

## 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 Very Large Group – over 3 million population urban areas

Urban Area	Delay per Traveler	Travel Time Index	Total Delay	1982 to 2005	
				Delay per Traveler	Total Delay
New York-Newark, NY-NJ-CT	L	0	H+	0	F+
Los Angeles-Long Beach-Santa Ana, CA	H+	H+	H+	S	F+
Chicago, IL-IN	L	H+	H	0	F+
Miami, FL	L	0	L	0	0
Philadelphia, PA-NJ-DE-MD	L-	L-	L-	S-	S-
Dallas-Fort Worth-Arlington, TX	H	L	L	F+	F
Washington, DC-VA-MD	H	0	L	F+	S-
<b>Atlanta, GA</b>	<b>H</b>	<b>L</b>	<b>L</b>	<b>0</b>	<b>S-</b>
San Francisco-Oakland, CA	H	H	L	F	S-
Boston, MA-NH-RI	L	L-	L-	0	S-
Detroit, MI	0	L-	L-	S	S-
Houston, TX	H	0	L-	S	S-
Phoenix, AZ	L	L	L-	S-	S-
Seattle, WA	L-	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

## 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 Atlanta, GA

Inventory Measures	2005	2004	2003	2002	2001	2000
<b>Urban Area Information</b>						
Population (1000s)	4,170	3,900	3,700	3,450	3,250	3,100
Rank	8	11	12	12	12	12
Urban Area (square miles)	3,050	3,025	2,900	2,775	2,675	2,550
Popn Density (persons/sq mile)	1,367	1,289	1,276	1,243	1,215	1,216
Peak Travelers (1000s)	2,193	2,036	1,917	1,756	1,628	1,528
<b>Freeway</b>						
Daily Vehicle-Miles of Travel (1000s)	49,200	49,485	48,590	47,390	46,150	45,950
Lane Miles	2,545	2,530	2,500	2,470	2,425	2,390
<b>Arterial Streets</b>						
Daily Vehicle-Miles of Travel (1000s)	45,000	44,900	44,000	42,500	41,000	40,000
Lane Miles	7,500	7,200	6,900	6,600	6,250	6,000
<b>Public Transportation</b>						
Annual Psgr-Miles of Travel (millions)	811	803	780	856	874	803
Annual Unlinked Psgr Trips (millions)	150	148	149	166	167	170
<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)	2.23	1.83	1.14	1.24	1.39	1.41
<b>System Performance</b>						
<b>Congested Travel</b> (% of peak VMT)	76	77	77	79	76	77
<b>Congested System</b> (% of lane-miles)	58	58	58	62	61	59
<b>Congested Time</b> (number of "Rush Hours")	7.8	8.0	8.0	8.0	8.0	8.0
<b>Annual Increase Needed To Maintain Constant Congestion Level:</b>						
Lane-Miles	186	247	304	320	359	405
Transit Riders or Carpoolers (millions)	61	83	104	110	125	144
<b>Annual Excess Fuel Consumed</b>						
Total Fuel (1000 gallons)	96,066	92,730	90,306	88,036	82,327	79,903
Rank	7	6	5	5	5	5
Fuel per Peak Traveler (gallons)	44	46	47	50	51	52
Rank	3	2	2	2	2	2
<b>Annual Delay</b>						
Total Delay (1000s of person-hours)	132,296	127,539	123,296	121,690	115,751	112,140
Rank	6	6	6	5	5	5
Delay per Peak Traveler (person-hrs)	60	63	64	69	71	73
Rank	2	2	2	2	1	1
Delay due to Incidents (percent)	52	52	52	52	52	52
<b>Travel Time Index</b>						
Rank	1.34	1.32	1.32	1.32	1.31	1.31
Rank	11	9	8	8	10	8
<b>Congestion Cost</b>						
Total Cost (\$ millions)	2,581	2,373	2,181	2,103	1,978	1,859
Rank	6	5	5	5	5	4
Cost per Peak Traveler (\$)	1,177	1,166	1,138	1,197	1,215	1,217
Rank	2	2	2	1	1	1

