


# Resiliency in Transportation Decision Making

*Panel on Environmental and Resilience Issues*  
Future Interstate Study Committee

December 19, 2016

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# FHWA's policy on Resilience

 **Order**

U.S. DEPARTMENT OF  
TRANSPORTATION

**Federal Highway  
Administration**

**Subject: Transportation System Preparedness and  
Resilience to Climate Change and Extreme Weather  
Events**

Classification Code	Date	Office of Primary Interest
5520	December 15, 2014	HEP/HIF/FLH

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Par.

1. What is the purpose of this directive?
2. Does this directive cancel an existing FHWA directive?
3. What is the background of this directive?
4. What authorities govern this directive?
5. What is the scope of this directive?
6. What definitions are used in this directive?
7. What is the FHWA's policy concerning climate change and extreme weather event preparedness and resilience?
8. What are the FHWA's responsibilities?
9. Where can I obtain additional guidance?

1. **What is the purpose of this directive?** The purpose of this directive is to establish the Federal Highway Administration (FHWA) policy on preparedness and resilience to climate change and extreme weather events. This directive further serves to implement relevant provisions of title 23 of the United States Code (U.S.C.), to comply with Executive Order 13653, Preparing the United States for the Impacts of Climate Change (EO 13653), dated November 1, 2013, and further the U.S. Department of Transportation (DOT) Policy Statement on Climate Change Adaptation.

2. **Does this directive cancel an existing FHWA directive?** No. This is a new FHWA directive.

3. **What is the background of this directive?**

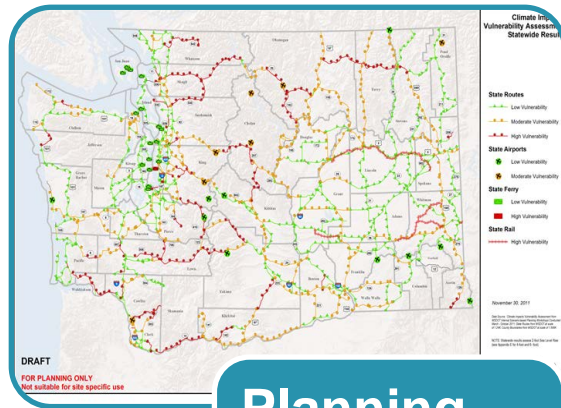
- a. Climate change and extreme weather events present significant and growing risks to the safety, reliability, effectiveness, and sustainability of the Nation's transportation infrastructure and operations.
- b. The impacts of a changing climate (such as higher temperatures, sea-level rise, and changes in seasonal precipitation and the intensity of rain events) and extreme weather events are affecting the lifecycle of transportation systems and are expected to intensify. For example, sea level rise coupled with storm surges can inundate coastal roads that would not have inundated in the past, necessitate more emergency evacuations, and require costly, and sometimes

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- FHWA Order 5520:  
Transportation System Preparedness and Resilience to Climate Change and Extreme Weather Events
- Establishes FHWA policy and responsibilities related to preparedness and resilience to climate change and extreme weather events
- Signed: December 15, 2014
- See:  
<http://www.fhwa.dot.gov/legsregs/directives/orders/5520.cfm>

# Integrating Climate Resilience

Goal: Mainstream consideration of climate change vulnerability and risk in transportation decision making



