Performance Measure Summary - Madison WI

There are several inventory and performance measures listed in the pages of this Urban Area Report for the years from 1982 to 2020. 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 2020 (estimated at \$20.17 per hour of person travel and \$55.24 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.

Annual Greenhouse Gases (CO2) Produced -Tons of CO2 produced from all vehicle travel.

Excess Greenhouse Gases (CO2) Produced due to Congestion-Tons of CO2 produced due to congested portion of travel. The excess CO2 is a subset of the total CO2 produced.

Inventory Measures	2020	2019	2018	2017	2016	2015
Urban Area Information						
Population (1000s)	445	445	445	445	440	440
Rank	82	82	82	82	82	82
Commuters (1000s)	201	201	201	201	198	197
Daily Vehicle-Miles of Travel (1000s)						
Freeway	3,216	3,990	4,005	3,850	3,754	3,630
Arterial Streets	2,927	3,631	3,545	3,575	3,509	3,670
Cost Components						
Value of Time (\$/hour)	20.17	19.14	18.71	18.12	17.91	17.69
Commercial Cost (\$/hour)	55.24	49.49	54.71	52.14	50.20	46.87
Gasoline (\$/gallon)	2.25	2.54	2.81	2.33	2.18	2.33
Diesel (\$/gallon)	2.69	2.81	3.25	2.51	2.32	2.31
System Performance	2020	2019	2018	2017	2016	2015
Congested Travel (% of peak VMT)				16.4		
Congested System (% of lane-miles)				8.9		
Congested Time (number of "Rush Hours")				1.7		
Annual Excess Fuel Consumed						
Total Fuel (1000 gallons)	3,413	5,182	5,038	4,938	4,868	4,821
Rank	75	80	80	80	80	80
Fuel per Peak Auto Commuter (gallons)	12	18	17	17	17	17
Rank	39	69	74	68	68	65
Annual Delay						
Total Delay (1000s of person-hours)	7,945	12,064	11,652	10,864	10,625	10,435
Rank	75	80	80	83	82	82
Delay per Auto Commuter (pers-hrs)	28	42	41	38	37	37
Rank	36	71	72	80	81	79
Travel Time Index	1.05	1.16	1.16	1.15	1.15	1.15
Rank	85	59	57	69	69	67
Commuter Stress Index	1.05	1.18	1.17	1.16		
Rank	99	60	67	72		
Freeway Planning Time Index (95th Pctile)		1.54	1.41	1.39		
Rank		40	52	55		
Congestion Cost						
Total Cost (\$ millions)	183	264	259	238	228	221
Rank	76	80	80	82	81	81
Cost per Auto Commuter (\$)	514	743	729	668	658	641
Rank	58	86	88	90	90	88
Truck Congestion						
Annual Person-Hours of Delay (000)	519	690	652	606	587	570
Rank	66	70	72	76	76	76
Annual Gallons of Wasted Fuel (000)	928	1,234	1,197	1,098	1,083	1,072
Rank	66	71	72	74	74	74
Annual Congestion Cost (\$ million)	28	34	36	32	30	27
Rank	66	75	70	76	76	76
Annual Greenhouse Gases (CO2) Produced					1	
Excess Due to Congestion (tons)	34,400	52,236				
Rank	75	81				
Due to All Travel (tons)	916,396	1,391,523				
Rank	84	87				
Truck Annual Greenhouse Gases (CO2) Produced					1	
Excess Due to Truck Congestion (tons)	10,194	13,554				
Rank	66	71				
Due to Truck Travel (tons)	278,078	369,727				
Rank	74	81				

