Disaster Planning for Historic Properties:
Integrating Hazard Mitigation and Historic Preservation in Pennsylvania

2015 PENNSYLVANIA STATEWIDE CONFERENCE ON HERITAGE
The State Museum of Pennsylvania, Harrisburg
Thursday, July 9, 2015
8:30 AM
The role of the SHPO is to identify and protect the architectural and archaeological resources of Pennsylvania. Our responsibility is to work with individuals, communities, local governments, and state and federal agencies to educate Pennsylvanians about our heritage and its value, to build better communities through preservation tools and strategies, to provide strong leadership, both individually and through partnerships, and to ensure the preservation of Pennsylvania’s heritage.
Historic Properties: Common Threats

- New Development / Redevelopment
- Alteration
- Neglect / Lack of Maintenance

**Natural and Man-Made Hazards**
- Floods
- Earthquakes
- Tornadoes
- Wildfire
Disaster Relief Appropriations Act of 2013
U.S. Department of the Interior, National Park Service
Emergency Supplemental Historic Preservation Fund

$1.5 million Grant Awarded to PHMC in 2014 is funding:

Disaster Recovery and Planning for Historic Properties

- Awarding subgrants to private property owners and nonprofit organizations for reimbursing the costs of repairing National Register-eligible or listed historic properties damaged by Hurricane Sandy.

- Undertaking municipal and county hazard mitigation planning to incorporate and prioritize historic properties.

- Developing model guidance and hazard mitigation demonstration projects related to historic properties.

- Providing training and educational programs on disaster-related topics.
Hurricane Sandy Recovery
Hurricane Sandy (DR-4099):
18 Counties Declared Eligible for Federal Public Assistance (No Individual Assistance)
Howard Riegel Residence (circa 1908)

The Historic Easton Cemetery (circa 1849)

City of Easton, Northampton County
Damaged by Hurricane Sandy’s Winds, 2012
Planning for Future Disasters
Kinzua Viaduct, Hamlin Township, McKean County
Destroyed by F-1 Tornado, 2003

Kinzua Viaduct
Originally begun in 1881 for the New York, Lake Erie & Western Railroad to ship coal, lumber and oil, it was once the world’s highest and longest rail viaduct. Rebuilt in 1930 to carry heavier loads, it was in service until 1959. Kinzua Bridge State Park was created here in 1965. In 2003 an F-1 tornado partially destroyed the viaduct. Remaining towers were restored and the skywalk constructed in 2011.
Philip Seidel Forge, Lower Alsace Township, Berks County
Destroyed by Fire, 2015
Borough of Palmyra, Lebanon County
Threatened by Land Subsidence (Sinkholes), 2014
Prioritizing Historic Properties within the Disaster Cycle
Why Prioritize and Plan for Historic Properties?

- They inform citizens of their unique local heritage, their cultural identity, and the origins of their community.
- They are the foundations of our communities’ built environment and they provide that familiar “sense of place”.
- They are very often valuable economic assets and tourism attractions.

The Importance of Preserving Historic Properties

McConnell’s Mill and Covered Bridge
Slippery Rock Township, Lawrence County
Disaster Mitigation Act of 2000

- Federal legislation amended the Robert T. Stafford Relief and Emergency Assistance Act
- Requires local jurisdictions to have hazard mitigation plans to be eligible for federal assistance following a disaster event
- **Emphasizes public participation** and coordination among state and local agencies
- Encourages communities to continuously strive to improve their plans and resulting mitigation actions
- The **integration of historic properties** into comprehensive mitigation planning is **critical** to the spirit and intent of DMA 2000

Federal Hazard Mitigation Law
DMA 2000
Phase I:
Identifying selected counties’ most hazard-prone historic properties through a carefully defined reconnaissance-level survey and recording hazard-specific information for vulnerability assessments

Phase II:
Developing strategies to protect these local historic assets during, and in the aftermath of, future natural disasters and integrating those strategies into select counties’ FEMA-approved hazard mitigation plans
The Disaster Planning for Historic Properties Initiative: “Pilot” Counties
“Historic Properties”

For local planning purposes, these may be defined as:

- Contributing to the community’s character
  - Ex: Local landmarks, residential neighborhoods

- Important economic development assets
  - Ex: Tourism destinations, downtown/village commercial districts, industrial buildings

- Meeting other local planning goals
  - Ex: County Comprehensive Plan (Municipalities Planning Code’s “plan for historic preservation” requirement)

