

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-
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
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 Chicago, IL-IN

Inventory Measures	2005	2004	2003	2002	2001	2000
Urban Area Information						
Population (1000s)	8,140	8,135	8,125	8,120	8,110	8,090
Rank	3	3	3	3	3	3
Urban Area (square miles)	2,800	2,790	2,785	2,780	2,780	2,775
Popn Density (persons/sq mile)	2,907	2,916	2,917	2,921	2,917	2,915
Peak Travelers (1000s)	4,379	4,352	4,323	4,287	4,193	4,094
Freeway						
Daily Vehicle-Miles of Travel (1000s)	55,050	54,000	52,010	51,425	49,865	49,000
Lane Miles	2,720	2,680	2,665	2,665	2,655	2,655
Arterial Streets						
Daily Vehicle-Miles of Travel (1000s)	50,500	50,000	49,000	48,425	47,005	46,975
Lane Miles	12,900	12,615	12,395	12,100	11,995	11,940
Public Transportation						
Annual Psgr-Miles of Travel (millions)	3,873	3,751	3,679	3,700	3,711	3,720
Annual Unlinked Psgr Trips (millions)	604	583	582	596	600	597
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)	2.34	1.95	1.57	1.46	1.50	1.70
System Performance						
Congested Travel (% of peak VMT)	82	82	81	80	75	74
Congested System (% of lane-miles)	63	62	62	62	57	57
Congested Time (number of "Rush Hours")	7.8	7.6	7.6	7.6	7.4	7.4
Annual Increase Needed To Maintain Constant Congestion Level:						
Lane-Miles	300	275	204	249	233	350
Transit Riders or Carpoolers (millions)	70	65	48	58	54	80
Annual Excess Fuel Consumed						
Total Fuel (1000 gallons)	141,612	132,604	124,972	119,488	100,651	96,278
Rank	3	3	3	3	3	3
Fuel per Peak Traveler (gallons)	32	30	29	28	24	24
Rank	17	18	18	20	26	25
Annual Delay						
Total Delay (1000s of person-hours)	202,835	189,791	178,204	170,527	145,059	140,549
Rank	3	3	3	3	3	3
Delay per Peak Traveler (person-hrs)	46	44	41	40	35	34
Rank	16	18	19	19	25	27
Delay due to Incidents (percent)	49	49	49	49	48	48
Travel Time Index						
Rank	1.47	1.44	1.43	1.41	1.35	1.34
Rank	2	2	2	2	3	3
Congestion Cost						
Total Cost (\$ millions)	3,968	3,562	3,222	3,019	2,522	2,390
Rank	3	3	3	3	3	3
Cost per Peak Traveler (\$)	906	818	745	704	602	584
Rank	15	18	18	18	24	24

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 Chicago, IL-IN, Continued

Inventory Measures	1999	1998	1997	1996	1995	1994
Urban Area Information						
Population (1000s)	8,075	8,060	7,950	7,880	7,745	7,700
Rank	3	3	3	3	3	3
Urban Area (square miles)	2,765	2,760	2,740	2,740	2,700	2,500
Popn Density (persons/sq mile)	2,920	2,920	2,901	2,876	2,869	3,080
Peak Travelers (1000s)	4,005	3,917	3,784	3,672	3,532	3,442
Freeway						
Daily Vehicle-Miles of Travel (1000s)	48,600	48,425	46,760	46,930	44,490	42,120
Lane Miles	2,655	2,655	2,645	2,630	2,620	2,620
Arterial Streets						
Daily Vehicle-Miles of Travel (1000s)	46,510	46,015	45,095	42,580	40,765	40,970
Lane Miles	11,930	11,920	11,905	11,830	11,795	11,700
Public Transportation						
Annual Psgr-Miles of Travel (millions)	3,537	3,537	3,394	3,307	3,319	2,648
Annual Unlinked Psgr Trips (millions)	584	561	548	550	551	552
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)	1.17	1.15	1.21	1.39	1.28	1.11
System Performance						
Congested Travel (% of peak VMT)	74	74	73	73	68	62
Congested System (% of lane-miles)	57	57	57	57	56	55
Congested Time (number of "Rush Hours")	7.4	7.4	7.2	7.2	7.0	6.4
Annual Increase Needed To Maintain Constant Congestion Level:						
Lane-Miles	400	436	449	444	375	403
Transit Riders or Carpoolers (millions)	90	98	98	95	77	81
Annual Excess Fuel Consumed						
Total Fuel (1000 gallons)	99,576	98,913	92,284	90,826	79,186	68,007
Rank	3	3	3	3	3	3
Fuel per Peak Traveler (gallons)	25	25	24	25	22	20
Rank	22	19	20	17	20	28
Annual Delay						
Total Delay (1000s of person-hours)	145,029	143,844	134,628	131,801	116,362	102,677
Rank	3	3	3	3	3	3
Delay per Peak Traveler (person-hrs)	36	37	36	36	33	30
Rank	25	23	24	21	24	28
Delay due to Incidents (percent)	48	48	48	49	49	50
Travel Time Index						
Rank	1.35	1.35	1.34	1.34	1.31	1.27
Rank	4	3	3	4	4	7
Congestion Cost						
Total Cost (\$ millions)	2,341	2,275	2,108	2,043	1,745	1,476
Rank	3	3	3	3	3	3
Cost per Peak Traveler (\$)	585	581	557	556	494	429
Rank	23	17	19	16	17	25

