

# Performance Measure Summary - Tucson AZ

There are several inventory and performance measures listed in the pages of this Urban Area Report for the years from 1982 to 2017. There is no single performance measure that experts agree "says it all". A few key points should be recognized by users of the Urban Mobility Scorecard data.

**Use the trends** - The multi-year performance measures are better indicators, in most cases, than any single year. 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. (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 atop several 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. It is calculated as the ratio of travel time in the peak period to travel time in free-flow. A value of 1.30 indicates that a 20-minute free-flow trip takes 26 minutes in the peak.

**Planning Time Index** - A travel time reliability measure that represents the total travel time that should be planned for a trip. Computed with the 95th percentile travel time it represents the amount of time that should be planned for a commute trip to be late for only 1 day a month. If it is computed with the 80th percentile travel time it represents the amount of time that should be planned for a trip to be late for only 1 day a week. A PTI of 2.00 means that for a 20-minute trip in light traffic, 40 minutes should be planned.

**Peak Commuters** - Number of travelers who begin a trip during the morning or evening peak travel periods (6 to 10 a.m. and 3 to 7 p.m.). "Commuters" are private vehicle users unless specifically noted.

**Annual Delay per Commuter** - A yearly sum of all the per-trip delays for those persons who travel in the peak period (6 to 10 a.m. and 3 to 7 p.m.). This measure illustrates the effect of traffic slowdowns as well as the length of each trip.

**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** - These values are derived from time periods with lighter traffic volumes in the INRIX speed database. They are used as the national comparison thresholds. Other speed thresholds may be appropriate for urban project evaluations or sub-region studies.

**Excess Fuel Consumed** - Increased fuel consumption due to travel in congested conditions rather than free-flow conditions.

**Congestion Cost** - Value of travel delay for 2017 (estimated at \$18.29 per hour of person travel and \$59.94 per hour of truck time) and excess fuel consumption estimated using state average cost per gallon.

**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), so increases include both new growth and development that was previously in areas designated as rural.

**Number of Rush Hours** - Time when the road system might have congestion.

# Mobility Data for Tucson AZ

Inventory Measures	2017	2016	2015	2014	2013	2012
<b>Urban Area Information</b>						
Population (1000s)	875	870	865	865	850	840
Rank	52	52	52	52	52	52
Commuters (1000s)	431	428	426	426	426	414
<b>Daily Vehicle-Miles of Travel (1000s)</b>						
Freeway	3,972	4,221	4,067	3,775	3,784	3,755
Arterial Streets	10,272	11,832	12,280	11,760	11,308	10,680
<b>Cost Components</b>						
Value of Time (\$/hour)	18.12	17.91	17.69	17.67	17.39	17.14
Commercial Cost (\$/hour)	52.14	50.20	46.87	44.82	41.23	39.66
Gasoline (\$/gallon)	2.23	2.15	2.42	3.23	3.47	3.34
Diesel (\$/gallon)	2.42	2.20	2.41	3.55	3.77	3.94
System Performance	2017	2016	2015	2014	2013	2012
<b>Congested Travel (% of peak VMT)</b>	14.5	--	--	--	--	--
<b>Congested System (% of lane-miles)</b>	1.6	--	--	--	--	--
<b>Congested Time (number of "Rush Hours")</b>	1.0	--	--	--	--	--
<b>Annual Excess Fuel Consumed</b>						
Total Fuel (1000 gallons)	14,004	13,848	13,616	13,418	13,274	13,149
Rank	47	46	46	46	46	46
Fuel per Peak Auto Commuter (gallons)	20	20	20	20	19	19
Rank	47	47	42	38	45	42
<b>Annual Delay</b>						
Total Delay (1000s of person-hours)	32,305	31,661	30,850	30,124	29,528	28,979
Rank	46	46	46	46	46	46
Delay per Auto Commuter (pers-hrs)	52	50	49	47	46	44
Rank	32	33	33	34	34	38
<b>Travel Time Index</b>						
Rank	1.21	1.21	1.21	1.20	1.20	1.20
Rank	37	37	36	36	36	37
<b>Commuter Stress Index</b>						
Rank	1.22	--	--	--	--	--
Rank	40	--	--	--	--	--
<b>Freeway Planning Time Index (95th Pctile)</b>						
Rank	1.25	--	--	--	--	--
Rank	84	--	--	--	--	--
<b>Congestion Cost</b>						
Total Cost (\$ millions)	655	632	609	604	584	564
Rank	46	46	46	46	46	46
Cost per Auto Commuter (\$)	831	819	793	772	763	760
Rank	52	50	50	50	48	48
<b>Truck Congestion</b>						
Annual Person-Hours of Delay (000)	1,357	1,330	1,296	1,265	1,240	1,217
Rank	46	46	46	46	46	46
Annual Gallons of Wasted Fuel (000)	2,969	2,936	2,887	2,845	2,814	2,788
Rank	47	46	46	46	46	46
Annual Congestion Cost (\$ million)	69	65	60	60	55	53
Rank	46	46	46	46	46	46

