

Chapter 4

Transportation/Clearance Times

In FEMA/USACE comprehensive hurricane evacuation studies, the primary objective of the transportation analysis is to determine the clearance times¹ needed to conduct a safe and timely evacuation for a range of hurricane threats. The Transportation Analysis includes input from the Vulnerability Analysis, Shelter Analysis and Behavioral Analysis as well as demographic sources on permanent and seasonal populations. Federal, state and local government officials confirm results from an evacuation behavioral response survey that approximately 40-56% of people in evacuation zones under evacuation directives left their homes to go someplace safer.

For southwest Louisiana, clearance times had been updated for Acadia, Assumption, Calcasieu, Cameron, Iberia, Jefferson Davis, Lafayette, St. Martin, St. Mary, Terrebonne, and Vermilion Parishes in the Transportation Analysis done for the FEMA/USACE of Engineers New Orleans District by Post Buckley Schuh and Jernigan in May 2000. Jefferson, Lafourche, Orleans, Plaquemines, St. Bernard, St. Charles, St. James, St. John the Baptist, and St. Tammany had clearance times prepared for them in the Hurricane Preparedness Study dated 1994. Only Ascension and Tangipahoa Parishes have not had studies done to calculate their clearance times. For Alabama clearance times had been calculated for Baldwin and Mobile counties in the study done August 1999. Mississippi had a transportation analysis done for Hancock, Harrison, and Jackson Counties in February 2001. Texas clearance times were updated in 2002 by a transportation analysis performed by Texas A&M University. Each of these studies provided clearance times for a range of scenarios reflecting differing storm intensities, seasonal occupancy levels, and differing mobilization rates. Tropical Storm Isidore and Hurricane Lili provided a limited opportunity to analyze the validity of these study products due to the low evacuation participation rates for both events.

Transportation and clearance time issues related to both Isidore and Lili, and discussed by the study teams with local and state officials included the following:

¹ When the first evacuating vehicle enters the road network, ends when the last vehicle reaches an assumed point of safety - includes travel time and waiting in traffic congestion (does not relate to any one particular vehicle)

- Was the evacuation roadway capacity sufficient to meet traffic demand?
- Were any traffic control actions taken to speed up traffic flow?
- When was the evacuation essentially completed?
- How long did the evacuation take?
- Were any major problems encountered in this evacuation?

Table 4-1, located at the end of this chapter, provides a summary of the responses received regarding transportation and clearance time data.

Regrettably, very few parishes and counties were able to state definitively how long the evacuations actually took. In areas that had been recently deluged with rain from Isidore, flooded roads were common and caused traffic problems. Heavy congestion resulting from many jurisdictions sharing the same roads was a common issue in many places. Halting construction on roads should be mandatory during hurricane evacuations. One incident was reported of railroad traffic causing a delay that forced evacuees to halt as the train crossed the evacuation route. Bottlenecks occurred in areas that forced reduction of four lanes of traffic into two lanes. The work that is slated for the I-49 by-pass in Lafayette Parish cannot come soon enough for the Parishes that share this route. Misunderstandings and lack of information exists in regards to the sharing of roads between parishes, counties and states. Receiving parishes and counties can be overwhelmed by the influx of evacuees traveling east and west in an evacuation, as opposed to going north to avoid the storm.

Alarmingly the events also showed the general lack of response by the population to evacuate even when faced with the possibility of a major hurricane event-making landfall. This continues to be an on-going frustration of local emergency management officials, especially as their population continues to grow in numbers. New residents to areas, which have never experienced a powerful storm, need to be aware of the danger and effects hurricanes cause. Emergency management officials continue to caution residents that each storm is unique and cannot be predicted. While most parishes and counties felt the roadway network was adequate and could handle the volumes experienced in both events, all agreed that should a mass evacuation occur serious congestion and traffic problems would occur.

A key issue in the evacuation process is the flow of traffic and the means by which traffic is kept moving through the evacuating areas. In the Texas Sabine Study Area an extensive Traffic Control Plan was developed after Hurricane Andrew. This plan is updated annually. Under the Traffic Control Plan traffic is “routed” away from coastal areas and non-evacuation traffic is kept from hindering the flow of evacuating vehicles. Texas reported this Plan was implemented during the Lili evacuation and worked well.

Traffic counters are located along many roads in the affected area. Unfortunately only traffic counters located in Mississippi recorded traffic during the Hurricane Lili evacuation. Figures 4-1 through 4-4 show the evacuation traffic versus normal daily traffic for I-55 and I-59. The data is reported for a 20-hour time span and reflects both Northbound and Southbound traffic. 1999 data was gathered on Wednesday, September 27th and Thursday, September 28th. 2001 was gathered Wednesday, September 26th and Thursday, September 27th. The 2002 data was recorded Wednesday, October 2nd and Thursday, October 3rd and reflects the actual traffic occurring during the Hurricane Lili evacuation. The 2002 data shows an increase in the traffic northbound out of the area on both roads occurring on Wednesday. From the interviews conducted, many jurisdictions indicated that some residents did in fact leave prior to evacuation orders being issued, and the traffic counts recorded in Mississippi support this observation.

