Performance Measure Summary - Buffalo NY

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)	930	930	935	940	945	945
Rank	50	50	50	50	50	50
Commuters (1000s)	444	444	447	449	450	451
Daily Vehicle-Miles of Travel (1000s)						
Freeway	5,233	6,867	6,930	6,796	6,849	6,812
Arterial Streets	7,529	9,880	9,857	9,959	9,786	9,735
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)	2.55	2.76	3.00	2.48	2.33	2.51
Diesel (\$/gallon)	3.08	3.17	3.38	2.70	2.49	2.88
System Performance	2020	2019	2018	2017	2016	2015
•						2013
Congested Travel (% of Jone WIGE)				25.9		
Congested System (% of lane-miles)				2.4 4.2		
Congested Time (number of "Rush Hours")				4.2		
Annual Excess Fuel Consumed						
Total Fuel (1000 gallons)	6,968	11,904	11,807	11,494	11,137	10,731
Rank	49	52	51	51	51	52
Fuel per Peak Auto Commuter (gallons)	14	24	24	23	23	23
Rank	17	27	27	29	27	25
Annual Delay						
Total Delay (1000s of person-hours)	16,005	27,343	27,020	26,977	25,753	24,392
Rank	49	52	51	51	52	52
Delay per Auto Commuter (pers-hrs)	29	49	48	48	48	47
Rank	29	44	43	42	39	39
Travel Time Index	1.08	1.16	1.16	1.16	1.16	1.16
Rank	44	59	57	59	58	57
Commuter Stress Index	1.09	1.17	1.17	1.17		
Rank	44	67	67	66		
Freeway Planning Time Index (95th Pctile)		1.37	1.34	1.44		
Rank		58	60	50		
Congestion Cost						
Total Cost (\$ millions)	362	589	587	574	539	505
Rank	49	53	51	51	52	53
Cost per Auto Commuter (\$)	649	1,056	1,048	1,018	979	922
Rank	28	41	37	37	39	41
Truck Congestion						
Annual Person-Hours of Delay (000)	720	1,019	974	943	900	852
Rank	52	59	60	60	59	59
Annual Gallons of Wasted Fuel (000)	1,285	1,817	1,756	1,718	1,665	1,604
Rank	52	58	59	59	59	59
Annual Congestion Cost (\$ million)	39	51	54	50	46	42
Rank	52	58	59	59	58	58
Annual Greenhouse Gases (CO2) Produced	1					
Excess Due to Congestion (tons)	69,234	118,280				
Rank	49	52				
Due to All Travel (tons)	1,940,095	3,314,453				 -
Rank	1,940,093	55				 -
	33	33				
Truck Annual Greenhouse Gases (CO2) Produced	14.074	10.005			1	
Excess Due to Truck Congestion (tons)	14,074	19,905				
Rank	52	59				
	400 0 50	(00 (00				
Due to Truck Travel (tons) Rank	483,353 54	683,609 59				

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

Inventory Measures	2014	2013	2012	2011	2010	2009
Urban Area Information						
Population (1000s)	945	965	985	1,000	1,015	1,030
Rank	50	47	45	45	43	43
Commuters (1000s)	451	448	457	455	459	456
Daily Vehicle-Miles of Travel (1000s)						
Freeway	6,786	6,662	6,560	6,931	6,938	6,700
Arterial Streets	9,291	9,409	9,515	9,604	9,613	9,400
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)	3.63	3.79	3.75	3.65	2.95	2.47
Diesel (\$/gallon)	3.92	4.20	4.17	3.99	3.21	2.90
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)	10,425	10,263	10,180	10,098	9,916	9,870
Rank	52	52	51	51	51	51
Fuel per Peak Auto Commuter (gallons)	21	21	21	20	20	20
Rank	30	30	28	32	29	18
Annual Delay						
Total Delay (1000s of person-hours)	23,489	22,922	22,334	21,754	20,969	20,483
Rank	52	52	52	52	52	51
Delay per Auto Commuter (pers-hrs)	47	46	44	43	41	40
Rank	34	34	38	38	42	43
Travel Time Index	1.17	1.17	1.17	1.16	1.16	1.16
Rank	49	48	47	56	54	55
Commuter Stress Index						
Rank						
Freeway Planning Time Index (95th Pctile)						
Rank						
Congestion Cost						
Total Cost (\$ millions)	497	478	459	443	408	388
Rank	52	52	51	51	52	51
Cost per Auto Commuter (\$)	881	872	859	863	859	853
Rank	43	42	43	42	44	43
Truck Congestion						
Annual Person-Hours of Delay (000)	821	801	781	760	733	716
Rank	60	60	59	60	59	58
Annual Gallons of Wasted Fuel (000)	1,558	1,534	1,521	1,509	1,482	1,475
Rank	59	59	59	58	58	58
Annual Congestion Cost (\$ million)	40	37	35	38	34	32
Rank	59	58	58	58	58	58
Annual Greenhouse Gases (CO2) Produced					ı	
Excess Due to Congestion (tons)						
Rank						
Due to All Travel (tons)						
Rank						
Truck Annual Greenhouse Gases (CO2) Produced					ı	
Excess Due to Truck Congestion (tons)						
Rank						
Due to Truck Travel (tons)						
Rank					I	

