Climate Change & Extreme Weather Events

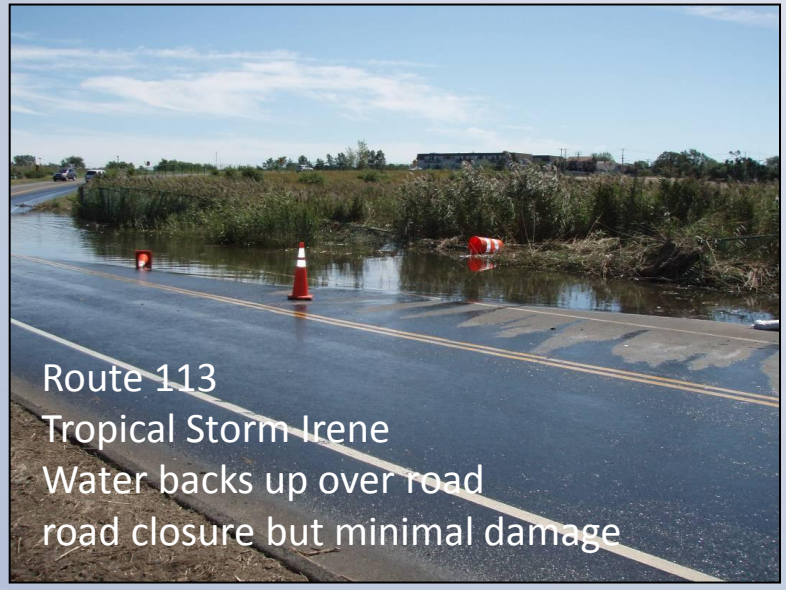
Connecticut Department of Transportation

Shoreline Preservation Task Force July 24, 2013

How Extreme Weather Events Affect DOT

Impacts differ by type of storm & environmental setting:

COASTAL STORMS



- **Sea level is rising & flood zones expanding**
  - Many state facilities are ***outside*** flood zone
  - Some facilities ***within*** coastal flood zone are elevated 'above' flood level
- **Rail facilities are concentrated along coast**
  - special area for concern

Types of Problems:

- **Beach erosion**
- **Tidal & backwater flooding**
  - Facility closure, but minimal damage
  - Some assets can be moved for storm: rail cars, buses, highway maintenance trucks
- **Wind damage**

Inland Storms

- **Inland problems *more extensive* due to larger geography**
- **Inland events can be *more damaging* to transportation infrastructure**
  - Increasing frequency
  - Increasing intensity of storms
    - Larger rainfall amounts
    - Higher flood levels in streams & rivers

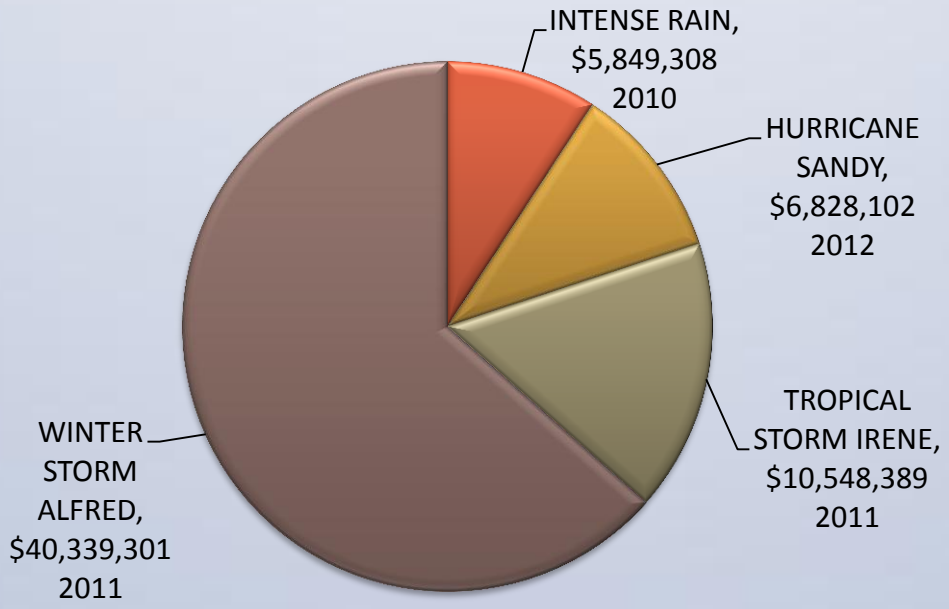
Types of Problems:

