Performance Measure Summary – Philadelphia, PA-NJ-DE-MD

There are several inventory and performance measures listed in the pages of this Urban Area Report for the years from 1982 to 2007. 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. 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*).

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 2007 (estimated at $15.47 per hour of person travel and $102.12 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.

The Mobility Data for Philadelphia PA-NJ-DE-MD

Inventory Measures	2007	2006	2005	2004	2003	2002
Urban Area Information						
Population (1000s)	5,310	5,310	5,300	5,300	5,285	5,200
Rank	5	5	5	4	4	4
Urban Area (square miles)	2,280	2,280	2,280	2,275	2,270	2,200
Population Density (persons/sq mile)	2,329	2,329	2,325	2,330	2,328	2,364
Peak Travelers (1000s)	2,947	2,942	2,920	2,910	2,886	2,824
Freeway						
Daily Vehicle-Miles of Travel (1000s)	36,400	35,945	35,325	34,440	33,875	30,770
Lane-Miles	2,400	2,390	2,305	2,305	2,300	2,085
Arterial Streets						
Daily Vehicle-Miles of Travel (1000s)	47,765	47,945	48,235	47,910	47,245	45,070
Lane-Miles	8,230	8,230	8,230	8,215	8,040	7,720
Public Transportation						
Annual Psgr-Miles of Travel (millions)	1,600	1,591	1,631	1,589	1,507	1,460
Annual Unlinked Psgr Trips (millions)	341	342	353	351	338	331
Cost Components						
Value of Time ($/hour)	15.47	15.06	14.58	14.10	13.73	13.43
Commercial Cost ($/hour)	102.12	98.77	94.06	86.24	82.38	79.96
Fuel Cost ($/gallon)	2.97	2.68	2.28	1.94	1.51	1.36
System Performance	**2007**	**2006**	**2005**	**2004**	**2003**	**2002**
Congested Travel (% of peak VMT)	63	63	63	63	63	63
Congested System (% of lane-miles)	52	52	52	52	52	52
Congested Time (number of "Rush Hours")	7.2	7.2	7.2	7.2	7.0	7.0
Annual Increase Needed to Maintain Constant Congestion Level:						
Lane-miles	224	327	413	439	469	357
Transit Riders or Carpoolers (millions)	62	90	114	119	128	96
Annual Excess Fuel Consumed						
Total Fuel (1000 gallons)	71,262	70,478	70,907	68,134	65,803	62,320
Rank	11	11	11	12	11	11
Fuel per Peak Traveler (gallons)	24	24	24	23	23	22
Rank	34	34	35	36	34	33
Annual Delay						
Total Delay (1000s of person-hours)	112,074	111,108	111,704	107,292	104,117	99,030
Rank	11	11	11	11	11	11
Delay per Peak Traveler (person-hours)	38	38	38	37	36	35
Rank	29	30	32	31	31	28
Delay due to Incidents (percent)	59	59	59	59	58	58
Travel Time Index	1.28	1.27	1.28	1.27	1.26	1.27
Rank	24	24	23	23	23	17
Congestion Cost						
Total Cost ($ millions)	2,316	2,230	2,147	1,945	1,812	1,673
Rank	11	11	11	11	11	11
Cost per Peak Traveler ($)	786	758	735	669	628	592
Rank	30	32	32	33	30	30

Note: System Performance statistics for 2000 through 2007 data reflect the effects of operational treatments.
Note: Zeroes in the table reflect values less than 0.5.

