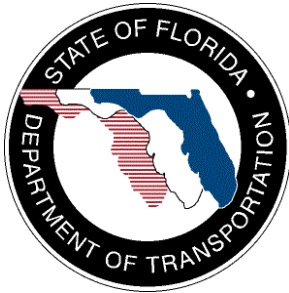


Technical Memorandum

Florida Department of Transportation Hurricane Response Action Plan

June 14, 2005

Version 2



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FDOT Hurricane Response Action Plan

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List of Acronyms

ATMS	Advanced Traffic Management System
C2C	Center-to-Center
CCTV	Closed-circuit Television
<i>CFP</i>	<i>Cost Feasible Plan</i>
DMS	Dynamic Message Sign
DTOE	District Traffic Operations Engineer
EOC	Emergency Operations Center
ERN	Everglades Radio Network
FACERS	Florida Association of County Engineers & Road Superintendents
FCO	Fixed Capital Outlay
FDCA	Florida Department of Community Affairs
FDOT	Florida Department of Transportation
FHWA	Federal Highway Administration
FSITE	Florida Section Institute of Transportation Engineers
FTE	Florida's Turnpike Enterprise
HAR	Highway Advisory Radio
ITS	Intelligent Transportation Systems
ITS Florida™	Intelligent Transportation Society of Florida
LED	Light-Emitting Diode
LTR®	Logic Trunked Radio
MHz	Megahertz
PIO	Public Information Office
RTMC	Regional Transportation Management Center
SEOC	State Emergency Operations Center
SHS	State Highway System
SIS	Strategic Intermodal System
TEOC	Transportation Emergency Operations Center
TEOO	Traffic Engineering and Operations Office
TERL	Traffic Engineering Research Lab
TIM	Traffic Incident Management
TiRN™	Traveler Information Radio Network™
TMC	Transportation Management Center
UCF	University of Central Florida
VMS	Variable Message Sign

1. Executive Summary

Continuing the effort begun with the *Hurricane Response Evaluation and Recommendations* report¹ developed following the 2004 hurricane season, the Florida Department of Transportation (FDOT) Traffic Engineering and Operations Office (TEOO) has developed this *Hurricane Response Action Plan* to ensure that certain key recommendations are implemented for 2005 and beyond. It is the intent of this *Action Plan* to present the priority issues that should be addressed in the FDOT's ongoing hurricane response planning, and to assign responsibility for accomplishing these objectives in a timely, effective manner.

Florida's hurricane preparedness, planning, and emergency response and recovery capabilities were put to the ultimate test when successive hurricanes struck the state during August and September 2004. Following these catastrophic events, the FDOT initiated an intensive evaluation of its hurricane response operations, particularly the efforts of the various Districts and Florida's Turnpike Enterprise (FTE). This evaluation helped the FDOT assess how well its hurricane response and recovery plans worked, and identify the areas where improvements should be made. The *Hurricane Response Evaluation and Recommendations* report concluded with 54 different recommendations from a total of 12 functional areas within intelligent transportation systems (ITS) and traffic operations. The report encouraged the FDOT to examine the recommendations further, and to choose which ones to consider for future application in hurricane response plans and operations.

Representatives from the FDOT, the District Traffic Operations Engineers (DTOEs), the Florida Section Institute of Transportation Engineers (FSITE), the Florida Association of County Engineers and Road Superintendents (FACERS), and the Intelligent Transportation Society of Florida (ITS FloridaTM)² attended a meeting on January 27, 2005, in Miami. Attendees decided that the TEOO will develop a hurricane plan to guide future preparation, response, and recovery operations. This *Action Plan* divides the recommendations from the *Hurricane Response Evaluation and Recommendations* report into District responsibilities and Central Office responsibilities. The Central Office responsibilities are then subdivided into items that have already been addressed and items remaining to be addressed.

¹ *Technical Memorandum – Florida Department of Transportation Hurricane Response Evaluation and Recommendations, Version 5* (February 2005). FDOT Contract No. C-7772. Available online at http://floridait.com/Hurricane_Evaluation.htm.

