

Performance Measure Summary - Denver-Aurora CO

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 Denver-Aurora CO

Inventory Measures	2017	2016	2015	2014	2013	2012
Urban Area Information						
Population (1000s)	2,675	2,660	2,630	2,615	2,550	2,475
Rank	17	17	17	17	18	18
Commuters (1000s)	1,340	1,331	1,315	1,307	1,297	1,301
Daily Vehicle-Miles of Travel (1000s)						
Freeway	26,961	26,302	25,453	24,412	21,242	20,980
Arterial Streets	23,413	22,972	22,474	21,868	20,356	20,600
Cost Components						
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)	2.34	2.15	2.47	3.33	3.54	3.28
Diesel (\$/gallon)	2.42	2.18	2.43	3.59	3.80	3.85
System Performance	2017	2016	2015	2014	2013	2012
Congested Travel (% of peak VMT)	33.7	--	--	--	--	--
Congested System (% of lane-miles)	19.3	--	--	--	--	--
Congested Time (number of "Rush Hours")	4.7	--	--	--	--	--
Annual Excess Fuel Consumed						
Total Fuel (1000 gallons)	44,449	44,345	44,115	44,005	43,608	42,279
Rank	16	15	15	15	15	15
Fuel per Peak Auto Commuter (gallons)	25	25	24	24	25	24
Rank	20	16	20	17	15	16
Annual Delay						
Total Delay (1000s of person-hours)	107,463	105,664	103,318	101,271	99,468	95,576
Rank	17	17	17	17	17	17
Delay per Auto Commuter (pers-hrs)	61	59	58	55	55	53
Rank	20	21	20	20	19	19
Travel Time Index						
Rank	1.31	1.31	1.31	1.30	1.30	1.30
Rank	17	17	16	17	16	16
Commuter Stress Index						
Rank	1.32	--	--	--	--	--
Rank	20	--	--	--	--	--
Freeway Planning Time Index (95th Pctile)						
Rank	1.83	--	--	--	--	--
Rank	23	--	--	--	--	--
Congestion Cost						
Total Cost (\$ millions)	2,177	2,104	2,038	2,030	1,965	1,853
Rank	17	17	17	17	17	17
Cost per Auto Commuter (\$)	1,163	1,151	1,119	1,091	1,082	1,053
Rank	23	23	23	23	22	21
Truck Congestion						
Annual Person-Hours of Delay (000)	4,513	4,438	4,339	4,253	4,178	4,014
Rank	17	17	17	17	17	17
Annual Gallons of Wasted Fuel (000)	9,423	9,401	9,352	9,329	9,245	8,963
Rank	16	15	15	15	15	15
Annual Congestion Cost (\$ million)	229	216	201	201	186	174
Rank	17	17	17	17	17	17

