



Improvement of Hurricane Evacuation Practices in New Orleans

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EXECUTIVE SUMMARY

In the 2005 tragedy of Hurricane Katrina, 1,500 New Orleans residents died as a result of confinement within the city during the Category 3 hurricane. This death toll stems from poor planning and implementation of hurricane evacuation protocols. During Hurricane Katrina, 40% of New Orleans residents did not leave the city. The factors that contributed to the city's failure to evacuate all of its residents include residents' lack of information regarding emergency evacuation procedures, the untimely mandate of an emergency evacuation, the absence of public transportation options for residents with special needs, poorly prepared evacuation routes, and the city's overall lack of planning and preparation for emergency response.

Based upon the remedial tactics utilized in Florida and Alabama to ameliorate similar preparedness issues, the recommendations for improvement of evacuation practices in New Orleans include the provision of monthly information regarding emergency evacuation procedures to residents, an increase in modes of public transportation, a transportation registry for those in need in the event of an emergency evacuation, correspondence between RTA and emergency response planners, the creation of an entity that is solely responsible for the research and development of an effective evacuation plan, and the re-implementation of the Hurricane Pam exercise.

INTRODUCTION

Approximately 350,000 residents did not evacuate the city of New Orleans during Hurricane Katrina. Nearly 127,000 of those who did not evacuate did not have the means to do so on their own. Residents were given a mere 48 hours to evacuate the city after Mayor Ray Nagin announced a mandatory evacuation of the city for Hurricane Katrina. The evacuation time for those who chose to leave the city was inflated to an average travel time of 20 hours.¹ In the midst of the evacuation for Hurricane Katrina, cell phone communication was exhausted due to an overwhelming number of calls made at the time. In addition to resident's lack of access to personal vehicles and the issues caused by the abbreviated evacuation time, no specific bus arrangements were made to aid in the emergency evacuation. Mayor Ray Nagin ordered 700 busses from Federal Emergency Management Agency the day that a mandatory evacuation was put into effect in New Orleans. Two days after Katrina hit the city, 100 FEMA busses arrived to transport those who received shelter at the Superdome out of the city. Each of the problems that arose during the Katrina evacuation of New Orleans is a result of poor emergency planning.

DESCRIPTION OF EFFECTIVE PRACTICES

The effectiveness can also be measured by the examination of various strategies and the evaluation of whether the strategies address the issues that have been recognized as “effective practices,” specifically those outlined by the United States Department of Transportation (DOT). For the purposes of this analysis, each evacuation plan is rated by the point index shown below. This index is based off of the effective qualities highlighted by the DOT. The DOT states, “A good plan will address each of the listed questions.” Each component of an evacuation plan receives points, which vary depending upon the significance of the issue, if it addresses the questions mentioned by the DOT.ⁱⁱ The first eight questions are assigned greater point values because the DOT highlights these points as the pressing questions to answer in a plan.

DOT EVACUATION PREPAREDNESS POINT INDEX

* The highest score that a plan can receive based off of this measure is 25 points.

Pt.	Questions Posed by the DOT
2	Are transportation officials included in the development of an evacuation plan?
2	Does the plan contain provisions to identify the number of evacuees that will require transportation assistance?
2	Have those with authority and responsibility for evacuation procedures been identified, and have their tasks been pre-defined?
2	Is someone/something responsible for managing evacuation’s operations?
2	Does the plan fit into the larger emergency management plan?
2	Does the plan address shelter-in-place provisions if full evacuation is not feasible?
2	Is the community informed of what steps they should take to be prepared for an evacuation?
2	Has the plan been exercised and revised as needed?
1	Is the community informed of the locations of nearby shelters?
1	Is the community informed of whether a person is located in an evacuation zone?
1	Is the community informed of what evacuation routes they should use?
1	Does the plan identify organizations and individuals responsible for directing resources to execute evacuation orders?
1	Are the resources available to account for evacuating those with special needs?
1	Does the plan address the communication of alternative routes/transportation modes?
1	Does the plan require evacuation routes to be designated, marked, and communicated to the public?
1	Does the plan include monitoring evacuation/re-entry operations of motorized transport, rail, air, water, and other modes of transportation to determine the adequacy of available resources?
1	Does the plan identify the provisions made to monitor traffic conditions on the evacuation/re-entry routes and make operational adjustments as appropriate to maximize throughput?

