

# Congestion in Florida

## Findings from the 2012 Urban Mobility Report

This special report of the FDOT Trends and Conditions series highlights the costs and challenges of congestion in seven urban areas in Florida and across the nation. It is based on the Texas Transportation Institute's (TTI) 2012 Urban Mobility Report. It is based on the Texas Transportation Institute's (TTI) 2012 Urban Mobility Report. This brief summarizes congestion estimates for calendar year 2011 and compares them with updated congestion estimates for prior years:

- **Congestion levels stable** – High fuel prices and a slow economy temporarily stopped travel demand growth. Nationally, congestion levels remained unchanged from 2010 to 2011. In Florida, both overall congestion and congestion per auto commuter remained virtually unchanged.
- **Congestion in Florida cities** –Miami ranked 1<sup>st</sup> in Florida and 11<sup>th</sup> nationally, with 47 hours of annual delay per auto commuter in 2011. Orlando, with an annual delay of 45 hours per auto commuter, ranked 2<sup>nd</sup> in Florida and 13<sup>th</sup> in the nation. In terms of a travel time index (the ratio of congested to free-flow travel time), Miami ranked 1<sup>st</sup> in Florida and 14<sup>th</sup> nationally, with a value of 1.25.
- **Moderation of national congestion cost** – Congestion cost remained steady at about \$121 billion for 498 urban areas in the U.S. from 2010 to 2011. There were 5.5 billion hours in travel delay and 2.9 billion excess gallons of fuel consumed. The 2011 travel delay and excess fuel consumption also remained constant from 2010.
- **Moderation of congestion costs in Florida** – The congestion cost in 2011 for the seven selected urban areas in Florida was about \$7.15 billion, slightly above the 2010 level of \$7.05 billion. There were approximately 333 million hours in travel delay and 171 million excess gallons of fuel consumed. All three measures experienced a modest 1.5 percent increase.
- **Congestion cost savings** – Operational improvements and public transit in Florida reduce congestion costs by \$868 million, with \$537 million saved through operational treatments and \$331 million saved through use of public transportation.
- **Moderated use of major highways** – The average limited access highway lane in Florida's seven selected urban areas has shown a decline in use since 2005, including declines between 2010 and 2011.
- **A pause in the growing burden of congestion** – Reduced travel due to the rise in fuel prices following the spike in 2008 and the depressed economy resulted in lower congestion in 2011. However, congestion is anticipated to increase again, perhaps more slowly, as population and economic growth become more positive.

## Key Mobility Measures

Characteristics of traffic congestion on any road network include slower speeds, longer trip times, and increased queuing. This condition generally persists when traffic demand exceeds the capacity of the road or road network. Congestion often is measured in terms of delay per traveler (or auto commuter) and is calculated as the time difference between the average speed and the free-flow speed on a roadway segment for vehicle occupants. The TTI report indicates that congestion is a problem in all the major urban areas and had been getting progressively worse until the middle of the last decade, when travel levels moderated and declined.

Table 1 shows the key mobility measures for seven urban areas selected for study in Florida. When key mobility measures such as yearly delay per auto commuter, travel time index, and wasted fuel per auto commuter were considered, Miami and Orlando ranked the highest in Florida. Three urban areas — Miami, Orlando and Tampa–St. Petersburg — shared 85 percent of travel delay and 86 percent of total excess fuel consumed (Table 2). Miami ranked 1<sup>st</sup> in Florida in total travel delay, excess fuel consumption, and congestion. Orlando and Tampa–St. Petersburg ranked 2<sup>nd</sup> and 3<sup>rd</sup>, respectively.

