

## Performance Measure Summary – Charleston-North Charleston, SC

There are several inventory and performance measures listed in the pages of this Urban Area Report for the years from 1982 to 2007. There is no single performance measure that experts agree “says it all.” The best comparison of congestion levels and trends is done between regions of similar size, over several years, and with a few measures of congestion. 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. A few key points should be recognized by users of the Urban Mobility Report data.

**Use the Trends** – The multi-year performance measures are better indicators, in most cases, than 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 the top of a few 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. The ratio of travel time in the peak period to travel time in free-flow. A value of 1.30 indicates a 20-minute free-flow trip takes 26 minutes in the peak.

**Peak Travelers** – Number of travelers (using any travel mode) who begin a trip during the morning or evening peak travel periods (6 to 9 a.m. and 4 to 7 p.m.).

**Annual Delay per Traveler** – A yearly sum of all the per-trip delays. This measure illustrates the effect of the per-mile congestion as well as the length of each trip. The extra time required to travel in the peak period is divided by the number of travelers who begin a trip during the peak period (6 to 9 a.m. and 4 to 7 p.m.).

**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** (60 mph on freeways and 35 mph on arterials) – These values are used as the national comparison thresholds. Other speed values may be appropriate for urban areas or sub-regions.

**Excess Fuel Consumed** – Increased fuel consumption due to travel in congested conditions rather than free-flow conditions.

**Public Transportation** – Regular route service from all public transportation providers in an urban area.

**Operations Treatments** – Freeway incident management, freeway ramp metering, arterial street signal coordination and arterial street access management.

**Congestion Cost** – Value of travel delay for 2007 (estimated at \$15.47 per hour of person travel and \$102.12 per hour of truck time) and excess fuel consumption (estimated using state average cost per gallon).

**Annual Increase Needed to Maintain Constant Congestion Level** – Number of lane-miles that must be added to the road system each year – or – the number of new transit riders or carpoolers that must be added to keep congestion levels the same as the previous year.

**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). The annual change in miles traveled, therefore, includes both new travel due to growth and travel that previously occurred in areas designated as rural.

**Number of Rush Hours** – Time when system might have congestion.

## The Mobility Data for Charleston-North Charleston SC

Inventory Measures	2007	2006	2005	2004	2003	2002
<b>Urban Area Information</b>						
Population (1000s)	480	475	475	475	470	460
Rank	76	76	74	73	72	72
Urban Area (square miles)	295	290	290	290	285	285
Population Density (persons/sq mile)	1,627	1,638	1,638	1,638	1,649	1,614
Peak Travelers (1000s)	265	261	259	257	253	244
<b>Freeway</b>						
Daily Vehicle-Miles of Travel (1000s)	3,645	3,610	3,475	3,230	3,130	3,000
Lane-Miles	270	270	270	260	255	255
<b>Arterial Streets</b>						
Daily Vehicle-Miles of Travel (1000s)	6,170	6,040	5,820	5,775	5,700	5,600
Lane-Miles	860	855	840	830	825	820
<b>Public Transportation</b>						
Annual Psgr-Miles of Travel (millions)	16.5	14.6	12.5	12.6	14.2	15.3
Annual Unlinked Psgr Trips (millions)	4.0	3.8	3.5	3.5	3.9	3.4
<b>Cost Components</b>						
Value of Time (\$/hour)	15.47	15.06	14.58	14.10	13.73	13.43
Commercial Cost (\$/hour)	102.12	98.77	94.06	86.24	82.38	79.96
Fuel Cost (\$/gallon)	2.82	2.49	2.19	1.83	1.39	1.25
System Performance	2007	2006	2005	2004	2003	2002
<b>Congested Travel</b> (% of peak VMT)	51	46	45	45	45	44
<b>Congested System</b> (% of lane-miles)	49	44	40	40	40	40
<b>Congested Time</b> (number of "Rush Hours")	7.2	7.2	7.0	7.0	6.8	6.6
<b>Annual Increase Needed to Maintain Constant Congestion Level:</b>						
Lane-miles	30	33	29	28	27	29
Transit Riders or Carpoolers (millions)	9	10	8	8	8	8
<b>Annual Excess Fuel Consumed</b>						
Total Fuel (1000 gallons)	6,090	5,531	5,008	5,047	4,824	4,379
Rank	55	58	57	58	57	59
Fuel per Peak Traveler (gallons)	23	21	19	20	19	18
Rank	35	37	42	39	43	43
<b>Annual Delay</b>						
Total Delay (1000s of person-hours)	9,944	9,188	8,167	8,363	8,000	7,272
Rank	55	58	58	58	57	57
Delay per Peak Traveler (person-hours)	38	35	32	32	32	30
Rank	29	35	39	38	35	41
Delay due to Incidents (percent)	54	54	54	54	54	54
<b>Travel Time Index</b>	1.20	1.18	1.17	1.18	1.17	1.16
Rank	35	38	42	39	41	43
<b>Congestion Cost</b>						
Total Cost (\$ millions)	207	183	155	151	138	122
Rank	52	56	57	54	55	56
Cost per Peak Traveler (\$)	781	702	600	587	546	500
Rank	32	35	41	38	39	42

