#### **Performance Measure Summary - Provo-Orem UT**

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	550	545
Rank	75	75	75	76	76	76
Commuters (1000s)	263	263	263	261	258	255
Daily Vehicle-Miles of Travel (1000s)						
Freeway	4,937	5,535	5,293	5,190	5,053	4,492
Arterial Streets	3,634	4,074	4,018	3,943	3,825	3,652
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)	2.51	2.77	3.05	2.47	2.28	2.69
Diesel (\$/gallon)	2.83	2.92	3.42	2.69	2.43	2.54
System Performance	2020	2019	2018	2017	2016	2015
Congested Travel (% of peak VMT)				1.1		
Congested System (% of lane-miles)				7.3		
Congested Time (number of "Rush Hours")				0.7		
Annual Excess Fuel Consumed						
Total Fuel (1000 gallons)	2,814	5,132	5,159	5,235	5,128	4,979
Rank	81	81	79	79	79	79
Fuel per Peak Auto Commuter (gallons)	8	15	15	15	15	16
Rank	82	91	86	84	83	73
Annual Delay						
Total Delay (1000s of person-hours)	5,275	9,621	8,988	8,701	8,423	8,107
Rank	86	88	88	89	89	88
Delay per Auto Commuter (pers-hrs)	15	27	26	25	24	23
Rank	94	97	98	98	98	98
Travel Time Index	1.05	1.12	1.11	1.11	1.11	1.11
Rank	85	91	96	96	96	96
Commuter Stress Index	1.06	1.13	1.12	1.12		
Rank	91	93	97	96		
Freeway Planning Time Index (95th Pctile)		1.22	1.24	1.27		
Rank		87	80	78		
Congestion Cost						
Total Cost (\$ millions)	130	227	222	209	195	183
Rank	84	85	85	85	85	86
Cost per Auto Commuter (\$)	309	538	526	499	489	466
Rank	95	97	98	99	99	99
Truck Congestion						
Annual Person-Hours of Delay (000)	589	1,047	1,047	965	854	740
Rank	61	56	56	56	61	64
Annual Gallons of Wasted Fuel (000)	1,173	2,087	2,161	1,910	1,787	1,655
Rank	54	53	51	57	58	58
Annual Congestion Cost (\$ million)	32	52	59	52	44	37
Rank	60	57	56	55	60	62
Annual Greenhouse Gases (CO2) Produced					, ,	
Excess Due to Congestion (tons)	28,876	52,663				
Rank	79	80				
Due to All Travel (tons)	1,156,614	2,109,427				
Rank	74	77				
Truck Annual Greenhouse Gases (CO2) Produced						
Excess Due to Truck Congestion (tons)	12,837	22,831				
Rank	55	53				
Due to Truck Travel (tons)	473,622	842,336				
Rank	56	51				

<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)	540	530	515	500	485	470
Rank	76	76	77	79	79	79
Commuters (1000s)	253	253	245	238	230	222
Daily Vehicle-Miles of Travel (1000s)						
Freeway	4,170	3,995	3,870	4,031	3,955	3,800
Arterial Streets	3,414	3,204	3,270	3,141	3,082	2,949
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)	3.51	3.61	3.24	3.33	2.80	2.15
Diesel (\$/gallon)	3.73	3.89	3.91	3.69	3.07	2.56
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)	4,741	4,668	4,366	4,068	3,940	3,948
Rank	80	80	81	81	81	81
Fuel per Peak Auto Commuter (gallons)	15	16	15	13	12	12
Rank	81	71	78	84	89	83
Annual Delay						
Total Delay (1000s of person-hours)	7,652	7,466	6,920	6,331	6,075	5,973
Rank	89	88	91	92	92	91
Delay per Auto Commuter (pers-hrs)	22	22	22	22	21	22
Rank	97	97	97	97	96	94
Travel Time Index	1.12	1.12	1.11	1.11	1.11	1.11
Rank	92	92	94	93	93	92
Commuter Stress Index						
Rank						
Freeway Planning Time Index (95th Pctile)						
Rank						
Congestion Cost						
Total Cost (\$ millions)	175	167	151	139	127	121
Rank	87	86	89	89	89	89
Cost per Auto Commuter (\$)	439	430	406	382	379	381
Rank	99	99	99	99	99	99
Truck Congestion						
Annual Person-Hours of Delay (000)	621	607	563	515	493	486
Rank	1 505	1 492	71	75	75	75 1 252
Annual Gallons of Wasted Fuel (000)	1,505	1,483	1,387	1,291	1,250	1,253
Rank	60	60	61	62	63	62
Annual Congestion Cost (\$ million)	32	29 65	26	26 74	23 75	22
Rank	65	65	66	/4	/3	74
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.

