#### **Performance Measure Summary - New Haven CT**

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)	560	560	560	555	555	555
Rank	75	75	75	76	75	75
Commuters (1000s)	265	265	265	263	263	263
Daily Vehicle-Miles of Travel (1000s)						
Freeway	6,175	7,846	7,718	7,695	7,593	7,604
Arterial Streets	3,275	4,162	4,188	4,182	4,154	4,121
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)	2.50	2.71	3.04	2.48	2.29	2.48
Diesel (\$/gallon)	3.04	3.16	3.36	2.66	2.50	2.87
System Performance	2020	2019	2018	2017	2016	2015
Congested Travel (% of peak VMT)				14.0		
Congested System (% of lane-miles)				1.5		
Congested Time (number of "Rush Hours")				1.0		
Annual Excess Fuel Consumed						
Total Fuel (1000 gallons)	4,531	6,472	6,420	6,379	6,291	6,228
Rank	62	73	73	73	71	71
Fuel per Peak Auto Commuter (gallons)	13	18	18	18	18	18
Rank	28	69	64	63	60	58
Annual Delay						
Total Delay (1000s of person-hours)	10,778	15,397	15,451	15,574	15,212	14,932
Rank	63	73	72	71	71	70
Delay per Auto Commuter (pers-hrs)	31	44	44	45	44	44
Rank	24	64	60	55	53	49
Travel Time Index	1.10	1.15	1.15	1.16	1.16	1.16
Rank	29	72	72	59	58	57
Commuter Stress Index	1.12	1.16	1.17	1.17		
Rank	24	79	67	66		
Freeway Planning Time Index (95th Pctile)		1.23	1.25	1.30		
Rank		84	76	70		
Congestion Cost						
Total Cost (\$ millions)	243	339	338	334	320	311
Rank	62	72	72	71	70	70
Cost per Auto Commuter (\$)	583	814	812	809	795	776
Rank	42	72	65	63	64	61
Truck Congestion						
Annual Person-Hours of Delay (000)	479	634	648	654	639	627
Rank	69	76	73	69	69	68
Annual Gallons of Wasted Fuel (000)	826	1,092	1,061	1,052	1,038	1,027
Rank	69	76	77	76	76	76 20
Annual Congestion Cost (\$ million)	26	38 70	36	35	32	30
Rank	68	/0	70	68	70	69
Annual Greenhouse Gases (CO2) Produced	45.000	(4.33)			I	
Excess Due to Congestion (tons)	45,029	64,326				
Rank Due to All Travel (tone)	62	73				
Due to All Travel (tons) Rank	1,837,176	2,624,471 64				
	33	04				
Truck Annual Greenhouse Gases (CO2) Produced	0.000	11.050		1	I	
Excess Due to Truck Congestion (tons)	8,966 69	11,859				
Rank Due to Truck Travel (tons)		77 817 538				
Due to Truck Travel (tons)	618,057	817,538				
Rank	40	54				

<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)	560	560	560	560	555	555
Rank	75	74	74	72	72	71
Commuters (1000s)	265	270	270	270	266	266
Daily Vehicle-Miles of Travel (1000s)						
Freeway	7,421	7,697	7,465	7,860	7,873	7,700
Arterial Streets	4,171	4,005	4,075	4,018	4,025	4,074
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)	3.65	3.82	3.78	3.59	2.91	2.41
Diesel (\$/gallon)	3.87	4.20	4.15	3.90	3.20	2.88
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)	6,137	6,103	6,060	6,048	6,031	5,970
Rank	71	71	71	70	69	68
Fuel per Peak Auto Commuter (gallons)	18	18	18	18	18	17
Rank	57	54	52	49	46	43
Annual Delay						
Total Delay (1000s of person-hours)	14,460	14,126	13,778	13,500	13,337	12,955
Rank	71	69	69	69	69	68
Delay per Auto Commuter (pers-hrs)	43	43	42	40	40	39
Rank	49	46	46	49	48	47
Travel Time Index	1.16	1.16	1.16	1.16	1.16	1.16
