WEBINAR
3/27/2020 @ noon-1PM

Historic Structures and Floodplain Management: Data, Guidelines and Case Studies

John Gardosik
Hurricane Sandy Recovery Project Manager at the Pennsylvania State Historic Preservation Office

Overview:
Flooding is the single greatest natural cause of property damage loss in Pennsylvania. After Hurricane Sandy in 2014, the Pennsylvania State Historic Preservation Office (PA SHPO) has, through its Disaster Planning for Historic Properties Initiative, worked with community partners to survey historic properties at risk of flooding, identify individual properties for in-depth analysis, and produce guidance for communities engaged in disaster planning. This presentation will provide an overview of projects conducted to date with a focus on the Philadelphia area and a discussion of the evolution of PA SHPO’s approach in response to lessons learned.
The Pennsylvania Association of State Floodplain Managers is a statewide organization of floodplain managers, engineers, planners, local, state and federal officials, and water resource professionals whose purpose is to:

- Promote public awareness of integrated floodplain management;
- Promote a liaison and to encourage the exchange of ideas and information among individuals and groups concerned with floodplain management;
- Inform concerned individuals and groups of pending floodplain management legislation, regulation, and related matters in order to advance the effective implementation of floodplain management.
A PAFPM membership gives you access to training, workshops, newsletter, conferences, and networking opportunities.

Memberships are valid for 1 year (July 1 - June 30)

Contact us at flood@pafpm.org with questions about membership.
Webinar:
May 14, 2020 @ noon
Floodplain Management 101
Josh Lippert, CFM
Registration – Coming Soon @ PAFPM.org

Annual Conference:
September 14-16th
Harrisburg, PA
“Resiliency the new Sustainability”
Call for presenters and sponsors –
Coming Soon @ PAFPM.org
Regulations [codes]

NFIP Regulations (44 CFR Parts 59 & 60)

Local Floodplain Management Regulations* or IBC Appendix G*

Building Code

Flood Resistant Buildings and Development

ASCE 7

ASCE 24

IBC

IRC

IAPC
Regulations [historic structures] – definitions ICC

[BS] 507.3 [Historic Buildings] Flood hazard areas. Within flood hazard areas established in accordance with Section 1612.3 of the International Building Code, or Section R322 of the International Residential Code, as applicable, where the work proposed constitutes substantial improvement or repair of substantial damage, the existing structure shall be brought into compliance with Section 1612 of the International Building Code, or Section R322 of the International Residential Code, as applicable:

Exception: Historic buildings meeting any of the following criteria need not be brought into compliance:

1. Listed or preliminarily determined to be eligible for listing in the National Register of Historic Places.
2. Determined by the Secretary of the U.S. Department of Interior as contributing to the historical significance of a registered historic district or a district preliminarily determined to qualify as an historic district.
3. Designated as historic under a state or local historic preservation program that is approved by the Department of Interior.

HISTORIC BUILDING. Any building or structure that is one or more of the following:

1. Listed or certified as eligible for listing by the State Historic Preservation Officer or the Keeper of the National Register of Historic Places, in the National Register of Historic Places.
2. Designated as historic under an applicable state or local law.
3. Certified as a contributing resource within a National Register, state designated or locally designated historic district.
Regulations [historic variances] – IBC 2018 Appendix G

G105.3 Historic structures. A variance is authorized to be issued for the repair or rehabilitation of a historic structure upon a determination that the proposed repair or rehabilitation will not preclude the structure’s continued designation as a historic structure, and the variance is the minimum necessary to preserve the historic character and design of the structure.

Exception: Within flood hazard areas, historic structures that do not meet one or more of the following designations:
1. Listed or preliminarily determined to be eligible for listing in the National Register of Historic Places.
2. Determined by the Secretary of the U.S. Department of Interior as contributing to the historical significance of a registered historic district or a district preliminarily determined to qualify as an historic district.
3. Designated as historic under a state or local historic preservation program that is approved by the Department of Interior.
R105.3.1.1 Determination of substantially improved or substantially damaged existing buildings in flood hazard areas. For applications for reconstruction, rehabilitation, addition, alteration, repair or other improvement of existing buildings or structures located in a flood hazard area as established by Table R301.2(1), the building official shall examine or cause to be examined the construction documents and shall make a determination with regard to the value of the proposed work. For buildings that have sustained damage of any origin, the value of the proposed work shall include the cost to repair the building or structure to its predamaged condition. If the building official finds that the value of proposed work equals or exceeds 50 percent of the market value of the building or structure before the damage has occurred or the improvement is started, the proposed work is a substantial improvement or repair of substantial damage and the building official shall require existing portions of the entire building or structure to meet the requirements of Section R322.

For the purpose of this determination, a substantial improvement shall mean any repair, reconstruction, rehabilitation, addition or improvement of a building or structure, the cost of which equals or exceeds 50 percent of the market value of the building or structure before the improvement or repair is started. Where the building or structure has sustained substantial damage, repairs necessary to restore the building or structure to its predamaged condition shall be considered substantial improvements regardless of the actual repair work performed. The term shall not include either of the following:

1. Improvements to a building or structure that are required to correct existing health, sanitary or safety code violations identified by the building official and that are the minimum necessary to ensure safe living conditions.