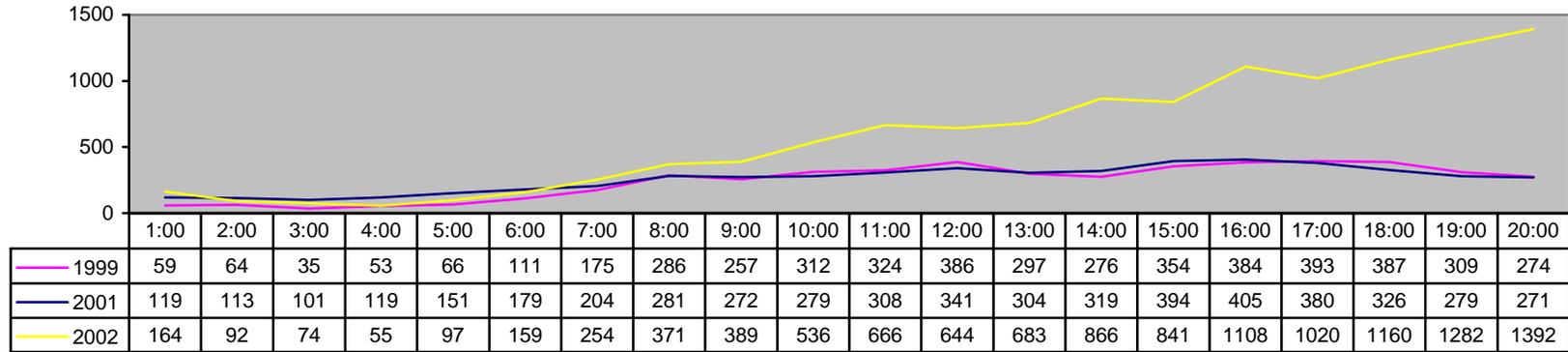
With close to 500,000 people advised to leave coastal and low-lying areas in Texas and Louisiana during the approach of Hurricane Lili, the U.S. Department of Transportation (USDOT) deployed its Evacuation Traffic Information System (ETIS) for the first time. ETIS is designed to more accurately predict specific levels and direction of evacuation traffic. Developed in direct response to significant traffic logjams occurring in southeastern states with Hurricane Floyd’s 1999 near-landfall, ETIS operates on a sophisticated model that combines behavioral studies, data from past occurrences, and real-time data from ongoing incidents, including weather information, evacuation percentages and tourist occupancy rates in affected areas. FEMA requested that the USDOT develop the program with recognition that more sophisticated technology would be helpful for major evacuations, especially when neighboring states are sharing major road networks. Displayed as a series of tables and roadway-network graphics, ETIS provides emergency managers with crucial information to help with decisions

regarding highway lane usage and the provision of emergency services. The ETIS program, used in conjunction with a USDOT/FEMA organized Evacuation Liaison Team (ELT), is designed to be especially useful in helping state and local managers anticipate state-to-state traffic. PBS&J built the ETIS model using specially designed algorithms that allow data to be displayed in easily read graphics, illustrating congestion levels, for example, by altering the color and the size of map lines for highways. Figures 4-5 and 4-6 represent screen captures taken from ETIS. Prior to Hurricane Lili making landfall, contractors were deployed to FEMA Regions 4 (Atlanta, Georgia) and 6 (Denton, Texas) as well as the state Emergency Operations Centers (EOCs) in Louisiana to use the ETIS program for the first time. FEMA and USDOT as well as state emergency management and transportation agencies discussed their experiences. The following is a brief listing of some of the lessons learned from this experience.

- State EOC ELT support staff (DOT and Emergency Management staff) need additional training as to their roles in the ELT process and the use of ETIS. Communications between members of the ELT must be more organized and cohesive.
- Office space and equipment needs to be addressed. Additionally the connectivity at the National Hurricane Center (NHC) needs to be checked to ensure ETIS functions as needed.
- Revised guidelines for activation need to be addressed. Also staffing issues as to who goes where and when need to be resolved.