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

Mobility Data for Denver-Aurora CO

Inventory Measures	2011	2010	2009	2008	2007	2006
Urban Area Information						
Population (1000s)	2,425	2,360	2,290	2,250	2,200	2,145
Rank	19	19	19	19	19	20
Commuters (1000s)	1,315	1,276	1,236	1,210	1,181	1,150
Daily Vehicle-Miles of Travel (1000s)						
Freeway	22,205	21,817	21,000	20,120	20,395	19,935
Arterial Streets	21,575	21,193	21,538	22,000	22,925	23,555
Cost Components						
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)	3.27	2.62	2.17	3.39	3.20	2.60
Diesel (\$/gallon)	3.67	2.90	2.48	4.10	3.68	2.88
System Performance	2011	2010	2009	2008	2007	2006
Congested Travel (% of peak VMT)	--	--	--	--	--	--
Congested System (% of lane-miles)	--	--	--	--	--	--
Congested Time (number of "Rush Hours")	--	--	--	--	--	--
Annual Excess Fuel Consumed						
Total Fuel (1000 gallons)	40,469	40,202	39,179	39,597	39,762	39,479
Rank	15	15	15	15	15	15
Fuel per Peak Auto Commuter (gallons)	22	23	21	22	22	22
Rank	18	14	15	19	19	18
Annual Delay						
Total Delay (1000s of person-hours)	89,836	87,604	83,780	80,641	80,977	80,402
Rank	18	18	17	19	17	17
Delay per Auto Commuter (pers-hrs)	50	50	49	49	50	51
Rank	21	17	15	18	17	17
Travel Time Index						
Rank	19	13	12	12	11	12
Commuter Stress Index						
Rank	--	--	--	--	--	--
Freeway Planning Time Index (95th Pctile)						
Rank	--	--	--	--	--	--
Congestion Cost						
Total Cost (\$ millions)	1,728	1,611	1,502	1,503	1,449	1,377
Rank	18	18	17	18	17	17
Cost per Auto Commuter (\$)	1,022	1,027	1,000	953	994	1,016
Rank	23	21	19	24	20	18
Truck Congestion						
Annual Person-Hours of Delay (000)	3,773	3,679	3,519	3,387	3,401	3,377
Rank	18	18	17	19	17	17
Annual Gallons of Wasted Fuel (000)	8,579	8,523	8,306	8,395	8,429	8,370
Rank	15	15	15	15	15	15
Annual Congestion Cost (\$ million)	179	162	150	156	148	136
Rank	17	17	16	16	16	16

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

Mobility Data for Denver-Aurora CO

Inventory Measures	2005	2004	2003	2002	2001	2000
Urban Area Information						
Population (1000s)	2,090	2,065	2,050	2,030	2,025	1,910
Rank	21	21	20	20	20	21
Commuters (1000s)	1,115	1,096	1,083	1,046	1,019	938
Daily Vehicle-Miles of Travel (1000s)						
Freeway	19,900	18,815	17,960	17,400	17,250	16,905
Arterial Streets	23,380	22,820	21,790	20,925	20,520	20,185
Cost Components						
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)	2.32	1.94	1.51	1.39	1.70	1.55
Diesel (\$/gallon)	2.56	2.04	1.55	1.40	1.68	1.51
System Performance	2005	2004	2003	2002	2001	2000
Congested Travel (% of peak VMT)	--	--	--	--	--	--
Congested System (% of lane-miles)	--	--	--	--	--	--
Congested Time (number of "Rush Hours")	--	--	--	--	--	--
Annual Excess Fuel Consumed						
Total Fuel (1000 gallons)	38,740	37,308	35,195	33,968	31,329	28,510
Rank	15	15	15	15	15	15
Fuel per Peak Auto Commuter (gallons)	22	21	20	21	19	17
Rank	15	14	17	12	13	24
Annual Delay						
Total Delay (1000s of person-hours)	78,897	75,979	71,676	69,178	63,803	58,062
Rank	17	17	17	17	18	18
Delay per Auto Commuter (pers-hrs)	52	50	48	48	45	44
Rank	12	13	14	13	17	16
Travel Time Index						
Rank	1.32	1.31	1.30	1.29	1.28	1.27
Rank	8	9	10	10	10	11
Commuter Stress Index						
Rank	--	--	--	--	--	--
Rank	--	--	--	--	--	--
Freeway Planning Time Index (95th Pctile)						
Rank	--	--	--	--	--	--
Rank	--	--	--	--	--	--
Congestion Cost						
Total Cost (\$ millions)	1,300	1,198	1,086	1,021	935	824
Rank	16	16	17	17	18	18
Cost per Auto Commuter (\$)	1,029	1,025	994	980	916	856
Rank	19	19	21	20	21	25
Truck Congestion						
Annual Person-Hours of Delay (000)	3,314	3,191	3,010	2,905	2,680	2,439
Rank	17	17	17	17	18	18
Annual Gallons of Wasted Fuel (000)	8,213	7,909	7,461	7,201	6,642	6,044
Rank	15	15	15	15	15	15
Annual Congestion Cost (\$ million)	127	115	101	93	85	74
Rank	16	16	17	17	18	18

