

## 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 Small Group – less than 500,000 population urban areas

Urban Area	Delay per Traveler	Travel Time Index	Total Delay	1982 to 2005	
				Delay per Traveler	Total Delay
Colorado Springs, CO	H+	H+	H+	F+	F+
Charleston-North Charleston, SC	H+	H+	H+	F	F+
<b>Bakersfield, CA</b>	<b>L</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>F+</b>
Columbia, SC	0	L	H	0	F+
Cape Coral, FL	H+	H	H+	F	F+
Little Rock, AR	0	L	0	0	F
Spokane, WA	L-	L-	L-	S-	S-
Pensacola, FL-AL	H+	H	H+	F+	F+
Corpus Christi, TX	L-	L	L	S-	S-
Anchorage, AK	L-	L	L-	S-	S-
Eugene, OR	L	0	L	S-	S-
Beaumont, TX	L-	L	L-	S-	S-
Salem, OR	L	0	L	0	S-
Laredo, TX	L-	0	L-	S	S-
Brownsville, TX	L-	L	L-	S-	S-
Boulder, CO	0	0	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 Bakersfield, CA

<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)	470	455	440	425	410	405
Rank	72	72	72	72	73	73
Urban Area (square miles)	215	200	190	185	185	185
Popn Density (persons/sq mile)	2,186	2,275	2,316	2,297	2,216	2,189
Peak Travelers (1000s)	256	247	237	226	214	209
<b>Freeway</b>						
Daily Vehicle-Miles of Travel (1000s)	2,065	2,035	2,000	2,045	1,985	1,930
Lane Miles	195	195	195	195	195	190
<b>Arterial Streets</b>						
Daily Vehicle-Miles of Travel (1000s)	4,930	4,725	4,500	4,300	4,150	4,030
Lane Miles	1,080	1,070	1,060	1,050	1,035	1,025
<b>Public Transportation</b>						
Annual Psgr-Miles of Travel (millions)	29	31	31	32	31	27
Annual Unlinked Psgr Trips (millions)	7	7	7	7	7	6
<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)	2.62	2.28	1.78	1.66	1.93	1.72
<b>System Performance</b>						
<b>Congested Travel</b> (% of peak VMT)	27	26	23	22	18	17
<b>Congested System</b> (% of lane-miles)	30	30	26	26	22	21
<b>Congested Time</b> (number of "Rush Hours")	4.2	3.8	3.6	3.4	3.2	3.2
<b>Annual Increase Needed To Maintain Constant Congestion Level:</b>						
Lane-Miles	41	43	37	40	40	37
Transit Riders or Carpoolers (millions)	8	8	7	7	7	6
<b>Annual Excess Fuel Consumed</b>						
Total Fuel (1000 gallons)	2,113	1,886	1,513	1,354	1,069	1,033
Rank	76	76	76	76	76	77
Fuel per Peak Traveler (gallons)	8	8	6	6	5	5
Rank	73	73	77	76	83	80
<b>Annual Delay</b>						
Total Delay (1000s of person-hours)	3,482	3,067	2,434	2,190	1,742	1,657
Rank	74	76	76	75	77	77
Delay per Peak Traveler (person-hrs)	14	12	10	10	8	8
Rank	72	74	77	79	83	82
Delay due to Incidents (percent)	55	54	55	54	54	55
<b>Travel Time Index</b>						
Rank	1.09	1.08	1.07	1.06	1.05	1.05
Rank	64	71	74	77	82	82
<b>Congestion Cost</b>						
Total Cost (\$ millions)	66	56	43	37	29	27
Rank	73	76	75	75	77	77
Cost per Peak Traveler (\$)	259	226	181	165	136	130
Rank	72	74	77	80	83	82