Inventory Measures	2008	2007	2006	2005	2004	2003
Urban Area Information						
Population (1000s)	450	440	435	430	425	420
Rank	80	80	80	79	79	78
Commuters (1000s)	212	206	203	199	195	192
Daily Vehicle-Miles of Travel (1000s)						
Freeway	3,650	3,830	3,765	3,655	3,535	3,450
Arterial Streets	3,040	3,090	2,990	3,170	2,955	2,880
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)	3.35	3.23	2.58	2.32	1.98	1.61
Diesel (\$/gallon)	4.13	3.70	2.91	2.69	2.11	1.56
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)	4,004	4,017	3,958	3,878	3,635	3,531
Rank	82	4,017	3,938	79	79	79
Fuel per Peak Auto Commuter (gallons)	13	13	13	13	12	12
Rank	84	85	81	81	83	83
	04	65	01	01	65	0.5
Annual Delay Total Delay (1000s of person-hours)	5,770	5,788	5,703	5,588	5 227	5,088
Rank	92	91	91	91	5,237 90	90
Delay per Auto Commuter (pers-hrs)	22	22	22	22	21	21
Rank	95	94	94	94	94	94
			-			
Travel Time Index Rank	1.12	1.12	1.12	1.12	1.12	1.11 87
Commuter Stress Index	90	90	88	86	83	
Rank						
Freeway Planning Time Index (95th Pctile)						
Rank						
Congestion Cost						
Total Cost (\$ millions)	123	118	111	104	93	87
Rank	88	88	88	88	89	88
Cost per Auto Commuter (\$)	362	378	382	389	377	373
Rank	99	98	96	96	96	96
Truck Congestion		, ,	, ,	, ,	70	
Annual Person-Hours of Delay (000)	468	470	464	455	426	414
Rank	75	75	72	72	73	73
Annual Gallons of Wasted Fuel (000)	1,271	1,276	1,256	1,231	1,155	1,122
Rank	62	62	62	60	62	63
Annual Congestion Cost (\$ million)	23	22	20	19	16	15
Rank	73	71	69	68	73	71
Annual Greenhouse Gases (CO2) Produced	, , ,	, -	<u> </u>		, 5	, 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)						
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Rank	I I					

<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)	415	410	400	395	390	380
Rank	78	77	78	77	76	76
Commuters (1000s)	187	182	175	170	165	159
Daily Vehicle-Miles of Travel (1000s)						
Freeway	3,375	3,300	3,225	3,175	3,100	3,050
Arterial Streets	2,800	2,715	2,650	2,600	2,535	2,420
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)	1.41	1.60	1.54	1.26	1.14	1.31
Diesel (\$/gallon)	1.41	1.61	1.50	1.25	1.22	1.42
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						<u> </u>
Total Fuel (1000 gallons)	3,278	3,191	2,777	2,767	2,501	2,419
Rank	78	77	79	78	79	78
Fuel per Peak Auto Commuter (gallons)	10	11	9	10	8	9
Rank	87	78	84	77	83	75
Annual Delay						
Total Delay (1000s of person-hours)	4,724	4,597	4,001	3,987	3,604	3,485
Rank	90	89	92	89	91	87
Delay per Auto Commuter (pers-hrs)	20	20	18	18	17	17
Rank	94	94	94	93	93	92
Travel Time Index	1.11	1.11	1.10	1.10	1.09	1.09
Rank	83	83	85	83	83	83
Commuter Stress Index						
Rank						
Freeway Planning Time Index (95th Pctile)						
Rank						
Congestion Cost						
Total Cost (\$ millions)	78	75	63	60	53	51
Rank	88	88	88	87	87	86
Cost per Auto Commuter (\$)	358	353	311	324	299	295
Rank	95	95	96	95	95	94
Truck Congestion						
Annual Person-Hours of Delay (000)	383	373	325	323	292	282
Rank	73	72	75	72	74	74
Annual Gallons of Wasted Fuel (000)	1,041	1,012	882	879	794	768
Rank	63	63	65	64	65	64
Annual Congestion Cost (\$ million)	13	13	11	10	9	9
Rank	71	70	71	71	71	71
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	1996	1995	1994	1993	1992	1991
Urban Area Information						
Population (1000s)	375	365	360	350	340	330
Rank	76	76	75	76	75	76
Commuters (1000s)	154	148	143	137	131	126
Daily Vehicle-Miles of Travel (1000s)						
Freeway	3,000	2,900	2,825	2,750	2,700	2,630
Arterial Streets	2,350	2,300	2,240	2,200	2,160	2,100
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)	1.29	1.15	1.11	1.15	1.16	1.15
Diesel (\$/gallon)	1.37	1.22	1.17	1.22	1.20	1.22
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)	2,167	2,097	2,055	1,718	1,706	1,676
Rank	78	78	77	79	78	77
Fuel per Peak Auto Commuter (gallons)	7	7	8	5	5	6
Rank	82	77	65	82	82	67
Annual Delay						
Total Delay (1000s of person-hours)	3,122	3,022	2,961	2,475	2,458	2,415
Rank	90	86	86	88	87	84
Delay per Auto Commuter (pers-hrs)	15	16	16	14	14	14
Rank	93	91	89	90	90	88
Travel Time Index	1.08	1.08	1.08	1.07	1.08	1.08
Rank	86	84	80	83	75	68
Commuter Stress Index						
Rank						
Freeway Planning Time Index (95th Pctile)						
Rank						
Congestion Cost						
Total Cost (\$ millions)	45	42	40	33	32	31
Rank	86	86	83	87	84	83
Cost per Auto Commuter (\$)	268	272	268	229	235	247
Rank	94	94	93	94	92	87
Truck Congestion						
Annual Person-Hours of Delay (000)	253	246	240	201	199	195
Rank	74	73	72	74	73	71
Annual Gallons of Wasted Fuel (000)	687	666	653	545	542	532
Rank	64	64	64	65	64	62
Annual Congestion Cost (\$ million)	8	7	7	6	6	5
Rank	73	73	69	72	67	70
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)						

