STORM GUIDANCE FOR FLORIDA'S HISTORIC COMMUNITIES

PDP

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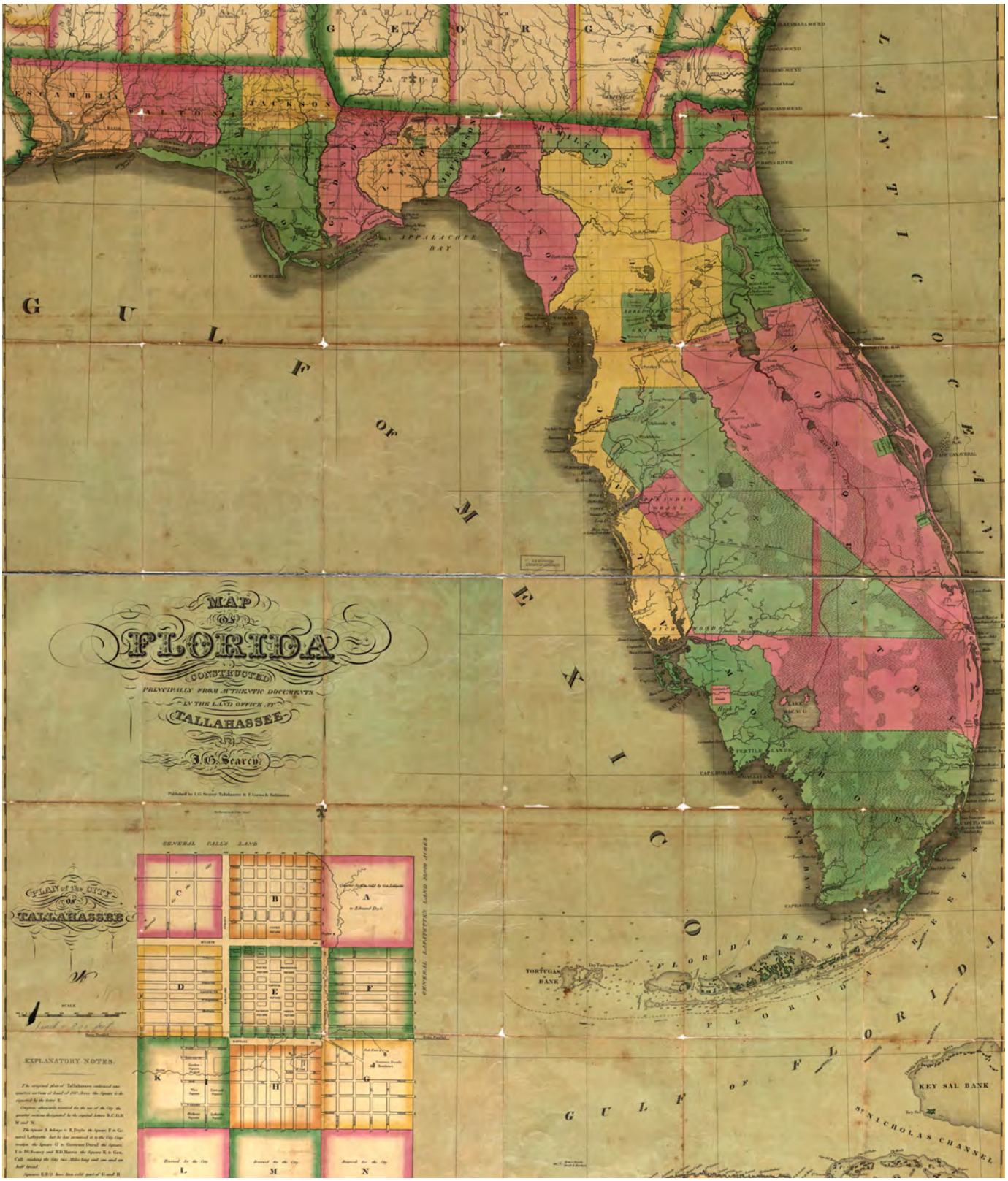


Map of Florida constructed principally from authentic documents in the land office at Tallahassee I.G. Searcy and F. Lucas, Jr. 1829. (Florida Memory)

NOAA captured Hurricane Irma as it approached Florida September 8, 2017, the first major hurricane landfall since Wilma in 2005. The northerly track up the Florida peninsula resulted in some impact to most of the state from either winds, rain, or storm surge (Florida Department of Environmental Protection, 2018).

INTRODUCTION

PURPOSE

This Storm Guidance document (*Guidance*) is written as an aid for local governments as they prepare planning and policy tools for historic properties that integrates hazard mitigation and disaster recovery.

Significant storms, such as Hurricane Ian (September 2022) have occurred during the preparation of this document, and others will follow. The intent is not to catalog these events but to illustrate and recommend what can be done to anticipate and mitigate impacts.

The information is presented in a series of stand-alone chapters with cross-references to pertinent information. Since the chapters are stand-alone, information may be repeated or rephrased from other chapters; this is intentional.

The appendices include references to additional information, a glossary to explain unfamiliar terminology, and full reports on dedicated subjects including archaeology and the economic impacts of Florida' severe storms.

Severe storms, climate change, and sea level rise impact properties across Florida with its extensive coastline, water bodies, and other geographic features. Historic buildings and structures constructed without modern building codes and are often located near waterways making them particularly vulnerable. In addition, below ground, the archaeological record documents over 10,000 years of Native American presence i with many settlements in close proximity to natural resources.

Across Florida, flood and storm events are increasing in frequency and intensity over historic trends due to climate change, impacting the built and archaeological environments with multiple causes. Community and property mitigation efforts to reduce storm impacts can result in radical changes that conflict with traditional preservation practices. Significant loss of historic integrity of individual buildings and historic districts reduces the community's unique character and heritage tourism economy.

It must also be acknowledged that it is not possible to protect all significant historic resources. Pre-disaster documentation can create a historic record prior to property mitigation efforts that may destroy valuable information about past human occupation.

Preservation stakeholders face a challenge to find solutions among complex and sometimes contradictory policies, regulations, and practices. To help bridge the gap between hazard mitigation and historic preservation, the Florida Division of Historical Resources (DHR) sought to create a resource for historic property owners, local preservation officials, and design professionals.

PROJECT BACKGROUND

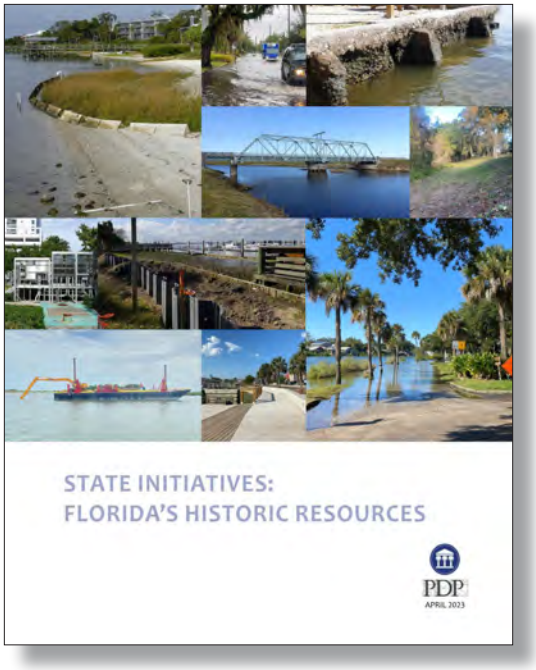
The overall project was designed to provide guidance for disaster mitigation and recovery efforts for Florida's historic properties that expands upon the 2006 publication titled, "Disaster Planning for Florida's Historic Properties" and other similar guidance. Financial assistance was provided by the National Park Service (NPS) pursuant to the Hurricane Harvey, Irma, and Maria (HIM) Emergency Supplemental Historic Preservation Fund (ESHPF) Grant Program.

This project comprises three guidance documents: One addressing the needs of individual properties, one for Florida's local governments, and one for state agencies. To develop a comprehensive assessment of the impacts of flood and storm events on historic preservation, multiple subject matter experts gathered information to contribute to each document. While the *Storm Guidance for Florida's Historic Communities* addresses policy and resource considerations, the other documents address the following:

- Historic property owner mitigation measures
- Roles of state agencies in disaster management
- Community needs and mitigation measures
- Archaeological heritage at risk
- Economic impacts of storm and flood events on historic communities

All documents and related appendices are available on the DHR web site. *(dos.myflorida.com/historical/)*

Property Owner Guidance Document



State Initiatives Guidance Document

STORM GUIDANCE FOR FLORIDA'S HISTORIC COMMUNITIES DOCUMENT SUMMARY

The information in this *Guidance* document addresses historic resources of all types. It is intended to be applicable to local governments at all levels that create and implement policies related to historic preservation, flood, and disaster management. Basic flood insurance and floodplain management requirements are described first to provide the regulatory context and affects on historic structures. Wind mitigation is described from the perspective of retrofitting existing buildings. Guidance and tools are provided to assist in decision-making processes that will minimize the impact of flooding and wind damage while preserving a community's historic and economic value. All phases of disaster management from planning to mitigation are presented and then expanded to demonstrate how historic resources can be incorporated in existing and proposed policies.

In addition to the glossary and references, the appendix includes the full content of specific reports that contributed to the information and recommendations provided. Case studies of eighteen historic Florida communities identify a range of local challenges and initiatives. Subject matter experts for archaeological resource management and economics contribute a thorough perspective that can be used by local governments to develop a specialized focus on their own social, economic, and cultural priorities.

DOCUMENT ORGANIZATION

This *Guidance* document was organized to provide users quick access to information most relevant to their needs. The list below summarizes the content of each chapter for easy reference.

01 STORM VULNERABILITY

The first step in assessing the vulnerabilities of a historic property is identifying the types of storm and flood events that may impact a property.

02 FLOODPLAIN MANAGEMENT FOR HISTORIC BUILDINGS

Government agencies are responsible for administering flood insurance programs, reducing community risk through laws and policies, and recognizing historic properties. Reviews the regulatory framework for historic properties in floodplain management.

03 WIND RETROFITTING

Historic buildings can be adapted to withstand greater wind forces and measures can be incorporated into a planned renovation project. Implementing wind resistant measures can improve resilience and reduce insurance costs.

04 LOCAL TOOLS: PRESERVATION AND STORM MITIGATION

Many activities and initiatives can be taken by local governments to improve outcomes for historic resources vulnerable to severe storms including identifying vulnerable properties; incorporating historic resources and hazard mitigation in community planning documents; modifying local regulations; and providing information to property owners.

05 CASE STUDIES

Summary of the Case Studies report compiling information gathered from site visits to eighteen Florida communities including reoccurring themes and emerging trends. *(The full report can be found in Appendix C, Case Studies.)*

06 ARCHAEOLOGY

Reviews the threats of severe storms on archaeological sites; provides recommendations to develop a local archaeological program, and summarizes archaeological site mitigation methods. *(The full report can be found in Appendix D, Archaeology.)*

07 ECONOMIC INDICATORS OF STORM IMPACT

Historic communities can benefit economically from heritage tourism, sales activity on Main Streets, and the creation of tourism-related jobs. Documenting the economic value of historic resources can increase political and public support. Severe storms can disrupt local economies and tourism. *(The full report can be found in Appendix E, The Potential Economic Consequences of Flooding on Florida's Historic Communities.)*

08 PLANNING: HAZARD MITIGATION FOR HISTORIC RESOURCES

Historic resources protection can be included in the local hazard mitigation planning process that prioritizes local historic resources through public engagement, providing options for potential funding.

USING THIS GUIDANCE DOCUMENT

Information in this *Guidance* document should be considered as a supplement to aid with the interpretation of related Florida Statutes, the Florida Building Code, and the National Flood Insurance Program regulations; with consultation with architects, engineers, and contractors; and with legal staff when assessing policy impacts.

Bold Text

Within the narrative portion of this document, certain words or phrases are emphasized in **bold** to call the reader's attention to an important fact or citation, or to identify items in a list.

Italicized Text

Resources for more information and cross-references to other sections of the document use *(italicized text in parentheses)*.

Sidebars

Shaded text boxes (such as this one) are provided throughout the document to highlight specific information. These will include at-a-glance information and definitions.

Jacksonville, ca. 1903. (Florida Memory)

1 STORM VULNERABILITY

Weather has significant impacts on Florida's historic buildings and environments. ***Although hurricane season extends from June 1st through November 30th each year, Florida's severe weather often extends from early spring to late fall. The largest weather impacts on historic buildings are flooding and wind. Secondary storm vulnerabilities at historic properties include fire and lightning strikes, as well as the possibility of sinkholes, shifting shorelines, and erosion. The rate and intensity of all of these vulnerabilities are increasing due to climate change.***

While all historic properties may be exposed to severe weather, carefully selected improvements to mitigate or reduce weather impacts can reduce a property's vulnerability. Historic buildings were not built to meet the stringent requirements of current building codes and inherently lack the benefits of modern construction. Yet, historic building materials are often more resilient than modern building materials.

VULNERABILITY

[Vulnerability is the] susceptibility of human settlements to the harmful impacts of natural hazards.

This susceptibility has implications at the individual, household, and community levels, and potentially harmful outcomes such as injuries, deaths, damage to housing and infrastructure, and destruction of businesses and livelihoods. It is therefore important to capture both the physical/exposure and social/human dimensions.

[FEMA]

Hurricane Dennis, 2005, flooded Apalachicola streets and vulnerable historic commercial areas.

FLOODING

There are two basic types of flooding: persistent flooding and event flooding. Each type of flooding can cause significant damage, but when an area plagued by persistent flooding is struck by an event flood, such as a hurricane or flash flood, the combined effect can be devastating. Persistent flooding, also referred to as nuisance flooding, is typically minor flooding that results in traffic problems, road closures, overwhelmed storm drains, and occasionally infrastructure damage. These often cause public inconvenience and business interruptions. Persistent flooding can occur when there is a combination of a normal high tide and a significant moon phase. When there are high water tables, soils can become spongy or soggy. This is particularly true along the banks of waterways and low-lying, flatter areas.

Persistent flooding can alter the ecosystem of an area. This may disrupt an area's ability to support farming and other activities depending on the flooding frequency and water salt content. As its frequency and severity worsen, persistent flooding can also impact the drinking water supply for those relying on well water.

Event flooding is occasional flooding that has a specific cause, typically a weather event that occurs from natural sources like storms, precipitation, and all types of waterbodies. Low-lying and flood-prone areas adjacent to or near waterways, called floodplains, are more vulnerable to these weather events. The Federal Emergency Management Agency (FEMA) identifies floodplains on maps to provide an indicator of potential flooding. Event flooding can be unpredictable, such as sudden infrastructure failures like collapsed water pipes, and clogged storm drains, due to deferred maintenance.

FLOOD OR FLOODING

A general and temporary condition of partial or complete inundation of normally dry land from:

1. The overflow of inland or tidal waters.
2. The unusual and rapid accumulation or runoff of surface waters from any source.

[FBC]

Floods occur naturally and can happen almost anywhere. They may not even be near a body of water, although river and coastal flooding are two of the most common types. Heavy rains, poor drainage, and even nearby construction projects can create risk for flood damage.

[FEMA]

Low-lying coastal communities with high water tables are especially at risk to infrastructure failure from high tide events that compromise water and sewer gravity flow.

FLOODING SOURCES

Flooding in Florida is most often associated with storm events that occur during hurricane season. Depending upon the path and severity of the storm, these events can be limited to a specific area or can occur along the entire path. Other sources of flooding may occur from high-wind seasonal storms, heavy rains, stormwater infrastructure failures, and increasingly high tides. Across the state, particularly in coastal communities, it is not uncommon for all of these sources to contribute to a flood. Understanding a property's vulnerability to various flood types is key to developing a mitigation strategy.

COASTAL FLOODING

"The rate of increase for flood events is accelerating at most locations along the East and Gulf Coasts." *(National Oceanic and Atmospheric Administration, 2021. Tides and currents: CO-OPS derived product API, www.noaa.gov)* Storm surge, tidal shifts, waves, and sea level can all influence coastal flooding. Due to increased sea levels and storm severity, coastal areas are experiencing more flooding events as evidenced by breaches of natural and man-made shoreline protection, pooling of water in streets and in low-lying areas, and destruction of natural landscapes from saltwater intrusion. Shorelines have also been impacted by development and by management interventions of coastal resource agencies.

SEVERE STORMS

Severe storms with significant rainfall can also result in flooding. The types of storms resulting in flooding can be the remnants of anticipated storms such as hurricanes, tropical storms, or high-wind seasonal storms; or an unpredictable intense rainfall, known as a flash flood. Properties with limited natural landscape areas to absorb rain water often divert storm water to the street, adjacent parcels, or directly into the storm water system. ***When there is a heavy storm, the rain water can overwhelm stormwater system and can cause flooding by raising waterbodies or backflowing onto private property.***

STORMWATER INFRASTRUCTURE

Many Florida communities have a history of infrastructure-related flooding. This is often due to water flowing backwards in storm drains, floor drains, sewers, septic systems, and water supply piping or because drainage is deteriorated or over capacity. Combined stormwater and sanitary sewer systems are of particular concern since any backups may bring contaminated water with the flood water. A common priority among Florida's local governments is obtaining funds for maintenance and implementation of upgrades for stormwater infrastructure systems to separate the sanitary and sewer discharage. ***Property owners or tenants who believe the source of their flooding may be connected to their drainage system or water supply should contact their water utility or public works department.***

DEVELOPMENT OF NATURAL AREAS

Florida experienced a building and land development boom in the early-20th century and continues to suffer from the lack of a comprehensive land management program. No state regulations require the systematic preservation of natural areas through mandatory planning for new development that requires a net-zero impact to natural stormwater flows. Florida's past and current development includes the filling of marshes; draining and channelizing of water bodies; and increasing impervious surfaces; undermining nature's ability to absorb water into the ground. As a result, local communities that do not implement appropriate regulations on new development may experience increased flooding.

Davis Islands in Tampa is an example of land reclamation projects that occurred during the Florida Land Boom. (ca. 1927, Florida Memory)

RIVERINE

As development increases, more of the natural watersheds are covered with buildings and paved surfaces, which increases runoff into adjacent rivers and water ways. The additional volume of water causes rivers to rise and flow faster and culverts to be overwhelmed. When the height of the water body rises and overflows its banks, riverine flooding occurs. The fast-flowing water can be dangerous to pedestrians and moving vehicles, and can cause unsecured objects to become floating projectiles. Although riverine flooding can be devastating, there is often sufficient notice to allow individuals to protect their property and to safely relocate to higher ground.

Hurricane Ian caused significant damage across southwest Florida in 2022 with flooding and wind damage resulting in over $50 billion in damage.

WIND AND TORNADOES

While flood vulnerability is typically associated with a building's proximity to water, buildings throughout Florida are potentially vulnerable to wind damage from natural events. Severe storms, such as hurricanes and tropical storms with significant sustained winds and gusts, will cause damage, with the added danger of flying debris. Tornadoes can have wind speeds greater than hurricanes, and usually develop in association with severe thunderstorms. Secondary damage can also occur from downed trees, which can fall on buildings or power lines. This can start fires or block roadways, hindering emergency vehicle access.

Wind damage can cause failure to the following building components:

- Roofs,
- Window and door openings,
- Structural systems,
- Siding materials, and
- Appendages, such as chimneys, porches, and carports.