The Mobility Data for Philadelphia PA-NJ-DE-MD, Continued

Inventory Measures	2001	2000	1999	1998	1997
Urban Area Information					
Population (1000s)	5,125	5,040	4,950	4,875	4,800
Rank	4	4	4	4	4
Urban Area (square miles)	2,100	2,000	1,900	1,800	1,700
Population Density (persons/sq mile)	2,440	2,520	2,605	2,708	2,824
Peak Travelers (1000s)	2,716	2,611	2,500	2,408	2,314
Freeway					
Daily Vehicle-Miles of Travel (1000s)	30,050	28,930	28,625	27,860	26,930
Lane-Miles	2,070	2,065	2,065	2,060	2,050
Arterial Streets					
Daily Vehicle-Miles of Travel (1000s)	42,050	40,015	38,500	37,105	36,515
Lane-Miles	7,435	7,120	6,850	6,655	6,575
Public Transportation					
Annual Psgr-Miles of Travel (millions)	1,480	1,540	1,488	1,366	1,415
Annual Unlinked Psgr Trips (millions)	338	337	328	292	316
Cost Components					
Value of Time ($/hour)	13.22	12.85	12.43	12.17	11.98
Commercial Cost ($/hour)	80.88	80.75	74.23	72.61	74.32
Fuel Cost ($/gallon)	1.54	1.51	1.11	1.06	1.19
System Performance	**2001**	**2000**	**1999**	**1998**	**1997**
Congested Travel (% of peak VMT)	59	55	55	53	51
Congested System (% of lane-miles)	51	46	46	46	45
Congested Time (number of "Rush Hours")	6.8	6.6	6.4	6.2	6.0
Annual Increase Needed to Maintain Constant Congestion Level:					
Lane-miles	317	236	191	163	153
Transit Riders or Carpoolers (millions)	83	61	50	42	39
Annual Excess Fuel Consumed					
Total Fuel (1000 gallons)	57,135	49,469	48,163	46,338	40,442
Rank	11	11	11	12	12
Fuel per Peak Traveler (gallons)	21	19	19	19	17
Rank	32	37	38	37	39
Annual Delay					
Total Delay (1000s of person-hours)	90,256	79,121	76,686	73,093	64,321
Rank	11	11	11	11	12
Delay per Peak Traveler (person-hours)	33	30	31	30	28
Rank	30	37	33	32	37
Delay due to Incidents (percent)	59	58	58	58	57
Travel Time Index	1.26	1.23	1.23	1.23	1.20
Rank	20	23	19	17	23
Congestion Cost					
Total Cost ($ millions)	1,519	1,296	1,190	1,107	973
Rank	11	11	11	9	12
Cost per Peak Traveler ($)	559	496	476	460	420
Rank	33	38	36	35	37

Note: System Performance statistics for 2000 through 2007 data reflect the effects of operational treatments.
Note: Zeroes in the table reflect values less than 0.5.

The Mobility Data for Philadelphia PA-NJ-DE-MD, Continued

Inventory Measures	1996	1995	1994	1993	1992
Urban Area Information					
Population (1000s)	4,725	4,670	4,640	4,625	4,610
Rank	4	4	4	4	4
Urban Area (square miles)	1,600	1,500	1,475	1,460	1,445
Population Density (persons/sq mile)	2,953	3,113	3,146	3,168	3,190
Peak Travelers (1000s)	2,225	2,148	2,083	2,026	1,973
Freeway					
Daily Vehicle-Miles of Travel (1000s)	25,445	25,185	24,045	23,395	22,530
Lane-Miles	2,050	2,050	2,045	2,040	1,905
Arterial Streets					
Daily Vehicle-Miles of Travel (1000s)	35,755	35,560	36,300	35,825	35,580
Lane-Miles	6,565	6,520	6,435	6,410	6,385
Public Transportation					
Annual Psgr-Miles of Travel (millions)	1,408	1,405	1,440	1,367	1,392
Annual Unlinked Psgr Trips (millions)	329	339	343	341	337
Cost Components					
Value of Time ($/hour)	11.71	11.37	11.06	10.78	10.47
Commercial Cost ($/hour)	74.17	71.54	69.53	67.77	66.19
Fuel Cost ($/gallon)	1.26	1.19	1.04	1.09	1.14
System Performance	**1996**	**1995**	**1994**	**1993**	**1992**
Congested Travel (% of peak VMT)	46	44	44	43	42
Congested System (% of lane-miles)	45	44	44	44	43
Congested Time (number of "Rush Hours")	5.6	5.6	5.6	5.4	5.6
Annual Increase Needed to Maintain Constant Congestion Level:					
Lane-miles	180	171	171	171	183
Transit Riders or Carpoolers (millions)	44	42	42	42	45
Annual Excess Fuel Consumed					
Total Fuel (1000 gallons)	36,040	33,622	31,852	30,197	31,150
Rank	12	13	13	13	12
Fuel per Peak Traveler (gallons)	16	16	15	15	16
Rank	40	39	40	35	29
Annual Delay					
Total Delay (1000s of person-hours)	57,178	54,996	52,322	49,317	52,253
Rank	11	11	11	11	8
Delay per Peak Traveler (person-hours)	26	26	25	24	26
Rank	38	37	34	34	27
Delay due to Incidents (percent)	57	57	56	56	56
Travel Time Index	1.18	1.17	1.16	1.16	1.17
Rank	27	26	27	26	20
Congestion Cost					
Total Cost ($ millions)	855	793	724	666	690
Rank	11	11	12	12	9
Cost per Peak Traveler ($)	384	369	348	329	350
Rank	40	39	36	37	26

Note: System Performance statistics for 2000 through 2007 data reflect the effects of operational treatments.
Note: Zeroes in the table reflect values less than 0.5.

