



U.S. Department of Transportation
Federal Highway Administration
Office of Infrastructure



Transportation Asset Management

The Process

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Image source: FHWA

Disclaimer

- Except for any statutes or regulations cited, the contents of this presentation do not have the force and effect of law and are not meant to bind the public in any way. This presentation is intended only to provide information to the public regarding existing requirements under the law or agency policies.

Asset Management

“Asset management means a strategic and systematic process of operating, maintaining, and improving physical assets, with a focus on both engineering and economic analysis based upon *quality information*, to identify a structured sequence of maintenance, preservation, repair, rehabilitation, and replacement actions that will achieve and sustain a desired state of good repair over the life cycle of the assets at minimum practicable cost.” (Emphasis added) (23 CFR 515.5)

MAP-21 Language (Carried through in BIL)

- 23 U.S.C. 119(e), requires:
 - A State shall develop a risk-based *asset management plan* for the National Highway System to improve or preserve the condition of the assets and the performance of the system.
 - TAMP requirements were amended by the BIL (§ 11105) to require that States take into consideration extreme weather and resilience within their lifecycle cost and risk management analysis. (23 U.S.C. 119(e)(4)(D))

Background: TAMP Contents

(23 CFR 515.9, except where noted)

Area	TAMP
NHS inventory and condition ¹	Yes
Objectives and measures	Yes
Performance gap identification	Yes
Lifecycle planning	Yes
Risk management analysis	Yes
Financial plan	Yes
Investment strategies	Yes
Data from other owners	Yes
Use of best available data (23 CFR 515.7)	Yes

¹ A TAMP must include a summary listing of all NHS pavement and bridge assets. State DOTs are also encouraged to include all other NHS infrastructure assets within the right-of-way corridor and assets on other public roads.



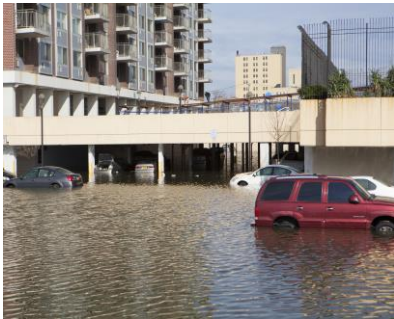
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Integrating Resiliency into Transportation Asset Management



What Is Resilience?

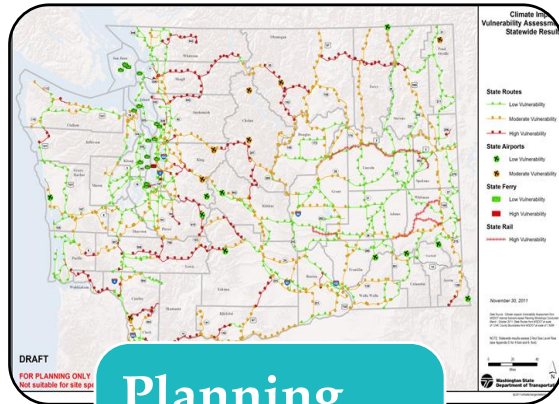
Resilience: The ability to anticipate, prepare for, and adapt to changing conditions and withstand, respond to, and recover rapidly from disruptions, FHWA Order 5520 (FHWA 2014c).



Addressing Resilience Gaps

Goal: Integrate extreme weather and resilience to climate change in transportation decision making

- In support of 23 U.S.C. § 503(b)(3)(B)(viii), which directs the U.S. Department of Transportation “to carry out research and development activities ... to study vulnerabilities of the transportation system to ... extreme events and methods to reduce those vulnerabilities.”