## Planning

- Long Range Transportation Plans
- Asset Management Plans



## Project Level

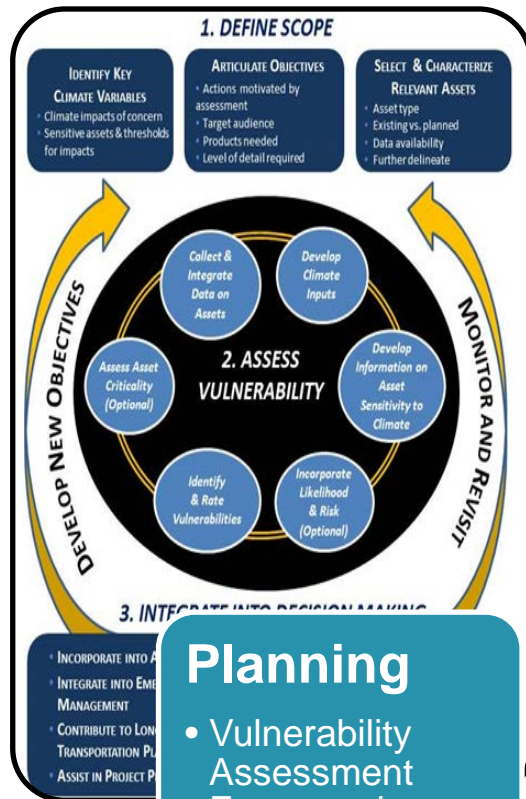
- Environmental Processes
- Engineering
- Design



## Operations and Maintenance

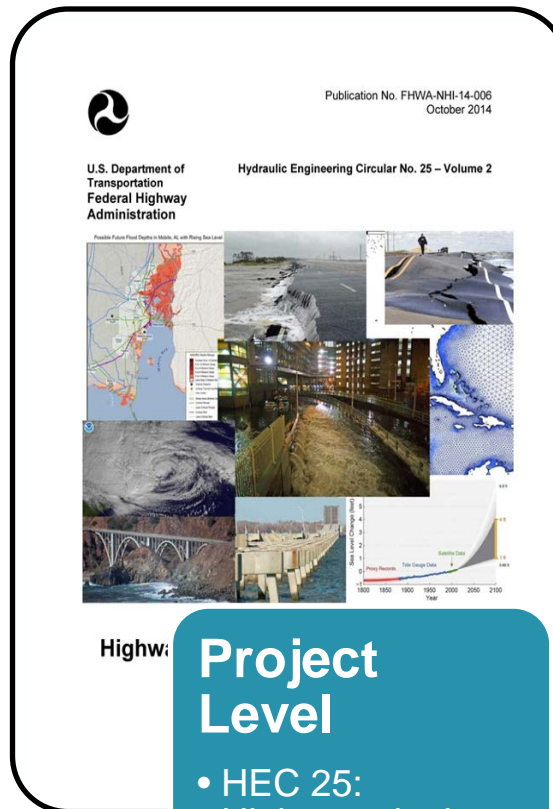
- Emergency Relief
- Snow Removal Programs

# Developing Tools, Resources, and Guides



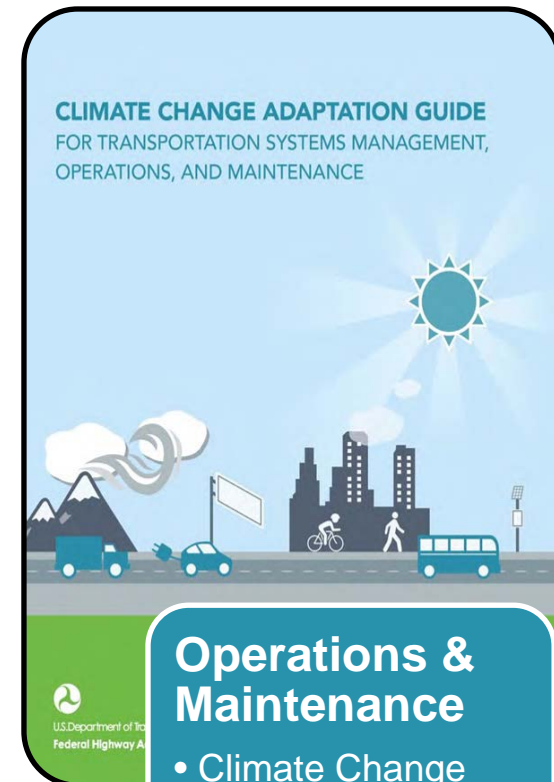
## Planning

- Vulnerability Assessment Framework (2013)