Figure 4-1 - Traffic Counts

I-55 Northbound: Wednesday - Evacuation Traffic vs Non-evacuation Traffic



I-55 Northbound: Thursday - Evacuation Traffic vs Non-evacuation Traffic

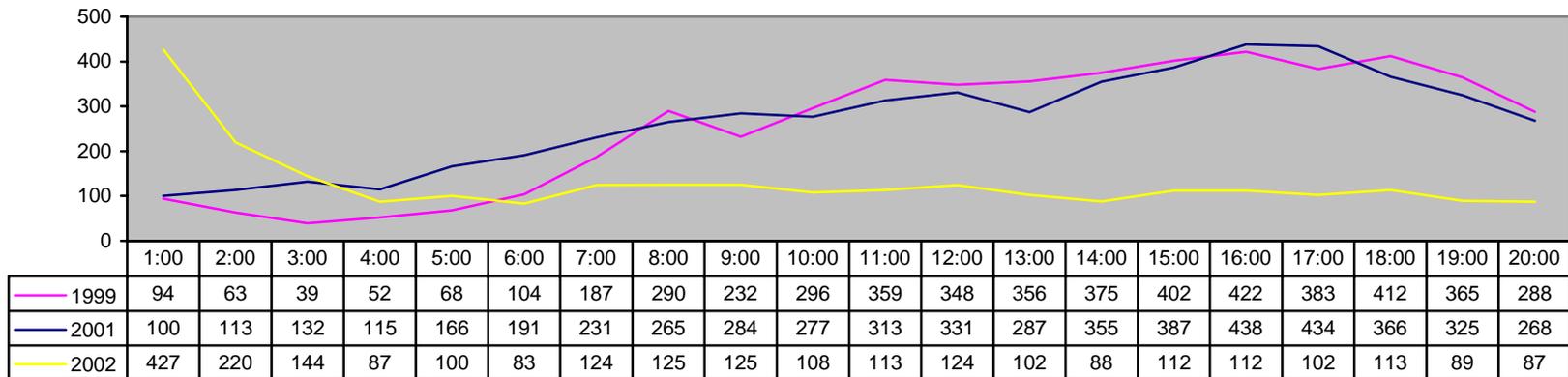
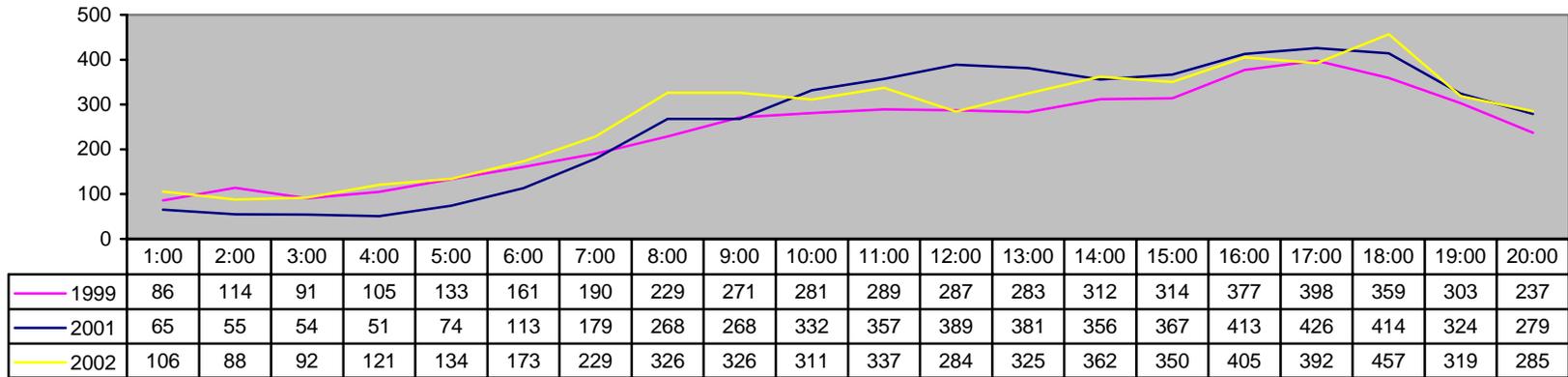