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

Mobility Data for Denver-Aurora CO

Inventory Measures	1999	1998	1997	1996	1995	1994
Urban Area Information						
Population (1000s)	1,860	1,830	1,800	1,770	1,730	1,675
Rank	21	21	21	23	23	23
Commuters (1000s)	891	857	822	789	753	712
Daily Vehicle-Miles of Travel (1000s)						
Freeway	16,500	16,120	15,700	15,100	14,285	13,475
Arterial Streets	19,520	17,990	16,850	16,410	16,170	15,685
Cost Components						
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)	1.16	1.10	1.24	1.36	1.22	1.16
Diesel (\$/gallon)	1.18	1.22	1.33	1.41	1.26	1.20
System Performance	1999	1998	1997	1996	1995	1994
Congested Travel (% of peak VMT)	--	--	--	--	--	--
Congested System (% of lane-miles)	--	--	--	--	--	--
Congested Time (number of "Rush Hours")	--	--	--	--	--	--
Annual Excess Fuel Consumed						
Total Fuel (1000 gallons)	26,126	23,820	21,520	19,019	16,784	14,927
Rank	15	15	17	19	22	24
Fuel per Peak Auto Commuter (gallons)	15	14	14	11	10	9
Rank	32	31	26	49	52	56
Annual Delay						
Total Delay (1000s of person-hours)	53,208	48,510	43,827	38,733	34,181	30,401
Rank	18	19	19	23	23	23
Delay per Auto Commuter (pers-hrs)	42	40	37	34	31	29
Rank	17	19	22	33	41	42
Travel Time Index						
Rank	1.26	1.24	1.23	1.21	1.19	1.18
Rank	9	14	15	20	23	23
Commuter Stress Index						
Rank	--	--	--	--	--	--
Rank	--	--	--	--	--	--
Freeway Planning Time Index (95th Pctile)						
Rank	--	--	--	--	--	--
Rank	--	--	--	--	--	--
Congestion Cost						
Total Cost (\$ millions)	721	644	576	501	428	370
Rank	18	19	19	23	23	23
Cost per Auto Commuter (\$)	813	758	695	628	572	523
Rank	26	29	32	38	49	49
Truck Congestion						
Annual Person-Hours of Delay (000)	2,235	2,037	1,841	1,627	1,436	1,277
Rank	18	19	19	23	23	23
Annual Gallons of Wasted Fuel (000)	5,539	5,050	4,562	4,032	3,558	3,165
Rank	15	15	17	19	22	24
Annual Congestion Cost (\$ million)	64	58	52	46	39	34
Rank	18	18	19	21	23	23

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Mobility Data for Denver-Aurora CO