**Table 1 – Key Mobility Measures for 2011**

Urban Area	Population Group	Yearly Delay per Auto Commuter			Travel Time Index			Wasted Fuel per Auto Commuter		
		Hours	Rank in Florida	Rank in U.S.	Value	Rank in Florida	Rank in U.S.	Gallons	Rank in Florida	Rank in U.S.
Florida										
Miami FL	Very Large	47	1	11	1.25	1	14	25	1	6
Orlando FL	Large	45	2	13	1.20	2	27	22	2	15
Tampa-St. Petersburg FL	Large	38	3	30	1.20	2	27	18	3	30
Jacksonville FL	Large	30	4	53	1.14	5	61	13	5	60
Cape Coral FL	Small	30	4	53	1.15	4	57	15	4	48
Pensacola FL-AL	Small	22	5	86	1.11	7	79	11	6	80
Sarasota-Bradenton FL	Medium	21	6	88	1.12	6	74	11	6	80
<b>Weighted Mean</b>		<b>40</b>						<b>21</b>		
<b>Group Means for U.S. (By Population Group)</b>										
Very Large Average (≥ 3 million)		52			1.27			24		
Large Average (≥1 million and < 3 million)		37			1.20			17		
Med. Average (≥ 500,000 and < 1 mil.)		29			1.15			14		
Small Average (< 500,000)		23			1.11			11		
Note: The Miami urban area includes the urban areas of Miami-Dade, Broward and Palm Beach counties.										

**Table 2 – Components of Congestion Problems, 2011 Urban Area Totals**

Urban Area	Population Group	Travel Delay			Excess Fuel Consumed			Congestion Cost		
		Hours (1000s)	Rank in FL	Rank in U.S.	Gallons (1000s)	Rank in FL	Rank in U.S.	\$ Million	Rank in FL	Rank in U.S.
<b>Florida</b>										
Miami	Very Large	174,612	1	5	93,863	1	4	3,749	1	5
Tampa-St. Petersburg	Large	62,876	2	18	30,539	2	17	1,325	2	18
Orlando	Large	46,607	3	25	23,336	3	21	1,031	3	23
Jacksonville	Large	22,629	4	46	10,300	4	50	486	4	45
Sarasota-Bradenton	Medium	10,523	5	70	5,301	5	67	222	5	70
Cape Coral	Small	9,964	6	74	5,118	6	68	220	6	71
Pensacola FL-AL	Small	5,655	7	88	2,755	7	87	119	7	88
<b>Weighted Mean</b>		<b>101,411</b>	*		<b>53,436</b>	*		<b>2,176</b>	*	
<b>Group Means for U.S. (By Population Group)</b>										
Very Large Average		195,831			90,936			4,254		
Large Average		39,747			18,265			856		
Medium Average		13,516			6,634			293		
Small Average		5,586			2,702			123		

\*Mean is weighted based on peak period travelers

**Table 3 – Congestion Impacts for 498 U.S. Urban Areas**

	1982	2000	2005	2010	2011
<b>Individual Traveler Congestion</b>					
Yearly Delay per Auto Commuter (hours)	16	39	43	38	38
Travel Time Index	1.07	1.19	1.23	1.18	1.18
Commuter Stress Index	--	--	--	1.29	1.29
Wasted Fuel per auto commuter (gallons)*	8	19	23	19	19
Congestion Cost per auto commuter (constant 2011 dollars)	\$342	\$795	\$924	\$810	\$818
<b>Total Congestion</b>					
Travel Delay (billion hours)	1.1	4.5	5.9	5.5	5.5
Wasted Fuel (billion gallons)	0.5	2.4	3.2	2.9	2.9
Truck Congestion Cost (billions of 2011 Dollars)	--	--	--	\$27	\$27
Congestion Cost (billions of 2011 dollars)	\$24	\$94	\$128	\$120	\$121
<b>Effect of Some Solutions</b>					
Yearly Travel Delay saved by					
Operational Treatments (million hours)	9	215	368	370	374
Public Transportation (million hours)	409	774	869	856	865
Yearly Congestion Costs saved by					
Operational Treatments (billions of 2011 dollars)	\$0.2	\$3.6	\$7.3	\$8.3	\$8.5
Public Transportation (billions of 2011 dollars)	\$8.0	\$14.0	\$18.5	\$20.2	\$20.8

Yearly delay per auto commuter – The extra time spent traveling at congested speeds rather than free-flow speeds by private vehicle drivers and passengers who typically travel in the peak periods.

Travel Time Index (TTI) – The ratio of travel time in the peak period to travel time at free-flow conditions. A Travel Time Index of 1.30 indicates a 20-minute free-flow trip takes 26 minutes in the peak period.

