Performance Measure Summary - Charlotte NC-SC

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)	1,475	1,475	1,400	1,340	1,295	1,250
Rank	36	36	38	38	38	38
Commuters (1000s)	741	741	703	673	651	627
Daily Vehicle-Miles of Travel (1000s)						
Freeway	14,411	16,470	16,807	16,721	16,175	15,319
Arterial Streets	12,922	14,768	14,430	14,359	13,971	13,952
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)	2.19	2.43	2.71	2.20	2.10	2.15
Diesel (\$/gallon)	2.70	2.88	3.10	2.45	2.23	2.47
System Performance	2020	2019	2018	2017	2016	2015
Congested Travel (% of peak VMT)				24.2		
Congested System (% of lane-miles)				18.0		
Congested Time (number of "Rush Hours")				3.0		
Annual Excess Fuel Consumed						
Total Fuel (1000 gallons)	8,206	18,348	17,804	17,213	16,684	16,201
Rank	43	39	39	39	39	39
Fuel per Peak Auto Commuter (gallons)	10	21	22	22	21	20
Rank	59	43	37	32	37	42
Annual Delay						
Total Delay (1000s of person-hours)	23,138	51,737	51,636	50,641	48,442	46,235
Rank	41	33	34	34	34	35
Delay per Auto Commuter (pers-hrs)	24	53	56	57	54	52
Rank	63	33	30	28	30	31
Travel Time Index	1.06	1.22	1.22	1.22	1.22	1.23
Rank	75	34	34	34	33	29
Commuter Stress Index	1.07	1.26	1.24	1.24		
Rank	75	37	38	36		
Freeway Planning Time Index (95th Pctile)		1.73	1.60	1.66		
Rank		31	38	33		
Congestion Cost						
Total Cost (\$ millions)	516	1,120	1,107	1,071	1,009	949
Rank	41	35	34	34	34	35
Cost per Auto Commuter (\$)	585	1,271	1,324	1,339	1,289	1,224
Rank	41	21	20	19	19	20
Truck Congestion						
Annual Person-Hours of Delay (000)	1,064	2,041	2,022	2,147	2,035	1,942
Rank	42	41	39	36	37	38
Annual Gallons of Wasted Fuel (000)	1,789	3,432	3,517	3,649	3,537	3,435
Rank	41	41	39	34	34	36
Annual Congestion Cost (\$ million)	56	121	111	113	103	93
Rank	42	37	39	36	36	38
Annual Greenhouse Gases (CO2) Produced				ı	1	
Excess Due to Congestion (tons)	82,035	183,433				
Rank	43	39				
Due to All Travel (tons)	2,360,587	5,278,326				
Rank	43	38				
Truck Annual Greenhouse Gases (CO2) Produced				1	1	
Excess Due to Truck Congestion (tons)	19,657	37,700				
Rank	41	41				
Due to Truck Travel (tons)	607,254	1,164,637				
Rank	41	43				

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

Inventory Measures	2014	2013	2012	2011	2010	2009
Urban Area Information						
Population (1000s)	1,210	1,170	1,140	1,100	1,070	1,045
Rank	38	40	40	40	40	41
Commuters (1000s)	600	595	579	558	541	526
Daily Vehicle-Miles of Travel (1000s)						
Freeway	14,001	12,416	12,285	12,797	12,582	12,000
Arterial Streets	13,498	10,225	9,770	10,066	9,897	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)	3.19	3.44	3.49	3.32	2.70	2.24
Diesel (\$/gallon)	3.57	3.89	3.89	3.64	2.93	2.53
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)	15,686	15,026	14,455	13,883	13,457	13,117
Rank	40	40	41	43	43	43
Fuel per Peak Auto Commuter (gallons)	19	18	17	17	15	14
Rank	47	54	61	60	73	71
Annual Delay						
Total Delay (1000s of person-hours)	44,377	42,138	39,817	37,553	35,734	34,180
Rank	35	35	36	36	37	37
Delay per Auto Commuter (pers-hrs)	51	50	48	46	45	44
Rank	31	28	29	30	30	28
Travel Time Index	1.23	1.23	1.24	1.24	1.24	1.24
Rank	30	30	25	24	24	24
Commuter Stress Index						
Rank						
Freeway Planning Time Index (95th Pctile)						
Rank						
Congestion Cost						
Total Cost (\$ millions)	924	864	806	752	686	640
Rank	35	36	37	37	37	38
Cost per Auto Commuter (\$)	1,168	1,120	1,072	1,044	1,024	998
Rank	21	23	24	24	26	26
Truck Congestion						
Annual Person-Hours of Delay (000)	1,864	1,770	1,672	1,577	1,501	1,436
Rank	38	39	39	39	40	2 791
Annual Gallons of Wasted Fuel (000)	3,325	3,186	3,064	2,943	2,853	2,781
Rank	37	38	40	40	40	40
Annual Congestion Cost (\$ million) Rank	90	81 38	74 39	76 39	68 40	63 40
	36	36	39	39	40	40
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						
Nank Due to Truck Travel (tons)						
Rank	 			 	 	
Rain						