2. Any alteration of a historic building or structure, provided that the alteration will not preclude the continued designation as a historic building or structure. For the purposes of this exclusion, a historic building shall be any of the following:
   2.1. Listed or preliminarily determined to be eligible for listing in the National Register of Historic Places.
   2.2. Determined by the Secretary of the U.S. Department of Interior as contributing to the historical significance of a registered historic district or a district preliminarily determined to qualify as an historic district.
   2.3. Designated as historic under a state or local historic preservation program that is approved by the Department of Interior.
Regulations [substantial improvement] – definition ICC

[BS] SUBSTANTIAL IMPROVEMENT. Any repair, reconstruction, rehabilitation, alteration, addition or other improvement of a building or structure, the cost of which equals or exceeds 50 percent of the market value of the structure before the improvement or repair is started. If the structure has sustained substantial damage, any repairs are considered substantial improvement regardless of the actual repair work performed. The term does not, however, include either:

1. Any project for improvement of a building required to correct existing health, sanitary or safety code violations identified by the building official and that are the minimum necessary to assure safe living conditions.
2. Any alteration of a historic structure provided that the alteration will not preclude the structure’s continued designation as a historic structure.
1. Complete Flood Protection Form - EXISTING BUILDINGS [FP-EX]

2. Attach Cost Estimate

ESTIMATED COST

• Materials and labor, including the estimated value of donated or discounted materials and owner or volunteer labor, plus sales tax
• Site preparation related to the improvement or repair (e.g., foundation excavation or filling in basements)
• Demolition and construction debris disposal
• Construction management and supervision
• Structural elements and exterior/interior finishes
• Utility and service equipment

Items that can be excluded:

• Costs to obtain or prepare plans and specifications
• Land survey costs
• Permit fees and inspection fees
• Outside improvements, including landscaping, irrigation, sidewalks, driveways, fences, yard lights, swimming pools, pool enclosures, and detached accessory structures (e.g., garages, sheds, and gazebos)
• Costs required for the minimum necessary work to correct existing violations of health, safety, and sanitary codes

3. Substantial Improvement Calculation

IMPROVEMENT VALUE / MARKET VALUE

PERCENTAGE OF IMPROVEMENT

Best Practice [substantial improvement]
Best Practice [substantial improvement]

<table>
<thead>
<tr>
<th>Year</th>
<th>Market Value</th>
<th>Taxable Land</th>
<th>Taxable Improvement</th>
<th>Exempt Land</th>
<th>Exempt Improvement</th>
</tr>
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<tbody>
<tr>
<td>2019</td>
<td>$126,612,200</td>
<td>$24,337,840</td>
<td>$97,274,360</td>
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<td>$0</td>
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<td>2018</td>
<td>$110,000,000</td>
<td>$23,109,000</td>
<td>$86,900,000</td>
<td>$0</td>
<td>$0</td>
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<tr>
<td>2017</td>
<td>$75,000,000</td>
<td>$22,057,500</td>
<td>$53,942,500</td>
<td>$0</td>
<td>$0</td>
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<tr>
<td>2016</td>
<td>$74,000,000</td>
<td>$23,055,800</td>
<td>$51,042,400</td>
<td>$0</td>
<td>$0</td>
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<tr>
<td>2015</td>
<td>$50,000,000</td>
<td>$18,057,500</td>
<td>$32,042,500</td>
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<td>$0</td>
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</tbody>
</table>
Challenges [regulations]

• Existing market value of structure only
• Value/scope of work
• Phasing work and/or multiple permits
• Interior vs. exterior designations
• Role of local jurisdiction and State Historic Preservation Office (SHPO)
• Variance requirements
• Flood requirements beyond items that impact exterior

Myths

• Historic structures are exempt from floodplain regulations
• Historic structures are “grandfathered”
Historic Structures & Floodplain Management
National Register of Historic Places

What “historic” means
• Eligible to be listed (or already listed) in the National Register of Historic Places
• The National Register is the nation’s official list of cultural resources worthy of preservation.
• This can include Buildings, Sites, Districts, Structures, and Objects

Is a property eligible?
• Is it more than 50 years old?
• Is it historically and/or architecturally significant?
• Does it retain integrity?
Listing Does Not

- Restrict a private property owner’s ability to use or make changes to the property
- Require the owner to maintain or restore the property
- Require public access to the property
- Enable the federal government to acquire the property or impose restrictions on it
THE SECRETARY OF THE INTERIOR’S STANDARDS FOR THE TREATMENT OF HISTORIC PROPERTIES WITH GUIDELINES FOR PRESERVING, REHABILITATING, RESTORING & RECONSTRUCTING HISTORIC BUILDINGS

U.S. Department of the Interior National Park Service Technical Preservation Services
Standards for Rehabilitation

Acknowledge the need to alter or add to a historic property to meet continuing or changing uses while retaining the property’s historic character

**Grants & Tax Credits**
- Federal rehab tax credits
- PHMC Keystone grants

**Section 106 Reviews**
- Housing rehabilitation
- Public building renovations

**HARB District Reviews**

*Cornwall iron worker housing,* south of the city of Lebanon
# Standards for Rehabilitation

1. A property will be used as it was historically or be given a new use that requires minimal change to its distinctive materials, features, spaces and spatial relationships.

2. **The historic character** of a property will be retained and preserved. The removal of distinctive materials or alteration of features, spaces and spatial relationships that characterize a property will be avoided.

3. Each property will be recognized as a physical record of its time, place and use. Changes that create a false sense of historical development, such as adding conjectural features or elements from other historic properties, will not be undertaken.

4. Changes to a property that have acquired historic significance in their own right will be retained and preserved.

5. Distinctive materials, features, finishes, and construction techniques or examples of craftsmanship that characterize a property will be preserved.

6. Deteriorated historic features will be repaired rather than replaced. Where the severity of deterioration requires replacement of a distinctive feature, the new feature will match the old in design, color, texture and, where possible, materials. Replacement of missing features will be substantiated by documentary and physical evidence.

7. Chemical or physical treatments, if appropriate, will be undertaken using the gentlest means possible. Treatments that cause damage to historic materials will not be used.

8. Archeological resources will be protected and preserved in place. If such resources must be disturbed, mitigation measures will be undertaken.

9. New additions, exterior alterations, or related new construction will not destroy historic materials, features, and spatial relationships that characterize the property. The new work will be differentiated from the old and will be compatible with the historic materials, features, size, scale and proportion, and massing to protect the integrity of the property and its environment.

