Performance Measure Summary – Austin, TX

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 Austin TX

Inventory Measures	2007	2006	2005	2004	2003	2002
Urban Area Information						
Population (1000s)	1,035	1,030	1,025	1,020	1,010	990
Rank	41	40	40	39	39	39
Urban Area (square miles)	525	520	515	515	510	505
Population Density (persons/sq mile)	1,971	1,981	1,990	1,981	1,980	1,960
Peak Travelers (1000s)	580	573	566	560	551	533
Freeway						
Daily Vehicle-Miles of Travel (1000s)	9,400	9,000	9,390	9,175	9,200	9,260
Lane-Miles	585	585	585	585	585	585
Arterial Streets						
Daily Vehicle-Miles of Travel (1000s)	8,040	7,800	7,200	7,000	6,800	6,550
Lane-Miles	1,220	1,210	1,180	1,150	1,130	1,105
Public Transportation						
Annual Psgr-Miles of Travel (millions)	137	132	113	121	125	118
Annual Unlinked Psgr Trips (millions)	34	35	33	36	37	36
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 ($/gallon)	2.92	2.55	2.23	1.83	1.45	1.32
System Performance	**2007**	**2006**	**2005**	**2004**	**2003**	**2002**
Congested Travel (% of peak VMT)	70	66	66	66	66	66
Congested System (% of lane-miles)	58	55	55	53	53	55
Congested Time (number of "Rush Hours")	7.4	7.2	7.4	7.2	7.2	7.2
Annual Increase Needed to Maintain Constant Congestion Level:						
Lane-miles	36	25	36	50	59	69
Transit Riders or Carpoolers (millions)	12	8	12	16	19	22
Annual Excess Fuel Consumed						
Total Fuel (1000 gallons)	15,578	14,877	15,355	14,217	13,650	12,873
Rank	33	33	32	34	32	31
Fuel per Peak Traveler (gallons)	27	26	27	25	25	24
Rank	23	29	27	31	25	28
Annual Delay						
Total Delay (1000s of person-hours)	22,777	22,529	22,349	20,562	19,776	18,655
Rank	32	32	31	36	32	31
Delay per Peak Traveler (person-hours)	39	39	40	37	36	35
Rank	24	28	29	31	31	28
Delay due to Incidents (percent)	56	57	57	57	57	56
Travel Time Index	1.29	1.29	1.31	1.29	1.28	1.27
Rank	20	20	15	18	19	17
Congestion Cost						
Total Cost ($ millions)	471	450	432	375	346	316
Rank	32	32	32	35	34	33
Cost per Peak Traveler ($)	812	786	763	670	627	593
Rank	26	28	29	32	31	29

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 Austin TX, Continued

Inventory Measures	2001	2000	1999	1998	1997
Urban Area Information					
Population (1000s)	960	925	895	870	840
Rank	40	40	40	41	42
Urban Area (square miles)	500	495	490	485	475
Population Density (persons/sq mile)	1,920	1,869	1,827	1,794	1,768
Peak Travelers (1000s)	508	482	458	438	417
Freeway					
Daily Vehicle-Miles of Travel (1000s)	9,300	8,800	8,250	7,850	7,500
Lane-Miles	580	575	560	555	545
Arterial Streets					
Daily Vehicle-Miles of Travel (1000s)	6,350	6,200	5,800	5,680	5,450
Lane-Miles	1,080	1,060	1,050	1,035	1,020
Public Transportation					
Annual Psgr-Miles of Travel (millions)	114	120	108	107	118
Annual Unlinked Psgr Trips (millions)	34	38	36	30	33
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 ($/gallon)	1.46	1.47	1.07	1.01	1.12
System Performance	**2001**	**2000**	**1999**	**1998**	**1997**
Congested Travel (% of peak VMT)	66	61	58	56	54
Congested System (% of lane-miles)	55	52	52	52	50
Congested Time (number of "Rush Hours")	7.2	7.2	6.8	6.4	6.2
Annual Increase Needed to Maintain Constant Congestion Level:					
Lane-miles	74	79	69	64	64
Transit Riders or Carpoolers (millions)	24	25	21	19	18
Annual Excess Fuel Consumed					
Total Fuel (1000 gallons)	12,931	11,062	10,021	8,955	8,965
Rank	31	33	36	36	35
Fuel per Peak Traveler (gallons)	25	23	22	20	22
Rank	19	25	29	32	24
Annual Delay					
Total Delay (1000s of person-hours)	18,719	16,502	14,843	13,042	13,466
Rank	31	33	37	38	36
Delay per Peak Traveler (person-hours)	37	34	32	30	32
Rank	18	26	32	32	28
Delay due to Incidents (percent)	56	56	56	56	57
Travel Time Index	1.27	1.24	1.23	1.21	1.22
Rank	16	20	19	24	19
Congestion Cost					
Total Cost ($ millions)	315	271	230	197	204
Rank	31	33	36	38	36
Cost per Peak Traveler ($)	621	563	502	449	489
Rank	22	31	32	36	31