Figure 4-2 - Traffic Counts

I-55 Southbound: Wednesday - Evacuation Traffic vs Non-evacuation Traffic



I-55 Southbound: Thursday - Evacuation Traffic vs Non-evacuation Traffic

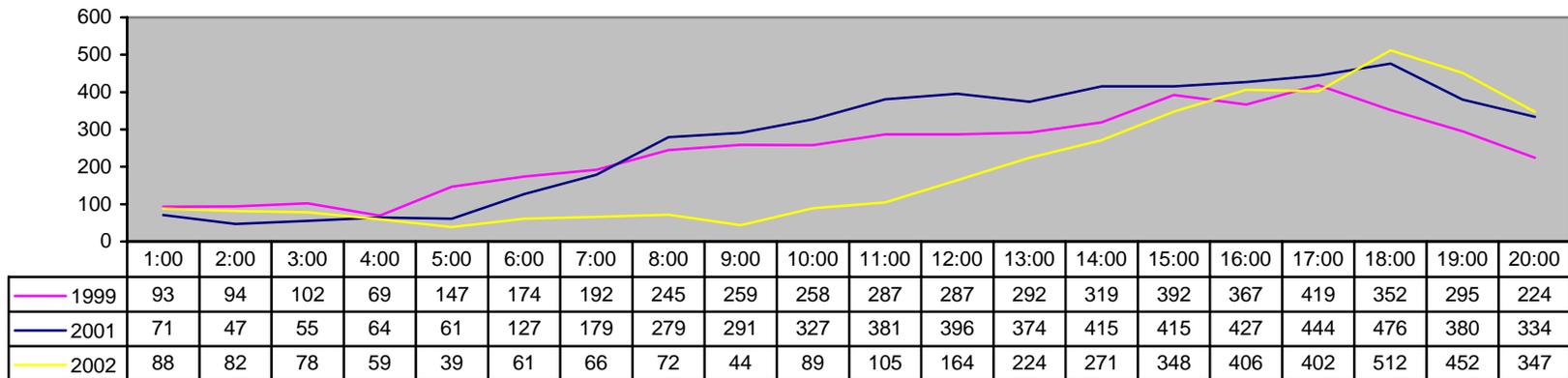
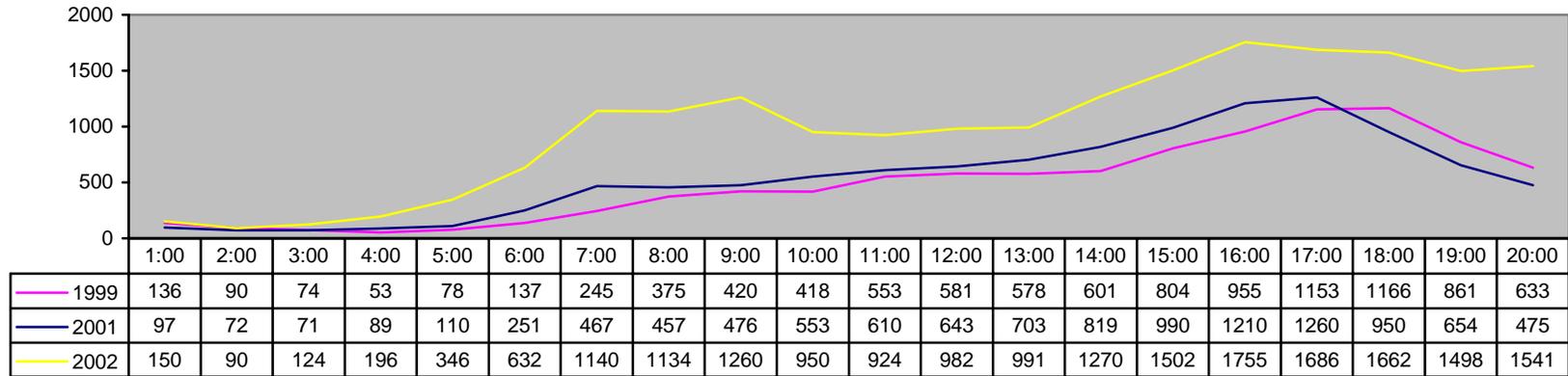