The Mobility Data for Philadelphia PA-NJ-DE-MD, Continued

Inventory Measures	1991	1990	1989	1988	1987
Urban Area Information					
Population (1000s)	4,590	4,580	4,565	4,550	4,500
Rank	4	4	4	4	4
Urban Area (square miles)	1,435	1,420	1,400	1,370	1,350
Population Density (persons/sq mile)	3,199	3,225	3,261	3,321	3,333
Peak Travelers (1000s)	1,919	1,869	1,844	1,825	1,787
Freeway					
Daily Vehicle-Miles of Travel (1000s)	22,080	21,210	21,170	19,450	17,790
Lane-Miles	1,835	1,730	1,700	1,630	1,575
Arterial Streets					
Daily Vehicle-Miles of Travel (1000s)	33,105	33,845	33,440	34,105	34,295
Lane-Miles	6,350	6,310	6,280	6,265	6,115
Public Transportation					
Annual Psgr-Miles of Travel (millions)	1,457	1,495	1,542	1,535	1,400
Annual Unlinked Psgr Trips (millions)	361	373	389	385	368
Cost Components					
Value of Time ($/hour)	10.17	9.75	9.25	8.83	8.48
Commercial Cost ($/hour)	64.55	62.47	59.16	56.03	54.62
Fuel Cost ($/gallon)	1.16	1.30	1.06	0.98	0.98
System Performance	**1991**	**1990**	**1989**	**1988**	**1987**
Congested Travel (% of peak VMT)	41	43	43	43	42
Congested System (% of lane-miles)	43	39	39	39	38
Congested Time (number of "Rush Hours")	5.4	5.6	5.6	5.6	5.4
Annual Increase Needed to Maintain Constant Congestion Level:					
Lane-miles	196	308	310	301	318
Transit Riders or Carpoolers (millions)	46	73	74	71	75
Annual Excess Fuel Consumed					
Total Fuel (1000 gallons)	28,285	27,929	27,701	26,962	25,926
Rank	13	12	11	9	8
Fuel per Peak Traveler (gallons)	15	15	15	15	15
Rank	26	26	22	20	16
Annual Delay					
Total Delay (1000s of person-hours)	47,542	45,892	45,378	45,281	43,706
Rank	9	9	9	9	8
Delay per Peak Traveler (person-hours)	25	25	25	25	24
Rank	25	24	19	18	16
Delay due to Incidents (percent)	56	55	55	54	54
Travel Time Index	1.16	1.16	1.16	1.16	1.15
Rank	21	19	19	16	13
Congestion Cost					
Total Cost ($ millions)	612	571	532	502	469
Rank	9	10	10	9	8
Cost per Peak Traveler ($)	319	306	288	275	263
Rank	27	27	24	20	17

