#### Performance Measure Summary - Birmingham AL

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)	795	795	795	800	800	795
Rank	56	56	56	55	55	55
Commuters (1000s)	417	417	417	420	420	415
Daily Vehicle-Miles of Travel (1000s)						
Freeway	11,126	12,349	12,306	12,334	12,057	12,024
Arterial Streets	8,123	9,015	8,963	9,132	9,126	8,769
Cost Components		,	,	,		
Value of Time (\$/hour)	20.17	19.14	18.71	18.12	17.91	17.69
Commercial Cost (\$/hour)	55.24	61.03	54.71	52.14	50.20	46.87
Gasoline (\$/gallon)	2.10	2.31	2.59	2.10	1.97	2.04
Diesel (\$/gallon)	2.67	2.81	3.54	2.37	2.18	2.40
System Performance	2020	2019	2018	2017	2016	2015
Congested Travel (% of peak VMT)				15.8		
Congested System (% of lane-miles)				9.9		
Congested Time (number of "Rush Hours")				1.2		
Annual Excess Fuel Consumed						
Total Fuel (1000 gallons)	5,066	11,276	9,962	9,090	9,026	8,990
Rank	58	53	54	56	57	57
Fuel per Peak Auto Commuter (gallons)	9	20	18	16	16	16
Rank	70	52	64	77	76	73
Annual Delay						
Total Delay (1000s of person-hours)	12,935	28,789	24,656	22,877	22,292	22,011
Rank	58	50	54	56	56	56
Delay per Auto Commuter (pers-hrs)	23	51	43	40	39	39
Rank	68	40	65	75	78	71
Travel Time Index	1.05	1.17	1.14	1.13	1.13	1.13
Rank	85	49	76	83	83	83
Commuter Stress Index	1.06	1.22	1.17	1.15		
Rank	91	41	67	78		
Freeway Planning Time Index (95th Pctile)		1.45	1.36	1.38		
Rank		47	56	57		
Congestion Cost						
Total Cost (\$ millions)	291	636	540	486	466	454
Rank	58	50	54	56	56	56
Cost per Auto Commuter (\$)	521	1,139	967	864	847	833
Rank	55	32	45	55	55	51
Truck Congestion						
Annual Person-Hours of Delay (000)	672	1,473	1,216	961	936	924
Rank	55	49	52	57	56	56
Annual Gallons of Wasted Fuel (000)	1,073	2,352	1,981	1,927	1,914	1,906
Rank	60	50	54	54	55	55
Annual Congestion Cost (\$ million)	35	86	67	51	48	45
Rank	55	48	52	57	56	55
Annual Greenhouse Gases (CO2) Produced						
Excess Due to Congestion (tons)	50,991	113,491				
Rank	58	53				
Due to All Travel (tons)	1,788,477	3,980,633				
Rank	57	49				
Truck Annual Greenhouse Gases (CO2) Produced						
Truck Annual Greenhouse Gases (CO2) Produced Excess Due to Truck Congestion (tons)	11,885	26,064				
	11,885 60	26,064 49			 	 
Excess Due to Truck Congestion (tons)				  		  

