

## 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+
<b>Oklahoma City, OK</b>	<b>L-</b>	<b>L-</b>	<b>L</b>	<b>S</b>	<b>S-</b>
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
<b>2005 Values</b> 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
<b>1982 to 2005 Trends</b> Delay per Traveler - Total Delay -	5 Hours 5 Hours x Average Population	3 Hours 3 Hours x Average Population

### The Mobility Data for Oklahoma City, OK

<b>Inventory Measures</b>	<b>2005</b>	<b>2004</b>	<b>2003</b>	<b>2002</b>	<b>2001</b>	<b>2000</b>
<b>Urban Area Information</b>						
Population (1000s)	850	835	830	820	810	800
Rank	50	50	49	48	47	46
Urban Area (square miles)	555	550	545	540	535	530
Popn Density (persons/sq mile)	1,532	1,518	1,523	1,519	1,514	1,509
Peak Travelers (1000s)	469	458	453	441	428	417
<b>Freeway</b>						
Daily Vehicle-Miles of Travel (1000s)	9,245	9,230	9,200	9,100	9,060	8,930
Lane Miles	750	745	740	740	735	735
<b>Arterial Streets</b>						
Daily Vehicle-Miles of Travel (1000s)	11,500	11,110	11,000	11,380	11,020	10,715
Lane Miles	2,505	2,495	2,475	2,450	2,420	2,410
<b>Public Transportation</b>						
Annual Psgr-Miles of Travel (millions)	14	14	21	24	19	18
Annual Unlinked Psgr Trips (millions)	3	4	4	6	6	4
<b>Cost Components</b>						
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)	2.19	1.77	1.42	1.27	1.31	1.48
<b>System Performance</b>						
<b>Congested Travel</b> (% of peak VMT)	31	31	31	31	31	28
<b>Congested System</b> (% of lane-miles)	31	31	30	26	26	22
<b>Congested Time</b> (number of "Rush Hours")	5.0	5.0	5.0	5.0	5.0	4.8
<b>Annual Increase Needed To Maintain Constant Congestion Level:</b>						
Lane-Miles	35	30	44	65	66	69
Transit Riders or Carpoolers (millions)	8	6	10	14	15	15
<b>Annual Excess Fuel Consumed</b>						
Total Fuel (1000 gallons)	6,179	6,311	6,336	6,809	6,545	5,664
Rank	54	52	50	48	48	51
Fuel per Peak Traveler (gallons)	13	14	14	16	15	14
Rank	59	51	51	45	46	49
<b>Annual Delay</b>						
Total Delay (1000s of person-hours)	9,468	9,876	9,826	10,700	10,118	8,619
Rank	52	51	50	48	49	50
Delay per Peak Traveler (person-hrs)	20	22	22	24	24	21
Rank	56	52	52	50	48	54
Delay due to Incidents (percent)	55	56	56	56	56	56
<b>Travel Time Index</b>						
Rank	1.09	1.09	1.09	1.10	1.10	1.09
Rank	64	65	64	60	61	65
<b>Congestion Cost</b>						
Total Cost (\$ millions)	171	171	165	175	163	136
Rank	52	51	50	49	49	50
Cost per Peak Traveler (\$)	365	373	364	397	380	327
Rank	57	55	53	49	48	56

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 Oklahoma City, OK, Continued**