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

# Mobility Data for Tucson AZ

Inventory Measures	2011	2010	2009	2008	2007	2006
<b>Urban Area Information</b>						
Population (1000s)	825	810	790	775	760	740
Rank	52	52	52	52	52	53
Commuters (1000s)	406	397	386	377	368	356
<b>Daily Vehicle-Miles of Travel (1000s)</b>						
Freeway	3,793	3,761	3,632	3,550	3,510	3,650
Arterial Streets	10,832	10,741	11,100	11,260	11,205	11,235
<b>Cost Components</b>						
Value of Time (\$/hour)	16.79	16.28	16.01	16.07	15.47	15.06
Commercial Cost (\$/hour)	44.62	42.50	41.83	40.77	39.30	37.88
Gasoline (\$/gallon)	3.19	2.70	2.32	3.36	3.03	2.63
Diesel (\$/gallon)	3.68	2.99	2.59	4.09	3.55	2.97
System Performance	2011	2010	2009	2008	2007	2006
<b>Congested Travel (% of peak VMT)</b>	--	--	--	--	--	--
<b>Congested System (% of lane-miles)</b>	--	--	--	--	--	--
<b>Congested Time (number of "Rush Hours")</b>	--	--	--	--	--	--
<b>Annual Excess Fuel Consumed</b>						
Total Fuel (1000 gallons)	12,858	12,826	12,327	13,385	12,522	11,779
Rank	46	46	46	44	46	48
Fuel per Peak Auto Commuter (gallons)	19	20	17	21	20	19
Rank	40	29	43	24	28	36
<b>Annual Delay</b>						
Total Delay (1000s of person-hours)	28,072	27,738	26,661	27,569	25,792	24,262
Rank	46	45	45	45	45	45
Delay per Auto Commuter (pers-hrs)	44	43	43	42	41	41
Rank	35	34	31	34	36	34
<b>Travel Time Index</b>						
Rank	1.20	1.20	1.21	1.21	1.22	1.22
Rank	37	36	33	36	34	34
<b>Commuter Stress Index</b>						
Rank	--	--	--	--	--	--
Rank	--	--	--	--	--	--
<b>Freeway Planning Time Index (95th Pctile)</b>						
Rank	--	--	--	--	--	--
Rank	--	--	--	--	--	--
<b>Congestion Cost</b>						
Total Cost (\$ millions)	540	511	479	513	459	416
Rank	46	46	45	45	45	46
Cost per Auto Commuter (\$)	759	774	756	775	751	727
Rank	48	47	47	42	48	50
<b>Truck Congestion</b>						
Annual Person-Hours of Delay (000)	1,179	1,165	1,120	1,158	1,083	1,019
Rank	46	45	45	45	45	45
Annual Gallons of Wasted Fuel (000)	2,726	2,719	2,613	2,838	2,655	2,497
Rank	46	46	46	44	46	48
Annual Congestion Cost (\$ million)	56	52	48	53	47	41
Rank	46	46	46	45	45	46