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 Austin TX, Continued

Inventory Measures	1996	1995	1994	1993	1992
Urban Area Information					
Population (1000s)	800	760	730	720	710
Rank	44	44	45	45	46
Urban Area (square miles)	470	460	445	435	430
Population Density (persons/sq mile)	1,702	1,652	1,640	1,655	1,651
Peak Travelers (1000s)	390	365	345	335	325
Freeway					
Daily Vehicle-Miles of Travel (1000s)	7,275	6,875	6,600	6,500	6,100
Lane-Miles	540	540	540	540	510
Arterial Streets					
Daily Vehicle-Miles of Travel (1000s)	5,300	5,000	4,800	4,600	4,500
Lane-Miles	1,000	990	975	960	940
Public Transportation					
Annual Psgr-Miles of Travel (millions)	110	102	90	90	91
Annual Unlinked Psgr Trips (millions)	31	28	27	26	26
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 ($/gallon)	1.21	1.14	1.03	1.10	1.09
System Performance	**1996**	**1995**	**1994**	**1993**	**1992**
Congested Travel (% of peak VMT)	49	45	41	38	36
Congested System (% of lane-miles)	45	45	43	40	38
Congested Time (number of "Rush Hours")	6.0	5.4	5.0	4.8	4.8
Annual Increase Needed to Maintain Constant Congestion Level:					
Lane-miles	65	68	73	83	77
Transit Riders or Carpoolers (millions)	18	18	19	21	20
Annual Excess Fuel Consumed					
Total Fuel (1000 gallons)	7,883	6,586	5,501	4,564	4,066
Rank	38	40	42	43	42
Fuel per Peak Traveler (gallons)	20	18	16	14	13
Rank	29	31	35	40	39
Annual Delay					
Total Delay (1000s of person-hours)	11,492	9,545	7,938	6,528	5,901
Rank	39	42	43	44	46
Delay per Peak Traveler (person-hours)	29	26	23	19	18
Rank	32	37	40	48	46
Delay due to Incidents (percent)	57	57	56	57	56
Travel Time Index	1.20	1.17	1.15	1.13	1.12
Rank	21	26	32	34	38
Congestion Cost					
Total Cost ($ millions)	172	138	111	89	78
Rank	39	42	42	44	47
Cost per Peak Traveler ($)	442	378	320	265	238
Rank	32	37	43	47	47