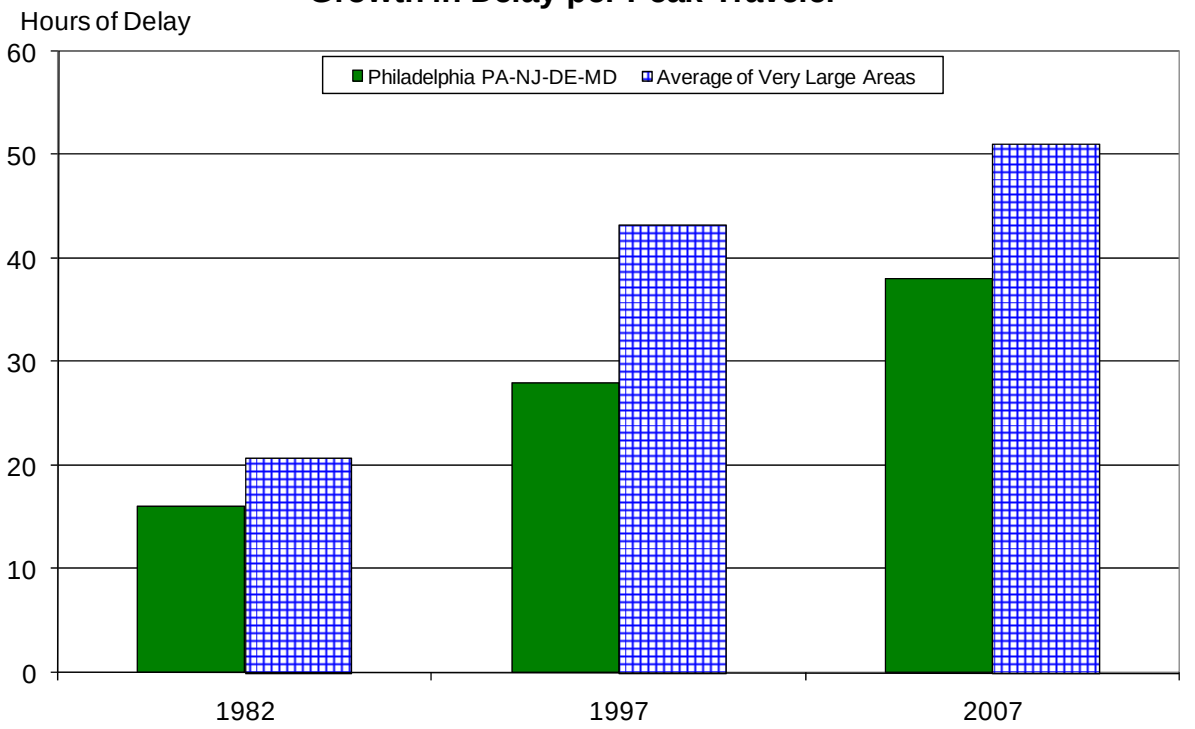
Note: System Performance statistics for 2000 through 2007 data reflect the effects of operational treatments.
Note: Zeroes in the table reflect values less than 0.5.

The Mobility Data for Philadelphia PA-NJ-DE-MD, Continued

Inventory Measures	1986	1985	1984	1983	1982
Urban Area Information					
Population (1000s)	4,480	4,470	4,465	4,460	4,450
Rank	4	4	4	4	4
Urban Area (square miles)	1,330	1,300	1,275	1,135	1,090
Population Density (persons/sq mile)	3,368	3,438	3,502	3,930	4,083
Peak Travelers (1000s)	1,761	1,743	1,723	1,708	1,687
Freeway					
Daily Vehicle-Miles of Travel (1000s)	16,000	15,585	15,980	15,705	14,110
Lane-Miles	1,560	1,550	1,540	1,520	1,465
Arterial Streets					
Daily Vehicle-Miles of Travel (1000s)	33,030	30,015	29,145	28,715	28,425
Lane-Miles	5,950	5,810	5,705	5,625	5,585
Public Transportation					
Annual Psgr-Miles of Travel (millions)	1,426	1,444	1,540	1,540	1,540
Annual Unlinked Psgr Trips (millions)	365	401	414	414	414
Cost Components					
Value of Time ($/hour)	8.18	8.03	7.75	7.43	7.20
Commercial Cost ($/hour)	52.63	55.80	54.65	52.70	52.13
Fuel Cost ($/gallon)	0.96	1.25	1.27	1.30	1.35
System Performance	**1986**	**1985**	**1984**	**1983**	**1982**
Congested Travel (% of peak VMT)	39	35	34	34	32
Congested System (% of lane-miles)	38	38	38	38	38
Congested Time (number of "Rush Hours")	5.0	4.4	4.4	4.4	4.2
Annual Increase Needed to Maintain Constant Congestion Level:					
Lane-miles	- -	- -	- -	- -	- -
Transit Riders or Carpoolers (millions)	- -	- -	- -	- -	- -
Annual Excess Fuel Consumed					
Total Fuel (1000 gallons)	23,568	19,620	17,605	17,178	16,102
Rank	8	8	8	7	7
Fuel per Peak Traveler (gallons)	13	11	10	10	10
Rank	18	22	23	18	14
Annual Delay					
Total Delay (1000s of person-hours)	40,138	33,502	29,536	28,761	27,230
Rank	8	8	8	7	7
Delay per Peak Traveler (person-hours)	23	19	17	17	16
Rank	15	20	21	17	17
Delay due to Incidents (percent)	55	54	54	55	55
Travel Time Index	1.15	1.13	1.12	1.12	1.11
Rank	10	13	14	11	9
Congestion Cost					
Total Cost ($ millions)	416	350	300	281	260
Rank	8	8	8	7	7
Cost per Peak Traveler ($)	236	201	174	164	154
Rank	16	18	23	18	18