- **Bridge damage**
- **Culverts washed out**
- **Roadways washed out**
- **Wind damage**

Frequency & Budget Impacts of Extreme Events

Number of Emergency Declaration Projects Initiated by Year

- Increasing frequency trend
- Increasing Fiscal Impact on Department Budget



How DOT Is Adapting

Variety of Strategies & Responses required:

- ***Preparation for approaching storms***
- ***Storm response***
- ***Longer term strategies & adaptations***

1. Preparation for approaching storms

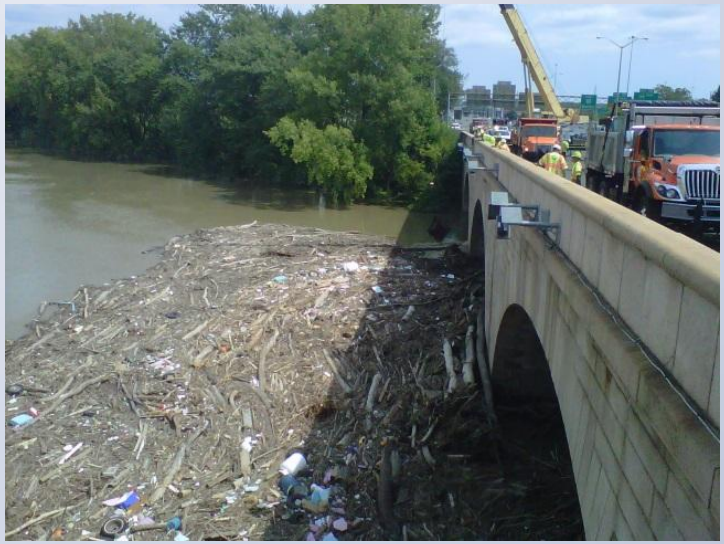
- NIMS Incident Command Training
- Coordination of all state agencies, Hartford EOC
- Top off fuel depots and replenish supplies
- Ready all storm response equipment
- Regional Coordination through TRANSCOM, CONEG, MTAC and AASHTO
- Travel advisories /Travel Bans

2. Storm response

- All hands on deck
- Keep roads safe and passible
- Post storm damage assessment
- Emergency Declaration for transport of emergency relief supplies
- Emergency Response contractors for rapid repair of infrastructure
- Developed Make Safe response model for utility restoration
- Resources for EVAC
- Federal Emergency Funding

Lessons Learned

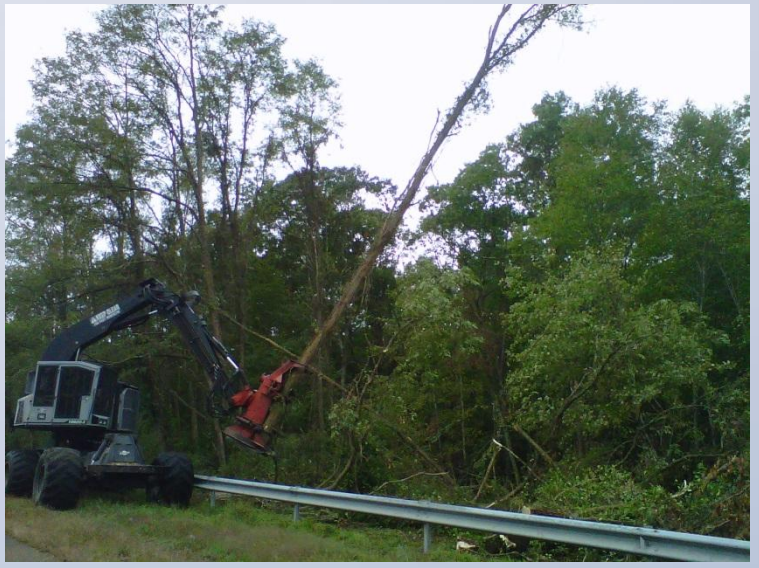
- Inland infrastructure more vulnerable
- Generator power and fuel supplies are critical
- Travel Advisories/TT bans
- EMAC
- Accurate damage assessments
- More costly to harden than repair