Figure 4-3 - Traffic Counts

I-59 Northbound: Wednesday - Evacuation Traffic vs Non-evacuation Traffic



I-59 Northbound: Thursday - Evacuation Traffic vs Non-evacuation Traffic

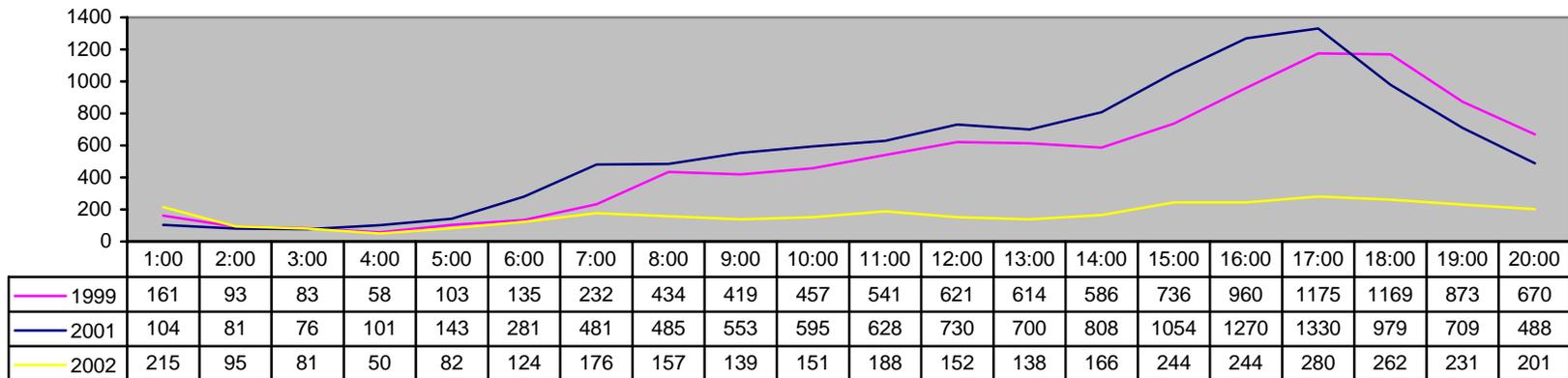
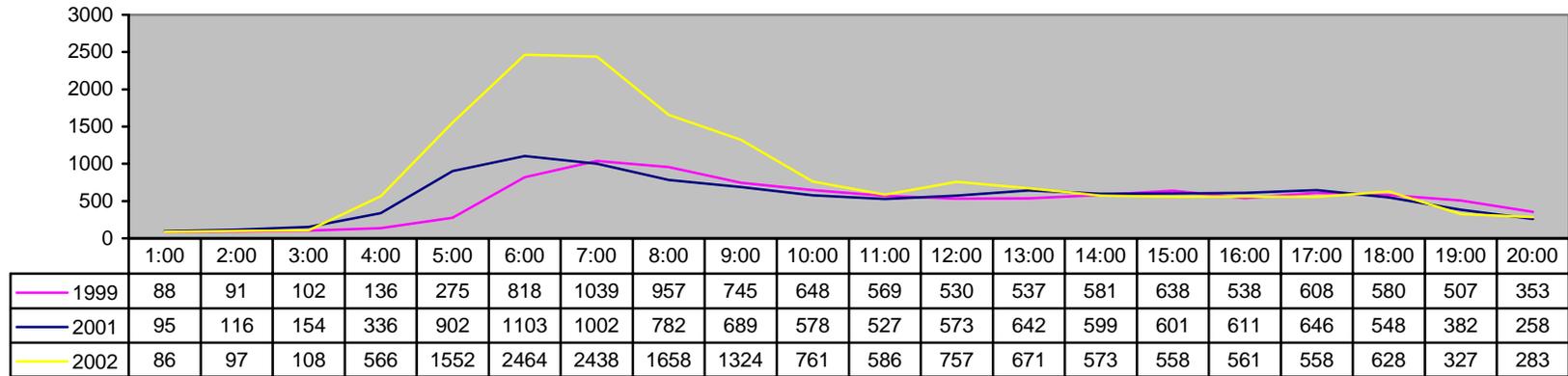