Note: System Performance statistics for 2000 through 2007 data reflect the effects of operational treatments.

Note: Zeroes in the table reflect values less than 0.5.

## The Mobility Data for Charleston-North Charleston SC, Continued

Inventory Measures	2001	2000	1999	1998	1997
<b>Urban Area Information</b>					
Population (1000s)	460	455	440	435	430
Rank	72	72	71	71	70
Urban Area (square miles)	280	280	275	270	265
Population Density (persons/sq mile)	1,643	1,625	1,600	1,611	1,623
Peak Travelers (1000s)	241	234	223	218	212
<b>Freeway</b>					
Daily Vehicle-Miles of Travel (1000s)	2,865	2,815	2,700	2,615	2,475
Lane-Miles	250	235	225	220	220
<b>Arterial Streets</b>					
Daily Vehicle-Miles of Travel (1000s)	5,500	5,375	5,250	5,175	5,075
Lane-Miles	815	805	800	795	785
<b>Public Transportation</b>					
Annual Psgr-Miles of Travel (millions)	17.1	17.3	11.6	14.1	15.6
Annual Unlinked Psgr Trips (millions)	4.7	4.6	2.9	3.3	3.6
<b>Cost Components</b>					
Value of Time (\$/hour)	13.22	12.85	12.43	12.17	11.98
Commercial Cost (\$/hour)	80.88	80.75	74.23	72.61	74.32
Fuel Cost (\$/gallon)	1.38	1.41	1.00	0.97	1.07
System Performance	2001	2000	1999	1998	1997
<b>Congested Travel</b> (% of peak VMT)	43	45	43	42	39
<b>Congested System</b> (% of lane-miles)	40	42	41	40	40
<b>Congested Time</b> (number of "Rush Hours")	6.4	6.6	6.6	6.4	6.2
<b>Annual Increase Needed to Maintain Constant Congestion Level:</b>					
Lane-miles	26	25	23	26	24
Transit Riders or Carpoolers (millions)	7	7	6	7	6
<b>Annual Excess Fuel Consumed</b>					
Total Fuel (1000 gallons)	4,180	4,236	4,040	3,821	3,436
Rank	60	60	59	59	59
Fuel per Peak Traveler (gallons)	17	18	18	18	16
Rank	45	43	41	39	42
<b>Annual Delay</b>					
Total Delay (1000s of person-hours)	6,940	6,941	6,670	6,345	5,770
Rank	61	60	61	58	58
Delay per Peak Traveler (person-hours)	29	30	30	29	27
Rank	41	37	34	36	39
Delay due to Incidents (percent)	54	54	54	54	53
<b>Travel Time Index</b>	1.16	1.16	1.16	1.15	1.14
Rank	42	40	41	43	43
<b>Congestion Cost</b>					
Total Cost (\$ millions)	116	113	103	95	86
Rank	60	60	60	58	59
Cost per Peak Traveler (\$)	480	483	460	439	408
Rank	44	40	40	39	39

Note: System Performance statistics for 2000 through 2007 data reflect the effects of operational treatments.

Note: Zeroes in the table reflect values less than 0.5.

