

## 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+
<b>Miami, FL</b>	<b>L</b>	<b>0</b>	<b>L</b>	<b>0</b>	<b>0</b>
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-
Atlanta, GA	H	L	L	0	S-
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 Miami, FL**

<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)	5,330	5,270	5,100	5,000	4,965	4,870
Rank	4	5	5	5	5	5
Urban Area (square miles)	1,680	1,680	1,680	1,675	1,670	1,660
Popn Density (persons/sq mile)	3,173	3,137	3,036	2,985	2,973	2,934
Peak Travelers (1000s)	3,022	2,972	2,861	2,760	2,691	2,596
<b>Freeway</b>						
Daily Vehicle-Miles of Travel (1000s)	39,470	38,320	37,000	35,695	35,065	34,700
Lane Miles	2,050	2,050	1,975	1,920	1,915	1,910
<b>Arterial Streets</b>						
Daily Vehicle-Miles of Travel (1000s)	52,455	52,240	49,045	45,580	44,055	42,735
Lane Miles	7,400	7,025	6,620	6,400	6,250	6,105
<b>Public Transportation</b>						
Annual Psgr-Miles of Travel (millions)	806	757	707	672	675	628
Annual Unlinked Psgr Trips (millions)	159	151	134	126	127	122
<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)	2.34	1.99	1.53	1.41	1.51	1.54
<b>System Performance</b>						
<b>Congested Travel</b> (% of peak VMT)	85	82	80	77	77	74
<b>Congested System</b> (% of lane-miles)	75	74	73	72	68	63
<b>Congested Time</b> (number of "Rush Hours")	8.0	8.0	8.0	8.0	7.8	7.8
<b>Annual Increase Needed To Maintain Constant Congestion Level:</b>						
Lane-Miles	330	403	374	329	359	352
Transit Riders or Carpoolers (millions)	111	140	130	112	121	118
<b>Annual Excess Fuel Consumed</b>						
Total Fuel (1000 gallons)	105,181	100,817	95,792	89,278	83,819	77,523
Rank	5	4	4	4	4	6
Fuel per Peak Traveler (gallons)	35	34	33	32	31	30
Rank	10	12	10	10	11	13
<b>Annual Delay</b>						
Total Delay (1000s of person-hours)	150,146	145,302	139,442	131,659	123,686	115,081
Rank	5	4	4	4	4	4
Delay per Peak Traveler (person-hrs)	50	49	49	48	46	44
Rank	11	11	10	10	10	13
Delay due to Incidents (percent)	52	52	52	52	52	52
<b>Travel Time Index</b>	1.38	1.37	1.38	1.37	1.36	1.33
Rank	6	5	3	3	2	4
<b>Congestion Cost</b>						
Total Cost (\$ millions)	2,730	2,518	2,306	2,120	1,979	1,786
Rank	5	4	4	4	4	5
Cost per Peak Traveler (\$)	903	847	806	768	735	688
Rank	16	14	11	11	14	13