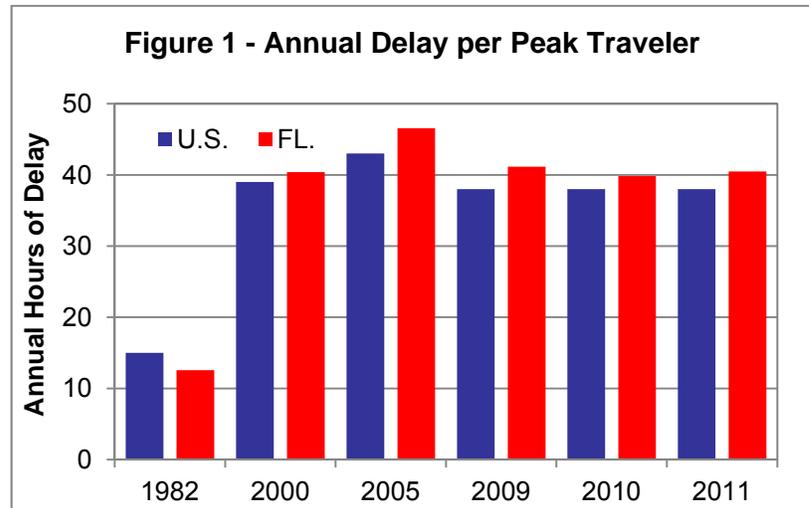
Commuter Stress Index – The ratio of travel time for the peak direction to travel time at free-flow conditions. A TTI calculation for only the most congested direction in both peak periods.

Wasted fuel – Extra fuel consumed during congested travel.

Congestion cost – The yearly value of delay time and wasted fuel.

## Impacts on Travelers

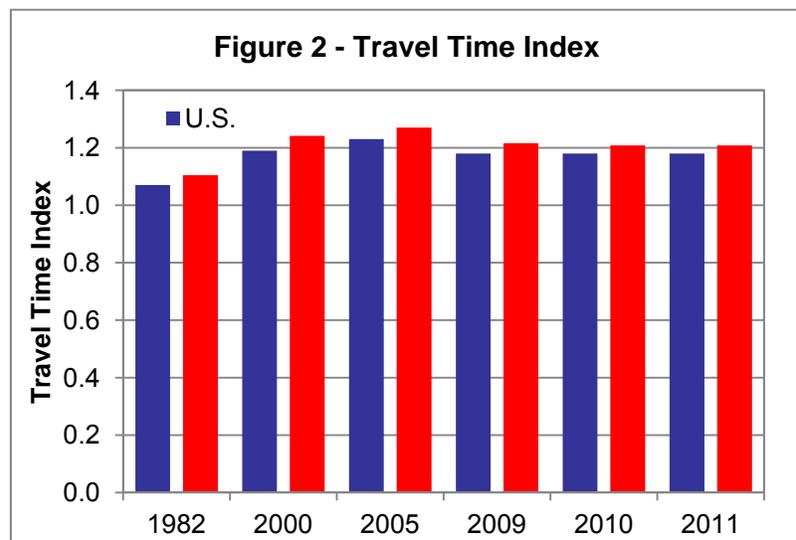
Figure 1 presents a comparison of the annual hours of delay per peak period auto commuter nationwide as well as in Florida. The increasing delay associated with a growing economy and demand for travel was observed from 1982 through 2005, with peak delays almost tripling the delay experienced in 1982 for both the U.S. and Florida. Florida which had relatively lower delay in 1982, about 13% less compared with the nation,



surpassed the national level of delay in 2005. Delay declined with the downturn in the economy as lower employment reduced demand for travel to employment and other activities. The drop in delay for Florida was identical to that for the U.S. from 2005 to 2009. The delay per auto commuter was reduced by 1 hour for Florida while remaining the same for the U.S. between 2009 and 2011.

A similar trend is shown for the travel time index for Florida and the U.S. in Figure 2. This measure represents the ratio of the travel time in the peak period to travel time in free flow conditions.

The travel time index reached its peak of 1.23 and 1.27, respectively, for the U.S. and Florida in 2005, up from the 1982 levels of 1.07 and 1.10. This means that a 20-minute free-flow trip took 21.4 minutes in 1982 in the U.S. and 22.0 minutes in Florida, but 24.2 minutes for the U.S. and 25.4 minutes for Florida in 2005. It then dropped in 2009 for both the U.S. and Florida and remained more moderate in subsequent years.



Note: Use caution in interpreting trends as the unequal time between data points distorts the shape of the trends.