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

Inventory Measures	2008	2007	2006	2005	2004	2003
Urban Area Information						
Population (1000s)	1,010	990	980	965	955	940
Rank	43	43	43	45	44	42
Commuters (1000s)	507	493	485	474	467	457
Daily Vehicle-Miles of Travel (1000s)						
Freeway	11,620	11,775	11,500	10,985	10,000	9,200
Arterial Streets	9,270	9,420	9,115	9,015	8,700	8,300
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)	3.42	2.95	2.62	2.27	1.89	1.46
Diesel (\$/gallon)	4.11	3.33	2.80	2.44	1.90	1.47
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)	14,093	13,773	13,092	12,334	12,006	11,560
Rank	41	42	43	43	43	43
Fuel per Peak Auto Commuter (gallons)	16	17	16	14	15	14
Rank	68	61	64	75	65	69
Annual Delay						
Total Delay (1000s of person-hours)	34,975	34,180	32,489	30,609	29,794	28,687
Rank	35	36	37	38	38	39
Delay per Auto Commuter (pers-hrs)	47	47	45	44	43	42
Rank	21	24	27	27	28	28
Travel Time Index	1.25	1.25	1.24	1.23	1.23	1.23
Rank	24	27	27	28	29	28
Commuter Stress Index						
Rank						
Freeway Planning Time Index (95th Pctile)						
Rank						
Congestion Cost						
Total Cost (\$ millions)	676	631	579	524	489	454
Rank	36	36	37	39	39	39
Cost per Auto Commuter (\$)	1,009	1,026	1,002	977	983	971
Rank	23	24	26	27	27	26
Truck Congestion						
Annual Person-Hours of Delay (000)	1,469	1,436	1,365	1,286	1,251	1,205
Rank	39	38	40	41	41	41
Annual Gallons of Wasted Fuel (000)	2,988	2,920	2,775	2,615	2,545	2,451
Rank	38	39	40	41	41	41
Annual Congestion Cost (\$ million)	68	62	56	50	46	42
Rank	39	38	40	41	41	41
Annual Greenhouse Gases (CO2) Produced				1	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	2002	2001	2000	1999	1998	1997
Urban Area Information						
Population (1000s)	910	865	830	785	755	720
Rank	43	45	46	47	48	49
Commuters (1000s)	436	407	385	358	339	318
Daily Vehicle-Miles of Travel (1000s)						
Freeway	8,700	8,100	7,640	7,000	6,380	6,200
Arterial Streets	7,990	7,480	7,000	6,510	6,000	5,455
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)	1.33	1.43	1.46	1.05	1.02	1.14
Diesel (\$/gallon)	1.32	1.47	1.44	1.06	1.12	1.20
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)	10,837	9,693	8,835	7,929	7,216	6,619
Rank	43	46	48	51	51	49
Fuel per Peak Auto Commuter (gallons)	13	12	11	10	9	9
Rank	71	74	74	77	79	75
Annual Delay						
Total Delay (1000s of person-hours)	26,893	24,055	21,924	19,678	17,908	16,426
Rank	40	40	41	44	44	45
Delay per Auto Commuter (pers-hrs)	41	39	38	36	35	34
Rank	28	32	34	37	37	38
Travel Time Index	1.22	1.21	1.20	1.20	1.19	1.18
Rank	29	29	29	26	27	28
Commuter Stress Index						
Rank						
Freeway Planning Time Index (95th Pctile)						
Rank						
Congestion Cost						
Total Cost (\$ millions)	414	366	324	278	248	225
Rank	40	41	43	44	45	45
Cost per Auto Commuter (\$)	931	842	789	732	682	636
Rank	31	36	37	45	49	51
Truck Congestion						
Annual Person-Hours of Delay (000)	1,129	1,010	921	826	752	690
Rank	41	41	43	44	44	45
Annual Gallons of Wasted Fuel (000)	2,297	2,055	1,873	1,681	1,530	1,403
Rank	41	42	44	47	47	47
Annual Congestion Cost (\$ million)	37	33	29	24	22	20
Rank	41	41	42	44	45	45
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)						
			· I		ı I	
Rank						
Rank 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)	685	660	635	620	600	560
Rank	50	50	53	52	54	56
Commuters (1000s)	298	282	267	257	245	224
Daily Vehicle-Miles of Travel (1000s)						
Freeway	5,200	4,485	4,095	3,700	3,300	2,800
Arterial Streets	5,120	4,960	4,875	4,795	4,700	4,605
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	1.13	1.02	1.07	1.08	1.12
Diesel (\$/gallon)	1.28	1.19	1.08	1.13	1.15	1.21
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)	6,056	5,534	5,122	4,789	4,419	4,007
