

HURRICANE JEANNE POST-STORM TRANSPORTATION ANALYSIS

September 2005

Table of Contents

County Post-Storm Survey Responses Regarding Evacuations And Traffic Conditions	Page 2
Analysis Of The Traffic Counter Data	Page 9
Comparison of ETIS Travel Demand & Congestion Forecasts to TTMS Counter Data	Page 37
Conclusions	Page 62

List of Tables

Table 1. Traffic Related Responses of Emergency Management Offices	Page 3
Table 2. Hurricane Jeanne Local Emergency Management Evacuation Route Data	Page 5
Table 3a. Hurricane Jeanne Traffic Counter Timelines	Page 45
Table 3b. Hurricane Jeanne Traffic Counter Timelines (Continued)	Page 53
Table 4. Hurricane Jeanne ETIS To Counter Comparisons	Page 62

List of Figures

Figure 1. I-75 Northbound Near Goldengate (0351)	Page 15
Figure 2. I-75 Northbound Near Punta Gorda (0350)	Page 15
Figure 3. I-75 Northbound Near Ocala (0317)	Page 16
Figure 4. I-75 Northbound Near FL / GA Line (0112)	Page 16
Figure 5. US 301 Northbound Near Waldo (0018)	Page 18
Figure 6. Florida Turnpike Northbound Near Ft. Pierce (0421)	Page 15
Figure 7. I-95 Northbound Jupiter (0217)	Page 16
Figure 8. I-95 Northbound Near Bunnell (0292)	Page 17
Figure 9. I-95 Northbound Near FL / GA Line (0132)	Page 19
Figure 10. US 192 Northbound Near Holopaw (0065)	Page 29
Figure 11. SR 520 Westbound Near Merritt Island (0113)	Page 30
Figure 12. SR 528 Westbound Near Titusville (0336)	Page 30
Figure 13. SR 50 Westbound Near Bithlo (0104)	Page 31
Figure 14. US 17 Northbound Near San Mateo (0105)	Page 32
Figure 15. I-10 Westbound Near Baldwin (0109)	Page 35
Figure 16. I-10 Westbound Near Live Oak (0238)	Page 36
Figure 17. I-10 Westbound Near Quincy (0220)	Page 36
Figure 18. I-10 Westbound Near Marianna (0218)	Page 37

Hurricane Jeanne Transportation Assessment

Transportation and Evacuation

The primary objective of the FEMA / USACE comprehensive hurricane evacuation studies (HES) is the calculation of clearance times. They are the amount of time needed to clear the entire evacuation road network of all evacuation traffic and convey those vehicles and their occupants to a point of relative safety. Clearance times are calculated for a variety of evacuation scenarios based on hurricane intensity, tourist occupancy and response timing, and are used by emergency managers to determine when to issue evacuation orders.

The transportation analysis combines variables from the vulnerability analysis (evacuation zones, vulnerable population and evacuating vehicles); behavioral analysis (response rates, participation percentages, intended destinations per evacuation zone); and shelter analysis (shelter use percentages and locations) into a hurricane evacuation transportation model. This transportation model emulates the characteristics of the evacuation roadway network during various hurricane evacuation scenarios to determine the most congested segments.

The most recent Transportation Analysis for the Treasure Coast Region, namely Palm Beach, Martin, St. Lucie, and Indian River Counties, was completed in 2004, while the hurricane evacuation transportation work for Broward and Dade Counties was finished in 2003.

The East Central Florida HES prepared in 1999 and the Northeast Florida HES, dated 1998 provided the clearance times used for evacuation planning purposes. The counties in the interior of north Florida and down the spine of central Florida were covered by the Cedar Key and Central Florida HESs respectively, both conducted in 1995.

Table 2 provides the observations of local and state government representatives regarding evacuation and transportation related issues during Hurricane Jeanne. Transportation and clearance time issues discussed by the study teams with local and state officials for the Hurricane Jeanne event included the following:

- The perception of the roadway network's ability to meet evacuation traffic demand;
- The traffic control measures emplaced to improve flow or reduce congestion;

- The perceptions regarding how quickly the public responded to evacuation orders;
- The apparent volume of traffic during the evacuation;
- The duration of the evacuation event relative to clearance times; and
- Any traffic problems experienced during the evacuation.

COUNTY POST-STORM SURVEY RESPONSES REGARDING EVACUATIONS AND TRAFFIC CONDITIONS

Below are the results collected from the emergency managers in counties impacted by Hurricane Jeanne (See Table 1). The responses below relate specifically to evacuations, protective action decision making and traffic control measures. The decision-making information specifically focuses on when evacuation orders were given and what areas or zones their decisions pertained to. Unfortunately, it is the decision making data that is frequently the least complete. This information is also very important in performing the types of analysis required for this document.

Fifteen of the 25 counties that were surveyed regarding their response operations during Hurricane Jeanne indicated that heavy traffic, congestion, traffic jams or gridlock characterized the road conditions during the evacuation. Two county emergency management offices indicated that traffic gridlock characterized the roadways in or near their jurisdictions for Hurricane Jeanne. Other predominant problems were the availability of fuel, the lack of adequate signage and road construction. Only one county that used the clearance times included in their HES indicated that they were insufficient for the magnitude of the storm. Interestingly, the county that indicated some degree of contention with their clearance times for this event had been updated the previous year.

Table 2 provides evacuation route information collected from officials of local governments surveyed during this effort. The data details what roadways are considered primary and secondary evacuation routes for residents and visitors within their communities. Where it was reported by local officials, Table 2 includes any anecdotal information regarding the observed traffic conditions in their areas. The table also indicates which roadways specifically referenced by local officials in their surveys are covered by a traffic counter or included in ETIS as an evacuation route.

Table 1. HURRICANE JEANNE LOCAL EMERGENCY MANAGEMENT SURVEY RESPONSES

County	Evacuation Decision	Indicated Time of Order or Possible Evacuation Start Time	Estimated Number of Vehicles Evacuating	Estimated Percent Compliance With Evac Orders	Estimated Arrival Tropical Storm Winds	Public Response	Tourist Occupancy	Clearance Time Sufficient	Heavy Traffic	Congestion	Traffic Jams	Gridlock	Tolls	Fuel Availability	Inadequate Signage	Uncoordinated Traffic Signals.	Diversions from Other Co.	Construction
East Coast Coastal Counties (in geographic order south to north)																		
Broward	Cat 2	NS	NS	40%		S	NS	✓					●					●
Palm Beach	Cat 5	9/25-7 AM	21,000	NS		N	L	✗	●	●	●	●		●				●
Martin	Cat 5	9/24-8 AM	37,000 ^b	NS		N	L	✓		●	●							
St. Lucie	Cat 4 / All	NS	NS	75%		N	L	✓	●						●	●		
Indian River	Cat 1	NS	NS	60%		S	N	✓ ^a		●	●						●	●
Brevard	Cat 5	NS	NS	30%		S	NS	✓	●	●	●			●				
Volusia	Cat 3	9/25-8 AM	58,000	80%		F	N	✓	●	●		●		●	●			●
Nassau	Cat 1	9/25-8 AM	NS	NS		NS	H	✓	c	c	c	c	c	c	c	c	c	c
West Coast Coastal Counties (in geographic order south to north)																		
Manatee	Cat 1	9/25-12 PM	NS	NS		N	N	✓						●				●
Pinellas	MH, FPA	9/25-6 PM	15,000	NS		S	N	NA	c	c	c	c	c	c	c	c	c	c
Pasco	MH, LLA	9/25-9 AM	7,000	NS		S	L	✓						●				
Citrus	Cat 1	9/26-2 PM	NS	NS		NS	H	✓	c	c	c	c	c	c	c	c	c	c
Inland Counties (listed alphabetically)																		
Alachua	MH, FPA	NS	NS	10%		S	H	✓	●									●
Bradford	MH, FPA	NS	800	10%		F	H	NS	●					●				
Columbia	MH, FPA	NS	NS	NS		NS	NS	NS	c	c	c	c	c	c	c	c	c	c
DeSoto	MH, LLA	9/25-10 PM	NS	20%		F	L	NA						●		●		
Glades	Whole Co.	NS	NS	50%		NS	L	NA	●	●	●			●			●	
Hendry	MH, LLA	NS	NS	15%		N	L	NA	●					●	●			
Highlands	MH, LLA	9/25	NS	30%		N	L	NA	●					●				
Madison	MH	9/26-9 AM	50	10%		N	H	NA	c	c	c	c	c	c	c	c	c	c
Marion	MH	9/23-12 PM	12,000	NS		NS	L	NA						●	●			

Table 1. HURRICANE JEANNE LOCAL EMERGENCY MANAGEMENT SURVEY RESPONSES

County	Evacuation Decision	Indicated Time of Order or Possible Evacuation Start Time	Estimated Number of Vehicles Evacuating	Estimated Percent Compliance With Evac Orders	Estimated Arrival Tropical Storm Winds	Public Response	Tourist Occupancy	Clearance Time Sufficient	Heavy Traffic	Congestion	Traffic Jams	Gidlock	Tolls	Fuel Availability	Inadequate Signage	Uncoordinated Traffic Signals.	Diversions from Other Co.	Construction
Inland Counties Continued (listed alphabetically)																		
Orange	MH, LLA	NS	NS	25%		N	H	NS		●	●		●	●	●			
Osceola	MH, LLA	NS	NS	10%		S	H	NS		●				●	●			●
Polk	MH, LLA	NS	NS	10%		S	L	NA	●	●				●	●		●	●
Seminole	MH, LLA	NS	NS	25%		N	N	NA		●	●		●	●	●			

- Blue fill in Evacuation Decision box = mandatory order
- Yellow fill in Evacuation Decision box = voluntary order
- Green fill in Evacuation Decision box = recommended order
- No fill in Evacuation Decision box = type not specified
- Cat 1,2,3,4,5 in Evacuation Decision box = highest category of surge evacuation zone. Unless otherwise specified any level of surge area evacuations include mobile homes, flood prone or low lying areas.
- MH in Evacuation Decision box = mobile home orders
- FPA in Evacuation Decision box = Flood prone areas
- LLA in Evacuation Decision box = Low lying areas

S= Slow Public Response
 N = Normal Public Response
 F = Fast Public Response
 L= Low Tourist Occupancy
 N = Normal Tourist Occupancy
 H = High Tourist Occupancy
 ✓ = Clearance Times judged sufficient by county
 ✗ = Clearance Times judged insufficient by county
 NA = Not Applicable (Not studied under the US Army Corps of Engineers HES Program)
 NS = Data not specified by County

a Used locally derived clearance time of 8 hours.
 b Based on 85,000 people evacuating figure divided by 2.3 people per vehicle
 c No specific evacuation problems indicated by county

Table 2. HURRICANE JEANNE LOCAL EMERGENCY MANAGEMENT EVACUATION ROUTE DATA

Responding County	Primary And Secondary Evacuation Routes	Descriptions of Traffic Conditions from Local Officials		
		Roads with Heavy Traffic	Roads with Congestion	Roads at Gridlock
East Coast Coastal Counties (in geographic order south to north)				
Broward	<ul style="list-style-type: none"> • I-95 • Florida Turnpike • <i>All east west routes</i> 			
Palm Beach	<ul style="list-style-type: none"> • I-95 • US 27 • Florida Turnpike • SR 710 • SR 80 	<ul style="list-style-type: none"> • US 27 • SR 80 	<ul style="list-style-type: none"> • Florida Turnpike 	<ul style="list-style-type: none"> • Florida Turnpike at Yeehaw Junction
Martin	<ul style="list-style-type: none"> ➤ I-95 ➤ US 1 ➤ US 98 / 441 ➤ SR 76 ➤ SR 710 ➤ SR 714 ➤ SR 726 		<ul style="list-style-type: none"> • No specific roads identified 	
St. Lucie	<ul style="list-style-type: none"> • I-95 • US 1 • Florida Turnpike • SR 70 • Midway Road 	<ul style="list-style-type: none"> • US 1 • Florida Turnpike 		
Indian River	<ul style="list-style-type: none"> ➤ I-95 ➤ SR 60 ➤ Florida Turnpike 		<ul style="list-style-type: none"> • No specific roads identified 	
Brevard	<ul style="list-style-type: none"> • SR 407 • SR 518 • SR 528 • US 192 • Plus seven routes off islands 			

Table 2. HURRICANE JEANNE LOCAL EMERGENCY MANAGEMENT EVACUATION ROUTE DATA

Responding County	Primary And Secondary Evacuation Routes	Descriptions of Traffic Conditions from Local Officials		
		Roads with Heavy Traffic	Roads with Congestion	Roads at Gridlock
Volusia	<ul style="list-style-type: none"> • I-4 • I-95 • US 92 • SR A1A • SR 40 • SR 44 • SR 414 ^a 		<ul style="list-style-type: none"> • SR 40 (in Lake and Marion Co. where roadway goes from 4 to 2 lanes) 	<ul style="list-style-type: none"> • General description of roadway network, specific roads not identified
Nassau	<ul style="list-style-type: none"> • I-95 • US 17 • US 301 • SR 200 			
West Coast Coastal Counties (in geographic order south to north)				
Manatee	<ul style="list-style-type: none"> • I-75 • I-275 • US 41 • US 301 • SR 64 • SR 70 			
Pinellas	<ul style="list-style-type: none"> • I-275 • US 19 • SR 60 • SR 688 			
Pasco	<ul style="list-style-type: none"> • I-75 • US 19 • US 41 • US 310 • Suncoast Expressway ^b • SR 52 • SR 54 	<ul style="list-style-type: none"> • Normal on all routes 	<ul style="list-style-type: none"> • Normal on all routes 	<ul style="list-style-type: none"> • Normal on all routes

Table 2. HURRICANE JEANNE LOCAL EMERGENCY MANAGEMENT EVACUATION ROUTE DATA

Responding County	Primary And Secondary Evacuation Routes	Descriptions of Traffic Conditions from Local Officials		
		Roads with Heavy Traffic	Roads with Congestion	Roads at Gridlock
Citrus	<ul style="list-style-type: none"> • SR 44 E of Crystal River • CR 490 • Grover Cleveland Blvd • US 41 			
Inland Counties (listed alphabetically)				
Alachua	<ul style="list-style-type: none"> • I-75 • US 301 • US 441 			
Bradford	<ul style="list-style-type: none"> • US 301 North • SR 100 East • SR 100 West • SR 16 East • SR 16 West 			
Columbia	<ul style="list-style-type: none"> • I-10 • I-75 • US 41 • US 90 • US 441 			
DeSoto	<ul style="list-style-type: none"> • US 17 • SR 70 • SR 72 			
Glades	<ul style="list-style-type: none"> • US 27 • SR 29 • SR 78 	<ul style="list-style-type: none"> • US 27 • SR 78 		
Hendry	<ul style="list-style-type: none"> • US 27 • SR 29 • SR 78 • SR 80 			
Highlands	<ul style="list-style-type: none"> • US 27 • US 98 • SR 64 • SR 66 • SR 70 	<ul style="list-style-type: none"> • US 27 		

Table 2. HURRICANE JEANNE LOCAL EMERGENCY MANAGEMENT EVACUATION ROUTE DATA

Responding County	Primary And Secondary Evacuation Routes	Descriptions of Traffic Conditions from Local Officials		
		Roads with Heavy Traffic	Roads with Congestion	Roads at Gridlock
Inland Counties Continued (listed alphabetically)				
Madison	<ul style="list-style-type: none"> • I-10 • US 90 			
Marion	<ul style="list-style-type: none"> • I-75 • US 27 • US 41 • US 301 • US 441 			
Orange	<ul style="list-style-type: none"> • I-4 • SR 46 • SR 50 • SR 520 • SR 528 			
Osceola	<ul style="list-style-type: none"> • I-4 • US 192 • US 441 • Florida Turnpike • SR 60 		<ul style="list-style-type: none"> • One or more roads (not specified) 	
Polk	<ul style="list-style-type: none"> • I-4 • US 17-19 • US 27 • SR 60 		<ul style="list-style-type: none"> • I-4 (during some periods) • US 27 (during some periods) • SR 60 (during some periods) 	
Seminole	<ul style="list-style-type: none"> • I-4 • US 17-92 • SR 46 • SR 434 • SR 436 			

Red Bold Letters = ETIS route and TTMS counter in or near county boundaries
 Blue Bold Letter = Route modeled in ETIS only, no TTMS counter in or near boundaries
 Green Bold Letters = TTMS counter only in or near county boundaries, but not modeled in ETIS
 Black Lettering, No Bold Letters = route with no TTMS counter and not modeled in ETIS
 Letters in italics indicate routes recommended by emergency management not modeled in most recent transportation analysis

a SR 414 is located in Seminole County, not in Volusia County
b Road not yet constructed when last HES Analysis was prepared

Analysis of the Traffic Counter Data

Florida has the benefit of strategically located traffic counters that record hourly counts as well as average speeds and provide that data in real time to a website that can be easily accessed. Analysis of the traffic counter data alone during Hurricane Jeanne provided no conclusive evidence of any significant traffic congestion on those specific roadway segments with Telemetered Traffic Monitoring System (TTMS) counters. The following pages include figures graphically depicting the data collected at these counters during the evacuations for Hurricane Jeanne.

I-75 Northbound (TTMS counter 0351, 0350, 0317 and 0112)

- There were four traffic counters on I-75 activated in an emergency mode during Hurricane Jeanne. Counter 0351 (Figure 1) is located on the western end of the Alligator Alley near Goldengate, just east of Naples in Collier County. The site of counter 0350 (see Figure 2) is near Punta Gorda in Charlotte County and the next activated counter north on this evacuation corridor is 0317 just south of Ocala (Figure 3). Counter 0112 (Figure 4) is located just south of the Florida – Georgia state line in Hamilton County. All the counters, except the one near Ocala, were also recording the average hourly speeds; that data can be seen in Table 3 below.
- Interestingly, At 7:00 AM on Thursday, September 23rd, 2004, all four counters on the I-75 corridor simultaneously began to record an increase in traffic volumes above the standard deviation for the average daily traffic (ADT) counts. All four of the counters had recorded normal to below normal figures leading up to that time, recorded above normal traffic counts for a few hours and reverted to average or below values. Only the traffic counter at Punta Gorda continued to measure above average traffic vehicle counts all day Thursday.
- The hourly counts for the two stations counters in the northern half of the state, near Ocala and the state line, dropped below ADT mid-afternoon and did not recommence recording above average volumes until the mid-morning hours on Friday the 24th of September. The slightly prolonged period of hiatus at these two counters may indicate that the higher than normal vehicle counts of September 23rd may not have been associated with evacuations from Hurricane Jeanne, but may instead have been attributable to a University of Florida

home football game with Kentucky on Saturday, September 25th or some other phenomenon stemming from the previous landfalling storms.