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 Bakersfield, CA, 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)	390	385	375	365	360	350
Rank	73	73	73	73	73	73
Urban Area (square miles)	185	185	180	180	175	170
Popn Density (persons/sq mile)	2,108	2,081	2,083	2,028	2,057	2,059
Peak Travelers (1000s)	198	193	185	177	172	165
<b>Freeway</b>						
Daily Vehicle-Miles of Travel (1000s)	1,760	1,725	1,630	1,595	1,575	1,570
Lane Miles	160	160	160	160	160	160
<b>Arterial Streets</b>						
Daily Vehicle-Miles of Travel (1000s)	3,960	3,900	3,780	3,620	3,550	3,400
Lane Miles	1,020	1,010	1,000	990	980	960
<b>Public Transportation</b>						
Annual Psgr-Miles of Travel (millions)	24	17	17	17	18	18
Annual Unlinked Psgr Trips (millions)	6	5	5	5	6	6
<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)	1.59	1.27	1.40	1.21	1.27	1.16
<b>System Performance</b>						
<b>Congested Travel</b> (% of peak VMT)	18	18	16	15	12	12
<b>Congested System</b> (% of lane-miles)	21	21	20	19	14	14
<b>Congested Time</b> (number of "Rush Hours")	3.6	3.4	3.0	3.0	2.9	2.9
<b>Annual Increase Needed To Maintain Constant Congestion Level:</b>						
Lane-Miles	34	36	32	30	37	37
Transit Riders or Carpoolers (millions)	6	6	5	5	6	6
<b>Annual Excess Fuel Consumed</b>						
Total Fuel (1000 gallons)	1,048	1,013	868	796	659	639
Rank	77	77	77	77	77	77
Fuel per Peak Traveler (gallons)	5	5	5	5	4	4
Rank	81	79	81	79	82	82
<b>Annual Delay</b>						
Total Delay (1000s of person-hours)	1,691	1,651	1,455	1,354	1,143	1,120
Rank	77	77	77	77	77	78
Delay per Peak Traveler (person-hrs)	9	9	8	8	7	7
Rank	81	79	81	79	80	78
Delay due to Incidents (percent)	54	54	54	53	53	53
<b>Travel Time Index</b>						
Rank	1.05	1.05	1.05	1.04	1.04	1.04
Rank	82	77	80	79	83	83
<b>Congestion Cost</b>						
Total Cost (\$ millions)	27	25	22	20	16	15
Rank	77	77	77	77	77	77
Cost per Peak Traveler (\$)	134	131	118	111	95	94
Rank	81	79	81	79	80	78

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 Bakersfield, CA, 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)	335	325	315	300	295	285
Rank	73	73	73	74	74	75
Urban Area (square miles)	160	155	145	135	120	115
Popn Density (persons/sq mile)	2,094	2,097	2,172	2,222	2,458	2,478
Peak Travelers (1000s)	155	148	141	133	130	124
<b>Freeway</b>						
Daily Vehicle-Miles of Travel (1000s)	1,500	1,520	1,530	1,460	1,410	1,375
Lane Miles	160	160	165	165	165	160
<b>Arterial Streets</b>						
Daily Vehicle-Miles of Travel (1000s)	3,330	3,200	3,050	2,900	2,800	2,650
Lane Miles	950	915	885	860	840	810
<b>Public Transportation</b>						
Annual Psgr-Miles of Travel (millions)	18	19	19	16	14	12
Annual Unlinked Psgr Trips (millions)	6	6	6	5	4	3
<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)	1.23	1.28	1.11	1.14	1.14	1.05
<b>System Performance</b>						
<b>Congested Travel</b> (% of peak VMT)	12	11	10	9	8	8
<b>Congested System</b> (% of lane-miles)	14	15	14	13	13	13
<b>Congested Time</b> (number of "Rush Hours")	2.8	2.8	2.8	2.7	2.7	2.7
<b>Annual Increase Needed To Maintain Constant Congestion Level:</b>						
Lane-Miles	41	47	51	51	57	64
Transit Riders or Carpoolers (millions)	6	7	8	8	8	9
<b>Annual Excess Fuel Consumed</b>						
Total Fuel (1000 gallons)	611	510	449	388	350	327
Rank	77	79	79	79	80	80
Fuel per Peak Traveler (gallons)	4	3	3	3	3	3
Rank	80	81	81	81	81	80
<b>Annual Delay</b>						
Total Delay (1000s of person-hours)	1,081	862	767	664	617	575
Rank	77	79	79	80	80	80
Delay per Peak Traveler (person-hrs)	7	6	5	5	5	5
Rank	78	80	80	81	81	79
Delay due to Incidents (percent)	53	54	54	53	53	53
<b>Travel Time Index</b>						
Rank	80	82	83	83	84	82
<b>Congestion Cost</b>						
Total Cost (\$ millions)	15	11	10	8	7	6
Rank	77	79	79	79	80	80
Cost per Peak Traveler (\$)	94	77	69	62	55	51
Rank	78	80	81	81	81	80