Planning

- Long Range Transportation Plans
- Asset Management Plans

Credit: WSDOT



Project Level

- Environmental Processes
- Engineering
- Design

Credit: CDOT



Operations and Maintenance

- Emergency Relief
- Snow Removal Programs

Credit: Nashville MTA



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Life Cycle Planning



Addressing Resiliency & Risk in Life Cycle Planning

Risks, changing deterioration rates can influence:

- **LCP strategies (\$)**

- -Changing asphalt binders - *higher temperatures*
- -Protect roads – *more frequent flooding*
- -Protect/elevate roads and bridges – *higher sea levels can elevate tides, storm surge*

- **LCP scenarios**

- -Different levels of investment to address system/network resilience
- -Greater \$
- (-or, Less \$)

Resilience & Asset Management Resources

- Asset Management, Extreme Weather, and Proxy Indicators Pilot Program (2017-2019)
- Guidance on Incorporating Risk Management into Transportation Asset Management Plans (2017)
- Guidance on Using a Life Cycle Planning Process to Support Asset Management (2017)
- Risk-Based Transportation Asset Management Reports: Building Resilience into Transportation Assets (2013)
- AASHTO:NCHRP 25-25 (94) Integrating Extreme Weather into TAMPs (2015)

Resilience and Asset Management Resources

Current resources:

1. Guidance on *Incorporating Risk Management into Transportation Asset Management Plans* (2017) (FHWA 2017b).
2. Guidance on *Using a Life Cycle Planning Process to Support Asset Management* (2017) (FHWA 2017f).

Coming soon:

1. *Addressing Resilience to Climate Change and Extreme Weather in Transportation Asset Management.*
2. National Highway Institute (NHI) resilience course: *Addressing Resilience in Highway Project Development and Preliminary Design* (2022).

NHI Resilience Course

- *Addressing Resilience in Highway Project Development & Preliminary Design*
- Content:
 - Addressing resilience in engineering decision-making (Pavements and Geohazards, Inland Flooding, Coastal Hydraulics)
 - Accessing, using climate projections
 - Integrating resilience into project development
- Audience: Engineering, design, project development/ NEPA staff (etc.).
- 2.5 to 3 days, in-person.
- Source material: *Synthesis of Approaches for Addressing Resilience in Project Development* (2017) & project assessments, Hydraulic Engineering Circulars -17 & -25, pavements and geohazards resources, etc.

NHI Resilience Course

- Web trainings posted on NHI website (2022)
 - [FHWA-NHI-142081 Understanding Past, Current and Future Climate Conditions](#)
 - [FHWA-NHI-142082 Introduction to Temperature and Precipitation Projections](#)
 - [FHWA-NHI-142083 Systems Level Vulnerability Assessments](#)
 - [FHWA-NHI-142084 Adaptation Analysis for Project Decision Making](#)
- Free
- ***Prerequisites*** for the in-person course: ***Addressing Resilience in Highway Project Development & Preliminary Design***



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FHWA Resilience

Ongoing Efforts



Assessing Flooded Pavements

- Project objectives:
 - Develop methods to assess flooded pavements.
 - Assess the capacity to carry traffic during/ after flooding.
 - Evaluate emergency or heavy equipment.
 - Evaluate normal traffic.
 - Determine the tradeoff between the user costs of road closure (and detours) versus the costs of increased road damage.
 - Develop a decision support tool.
- Project deliverables: A report is in publication (FHWA forthcoming a).



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National Oceanic and Atmospheric Administration Project: Effects of Sea Level Rise

- Joint project with the National Centers for Coastal Ocean Science.
- Project goal details: Facilitate informed adaptation planning and coastal management decisions through a multidisciplinary research program that results in integrated models and tools of dynamic physical and biological processes capable of evaluating vulnerability and resilience under multiple SLR, inundation, and management scenarios.



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Equity and Transportation Asset Management



What is Equity?

Equity –“ the consistent and systematic fair, just, and impartial treatment of all individuals, including individuals who belong to underserved communities that have been denied such treatment, such as Black, Latino, and Indigenous and Native American persons, Asian Americans and Pacific Islanders and other persons of color; members of religious minorities; lesbian, gay, bisexual, transgender, and queer (LGBTQ+) persons; persons with disabilities; persons who live in rural areas; and persons otherwise adversely affected by persistent poverty or inequality.” (*Executive Order 13985*)

Equity and TAMPs

Transportation agencies should consider integrating equity into asset management as they develop their TAMPs.

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www.fhwa.dot.gov/environment/sustainability/resilience