- By 6:00 PM on Friday, September 24th all four of the counters on I-75 were registering traffic counts higher than the standard deviation for the ADT figures and they would continue until mid-afternoon on Saturday, September 25. More than likely this sustained period of higher than average volumes at all of the counters on I-75 signals the beginning of the evacuations for Hurricane Jeanne, although there is no way to confirm that assertion.
- Possibly as a result of evacuation orders reportedly being issued in Palm Beach (recommended) and Martin Counties (mandatory) all the counters on I-75 except for the Goldengate site registered a significant increase in traffic above normal levels on Friday, September 24th, 2004. These increased volumes were sustained through much of Friday and Saturday which indicates that this traffic was more than likely associated with evacuations along the east coast of Florida. Reportedly, most of the western coastal counties in Florida did not issue any protective action decisions until the afternoon of Saturday, September 25th. Once the counties in the Tampa Bay and Withlacoochee regions officially joined the exodus from Hurricane Jeanne the traffic volumes increased significantly, triggering the peak hourly volumes observed on Saturday from the counters near Ocala and on the Florida - Georgia line.
- The peak hourly volumes recorded at the sites during the Hurricane Jeanne event indicate that none of the segments with traffic counter sites experienced major traffic congestion or other issues associated with reduced traffic flow.
 - The peak hourly volume at the counter station in Goldengate in Collier County indicates that evacuations for Miami-Dade and Broward Counties may not have begun until Saturday September 25th. At that TTMS location, the maximum hourly peak volume for the entire Jeanne event did not occur until 1:00 PM, registering a total of 1,734 vehicles, or over 550 vehicles below the hourly evacuation service volume. Average speeds remained well above the posted speed limit for the duration of the period of increased traffic volumes.
 - The only traffic counter on I-75 during the Hurricane Jeanne event to register a peak hourly volume on Friday was near Punta Gorda, again probably as evacuation traffic

began filtering across from the Treasure Coast Counties. The counter at Punta Gorda recorded a peak count of 2,261 vehicles at 6:00 PM, barely below the hourly evacuation service volume of 2,300 vehicles assigned to that roadway segment. Nonetheless the average speeds recorded at that peak hour and hours immediately before and after (see Table 3) indicated that traffic was not slowed down significantly as a result of the recorded volumes. The recorded speeds remained near or above the posted speed limit for that roadway segment.

- At the Ocala counter (0317), the traffic volumes on Friday, September 24, remained more than 1,000 vehicles per hour less than the hourly evacuation service volume of 4,500 vehicles. The peak hourly volume was recorded at 10:00 AM the next day, September 25th, at 4,570 vehicles, 70 over the hourly evacuation capacity of 4,500 for that roadway segment. The average recorded speeds at that counter were not recorded during this event, so it is not possible to definitively state whether the peak hour also created any significant traffic flow problems, although major problems in that regard are not likely or apparent from the data. The peak conveyance period for traffic at this counter site was not sustained for very long, at 9:00 AM the hourly count was 1,202 vehicles lower than the peak reading and the recorded volumes one hour after the maximum hourly reading was less than 4,000. The traffic volumes recorded at this site dropped off steadily and consistently reaching parity with ADT values by 5:00 PM, seven hours later. Therefore, in the absence of average speed data, the short duration of high hourly traffic volumes relative to the hourly evacuation capacity indicate that traffic flow issues were not a significant problem on this roadway segment.
- Given the timing of the peak traffic counts at the I-75 counter near Ocala, it is difficult to differentiate the traffic using that segment to travel to Gainesville for the Gators football home game from those responding to evacuation orders for Hurricane Jeanne. More than likely both events had a hand in creating the spike in traffic counts during the morning hours of Saturday, September 25th.
- The counter on I-75 near the state line with Georgia indicated a somewhat prolonged period of peak hourly traffic during Saturday afternoon. Spanning a period from 1:00 PM to 5:00 PM, the hourly traffic counts remained between 2,100 and 2,200 vehicles. Despite the duration of the peak vehicle counts, the average recorded speeds for that

roadway segment remained above the speed limit for the entire period. Given that the peak recorded values were less than half of the hourly evacuation service volume, and the high average speeds, it is not likely that this segment experienced any major problems with traffic flow.

- In assessing the total number of additional vehicles over ADT processed at each TTMS site on I-75, the numbers are consistent with expectations regarding vehicle distribution during the Hurricane Jeanne evacuation event.
 - The southernmost site on I-75 (Alligator Alley) near Goldengate indicates that approximately 6,400 vehicles above normal daily volumes traveled westbound from the east coast to the west coast in advance of Hurricane Jeanne's arrival. Of those vehicles, 79 % were recorded on Saturday, September 25th.
 - The TTMS station near Punta Gorda recorded 11,777 additional vehicles over ADT for Thursday, September 23rd through Saturday, September 25th traveled north on I-75 on that roadway segment. From these figures one can conclude that nearly 80% of the vehicles over normal figures for those three days combined occurred on Thursday and Friday, when the corresponding traffic volumes at the Alligator Alley counter were very low, 1,355 vehicles for the same period or 21%. Therefore most of the traffic processed by this roadway segment did not come across the Alley. Instead they may have come across on SR 70 and SR 80 from the eastern coastal counties; unfortunately, this cannot be confirmed since no TTMS counters exist on either one of those roadways. Of those vehicles that came across Alligator Alley, apparently 46% did not continue beyond destinations in Southwest Florida.
 - Counter 0317 near Ocala recorded slightly over 26,500 vehicles over the normal figures for Thursday to Saturday, September 23rd to 25th. On Thursday this counter recorded 74% of the additional vehicles over ADT counted at the Punta Gorda site. Friday's proportion of additional vehicles over ADT at the Ocala site in relation to the Punta Gorda site was 207% and Saturday's was over five times the number. This implies that approximately one quarter of the vehicles over ADT measured at this site on Thursday did not continue past locations in the Tampa Bay region; whereas on Friday and Saturday, more vehicles probably traveled across the state on I-4, SR 60 and SR 40, or

originated in Tampa Bay/Withlacoochee regions and traveled north toward locations further up the Florida peninsula or into other states.

- Slightly fewer than 5,000 additional vehicles were recorded by the TTMS sensor at the state line than were counted at the Ocala station. Furthermore, it appears that only a very small number of the additional vehicles counted at the Ocala site continued westbound on I-10. Of the additional vehicles over ADT counted at the Ocala station on I-75, only 36% on Thursday September 24th, 63% on Friday and an overwhelming majority on Saturday appeared to continue on into Georgia. This implies that from Thursday to Saturday a decreasing number of the vehicles traveling north on I-75 past Ocala found destinations in Florida counties on or adjacent to that corridor, or chose alternative routes in the State. Again these figures are consistent with expected vehicle distributions since as hotels and motels continued to fill up along that roadway, evacuees were forced to travel further away in search of those types of refuges.
- Furthermore, with home football games at two of the likely destinations for evacuees, i.e., Gainesville (University of Florida versus University of Kentucky) and Tallahassee (Florida State University versus Clemson University), the availability of hotels and other types of refuges in those areas was probably non-existent. This would explain why the percentages of vehicle trips counted traveling northbound into Georgia increased as the weekend neared.
- For the Hurricane Jeanne evacuation period, all of the traffic counters on I-75 recorded that evacuation travel demand had already dropped to negligible levels by the estimated arrival times of tropical storm force winds at each location. The number in every case had dropped to well below normal daily counts hours before the arrival of tropical storm winds, and those hourly continued to drop as Jeanne's center approached.
- Clearly an evacuation event of this magnitude, a category 4 storm approaching mostly the Treasure Coast region, but also requiring full protective action responses from East Central Florida and partial evacuations in the South and Northeast Florida regions, should have taxed the capacity of all roadways for days, especially along the northern sections of I-75. The fact that there is no real evidence of major traffic congestion from the four counters on this roadway is testimony to the very low participation rates that were experienced during this hurricane event.

- In comparing the ETIS numbers to the additional vehicles over ADT, it becomes apparent that the southernmost segments of I-75, below the Tampa Bay region were more impacted by Hurricane Jeanne than was forecast. Conversely, the segments north of Tampa Bay and the Florida Turnpike did not experience the evacuation travel demand predicted by ETIS. The reasons for these differences between forecast and actual figures are not apparent from the traffic counter data.
 - It does appear that more vehicles than would be intuitively expected to traversed the lower portion of the state and sought refuge along the western coast, or continued northbound on I-75. This lower than observed prediction may be somewhat attributable to the fact that vehicles from many of the inland counties cannot be committed to evacuations in ETIS. Without the additional travel demand generated in Glades, Hendry Polk and other Counties, the ETIS forecast vehicle numbers for these segments of I-75 would tend to be lower than the actual number. An adjustment of evacuation destinations or their relative destinations in ETIS for evacuating counties may be in order to reflect these figures.
 - On the other hand, the northern segments of I-75 north of the center part of the peninsula did not experience as much evacuation travel demand as forecast in ETIS, despite good agreement between the predicted and the actual vehicle numbers on the Florida Turnpike. This implies that the estimated participation rates provided by the surveyed counties were higher than the actual percentages. To lend some credence to that assertion, the ETIS forecast figures for both sites (near Ocala and the state line) are exactly 65% of the actual vehicles figures recorded there. Furthermore, the percentage of vehicles forecast for the state line segment of I-75 vis-à-vis the Ocala segment is 82% which is within one percentage point of agreement with the actual figures observed at both counters (81%).

Figure 1. Jeanne - I-75 Northbound Near Goldengate (0351)

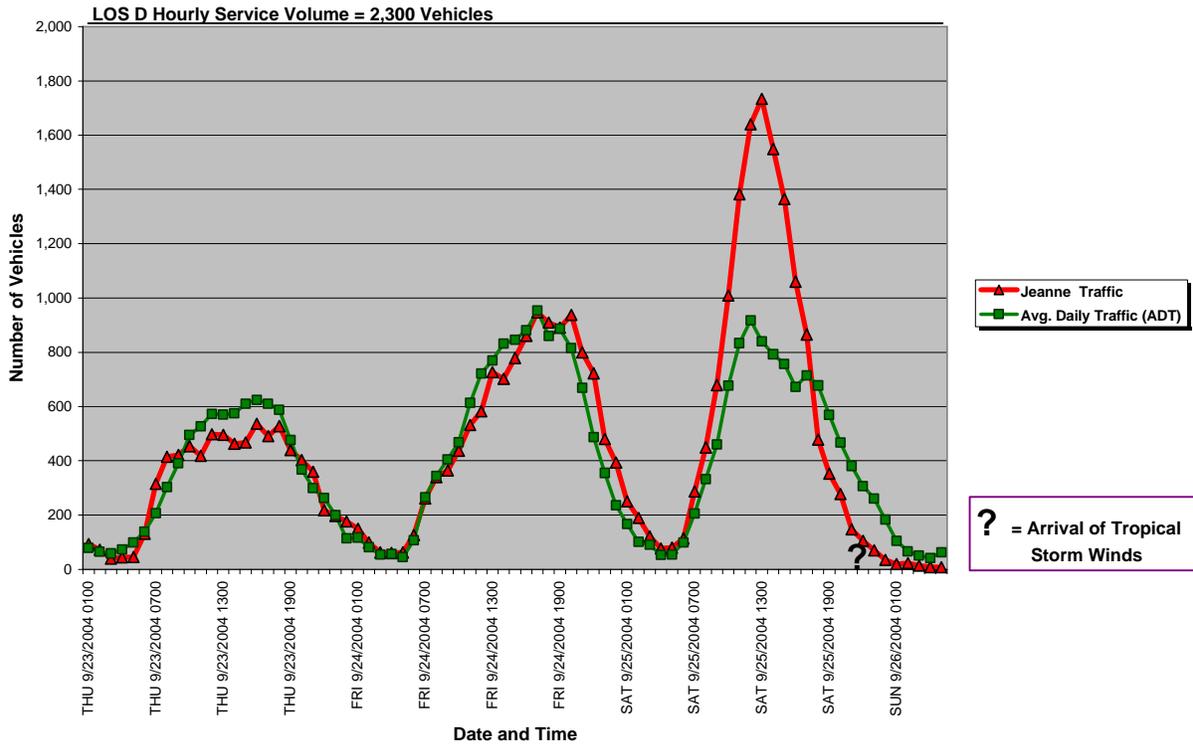


Figure 2. Jeanne - I-75 Northbound Near Punta Gorda (0350)

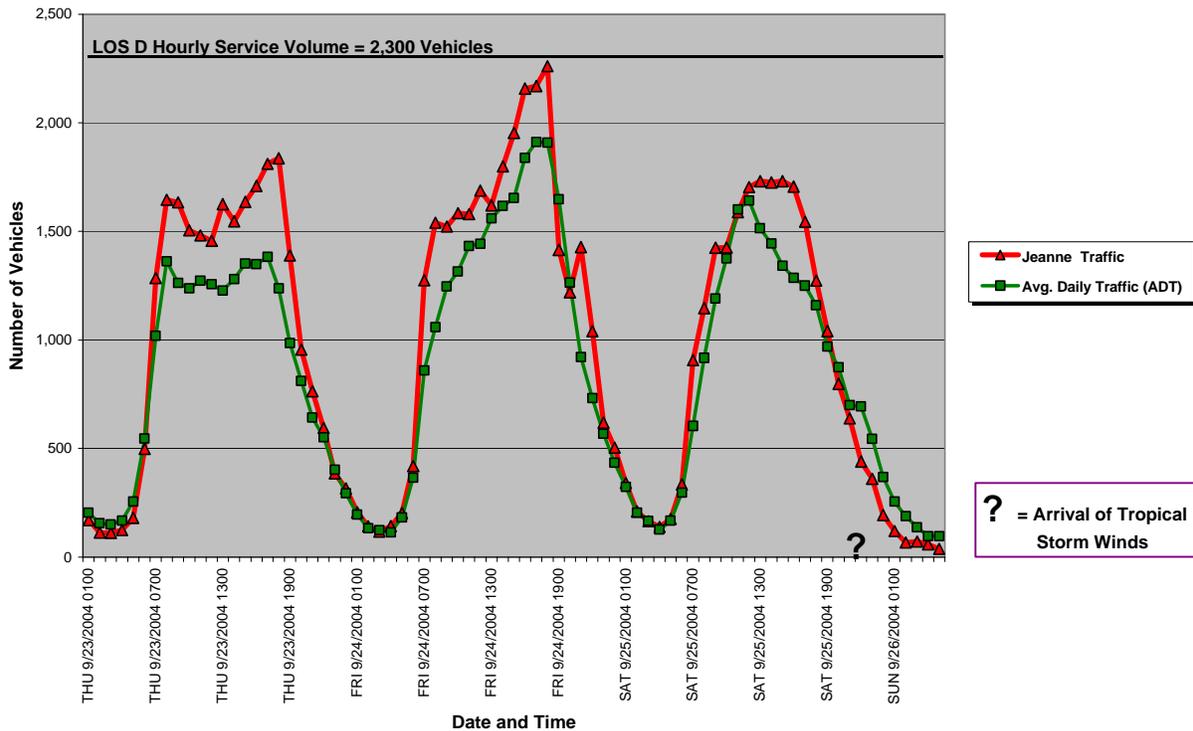


Figure 3. Jeanne - I-75 Northbound Near Ocala (0317)

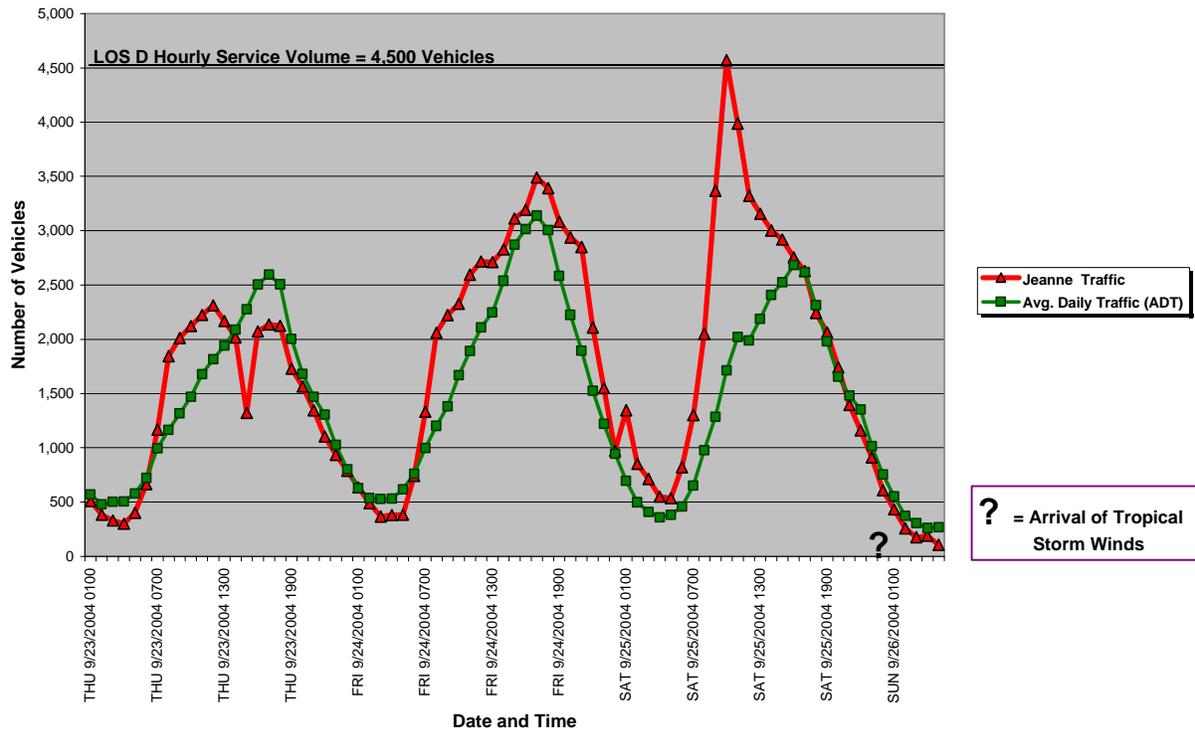
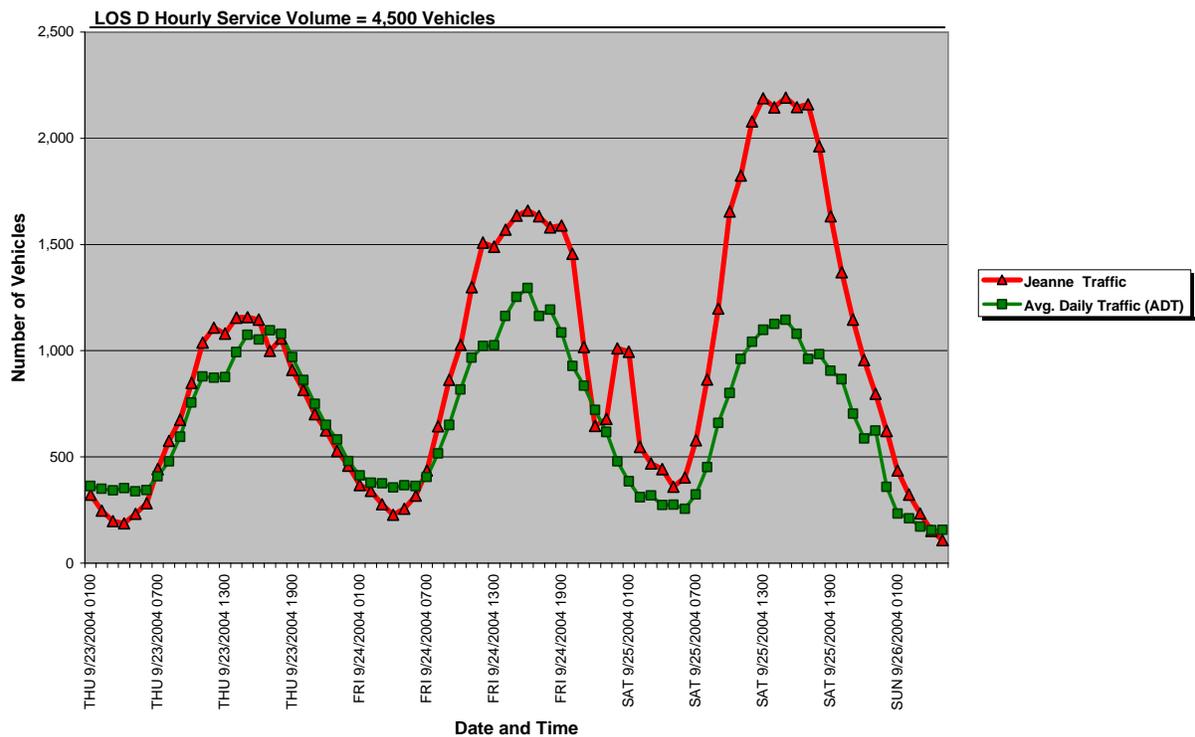