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 Miami, FL, 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)	4,620	4,525	4,460	4,395	4,280	4,120
Rank	5	5	5	5	5	5
Urban Area (square miles)	1,645	1,625	1,610	1,585	1,525	1,475
Popn Density (persons/sq mile)	2,809	2,785	2,770	2,773	2,807	2,793
Peak Travelers (1000s)	2,416	2,326	2,252	2,184	2,089	1,973
<b>Freeway</b>						
Daily Vehicle-Miles of Travel (1000s)	32,815	31,475	30,900	29,800	29,460	27,660
Lane Miles	1,905	1,905	1,895	1,880	1,850	1,815
<b>Arterial Streets</b>						
Daily Vehicle-Miles of Travel (1000s)	40,040	38,065	36,050	34,000	32,995	31,600
Lane Miles	6,090	6,030	6,015	5,955	5,910	5,850
<b>Public Transportation</b>						
Annual Psgr-Miles of Travel (millions)	634	613	581	572	599	614
Annual Unlinked Psgr Trips (millions)	118	114	110	110	112	113
<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)	1.14	1.07	1.17	1.30	1.20	1.08
<b>System Performance</b>						
<b>Congested Travel</b> (% of peak VMT)	69	63	63	64	64	62
<b>Congested System</b> (% of lane-miles)	59	54	54	59	59	59
<b>Congested Time</b> (number of "Rush Hours")	7.6	7.4	7.4	7.2	7.2	7.0
<b>Annual Increase Needed To Maintain Constant Congestion Level:</b>						
Lane-Miles	337	329	318	321	324	267
Transit Riders or Carpoolers (millions)	107	100	93	91	91	72
<b>Annual Excess Fuel Consumed</b>						
Total Fuel (1000 gallons)	69,364	59,338	55,946	52,367	50,140	45,558
Rank	7	8	8	8	8	8
Fuel per Peak Traveler (gallons)	29	26	25	24	24	23
Rank	14	18	18	23	15	14
<b>Annual Delay</b>						
Total Delay (1000s of person-hours)	103,302	88,591	83,564	77,374	73,422	68,404
Rank	8	8	8	8	8	8
Delay per Peak Traveler (person-hrs)	43	38	37	35	35	35
Rank	16	17	19	22	16	15
Delay due to Incidents (percent)	52	52	52	52	52	52
<b>Travel Time Index</b>						
Rank	7	10	10	9	9	9
<b>Congestion Cost</b>						
Total Cost (\$ millions)	1,527	1,283	1,202	1,092	1,008	905
Rank	8	8	8	8	8	8
Cost per Peak Traveler (\$)	632	552	534	500	483	459
Rank	17	19	24	23	21	17

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 Miami, FL, 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)	4,080	4,030	3,965	3,910	3,860	3,755
Rank	5	5	6	6	6	6
Urban Area (square miles)	1,440	1,405	1,375	1,355	1,335	1,305
Popn Density (persons/sq mile)	2,833	2,868	2,884	2,886	2,891	2,877
Peak Travelers (1000s)	1,922	1,866	1,804	1,748	1,710	1,648
<b>Freeway</b>						
Daily Vehicle-Miles of Travel (1000s)	25,815	24,875	22,675	21,670	21,020	19,360
Lane Miles	1,755	1,720	1,680	1,635	1,590	1,550
<b>Arterial Streets</b>						
Daily Vehicle-Miles of Travel (1000s)	30,925	30,110	29,500	29,210	28,895	28,415
Lane Miles	5,715	5,625	5,550	5,470	5,430	5,415
<b>Public Transportation</b>						
Annual Psgr-Miles of Travel (millions)	641	553	519	470	415	381
Annual Unlinked Psgr Trips (millions)	121	100	99	98	93	84
<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)	1.13	1.12	1.10	1.05	1.08	1.00
<b>System Performance</b>						
<b>Congested Travel</b> (% of peak VMT)	60	61	58	60	58	57
<b>Congested System</b> (% of lane-miles)	59	59	62	65	62	66
<b>Congested Time</b> (number of "Rush Hours")	6.8	6.6	6.0	6.0	6.0	5.6
<b>Annual Increase Needed To Maintain Constant Congestion Level:</b>						
Lane-Miles	261	293	292	327	367	353
Transit Riders or Carpoolers (millions)	69	76	73	81	91	84
<b>Annual Excess Fuel Consumed</b>						
Total Fuel (1000 gallons)	42,526	42,623	36,901	37,194	34,812	33,878
Rank	7	7	7	7	8	8
Fuel per Peak Traveler (gallons)	22	23	20	21	20	21
Rank	15	15	16	14	14	14
<b>Annual Delay</b>						
Total Delay (1000s of person-hours)	65,013	64,960	56,951	57,542	54,187	52,800
Rank	7	7	7	7	8	7
Delay per Peak Traveler (person-hrs)	34	35	32	33	32	32
Rank	14	13	14	15	15	13
Delay due to Incidents (percent)	52	52	52	52	52	52
<b>Travel Time Index</b>						
Rank	10	10	10	9	10	7
<b>Congestion Cost</b>						
Total Cost (\$ millions)	842	822	703	691	609	563
Rank	7	7	7	7	7	7
Cost per Peak Traveler (\$)	438	440	389	395	356	342
Rank	15	13	16	15	15	14