<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)	795	790	785	780	775	765
Rank	55	55	55	54	54	53
Commuters (1000s)	415	419	417	413	409	402
Daily Vehicle-Miles of Travel (1000s)						
Freeway	11,396	9,833	9,595	10,184	10,160	9,700
Arterial Streets	8,803	7,571	7,865	7,969	7,900	7,700
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)	3.06	3.28	3.33	3.12	2.60	2.17
Diesel (\$/gallon)	3.48	3.78	3.78	3.59	2.86	2.48
System Performance	2014	2013	2012	2011	2010	2009
Congested Travel (% of peak VMT)						
Congested System (% of lane-miles)				<u></u>		
Congested Time (number of "Rush Hours")						
Annual Excess Fuel Consumed						
Total Fuel (1000 gallons)	8,955	8,900	8,760	8,482	8,277	8,067
Rank	56	56	56	57	57	57
Fuel per Peak Auto Commuter (gallons)	16	16	17	15	15	14
Rank	70	71	61	74	73	71
Annual Delay	70	/1	01	/	73	/1
Total Delay (1000s of person-hours)	21,543	21,033	20,329	19,502	18,855	18,032
Rank	56	56	55	19,302	10,033	16,032
Delay per Auto Commuter (pers-hrs)	38	38	37	36	35	34
Rank	71	68	69	69	71	74
Travel Time Index	1.14	1.14	1.13	1.13	1.13	1.13
Rank	78	76	84	83	82	82
Commuter Stress Index	/6	70	04	63	62	
Rank				 		
Freeway Planning Time Index (95th Pctile)						
Rank						
Congestion Cost						
Total Cost (\$ millions)	452	435	415	394	365	340
Rank	56	56	56	56	56	57
Cost per Auto Commuter (\$)	810	799	782	774	772	750
Rank	51	50	51	50	50	53
Truck Congestion						
Annual Person-Hours of Delay (000)	905	883	854	819	792	757
Rank	56	55	56	56	56	57
Annual Gallons of Wasted Fuel (000)	1,898	1,887	1,857	1,798	1,755	1,710
Rank	54	54	54	56	56	56
Annual Congestion Cost (\$ million)	44	41	39	41	36	34
Rank	56	55	55	55	56	56
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)						
LACCOS DUC TO THUCK CONSCION (10)131	1					
Rank						
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<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)	760	750	740	730	720	715
Rank	53	53	53	53	53	53
Commuters (1000s)	398	391	384	376	369	364
Daily Vehicle-Miles of Travel (1000s)		0,1				
Freeway	9,395	9,715	9,580	9,550	9,270	9,020
Arterial Streets	7,435	7,630	7,605	7,600	7,435	7,535
	7,733	7,030	7,003	7,000	7,733	1,333
Cost Components	16.07	15 47	15.06	14.50	14 10	12.72
Value of Time (\$/hour)	16.07	15.47	15.06	14.58	14.10	13.73 33.92
Commercial Cost (\$/hour)	40.77	39.30	37.88	36.51	35.19	1.46
Gasoline (\$/gallon)	3.35 4.06	2.90	2.55	2.24	1.87	
Diesel (\$/gallon)		3.27	2.73	2.41	1.88	1.45
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)	8,647	8,280	8,093	7,830	7,653	7,476
Rank	56	56	56	55	55	55
Fuel per Peak Auto Commuter (gallons)	17	15	16	14	14	14
Rank	61	73	64	75	71	69
Annual Delay						
Total Delay (1000s of person-hours)	18,409	17,628	17,230	16,670	16,293	15,917
Rank	55	55	55	54	55	55
Delay per Auto Commuter (pers-hrs)	35	34	34	33	33	33
Rank	66	72	69	71	69	65
Travel Time Index	1.14	1.13	1.13	1.13	1.13	1.13
Rank	76	84	81	81	80	75
Commuter Stress Index	70		01	01		73
Rank						
Freeway Planning Time Index (95th Pctile)						
Rank						
Congestion Cost	260	220	210	200	270	252
Total Cost (\$ millions) Rank	360 55	329 54	310 54	288 55	270 55	253 55
Cost per Auto Commuter (\$)	758	756	758	758	768	770
Rank	48	52	54	53	51	
	40	32	34	33	31	50
Truck Congestion	772	740	72.4	700	604	((0
Annual Person-Hours of Delay (000)	773	740	724	700	684	669
Rank	56	56	56	56	58	58
Annual Gallons of Wasted Fuel (000)	1,833	1,755	1,716	1,660	1,622	1,585
Rank	54	55	56	55	55	54
Annual Congestion Cost (\$ million)	37	33	30	28	25	23
Rank	55	56	56	55	58	58
Annual Greenhouse Gases (CO2) Produced					1	
Annual Greenhouse Gases (CO2) Produced Excess Due to Congestion (tons)						
Annual Greenhouse Gases (CO2) Produced  Excess Due to Congestion (tons)  Rank				 	 	
Annual Greenhouse Gases (CO2) Produced  Excess Due to Congestion (tons)  Rank  Due to All Travel (tons)		  		  	  	  
Annual Greenhouse Gases (CO2) Produced  Excess Due to Congestion (tons)  Rank				  		  
Annual Greenhouse Gases (CO2) Produced  Excess Due to Congestion (tons)  Rank  Due to All Travel (tons)			 	  		   
Annual Greenhouse Gases (CO2) Produced Excess Due to Congestion (tons) Rank Due to All Travel (tons) Rank			 	   		  
Annual Greenhouse Gases (CO2) Produced  Excess Due to Congestion (tons)  Rank  Due to All Travel (tons)  Rank  Truck Annual Greenhouse Gases (CO2) Produced	  	  	  	   		   
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)	  	  	  	    		     