² ITS Florida is a trademark of the Intelligent Transportation Society of Florida.

FDOT Hurricane Response Action Plan

The items to be addressed are shown in *Section 3* herein and identify the individuals responsible for completing the tasks necessary to implement the recommendation. This includes the actions or tasks to be completed, as well as a preliminary completion date and current progress. Because this *Action Plan* is a working document, it will be updated on a periodic basis and will be evaluated by the TEOO as to its validity.

2. District Responsibilities

In reviewing the recommendations from the *Hurricane Response Evaluation and Recommendations* report, some were identified as more appropriately addressed at a District level rather than by the TEOO staff. These recommendations are listed here as action items, and all Districts are strongly urged to implement them as feasible and/or appropriate within their own hurricane plans.

2.1 Signal Operations

- Develop signal timing plans for evacuations.
- Retime signals as appropriate after an emergency in such locations as detour routes and heavily traveled areas.
- Organize signal assessment and repair teams in advance.

2.2 Expectations for Signal Restoration

Make available a standing stockpile of spare parts, such as hangers, signal heads, and related hardware for distribution to maintaining agencies.

2.3 Road Rangers

Develop a redundant means of communication for Road Rangers to use when cellular services, such as Nextel®, are not available.³ An example of this is being done in District 6 using the Logic Trunked Radio (LTR®) system.⁴ This system relies on a tower installed on an 80-story building in downtown Miami, with a backup installed nearby. The cost was \$115,000, which included the installation and programming of 30 mobile Motorola® units, 34 portable units, and 4 base stations, and system installation in the transportation management center (TMC).⁵

³ Nextel is a registered trademark of Nextel Communications, Inc.

⁴ LTR is a registered trademark of EFJohnson, Co.

⁵ Motorola is a registered trademark of Motorola, Inc.

Likewise, the FTE has instituted changes. As of May 1, 2005, the FTE began dispatching their Road Rangers using the 450 megahertz (MHz) radio system as the primary dispatch method, with the Nextel cellular service designated as the backup means of communication. The FTE has two base units in each of the two TMC facilities and one mounted in each truck. This system is also used by the FHP Dispatch Center in Lake Worth.

2.4 Transportation Management Center Operations

- Develop a plan for hurricanes and other emergencies, and update the plan annually. The plan should include, at a minimum, a list of all staff and their contact information; staff roles and responsibilities; the expected staffing criteria and schedules, if applicable; and the criteria for shutting down and starting up the TMC in an emergency, including an indication of remote operations capability. Note what provisions will be supplied to the staff, how to obtain the provisions, and what the staff will be responsible for supplying. Provide a maintenance plan for all the equipment, including information on what to do year round, immediately prior to, during, and immediately after an event. Provide a test plan for all backup equipment, such as generators; a backup plan for communicating with staff and partners if power or cellular services are down; and how to conduct damage assessments after emergency events.
- Place TMC staff at county emergency operations centers (EOCs) to obtain real-time emergency information and relay it back to the TMC. Alternatively, establish remote operations capabilities at county EOCs. It is recommended that the staff placed at EOCs either be Traffic Operations personnel or individuals with a good understanding of traffic engineering.
- Develop emergency contracts and have them ready for immediate implementation in case of emergencies.
- Train in-house staff to troubleshoot and make repairs to ITS field devices.
- Utilize the hourly traffic counts from locations on major state corridors for monitoring increasing volumes and speed data on the State Highway System (SHS). Real-time polling and reporting is requested by the State Emergency Operations Center (SEOC) staff for pertinent locations several days prior to a hurricane's arrival. The FDOT Transportation Statistics Office makes this data available on the Internet at <http://webapp01.dot.state.fl.us/trafficinformation/>.

2.5 Intelligent Transportation System Field Devices

- Develop and maintain a spare parts inventory that includes replacements for such devices as closed-circuit television (CCTV) cameras.
- Consider requiring maintenance contractors to maintain a minimum number of generators to power critical ITS field devices, as dictated by the needs of each District.
- Prepare an inventory of the portable traffic control devices, such as portable variable message signs (VMSs) and mobile highway advisory radio (HAR) units, available prior to the emergency event and have a plan for storing these devices out of harm's way. The inventory can include both devices owned by the FDOT and those provided by contractors.

