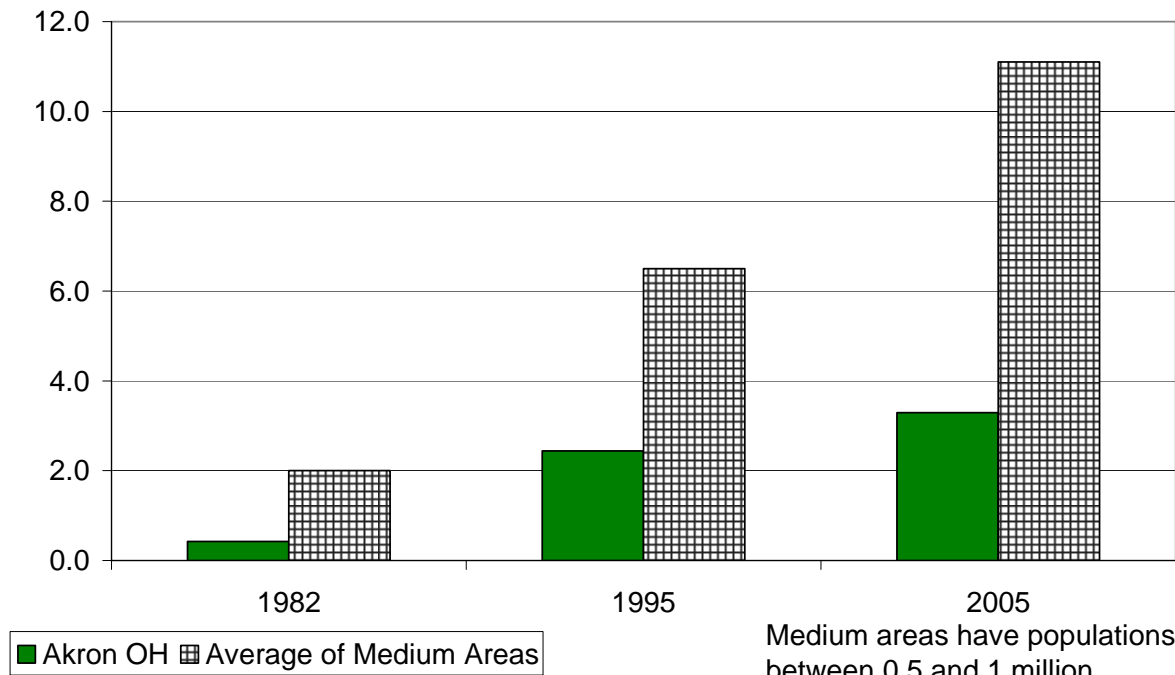
Hours of Delay



Medium areas have populations between 0.5 and 1 million

Growth in Total Delay

Annual Hours of Delay (million)



Medium areas have populations between 0.5 and 1 million