Rank	50	51	50	50	50	51
Fuel per Peak Auto Commuter (gallons)	8	6	6	5	6	6
Rank	76	85	84	82	69	67
Annual Delay						
Total Delay (1000s of person-hours)	15,028	13,732	12,712	11,884	10,967	9,944
Rank	45	45	45	47	46	46
Delay per Auto Commuter (pers-hrs)	33	32	31	30	29	28
Rank	38	34	31	30	28	26
Travel Time Index	1.18	1.17	1.17	1.16	1.15	1.15
Rank	26	29	26	26	27	24
Commuter Stress Index						
Rank						
Freeway Planning Time Index (95th Pctile)						
Rank						
Congestion Cost						
Total Cost (\$ millions)	202	179	161	147	133	117
Rank	45	46	46	47	46	46
Cost per Auto Commuter (\$)	595	561	534	513	487	458
Rank	52	54	54	51	53	54
Truck Congestion						
Annual Person-Hours of Delay (000)	631	577	534	499	461	418
Rank	45	45	45	46	46	46
Annual Gallons of Wasted Fuel (000)	1,284	1,173	1,086	1,015	937	849
Rank	48	46	47	47	46	46
Annual Congestion Cost (\$ million)	18 45	16 45	15	14	13 44	11
Rank	45	45	45	45	44	46
Annual Greenhouse Gases (CO2) Produced					ı	
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 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)	540	530	520	500	485	445
Rank	57	56	56	59	60	64
Commuters (1000s)	213	208	202	193	185	169
Daily Vehicle-Miles of Travel (1000s)						
Freeway	2,650	2,270	1,915	1,800	1,780	1,650
Arterial Streets	4,500	4,390	4,300	4,220	4,100	4,000
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)	1.08	1.08	1.00	1.00	0.98	1.28
Diesel (\$/gallon)	1.07	0.98	0.91	0.91	0.89	1.16
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						<u> </u>
Total Fuel (1000 gallons)	3,495	3,140	2,832	2,561	2,279	1,953
Rank	52	52	53	54	53	55
Fuel per Peak Auto Commuter (gallons)	4	4	3	3	4	2
Rank	81	76	81	80	54	84
Annual Delay						
Total Delay (1000s of person-hours)	8,674	7,792	7,027	6,355	5,656	4,847
Rank	47	48	46	45	46	48
Delay per Auto Commuter (pers-hrs)	26	24	22	21	19	18
Rank	27	29	32	31	35	35
Travel Time Index	1.14	1.13	1.12	1.11	1.10	1.10
Rank	26	28	28	30	33	27
Commuter Stress Index						
Rank						
Freeway Planning Time Index (95th Pctile)						
Rank						
Congestion Cost						
Total Cost (\$ millions)	98	84	73	63	54	46
Rank	47	49	46	45	46	49
Cost per Auto Commuter (\$)	416	397	376	355	324	284
Rank	59	61	58	61	63	65
Truck Congestion						
Annual Person-Hours of Delay (000)	364	327	295	267	238	204
Rank	47	46	46	46	46	50
Annual Gallons of Wasted Fuel (000)	741	666	600	543	483	414
Rank	46	48	49	49	49	50
Annual Congestion Cost (\$ million)	10	8	7	7	6	5
Rank	44	47	46	46	46	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)						
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	1984	1983	1982
Urban Area Information			
Population (1000s)	425	420	415
Rank	65	65	65
Commuters (1000s)	160	157	153
Daily Vehicle-Miles of Travel (1000s)			
Freeway	1,600	1,510	1,410
Arterial Streets	3,700	3,400	3,290
Cost Components			
Value of Time (\$/hour)	7.75	7.43	7.20
Commercial Cost (\$/hour)	23.94	23.63	23.31
Gasoline (\$/gallon)	1.29	1.32	1.38
Diesel (\$/gallon)	1.17	1.20	1.26
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)	1,770	1,577	1,407
Rank	55	55	56
Fuel per Peak Auto Commuter (gallons)	2	2	2
Rank	79	69	55
Annual Delay			
Total Delay (1000s of person-hours)	4,392	3,914	3,491
Rank	48	49	49
Delay per Auto Commuter (pers-hrs)	17	16	14
Rank	35	33	40
Travel Time Index	1.09	1.08	1.08
Rank	30	34	29
Commuter Stress Index			
Rank			
Freeway Planning Time Index (95th Pctile)			
Rank			
Congestion Cost			
Total Cost (\$ millions)	41	35	31
Rank	47	49	49
Cost per Auto Commuter (\$)	266	248	229
Rank	66	64	67
Truck Congestion			
Annual Person-Hours of Delay (000)	184	164	147
Rank	48	49	49
Annual Gallons of Wasted Fuel (000)	375	334	298
Rank	51	51	51
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.