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

# Mobility Data for Tucson AZ

Inventory Measures	2005	2004	2003	2002	2001	2000
<b>Urban Area Information</b>						
Population (1000s)	720	700	685	665	655	645
Rank	54	55	56	56	59	59
Commuters (1000s)	344	333	324	311	302	293
<b>Daily Vehicle-Miles of Travel (1000s)</b>						
Freeway	3,540	3,425	3,285	3,000	2,750	2,420
Arterial Streets	11,100	10,320	10,105	9,620	9,610	9,355
<b>Cost Components</b>						
Value of Time (\$/hour)	14.58	14.10	13.73	13.43	13.22	12.85
Commercial Cost (\$/hour)	36.51	35.19	33.92	32.69	31.51	30.38
Gasoline (\$/gallon)	2.42	2.04	1.59	1.47	1.62	1.52
Diesel (\$/gallon)	2.69	2.12	1.61	1.46	1.66	1.57
System Performance	2005	2004	2003	2002	2001	2000
<b>Congested Travel (% of peak VMT)</b>	--	--	--	--	--	--
<b>Congested System (% of lane-miles)</b>	--	--	--	--	--	--
<b>Congested Time (number of "Rush Hours")</b>	--	--	--	--	--	--
<b>Annual Excess Fuel Consumed</b>						
Total Fuel (1000 gallons)	11,074	10,129	9,810	9,342	9,064	8,848
Rank	48	49	49	51	49	48
Fuel per Peak Auto Commuter (gallons)	19	17	16	14	14	15
Rank	34	46	49	61	54	40
<b>Annual Delay</b>						
Total Delay (1000s of person-hours)	22,810	20,862	20,206	19,242	18,669	18,225
Rank	47	47	47	48	48	47
Delay per Auto Commuter (pers-hrs)	41	40	40	40	40	40
Rank	34	37	32	30	29	28
<b>Travel Time Index</b>						
Rank	1.21	1.20	1.20	1.20	1.20	1.20
Rank	35	35	35	35	32	29
<b>Commuter Stress Index</b>						
Rank	--	--	--	--	--	--
Rank	--	--	--	--	--	--
<b>Freeway Planning Time Index (95th Pctile)</b>						
Rank	--	--	--	--	--	--
Rank	--	--	--	--	--	--
<b>Congestion Cost</b>						
Total Cost (\$ millions)	377	330	307	284	273	258
Rank	47	47	47	48	47	47
Cost per Auto Commuter (\$)	707	668	667	648	637	638
Rank	55	63	61	63	59	57
<b>Truck Congestion</b>						
Annual Person-Hours of Delay (000)	958	876	849	808	784	765
Rank	47	47	47	48	48	47
Annual Gallons of Wasted Fuel (000)	2,348	2,147	2,080	1,980	1,921	1,876
Rank	48	49	49	51	49	48
Annual Congestion Cost (\$ million)	37	32	29	26	25	23
Rank	47	47	46	47	47	47