Tropical Storm Irene
2011
Debris Pile-Bulkeley
Bridge

3. Longer term strategies & adaptations

- **Prepare needs list for infrastructure hardening**
- **Transportation asset management**
- **Perform Risk analysis for critical infrastructure**
- **Life cycle/benefit cost analysis**



Climate Change and Planning for the Future

Study Asset Vulnerability

- FHWA Extreme Weather Vulnerability Assessment-Northwest Connecticut, Culvert Evaluations
- NY-CT-NJ Coastal Asset Vulnerability Assessment

Address Climate Change on Regional Scale

- Transportation and Climate Change Initiative-partner with New England Mid-Atlantic States, through Georgetown University
- Conference of New England Governors and Eastern Canadian Providences-partner in GHG reduction planning and transportation sector energy reduction

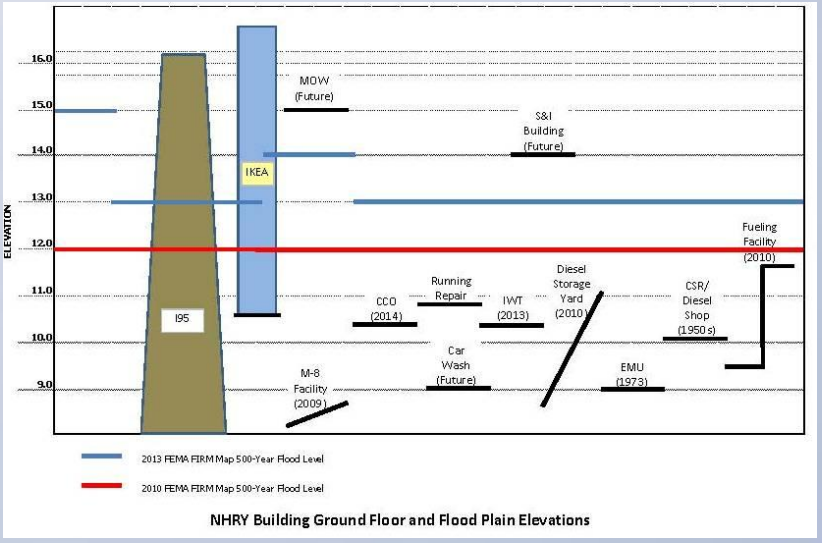
Incorporating Resiliency into Project Design

- Design/Rebuild using current and projected rainfall and storm surge
- Harden Assets where possible
- Use Updated Flood Maps and Inundation Maps

New Haven Rail Yard

Example Project # 1-New Haven Rail Yard

- Until the 1950's the Yard was directly on the coastline
- Construction of I-95 created an embankment along the New Haven Harborfront-revisions to Flood Elevations (First Flood Map revision since 1950s)
- Map Amendments 1998, 2008, 2010, 2013
- As Flood Heights increased, building floor elevations were increased and pump systems installed
- Drainage Systems reconstructed
- Progressive Adaptive Design Elements to pre-existing fixed asset



Example Project #2-(Old Saybrook Sea Wall)

- Storm Surge Erosion caused undermining and failure
- Reconstruction included hardening the asset by constructing an unseen, deep barrier under the toe of the wall to protect it from undermining

Old Saybrook Seawall –more damage as a result of Hurricane Sandy in late 2012

Old Saybrook Seawall –After tropical storm Irene repair work in 11/12

Thank you

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