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

Inventory Measures	2014	2013	2012	2011	2010	2009
Urban Area Information						
Population (1000s)	435	430	425	415	400	390
Rank	83	83	83	83	83	83
Commuters (1000s)	194	192	189	185	177	172
Daily Vehicle-Miles of Travel (1000s)						
Freeway	3,498	3,501	3,085	3,499	3,356	3,200
Arterial Streets	3,800	3,693	2,780	2,935	2,899	2,880
Cost Components						
Value of Time (\$/hour)	17.67	17.39	17.14	16.79	16.28	16.01
Commercial Cost (\$/hour)	44.82	41.23	39.66	44.62	42.50	41.83
Gasoline (\$/gallon)	3.32	3.63	3.60	3.42	2.71	2.29
Diesel (\$/gallon)	3.65	3.91	3.91	3.71	2.99	2.54
System Performance	2014	2013	2012	2011	2010	2009
Congested Travel (% of peak VMT)						
Congested System (% of lane-miles)						
Congested Time (number of "Rush Hours")						
Annual Excess Fuel Consumed						
Total Fuel (1000 gallons)	4,774	4,714	4,560	4,429	4,326	4,134
Rank	79	79	79	79	79	80
Fuel per Peak Auto Commuter (gallons)	16	17	16	16	17	15
Rank	70	64	69	67	61	62
Annual Delay						
Total Delay (1000s of person-hours)	10,151	9,850	9,443	9,006	8,637	8,097
Rank	82	82	82	82	83	83
Delay per Auto Commuter (pers-hrs)	35	35	34	34	33	33
Rank	80	79	79	78	77	77
Travel Time Index	1.15	1.15	1.15	1.15	1.14	1.14
Rank	68	68	69	67	71	72
Commuter Stress Index						
Rank						
Freeway Planning Time Index (95th Pctile)						
Rank						
Congestion Cost						
Total Cost (\$ millions)	219	210	198	187	172	157
Rank	81	81	81	82	83	83
Cost per Auto Commuter (\$)	619	609	592	581	576	547
Rank	88	87	90	91	91	91
Truck Congestion						
Annual Person-Hours of Delay (000)	559	543	521	496	476	447
Rank	76	76	76	76	76	77
Annual Gallons of Wasted Fuel (000)	1,061	1,049	1,015	986	962	919
Rank	74	74	74	76	76	76
Annual Congestion Cost (\$ million)	27	25	23	24	22	20
Rank	76	76	76	76	76	76
Annual Greenhouse Gases (CO2) Produced				ı	1	
Excess Due to Congestion (tons)						
Rank						
Due to All Travel (tons)						
Rank						
Truck Annual Greenhouse Gases (CO2) Produced					1	
Excess Due to Truck Congestion (tons)						
Rank						
Due to Truck Travel (tons)						
Rank						

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

Inventory Measures	2008	2007	2006	2005	2004	2003
Urban Area Information						
Population (1000s)	385	385	385	380	380	370
Rank	83	83	83	83	82	81
Commuters (1000s)	169	169	168	164	163	158
Daily Vehicle-Miles of Travel (1000s)						
Freeway	3,065	3,125	3,025	2,900	2,890	2,830
Arterial Streets	2,870	2,905	2,895	3,045	3,145	2,960
Cost Components	,	,	,		,	
Value of Time (\$/hour)	16.07	15.47	15.06	14.58	14.10	13.73
Commercial Cost (\$/hour)	40.77	39.30	37.88	36.51	35.19	33.92
Gasoline (\$/gallon)	3.48	3.08	2.73	2.37	1.98	1.58
Diesel (\$/gallon)	4.15	3.41	2.90	2.53	1.98	1.53
System Performance	2008	2007	2006	2005	2004	2003
						2005
Congested Travel (% of lone miles)						
Congested System (% of lane-miles) Congested Time (number of "Rush Hours")						
Annual Excess Fuel Consumed						
Total Fuel (1000 gallons)	4,190	3,983	3,732	3,416	3,187	2,962
Rank	80	82	82	84	85	85
Fuel per Peak Auto Commuter (gallons)	16	16	16	14	13	13
Rank	68	70	64	75	80	74
Annual Delay						
Total Delay (1000s of person-hours)	7,815	7,429	6,962	6,373	5,943	5,526
Rank	83	85	86	86	86	87
Delay per Auto Commuter (pers-hrs)	31	32	31	30	29	28
Rank	78	77	80	82	83	84
Travel Time Index	1.15	1.15	1.15	1.14	1.14	1.13
Rank	69	69	69	73	71	75
Commuter Stress Index						
Rank						
Freeway Planning Time Index (95th Pctile)						
Rank						
Congestion Cost						
Total Cost (\$ millions)	157	143	129	113	101	90
Rank	83	85	86	86	85	85
Cost per Auto Commuter (\$)	524	516	499	474	454	432
Rank	92	93	92	92	92	92
Truck Congestion						
Annual Person-Hours of Delay (000)	431	410	383	351	327	304
Rank	79	79	81	82	82	82
Annual Gallons of Wasted Fuel (000)	932	886	830	761	709	659
Rank	76	78	79	80	80	81
Annual Congestion Cost (\$ million)	20	18	16	14	12	11
Rank	78	79	79	82	82	81
Annual Greenhouse Gases (CO2) Produced	1					
Excess Due to Congestion (tons)						
Rank					<u></u>	
Due to All Travel (tons)					<u></u>	
Rank				l		
Truck Annual Greenhouse Gases (CO2) Produced				1	I	
Excess Due to Truck Congestion (tons)						
Rank Due to Truck Travel (tons)						
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Rank						

