

USING VARIABLE MESSAGE SIGNS FOR A HURRICANE RESPONSE SCENARIO

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Presentation Outline

- Background & Project Objectives
- Message Development Procedure
- Description of Infrastructure & Plan
- Using the messages on a Sample Scenario
- Conclusion & Recommendations



BACKGROUND & PROJECT OBJECTIVES

Project Goals

- Identify natural and human-caused disaster scenarios.
- Study the vulnerabilities of the state transportation system during the scenarios.
- Examine the feasibility of employing VMS as an emergency communication system.
- Design and conduct driving simulation experiments to assess peoples' response to various types of VMS messages.
- Develop a scenario-based VMS message library for quick and effective deployment of messages .

Literature Review

State of Rhode Island. "State of Rhode Island Emergency Operations Plan." Manual. 2006.

Church, Richard L and Sexton Ryan. Modeling Small Area Evacuation: Can Existing Transportation Infrastructure Impede Public Safety? Santa Barbara: Vehicle Intelligence and Transportation Analysis Laboratory, 2002.

Hitti, Miranda. Hurricane Evacuation: A Third Won't Go. 21 July 2006. 22 July 2006<<http://www.cbsnews.com/stories/2006/07/21/health/webmd/printable1826412.shtml>>.

Kovel, Jacob P. "Modeling Disaster Response Planning." Journal of Urban Planning and Development 126.1 (2000): 26-38.

Literature Review

Milkovits, Amanda. "Hardest part of the evacuation plan may be convincing 135,000 people it's time to leave." The Providence Journal 18 July 2006.

Salit, Richard. "Emergency planners won't hold back orders to evacuate." The Providence Journal 19 July 2006.

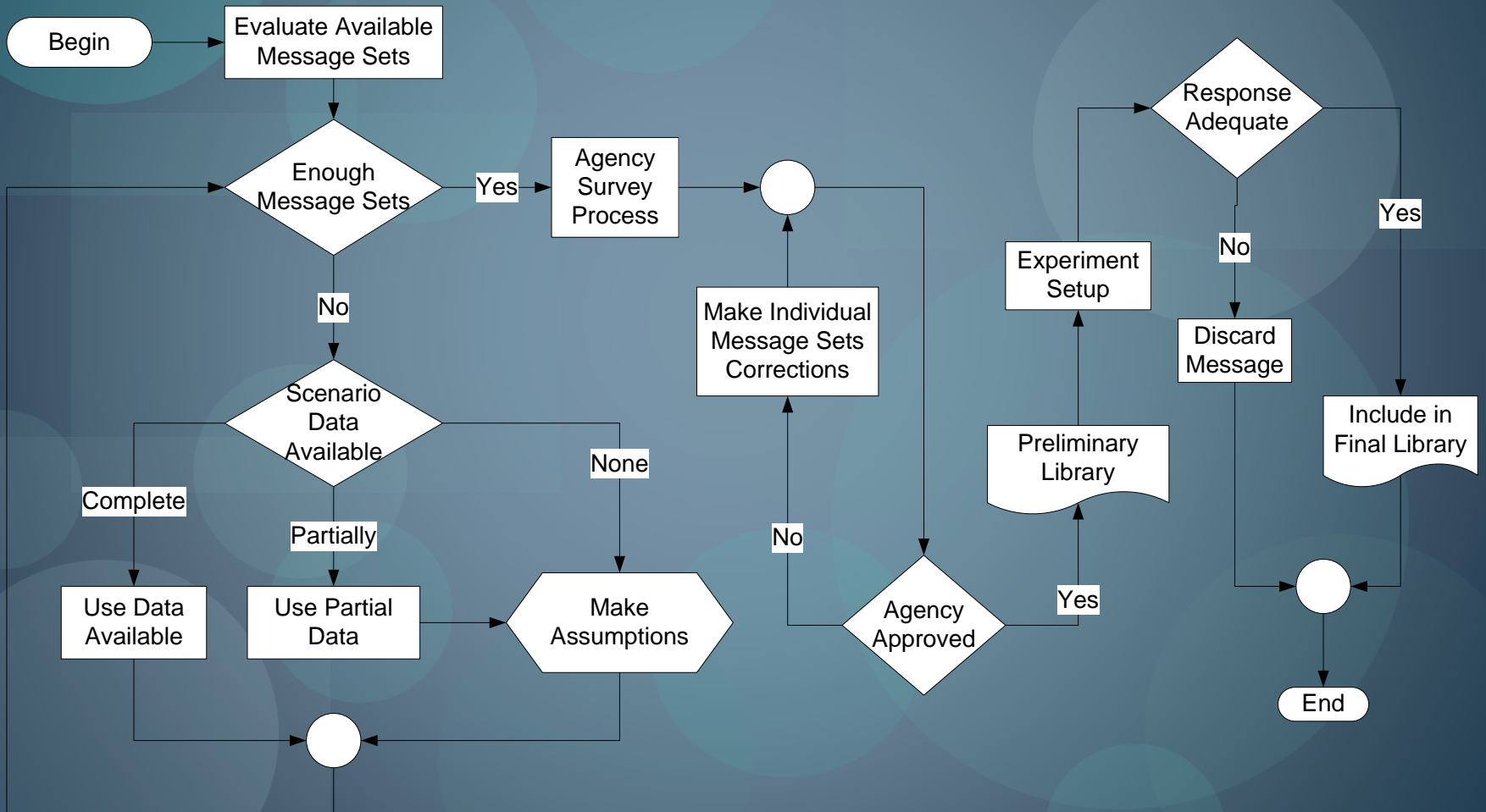
Wholson, Brian, Urbina Elba and Levitan Marc. National Review of Hurricane Evacuation Plans and Policies. Baton Rouge: LSU Hurricane Center, 2001.