Figure 4. Jeanne - I-75 Northbound Near FL / GA Line (0112)

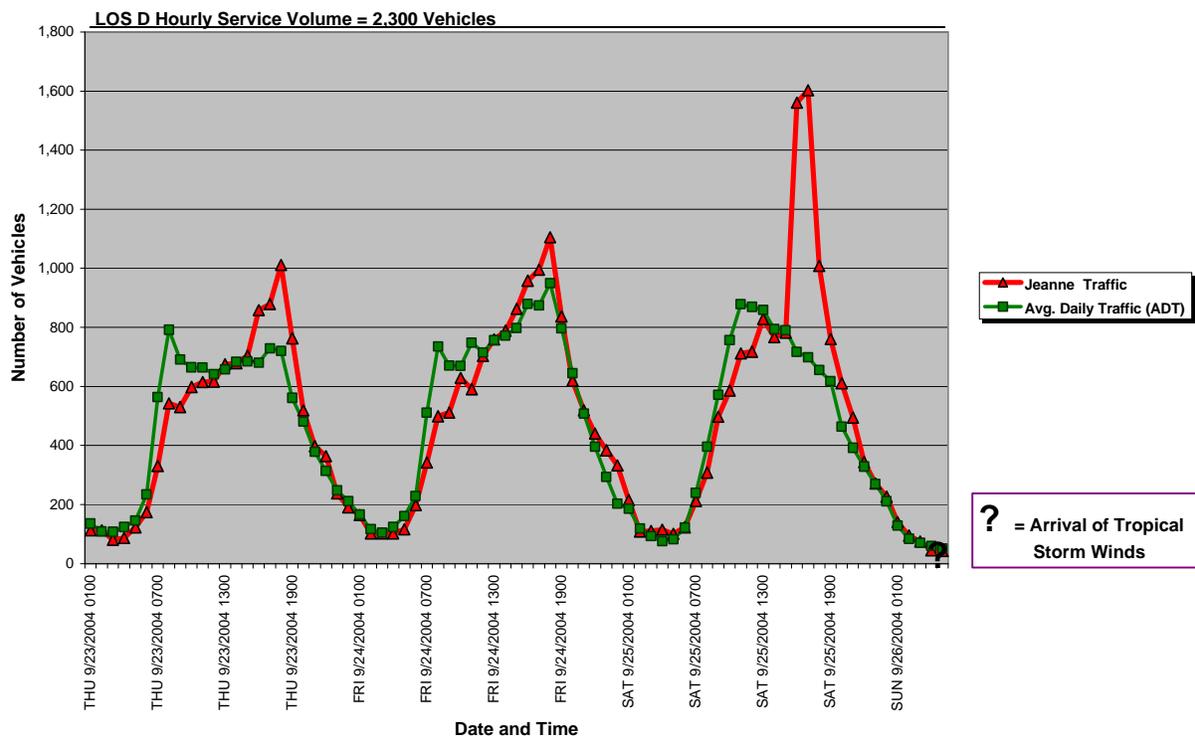


US 301 Northbound (TTMS counter 0018)

- The traffic counter on US 301 (see Figure 5) is near Waldo near Alachua County's border with Bradford County. The site is past the intersection of US 301 with SR 24, so it is not clear whether most of the vehicles over ADT recorded at this station exited off of I-75 onto SR 24 or continued up from US 301 and other local routes. Furthermore, the eventual destinations of these additional vehicles cannot be really discerned. The travel options from this segment of US 301 are into Starke or other adjoining inland locations, or to continue on to Jacksonville with follow on destinations in Georgia. Interestingly, Bradford County, where Starke is located, issued evacuation orders for their mobile home residents during Hurricane Jeanne, as did Union, Clay, St. Johns, Duval and Nassau Counties.
- US 301 experienced slightly higher than normal volumes all three days of the likely evacuation period for Hurricane Jeanne. Each day saw a distinct period of higher than normal volumes during the afternoon that dropped to or below normal during the night or morning hours (see Table 3). On Thursday, September 23rd, significantly higher than average daily traffic figures traveled north on US 301 between 2:00 PM and 8:00 PM. With the exception of counts at 8:00 PM and 2:00 AM, Friday's period of higher than normal traffic started at 3:00 PM and continued to 5:00 AM on Saturday. The last higher traffic count period extended from 2:00 PM to 2:00 AM on Sunday.
- Thursday, September 23rd saw 968 vehicles over ADT, Friday; over 750 extra vehicles used that roadway, followed by slightly over 2,600 on Saturday and Sunday, September 25th and 26th. Of all vehicles over ADT from Thursday to Sunday, 60 % were recorded on Saturday alone with 57% from 4:00 PM to 9:00 PM.
- The peak hourly volume for this segment of US 301 occurred at 5:00 PM on Saturday, September 24th with a total of 1,603 vehicles recorded for that hour. With an hourly evacuation service volume of 2,300 vehicles, this segment should have been able to easily handle this and all other hours of greater than normal traffic volumes. This statement is further corroborated by the average speeds recorded at this counter which indicates that for the higher than ADT hours they never dropped more than one mile and hour lower than the posted speed limit.

- Given the timing of the peak hour of traffic volumes during the days leading up to the arrival of Hurricane Jeanne, it is likely that the high values on Saturday were somewhat attributable to the University of Florida home game. The proportion of evacuation to football traffic is not evident from the counter data.
- By the time tropical storm force winds theoretically arrived at the counter location at 5:00 AM on Sunday, September 26th, the hourly counts had been steadily decreasing since the peak hour on Saturday afternoon. At that time only 55 vehicles were registered as using that segment of US 301.

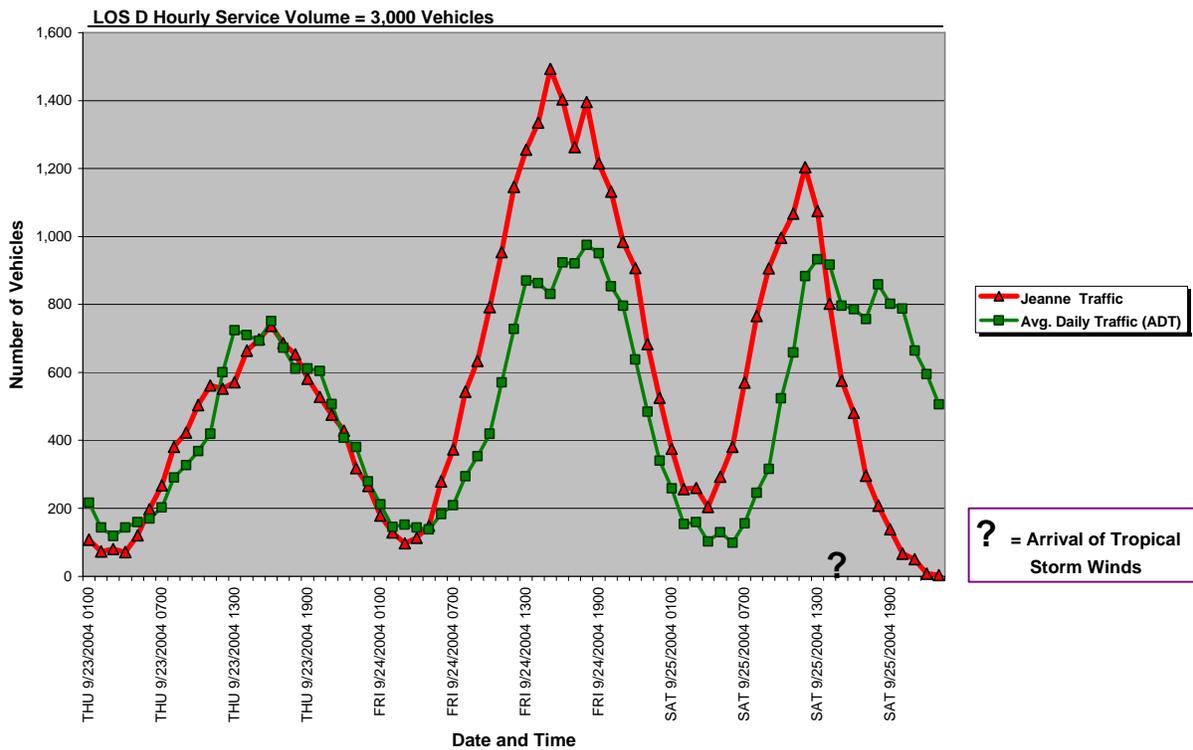
Figure 5. Jeanne - US 301 Northbound Near Waldo (0018)



Florida Turnpike Northbound (TTMS counter 0421)

- This traffic counter is located near Fort Pierce just north of where the Turnpike crosses I-95. Presumably this counter would capture the northbound traffic evacuating from the South Florida and Treasure Coast regions to all others in the northern half of the state and or to destinations in other states.
- According to data collected at this site on the Florida Turnpike, increased traffic counts began at first light on Thursday, September 23rd, more than 24 hours before Palm Beach and Martin County issued evacuation orders in response to Hurricane Jeanne's approach.
- During the 43 hours of greater than average daily traffic counts, The Florida Turnpike conveyed almost 10,500 vehicles over normal levels. Of those vehicles, only 6% of the total number of vehicles used that segment on Thursday, September 23rd; whereas on Friday and Saturday, 58% and 36 % respectively traveled northbound on that portion of the Turnpike. These daily percentages of the overall number of additional vehicles over ADT indicate that the significant increases in traffic volumes on the Turnpike coincide generally with the reported issuance of evacuation orders in the Treasure Coast region.
- The hourly peak volume recorded by this counter near Fort Pierce occurred at 3:00 PM on Friday, September 24th, 2004, and at 1,493 vehicles it constituted less than half of the hourly evacuation service volumes assigned to this roadway segment. The average of the hourly average speeds for the traffic counter during the hours of greater than ADT volumes was 74 mph, 4 miles an hour over the posted speed limit. During the peak hour, the average speed was 75 miles per hour. Based on the values for this counter, it does not appear that any major problems occurred with the flow of traffic during the evacuation event.
- By 3:00 PM on Saturday, September 25th, as tropical storm force winds were estimated to be reaching that traffic counter location, the traffic counts had been decreasing for the previous three hours dropping from a daily peak of 1,204 down to 575 vehicles. The hourly counts continued to drop dramatically so that by 11:00 PM on that evening, eight hours later, the traffic count was 3 vehicles.
- Agreement between ETIS and the additional vehicles over ADT recorded at the Fort Pierce TTMS station was very good, with the actual count constituting 92% of the ETIS forecast travel demand for that segment.

Figure 6. Jeanne - Florida Turnpike Northbound Near Ft. Pierce (0421)



I-95 Northbound (TTMS counters 0217, 0292 and 0132)

- The southernmost traffic counter (0217, see Figure 7) activated on I-95 during the Hurricane Jeanne evacuation event is located near Jupiter in Palm Beach County. Traffic counter 0292 is situated near Bunnell in Flagler County (Figure 8) and the portion of I-95 just south of the Florida - Georgia line was covered during the evacuation event by counter 0132, shown in Figure 9 below.
- Consistent with expectations the traffic counter at Jupiter measured the first increased hourly count over ADT at 6:00 AM on Thursday, September 23rd, followed by the counter near Bunnell 3 hours later. By 6:00 PM the counter near the state line recorded its first hour above normal traffic counts. Although the counters on the central and northern segments of I-95 recorded some hours above ADT levels, they were by no means consistently registering higher than normal counts until Friday and Saturday, September 24th and 25th. Conversely

by 4:00 PM on Saturday, September 25th, the Jupiter TTMS sensor on I-95 recorded its last above normal traffic count for the entire Hurricane Jeanne evacuation event.

- On the first day, Thursday, September 23rd, the segment with the most amount of traffic volume was by far near Jupiter with a total of 4,653 vehicles above ADT. On the first day, the next two counters further north near Bunnell and the state line recorded only 527 and 339 vehicles respectively. This implies that much of that traffic only progressed as far as the central portion of the state, probably seeking refuge in Orlando while some availability of hotel rooms may still have existed.
- Nearly as many vehicles used the Jupiter segment of I-95 on the second day as the first, while the Bunnell and state line counters also recorded dramatically higher numbers. The data from the I-95 counters on the second day imply that Treasure Coast counties were continuing to evacuate north, but a greater percentage were continuing northward on I-95, even entering into Georgia. At the same time evacuations were getting underway in the East Central Florida region (Brevard and Volusia Counties) and even in the Northeast Florida Counties. Unfortunately, only the county in either of those regions with specified clearance times was Volusia County, so the above assertion cannot be definitively supported.
- On the third day, the Jupiter traffic counter on I-95 recorded no hours with volumes above ADT levels, while the other two TTMS locations further north recorded between a third and a quarter of their overall additional vehicle totals for the entire event. By Friday, September 25th, the traffic volumes on I-95 were slackening, but were still high relative to normal hourly counts. Saturday's traffic counter data indicates that Treasure Coast evacuations had dropped off to negligible hourly rates, while the East Central and Northeast Florida regions continued with their efforts.
- The peak hour of traffic volume recorded at the Fort Pierce site occurred at 5:00 PM on Thursday, September 23rd. Although the highest vehicle count on this segment of I-95 for the Hurricane Jeanne event was approximately 4,100 vehicles it did not surpass the historical peak hourly count of 4,265. This peak hourly figure also did not exceed the 4,500 vehicle hourly evacuation service volume assigned to that roadway segment. The peak hour vehicle counts on subsequent days also did not exceed the normal daily figures. The average speed at the counter for all hours above ADT levels was 71 miles an hours which provides further

indication that traffic flow at this roadway segment did not appear to deteriorate appreciably from normal conditions during the evacuation event.

- The peak hours for the traffic counters on I-95 near Bunnell and the Florida – Georgia state line occurred in the afternoon of Friday, September 24th, 2004 within two hours of one another. The Bunnell station recorded a peak of slightly over 2,900 vehicles at 4:00 PM followed by a reading of 2,571 at 6:00 PM of the same day at the counter near the state boundary with Georgia. In both cases, the peak hour counts did not come close to reaching the hourly evacuation service volume for the road segments, much less surpassing them. The Bunnell counter peak volume only constituted 58% of the assigned evacuation capacity of 5,000 vehicles per hour, and the sensor furthest north only achieved 40% of its hourly evacuation through-put.
- The Bunnell counter data also provides some indication of a possible incident which may have slightly reduced the roadway segment's ability to process the traffic demand. Between 1:00 and 2:00 PM on Saturday, September 25th, the measured traffic counts dropped nearly 700 vehicles with a corresponding slight reduction in the average speed. The relatively lower vehicle numbers for 2:00 and 3:00 PM on that day, even lower than ADT counts for those hours, do not appear consistent with the traffic volumes recorded before and after that timeframe. Furthermore, the peak hourly volume for the Bunnell station at 4:00 PM is a dramatic increase (exactly 1,300 vehicles) over the previous hour's value and coincides with an average speed of 65 miles an hour. This temporary decrease in vehicle through-put provides an indication that an accident or possibly a breakdown in an active lane may have impeded traffic during that time. It also appears that a less significant but discernable reduction, possibly as a result of the apparent constriction on the Bunnell segment, occurred two hours later at the counter site near Georgia.
- By the time tropical storm force winds arrived at either the Jupiter or Bunnell sites, hourly traffic volumes had long since dropped below ADT levels and were well on their way to single or double digits. This implies that both of these roadways had sufficient time to process most of their evacuation travel demand before the hurricane made road conditions unworthy of travel.
- The data collected from both the counter on the Florida Turnpike near Fort Pierce and on I-95 near Jupiter do not appear to support Palm Beach County's assertion that their clearance

times were not sufficient for the hurricane situation created by Hurricane Jeanne. Even when assessing the overall number of vehicles processed by each roadway, and not just the additional vehicles over ADT, the service volume to evacuating vehicles ratio on the Fort Pierce segment of the Turnpike was 10.53 hours, while the I-95 minimum time required to process the total vehicle demand was 14.13 hours.

- The out of region clearance times for a category 3 through 5 event for all counties in the Treasure Coast region as provided in the 2004 Transportation Analysis and Abbreviated Transportation Model (ATM) are up to 26.75 hours for a slow response evacuation.
 - According to the Treasure Coast Transportation Analysis report, the segment on the Florida Turnpike with the traffic counter is expected to have an evacuation travel demand of 41,416 vehicles with a service volume to evacuating vehicle ratio of 13.81 hours, not including background traffic. The actual vehicle count over ADT during Hurricane Jeanne for this roadway segment was 10,490, 25% of the figures provided in the Transportation Analysis report. The real service volume to evacuation vehicle ratio for Hurricane Jeanne was only 3.5 hours.
 - Within Palm Beach County the in-county vehicle demand on I-95 for the segment with the counter is 28,693 evacuating vehicles, requiring almost five and three quarter hours of roadway processing time to clear that vehicle demand, not including background traffic. The actual additional vehicle count over ADT for the Hurricane Jeanne event was only 8,194 with the remaining 62,480 vehicles as normal traffic figures (or background traffic) for the event period. This additional vehicle over ADT figure constitutes only 29% of the forecast travel demand for a full category 3-5 evacuation in Palm Beach County. Therefore, the real service volume to evacuating vehicle ratio for Palm Beach County for that roadway segment during Hurricane Jeanne was an only additional 1.64 hours.
- Comparing the ETIS results to the traffic data collected during Hurricane Jeanne seems to indicate that the travel demand forecast for the Palm Beach County segment of I-95 was in close agreement. This suggests that at least for the Palm Beach County portion of the roadway the participation rate estimates from local emergency management officials was probably quite accurate. For the I-95 counter sites near Bunnell and the state line the evidence seems to imply that the local estimates of participation percentages were high relative to the actual number of evacuees that complied with local protective action

directives. This statement seems to be corroborated by the fact that almost all other ETIS travel demand forecasts for the roadways in the northern portion of the peninsula were high relative to the number of additional vehicles recorded over the normal daily figures. In every case on roadways that connect to I-95 from the east coast traveling westbound, the ETIS forecast number of evacuating vehicles was higher than the additional vehicle figures over ADT observed at the counters.