<b>Inventory Measures</b>	<b>1999</b>	<b>1998</b>	<b>1997</b>	<b>1996</b>	<b>1995</b>	<b>1994</b>
<b>Urban Area Information</b>						
Population (1000s)	790	780	770	760	750	740
Rank	44	44	44	44	44	44
Urban Area (square miles)	520	515	505	500	495	490
Popn Density (persons/sq mile)	1,519	1,515	1,525	1,520	1,515	1,510
Peak Travelers (1000s)	404	393	382	371	360	350
<b>Freeway</b>						
Daily Vehicle-Miles of Travel (1000s)	8,985	8,730	8,665	8,500	8,245	7,740
Lane Miles	730	730	730	730	725	725
<b>Arterial Streets</b>						
Daily Vehicle-Miles of Travel (1000s)	10,455	10,145	9,865	9,595	9,360	9,065
Lane Miles	2,380	2,350	2,330	2,320	2,300	2,275
<b>Public Transportation</b>						
Annual Psgr-Miles of Travel (millions)	18	16	14	14	16	18
Annual Unlinked Psgr Trips (millions)	4	4	3	3	4	4
<b>Cost Components</b>						
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)	1.03	1.00	1.08	1.21	1.06	0.97
<b>System Performance</b>						
<b>Congested Travel</b> (% of peak VMT)	30	27	27	24	22	16
<b>Congested System</b> (% of lane-miles)	24	22	22	21	20	15
<b>Congested Time</b> (number of "Rush Hours")	4.8	4.6	4.4	4.2	4.0	3.4
<b>Annual Increase Needed To Maintain Constant Congestion Level:</b>						
Lane-Miles	92	70	118	117	129	96
Transit Riders or Carpoolers (millions)	20	15	25	24	26	19
<b>Annual Excess Fuel Consumed</b>						
Total Fuel (1000 gallons)	6,216	5,338	5,092	4,396	3,896	2,686
Rank	50	51	50	53	54	59
Fuel per Peak Traveler (gallons)	15	14	13	12	11	8
Rank	46	52	52	56	56	66
<b>Annual Delay</b>						
Total Delay (1000s of person-hours)	9,508	8,203	7,835	6,757	6,119	4,328
Rank	50	50	51	53	53	61
Delay per Peak Traveler (person-hrs)	24	21	21	18	17	12
Rank	50	55	54	59	58	65
Delay due to Incidents (percent)	57	57	57	56	56	55
<b>Travel Time Index</b>						
Rank	66	67	68	68	70	74
<b>Congestion Cost</b>						
Total Cost (\$ millions)	144	120	114	96	84	57
Rank	50	50	50	53	53	62
Cost per Peak Traveler (\$)	355	306	298	259	234	163
Rank	51	56	54	59	59	65

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 Oklahoma City, OK, Continued**

<b>Inventory Measures</b>	<b>1993</b>	<b>1992</b>	<b>1991</b>	<b>1990</b>	<b>1989</b>	<b>1988</b>
<b>Urban Area Information</b>						
Population (1000s)	725	720	705	690	680	675
Rank	44	44	45	45	44	44
Urban Area (square miles)	480	475	470	460	450	445
Popn Density (persons/sq mile)	1,510	1,516	1,500	1,500	1,511	1,517
Peak Travelers (1000s)	337	330	317	306	299	294
<b>Freeway</b>						
Daily Vehicle-Miles of Travel (1000s)	7,725	7,300	7,125	6,935	6,830	6,850
Lane Miles	725	715	700	690	680	650
<b>Arterial Streets</b>						
Daily Vehicle-Miles of Travel (1000s)	9,150	8,040	7,860	7,350	7,505	7,155
Lane Miles	2,275	2,250	2,240	2,220	2,205	2,140
<b>Public Transportation</b>						
Annual Psgr-Miles of Travel (millions)	17	16	14	13	13	13
Annual Unlinked Psgr Trips (millions)	5	5	4	4	4	4
<b>Cost Components</b>						
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)	1.05	1.03	1.05	1.11	1.06	0.98
<b>System Performance</b>						
<b>Congested Travel</b> (% of peak VMT)	16	15	15	13	13	12
<b>Congested System</b> (% of lane-miles)	15	15	15	15	15	15
<b>Congested Time</b> (number of "Rush Hours")	3.4	3.0	2.9	2.9	2.9	3.0
<b>Annual Increase Needed To Maintain Constant Congestion Level:</b>						
Lane-Miles	114	75	80	55	72	109
Transit Riders or Carpoolers (millions)	22	14	14	9	12	19
<b>Annual Excess Fuel Consumed</b>						
Total Fuel (1000 gallons)	2,716	2,282	2,163	1,769	1,779	1,677
Rank	57	59	57	60	57	56
Fuel per Peak Traveler (gallons)	8	7	7	6	6	6
Rank	61	64	59	63	62	62
<b>Annual Delay</b>						
Total Delay (1000s of person-hours)	4,384	3,679	3,509	2,798	2,830	2,717
Rank	58	60	56	60	59	57
Delay per Peak Traveler (person-hrs)	13	11	11	9	9	9
Rank	61	64	59	65	62	62
Delay due to Incidents (percent)	55	55	55	56	55	55
<b>Travel Time Index</b>						
Rank	73	76	71	75	72	70
<b>Congestion Cost</b>						
Total Cost (\$ millions)	56	46	43	34	32	29
Rank	58	62	57	61	59	58
Cost per Peak Traveler (\$)	167	140	135	110	105	97
Rank	62	65	59	64	63	62