Figure 4-4 - Traffic Counts

I-59 Southbound: Wednesday - Evacuation Traffic vs Non-evacuation Traffic



I-59 Southbound: Thursday - Evacuation Traffic vs Non-evacuation Traffic

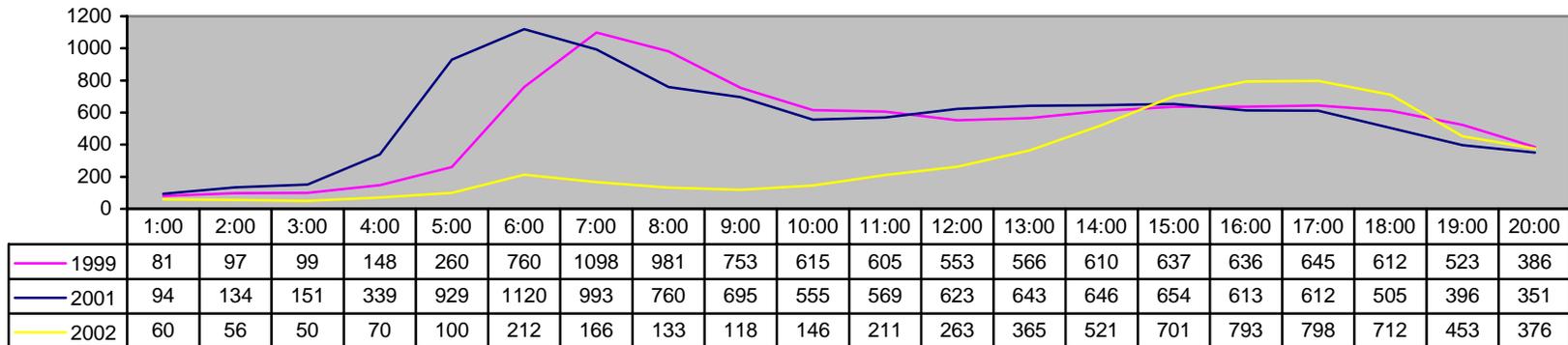


Figure 4-5 ETIS

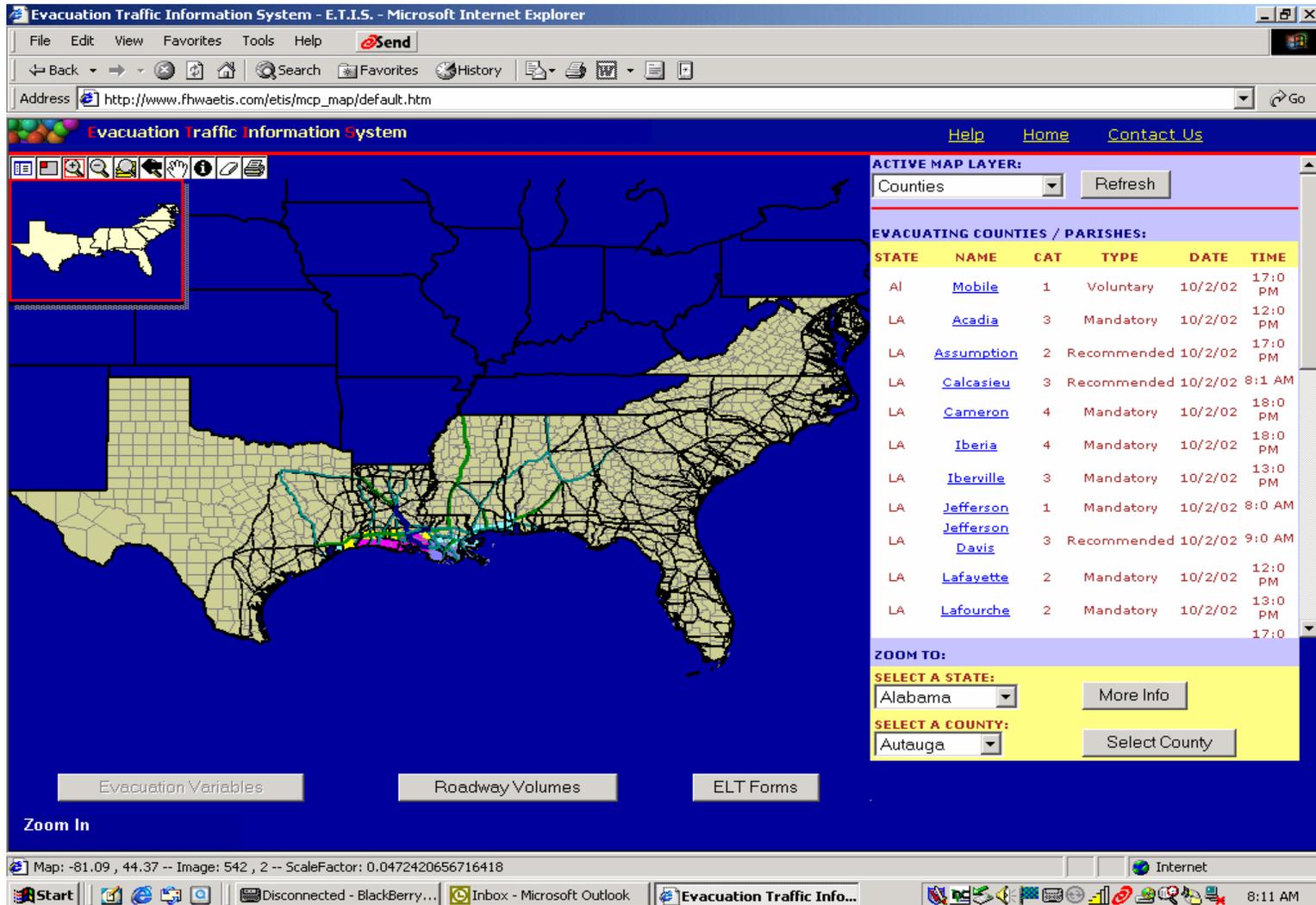
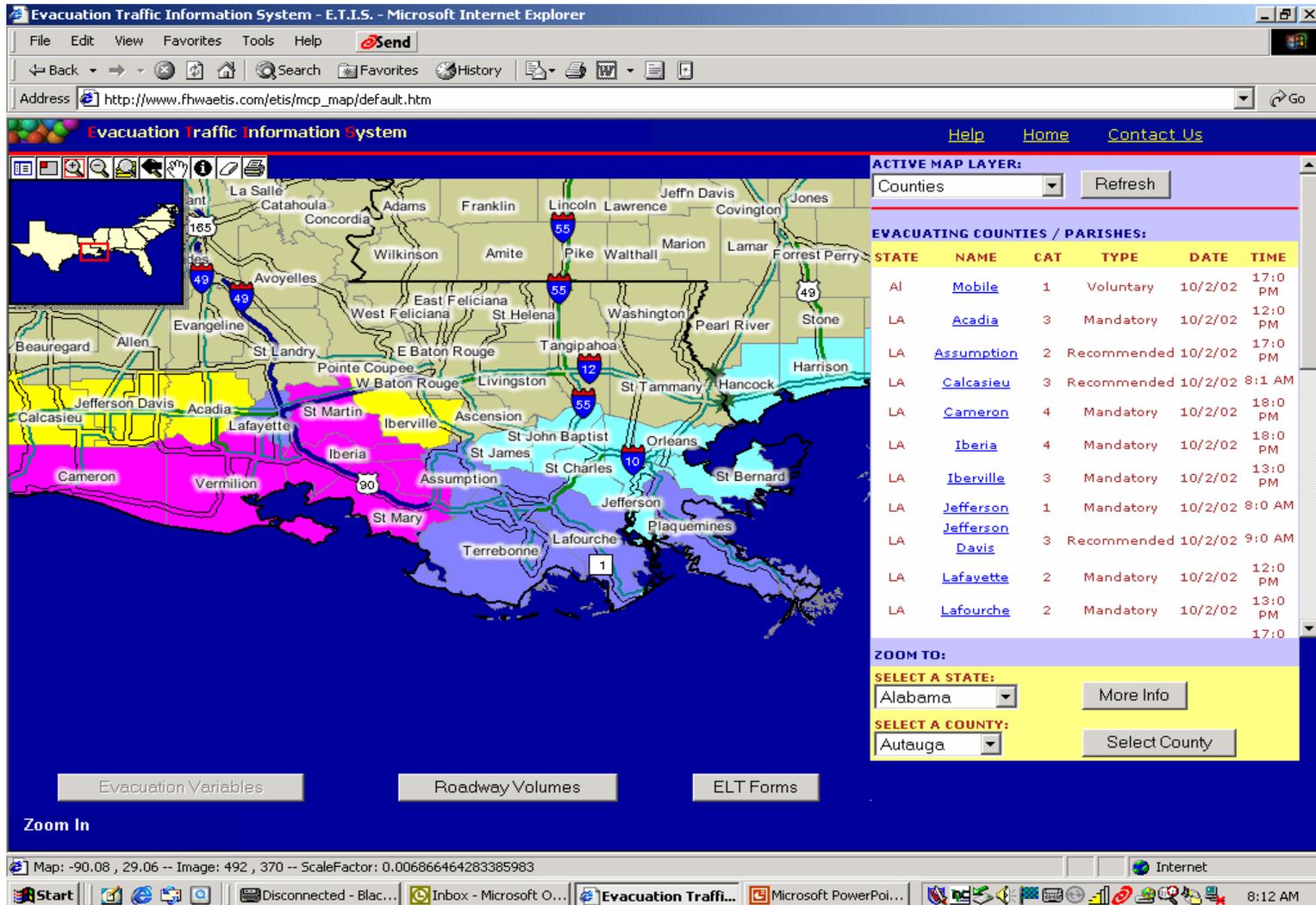