Definition of “Historic Properties”
Context of Hazard Mitigation Plan Integration
For federal and state law compliance purposes, these are more specifically defined as:

- Eligible for, or listed in, the National Register of Historic Places
- Various types
  - Buildings
  - Structures
  - Objects
  - Sites
  - Districts
- Archaeological sites
Integrating Historic Preservation & Hazard Mitigation: Pennsylvania’s Guidance

- Developed a planning process to be used by Milton, Northumberland County, in future flood mitigation projects with the following goals:
  - Use the least intrusive techniques for the most historic buildings
  - Use a variety of techniques for different buildings
  - Eliminate as much risk as possible

- Only focused on flood hazards; not comprehensive in hazard scope
  - Still very relevant and a good model
Integrating Historic Preservation & Hazard Mitigation: The Federal Guidance

- State and Local Mitigation Planning How-To Guide (FEMA 386-6)
  - Published by Federal Emergency Management Agency in 2005

- Comprehensive in its scope and covers a variety of hazards beyond flooding
Integrating Historic Preservation & Hazard Mitigation: The Federal Guidance

- FEMA’s Historic Property Integration “How-To Guide” is intended to be used with the following Hazard Mitigation Companion Guides:
  - Getting Started: Building Support for Mitigation Planning (FEMA 386-1)
  - Understanding Your Risks: Identifying Hazards and Estimating Losses (FEMA 386-2)
  - Developing the Mitigation Plan: Identifying Mitigation Actions and Implementation Strategies (FEMA 386-3)
  - Bringing the Plan to Life: Implementing the Hazard Mitigation Plan (FEMA 386-4)
Phase 1: Organize Resources

1. **Assess the level of awareness and support** for protecting your community’s historic properties, and **identify resources** for mitigating hazards to historic properties.

2. **Build the planning team**: identify and recruit historic preservation experts.

3. **Engage the public** during key points in the hazard mitigation planning process.
Phase 1: Organize Resources

Assess Awareness and Support for Protecting your Community’s Historic Properties—and Identify Resources

- What preservation efforts are currently underway in the community, and by whom?
- Does the community have a historic preservation plan or an historic district ordinance?
  - Comprehensive Plan “Historic Preservation Element”
- What are the obstacles to historic property preservation in the community?
- Identify resources (funding opportunities)
  - PHMC Keystone Preservation Grant Program
  - FEMA Pre-Disaster Mitigation Grant Program

FEMA’s Guidance for Integrating Historic Preservation and Hazard Mitigation Planning
FEMA 386-6 (2005)
Phase 1: Organize Resources

Build a Complete & Balanced Planning Team

- Historic preservation/heritage planners
- Preservation architects
- State, regional, and local historical societies
- Local, State, and Federal agencies that specialize in historic preservation and emergency management
  - PA Historic Preservation Office
  - PEMA
  - FEMA (HM, EHP Divisions)
- Businesses and Development Organizations for Historic Districts
  - “Main Street” organizations
  - Agricultural Preservation organizations
- Academia

'EMA’s Guidance for Integrating Historic Preservation and Hazard Mitigation Planning
FEMA 386-6 (2005)
Phase 1: Organize Resources

Engage the Public at Key Stages

- At “kick-off” to provide information about the planning process
- To understand what historic properties the community values
- At the conclusion of the risk assessment to report on findings
- During the development of goals and mitigation strategies/actions
- Throughout implementation of the plan

FEMA’s Guidance for Integrating Historic Preservation and Hazard Mitigation Planning
FEMA 386-6 (2005)
Phase 2: Assess Risks

1. **Identify hazards** that are likely to affect your community

2. Profile hazards to **determine hazard-prone areas** and the magnitude of each hazard

3. **Inventory historic properties** vulnerable to likely hazards **by conducting field (re)survey for unknown resources and geospatial analysis of known resources**
   - Assess vulnerabilities
   - Establish a hierarchy of community-driven preservation priorities

4. **Estimate** the associated amount of **potential losses to historic properties ($)**
2013 State Standard All-Hazard Mitigation Plan
Commonwealth of Pennsylvania (PEMA)

Phase 2: Assess Risks
Commonwealth of Pennsylvania
2013 State Standard All-Hazard Mitigation Plan

Approved: October 18, 2013
Prepared for:
Pennsylvania Emergency Management Agency
2605 Interstate Drive
Harrisburg, PA 17110