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 Atlanta, GA, 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)	2,950	2,820	2,675	2,500	2,460	2,400
Rank	12	12	12	14	14	14
Urban Area (square miles)	2,400	2,250	2,100	1,950	1,875	1,800
Popn Density (persons/sq mile)	1,229	1,253	1,274	1,282	1,312	1,333
Peak Travelers (1000s)	1,431	1,345	1,255	1,155	1,117	1,073
<b>Freeway</b>						
Daily Vehicle-Miles of Travel (1000s)	44,630	42,000	39,650	36,750	35,395	33,840
Lane Miles	2,350	2,300	2,240	2,200	2,190	2,155
<b>Arterial Streets</b>						
Daily Vehicle-Miles of Travel (1000s)	38,600	37,000	35,900	34,400	32,500	31,000
Lane Miles	5,800	5,500	5,200	4,900	4,750	4,500
<b>Public Transportation</b>						
Annual Psgr-Miles of Travel (millions)	808	765	835	688	644	617
Annual Unlinked Psgr Trips (millions)	166	161	173	148	147	146
<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)	0.98	0.93	1.03	1.13	1.05	0.94
<b>System Performance</b>						
<b>Congested Travel</b> (% of peak VMT)	74	70	67	64	63	60
<b>Congested System</b> (% of lane-miles)	58	56	53	52	52	50
<b>Congested Time</b> (number of "Rush Hours")	8.0	7.8	7.8	7.6	7.4	7.4
<b>Annual Increase Needed To Maintain Constant Congestion Level:</b>						
Lane-Miles	417	464	516	490	491	453
Transit Riders or Carpoolers (millions)	148	163	182	170	167	153
<b>Annual Excess Fuel Consumed</b>						
Total Fuel (1000 gallons)	75,303	72,101	64,759	57,712	52,944	47,581
Rank	5	5	6	7	7	7
Fuel per Peak Traveler (gallons)	53	54	52	50	47	44
Rank	2	1	2	2	2	2
<b>Annual Delay</b>						
Total Delay (1000s of person-hours)	107,193	104,421	94,158	86,090	78,193	70,354
Rank	4	4	7	7	7	7
Delay per Peak Traveler (person-hrs)	75	78	75	75	70	66
Rank	1	1	1	1	2	2
Delay due to Incidents (percent)	52	52	53	53	53	53
<b>Travel Time Index</b>						
Rank	11	7	8	10	11	13
<b>Congestion Cost</b>						
Total Cost (\$ millions)	1,682	1,609	1,437	1,286	1,131	980
Rank	4	4	6	7	7	7
Cost per Peak Traveler (\$)	1,175	1,196	1,146	1,113	1,012	913
Rank	1	1	1	1	1	2