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

# Mobility Data for Tucson AZ

Inventory Measures	1999	1998	1997	1996	1995	1994
<b>Urban Area Information</b>						
Population (1000s)	640	635	625	625	620	605
Rank	58	58	58	57	56	56
Commuters (1000s)	288	282	274	271	265	256
<b>Daily Vehicle-Miles of Travel (1000s)</b>						
Freeway	2,100	1,955	1,775	1,670	1,475	1,365
Arterial Streets	9,265	9,135	8,985	8,250	8,000	7,725
<b>Cost Components</b>						
Value of Time (\$/hour)	12.43	12.17	11.98	11.71	11.37	11.06
Commercial Cost (\$/hour)	29.28	28.89	28.50	28.12	27.75	27.38
Gasoline (\$/gallon)	1.38	1.19	1.32	1.26	1.20	1.19
Diesel (\$/gallon)	1.39	1.31	1.34	1.29	1.22	1.21
System Performance	1999	1998	1997	1996	1995	1994
<b>Congested Travel (% of peak VMT)</b>	--	--	--	--	--	--
<b>Congested System (% of lane-miles)</b>	--	--	--	--	--	--
<b>Congested Time (number of "Rush Hours")</b>	--	--	--	--	--	--
<b>Annual Excess Fuel Consumed</b>						
Total Fuel (1000 gallons)	8,362	7,830	7,376	6,913	6,586	6,065
Rank	47	47	46	48	44	44
Fuel per Peak Auto Commuter (gallons)	14	13	13	12	12	11
Rank	42	42	38	38	35	37
<b>Annual Delay</b>						
Total Delay (1000s of person-hours)	17,223	16,128	15,193	14,239	13,565	12,492
Rank	48	49	46	46	46	48
Delay per Auto Commuter (pers-hrs)	39	38	36	34	33	31
Rank	27	26	28	33	31	31
<b>Travel Time Index</b>						
Rank	1.19	1.18	1.17	1.16	1.16	1.15
Rank	30	30	32	35	32	34
<b>Commuter Stress Index</b>						
Rank	--	--	--	--	--	--
Rank	--	--	--	--	--	--
<b>Freeway Planning Time Index (95th Pctile)</b>						
Rank	--	--	--	--	--	--
Rank	--	--	--	--	--	--
<b>Congestion Cost</b>						
Total Cost (\$ millions)	235	215	200	183	170	152
Rank	48	49	46	46	45	48
Cost per Auto Commuter (\$)	623	598	573	548	538	510
Rank	58	60	59	57	51	53
<b>Truck Congestion</b>						
Annual Person-Hours of Delay (000)	723	677	638	598	570	525
Rank	48	49	46	46	46	47
Annual Gallons of Wasted Fuel (000)	1,773	1,660	1,564	1,466	1,396	1,286
Rank	47	47	46	48	44	44
Annual Congestion Cost (\$ million)	21	19	18	17	16	14
Rank	47	47	46	45	44	44

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

# Mobility Data for Tucson AZ

Inventory Measures	1993	1992	1991	1990	1989	1988
<b>Urban Area Information</b>						
Population (1000s)	590	560	550	530	510	500
Rank	56	59	59	59	61	61
Commuters (1000s)	246	231	224	213	203	198
<b>Daily Vehicle-Miles of Travel (1000s)</b>						
Freeway	1,330	1,280	1,250	1,275	1,200	1,070
Arterial Streets	7,675	7,500	7,320	7,190	7,110	7,050
<b>Cost Components</b>						
Value of Time (\$/hour)	10.78	10.47	10.17	9.75	9.25	8.83
Commercial Cost (\$/hour)	27.02	26.66	26.30	25.95	25.60	25.26
Gasoline (\$/gallon)	1.18	1.22	1.06	1.07	1.11	1.02
Diesel (\$/gallon)	1.20	1.26	1.20	1.18	1.20	1.10
System Performance	1993	1992	1991	1990	1989	1988
<b>Congested Travel (% of peak VMT)</b>	--	--	--	--	--	--
<b>Congested System (% of lane-miles)</b>	--	--	--	--	--	--
<b>Congested Time (number of "Rush Hours")</b>	--	--	--	--	--	--
<b>Annual Excess Fuel Consumed</b>						
Total Fuel (1000 gallons)	5,774	5,436	5,089	4,658	4,194	3,910
Rank	44	44	44	42	43	42
Fuel per Peak Auto Commuter (gallons)	11	10	9	9	8	7
Rank	22	24	27	23	26	27
<b>Annual Delay</b>						
Total Delay (1000s of person-hours)	11,894	11,198	10,482	9,594	8,638	8,053
Rank	46	44	44	43	43	42
Delay per Auto Commuter (pers-hrs)	31	31	30	28	27	25
Rank	26	22	20	21	21	24
<b>Travel Time Index</b>						
Rank	1.15	1.15	1.14	1.14	1.13	1.12
Rank	30	26	28	25	27	27
<b>Commuter Stress Index</b>						
Rank	--	--	--	--	--	--
Rank	--	--	--	--	--	--
<b>Freeway Planning Time Index (95th Pctile)</b>						
Rank	--	--	--	--	--	--
Rank	--	--	--	--	--	--
<b>Congestion Cost</b>						
Total Cost (\$ millions)	142	130	118	104	89	80
Rank	45	44	44	43	43	42
Cost per Auto Commuter (\$)	497	485	468	446	427	418
Rank	49	48	46	46	48	48
<b>Truck Congestion</b>						
Annual Person-Hours of Delay (000)	500	470	440	403	363	338
Rank	46	44	43	43	43	42
Annual Gallons of Wasted Fuel (000)	1,224	1,153	1,079	987	889	829
Rank	44	44	44	42	43	42
Annual Congestion Cost (\$ million)	13	12	11	10	9	8
Rank	44	44	44	42	43	42

