

## 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 Medium Group – 500,000 to 1 million population urban areas

Urban Area	Delay per Traveler	Travel Time Index	Total Delay	1982 to 2005	
				Delay per Traveler	Total Delay
Jacksonville, FL	H+	H+	H+	F	F+
Nashville-Davidson, TN	H+	0	H+	0	F+
Salt Lake City, UT	0	H	H	0	F+
Raleigh-Durham, NC	H+	H	H+	F+	F+
Richmond, VA	L-	L-	0	S-	S
Louisville, KY-IN	H+	H+	H+	F+	F+
Hartford, CT	L-	L-	L	S	S-
Bridgeport-Stamford, CT-NY	H	H+	H+	F	F+
Charlotte, NC-SC	H+	H+	H+	F+	F+
Austin, TX	H+	H+	H+	F+	F+
Oklahoma City, OK	L-	L-	L	S	S-
Tulsa, OK	L-	L-	L	S-	S-
Tucson, AZ	H+	H+	H+	0	F+
Dayton, OH	L-	L-	L-	S-	S-
Honolulu, HI	L	H+	L	S-	S-
Birmingham, AL	H+	0	H	F+	F+
<b>El Paso, TX-NM</b>	<b>L</b>	<b>0</b>	<b>L</b>	<b>F</b>	<b>S-</b>
Rochester, NY	L-	L-	L-	S-	S-
Springfield, MA-CT	L-	L-	L-	S-	S-
Omaha, NE-IA	L	0	L	0	S-
Sarasota-Bradenton, FL	L	H	L	S-	S-
Allentown-Bethlehem, PA-NJ	L-	L	L-	S-	S-
Akron, OH	L-	L-	L-	S-	S-
Fresno, CA	L-	L	L-	S-	S-
Grand Rapids, MI	L	L-	L-	0	S-
Oxnard-Ventura, CA	H+	H+	0	F+	F+
Albuquerque, NM	H+	0	0	F	S
New Haven, CT	L-	L-	L-	S-	S-
Albany-Schenectady, NY	L-	L-	L-	S-	S-
Toledo, OH-MI	L-	L-	L-	S-	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 El Paso, TX-NM

<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)	675	675	670	665	660	655
Rank	56	56	56	56	56	56
Urban Area (square miles)	255	255	255	250	250	245
Popn Density (persons/sq mile)	2,647	2,647	2,627	2,660	2,640	2,673
Peak Travelers (1000s)	367	365	360	353	346	339
<b>Freeway</b>						
Daily Vehicle-Miles of Travel (1000s)	4,555	4,480	4,300	4,200	4,115	3,975
Lane Miles	280	280	280	280	280	280
<b>Arterial Streets</b>						
Daily Vehicle-Miles of Travel (1000s)	6,100	5,910	5,705	5,435	5,300	5,205
Lane Miles	1,375	1,375	1,360	1,335	1,330	1,330
<b>Public Transportation</b>						
Annual Psgr-Miles of Travel (millions)	58	62	62	62	69	63
Annual Unlinked Psgr Trips (millions)	13	11	11	11	14	14
<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	1.45	1.32	1.46	1.47
<b>System Performance</b>						
<b>Congested Travel</b> (% of peak VMT)	45	44	42	41	40	37
<b>Congested System</b> (% of lane-miles)	28	28	28	28	28	28
<b>Congested Time</b> (number of "Rush Hours")	6.8	6.6	6.2	6.0	5.8	5.6
<b>Annual Increase Needed To Maintain Constant Congestion Level:</b>						
Lane-Miles	50	52	49	45	45	40
Transit Riders or Carpoolers (millions)	11	11	10	9	9	8
<b>Annual Excess Fuel Consumed</b>						
Total Fuel (1000 gallons)	5,745	5,358	4,544	4,343	4,178	3,724
Rank	55	56	59	61	61	63
Fuel per Peak Traveler (gallons)	16	15	13	12	12	11
Rank	46	48	55	59	60	63
<b>Annual Delay</b>						
Total Delay (1000s of person-hours)	8,675	8,069	6,748	6,552	6,363	5,592
Rank	57	59	61	62	62	64
Delay per Peak Traveler (person-hrs)	24	22	19	19	18	17
Rank	51	52	60	59	62	64
Delay due to Incidents (percent)	56	56	56	56	56	55
<b>Travel Time Index</b>						
Rank	1.17	1.16	1.14	1.14	1.14	1.13
Rank	42	45	48	50	50	52
<b>Congestion Cost</b>						
Total Cost (\$ millions)	159	141	114	108	104	89
Rank	55	58	61	63	63	64
Cost per Peak Traveler (\$)	433	387	317	306	301	263
Rank	52	52	61	61	63	65