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 Chicago, IL-IN, Continued

Inventory Measures	1993	1992	1991	1990	1989	1988
Urban Area Information						
Population (1000s)	7,600	7,515	7,515	7,510	7,405	7,330
Rank	3	3	3	3	3	3
Urban Area (square miles)	2,250	2,175	2,050	1,990	1,985	1,990
Popn Density (persons/sq mile)	3,378	3,455	3,666	3,774	3,730	3,683
Peak Travelers (1000s)	3,329	3,224	3,156	3,087	3,014	2,961
Freeway						
Daily Vehicle-Miles of Travel (1000s)	40,965	39,000	37,695	36,225	34,000	32,200
Lane Miles	2,600	2,440	2,300	2,230	2,125	2,110
Arterial Streets						
Daily Vehicle-Miles of Travel (1000s)	40,525	39,910	39,250	38,740	38,325	38,000
Lane Miles	11,600	11,520	11,405	11,300	11,190	11,100
Public Transportation						
Annual Psgr-Miles of Travel (millions)	2,610	2,648	3,506	3,651	3,773	3,686
Annual Unlinked Psgr Trips (millions)	538	586	651	696	698	702
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)	1.16	1.19	1.19	1.16	1.13	1.04
System Performance						
Congested Travel (% of peak VMT)	61	62	61	60	59	54
Congested System (% of lane-miles)	55	52	52	52	51	47
Congested Time (number of "Rush Hours")	6.2	6.4	6.4	6.4	6.2	5.8
Annual Increase Needed To Maintain Constant Congestion Level:						
Lane-Miles	430	439	428	447	452	413
Transit Riders or Carpoolers (millions)	86	86	83	86	85	76
Annual Excess Fuel Consumed						
Total Fuel (1000 gallons)	65,929	64,890	62,433	60,559	57,936	49,686
Rank	4	4	4	4	4	4
Fuel per Peak Traveler (gallons)	20	20	20	20	19	17
Rank	23	17	18	17	17	17
Annual Delay						
Total Delay (1000s of person-hours)	100,821	99,856	95,316	93,086	90,427	78,118
Rank	3	3	3	4	4	4
Delay per Peak Traveler (person-hrs)	30	31	30	30	30	26
Rank	22	17	16	16	17	16
Delay due to Incidents (percent)	51	51	50	51	52	52
Travel Time Index						
Rank	7	6	8	7	6	8
Congestion Cost						
Total Cost (\$ millions)	1,413	1,364	1,274	1,206	1,088	892
Rank	3	3	3	4	4	4
Cost per Peak Traveler (\$)	424	423	404	391	361	301
Rank	19	16	15	16	14	16