## The Mobility Data for Charleston-North Charleston SC, Continued

Inventory Measures	1996	1995	1994	1993	1992
<b>Urban Area Information</b>					
Population (1000s)	425	425	420	415	410
Rank	70	70	70	70	70
Urban Area (square miles)	265	260	255	250	245
Population Density (persons/sq mile)	1,604	1,635	1,647	1,660	1,673
Peak Travelers (1000s)	206	203	197	192	187
<b>Freeway</b>					
Daily Vehicle-Miles of Travel (1000s)	2,405	2,350	2,260	2,140	2,050
Lane-Miles	215	205	195	195	190
<b>Arterial Streets</b>					
Daily Vehicle-Miles of Travel (1000s)	5,000	4,925	4,850	4,720	4,660
Lane-Miles	780	775	765	760	755
<b>Public Transportation</b>					
Annual Psgr-Miles of Travel (millions)	16.0	17.9	17.9	18.0	15.8
Annual Unlinked Psgr Trips (millions)	3.6	3.7	3.7	3.7	3.7
<b>Cost Components</b>					
Value of Time (\$/hour)	11.71	11.37	11.06	10.78	10.47
Commercial Cost (\$/hour)	74.17	71.54	69.53	67.77	66.19
Fuel Cost (\$/gallon)	1.16	1.07	0.95	1.00	1.00
System Performance	1996	1995	1994	1993	1992
<b>Congested Travel</b> (% of peak VMT)	38	38	40	40	40
<b>Congested System</b> (% of lane-miles)	39	39	40	40	41
<b>Congested Time</b> (number of "Rush Hours")	6.2	6.2	6.2	6.0	5.8
<b>Annual Increase Needed to Maintain Constant Congestion Level:</b>					
Lane-miles	28	29	34	33	36
Transit Riders or Carpoolers (millions)	7	8	9	8	9
<b>Annual Excess Fuel Consumed</b>					
Total Fuel (1000 gallons)	3,301	3,340	3,383	3,238	3,189
Rank	60	56	53	51	51
Fuel per Peak Traveler (gallons)	16	16	17	17	17
Rank	40	39	32	26	25
<b>Annual Delay</b>					
Total Delay (1000s of person-hours)	5,585	5,663	5,667	5,467	5,384
Rank	58	54	52	51	48
Delay per Peak Traveler (person-hours)	27	28	29	28	29
Rank	36	32	27	24	18
Delay due to Incidents (percent)	53	53	54	54	54
<b>Travel Time Index</b>	1.14	1.14	1.15	1.15	1.15
Rank	42	41	32	30	26
<b>Congestion Cost</b>					
Total Cost (\$ millions)	82	81	79	74	72
Rank	58	54	52	51	48
Cost per Peak Traveler (\$)	400	400	398	386	383
Rank	38	32	29	26	20

Note: System Performance statistics for 2000 through 2007 data reflect the effects of operational treatments.

Note: Zeroes in the table reflect values less than 0.5.

## The Mobility Data for Charleston-North Charleston SC, Continued

Inventory Measures	1991	1990	1989	1988	1987
<b>Urban Area Information</b>					
Population (1000s)	400	395	390	385	375
Rank	70	70	70	70	70
Urban Area (square miles)	240	235	230	225	220
Population Density (persons/sq mile)	1,667	1,681	1,696	1,711	1,705
Peak Travelers (1000s)	180	175	171	167	162
<b>Freeway</b>					
Daily Vehicle-Miles of Travel (1000s)	1,950	1,900	1,705	1,685	1,570
Lane-Miles	185	180	165	155	145
<b>Arterial Streets</b>					
Daily Vehicle-Miles of Travel (1000s)	4,500	4,380	4,260	4,125	4,000
Lane-Miles	750	750	745	740	740
<b>Public Transportation</b>					
Annual Psgr-Miles of Travel (millions)	13.5	17.2	15.7	16.2	19.0
Annual Unlinked Psgr Trips (millions)	3.5	4.0	3.9	3.9	5.1
<b>Cost Components</b>					
Value of Time (\$/hour)	10.17	9.75	9.25	8.83	8.48
Commercial Cost (\$/hour)	64.55	62.47	59.16	56.03	54.62
Fuel Cost (\$/gallon)	1.06	1.03	1.08	1.00	1.00
System Performance	1991	1990	1989	1988	1987
<b>Congested Travel</b> (% of peak VMT)	36	35	35	34	34
<b>Congested System</b> (% of lane-miles)	37	37	37	37	37
<b>Congested Time</b> (number of "Rush Hours")	5.6	5.6	5.4	5.4	5.2
<b>Annual Increase Needed to Maintain Constant Congestion Level:</b>					
Lane-miles	40	38	39	43	45
Transit Riders or Carpoolers (millions)	10	9	9	10	10
<b>Annual Excess Fuel Consumed</b>					
Total Fuel (1000 gallons)	2,762	2,619	2,445	2,346	2,158
Rank	51	51	50	46	44
Fuel per Peak Traveler (gallons)	15	15	14	14	13
Rank	26	26	24	23	23
<b>Annual Delay</b>					
Total Delay (1000s of person-hours)	4,758	4,486	4,214	4,046	3,706
Rank	50	51	49	45	41
Delay per Peak Traveler (person-hours)	26	26	25	24	23
Rank	22	20	19	21	19
Delay due to Incidents (percent)	54	54	53	53	53
<b>Travel Time Index</b>	1.13	1.13	1.12	1.12	1.12
Rank	29	27	25	24	22
<b>Congestion Cost</b>					
Total Cost (\$ millions)	62	56	50	46	41
Rank	50	50	48	43	40
Cost per Peak Traveler (\$)	344	320	293	274	252
Rank	21	22	23	21	20