<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)	320	310	300	295	290	280
Rank	77	78	80	80	80	81
Commuters (1000s)	120	115	111	108	105	101
Daily Vehicle-Miles of Travel (1000s)						
Freeway	2,540	2,475	2,400	2,300	2,220	2,180
Arterial Streets	2,040	2,000	1,960	1,920	1,880	1,850
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)	1.05	1.20	1.11	1.11	1.08	1.42
Diesel (\$/gallon)	1.07	1.18	1.09	1.09	1.07	1.40
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)	1,361	1,299	1,085	1,008	927	852
Rank	80	79	80	80	80	79
Fuel per Peak Auto Commuter (gallons)	4	5	3	3	3	3
Rank	81	63	81	80	74	66
Annual Delay						
Total Delay (1000s of person-hours)	1,961	1,872	1,563	1,453	1,336	1,228
Rank	85	85	85	85	85	86
Delay per Auto Commuter (pers-hrs)	12	12	10	10	9	9
Rank	89	89	89	85	87	83
Travel Time Index	1.07	1.06	1.06	1.05	1.05	1.05
Rank	74	79	73	79	74	64
Commuter Stress Index						
Rank						
Freeway Planning Time Index (95th Pctile)						
Rank						
Congestion Cost						
Total Cost (\$ millions)	24	22	18	16	14	13
Rank	84	84	85	84	84	85
Cost per Auto Commuter (\$)	203	209	187	175	175	152
Rank	90	88	91	92	91	91
Truck Congestion						
Annual Person-Hours of Delay (000)	159	153	128	118	108	101
Rank	75	71	73	74	74	72
Annual Gallons of Wasted Fuel (000)	433	412	344	320	295	271
Rank	67	64	67	68	68	66
Annual Congestion Cost (\$ million) Rank	71	4 68	3 71	3 68	3 67	3 64
	/1	08	/1	08	07	04
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						
Nank 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	1984	1983	1982
Urban Area Information			
Population (1000s)	270	250	250
Rank	82	82	82
Commuters (1000s)	97	89	88
Daily Vehicle-Miles of Travel (1000s)			
Freeway	2,100	2,000	1,900
Arterial Streets	1,800	1,750	1,700
Cost Components			
Value of Time (\$/hour)	7.75	7.43	7.20
Commercial Cost (\$/hour)	23.94	23.63	23.31
Gasoline (\$/gallon)	1.43	1.47	1.53
Diesel (\$/gallon)	1.41	1.44	1.51
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)	760	684	632
Rank	79	76	77
Fuel per Peak Auto Commuter (gallons)	2	2	2
Rank	79	69	55
Annual Delay	1		
Total Delay (1000s of person-hours)	1,096	985	911
Rank	86	86	86
Delay per Auto Commuter (pers-hrs)	8	8	8
Rank	83	76	73
Travel Time Index	1.04	1.04	1.04
Rank	75	68	61
Commuter Stress Index	/5		01
Rank			
Freeway Planning Time Index (95th Pctile)			
Rank			
Congestion Cost			
Total Cost (\$ millions)	11	10	9
Rank	85	84	85
Cost per Auto Commuter (\$)	148	137	135
Rank	90	90	89
Truck Congestion	70	70	- 07
Annual Person-Hours of Delay (000)	89	79	74
Rank	73	73	74
Annual Gallons of Wasted Fuel (000)	241	217	201
Rank	67	68	65
Annual Congestion Cost (\$ million)	2	2	2
Rank	71	68	65
Annual Greenhouse Gases (CO2) Produced	/1	00	- 03
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			
Due to Truck Travel (tons) Rank			
Kalik			

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