### **Performance Measure Summary - Baltimore MD**

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)	2,610	2,610	2,615	2,620	2,615	2,610
Rank	19	19	19	19	18	18
Commuters (1000s)	1,275	1,275	1,278	1,280	1,275	1,270
Daily Vehicle-Miles of Travel (1000s)						
Freeway	24,319	31,258	30,974	31,098	30,596	29,008
Arterial Streets	15,036	19,327	19,310	19,243	18,984	19,541
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)	2.33	2.55	2.80	2.35	2.17	2.31
Diesel (\$/gallon)	2.70	2.97	3.18	2.51	2.28	2.55
System Performance	2020	2019	2018	2017	2016	2015
Congested Travel (% of peak VMT)				32.3		
Congested System (% of lane-miles)				21.4		
Congested Time (number of "Rush Hours")				4.7		
Annual Excess Fuel Consumed						
Total Fuel (1000 gallons)	16,825	39,125	38,945	37,067	36,551	35,905
Rank	21	19	17	17	17	17
Fuel per Peak Auto Commuter (gallons)	10	23	23	22	21	21
Rank	59	33	31	32	37	36
Annual Delay						
Total Delay (1000s of person-hours)	44,292	102,994	97,128	93,815	91,419	88,266
Rank	23	19	20	20	20	20
Delay per Auto Commuter (pers-hrs)	27	63	61	59	57	55
Rank	42	19	20	22	22	24
Travel Time Index	1.07	1.26	1.26	1.25	1.25	1.25
Rank	57	23	23	24	24	24
Commuter Stress Index	1.09	1.32	1.30	1.27		
Rank	44	23	28	27		
Freeway Planning Time Index (95th Pctile)		1.75	1.69	1.73		
Rank		30	32	29		
Congestion Cost						
Total Cost (\$ millions)	993	2,203	2,111	2,001	1,917	1,828
Rank	23	19	20	20	20	20
Cost per Auto Commuter (\$)	549	1,219	1,166	1,103	1,055	1,013
Rank	49	27	31	32	32	32
Truck Congestion				_	_	_
Annual Person-Hours of Delay (000)	2,078	4,231	4,099	3,940	3,840	3,707
Rank	22	21	20	21	21	21
Annual Gallons of Wasted Fuel (000)	3,460	7,045	6,950	6,858	6,763	6,643
Rank	24	22	22	21	21	23
Annual Congestion Cost (\$ million)	110	207	225	208	195	179
Rank	23	23	20	20	21	21
Annual Greenhouse Gases (CO2) Produced	160 100	201 110			I	
Excess Due to Congestion (tons)	168,199	391,119				
Rank Due to All Travel (tone)	21	19				
Due to All Travel (tons) Rank	4,173,443	9,704,685	 			
		16				
Truck Annual Greenhouse Gases (CO2) Produced	27,002	77 172		1	I	
Excess Due to Truck Congestion (tons)  Rank	37,902	77,172				
Nank Due to Truck Travel (tons)	946,765	1,927,680				
Rank	946,763	23	 			
Rank	20					

<sup>\*</sup> Note: Zeroes in the table reflect values less than 0.5.