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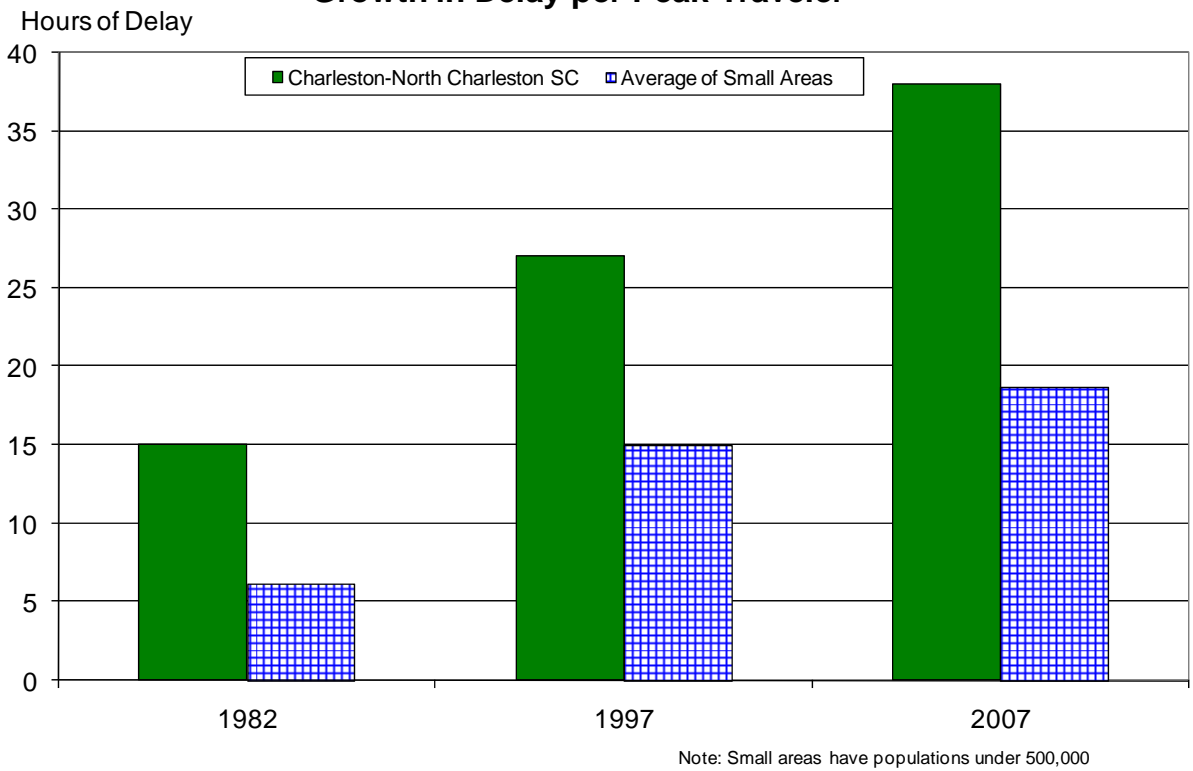
## The Mobility Data for Charleston-North Charleston SC, Continued