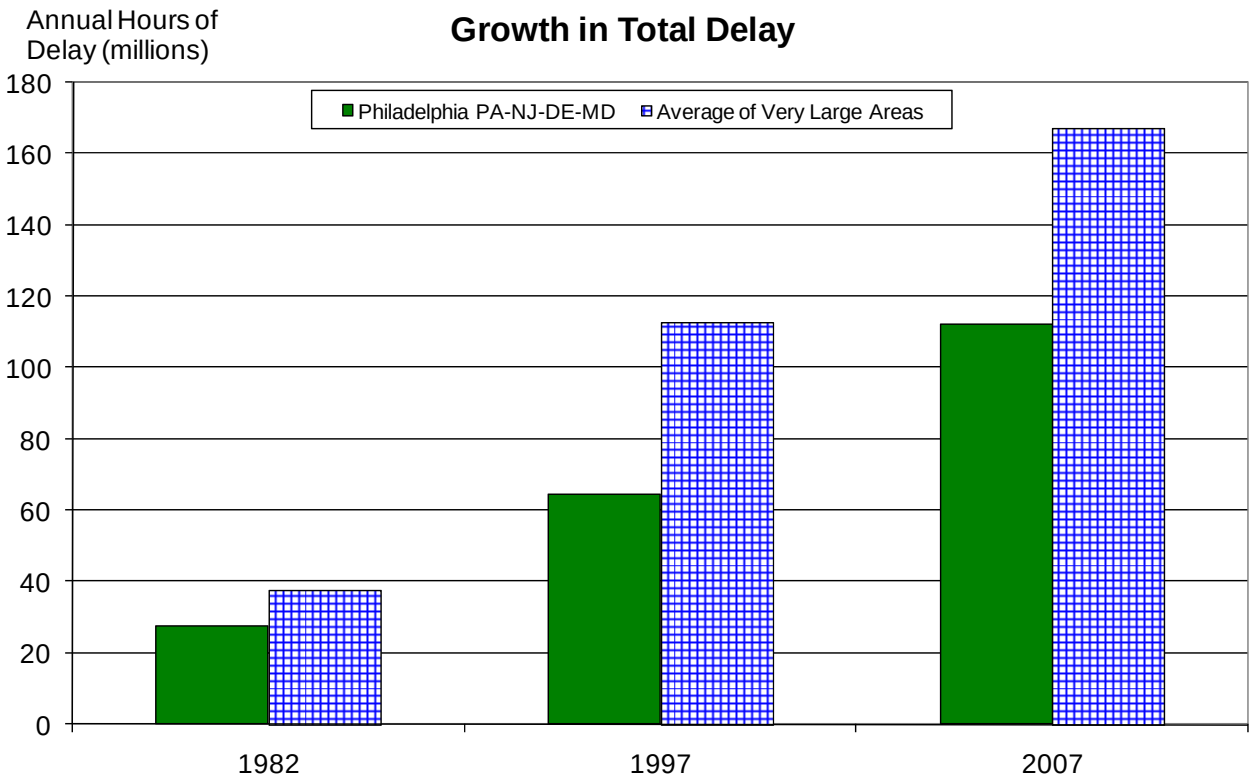
Note: System Performance statistics for 2000 through 2007 data reflect the effects of operational treatments.
Note: Zeroes in the table reflect values less than 0.5.

Growth in Delay per Peak Traveler



Note: Very Large areas have populations over 3 million

Growth in Total Delay



Note: Very Large areas have populations over 3 million

Benefits from Public Transportation Service and Operations Strategies in Philadelphia PA-NY-DE-MD