Wolshon, Brian, et al. "Review of Policies and Practices for Hurricane Evacuation. II: Traffic Operations, Management, and Control." Natural Hazards Review 6.3 (2005): 143-161.

PROCESS FOR MESSAGE DEVELOPMENT & USAGE

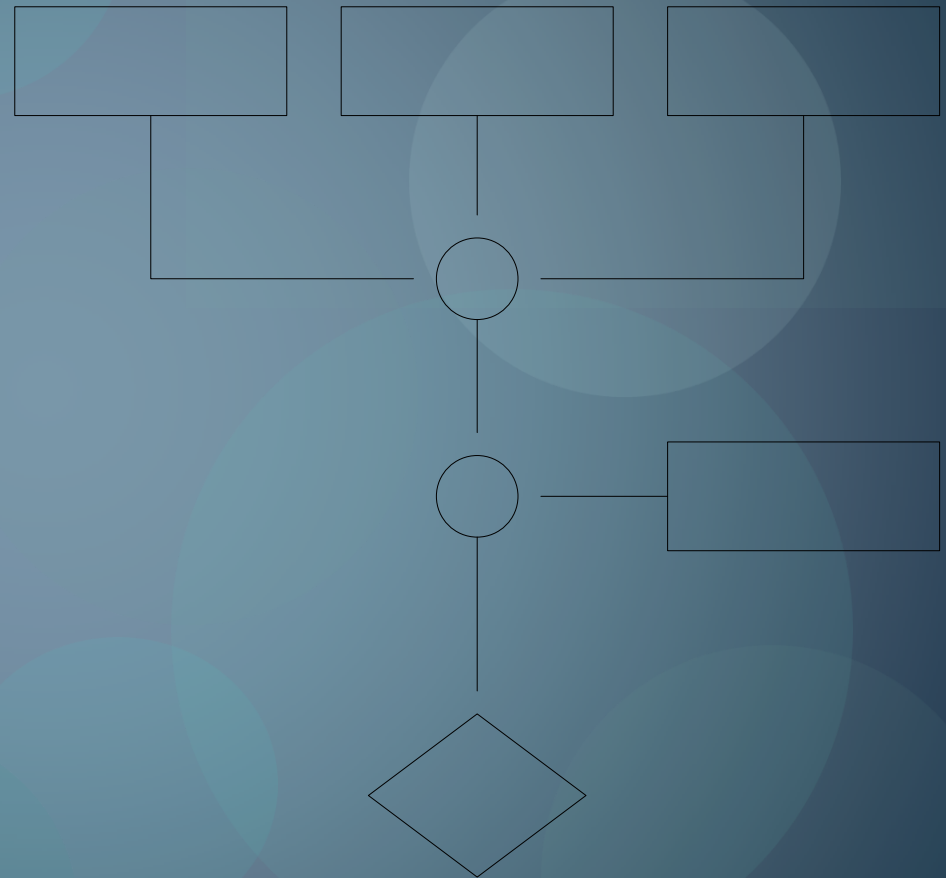
Description of how to arrive to a final message