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 Oklahoma City, OK, Continued**

<b>Inventory Measures</b>	<b>1987</b>	<b>1986</b>	<b>1985</b>	<b>1984</b>	<b>1983</b>	<b>1982</b>
<b>Urban Area Information</b>						
Population (1000s)	670	665	655	650	645	640
Rank	43	43	43	42	42	42
Urban Area (square miles)	440	435	430	425	415	420
Popn Density (persons/sq mile)	1,523	1,529	1,523	1,529	1,554	1,524
Peak Travelers (1000s)	290	285	279	275	271	266
<b>Freeway</b>						
Daily Vehicle-Miles of Travel (1000s)	6,425	6,075	5,975	5,850	5,155	4,885
Lane Miles	630	620	615	610	565	550
<b>Arterial Streets</b>						
Daily Vehicle-Miles of Travel (1000s)	7,100	7,030	7,020	6,820	6,400	6,085
Lane Miles	2,110	2,050	2,050	2,025	1,980	1,950
<b>Public Transportation</b>						
Annual Psgr-Miles of Travel (millions)	12	13	15	13	13	13
Annual Unlinked Psgr Trips (millions)	4	4	4	4	4	4
<b>Cost Components</b>						
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)	0.98	0.96	1.25	1.27	1.30	1.35
<b>System Performance</b>						
<b>Congested Travel</b> (% of peak VMT)	11	9	9	9	9	7
<b>Congested System</b> (% of lane-miles)	14	14	14	14	14	10
<b>Congested Time</b> (number of "Rush Hours")	2.9	2.9	2.9	2.8	2.7	2.7
<b>Annual Increase Needed To Maintain Constant Congestion Level:</b>						
Lane-Miles	117	--	--	--	--	--
Transit Riders or Carpoolers (millions)	20	--	--	--	--	--
<b>Annual Excess Fuel Consumed</b>						
Total Fuel (1000 gallons)	1,522	1,242	1,265	1,194	1,030	808
Rank	58	59	54	54	52	59
Fuel per Peak Traveler (gallons)	5	4	4	4	4	3
Rank	60	64	58	57	59	62
<b>Annual Delay</b>						
Total Delay (1000s of person-hours)	2,552	2,082	2,147	2,035	1,752	1,355
Rank	56	60	53	53	53	59
Delay per Peak Traveler (person-hrs)	9	7	8	7	6	5
Rank	59	62	56	57	56	60
Delay due to Incidents (percent)	54	54	54	54	54	55
<b>Travel Time Index</b>						
Rank	69	73	70	68	68	73
<b>Congestion Cost</b>						
Total Cost (\$ millions)	26	20	21	19	16	12
Rank	56	61	53	54	53	60
Cost per Peak Traveler (\$)	89	71	75	70	59	46
Rank	60	63	57	57	55	61