Inventory Measures	2014	2013	2012	2011	2010	2009	
Urban Area Information							
Population (1000s)	2,600	2,560	2,540	2,525	2,510	2,500	
Rank	18	17	17	17	17	17	
Commuters (1000s)	1,261	1,250	1,243	1,238	1,226	1,217	
Daily Vehicle-Miles of Travel (1000s)							
Freeway	28,522	28,327	26,900	26,805	26,678	26,400	
Arterial Streets	19,119	19,105	18,420	18,338	18,251	18,100	
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)	3.28	3.51	3.49	3.41	2.73	2.25	
Diesel (\$/gallon)	3.52	3.82	3.86	3.66	2.98	2.60	
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)	35,600	34,997	34,280	33,564	33,098	32,157	
Rank	17	17	17	17	17	16	
Fuel per Peak Auto Commuter (gallons)	21	20	19	19	20	18	
Rank	30	37	42	40	29	34	
Annual Delay							
Total Delay (1000s of person-hours)	86,755	84,539	82,074	78,206	75,705	72,179	
Rank	20	20	20	20	20	20	
Delay per Auto Commuter (pers-hrs)	54	51	50	48	47	45	
Rank	23	25	23	26	24	25	
Travel Time Index	1.26	1.25	1.25	1.24	1.24	1.24	
Rank	22	24	23	24	24	24	
Commuter Stress Index							
Rank							
Freeway Planning Time Index (95th Pctile)							
Rank							
Congestion Cost							
Total Cost (\$ millions)	1,825	1,753	1,677	1,585	1,467	1,364	
Rank	20	20	20	20	20	20	
Cost per Auto Commuter (\$)	990	974	957	943	940	912	
Rank	32	32	32	31	31	31	
Truck Congestion							
Annual Person-Hours of Delay (000)	3,644	3,551	3,447	3,285	3,180	3,032	
Rank	21	21	21	21	21	21	
Annual Gallons of Wasted Fuel (000)	6,587	6,475	6,342	6,210	6,124	5,949	
Rank	22	22	23	23	21	21	
Annual Congestion Cost (\$ million)	176	162	152	160	144	134	
Rank	21	21	21	21	21	20	
Annual Greenhouse Gases (CO2) Produced							
Excess Due to Congestion (tons)							
Rank							
Due to All Travel (tons)							
Rank							
			T				
Truck Annual Greenhouse Gases (CO2) Produced			I		-		
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)		  		  	  	  	

<sup>\*</sup> Note: Zeroes in the table reflect values less than 0.5.

Inventory Measures	2008	2007	2006	2005	2004	2003
Urban Area Information						
Population (1000s)	2,475	2,450	2,425	2,400	2,370	2,340
Rank	17	17	17	17	17	17
Commuters (1000s)	1,200	1,180	1,160	1,139	1,119	1,099
Daily Vehicle-Miles of Travel (1000s)						
Freeway	26,200	26,670	26,480	26,455	26,335	26,050
Arterial Streets	18,080	18,555	18,545	18,720	18,440	18,230
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)	3.40	3.00	2.70	2.32	1.95	1.52
Diesel (\$/gallon)	4.24	3.43	2.84	2.52	1.99	1.57
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)	32,957	34,254	33,831	32,979	32,385	30,841
Rank	16	16	16	16	16	16
Fuel per Peak Auto Commuter (gallons)	18	19	19	19	19	18
Rank	49	40	36	34	27	30
Annual Delay						
Total Delay (1000s of person-hours)	70,452	73,224	72,320	70,499	69,230	65,929
Rank	20	20	20	19	19	20
Delay per Auto Commuter (pers-hrs)	44	47	47	46	46	45
Rank	28	24	24	26	25	24
Travel Time Index	1.25	1.26	1.26	1.26	1.26	1.25
Rank	24	24	23	22	20	20
Commuter Stress Index						
Rank						
Freeway Planning Time Index (95th Pctile)						
Rank						
Congestion Cost						
Total Cost (\$ millions)	1,379	1,368	1,304	1,221	1,148	1,051
Rank	20	20	20	20	19	20
Cost per Auto Commuter (\$)	881	953	967	974	989	967
Rank	33	29	29	28	26	27
Truck Congestion						
Annual Person-Hours of Delay (000)	2,959	3,075	3,037	2,961	2,908	2,769
Rank	21	21	21	21	21	21
Annual Gallons of Wasted Fuel (000)	6,098	6,338	6,259	6,102	5,992	5,706
Rank	22	21	21	21	20	20
Annual Congestion Cost (\$ million)	139	135	125	116	107	96
Rank	21	20	21	21	21	21
Annual Greenhouse Gases (CO2) Produced						
Excess Due to Congestion (tons)						
Rank						
Due to All Travel (tons)						
Rank						
_			ı			
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)		  		  	  	  

<sup>\*</sup> Note: Zeroes in the table reflect values less than 0.5.