*This index displays the maximum number of points that can be earned by evaluated evacuation plans.

EVACUATION PROCEDURE FOR HURRICANE KATRINA IN NEW ORLEANS

On August 26th, 2005 Governor Kathleen Blanco declared a federal state of emergency in Louisiana in response to Hurricane Katrina's rapid growth in the Gulf of Mexico. The following day, voluntary evacuations were put into effect in the city of New Orleans. Contra flow commenced on routes I55, I59, and I10 on August 27th for those who chose to evacuate the city. On August 28th, Mayor Ray Nagin put a mandatory evacuation into effect and also ordered 700 evacuation busses from FEMA. At 5:00 AM on August 29th, Hurricane Katrina made landfall in Louisiana. While 1 million New Orleans residents evacuated the city, as many as 350,000 residents were left behind to face the storm. The following table lists the evacuation procedures implemented during Katrina and the respective problems that were encountered with the execution of each procedure.ⁱⁱⁱ Federal Emergency Management Agency (FEMA)

PROBLEMS ENCOUNTERED IN EVACUATION PROCEDURE DURING KATRINA

Implemented Procedure	Problems Encountered in Execution
Mandatory Evacuation Announcement	Allowed residents only 24 hours to evacuate, which contributed to the percentage of New Orleans residents who did not evacuate. This exacerbated traffic problems encountered during evacuation. Evacuees who traveled to Houston, on average, spent 20 hours driving, when ordinarily the commute would require 5-6 hours.
Contra Flow Evacuation Routes	Excessive traffic congestion Excessive evacuation commute time
Radio/Television Alerts	Communications outages resulted in the inability to provide residents with cell phone, radio, or TV alerts after August 28 th .
Superdome Shelter	Superdome was not equipped to accommodate 20,000 evacuees, which resulted in thousands of residents stranded in New Orleans without food or shelter ^{iv}
GOHSEP/TRAC- Hurricane evacuation preparedness programs	Programs were restricted to small populations of Louisiana and did not provide information to all New Orleans residents
700 bus order from FEMA	Order was put in place less than 24 hours before Katrina hit the city. No busses reached New Orleans in time to evacuate residents from the state. 100 busses that arrived to New Orleans came 2 days after Katrina hit the city. (127,000 residents lack access to transportation, but no bus arrangements were made to transport residents out of the city)
2004 Practice Evacuation for Hurricane PAM	Exercise indicated that 1,000 shelters would be necessary to accommodate all non-evacuees, but the Superdome was the only open shelter. ^v

EFFECTIVENESS OF HURRICANE KATRINA PROCEDURES IN NEW ORLEANS

Points Received	Pt.	Questions Posed by the DOT
X	2	Are transportation officials included in the development of an evacuation plan?
X	2	Does the plan contain provisions to identify the number of evacuees that will require transportation assistance?
X	2	Have those with authority and responsibility for evacuation procedures been identified, and have their tasks been pre-defined?
2	2	Is someone/something responsible for managing evacuation's operations?
X	2	Does the plan fit into the larger emergency management plan?
X	2	Does the plan address shelter-in-place provisions if full evacuation is not feasible?
X	2	Is the community informed of what steps they should take to be prepared for an evacuation?
1 (Plan has been exercised, but not revised)	2	Has the plan been exercised and revised as needed?
X	1	Is the community informed of the locations of nearby shelters?
1	1	Is the community informed of whether a person is located in an evacuation zone?
X	1	Is the community informed of what evacuation routes they should use?
X	1	Does the plan identify organizations and individuals responsible for directing resources to execute evacuation orders?
1	1	Are the resources available to account for evacuating those with special needs?
X	1	Does the plan address the communication of alternative routes/transportation modes?
X	1	Does the plan require evacuation routes to be designated, marked, and communicated to the public?
X	1	Does the plan include monitoring evacuation/re-entry operations of motorized transport, rail, air, water, and other modes of transportation to determine the adequacy of available resources?
X	1	Does the plan identify the provisions made to monitor traffic conditions on the evacuation/re-entry routes and make operational adjustments as appropriate to maximize throughput?
Total Points Received: 5		