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 Bakersfield, CA, 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)	280	265	255	250	240	230
Rank	75	76	76	75	76	76
Urban Area (square miles)	105	95	90	80	75	70
Popn Density (persons/sq mile)	2,667	2,789	2,833	3,125	3,200	3,286
Peak Travelers (1000s)	121	113	108	106	101	95
<b>Freeway</b>						
Daily Vehicle-Miles of Travel (1000s)	1,260	1,220	1,215	1,135	925	880
Lane Miles	160	160	155	155	145	130
<b>Arterial Streets</b>						
Daily Vehicle-Miles of Travel (1000s)	2,550	2,400	2,200	2,050	2,000	1,900
Lane Miles	790	780	760	750	735	725
<b>Public Transportation</b>						
Annual Psgr-Miles of Travel (millions)	11	11	10	9	9	9
Annual Unlinked Psgr Trips (millions)	3	3	3	3	3	3
<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)	1.05	1.03	1.35	1.36	1.39	1.46
<b>System Performance</b>						
<b>Congested Travel</b> (% of peak VMT)	6	4	4	4	4	4
<b>Congested System</b> (% of lane-miles)	9	5	5	5	5	5
<b>Congested Time</b> (number of "Rush Hours")	2.5	2.5	2.4	2.3	2.2	2.2
<b>Annual Increase Needed To Maintain Constant Congestion Level:</b>						
Lane-Miles	61	--	--	--	--	--
Transit Riders or Carpoolers (millions)	9	--	--	--	--	--
<b>Annual Excess Fuel Consumed</b>						
Total Fuel (1000 gallons)	243	170	155	133	117	111
Rank	80	82	82	83	82	82
Fuel per Peak Traveler (gallons)	2	2	1	1	1	1
Rank	82	82	82	81	84	82
<b>Annual Delay</b>						
Total Delay (1000s of person-hours)	432	300	272	234	202	191
Rank	80	81	82	83	82	82
Delay per Peak Traveler (person-hrs)	4	3	3	2	2	2
Rank	79	82	82	82	83	81
Delay due to Incidents (percent)	53	53	53	53	53	53
<b>Travel Time Index</b>						
Rank	1.02	1.01	1.01	1.01	1.01	1.01
Rank	85	85	85	86	85	85
<b>Congestion Cost</b>						
Total Cost (\$ millions)	5	3	3	2	2	2
Rank	80	81	82	82	82	82
Cost per Peak Traveler (\$)	38	27	25	22	19	19
Rank	80	82	82	82	83	81

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

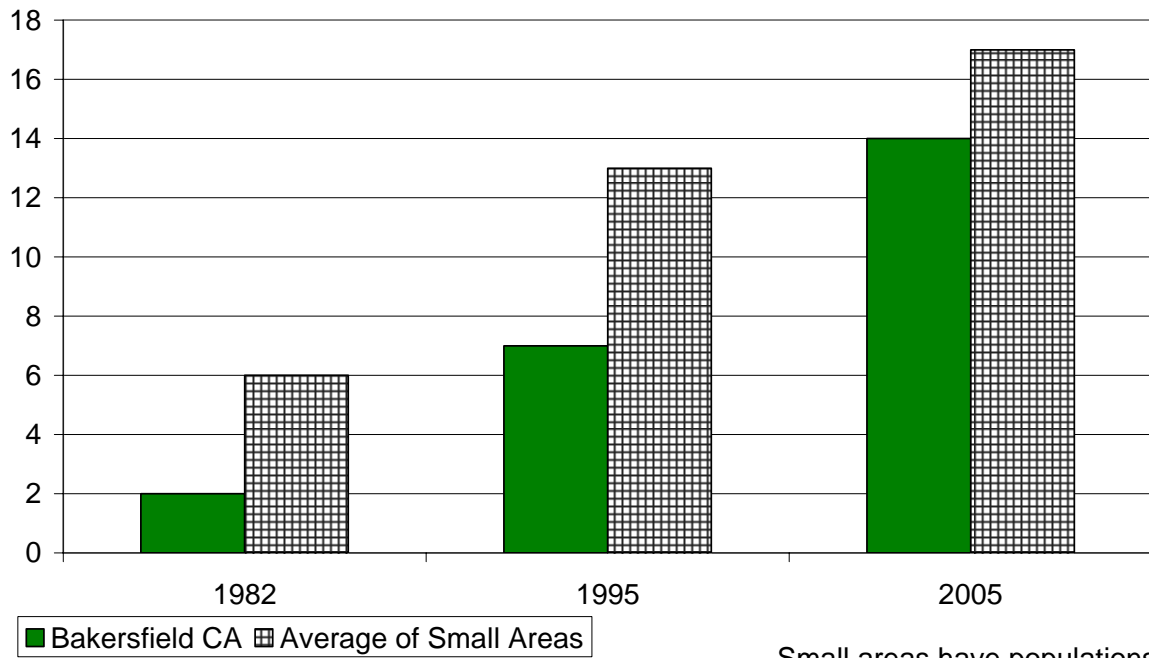
Note: Zeroes in the table reflect values less than 0.5.