Inventory Measures	2002	2001	2000	1999	1998	1997
Urban Area Information						
Population (1000s)	2,295	2,250	2,200	2,160	2,155	2,150
Rank	17	17	17	17	17	17
Commuters (1000s)	1,062	1,024	986	951	934	917
Daily Vehicle-Miles of Travel (1000s)						
Freeway	25,130	23,555	22,660	21,755	21,290	20,775
Arterial Streets	17,530	16,640	16,490	16,370	16,560	16,290
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)	1.42	1.63	1.57	1.10	1.08	1.19
Diesel (\$/gallon)	1.41	1.58	1.56	1.16	1.19	1.27
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)	29,595	28,336	25,802	24,722	22,933	21,374
Rank	16	16	17	17	18	18
Fuel per Peak Auto Commuter (gallons)	18	18	16	15	14	12
Rank	27	23	32	32	31	47
Annual Delay						
Total Delay (1000s of person-hours)	63,265	60,575	55,157	52,849	49,023	45,691
Rank	19	19	19	19	18	18
Delay per Auto Commuter (pers-hrs)	44	44	41	41	38	36
Rank	24	20	24	21	26	28
Travel Time Index	1.25	1.25	1.23	1.23	1.21	1.20
Rank	17	17	22	21	24	24
Commuter Stress Index						
Rank						
Freeway Planning Time Index (95th Pctile)						
Rank						
Congestion Cost						
Total Cost (\$ millions)	983	932	824	753	685	631
Rank	19	19	19	19	18	18
Cost per Auto Commuter (\$)	948	922	861	853	811	768
Rank	28	28	29	28	27	27
Truck Congestion						
Annual Person-Hours of Delay (000)	2,657	2,544	2,317	2,220	2,059	1,919
Rank	20	20 5 242	20	20	20	20
Annual Gallons of Wasted Fuel (000)	5,476	5,243	4,774	4,574	4,243	3,954
Rank	20	20	21	21	21	21
Annual Congestion Cost (\$ million) Rank	89 20	83 20	73 20	66 20	60 21	56 20
	20	20	20	20	۷1	20
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						
Rank Due to Truck Travel (tons)	 					
Rank	 	 				
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<sup>\*</sup> Note: Zeroes in the table reflect values less than 0.5.

Inventory Measures	1996	1995	1994	1993	1992	1991
Urban Area Information						
Population (1000s)	2,145	2,140	2,130	2,110	2,040	2,020
Rank	17	17	16	16	16	16
Commuters (1000s)	900	883	866	844	804	782
Daily Vehicle-Miles of Travel (1000s)						
Freeway	20,435	19,770	18,945	18,030	17,625	16,045
Arterial Streets	16,370	16,380	16,370	16,400	16,000	15,690
Cost Components	10,570	10,200	10,570	10,.00	10,000	10,000
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)	1.29	1.23	1.08	1.14	1.18	1.13
Diesel (\$/gallon)	1.39	1.32	1.16	1.22	1.28	1.27
System Performance	1996	1995	1994	1993	1992	1991
						1991
Congested Travel (% of peak VMT)						
Congested System (% of lane-miles)						
Congested Time (number of "Rush Hours")						
Annual Excess Fuel Consumed	20.700	20.22.1	10.000	15.004	1.0.00	17.17
Total Fuel (1000 gallons)	20,708	20,234	18,982	17,931	16,940	16,161
Rank	16	16	16	15	15	15
Fuel per Peak Auto Commuter (gallons)	12	12	12	11	10	10
Rank	38	35	21	22	24	19
Annual Delay						
Total Delay (1000s of person-hours)	44,267	43,253	40,578	38,330	36,213	34,547
Rank	18	17	17	17	17	17
Delay per Auto Commuter (pers-hrs)	35	35	33	32	32	31
Rank	25	20	22	22	17	17
Travel Time Index	1.20	1.20	1.19	1.18	1.18	1.17
Rank	24	21	22	20	18	18
Commuter Stress Index						
Rank						
Freeway Planning Time Index (95th Pctile) Rank						
Congestion Cost	601	570	510	400	442	410
Total Cost (\$ millions)	601	570	519	480	442	410
Rank	18	17	17	16	17	17
Cost per Auto Commuter (\$)	759	767	739	716	697	689
Rank	26	23	24	23	23	21
Truck Congestion	1.050	1.017	1.704	1 (10	1.501	1 451
Annual Person-Hours of Delay (000)	1,859	1,817	1,704	1,610	1,521	1,451
Rank	20	20	19	19	19	19
Annual Gallons of Wasted Fuel (000)	3,831	3,744	3,512	3,317	3,134	2,990
Rank	21	18	18	18	18	18
Annual Congestion Cost (\$ million) Rank	54   20	52 19	47   19	45 19	42   19	39 19
	20	19	19	19	19	19
Annual Greenhouse Gases (CO2) Produced					ı	
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						

<sup>\*</sup> Note: Zeroes in the table reflect values less than 0.5.