EVACUATION IN JACKSONVILLE, FLORIDA DURING HURRICANE GEORGES

During the 1998 evacuation for Hurricane Georges, 22% of Jacksonville’s residents evacuated the city.^{vi} The Category 4 storm resulted in a 602 deaths, which led city officials to reconsider evacuation procedures in the city.^{vii} The only evacuation practice used during Hurricane Georges was the provision of shelters for evacuees and radio broadcasts of possible evacuation routes. The prominent problems in the execution of evacuation practices during Hurricane Georges were residents’ lack of access to transportation and their overall confusion regarding the shelters to which they could evacuate. This problem indicates that efforts to publicize hurricane evacuation information were ineffective.

EFFECTIVENESS OF HURRICANE GEORGES PRACTICES IN JACKSONVILLE

Points Received	Pt.	Questions Posed by the DOT
X	2	Are transportation officials included in the development of an evacuation plan?
X	2	Does the plan contain provisions to identify the number of evacuees that will require transportation assistance?
X	2	Have those with authority and responsibility for evacuation procedures been identified, and have their tasks been pre-defined?
2 (The governor)	2	Is someone/something responsible for managing evacuation’s operations?
X	2	Does the plan fit into the larger emergency management plan?
1	2	Does the plan address shelter-in-place provisions if full evacuation is not feasible?
X	2	Is the community informed of what steps they should take to be prepared for an evacuation?
X	2	Has the plan been exercised and revised as needed?
X	1	Is the community informed of the locations of nearby shelters?
X	1	Is the community informed of whether a person is located in an evacuation zone?
1	1	Is the community informed of what evacuation routes they should use?
X	1	Does the plan identify organizations and individuals responsible for directing resources to execute evacuation orders?
X	1	Are the resources available to account for evacuating those with special needs?
1	1	Does the plan address the communication of alternative routes/transportation modes?
1	1	Does the plan require evacuation routes to be designated, marked, and communicated to the public?
X	1	Does the plan include monitoring evacuation/re-entry operations of motorized transport, rail, air, water, and other modes of transportation to determine the adequacy of available resources?
X	1	Does the plan identify the provisions made to monitor traffic conditions on the evacuation/re-entry routes and make operational adjustments as appropriate to maximize throughput?
Total Points Received: 6		

EVACUATION PROCEDURAL CHANGES IN JACKSONVILLE, FLORIDA

The Evacuation Liaison Team (ELT), a federal management team, began to conduct research on how to increase evacuation rates after Hurricane Georges. ELT works to coordinate multi-state evacuations. This entity can be utilized as a resource by any state if a state formally requests its intervention through a FEMA Regional Operations Center. The center's aim is to allow states to share resources that promote public safety and swift transportation during hurricane evacuations. ELT corresponded with the Florida Department of Transportation (FDOT), which was responsible for the collection of count data, or the number of cars that travel, along various evacuation routes. The FDOT collected information that was used in ELT's decision to nullify the use of contra flow on I-75, which was once used as an evacuation route.

Under ELT several procedural changes occurred in Jacksonville. ELT interacted with the Jacksonville Transit Authority (JTA) to provide Jacksonville residents with public transportation options during a hurricane evacuation. ELT deemed JTA the head of emergency evacuation transportation matters. JTA then decided to bolster its fleet from 75 busses to 180 in order to provide residents with free bus services to shelters during hurricane evacuations.^{viii} JTA also collaborated with the Duval County Emergency Preparedness Division, which maintains a registry of Jacksonville residents who are unable to transport themselves to a shelter in a hurricane evacuation due to special medical needs. Jacksonville residents must register with the Duval County Emergency Preparedness Division annually in order to maintain up-to-date records of registration. ELT appointed JTA as the entity responsible for the annual formulation of evacuation routes. The final change made pursuant to prevent confusion during emergency evacuations and to maximize the publicity of evacuation information, Jacksonville County residents receive emergency information regarding public transportation options and evacuee shelter locations monthly in their utility bills.