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

# Mobility Data for Tucson AZ

Inventory Measures	1987	1986	1985	1984	1983	1982
<b>Urban Area Information</b>						
Population (1000s)	490	480	470	455	450	450
Rank	61	61	61	61	61	60
Commuters (1000s)	192	187	182	174	171	169
<b>Daily Vehicle-Miles of Travel (1000s)</b>						
Freeway	1,130	1,040	970	950	810	750
Arterial Streets	6,980	6,940	6,910	6,885	6,800	6,750
<b>Cost Components</b>						
Value of Time (\$/hour)	8.48	8.18	8.03	7.75	7.43	7.20
Commercial Cost (\$/hour)	24.93	24.60	24.27	23.94	23.63	23.31
Gasoline (\$/gallon)	1.03	1.00	1.31	1.33	1.36	1.42
Diesel (\$/gallon)	1.11	1.08	1.42	1.43	1.46	1.53
System Performance	1987	1986	1985	1984	1983	1982
<b>Congested Travel (% of peak VMT)</b>	--	--	--	--	--	--
<b>Congested System (% of lane-miles)</b>	--	--	--	--	--	--
<b>Congested Time (number of "Rush Hours")</b>	--	--	--	--	--	--
<b>Annual Excess Fuel Consumed</b>						
Total Fuel (1000 gallons)	3,490	3,302	2,926	2,620	2,430	2,357
Rank	42	42	43	43	43	42
Fuel per Peak Auto Commuter (gallons)	6	6	6	4	4	3
Rank	32	28	22	41	35	34
<b>Annual Delay</b>						
Total Delay (1000s of person-hours)	7,188	6,801	6,027	5,396	5,006	4,854
Rank	44	44	44	45	44	43
Delay per Auto Commuter (pers-hrs)	23	22	20	19	18	17
Rank	25	24	25	27	25	24
<b>Travel Time Index</b>						
Rank	1.11	1.11	1.10	1.09	1.09	1.08
Rank	29	26	26	29	27	28
<b>Commuter Stress Index</b>						
Rank	--	--	--	--	--	--
Rank	--	--	--	--	--	--
<b>Freeway Planning Time Index (95th Pctile)</b>						
Rank	--	--	--	--	--	--
Rank	--	--	--	--	--	--
<b>Congestion Cost</b>						
Total Cost (\$ millions)	69	63	56	48	43	41
Rank	43	43	44	45	44	43
Cost per Auto Commuter (\$)	389	381	347	318	310	311
Rank	51	45	46	46	46	43
<b>Truck Congestion</b>						
Annual Person-Hours of Delay (000)	302	286	253	227	210	204
Rank	44	44	44	45	44	43
Annual Gallons of Wasted Fuel (000)	740	700	620	555	515	500
Rank	42	42	43	43	43	42
Annual Congestion Cost (\$ million)	7	7	6	6	5	5
Rank	43	40	43	40	43	40

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