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

Inventory Measures	2002	2001	2000	1999	1998	1997
Urban Area Information						
Population (1000s)	365	360	355	350	345	340
Rank	81	80	80	80	80	80
Commuters (1000s)	154	149	145	141	137	133
Daily Vehicle-Miles of Travel (1000s)						
Freeway	2,775	2,720	2,650	2,580	2,500	2,450
Arterial Streets	2,920	2,860	2,725	2,665	2,575	2,485
Cost Components						
Value of Time (\$/hour)	13.43	13.22	12.85	12.43	12.17	11.98
Commercial Cost (\$/hour)	32.69	31.51	30.38	29.28	28.89	28.50
Gasoline (\$/gallon)	1.46	1.51	1.64	1.17	1.14	1.19
Diesel (\$/gallon)	1.40	1.58	1.57	1.16	1.16	1.26
System Performance	2002	2001	2000	1999	1998	1997
Congested Travel (% of peak VMT)						
Congested System (% of lane-miles)						
Congested Time (number of "Rush Hours")						
Annual Excess Fuel Consumed						
Total Fuel (1000 gallons)	2,774	2,618	2,399	2,260	2,067	2,002
Rank	86	85	84	85	85	2,002
Fuel per Peak Auto Commuter (gallons)	12	11	10	10	8	9
Rank	78	78	80	77	83	75
Annual Delay	70	70	00	, ,	05	7.5
Total Delay (1000s of person-hours)	5,176	4,885	4,474	4,218	3,857	3,735
Rank	87	86	86	86	86	3,733
Delay per Auto Commuter (pers-hrs)	26	25	23	23	21	21
Rank	86	87	89	87	89	86
Travel Time Index	1.13	1.12	1.11	1.11	1.10	1.10
Rank	75	78	79	78	80	80
Commuter Stress Index				/ o 		
Rank						
Freeway Planning Time Index (95th Pctile)						
Rank						
Congestion Cost						
Total Cost (\$ millions)	82	76	68	61	55	53
Rank	87	86	85	86	85	84
Cost per Auto Commuter (\$)	413	401	377	365	342	338
Rank	92	91	93	93	93	90
Truck Congestion	72	71	75	,,,	75	
Annual Person-Hours of Delay (000)	285	268	246	233	212	206
Rank	82	83	83	82	80	80
Annual Gallons of Wasted Fuel (000)	617	582	533	503	460	445
Rank	82	84	83	83	83	81
Annual Congestion Cost (\$ million)	10	9	8	7	6	6
Rank	79	79	79	80	80	80
Annual Greenhouse Gases (CO2) Produced	,,,	,,	,,			
Excess Due to Congestion (tons)						
Rank						
Due to All Travel (tons)				 		
Rank					<u></u>	
Truck Annual Greenhouse Gases (CO2) Produced						
Excess Due to Truck Congestion (tons)						
Rank						
Due to Truck Travel (tons)						
Due to Truck Travel (tons) Rank						