Message Development Procedure

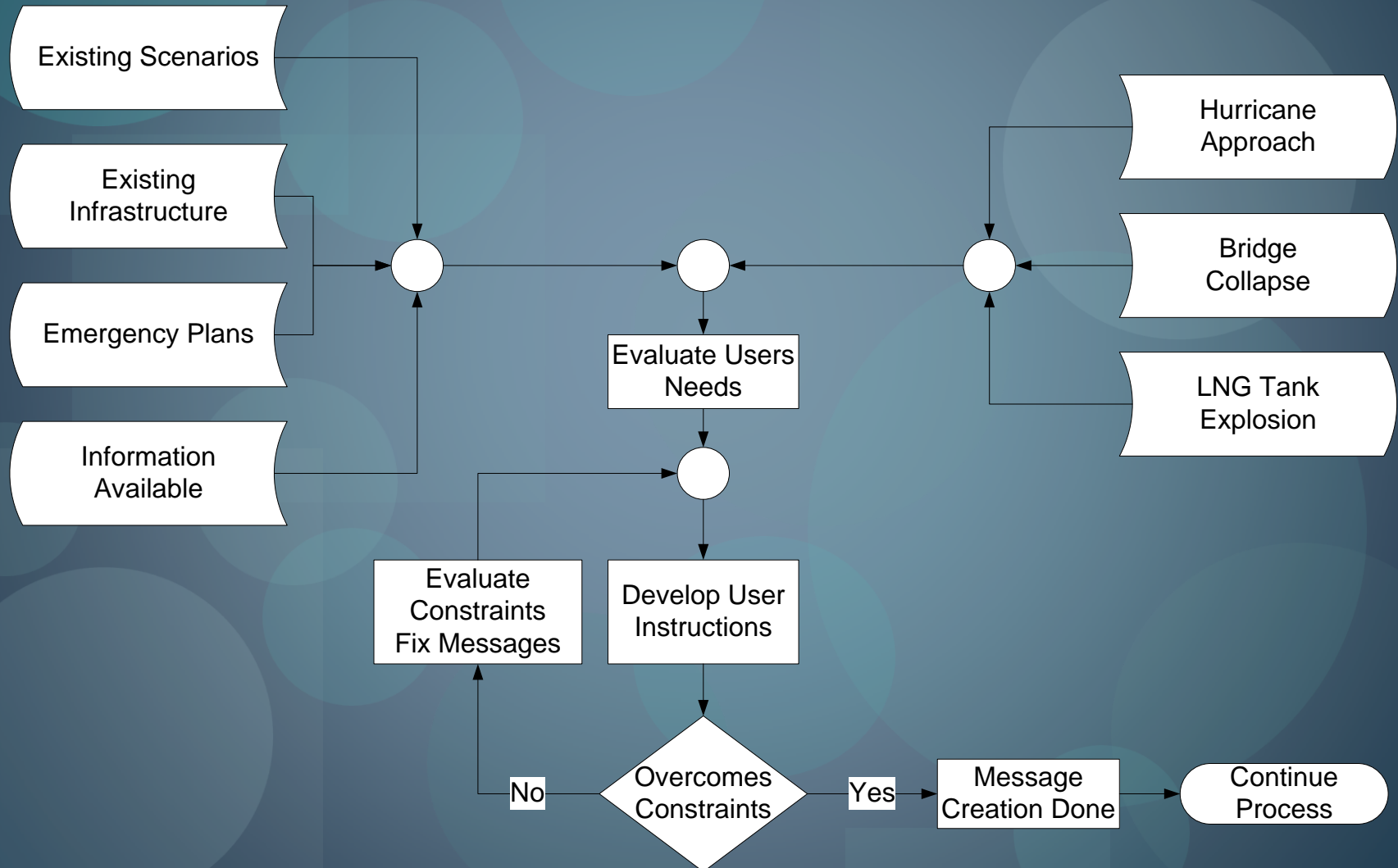


Agency Survey Process

- What help can the agency get during an emergency.
- What is the agency role during the emergency.
- What are the current plans for the emergency.