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

Inventory Measures	2008	2007	2006	2005	2004	2003
Urban Area Information						
Population (1000s)	1,045	1,060	1,065	1,070	1,085	1,095
Rank	41	39	39	38	38	37
Commuters (1000s)	458	458	459	457	462	464
Daily Vehicle-Miles of Travel (1000s)						
Freeway	6,595	6,760	6,870	6,720	6,725	6,720
Arterial Streets	9,540	9,645	9,235	8,700	8,300	8,000
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)	3.55	3.19	2.82	2.40	2.14	1.62
Diesel (\$/gallon)	4.52	3.71	3.03	2.66	2.14	1.73
System Performance	2008	2007	2006	2005	2004	2003
Congested Travel (% of peak VMT)						
Congested System (% of lane-miles)						
Congested Time (number of "Rush Hours")						
Annual Excess Fuel Consumed						
Total Fuel (1000 gallons)	9,788	10,146	9,988	9,976	9,912	9,844
Rank	51	51	50	50	50	49
Fuel per Peak Auto Commuter (gallons)	19	20	20	20	20	20
Rank	37	28	28	25	21	17
Annual Delay						
Total Delay (1000s of person-hours)	19,345	20,053	19,739	19,717	19,590	19,457
Rank	53	51	51	51	49	49
Delay per Auto Commuter (pers-hrs)	37	36	36	36	36	35
Rank	54	59	56	53	52	53
Travel Time Index	1.16	1.16	1.16	1.16	1.15	1.15
Rank	61	59	58	57	64	62
Commuter Stress Index						
Rank						
Freeway Planning Time Index (95th Pctile)						
Rank						
Congestion Cost						
Total Cost (\$ millions)	380	376	357	342	326	310
Rank	52	51	51	50	50	49
Cost per Auto Commuter (\$)	797	861	869	897	921	942
Rank	47	42	38	38	35	30
Truck Congestion	(7.0	701	700	(00		
Annual Person-Hours of Delay (000)	676	701	690	690	685	680
Rank	58	58 1 517	1 403	58 1 401	1 482	57 1 471
Annual Gallons of Wasted Fuel (000) Rank	1,463	1,517 58	1,493 58	1,491 58	1,482 58	1,471 57
Rank Annual Congestion Cost (\$ million)	38 32	38	58 29	58 27	26	24
Rank	58	58	58	58	54	54
Annual Greenhouse Gases (CO2) Produced	50	50	50	50	54	J 1
Excess Due to Congestion (tons)		<u></u>				_
Rank				 		
Due to All Travel (tons)	 					
Rank						
Truck Annual Greenhouse Gases (CO2) Produced						
Excess Due to Truck Congestion (tons)						
Rank	 	<u> </u>		<u></u>		
Due to Truck Travel (tons)	 					
Rank	 					
A COVADA						