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 Miami, FL, 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)	3,670	3,635	3,580	3,495	3,415	3,370
Rank	6	6	6	6	7	7
Urban Area (square miles)	1,275	1,245	1,220	1,210	1,160	1,100
Popn Density (persons/sq mile)	2,878	2,920	2,934	2,888	2,944	3,064
Peak Travelers (1000s)	1,596	1,567	1,529	1,478	1,434	1,402
<b>Freeway</b>						
Daily Vehicle-Miles of Travel (1000s)	17,425	15,770	14,605	13,375	12,405	11,960
Lane Miles	1,520	1,480	1,445	1,415	1,385	1,375
<b>Arterial Streets</b>						
Daily Vehicle-Miles of Travel (1000s)	27,790	27,025	26,010	25,320	24,910	24,500
Lane Miles	5,375	5,355	5,305	5,275	5,220	5,150
<b>Public Transportation</b>						
Annual Psgr-Miles of Travel (millions)	390	396	400	367	367	367
Annual Unlinked Psgr Trips (millions)	88	89	87	80	80	80
<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)	1.00	0.98	1.28	1.29	1.32	1.38
<b>System Performance</b>						
<b>Congested Travel</b> (% of peak VMT)	50	44	39	34	34	33
<b>Congested System</b> (% of lane-miles)	64	61	65	61	57	56
<b>Congested Time</b> (number of "Rush Hours")	5.0	4.6	4.0	3.6	3.4	3.2
<b>Annual Increase Needed To Maintain Constant Congestion Level:</b>						
Lane-Miles	303	--	--	--	--	--
Transit Riders or Carpoolers (millions)	69	--	--	--	--	--
<b>Annual Excess Fuel Consumed</b>						
Total Fuel (1000 gallons)	26,575	21,743	17,291	14,046	13,655	13,109
Rank	8	9	9	9	9	8
Fuel per Peak Traveler (gallons)	17	14	11	10	10	9
Rank	14	15	25	27	22	18
<b>Annual Delay</b>						
Total Delay (1000s of person-hours)	42,056	34,390	28,065	22,905	22,559	21,850
Rank	9	9	9	9	9	8
Delay per Peak Traveler (person-hrs)	26	22	18	15	16	16
Rank	14	19	26	30	22	19
Delay due to Incidents (percent)	52	52	52	52	52	52
<b>Travel Time Index</b>						
Rank	1.18	1.16	1.13	1.11	1.11	1.11
Rank	8	10	14	20	15	13
<b>Congestion Cost</b>						
Total Cost (\$ millions)	434	343	279	221	211	199
Rank	9	9	9	10	9	9
Cost per Peak Traveler (\$)	272	219	183	150	147	142
Rank	16	19	26	31	23	19