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 Chicago, IL-IN, Continued

Inventory Measures	1987	1986	1985	1984	1983	1982
Urban Area Information						
Population (1000s)	7,240	7,195	7,150	7,100	7,100	7,080
Rank	3	3	3	3	3	3
Urban Area (square miles)	1,960	1,960	1,960	1,960	1,960	1,900
Popn Density (persons/sq mile)	3,694	3,671	3,648	3,622	3,622	3,726
Peak Travelers (1000s)	2,896	2,849	2,810	2,762	2,741	2,705
Freeway						
Daily Vehicle-Miles of Travel (1000s)	30,255	29,005	27,715	25,605	24,795	24,325
Lane Miles	2,095	2,035	1,980	1,965	1,980	1,935
Arterial Streets						
Daily Vehicle-Miles of Travel (1000s)	37,340	36,975	36,020	35,590	35,400	35,100
Lane Miles	11,050	11,010	10,900	10,820	10,785	10,745
Public Transportation						
Annual Psgr-Miles of Travel (millions)	3,500	3,500	3,681	3,570	3,570	3,570
Annual Unlinked Psgr Trips (millions)	691	700	744	734	734	734
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)	1.05	1.02	1.34	1.35	1.38	1.44
System Performance						
Congested Travel (% of peak VMT)	51	50	45	39	34	34
Congested System (% of lane-miles)	47	47	42	41	36	36
Congested Time (number of "Rush Hours")	5.4	5.2	5.0	4.4	4.0	4.0
Annual Increase Needed To Maintain Constant Congestion Level:						
Lane-Miles	343	--	--	--	--	--
Transit Riders or Carpoolers (millions)	61	--	--	--	--	--
Annual Excess Fuel Consumed						
Total Fuel (1000 gallons)	44,653	43,320	37,590	29,521	24,200	24,314
Rank	4	4	4	5	5	3
Fuel per Peak Traveler (gallons)	15	15	13	11	9	9
Rank	16	12	13	21	25	20
Annual Delay						
Total Delay (1000s of person-hours)	71,731	69,801	60,953	48,081	39,544	39,595
Rank	4	4	3	4	4	3
Delay per Peak Traveler (person-hrs)	25	24	22	17	14	15
Rank	17	11	12	21	27	21
Delay due to Incidents (percent)	52	52	53	53	53	53
Travel Time Index						
Rank	7	7	7	8	11	8
Congestion Cost						
Total Cost (\$ millions)	793	746	650	494	392	383
Rank	4	3	3	4	4	3
Cost per Peak Traveler (\$)	274	262	231	179	143	141
Rank	14	11	12	19	26	20

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

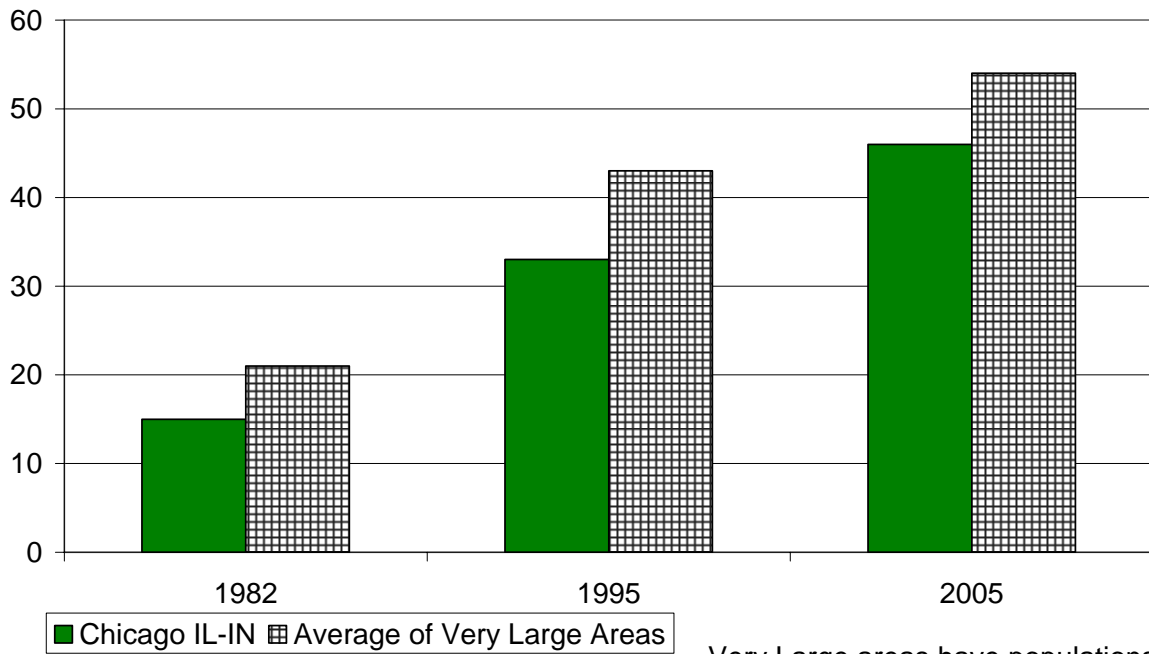
Note: Zeroes in the table reflect values less than 0.5.