Figure 4-6 ETIS



Recommendations:

1. Update hurricane evacuation studies and provide a transportation analysis tool that will allow local jurisdictions the ability to update clearance times as housing unit growth/road construction dictates.
2. Update road networks to reflect traffic issues for evacuees traveling east and west.
3. Appoint an ICCOH subcommittee to develop a template for evacuation zone delineations. The template should provide guidance to FEMA and state hurricane program managers and USACE study managers about the process of examining risk maps, evacuation routes and road networks and include sample zone maps. It should also describe how to involve local agencies, DOT and law enforcement.
4. Texas has had hurricane evacuation studies through Texas A&M University in the past, including transportation analysis. Starting in 2003 the State of Texas is having the USACE perform hurricane evacuation studies. A USACE study should be done that will include the development of a transportation analysis tool for coastal counties and inland counties impacted by evacuees.
5. Federal and state agencies will need to install more “real time” traffic counters at strategic locations along major evacuation routes so traffic information programs like ETIS can be effective evacuation tools.
6. Encourage communication among neighboring states, counties, and parishes during and after hurricane evacuation events that would better allow for the handling of evacuees that do not always go where they are expected to go.

NOTE Discussion on Page 3-2 applies to the following table and data contained within.

Table 4-1 Transportation /Clearance Time Data Summary

Location	Evacuation Roadway Network Equal to Traffic Demand	Traffic Control Actions	Clearance Time Experienced	Study Calculated Time Category 1 –2	Problems Encountered
Louisiana					
Acadia	Yes	Traffic control points	Unavailable	7 ¾ hours	Apathy to leave; construction hindering traffic; traffic from surrounding parishes increases congestion
Ascension	Yes	Traffic control points	4 hours	No study done in this area	None reported – no major evacuation
Assumption	Yes	None reported	Unavailable	7 hours	Heavy traffic
Calcasieau	No, evacuation roads should be four-lane only	Traffic control points; barricades; coordinated traffic lights	Unavailable	7 ¼ hours	Very heavy congestion; 4 lanes of traffic bottlenecked to two; other parishes using same roads
Iberia	Yes	Traffic control points; coordinated traffic lights	10 hours	6 ¼ hours	Traffic flowing until reaching other parishes; need by pass on 49