<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)	710	690	670	665	660	660
Rank	53	54	54	54	54	53
Commuters (1000s)	357	343	328	322	316	312
Daily Vehicle-Miles of Travel (1000s)						
Freeway	8,760	8,685	8,685	8,595	8,325	8,025
Arterial Streets	7,590	7,415	7,295	7,140	7,165	6,995
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)	1.32	1.43	1.49	1.08	1.06	1.15
Diesel (\$/gallon)	1.31	1.44	1.43	1.08	1.12	1.21
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)	7,319	6,919	6,838	6,691	6,060	5,437
Rank	54	54	53	53	54	56
Fuel per Peak Auto Commuter (gallons)	14	13	12	13	12	11
Rank	61	63	68	51	53	54
Annual Delay						
Total Delay (1000s of person-hours)	15,582	14,730	14,558	14,244	12,902	11,575
Rank	53	54	53	52	53	53
Delay per Auto Commuter (pers-hrs)	32	32	33	32	30	27
Rank	67	65	56	57	61	66
Travel Time Index	1.13	1.13	1.13	1.13	1.12	1.11
Rank	75	73	72	70	71	71
Commuter Stress Index						
Rank						
Freeway Planning Time Index (95th Pctile)						
Rank						
Congestion Cost						
Total Cost (\$ millions)	241	225	217	203	180	160
Rank	54	54	53	52	53	53
Cost per Auto Commuter (\$)	771	739	750	757	703	640
Rank	48	47	44	40	46	49
Truck Congestion						
Annual Person-Hours of Delay (000)	654	619	611	598	542	486
Rank	56	55	55	52	53	53
Annual Gallons of Wasted Fuel (000)	1,552	1,467	1,450	1,418	1,285	1,153
Rank	53	54	49	49	49	54
Annual Congestion Cost (\$ million)	22	20	19	18	16	14
Rank	55	55	55	52	52	53
Annual Greenhouse Gases (CO2) Produced						
Excess Due to Congestion (tons)						
Rank						
I D ( A11 T 1 (/ )						
Due to All Travel (tons)				ı		
Rank	 					
Rank Truck Annual Greenhouse Gases (CO2) Produced						
Rank				<u>  </u> 		
Rank Truck Annual Greenhouse Gases (CO2) Produced				  		  
Rank  Truck Annual Greenhouse Gases (CO2) Produced  Excess Due to Truck Congestion (tons)				   		  

<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)	655	650	645	645	640	635
Rank	53	52	50	50	50	50
Commuters (1000s)	306	299	294	290	284	278
Daily Vehicle-Miles of Travel (1000s)						
Freeway	7,710	7,310	7,095	6,750	6,360	6,100
Arterial Streets	6,820	6,805	6,710	6,505	6,375	6,095
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)	1.21	1.14	1.02	1.08	1.20	1.07
Diesel (\$/gallon)	1.24	1.17	1.05	1.11	1.21	1.19
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)	4,880	4,468	3,987	3,437	2,871	2,601
Rank	56	56	59	59	62	65
Fuel per Peak Auto Commuter (gallons)	10	9	8	7	6	5
Rank	57	59	65	67	69	79
Annual Delay						
Total Delay (1000s of person-hours)	10,389	9,513	8,488	7,317	6,112	5,537
Rank	55	55	55	59	63	64
Delay per Auto Commuter (pers-hrs)	25	23	21	18	15	14
Rank	70	73	75	82	88	88
Travel Time Index	1.10	1.09	1.08	1.07	1.06	1.06
Rank	76	77	80	83	88	88
Commuter Stress Index						
Rank						
Freeway Planning Time Index (95th Pctile)						
Rank						
Congestion Cost						
Total Cost (\$ millions)	141	125	108	91	75	66
Rank	56	55	55	58	63	64
Cost per Auto Commuter (\$)	590	554	509	454	387	361
Rank	53	57	58	64	73	73
Truck Congestion						
Annual Person-Hours of Delay (000)	436	400	356	307	257	233
Rank	56	55	56	60 720	63	65 551
Annual Gallons of Wasted Fuel (000)	1,035	947	845	729	609	551
Rank	55	55	55	57 9	59	61
Annual Congestion Cost (\$ million) Rank	13 54	11 55	10 55	55	7 62	65
	34	33	33	33	02	03
Annual Greenhouse Gases (CO2) Produced				1		
Excess Due to Congestion (tons)  Rank						
Nank Due to All Travel (tons)					 	
Rank						 -
Truck Annual Greenhouse Gases (CO2) Produced				1		
Excess Due to Truck Congestion (tons)  Rank						
Rank Due to Truck Travel (tons)						
Rank			 		 	
Kank						