Benefits From Public Transportation Service and Operations Strategies for Chicago, IL-IN

Operations Strategies	2005	2004	2003	2002	2001	2000
Freeway Ramp Metering						
Percent of Roadway Miles	23	23	23	23	21	21
Annual Delay Reduction (1000 hours)	1,125	1,054	966	939	602	545
Freeway Incident Management						
Cameras						
Percent of Roadway Miles	40	41	28	28	27	26
Service Patrols						
Percent of Roadway Miles	59	60	50	50	50	50
Annual Delay Reduction (1000 hours)	3,630	3,408	2,665	2,413	1,632	1,502
Arterial Signal Coordination						
Percent of Roadway Miles	54	56	56	56	57	55
Annual Delay Reduction (1000 hours)	626	589	632	558	540	547
Arterial Access Management						
Percent of Roadway Miles	14	14	13	13	13	13
Annual Delay Reduction (1000 hours)	3,004	3,396	2,925	2,455	2,361	1,866
HOV Lanes						
Daily Passenger-miles of Travel (1000s)	--	--	--	--	--	--
HOV User Delay Savings	--	--	--	--	--	--
Total Effect of Operations Treatments						
Annual Delay Reduction (1000 hours)	8,384	8,446	7,187	6,365	5,135	4,460
Annual Delay Saved per Peak Traveler (hours)	2	2	2	1	1	1
Annual Congestion Cost Savings (\$million)	163.6	157.9	129.7	113.0	89.1	76.2
Travel Time Index with Strategies	1.472	1.444	1.429	1.413	1.350	1.337
Travel Time Index (Base)	1.490	1.462	1.445	1.427	1.361	1.347
Public Transportation Service						
Existing Service						
Annual Passenger-miles of Travel (million)	3,873	3,751	3,679	3,700	3,711	3,720
Unlinked Passenger Trips (million)	604	583	582	596	600	597
Travel Time Index (combined road and transit)	1.400	1.379	1.366	1.352	1.299	1.288
Condition if Public Transportation Service were Discontinued						
Travel Time Index	1.544	1.526	1.518	1.500	1.427	1.405
Annual Delay Increase (1000 hours)	39,554	41,428	43,467	43,605	39,961	37,201
Annual Delay Increase per Peak Traveler (hours)	9	10	10	10	10	9
Annual Congestion Cost Increase (\$million)	779.4	783.4	794.2	780.3	703.5	640.4

Growth in Delay per Peak Traveler

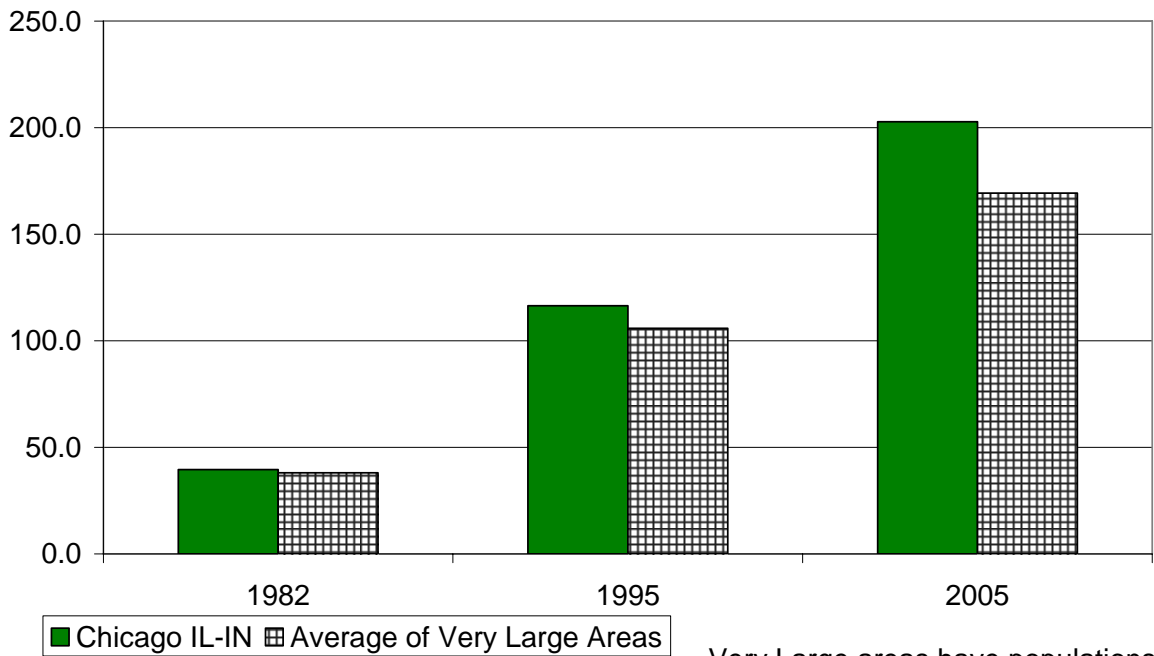
Hours of Delay



Very Large areas have populations over 3 million

Annual Hours of Delay (million)

Growth in Total Delay



Very Large areas have populations over 3 million