There are several improvements that a property owner can implement to reduce the potential damage from high winds, including trimming trees, protecting windows, and improving structural reinforcing. *(Refer to Chapter 3, Wind Retrofitting.)*

Lightning struck one of the identical roof towers of this historic church and fortunately the impact was limited and only affected the right tower roof.

SECONDARY THREATS

FIRE AND LIGHTNING

Following Hurricane Michael in 2018, piles of debris and downed trees remained across the Florida panhandle. Three years later, the debris and trees ignited wildfires that ravaged 34,000 acres. Wildfire activity is linked with temperature and precipitation patterns. Florida is greatly affected by the El Niño–Southern Oscillation occurrence during winter and spring months that overlap the traditional wildfire season, increasing this risk. *(Florida Climate Center: www.climatecenter.fsu.edu)*

- Typical wildfire season is March through June (hurricane season occurs annually June 1st through November 30th)
- Lightning is one of the most hazardous and life threatening impacts of a storm event and difficult to forecast
- Warm temperatures and water will produce thunderstorms and generate lightning

Fire can also occur in the aftermath of a flood when fuel containers are damaged or electrical sources, such as downed electrical lines, that come in contact with flood water. Flood water or debris blocking roadways can hinder fire-fighting efforts, allowing the fire to continue to spread.

SHIFTING LANDSCAPES: SINKHOLES, SUBSIDENCE, AND EROSION

Florida's geography and geology contribute to challenges that are exacerbated by climate change. *(Refer to Climate Change, page 1.8.)* Much of the underground rock in Florida is limestone, which is soft and

FLORIDA'S GEOGRAPHY AND GEOLOGY

Florida's geographic position and latitudinal range mean that the state is situated such that it encompasses both temperate and sub-tropical climate regimes" and "Florida's karst system of sinkholes, submerged caves and springs depend on the connection between the surface and the underground, with even slight changes in soil moisture, elevation, and temperature causing profound effects."

[Beth Stys, et al]

University of South Florida's Dr. Lori Collins studied the 2017 Pasco County sinkhole at Lake Padgett comparing the 1952 USDA aerial with current imagery.

dissolves in water. These underground areas of limestone are known as Karst regions. As Karst regions are exposed to water, either through more frequent flooding or seepage into the rock, the limestone erodes, forming underground caves or streams.

SINKHOLES

Due to Florida's geology, the Florida Department of Environmental Protection (DEP) has identified the increased likelihood of sinkholes. The soil on top of underground caves and streams in Karst regions can collapse, forming sinkholes. Sinkholes could theoretically form anywhere in Florida although some regions are higher risk. High-risk areas include those where limestone is close to the surface, or areas with deeper limestone but with contributing factors of the water table elevation, soil composition, and aquifer characteristics. Sinkholes can be triggered from drought, construction with heavy blasting and land transformation, flooding, heavy rainfall, and heavy groundwater pumping. There may or may not be any advance warning, so it is important to monitor a property for development of any sinkholes. Contact a professional engineer and local authorities if a sinkhole develops.

SUBSIDENCE

Land areas near shorelines are slowly sinking–a gradual process known as subsidence. With subsidence, the negative impacts of rising seas and storm events are increasing. This is getting worse with climate change.

(Refer to Climate Change, page 1.6.) As a peninsula, Florida is almost surrounded by bodies of water and is experiencing different rates of subsidence all over the state.

Subsidence can also compromise natural shoreline protection including marshes, beaches, mangrove stands, coral reefs, and oyster beds, reducing their effectiveness. Invasive species, pollutants, and development can also contribute to increased rates of shoreline loss. Waterfront property owners can encourage the growth and preservation of natural shoreline protection by understanding its function and limiting activities that are harmful. *(Refer to Natural Shoreline Protection, page 12.4.)*

EROSION

Lands along waterbodies can gradually erode from slow consistent waves or currents over hundreds and thousands of years. However, more significant and noticeable erosion is occurring at an accelerated rate from increasing severe storms and sea level rise.

Erosion can impact coastal waterfront properties, historic maritime resources such as lighthouses, and the archaeological remains of some of Florida's Native American populations and European settlers.

Developers influenced land reclamation projects in the Florida Everglades in support of agriculture and the Florida Land Boom. (ca. 1960, Florida Memory)

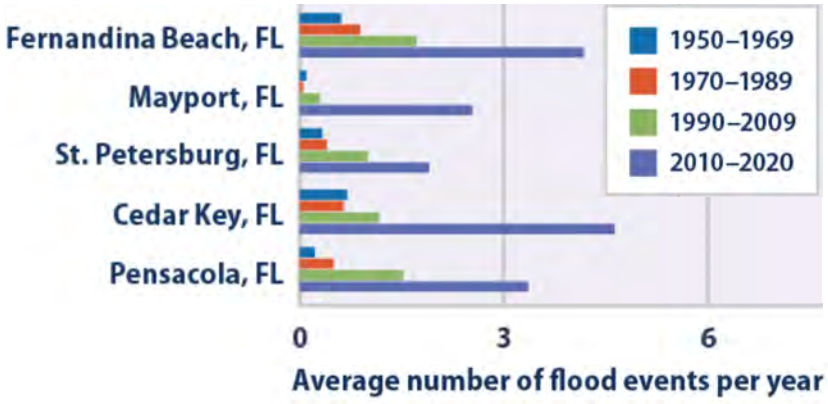
FLOOD-RELATED EROSION

The collapse or subsidence of land along the shore of a lake or other body of water as a result of undermining caused by waves or currents of water exceeding anticipated cyclical levels or suddenly caused by an unually high water level in a natural body of water, accompanied by a severe storm, or by an unanticipated force of nature, such as a flash flood or an abnormal tidal surge, or by some similarly unusual and unforeseeable event which results in flooding.

[NFIP]

CLIMATE CHANGE

National and international climate scientists, governments, and non-governmental organizations recognize that Florida's climate is changing, as evidenced by rising temperatures and seas. *(What Climate Change Means for Florida, US Environmental Protection Agency, 2016.)* Floridians and visitors experience more severe storms, increased flooding occurrences, and changes in biodiverse ecosystems. The 2022 report



The average number of coastal flood events per year from 1950 to 2020. (US Environmental Protection Agency, www.epa.gov)

from the Intergovernmental Panel on Climate Change uses Florida as an example of a state at-risk for sea level rise and flooding from both natural geography and the impacts of development along all coasts. Residents in communities not at high risk for flooding may experience indirect affects with population increases. The state as a whole may see an influx of new residents particularly with the increase in remote workers choosing to be located in Florida. These population increases can stress infrastructure and social resources already at capacity.

Historic development patterns and archaeological sites provide evidence of climate adaptation over time. Traditionally people chose settlement areas that were on high ground and within reasonable distance to natural resources. With an increasing population and demand for waterfront property, more development is occurring in vulnerable areas.

HURRICANE IAN

On September 28, 2022, Hurricane Ian made landfall as a Category 4 storm near Pirate Harbor, south of Tampa, with sustained 145 mph winds, 20-inches of rain, and 12- to 18-foot storm surge. Although the economic impact has yet to be calculated, early estimates indicate flood and wind losses between $41 and $70 billion, making Ian one of Florida's most expensive storms in modern history.

[NOAA, Forbes]

INCREASING SEVERITY AND OCCURRENCE

Communities in Florida are experiencing an increase in the rate and intensity of flooding and high winds over historical trends. Roads can now become impassable more frequently, temporary ponds form after heavy rains, and property owners have to address new and more frequent–or more severe–flooding of their homes and businesses. Increased precipitation attributed to climate change is a contributing factor, made worse when accompanied by high tides or winds of a strong storm. These factors can occur separately or together, and stress infrastructure systems that have already begun to fail due to age and/or lack of maintenance.

Severe hurricane winds and changing wind patterns contribute to more frequent coastal flooding and higher storm surge, while high water tables can decrease the soil's ability to absorb a downpour. Significant increases in rainfall can overwhelm rivers, waterways, and stormwater systems and lead to flash flooding.

While disruptive to property owners, businesses, and visitors, there is also a substantial economic toll on Florida's historic communities and a growing threat to its historical and cultural resources.

REFERENCES

Note: All references are available online unless otherwise noted. References that are only available as online resources are noted as "online resource." Refer to *Appendix A: Resources* for web links.

WUSF Public Media, *Studying Pasco Sinkhole Has Personal, Professional Meaning for USF Researcher*, (2017). See also: University of South Florida, Digital Heritage and Humanities Collections: *Terrestrial Laser Scanning, UAVs, and GIScience Applications for Sinkhole Documentation*. *(www.dhhc.lib.usf.edu*)

Stys, B., Foster, T., Fuentes, M. M. P. B., Glazer, B., Karish, K., Montero, N., & Reece, J. S. (2017). *Climate Change Impacts on Florida's Biodiversity and Ecology*. *Florida's Climate: Changes, Variations, & Impacts. (purl.flvc.org/fsu/fd/FSU_libsubv1_scholarship_submission_1515510476_b6a1e65a)*

NOAA. (National Oceanic and Atmospheric Administration). 2021. *Tides and Currents: CO-OPS derived product API*. See also U.S. EPA's *Climate Change Indicators in the United States www.epa.gov/climate-indicators*.

Tallahassee, 1957. (Florida Memory)

2 FLOODPLAIN MANAGEMENT FOR HISTORIC BUILDINGS

There are many regulations and requirements that impact all properties in Florida including building codes, as well as zoning and floodplain management ordinances. While there tends to be a clear understanding of the role and impact of building codes and zoning ordinances, the role of floodplain management and its impact on historic properties is less clear to local preservation planners and property owners.

The framework for floodplain management has been established by the federal government and is integrated into state and local regulations.

- **Federal Government:** The National Flood Insurance Program (NFIP), a division of the Federal Emergency Management Agency (FEMA), establishes the minimum requirements for floodplain management.
- **State Government:** Every state has adopted the NFIP floodplain management requirements, with some states, including Florida, adopting more stringent requirements.
- **Local Governments:** Each municipality adopts its state's floodplain management requirements and may impose more stringent requirements.

Due to the federal and state requirements, floodplain management affects and influences the treatment of all properties in the floodplain. As a result, it is vital that preservation planners and others concerned about flood-prone historic buildings have a good understanding of floodplain management.

FLOODPLAIN MANAGEMENT

Floodplain management is a program of corrective and preventative measures that strive to minimize losses from floods and protect natural resources. To protect life, property, and public investment, buildings and infrastructure located in floodplains are managed via a federal-state-local partnership among various agencies, most notably the Federal Emergency Management Agency (FEMA), the U.S. Army Corps of Engineers (USACE), the Florida Department of Emergency Management (FDEM), the Florida Building Commission, and the local jurisdiction's floodplain administrator.

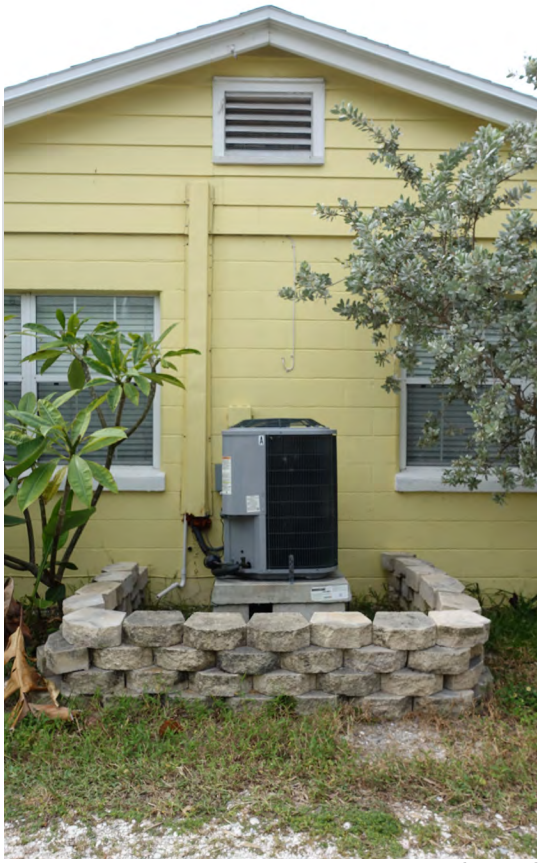
Local floodplain administrators (sometimes referred to as "floodplain managers") typically regulate development in high-risk areas through floodplain ordinances, which must meet or exceed minimum standards to be approved by the state and FEMA. Adoption of an approved floodplain ordinance allows that community to participate in the National Flood Insurance Program (NFIP), making insured properties eligible to receive federal funding following a flood event. The Florida State Floodplain Management Office, part of FDEM, can verify a local government's participation in the NFIP and provide contact information for the local floodplain administrator.

Although there are variations between local ordinances, there are many types of work subject to floodplain management regulations that are applicable to all properties, including those designated as historic.

Examples include, but are not limited to:

- Modifying or adding any building system or equipment, including electrical, plumbing, heating, air conditioning, and generators;
- Installing finishes, doors, and windows in areas that are vulnerable to flooding;
- Limiting the use of basements and flood-prone areas to parking, building access, and storage *(refer to Wet Floodproofing, page 13.4)*;
- Undertaking Substantial Improvements to existing structures *(refer to Substantial Improvement, sidebar page 2.12)*;
- Constructing an addition to an existing structure; and
- Erecting a new building.

Some property improvements will not require compliance with floodplain management regulations. *(Refer to Storm Guidance for Florida's Historic Properties, Chapter 4, Basic Improvements.)* Property owners should be encouraged to contact the local floodplain administrator to determine the applicable regulations to understand the permit review process. In addition, numerous online resources are available that may be helpful in the decision-making process. *(Refer to Appendix A: Resources.)* Modifications of existing buildings to improve flood resistance should also include wind retrofit improvements to maximize the value of the project. *(Refer to Chapter 3, Wind Retrofitting.)*



Many communities require mechanical equipment to be elevated.

FEDERAL FUNDING

The federal government provides financial assistance only in the event of a Presidential Disaster Declaration. However, most incidents of flooding do not warrant the declaration, in which case the property owner would be financially responsible for necessary repairs through flood insurance or other means. *(Refer to Chapter 10, Recovery: Hazard Mitigation for Historic Resources, and Funding for Recovery, page 10.7.)*

The following federal funding is available following a Presidential Disaster Declaration:

- **Individuals and Households Program (IHP):** Administered by FEMA, IHP provides financial and direct services to eligible individuals and households affected by a disaster who have uninsured or under insured necessary expenses and serious needs. In 2022, the IHP program grant limit was increased to $41,000 for housing assistance and up to $41,000 for other needs assistance. While housing assistance is funded by FEMA, other needs assistance is partially funded by the state. *(www.fema.gov)*
- **U.S. Small Business Administration (SBA):** The SBA makes long-term, low-interest loans for both residential and commercial use through its Disaster Loan Assistance program to address both physical and economic damage from a declared disaster.
- **U.S. Department of Housing and Urban Development (HUD):** HUD can provide funding through its Community Development Block Grant Disaster Recovery (CDBG-DR) Program. To be eligible for funding, the proposed project must be a CDBG eligible activity and meet a CDBG national objective. *(www.hudexchange.info/programs/cdbg-dr/)*

FEDERAL FLOOD REGULATIONS

NATIONAL FLOOD INSURANCE PROGRAM

Established in 1968, the National Flood Insurance Program (NFIP) offers repair assistance for flood-damaged properties, provides maps of floodplain areas, delineates zones of risk, and makes flood insurance available to property owners.

The intent of the NFIP was to:

- Allow property owners to purchase flood insurance from the federal government where private insurance was unavailable or cost prohibitive;
- Provide a national insurance funding pool to distribute the risk across a larger geographic area, thus reducing premium costs; and
- Provide incentives for flood risk management and reduce the overall costs of flooding.

In many ways, flood insurance works like other types of insurance. In exchange for the payment of a premium, the insurance provider guarantees compensation or partial compensation for a covered loss. Insurance premiums vary with the level of risk: For example, less flood-prone properties may have lower premiums than those in more vulnerable locations. With flood insurance, a property owner or tenant can receive financial assistance to offset recovery costs from a flood event. Flood insurance is typically available to cover damage to both the buildings and contents (i.e. furnishings and objects). If a community participates in the Community Rating System (CRS), property owners and tenants are eligible for discounted flood insurance premiums. *(Refer to Community Rating System, page 2.18.)*

PROPERTY FLOOD INSURANCE

In communities that participate in the National Flood Insurance Program, NFIP insurance is available to all owners and tenants of eligible residential and commercial properties regardless of the property's flood risk. ***Flood insurance is required for some properties, such as mortgaged properties located within high-risk areas, but it should be considered by owners of all properties at risk for flooding. In cases where flood insurance is not required, each property owner must assess their property's level of risk and their ability to financially recover from a flood event if they choose to decline coverage. In addition, all property owners and tenants should consider flood insurance for their contents. In the event of a flood, any flood-related damage not covered by insurance is largely the responsibility of the owner and/or tenant.***

To qualify for flood insurance or maintain coverage, alterations may be required to protect a property from flooding (e.g., wet floodproofing, dry floodproofing, elevating, or relocating) and to achieve lower insurance premiums. In some cases, these alterations conflict with best practices for historic preservation. The key is to balance the extent of change required for flood protection with the desire to maintain historic character. *(Refer to Storm Guidance for Florida's Historic*

Properties, Chapter 6, Wet Floodproofing, Chapter 7, Dry Floodproofing, and Chapter 8, Elevating or Relocating.) ***Alterations can jeopardize the historic character and integrity of a building, property, and setting. If the changes cause the building to no longer meet the definition of a "historic structure," full floodplain management requirements must be met.*** *(Refer to Florida Building Code: Floodplain Management for Historic Properties, sidebar page 2.12, and 107.5 Historic Buildings, sidebar page 2.13.)* All contributing properties in National Register Historic Districts and locally designated historic districts, in addition to all individually landmarked properties within a local preservation ordinance, meet the criteria of "historic structures" under the NFIP. *(Refer to Implementing Floodplain Regulations, page 2.10, and Historic Properties and Floodplain Regulations, page 2.11.)*

Unfortunately, alterations required to protect a property from flooding (e.g., elevation, or raising the property on a new, higher foundation) and to achieve lower insurance premiums are frequently at odds with best practices for preservation. *(Refer to Elevating, page 13.12.)* Alterations can jeopardize the historic character and integrity of a building, property, and setting. For instance, elevation changes the appearance of a building and its relationship to its setting, while replacing plaster with tile or other water-resistant finishes changes the character of an interior space. FEMA has attempted to address this tension by providing flexibility for historic properties in meeting floodplain regulations. *(Refer to Implementing Floodplain Regulations, page 2.10. To consider specific options for reducing flood vulnerability at historic properties, refer to Chapter 11, Mitigation: Hazard Mitigation for Historic Resources, and Chapter 13, Property Flood Mitigation Strategies.)*

NATIONAL FLOOD INSURANCE RATING METHOD

In 2021, FEMA updated the rating methodology for flood insurance policies with a program called Risk Rating 2.0 - Equity in Action.

As part of the update, flood zones are no longer factored into flood rates; instead, a number of property specific factors are used. Phased implementation of the new policies began in October 2021; remaining policies subject to renewal after April 2022 are being updated.

