

**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