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

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**The Mobility Data for Atlanta, GA, 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)	2,320	2,290	2,175	2,125	2,000	1,900
Rank	14	14	14	14	14	17
Urban Area (square miles)	1,760	1,700	1,650	1,625	1,615	1,575
Popn Density (persons/sq mile)	1,318	1,347	1,318	1,308	1,238	1,206
Peak Travelers (1000s)	1,021	992	927	890	832	785
<b>Freeway</b>						
Daily Vehicle-Miles of Travel (1000s)	30,675	27,510	25,970	25,260	24,755	23,105
Lane Miles	2,120	2,040	1,945	1,880	1,800	1,700
<b>Arterial Streets</b>						
Daily Vehicle-Miles of Travel (1000s)	28,500	26,510	25,000	23,000	21,900	20,600
Lane Miles	4,250	4,000	3,900	3,840	3,750	3,680
<b>Public Transportation</b>						
Annual Psgr-Miles of Travel (millions)	582	596	642	647	632	563
Annual Unlinked Psgr Trips (millions)	141	144	146	150	145	148
<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)	0.97	0.99	1.00	1.01	1.07	0.99
<b>System Performance</b>						
<b>Congested Travel</b> (% of peak VMT)	56	51	48	47	45	44
<b>Congested System</b> (% of lane-miles)	48	45	43	43	42	42
<b>Congested Time</b> (number of "Rush Hours")	7.2	6.6	6.4	6.2	6.4	6.2
<b>Annual Increase Needed To Maintain Constant Congestion Level:</b>						
Lane-Miles	398	286	262	293	305	278
Transit Riders or Carpoolers (millions)	128	89	79	86	89	78
<b>Annual Excess Fuel Consumed</b>						
Total Fuel (1000 gallons)	39,794	33,363	28,350	24,823	23,728	23,221
Rank	9	9	14	14	14	12
Fuel per Peak Traveler (gallons)	39	34	31	28	29	30
Rank	3	5	6	8	5	4
<b>Annual Delay</b>						
Total Delay (1000s of person-hours)	61,154	51,890	44,420	37,719	36,423	36,325
Rank	8	10	12	14	14	11
Delay per Peak Traveler (person-hrs)	60	52	48	42	44	46
Rank	2	5	6	7	6	4
Delay due to Incidents (percent)	54	54	54	54	54	54
<b>Travel Time Index</b>						
Rank	14	16	20	22	21	16
<b>Congestion Cost</b>						
Total Cost (\$ millions)	822	684	569	470	425	404
Rank	8	11	12	14	12	11
Cost per Peak Traveler (\$)	805	690	614	528	511	515
Rank	2	4	7	7	6	4

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 Atlanta, GA, 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)	1,770	1,695	1,615	1,610	1,610	1,610
Rank	19	20	20	19	19	19
Urban Area (square miles)	1,530	1,520	1,500	1,470	1,470	1,460
Popn Density (persons/sq mile)	1,157	1,115	1,077	1,095	1,095	1,103
Peak Travelers (1000s)	724	688	651	644	639	633
<b>Freeway</b>						
Daily Vehicle-Miles of Travel (1000s)	22,965	21,650	19,555	18,230	16,995	14,270
Lane Miles	1,645	1,605	1,565	1,535	1,505	1,400
<b>Arterial Streets</b>						
Daily Vehicle-Miles of Travel (1000s)	19,900	19,280	18,020	17,500	17,000	16,500
Lane Miles	3,560	3,475	3,400	3,290	3,200	3,100
<b>Public Transportation</b>						
Annual Psgr-Miles of Travel (millions)	557	551	538	487	487	487
Annual Unlinked Psgr Trips (millions)	150	151	156	141	141	141
<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)	0.99	0.97	1.27	1.28	1.31	1.37
<b>System Performance</b>						
<b>Congested Travel</b> (% of peak VMT)	43	39	34	33	30	29
<b>Congested System</b> (% of lane-miles)	42	37	35	35	32	33
<b>Congested Time</b> (number of "Rush Hours")	6.4	6.0	5.4	5.2	4.8	4.2
<b>Annual Increase Needed To Maintain Constant Congestion Level:</b>						
Lane-Miles	357	--	--	--	--	--
Transit Riders or Carpoolers (millions)	102	--	--	--	--	--
<b>Annual Excess Fuel Consumed</b>						
Total Fuel (1000 gallons)	21,378	17,925	15,088	12,988	11,439	10,046
Rank	11	10	12	11	11	12
Fuel per Peak Traveler (gallons)	30	26	23	20	18	16
Rank	4	4	5	5	6	6
<b>Annual Delay</b>						
Total Delay (1000s of person-hours)	33,092	28,644	24,460	20,851	18,155	16,375
Rank	11	10	11	11	12	12
Delay per Peak Traveler (person-hrs)	46	42	38	32	28	26
Rank	4	4	5	4	4	4
Delay due to Incidents (percent)	55	54	54	54	55	55
<b>Travel Time Index</b>						
Rank	14	15	17	18	18	18
<b>Congestion Cost</b>						
Total Cost (\$ millions)	355	294	251	206	174	153
Rank	11	10	11	12	12	12
Cost per Peak Traveler (\$)	490	428	385	321	273	241
Rank	4	4	5	5	4	4