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

Inventory Measures	2002	2001	2000	1999	1998	1997
Urban Area Information						
Population (1000s)	1,100	1,110	1,110	1,100	1,090	1,080
Rank	37	37	36	36	36	37
Commuters (1000s)	459	456	449	438	427	416
Daily Vehicle-Miles of Travel (1000s)						
Freeway	6,435	6,380	6,365	6,050	5,850	5,700
Arterial Streets	7,850	7,800	7,890	8,115	7,950	7,500
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)	1.49	1.72	1.64	1.19	1.15	1.31
Diesel (\$/gallon)	1.51	1.70	1.65	1.24	1.29	1.39
System Performance	2002	2001	2000	1999	1998	1997
						1))//
Congested Travel (% of lone miles)						
Congested System (% of lane-miles) Congested Time (number of "Rush Hours")						
Annual Excess Fuel Consumed						
Total Fuel (1000 gallons)	9,751	9,352	9,149	8,508	7,459	6,441
Rank	47	47	45	45	49	51
Fuel per Peak Auto Commuter (gallons)	21	19	19	19	17	14
Rank	12	13	11	9	13	26
Annual Delay						
Total Delay (1000s of person-hours)	19,272	18,482	18,083	16,815	14,742	12,730
Rank	47	48	48	48	49	51
Delay per Auto Commuter (pers-hrs)	35	34	33	32	28	25
Rank	51	51	56	57	66	73
Travel Time Index	1.15	1.15	1.14	1.14	1.12	1.11
Rank	58	55	62	58	71	71
Commuter Stress Index						
Rank						
Freeway Planning Time Index (95th Pctile)						
Rank						
Congestion Cost						
Total Cost (\$ millions)	299	284	270	239	206	176
Rank	48	48	48	48	49	51
Cost per Auto Commuter (\$)	953	927	932	896	801	704
Rank	27	27	22	22	28	39
Truck Congestion						
Annual Person-Hours of Delay (000)	673	646	632	588	515	445
Rank	54	54	54	54	56	59
Annual Gallons of Wasted Fuel (000)	1,458	1,398	1,367	1,272	1,115	962
Rank	56	56	55	55	57	59
Annual Congestion Cost (\$ million)	23	21	20	18	15	13
Rank	54	54	53	52	55	58
Annual Greenhouse Gases (CO2) Produced						
Excess Due to Congestion (tons)						
Rank					<u></u>	
Due to All Travel (tons)					<u></u>	
Rank						
Truck Annual Greenhouse Gases (CO2) Produced				1	I	
Excess Due to Truck Congestion (tons)						
Rank						
Due to Touch Tours (tours)	· '					
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)	1,075	1,070	1,070	1,070	1,070	1,065
Rank	36	36	35	35	35	34
Commuters (1000s)	407	399	392	386	380	372
Daily Vehicle-Miles of Travel (1000s)						
Freeway	5,530	5,565	5,645	5,580	5,365	5,265
Arterial Streets	7,100	6,800	6,500	6,200	6,025	5,840
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)	1.37	1.27	1.15	1.21	1.24	1.21
Diesel (\$/gallon)	1.28	1.19	1.07	1.13	1.00	1.35
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)	5,813	5,556	5,341	4,963	4,648	4,476
Rank	52	49	49	49	49	47
Fuel per Peak Auto Commuter (gallons)	13	11	12	11	9	9
Rank	29	41	21	22	45	27
Annual Delay						
Total Delay (1000s of person-hours)	11,489	10,981	10,556	9,810	9,188	8,848
Rank	52	50	50	51	51	50
Delay per Auto Commuter (pers-hrs)	23	22	22	20	19	19
Rank	74	76	72	74	74	68
Travel Time Index	1.10	1.10	1.09	1.09	1.08	1.08
Rank	76	72	75	74	75	68
Commuter Stress Index						
Rank						
Freeway Planning Time Index (95th Pctile)						
Rank						
Congestion Cost						
Total Cost (\$ millions)	156	144	135	122	112	105
Rank	52	50	50	51	51	50
Cost per Auto Commuter (\$)	652	642	635	607	584	580
Rank	42	38	33	32	31	28
Truck Congestion						
Annual Person-Hours of Delay (000)	402	384	369	343	321	309
Rank	59	57	55	55	55	54
Annual Gallons of Wasted Fuel (000)	869	830	798	742	695	669
Rank	59	58	56	55	55	54
Annual Congestion Cost (\$ million)	12	11	10	9	9	8
Rank	57	55	55	55	54	54
Annual Greenhouse Gases (CO2) Produced						
Excess Due to Congestion (tons)						
Rank						
Due to All Travel (tons)						
Rank						
Truck Annual Greenhouse Gases (CO2) Produced						
Truck Annual Greenhouse Gases (CO2) Produced Excess Due to Truck Congestion (tons)						
Excess Due to Truck Congestion (tons) Rank	 	 	 	 	 	
Excess Due to Truck Congestion (tons)		 		 		