EFFECTIVENESS OF NEW PLAN IMPLEMENTED IN JACKSONVILLE, FLORIDA

Points Received	Pt.	Questions Posed by the DOT
2	2	Are transportation officials included in the development of an evacuation plan?
2	2	Does the plan contain provisions to identify the number of evacuees that will require transportation assistance?
2	2	Have those with authority and responsibility for evacuation procedures been identified, and have their tasks been pre-defined?
2	2	Is someone/something responsible for managing evacuation's operations?
2	2	Does the plan fit into the larger emergency management plan?
2 (Provides transportation to these shelters)	2	Does the plan address shelter-in-place provisions if full evacuation is not feasible?
2	2	Is the community informed of what steps they should take to be prepared for an evacuation?
X	2	Has the plan been exercised and revised as needed?
1	1	Is the community informed of the locations of nearby shelters?
X	1	Is the community informed of whether a person is located in an evacuation zone?
1	1	Is the community informed of what evacuation routes they should use?
1	1	Does the plan identify organizations and individuals responsible for directing resources to execute evacuation orders?
1	1	Are the resources available to account for evacuating those with special needs?
1	1	Does the plan address the communication of alternative routes/transportation modes?
1	1	Does the plan require evacuation routes to be designated, marked, and communicated to the public?
X	1	Does the plan include monitoring evacuation/re-entry operations of motorized transport, rail, air, water, and other modes of transportation to determine the adequacy of available resources?
X	1	Does the plan identify the provisions made to monitor traffic conditions on the evacuation/re-entry routes and make operational adjustments as appropriate to maximize throughput?
Total Points Received: 20		

EVACUATION IN ALABAMA DURING HURRICANE GEORGES

Approximately 67% of Alabama residents evacuated from the state during Hurricane Georges. The evacuation procedures that Alabama put into effect during this evacuation consisted of contra flow on I-65, mobilization of personnel along evacuation routes to regulate traffic flow, radio and television alert systems, and evacuation zoning. The primary problems encountered with these practices during Hurricane Georges included excessive traffic congestion of I-65 and inadequate aid provided by personnel positioned about the city.^{ix}

EFFECTIVENESS OF HURRICANE GEORGES PROCEDURES IN ALABAMA

Points Received	Pt.	Questions Posed by the DOT
X	2	Are transportation officials included in the development of an evacuation plan?
X	2	Does the plan contain provisions to identify the number of evacuees that will require transportation assistance?
X	2	Have those with authority and responsibility for evacuation procedures been identified, and have their tasks been pre-defined?
2	2	Is someone/something responsible for managing evacuation's operations?
X	2	Does the plan fit into the larger emergency management plan?
X	2	Does the plan address shelter-in-place provisions if full evacuation is not feasible?
2	2	Is the community informed of what steps they should take to be prepared for an evacuation?
X	2	Has the plan been exercised and revised as needed?
X	1	Is the community informed of the locations of nearby shelters?
X	1	Is the community informed of whether a person is located in an evacuation zone?
1	1	Is the community informed of what evacuation routes they should use?
1	1	Does the plan identify organizations and individuals responsible for directing resources to execute evacuation orders?
X	1	Are the resources available to account for evacuating those with special needs?
X	1	Does the plan address the communication of alternative routes/transportation modes?
X	1	Does the plan require evacuation routes to be designated, marked, and communicated to the public?
X	1	Does the plan include monitoring evacuation/re-entry operations of motorized transport, rail, air, water, and other modes of transportation to determine the adequacy of available resources?
X	1	Does the plan identify the provisions made to monitor traffic conditions on the evacuation/entry routes and make operational adjustments as appropriate to maximize throughput?
Total Points Received: 6		

EVACUATION PROCEDURAL CHANGES IN ALABAMA

During Hurricane Georges, city mayors held the burden of the plan development, publicizing, and delegation of responsibilities to everyone involved in emergency response matters. In effort to address the issues that occurred during Hurricane Georges, the Alabama Department of Transportation (ALDOT), Department of Public Safety (ADPS), and Department of Emergency Management (ADEM) centralized control of evacuation plan development and implementation for the entire state of Alabama. The three organizations decided that Alabama should begin an annual practice of hurricane evacuations to address its previously identified flaws.^x

ALDOT, ADPS, and ADEM conducted research that explored the reasons people did not evacuate during Hurricane Georges.^{xi} Telephone surveys demonstrated that people opt out of evacuations for the following reasons:

1. They traditionally do not evacuate
2. They have undergone poor evacuation experiences
3. They lacked transportation to evacuate on their own
4. They experienced confusion or were unaware about zoning and the severity of the storm
5. They feared that looting might occur in their absence
6. They did not have the time to evacuate

The plan tests the strategies outlined for the previous hurricane season in order to address some of the reasons that people chose not to evacuate. The practice evacuation calls for the activation of all personnel and agencies involved in evacuation protocols. The Department of Transportation must engage all busses that are allocated to evacuees. All alert systems are put into effect for 24 hours prior to this exercise as well. All agencies involved in evacuation procedures must meet the resource requests expected of them by the evacuation plans. Alabama refines its evacuation procedures annually after each evacuation exercise is practiced. Thus far, real traffic conditions presented during the exercise have provided ALDOT with the evidence to identify that Montgomery is an area in which most obstructions of traffic flow occur. All law enforcement officers must take their positions along evacuation routes and initiate contra flow procedures. This practice reminds officers of their specific roles in the maintenance of traffic flow at traffic control points.^{xii}

In 2004, Alabama implemented its refined hurricane evacuation practices during Hurricane Ivan. This plan incorporated revised contra flow routes and full activation of emergency response personnel, who include police, ambulances, bus drivers, and television/radio spokespersons. The plan enabled 81% of Alabama residents to evacuate the state during Hurricane Ivan.^{xiii}

EFFECTIVENESS OF HURRICANE IVAN PROCEDURES IN ALABAMA

Points Received	Pt.	Questions Posed by the DOT
2	2	Are transportation officials included in the development of an evacuation plan?
2	2	Does the plan contain provisions to identify the number of evacuees that will require transportation assistance?
2	2	Have those with authority and responsibility for evacuation procedures been identified, and have their tasks been pre-defined?
2	2	Is someone/something responsible for managing evacuation's operations?
2	2	Does the plan fit into the larger emergency management plan?
X	2	Does the plan address shelter-in-place provisions if full evacuation is not feasible?
2	2	Is the community informed of what steps they should take to be prepared for an evacuation?
2	2	Has the plan been exercised and revised as needed?
X	1	Is the community informed of the locations of nearby shelters?
X	1	Is the community informed of whether a person is located in an evacuation zone?
1	1	Is the community informed of what evacuation routes they should use?
1	1	Does the plan identify organizations and individuals responsible for directing resources to execute evacuation orders?
X	1	Are the resources available to account for evacuating those with special needs?
1	1	Does the plan address the communication of alternative routes/transportation modes?
1	1	Does the plan require evacuation routes to be designated, marked, and communicated to the public?
X	1	Does the plan include monitoring evacuation/re-entry operations of motorized transport, rail, air, water, and other modes of transportation to determine the adequacy of available resources?
1	1	Does the plan identify the provisions made to monitor traffic conditions on the evacuation/re-entry routes and make operational adjustments as appropriate to maximize throughput?
Total Points Received: 19		

RECOMMENDATIONS BASED ON RESULTS IN JACKSONVILLE, FLORIDA

Jacksonville, Florida serves as a sound comparative study from which New Orleans can borrow some methodological ideas. Much like New Orleans, Jacksonville is annually affected by hurricanes and faces similar obstacles in the education and evacuation of its residents. The problems surrounding the matters of public transit options and sheltering parallel one another in the case of Florida's Hurricane Georges and New Orleans' Hurricane Katrina.