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 El Paso, TX-NM, 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)	650	640	610	605	590	580
Rank	55	55	56	56	57	57
Urban Area (square miles)	240	240	235	235	230	225
Popn Density (persons/sq mile)	2,708	2,667	2,596	2,574	2,565	2,578
Peak Travelers (1000s)	332	323	304	298	287	278
<b>Freeway</b>						
Daily Vehicle-Miles of Travel (1000s)	3,800	3,600	3,460	3,400	3,430	3,410
Lane Miles	280	280	280	280	280	275
<b>Arterial Streets</b>						
Daily Vehicle-Miles of Travel (1000s)	5,110	5,025	4,950	4,805	4,690	4,550
Lane Miles	1,320	1,310	1,305	1,295	1,285	1,275
<b>Public Transportation</b>						
Annual Psgr-Miles of Travel (millions)	67	63	66	79	82	84
Annual Unlinked Psgr Trips (millions)	13	14	14	16	16	16
<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)	1.07	1.01	1.12	1.21	1.14	1.03
<b>System Performance</b>						
<b>Congested Travel</b> (% of peak VMT)	31	28	23	24	24	25
<b>Congested System</b> (% of lane-miles)	27	26	21	22	22	23
<b>Congested Time</b> (number of "Rush Hours")	5.2	4.6	4.4	4.2	4.2	4.2
<b>Annual Increase Needed To Maintain Constant Congestion Level:</b>						
Lane-Miles	36	36	52	61	78	88
Transit Riders or Carpoolers (millions)	7	7	10	11	14	16
<b>Annual Excess Fuel Consumed</b>						
Total Fuel (1000 gallons)	3,177	2,439	2,071	1,832	1,945	2,105
Rank	64	66	66	68	64	63
Fuel per Peak Traveler (gallons)	10	8	7	6	7	8
Rank	70	71	73	73	70	66
<b>Annual Delay</b>						
Total Delay (1000s of person-hours)	4,723	3,643	3,093	2,770	2,942	3,196
Rank	65	68	70	69	66	63
Delay per Peak Traveler (person-hrs)	14	11	10	9	10	11
Rank	70	74	75	76	72	69
Delay due to Incidents (percent)	55	54	55	55	55	55
<b>Travel Time Index</b>						
Rank	61	68	71	71	66	59
<b>Congestion Cost</b>						
Total Cost (\$ millions)	72	54	46	40	42	44
Rank	65	68	69	68	65	63
Cost per Peak Traveler (\$)	216	168	151	135	145	157
Rank	70	73	73	76	71	68