10. New additions and adjacent or related new construction will be undertaken in such a manner that, if removed in the future, the essential form and integrity of the historic property and its environment would be unimpaired.
Character-Defining Features

**Roofline**
- Pitch and shape

**Massing or Plan**
- Footprint
- Bays
- Symmetry

**Materials**
- Structural
- Cladding

**Cornice details**

**Window/door openings**
- Shape
- Trim (lintels, surrounds)

**Porch posts and balustrades**

*Integrity is not condition!*
# Resilience to Natural Hazards

<table>
<thead>
<tr>
<th><strong>Recommended</strong></th>
<th><strong>Not Recommended</strong></th>
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<tbody>
<tr>
<td>Resilience to natural hazards should be addressed as part of the treatment Rehabilitation. A historic building may have existing characteristics or features that help address or minimize the impacts of natural hazards. These should be used to best advantage and should be taken into consideration early in the planning stages of a rehabilitation project before proposing any new treatments. When new adaptive treatments are needed they should be carried out in a manner that will have the least impact on the historic character of the building, its site, and setting.</td>
<td>Failing to identify and periodically reevaluate the potential vulnerability of the building, its site, and setting to the impacts of natural hazards.</td>
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<tr>
<td>Identifying the vulnerabilities of the historic property to the impacts of natural hazards (such as wildfires, hurricanes, or tornadoes) using the most current climate information and data available.</td>
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<td>Assessing the potential impacts of known vulnerabilities on character-defining features of the building, its site, and setting; and reevaluating and reassessing potential impacts on a regular basis.</td>
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<td>Documenting the property and character-defining features as a record and guide for future repair work, should it be necessary, and storing the documentation in a weatherproof location.</td>
<td>Failing to document the historic property and its character-defining features with the result that such information is not available in the future to guide repair or reconstruction work, should it be necessary.</td>
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<tr>
<td>Ensuring that historic resources inventories and maps are accurate, up to date, and accessible in times of emergency.</td>
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<tr>
<td>Maintaining the building, its site, and setting in good repair, and regularly monitoring character-defining features.</td>
<td>Failing to regularly monitor and maintain the property and the building systems in good repair.</td>
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<tr>
<td>Using and maintaining existing characteristics and features of the historic building, its site, setting, and larger environment (such as shutters for storm protection or a site wall that keeps out flood waters) that may help to avoid or minimize the impacts of natural hazards</td>
<td>Allowing loss, damage, or destruction to occur to the historic building, its site, or setting by failing to evaluate potential future impacts of natural hazards or to plan and implement adaptive measures, if necessary to address possible threats.</td>
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<tr>
<td>Undertaking work to prevent or minimize the loss, damage, or destruction of the historic property while retaining and preserving significant features and the overall historic character of the building, its site, and setting.</td>
<td>Carrying out adaptive measures intended to address the impacts of natural hazards that are unnecessarily invasive or will otherwise adversely impact the historic character of the building, its site, or setting.</td>
</tr>
<tr>
<td>RECOMMENDED</td>
<td>NOT RECOMMENDED</td>
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<tr>
<td>Ensuring that, when planning work to adapt for natural hazards, all feasible alternatives are</td>
<td>Implementing a treatment traditionally used in another region or one typically used for a different property type or architectural style which is</td>
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<td>considered, and that the options requiring the least alteration are considered first.</td>
<td>not compatible with the historic character of the property.</td>
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<tr>
<td>Implementing local and regional traditions (such as elevating residential buildings at</td>
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<td>risk of flooding or reducing flammable vegetation around structures in fire-prone areas) for</td>
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<td>adapting buildings and sites in response to specific natural hazards, when appropriate. Such</td>
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<tr>
<td>traditional methods may be appropriate if they are compatible with the historic character of</td>
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<td>the building, its site, and setting.</td>
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<tr>
<td>Using special exemptions and variances when adaptive treatments to protect buildings from</td>
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<tr>
<td>known hazards would otherwise negatively impact the historic character of the building, its</td>
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<tr>
<td>site, and setting.</td>
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<tr>
<td>Considering adaptive options, whenever possible, that would protect multiple historic</td>
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<td>resources, if the treatment can be implemented without negatively impacting the historic</td>
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<td>character of the district, or archeological resources, other cultural or religious features,</td>
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<td>or burial grounds.</td>
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Guidelines on Flood Adaptation for Rehabilitating Historic Buildings

Foreword
Flooding risk has long been a major challenge for many historic properties. Changing weather patterns, stronger hurricanes and other extreme weather events, sea level rise, increased nuisance flooding, king tides, and continuing development in flood plains are some of the factors increasing the risk of flooding events, both in terms of their frequency and magnitude. Some historic properties that have never flooded before may now be exposed to this risk, and those that flooded infrequently in the past may experience more instances of flooding or of water reaching higher levels than ever before.

The goal of the Guidelines on Flood Adaptation for Rehabilitating Historic Buildings is to provide information about how to adapt historic buildings to be more resilient to flooding risk in a manner that will preserve their historic character and that will meet the Secretary of the Interior’s Standards for Rehabilitation. These guidelines should be used in conjunction with the Guidelines for Rehabilitating Historic Buildings that are part of the Secretary of the Interior’s Standards for the Treatment of Historic Properties with Guidelines for Preserving, Rehabilitating, Restoring & Reconstructing Historic Buildings, issued in 2017. Like the Guidelines for Rehabilitating Historic Buildings, these guidelines are intended to focus primarily on historic buildings and their site and setting.

The treatments described here may be considered as means of preserving historic properties located in flood plains and making them more resilient to flooding hazards. Flood events can be particularly destructive to historic buildings and therefore may require greater adaptive treatments. While many of these treatments can be undertaken with minimal effects on the historic character of a property, some may require more change than would normally be acceptable in other contexts. Consequently, such treatments would generally not be appropriate to use in the majority of rehabilitation projects when the historic building does not have a flood risk. The treatment selected should always be one that minimizes changes to the building’s historic character. Adaptation treatments should reduce the risk of flood damage as much as possible, but should do so without destroying significant historic materials, features, or spaces.