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 Austin TX, Continued

Inventory Measures	1991	1990	1989	1988	1987
Urban Area Information					
Population (1000s)	690	660	625	615	580
Rank	46	48	49	48	50
Urban Area (square miles)	420	400	395	395	390
Population Density (persons/sq mile)	1,643	1,650	1,582	1,557	1,487
Peak Travelers (1000s)	311	292	275	268	251
Freeway					
Daily Vehicle-Miles of Travel (1000s)	5,830	5,320	4,900	4,555	4,375
Lane-Miles	470	430	400	400	400
Arterial Streets					
Daily Vehicle-Miles of Travel (1000s)	4,400	4,250	4,100	3,950	3,800
Lane-Miles	920	900	885	860	840
Public Transportation					
Annual Psgr-Miles of Travel (millions)	80	77	60	47	35
Annual Unlinked Psgr Trips (millions)	23	21	14	11	10
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 ($/gallon)	1.12	1.04	1.07	0.99	0.99
System Performance	**1991**	**1990**	**1989**	**1988**	**1987**
Congested Travel (% of peak VMT)	35	34	34	31	30
Congested System (% of lane-miles)	33	33	33	33	35
Congested Time (number of "Rush Hours")	5.2	5.0	5.0	4.2	4.0
Annual Increase Needed to Maintain Constant Congestion Level:					
Lane-miles	63	59	61	57	80
Transit Riders or Carpoolers (millions)	16	15	15	13	18
Annual Excess Fuel Consumed					
Total Fuel (1000 gallons)	4,173	3,653	3,117	2,554	2,519
Rank	41	43	44	44	40
Fuel per Peak Traveler (gallons)	13	12	11	10	10
Rank	36	38	37	36	35
Annual Delay					
Total Delay (1000s of person-hours)	6,288	5,409	4,655	3,866	3,782
Rank	41	45	45	48	40
Delay per Peak Traveler (person-hours)	20	18	17	14	15
Rank	37	42	40	46	39
Delay due to Incidents (percent)	57	56	56	55	56
Travel Time Index	1.13	1.12	1.11	1.09	1.09
Rank	29	34	33	40	35
Congestion Cost					
Total Cost ($ millions)	81	66	54	43	40
Rank	41	46	45	47	42
Cost per Peak Traveler ($)	260	227	196	159	161
Rank	37	42	41	47	41

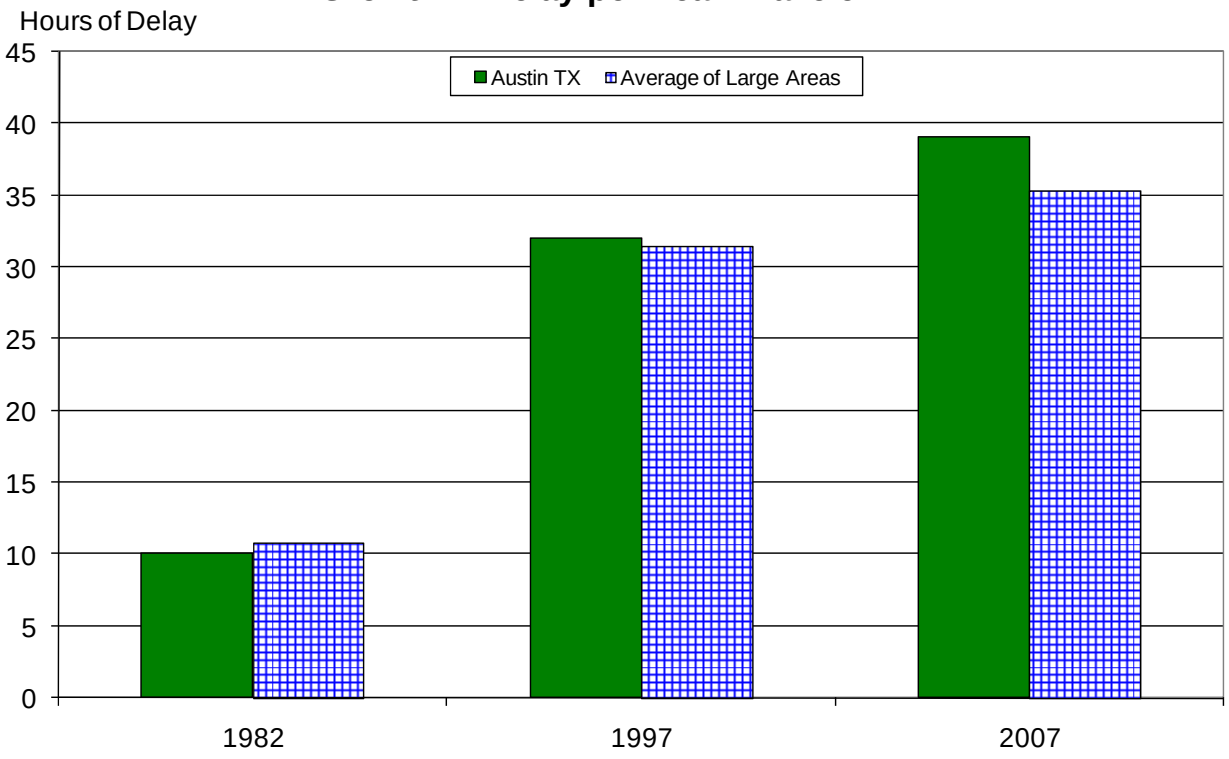
Note: System Performance statistics for 2000 through 2007 data reflect the effects of operational treatments.
Note: Zeroes in the table reflect values less than 0.5.