The following types of considerations contribute to FEMA's Risk Rating 2.0 - Equity in Action flood insurance rates under the revised program:

- Geographic rating factors (distance to coast and associated flood type [storm surge, riverine])
- Quality of levees, if applicable
- Property characteristics (number of stories and first floor height)
- Hierarchy of associated hydrological feature (watershed, drainage area, river)
- Non-single family homes that have unique elements and historical loss ratios
- Ratio of coverage limit to coverage replacement cost

Elevating a historic building to a new foundation height can alter the individual building and the surrounding historic streetscape.

FLOOD INSURANCE AND THE NFIP

Flooding is the most common, and most expensive, natural disaster in the United States. Just 1 inch of water pooled in a single-story, 1,000 square-foot home can cause close to $11,000 worth of damage; 1 foot of water in a 2,500 square-foot single-story home can cause more than $29,000 in damage.

[FEMA - June 14, 2021]

FLOOD INSURANCE COVERAGE

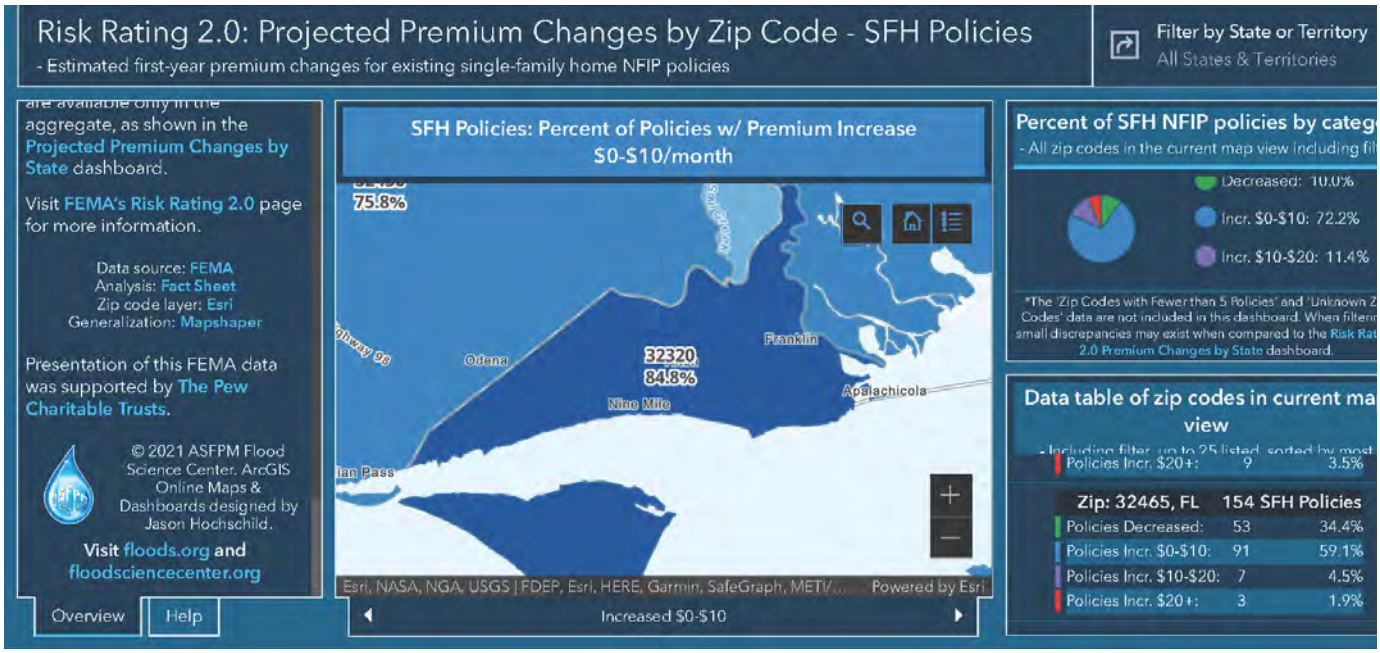
Flood insurance is available for tenants and property owners from the National Flood Insurance Program (NFIP) for buildings and contents at qualified properties in the following amounts:

	BUILDING	CONTENTS
RESIDENTIAL	$250,000	$100,000
RENTER	$0	$100,000
COMMERCIAL	$500,000	$500,000

Flood insurance is also available from private companies, although amounts may vary.

FLOODSMART

FloodSmart, administered by FEMA, is the official website of the National Flood Insurance Program (NFIP). It is a valuable resource for property owners and includes information regarding flood risk, flood insurance, and reducing flood risk. *(www.floodsmart.gov/)*



FEMA's Risk Rating 2.0 Interactive Map provides information on projected flood insurance rates by zip code. In addition, the website includes a detailed report on the impacts of Risk Rating 2.0 for the state and a rate comparison using the old method of calculation and the Risk Rating 2.0 calculation method. (www.fema.gov/flood-insurance/risk-rating/profiles)

FEMA EQUITY IN ACTION

To provide more equity, FEMA now has the capability and tools to address rating disparities by incorporating more flood risk variables. These include flood frequency, multiple flood types–river outflow, storm surge, coastal erosion, and heavy rainfall–distance to a water source and property characteristics such as elevation and the cost to rebuild.

[FEMA, press release April 1, 2021]

The use of areas below the Base Flood Elevation will be limited to those that meet code and insurance requirements including an entrance, parking, and storage.

BASIS FOR FLOOD INSURANCE RATE CALCULATION UNDER FEMA RISK RATING 2.0

Property owners should contact their policy representative to find out how their specific policy is affected. The information provided here is a general summary for informational purposes only.

- Community Rating System (CRS) discount, if applicable: Expands the single-family home discount to non-single family homes regardless of location within or outside of a Special Flood Hazard Area (SFHA) *(refer to Community Rating System, page 2.18)*
- A standard discount factor used for machinery and equipment elevated above the first floor
- A first floor height based on one of four foundation types with each foundation type having a different factor *(refer to Building Foundation Type, page 2.18)*
- Maximum building rate of $15 per thousand dollars of Building Value multiplied by the Insurance to Value factor and a maximum contents rate of $15 per thousand dollars of Contents Value multiplied by the Insurance to Value factor
- Prior claims, including flood losses within 20 years prior to the policy period, which will have a surcharge based on the claim value and Insurance to Value factor
- An evaluation of each of the factors that establishes a maximum ceiling and floor rate for each unique portion of the rating plan (e.g. peril and segment

The historic Don CeSar Hotel in St. Pete Beach is situated in a flood zone.

WHAT IS NOT CHANGING:

- Most annual rate increases will be less than 18%
- FEMA flood maps will still be used for mandatory purchase and floodplain management *(Refer to Flood Insurance Rate Maps, page 2.6)*
- Premium discounts for pre-FIRM and newly mapped properties, transferable discounts, and CRS discounts *(Refer to Pre-Firm Structures, page 2.7, and Community Rating System, page 2.18)*

FLOOD INSURANCE RATE MAPS

FEMA develops and publishes maps, called Flood Insurance Rate Maps (FIRMs), which show the horizontal and vertical extent of the floodplain. FIRMs serve as the basis for floodplain regulation and management, as well as for determining flood insurance premiums. FEMA maintains the regulatory FIRMs, which are available from the local floodplain administrator and online though FEMA's Map Service Center. *(msc.fema.gov/portal/home)*

In the FIRMs, FEMA delineates three main areas to graphically depict flood risk: Special Flood Hazard Area (SFHA), which refers to the area predicted to have a 1% chance of flooding each year; the 0.2% annual chance floodplain; and minimal flood hazard areas outside the floodplain. Properties located within the SFHA are considered high risk, while properties at an elevation higher than the 0.2% annual floodplain fall within minimal flood hazard areas and, consequently, have lower insurance premiums. ***Because FIRMs are based on modelling past storm events and/or present conditions, they do not address future threats such as sea level rise.*** *(Refer to Climate Change, page 1.8.)* To best plan for properties threatened by flooding, this Guidance document recommends that floodplain administrators and planners conduct additional analyses to accommodate climate projections and address future flood risks. *(Refer to Establish a Planning Timeframe, page 8.14.)*

FLOODSMART

FloodSmart, administered by FEMA, is the official website of the National Flood Insurance Program (NFIP). It is a valuable resource directed towards property owners that includes information regarding flood risk, flood insurance, and reducing flood risk. *(www.floodsmart.gov/)*

LOCATION DEFINITIONS

Base Flood Elevation (BFE): The elevation of the base flood, including wave height, relative to the National Geodetic Vertical Datum (NGVD), North American Vertical Datum (NAVD) or other datum specified on the Flood Insurance Rate Map (FIRM).

[FBC]

Design Flood Elevation (DFE): The elevation of the "design flood," including wave height, relative to the datum specified on the community's legally designated flood hazard map. In areas designated as Zone AO, the design flood elevation shall be the elevation of the highest existing grade of the building's perimeter plus the depth number (in feet) specified on the flood hazard map. In areas designated as Zone AO where the depth number is not specified on the map, the depth number shall be taken as being equal to two (2) feet.

[FBC]

Freeboard: An additional amount of height above the Base Flood Elevation used as a factor of safety (e.g., one (1) foot above the Base Flood) in determining the level at which a structure's lowest floor must be elevated or floodproofed to be in accordance with state or community floodplain management regulations.

[NFIP]

Lowest Floor: The lowest floor of the lowest enclosed area of a building or structure, including basement, but excluding any unfinished or flood-resistant enclosure, other than a basement, usable solely for vehicle parking, building access or limited storage provided that such enclosure is not built so as to render the structure in violation of the non-elevation requirements of the Florida Building Code or ASCE 24.

[FBC]

The SFHA includes two different flood zones on the FIRMs: A Zones and V Zones. The difference between the two zones is that V Zones are subject to storm-induced velocity wave action (for example, a beach house that could be inundated in a storm), while A Zones are not. Therefore, buildings in V Zones must meet more stringent standards because of the forces they must withstand. Understanding the different requirements for each flood zone can be confusing; it is therefore recommended that planners meet with the local floodplain administrator to see how the floodplain ordinance may affect historic resources within a community.

FIRMs also depict the computed elevation to which floodwater is expected to rise during the 1% annual chance flood event (also known as the base flood). This height, ***the Base Flood Elevation (BFE), is the federal regulatory requirement for the elevation or floodproofing of structures.*** (Florida has established an elevation requirement of BFE plus one-foot, representing the state regulatory requirement for the floodproofing or elevation of structures.) VE Zones (depicted on older FIRMs as V1-30), and AE (depicted on older FIRMs as A1-30) both have BFEs delineated on the FIRMs. These elevations are determined by detailed hydraulic analyses based on flood models and information from past storm events.

PRE-FIRM STRUCTURES

> 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).
>
> [NFIP]

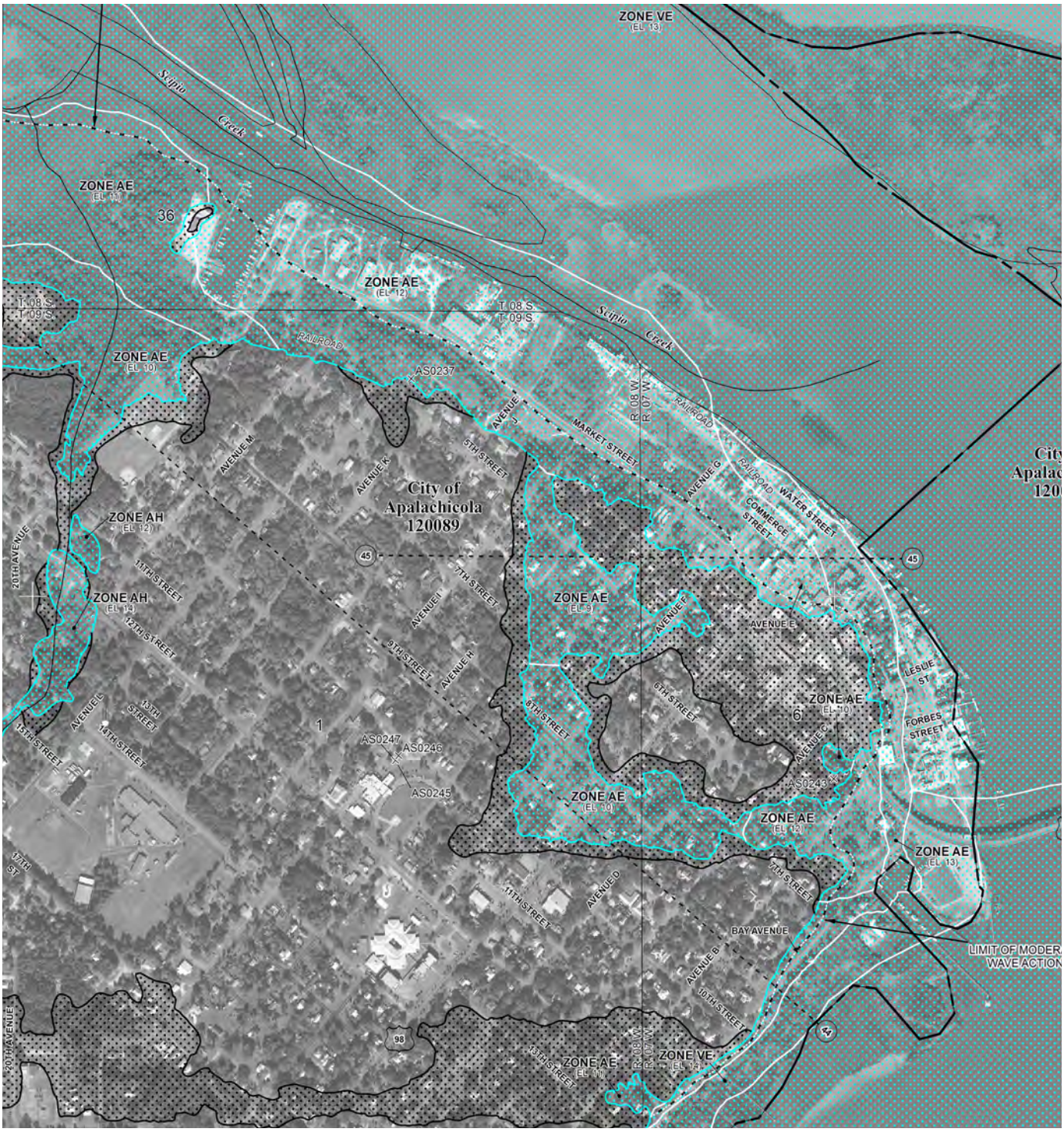
Most historic buildings are pre-FIRM structures. Buildings constructed or substantially improved after the community's initial FIRM should have been constructed in compliance with the local floodplain ordinance that was in effect at the time of construction. The Florida Building Code (FBC) has established more rigorous requirements over time. Many municipalities have requirements that exceed the FBC and may mandate compliance with local floodplain management requirements for all buildings, including pre-FIRM structures.

FIRM REVISIONS

FIRM's are periodically updated to reflect known flood risk based upon historical data. Development impacting flood vulnerability is routinely updated and may result in a boundary change or even an increase in BFE. This may change a property's designation and include it within the SFHA.

EVALUATING SEA LEVEL RISE

Over the course of a 30-year mortgage, sea levels are projected to rise an average of 10-12 inches in Florida. *(2022 Sea Level Rise Technical Report, NOAA.)* Potential impacts from increased sea levels can be viewed using NOAA's "Sea Level Rise Viewer" that illustrates the scale of potential flooding relative to mean higher high water (MHHW). *(www.noaa.gov)* MHHW is the average of the high water height of each tidal day. Property owners should use this information as a supplement to the FIRMs to assess potential flood risk to their property.



The turquoise dots on this Flood Insurance Rate Map of Apalachicola, Florida, indicate the Special Flood Hazard Areas (SFHAs). The SFHA (also known as the 1% annual chance flood, 100-year flood, and base flood zone), has historically been subject to a 1% chance of flooding during any given year. In this case, the SFHA is defined as Zone AE, in which the base flood elevations are determined. The areas with the black dots represent areas of historically 0.2% annual chance flood (also known as the 500-year flood zone). Areas without dots have been determined to be outside of the historically 0.2% annual chance floodplain. It is important to highlight that these categories do not include future conditions due to climate change or other factors. (Map obtained through FEMA's Map Service Center, msc.fema.gov/portal/home.)

NFIP: FLOOD INSURANCE RATE MAP TERMINOLOGY

Flood Insurance Rate Map: Official map of a community on which FEMA has delineated the Special Flood Hazard Areas (SFHAs), the Base Flood Elevations (BFEs) and the risk premium zones applicable to the community.

Special Flood Hazard Areas (SFHAs): An area having special flood, mudflow or flood-related erosion hazards and shown on a Flood Hazard Boundary Map (FHBM) or a Flood Insurance Rate Map (FIRM) Zone A, AO, A1-A30, AE, A99, AH, AR, AR/A, AR/AE, AR/AH, AR/AO, AR/A1-A30, V1-V30, VE or V. The SFHA is the area where the National Flood Insurance Program's (NFIP's) floodplain management regulations must be enforced and the area where the mandatory purchase of flood insurance applies. For the purpose of determining Community Rating System (CRS) premium discounts, all AR and A99 zones are treated as non-SFHAs. [NFIP]

Base Flood Elevation (BFE): The elevation of surface water resulting from a flood that has a 1% chance of equaling or exceeding that level in any given year. The BFE is shown on the Flood Insurance Rate Map (FIRM) for zones AE, AH, A1–A30, AR, AR/A, AR/AE, AR/A1–A30, AR/AH, AR/AO, V1–V30 and VE.

Coastal High Hazard Area (V Zone): Area within the special flood hazard area extending from offshore to the inland limit of a primary dune along an open coast and any other area that is subject to high-velocity wave action from storms or seismic sources, and shown on a Flood Insurance Rate Map (FIRM) or other flood hazard map as velocity Zone V, VO, VE or V1-30. [FBC]

Coastal A Zone: Area within a special flood hazard area, landward of a V zone or landward of an open coast without mapped coastal high hazard areas. In a coastal A zone, the principal source of flooding must be astronomical tides, storm surges, seiches or tsunamis, not riverine flooding. During the base flood conditions, the potential for breaking wave height shall be greater than or equal to 1 ½ feet (457 mm). The inland limit of the coastal A zone is (a) the Limit of Moderate Wave Action if delineated on a FIRM, or (b) designated by the authority having jurisdiction. [FBC]

Zone: A geographical area shown on a Flood Hazard Boundary Map (FHBM) or a Flood Insurance Rate Map (FIRM) that reflects the severity or type of flooding in the area.