Message Scenario Development





EXISTING INFRASTRUCTURE AND HURRICANE PLAN

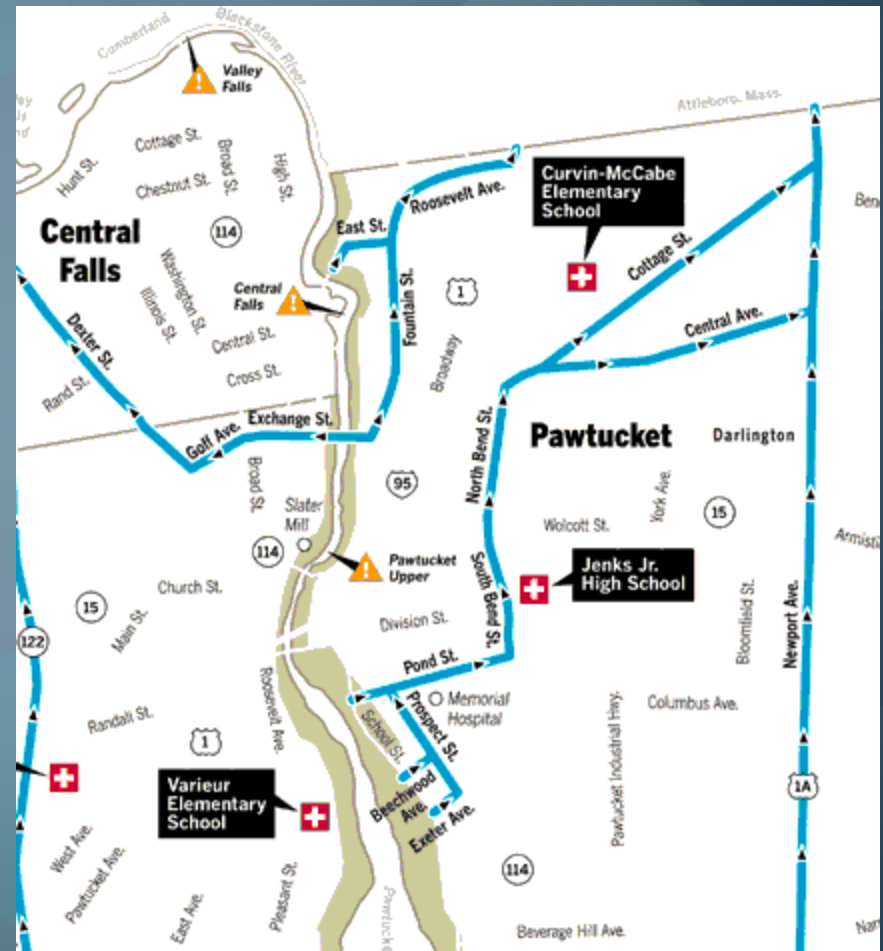
Existing Infrastructure

- Inventory of portable and fixed dynamic message signs.
- Signs showing evacuation routes.
- Existing hurricane approved shelters