The fuel wasted per auto commuter in Florida was at or above the U.S. level across the study years (Figure 3), except for 1982. The general trend across the above-discussed measures shows that Florida observed significant growth over the last three decades, peaking in 2005 above the national level. The fuel wasted per auto commuter declined for both the U.S. and Florida post 2005, due to the adverse economic conditions and resulting lower demand for activity participation and travel. The increase in share of fuel-efficient cars and the decline in congestion delay were also attributable to the decline in wasted fuel per traveler.

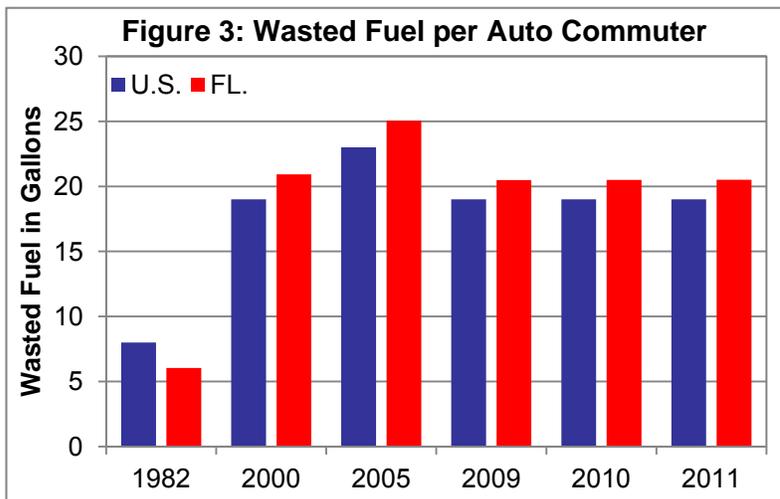
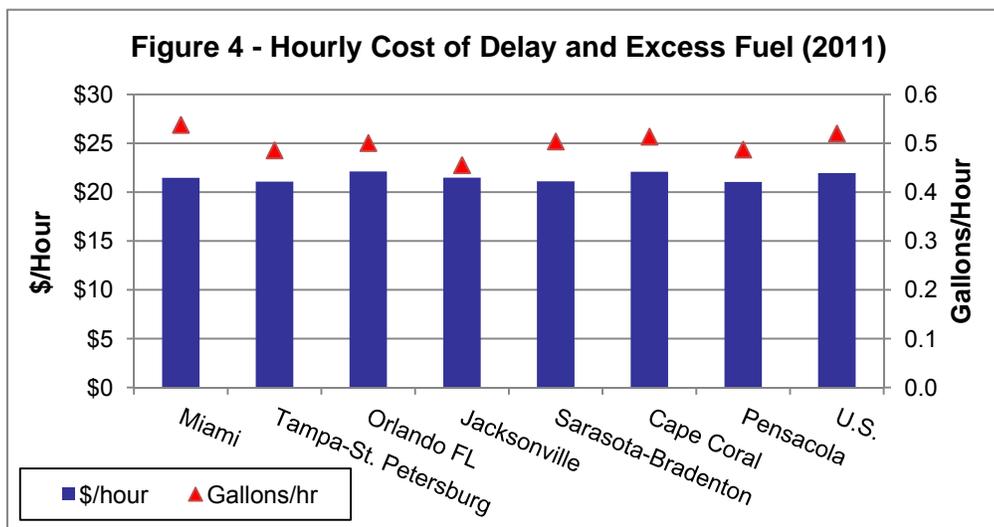


Figure 4 compares the cost of delay and fuel consumed per hour among cities in Florida and the U.S. in general. The hourly

costs for the metro areas of Florida were similar to the national average of \$21.9 per hour, ranging from \$21.0 to \$22.1 per hour. These cost differences result from varying fuel costs and differences in the share of truck and passenger traffic across regions from which the congestion costs are calculated. Among Florida's seven urban areas studied, Cape Coral and Orlando had the highest hourly cost of congestion (\$22.1/hr) in Florida.



The delay and congestion up to this point primarily focused on travelers. The following analysis looks at the effect of congestion on freight. According to the *2012 Urban Mobility Report*, Florida moved \$559.2 billion worth of commodities, 75% of which have been moved through urban areas. Table 4 summarizes the truck delay associated with moving these commodities through the seven urban areas in Florida. The truck delay estimated here is the travel time required above the free flow travel time to complete a trip by truck.