- As referenced above, it is likely that part of the explanation for the difference between ETIS and the real figures on I-95 is that evacuation participation rates were indeed lower than the percentages provided by local officials during the Post-Jeanne surveys. Some counties along the eastern seaboard estimated that their participation rates were 70% and above for Hurricane Jeanne and the vehicle counts on I-95 do not support that degree of compliance with evacuation orders. If those participation rates were realized during this event, most of the evacuating vehicles did not leave the county of origin or did not travel in a manner consistent with the norms established by the behavioral surveys and emulated in the transportation analyses.
- Another contributing factor for this discrepancy, especially for I-95, is that many of the other roads that convey vehicles westward from I-95 are not included in the ETIS model, so those vehicles are distributed along the other roadways are included in the model. US 17, US 192, SR 520 all assist in reducing the load of vehicles that are borne on I-95 during a hurricane evacuation, but they are not included in the ETIS model. Therefore the vehicles are more than likely routed onto I-95 in developing the vehicle demand estimates. According to the traffic counters the above specified roadways helped move a total of approximately 13,000 vehicles away from the coast to other communities in Florida and beyond.

Figure 7. Jeanne - I-95 Northbound Jupiter (0217)

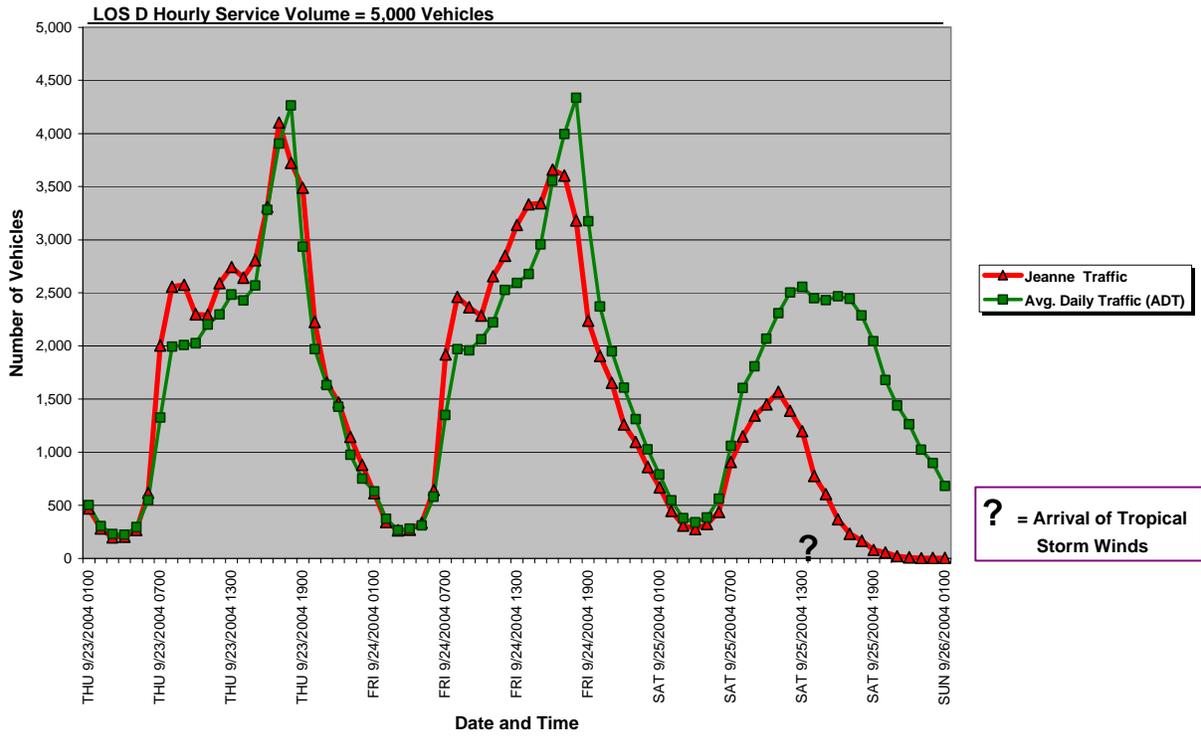


Figure 8. Jeanne - I-95 Northbound Near Bunnell (0292)

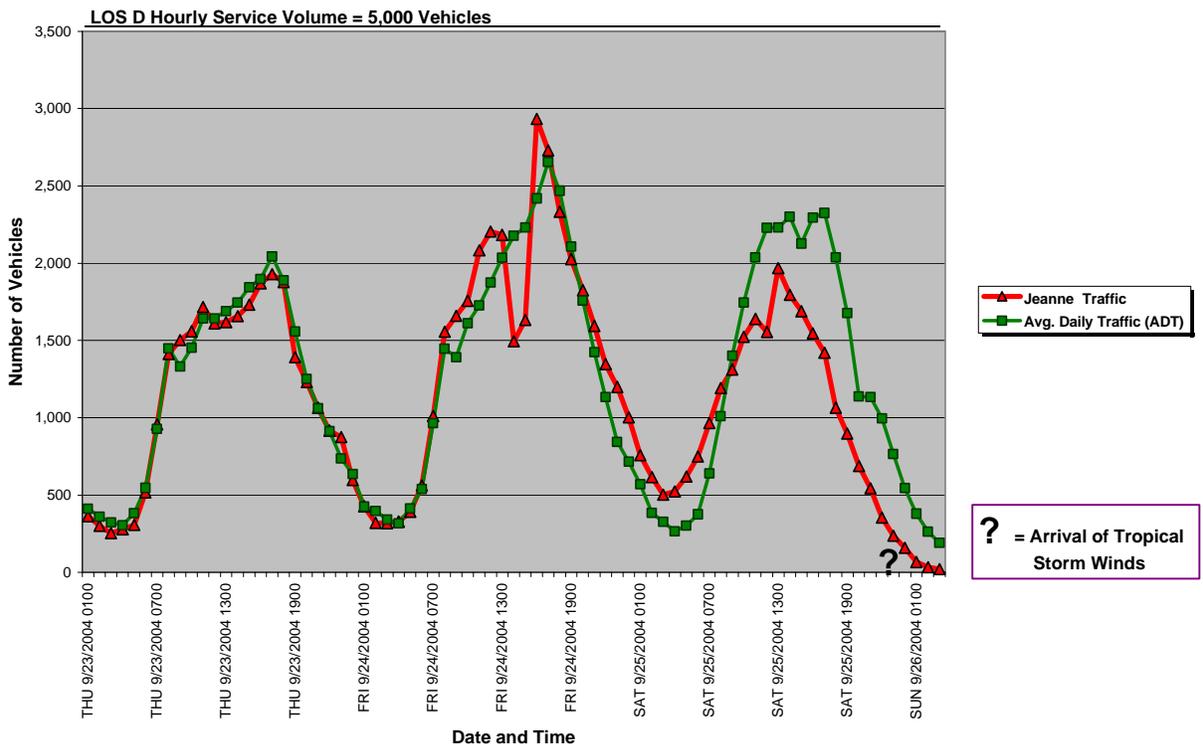
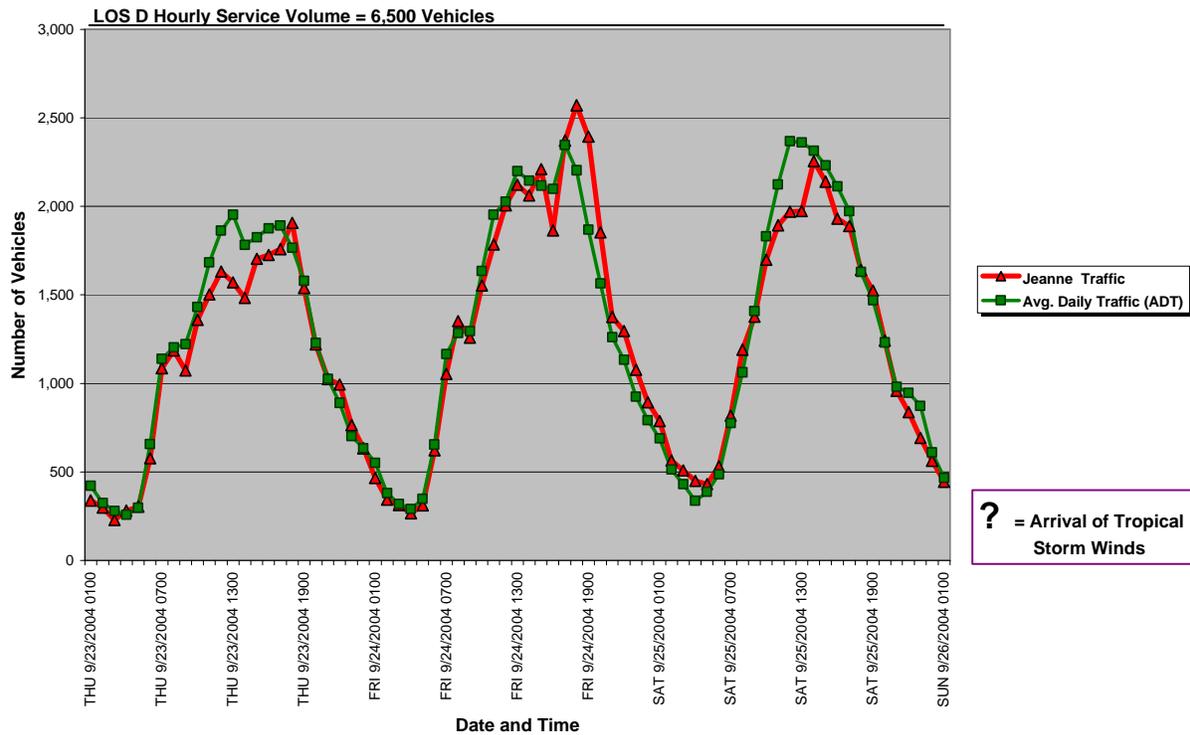


Figure 9. Jeanne - I-95 Northbound Near FL / GA Line (0132)



Central Florida Roadways Inland (US 192, SR 520, SR 528, SR 50)

- Most of these roadways primarily support evacuations from Brevard County inland although a percentage of vehicles traveling northbound on I-95 may also use them to escape the coast, especially SR 528.
 - Counter 0065 near Holopaw (see Figure 10) measures traffic volumes and average speeds on US 192. This roadway is primarily used by evacuees leaving the Melbourne area of Brevard County.
 - The traffic counter on SR 520 (Figure 11) is located near the eastern approach to the Hubert Humphrey Bridge off of Merritt Island. Most likely the vehicles crossing this TTMS sensor (0113) are evacuating from zones in the central portion of Brevard County heading for in-county locations near Cocoa and Rockledge or I-95 and SR 528.
 - The segment on SR 528, also known as the Beeline Expressway, just east of its intersection with SR 520 (Figure 12) has a traffic counter (0336). The Beeline is the primary evacuation roadway for Brevard County and the only one in this group that has been included in the ETIS model.

- There is also a TTMS sensor located on SR 50 just west of its intersection with SR 520 near Bithlo. The Traffic counts are detailed in Figure 13 and the hours of above ADT counts and average speeds are included in Table 3 below.
- By the data provided from the above traffic counters it appears that some degree of evacuation or a greater than normal movement of vehicles westbound was underway in Brevard County during the pre-dawn hours of Thursday, September 23rd, 2004. This is especially true on SR 520 where higher than ADT traffic counts were recorded as early as 1:00 AM on Thursday. Of the three traffic counters measuring traffic volumes on September 23rd, the station on 520 recorded 36% of its total number of additional vehicles over ADT pre-Jeanne, whereas US 192 and the Beeline sensors recorded less than 20% of their total additional vehicles during the event.
- Nonetheless it does not appear that the three traffic counter above began measuring hourly volumes consistently above normal levels until Friday morning. The addition of data from the counter 0104, which was only turned on at midnight on Thursday, further corroborates that statement. By 8:00 AM all four counters were measuring traffic volumes above ADT for the rest of the day.
- Between Thursday, September 23rd and Saturday, September 25th the counter on US 192 measured above average traffic for a total of 44 hours conveying nearly 5,200 vehicles over ADT in that time period. Most of those additional vehicles traveled on Friday and Saturday constituting 87% of all trips counted above ADT levels for those days. The peak hourly count occurred at noon on September 25th, using approximately 63% of the hourly evacuation service volumes assigned to that roadway. The average hourly speeds measured on that roadway during the higher than normal traffic hours (see Table 3) averaged 61 miles an hour. This indicates that there were no apparent major traffic congestion problems on this segment of US 192 during evacuations from Hurricane Jeanne.
- The TTMS sensor on SR 520 during the same three day period registered over 4,011 total vehicles over normal daily figures for that period. Most of the additional vehicles were observed during the afternoon hours when normal hourly volumes are high. On both Thursday and Friday, the peak hourly counts were significantly above the hourly evacuation service volume of 1,710 vehicles. The high hourly counts, slightly above 2,300 vehicles

occurred at 4:00 PM on both days, but according to the historical traffic data for that segment of SR 520 on those days, the volumes routinely exceed the Level of Service D figures. During those higher than normal traffic periods the average speeds remained at or near the posted speed limit of 50 miles per hour which indicates that the increased traffic volumes measured on the days preceding Hurricane Jeanne did not seriously impede traffic flow.

- SR 528, or the Beeline Expressway, was by far the roadway with the most evacuation demand in this group. In the three days from Thursday to Saturday, September 23rd through 25th, this TTMS sensor counted 13,390 vehicles over the ADT figures for the segment. In its 46 hours of processing higher than normal vehicle counts during Hurricane Ivan, it appears that a majority (up to 90%) of those vehicles were from Brevard County. The peak hour of traffic volume occurred at 5:00 PM on Saturday, September 24th with a count of 1,950 vehicles, 434 higher than ADT for that hour, but only 59% of the hourly evacuation service volume. The average recorded speed in the days leading up to the storm was 74 mph, four miles an hour above the speed limit. The measured traffic volumes and average speeds on this segment of SR 528 indicate that there were no serious traffic flow problems at that location.
- The counter on SR 50 near Bithlo was only activated in an emergency mode to record hourly vehicle counts and average speeds at midnight on Thursday/Friday. Although it did measure higher than normal traffic volumes during Friday and the early portion of Saturday, its record probably is not complete and, therefore of limited value for evacuation traffic analysis purposes. Nonetheless, the counter data has been included in Figure 15 and in Table 3.
- At all traffic counter locations the volume of traffic had begun to drop off below ADT levels well before the arrival of tropical storm force winds. This indicates that the traffic started to abate because the evacuation travel demand was becoming exhausted rather than because the winds and deteriorating road conditions were forcing people to halt their movements.
- In comparing the Transportation analysis and ETIS results with the traffic counter data, there are some indications that portions of Brevard County may have exceeded the 30 percent participation rate by a slight margin. A participation rate of 30% for the forecast vehicle counts in the 1999 East Central Florida of these roadways translates to 2,091 vehicles on US 192, 2,221 on SR 520 and 12,973 on SR 528. These figures are significantly lower than the

actual count of vehicles over ADT levels recorded during the Hurricane Jeanne event, even taking six years of population growth into account. Based on the figures provided by those counters, the actual participation rate for Brevard County during Hurricane Jeanne may have been as high as 40%.

- ETIS overestimated the actual number of vehicles traveling westbound on the Beeline Expressway by 38%. Again, the possible explanations for the difference in numbers are similar to those for I-95 discussed above. Although the figures indicate that Brevard County’s participation rate estimate may have been low for Hurricane Jeanne, it is likely that the counties to the south may have overestimated their compliance rates which could result in fewer vehicles from those counties using SR 528.