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 El Paso, TX-NM, 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)	570	565	560	540	520	510
Rank	56	55	55	55	55	57
Urban Area (square miles)	220	210	210	210	205	205
Popn Density (persons/sq mile)	2,591	2,690	2,667	2,571	2,537	2,488
Peak Travelers (1000s)	270	264	259	246	235	229
<b>Freeway</b>						
Daily Vehicle-Miles of Travel (1000s)	3,255	3,030	2,830	2,650	2,420	2,620
Lane Miles	270	255	255	255	250	250
<b>Arterial Streets</b>						
Daily Vehicle-Miles of Travel (1000s)	4,460	4,115	3,960	3,725	3,620	3,490
Lane Miles	1,260	1,200	1,165	1,145	1,115	1,085
<b>Public Transportation</b>						
Annual Psgr-Miles of Travel (millions)	80	86	76	73	58	55
Annual Unlinked Psgr Trips (millions)	15	16	13	13	10	9
<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)	1.10	1.09	1.12	1.04	1.07	0.99
<b>System Performance</b>						
<b>Congested Travel</b> (% of peak VMT)	24	22	21	16	15	14
<b>Congested System</b> (% of lane-miles)	23	22	23	17	17	17
<b>Congested Time</b> (number of "Rush Hours")	4.0	3.8	3.2	2.9	2.8	2.9
<b>Annual Increase Needed To Maintain Constant Congestion Level:</b>						
Lane-Miles	73	63	41	43	38	57
Transit Riders or Carpoolers (millions)	13	11	7	7	6	9
<b>Annual Excess Fuel Consumed</b>						
Total Fuel (1000 gallons)	1,683	1,572	1,262	967	845	772
Rank	64	65	66	67	68	67
Fuel per Peak Traveler (gallons)	6	6	5	4	4	3
Rank	70	69	71	75	75	73
<b>Annual Delay</b>						
Total Delay (1000s of person-hours)	2,516	2,386	1,874	1,439	1,286	1,121
Rank	66	65	66	70	70	70
Delay per Peak Traveler (person-hrs)	9	9	7	6	5	5
Rank	72	72	74	80	77	77
Delay due to Incidents (percent)	55	55	55	56	55	56
<b>Travel Time Index</b>						
Rank	66	62	66	68	69	69
<b>Congestion Cost</b>						
Total Cost (\$ millions)	34	31	24	18	15	12
Rank	66	65	65	69	70	69
Cost per Peak Traveler (\$)	124	118	93	72	63	54
Rank	72	71	74	79	77	76

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 El Paso, TX-NM, 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)	500	480	455	450	450	450
Rank	56	57	62	62	58	57
Urban Area (square miles)	200	190	185	180	190	150
Popn Density (persons/sq mile)	2,500	2,526	2,459	2,500	2,368	3,000
Peak Travelers (1000s)	223	212	200	196	194	192
<b>Freeway</b>						
Daily Vehicle-Miles of Travel (1000s)	2,510	2,680	2,386	2,190	1,995	1,980
Lane Miles	250	250	245	245	245	240
<b>Arterial Streets</b>						
Daily Vehicle-Miles of Travel (1000s)	3,265	3,195	3,105	3,075	2,960	2,910
Lane Miles	1,075	1,065	1,060	1,050	950	935
<b>Public Transportation</b>						
Annual Psgr-Miles of Travel (millions)	52	57	52	50	50	50
Annual Unlinked Psgr Trips (millions)	9	10	9	9	9	9
<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)	13	12	11	9	9	9
<b>Congested System</b> (% of lane-miles)	17	12	12	11	11	11
<b>Congested Time</b> (number of "Rush Hours")	2.8	2.9	2.8	2.6	2.5	2.6
<b>Annual Increase Needed To Maintain Constant Congestion Level:</b>						
Lane-Miles	44	--	--	--	--	--
Transit Riders or Carpoolers (millions)	7	--	--	--	--	--
<b>Annual Excess Fuel Consumed</b>						
Total Fuel (1000 gallons)	693	603	498	412	369	355
Rank	65	67	70	70	70	70
Fuel per Peak Traveler (gallons)	3	3	2	2	2	2
Rank	72	73	74	74	77	77
<b>Annual Delay</b>						
Total Delay (1000s of person-hours)	996	838	720	628	579	557
Rank	70	72	71	72	71	70
Delay per Peak Traveler (person-hrs)	4	4	4	3	3	3
Rank	75	76	77	77	78	78
Delay due to Incidents (percent)	56	57	56	55	55	55
<b>Travel Time Index</b>						
Rank	67	69	73	76	74	75
<b>Congestion Cost</b>						
Total Cost (\$ millions)	11	9	7	6	6	5
Rank	71	72	71	72	71	70
Cost per Peak Traveler (\$)	48	40	37	32	28	27
Rank	75	76	77	77	77	77