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

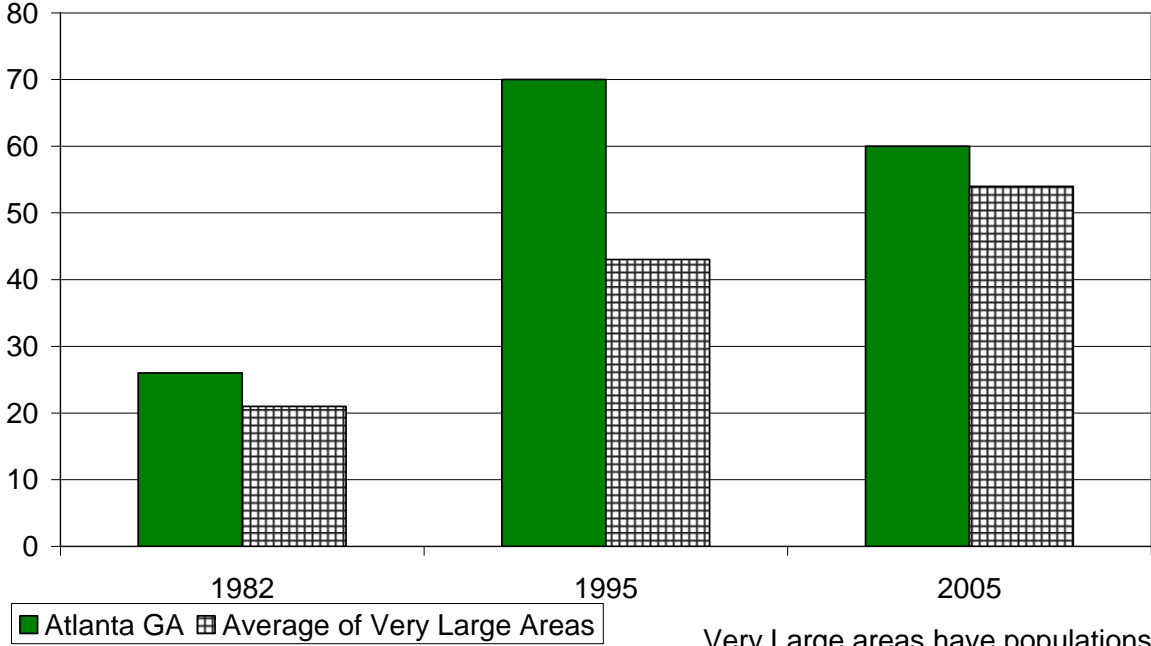
Note: Zeroes in the table reflect values less than 0.5.