## Project Level

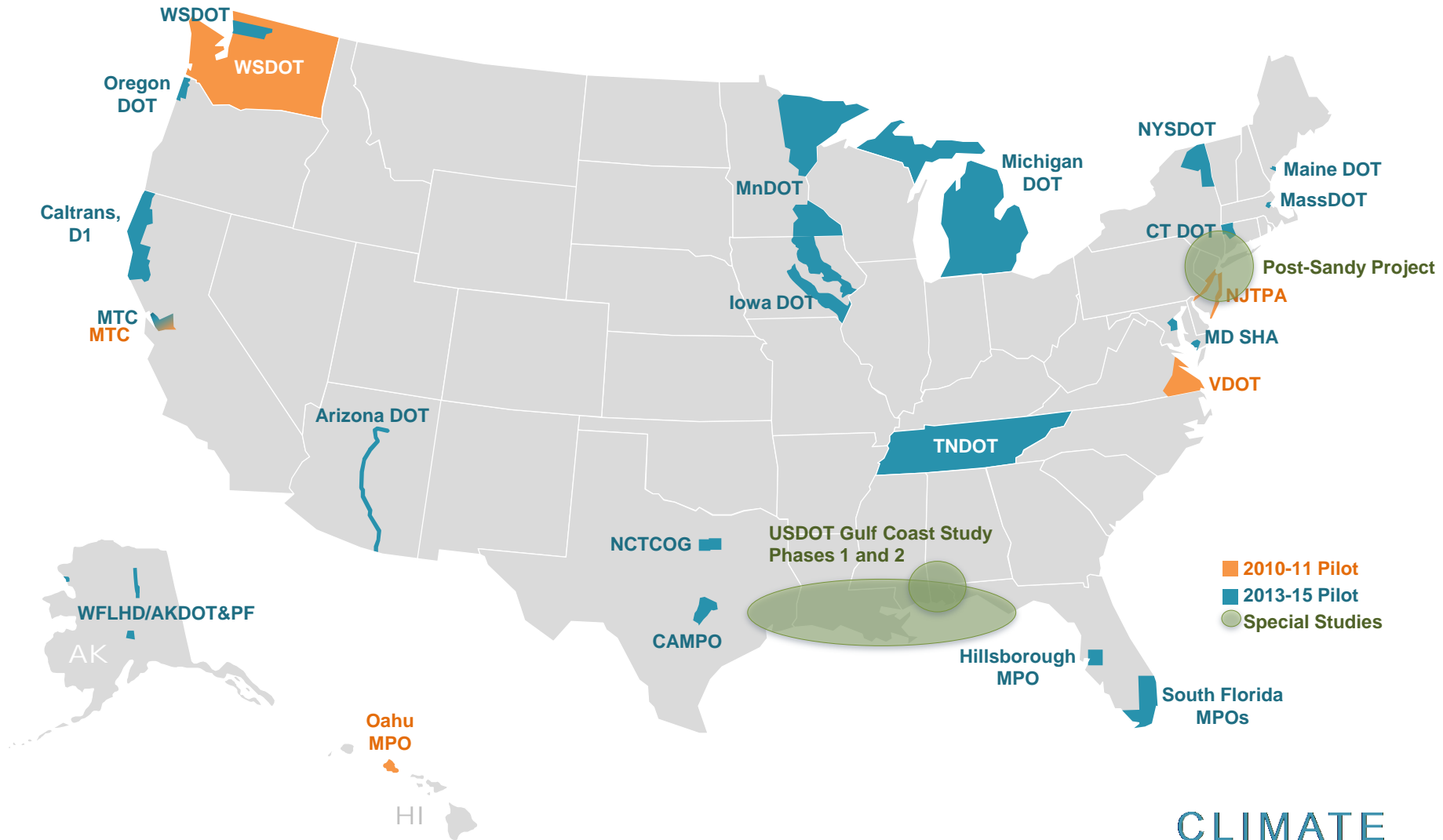
- HEC 25: Highways in the Coastal Environment (October 2014)



## Operations & Maintenance

- Climate Change Adaptation Guide (November 2015)