Rank	58	55	57	56	54	55
Commuter Stress Index						
Rank						
Freeway Planning Time Index (95th Pctile)						
Rank						
Congestion Cost		• • •				
Total Cost (\$ millions)	307	296	284	276	260	246
Rank	70	69 720	69	69 729	68	68
Cost per Auto Commuter (\$)  Rank	749 62	739 61	729 60	738 58	751 56	742 55
	02	01	00	36	30	33
Truck Congestion	607	593	579	567	560	544
Annual Person-Hours of Delay (000)  Rank	70	68	67	67	65	65
Annual Gallons of Wasted Fuel (000)	1,012	1,007	1,000	998	995	985
Rank	76	76	76	75	75	75
Annual Congestion Cost (\$ million)	29	27	26	28	25	24
Rank	70	69	66	65	65	64
Annual Greenhouse Gases (CO2) Produced	, ,	07	00		03	01
Excess Due to Congestion (tons)						
Rank						
Due to All Travel (tons)		<u></u>				
Rank						
Truck Annual Greenhouse Gases (CO2) Produced						
Excess Due to Truck Congestion (tons)						
Rank						
Due to Truck Travel (tons)						
Rank						
	1					

<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)	550	550	545	545	540	535
Rank	71	70	69	68	68	68
Commuters (1000s)	262	261	257	255	251	248
Daily Vehicle-Miles of Travel (1000s)						
Freeway	7,500	7,565	7,480	7,465	7,310	7,450
Arterial Streets	4,200	4,240	4,295	4,310	4,310	4,270
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	3.23	2.83	2.35	2.08	1.60
Diesel (\$/gallon)	4.46	3.66	2.99	2.65	2.11	1.68
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)	6,398	6,269	6,131	6,033	5,937	5,793
Rank	67	68	67	66	67	65
Fuel per Peak Auto Commuter (gallons)	19	19	18	18	18	18
Rank	37	40	47	43	38	30
Annual Delay						
Total Delay (1000s of person-hours)	13,222	12,956	12,672	12,468	12,270	11,974
Rank	64	65	64	62	61	62
Delay per Auto Commuter (pers-hrs)	38	39	38	38	38	37
Rank	47	44	45	46	42	45
Travel Time Index	1.17	1.17	1.17	1.17	1.17	1.16
Rank	51	54	51	49	46	52
Commuter Stress Index						
Rank						
Freeway Planning Time Index (95th Pctile)						
Rank						
Congestion Cost						
Total Cost (\$ millions)	261	244	230	217	205	192
Rank	64	65	65	62	60	61
Cost per Auto Commuter (\$)	750	764	771	781	796	797
Rank	50	50	48	48	47	44
Truck Congestion			500	50.4		500
Annual Person-Hours of Delay (000)	555	544	532	524	515	503
Rank	1 055	1 034	65	64	63	63
Annual Gallons of Wasted Fuel (000) Rank	1,055	1,034 73	1,012 71	995 70	980 69	956 69
Rank Annual Congestion Cost (\$ million)	26	73 24	22	20	19	69 17
Rank	63	65	64	65	62	64
Annual Greenhouse Gases (CO2) Produced	03	0.3	04	03	02	04
Excess Due to Congestion (tons)				ı		
Rank			 			
Due to All Travel (tons)			 		 	 -
Rank			 			
Truck Annual Greenhouse Gases (CO2) Produced						
Excess Due to Truck Congestion (tons)				1		
Rank (tons)			 		 	
Nank Due to Truck Travel (tons)			 		 	
Rank			 		 	 -
1 Cultic						

<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)	535	530	525	520	515	505
Rank	67	67	67	67	65	65
Commuters (1000s)	245	239	234	229	224	217
Daily Vehicle-Miles of Travel (1000s)						
Freeway	7,505	7,200	6,800	6,400	6,000	5,500
Arterial Streets	4,145	3,705	3,695	3,685	3,390	3,240
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)	1.46	1.77	1.70	1.24	1.22	1.39