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

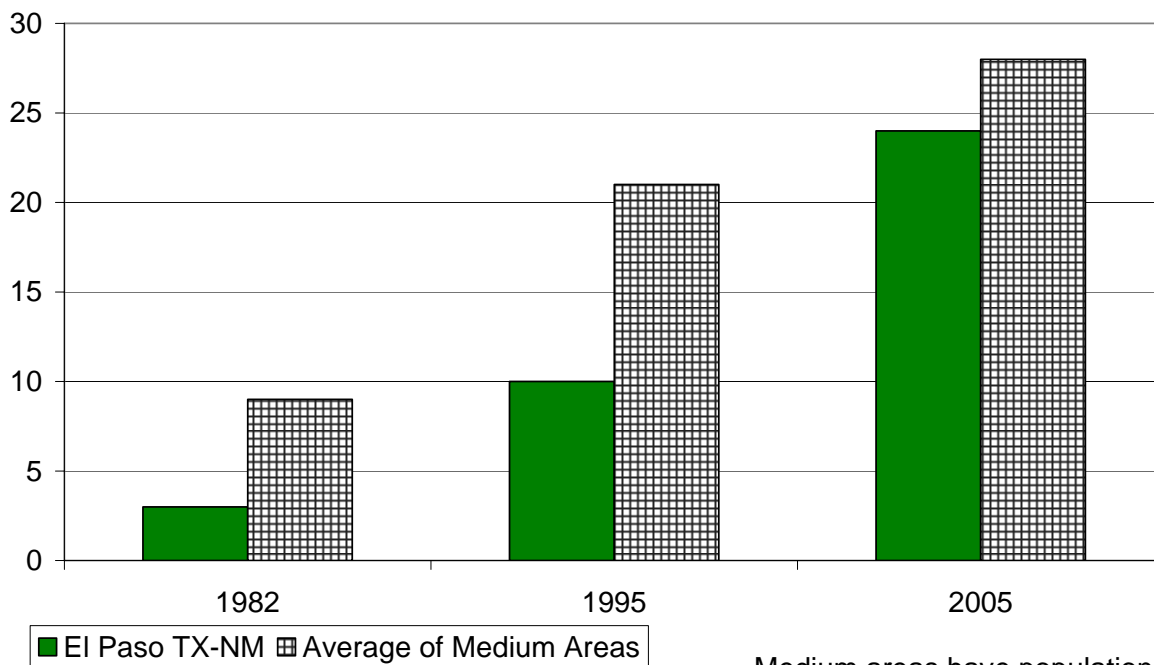
Note: Zeroes in the table reflect values less than 0.5.