### Benefits From Public Transportation Service and Operations Strategies for Bakersfield, CA

<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	53	53	53	53	53	53
<b>Service Patrols</b>						
Percent of Roadway Miles	--	--	--	--	--	15
Annual Delay Reduction (1000 hours)	5	4	3	3	2	2
<b>Arterial Signal Coordination</b>						
Percent of Roadway Miles	60	61	61	62	63	63
Annual Delay Reduction (1000 hours)	31	20	13	15	18	15
<b>Arterial Access Management</b>						
Percent of Roadway Miles	44	45	45	46	46	45
Annual Delay Reduction (1000 hours)	167	145	96	88	84	98
<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)	203	169	113	105	103	116
Annual Delay Saved per Peak Traveler (hours)	1	1	0	0	0	1
Annual Congestion Cost Savings (\$million)	3.7	2.9	1.9	1.7	1.7	1.8
Travel Time Index with Strategies	1.091	1.084	1.069	1.063	1.051	1.051
Travel Time Index (Base)	1.095	1.087	1.072	1.066	1.054	1.054
<b>Public Transportation Service</b>						
<b>Existing Service</b>						
Annual Passenger-miles of Travel (million)	29	31	31	32	31	27
Unlinked Passenger Trips (million)	7	7	7	7	7	6
Travel Time Index (combined road and transit)	1.089	1.082	1.068	1.062	1.050	1.050
<b>Condition if Public Transportation Service were Discontinued</b>						
Travel Time Index	1.098	1.091	1.076	1.069	1.056	1.056
Annual Delay Increase (1000 hours)	202	191	182	137	112	96
Annual Delay Increase per Peak Traveler (hours)	1	1	1	1	1	0
Annual Congestion Cost Increase (\$million)	3.9	3.6	3.3	2.4	1.9	1.6

### Growth in Delay per Peak Traveler

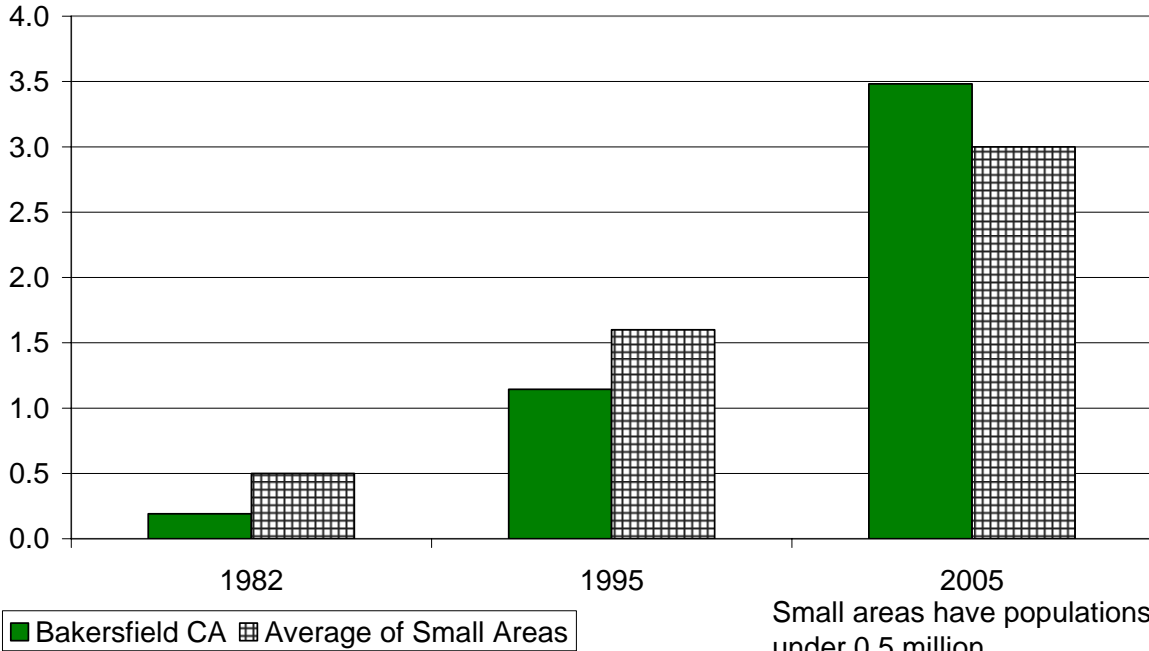
Hours of Delay



Small areas have populations under 0.5 million

### Growth in Total Delay

Annual Hours of Delay (million)



Small areas have populations under 0.5 million