The Mobility Data for Austin TX, Continued

Inventory Measures	1986	1985	1984	1983	1982
Urban Area Information					
Population (1000s)	565	560	545	520	495
Rank	50	50	50	52	55
Urban Area (square miles)	380	375	365	345	345
Population Density (persons/sq mile)	1,487	1,493	1,493	1,507	1,435
Peak Travelers (1000s)	242	239	231	218	205
Freeway					
Daily Vehicle-Miles of Travel (1000s)	4,550	4,200	3,730	3,615	3,000
Lane-Miles	400	380	355	330	300
Arterial Streets					
Daily Vehicle-Miles of Travel (1000s)	3,650	3,500	3,400	3,200	3,000
Lane-Miles	815	800	760	750	730
Public Transportation					
Annual Psgr-Miles of Travel (millions)	30	23	16	16	16
Annual Unlinked Psgr Trips (millions)	10	8	5	5	5
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 ($/gallon)	0.97	1.27	1.28	1.31	1.37
System Performance	**1986**	**1985**	**1984**	**1983**	**1982**
Congested Travel (% of peak VMT)	32	29	23	24	20
Congested System (% of lane-miles)	33	32	25	25	21
Congested Time (number of "Rush Hours")	4.2	3.8	3.6	3.8	3.0
Annual Increase Needed to Maintain Constant Congestion Level:					
Lane-miles	- -	- -	- -	- -	- -
Transit Riders or Carpoolers (millions)	- -	- -	- -	- -	- -
Annual Excess Fuel Consumed					
Total Fuel (1000 gallons)	2,749	2,444	2,083	1,974	1,382
Rank	37	39	38	37	40
Fuel per Peak Traveler (gallons)	11	10	9	9	7
Rank	27	30	27	23	30
Annual Delay					
Total Delay (1000s of person-hours)	4,037	3,862	3,479	3,100	2,101
Rank	38	37	36	36	41
Delay per Peak Traveler (person-hours)	17	16	15	14	10
Rank	30	32	28	26	38
Delay due to Incidents (percent)	57	58	59	59	58
Travel Time Index	1.10	1.10	1.09	1.09	1.07
Rank	24	23	23	20	26
Congestion Cost					
Total Cost ($ millions)	42	41	36	31	20
Rank	38	37	36	36	40
Cost per Peak Traveler ($)	173	171	155	141	99
Rank	31	32	29	29	40