The National Park Service has developed these guidelines for adapting historic buildings to flooding risks in accordance with its directive to provide information concerning professional methods and techniques to ensure the preservation and rehabilitation of the historic properties that are an important part of the nation’s heritage.
Program Background

- Following Hurricane Sandy, PA SHPO applied for and received a competitive grant offered to states with Sandy disaster declarations.
- A small number of Sandy-affected properties received repair subgrants, but the majority of funding has gone toward planning for future disasters and resiliency.
- PA SHPO partnered with four pilot counties on comprehensive survey and updates to their Hazard Mitigation Plans

Pilot Counties: Bedford, Cameron, Monroe, Philadelphia
Survey

Survey is the backbone of historic preservation

- PA SHPO does not typically directly carry out survey, though we do make grants available for municipalities and organizations to carry out survey projects
- Survey projects provide an opportunity to gather a range of broadly useful data
- Tailoring survey projects to neighborhoods and communities most at risk maximizes their value
Phase 2
Property Sheets

Recommendations for Properties

Property sheets were created for selected resources in each of the pilot counties. These sheets include visual representations of flood events and a range of recommendations for hazard mitigation actions.

1. Keep exterior envelope water resistant by applying paint to historically painted surfaces, and/or repoint masonry with materials compatible to historic masonry. If more modern materials need to be used, ensure they match the existing materials in color and texture. Apply a water-repellent coating to masonry surfaces only after consulting with PHMC.
2. Inspect the structure annually to ensure that all masonry joints are water tight, and/or for loose bricks, and repoint masonry joints as necessary with like mortar or a better water tight mortar that provides the same appearance as the historic mortar.
3. Assess the functionality of drainage features, including gutters and downspouts, to ensure stormwater runoff is being directed away from the structure, and not to an area that may jeopardize the integrity of significance of wood or other architectural features.
4. Keep historic windows and doors in good repair and painted to keep them water-resistant. It is not recommended that property owners replace historic windows and doors, although when historic materials require replacing due to...
Demonstration Workshops

All at-risk properties in PA is a big universe

• A demonstration workshop provides an opportunity to visualize risks and solutions in the real world.
• Approach resiliency from all scales: top-down statewide guidelines and bottom-up scalable individual property recommendations
Property Selection

- The selected property should itself be at risk and this workshop should investigate property-specific interventions
- The selected property needs to be representative of at-risk properties throughout PA
- This workshop offers an opportunity to begin building a library of modular, broadly applicable solutions
- This workshop serves as a prototype for future events
Mather Mill

Why pick Mather Mill?

- Property is owned by Pennsylvania Historical & Museum Commission
- Representative of a common property type that is, by definition, near water
- Located in a declared Sandy county that had not previously been addressed by DPHP
- Building is essentially an empty box
Subject Matter Experts

Represented Agencies & Organizations

- Pennsylvania Historical & Museum Commission
- Pennsylvania Emergency Management Agency
- United States Army Corps of Engineers
- Montgomery County Planning Commission
- Whitemarsh Township
- Wissahickon Valley Watershed Association
- Friends of Hope Lodge
- Land Studies
Design Proposals

As part of the workshop, the firms were given 2 weeks to create design proposals to address use and resiliency at Mather Mill and suggest strategies for scaling those proposals to other at-risk properties.

Proposal Criteria

- **Historic Integrity** – Any design proposals must adhere to the Secretary of the Interior’s Standards for Rehabilitation.
- **Flood Resilience** – How does the proposal adapt Mather Mill to withstand future flood events?
- **Replicability & Modularity** – Though the Mill is a distinctive structure, proposals should consider how design approaches can be adapted to a wide range of historic at-risk buildings.
HOW CAN WE MAKE THIS WORK?

1. Develop an adaptive-reuse rehabilitation treatment program to stabilize, reuse, and maintain the building according to the Secretary of the Interior’s Standards for the Treatment of Historic Properties. Use “wet floodproofing” techniques and design openings within the lower level walls to let flood waters enter and exit.

2. Remove a limited portion of the existing floor structure to interpret use as a grist mill and location of historic water wheel. Design the improvements to withstand repetitive flooding.

3. Retain the embedded energy of the existing floor structure, and construct a new elevated platform above the Base Flood Elevation.

4. Provide multi-use open space suitable for mix of compatible low-impact uses that benefit the community:
   - Education and interpretation
   - Hope Lodge programming
   - Wasatch Front Water Association programming
   - Performances
   - Movie nights
   - Events and festivals
   - Local business pop-up programming
   - Community Shared Agriculture (CSA) pickup
   - Community meetings
   - Continuing education with local colleges and universities

5. Flexible demountable screens and panels for changing exhibits and programs

6. Route mechanical and electrical equipment and audio-visual equipment as high as feasible within the new construction.

7. To protect materials that need to be stored on site, design interior partitions to withstand hydrostatic loads up to approximately 3 feet above the DE, and provide removable flood barriers at interior doors.

8. Create screen-printed mural artwork and use vertical space above the DE to exhibit and interpret grist mill machinery.
Restating the Problem

Each firm provided a preface to their proposal that restated the problem as they interpreted it. Like the Phase 2 Property Sheets, this included visualizing flood scenarios.
Site Planning

Mitigating flood risk through site intervention was also a large part of most submissions.
Building Interventions

Each proposal suggested a different level of intervention to the building itself. Some included minimal interventions and relied on temporary, easy to remove fixtures, displays, and bathroom facilities. The proposal from Seiler + Drury included the most substantial alterations to the mill.
Historic preservation brings economic benefit by offering experiences and investment opportunities that are not available elsewhere.

PROTECTING & PRESERVING SENSE OF PLACE
Valley Green Inn
Valley Green Inn

Why pick Valley Green Inn?

• Property is owned by the City of Philadelphia
• Strong relationship with local partners at the City and Friends of the Wissahickon
• FOW is developing a master plan that materials produced here could contribute to
• Existing user with specific needs and experience
• Heavily trafficked site
• Representative of a common property type that is frequently near water

Valley Green Inn
Climate Resilience Design Workshop

#PreservAtionHappensHere!
Subject Matter Experts

Represented Agencies & Organizations

- Pennsylvania Historical & Museum Commission
- Pennsylvania Emergency Management Agency
- United States Army Corps of Engineers
- Philadelphia Licenses & Inspections
- Philadelphia Office of Emergency Management
- Philadelphia Water Department
- Friends of the Wissahickon
Attending Firms

Represented Architecture, Landscape Architecture, Engineering, & Emergency Management & Planning Firms:

- AKRF
- Andropogon
- Artefact, Inc
- DIGSAU
- James Corner Field Operations
- Flaura Teeter Landscape Architects
- Heritage Design Collaborative
- LandStudies, Inc
- Mark B. Thompson Associates, LLC
- Michael Baker International, Inc
- Meliora Design
- NV5

- Preservation Design Partnership
- Ruggiero Plante Land Design
- sbk + partners, LLC
- Seiler + Drury Architecture
- Sikora Wells Appel
- Studio | Bryan Hanes
- VITETTA
- WRT

#PreservationHappensHere!
Workshop Schedule

Three Sections:
1. Background Information
2. Emergency operations planning and City regulations
3. Discussion
Design Proposals

As part of the workshop, the firms were asked to form cross-disciplinary teams to address the issues raised during the workshop. We received materials from twelve firms divided between four teams:

1. andropogon
2. MBTA | SIKORA WELLS APPEL | LANDSTUDIES
3. AKRF STUDIO | BRYAN HANES
4. JAMES CORNER FIELD OPERATIONS

#PreservationHappensHere!
Proposal Criteria

Proposals must address the following considerations:
• Specific focus on Valley Green Inn and immediate context
• Flood risk from creek vs. stormwater management and drainage
• Access and planning before, during, and after disaster event

Each proposal document must be divided into the following sections:
• Landscape Interventions
• Building Interventions

Visual elements (including renderings, graphics, and diagrams) are highly encouraged and should be utilized wherever possible.
Guidelines on Flood Adaptation for Rehabilitating Historic Buildings

Jenifer Eggleston
Jennifer Parker
Jennifer Wellock

November 2019
Existing Conditions

The lot will be fenced, curbed and gated. The temporary police barrier will be replaced by a gate and the Inn will take the responsibility for its operation. The gate will be designed to allow emergency access.

The main lot will be slightly reconfigured and extended to the center of the Warming Shed. This will allow parking for 46 cars in 9 x 18 foot bays with an aisle of 20 feet. This new configuration will not encroach on Forbidden Drive.
Guidelines on Flood Adaptation for Rehabilitating Historic Buildings

Jennifer Eggleston
Jennifer Parker
Jennifer Wellock

November 2019
Planning and Assessment for Flood Risk Reduction

All planning and assessment for reducing flood risks should include the following:

- Identify the historic property’s flood risks and vulnerabilities and any existing capacity for resilience.
- Monitor the condition of the property and regularly reevaluate its flooding risks and vulnerabilities.
- Document the historic property as a record and future guide. The Secretary of the Interior’s Standards for Architectural and Engineering Documentation or Preservation Brief 41: Preparation and Use of Historic Structure Reports can serve as a guide.
- Review and understand the compliance requirements of the local flood plain ordinance and related local regulations.
- Identify and assess all feasible adaptation treatment options as to how they will address the flooding risk.
- For each treatment option, evaluate the impacts of any potential alterations to the historic property’s character-defining spaces, features, and materials, and its site and environment.
- Consideration should be given to how local communities have decided to adapt to the risk of flooding hazards and treat historic properties impacted by these risks. Also consider the future viability of community infrastructure, such as roads, sewers, and other utilities and services.
- Select the time frame for which the adaptation treatment is expected to adequately reduce the risk. This could be tied to the length of a mortgage or some other point in the future.
- Always select an adaptive treatment that minimizes the impacts to the historic character and appearance of an individual property and or a larger historic district.
**RECOMMENDATIONS**

**PRIORITIZE REPAIRS AND MAINTENANCE**
- Remediate structural and envelope issues that impede the buildings' ability to resist the lateral and buoyancy factors associated with floodwater as well as heavy precipitation and secondary impacts including fire protection and mold remediation and prevention.
- Following the completion of repairs, a building-wide maintenance program that addresses occupied and unoccupied spaces of the building should be implemented to remediate small problems before they become costly repairs.
- Stabilize the building and complete necessary repairs to optimize its resistance to major flood events and other natural disasters.
- Implement a regular maintenance plan to optimize the buildings' resistance to flood events.

**PROTECT THE HISTORIC INN**
- Rebuild/modify the rear retaining wall to serve as a flood wall that can withstand rainwater runoff.
- Implement an emergency operations plan that includes the installation of a perimeter metal flood-barrier panels and/or water-filled, deployable flood barriers.

**BUILD A NEW BUILDING TO SERVE FUTURE GENERATIONS**
- Build a new building adjacent to the existing historic inn that can house the functions of the existing building additions and the covered terrace, while providing accessible connections to the historic inn's 2nd floor.
- Include a large deck referred to here as the Forest Glade that extends off of the buildings' 2nd floor to provide exterior event space and connections to the outdoors.
- Shepherd the historic inn's "graceful demise" as it degrades over time.
- Preserve portions of the inn's masonry construction as educational and historic ruins while transferring all operations to the new building.

**INCREASE SITE CAPACITY**
- Diversity trail options and programmatic opportunities (see next section).
- Modify parking lots to create turn-around.
- Add off-site-parking shuttle to alleviate parking demand.
- Maintain site character and sense of place as "urban wilderness."
**RECOMMENDATIONS**

**EXPAND THE TRAIL NETWORK INTO THREE, “BRAIDED” ROUTES**
- Build an Upper Trail, upslope of the Inn that’s designed as a “fast track” for bikers, runners, etc.
- Rebrand the trail section that fronts the Inn as the Historic Forbidden Drive
- Build a Creek Trail along the creek’s edge

**BUILD A PEDESTRIAN BRIDGE**
- Connect the existing vehicular bridge over the Wissahickon Creek with the Upper Trail with a pedestrian bridge that spans Forbidden Drive and the Lower Lot
- Provide a universally-accessible, pedestrian connection down to the Eddy

**CELEBRATE SLOW ACTIVITIES**
- Reserve the space between the Inn and creek for more stationary, public activities like arts/culture and fishing (this will be a slow-moving area, like a stream’s eddy)
- Indicate a gateway for entering the Eddy
- Include meandering, garden steps and a universally-accessible connection between the Upper Trail and Forest Glade
- Direct vehicles to cross the Upper Trail at a single point (rather than driving along it) to access the Lower Lot (similar to the intersection of Forbidden Drive and Bells Mill Road)