2.6 Microwave System and Communications through Cellular Telephones and Radios

- Districts should continue to use and maintain the FDOT-owned 47 MHz maintenance radio system to ensure communication during emergencies. (The FTE's maintenance radio system operates at 450 MHz.)
- Contractors who provide services to the FDOT during emergencies should be included in the FDOT communication system.
- Districts should explore the possible use of satellite telephones for redundancy following a hurricane, since cellular telephones and radios could be out of service after such an event.

3. Central Office Responsibilities

Upon reviewing the recommendations contained in the *Hurricane Response Evaluation and Recommendations* report, the FDOT determined that certain ones should remain the responsibility of the TEOO. In addition, a successful implementation of the recommendations would first begin with a layout of the tasks comprising the *Hurricane Response Action Plan*, then tracking these actions to measure the TEOO's progress. It should be noted that the TEOO has already begun working on the action items, and it is necessary to document some of the efforts that have occurred to date that have an impact on this *Action Plan*. These action items are described in this section.

Prior to the finalization of the *Hurricane Response Evaluation and Recommendations* report, the TEOO began working with the FDOT's Structures and Roadway Design offices to improve the design of the span wire signal hanger system. This is an ongoing effort with the final product expected to be a new patentable hanger system that is intended to better survive hurricane-force winds and to be used in all FDOT span wire signal installations in the future.

Also at the January 27 meeting in Miami, State Traffic Engineer Lap Hoang, the Deputy State Traffic Engineers, the DTOEs, and the FACERS took initial actions on certain recommendations. These actions are identified in *Section 6* of the *Hurricane Response Evaluation and Recommendations* report; however, the mast arm policy mentioned in that section has been modified and the current draft is provided below. It should be noted that this policy has not yet been finalized.

Proposed Policy for Use of Mast Arm Signal Supports and Underground Communications Cable Infrastructure on State Highways in Florida

All new signals installed on the State Highway System (SHS) that meet any of the following criteria:

1. Along designated coastal evacuation routes;
2. Along the Strategic Intermodal System (SIS) routes; or
3. Along corridors within the 10-mile coastal region previously established

shall be supported by mast arms with the signal heads rigidly attached to the mast arms. A span wire assembly may be used along these corridors only when it is impractical to use mast arm or rigid overhead structures.

The Districts have the flexibility to provide total funding, if funding is available. If funding is not sufficient, mast arm signal supports or other types of rigid supports not included in the above criteria can be installed by the Department and/or Maintaining Agency, with the Maintaining Agency providing the funding for the cost difference between the proposed supports and strain pole supports typically installed by the Department.

In addition, an underground communications cable infrastructure shall be utilized for those signals operating as part of an advanced traffic management system (ATMS) on these designated corridors.

3R Design Policy

Signals within the mast arm policy area will be replaced with mast arms on 3R projects where existing strain poles require replacement/relocation.

After the Miami meeting, the State Traffic Engineer and the Deputy State Traffic Engineers met to discuss the remaining recommendations, and established the following roles and responsibilities:

- Michael Akridge, Deputy State Traffic Engineer, is responsible for overseeing the development of the Central Office *Hurricane Response Action Plan* in coordination with the other Deputy State Traffic Engineers, and for the update of the statewide contraflow plan contained in the *Analysis of Florida's One-Way Operations for Hurricane Evacuation*.⁶
- Mark Wilson, Deputy State Traffic Engineer, is responsible for working with the Roadway Design Office to redesign traffic controller cabinets to accommodate emergency generators and to update the appropriate FDOT equipment standards. Mr. Wilson is also charged with developing a plan and schedule to ensure that all new traffic signals are light emitting diode (LED) displays; contacting the Districts regarding their generator needs and storage capabilities; and working with the State Structures Office to ensure that all new internally illuminated signs are back-mounted only. In addition, he will work with the Structures Office and the Traffic Engineering Research Laboratory (TERL) on the span wire signal hanger design; and on identifying critical signs, their necessary design life, and an appropriate time frame for replacement after a hurricane.
- Elizabeth Birriel, Deputy State Traffic Engineer, is responsible for researching the possible use of video vehicle detection systems as the FDOT standard for incident detection at arterial intersections. She will oversee the University of Central Florida (UCF) research project to develop software for creating diversion routes for use in emergency evacuations and reentries. Mrs. Birriel is also responsible for developing an issue paper on the mounting of signal heads on mast arms vertically versus horizontally and for developing dynamic message sign (DMS) guidelines to be disseminated to the Districts.