Prepared by:
Michael Baker Jr., Inc.
1818 Market Street, Suite 3110
Philadelphia, PA 19103

Phase 2: Assess Risks

2013 State Standard All-Hazard Mitigation Plan
Commonwealth of Pennsylvania (PEMA)
**Phase 2: Assess Risks**

**Cultural Resources Geographic Information System (CRGIS)**

crgis.state.pa.us

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**Mocanaqua Historic District**
Conyngham Township, Luzerne County

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**Cultural Resources Geographic Information System (CRGIS)**

crgis.state.pa.us
Phase 2: Assess Risks

Inventory Historic Properties

- Document properties as comprehensively as possible and record:
  - Primary building materials and structural system
  - Current physical condition
  - Building features that may be susceptible to local hazards
  - Character-defining architectural details
  - Market and Assessed Value ($)
  - Hazard-specific information
    - Ex: Elevation in flood-prone areas
## Phase 2: Assess Risks

### Building Data Requirements by Hazard

<table>
<thead>
<tr>
<th>Building Characteristics</th>
<th>Flood</th>
<th>Earthquake</th>
<th>Tsunami</th>
<th>Tornado</th>
<th>Coastal Storm</th>
<th>Landslide</th>
<th>Wildfire</th>
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</thead>
<tbody>
<tr>
<td>Building Type/Type of Foundation</td>
<td>☐</td>
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<tr>
<td>Building Code Design Level/Date of Construction</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
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<tr>
<td>Roof Material</td>
<td>☐</td>
<td>☐</td>
<td></td>
<td>☐</td>
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<td>☐</td>
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<tr>
<td>Roof Construction</td>
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<td></td>
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<td>☐</td>
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<tr>
<td>Vegetation</td>
<td></td>
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<td>Topography</td>
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<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Distance from the Hazard Zone</td>
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<td>☐</td>
<td></td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>
Phase 2: Assess Risks

Collect Flood Elevation Information

- Many buildings constructed before 1975 (most historic buildings) do not have flood Elevation Certificates
  - **“Pre-FIRM” building:** A building for which construction or substantial improvement occurred on or before December 31, 1974, or before the effective date of an initial Flood Insurance Rate Map (FIRM).

  - Elevation Certificates:
    - Help property owners demonstrate compliance with local floodplain ordinances
    - Provide the information necessary for insurers to determine proper flood insurance rates
Collecting Flood Elevation Data for Historic (Pre-FIRM) Buildings
PHMC’s Hazard-Specific Historic Resource Survey Form
Phase 2: Assess Risks

Disaster Planning for Historic Properties Initiative
Hazard Mitigation Integration Pilot Project, City of Philadelphia
Phase 2: Assess Risks

- Building in the 100-Year Floodplain
- Building in the 500-Year Floodplain
- Flood Hazard Area

Distance in Miles:
0  2.5  5  10 Miles
Phase 2: Assess Risks

Sea Level Rise and Coastal Flooding Impacts

Overview
Use the slider bar above to see how various levels of sea level rise will impact this area. Levels represent inundation at high tide. Areas that are hydrologically connected are shown in shades of blue (darker blue = greater depth).

Understanding The Map
Low-lying areas, displayed in green, are hydrologically "unconnected" areas that may flood. They are determined solely by how well they lie below the high tide level.
Phase 2: Assess Risks

Storm Surge Inundation (SLOSH Maximum of Maximums)

This web map displays a seamless national map of near worst case storm surge flooding (inundation) scenarios using the National Weather Service (NWS) SLOSH model maximum of maximums (MOMs) product for different hurricane wind categories at a high tide.

- Category 1
- Category 2
- Category 3
- Category 4
- Category 5

Category 4 Storm Surge Inundation (SLOSH Maximum of Maximums)

With this education and awareness tool, anyone living in hurricane-prone coastal areas along the U.S. East and Gulf Coasts can now evaluate their own unique risk to storm surge. This map makes it clear that storm surge is a serious concern.