Operations Strategies	2007	2006	2005	2004
Freeway Ramp Metering				
Percent of Roadway Miles	3	4	4	4
Annual Delay Reduction (1000 hours)	254	241	150	126
Freeway Incident Management				
Cameras				
Percent of Roadway Miles	31	31	32	32
Service Patrols				
Percent of Roadway Miles	69	68	70	70
Annual Delay Reduction (1000 hours)	6,054	5,774	4,466	3,962
Arterial Signal Coordination				
Percent of Roadway Miles	40	40	40	39
Annual Delay Reduction (1000 hours)	450	425	446	413
Arterial Access Management				
Percent of Roadway Miles	15	15	15	16
Annual Delay Reduction (1000 hours)	1,098	1,094	1,351	1,334
HOV Lanes				
Daily Passenger-miles of travel (1000s)	--	--	--	--
HOV User Delay Savings	--	--	--	--
Total Effect of Operations Treatments				
Annual Delay Reduction (1000 hours)	7,856	7,534	6,413	5,834
Annual Delay Saved per Peak Traveler (hours)	3	3	2	2
Annual Congestion Cost Savings ($million)	165.1	154.1	125.4	107.6
Travel Time Index with Strategies	1.277	1.275	1.278	1.270
Travel Time Index (Base)	1.293	1.290	1.291	1.283
Public Transportation Service	**2007**	**2006**	**2005**	**2004**
Existing Service				
Annual Passenger-miles of travel (million)	1,600	1,591	1,631	1,589
Unlinked Passenger Trips (million)	341	342	353	351
Travel Time Index (combined road and transit)	1.274	1.271	1.271	1.264
Condition if Public Transportation Service were Discontinued				
Travel Time Index	1.324	1.322	1.322	1.312
Annual Increase				
Delay (1000 hours)	22,538	23,094	23,157	20,713
Delay per Peak Traveler (hours)	8	8	8	7
Congestion Cost ($million)	472.6	470.7	452.1	381.5

Benefits from Public Transportation Service and Operations Strategies in Philadelphia PA-NY-DE-MD, Continued

Operations Strategies	2003	2002	2001	2000
Freeway Ramp Metering				
Percent of Roadway Miles	4	4	4	4
Annual Delay Reduction (1000 hours)	168	168	101	72
Freeway Incident Management				
Cameras				
Percent of Roadway Miles	32	35	28	18
Service Patrols				
Percent of Roadway Miles	59	65	75	83
Annual Delay Reduction (1000 hours)	3,166	3,187	3,350	2,817
Arterial Signal Coordination				
Percent of Roadway Miles	37	32	31	28
Annual Delay Reduction (1000 hours)	418	420	326	309
Arterial Access Management				
Percent of Roadway Miles	16	13	11	7
Annual Delay Reduction (1000 hours)	1,395	1,104	1,131	826
HOV Lanes				
Daily Passenger-miles of travel (1000s)	--	--	--	--
HOV User Delay Savings	--	--	--	--
Total Effect of Operations Treatments				
Annual Delay Reduction (1000 hours)	5,147	4,879	4,908	4,023
Annual Delay Saved per Peak Traveler (hours)	2	2	2	2
Annual Congestion Cost Savings ($million)	91.0	84.2	84.3	67.9
Travel Time Index with Strategies	1.264	1.268	1.257	1.231
Travel Time Index (Base)	1.275	1.279	1.269	1.241
Public Transportation Service	**2003**	**2002**	**2001**	**2000**
Existing Service				
Annual Passenger-miles of travel (million)	1,507	1,460	1,480	1,540
Unlinked Passenger Trips (million)	338	331	337	337
Travel Time Index (combined road and transit)	1.257	1.260	1.250	1.222
Condition if Public Transportation Service were Discontinued				
Travel Time Index	1.304	1.310	1.309	1.284
Annual Increase				
Delay (1000 hours)	19,530	20,273	23,117	23,064
Delay per Peak Traveler (hours)	7	7	9	9
Congestion Cost ($million)	345.6	349.2	395.5	385.2

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 2007	
				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	S	F+
Miami, FL	L	0	L	0	S
Philadelphia, PA-NJ-DE-MD	L-	L-	L-	S-	S-
San Francisco-Oakland, CA	H	H	L	0	S-
Dallas-Fort Worth-Arlington, TX	0	L	L	F+	0
Atlanta, GA	H	0	L	F+	S
Washington, DC-VA-MD	H+	0	L	F+	S-
Boston, MA-NH-RI	L-	L-	L-	0	S-
Detroit, MI	0	L-	L-	0	S-
Houston, TX	H	L	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

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	
2007 Values	**Above 1M Population**	**Below 1M Population**
Delay per Traveler -	5 Hours	3 Hours
Travel Time Index -	5 Index Points	3 Index Points
Total Delay -	5 Hours x Average Population	3 Hours x Average Population
1982 to 2007 Trends		
Delay per Traveler -	5 Hours	3 Hours
Total Delay -	5 Hours x Average Population	3 Hours x Average Population