<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)	630	630	625	620	615	615
Rank	50	49	48	47	47	47
Commuters (1000s)	272	270	266	262	258	256
Daily Vehicle-Miles of Travel (1000s)						
Freeway	5,900	5,400	5,170	4,950	4,675	4,350
Arterial Streets	5,800	5,580	5,505	5,400	5,295	5,170
Cost Components	3,000	3,300	3,303	3,100	3,273	3,170
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)	1.06	1.10	1.02	1.02	0.99	1.30
Diesel (\$/gallon)	1.07	1.01	0.93	0.94	0.91	1.20
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)	2,462	2,275	2,241	2,193	2,114	1,935
Rank	61	62	61	59	59	56
Fuel per Peak Auto Commuter (gallons)	4	4	4	4	4	5
Rank	81	76	71	61	54	32
Annual Delay						
Total Delay (1000s of person-hours)	5,241	4,843	4,772	4,670	4,501	4,120
Rank	63	63	60	57	56	53
Delay per Auto Commuter (pers-hrs)	14	13	13	13	12	11
Rank	86	84	80	75	74	72
Travel Time Index	1.05	1.05	1.05	1.05	1.05	1.04
Rank	89	86	83	79	74	81
Commuter Stress Index						
Rank						
Freeway Planning Time Index (95th Pctile)						
Rank						
Congestion Cost						
Total Cost (\$ millions)	60	53	50	47	44	40
Rank	63	61	59	57	56	53
Cost per Auto Commuter (\$)	355	353	360	372	376	348
Rank	70	67	62	58	56	54
Truck Congestion						
Annual Person-Hours of Delay (000)	220	203	200	196	189	173
Rank	64	64	60	58	55	54
Annual Gallons of Wasted Fuel (000)	522	482	475	465	448	410
Rank	59	59	57	53	53	51
Annual Congestion Cost (\$ million)	6	5	5	5	5	4
Rank	59	61	59	54	51	53
Annual Greenhouse Gases (CO2) Produced		V.			0.1	
Excess Due to Congestion (tons)						_
Rank						
Due to All Travel (tons)						
Rank						
Truck Annual Greenhouse Gases (CO2) Produced				ı	1	
Excess Due to Truck Congestion (tons)						
Rank						
D ( T 1 T 1 // )	'					
Due to Truck Travel (tons) Rank						

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

Inventory Measures	1984	1983	1982
Urban Area Information			
Population (1000s)	610	605	600
Rank	47	48	47
Commuters (1000s)	252	248	243
Daily Vehicle-Miles of Travel (1000s)		-	
Freeway	3,750	3,350	3,000
Arterial Streets	4,845	4,805	4,720
Cost Components	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	,,,,,,	
Value of Time (\$/hour)	7.75	7.43	7.20
Commercial Cost (\$/hour)	23.94	23.63	23.31
Gasoline (\$/gallon)	1.31	1.34	1.41
Diesel (\$/gallon)	1.21	1.24	1.29
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			
	1 445	1 201	1 220
Total Fuel (1000 gallons) Rank	1,445	1,391	1,330 60
	3	3	2
Fuel per Peak Auto Commuter (gallons) Rank	61	46	55
	01	40	
Annual Delay	2.076	2.0(2	2 021
Total Delay (1000s of person-hours)	3,076	2,962	2,831
Rank	61	60	59
Delay per Auto Commuter (pers-hrs)  Rank			8
	78	76	73
Travel Time Index	1.03	1.03	1.03
Rank	85	80	76
Commuter Stress Index			
Rank			
Freeway Planning Time Index (95th Pctile)			
Rank			
Congestion Cost			
Total Cost (\$ millions)	29	27	25
Rank	62	60	58
Cost per Auto Commuter (\$)	265	269	271
Rank	67	59	56
Truck Congestion			
Annual Person-Hours of Delay (000)	129	124	119
Rank	62	60	60
Annual Gallons of Wasted Fuel (000)	306	295	282
Rank	57	55	53
Annual Congestion Cost (\$ million)	3	3	3
Rank	58	54	50
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.