Table 4-1 Transportation /Clearance Time Data Summary

Location	Evacuation Roadway Network Equal to Traffic Demand	Traffic Control Actions	Clearance Time Experienced	Study Calculated Time Category 1 –2	Problems Encountered
Jefferson	Yes	None reported	Unavailable	10 hours	Flooded roads; congestion
Jefferson Davis	Yes	Traffic control points	Unavailable	7 ¼ hours	None reported but found general apathy to leave in parish
Lafayette	Yes	Barricades; traffic control points; redirected traffic; am radio messages	Unavailable	7 ¾ hours	Congestion
Lafourche	Yes	None reported	Unavailable	9 ¼ hours	Minor road flooding
Orleans	Yes	None reported	8 hours	10 hours	Flooded roads

Table 4-1 Transportation /Clearance Time Data Summary

Location	Evacuation Roadway Network Equal to Traffic Demand	Traffic Control Actions	Clearance Time Experienced	Study Calculated Time Category 1 –2	Problems Encountered
Plaquemines	Yes	None taken	Not applicable	10 hours	None
St. Bernard	Yes	Barricades; traffic control points	Unavailable	10 hours	None
St. Charles	Yes	None reported	Unavailable	9 ½ hours	Congestion; US Hwy 90 at I 310 backed up 10 miles
St. James	Yes	None reported	Unavailable	9 ½ hours	None
St. John the Baptist	Yes	None taken	Unavailable	9 ½ hours	Flooded roads; inadequate signage of evacuation routes

Table 4-1 Transportation /Clearance Time Data Summary

Location	Evacuation Roadway Network Equal to Traffic Demand	Traffic Control Actions	Clearance Time Experienced	Study Calculated Time Category 1 –2	Problems Encountered
St. Martin	Yes	None taken	Unavailable	6 ¼ hours	None reported
St. Mary	No, too many evacuees sharing two-lane roads	None reported	7 hours	7 hours	Uncoordinated traffic lights; heavy congestion; four lanes reduced to two
St. Tammany	Yes	None	2 – 3 hours	10 hours	None experienced except I-55 which had heavy traffic and flooding
Tangipahoa	Yes	None taken	Unavailable	No study done for this area	None except I-55
Terrebonne	Yes	None taken	Unavailable	7 hours	None

Table 4-1 Transportation /Clearance Time Data Summary

Location	Evacuation Roadway Network Equal to Traffic Demand	Traffic Control Actions	Clearance Time Experienced	Study Calculated Time Category 1 –2	Problems Encountered
Vermilion	Yes	Police stationed at critical points	Hard to determine	7 ¾ hours	None
Alabama					
Baldwin	Yes	None taken	Unavailable	9 ½ hours	Flooded roads; heavy congestion; county needs additional roads constructed
Mobile	Yes, but a larger event could be a problem	Barricades; control points; coordinated lights; message signs	Unavailable	9 ½ hours	East west travel very heavy; flooded roads; construction on roads an issue
Florida: I-10 very heavily congested but did not close; rest areas were extremely full; traffic counters to gauge traffic coming from the west would be very helpful; variable message boards to alert evacuees to keep going or advise them where to go would be helpful					

Table 4-1 Transportation /Clearance Time Data Summary

Location	Evacuation Roadway Network Equal to Traffic Demand	Traffic Control Actions	Clearance Time Experienced	Study Calculated Time Category 1 -2	Problems Encountered
Mississippi: I -55 flooding an issue; the implementation of contra flow needs to be re-evaluated (issue resolved June, 2003)					
Hancock	Yes	Roads closed; barricades	Unsure	12 hours	None; congestion from sightseers an issue
Harrison	Yes	Barricades; traffic control points; lock down drawbridges; am radio messages	Unknown	12 hours	Flooded roads; US49 construction upstream from Harrison
Jackson	Yes	Barricades	Not available	12 hours	Additional barricades needed; no real issues since general apathy towards storms

Table 4-1 Transportation /Clearance Time Data Summary

Location	Evacuation Roadway Network Equal to Traffic Demand	Traffic Control Actions	Clearance Time Experienced	Study Calculated Time Category 1 –2	Problems Encountered
Texas (study-calculated times for Texas were done by Texas A&M)					
Chambers	No, not enough roads for evacuation	Barricades; traffic control points; coordinated lights	Unavailable	Category 1: 10 hours Category 2: 13 hours	Heavy congestion from Louisiana evacuees; construction on roads needs to be stopped during event
Galveston	Yes	None	Unavailable	Category 1: 14 hours Category 2: 20 hours	Need additional roads built
Jefferson	Yes	None	9 hours	Category 1: 14 hours Category 2: 20 hours	Construction on roads; trains need to be stopped from passing and cutting off evacuation routes
Orange	Yes	Barricades; traffic control points; vehicle assistance	Hard to determine, reported times vary from 30 minutes to 10 hours.	Category 1: 14 hours Category 2: 20 hours	Accidents; congestion; Louisiana evacuees