## Benefits From Public Transportation Service and Operations Strategies for Atlanta, GA

<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	2	2	2	2	2	2
Annual Delay Reduction (1000 hours)	52	38	11	10	9	9
<b>Freeway Incident Management</b>						
<b>Cameras</b>						
Percent of Roadway Miles	55	55	40	36	33	20
<b>Service Patrols</b>						
Percent of Roadway Miles	91	91	91	93	89	82
Annual Delay Reduction (1000 hours)	6,087	5,528	5,307	4,731	4,113	3,490
<b>Arterial Signal Coordination</b>						
Percent of Roadway Miles	36	38	40	42	44	46
Annual Delay Reduction (1000 hours)	453	482	812	967	793	784
<b>Arterial Access Management</b>						
Percent of Roadway Miles	20	20	21	18	16	17
Annual Delay Reduction (1000 hours)	1,319	1,248	1,381	1,329	1,333	867
<b>HOV Lanes</b>						
Daily Passenger-miles of Travel (1000s)	650	598	665	488	360	357
HOV User Delay Savings	736	618	710	507	330	302
<b>Total Effect of Operations Treatments</b>						
Annual Delay Reduction (1000 hours)	8,647	7,913	8,220	7,544	6,578	5,452
Annual Delay Saved per Peak Traveler (hours)	4	4	4	4	4	4
Annual Congestion Cost Savings (\$million)	172.1	150.7	148.1	133.1	114.8	92.9
Travel Time Index with Strategies	1.339	1.325	1.322	1.324	1.312	1.307
Travel Time Index (Base)	1.361	1.345	1.343	1.345	1.330	1.322
<b>Public Transportation Service</b>						
<b>Existing Service</b>						
Annual Passenger-miles of Travel (million)	811	803	780	856	874	803
Unlinked Passenger Trips (million)	150	148	149	166	167	170
Travel Time Index (combined road and transit)	1.326	1.313	1.310	1.311	1.298	1.295
<b>Condition if Public Transportation Service were Discontinued</b>						
Travel Time Index	1.387	1.371	1.368	1.370	1.355	1.345
Annual Delay Increase (1000 hours)	12,542	12,665	12,075	11,789	11,575	10,269
Annual Delay Increase per Peak Traveler (hours)	6	6	6	7	7	7
Annual Congestion Cost Increase (\$million)	245.2	237.1	214.3	207.6	202.1	174.2

### Growth in Delay per Peak Traveler

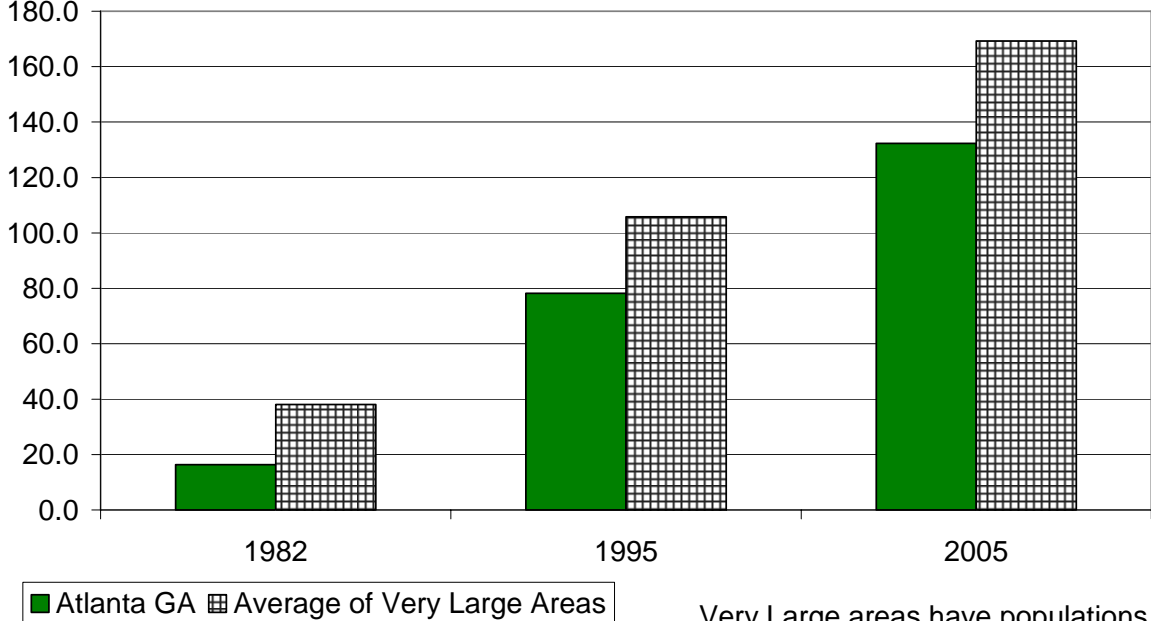
Hours of Delay



Very Large areas have populations over 3 million

### Growth in Total Delay

Annual Hours of Delay (million)



Very Large areas have populations over 3 million