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

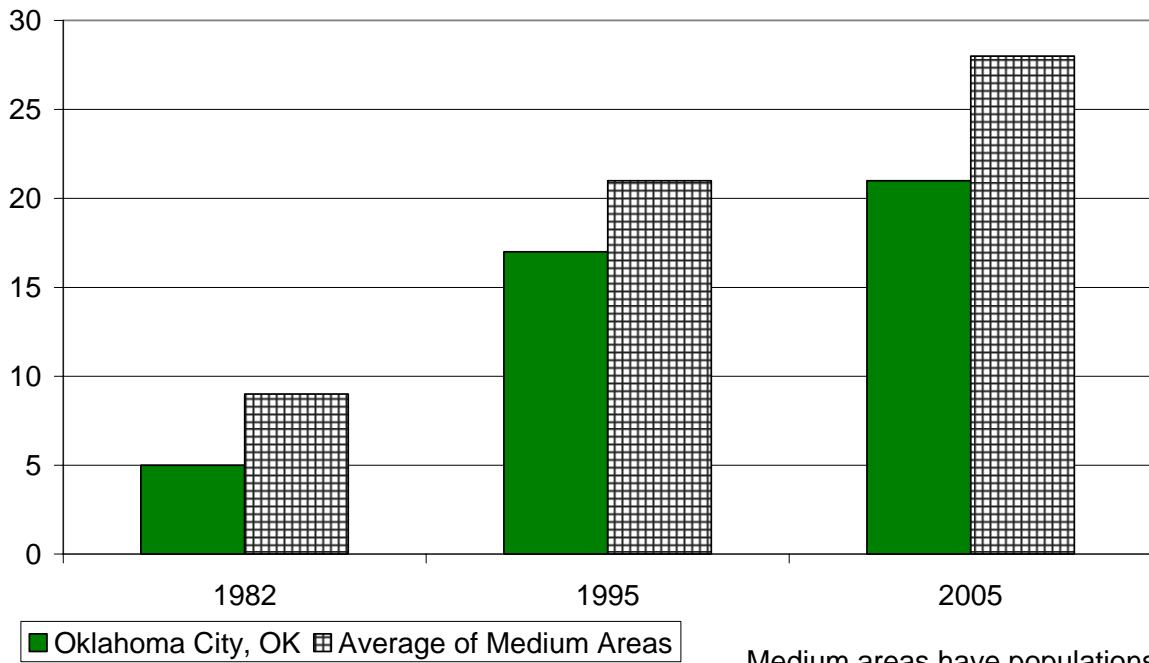
Note: Zeroes in the table reflect values less than 0.5.