**Benefits From Public Transportation Service and Operations Strategies for El Paso, TX-NM**

<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	--	--	4	4	4	4
Annual Delay Reduction (1000 hours)	--	--	1	1	1	1
<b>Freeway Incident Management</b>						
<b>Cameras</b>						
Percent of Roadway Miles	100	100	90	90	78	73
<b>Service Patrols</b>						
Percent of Roadway Miles	79	79	79	77	77	80
Annual Delay Reduction (1000 hours)	324	291	214	225	218	168
<b>Arterial Signal Coordination</b>						
Percent of Roadway Miles	56	55	55	56	49	49
Annual Delay Reduction (1000 hours)	60	43	47	46	29	29
<b>Arterial Access Management</b>						
Percent of Roadway Miles	51	51	49	49	46	47
Annual Delay Reduction (1000 hours)	270	195	174	137	156	120
<b>HOV Lanes</b>						
Daily Passenger-miles of Travel (1000s)	--	--	--	--	--	--
HOV User Delay Savings	--	--	--	--	--	--
<b>Total Effect of Operations Treatments</b>						
Annual Delay Reduction (1000 hours)	654	529	436	408	403	318
Annual Delay Saved per Peak Traveler (hours)	2	1	1	1	1	1
Annual Congestion Cost Savings (\$million)	11.7	9.1	7.3	6.7	6.5	5.0
Travel Time Index with Strategies	1.169	1.161	1.141	1.140	1.138	1.125
Travel Time Index (Base)	1.179	1.170	1.149	1.147	1.145	1.131
<b>Public Transportation Service</b>						
<b>Existing Service</b>						
Annual Passenger-miles of Travel (million)	58	62	62	62	69	63
Unlinked Passenger Trips (million)	13	11	11	11	14	14
Travel Time Index (combined road and transit)	1.165	1.157	1.137	1.136	1.133	1.122
<b>Condition if Public Transportation Service were Discontinued</b>						
Travel Time Index	1.189	1.179	1.157	1.156	1.155	1.140
Annual Delay Increase (1000 hours)	636	634	530	587	646	508
Annual Delay Increase per Peak Traveler (hours)	2	2	1	2	2	1
Annual Congestion Cost Increase (\$million)	11.5	11.0	8.9	9.6	10.4	8.0

### Growth in Delay per Peak Traveler

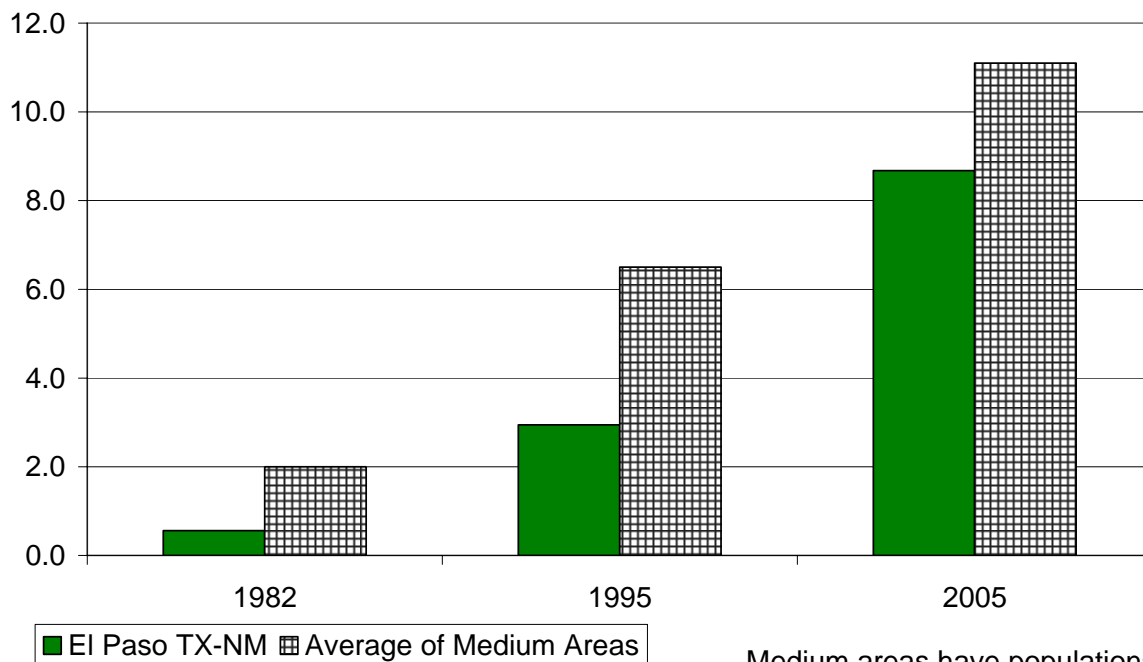
Hours of Delay



Medium areas have populations between 0.5 and 1 million

Annual Hours of Delay (million)

### Growth in Total Delay



Medium areas have populations between 0.5 and 1 million