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

Inventory Measures	1990	1989	1988	1987	1986	1985
Urban Area Information						
Population (1000s)	1,065	1,060	1,055	1,045	1,040	1,030
Rank	34	34	33	33	31	31
Commuters (1000s)	366	362	356	350	344	338
Daily Vehicle-Miles of Travel (1000s)						
Freeway	4,950	5,000	4,890	4,680	4,475	4,280
Arterial Streets	5,790	5,600	5,500	5,300	5,150	5,000
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)	1.07	1.13	1.04	1.05	1.02	1.34
Diesel (\$/gallon)	1.09	1.05	0.97	0.97	0.95	1.24
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)	4,312	4,010	3,525	3,156	3,054	2,986
Rank	46	44	44	45	44	41
Fuel per Peak Auto Commuter (gallons)	10	9	8	6	6	7
Rank	14	19	20	32	28	15
Annual Delay						
Total Delay (1000s of person-hours)	8,522	7,926	6,967	6,238	6,037	5,902
Rank	48	46	48	47	45	45
Delay per Auto Commuter (pers-hrs)	18	17	15	14	14	13
Rank	66	62	67	64	57	56
Travel Time Index	1.08	1.07	1.07	1.06	1.06	1.06
Rank	62	65	59	65	56	53
Commuter Stress Index						
Rank						
Freeway Planning Time Index (95th Pctile)						
Rank						
Congestion Cost						
Total Cost (\$ millions)	97	86	72	62	58	57
Rank	49	47	48	47	45	45
Cost per Auto Commuter (\$)	584	573	533	498	497	494
Rank	26	26	28	29	27	26
Truck Congestion						
Annual Person-Hours of Delay (000)	298	277	244	218	211	206
Rank	53	53	53	53	51	49
Annual Gallons of Wasted Fuel (000)	645	599	527	471	457	446
Rank	54	52	52	52	52	49
Annual Congestion Cost (\$ million)	8	7	6	6	5	5
Rank	51	51	52	48	51	46
Annual Greenhouse Gases (CO2) Produced					I	
Excess Due to Congestion (tons)						
Rank						
Due to All Travel (tons) Rank	 					
Truck Annual Greenhouse Gases (CO2) Produced					I	
Excess Due to Truck Congestion (tons)						
Rank Due to Truck Troyal (tons)						
Due to Truck Travel (tons)						
Rank						

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

Inventory Measures	1984	1983	1982
Urban Area Information			
Population (1000s)	1,030	1,050	1,075
Rank	31	31	30
Commuters (1000s)	336	339	343
Daily Vehicle-Miles of Travel (1000s)			
Freeway	4,000	3,775	3,980
Arterial Streets	4,900	4,750	4,630
Cost Components			
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)	1.25	1.28	1.34
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)	2,668	2,394	2,347
Rank	42	43	42
Fuel per Peak Auto Commuter (gallons)	6	5	5
Rank	20	22	16
Annual Delay			
Total Delay (1000s of person-hours)	5,273	4,730	4,639
Rank	45	45	43
Delay per Auto Commuter (pers-hrs)	12	11	10
Rank	56	56	58
Travel Time Index	1.05	1.05	1.04
Rank	57	55	61
Commuter Stress Index			
Rank			
Freeway Planning Time Index (95th Pctile)			
Rank			
Congestion Cost			
Total Cost (\$ millions)	49	43	41
Rank	45	45	43
Cost per Auto Commuter (\$)	457	430	438
Rank	27	27	23
Truck Congestion			
Annual Person-Hours of Delay (000)	184	165	162
Rank	48	48	47
Annual Gallons of Wasted Fuel (000)	398	358	351
Rank	48	49	47
Annual Congestion Cost (\$ million)	5	4	4
Rank	46	47	46
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)			
Rank			
Due to Truck Travel (tons)			
Rank			

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