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

Inventory Measures	1996	1995	1994	1993	1992	1991
Urban Area Information						
Population (1000s)	335	330	325	320	315	310
Rank	81	81	80	80	81	81
Commuters (1000s)	129	125	121	117	114	110
Daily Vehicle-Miles of Travel (1000s)						
Freeway	2,410	2,380	2,350	2,300	2,240	2,200
Arterial Streets	2,445	2,415	2,390	2,370	2,280	2,215
Cost Components						
Value of Time (\$/hour)	11.71	11.37	11.06	10.78	10.47	10.17
Commercial Cost (\$/hour)	28.12	27.75	27.38	27.02	26.66	26.30
Gasoline (\$/gallon)	1.33	1.18	1.09	1.12	1.11	1.15
Diesel (\$/gallon)	1.42	1.26	1.16	1.20	1.19	1.25
System Performance	1996	1995	1994	1993	1992	1991
Congested Travel (% of peak VMT)						
Congested System (% of lane-miles)						
Congested Time (number of "Rush Hours")						
Annual Excess Fuel Consumed						
Total Fuel (1000 gallons)	1,807	1,715	1,642	1,481	1,381	1,348
Rank	84	82	82	83	84	82
Fuel per Peak Auto Commuter (gallons)	7	7	7	6	5	5
Rank	82	77	73	76	82	79
Annual Delay						
Total Delay (1000s of person-hours)	3,371	3,199	3,063	2,763	2,577	2,515
Rank	85	85	85	86	84	83
Delay per Auto Commuter (pers-hrs)	20	19	19	17	17	17
Rank	85	85	85	85	83	78
Travel Time Index	1.09	1.09	1.09	1.08	1.08	1.08
Rank	79	77	75	77	75	68
Commuter Stress Index						
Rank						
Freeway Planning Time Index (95th Pctile)						
Rank						
Congestion Cost						
Total Cost (\$ millions)	47	43	40	35	32	31
Rank	85	85	83	85	84	83
Cost per Auto Commuter (\$)	308	303	303	275	270	269
Rank	90	90	89	90	87	86
Truck Congestion						
Annual Person-Hours of Delay (000)	186	177	168	152	142	139
Rank	80	80	80	80	80	80
Annual Gallons of Wasted Fuel (000)	402	381	366	330	307	300
Rank	82	82	80	82	82	80
Annual Congestion Cost (\$ million) Rank	5 80	5 80	5 79	4 80	4 79	4 78
	00	80	19	80	19	/8
Annual Greenhouse Gases (CO2) Produced				ı	I	
Excess Due to Congestion (tons) Rank						
Nank Due to All Travel (tons)						
Rank						 -
Truck Annual Greenhouse Gases (CO2) Produced				ı	I	
Excess Due to Truck Congestion (tons)						
Rank Due to Truck Travel (tons)						
Due to Truck Travel (tons)						
Rank						

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

Inventory Measures	1990	1989	1988	1987	1986	1985
Urban Area Information						
Population (1000s)	305	300	295	290	285	280
Rank	81	81	81	81	81	81
Commuters (1000s)	107	104	102	99	97	94
Daily Vehicle-Miles of Travel (1000s)						
Freeway	2,170	2,140	2,100	2,050	2,000	1,960
Arterial Streets	2,175	2,035	1,985	1,915	1,900	1,880
Cost Components						
Value of Time (\$/hour)	9.75	9.25	8.83	8.48	8.18	8.03
Commercial Cost (\$/hour)	25.95	25.60	25.26	24.93	24.60	24.27
Gasoline (\$/gallon)	1.11	1.13	1.04	1.05	1.02	1.34
Diesel (\$/gallon)	1.21	1.23	1.13	1.14	1.11	1.45
System Performance	1990	1989	1988	1987	1986	1985
Congested Travel (% of peak VMT)						
Congested System (% of lane-miles)						
Congested Time (number of "Rush Hours")						
Annual Excess Fuel Consumed						
Total Fuel (1000 gallons)	1,312	1,265	1,235	1,214	1,209	1,191
Rank	82	80	79	78	72	70
Fuel per Peak Auto Commuter (gallons)	5	5	5	5	5	5
Rank	72	63	58	48	40	32
Annual Delay						
Total Delay (1000s of person-hours)	2,448	2,361	2,305	2,264	2,255	2,220
Rank	83	82	79	78	75	73
Delay per Auto Commuter (pers-hrs)	17	16	16	16	17	17
Rank	70	68	61	55	47	38
Travel Time Index	1.08	1.08	1.08	1.08	1.08	1.08
Rank	62	55	49	45	43	40
Commuter Stress Index						
Rank						
Freeway Planning Time Index (95th Pctile)						
Rank						
Congestion Cost						
Total Cost (\$ millions)	29	26	25	23	23	22
Rank	82	81	79	78	74	72
Cost per Auto Commuter (\$)	268	276	292	301	300	296
Rank	86	80	76	71	66	64
Truck Congestion	124	120	107	105	104	122
Annual Person-Hours of Delay (000)	134	130	127	125	124	122
Rank	80	77	74	71	69	67 265
Annual Gallons of Wasted Fuel (000)	292	281	275	270	269	265
Rank Annual Congestion Cost (\$ million)	80	76 3	72 3	71	70 3	67 3
Rank	4 71	3 76	71	68	67	64
Annual Greenhouse Gases (CO2) Produced	/ 1	70	/ 1	00	07	U 1
Excess Due to Congestion (tons)				ı		
Rank			 			
Due to All Travel (tons)						 -
Rank			 			
Truck Annual Greenhouse Gases (CO2) Produced						
Excess Due to Truck Congestion (tons)				1	I	
Rank (tons)						
Nank Due to Truck Travel (tons)						
Rank			 			
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^{*} Note: Zeroes in the table reflect values less than 0.5.

