

APPENDIX G
Mitigation Strategies

MITIGATION STRATEGIES



**Represent Guidelines for Rehabilitating Historic Buildings issued in 2017 part of The Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for Preserving, Rehabilitating, Restoring & Reconstructing Historic Buildings. Planning and Assessment for Flood Risk Reduction is a step that should be completed for all project prior to selecting a mitigation strategy. The U.S. Department of the Interior, National Park Service publication: Guidelines on Flood Adaptation for Rehabilitating Historic Buildings, 2019 offers guidance for appropriate mitigation strategies for historic buildings and offers the recommended and not recommended modes of action.*

Temporary Protective Measures

Temporary Protective Measures *

- Flood Wrapping Systems
- Temporary Flood Barrier, System, or Equipment*
- Install Fastening Devices or Stanchions for Temporary Barriers*
- Evaluate Walls & Flood Barrier Against the Forces Induced by Flooding*
- Fill the Basement*
- Develop Procedure, Responsibilities & Training for Temporary Deployment of Flood Systems*
- Install a Generator*
- Relocate Valuable Collections to Higher Floors, Upper Shelves, Or Offsite*

Utilities + Life Safety

- Install Generators*
- Protect Utilities*
- Protection of Life Support Facilities / Dangerous Goods

Post-Event Stabilization + Protection

- Mold Remediation
- Structural Remediation

Site & Landscape

Site Adaptations*

- Plan & Implement Site Investigation*
- Provide Proper Drainage*
- Improve or Design New Stormwater Management System*
- Porous Pavements
- Infiltration Fields and Strips with Above-Ground Storage
- Rainwater Retention Ponds With or Without Infiltration Possibilities
- Shallow Infiltration Measures
- Rain Water Tanks
- Reduced Paved Surfaces
- Gutter
- Artificial Islands
- Storage / Settling Tank and Storage Basins

Landscape Adaptations*

- Improve, Restore, or Implement Natural Systems
- Use of Groundcover and Shrubbery
- Add trees as "straws" to help draw water from soil
- Improve Soil Infiltration Capacity
- Stormwater Park / "Water Squares"
- Raising Land
- Swales / Directing Stormwater
- Biofiltration
- Levee, Berm, or Embankment*

Public Lands / Streets / ROW

- Public Infrastructure Design
- Increase Height Difference Between Street /Ground Floor Level
- Raised Curbs / Hollow Roads
- Increased Capacity of Sewer System
- Increased Capacity of Stormwater Infrastructure
- Reconstruct Combined Sewer Systems to Separate Sewer Systems
- Smart-Drain (Ground Water)
- Infiltration and Transport Sewer
- Dikes / Levees / Seawalls
- Living Shoreline
- Green Spaces

Protect Utilities

Protect Utilities*

- Protect Utilities in a Watertight Impermeable Enclosure*
- Protection of Exposed Risers, Conduits, and Cables
- Relocate Ducts, Pipes, & Conduits*
- Utilize Duct Installation That Can Be Removed After Flood*
- Install Electrical Disconnect Above Flood Risk Level*
- Eliminate Electrical Servia From Flood Prone Areas*
- Increased Pump Capacity
- Increased Storage or Discharge Capacity of Surface Water

Pumping Stations
Relocate All Utilities Above the Flood Risk Level*
Elevate & Anchor Exterior Mechanical Equipment*
Relocate Interior Mechanical Equipment*
Install Backflow Prevention Devices*
Install Sump Pumps

Building Infrastructure

*Move the Historic Building**

Relocate Building, Utilities, Facilities, and Infrastructure*
Find an Available Site with as Similar Setting as Possible While Also Eliminating Flood Risk*
Document the Historic Building with Photographs*

*Elevate Building on a New Foundation**

Assess Potential Impacts of Elevation*
Document the Property with Photographs and/or Drawings*
Elevate the Building on a New Foundation*

*Elevate the Interior Structure**

Assess Potential Impacts of Elevation*
Document the Property with Photographs and/or Drawings*
Elevate the Interior Structure (i.e. build up interior floor)*

*Dry Floodproofing**

Evaluate the Strength of Masonry Walls & Footing Against Flood*
Anchor the Structure to the Foundation*
Implement Site Drainage to Manage Floodwaters*
Create Plan for Post Flood Water Removal*
Install Backflow Prevention Devices*
Install Sump Pumps*
Design Temporary or Permanent Closures*
Install Stanchions, Fasteners, or Tracks for Flood Shields*
Install a Low Wall Around Basement Windows*
Install Vents in Foundations Walls that Can be Sealed*
Coating or Covering the Exterior of Foundation Wall Surfaces*
Temporary Removable Waterproof Membrane*
Elevated Flood Wall / Flood Gate
By-Pass Creation
Building on Partially Elevated Areas
Construction on Piles

*Wet Floodproofing**

Evaluate the Strength of Masonry Walls & Footing Against Flood*
Anchor the Structure*
Relocate Utilities*
Install a Ground Fault Circuit Interrupter*
Install Hydrostatic Flood Vents (following Engineering Guidance)*
Install a Pumping System*
Remove Non-Historic Finishes & Furnishings that Retain Moisture*
Relocate Electrical Outlets & Panels Above Flood Risk Level*
Wet Proofing (Water Resistant Crawl Space or Interiors)
Install a Horizontal Water Stop*
Abandon the First Story*
Utilize Flood Damage-Resistant Materials*
Fast Replacement Components

*Fill the Basement**

Assess Strength of Basement Walls & Footings (Modify if Necessary)*
Remove or Breakup Non-Porous/Concrete Basement Floor Slabs*
Relocate All Systems & Utilities*
Fill Basement Using Removable Fill Material (Gravel, Soil, or Sand) & Compact*

Abandon the First Story

*Abandon the First Story**

Evaluate the Strength of Walls, Columns, & Footings*
Document Interior Materials, Features, Finishes, & Spaces*
Abandon the First Story*

Planning & Assessment for Flood Risk Reduction

*Planning and Assessment for Flood Risk Reduction**

Identify & Catalogue Important Historic Features*
Develop an Adaptive Strategies Implementation Plan*
Identify & Evaluate Vulnerabilities*
Document Properties & Defining Characteristics*
Monitor Character Defining Features*
Identify, Utilize, & Maintain Existing Characteristics that Minimize Flood Impacts*

Policies

Policy - Regulations
Policy - Incentives

Post-Event "Historic Resiliency Triage" Teams

Trades and Vocational Training

Integration into Higher Education

Identify & Assess Flood-Damage*

Information Resources

Checklist for preparation of historic property / resources

Checklist for post-event recovery of historic property / resources

Centralized website / digital platform of tools, standards, checklists

Education

Public Awareness

Healthy Waterways / Wetlands Education

Public Education

Educate Tourists

Mapping + Data

Online Mapping

Sea Level Rise Visualization

Ongoing Data Collection of Flood / Storm Surge / Tidal Data

Identify Vulnerable Cultural Resources

Natural Systems Monitoring

Vulnerability of Flora and Fauna

Mapping of Impacts on Watersheds

Economic Disruption Mitigation

Assess Value of Business or Property Services

Tourism Climate Change Assessment