Figure 10. Jeanne - US 192 Northbound Near Holopaw (0065)

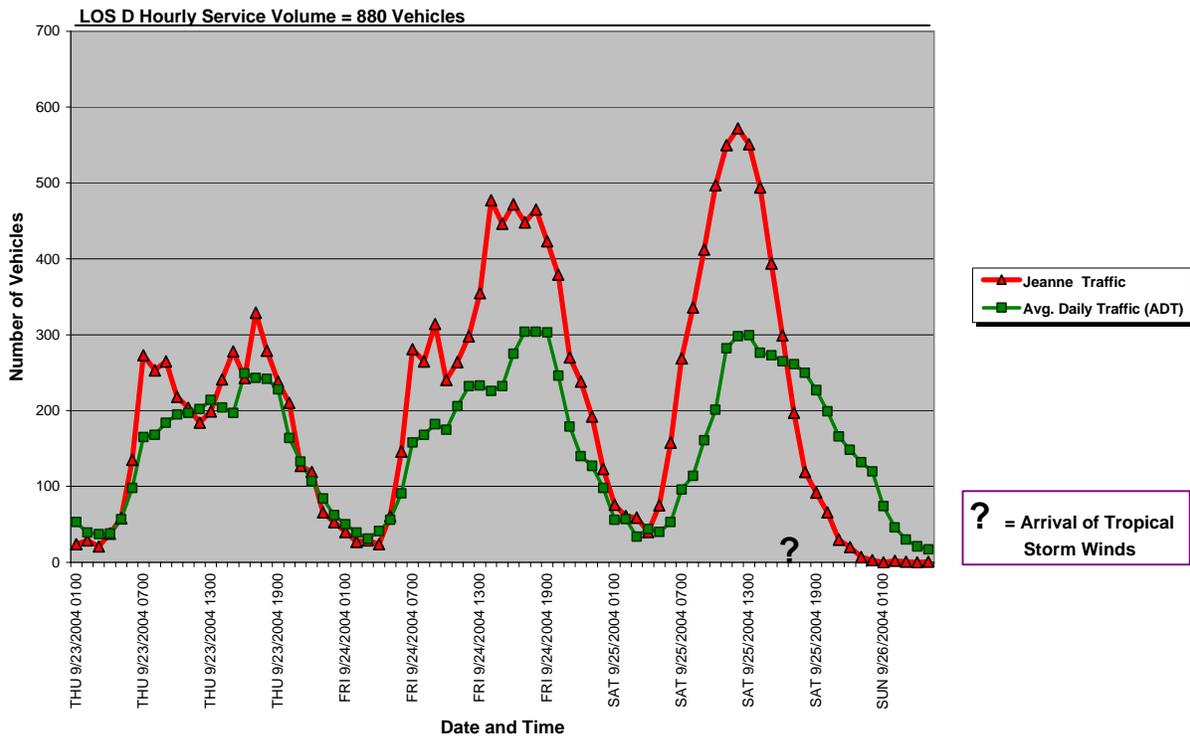


Figure 11. Jeanne - SR 520 Westbound Near Merritt Island (0113)

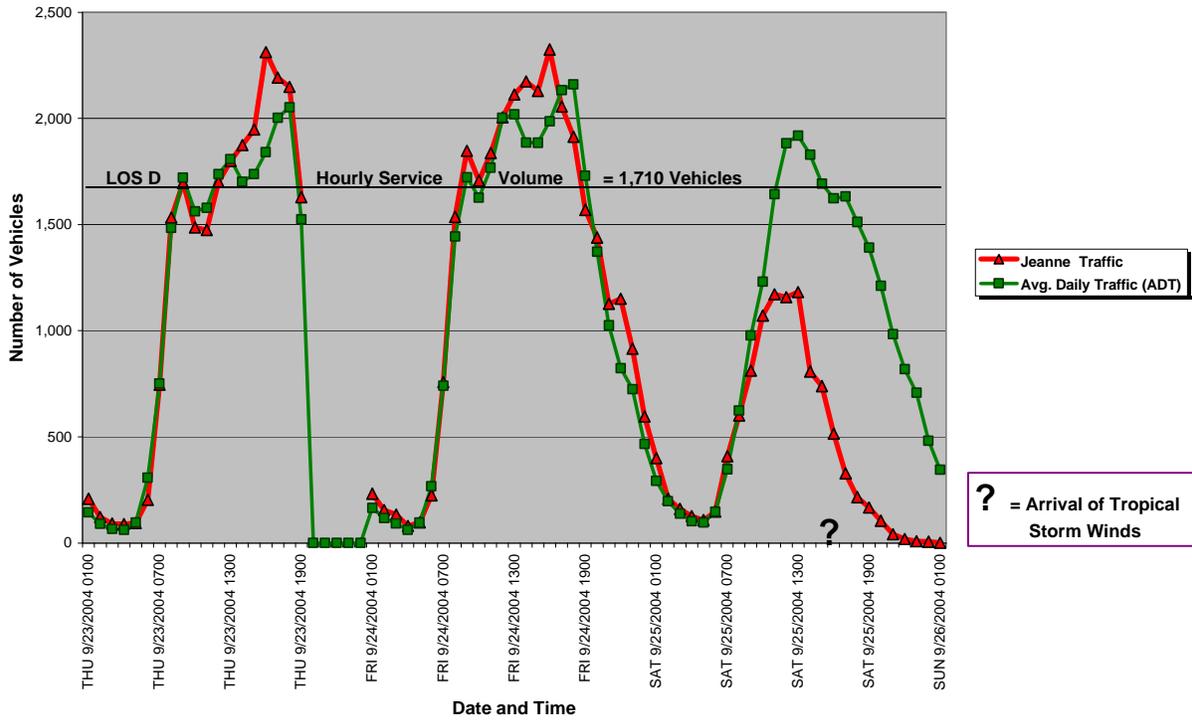


Figure 12. Jeanne - SR 528 Westbound Near Titusville (0336)

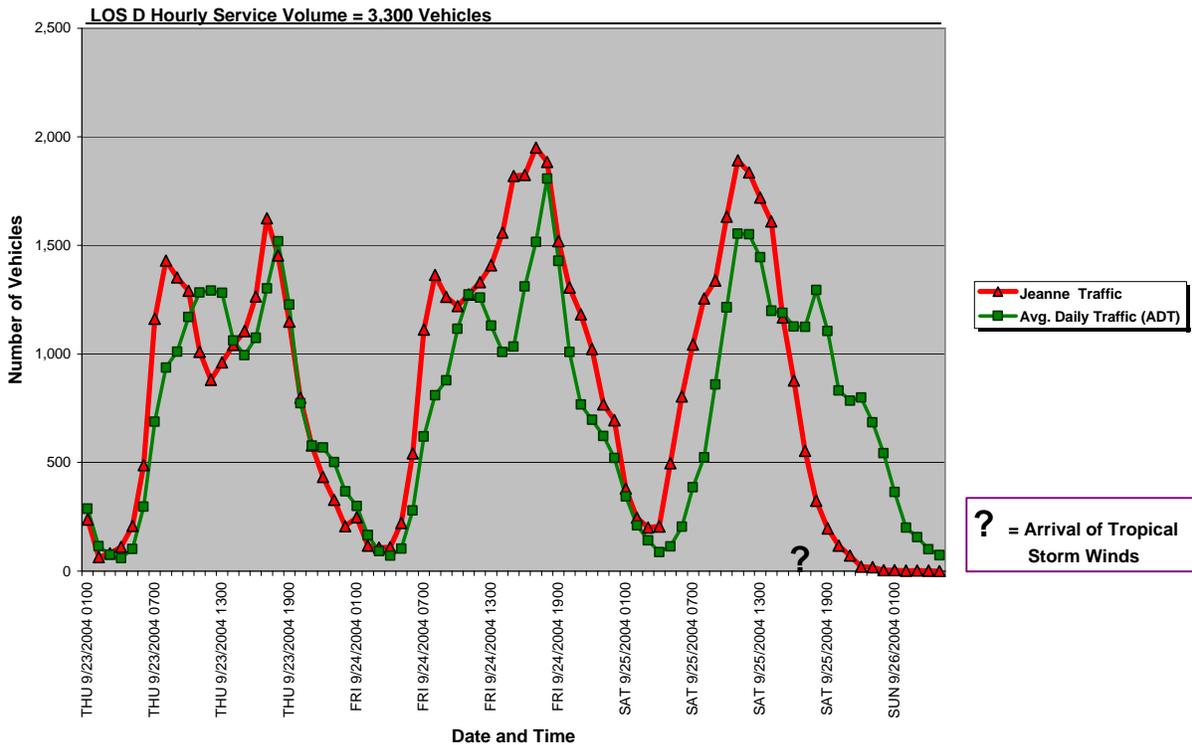
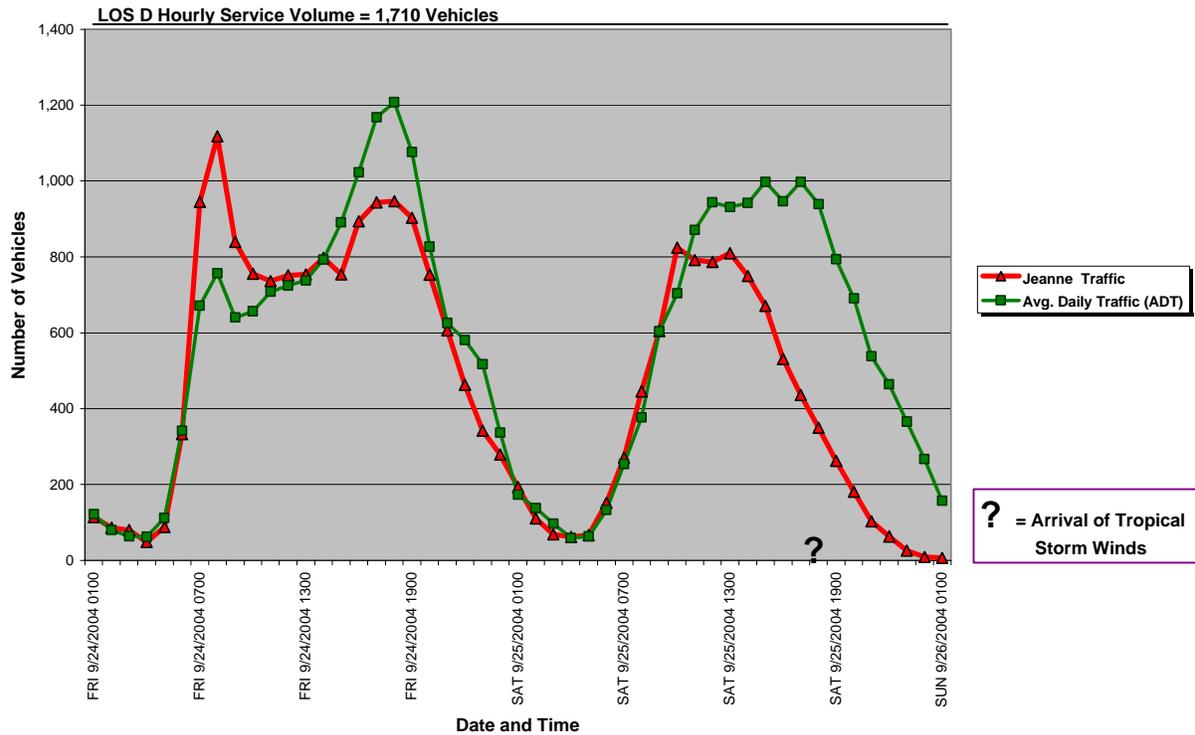


Figure 13. Jeanne - SR 50 Westbound Near Bithlo (0104)



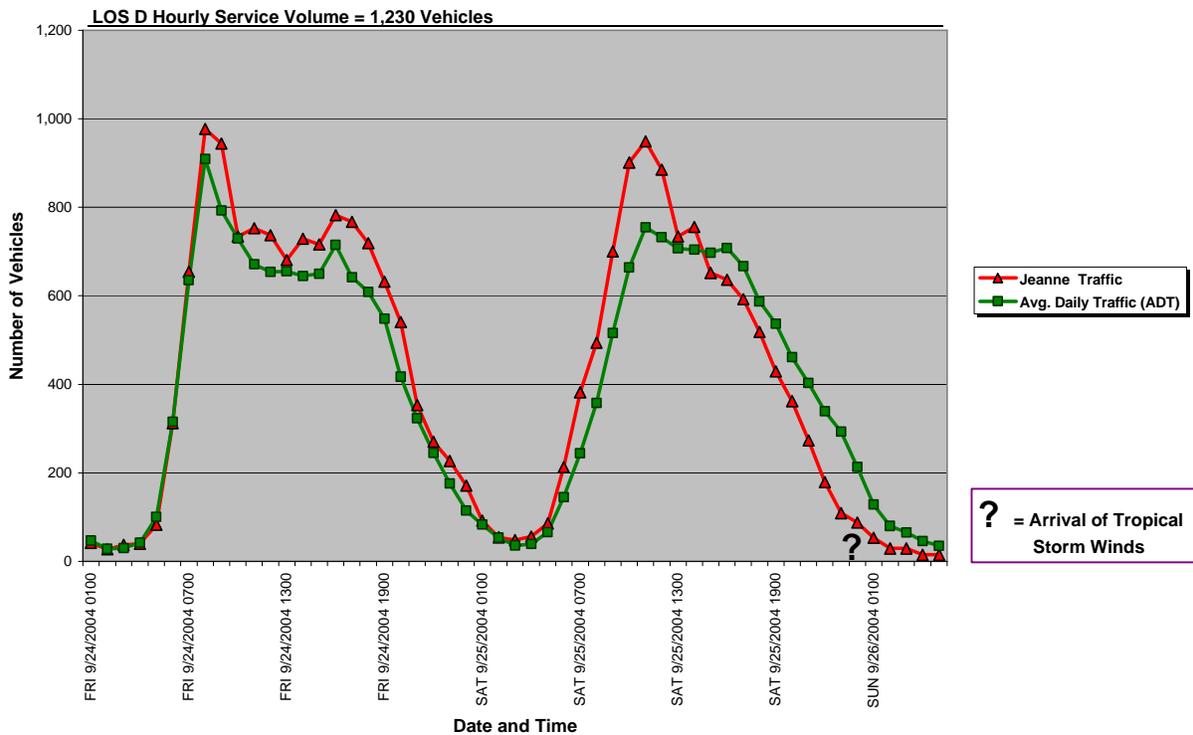
US 17 Northbound (TTMS counter 0105)

- This traffic counter on US 17 (Figure 17) is located just southeast of Palatka near San Mateo and is not included in ETIS. The sensor was not converted to emergency operations until Thursday/Friday at midnight, although there is no indication that traffic was higher than normal levels prior to activation.
- The TTMS sensor recorded the first hour above ADT at 8:00 on Friday, September 24th, 2004, and the higher than average traffic volumes for the next 25 hours.
- By the time traffic counts dropped below ADT at 2:00 PM on Saturday, September 25th, 2,511 additional vehicles had used that roadway segment.
- The peak hour of traffic volume measured at this site occurred at 8:00 AM on Friday although a second peak with slightly few vehicles per hour also occurred at 11:00 AM on Saturday. The Friday peak of 977 vehicles was only 68 higher than the ADT figure for that hour and 253 less than the hourly evacuation service volume for that roadway segment. The

Saturday peak although slightly less at 949 vehicles exceeded the average hourly count for that day by 194.

- The average speed for the entire high traffic volume period before Hurricane Jeanne's landfall was one mile an hour below the speed limit on this roadway. Nonetheless, a slight reduction from 55 to 47 mph at 9:00 AM on Friday, September 24th, one hour after the peak volume was recorded, provides some indication that traffic volume may have impeded the smooth flow of traffic. This slight hindrance was very temporary since by 10:00 AM, just one hour later, the average speed had nearly returned to the posted limit.
- By the estimated arrival time of tropical storm force winds at this counter location, very few vehicles were on this roadway segment. The recorded traffic volumes had dropped below ADT figures ten hours before the 39 mph sustained winds supposedly reached the counter location.

Figure 14. Jeanne - US 17 Northbound Near San Mateo (0105)



I-10 Westbound (TTMS counter 0109, 0238, 0220 and 0218)

- The traffic counters on I-10 that recorded higher than normal traffic volumes during the Hurricane Jeanne event are located from Jacksonville to Marianna. The eastern-most counter (0109) is located in Duval County near Baldwin, just east of the US 301 interchange (see Figure 15). TTMS sensor 0238 (Figure 16) is located just west of the I-10 junction with I-75 near Live Oak. A third traffic sensor (0220) is located near Quincy (Figure 17), while the western-most counter site (0218) is near Marianna in Jackson County (Figure 18). None of these traffic counters were activated in the emergency operations mode until midnight on Friday morning.
- Although the first hour of recorded westbound traffic at the three westernmost traffic counters were above ADT levels, it is not possible to discern whether higher than normal volumes were evident on I-10 on Thursday, September 23rd, 2004, as a result of Hurricane Jeanne. Nonetheless, none of the counters on I-10 recorded sustained periods of higher than average hourly counts until the afternoon of Friday, September 24th. By 11:00 PM of that same day all four TTMS sites were registering hourly traffic counts consistently above average levels.
- The daily percentages of all vehicles over ADT recorded at the three easternmost counters basically indicate that one third of the additional vehicles traveled westbound on I-10 on Friday and the other two-thirds did so on Saturday. The Quincy and Marianna sites registered some traffic on Sunday, but by noon of that day the hourly volumes at all four locations had dropped below ADT levels.
- The peak hours of traffic volume recorded at each of the I-10 stations do not appear to follow a logical succession or pattern. Nonetheless, the peaks in traffic experienced throughout the days in which recording was underway, do appear to have a ripple effect seemingly moving east to west from the sensor in Baldwin to Marianna. The Baldwin station registered the first peak in evacuation traffic volumes at 5:00 PM on Friday, September 24th, followed by the Quincy counter one hour later. The peak hour for the site near Live Oak west of the I-10 junction with I-75 did not occur until noon on Saturday, September 25th, whereas the Marianna location did not experience the apex of its traffic until 2:00 PM the same day. As mentioned earlier Florida State University in Tallahassee had a home game on September

25th, and the spike in traffic counts at the Live Oak counter may be somewhat attributable to that event.

- Regardless of the site, none of the peak traffic volumes surpassed the hourly evacuation service volume for their respective segments of I-10. The counter near Baldwin came the closest to reaching its hourly evacuation capacity but fell short by nearly 700 vehicles per hour. Additionally, that peak value was only 239 vehicles higher than the average daily traffic count for that hour.
- The average speed limits recorded at all four sites for the hours above ADT were above the 70 mile per hour speed limit. In fact for all four counters, only four of the 154 total hours of higher than normal traffic volumes had average speeds at or below the speed limit; all other hourly speed figures were above the speed limit. This provides a reasonably clear indication that there were no major impediments to traffic flow on the segments of I-10 with sensors during Hurricane Jeanne.
- From east to west the total count of vehicles above ADT for Friday, September 24th to Sunday, September 26th were 8,256; 8,508; 7,404 and 5,803.
 - These figures imply that a portion of the evacuating vehicles northbound on I-95 above the Bunnell traffic counter (0292) traveled west on I-10 along with the vehicles that originated in Duval and Nassau Counties, as well as Bradford, Clay and Union Counties.
 - It appears that more northbound vehicles on I-75 went westbound on I-10 than I-10 westbound vehicles went north on I-75.
 - Only 1,104 vehicles did not continue to the Quincy counter on I-10 which indicates that they either chose alternative routes to other destinations along the route or they ended their trips in communities along the way. Tallahassee may have been a likely destination community for these vehicles on I-10.
 - An additional 1,600 vehicles also did not apparently continue on to the location of the traffic counter near Marianna, which actually west of the interchanges off of I-10 into that community. Those vehicles may have chosen Marianna as a destination since the traffic counter readings at the state line on US 231 during this event were below ADT levels for the entire Hurricane Jeanne evacuation period.

- None of the other traffic counters further west on I-10 were operating in the emergency mode, therefore the additional volume of traffic above ADT that continued beyond the Marianna station is not known.

➤ In comparing the ETIS figures with the actual number of additional vehicles above ADT, clearly the model overestimated the forecast travel demand figures at all four counter locations. Table 4 show that agreement between the two figures was closer at the Baldwin and Quincy sites than at the other two. As with the other major roadways, inexact information about to what level counties evacuated and natural discrepancies in participation rate estimates could result in dramatically different numbers, especially in circumstances where the travel demand on a segment of roadway is a compilation of evacuation traffic from many communities. If the actual travel demand figures on I-75 and I-95 are lower than the forecast numbers, then it stands to reason that those shortfalls will become evident for the predicted numbers for I-10 also.