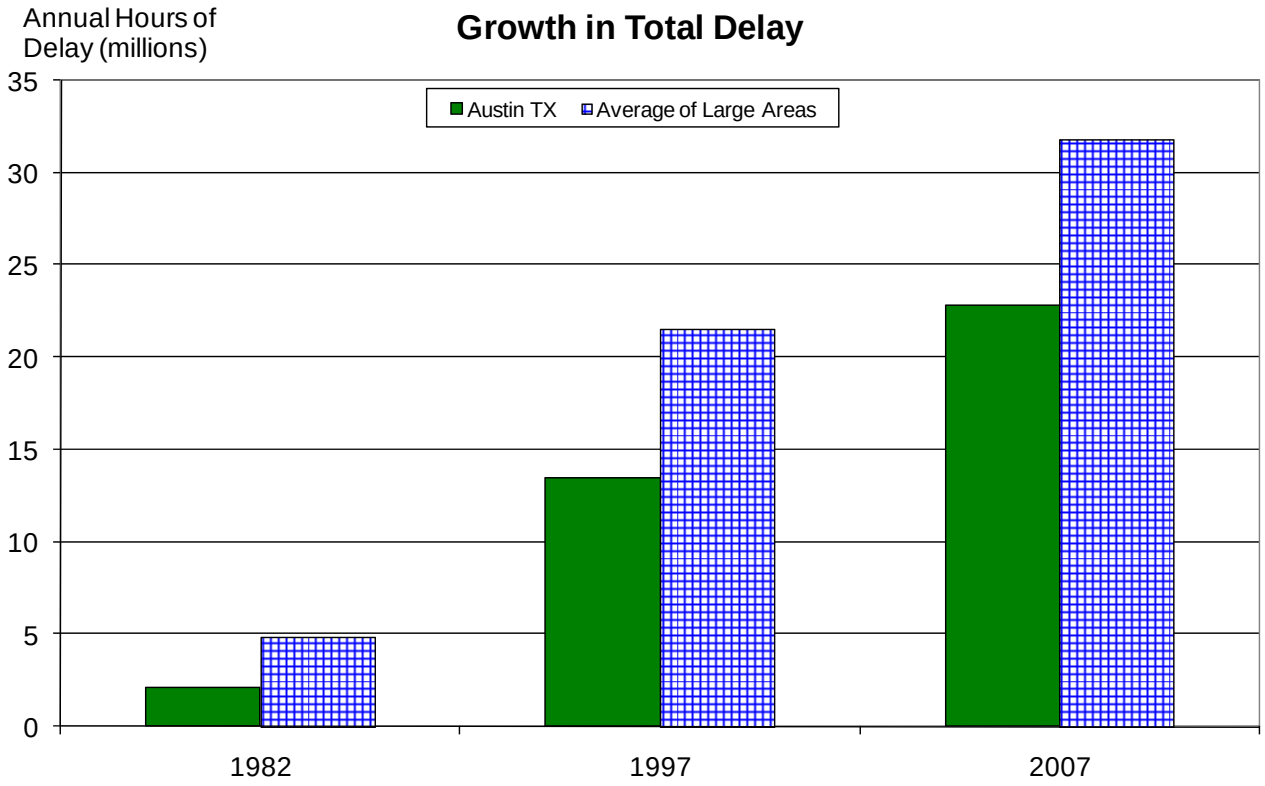
Note: System Performance statistics for 2000 through 2007 data reflect the effects of operational treatments.
Note: Zeroes in the table reflect values less than 0.5.

Growth in Delay per Peak Traveler



Note: Large areas have populations between 1 and 3 million

Growth in Total Delay



Note: Large areas have populations between 1 and 3 million

Benefits from Public Transportation Service and Operations Strategies in Austin TX

Operations Strategies	2007	2006	2005	2004
Freeway Ramp Metering				
Percent of Roadway Miles	--	--	--	--
Annual Delay Reduction (1000 hours)	--	--	--	--
Freeway Incident Management				
Cameras				
Percent of Roadway Miles	33	33	32	32
Service Patrols				
Percent of Roadway Miles	67	67	66	66
Annual Delay Reduction (1000 hours)	762	789	848	733
Arterial Signal Coordination				
Percent of Roadway Miles	69	69	68	64
Annual Delay Reduction (1000 hours)	129	146	126	116
Arterial Access Management				
Percent of Roadway Miles	36	35	31	31
Annual Delay Reduction (1000 hours)	318	252	138	169
HOV Lanes				
Daily Passenger-miles of travel (1000s)	--	--	--	--
HOV User Delay Savings	--	--	--	--
Total Effect of Operations Treatments				
Annual Delay Reduction (1000 hours)	1,209	1,187	1,113	1,019
Annual Delay Saved per Peak Traveler (hours)	2	2	2	2
Annual Congestion Cost Savings ($million)	25.1	23.9	21.8	18.9
Travel Time Index with Strategies	1.295	1.292	1.307	1.290
Travel Time Index (Base)	1.308	1.305	1.320	1.302
Public Transportation Service	**2007**	**2006**	**2005**	**2004**
Existing Service				
Annual Passenger-miles of travel (million)	137	132	113	121
Unlinked Passenger Trips (million)	34	35	33	36
Travel Time Index (combined road and transit)	1.301	1.298	1.314	1.296
Condition if Public Transportation Service were Discontinued				
Travel Time Index	1.319	1.315	1.330	1.312
Annual Increase				
Delay (1000 hours)	1,472	1,499	1,295	1,287
Delay per Peak Traveler (hours)	3	3	2	2
Congestion Cost ($million)	30.6	30.2	25.1	23.7