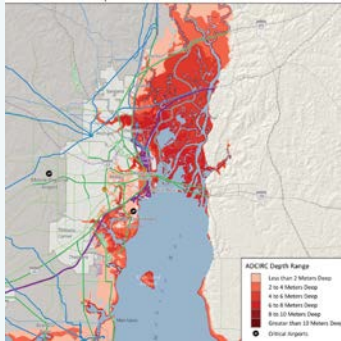
# Research projects with Partners



# FHWA & CLIMATE RESILIENCE

## Research

Gulf Coast 2 Study



Vulnerability Pilots



Hurricane Sandy Project



Engineering Assessments Study



Green Infrastructure Pilots

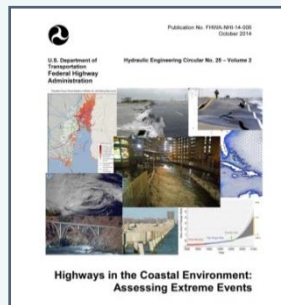


## Resources

Vulnerability Assessment Framework



Guidance (HEC-25 & 17)



Synthesis Document

Project Development Approaches for Climate and Extreme Weather Resilience (2016)

Green Infrastructure Techniques for Coastal Highway Resilience





# Relevant Recent Legislation

- Moving Ahead for Progress in the 21st Century (MAP 21)
  - Requires risk-based asset management plans
  - Evaluation of facilities that have been repeatedly repaired or replaced
  - Added eligibility of “protection against extreme events” to funding programs
- Fixing America’s Surface Transportation Act (FAST ACT)
  - Formalizes resilience consideration into transportation planning

# FHWA ASSET MANAGEMENT FINAL RULE

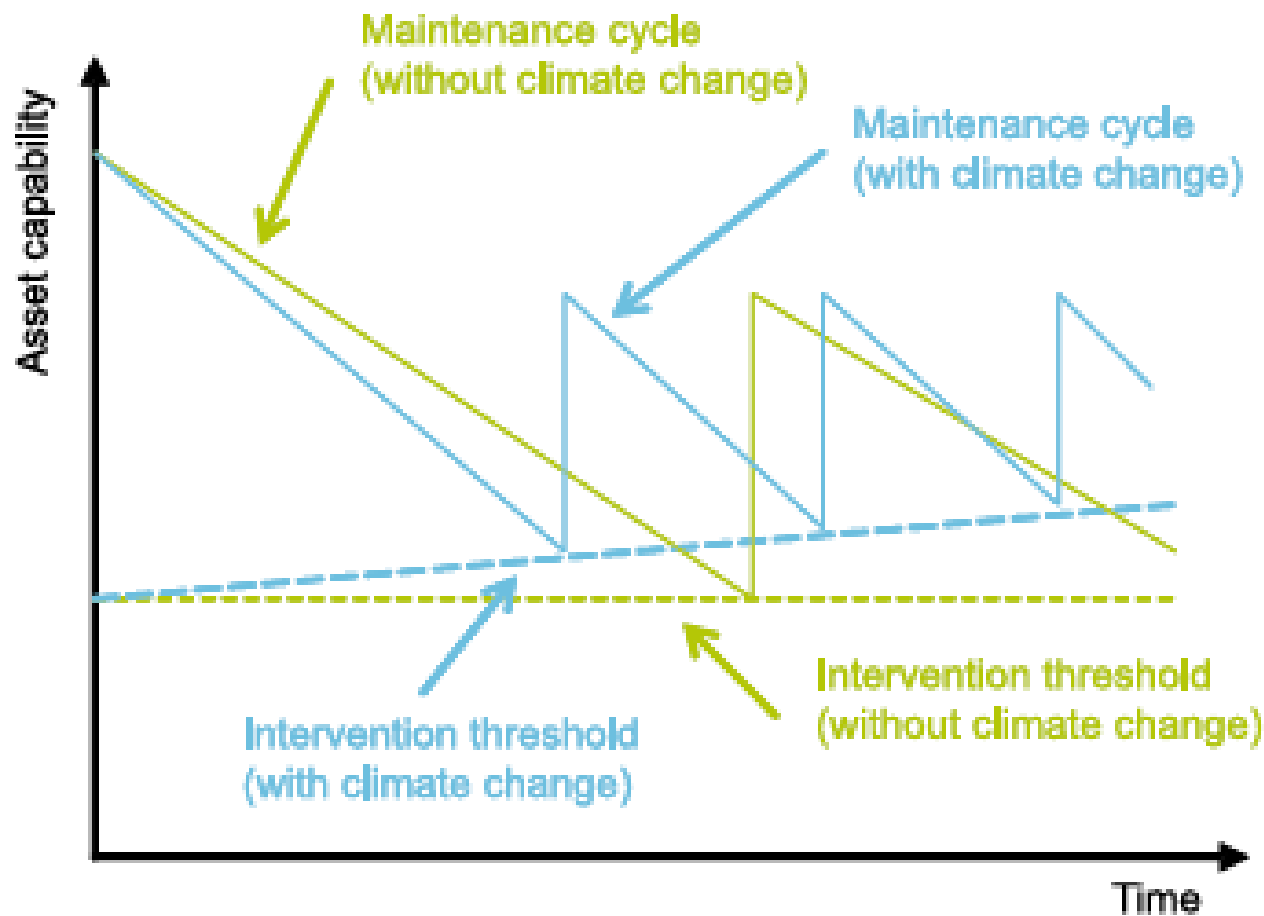
- Published October 2016
- Implements MAP-21 provisions
- Includes consideration of climate and extreme weather risk in asset management plans
- Added new section (23 CFR 667) that addresses MAP-21 Section 1315(b) - evaluation of facilities repeatedly repaired or replaced