## Benefits From Public Transportation Service and Operations Strategies for Oklahoma City, OK

<b>Operations Strategies</b>	<b>2005</b>	<b>2004</b>	<b>2003</b>	<b>2002</b>	<b>2001</b>	<b>2000</b>
<b>Freeway Ramp Metering</b>						
Percent of Roadway Miles	--	--	--	--	--	--
Annual Delay Reduction (1000 hours)	--	--	--	--	--	--
<b>Freeway Incident Management</b>						
<b>Cameras</b>						
Percent of Roadway Miles	36	29	--	--	--	--
<b>Service Patrols</b>						
Percent of Roadway Miles	--	--	--	--	--	--
Annual Delay Reduction (1000 hours)	10	10	--	--	--	--
<b>Arterial Signal Coordination</b>						
Percent of Roadway Miles	8	7	6	7	7	7
Annual Delay Reduction (1000 hours)	10	7	10	17	16	14
<b>Arterial Access Management</b>						
Percent of Roadway Miles	7	7	7	7	7	8
Annual Delay Reduction (1000 hours)	35	31	33	46	56	49
<b>HOV Lanes</b>						
Daily Passenger-miles of Travel (1000s)	--	--	--	--	--	--
HOV User Delay Savings	--	--	--	--	--	--
<b>Total Effect of Operations Treatments</b>						
Annual Delay Reduction (1000 hours)	55	48	43	63	71	63
Annual Delay Saved per Peak Traveler (hours)	0	0	0	0	0	0
Annual Congestion Cost Savings (\$million)	1.1	0.9	0.7	1.0	1.1	1.0
Travel Time Index with Strategies	1.090	1.094	1.095	1.101	1.099	1.087
Travel Time Index (Base)	1.091	1.095	1.095	1.101	1.100	1.088
<b>Public Transportation Service</b>						
<b>Existing Service</b>						
Annual Passenger-miles of Travel (million)	14	14	21	24	19	18
Unlinked Passenger Trips (million)	3	4	4	6	6	4
Travel Time Index (combined road and transit)	1.090	1.094	1.095	1.100	1.098	1.087
<b>Condition if Public Transportation Service were Discontinued</b>						
Travel Time Index	1.090	1.095	1.096	1.103	1.100	1.089
Annual Delay Increase (1000 hours)	2	113	108	213	78	158
Annual Delay Increase per Peak Traveler (hours)	0	0	0	0	0	0
Annual Congestion Cost Increase (\$million)	0.0	2.0	1.9	3.5	1.3	2.5

### Growth in Delay per Peak Traveler

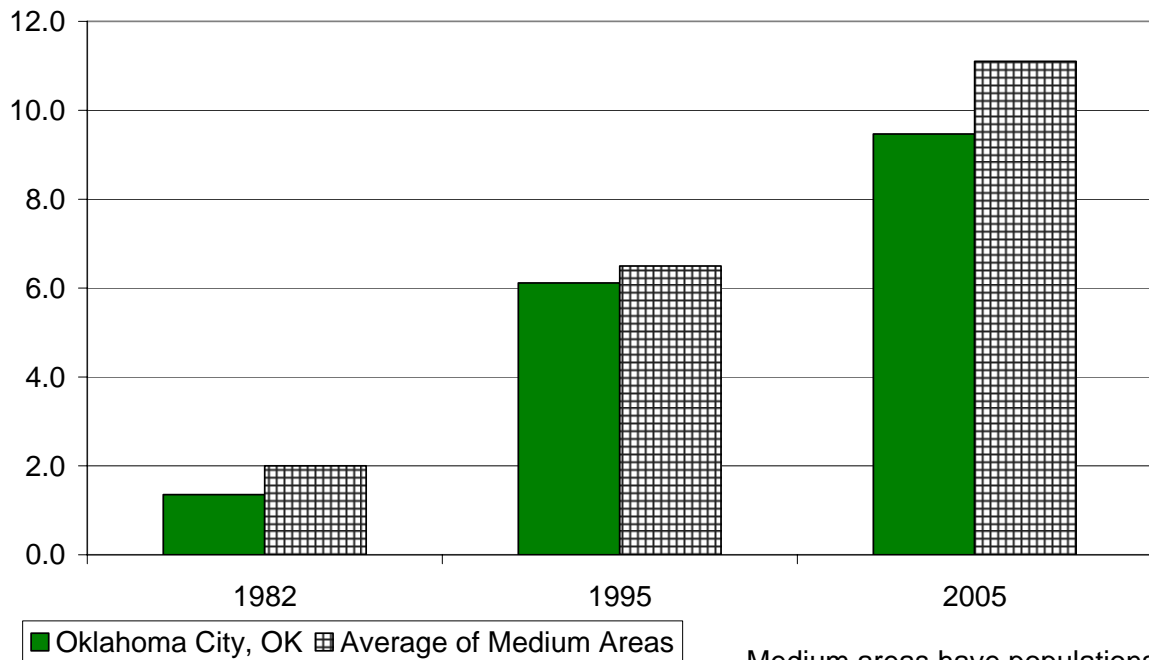
Hours of Delay



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