Inventory Measures	1986	1985	1984	1983	1982
<b>Urban Area Information</b>					
Population (1000s)	370	360	355	345	340
Rank	69	69	69	69	69
Urban Area (square miles)	215	210	205	200	200
Population Density (persons/sq mile)	1,721	1,714	1,732	1,725	1,700
Peak Travelers (1000s)	158	153	150	145	141
<b>Freeway</b>					
Daily Vehicle-Miles of Travel (1000s)	1,360	1,340	1,130	925	850
Lane-Miles	135	130	115	110	90
<b>Arterial Streets</b>					
Daily Vehicle-Miles of Travel (1000s)	3,865	3,800	3,715	3,665	3,500
Lane-Miles	735	730	730	725	720
<b>Public Transportation</b>					
Annual Psgr-Miles of Travel (millions)	16.7	21.1	22.2	22.2	22.2
Annual Unlinked Psgr Trips (millions)	5.3	5.0	5.3	5.3	5.3
<b>Cost Components</b>					
Value of Time (\$/hour)	8.18	8.03	7.75	7.43	7.20
Commercial Cost (\$/hour)	52.63	55.80	54.65	52.70	52.13
Fuel Cost (\$/gallon)	0.98	1.28	1.29	1.32	1.38
System Performance	1986	1985	1984	1983	1982
<b>Congested Travel</b> (% of peak VMT)	29	29	25	24	25
<b>Congested System</b> (% of lane-miles)	32	32	27	27	28
<b>Congested Time</b> (number of "Rush Hours")	5.0	5.0	4.8	4.4	4.4
<b>Annual Increase Needed to Maintain Constant Congestion Level:</b>					
Lane-miles	--	--	--	--	--
Transit Riders or Carpoolers (millions)	--	--	--	--	--
<b>Annual Excess Fuel Consumed</b>					
Total Fuel (1000 gallons)	1,731	1,701	1,390	1,264	1,206
Rank	47	45	47	47	43
Fuel per Peak Traveler (gallons)	11	11	9	9	9
Rank	27	22	27	23	20
<b>Annual Delay</b>					
Total Delay (1000s of person-hours)	3,006	2,930	2,402	2,191	2,069
Rank	46	45	47	46	42
Delay per Peak Traveler (person-hours)	19	19	16	15	15
Rank	24	20	24	23	20
Delay due to Incidents (percent)	53	53	53	53	53
<b>Travel Time Index</b>	1.10	1.10	1.09	1.08	1.08
Rank	24	23	23	26	22
<b>Congestion Cost</b>					
Total Cost (\$ millions)	32	32	25	22	21
Rank	44	42	45	42	38
Cost per Peak Traveler (\$)	201	207	168	153	146
Rank	24	17	24	22	21

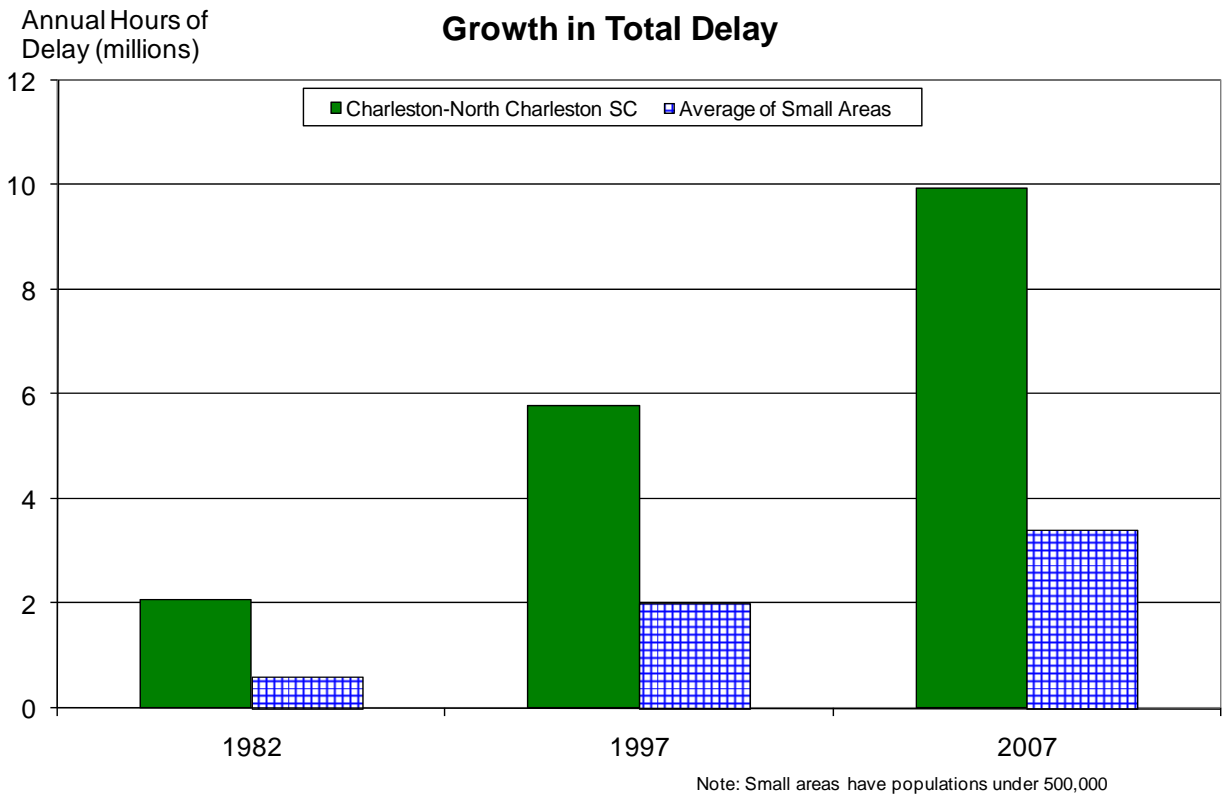
Note: System Performance statistics for 2000 through 2007 data reflect the effects of operational treatments.