**Table 4 – Truck Delay in Florida**

Urban Area	Population Group	US Rank	Florida Rank	Truck Delay (1000 Hours)	% of Total Delay
<b>Florida</b>					
Miami FL	Very Large	6	1	9,682	5.5%
Orlando FL	Large	20	2	3,265	7.0%
Tampa-St. Petersburg FL	Large	21	3	3,223	5.1%
Jacksonville FL	Large	48	4	1,366	6.0%
Cape Coral FL	Small	65	5	688	6.9%
Sarasota-Bradenton FL	Medium	77	6	532	5.1%
Pensacola FL-AL	Small	94	7	292	5.2%
Very Large Average				12,292	6.3%
Large Average				2,402	6.0%
Medium Average				822	6.1%
Small Average				288	5.2%

Miami’s truck delay was approximately 32% less than the national average delay for very large urban areas. In large urban areas, truck delay in Tampa and Orlando was approximately 40% above the average delay but Jacksonville experienced a below-average truck delay in this category. Truck delays in Sarasota as a medium urban area and Pensacola as a small urban area were also below the average for their respective urban categories. The City of Cape Coral in the small category had the third highest delay among its peers, only trailing Jackson, MS and Columbia, SC and exceeding the national average of small urban areas by over 97%.

**Effects of Mobility Improvement/Solutions to Congestion Problems in Florida**

Mobility improvements or solutions include operational treatments and use of public transportation. Operational treatments refer to freeway incident management, freeway ramp metering, arterial street signal coordination, arterial street access management and high-occupancy vehicle lanes. Florida saved close to 25 million hours of travel time in 2011 through operational treatments, which equaled \$537 million savings in cost. Public transportation systems in Florida saved over 15 million hours of travel time, which equated to approximately \$331 million in cost savings (Table 5).

**Table 5 – Effect of Mobility Improvements in Florida**

Urban Area	Population Group	Operational Treatment Savings				Public Transportation Savings			
		Delay Reduction (1000 Hours)	Rank in Florida	Rank in U.S.	Cost Savings (\$ Million)	Delay Reduction (1000 Hours)	Rank in Florida	Rank in U.S.	Cost Savings (\$ Million)
<b>Florida</b>									
Miami	Very Large	15,073	1	5	323.6	11,589	1	9	248.8
Tampa-St. Petersburg	Large	4,591	2	17	96.8	1,210	3	38	25.5
Orlando	Large	2,746	3	25	60.8	1,704	2	33	37.7
Jacksonville	Large	1,326	4	34	28.5	501	4	56	10.8
Sarasota-Bradenton	Medium	668	5	56	14.1	152	6	87	3.2
Cape Coral	Small	501	6	61	11.1	173	5	82	3.8
Pensacola FL-AL	Small	89	7	94	1.9	54	7	97	1.2
<b>Group means for U.S. (By Population Group)</b>									
Very Large Average		16,473			356.3	49,465			1,076.5
Large Average		2,194			47.1	2,524			54.3
Medium Average		492			10.7	372			8.0
Small Average		193			4.3	183			4.1

Table 6 exhibits the intensive use of the limited access lanes in Florida urban areas. From 1982 to 2005, daily vehicle miles traveled (DVMT) per lane mile increased by over 82% on average. Tampa-St. Petersburg witnessed the smallest increase of 28% whereas Cape Coral experienced the largest growth of 196%. However, the DVMT per lane mile dropped across all urban areas in Florida by an average of approximately 12% from 2005 to 2011.

**Table 6 – Trend in Daily VMT per Freeway Lane Mile, 1982 to 2011**

Urban Area	VMT PER FREEWAY LANE MILE						2011 Rank
	1982	2000	2005	2009	2010	2011	In Florida
Miami	8,698	18,168	19,022	18,807	19,423	19,125	1
Tampa- St. Petersburg	11,940	13,379	15,353	14,681	14,537	14,134	2
Sarasota-Bradenton	5,333	15,000	15,212	14,545	14,234	13,983	3
Jacksonville	10,000	13,660	14,839	13,678	13,459	13,104	4
Orlando	9,167	12,877	14,671	13,749	13,089	12,889	5
Cape Coral	5,667	11,875	15,625	11,724	11,753	11,643	6
Pensacola FL-AL	6,667	9,583	10,179	8,485	7,817	7,588	7
<b>National Average</b>	9,072	14,165	14,637	13,842	13,911	13,970	