Inventory Measures	1984	1983	1982
Urban Area Information			
Population (1000s)	275	270	265
Rank	81	80	80
Commuters (1000s)	92	90	87
Daily Vehicle-Miles of Travel (1000s)	72	70	
Freeway	1,940	1,920	1,900
Arterial Streets	1,870	1,860	1,845
Cost Components	1,070	1,000	1,013
Value of Time (\$/hour)	7.75	7.43	7.20
Commercial Cost (\$/hour)	23.94	23.63	23.31
Gasoline (\$/gallon)	1.35	1.38	1.44
Diesel (\$/gallon)	1.47	1.50	1.57
System Performance	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)	1,171	1,110	972
Rank	70	67	69
Fuel per Peak Auto Commuter (gallons)	5	5	3
Rank	27	22	34
Annual Delay			
Total Delay (1000s of person-hours)	2,184	2,071	1,812
Rank	69	68	70
Delay per Auto Commuter (pers-hrs)	17	16	15
Rank	35	33	33
Travel Time Index	1.08	1.08	1.07
Rank	39	34	36
Commuter Stress Index			
Rank			
Freeway Planning Time Index (95th Pctile)			
Rank			
Congestion Cost			
Total Cost (\$ millions)	21	19	17
Rank	69	67	68
Cost per Auto Commuter (\$)	306	316	285
Rank	56	48	52
Truck Congestion			
Annual Person-Hours of Delay (000)	121	114	100
Rank	65	64	64
Annual Gallons of Wasted Fuel (000)	260	247	216
Aminual Gallons of Washen Fuel (000)			63
Rank	64	62	03
		62 3	3
Rank	64	-	
Rank Annual Congestion Cost (\$ million)	64 3	3	3
Rank Annual Congestion Cost (\$ million) Rank	64 3	3	3
Rank Annual Congestion Cost (\$ million) Rank Annual Greenhouse Gases (CO2) Produced	64 3	3	3
Rank Annual Congestion Cost (\$ million) Rank Annual Greenhouse Gases (CO2) Produced Excess Due to Congestion (tons)	64 3	3	3
Rank Annual Congestion Cost (\$ million) Rank Annual Greenhouse Gases (CO2) Produced Excess Due to Congestion (tons) Rank	64 3	3	3
Rank Annual Congestion Cost (\$ million) Rank Annual Greenhouse Gases (CO2) Produced Excess Due to Congestion (tons) Rank Due to All Travel (tons)	64 3 58	3 54 	3 50
Rank Annual Congestion Cost (\$ million) Rank Annual Greenhouse Gases (CO2) Produced Excess Due to Congestion (tons) Rank Due to All Travel (tons) Rank	64 3 58	3 54 	3 50
Rank Annual Congestion Cost (\$ million) Rank Annual Greenhouse Gases (CO2) Produced Excess Due to Congestion (tons) Rank Due to All Travel (tons) Rank Truck Annual Greenhouse Gases (CO2) Produced	64 3 58	3 54 	3 50
Rank Annual Congestion Cost (\$ million) Rank Annual Greenhouse Gases (CO2) Produced Excess Due to Congestion (tons) Rank Due to All Travel (tons) Rank Truck Annual Greenhouse Gases (CO2) Produced Excess Due to Truck Congestion (tons)	64 3 58	3 54 	3 50

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