Diesel (\$/gallon)	1.42	1.60	1.58	1.16	1.19	1.30
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)	5,729	5,475	5,246	5,034	4,761	4,293
Rank	62	62	63	61	61	62
Fuel per Peak Auto Commuter (gallons)	19	18	18	17	17	15
Rank	18	23	16	17	13	17
Annual Delay						
Total Delay (1000s of person-hours)	11,840	11,315	10,842	10,404	9,839	8,873
Rank	62	62	62	63	62	64
Delay per Auto Commuter (pers-hrs)	37	36	36	35	34	33
Rank	42	43	40	41	40	45
Travel Time Index	1.16	1.16	1.16	1.15	1.15	1.14
Rank	50	48	43	50	43	46
Commuter Stress Index						
Rank						
Freeway Planning Time Index (95th Pctile)						
Rank						
Congestion Cost						
Total Cost (\$ millions)	185	175	163	149	138	123
Rank	62	61	62	62	61	62
Cost per Auto Commuter (\$)	805	781	770	764	735	674
Rank	42	42	40	39	39	44
Truck Congestion						
Annual Person-Hours of Delay (000)	497	475	455	437	413	373
Rank	63	63	63	63	63	64
Annual Gallons of Wasted Fuel (000)	945	903	865	830	785	708
Rank	68	67 15	66	66	66	66
Annual Congestion Cost (\$ million)  Rank	16 64	15 64	14 64	13 61	12 62	11 63
	04	04	04	01	02	03
Annual Greenhouse Gases (CO2) Produced				1	I	
Excess Due to Congestion (tons)  Rank						
Due to All Travel (tons)					 	
Rank						 -
Truck Annual Greenhouse Gases (CO2) Produced				1	I	
Excess Due to Truck Congestion (tons)  Rank						
Rank Due to Truck Travel (tons)						
Rank						
IXanx						

<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)	495	485	475	465	460	455
Rank	66	68	68	68	68	67
Commuters (1000s)	210	203	197	190	186	181
Daily Vehicle-Miles of Travel (1000s)						
Freeway	5,000	4,830	4,700	4,605	4,460	4,285
Arterial Streets	3,105	3,030	2,920	2,810	2,680	2,520
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)	1.47	1.34	1.18	1.23	1.26	1.23
Diesel (\$/gallon)	1.41	1.29	1.13	1.18	1.25	1.38
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)	4,038	3,823	3,565	3,228	2,868	2,649
Rank	62	63	62	62	63	64
Fuel per Peak Auto Commuter (gallons)	14	13	12	11	10	9
Rank	18	19	21	22	24	27
Annual Delay						
Total Delay (1000s of person-hours)	8,346	7,901	7,368	6,671	5,928	5,474
Rank	63	63	63	63	64	65
Delay per Auto Commuter (pers-hrs)	32	31	30	28	25	24
Rank	43	41	38	40	45	43
Travel Time Index	1.13	1.13	1.12	1.11	1.10	1.10
Rank	50	47	50	52	58	51
Commuter Stress Index						
Rank						
Freeway Planning Time Index (95th Pctile)						
Rank						
Congestion Cost						
Total Cost (\$ millions)	114	105	95	84	73	65
Rank	63	63	63	63	64	65
Cost per Auto Commuter (\$)	647	636	612	566	520	492
Rank	45	40	41	43	46	47
Truck Congestion						
Annual Person-Hours of Delay (000)	351	332	309	280	249	230
Rank	64	63	63	64	65	66
Annual Gallons of Wasted Fuel (000)	666	630	588	532	473	437
Rank	66	67	67	68	69	69
Annual Congestion Cost (\$ million)	10	9	9	8	7	6
Rank	63	64	61	60	62	65
Annual Greenhouse Gases (CO2) Produced						
Excess Due to Congestion (tons)						
Rank						
Due to All Travel (tons)						
- D 1						
Rank						
Truck Annual Greenhouse Gases (CO2) Produced						