Zone A: Areas with a 1% annual chance of flooding and a 26% chance of flooding over the life of a 30-year mortgage. Because detailed analyses are not performed for such areas; no depths or base flood elevations are shown within these zones. [NFIP]

Zone A99: Areas with a 1% annual chance of flooding that will be protected by a Federal flood control system where construction has reached specified legal requirements. No depths or base flood elevations are shown within these zones. [NFIP]

Zone A1-30. These are known as numbered A Zones (e.g., A7 or A14). This is the base floodplain where the FIRM shows a BFE (old format). [NFIP]

Zone AE. The base floodplain where base flood elevations are provided. AE Zones are now used on new format FIRMs instead of A1-A30 Zones. [NFIP]

Zone AH. Areas with a 1% annual chance of shallow flooding, usually in the form of a pond, with an average depth ranging from 1 to 3 feet. These areas have a 26% chance of flooding over the life of a 30-year mortgage. Base flood elevations derived from detailed analyses are shown at selected intervals within these zones. [NFIP]

Zone AO. River or stream flood hazard areas, and areas with a 1% or greater chance of shallow flooding each year, usually in the form of sheet flow, with an average depth ranging from 1 to 3 feet. These areas have a 26% chance of flooding over the life of a 30-year mortgage. Average flood depths derived from detailed analyses are shown within these zones. [NFIP]

Zone AR. Areas with a temporarily increased flood risk due to the building or restoration of a flood control system (such as a levee or a dam). Mandatory flood insurance purchase requirements will apply, but rates will not exceed the rates for unnumbered A zones if the structure is built or restored in compliance with Zone AR floodplain management regulations. [NFIP]

Zone V: Coastal areas with a 1% or greater chance of flooding and an additional hazard associated with storm waves. These areas have a 26% chance of flooding over the life of a 30-year mortgage. No base flood elevations are shown within these zones. [NFIP]

Zone VE and V1-30. Coastal areas with a 1% or greater chance of flooding and an additional hazard associated with storm waves. These areas have a 26% chance of flooding over the life of a 30-year mortgage. Base flood elevations derived from detailed analyses are shown at selected intervals within these zones. [NFIP]

IMPLEMENTING FLOODPLAIN REGULATIONS

To participate in the NFIP and to allow property owners to take advantage of federal flood insurance, a municipality must adopt and enforce a floodplain management ordinance that restricts new construction and improvements to existing construction in the SFHA. *(Refer to Flood Insurance Rate Maps, page 2.6.)* Although FEMA develops the FIRMs, which identify areas vulnerable to flooding, and offers information and strategies for floodplain management, much of the responsibility for floodplain management occurs at the municipal level, with standards, assistance, and guidance from state and federal governments. *(Refer to Community Rating System, page 2.18, and Participate in the Community Rating System, page 4.23.)*

The Florida Department of Environmental Protection Emergency Management (FDEM) establishes state standards and works with local communities to regulate construction in flood-prone areas through zoning, planning, and building codes. Although all development projects within the SFHA must be reviewed for permitting at the local level, some projects also require state, and potentially federal, approval, especially regarding construction permits in state waterways, activities near non-tidal wetlands, and activities that may change tidal wetland boundaries. FDEM helps communities conduct outreach related to floodplain management and flood insurance, quantify the risk of flooding, and identify mitigation actions to reduce the community's vulnerability to flood hazards. Many of these activities take place as part of the hazard mitigation planning process. *(Refer to Chapter 8, Planning: Hazard Mitigation for Historic Resources.)*

The FDEM has developed the Model Code-Companion Floodplain Management Ordinance For Communities with Inland (Zone A) and Coastal High Hazard Areas (Zone V) (April 3, 2017). The Model Ordinance integrates NFIP and state permitting requirements and contains additional provisions and suggestions that are more stringent than the federal regulations. Each Florida community can tailor the model ordinance to meet its conditions and adopt more stringent requirements to both improve its resilience and potentially achieve an insurance premium discount for property owners through the Community Rating System (CRS). *(Refer to Community Rating System, page 2.18.)* A municipal floodplain ordinance may be codified in different places. It may be its own article in the jurisdiction's code or as an article in another code, such as planning and zoning.

The local floodplain administrator ensures compliance with the floodplain ordinance; conducts outreach and education regarding the requirements of the NFIP and the municipality's floodplain regulations; reviews, approves, or denies updates to the community's FIRM; issues permits; participates in hazard mitigation planning activities; manages mitigation activities to protect vulnerable resources; and manages activities related to participation in the CRS. *(Refer to Community Rating System, page 2.18.)* It is important for preservation planners and others interested in flood-prone historic properties to understand their local floodplain regulation and how it might impact historic properties.

"100-YEAR FLOODPLAIN"

The term "100-year floodplain" implies, inaccurately, that a flood is likely to occur only once in a 100-year period. (Likewise, "500-year floodplain" implies one flood every 500 years.) What "100-year floodplain" actually means is that the area within that boundary has a 1% chance or 1-in-100 chance of flooding in any given year; therefore the 100-year floodplain is also referred to as the 1-percent-annual-chance floodplain. In fact, properties could experience a "100-year flood" in two consecutive years, just as it is possible for properties located in minimal flood hazard areas to flood, particularly in a severe weather event such as a hurricane.

For these reasons, and because FIRMs do not include climate change projections, it is recommended that local planners and preservation advocates use "1-percent-annual-chance floodplain" or "Special Flood Hazard Area" (SFHA) and that they account for climate change projections in any evaluation of flood vulnerability. However, it is important to be prepared to explain the term "100-year floodplain," particularly in public outreach. *(Refer to Establish a Planning Timeframe, page 8.14.)*

553.73, FLORIDA STATUTES

(5) Notwithstanding subsection (4), counties and municipalities may adopt by ordinance an administrative or technical amendment to the Florida Building Code relating to flood resistance in order to implement the National Flood Insurance Program or incentives. Specifically, an administrative amendment may assign the duty to enforce all or portions of flood-related code provisions to the appropriate agencies of the local government and adopt procedures for variances and exceptions from flood-related code provisions other than provisions for structures seaward of the coastal construction control line consistent with the requirements in 44 C.F.R. s. 60.6. A technical amendment is authorized to the extent it is more stringent than the code. A technical amendment is not subject to the requirements of subsection (4) and may not be rendered void when the code is updated if the amendment is adopted for the purpose of participating in the Community Rating System promulgated pursuant to 42 U.S.C. s. 4022, the amendment had already been adopted by local ordinance prior to July 1, 2010, or the amendment requires a design flood elevation above the base flood elevation. Any amendment adopted pursuant to this subsection shall be transmitted to the commission within 30 days after being adopted.

MODEL CODE-COMPANION FLOODPLAIN MANAGEMENT ORDINANCE FOR COMMUNITIES WITH INLAND (ZONE A) AND COASTAL HIGH HAZARD AREAS (ZONE V)

Florida's Model Code-Companion Floodplain Management Ordinance For Communities with Inland (Zone A) and Coastal High Hazard Areas (Zone V) (April 3, 2017) is available to guide local municipalities in the preparation of local ordinances. Communities seeking to adopt an floodplain management exemption for historic properties should reference the variance option and cross-reference the process between the zoning code and floodplain management code definitions.

A variance was issued when this building underwent rehabilitation allowing the finished floor elevation to remain unaltered.

HISTORIC PROPERTIES AND FLOODPLAIN REGULATIONS

Floodplain management ordinances focus on the protection of property. Some jurisdictions adopt more restrictive floodplain ordinances to account for changes in local conditions (for example, more frequent nuisance flooding), to improve resiliency to flood events, or to lower insurance premiums for property owners. *(Refer to Community Rating System, page 2.18, and Participate in the Community Rating System, page 4.23.)*

Historic properties in Florida are NOT automatically exempt from floodplain regulation. The NFIP and the FBC allow municipalities to waive compliance with floodplain management regulations at designated historic structures. However, this does not lessen their flood vulnerability nor reduce flood insurance premiums. Municipalities may mandate compliance with local floodplain management requirements for all buildings, including pre-FIRM structures. The FDEM has prepared a model ordinance for local communities to guide the preparation of ordinances that include exemptions for historic properties. *(Refer to Flood Resistant Provisions in the 7th Edition Florida Building Code Chapter 12, Historic Buildings, page 34, and Model Code-Companion Floodplain Management Ordinance for Communities with Zone A Only, sidebar, at left.)*

Both the Florida Building Code and the Model Code-Companion Floodplain Management Ordinance For Communities with Zone A Only provide guidance for municipalities to establish exemptions. The FBC also allows municipalities to adopt an exemption for projects deemed to be a "Substantial Improvement" ***provided that the alteration will not preclude the structure's continued designation as a historic structure.***

FLORIDA BUILDING CODE: FLOODPLAIN MANAGEMENT FOR HISTORIC PROPERTIES

The 2020 Florida Building Code provides exemptions from adherence with the Floodplain Management requirements for designated historic properties that meet specific conditions. *(Emphasis added below. Refer to Appendix B: Glossary for related definitions.)*

1201.3 FLOOD HAZARD AREAS

In flood hazard areas, if all proposed work, including repairs, work required because of a change of occupancy, and alterations, constitutes Substantial Improvement, then the building shall comply with Section 1612 of the Florida Building Code, Building, or Section R322 of the Florida Building Code, Residential, as applicable.

Exception: If the program that designated the building as historic determines that it will continue to be an historic building after the proposed work is completed, then the proposed work is not considered to be Substantial Improvement. For the purposes of this exception, an historic building is:

1. Individually listed in the National Register of Historic Places; or
2. A contributing resource within a National Register of Historic Places listed district; or
3. Designated as historic property under an official municipal, county, special district or state designation, law, ordinance or resolution either individually or as a contributing property in a district, provided the local program making the designation is approved by the Department of the Interior (the Florida state historic preservation officer maintains a list of approved local programs); or
4. Determined eligible by the Florida State Historic Preservation Officer for listing in the National Register of Historic Places, either individually or as a contributing property in a district.

1203.1 HISTORIC PRESERVATION GOAL

The historic preservation goal of this code shall be to minimize damage to and loss of historic structures, their unique characteristics and their contents as follows:

1. ***Maintain and preserve original space configurations of historic buildings.***
2. ***Minimize alteration, destruction or loss of historic fabric or design.***

1203.2 HISTORIC PRESERVATION OBJECTIVES

1. Preservation of the original qualities or character of a building, structure, site or environment shall be encouraged.
2. Removal or alteration of any historic material or distinctive architectural features shall be minimized.
3. Distinctive stylistic features or examples of skilled craftsmanship that characterize a building, structure or site shall be treated with sensitivity.
4. A compatible use for a property that requires minimal alteration of the building, structure or site and its environment shall be encouraged.
5. New additions or alterations shall be designed and constructed in such a manner that if such additions or alterations were to be removed in the future, the essential form and integrity of the structure would be unimpaired to the greatest degree possible.
6. Repairs, alterations, restorations, changes of occupancy, additions and relocations shall be guided by the recommended approaches in rehabilitation set forth in the Secretary of the Interior's Standards for Rehabilitation and Guidelines for Rehabilitating Historic Buildings.

202 DEFINITIONS

Substantial Damage: Damage of any origin sustained by a structure whereby the cost of restoring the structure to its before-damaged condition would equal or exceed 50 percent of the market value of the structure before the damage occurred.

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 is 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.***

MITIGATION IMPACT ON HISTORIC INTEGRITY

It is important to keep in mind that the practice of flood mitigation has not traditionally taken a building's historic character into account. Flood mitigation strategies require change, often radical change, that can damage or destroy the integrity or character of historic properties. If a property is altered to the point it is no longer eligible to be designated as historic, the owner must comply with the municipality's Floodplain Management ordinance. When selecting flood mitigation options, every effort should be made to minimize the impacts on the building's historic integrity.

GUIDELINES FOR FLOOD ADAPTATION FOR REHABILITATING HISTORIC BUILDINGS

In November 2021, the National Park Service released the *Guidelines for Flood Adaptation for Rehabilitating Historic Buildings*, providing further direction for communities, property owners, and tenants considering the impact of flood mitigation projects.

[www.nps.gov/orgs/1739/upload/flood-adaptation-guidelines-2021.pdf]

On its face, "historic structure" designation may appear to be a benefit in that it does not mandate compliance with flood-related building regulations, thus limiting potential change and providing greater protection of the property's historic integrity. However, not requiring compliance:

- Leaves buildings vulnerable to flooding and damage;
- Does not relieve property owners from obtaining flood insurance if otherwise required; and
- May foster a false belief that the flood risk is somehow reduced or eliminated.

Without guidance for how to reduce a property's vulnerability to flooding, "historic structure" designation may also place property owners who seek to reduce risk or lower their flood insurance premiums at odds with local historic preservation commissions, which strive to limit alterations to historic properties that are not otherwise mandated.

The passage of the federal Homeowners Flood Insurance Affordability Act (FEMA, 2014), which allowed for flood insurance premiums to increase to meet the actuarial rate for a property, provided an impetus for property owners to alter historic structures to avoid rising flood insurance premiums, regardless of whether the changes to the properties affect their continued designation as historic. This Act, in effect, promoted property protection over historic integrity. This shift towards mitigating historic structures conflicts with the prevailing direction of floodplain regulations, which emphasize historic integrity over flood protection. This will likely continue under ***FEMA's Risk Rating 2.0 - Equity in Action (2020) rating system, which factors prior storm damage when calculating flood insurance premiums.*** *(Refer to National Flood Insurance Rating Method, page 2.4.)*

107.5 HISTORIC BUILDINGS

A variance is authorized to be issued for the repair, improvement, or rehabilitation of a historic building that is determined eligible for the exception to the flood resistant construction requirements of the Florida Building Code, Existing Building, Chapter 12 Historic Buildings, upon a determination that the proposed repair, improvement, or rehabilitation will not preclude the building's continued designation as a historic building and the variance is the minimum necessary to preserve the historic character and design of the building. If the proposed work precludes the building's continued designation as a historic building, a variance shall not be granted and the building and any repair, improvement, and rehabilitation, shall be subject to the requirements of the Florida Building Code.

[FDEM]

HISTORIC STRUCTURE

Definitions of "historic structure" differ between regulatory agencies:

- **NFIP, FBC, FDEM:** When referring to historic properties, the NFIP and state model floodplain ordinance use FEMA's definition of "historic structure" that is based on, but not limited to, the criteria for listing in the National Register of Historic Places (*Refer to 1201.3, sidebar page 2.12.)*
- **NPS:** A constructed work, usually immovable by nature or design, consciously created to serve some human activity. *(www.nps.gov)*
- **DHR:** Any prehistoric or historic district, site, building, object, or other real or personal property of historical, architectural, or archaeological value, and folklife resources *(F.S. 267.021)*
- **Local Governments:** Florida municipalities set their own criteria defining what properties are "historic" as part of floodplain regulations

Therefore, properties designated "historic" under municipal historic preservation ordinances may or may not qualify for special treatment under local floodplain ordinances. However, if the property is located in a municipality that is a Certified Local Government (CLG) under the CLG Program, jointly administered by the National Park Service and the DHR, the NFIP, FBC, and FDEM will recognize the designation for the purposes of their associated regulations.

Flood damage can be extensive to interior finishes and furnishings. (City of Jacksonville)

REPETITIVE LOSS AND SEVERE REPETITIVE LOSS PROPERTIES

A history of flood loss likely indicates a building has a higher flood risk. FEMA tracks flood insurance policies and claims through a central database, using this data to identify properties that experience frequent or profoundly damaging flooding. These properties fall under two definitions established by the NFIP: "Repetitive Loss property" or "Severe Repetitive Loss property." *(Refer to NFIP Loss Definitions sidebar, at right.)*

Properties that fit the Repetitive Loss or Severe Repetitive Loss definitions are the greatest burden to the NFIP; those few properties comprise roughly one quarter of all NFIP payments since the inception of the program in 1978 and are subject to higher flood insurance under FEMA's Risk Rating 2.0 - Equity in Action. State and local hazard mitigation plans, therefore, often prioritize Repetitive Loss and Severe Repetitive Loss properties for mitigation, usually in the form of elevation or acquisition and demolition. However, the database only tracks insured properties (or properties that were insured at one time) where owners have submitted, and been paid for, a flood insurance claim for building and/or contents damaged by flooding. This means that uninsured properties or properties without claims that experience routine flooding may not appear in FEMA's database. The municipal floodplain administrator maintains a list of Repetitive Loss and Severe Repetitive Loss properties in the community.

Properties are identified as a Repetitive Loss or a Severe Repetitive Loss regardless of whether they meet the regulatory definition of "historic structure" in the municipality's floodplain ordinance. ***Although "historic structures" may not be required to comply with floodplain regulations, if a historic structure is also a Repetitive Loss or Severe Repetitive Loss property, the local floodplain administrator may still decide to pursue mitigation. Repetitive Loss properties are usually targeted for elevation or floodproofing, which reduce risk but can negatively affect a***

NFIP LOSS DEFINITIONS

Repetitive Loss Property: An NFIP-insured structure that has had at least 2 paid flood losses of more than $1,000 each in any 10-year period since 1978.

Severe Repetitive Loss Property: Any building that:

1. Is covered under a Standard Flood Insurance Policy made available under this title;
2. Has incurred flood damage for which:
   a. 4 or more separate claim payments have been made under a Standard Flood Insurance Policy issued pursuant to this title, with the amount of each such claim exceeding $5,000, and with the cumulative amount of such claims payments exceeding $20,000; or
   b. At least 2 separate claims payments have been made under a Standard Flood Insurance Policy, with the cumulative amount of such claim payments exceed the fair market value of the insured building on the day before each loss.

MITIGATE FUTURE LOSSES

Most NFIP policies include Increased Cost of Compliance (ICC) coverage, which applies when flood damage is severe. If your community declares your home "Substantially Damaged" or a "Repetitive Loss property," you will be required to bring your home up to current community standards. If your damaged building qualifies for ICC coverage, you could receive up to $30,000 to cover the cost to elevate, demolish, or relocate your home. Please refer to Coverage D of your policy and discuss with your insurance agent for further details.

[FEMA, P-2144 , September 2021]

FLORIDA STATUTES

The Florida Legislature may routinely modify Florida Statutes that impact historic structures and any reference made to Florida Statutes should be verified with the current legislation. *(www.leg.state.fl.us)* Additionally, a local building or planning official can answer any questions on current regulations. This may include minimum requirements for base flood elevation, local government pre-emptions for design review and demolition for properties in flood hazard zones, and procedural requirements related to building permits.

ACQUISITION PROGRAM

FEMA and the FDEM manage a Flood Mitigation Assistance Program that includes all types of mitigation opportunities including acquisition. Participation is voluntary and not guaranteed, and deed restrictions will be placed on the property to ensure it remains as a flood mitigation area. Under unique circumstances, State funds may be used to acquire property through the Land Acquisition Trust Fund although not specifically earmarked for flood mitigation purposes.

historic property's integrity and continued federal or local designation. Acquisition by a government agency and demolition are other typical mitigation actions for Severe Repetitive Loss properties with similarly negative impacts on historic properties. *(Refer to Acquisition Program, sidebar below.)*

If funded in part or in whole with state or federal dollars, a flood mitigation project will trigger historic preservation project review. *(Refer to Historic Property Project Review, sidebar page 4.25.)* However, flood protection, rather than preservation, is likely to prevail. In these cases, where protection and not preservation is emphasized, local preservation planners should review the list of Repetitive Loss and Severe Repetitive Loss properties in the municipality to determine:

- Whether any buildings meet the local floodplain ordinance's definition of "historic structure;"
- Whether any of the properties are locally recognized as historic, but do not meet the local floodplain ordinance's definition of "historic structure;" and
- Whether there may be buildings 50 years of age or older that have not been studied to assess their architectural or historical importance.

