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In This Section

Federal Flood Risk Management Standard

Transportation and Flood Risk

Flood risks impact our environment, economic prosperity, public health, and safety. Floods can lead to damaged roads, bridges, rail systems, and other transportation infrastructure, and threaten the long-term investments that Federal, State, and local governments are making in transportation infrastructure. Flooding may also result in disrupted transit service or closed roads, potentially limiting access to key evacuation routes during extreme weather events. Climate change is expected to continue to have significant impacts on current and future flood risks, with associated increases in flood damages and risk to human life in many areas of the United States.

To protect the integrity of the nation's transportation system and the people it serves, it is essential to manage and reduce flood risk when taking actions to plan, design, maintain, and repair our transportation system. Investments in resilience result in cost savings over time, through reduced repair costs, reduction of repetitive and substantial damages, improved safety, and reduced travel disruption.

The Bipartisan Infrastructure Law defines resilience as:

… a project with the ability to anticipate, prepare for, or adapt to conditions or withstand, respond to, or recover rapidly from disruptions, including the ability--

(A)(i) to resist hazards or withstand impacts from weather events and natural disasters; or (ii) to reduce the magnitude or duration of impacts of a disruptive weather event or natural disaster on a project; and

(B) to have the absorptive capacity, adaptive capacity, and recoverability to decrease project vulnerability to weather events or other natural disasters.

For the full definition, see sec. 11103 of the Bipartisan Infrastructure Law (BIL), enacted as the Infrastructure Investment and Jobs Act, Pub. L. 117-58 (Nov. 15, 2021).

Federal Flood Risk Management Standard

Executive Order 13690 issued on January 30, 2015, established a Federal Flood Risk Management Standard (FFRMS) to incorporate the most recent climate science into planning, National Environmental Policy Act (NEPA) procedures, and other processes for all federally funded actions.

E.O. 13690 modified and built upon the 1977 E.O. 11988 "Floodplain Management;", adding new elements such as the application of nature-based solutions, redefining the base floodplain to account for climate conditions, and adding new definitions, exceptions, and requirements. E.O. 13690 was revoked but then reinstated by E.O. 13690, which reestablished the FFRMS.

"It is the policy of the United States to improve the resilience of communities and federal assets against the impacts of flooding. These impacts are anticipated to increase over time due to the effects of climate change and other threats. Losses caused by flooding affect the environment, our economic prosperity, and public health and safety, each of which affects our national security."

- Section 1 of Executive Order 13690

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FFRMS Interim Guidelines

FFRMS Interim Guidelines

The FFRMS requires the Department of Transportation to establish the FFRMS floodplain using one of the following approaches:

1. **Climate-informed Science Approach (CISA).** The elevation and flood hazard area (i.e., geographic extent of the elevation's corresponding floodplain) that results from using a climate-informed science approach that uses the best-available, actionable hydrologic and hydraulic data and methods that integrate current and future changes in flooding based on climate science. This approach will also include an emphasis on whether the action is a critical action as one of the factors to be considered when conducting the analysis.

2. **Freeboard Value Approach (FVA).** The elevation and flood hazard area that results from adding an additional 2 feet to the Base Flood Elevation (BFE) and expanding to the corresponding horizontal extent for non-critical actions, and by adding an additional 3 feet to the BFE and expanding to the corresponding horizontal extent for critical actions.

3. **0.2-Percent-annual-chance Flood Approach (0.2PFA)** The area subject to flooding by the 0.2 percent annual chance flood (also known as the 500-year flood).

Consistent with USDOT's support for incorporating future climate risk exposure within our overall programs, USDOT prefers the CISA to establish the FFRMS floodplain when data to support such an analysis is available.

USDOT has developed the set of actions described in its Interim Guidelines to implement the FFRMS within our floodplain management authorities, actions, and applications. These Interim Guidelines are available for review and comment through the Federal eRulemaking Portal: http://www.regulations.gov.

USDOT has existing flood risk resources in place to advance the goals of the FFRMS and assist sponsors of USDOT-funded actions in establishing the FFRMS floodplain. These resources and tools, combined with existing floodplain regulations, provide options on the many opportunities to build resilience to flooding into the planning and construction of transportation projects.

Executive Office of the President Flood Risk Resources

E.O. 11988 "Floodplain Management"

E.O. 13690 "Establishing Federal Flood Risk Management Standard and a Process for Further Soliciting and Considering Stakeholder Input"

E.O. 13990 "Protecting Public Health and the Environment and Restoring Science to Tackle the Climate Crisis"

E.O. 14008 "Tackling the Climate Crisis at Home and Abroad"

E.O. 14030 "Climate-Related Financial Risk"

Climate Mapping for Resilience and Adaptation (CMRA). CMRA integrates information from across the federal government on local exposure to climate-related hazards, including flood risk and sea level rise projections:

2022 Sea Level Rise Technical Report (noaa.gov)

Sea Level Rise Viewer (noaa.gov)

Federal Flood Risk Management Standard, Appendix G of October 2015 Implementation Guidelines.