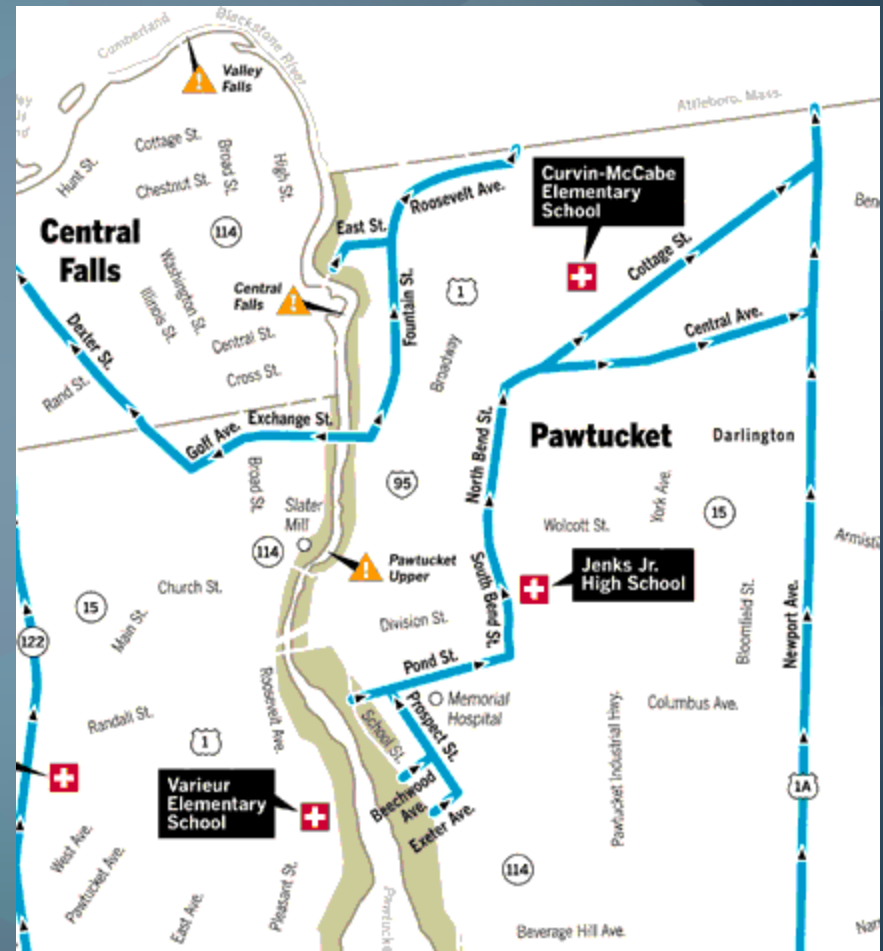
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Emergency Hurricane Plan

- Provide status about the hurricane approach.
- Warn users about certain dangers to avoid.
- Make recommendations for a safer experience during the hurricane.
- Target the conscience of the users.

Awareness (72-48 Hours)

Review and put in place memorandums of understanding. Determine a timeline for actions such as evacuations, EAS activation, closing of offices and parks.

Readiness (48-24 Hours)

The timelines for the closing of state facilities is announced. Possible declaration of state of emergency. Monitor the traffic control points. Issue evacuations orders as needed.

Response (24-0 Hours)

Provide reports about status of evacuation routes, including road closures. Re-localization of emergency workforce and equipment to safe locations.

Recovery (After Hurricane)

Damage assessment of public infrastructure. Establishment of curfews if required. Monitor local re-entry notifications. Provide status reports to DOT for use on the traffic management system.

Emergency Hurricane Plan

- Provide necessary guidance for evacuating out of town.
- Provide guidance for going towards a hurricane approved shelter.
- Advise users about beaches and park closures.

Awareness (72-48 Hours)

Review and put in place memorandums of understanding. Determine a timeline for actions such as evacuations, EAS activation, closing of offices and parks.

Readiness (48-24 Hours)

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Response (24-0 Hours)

Provide reports about status of evacuation routes, including road closures. Re-localization of emergency workforce and equipment to safe locations.

Recovery (After Hurricane)

Damage assessment of public infrastructure. Establishment of curfews if required. Monitor local re-entry notifications. Provide status reports to DOT for use on the traffic management system.

Emergency Hurricane Plan

- Provide traffic status for re-entry to evacuated zones.
- Warn users about zones that are flooded.
- Provide information about closure of beaches and parks.
- Inform users about road and bridge closures.

Awareness (72-48 Hours)

Review and put in place memorandums of understanding. Determine a timeline for actions such as evacuations, EAS activation, closing of offices and parks.

Readiness (48-24 Hours)

The timelines for the closing of state facilities is announced. Possible declaration of state of emergency. Monitor the traffic control points. Issue evacuations orders as needed.