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### Growth in Delay per Peak Traveler



### Growth in Total Delay



**Benefits from Public Transportation Service and Operations Strategies in  
Charleston-North Charleston SC**

<b>Operations Strategies</b>	<b>2007</b>	<b>2006</b>	<b>2005</b>	<b>2004</b>
<b>Freeway Ramp Metering</b>				
Percent of Roadway Miles	--	--	--	--
Annual Delay Reduction (1000 hours)	--	--	--	--
<b>Freeway Incident Management</b>				
<b>Cameras</b>				
Percent of Roadway Miles	26	26	26	27
<b>Service Patrols</b>				
Percent of Roadway Miles	47	47	48	50
Annual Delay Reduction (1000 hours)	98	90	59	66
<b>Arterial Signal Coordination</b>				
Percent of Roadway Miles	15	15	16	17
Annual Delay Reduction (1000 hours)	20	17	15	15
<b>Arterial Access Management</b>				
Percent of Roadway Miles	2	2	2	2
Annual Delay Reduction (1000 hours)	4	4	5	1
<b>HOV Lanes</b>				
Daily Passenger-miles of travel (1000s)	--	--	--	--
HOV User Delay Savings	--	--	--	--
<b>Total Effect of Operations Treatments</b>				
Annual Delay Reduction (1000 hours)	122	111	79	83
Annual Delay Saved per Peak Traveler (hours)	0	0	0	0
Annual Congestion Cost Savings (\$million)	2.7	2.4	1.6	1.6
Travel Time Index with Strategies	1.198	1.181	1.169	1.176
Travel Time Index (Base)	1.201	1.184	1.172	1.179
<b>Public Transportation Service</b>	<b>2007</b>	<b>2006</b>	<b>2005</b>	<b>2004</b>
<b>Existing Service</b>				
Annual Passenger-miles of travel (million)	16.5	14.6	12.5	12.6
Unlinked Passenger Trips (million)	4.0	3.8	3.5	3.5
Travel Time Index (combined road and transit)	1.200	1.183	1.171	1.178
<b>Condition if Public Transportation Service were Discontinued</b>				
Travel Time Index	1.202	1.184	1.173	1.180
Annual Increase				
Delay (1000 hours)	117	82	114	120
Delay per Peak Traveler (hours)	0	0	0	0
Congestion Cost (\$million)	2.4	1.6	2.1	2.1

