AASHTO Annual Meeting

Sustainable Transportation:
Energy, Infrastructure and Climate Solutions
(STEICS) Committee Meeting

November 17, 2012
CLIMATE CHANGE BASICS

![Graph showing temperature trends from 1950s to 2000s in the United States. The graph compares record highs and lows with ratios for each decade: 1.09:1 for 1950s, 0.77:1 for 60s, 0.78:1 for 70s, 1.14:1 for 80s, 1.36:1 for 90s, and 2.04:1 for 2000s.]
Out of a possible 171,442 records: 2,284 (Broken) + 998 (Tied) = 3,282 Total
What have we observed?

Wetter Trends

The wettest days are wetter
Top Weather Events of 2011 across Vermont

At Burlington International Airport, it was the wettest year on record with 50.92" of rain. Burlington also had its 3rd snowiest winter on record with 128.4"

- March 6 - 7, 2011 Winter Storm
  2” rain/25.8” snow, high winds

- April 13 - June 19, 2011 Lake Champlain Record Flooding
  103.38 feet – Previous record 101.8 feet

- May 26 - 27, 2011 Flash Flooding and Severe Weather
  Central Vermont

- August 28, 2011 Tropical Storm Irene
RT 2 Causeway  Lake Champlain Flooding
DAMAGE CAUSED BY FLASH FLOODING
~ CABOT, VERMONT
August 28, 2011 ~ Tropical Storm Irene

- Tropical Storm Irene produced catastrophic river and flash flooding across Vermont and portions of northern New York on Sunday, August 28, 2011.
- This was a scale of devastation not seen across the region since the epic floods of November 1927. Six lives were lost.
- Thirteen Vermont communities were isolated for days due to the loss of numerous roads and bridges.
- Nearly 2000 road segments were damaged, with 118 sections of state roads and 175 local roads completely washed out.
- Among nearly 300 damaged bridges, several iconic covered bridges were heavily damaged or completely destroyed in Vermont.
- Over 800 homes and businesses, and several rail and major telecommunication lines were damaged or destroyed by fast-moving flood waters.
- Monetary damages - while still not finalized - are estimated at $750 million in insured losses and needed repairs to public infrastructure.
Bridge & Highway Status ~ August 30, 2011
Tropical Storm Irene Total Rainfall - Northern New York & Vermont

August 27th & 28th, 2011

In Inches
- Irene Track
- ONQC
- < 2
- 2 - 3
- 3 - 4
- 4 - 5
- 5 - 6
- 6 - 7
- > 7

Sources: 186 reports from NWS Cooperative Observers, ASOS, RAWS, CoCoRaHS, Mesonets, Trained Spotters, Personal Weather Stations, Public

Reports are unofficial. This map is an interpolation of actual reported values but should be considered an estimation only. Due to the influence of terrain, amounts may vary greatly over a short distance.

Created by the National Weather Service Burlington, VT 08/30/2011
The opening was celebrated on November 4th.
Route 107 Stockbridge
HAZMAT & DESTRUCTION

Tropical Storm Irene Damage to Homes By Housing Type

- House Single/Duplex: 83%
- Mobile Home: 15%
- Apartment: 2%
- Other: 1%

ACCD
Irene Recovery Office
1/4/2012
Summary of State Highway Roads and Bridges

August 28, 2011
State Road Segments Closed = 146 ~ 531 miles
Bridges Closed = 34

December 31, 2011
State Road Segments Closed = 0
(2 roads totaling 30 miles were open with restrictions)
Bridges Closed = 0
(1 open with restrictions)
**Resources**

**VTrans Employees:** Approximately 700 were assigned to *IRENE* recovery tasks

**DOT Partners**
- **Maine** – 150 people, 145 pieces of equipment
- **New Hampshire** – 75 people, 60 pieces of equipment

**Hundreds of National Guard Troops:**
- **Vermont** – 200 people, numerous equipment
- **Maine** – 220 people, numerous equipment, Command & Control function for out-of-state troops
- **Illinois** – 145 troops, 8 aircraft, 23 vehicles
- **Ohio** – 93 people, 29 pieces of equipment
- **New Hampshire** – 8 people, 2 aircraft
- **South Carolina** – 51 people, 23 pieces of equipment
- **West Virginia** – 30 people, 10 pieces of equipment
- **Virginia** – 16 people, 6 pieces of equipment

**Over 200 Private Contractors and Consultants**
- Approximately 1800 people from the private sector, primarily from Vermont

**Medical Assistance from LA, ME, AR, MO, NH, ID and FL**

**Regional Planning Commissions** – Outreach to local government, funded by VTrans
Incident Command System (ICS)

Systematic tool for command, control and coordination of an emergency response

- Part of National Incident Management System (NIMS)
- ICS originally developed by fire chiefs in 1968 to respond to forest fires out west
- NIMS born in response to 9/11
- Flexible
- Scalable
- Off the shelf
- Training readily available - FEMA
The ICCs are operated by a Unified Command (UC) in Montpelier. The UC role was to set priorities, provide overall management through directives, and take the lead on communication and public information. The UC was given direction by the Secretary’s Office.
Lessons Learned for Emergency Response

- Use of ICS is crucial to success
- Choose leaders early
- Train leaders intensely
- Enhance technology available to ICS leaders
- Train all staff in ICS
- Adopt SOP that incorporate structure of UC and role of IT
- Communicate – constantly
- Celebrate milestones
Irene Response Sparked Innovation

- Use of cross-functional teams
- Infusion of tech-savvy staff
- Empowering staff to make decisions at local level
- Close roads more frequently for repairs
- Streamline design process
High-Level Ways to Foster Innovation

- Continue the deployment of cross-functional teams, IT emphasis, staff empowerment and urgency
- Move from committees to Task Groups
- Develop champions to test and implement change
- Work to create a less risk-averse culture
- Integrate planning and training efforts with resource agencies to build in a more flood resilient manner and streamline permitting processes
VTrans Transportation Resilience Plan

Vulnerability Assessment

Risk Assessment

Adaptation Strategies

Implementation Actions