**LEGEND**

- Category 4 (SLOSH MOMs) Storm Surge Inundation
- Inundation Depth:
  - Up to 3 feet above ground
  - Greater than 3 feet above ground
  - Greater than 6 feet above ground
  - Greater than 9 feet above ground
- Levee Areas - Consult Local Officials For Flood Risk

Disaster Planning for Historic Properties Initiative
Hazard Mitigation Integration Pilot Project, City of Philadelphia

Pennsylvania Historical & Museum Commission
STATE HISTORIC PRESERVATION OFFICE
Phase 2: Assess Risks

National Register Listed Historic Buildings at Risk: Various Flood Inundation Scenarios
City of Philadelphia

Total Estimated Flood-prone National Register Listed Historic Buildings, Citywide: 2,385

Plan District:
- National Register Listed Historic Building
  - Building listed in the National Register of Historic Places, either individually and/or part of a National Register listed Historic district
- National Register Listed Historic Building At Risk of Flood Inundation
  - Building located within areas identified as vulnerable to one or more of the following: 100-year or 500-year floods, high tide hurricane (category 1-4) storm surge inundation, or high tide inundation due to potential sea level rise (1 ft. - 6 ft.)

*Building may also be listed in the Philadelphia Register of Historic Places.
Phase 2: Assess Risks

Registered Historic Buildings At Risk: Various Flood Inundation Scenarios*
Central Plan District, City of Philadelphia

Total Estimated Floodprone Registered Historic Buildings, Central Plan District:
1,915

Registered Historic Building
- Listed in National Register of Historic Places (including National Historic Landmarks, buildings of individual merit, and those contributing to an historic district)
- CR Listed in Philadelphia Register of Historic Places OR Both
Registered Historic Building At Risk of Flood Inundation
- Building located within areas identified as vulnerable to one or more of the following: 100-year or 500-year floods, high tide hurricane (categories 1–4) storm surge inundation, or high tide inundation due to potential sea level rise (1 ft. – 6 ft.)
Phase 2: Assess Risks

Table 1. Citywide: Estimated total number of historic buildings* in various identified flood hazard areas including the 100-year and 500-year flood inundation areas, hurricane storm surge inundation areas, and projected sea level rise inundation areas.

<table>
<thead>
<tr>
<th>Estimated Number of Historic Buildings in...</th>
<th>National Historic Landmark (NHL) Listed Buildings*</th>
<th>National Register Listed Historic Buildings*</th>
<th>National Register Eligible Historic Buildings*</th>
<th>Philadelphia Register Listed/Locally Designated Historic Buildings*</th>
<th>Historic Buildings Listed in Philadelphia Register OR Listed in National Register OR NHL-Listed*</th>
</tr>
</thead>
<tbody>
<tr>
<td>100-Year Flood Inundation Areas</td>
<td>16</td>
<td>414</td>
<td>239</td>
<td>147</td>
<td>470</td>
</tr>
<tr>
<td>500-Year Flood Inundation Areas</td>
<td>20</td>
<td>815</td>
<td>523</td>
<td>369</td>
<td>926</td>
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<tr>
<td>Category 1 Storm Surge Inundation Areas</td>
<td>0</td>
<td>34</td>
<td>97</td>
<td>38</td>
<td>50</td>
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<tr>
<td>Category 2 Storm Surge Inundation Areas</td>
<td>1</td>
<td>263</td>
<td>519</td>
<td>139</td>
<td>295</td>
</tr>
<tr>
<td>Category 3 Storm Surge Inundation Areas</td>
<td>5</td>
<td>842</td>
<td>2,233</td>
<td>493</td>
<td>931</td>
</tr>
<tr>
<td>Category 4 Storm Surge Inundation Areas</td>
<td>15</td>
<td>2,105</td>
<td>10,448</td>
<td>1,907</td>
<td>2,879</td>
</tr>
<tr>
<td>+1 ft. Sea Level Rise Inundation Areas</td>
<td>1</td>
<td>15</td>
<td>25</td>
<td>16</td>
<td>22</td>
</tr>
<tr>
<td>+2 ft. Sea Level Rise Inundation Areas</td>
<td>1</td>
<td>20</td>
<td>33</td>
<td>23</td>
<td>31</td>
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<tr>
<td>+3 ft. Sea Level Rise Inundation Areas</td>
<td>1</td>
<td>40</td>
<td>46</td>
<td>25</td>
<td>51</td>
</tr>
<tr>
<td>+4 ft. Sea Level Rise Inundation Areas</td>
<td>1</td>
<td>69</td>
<td>87</td>
<td>26</td>
<td>80</td>
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<tr>
<td>+5 ft. Sea Level Rise Inundation Areas</td>
<td>3</td>
<td>100</td>
<td>117</td>
<td>26</td>
<td>113</td>
</tr>
<tr>
<td>+6 ft. Sea Level Rise Inundation Areas</td>
<td>3</td>
<td>133</td>
<td>217</td>
<td>32</td>
<td>150</td>
</tr>
</tbody>
</table>

*Including buildings of individual merit and buildings contributing to an historic district.