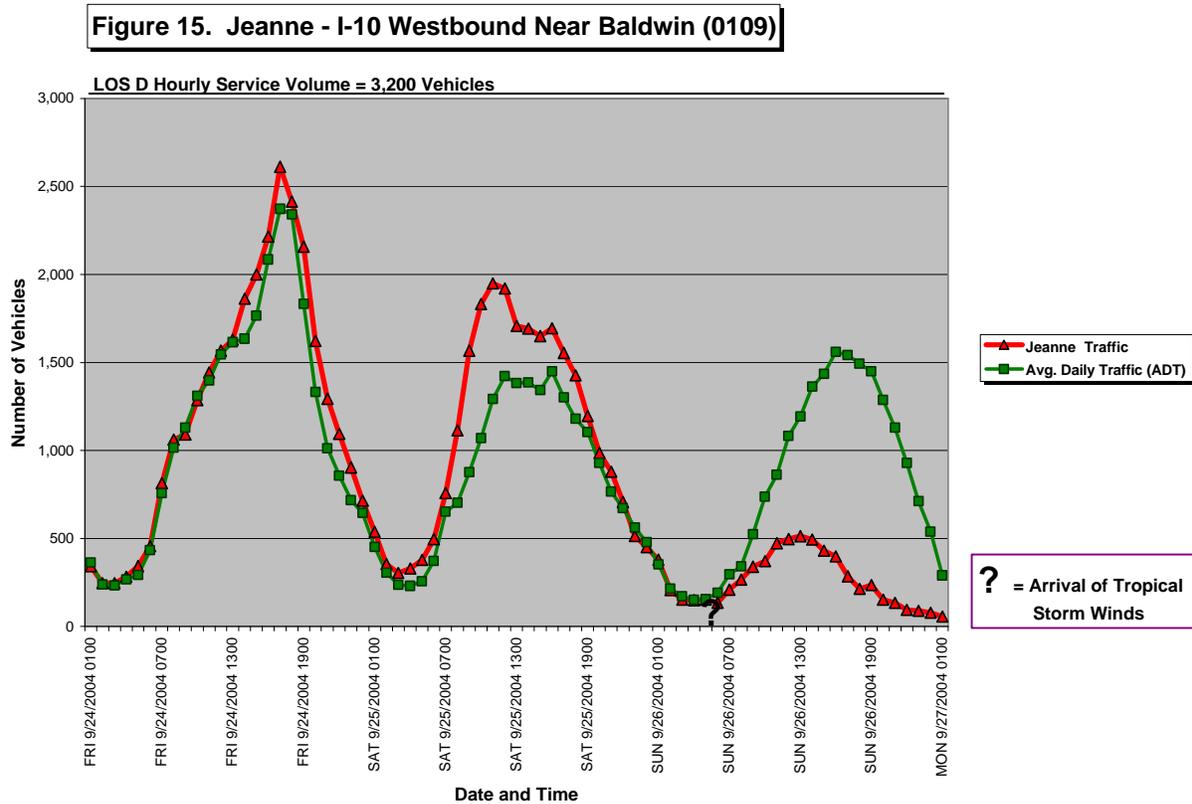


Figure 16. Jeanne - I-10 Westbound Near Live Oak (0238)

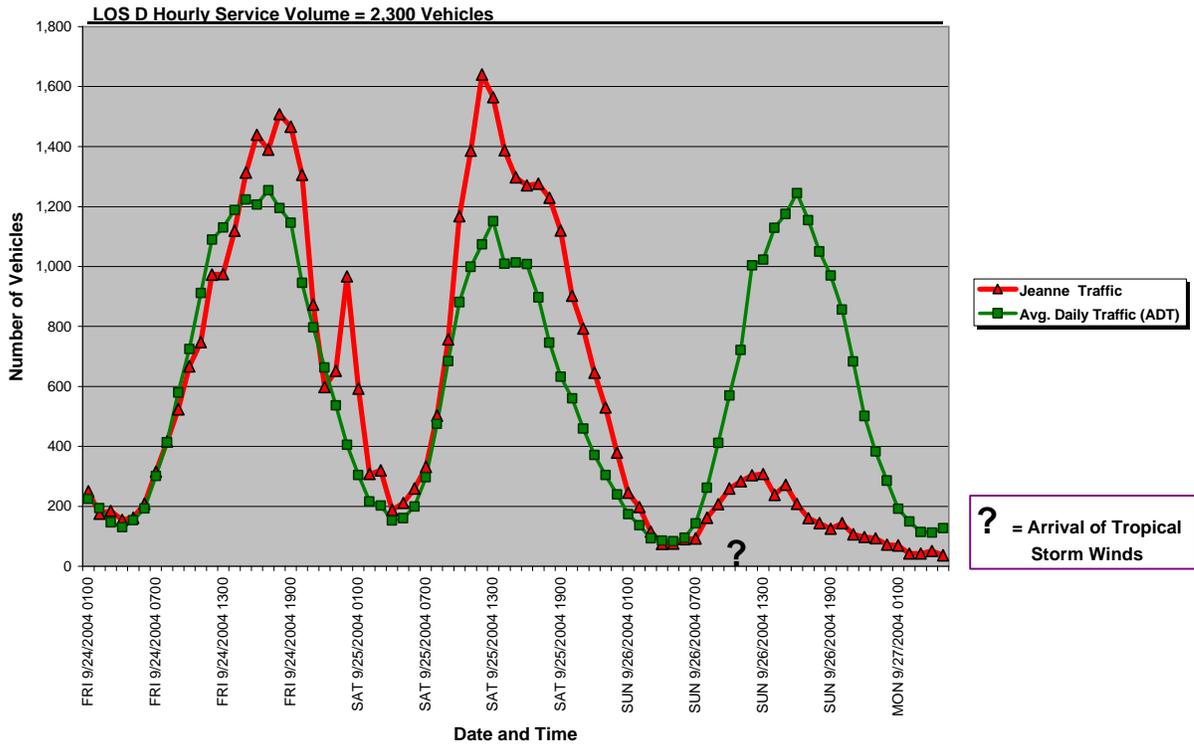


Figure 17. Jeanne - I-10 Westbound Near Quincy (0220)

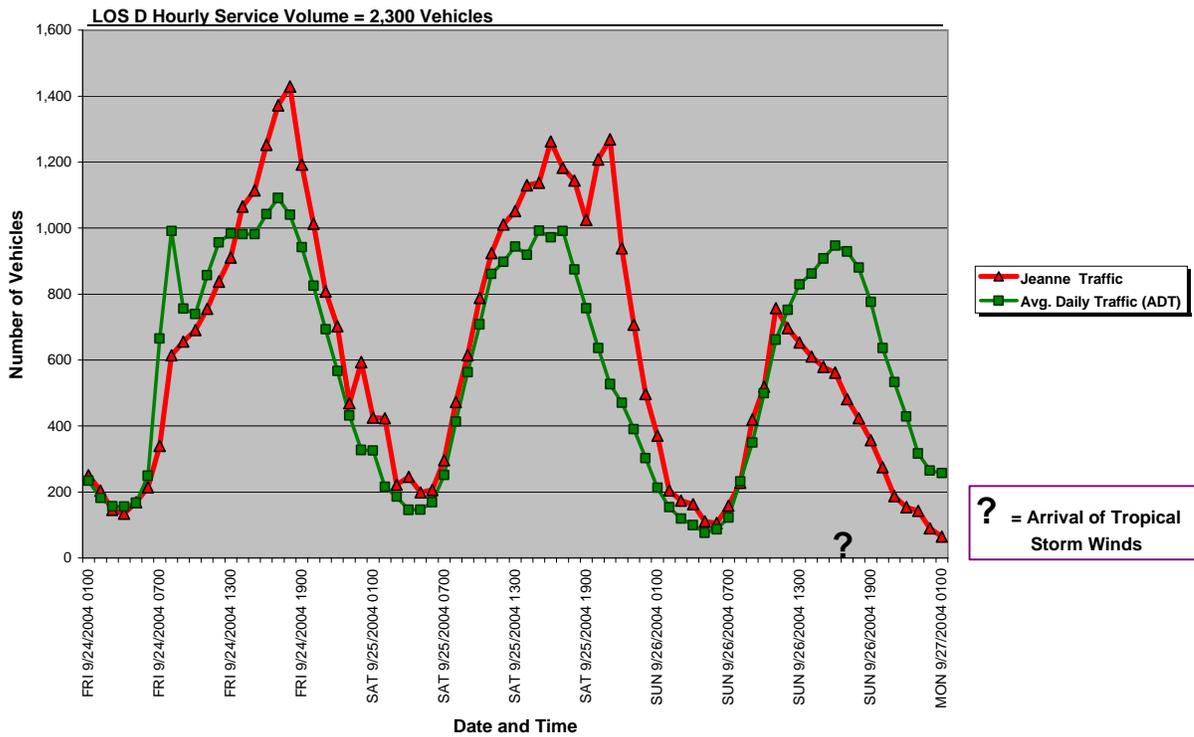
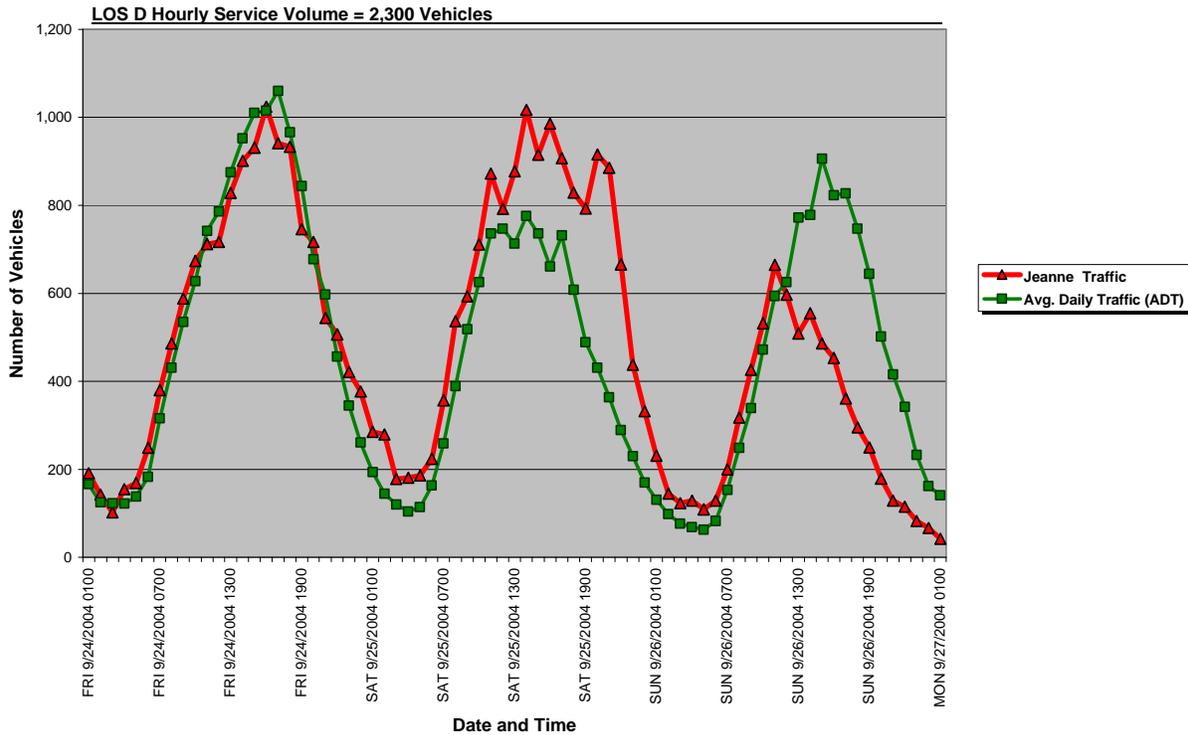


Figure 18. Jeanne - I-10 Westbound Near Marianna (0218)



Comparison of ETIS Travel Demand and Congestion Level Forecasts to TTMS Counter Data during Hurricane Jeanne

- Table 3 relates the hours where Telemetered Traffic Monitoring System (TTMS) traffic counters were recording traffic counts that exceeded the average daily traffic (ADT) figures to weather related and operational events that were occurring during Hurricane Jeanne.
- Table 4 below provides a comparison between the travel demand and congestion level forecasts with the actual numbers of additional vehicles over the average daily traffic (ADT) figures collected for those same segments. The table does not include all segments on a particular corridor, only those segments on roadways covered by ETIS and having an operational Telemetered Traffic Monitoring System (TTMS).
 - In cases where both HES and ETIS data were appropriate and available for the road segments included in this table, those data were provided. In most instances for this table only the ETIS data is provided since many of these segments with TTMS sensors are

used by many counties from many different regions simultaneously for evacuation. This multi-regional travel demand data is not always readily available from most regional HES Transportation Analyses. Because ETIS is specifically designed to consolidate the maximum travel demands for many counties and regions during an evacuation event, and therefore most the appropriate data for the purposes of this analysis, its vehicle forecast are by far the most prevalent figures in the table. Where appropriate, the HES vehicle numbers were included in the table 4.

- The first column provides the name of the specific roadway segment used to compare HES / ETIS forecast data with the actual values recorded by the TTMS counters during the Hurricane Jeanne evacuation event. These roadways are aggregated by corridor and listed in succession based on the likely travel direction of evacuation traffic, in most cases south to north and west to east.
- The column labeled HES / ETIS Hourly Service Volume indicates how many vehicles per hour each specific roadway segment can process in one direction under hurricane evacuation conditions. The figure normally used in the HES and ETIS to characterize the roadway segment's ability to convey traffic is Level of Service (LOS) D, one step lower than maximum theoretical hourly through-put (LOS E). This slight attenuation of hourly capacity takes into account reductions caused by higher than normal traffic volumes, the potential for less than optimal weather conditions and a certain degree of duress imposed by the situation on the drivers using the roadway.
- The third column relating to HES / ETIS Predicted Number of Vehicles provides the total number of vehicles forecast in the HES or by ETIS to use that particular segment of roadway during the entire course of an evacuation. The travel demand figures provided in this column relate only to the additional number of vehicles on the roadway generated by evacuation orders and not the entire number of vehicles using the roadway segment. The number of over average daily traffic (ADT) figures, also known as the "background traffic" is not included in these figures. In most cases, for the reasons explained above only the ETIS data is provided.
- The data under the column heading of HES / ETIS Predicted Congestion Levels is the forecast amount of time needed to process the travel demand in the previous column

given the hourly directional service volume figures provided in the second column. In most cases, for the reasons explained above, only the ETIS data is provided.

- The next column labeled Additional Number of Vehicles over ADT during Event provides data regarding the actual values recorded by the TTMS counters during Hurricane Jeanne. This column specifies the difference between the total number of vehicles counted during the evacuation event against those normally using the segment (ADT) during the higher than average volume hours. For comparisons of forecast versus real event data, the values in this column also specifically relate to the data in the third column under the HES / ETIS Predicted Number of Vehicles heading. This additional vehicles figure is also reiterated at the bottom of Table 3 in the row labeled Difference Between Recorded and ADT Volume During Evacuation Period.
- The Total Number of Vehicles Recorded during Event column in Table 4 represents the total number of vehicles counted during the same hours as in the previous column, or the additional vehicles plus the historical number of vehicles for that time and day (ADT). The total vehicles column information is also found in the Total Number of Vehicles Recorded during Evacuation Period row at the bottom of Table 3.
- The column labeled Number of Hours above ADT During Event Column specifies the length of time that each TTMS counter recorded hourly vehicle counts above the standard deviation of the ADT traffic volumes. The hours in this table coincide with the bright green boxes for each counter in Table 3 as well as the row labeled Total Number of Hours above ADT Volume. The data in this column also relates specifically to the final column in the table called Actual Service Volume / Evac Vehicle Ratio.

Caveats Regarding the Analysis of Traffic Counter Data Relative to HES and ETIS Figures

The following points must be taken into consideration when comparing the traffic counter data collected during the hurricane evacuation against the figures contained in the HES the Abbreviated Transportation Model (ATM) or generated by ETIS.

- Some of the differences between the vehicle counts from roadway sensor data and the evacuating vehicle figures provided in the HES related products are attributable to the generalized information collected by the traffic counter itself.

- The hourly vehicle numbers recorded by traffic sensors are strictly raw data with no differentiation between the evacuation trips and those not leaving an area in response to a storm threat. Therefore, the counters cannot assist in determining when the first or last trip used a roadway segment with the express purpose of evacuating. The customary criteria for establishing the hour an evacuation begins or ends from traffic counter data is when the number of recorded vehicles exceeds or drops below ADT figures. Although this is a reasonable method, there are many likely scenarios where a significant number of vehicles may be on the roadway leaving an area in response to a potential hurricane threat days in advance of the ADT values being exceeded by traffic counts. Clearly, determining when the evacuation began and ended relative to the traffic counts can have a significant impact on the number of vehicles considered to be evacuating.
- The inability to definitively separate evacuation from non-evacuation trips in the traffic counter data may also account for further differences in the number of vehicles recorded on a roadway segment for an event and the vehicle demand forecasts provided in the HES-related products. Even for those hours when actual vehicle counts are significantly above ADT at a roadway segment, the actual proportion of evacuation to non-evacuation trips cannot be discerned from the traffic counter data. Again, the general rule of thumb for separating the evacuation from the non-evacuation trips is to use the ADT figures, so that the vehicle counts over that number constitute the traffic associated with evacuations. As in the discussion above, using the ADT as a method to mete out the different types of traffic recorded at a counter site during evacuations, while valid, does not necessarily constitute the real number of evacuating to non-evacuating vehicles. It could easily be argued that during evacuations, the amount of traffic normally using a roadway would be suppressed since many people are evacuating rather than going to school, work and their other routine daily destinations. Especially over time as more vehicles are involved in the evacuation, the higher the proportion of evacuating to non-evacuating vehicles recorded on a roadway segment.
- Finally, traffic counter data cannot be used to differentiate the high traffic volumes due to evacuations from those caused by special events or other traffic anomalies. The height of hurricane season also coincides with the beginning of college football season, high tourist season and many one-time or recurring special events. If hurricane evacuations coincide

with other high-traffic volume generating events, the vehicle counts in these overlapping instances would not be able to discriminate between those two types of vehicle trips.

This issue was especially relevant for Hurricane Jeanne, in that there were college football games scheduled while the evacuations were underway. A University of Florida home game, among other gridiron contests, continued despite the approaching threat, and those concurrent vehicle trips probably impacted certain roadways simultaneously.

- There are significant variations in the methodologies used by the HESs, ATMs and ETIS to determine the number of vehicles on key roadway segments during evacuations. These variations may also serve to exacerbate the differences between the traffic counter figures and the evacuating vehicle forecasts provided in the HES products during an evacuation event.
 - In addition to the number of vehicles trips specifically associated with evacuations, the methodology for calculating the clearance times provided in the HESs does factor in the trips considered to be background traffic. Background traffic is the other vehicles using an evacuation roadway segment for purposes not specifically related to evacuating from the tropical cyclone. The background numbers used in the HES clearance time methodology are based on annual ADT averages which would not account for the wide daily variations in normal traffic that may exist on days when evacuations are occurring. This difference in determining the normal traffic in developing the clearance times may account for differences between the HES and actual counter figures during the theoretical evacuation period for a particular event.
 - The ATM vehicle figures provided in the Vehicles by Roadway and Clearance Time tabs for key evacuation roadway segments in the spreadsheets do not include the background traffic numbers. However, the clearance times provided in the ATMs do factor in the additional time needed for the key roadway segment to process the background vehicles.
 - The ETIS figures do not factor in the number of vehicles that would be considered background traffic on each of the modeled roadway segments. Therefore, the forecast number of vehicles for each roadway segment in ETIS includes those additional vehicles theoretically using the roadway for evacuation purposes only. Certainly this fact may account any differences between the total vehicle traffic count recorded by a traffic

counter and the ETIS forecasted number of vehicles on a roadway segment during an evacuation event.