**RE-IMAGINE EVENT RENTALS**
- Shift from creek-side to woodland wedding ceremonies at the Forest Glade
- Locate events and dining in new building and 2nd floor of historic Inn
- Limit event size to 100 guests (the recent increase to 150 guests resulted from site improvements within the floodplain that are not permissible by code)

**ADD NEW PROGRAM**
- Add public program (e.g. welcome center) and/or a Friends of the Wissahickon field office to 1st floor of historic inn once the dining space has been elevated to an upper level
- Consider providing accommodations for an on-site caretaker, who would be responsible for deploying the floodgates
- Add a fishing and bike rental vendor in the Warming Shed or under the new building
- Add a temporary vendor (e.g. ice cream cart) at the Forest Glade
- Introduce a beer garden at the existing covered patio location; remove the tent, as it is not permitted in the floodplain
RECOMMENDATIONS

DESIGN ABOVE THE 500 YEAR FLOOD ELEVATION
- Locate new structures and utilities above the 500-year flood elevations designated on FEMA and/or flood insurance maps, which is currently seven-feet above the current first-floor level of the Inn
- Determine the 1,000-year flood elevation through a hydrologic and hydraulic assessment, and ideally, design new improvements above this elevation

TREAT THE UPSLOPE WATER AS AN ASSET
- Design the Upper Trail above the Inn to function as a dam that holds water
- Direct runoff and seep water around the Inn
- Terrace upslope of the Inn and provide check dams to help manage runoff
- Dry well outfall as an asset within upslope, tributary area and next to Inn

ALLOW THE BASEMENT TO FLOOD
- Abandon the Inn’s basement as a usable space and let the flood water move in and drain out, since the basement will inevitably remain beneath flood waters
- Move critical systems, equipment, and stored items from the Inn’s basement to above the designated flood elevation
- Waterproof and infill the basement with gravel (see Appendix for more information)

LET THE EDDY FLOOD
- Remove existing retaining wall
- Add creek-side terracing that increases flood capacity by restoring the floodplain
- Anticipate flooding in this zone
- Design terracing that visitors can use to gauge flood heights in a memorable way

PLAN FOR DISASTER
- Increase the number of access points for emergency vehicles (e.g. at Junxinta St.)
- Plan for resiliency and retreat from flooding
- Use the Forest Glade and upper levels of the existing and new building as floodplain-evacuation locations
Fill the Basement

Technical Limitations:
- The treatment can only be used on buildings with basements of masonry construction due to structural considerations.
- Access and clearance to the basement must be sufficient to allow compacting equipment to enter and to be removed after the basement has been filled.

Structural Considerations

<table>
<thead>
<tr>
<th>Recommended</th>
<th>Not Recommended</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assessing the strength of basement walls and footings to ensure they are strong enough to support the fill after it is compacted.</td>
<td>Filling in a basement without assessing or evaluating the strength of the basement walls and footings to ensure they are strong enough to support the fill when compacted.</td>
</tr>
<tr>
<td>Modify existing basement walls and footings, when necessary, to provide enough strength to support the fill. As long as the modifications do not significantly alter the visible exterior portions of the foundation.</td>
<td>Altering visible exterior foundation walls to an extent that the historic character of a building is negatively impacted.</td>
</tr>
</tbody>
</table>

Guidelines on Flood Adaptation for Rehabilitating Historic Buildings

Jenifer Eggleston
Jennifer Parker
Jennifer Wellock

November 2019
**RECOMMENDATIONS**

**CREATE A CREEK-SIDE DESTINATION**
- Introduce iconic terracing that provides creek access.
- Allow people to reach the water when it's at varying depths.

**PLAY HOMAGE TO THE LENAPE HISTORY**
- Create opportunities for fishing at the water's edge.
- Introduce interpretive signage or public art.

**FOSTER ECOLOGICALLY-DIVERSE AND FUNCTIONAL HABITATS**
- Build soil.
- Restore native plant communities.
- Manage invasive species.
- Monitor effectiveness and build on what's working.

**CONSIDER A DEER FENCE UPSLOPE OF THE INN**
- Retrace Valley Green's name, which comes from the Hemlocks that once stood.
- Extend the deer exclusion fencing around the Boy Scouts of America/Outward Bound facilities on Wiggard Avenue downhill.
- Add a new stormwater-focused planting strategy.
PHASING STRATEGY

PLANNING FOR A NEW ICON

The Design Team proposes a 3-phase approach that supports the birth of a new Valley Green icon and the graceful decay decline of the historic inn.

PHASE I
Time-Sensitive Improvements (IMMEDIATE)

Evaluation & Recommendations
- Provide full-building architectural, structural, and mechanical-electrical assessments & recommendations
- Provide site, infrastructure, structural, and ecological assessment & recommendations
- Perform building interior air quality testing in multiple locations
- Prepare hydrologic and hydraulic study of stream corridor to determine the 1,000-year floor elevation
- Perform Phase I archaeological survey

Critical Remediation & Stabilization
- Perform critical structural, moisture control, and air-quality improvements

PHASE II
Design & Fundraising (Short-term)

- Perform site analysis and gather stakeholder feedback for design vision
- Prepare design documents and establish project costs
- Submit permitting documents
- Conduct fundraising campaign
- Prepare construction documents

PHASE III
Short-term Remediation & Stabilization (Short-term)

- Perform urgent life-safety and fire-protection improvements
- Perform stormwater-runoff, remediation improvements around inn
- Construct the Upper Trail
- Construct temporary overlook deck
- Construct public bathrooms near the Upper Trail and Forest Glade
- Contract temporary ice-cream cart near the Forest Glade
- Provide shuttle service from upper parking lot

March 2020
**PHASE IV**  
Mid-Term Remediation & stabilization (Mid-Term)  
- Relocate building systems above floodplain  
- Wet floodproof basement, fill with aggregates, and install perimeter flood vents  
- Decommission building additions  
- Relocate water main from Forbidden Drive to the Upper Trail  
- Remove creek-side retaining wall  
- Construct the Eddy, including terracing and planting  
- Construct pedestrian bridge connection to Upper Trail  
- Renovate parking areas

**PHASE V**  
Birth of a New Icon (Mid-Term)  
Evaluation & Recommendations  
- Demolish existing building additions  
- Construct new building behind/beside historic Inn  
- Construct a deck (called the Forest Glade) off of the new building  
- Renovate the upper level of the historic Inn for dining/events  
- Renovate the lower level of the historic Inn for more publicly-accessible uses  
- Add new program

**PHASE VI**  
Graceful Decline (Long-Term)  
- Establish timing threshold for demolition of historic Inn  
- Perform controlled-demolition  
- Preserve foundation and other stable, masonry remains  
- Install interpretive signage and other amenities that celebrate the historic inn
Demolition

In this section demolition refers to the complete removal of a historic building and any related structures in order to clear a historic site within an established flood risk level of any occupied structures. It is important to understand that demolition is not a treatment that meets the Standards for Rehabilitation.