Ideally, preservation planners will work with floodplain administrators to develop flood mitigation projects that will provide the best outcome in terms of protection and preservation for these properties. Where compromise is not possible, preservation planners should offer options to offset the detrimental effect that flood mitigation will have on the historic property (e.g., architectural and historical investigation or documentation and/or local designation of similar properties within a local jurisdiction). *(Refer to Historic and Cultural Resource Documentation, sidebar page 14.6.)*

RESOLVING CONFLICTS IN LOCAL ORDINANCES

Florida's historic communities are inconsistent in the application of the historic structure exceptions for Substantial Improvement and floodplain management. A 2018 study found that many Certified Local Governments (CLGs) were using both a variance and an exception provision. This is inconsistent with FEMA guidance as well as statutory interpretation of local ordinances (Adoption of Ordinances Consistent with FEMA to Protect Historic Structures, Draft, January 2018). Review of the following sections of the floodplain ordinance to ensure that there is a clear path for historic property owners is recommended:

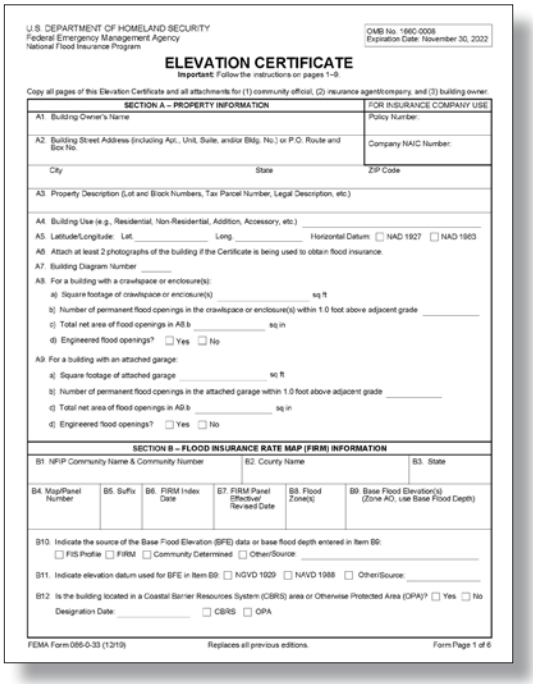
- **Definition of Substantial Improvement:** The Florida Statutes excepts certain historic properties from construction work that would otherwise be evaluated as a Substantial Improvement and many communities have adopted similar language (161.54, Florida Statutes). By definition, historic structures may be exempt from floodplain management regulations without any further action.
- **Variance provision in the floodplain ordinance:** This is the most direct method to address historic structures and allows for public review and expert analysis of the ability for the historic structure to maintain its designation status.

Flood vulnerability is largely based upon a building's location. A house at the bottom of a hill will be more vulnerable than a similar one at the top of the hill.

***House A** is above the DFE and elevation is not required, although it may be prudent to abandon the basement and relocate the building equipment and systems. **House B** was slightly vulnerable, but the extreme elevation, removal of the porch and chimney, and addition of the garage doors significantly impacts its historic integrity. **House C** has been elevated to a level of safety with minimal visual impact with the exception of a raised porch. **House D** required the greatest elevation to reduce its vulnerability, requiring an extended foundation and the reorientation of the stairs to provide access, but the remainder of the historic features are retained, minimizing the impact on its historic integrity.*

EVALUATING A PROPERTY'S FLOOD RISK

The most accurate way to evaluate flood risk is to have a licensed land surveyor, registered professional engineer, or registered architect prepare an Elevation Certificate for an individual property. ***An Elevation Certificate is an NFIP form used to provide elevation information (e.g., the height of the building's lowest floor in relation to the Base Flood Elevation [BFE] and other measurements related to the flood risk) to ensure compliance with floodplain regulations and to aid in determining the insurance rate for a specific property.*** For a building whose lowest floor is below the BFE, the Elevation Certificate will determine the height to which the building must be protected or elevated to mitigate that property's flood risk and comply with floodplain regulations. Municipalities may require preparation of Elevation Certificates as part of their permitting process; these certificates are typically kept on file by the local floodplain administrator. There are two important factors to consider when determining flood risk: A building's horizontal location (map location within the floodplain) and its vertical location (height of lowest occupied floor above adjacent grade relative to the BFE).



U.S. DEPARTMENT OF HOMELAND SECURITY
Federal Emergency Management Agency
National Flood Insurance Program

OMB No. 1660-0008
Expiration Date: November 30, 2022

ELEVATION CERTIFICATE
Important: Follow the instructions on pages 1–9.

Copy all pages of this Elevation Certificate and all attachments for (1) community official, (2) insurance agent/company, and (3) building owner.

SECTION A – PROPERTY INFORMATION | FOR INSURANCE COMPANY USE

A1. Building Owner's Name — Policy Number:

A2. Building Street Address (including Apt., Unit, Suite, and/or Bldg. No.) or P.O. Route and Box No. — Company NAIC Number:

City — State — ZIP Code

A3. Property Description (Lot and Block Numbers, Tax Parcel Number, Legal Description, etc.)

A4. Building Use (e.g., Residential, Non-Residential, Addition, Accessory, etc.)

A5. Latitude/Longitude: Lat. _____ Long. _____ Horizontal Datum: ☐ NAD 1927 ☐ NAD 1983

A6. Attach at least 2 photographs of the building if the Certificate is being used to obtain flood insurance.

A7. Building Diagram Number _____

A8. For a building with a crawlspace or enclosure(s):
a) Square footage of crawlspace or enclosure(s) _____ sq ft
b) Number of permanent flood openings in the crawlspace or enclosure(s) within 1.0 foot above adjacent grade _____
c) Total net area of flood openings in A8.b _____ sq in
d) Engineered flood openings? ☐ Yes ☐ No

A9. For a building with an attached garage:
a) Square footage of attached garage _____ sq ft
b) Number of permanent flood openings in the attached garage within 1.0 foot above adjacent grade _____
c) Total net area of flood openings in A9.b _____ sq in
d) Engineered flood openings? ☐ Yes ☐ No

SECTION B – FLOOD INSURANCE RATE MAP (FIRM) INFORMATION

B1. NFIP Community Name & Community Number		B2. County Name		B3. State
B4. Map/Panel Number	B5. Suffix	B6. FIRM Index Date	B7. FIRM Panel Effective/ Revised Date	B8. Flood Zone(s)	B9. Base Flood Elevation(s) (Zone AO, use Base Flood Depth)

B10. Indicate the source of the Base Flood Elevation (BFE) data or base flood depth entered in Item B9:
☐ FIS Profile ☐ FIRM ☐ Community Determined ☐ Other/Source: _____

B11. Indicate elevation datum used for BFE in Item B9: ☐ NGVD 1929 ☐ NAVD 1988 ☐ Other/Source: _____

B12. Is the building located in a Coastal Barrier Resources System (CBRS) area or Otherwise Protected Area (OPA)? ☐ Yes ☐ No
Designation Date: _____ ☐ CBRS ☐ OPA

FEMA Form 086-0-33 (12/19) — Replaces all previous editions. — Form Page 1 of 6

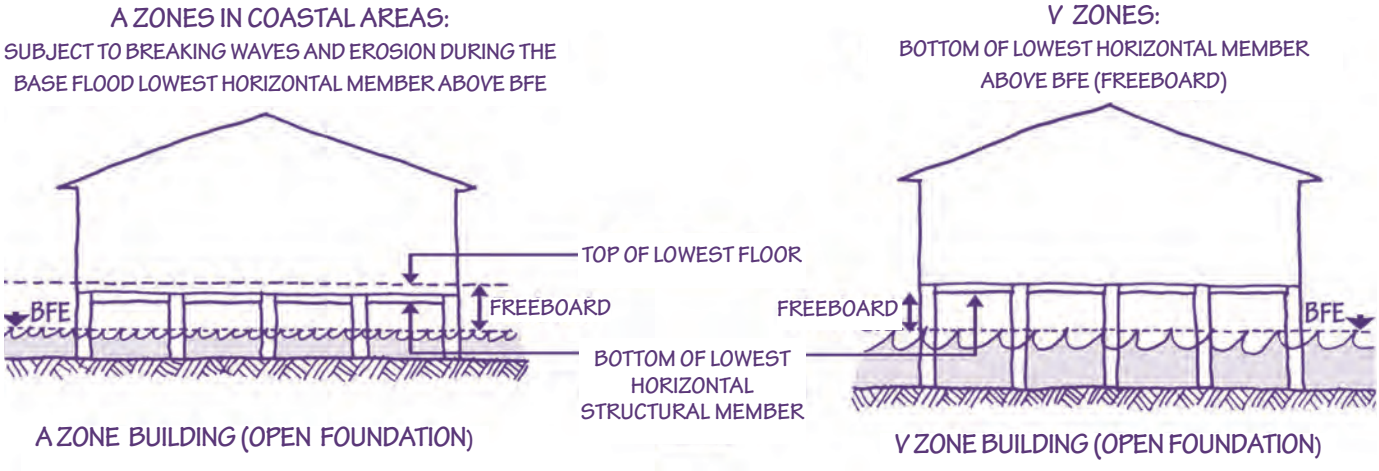
An Elevation Certificate is the official form documenting a building's position relative to sea level.

LOCATION WITHIN THE FLOODPLAIN

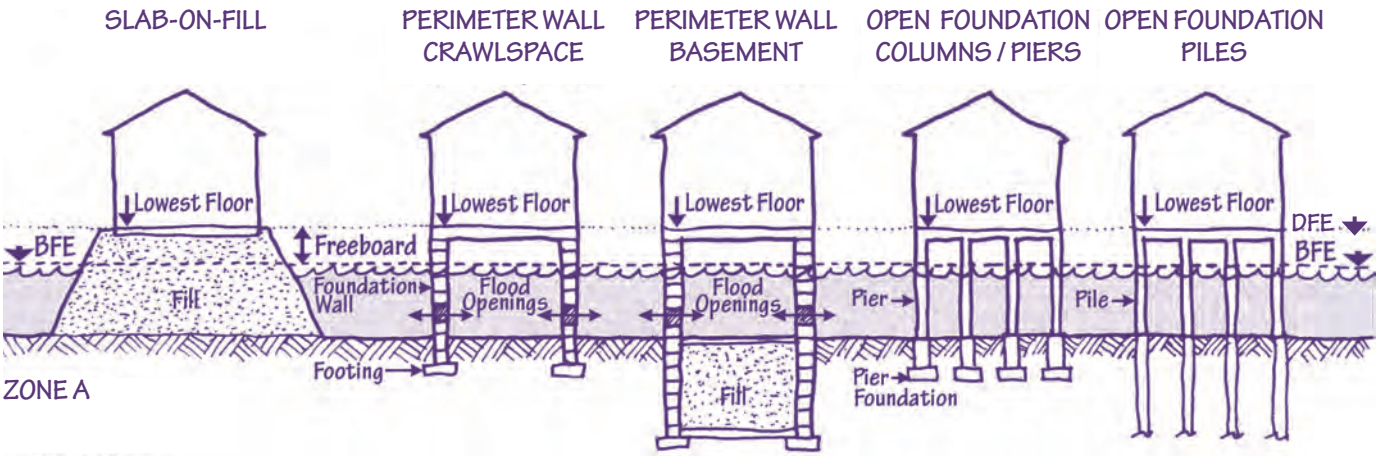
Different areas of flood risk are depicted on the FIRMs. In the SFHA, flood zones (AE, A1-30, VE, and V1-30) also depict the BFE, the height

to which floodwater is expected to rise during a 1-percent-annual-chance flood event. A building's vertical location in the floodplain is determined by comparing the height of the building's lowest occupied floor to the BFE. *(Refer to Location Definitions sidebar, page 2.7.)* For the purposes of this evaluation, the "lowest occupied floor" means the lowest floor that contains areas useable by the occupants (including a basement recreational room) or contains building systems, such as heaters and electric meters (including crawlspaces). In cases where there is no basement, the lowest floor may be a building's first floor (e.g. slab-on-grade). If a property's basement falls below the BFE, that property might have a higher flood risk, even if it lies outside the SFHA, particularly from groundwater or through water entry into window and door openings close to or below grade. Conversely, where the lowest floor of a property within a SFHA is raised above the BFE, the risk of damage to property and contents is reduced, potentially resulting in lower insurance premiums.

Some communities, particularly those that experience regular and severe flooding or that seek to lower premiums for greater numbers of property owners, can impose more stringent requirements by establishing a Design Flood Elevation (DFE), a height generally one to two feet above the BFE. *(Refer to Location Definitions, sidebar page 2.7, Community Rating System, page 2.18, and Participate in the Community Rating System, page 4.23.)* This extra height requirement is called "freeboard." In Florida, municipalities often differ in their floodplain ordinances as to the amount of freeboard they adopt. A few have no freeboard requirement beyond the one-foot mandated by the Florida Building Code (FBC), while others require one or more feet of freeboard. ***Freeboard requirements can help protect properties from increased flooding in the future due to factors such as climate change, which is otherwise not a required consideration.***



NFIP minimum elevation requirements: A Zones – elevate top of lowest floor to or above BFE; V Zones – elevate bottom of lowest horizontal structural member to or above BFE. In both V Zones and A Zones, many property owners have decided to elevate a full story to provide below-building parking, far exceeding the elevation requirement. See FEMA Technical Fact Sheet No. 1.2, Summary of Coastal Construction Requirements and Recommendations, for more information about NFIP minimum requirements in A Zones and V Zones. (Refer to www.fema.gov/media-library-data/20130726-1537-20490-0596/fema499_1_2.pdf. Base diagram obtained from www.fema.gov.)



Examples of NFIP-compliant homes in Zone A where the top of the lowest floor is located above the BFE. (Base diagram obtained from www.fema.gov.)

BUILDING FOUNDATION TYPE

Properties located within a FIRM's V Zones should be constructed on foundations of piers, posts, or piles set deep enough to resist the effects of scour and erosion and strong enough to withstand the forces from waves, currents, flood loads, and flood-borne debris. *(Refer to Flood Insurance Rate Maps, page 2.6.)* New basements are prohibited in V Zones but may be present in pre-FIRM structures.

In A Zones, buildings should be constructed on crawlspaces or continuous foundation walls with openings, such as flood vents, which allow floodwater to enter and exit without restriction. *(Refer to Wet Floodproofing, page 13.4.)*

It is recommended that buildings in Coastal A Zones also be constructed to the same requirements as buildings in V Zones, since buildings in Coastal A Zones are also subject to breaking waves, scour, and erosion. *(Refer to companion Storm Guidance for Florida's Historic Properties.)*

COMMUNITY RATING SYSTEM

Just as flood insurance rates can be reduced by lowering the risk of flood damage at individual properties, rates can also be dramatically reduced for municipalities participating in the NFIP's Community Rating System (CRS). ***The CRS is a voluntary incentive program that recognizes and encourages community floodplain management efforts that exceed the minimum NFIP requirements.*** The CRS uses a rating system from Class 10 to Class 1, with Class 10 being the lowest-rated classification and Class 1 being the highest-rated classification. Class 10 communities have been determined to be eligible to participate in the CRS, while communities with class 1 through 9 status are eligible for reduced flood insurance premiums.

Flood insurance premiums in SFHAs can be reduced by up to 45% for Class 1 communities (the highest rating in CRS) down to 5% for Class 9 communities. The reduction in flood insurance is commensurate with the actions, policy, and other steps the community has taken to reduce their potential for damage from flooding.

FLORIDA'S COMMUNITY RATING SYSTEM ELIGIBLE COMMUNITIES

Effective April 1, 2023, 245 of Florida's 264 NFIP participating communities were determined to have a classification rating of 1 to 9 in the Community Rating System (CRS), making them eligible for insurance premium reductions.

The following three communities have achieved Class 3 status in the NFIP's CRS, making properties located within the SFHAs eligible for a 35% discount on flood insurance:

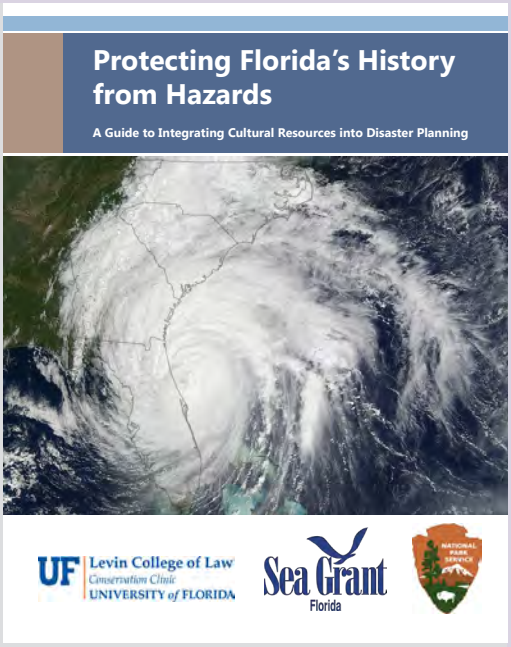
- Cutler Bay, Town of
- Monroe County
- Ocala, City of
- Pinellas County

The following community has achieved Class 4 status in the NFIP's CRS, making properties located within the SFHAs eligible for a 30% discount on flood insurance:

- Palm Coast, City of

Of the remaining, 55 communities have achieved Class 5 status in the NFIP's CRS, making properties located within the SFHAs eligible for a 25% discount on flood insurance.

Communities often make changes to improve their classifications rating. An updated list of classifications is available from FEMA. *(www.fema.gov/floodplain-management/community-rating-system#participating)*



A 2017 publication identifies how to include historic preservation in floodplain management. (www.law.ufl.edu)

IMPROVING CRS RATING WITH HISTORIC PRESERVATION

Local planning efforts can proactively use historic preservation to achieve goals of the CRS program and improve their score by taking action to reduce flood damage to historic structures:

- Inventory historic properties: Not expressly a sole credit, but it can help determine the number of buildings affected by an activity that does qualify for a credit
- Map vulnerable historic properties: The location, depth, source, and cause of flooding is used to assess a flood hazard impact on the community
- Share information about flood risks to historic structures: Generate a print and/or digital media campaign sharing flood protection strategies for historic structures
- Adapt historic structures to achieve floodplain requirements: Communities should provide recommendations on how to flood mitigate while maintaining historic character
- Encourage government acquisition of cultural resources: Open lands can include historic landscapes or archaeological sites

The goals of the CRS are to:

- Reduce property flood damage;
- Reinforce and support the insurance aspects of the NFIP; and
- Promote a community-wide, comprehensive approach to floodplain management.

In the CRS program, communities earn credits for taking specific initiatives that exceed the minimum requirements of the NFIP. For every 500 credits, flood insurance rates in a SFHA can be reduced by 5%. Examples of how communities can earn credits under the CRS include:

- Providing public information regarding flood hazards, flood insurance, and reduced flood damage;
- Mapping flood-prone areas and instituting regulations that limit new development in those areas;
- Reducing flood damage and flood risk at existing developments; and
- Providing flood preparedness through flood warning and levee and dam safety projects.

Participation in the CRS will generally improve the ability of a community and its property owners to recover from flooding. As indicated above, communities can increase their CRS classification by requiring a reduction in flood risk at existing developments. ***Although large-scale flood mitigation options can be considered, achieving the best classification will likely require the modification of individual properties. For historic properties, this could require more extreme alterations and impact the historic integrity of existing buildings and their settings.*** Examples of more extreme compliance that would affect historic structures include:

- Requiring higher Design Flood Elevations (DFEs) by increasing freeboard;
- Sealing lower window and door openings;
- Eliminating floodplain management requirements for historic properties; and/or
- Eliminating residential use of lower building levels.