*As identified by the Sea, Lake, and Overland Surge from Hurricanes (SLOSH) model of the National Oceanic and Atmospheric Administration's (NOAA) National Weather Service.

*As identified by the Sea Level Rise Impacts model of the NOAA's Coastal Services Center.

Disaster Planning for Historic Properties Initiative
Hazard Mitigation Integration Pilot Project, City of Philadelphia
Phase 2: Assess Risks

Establish a Preservation “Hierarchy”

- Prioritize historic properties for mitigation
  - Which properties would the community miss most if destroyed by disaster?
  - Public input is critical to identifying and prioritizing these properties

- Hierarchy of historic properties will inform mitigation action priorities in Phase 3

- Variables that may influence preservation priorities:
  - Public sentiment
  - Economic importance
  - Level of historical/cultural significance
  - Integrity
Phase 2: Assess Risks

**Estimate Historic Building Replacement Costs**

- Difficult to place a dollar value on elaborate and unique craftsmanship of historic buildings, but these estimations are necessary to understand cost-effectiveness of various hazard mitigation alternatives.

- Modern-day industry standards (RSMeans) for construction costs recommended—PLUS a multiplier (20% to 25%) for historic buildings.

- Qualified preservation architect or historic building rehabilitation contractor can assist with these estimations.

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FEMA’s Guidance for Integrating Historic Preservation and Hazard Mitigation Planning

FEMA 386-6 (2005)
Phase 3: Develop a Mitigation Plan

1. Develop mitigation goals and objectives for your historic properties based on your community’s preservation priorities/hierarchy

2. Identify, evaluate, and prioritize actions

3. Prepare an implementation strategy

4. Document the mitigation planning process and public input
Phase 3: Develop a Mitigation Plan

Flooding: Repetitive Loss Properties

- **Repetitive Loss Property**
  - A property for which two or more flood insurance claims of more than $1,000 have been paid by the NFIP within a 10-year period

- **Severe Repetitive Loss Property**
  - A 1- to 4-family property that has had four or more NFIP insurance claims of more than $5,000 or 2-3 claims that cumulatively exceed the building’s value

- Pennsylvania has a high proliferation of these due to historic settlement patterns

- Hazard mitigation is often achieved through the demolition of these high-risk properties
Phase 3: Develop a Mitigation Plan

Alternatives to Demolition and Relocation

- What alternatives may minimize risk without compromising the integrity and historic fabric of your community?

- Evaluate the cost-effectiveness of various mitigation options
Phase 3: Develop a Mitigation Plan

**Identify appropriate and cost-effective mitigation actions**

- Consider the impacts of actions on historic buildings
  - Appearance
  - Setting
  - Scale

- **Benefit-Cost Analysis (BCA)**
  - How does the cost of implementation compare to the amount of damage it would prevent?
**Risk Reduction vs. Level of Impact to Historic Properties**

<table>
<thead>
<tr>
<th>Flood Mitigation Alternative</th>
<th>Reduction of Risk</th>
<th>Level of Impact to Historic Properties</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acquisition &amp; Demolition</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>Relocation</td>
<td>High</td>
<td>Medium to High</td>
</tr>
<tr>
<td>Elevation</td>
<td>Medium</td>
<td>Medium</td>
</tr>
<tr>
<td>Dry Floodproofing</td>
<td>Low to Medium</td>
<td>Low to Medium</td>
</tr>
<tr>
<td>Wet Floodproofing</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>Stream Channel Improvements</td>
<td>Low</td>
<td>High (for Archaeological Resources)</td>
</tr>
<tr>
<td>Levees &amp; Floodwalls</td>
<td>Medium</td>
<td>Medium</td>
</tr>
</tbody>
</table>
Phase 4: Implement the Plan and Monitor Progress

1. Sensitivity of information
   - Archaeological sites

2. Required regulatory review
   - Section 106 of the NHPA
   - Pennsylvania History Code

3. Interagency coordination & agreements

4. Evaluate and update your plan

5. Update your historic property inventory data
International Best Practices for Historic Property Hazard Mitigation

Literature Guide Available on PHMC’s Website Soon!
The Disaster Planning for Historic Properties Initiative: “Pilot” Counties