- Differences in the way that the HES transportation model and ETIS factor in participation rates will have an impact on their agreement regarding the vehicle numbers for a roadway segment. Whereas the vehicle by road segment numbers in the HESs and initial versions of the ATMs are based on fixed, behaviorally derived evacuation participation numbers, ETIS allows the user to select those variables based on storm and other situation-specific parameters. Additionally in the HESs, each traffic evacuation zone, evacuation zone and each housing type has its own set of participation rates already selected, while the percentage selected in ETIS applies to the entire population that is committed to evacuate by the user in the program. Therefore, these differences in the application of participation rates between the HESs and ETIS can account for any discrepancies between the evacuating vehicle figures from both sources.
- Finally, the interval between the collection of socio-economic, behavioral and roadway data for the last hurricane evacuation study / restudy can also accentuate differences between the traffic counter evacuating vehicle numbers and those provided in the HESs or in ETIS. Many of the hurricane evacuation studies / restudies in Florida were completed on or before 2000. Therefore, the data used to develop socio-economic figures for those studies was not based on the most recent U.S. census, but instead on the one conducted in 1990 with projections to the study date. Many regions in Florida are experiencing dynamic population growth where four or five years can mean a significant increase in the number of evacuating vehicles. Certainly that is true for the Southwest Florida, Treasure Coast, Tampa Bay, East Central Florida and Northeast Florida regions, many of which were impacted during this hurricane event.
- The congestion times provided by ETIS are not the same as clearance times in the HESs and do not coincide with the total number of hours that a counter recorded hourly volumes above ADT.
 - The ETIS congestion time represents the hours of expected travel demand for that specific roadway segment and is determined by dividing the forecast number of vehicles by the hourly directional service volume (e.g. a roadway segment that has an hourly

directional service volume of 1,000 vehicles can process a total travel demand of 10,000 vehicles in 10 hours).

- The congestion time calculated by ETIS represents only the queuing delay time component of an HES clearance time. The other components of an HES clearance time not included in the ETIS figures are mobilization time (usually accounted for by the response time) and the travel time.
- Unfortunately much of the operational data regarding the effective times of evacuation orders, levels of evacuation and other details which have an impact on evacuations, and hence traffic volumes and timing, is not complete. Most of this operational data was collected during the post-storm surveys that were conducted as part of this report effort.
- Table 4 is a quantitative assessment of HES and ETIS figures against the traffic counter data collected during Hurricane Jeanne. Although this could have been a large-scale evacuation event theoretically suitable for assessing the accuracy of transportation models and other HES data, the actual participation rates categorically were very low. Therefore, it does not appear that the counter data on hand will support any definitive conclusions, or is at all suitable for validation of any evacuation transportation data.
- In this case, almost none of the clearance time figures in the HESs or in ETIS can be validated by how long the roadway segments with traffic counters actually experienced higher than normal traffic volumes. Almost all of the traffic counters witnessed very long periods where the vehicle counts, probably due to evacuations from Hurricane Jeanne, were above the average daily totals. Even relatively obscure evacuation routes experienced extended episodes where the hourly traffic totals during the event were above the normal daily figures. Evidently, evacuees from all the at-risk regions began evacuating, many without the benefit of an evacuation order, very early relative to the storm's approach and landfall and they did so quite slowly. For the most part the evacuation roadway network was allowed to process the travel demand for this event in small increments over a long time span rather than all at once.
- Another shortcoming to relating the traffic counter data to clearance times and roadway segment travel demand forecasts for this event is that many of the TTMS stations are located at regional evacuation links. There are very few instances where a TTMS traffic counter is

located on a roadway that is most likely used by a single county for evacuation: US 29; US 192/SR 520/SR 50/SR 528, SR 71, US 231 below I-10 and US 1 at Key Largo are about the only TTMS sites that can be used to validate county clearance times. Of the routes specified above, only US 192 and SR 520/SR 50/SR 528 were directly impacted by evacuations from Hurricane Jeanne. In those cases, the differences between the HES and counter data during this event may be due to variations in participation rates, evacuees from other regions and other circumstantial factors that cannot be quantified in a transportation model. The increased traffic volumes on the other routes above during the event were probably attributable to the evacuation traffic from the Florida Peninsula trickling through the evacuation network toward their final destination locations. Even the regional clearance times and travel demand forecasts are based on incomplete or outdated information. Only 13 of the 32 inland counties in the State of Florida have current evacuation data; and counties such as Polk, Alachua, Leon and others have the potential to impose a significant number of evacuating vehicles on the statewide evacuation roadway network. Therefore, the travel demand forecast figures in ETIS and the regional clearance times in many of the regional HESs do not factor in the vehicles from many of the inland counties.

- Using the figures in Table 4 and the traffic counter data included in the above charts (Figures 1 through 41) and in Table 2, the following observations apply to Hurricane Jeanne:
 - In many cases, the ETIS forecast of travel demand for roadway segments with traffic counters were higher than the actual number of additional vehicles over ADT that were recorded by the traffic counters. Much of this is possibly attributable to an overestimation of participation rates by local emergency management offices, which is a very subjective figure in almost all cases.
 - Other reasons for the discrepancies between the HES / ETIS roadway segment travel demand figures and the traffic counter totals during Hurricane Jeanne are: lack of data regarding some inland counties and their contributions to the evacuating number of vehicles; spotty data regarding evacuation zones or what populations were ordered to evacuate; and outdated information regarding the destinations of out-of-county evacuees.

Table 3a.

HURRICANE JEANNE Traffic Counter Timelines

Date	Advisory	Time	Situation / Conditions	0351	0350	0317	0112	0018	0421	0217	0292	0132	
				NB	NB	NB	NB	NB	NB	NB	NB	NB	NB
				I-75 Near Goldengate	I-75 Near Punta Gorda	I-75 Near Ocala	I-75 Near GA Line	US 301 Near Waldo	FL Turnpike Near Ft. Pierce	I-95 Near Jupiter	I-95 Near Bunnell	I-95 Near GA Line	
Thursday September 23, 2004	Adv # 38 Cat 2	12:00 AM											
		1:00 AM											
		2:00 AM											
		3:00 AM											
		4:00 AM											
	Adv # 39 Cat 2	5:00 AM								72	70		
		6:00 AM			75	70	a	72		74	72		
		7:00 AM			76	70	a	72		75	73		
		8:00 AM			79	69	a	74		76	70	73	
		9:00 AM			75	69	a	74		74	71	72	
		10:00 AM			74	68	a	75		74	70	72	
	Adv # 40 Cat 2	11:00 AM		<ul style="list-style-type: none"> 72-hour forecast track reaches Florida Coastline vicinity Jensen Beach as a cat 2 storm 	77	68	a	75		75	71	72	
		12:00 PM		❖ Marion Co., FL Issues Mandatory Evac Order for MH	79	67	a	75		75	71	72	
		1:00 PM			78	69	a	76		75	71	71	
		2:00 PM			77	69	a	76	66	76	71	72	
		3:00 PM			78	69	a	75	67	76	71	69	
		4:00 PM			80	69	a	74	68	76	71	71	
	Adv # 41 Cat 2	5:00 PM			79	70	a	74	68	75	67	73	73
		6:00 PM			80	72	a	75	68	76	70	74	73
		7:00 PM			80	71	a	74	68	76	72	72	73
		8:00 PM			77	70	a	74	65	75	71	72	71
		9:00 PM			79	71	a	74	66	75	70	73	72
		10:00 PM			78	72	a	74	66	73	71	72	72
Adv # 42	11:00 PM			77	72	a	73	67	73	71	71		

Table 3a.

HURRICANE JEANNE Traffic Counter Timelines

Date	Advisory	Time	Situation / Conditions	0351 NB	0350 NB	0317 NB	0112 NB	0018 NB	0421 NB	0217 NB	0292 NB	0132 NB
				I-75 Near Goldengate	I-75 Near Punta Gorda	I-75 Near Ocala	I-75 Near GA Line	US 301 Near Waldo	FL Turnpike Near Ft. Pierce	I-95 Near Jupiter	I-95 Near Bunnell	I-95 Near GA Line
Friday September 24, 2004	Adv # 42 Cat 2	12:00 AM		76	71	a	72	65	73	70	72	72
		1:00 AM		76	71	a	73	67	72	69	71	71
		2:00 AM		75	69	a	72	65	72	68	71	72
		3:00 AM		74	70	a	72	65	72	68	71	71
		4:00 AM		73	70	a	72	65	72	69	71	70
	Adv # 43 Cat 2	5:00 AM	<ul style="list-style-type: none"> Hurricane Watch posted from Key Largo, FL to Ponte Vedra, FL Forecast landfall location near Ormond Beach as a cat 2 in 63 hours 	74	70	a	73	66	72	70	72	73
		6:00 AM		76	70	a	73	66	73	71	72	73
		7:00 AM	❖ Palm Beach Co., FL Issues Recommended Evac Order	76	70	a	73	67	75	72	73	73
		8:00 AM	❖ Martin Co., FL Issues Mandatory Evac Order for Cat 1-5, MH, LLA	77	70	a	74	66	75	71	73	73
		9:00 AM		79	69	a	75	66	75	71	71	72
		10:00 AM		78	68	a	76	65	74	71	71	72
	Adv # 44 Cat 2	11:00 AM		79	68	a	76	67	74	72	70	72
		12:00 PM		79	69	a	75	67	74	72	70	72
		1:00 PM		79	68	a	75	67	74	72	67	72
		2:00 PM		79	68	a	76	68	75	72	69	72
		3:00 PM		79	68	a	77	67	75	71	65	73
	4:00 PM		80	69	a	76	67	76		68	72	
	Adv # 45 Cat 2	5:00 PM	<ul style="list-style-type: none"> Hurricane Warning issued for Key Largo, FL to Ponte Vedra, FL Hurricane Watch from Ponte Vedra, FL to Altamaha Sound, GA Tropical Storm Watch posted for Cape Sable, FL to Anclote Key, FL and Key Largo, FL to Marathon, FL 	81	69	a	76	68	76		71	72
		6:00 PM		81	71	a	77	68	76		72	72
		7:00 PM		81	72	a	76	67	74		72	69

Table 3a.

HURRICANE JEANNE Traffic Counter Timelines

Date	Advisory	Time	Situation / Conditions	0351	0350	0317	0112	0018	0421	0217	0292	0132	
				NB	NB	NB	NB	NB	NB	NB	NB	NB	NB
				I-75 Near Goldengate	I-75 Near Punta Gorda	I-75 Near Ocala	I-75 Near GA Line	US 301 Near Waldo	FL Turnpike Near Ft. Pierce	I-95 Near Jupiter	I-95 Near Bunnell	I-95 Near GA Line	
Friday September 24, 2004	Adv # 45 Cat 2	8:00 PM		79	71	a	75	65	75		72	70	
		9:00 PM		79	71	a	74	65	74		73	71	
		10:00 PM		77	72	a	75	64	74		72	71	
	Adv # 46	11:00 PM		78	71	a	76	65	73		72	71	
Saturday September 25, 2004	Adv # 46 Cat 2	12:00 AM		77	71	a	74	64	74		72	71	
		1:00 AM		76	70	a	73	64	71		72	71	
		2:00 AM		76	70	a	74	65	73		72	70	
		3:00 AM		74	71	a	74	67	72		72	70	
		4:00 AM		75	70	a	73	66	71		72	71	
	Adv # 47 Cat 2	5:00 AM	<ul style="list-style-type: none"> Tropical Storm Warning posted for Cape Sable, FL to Anclote Key, FL Tropical Storm Watch issued for Anclote Key, FL to Oklochonee Bay, FL 		76	71	a	73	67	72		72	70
		6:00 AM			74	70	a	73	67	72		72	71
		7:00 AM	<ul style="list-style-type: none"> Palm Beach Co., FL Issues Mandatory Evac Order 		77	71	a	74	66	74		73	72
		8:00 AM	<ul style="list-style-type: none"> ❖ Nassau Co., FL Issues Recommended Evac Order for Cat 1, CA, MH, LLA ❖ Volusia Co., FL Issues Mandatory Evac Order for CA, MH, LLA 		78	70	a	74	66	73			
		9:00 AM			79	70	a	75	66	74			
		10:00 AM			79	70	a	75	66	74			
	Adv # 48 Cat 3	11:00 AM	<ul style="list-style-type: none"> Hurricane Jeanne upgraded to cat 3 (115 MPH) Hurricane Watch posted for Englewood, FL to Suwannee, FL 		78	69	a	75	66	74			
		12:00 PM	❖ Manatee Co., FL Issues Mandatory Evac Order for Cat 1, CA, MH, LLA		80	69	a	75	66	74			
		1:00 PM			80	70	a	76	66				
		2:00 PM	<ul style="list-style-type: none"> Tropical Storm force winds arrive at Martin, Palm Beach and St. Lucie Co., FL 		79	69	a	76	66				

Table 3a.

HURRICANE JEANNE Traffic Counter Timelines

Date	Advisory	Time	Situation / Conditions	0351 NB	0350 NB	0317 NB	0112 NB	0018 NB	0421 NB	0217 NB	0292 NB	0132 NB
				I-75 Near Goldengate	I-75 Near Punta Gorda	I-75 Near Ocala	I-75 Near GA Line	US 301 Near Waldo	FL Turnpike Near Ft. Pierce	I-95 Near Jupiter	I-95 Near Bunnell	I-95 Near GA Line
Saturday September 25, 2004	Adv # 48 Cat 3	3:00 PM	<ul style="list-style-type: none"> Tropical Storm force winds arrive at Indian River Co., FL 	76	70	a	76	66				
		4:00 PM	<ul style="list-style-type: none"> Tropical Storm force winds arrive at Brevard, Broward, Osceola, Polk and Okeechobee Co., FL 	76	71		77	66				
	Adv # 49 Cat 3	5:00 PM	<ul style="list-style-type: none"> Tropical Storm Warning extended from Cape Sable, FL to Oklochonee Bay, FL Tropical Storm force winds arrive at Orange, Highlands and Glades Co., FL 		70		76	66				
		6:00 PM	<ul style="list-style-type: none"> Tropical Storm force winds arrive at Volusia, Miami-Dade, Seminole and Hendry Co., FL ❖ Pinellas Co., FL Issues Voluntary Evac Order for LLA 				77	66				
		7:00 PM				76	64					
		8:00 PM	<ul style="list-style-type: none"> Hurricane force winds arrive at Martin, Palm Beach and St. Lucie Co., FL Tropical Storm force winds arrive at Lake and Flagler Co., FL 				75					
		9:00 PM				75						
	10:00 PM	❖ Tropical Storm force winds arrive at Hillsborough, Pasco, Marion and Sumter Co., FL				74						
Adv # 50 Cat 3	11:00 PM	<ul style="list-style-type: none"> Tropical Storm Warning extended from Cape Sable, FL to Cape San Blas, FL Tropical Storm force winds arrive at Hernando, Marion and Putnam Co., FL ❖ Pinellas Co., FL Issues Mandatory Evac Order for MH 				73						
Sunday September 26, 2004	Adv # 50 Cat 3	12:00 AM	<ul style="list-style-type: none"> Eye makes landfall in Martin Co., FL as a cat 3 storm (120 MPH) Tropical Storm force winds arrive at Citrus and St. Johns Co., FL 				74					

Table 3a.

HURRICANE JEANNE Traffic Counter Timelines

Date	Advisory	Time	Situation / Conditions	0351	0350	0317	0112	0018	0421	0217	0292	0132
				NB	NB	NB	NB	NB	NB	NB	NB	NB
				1-75 Near Goldengate	1-75 Near Punta Gorda	1-75 Near Ocala	1-75 Near GA Line	US 301 Near Waldo	FL Turnpike Near Ft. Pierce	1-95 Near Jupiter	1-95 Near Bunnell	1-95 Near GA Line
Monday September 27, 2004	Adv # 56	4:00 PM										
	Adv # 57 Tropical Depression	5:00 PM	<ul style="list-style-type: none"> Center over Twiggs Co., GA All remaining Tropical Storm Warnings dropped 									
		6:00 PM										
		7:00 PM										
		8:00 PM	<ul style="list-style-type: none"> Center over Hancock Co., GA 									
		9:00 PM										
	10:00 PM											
		11:00 PM	<ul style="list-style-type: none"> Center over Spartanburg Co., SC 									
Total Number of Hours Above Average Directional Total (ADT) Volume				33	45	40	52	25	43	27	27	19
Hourly Evacuation Directional Service Volume (In Thousands of Vehicles per Hour)				2.3	2.3	4.5	4.5	2.3	3.0	5.0	5.0	6.5
ADT Volume for Evacuation Period (X 1,000 Vehicles)				14.4	55.8	75.2	40.5	17.7	21.1	61.8	35.2	29.4
Total Number of Vehicles Recorded During Evacuation period (X 1,000 Vehicles)				20.8	67.6	101.7	62.0	22.1	31.6	70.7	40.9	32.4
Difference Between Recorded and ADT Volume During Evacuation (X 1,000 Vehicles)				6.4	11.7	26.5	21.5	4.4	10.5	8.9	5.7	2.9

Light green = recorded hourly value for traffic counter above hourly average directional volume, but not above standard deviation.

Green boxes = traffic counter recorded hourly value above standard deviation for hourly average directional volume.

Red boxes = recorded peak at traffic counter for event.

Dark blue outlines around hour boxes indicate approximate arrival time of tropical storm force winds at the counter location.

Downward arrow = additional hours recorded above hourly average directional volume for counter during this event.

a Average speed data not available

b Counter not functioning or activated

Table 3b.