Similarly, DVMT per arterial lane mile increased by over 48% for Florida urban areas from 1982 to 2005 (Table 7) whereas it dropped across all urban places in Florida by an average of approximately 8% from 2005 to 2011. Florida’s urban areas had higher DVMT per arterial lane mile than the national average across the study years. Interestingly, Jacksonville ranked 4<sup>th</sup> in 1982 but dropped to the last in 2011, indicating that arterial lane expansion was closer to keeping pace with arterial demand than in other metro areas.

**Table 7 – Trend in Daily VMT per Arterial Lane Mile, 1982 to 2011**

Urban Area	VMT PER ARTERIAL LANE MILE						2011 Rank In Florida
	1982	2000	2005	2009	2010	2011	
Tampa- St. Petersburg	5,971	6,774	7,467	7,190	7,217	7,280	1
Orlando	4,038	7,738	7,986	7,288	7,028	7,022	2
Miami	4,757	7,000	7,089	6,910	6,797	6,636	3
Cape Coral	5,600	6,324	6,957	6,629	6,345	6,453	4
Sarasota-Bradenton	4,286	5,918	6,995	6,624	6,307	6,352	5
Pensacola FL-AL	4,326	6,188	6,744	6,234	6,117	6,168	6
Jacksonville	4,656	5,827	6,667	6,255	6,065	5,966	7
<b>National Average</b>	3,879	4,946	4,991	4,791	4,816	4,838	

### Travel Time Reliability

For the first time, the *Urban Mobility Report* includes a measure of this frustrating “extra” travel time – the amount of time you have to allow above the regular travel time. The INRIX dataset used by TTI as a source of roadway operating speeds is now sufficiently robust to provide many trip samples for each road section from which one can identify the longest trip times and present them in a measure similar to the Travel Time Index. The Planning Time Index (PTI) identifies the extra time factor that should be used to estimate the departure time to arrive on-time for a trip 19 times out of 20 times or 95% of the time. This indicates the effects of a variety of events that make travel time unpredictable. If the PTI for your trip is 3.00, that tells you to plan 60 minutes for a trip that takes 20 minutes when there are few other cars on the road (20 minutes x 3.00 = 60 minutes) to ensure you are on time for a trip 19 out of 20 times. Table 8 displays the planning time index for Florida metropolitan areas. In general, Florida has lower ranked planning time indices, which indicates less variability in travel time and/or faster incident clearing times relative to other urban areas with similar overall congestion levels.

**Table 8 - Planning Time Index**

Urban Area	Population Group	US Rank	Florida Rank	Planning Time Index
<b>Florida</b>				
Miami FL	Very Large	23	1	3.60
Orlando FL	Large	59	3	2.58
Tampa-St. Petersburg FL	Large	48	2	2.90
Jacksonville FL	Large	65	4	2.45
Cape Coral FL	Small	91	5	1.86
Sarasota-Bradenton FL	Medium	97	6	1.49
Pensacola FL-AL	Small	101	7	1.31
Very Large Average				4.08
Large Average				3.12
Medium Average				2.66
Small Average				2.09

This special report was prepared by CUTR. For more information, contact [Steve Polzin](mailto:Steve.Polzin@cutr.tamu.edu) at 813-974-9849. Visit <http://mobility.tamu.edu/ums/report/> to access TTI's report, 2012 *Urban Mobility Report*.

Notes:

- The 2012 *Urban Mobility Report* uses what FHWA defines as “Urbanized Areas.” All Urbanized Areas (population 50,000 or more) are also Urban Areas. There are 30 urbanized areas in Florida. Its six largest urbanized areas, plus Pensacola (which is #10), are reported. Palm Bay-Melbourne, Palm Coast-Daytona Beach and Port St. Lucie are not included in the TTI analysis.
- The seven urbanized areas in the report had a population of 12,103,923, or 73% of the 16,533,341 total urbanized area population in Florida (as of 2011).
- The reader is urged to exercise caution in using averages as the outliers can have significant policy implications.