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MESSAGE USE SCENARIO FOR HURRICANE

Preliminary Assumptions & Messages

Zone Used for Trial-and-Error




Sample Scenario



General Advisory for the Public





CONCLUSION & RECOMMENDATIONS

Preliminary Message Library

First Panel

| LINE 1 | LINE 2 | LINE 3 |
|----------|------------|-----------|
| EVACUATE | AHEAD | 1610 AM |
| ROADWORK | BEAR | AHEAD |
| SHELTER | EXIT | AT EXIT X |
| TUNE | NEXT EXIT | EXIT XX |
| | RADIO | LEFT |
| | STRAIGHT | RIGHT |
| | TURN | RTE XX |
| | TURN LEFT | |
| | TURN RIGHT | |
| | USE | |
| | VIA | |

Second Panel

| LINE 1 | LINE 2 | LINE 3 |
|-----------|-----------|--------|
| ONTO | NORTH TO | RTE XX |
| RIGHT | ON RTE XX | XX RD |
| RTE XX | ONTO | |
| THEN | RTE XX | |
| THEN EXIT | SCHOOL | |
| TO HIGH | SOUTH TO | |
| TO MIDDLE | XXX | |
| USE | | |

Awareness

**TUNE
RADIO
1610 AM**

**ROADWORK
AHEAD**

**DRIVE
CAREFULLY**

Readiness & Response

**SHELTER
BEAR
LEFT**

**SHELTER
NEXT EXIT**

**EVACUATE
VIA
RTE 1A N**

Recovery

**SHELTER
USE
RTE 1A**

**ONTO
SCHOOL**

**THEN
NORTH TO
XX RD**

Preliminary Message Library

First Panel

| LINE 1 | LINE 2 | LINE 3 |
|-----------|-----------|----------|
| BEACHES | AND PARKS | CLOSED |
| FILL | CLOSED | AHEAD |
| FLOOD | FOR POWER | ITEMS |
| HURRICANE | GAS TANKS | OUTAGES |
| PREPARE | HAZARDS | SUPPLIES |
| ROAD | LOOSE | YET |
| SECURE | NOT OPEN | |
| SHELTER | OPEN | |
| STORM | WARNING | |
| | WATCH | |
| | WATER | |

Second Panel

| LINE 1 | LINE 2 | LINE 3 |
|----------|-----------|--------|
| OFFICIAL | USE ONLY | |
| DRIVE | CAREFULLY | |
| | | |

Awareness

**STORM
WATCH**

**PREPARE
FOR POWER
OUTAGES**

**SECURE
LOOSE
ITEMS**

Readiness & Response

**FILL
GAS TANKS**

**SHELTER
OPEN
AHEAD**

**SECURE
WATER
SUPPLIES**

Recovery

**BEACHES
AND PARKS
CLOSED**

**FLOOD
WARNING**

**ROAD
CLOSED
AHEAD**

Preliminary Message Library

| Line 1 Problem | Line 2 Location | Line 3 Action |
|-------------------|-------------------------|-----------------------|
| BROKEN PAVEMENT | AHEAD | BE PREPARED TO STOP |
| CONGESTION | 1/2 MILE AHEAD | REDUCE SPEED |
| EVACUATION | 1 MILE AHEAD | USE CAUTION |
| HIGH WINDS | 1 1/2 MILES AHEAD | EXPECT DELAYS |
| ROAD FLOODED | 2 MILES AHEAD | TUNE RADIO TO 1610 AM |
| SLIPPERY ROAD | AT EXIT XX | TUNE RADIO TO 1630 AM |
| TRAFFIC CONTROL | AT XX | USE OTHER ROUTES |
| | NEAR XX | |
| | BEFORE XX | |
| | PAST XX | |
| | BETWEEN EXITS XX AND YY | |

Existing library from the Rhode Island Department of Transportation can be applied to a hurricane scenario during the 4 stages of the emergency plan.

Conclusion

- The use of VMS/DMS can overcome the dynamics of evacuation.
- VMS/DMS must be used as a complement to efforts by the agencies.
- It is crucial to have plan for deployment and retrieval of the signs.
- Development of the messages should be focus on providing guidance and information to the users in an effective way.

Future Work

- Test the messages for user response using the driving simulator.
- Complete the agency survey process for the Department of Transportation.
- Develop the scenarios for LNG tank explosion and Bridge Destruction
- Evaluate the optimum location of signs for optimum performance.

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