Inventory Measures	1993	1992	1991	1990	1989	1988
Urban Area Information						
Population (1000s)	1,610	1,600	1,580	1,580	1,565	1,550
Rank	23	23	23	23	23	23
Commuters (1000s)	668	647	624	609	598	587
Daily Vehicle-Miles of Travel (1000s)						
Freeway	12,950	12,430	11,425	11,205	10,500	10,315
Arterial Streets	15,170	13,900	13,240	12,365	12,170	12,120
Cost Components						
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)	1.21	1.23	1.19	1.11	1.15	1.06
Diesel (\$/gallon)	1.25	1.23	1.28	1.15	1.14	1.05
System Performance	1993	1992	1991	1990	1989	1988
Congested Travel (% of peak VMT)	--	--	--	--	--	--
Congested System (% of lane-miles)	--	--	--	--	--	--
Congested Time (number of "Rush Hours")	--	--	--	--	--	--
Annual Excess Fuel Consumed						
Total Fuel (1000 gallons)	12,863	11,583	10,813	10,366	9,992	9,075
Rank	26	28	28	25	24	24
Fuel per Peak Auto Commuter (gallons)	8	6	6	6	6	5
Rank	58	69	67	60	53	58
Annual Delay						
Total Delay (1000s of person-hours)	26,195	23,590	22,022	21,111	20,349	18,483
Rank	25	25	25	24	24	24
Delay per Auto Commuter (pers-hrs)	26	24	23	23	22	21
Rank	49	53	49	44	40	38
Travel Time Index						
Rank	26	26	23	25	23	23
Commuter Stress Index						
Rank	--	--	--	--	--	--
Freeway Planning Time Index (95th Pctile)						
Rank	--	--	--	--	--	--
Congestion Cost						
Total Cost (\$ millions)	312	274	249	229	211	183
Rank	25	25	25	25	24	24
Cost per Auto Commuter (\$)	463	429	413	414	422	403
Rank	60	60	59	55	50	51
Truck Congestion						
Annual Person-Hours of Delay (000)	1,100	991	925	887	855	776
Rank	25	25	25	24	24	24
Annual Gallons of Wasted Fuel (000)	2,727	2,456	2,292	2,198	2,118	1,924
Rank	26	28	28	25	24	24
Annual Congestion Cost (\$ million)	29	26	24	23	22	19
Rank	25	25	25	24	23	24

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Mobility Data for Denver-Aurora CO

Inventory Measures	1987	1986	1985	1984	1983	1982
Urban Area Information						
Population (1000s)	1,510	1,500	1,485	1,460	1,375	1,350
Rank	23	23	23	23	23	23
Commuters (1000s)	566	557	547	532	498	484
Daily Vehicle-Miles of Travel (1000s)						
Freeway	10,135	9,765	9,510	9,865	9,180	8,900
Arterial Streets	12,115	12,100	12,195	12,215	11,665	11,530
Cost Components						
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)	1.06	1.04	1.36	1.37	1.41	1.47
Diesel (\$/gallon)	1.05	1.03	1.35	1.36	1.39	1.46
System Performance	1987	1986	1985	1984	1983	1982
Congested Travel (% of peak VMT)	--	--	--	--	--	--
Congested System (% of lane-miles)	--	--	--	--	--	--
Congested Time (number of "Rush Hours")	--	--	--	--	--	--
Annual Excess Fuel Consumed						
Total Fuel (1000 gallons)	8,737	8,878	8,790	8,244	6,851	6,057
Rank	23	20	20	19	21	21
Fuel per Peak Auto Commuter (gallons)	5	5	5	5	5	3
Rank	48	40	32	27	22	34
Annual Delay						
Total Delay (1000s of person-hours)	17,793	18,080	17,902	16,789	13,952	12,336
Rank	23	21	21	21	21	22
Delay per Auto Commuter (pers-hrs)	21	21	21	21	18	17
Rank	31	26	23	19	25	24
Travel Time Index						
Rank	1.13	1.13	1.13	1.13	1.11	1.10
Rank	21	19	18	17	18	19
Commuter Stress Index						
Rank	--	--	--	--	--	--
Rank	--	--	--	--	--	--
Freeway Planning Time Index (95th Pctile)						
Rank	--	--	--	--	--	--
Rank	--	--	--	--	--	--
Congestion Cost						
Total Cost (\$ millions)	170	167	166	151	121	105
Rank	23	21	21	21	21	21
Cost per Auto Commuter (\$)	405	428	430	419	363	333
Rank	41	34	30	30	33	37
Truck Congestion						
Annual Person-Hours of Delay (000)	747	759	752	705	586	518
Rank	23	21	21	21	21	22
Annual Gallons of Wasted Fuel (000)	1,852	1,882	1,864	1,748	1,452	1,284
Rank	23	20	20	19	21	21
Annual Congestion Cost (\$ million)	18	18	19	17	14	12
Rank	23	21	20	21	21	21

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