Federal Flood Risk Management Standard Climate-Informed Science Approach (CISA) – State of the Science Report. This report provides a review and update of the best-available, actionable science that can support application of the Climate-Informed Science Approach (CISA), reflecting science and technology advancements made since EO 13690 was issued in 2015.

FFRMS Floodplain Determination Job Aid. The Flood Resilience Interagency Working Group released this FFRMS Floodplain Determination Job Aid to support agencies' implementation of federal flood programs and regulations, including FFRMS.

Federal Flood Standard Support Tool. The White House Flood Resilience Interagency Working Group developed a Federal Flood Standard Support Tool (FFSST) to enable users to identify the FFRMS floodplain more easily.

US DOT Flood Risk Resources

USDOT Order 5650.2. Floodplain Management and Protection. Floodplain.pdf (dot.gov)

FAA Order 1050.1F Desk Reference (v2), Chapter 14 Water Resources, Section 14.2 Floodplains. 1050 Desk Reference Chapter 14 (faa.gov)

FHWA Hydraulic Engineering Circular (HEC) 25, "Highways in the Coastal Environment". Provides technical guidance and methods for assessing the vulnerability of roads and bridges to extreme events and climate change in coastal areas, focusing on sea level rise, storm surge, and waves. HEC-25 - Highways in the Coastal Environment - 3rd Edition (dot.gov)

FHWA Hydraulic Engineering Circular (HEC) 17, "Highways in the River Environment – Floodplains, Extreme Events, Risk and Resilience". Provides technical guidance and methods for assessing the vulnerability of transportation facilities to extreme events and climate change in riverine environments. Highways in the River Environment - Floodplains, Extreme Events, Risk, and Resilience (HEC-17 2nd Edition) (dot.gov).

FHWA Nature-Based Solutions for Coastal Highway Resilience: An Implementation Guide. This guide follows the steps in the transportation project delivery process, providing information on planning, site assessment, design, permitting, construction, monitoring, maintenance, and adaptive management of nature-based solutions in the transportation context. fhwahep19042.pdf (dot.gov)

FHWA Transportation Engineering Approaches to Climate Resiliency (TEACR) Synthesis report and case studies. This report synthesizes lessons learned and innovations from recent FHWA studies and pilots to help transportation agencies address changing climate conditions and extreme weather events at the asset level. It is designed to provide needed information to a range of engineering disciplines to integrate climate considerations into transportation project development.
https://www.fhwa.dot.gov/environment/sustainability/resilience/ongoing_and_current_research/teacr/synthesis/

US DOT Gulf Coast 2 Study. The Gulf Coast Study produced tools and lessons learned that transportation agencies across the country are using to assess vulnerabilities and build resilience to climate change.
https://www.fhwa.dot.gov/environment/sustainability/resilience/ongoing_and_current_research/gulf_coast_study/index.cfm

FHWA Post-Hurricane Sandy Transportation Resilience Study in New York, New Jersey, and Connecticut. Study intended to inform transportation agency efforts to address changing climate conditions and extreme weather events from a regional planning level to facility level assessments.
https://www.fhwa.dot.gov/environment/sustainability/resilience/publications/hurricane_sandy/fhwahep17097.pdf

FHWA Resilience Pilots. FHWA has partnered with State Departments of Transportation (DOTs), Metropolitan Planning Organizations (MPOs) and others on 46 pilot projects to develop and deploy resilience solutions to current and future extreme weather events. https://www.fhwa.dot.gov/environment/sustainability/resilience/pilots/

CMIP Climate Data Processing Tool 2.1. Accesses and calculates climate projections for temperature and precipitation variables. Hydraulics - Bridges & Structures - Federal Highway Administration (dot.gov)

FHWA NHI course FHWA-NHI-135082 Highways in the Coastal Environment. National Highway Institute: Course Description for Highways in the Coastal Environment.

FHWA NHI course FHWA-NHI-135082A Future Sea Levels for the Design of Highways in the Coastal Environment. National Highway Institute: Course Description for Future Sea Levels for the Design of Highways in the Coastal Environment - FHWA-NHI-135082A (dot.gov)

FHWA NHI Course FHWA-NHI-135082C Water Levels for the Design of Highways in the Coastal Environment. National Highway Institute: Course Description for Water Levels for the Design of Highways in the Coastal Environment - FHWA-NHI-135082C (dot.gov)

FHWA NHI Course FHWA-NHI-142085A Addressing Climate Resilience in Highway Project Development and Preliminary Design. National Highway Institute: Course Description for Addressing Climate Resilience in Highway Project Development and Preliminary Design - FHWA-NHI-142085A (dot.gov)

FHWA NHI Course FHWA-NHI-142081 Understanding Past, Current and Future Climate Conditions. National Highway Institute: Course Description for Understanding Past, Current and Future Climate Conditions - FHWA-NHI-142081 (dot.gov)

FHWA NHI Course FHWA-NHI-142082 Introduction to Temperature and Precipitation Projections. National Highway Institute: Course Description for Introduction to Temperature and Precipitation Projections - FHWA-NHI-142082 (dot.gov)

Last updated: Wednesday, November 13, 2024

U.S. DEPARTMENT OF TRANSPORTATION
1200 New Jersey Avenue, SE
Washington, DC 20590
855-368-4200

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