**Benefits from Public Transportation Service and Operations Strategies in  
Charleston-North Charleston SC, Continued**

<b>Operations Strategies</b>	<b>2003</b>	<b>2002</b>	<b>2001</b>	<b>2000</b>
<b>Freeway Ramp Metering</b>				
Percent of Roadway Miles	--	--	--	--
Annual Delay Reduction (1000 hours)	--	--	--	--
<b>Freeway Incident Management</b>				
<b>Cameras</b>				
Percent of Roadway Miles	28	28	28	30
<b>Service Patrols</b>				
Percent of Roadway Miles	51	51	52	32
Annual Delay Reduction (1000 hours)	60	41	40	33
<b>Arterial Signal Coordination</b>				
Percent of Roadway Miles	17	18	18	19
Annual Delay Reduction (1000 hours)	19	23	18	23
<b>Arterial Access Management</b>				
Percent of Roadway Miles	2	2	2	2
Annual Delay Reduction (1000 hours)	2	3	--	36
<b>HOV Lanes</b>				
Daily Passenger-miles of travel (1000s)	--	--	--	--
HOV User Delay Savings	--	--	--	--
<b>Total Effect of Operations Treatments</b>				
Annual Delay Reduction (1000 hours)	81	66	58	93
Annual Delay Saved per Peak Traveler (hours)	0	0	0	0
Annual Congestion Cost Savings (\$million)	1.5	1.2	1.0	1.6
Travel Time Index with Strategies	1.172	1.159	1.156	1.162
Travel Time Index (Base)	1.174	1.161	1.158	1.164
<b>Public Transportation Service</b>	<b>2003</b>	<b>2002</b>	<b>2001</b>	<b>2000</b>
<b>Existing Service</b>				
Annual Passenger-miles of travel (million)	14.2	15.3	17.1	17.3
Unlinked Passenger Trips (million)	3.9	3.4	4.7	4.6
Travel Time Index (combined road and transit)	1.173	1.160	1.157	1.163
<b>Condition if Public Transportation Service were Discontinued</b>				
Travel Time Index	1.175	1.163	1.159	1.166
Annual Increase				
Delay (1000 hours)	106	150	121	163
Delay per Peak Traveler (hours)	0	1	1	1
Congestion Cost (\$million)	1.8	2.5	2.0	2.6

**Comparison of Several Key Mobility Performance Measures  
Small Group – less than 500,000 population urban areas**

Urban Area	Delay per Traveler	Travel Time Index	Total Delay	1982 to 2007	
				Delay per Traveler	Total Delay
Knoxville, TN	H+	H	H+	F	F+
<b>Charleston-North Charleston, SC</b>	<b>H+</b>	<b>H+</b>	<b>H+</b>	<b>F+</b>	<b>F+</b>
Cape Coral, FL	H+	H+	H+	F+	F+
Columbia, SC	H	0	H+	F+	F+
Wichita, KS	L-	L-	L-	S-	S-
Little Rock, AR	H	0	H	F+	F+
Spokane WA	L-	L-	L-	S-	S-
Pensacola, FL-AL	H+	H	H+	F+	F+
Corpus Christi, TX	L-	L-	L-	S-	S-
Anchorage, AK	L-	L	L-	S-	S-
Eugene, OR	L-	L	L-	S-	S-
Salem, OR	L	0	L	0	S-
Beaumont, TX	L-	L-	L-	S-	S-
Laredo, TX	L	H	L-	0	S-
Brownsville, TX	L-	L	L-	S-	S-
Boulder, CO	L-	0	L-	S-	S-

0 – Average congestion levels or average congestion growth

H Higher congestion; H+ Much higher congestion; F Faster congestion growth; F+ Much faster growth

L Lower congestion; L- Much lower congestion; S Slower congestion growth; S- Much slower growth

**Key Mobility Performance Measure Labels**

Note: Designation of an urban area congestion problem as “Much higher”, “Much faster growth”, etc. is determined using a general indicator of the accuracy of the congestion estimates. For regions with the same indicator label, there may be no difference in congestion levels. Different values are used for the indicators in regions over 1 million population and below 1 million population.

Measures	Differences Within These Values May Not Indicate a Difference in Congestion Level	
	Above 1M Population	Below 1M Population
<b>2007 Values</b> Delay per Traveler - Travel Time Index - Total Delay -	5 Hours 5 Index Points 5 Hours x Average Population	3 Hours 3 Index Points 3 Hours x Average Population
<b>1982 to 2007 Trends</b> Delay per Traveler - Total Delay -	5 Hours 5 Hours x Average Population	3 Hours 3 Hours x Average Population