Truck Annual Greenhouse Gases (CO2) Produced  Excess Due to Truck Congestion (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	1990	1989	1988	1987	1986	1985
Urban Area Information						
Population (1000s)	455	450	445	445	440	440
Rank	67	66	66	66	65	65
Commuters (1000s)	179	175	172	171	168	167
Daily Vehicle-Miles of Travel (1000s)						
Freeway	4,320	4,300	4,185	4,030	3,750	3,515
Arterial Streets	2,495	2,480	2,480	2,470	2,470	2,470
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)	1.12	1.21	1.12	1.12	1.09	1.43
Diesel (\$/gallon)	1.20	1.23	1.14	1.14	1.11	1.45
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)	2,458	2,203	2,051	1,963	1,790	1,591
Rank	63	63	62	63	62	62
Fuel per Peak Auto Commuter (gallons)	9	8	6	7	7	7
Rank	23	26	45	22	21	15
Annual Delay						
Total Delay (1000s of person-hours)	5,080	4,552	4,239	4,056	3,700	3,288
Rank	65	64	63	61	63	63
Delay per Auto Commuter (pers-hrs)	22	20	19	19	17	15
Rank	46	48	49	43	47	50
Travel Time Index	1.09	1.08	1.08	1.08	1.07	1.06
Rank	56	55	49	45	49	53
Commuter Stress Index						
Rank						
Freeway Planning Time Index (95th Pctile)						
Rank						
Congestion Cost						
Total Cost (\$ millions)	58	50	44	41	36	32
Rank	64	64	64	61	62	63
Cost per Auto Commuter (\$)	481	455	446	446	420	374
Rank	44	47	44	37	39	43
Truck Congestion						
Annual Person-Hours of Delay (000)	213	191	178	170	155	138
Rank	66	65	65	63	63	64
Annual Gallons of Wasted Fuel (000)	405	363	338	324	296	262
Rank	69	68	68	67	67	69
Annual Congestion Cost (\$ million)	6	5	5	4	4	4
Rank	59	61	59	61	58	53
Annual Greenhouse Gases (CO2) Produced				ı	ı	
Excess Due to Congestion (tons)						
Rank						
Due to All Travel (tons)						
Rank						
Truck Annual Greenhouse Gases (CO2) Produced				ı	I	
Excess Due to Truck Congestion (tons)						
Rank Due to Travel (Travel (tons)						
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)	435	435	430
Rank	64	64	64
Commuters (1000s)	163	162	158
Daily Vehicle-Miles of Travel (1000s)			
Freeway	3,265	3,100	3,250
Arterial Streets	2,200	2,195	2,155
Cost Components	,	,	
Value of Time (\$/hour)	7.75	7.43	7.20
Commercial Cost (\$/hour)	23.94	23.63	23.31
Gasoline (\$/gallon)	1.44	1.48	1.55
Diesel (\$/gallon)	1.47	1.50	1.57
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)	1,206	1,022	992
Rank	69	70	68
Fuel per Peak Auto Commuter (gallons)	5	3	2
Rank	27	46	55
	21	70	33
Annual Delay	2 402	2 112	2.050
Total Delay (1000s of person-hours) Rank	2,492	2,112 67	2,050 67
	12	10	10
Delay per Auto Commuter (pers-hrs)  Rank	56	64	58
		-	
Travel Time Index	1.05	1.04	1.04
Rank	57	68	61
Commuter Stress Index			
Rank			
Freeway Planning Time Index (95th Pctile)			
Rank			
Congestion Cost	2.1	10	10
Total Cost (\$ millions)	24	19	18
Rank	67	67	67
Cost per Auto Commuter (\$)  Rank	303	258	261
	57	62	59
Truck Congestion	10.5	00	0.5
Annual Person-Hours of Delay (000)	105	89	86
Rank	70	69	70
Annual Gallons of Wasted Fuel (000)	199	169	163
Rank	73	74	73
Annual Congestion Cost (\$ million)  Rank	3   58	2 68	2 65
	38	08	03
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.