⁶ *Analysis of Florida's One-Way Operations for Hurricane Evacuation – Compendium of Route by Route Technical Memoranda* (March 2002). Available online at <http://www.rsip.lsu.edu/anb10-3/Resources/resources.htm>.

As is evident here, the FDOT is pursuing an action plan that addresses Florida's surface transportation needs on several levels and offers solutions in terms of improved hardware and equipment; expanded utilization of ITS; and updated policies and procedures relating to traffic management in emergency situations.

3.1 Central Office Tasks to be Completed

Of the remaining recommendations from the *Hurricane Response Evaluation and Recommendations* report, a total of 16 have been assigned to various TEOO staff and are shown in Table 3.1. The table indicates the general category, the specific task planned, the actions necessary to accomplish the task, and the anticipated completion. This table will be updated on a quarterly basis and progress noted.

Table 3.1 – Hurricane Action Plan Action Items

Category	Task	Responsible Party	Actions	Estimated Completion
Road Rangers	Develop emergency response contracts for Traffic Operations, and have them in place and ready for use.	Michael Akridge	<ul style="list-style-type: none"> Develop boiler plate language for contracts involving Road Rangers. Ensure coordination between the FDOT Central Office, Contracts Administration Office, and Central Legal Office. 	August 2005
Signal Operations / Signal Restoration	Develop emergency response contracts for Traffic Operations, and have them in place and ready for use.	Mark Wilson	<ul style="list-style-type: none"> Develop boiler plate language for contracts involving signal restoration and signal equipment. Ensure coordination between the FDOT Central Office, Contracts Administration Office, and Central Legal Office. 	August 2005
Signal Restoration	Train Traffic Operations staff and other District staff in signal damage assessment and the documentation procedures required by the Federal Highway Administration (FHWA).	TIM Coordinator	<ul style="list-style-type: none"> Address training through the Traffic Incident Management (TIM) Teams and in coordination with the Central Office Emergency Management Office and District coordinators. 	
Road Rangers	Develop a cost feasible plan (CFP) for Road Rangers.	Michael Akridge	<ul style="list-style-type: none"> Contact the Districts about Road Ranger costs and the estimated cost of the 2004 hurricane season. 	June 2005
Road Rangers	Train in-house personnel as Road Ranger staff in case of emergencies.	Michael Akridge	<ul style="list-style-type: none"> Address training through the TIM Teams, and in coordination with the District Maintenance and Traffic Operations engineers. 	
TMC Operations	Develop a redundant communication system for controlling TMC and field devices.	Nick Adams	<ul style="list-style-type: none"> Develop a statewide center-to-center (C2C) network to interconnect the regional transportation management centers (RTMCs). 	As RTMCs come online

Table 3.1
(CONTINUED)

Category	Task	Responsible Party	Actions	Estimated Completion
TMC Operations	Develop a communication plan between the TEOO and the Districts for use during emergencies.	Michael Akridge	<ul style="list-style-type: none"> • Develop a communication plan identifying a sole point of contact for all TEOO communications, and disseminate the plan to the Districts and the Emergency Management Office. • Request that each active District TMC plan have District EOC personnel in the TMC during hurricane events to serve as the prime contact with the State's Transportation Emergency Operations Center (TEOC). If necessary, the TEOO should communicate to District TMCs through the TEOC. District Traffic Operations Engineers and Assistant DTOEs, and TMC management could become backup points of contact for the TEOO. 	June 2005
511 Operations	Standardize the information provided by the 511 systems.	Gene Glotzbach	<ul style="list-style-type: none"> • Address standardization through the 511 Working Group. 	May 2005
511 Operations	Implement call transfers to agencies outside the 511 systems.	Gene Glotzbach	<ul style="list-style-type: none"> • Address implementation through the 511 Working Group. • Develop a white paper for the implementation plan and cost. 	May 2005