This action may be incentivized where buyout zones have been identified as part of the community hazard mitigation plan. In these and possibly other situations, a government agency may purchase a property and demolish the structure after the sale to eliminate continued property risk and loss from the floodplain area and allow for open space. In other cases, private property owners may choose to demolish an existing historic building in order to eliminate their flood risk, allowing them to rebuild in a more flood-resilient method or relocate.

The Standards were created to support the preservation of historic buildings. Demolition is never a recommended treatment. However, in making land-use and planning decisions for a community or neighborhood, there may be situations when it is necessary to identify sacrificial historic sites or structures. Demolition could be chosen to remove buildings most at risk, in order to provide space needed to undertake adaptive measures to protect other, more important historic buildings, or to allow for new structures designed to withstand water damage in future flood events. Such a decision should be made only after extensive research of the historic property or district has been completed, in order to fully understand the significance of the building(s) that would be lost.
Guidelines on Flood Adaptation for Rehabilitating Historic Buildings

Site and Landscape Adaptations

<table>
<thead>
<tr>
<th>Recommended</th>
<th>Not Recommended</th>
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</thead>
<tbody>
<tr>
<td>Altering the site or setting in locations that are not important to the</td>
<td>Damaging or destroying significant historic landscape features, designs, or</td>
</tr>
<tr>
<td>historic characters of the property.</td>
<td>plantings in order to establish a new site or landscape feature to protect the</td>
</tr>
<tr>
<td></td>
<td>property from flood risks.</td>
</tr>
<tr>
<td>Retaining the topography and historic relationship between buildings and</td>
<td>Changing the grade level of the site if it substantially diminishes its historic</td>
</tr>
<tr>
<td>the site and setting</td>
<td>character. For example, adding fill to a site such that the formerly visible</td>
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<td></td>
<td>historic foundation is concealed.</td>
</tr>
<tr>
<td>Protecting and maintaining buildings, site, and landscape features by</td>
<td>Failing to ensure that site drainage is adequate so that buildings and site</td>
</tr>
<tr>
<td>providing proper drainage to ensure that water does not erode</td>
<td>features are damaged or destroyed.</td>
</tr>
<tr>
<td>foundation walls, drain toward the building, or damage or erode the</td>
<td>Changing the site grading so that water does not drain properly or is redirected</td>
</tr>
<tr>
<td>landscape.</td>
<td>toward other buildings or structures.</td>
</tr>
<tr>
<td>Surveying and documenting areas where the terrain will be altered or new</td>
<td>Failing to survey the building site prior to beginning work, which may result in</td>
</tr>
<tr>
<td>features constructed to determine the potential impact to important</td>
<td>damage or loss of important landscape features, archeological resources, other</td>
</tr>
<tr>
<td>landscape features, archeological resources, other cultural or religious</td>
<td>cultural or religious features, or burial grounds.</td>
</tr>
<tr>
<td>features, or burial grounds.</td>
<td>Protecting (e.g., preserving in place) important site features, archeological</td>
</tr>
<tr>
<td></td>
<td>resources, other cultural or religious features, or burial grounds.</td>
</tr>
<tr>
<td>Planning and carrying out any necessary site investigation before</td>
<td>Leaving known site features or archeological material unprotected so that it is</td>
</tr>
<tr>
<td>adaptation work begins, using professional archeologists and methods,</td>
<td>damaged as a result of adaptation work.</td>
</tr>
<tr>
<td>when preservation in place is not feasible.</td>
<td>Allowing unqualified personnel to conduct archeological investigations, which can</td>
</tr>
<tr>
<td></td>
<td>result in damage or loss of important archeological material.</td>
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<tr>
<td>Improving or restoring on-site or adjacent natural systems such as living</td>
<td></td>
</tr>
<tr>
<td>shorelines, wetlands, and beaches and dunes.</td>
<td></td>
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</tbody>
</table>
### Temporary Protective Measures

<table>
<thead>
<tr>
<th>Recommended</th>
<th>Not Recommended</th>
</tr>
</thead>
<tbody>
<tr>
<td>Selecting a temporary barrier, system, or equipment that will protect the historic building from the predicted type of flooding and that can be deployed using the labor, equipment, and warning time available.</td>
<td>Selecting a system or equipment inadequate to protect the historic building from predicted flooding and/or cannot be deployed quickly.</td>
</tr>
<tr>
<td>Evaluating and ensuring the ability of masonry walls and temporary flood barriers or other systems covering masonry openings to withstand the forces of flooding. Reinforcing walls as necessary to withstand such forces.</td>
<td>Reinforcing masonry walls to withstand the forces of flooding in a manner that destroys historic materials and features or diminishes the historic character of the property.</td>
</tr>
<tr>
<td>Installing fastening devices or stanchions to attach the temporary barrier or system in concealed or secondary locations of the building, and in a manner that does not damage, alter, or otherwise impact the historic character of the property.</td>
<td>Installing fastening devices or stanchions where they would damage, alter, or otherwise impact the distinctive materials, features, and spaces of the property.</td>
</tr>
<tr>
<td>Establishing procedures, responsibilities, and regular training for deploying temporary barriers and other systems.</td>
<td></td>
</tr>
</tbody>
</table>
**AUTOMATIC FLOOD CONTROL:** At peak flood stage, the flood barriers rise into a locked, upright position, preventing floodwater from reaching the foundation of the building and flooding the basement and first floor. The chamber beneath the barriers is serviced by a drain which carries water back towards the Wissahickon creek as the flood recedes.
FLOW VELOCITIES ARE EROSIVE
Under projected high-flow conditions of the future 100-year storm, floodwater streams through the Valley Green Inn parking lot at velocities up to 8 feet per second. At the inn itself, projected velocities are 3 to 4 feet per second. Any flood protection measures intended to protect the building will have to account for the hydrodynamic load and debris impact.