Although the CRS provides improved flood resilience and discounted flood insurance rates, each community will need to evaluate options in terms of implementation, feasibility, cost/benefit (in losses avoided), and financial savings in insurance premiums. Some communities adopt higher floodplain regulations for historic properties than the NFIP or the state require.

In many cases, the physical alterations required at some historic properties to meet the goals of CRS compliance may negatively impact their historic integrity. Historic preservation planners should work with the floodplain administrator in the CRS application process to seek a balance between protection and preservation. If the affected properties are locally designated, proposed mitigations may need to be coordinated with the local design or historic review authority. Similarly, if the property has received or anticipates receiving funding or permits from state or federal governments, it is best to contact the DHR prior to undertaking any work to verify review requirements. *(Refer to Historic Property Project Review, sidebar page 4.25.)*

REFERENCES

Note: All references are available online unless otherwise noted. References that are only available as online resources are noted as "online resource." Refer to *Appendix A: Resources* for web links.

44 C.F.R. § 59.1. *Definitions*, National Flood Insurance Program (NFIP) Regulations.

FEMA. *Community Status Book Report: Communities Participating in the National Flood Insurance Program*, online resource.

FEMA. *Flood Map Service Center*, online resource.

Florida Statutes, online resource.

U.S. Department of the Interior [National Park Service]. *Guidelines on Flood Adaptation for Rehabilitating Historic Buildings* (2021).

University of Florida. *Protecting Florida's History From Hazards* (2017).

Pensacola, 1906. (Library of Congress)

3 WIND RETROFITTING

The impacts of severe weather events such as tropical storms and hurricanes can extend well beyond flooding. The entire state of Florida is vulnerable to strong winds. ***High winds, which often accompany severe storms, can have a significant impact on a building's materials and structure.***

Wind damage can occur through:

- High wind pressure and suction;
- Wind-driven rain; and
- Wind-borne debris.

Winds during a storm can be constant and gusty. Wind damage, such as a window shattered by wind-borne debris can negatively impact and damage the building and its contents. In addition, the opening in the window can result in increased internal air pressure and suction in the building, potentially compromising a building's structure. ***Most of Florida's high-wind events, such as hurricanes and tropical storms, are accompanied by significant rainfall. Wind-driven rain can enter any opening in a building. Openings in roofs, windows, and walls can provide pathways for stormwater that can cause damage similar to flooding. Wind retrofitting, as a supplement to regular building and property maintenance, can reduce the potential damage from high winds.***

In 2001-2002, the State of Florida began mandating nationally-recognized codes and requirements to mitigate wind damage. (The 2020 Florida Building Code [FBC] includes the current requirements.) Historic buildings were not constructed to meet these current wind requirements.

However, wind retrofit projects can often be implemented in a manner that minimizes the impact on the historic character of the building.

ELEMENT	POTENTIAL WIND VULNERABILITY
Roof Covering	• Roof covering can blow off
Roof Structure	• Roof structure can blow off or collapse • Tree limbs can fall on roof structure
Roof Ventilation	• Water intrusion during high winds
Soffits	• Uplift from wind pressure • Water intrusion at soffit vents
Glazing	• Cracking from wind-borne debris • Cracking from wind pressure
Skylights	• Cracking from wind-borne debris or tree impact • Cracking from wind pressure
Roll-Up Garage Doors	• Collapse from wind pressure
Gable Ends	• Structural collapse
Porches / Balconies / Carports	• Detachment from building
Structural Connections	• Detachment of building elements
Chimneys	• Structural collapse
Exterior Wall Coverings	• Siding can blow off • Brick or stone veneer can blow off
Fallen Trees	• Limbs can crash on buildings • Blocked roads, downed power lines
Rooftop / Wall-Mounted Equipment	• Can blow off
Fences	• Can become dislodged and air-borne
Gravel / Shell Paving	• Can become air-borne
Outdoor Furnishings	• Can become air-borne

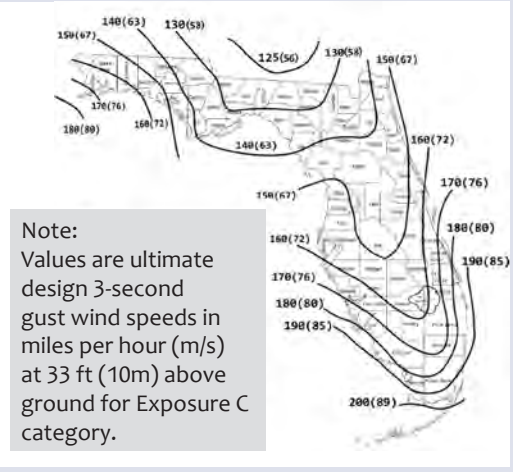
Wind damage from Hurricane Michael reached northward of Tallahassee into many rural communities like Greensboro.

HURRICANE WIND SCALE

Florida's coastal areas and the southern part of the state are in Wind-Borne Debris regions. Wind speeds and gusts in the Wind-Borne Debris regions can exceed a Category 5 Hurricane. These areas are subject to stronger code requirements.

CATEGORY	WIND SPEED	DAMAGE AT LANDFALL
1	74-95 mph	Minimal
2	96-110 mph	Extensive
3	11-129 mph	Devastating
4	130-156 mph	Catastrophic
5	157+ mph	Catastrophic

The Saffir-Simpson Hurricane Wind Scale. [NOAA]



Note:
Values are ultimate design 3-second gust wind speeds in miles per hour (m/s) at 33 ft (10m) above ground for Exposure C category.

Ultimate design wind speeds in Florida. The exact location of wind speed lines is established by local ordinance. [7th Edition (2020) update to the Florida Building Code]

NOAA captured Hurricane Irma as it approached Florida September 8, 2017 with Category 4 winds.

CONSIDERATIONS FOR WIND RETROFITTING PROJECTS

There is no single-solution for wind retrofitting projects: Each must be based upon the level of risk, building conditions, and the property owner's desired level of protection. Multiple retrofit measures will likely be required to reduce potential wind damage vulnerability.

When reviewing wind retrofit options, there are several factors to consider:

- **Level of Risk:** Properties located along the coast or in Wind-Borne Debris regions will experience higher wind speeds and gusts. *(Refer to Hurricane Wind Scale, sidebar at left.)*
- **Physical Construction:** Florida's historic buildings are constructed of a variety of materials in different configurations. Variations in construction can impact the potential success of a wind retrofit project.
- **Building Condition:** A well-maintained building will be more likely to withstand stronger winds. Minimizing or securing site features that can become air-borne will reduce potential impact damage. *(Refer to Encourage Property Maintenance, page 4.24.)*
- **Level of Desired Protection:** Individual property owners will determine whether it is worthwhile to invest in wind retrofit projects unless mandated as part of a larger project. Considerations will include cost, level of disruption, and the level of perceived vulnerability.

WIND INSURANCE

Severe winds can cause damage to buildings directly, and indirectly via falling tree limbs and air-borne debris. Unlike flood insurance, in the state of Florida wind storm insurance is generally required to be included as part of a typical homeowner's insurance policy *(Florida Statute 627.712)*. Residential and non-residential property owners should verify the adequacy of their coverage.

For homes built prior to the 2001 Florida Building Code, wind mitigation credits may be applied to a property insurance policy depending on current construction details for the following features:

- Roof covering;
- Nail spacing patterns;
- Roof-to-wall connections;
- Roof shape;
- Water barriers (Secondary Water Resistance); and
- Shutters.

Property owners should be encouraged to contact their insurance policy representative to learn the specific opportunities and requirements for wind credits based upon their building's conditions. A licensed contractor, architect, engineer, or local building inspector is authorized to inspect a property to identify potential mitigation measures and verify completed improvements.

WIND INSURANCE REQUIREMENTS

Insurance companies may impose more stringent requirements than necessitated by building codes as a condition of underwriting policies. A common area of concern is roofing. As a condition of providing a policy, or a policy at a more favorable rate, an insurance company may require scheduled roof replacement with their approved materials prior to the end of the current roof's useful life. This can make it challenging for property owners to maintain roof materials such as clay or concrete tile and slate.

However, ***the 2020 Florida Building Code (FBC) provides guidance for installing clay tiles, concrete tile, and slate in wind-prone areas***, that recommends the installation of solid sheathing and roof underlayment prior to installing rigid tiles. *(Refer to FEMA Clay and Concrete Roof Tile Replacement and FBC Rigid Tile Roofing, sidebar page 3.7.)* Local roof requirements, particularly in Wind-Borne Debris regions, may vary. *(Refer to Hurricane Wind Scale, sidebar page 3.3, and Local Wind Requirements, sidebar at right.)*

FLORIDA WIND INSURANCE SAVINGS CALCULATOR

The Florida Wind Insurance Savings Calculator can approximate insurance savings for building features and improvements. It also identifies the anticipated wind speed and areas of Wind-Borne Debris regions for an area based upon its location and terrain. *(Refer to Florida Flood Insurance Rate Calculator, apps.floridadisaster.org/wisc/.)*

LOCAL WIND REQUIREMENTS

Local building code requirements may be more stringent than the FBC, particularly in Wind-Borne Debris regions. *(Refer to Hurricane Wind Scale, sidebar page 3.3.)*

Existing buildings are generally permitted to remain in their current condition regardless of building code changes. However, replacement of a building element, due to damage or other reasons, may be subject to the requirements of the FBC and local requirements including wind resilience. This may also be the case if there is a change in use or in instances of Substantial Damage of Substantial Improvement. *(Refer to Substantial Improvement and Substantial Damage, sidebar page 2.12.)*

An understanding of local requirements may influence preservation review. For example, a local requirement for impact-resistent windows intended to protect a building and its occupants from high winds may make it difficult for a property owner to maintain historic windows. Proactively identifying criteria for wind-compliant windows may facilitate preservation review. Criteria may include matching the historic window type, size, configuration, and muntin pattern. *(Refer to Historic Property Project Review, page 4.25.)*

Historic buildings may have more complicated roof systems with attached roof features that will require a careful mitigation plan.

WIND RETROFIT ASSESSMENT

Prior to undertaking a wind mitigation project, property owners should be encouraged to complete a wind retrofit assessment. An assessment by a qualified professional can identify whether a "Wind Mitigation Package" will improve a building's wind resilience. *(Refer to Qualified Wind Assessment Professionals, sidebar at left.)* Sharing documentation related to the original construction or later improvements can improve the accuracy of the assessment

The assessor should perform a detailed review of the building to identify maintenance items that will impact the success of a wind retrofit project, and to recommend one or more of the three FEMA Mitigation Packages sufficient to provide guidance to the property owners.

The best option for some properties may be hurricane shutters as long as the roof and other features in well maintained.

QUALIFIED WIND ASSESSMENT PROFESSIONALS

A qualified professional should be retained by property owners to identify potential wind retrofit projects that may be effective given the unique property characteristics. Qualified professionals should have experience with historic building construction and with meeting the wind mitigation requirements of Florida and local jurisdictions, as applicable. In addition to architects and engineers, qualified professionals can include evaluators certified to meet Florida's wind retrofit program requirements.

PROPERTY MAINTENANCE

A well-maintained property can reduce potential damage in a high wind event or storm. Refer to *Encourage Property Maintenance, page 4.24, and Storm Guidance for Florida's Historic Properties, Appendix A: Storm Vulnerability Checklists* for additional improvements and maintenance items that can reduce potential wind damage at a property.

FEMA'S WIND RETROFIT GUIDE FOR RESIDENTIAL BUILDINGS

Information presented in this section is largely based on FEMA's *Wind Retrofit Guide for Residential Buildings.* [FEMA P-804 / December 2010, *www.fema.gov*]

FEMA'S WIND RETROFIT PACKAGES FOR EXISTING BUILDINGS

High winds, which often accompany severe storms, can have a significant impact on a building's materials as well as its structure. One of the primary concerns is that wind damage can create an opening for rain to enter a building, resulting in building and contents damage.

The parts of a building that are particularly vulnerable to high winds include:

- Roofing;
- Windows and skylights;
- Doors, including garage doors;
- Structural system connections;
- Exterior wall coverings;
- Chimneys; and
- Roof or wall mounted equipment.

FEMA's *Wind Retrofit Guide for Residential Buildings* breaks down wind retrofit projects into three mitigation "Packages." The packages group areas of a building and types of improvement work together, reflecting the complexity of implementation required from basic to advanced. The assessment should identify which Mitigation Package may be effective based on building conditions. *(Refer to Wind Retrofit Assessment page 3.5.)*

- **Basic Mitigation Package:** Securing roof; providing secondary roof water barrier; strengthening roof vents, soffits, and overhangs; and protecting windows, skylights, doors, and garage doors from wind-borne debris and large openings from wind pressure
- **Intermediate Mitigation Package:** Protecting windows, skylights, doors, and garage doors from wind-borne debris and large openings from wind pressure; bracing gable end walls over four-feet tall; and strengthening connections of attached structures such as porches and carports
- **Advanced Mitigation Package:** Developing a continuous load path from the top of the roof to the foundation; and protecting windows, skylights, doors, and garage doors from wind-borne debris and large openings from wind pressure

All of the Mitigation Packages include the protection of window and door openings, with greater protection above the Basic level. The Mitigation Packages can be completed all at once or sequentially to improve a building's level of protection, with the Advanced Mitigation Package completed after the Basic and Intermediate Packages. To protect their historic buildings, property owners should be encouraged to consider wind retrofitting when modifying an existing building or replacing exterior elements such as roofing or windows. However, the costs associated with wind retrofit projects will likely be included by the local building official in their determination of Substantial Improvement or Substantial Damage. The costs of required maintenance work undertaken prior to the wind retrofit may also be included. *(Refer to Encourage Property Maintenance, page 4.24, Substantial Improvement and Substantial Damage, sidebar page 2.12.)*

Siding is blown off a storefront in downtown Tallahassee from Hurricane Alma, 1966. (Florida Memory)

Protecting windows is an essential element of all Mitigation Packages.

BASIC MITIGATION PACKAGE

Most of the Basic Mitigation Package addresses the roof system, including improvements to structural connections, and minimizing the potential for stormwater intrusion.; it also includes protecting roof vents and overhangs. Some of the greatest damage to a building during a major storm generally occurs as a result of high winds that compromise the roof system by uplift, causing the entire roof, or components such as tiles or shingles, to blow off. Owners of historic buildings are encouraged to increase protection from these threats when repairing or replacing an existing roof.

FEMA CLAY AND CONCRETE TILE ROOF REPLACEMENT

When installing clay or concrete roof tiles, it is important to verify the local design wind speed and exposure category with the local building official. In addition, to improve wind resilience it is generally preferable to use nails or foam installations instead of mortar set.

[FEMA P-804]

FBC RIGID TILE ROOFING

It is also prudent to reference FBC, section 1609.5.3 Rigid Tiles, and local building codes for additional requirements. To be compliant with the FBC, solid sheathing and underlayment must be installed under rigid tiles. This construction methodology was less common in older roof installations.

Historic roof materials require special attention to materials and fastener, gutter, and flashing systems.

ROOF REPLACEMENT

Full roof replacement is likely needed to achieve the highest level of wind protection for a roof and may be triggered by a determination of Substantial Damage or Substantial Improvement by a local building official. *(Refer to Substantial Improvement and Substantial Damage, sidebar page 2.12.)*

As part of a roof replacement project, all roofing and underlayments should be removed to the roof deck, which, is typically plywood in newer construction, or may be wood boards or battens in older construction. Once the deck is exposed, the following steps should be undertaken:

- Replace damaged deck material;
- Add additional fasteners between the roof deck and structure below;
- Install a secondary water barrier (SWB) meeting local wind requirements that is compatible with deck and finished roof materials;
- Install a drip edge and flashing at eaves and gable ends;
- Replace damaged or worn flashing at roof penetrations such as chimneys and vent pipes or where roofing abuts a wall or similar element; and
- Install historically-appropriate roofing at visible locations to meet local wind speed requirements. (Solar heat gain can be reduced with light-colored or reflective roof coatings at flat roof surfaces that are not visible.)

Greater reductions in wind insurance premiums are more likely with roof replacement than with roof retrofit projects. *(Refer to Wind Insurance, page 3.4.)*

ROOF RETROFIT

Property owners may elect not to replace a roof as part of a wind retrofit project. In those cases, roof retrofitting may be a viable option for buildings with an accessible attic. Roof retroffiting work is largely completed within the attic, minimizing the removal of historic roof materials and impact on the building's historic appearance. It typically requires the application of spray polyurethane foam (SPF) to the underside of the roof deck, at joints between the deck panels, and on both sides of the framing panels.

Gable vents in older homes allow air ventilation and are not just decorative features.

Homes with flatter roofs may have wider eaves or overhangs as part of the roof structure.

ROOF VENTS, SOFFITS, AND OVERHANGS

A roof replacement project provides the opportunity to install ventilation systems that are designed to withstand high winds and minimize wind-driven rain intrusion. Roof vents can include soffits, ridge vents, and gable-end vents. Many historic ventilation openings, such as wood louvered vents, may not be strong enough to be effective in high wind events.

Soffits and overhangs, which are roof extensions, are also vulnerable to wind uplift. All soffits, overhangs, and vents should be strengthened, whether retrofitting or replacing an existing roof. If disassembly is required to improve the resilience of a soffit, there may be an opportunity to strengthen the connection between the roof and wall framing. *(Refer to Advanced Mitigation Package, page 3.13.)* Roof overhangs can generally be strengthened by extending the overhang framing within the attic roof framing.

Similar to roof retrofitting, roof vents, soffits, and overhangs can be strengthened from within an accessible attic with minimal exterior impact. In instances where an exterior change is required, such as the replacement of a wood gable vent with a metal vent, every effort should be made to duplicate the historic appearance.

WINDOWS AND DOORS

Windows and doors are highly vulnerable to impact damage from wind. At a minimum, temporary protection (such as plywood panels) should be installed. *(Refer to Window and Door Protection, page 3.9.)*

WINDOW AND DOOR REPLACEMENT

Windows and doors are critical components of a historic building's character. If window or door replacement is required, care must be used in selecting replacement windows or door systems that are visually similar to historic types and configurations.

Across Florida, properties located within one mile of the coast where wind speeds are 130 mph, and all properties where the wind speed is 140 mph or greater, are required to have impact-resistant windows, doors, or other protective coverings to meet the requirements of the 2020 Florida Building Code (FBC). These areas are referred to as Wind-Borne Debris regions and local jurisdictions may have specific information on the location of the wind speed line in a particular area. When making alterations to properties that do not already meet the requirements, it is possible the local jurisdiction will require compliance with current wind protection requirements. Protective coverings and hurricane shutters must meet technical specifications to be qualified as impact resistant.

Local governments are encouraged to provide property owners with guidance in the selection of appropriate replacement windows and doors. *(Refer to Develop Design Guidelines for Storm Mitigation, page 4.19.)*

LABELED WIND-RESISTANT PRODUCTS

New window and door assemblies intended for hurricane regions are tested for wind-borne degree impacts and for specified wind pressure. Historic windows, and those without labels, may not provide sufficient protection. In addition to windows and doors, hurricane shutters, skylights, garage doors, and glazed patio doors should be tested. The label should be permanently mounted and information regarding labeled elements should be shared with the assessor. *(Refer to Wind Retrofit Assessment, page 3.5.)*

Fasteners may need to be permanently installed to allow proper anchoring of fabric storm panels for protection.

