Summary

This concept of operations document serves as a regional framework of operation for the emergency responders and various transportation agencies within North Florida for the use of road weather information to close bridges during high wind events. This document is developed for the responding agencies within North Florida, and in most part, developed by them. The concept of operations was developed to improve safety of the responders, enhance coordination between different responding agencies, understand wind sensor operation and its impact on various agencies roles and responsibilities, and provide guidelines for actions taken during high wind condition. This concept of operations answers the what, who, where, how, and when types of questions pertaining to bridge closure during high speed winds or gusts days.

Four different scenarios were identified in the stakeholder meeting based on the wind speed and are summarized in Table E-1 on the next page. During stakeholder meeting held in October 2009, it was agreed that full closures will be implemented when sustained winds achieve 39 MPH in North Florida. This approach is preferred due to its ease and simplicity to implement when compared to partial closure scenario. Other techniques, such as "traffic pacing" and vehicle segregation (allowing passenger cars but not semitrailers to cross the bridge) were also evaluated. Although these strategies have been effective in other jurisdictions, these alternate methods were not recommended due to the complexities of the operations and potential for driver confusion.

To support this concept of operations, Road Weather Information Sensors (RWIS) were recommended for installation on each of the major bridges within the North Florida TPO planning boundaries. These locations were prioritized with the stakeholders working group and are summarized in Table E-2.

A review of various technologies available for RWIS was performed and an assessment is provided within this Concept of Operations. The selection of the final technologies will be performed during the design and procurement phase of the project.

The estimated costs for installing RWIS sensors on all 18 bridges is $1,051,600 which assumes fiber optic connections to the FDOT backbone system. The annual operations and maintenance costs were for the system for communications and regularly scheduled maintenance of the devices were estimated to be $90,471. Alternative forms of communications such as wireless communications (microwave line of sight, cellular digit package data and satellite using the National Weather Services network) are available that may be able to significantly lower the costs of the installation and operations and maintenance costs. The final costs of implementation will be determined during the design and procurement phase of the project.

Table E-1. Operational Scenarios

Threshold	Approach	Advantages	Disadvantages
19 MPH to 38 MPH	**Weather Advisory**	N/A	N/A
39 MPH	**Complete Closure**	▪ Simple to operate and implement due to no vehicle segregation ▪ Lower deployment cost of law enforcement officers ▪ Lower safety risk to the public by closing bridge to all traffic	▪ Higher frequency of full closures ▪ Higher vehicle diversions ▪ Higher cost to the public due to more frequent diversions ▪ Conservative approach by closing bridges to all traffic ▪ Provides poor mobility ▪ May complicate regional evacuation plans ▪ Higher deployment cost of law enforcement personnel
39 MPH to 49 MPH	**Tiered Closure**	▪ Lower frequency of full closures ▪ Greater mobility by allowing passenger cars to pass ▪ Fewer vehicle diversions ▪ Less cost to the public due to fewer diversions	▪ Complicated to operate and requires greater coordination ▪ Higher deployment cost of law enforcement officers ▪ Higher exposure of law enforcement officer to the hazardous conditions to segregate vehicles ▪ Higher safety risk to the public by allowing certain vehicles to pass during high speed wind conditions
39 MPH to 49 MPH	**Tiered Closure Using ITS**	▪ Lower frequency of full closures ▪ Greater mobility by allowing passenger cars to pass ▪ Fewer vehicle diversions ▪ Less cost to the public due to fewer diversions ▪ Simple to operate and requires greater coordination ▪ Less deployment cost of law enforcement officers ▪ Less exposure of law enforcement officer to the hazardous conditions for segregating vehicles	▪ Higher cost of implementation ▪ Higher safety risk to the public by allowing certain vehicles to pass during high speed wind conditions

Table E-2. Priority Road Weather Information Sensor Locations

County	Crossing	Bridge	Existing	Phase I	Phase II
Duval	St. Johns and Trout River	I-95, Fuller Warren Bridge		✓	
		I-295, Buckman Bridge	✓		
		SR 9A, Dames Point Bridge	✓		
		SR 115, Matthews Bridge		✓	
		I-95, Trout River Bridge			✓
		SR 13, Acosta Bridge			✓
		SR 228/US 1, Hart Bridge			✓
		US-90/SR-10, Main Street Bridge			✓
		SR 105, Heckscher Dr. Bridge			✓
	Intracoastal Waterway	SR 10, Atlantic Blvd Bridge			✓
		SR 202, JT Butler Blvd Bridge			✓
		US 90/SR 212, Beach Blvd Bridge		✓	
Nassau	Intracoastal Waterway	SR 200/SR A1A Intracostal Bridge		✓	
		SR A1A, Nassau Sound Bridge			✓
Clay	St. Johns River	SR 16, Shands Bridge		✓	
		US 17, Doctor's Inlet Bridge			✓
St. Johns	Intracoastal Waterway	SR 312, SR 312 Bridge	✓		
		CR-210, Palm Valley Bridge			✓
		CR-206, Crescent Beach Bridge		✓	
		SR A1A, Matanzas Bridge			✓
		SR A1A, Bridges of Lions			✓
		SR A1A, Vilano Bridge	✓		