

RESILIENCY PLANNING

June 23, 2015
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Transportation and Severe Weather Events



Hurricane Irene in
Schoharie (L) and Ulster
(R) Counties

← Tropical Storm Lee floods
95% of the Village of Owego
in Tioga County NY

Infrastructure...No Match for Water



**BINGHAMTON
2006**



**SANDY in
NEW YORK**



What Is Resiliency?

- The ability in a natural or manmade disaster for the transportation system to meet basic needs for:
 - ✓ Evacuation
 - ✓ Emergency Response
 - ✓ Short term Recovery
 - ✓ Long term Recovery

Elements of the Transportation System

Fixed node infrastructure (ports, terminals...)

Fixed route infrastructure (roads, railways, inland waterways...)

Vehicles

Institutions and policies

Key Strategies for Resiliency

- **Redundancy**: to what extent can the transportation system absorb the loss of a facility?
- **Adaptation**: to what extent can infrastructure be redesigned to avoid flood or storm surge damage and remain operational?



The Resiliency Perspective

- Resiliency planning requires evaluating the capabilities of the transportation system, not of individual facilities.
- It is based first on user needs, not engineering analysis.



Geography Matters

- Urban areas:
 - Large population
 - Concentrated economic activity
 - Robust emergency response capability
 - Greater redundancy
- Rural areas:
 - Dispersed population
 - Long distances to critical facilities
 - Less emergency response capability
 - Less redundancy/longer detours



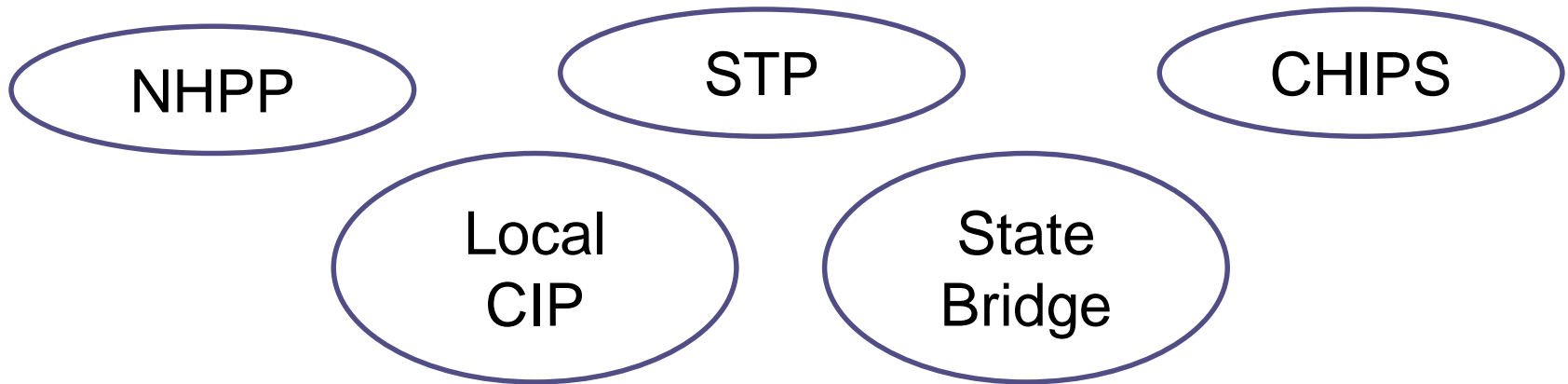
Jurisdiction Should Not Matter

- We always think about transportation infrastructure in terms of ownership – the entity that builds, maintains, operates; and receives funding
- System and user perspective dictate defining a set of facilities that can provided necessary service regardless of ownership



But...Money Always Matters

- No state or MPO can afford to undertake adaptation solutions for **all** infrastructure, so...
- How can funding be made available for a local project that is the best solution from a system perspective?
- Funding sometimes leads to the wrong answer



Barriers to Resiliency – FHWA Emergency Relief Program



U.S. Department
of Transportation
**Federal Highway
Administration**

- Uses a facility perspective
- Primarily funds restoration or replacement in-kind, although
- Betterments [including adaptation treatments] “can be justified for ER funding by comparing the projected cost to the ER program from potential recurring damage over the design life for the basic repair to the cost of the betterment.”

[FHWA Emergency Relief Manual, May 2013]



Barriers to Resiliency – FEMA



FEMA

The Public Assistance program reimburses governmental agencies for infrastructure damage when there is a Disaster Declaration.

“FEMA can help pay to restore facilities through repair or restoration, to pre-disaster design, function, and capacity in accordance with codes or standards.”

[FEMA P-323: Public Assistance Applicant Handbook]

Improvements can be incorporated in the project, but the owner pays the full cost.

Tools for Resiliency Planning

- Network Robustness Index
 - Models additional travel time for users when a link is removed from the network
- Flood Vulnerability Assessment
- Economic Impact Analysis
 - Recognizes that not all origins, destinations, or trips have an equal value



Benefit of Resiliency Planning

- Provides a more robust alternative to a facility-based, “repair or replace in-kind” approach
- Gives MPOs and states a risk-based method for selecting investments to support service delivery in extreme events
- Gives residents and business owners an understanding of how their mobility needs will be addressed



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Sen. James Inhofe, climate change denier