INTERMEDIATE MITIGATION PACKAGE

The Intermediate Mitigation Package largely addresses window and door protection. It also includes the structural bracing of gable ends and strengthening attached structures such as porches and carports.

WINDOW AND DOOR PROTECTION

Windows and doors are key components of a building's historic character. Window and door assemblies and their glass components provide protection against flying debris, but may also be responsible for quickly shifting air pressure inside a structure. If a window or door fails, the wind pressure inside a building will increase, applying pressure and suction forces to interior surfaces potentially resulting in structural damage or failure of other window and door openings to allow for equalization of pressures.

The types of windows and doors are key to understanding their wind resilience. Traditional historic residential windows are wood, single-glazed windows with one piece of glass in each window frame or in each lite (or light) if there are multiple window panes in a single frame. Mid-century windows and storefronts are typically single-glazed with metal frames. Modern windows are often double-glazed, made with sandwiched panes of glass. Double-glazed windows can have decorative muntins applied to the outside or inside of the glass, or lattice installed between the panes of glass to simulate traditional windows. *(Refer to Glass, sidebar page 3.10.)*

Historic doors can include traditional pedestrian doors, paired French doors, or large sliding doors. They can be made of wood, steel, or aluminum and often include glass.

Lucite hurricane panels are temporary solutions installed prior to a storm event leaving only fastener anchors visible when coverings are not in use.

WINDOW AND DOOR PROTECTION TYPES

Window and door protection generally falls under the following four categories

- **Traditional Protection:** Installed protection that is historically appropriate that may or may not meet current code requirements for wind protection, such as shutters and storm windows and doors
- **Temporary Protection Installed Pre-Storm:** Temporary fabric storm curtains, hurricane panels, or plywood, without permanently installed devices or hardware with the possible exception of fastener anchors
- **Permanently-Mounted Hurricane Protection:** Permanently installed wall-mounted accordion or roll-up shutters, or polycarbonate sheets to protect windows
- **Hurricane Resistant Windows:** Engineered replacement windows constructed to meet code-required wind resistance

From a traditional preservation perspective, the preference would be to utilize traditional protection whenever possible or temporary protection installed in advance of a storm. In locations of higher vulnerability, such as Wind-Borne Debris regions, it may be prudent to consider the value of saving the historic windows versus saving the building.

GARAGE DOORS

Due to their large scale, historic garage doors require more robust protection methods than a traditional door. Wind protection can include permanently installed interior structural bracing, minimizing exterior visibility, or construction of a temporary wall in front of the garage door immediately in advance of storm.

GLASS

Glass can easily shatter and is one of the most vulnerable parts of a window or glazed door. Shattered glass can become air-borne, injuring people and property. In some cases, glass can be upgraded in existing windows and doors to reduce the likelihood of shattering. The additional weight and depth of impact-resistant glazing and double glazing can make installation in a historic window or door more difficult.

- **Tempered glass** fractures into small fragments rather than shards, reducing the potential for wind-driven damage. It can be installed in historic or new windows or doors.
- **Glazing films** are clear structural films applied to glass so it performs like tempered glass. The films do not make the glass unbreakable, but they can minimize the shards that will become airborne.
- **Impact-resistant glazing** is composed of two panes of glass with an internal sandwiched film that holds cracked glass together. Impact-resistant glazing is thicker and heavier than traditional single-paned glass. Some historic windows can be retrofitted for impact-resistent glazing, although the wood sash and frame must also be able to withstand the wind force to be effective.
- **Double-glazing** is composed of two panes of glass separated by a sealed internal spacer. Due to the thickness and weight, double-glazing is typically only installed at new windows and doors. Double-glazing can be manufactured to be impact-resistent. *(Refer to Window and Door Replacement, sidebar page 3.9.)*

WINDOW AND DOOR HARDWARE

The wind resistance of historic windows and doors can be improved with the installation of quality weather stripping to minimize the entry of wind-driven rain. In addition, strengthening existing hardware attachment or supplementing existing hardware, particularly at swinging doors and windows, can provide added protection.

Older homes have more steeply pitched gable roofs and taller gable-ends at risk from damage and collapse. Front porches are also subject to wind uplift that may cause collapse if not property anchored.

GABLE-END BRACING

Many historic buildings, particularly residences, have gable roofs. Gable-end buildings look like an "A," while hipped roofs are sloped in all directions. Gable ends, particularly gable ends that are more than four feet in height, can collapse in high winds. A gable-end collapse can compromise the roof structure and provide an opening for storm water to enter a building. Bracing can be added to the gable-end within an attic to improve wind resilience. In addition, gable-end vents should be covered to prevent wind-driven rain from entering a building. *(Refer to Roof Vents, Soffits, and Overhangs, page 3.8.)*

Attached carports can be pulled away during high winds and cause damage to the house if not properly secured to the building and ground.

PORCHES AND CARPORTS

Porches and carports typically are vulnerable extensions of a building that are fastened to a building wall and rest on piers or a foundation. The most vulnerable portions of porches and carports are often the connections of the roof to the building, and connections to piers or foundations.

Mitigation options tend to rely on supplementing or replacing straps and connectors to increase their ability to withstand high winds, typically with minimal impact on the historic appearance. Roof rafters can be secured to the building using metal straps or lag bolts. Columns, posts, and carport walls can be anchored directly to masonry or concrete foundations to prevent uplift. Improving foundation connections may also improve resilience to moving floodwater.

CONTINUOUS LOAD PATH

The overall structure must be designed for the sum of all lateral and uplift pressures; and individual parts must be designed to resist the outward and inward pressure concentrations, and must be connected to supporting members (beams, columns, walls, foundation) to form a continuous resistance path. Forces are also generated on structures by air-borne missiles that vary in size from roofing gravel to entire sections of roofs.

[FEMA]

A continuous load path provides hurricane-rated connections between structural elements to resist wind forces and keep a building intact during hurricanes and other extreme storms. The important connections that should be addressed are illustrated and listed below:

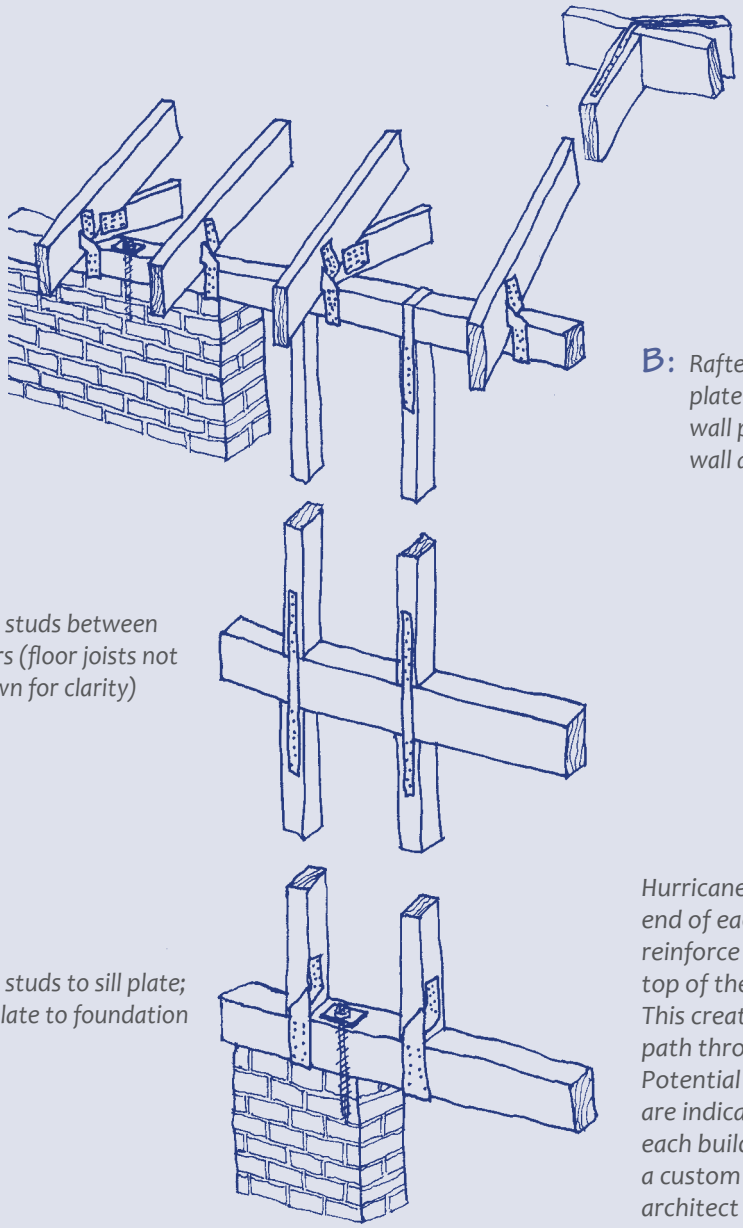
A. Across roof ridges

B. Roof to walls

C. Upper to lower walls between floors

D. Lower walls to wall sill plate

D. Wall sill plate to masonry or concrete foundation



A: *Rafters across a roof ridge*

B: *Rafters to top wall plate and joists; top wall plate to masonry wall and wall stud*

C: *Wall studs between floors (floor joists not shown for clarity)*

D: *Wall studs to sill plate; sill plate to foundation*

Hurricane connectors are located at the end of each wood framing member to reinforce the structural link from the top of the roof down to the foundation. This creates a continuous vertical load path throughout the wall system. Potential connection types and locations are indicated, but the conditions at each building are different and require a custom approach designed by an architect or engineer.

A large renovation exposing the structure is an opportunity to implement an Advanced Mitigation Package.

ADVANCED MITIGATION PACKAGE

The Advanced Mitigation Package establishes a continuous load path from the top of a building's roof to its foundation by improving the connections between structural elements. It is the most intrusive from a preservation perspective since it likely requires the removal of exterior and/or interior finishes to gain access to the connections.

Many buildings in Florida have wood framing for the roof and floors even if the walls are masonry. Wood-framed portions of a structure are more likely to be damaged by the effects of a significant storm. In some historic buildings, the connections between wood elements are nailed together with some earlier types of construction including pegged or mortised joints. The movement of a building in high wind tends to loosen connection joints, compromising the structural integrity of a building and leading to possible increased damage from a strong, sustained wind or wind gusts.

Completion of an Advanced Mitigation Package at a wood-framed building likely will impact the top of the roof, eaves, framing between floor levels, and where the building meets the sill plate and foundation. At masonry or concrete buildings, the areas of impact would likely be limited to locations where there are wood elements or transitions from wood to masonry or concrete, such as at a the roof level. *(Refer to Continuous Load Path, sidebar page 3.12.)*

ADDITIONAL MITIGATION CONSIDERATIONS

In addition to the three mitigation packages, there are additional improvements that can be undertaken by property owners to improve wind resilience. These include:

- Maintaining chimneys to prevent toppling
- Ensuring building elements are well secured
- Property maintenance to minimize flying debris and potential tree damage to buildings and electrical lines
- Securely anchoring roof-mounted and wall-mounted equipment

REFERENCES

Note: All references are available online unless otherwise noted. References that are only available as online resources are noted as "online resource." Refer to *Appendix A: Resources* for web links.

FEMA. *Wind Retrofit Guide for Residential Buildings* [*FEMA P-804*], 2010.

Florida's Foundation. *Make Mitigation Happen*.

2020 Florida Building Code 7th Edition.

U.S. Department of the Interior [National Park Service]. *The Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for Preserving, Rehabilitating, Restoring & Reconstructing Historic Buildings* (2017).

Tallahassee, 1957. (Florida Memory)

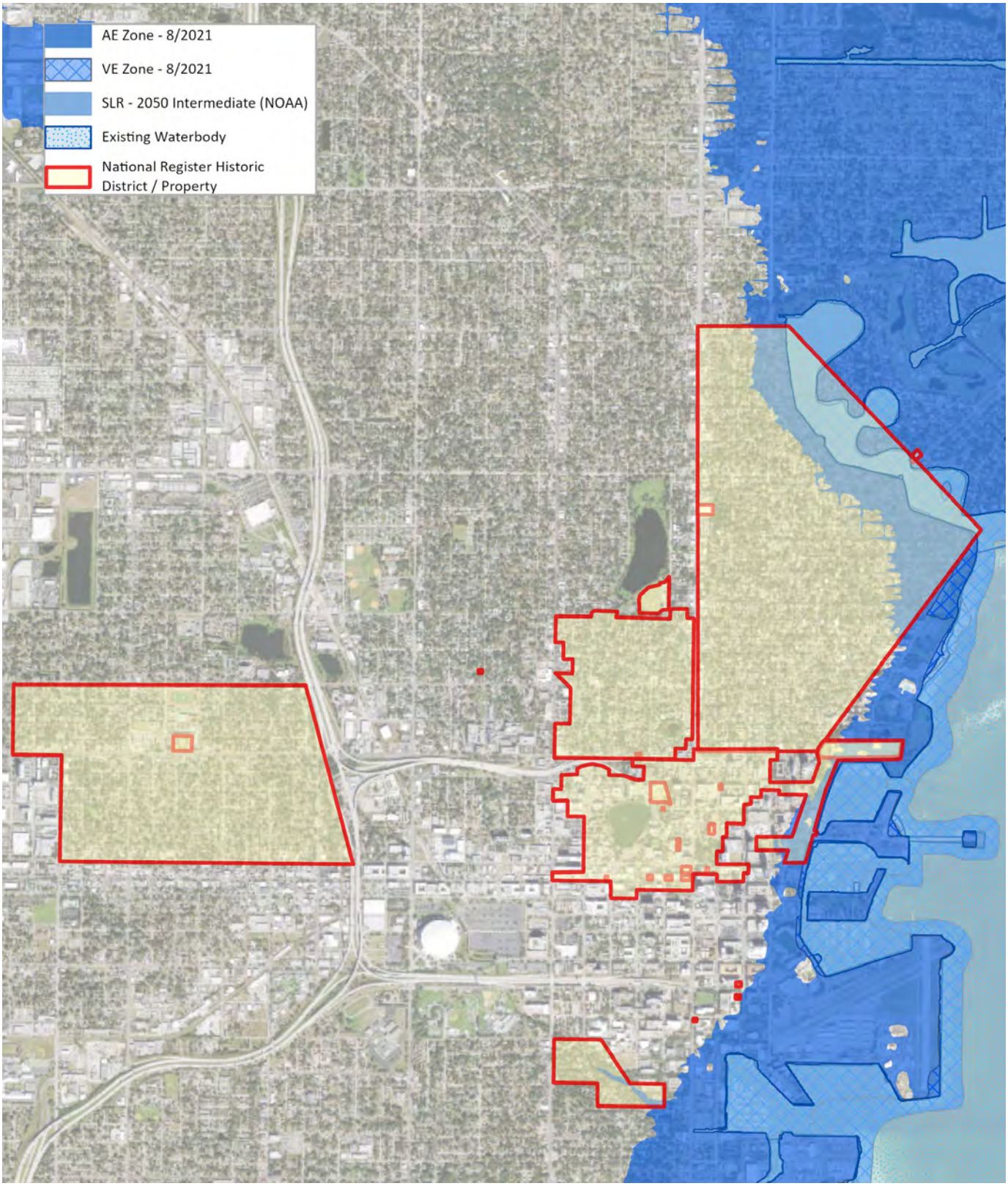
4 LOCAL TOOLS: PRESERVATION AND STORM MITIGATION

While all of Florida is vulnerable to wind damage, the level to which communities are impacted by flooding varies widely across the state. Those communities that have experienced repeated flooding may be more likely to have a more robust hazard mitigation or floodplain management plan and dedicated resources addressing flooding. By contrast, those that have not experienced flooding or whose experience is limited to an extreme event, such as Hurricanes Harvey, Irma, Michael, or Ian may not currently have dedicated resources to address flooding, but may be seeking to protect their historic commercial and residential properties to retain their unique sense of place.

Protecting an existing building from the impacts of severe winds tends to be a personal choice by individual property owners. However, local flood mitigation policies may impose requirements that can impact the historic integrity of a community. Communities seeking to protect their historic properties from severe storms should evaluate their current policies, programs, resources, information, and threats.

This analysis will prepare local government planners with a starting point and guide in:

- Revealing potential deficiencies in current information, processes, and resources;
- Directing local funding and personnel resources towards the protection of historic resources;
- Raising awareness about the flood and wind vulnerability of historic resources;



GIS mapping can be used to layer historic resources and areas of flood vulnerability to identify properties within flood-prone areas as shown in this map of St. Petersburg.

RESILIENT PLANNING AND HISTORIC PRESERVATION

Historic resources are important to resilient communities because they are places of memory and stability during times of crisis and help to preserve community identity even in the face of traumatic change. The growing popularity of resilience planning is an opportunity to better integrate preservation and disaster planning, to the benefit of both.

[Appler and Rumback, *Journal of American Planning Association*, 2016]

Local government officials can use traditional planning tools identified in this chapter to include historic resources within existing resiliency efforts.

- Establishing parameters for planning including identifying the most appropriate type of plan as well as the potential funding and mitigation opportunities;
- Identifying potential partners who can assist in aspect of the work, such as DHR, which can prioritize data collection and provide guidance in local planning efforts; and
- Integrating historic preservation into the local emergency management process.

Some of the activities that can be completed by local governments include:

- Identifying historic properties within flood-prone areas;
- Identifying vulnerable archaeological deposits and prioritizing documentation efforts;
- Addressing historic preservation and flood vulnerability in local planning efforts;
- Developing programs to identify and document vulnerable archaeological deposits;
- Modifying the local zoning ordinance;
- Modifying the local building code requirements;
- Modifying the local floodplain regulations;
- Developing community-specific design guidelines for flood mitigation of historic properties;
- Identifying the economic impact of historic preservation within a community;
- Developing incentives to encourage sensitive mitigation of historic properties;
- Participating in the Community Rating System (CRS);
- Encouraging property maintenance; and
- Planning for storm response and recovery tailored to the protection of historic properties.