Benefits from Public Transportation Service and Operations Strategies in Austin TX, Continued

Operations Strategies	2003	2002	2001	2000
Freeway Ramp Metering				
Percent of Roadway Miles	--	--	--	--
Annual Delay Reduction (1000 hours)	--	--	--	--
Freeway Incident Management				
Cameras				
Percent of Roadway Miles	31	31	31	32
Service Patrols				
Percent of Roadway Miles	66	66	66	67
Annual Delay Reduction (1000 hours)	698	582	594	518
Arterial Signal Coordination				
Percent of Roadway Miles	62	63	65	66
Annual Delay Reduction (1000 hours)	130	116	112	96
Arterial Access Management				
Percent of Roadway Miles	31	30	30	29
Annual Delay Reduction (1000 hours)	177	149	164	174
HOV Lanes				
Daily Passenger-miles of travel (1000s)	--	--	--	--
HOV User Delay Savings	--	--	--	--
Total Effect of Operations Treatments				
Annual Delay Reduction (1000 hours)	1,005	846	871	788
Annual Delay Saved per Peak Traveler (hours)	2	2	2	2
Annual Congestion Cost Savings ($million)	17.8	14.6	14.9	13.1
Travel Time Index with Strategies	1.280	1.266	1.271	1.239
Travel Time Index (Base)	1.293	1.277	1.282	1.248
Public Transportation Service	**2003**	**2002**	**2001**	**2000**
Existing Service				
Annual Passenger-miles of travel (million)	124	118	114	119
Unlinked Passenger Trips (million)	37	36	34	38
Travel Time Index (combined road and transit)	1.286	1.271	1.276	1.243
Condition if Public Transportation Service were Discontinued				
Travel Time Index	1.303	1.286	1.291	1.256
Annual Increase				
Delay (1000 hours)	1,314	1,173	1,227	1,064
Delay per Peak Traveler (hours)	2	2	2	2
Congestion Cost ($million)	23.2	20.1	20.9	17.7

Comparison of Several Key Mobility Performance Measures
Large Group – 1 million to 3 million population urban areas

Urban Area	Delay per Traveler	Travel Time Index	Total Delay	1982 to 2007	
				Delay per Traveler	Total Delay
San Diego, CA	H+	H+	H+	F+	F+
Minneapolis-St., Paul MN	H	0	H+	F+	F+
Baltimore, MD	H+	H+	H+	F+	F+
Tampa-St. Petersburg, FL	H+	H+	H+	0	F+
St. Louis, MO-IL	L-	L-	0	S-	S
Denver-Aurora, CO	H+	H+	H+	F	F+
Riverside-San Bernardino, CA	H+	H+	H+	F+	F+
Sacramento, CA	H	H+	H	0	F+
Pittsburgh, PA	L-	L-	L-	S-	S-
Portland, OR-WA	0	H	0	0	F
Cleveland, OH	L-	L-	L-	S-	S-
San Jose, CA	H+	H+	H+	F	F+
Cincinnati, OH-KY-IN	L-	L	L	S	S-
Virginia Beach, VA	L	L	L	S-	S-
Kansas City, MO-KS	L-	L-	L-	S-	S-
Milwaukee, WI	L-	L-	L-	S-	S-
San Antonio, TX	H	0	0	F+	F
Las Vegas, NV	H+	H	0	F+	F+
Orlando, FL	H+	H	H	F+	F+
Providence, RI-MA	L	L	L	0	S-
Columbus, OH	L	L	L	0	S-
Buffalo, NY	L-	L-	L-	S-	S-
New Orleans, LA	L-	L	L-	S-	S-
Charlotte, NC-SC	H	0	L	F	S-
Indianapolis, IN	H	0	L	S	S-
Jacksonville, FL	H	0	L	0	S-
Austin, TX	H	H	L	F	S-
Memphis, TN-MS-AR	L-	L-	L-	S	S-
Raleigh-Durham, NC	0	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