# Risk & Resiliency

Resilient infrastructure can mean lower net costs. Examine both costs and benefits of decisions

- Benefits of resiliency:
  - Higher initial costs, lower maintenance costs, reduced disruption
- Cost of ignoring resiliency:
  - More frequent maintenance cycles, replacement
  - Traffic delays, economic losses



UK Highways Agency, Climate Change Adaptation Strategy and Framework.

# Statewide 23 CFR §667 Evaluation

- Implements MAP-21 requirement (Section 1315(b))
- State DOTs required to conduct evaluations to determine reasonable alternatives to roads, highways, and bridges repeatedly repaired or replaced due to and emergency events





# Consideration of evaluations

- DOTs to consider results of evaluation when developing projects
- FHWA will periodically review the DOTs compliance.
- Provision is independent of ER program and does not guarantee ER eligibility
- DOTs make evaluations available to FHWA upon request
- FHWA may consider results when making project development decisions



# FHWA Planning rule

New Transportation Planning Rule (May 2016) adds:

- Metropolitan Transportation Plan must assess capital investment and other strategies that reduce the vulnerability of existing transportation infrastructure to natural disasters (23 CFR 450.324(f)(7)).
- MPOs recommended to consult with agencies and officials responsible for natural disaster risk reduction when developing Plan and TIP (23 CFR 450.316(b)).
- New planning factor on improving the resiliency and reliability of transportation system ([23 CFR 450.206\(a\)](#) and [23 CFR 450.306\(b\)](#)).



# NEPA and Climate Change

- New Climate Change Guidance issued by CEQ (August 2016) requires new Environmental Assessments and Environmental Impact Statements to consider:
  - The impacts of climate change on the proposed project
  - Cumulative impacts of transportation project on an environment vulnerable to the effects of climate change

# NEPA and Climate Change

- Already required by several states
- Likely to remain and issue due to risks to infrastructure and public interest
- Litigation?

# Climate, Resiliency and Emergency Relief

- Climate change and Resiliency consideration included in [ER program manual](#) and [ER order](#)
- Consider before replacing “in kind”
  - Up to current design standards?
  - Justification for betterment?



# Emergency Relief: Justifying Betterments



Texas SH 91 at Shawnee Creek,  
June 2015

# Observations

- Resiliency is critical to future performance of the system
- Need integration across planning and project decision making processes
- Recent legislation and regulations point to more consideration, not less
  - Long term performance, management
  - Preservation, efficient use of funds, choosing wisely
  - Considering effects at the system and project level
- We are not starting from scratch, learn from recent work
- Climate data will become better, more actionable
- Economic arguments are often most persuasive, need to develop better methods