Inventory Measures	1990	1989	1988	1987	1986	1985
Urban Area Information						
Population (1000s)	1,990	1,915	1,905	1,875	1,860	1,840
Rank	16	17	17	17	16	16
Commuters (1000s)	758	725	714	698	686	674
Daily Vehicle-Miles of Travel (1000s)						
Freeway	15,800	15,000	13,920	13,735	13,015	12,225
Arterial Streets	15,580	14,930	14,700	14,350	13,940	13,470
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)	1.08	1.11	1.02	1.03	1.00	1.31
Diesel (\$/gallon)	1.13	1.08	0.99	0.99	0.97	1.27
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)	15,151	13,601	12,448	11,039	10,408	9,432
Rank	15,151	15,001	12,448	11,039	10,408	9,432
Fuel per Peak Auto Commuter (gallons)	10	9	8	6	7	5
Rank	10	19	20	32	21	32
Annual Delay	14	17	20	32	21	32
Total Delay (1000s of person-hours)	22 200	29,075	26,609	23,597	22 240	20,163
Rank	32,388 17	29,073	20,009	23,397 17	22,249 17	20,163
Delay per Auto Commuter (pers-hrs)	30	28	26	24	23	21
Rank	16	19	20	20	21	23
Travel Time Index	1.17	1.16	1.15	1.13	1.13	1.12
Rank Commuter Stress Index	17	17	18	22	20	21
Rank						
Freeway Planning Time Index (95th Pctile)						
Rank						
Congestion Cost						
Total Cost (\$ millions)	369	317	277	237	216	196
Rank	17	17	17	17	17	170
Cost per Auto Commuter (\$)	674	639	614	570	557	516
Rank	21	20	20	22	23	24
Truck Congestion					23	
Annual Person-Hours of Delay (000)	1,360	1,221	1,118	991	934	847
Rank	1,300	19	1,116	19	19	20
Annual Gallons of Wasted Fuel (000)	2,803	2,516	2,303	2,042	1,925	1,745
Rank	17	17	17	19	1,723	20
Annual Congestion Cost (\$ million)	36	32	29	25	23	21
Rank	19	19	19	19	19	20
Annual Greenhouse Gases (CO2) Produced	1					
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			 			
IXanx						

<sup>\*</sup> Note: Zeroes in the table reflect values less than 0.5.

Inventory Measures	1984	1983	1982
Urban Area Information			
Population (1000s)	1,820	1,750	1,700
Rank	16	17	19
Commuters (1000s)	662	632	607
Daily Vehicle-Miles of Travel (1000s)			
Freeway	10,870	9,250	8,520
Arterial Streets	13,105	12,500	11,180
Cost Components			
Value of Time (\$/hour)	7.75	7.43	7.20
Commercial Cost (\$/hour)	23.94	23.63	23.31
Gasoline (\$/gallon)	1.33	1.36	1.42
Diesel (\$/gallon)	1.28	1.31	1.37
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)	8,716	7,683	6,477
Rank	16	17	18
Fuel per Peak Auto Commuter (gallons)	6	5	4
Rank	20	22	19
Annual Delay			
Total Delay (1000s of person-hours)	18,633	16,424	13,847
Rank	19	19	20
Delay per Auto Commuter (pers-hrs)	20	18	16
Rank	23	25	28
Travel Time Index	1.11	1.10	1.09
Rank	23	23	26
Commuter Stress Index	23	23	20
Rank			
Freeway Planning Time Index (95th Pctile)			
Rank			
Congestion Cost	175	1.40	122
Total Cost (\$ millions)	175	149	123
Rank	19	20	20
Cost per Auto Commuter (\$)	493	455	395
Rank	22	25	28
Truck Congestion	702	(00	500
Annual Person-Hours of Delay (000) Rank	783	690	582
	20	1 422	1 108
Annual Gallons of Wasted Fuel (000) Rank	1,613	1,422 20	1,198 20
Rank Annual Congestion Cost (\$ million)	20 20	17	20 14
Rank	19	20	20
	19	20	20
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			

<sup>\*</sup> Note: Zeroes in the table reflect values less than 0.5.