- **Jacksonville, Florida sought the aid of a federal oversight agency, ELT, which held the responsibility for planning and implementation of evacuation plans.**
 - New Orleans can receive the same aid in planning by ELT if the state of Louisiana places a formal request for aid through a Regional FEMA Operations Center. ELT will work to coordinate as many elements as possible of Louisiana's evacuation plans with those of surrounding states.
- **Jacksonville, Florida provided free bus services to evacuees and increased the number of JTA busses available in the city.**
 - New Orleans has approximately 80 busses in use. On average, a diesel bus costs up to \$300,000 each.^{xiv} High capacity busses can cost up to \$792,000 per bus.^{xv} New Orleans has allocated at least 26 million dollars towards bus replacement. In 2008, FEMA agreed to grant New Orleans \$44.2 million towards bus replacement. New Orleans should use this money to increase the number of available busses to its pre-Katrina number of 150 busses in order to increase public transportation options in the city.^{xvi}
- **In Jacksonville, Florida the entity responsible for the formulation of evacuation procedures worked alongside JTA to improve transportation efforts in hurricane evacuation.**
 - RTA states on its website, "It is our commitment to work with our local government during mandatory evacuations." Given that there is truth to this assertion, New Orleans should empower RTA as has been done in Jacksonville. Specific responsibilities must be outlined for RTA's involvement in hurricane evacuations. Incentives must be provided for bus drivers and their families to assure that bus transportation will be available during a hurricane evacuation.
- **JTA created a registry for those in need of transportation due to medical illnesses.**
 - RTA in New Orleans began a program called the City Assisted Evacuation Plan (CAEP), which is intended to provide transportation for those who have no means to do so on their own.^{xvii} This program extends to those who lack transportation due to financial need, have unreliable or no forms of personal transportation, or are homeless. Residents in need of this resource must simply dial 311 to inform the city of their personal information. This resource should be publicized throughout the city of New Orleans.
- **Jacksonville, Florida created a source of information that extends out to every household in the city.**
 - New Orleans can mimic this practice through the monthly distribution of water bills. Every household receives a water bill from the city. New Orleans can insert information regarding evacuation routes, CAEP, and zoning alongside all water bills.

RECOMMENDATIONS BASED ON RESULTS IN ALABAMA

The 14% increase in Alabama evacuation rates clearly indicates the success of the state's "practice makes perfect" methodology. Although very different from the practices done in Alabama, New Orleans has previously executed a practice of its own called Hurricane Pam. Hurricane Pam was an opportunity for the U.S. Army Corps of Engineers and emergency preparedness officials to simulate a hurricane in effort to prepare recovery and response plans for the city. New Orleans should build upon this concept by the simulation of emergency response practices in the city, as Alabama has done. First, police officers, EMS dispatches, bus drivers, RTA, contra flow personnel, and television and radio alert systems should have clearly defined roles in emergency response. Next, these duties should be put into practice in order to improve planning and guarantee the availability of resources such as personnel and busses.

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- ⁱ •http://www.nationalevacuationconference.org/files/presentations/day2/Boyd_Ezra.pdf
ⁱⁱ http://ops.fhwa.dot.gov/publications/evac_primer/19_components.htm
ⁱⁱⁱ •<http://www.thinkprogress.org/katrina-timeline>
^{iv} <http://www.foxnews.com/story/0,2933,167313,00.html>
^v <http://www.gpoaccess.gov/serialset/creports/pdf/hr109-377/pam.pdf>
^{vi} ^{vi} <http://emc.ornl.gov/CSEPPweb/data/Evacuation%20Documents/Fed%20Reports/georges.pdf>
^{vii} http://docs.lib.noaa.gov/noaa_documents/NOAA_related_docs/death_toll_natural_disasters.pdf
^{viii} <http://www.jacksonvillebeach.org/index.aspx?NID=84>
^{ix} <http://www.dot.state.al.us/InfoServices.html>
^x <http://www.fhwa.dot.gov/reports/hurricanevacuation/appendix.htm>
^{xi} ^{xi} •http://www.nationalevacuationconference.org/files/presentations/day2/Boyd_Ezra.pdf
^{xii} https://hseep.dhs.gov/support/lessons/Exercise%20Participation_The%20Alabama%20Emergency%20Management%20Agency%20Inclusion%20of%20State%20Mutual%20Aid%20Teams.pdf
^{xiii} <http://www.colorado.edu/hazards/research/qr/qr190/qr190.html>
^{xiv} http://news.cnet.com/The-greening-of-the-city-bus/2100-11389_3-6079090.html
^{xv} http://www.nola.com/politics/index.ssf/2010/06/rta_will_put_brand-new_buses_o.html
^{xvi} http://www.nola.com/politics/index.ssf/2010/06/rta_will_put_brand-new_buses_o.html
^{xvii} http://www.norta.com/Files/Evacuation/City_Assisted_Evacuation.pdf