HURRICANE JEANNE Traffic Counter Timelines

Date	Advisory	Time	Situation / Conditions	0065	0113	0336	0104	0105	0109	0238	0220	0218	
				WB	WB	WB	WB	NB	WB	WB	WB	WB	WB
				US 192 Near Holopaw	SR 520 Near Merritt Island	SR 528 Near Titusville	SR 50 Near Bithlo	US 17 Near San Mateo	I-10 Near Baldwin	I-10 Near Live Oak	I-10 Near Quincy	I-10 Near Marianna	
Thursday September 23, 2004	Adv # 38 Cat 2	12:00 AM			51		b	b	b	b	b	b	
		1:00 AM			52		b	b	b	b	b	b	
		2:00 AM				51		b	b	b	b	b	b
		3:00 AM				51	74	b	b	b	b	b	b
		4:00 AM				51	75	b	b	b	b	b	b
	Adv # 39 Cat 2	5:00 AM			63	52	76	b	b	b	b	b	b
		6:00 AM			60	53	77	b	b	b	b	b	b
		7:00 AM			63	52	78	b	b	b	b	b	b
		8:00 AM			63	51	77	b	b	b	b	b	b
		9:00 AM			62	51	75	b	b	b	b	b	b
	Adv # 40 Cat 2	10:00 AM			61	51	74	b	b	b	b	b	b
		11:00 AM		<ul style="list-style-type: none"> 72-hour forecast track reaches Florida Coastline vicinity Jensen Beach as a cat 2 storm 	63	50	75	b	b	b	b	b	b
		12:00 PM		❖ Marion Co., FL Issues Mandatory Evac Order for MH	63	50	75	b	b	b	b	b	b
		1:00 PM			63	48	75	b	b	b	b	b	b
		2:00 PM			63	50	75	b	b	b	b	b	b
	Adv # 41 Cat 2	3:00 PM			62	49	75	b	b	b	b	b	b
		4:00 PM			62	50	75	b	b	b	b	b	b
		5:00 PM			62	49	77	b	b	b	b	b	b
		6:00 PM			63	51	76	b	b	b	b	b	b
		7:00 PM			63	a	75	b	b	b	b	b	b
		8:00 PM			63	a	75	b	b	b	b	b	b
Adv # 42	9:00 PM			64	a	74	b	b	b	b	b	b	
	10:00 PM			64	a	74	b	b	b	b	b	b	
	Adv # 42	11:00 PM		62	a	75	b	b	b	b	b	b	

Table 3b.

HURRICANE JEANNE Traffic Counter Timelines

Date	Advisory	Time	Situation / Conditions	0065	0113	0336	0104	0105	0109	0238	0220	0218
				WB	WB	WB	WB	NB	WB	WB	WB	WB
				US 192 Near Holopaw	SR 520 Near Merritt Island	SR 528 Near Titusville	SR 50 Near Bithlo	US 17 Near San Mateo	I-10 Near Baldwin	I-10 Near Live Oak	I-10 Near Quincy	I-10 Near Marianna
Friday September 24, 2004	Adv # 42 Cat 2	12:00 AM		68	51	74			71	74	73	71
		1:00 AM		60	51	75	61		70	73	72	71
		2:00 AM		64	50	73	60	55	71	74	73	71
		3:00 AM		63	50	75	61	54	71	73	71	69
		4:00 AM		66	50	75	61	54	70	74	73	71
	Adv # 43 Cat 2 Adv # 43 Cat 2	5:00 AM	<ul style="list-style-type: none"> Hurricane Watch posted from Key Largo, FL to Ponte Vedra, FL Forecast landfall location near Ormond Beach as a cat 2 in 63 hours 	62	51	76	62	54	72	73	72	70
		6:00 AM		60	52	76	62	55	72	73	73	72
		7:00 AM	❖ Palm Beach Co., FL Issues Recommended Evac Order	62	52	76	61	55	73	75	75	73
		8:00 AM	❖ Martin Co., FL Issues Mandatory Evac Order for Cat 1-5, MH, LLA	62	50	75	61	47	73	75	74	73
		9:00 AM		62	51	74	60	54	72	75	74	73
		10:00 AM		61	50	73	61	55	73	75	74	73
		11:00 AM		61	49	72	60	55	72	75	74	73
	Adv # 44 Cat 2	12:00 PM		61	49	73	60	55	73	76	73	73
		1:00 PM		58	49	74	61	55	72	76	74	73
		2:00 PM		60	50	73	61	52	73	77	74	74
		3:00 PM		60	49	73	60	51	73	76	74	74
		4:00 PM		61	50	73	60	56	72	77	75	75
	Adv # 45 Cat 2	5:00 PM	<ul style="list-style-type: none"> Hurricane Warning issued for Key Largo, FL to Ponte Vedra, FL Hurricane Watch from Ponte Vedra, FL to Altamaha Sound, GA Tropical Storm Watch posted for Cape Sable, FL to Anclote Key, FL and Key Largo, FL to Marathon, FL 	60	51	74	61	56	73	77	75	73
		6:00 PM		62	51	74	62	57	72	77	74	74
		7:00 PM		59	50	73	60	55	72	77	74	73
		8:00 PM		59	49	73	60	55	72	77	73	73

Table 3b.

HURRICANE JEANNE Traffic Counter Timelines

Date	Advisory	Time	Situation / Conditions	0065	0113	0336	0104	0105	0109	0238	0220	0218
				WB	WB	WB	WB	NB	WB	WB	WB	WB
				US 192 Near Holopaw	SR 520 Near Merritt Island	SR 528 Near Titusville	SR 50 Near Bithlo	US 17 Near San Mateo	I-10 Near Baldwin	I-10 Near Live Oak	I-10 Near Quincy	I-10 Near Marianna
Friday September 24, 2004	Adv # 45 Cat 2	9:00 PM		62	49	72	60	54	71	77	73	72
		10:00 PM		60	50	73	61	55	72	77	74	72
	Adv # 46	11:00 PM		59	50	73	61	55	73	76	74	73
Saturday September 25, 2004	Adv # 46 Cat 2	12:00 AM		62	51	73	59	55	72	75	75	72
		1:00 AM		62	51	72	59	54	72	75	74	71
		2:00 AM		64	51	72	58	55	72	76	71	72
		3:00 AM		62	49	73	61	55	72	75	74	72
		4:00 AM		64	51	72	62	54	72	74	73	71
	Adv # 47 Cat 2	5:00 AM	<ul style="list-style-type: none"> Tropical Storm Warning posted for Cape Sable, FL to Anclote Key, FL Tropical Storm Watch issued for Anclote Key, FL to Oklochonee Bay, FL 	59		72	59	56	73	74	73	71
		6:00 AM		60		71	61	56	72	74	72	71
		7:00 AM	<ul style="list-style-type: none"> Palm Beach Co., FL Issues Mandatory Evac Order 	61		71	61	56	73	75	73	72
		8:00 AM	<ul style="list-style-type: none"> ❖ Nassau Co., FL Issues Recommended Evac Order for Cat 1, CA, MH, LLA ❖ Volusia Co., FL Issues Mandatory Evac Order for CA, MH, LLA 	59		72	60	56	72	76	75	72
		9:00 AM		59		71	60	55	73	76	75	74
		10:00 AM		59		71		55	73	76	75	73
	Adv # 48 Cat 3	11:00 AM	<ul style="list-style-type: none"> Hurricane Jeanne upgraded to cat 3 (115 MPH) Hurricane Watch posted for Englewood, FL to Suwannee, FL 	59		71		55	73	77	75	73
		12:00 PM	❖ Manatee Co., FL Issues Mandatory Evac Order for Cat 1, CA, MH, LLA	59		72		56	73	76	74	73
		1:00 PM		60		71		56	73	76	74	73
		2:00 PM	<ul style="list-style-type: none"> Tropical Storm force winds arrive at Martin, Palm Beach and St. Lucie Co., FL 	59		73			74	76	74	72
		3:00 PM	<ul style="list-style-type: none"> Tropical Storm force winds arrive at Indian River Co., FL 	59					74	75	74	74

Table 3b.

HURRICANE JEANNE Traffic Counter Timelines

Date	Advisory	Time	Situation / Conditions	0065	0113	0336	0104	0105	0109	0238	0220	0218
				WB	WB	WB	WB	NB	WB	WB	WB	WB
				US 192 Near Holopaw	SR 520 Near Merritt Island	SR 528 Near Titusville	SR 50 Near Bithlo	US 17 Near San Mateo	I-10 Near Baldwin	I-10 Near Live Oak	I-10 Near Quincy	I-10 Near Marianna
Saturday September 25, 2004	Adv # 48 Cat 3	4:00 PM	<ul style="list-style-type: none"> Tropical Storm force winds arrive at Brevard, Broward, Osceola, Polk and Okeechobee Co., FL 						74	76	74	74
	Adv # 49 Cat 3	5:00 PM	<ul style="list-style-type: none"> Tropical Storm Warning extended from Cape Sable, FL to Oklochonee Bay, FL Tropical Storm force winds arrive at Orange, Highlands and Glades Co., FL 						74	77	75	74
		6:00 PM	<ul style="list-style-type: none"> Tropical Storm force winds arrive at Volusia, Miami-Dade, Seminole and Hendry Co., FL ❖ Pinellas Co., FL Issues Voluntary Evac Order for LLA 						73	76	74	74
		7:00 PM							72	76	74	73
		8:00 PM	<ul style="list-style-type: none"> Hurricane force winds arrive at Martin, Palm Beach and St. Lucie Co., FL Tropical Storm force winds arrive at Lake and Flagler Co., FL 						69	75	73	74
		9:00 PM							67	75	74	72
	10:00 PM	<ul style="list-style-type: none"> ❖ Tropical Storm force winds arrive at Hillsborough, Pasco, Marion and Sumter Co., FL 							75	73	72	
Adv # 50 Cat 3	11:00 PM	<ul style="list-style-type: none"> Tropical Storm Warning extended from Cape Sable, FL to Cape San Blas, FL Tropical Storm force winds arrive at Hernando, Marion and Putnam Co., FL ❖ Pinellas Co., FL Issues Mandatory Evac Order for MH 							75	74	72	
Sunday September 26, 2004	Adv # 50 Cat 3	12:00 AM	<ul style="list-style-type: none"> Eye makes landfall in Martin Co., FL as a cat 3 storm (120 MPH) Tropical Storm force winds arrive at Citrus and St. Johns Co., FL 							75	74	71
		1:00 AM	<ul style="list-style-type: none"> Eye over Martin Co., FL as a cat 3 storm (120 MPH) 							74	73	71

Table 3b.

HURRICANE JEANNE Traffic Counter Timelines

Date	Advisory	Time	Situation / Conditions	0065	0113	0336	0104	0105	0109	0238	0220	0218	
				WB	WB	WB	WB	NB	WB	WB	WB	WB	WB
				US 192 Near Holopaw	SR 520 Near Merritt Island	SR 528 Near Titusville	SR 50 Near Bithlo	US 17 Near San Mateo	I-10 Near Baldwin	I-10 Near Live Oak	I-10 Near Quincy	I-10 Near Marianna	
Sunday September 26, 2004	Adv # 50 Cat 3	2:00 AM	<ul style="list-style-type: none"> Tropical Storm force winds arrive at Alachua Co., FL 							73		70	
		3:00 AM	<ul style="list-style-type: none"> Eye over Okeechobee Co., FL as a cat 3 storm (115 MPH) Tropical Storm force winds arrive at Clay, Bradford and Levy Co., FL 				b					69	
		4:00 AM					b						70
	Adv # 51 Cat 2	5:00 AM	<ul style="list-style-type: none"> Eye over Highlands Co., FL as a cat 2 storm (110 MPH) Hurricane Watch area upgraded to Hurricane Warning from Englewood, FL to Suwannee, FL Tropical Storm Warning area shifted from Everglades City, FL to Destin, FL Tropical Storm force winds arrive at Duval and Gilchrist Co., FL 					b					71
		6:00 AM	<ul style="list-style-type: none"> Tropical Storm force winds arrive at Dixie and Union Co., FL 					b					70
		7:00 AM	<ul style="list-style-type: none"> Eye over Polk Co., FL as a cat 2 storm (100 MPH) 					b					72
		8:00 AM					b						73
		9:00 AM	<ul style="list-style-type: none"> Eye over Polk Co., FL as a cat 1 storm (85 MPH) Tropical Storm force winds arrive at Taylor and Nassau Co., FL ❖ Madison Co., FL Issues Voluntary Evac Order for MH 					b					72
	10:00 AM						b						73
	Adv # 52 Cat 1	11:00 AM	<ul style="list-style-type: none"> Eye over Polk Co., FL as a cat 1 storm (75 MPH) 					b					
		12:00 PM	<ul style="list-style-type: none"> Tropical Storm force winds arrive at Madison Co., FL 					b					
		1:00 PM						b					

Table 3b. HURRICANE JEANNE Traffic Counter Timelines

Date	Advisory	Time	Situation / Conditions	0065	0113	0336	0104	0105	0109	0238	0220	0218
				WB	WB	WB	WB	NB	WB	WB	WB	WB
				US 192 Near Holopaw	SR 520 Near Merritt Island	SR 528 Near Titusville	SR 50 Near Bithlo	US 17 Near San Mateo	I-10 Near Baldwin	I-10 Near Live Oak	I-10 Near Quincy	I-10 Near Marianna
	Adv # 57	10:00 PM										
		11:00 PM	• Center over Spartanburg Co., SC									
Total Number of Hours Above Average Directional Total (ADT) Volume				44	34	46	8 ^b	25 ^b	35 ^b	34 ^b	41 ^b	44 ^b
Hourly Evacuation Directional Service Volume (In Thousands of Vehicles per Hour)				.88	.88	3.3	1.71	1.23	3.2	2.3	2.3	2.3
ADT Volume for Evacuation Period (X 1,000 Vehicles)				8.9	36.1	38.3	8.2	15.3	44.1	24.7	26.2	18.0
Total Number of Vehicles Recorded During Evacuation period (X 1,000 Vehicles)				14.1	40.1	51.6	9.5	17.8	52.4	33.2	33.6	23.8
Difference Between Recorded and ADT Volume During Evacuation (X 1,000 Vehicles)				5.2	4.0	13.4	1.3	2.5	8.3	8.5	7.4	5.8

Light green = recorded hourly value for traffic counter above hourly average directional volume, but not above standard deviation.
 Green boxes = traffic counter recorded hourly value above standard deviation for hourly average directional volume.
 Red boxes = recorded peak at traffic counter for event.
 Dark blue outlines around hour boxes indicate approximate arrival time of tropical storm force winds at the counter location.
 Downward arrow = additional hours recorded above hourly average directional volume for counter during this event.

- a Average speed data not available
- b Counter not functioning or activated

Table 4. HURRICANE JEANNE ETIS / HES TO COUNTER COMPARISONS								
Roadway Segment With Traffic Counter	HES / ETIS Service Volume (in Vehicles per Hour)	ETIS Forecast Vehicle Demand	Additional Number of Vehicles Over ADT During Event	Total Number of Vehicles Recorded During Event	ETIS Forecast Congestion Level (in Hours)	Number of Hours above Average Daily Traffic (ADT)	Actual Service Volume to Evac Vehicle Ratio	
							Vehicles Above ADT	Total Vehicles
I-75 Northbound								
I-75 Near Goldengate	2,300	3,239	6,437	20,808	1	33	2.8	9.0
I-75 Near Punta Gorda	2,300	845	11,777	67,608	<1	45	5.1	29.5
I-75 Near Ocala	4,500	40,635	26,503	101,656	9	40	5.9	22.6
I-75 near Georgia Line	4,500	33,158	21,531	62,045	7	52	4.8	13.8
Florida Turnpike Northbound								
FL Turnpike Near Fort Pierce	3,000	11,390	10,490	31,613	3	43	3.5	10.5
I-95 Northbound								
I-95 Near Jupiter	5,000	8,194	8,894	70,674	2	27	1.8	14.1
I-95 Near Bunnell	5,000	26,678	5,704	40,925	9	27	1.1	8.2
I-95 Near Georgia Line	6,500	10,923	2,907	32,353	4	19	0.5	4.5
SR 528 Westbound								
SR 528 Near Titusville	3,300	18,468	13,390	51,643	10	46	4.1	15.6
I-10 Westbound								
I-10 Near Baldwin	2,300	13,194	8,256	52,392	7	35	3.6	22.8
I-10 Near Live Oak	2,300	25,415	8,508	33,226	8	34	3.7	14.4
I-10 Near Quincy	2,300	10,730	7,404	33,620	4	41	3.2	14.6
I-10 Near Marianna	2,300	10,730	5,803	23,844	4	44	2.5	10.4
<p>Orange Header Boxes = HES / ETIS data Yellow Header Boxes = Telemetered Traffic Monitoring System (TTMS) Data Blue = Columns related to ETIS forecast and TTMS figures above ADT during event Green = Columns related to overall number of vehicles (additional + ADT vehicles) for entire event</p>								

Conclusions

1. From Thursday, September 23 to Sunday, September 26, 2004, an additional 142,800 vehicles over the average daily directional trips used the major evacuation routes out of the South Florida, Treasure Coast, East Central Florida, Northeast Florida, Central Florida, Tampa Bay, Withlacoochee and North Central Florida Regions. The average number of hours that all activated traffic counters on the Florida evacuation roadway network recorded above average volumes was 35.4 hours.
2. According to the survey data collected from the most affected counties during this event, the primary observation by local emergency management officials was that fuel availability was the predominant problem during the evacuation, followed by heavy traffic. Other evacuation problems cited by the surveyed county officials were heavy traffic, inadequate signage and construction.
3. Only two out of the 27 counties surveyed for this event, Collier, Pinellas and Volusia, indicated that gridlock conditions occurred on the roadways during the evacuation. Collier indicated that I-75 was the offending corridor and Volusia County specified State Route 40 westbound where it constricts from two lanes down to one lane in each direction was prone to gridlock. Pinellas County indicated that all evacuation routes near their jurisdiction were gridlocked during Jeanne.
4. The performance of ETIS in determining the cumulative evacuation travel demand for the state's roadway is mixed. Of the segments with traffic counters, the ETIS travel demand figures were within 49% of the recorded values, all but three of them were higher than the actual traffic volume. Unfortunately, there are no obvious reasons in the data for the discrepancies between the observed and the forecast values. Due to the low participation rates in the Treasure Coast, East Central Florida, Northeast Florida, Central Florida, Tampa Bay regions in response to this storm, the vehicle numbers and congestion figures generated by ETIS during the storm would not have been realized during the event. During the storm, incomplete information about local protective action decisions, their timing and participation rates can certainly affect the accuracy of the ETIS travel demand forecasts for certain roadway segments. Even after the storm the information collected from local

emergency management can have major implications for the accuracy of the scenario used to assess the program which in turn can have a dramatic impact on the program's results. ETIS relies heavily on the accuracy of local information, and the results from the program are greatly influenced by the quality of that data. Unfortunately, the collection of local evacuation related data is the most difficult part of the ELT mission. Nonetheless, ETIS would benefit greatly from a concerted effort to update socio-economic, behavioral, roadway capacity and other data used to generate the travel demand figures and clearance times

5. The seemingly early start to most people's evacuation trips also helped to ensure that the roadway segments were clear well before the arrival of tropical storm force winds at that site. The traffic counters indicate that all of the evacuation roadway segments on which they were located were clear of major traffic volumes before landfall or arrival of tropical storm force winds.
6. Despite reports of traffic congestion specifically attributed to many of the evacuation routes on which traffic counters were located, neither the hourly volumes nor the hourly average speeds indicated that these roadways reached saturation or otherwise degraded to a traffic queuing situation. All of the traffic counters indicated that the evacuation roadways even peak volume hours were able to convey traffic at the normal average posted speed limit. This does not mean that there were not isolated incidences of traffic congestion or even gridlock, only that those conditions were not recorded at the traffic counter locations.