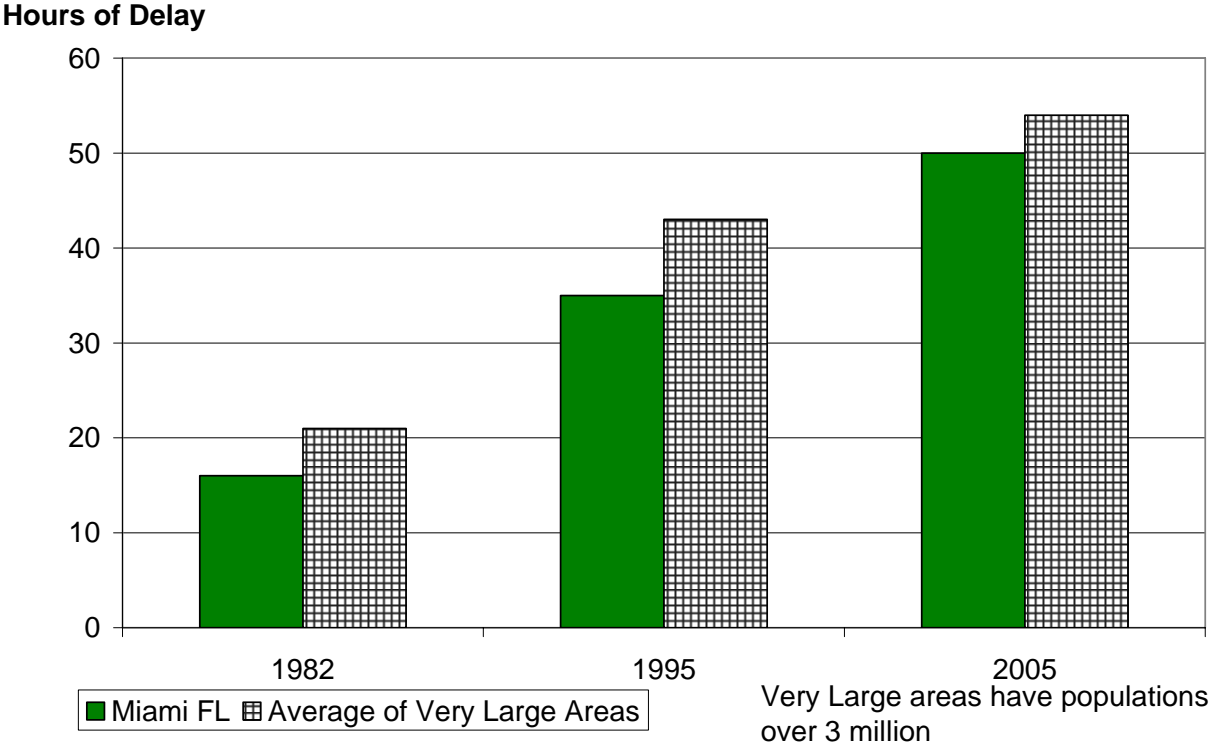
Note: System Performance statistics for 2000 through 2005 data reflect the effects of operational treatments.

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

### Benefits From Public Transportation Service and Operations Strategies for Miami, FL

<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	22	22	9	9	9	6
<b>Service Patrols</b>						
Percent of Roadway Miles	100	100	100	98	90	84
Annual Delay Reduction (1000 hours)	4,873	4,463	4,504	4,269	3,572	3,116
<b>Arterial Signal Coordination</b>						
Percent of Roadway Miles	74	79	83	78	80	82
Annual Delay Reduction (1000 hours)	1,080	1,154	1,143	901	1,080	1,867
<b>Arterial Access Management</b>						
Percent of Roadway Miles	78	83	80	81	82	82
Annual Delay Reduction (1000 hours)	5,849	5,874	5,645	5,047	4,998	3,857
<b>HOV Lanes</b>						
Daily Passenger-miles of Travel (1000s)	872	565	367	238	154	100
HOV User Delay Savings	1,110	560	307	146	56	17
<b>Total Effect of Operations Treatments</b>						
Annual Delay Reduction (1000 hours)	12,911	12,052	11,599	10,362	9,706	8,858
Annual Delay Saved per Peak Traveler (hours)	4	4	4	4	4	3
Annual Congestion Cost Savings (\$million)	232.1	206.5	189.9	165.3	153.6	135.6
Travel Time Index with Strategies	1.384	1.374	1.375	1.371	1.356	1.334
Travel Time Index (Base)	1.416	1.403	1.404	1.397	1.381	1.356
<b>Public Transportation Service</b>						
<b>Existing Service</b>						
Annual Passenger-miles of Travel (million)	806	757	707	672	675	628
Unlinked Passenger Trips (million)	159	151	134	126	127	122
Travel Time Index (combined road and transit)	1.364	1.355	1.357	1.353	1.338	1.317
<b>Condition if Public Transportation Service were Discontinued</b>						
Travel Time Index	1.428	1.419	1.417	1.412	1.396	1.371
Annual Delay Increase (1000 hours)	9,748	10,897	8,567	8,289	8,133	7,351
Annual Delay Increase per Peak Traveler (hours)	3	4	3	3	3	3
Annual Congestion Cost Increase (\$million)	170.3	182.0	137.0	130.1	127.8	112.6

### Growth in Delay per Peak Traveler



### Growth in Total Delay