UNCHANGED PHYSICAL CONDITION
FLOW VELOCITIES DURING FUTURE 100-YEAR STORM

CREEK VIEWS AND PLANTED BANKS ARE ESSENTIAL

*Old Valley Green Hotel.* Photograph from mid-19th c. showing a gentle slope to the creek. Only a small amount of stone wall is visible. Our team speculated that could be because the downstream dam was higher, making the creek deeper.

Source: Chestnut Hill Conservancy & Historical Society.

*A View on the Wissahickon.* Photograph from early 20th c. showing the bridge at Valley Green Road and the bank conditions: vegetated, including large trees.

Climate change and the associated threats of severe storms and flooding put the inn in an extremely vulnerable position. While located for scenic value, the Inn sits not only within the 100-year floodplain, but also the annual flood channel. "Center at the Gorge" employs an adaptive approach to flood risk management as illustrated to the right. In addition, the scheme increases fish habitat with shading at a new boardwalk, and provides a safer pedestrian environment by separating cars from people and cyclists.

Protecting the Inn
Elevate the Building on a New Foundation

<table>
<thead>
<tr>
<th>Recommended</th>
<th>Not Recommended</th>
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</thead>
<tbody>
<tr>
<td>Documenting the building in photographs and/or drawings, particularly any</td>
<td>Demolishing later additions and porches without regard to their historic</td>
</tr>
<tr>
<td>features that may be lost or altered prior to beginning work.</td>
<td>significance.</td>
</tr>
<tr>
<td>Elevating later additions and porches that also contribute to the</td>
<td>Lifting a building from its foundation without first conducting a thorough</td>
</tr>
<tr>
<td>historic significance of the building along with the main structure.</td>
<td>inspection and repairing any identified structural issues.</td>
</tr>
<tr>
<td>Repairing any structural deficiencies, such as rotten sill plates and</td>
<td>Protecting fragile features and materials subject to damage from minor</td>
</tr>
<tr>
<td>termite damage, before beginning work to separate the building from the</td>
<td>movements or vibrations of the structure, like decorative plaster.</td>
</tr>
<tr>
<td>existing foundation.</td>
<td></td>
</tr>
<tr>
<td>Protecting fragile features and materials subject to damage from minor</td>
<td></td>
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<tr>
<td>movements or vibrations of the structure, like decorative plaster.</td>
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</table>

Height of the Elevation

<table>
<thead>
<tr>
<th>Recommended</th>
<th>Not Recommended</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identifying and retaining the historic massing, scale, size, form, and</td>
<td>Elevating a building without considering the impact to the massing, size, scale,</td>
</tr>
<tr>
<td>proportional relationships of the major elements of the historic building</td>
<td>form, and proportional relationships of the historic building and/or the</td>
</tr>
<tr>
<td>and/or the historic district.</td>
<td>historic district.</td>
</tr>
<tr>
<td>Designing a new foundation that preserves the historic character of the</td>
<td>Designing a new foundation that is too tall, so that its size and scale are</td>
</tr>
<tr>
<td>building.</td>
<td>out of proportion to the historic building and, thus, diminish its character.</td>
</tr>
</tbody>
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Guidelines on Flood Adaptation for Rehabilitating Historic Buildings

Jennifer Eggleston
Jennifer Parker
Jennifer Wellock

November 2019
A dramatic new entry connects the upper parking lot with the public space in front of the Inn. It dramatizes the experience of traveling down into the gorge, with a winding boardwalk that engages a schist outcropping and the Historic Westcliff-on-Creek Bridge. The number of parking spaces at the Inn will never be sufficient to accommodate the hundreds of visitors who enter the park at this location. Therefore, with the exception of a few accessible spaces, parking is entirely located uphill in an expanded lot, allowing for greater gathering space as well as a more generous and resilient creek edge. Emergency vehicle access, a drop-off, new bike lane and new bike parking are all accommodated.

Engaging the Gorge
The gateway journey continues from the ravine across the creek and under the historic Wissahickon Creek Bridge. The light dappled underside of the bridge is made accessible and serves as a new portal for one’s arrival to the site. The boardwalk allows people to more closely engage with the water for fishing and feeding the ducks. It also reorients and aligns the approach to the inn, re-framing a new version of its nostalgic post-card image.

Crossing the Boardwalk
As seen in the 1875 inset image of the Inn, its adjacent stream bank was once shallower and more natural. "Center at the Gorge" employs best practices for stream bank restoration and flood mitigation by widening the Wissahickon Creek floodplain, reconstructing its steep edge as a series of resilient terraces that are able to better absorb the contemporary dynamics of the watershed under pressure.

Expanding the Floodplain
Next Steps

• Explore projects that use data gathered in surveys
• Continuing refinement of workshop format
• Continue survey projects
• Begin exploring other funding sources
• How do we approach potential future disaster grants?
Contact Information

**John Gardosik** | Project Manager, Hurricane Sandy Recovery  
State Historic Preservation Office  
Pennsylvania Historical and Museum Commission  
Commonwealth Keystone Building, Second Floor  
400 North Street | Harrisburg, PA 17120-0093  
Office Phone: 717.787.0771  
Email: jgardosik@pa.gov

Disaster Planning for Historic Properties website:  
[https://www.phmc.pa.gov/Preservation/Disaster-Planning](https://www.phmc.pa.gov/Preservation/Disaster-Planning)

Pennsylvania State Historic Preservation Office Blog:  
[https://pahistoricpreservation.com/](https://pahistoricpreservation.com/)
QUESTIONS

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