Table 3.1
(CONTINUED)

Category	Task	Responsible Party	Actions	Estimated Completion
511 Operations	Advertise the system as an information resource for evacuation, diversion, and reentry route information for the SHS.	Gene Glotzbach	<ul style="list-style-type: none"> Address advertisement of the system through the 511 Working Group. 	May 2005
Web Site	Update the South Florida 511 Traveler Information Web site ⁷ to provide travel times, speeds, and delays, and to make it comparable with the Tampa Bay system. ⁸	Gene Glotzbach	<ul style="list-style-type: none"> Address updates and compatibility through the 511 Working Group. Close coordination with Districts 4, 6, and 7 will be necessary. 	May 2006
Web Site	Continue ITS deployment in support of these Web sites and develop a centralized Web site.	Gene Glotzbach	<ul style="list-style-type: none"> Address deployment and development through the 511 Working Group. The statewide 511 system and its Web site are currently under development. 	July 2006
Dissemination Media	Develop standard information that can be sent to the Traveler Information Radio Network™ (TiRN™) and Everglades Radio Network (ERN).	Michael Akridge / Gene Glotzbach	<ul style="list-style-type: none"> Develop the standardized information to be sent to the stations and work with the Central Office Public Information Office (PIO) to implement. Coordinate with the Florida Department of Community Affairs (FDCA) in the development of the information. 	January 2006

⁷ More information regarding South Florida 511 Traveler Information is available online at http://ops.fhwa.dot.gov/511/locations/se_florida.htm.

⁸ More information regarding the Tampa Bay 511 Traveler Information system is available online at <http://www.511tampabay.com/>.

Table 3.1
(CONTINUED)

Category	Task	Responsible Party	Actions	Estimated Completion
Microwave System, and Communications through Cellular Telephones and Radios	Install fixed standby power generators at all microwave system tower sites.	Nick Adams	<ul style="list-style-type: none"> Assess all sites in the microwave system to determine which ones require new or replacement generators. Utilize funding from the Lodestar agreement and Fixed Capital Outlay (FCO) program to install generators at 12 sites each year. 	December 2008
Microwave System, and Communications through Cellular Telephones and Radios	Provide accessibility to all microwave and two-way radio sites during flooding conditions.	Nick Adams	<ul style="list-style-type: none"> Assess all sites in the microwave system to determine which sites experience flooding. Meet with associated District maintenance offices to develop access plans at problem sites as determined in the assessment step. <i>Note: Districts will need to make the actual improvements.</i> 	August 2005
Microwave System, and Communications through Cellular Telephones and Radios	Complete the repeater radio upgrade program.	Nick Adams	<ul style="list-style-type: none"> Complete the design plan for Districts 2 and 3; 5 and 7; and 4 and 6. Award contracts to install the repeater systems. Train District staff in the use of repeaters. 	December 2006
Microwave System, and Communications through Cellular Telephones and Radios	Complete the microwave system upgrade program.	Nick Adams	<ul style="list-style-type: none"> Complete the final upgrade project currently under construction. Provide a diversity bandwidth. 	June 2005

4. Conclusion

The 2004 hurricane season has been the catalyst for many public agencies to examine their emergency preparedness and response operations, and the FDOT has likewise taken this opportunity to assess the storms' impacts to roadway systems and services. From this effort has come initial actions that are expected to have an immediate and positive impact on the FDOT's ability to prepare for and recover from hurricanes. Also forthcoming will be longer term improvements to traffic management operations that will make transportation on Florida's highways safer and more efficient during emergency conditions.