IDENTIFY HISTORIC PROPERTIES WITHIN FLOOD-PRONE AREAS

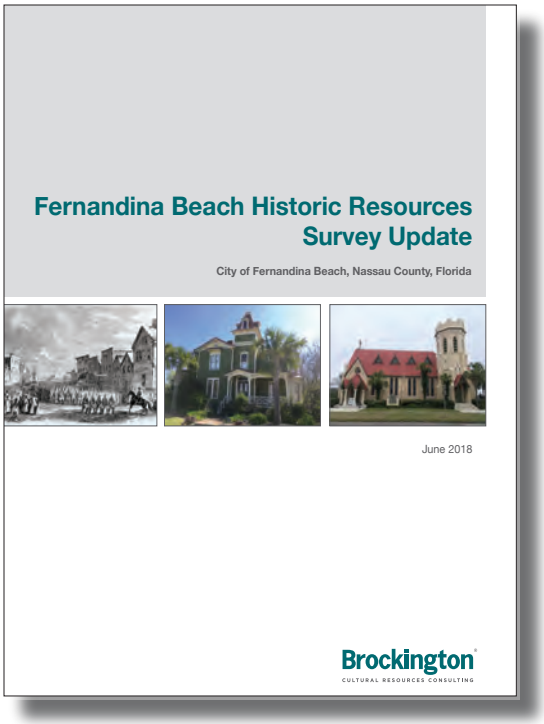
As with any preservation planning activity, the identification of historic and/or locally significant properties is one of the first steps in the hazard mitigation planning process. In addition to enriching local knowledge, the process provides a valuable opportunity for the community to provide feedback and share knowledge about places that are important to them. Engaging the public in the effort may help to identify significant properties that meet the criteria for listing in the National Register of Historic Places or for local designation, or that are culturally valuable to the community, with or without designation. *(Refer to Engage the Public, page 8.13.)*

HISTORIC RESOURCE DOCUMENTATION

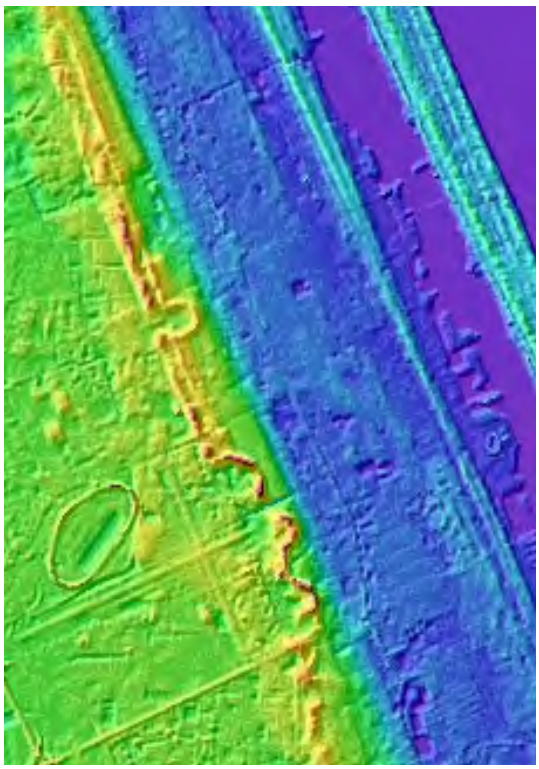
As a starting point, existing historic resource documentation should be collected from various entities, such as the following:

- **Local Government:** County and city governments may have a dedicated historic preservation program with staff and/or a reviewing commission or board. If not, the planning department may have a staff person assigned to historic preservation matters. These offices in local governments often maintain inventories of individual properties and historic districts in their jurisdiction, supplemental information about properties included in state or federal records, and information about the type and level of regulation of each property. Properties subject to design review and landmark designation will include properties subject to floodplain regulations as well as other regulations that may overlap historic preservation goals. Individual local landmarks or local historic districts can be designated by the local government depending on its ordinances. Note: A Historic Preservation Element of a comprehensive plan is optional and, if established, serves a single jurisdiction. Hazard mitigation planning is under the leadership of a county authority, so all local preservation programs of city governments within its jurisdiction should be consulted. *(Refer to Addressing Preservation and Planning in Local Planning Initiatives, page 4.6, and Chapter 8, Planning: Hazard Mitigation for Historic Resources.)*
- **State Historic Preservation Office (SHPO):** As SHPO, the Florida Division of Historical Resources (DHR) maintains the Florida Master Site File, an inventory of historic and cultural resources found in archaeological sites, historic structures, historic cemeteries, historic bridges, and districts, landscapes, or other linear features. *(dos.myflorida.com/historical/preservation/master-site-file/)* Information and data contained within this inventory must be requested from the Site File staff. Additionally, many Florida's National Register nominations are available from the National Park Service. *(www.nps.gov/subjects/nationalregister/database-research.htm)* These records are merely informational but often serve as the basis for local preservation planning and inventories. To regulate properties for design review or other purposes, local governments must designate properties according to local criteria; the state Inventory does not track which properties are locally designated. DHR also maintains records for Florida properties listed in or eligible for listing in the National Register of Historic Places and can make determinations of eligibility for properties that have not been evaluated. In the event of a state or federal undertaking, including mitigation efforts funded by FEMA, DHR consults with the state or federal agency to avoid, minimize, or mitigate harm to these historic properties through their Programmatic Agreement of the Section 106 process.
- **Florida Trust for Historic Preservation:** Dedicated to promoting the preservation and inclusive sharing of the diverse architectural, historical, and heritage of Florida, Florida Trust can provide preservation tools and volunteer support before, during, and after disasters. *(floridatrust.org.)*
- **Regional Planning Councils:** Area planning councils can provide technical and financial planning assistance as well as resources for including historic preservation policies in local government if they are not already established. *(Refer to Addressing Preservation and Disasters in Local Planning Initiatives, page 4.6.)*
- **Local Historical Societies and Museums:** Many local historical societies and some regional museums maintain archives, photographs, and other records about historic sites and properties, as well as oral histories and documents related to storm and flooding events.
- **Florida Statewide Programs:** Statewide resources, such as the Florida Public Archaeology Network (FPAN) and Florida Historical Association, can provide valuable information about the people and places that helped shaped the State's history.
- **Local, State, and Federal Agencies with Community Cultural Resources:** Several agencies collect and maintain information regarding historical and cultural resources. For example, Florida's Department of Transportation (FDOT) runs the state's Scenic Byways Program with 27 scenic byways encompass landscapes, viewsheds and historically and culturally significant places that may not be documented elsewhere. *(www.fdot.gov/designsupport/highwaybeautification/scenichighways)*

(Refer to Historic and Cultural Resource Documentation, page 14.6.)



Historic resource surveys need to be routinely updated to capture undocumented historic sites.



LiDAR imagery from Daytona Beach area identifies higher elevations in red and yellow tones reflecting relict dune systems that would have provided protection to inland areas.

To accurately assess the impact of flooding on historic properties, it is necessary to develop baseline survey documentation to establish municipal preservation goals and flood mitigation strategies. Municipalities in Florida with little or outdated information regarding their historic resources will need to develop additional documentation to inform their understanding their flood vulnerability. Where historic documentation is available, it is often filed in paper form not easily utilized by municipal planners in floodplain management and other local decision processes.

To enhance a community's ability to incorporate historic preservation considerations in their decision-making process, historic resource data should be linked to GIS (Geographic Information System) mapping to facilitate its use in both municipal planning and mitigation. As an alternative, historic properties can be manually located on a Flood Insurance Rate Map (FIRM) with the understanding that this approach is prone to transcription errors when property designation statuses change or FIRMs are updated. The flood vulnerability of individual properties can be supplemented by Elevation Certificates as they become available. *(Refer to Chapter 1, Storm Vulnerability, and Evaluating a Property's Flood Risk, page 2.16.)*

When identifying flood vulnerability, all known historic properties should be identified, including those on or determined eligible for listing in, the National Register of Historic Places; properties documented in the Statewide Inventory of Historic Places and local inventories; and properties identified as culturally or historically significant in planning documents. ***Designation as a "historic resource" locally, on the National Register of Historic Places, or National Register-eligible, has the potential to impact how a property will be treated vis-a-vis floodplain requirements and the recovery process. Therefore, an accurate list is critical.*** *(Refer to Implementing Floodplain Regulations, page 2.10.)*

When sufficient municipal resources are not available, volunteers or partnerships with other groups, including non-profit entities, can assist in documentation efforts. If necessary, these efforts can start small and documentation can be accumulated over several years. In some cases, funding to conduct cultural resources surveys may be available through the hazard mitigation planning process if those surveys identify hazard risks and recommend mitigation measures.

Such surveys provide additional advantages by facilitating regulatory reviews by the historic preservation commission and informing master plans and historic preservation elements. *(Refer to Addressing Preservation and Disasters in Local Planning Initiatives, page 4.6.)*

Consideration should also be given to documenting archaeological sites. This can be particularly relevant along coastlines that may have been home to Native American populations and early European settlements. Knowing the location of potential earth forms or deposits can also prevent unintended disturbance during subsurface projects such as the routing of a utilities update project, even if a community does not have a formal archeological program or mandate. *(Refer to Chapter 6, Archaeology, and Appendix D: Archaeology.)*

ADDRESSING PRESERVATION AND SEVERE STORMS IN LOCAL PLANNING INITIATIVES

Community planning is a process by which local goals and objectives are established, and a plan of action is identified by targeting investment based upon existing conditions and available resources. Locally, planning can address a variety of issues including city or regional planning, land use, development and redevelopment issues, open space, transportation, and historic preservation.

Protecting historic, archaeological, and cultural resources while planning for and adapting to damaging storms, flooding, and associated disasters is an ongoing challenge for Florida's communities. Although planning for disasters and historic properties should ideally occur through hazard mitigation plans, which are the best tools for integrating historic resources into a community's response, local governments can also develop other materials to foster preparedness. Cultural Resource Hazard Mitigation plans, historic preservation elements, and several smaller but nonetheless important initiatives, such as design guidelines for flood mitigation, offer ways to augment an existing hazard mitigation plan. *(Refer to Develop Design Guidelines for Storm Mitigation, page 4.19, and Chapter 8, Planning: Hazard Mitigation for Historic Resources.)*

It is critical that all plans share consistent goals and strategies and recognize a community's current and anticipated flood risk, which will establish a timeframe for planning and implementation. In the context of flooding, this will largely be defined by the community's existing level of preparedness related to its level of flood vulnerability. *(Refer to Assess and Document Historic Property Flood Risk, page 8.15.)* However, establishing a planning timeframe is uniquely challenged in the context of climate change. *(Refer to Establish a Planning Timeframe, page 8.14.)* Current flood risk can be assessed by reviewing the Flood Insurance Rate Maps (FIRMs), and information regarding the impacts of anticipated sea level rise is available through NOAA's Digital Coast Sea Level Rise Viewer. *(coast.noaa.gov/slr/) (Refer to Flood Insurance Rate Maps, page 2.6.)*

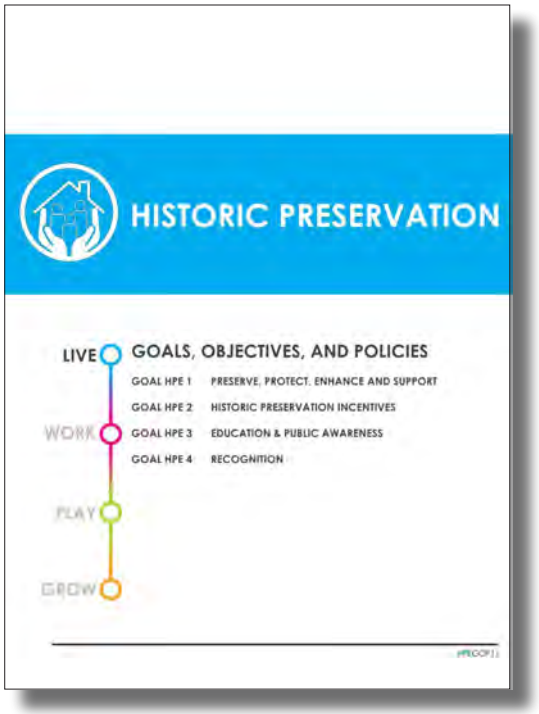
CULTURAL RESOURCE HAZARD MITIGATION PLAN

Additionally, local governments can create cultural resource hazard mitigation plans as a tool for guiding how communities and historic properties adapt to natural hazards, climate change, and increasing vulnerability to flooding. ***Like hazard mitigation plans and comprehensive plans, cultural resource hazard mitigation plans set goals, objectives, and actions related to floodplain management but with a focus on historic resources.***

Historic resources should be explained in the plan in terms of the value as community assets and identify actions towards their long-term protection with specific attention to storm vulnerability. Specific recommendations could include:

- Updating regulations to include current processes and policies
- Creating streamlined review processes to expedite response and review of historic properties impacted by flooding or wind damage

Historic preservation plans can develop hazard mitigation strategies for historic resources.



The Historic Preservation Element of the Delray Beach Comprehensive Plan establishes clear goals for the program.

COMPREHENSIVE PLANNING FOR HISTORIC PRESERVATION

Whether or not a community chooses to adopt a separate Historic Preservation Element in their comprehensive plan, historic resources must be addressed in the Future Land Use, Housing, and, where required, Coastal Management Elements.

In order to achieve preservation goals, a comprehensive plan may include policies related to floodplain management such as:

- Compatible design for flood mitigation projects in historic districts
- Maximum design flood elevations for historic buildings
- Demolition or partial demolition of historic building features when buildings are elevated
- Disaster management policies that include historic resource considerations
- Completing research and survey documentation of historic properties threatened by severe storms
- Providing a strategic framework to meet a community's goal of protecting their historic resources

This planning process may provide a more accessible forum for community participation than the larger disaster management planning process because historic resources help define a community's identity. To the degree possible, the planning team should follow the hazard mitigation planning process framework to ensure uniformity in the municipality's approach. *(Refer to Chapter 8, Planning: Hazard Mitigation for Historic Resources.)* ***Because both cultural resource hazard mitigation plans and standard hazard mitigation plans establish the framework for a municipality's future floodplain management, the goals, objectives and strategies in both documents should be consistent and reinforce each other.*** Cyclical updates–five years for hazard mitigation plans and ten years for master plans–allows a municipality to regularly evaluate and anticipate future goals. *(Refer to Write, Adopt, and Implement the Plan, page 8.28.)* These goals should include working with adjacent communities that share similar flood risks to develop recommendations for shared, large-scale mitigation projects, such as shoreline protection. Working together will reduce the likelihood that mitigation in one community will exacerbate flooding in an adjacent community.

COMPREHENSIVE PLANS: HISTORIC PRESERVATION ELEMENTS

Through comprehensive plans and plan updates, counties and municipalities develop a framework for future growth and development, illustrating current and potential land use and demographics. Although historic preservation is an optional element to meet Florida's comprehensive plan requirements, historic preservation must be addressed in the Future Land Use, Housing, and, where required, Coastal Management Elements.

A Historic Preservation Element, including a municipality's cultural resource hazard mitigation plan (if there is one), describes the following:

- A summary of the historic and cultural resources inventory
- Preservation goals
- Recommended actions

Typically developed by municipal planners, consultants and/or historic preservation boards or commissions, the Historic Preservation Element is not mandated so it does not have specific content requirements. Like comprehensive plans, historic preservation elements generally describe the existing conditions and regulatory framework and identify preservation goals and strategies to achieve those goals. As such, they are flexible and can be adapted to address local needs and recommendations. If adopted by a municipality or county, the Historic Preservation Element can have regulatory authority but generally it will not be as specific as land development codes or other ordinances.

FLORIDA COMPREHENSIVE PLANNING REQUIREMENTS

Comprehensive planning requirements in Florida recognize that flooding and sea level rise need to be addressed in local government planning initiatives:

- Legislation was passed in 2015 that requires communities that have a Coastal Management Element as part of their comprehensive plan must include "a redevelopment component that outlines the principles that must be used to eliminate inappropriate and unsafe development in the coastal areas when opportunities arise." *[Peril of Flood Community Planning Requirements F.S. 163.7138(2)(f)1-6]*
- Models of comprehensive planning documents that address the Peril of Flood were subsequently developed through grants administered by the Florida Department of Economic Opportunity.

COMPREHENSIVE PLANNING FOR HISTORIC PRESERVATION

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In order to achieve preservation goals, a comprehensive plan may include policies related to floodplain management such as:

- Compatible design for flood mitigation projects in historic districts
- Maximum design flood elevations for historic buildings
- Demolition or partial demolition of historic building features when buildings are elevated
- Disaster management policies that include historic resource considerations

INCORPORATING HISTORIC RESOURCES INTO A COMPREHENSIVE EMERGENCY MANAGEMENT PLAN (CEMP):

Communities have the flexibility to incorporate any applicable priorities within their own emergency plans. Nassau County's 2019-2023 Base Comprehensive Emergency Management Plan (CEMP) includes cultural resources as one of six priority recovery support functions.

NATURAL AND CULTURAL RESOURCES RECOVERY SUPPORT FUNCTION

Mission:

Address long-term environmental and cultural resource needs to protect from future damage or losses.

Core Capabilities:

Protect natural and cultural resources and historic properties; preserve, conserve, rehabilitate, and restore them in a manner consistent with community priorities and applicable laws.

Pre-Disaster:

- Identifies State and Federal programs and incentives to support the preservation, protection, conservation, and restoration of natural and cultural resources
- Develops an action plan to identify and address the community's priorities for restoration of, and protective measures for, natural and cultural resources
- Identifies gaps and reconciles inconsistencies among regulations, policies, program requirements, and processes used in disaster recovery that may affect natural and cultural resources
- Works with private nonprofits and other NGOs to encourage governments to include risk reduction for natural, cultural, and historic resources in emergency response and disaster recovery plans
- Promotes hazard mitigation and protection of cultural and natural resources utilizing coastal barriers, zoning restrictions, protective retrofitting, proactive floodplain and wetland management strategies to reduce vulnerabilities

Post-Disaster:

- Secures State and Federal resources through available programs to meet local needs
- Implements the natural and cultural resources protection and revitalization action plan
- Improves natural and cultural resource protection through hazard mitigation during restoration activities
- Addresses gaps and coordinates cross-jurisdictional resources and restoration activities to ensure consistency and avoid duplication of effort
- Maintains a robust communications network to ensure ongoing dialogue and information sharing among all levels of government, public and private partners.

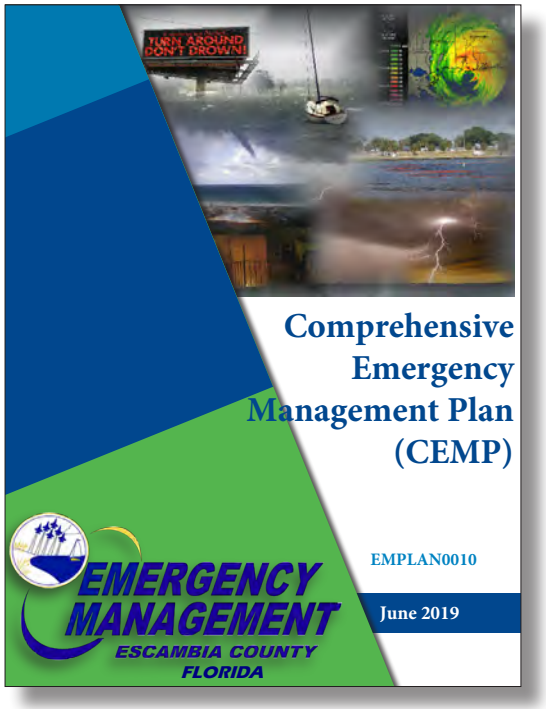
[www.onenassau.com]

DISASTER MANAGEMENT FOR HISTORIC RESOURCES AND THE COMPREHENSIVE PLAN

The City of St. Petersburg Comprehensive Plan, effective January 1, 2022, provides an example of where historic preservation and disaster management can be cross-referenced:

- **Historic Preservation 2.13:** The City shall create a Historic Property Disaster Preparedness Plan for historic and archaeological resources, pursuant to federal and state guidelines
- **Coastal Management 15.1:** The City will continue to promote the preservation of resources by conducting historic resource surveys and developing ordinances, guidelines and/or databases

[www.stpete.org]



Each community's CEMP will address its own unique emergency management issues.

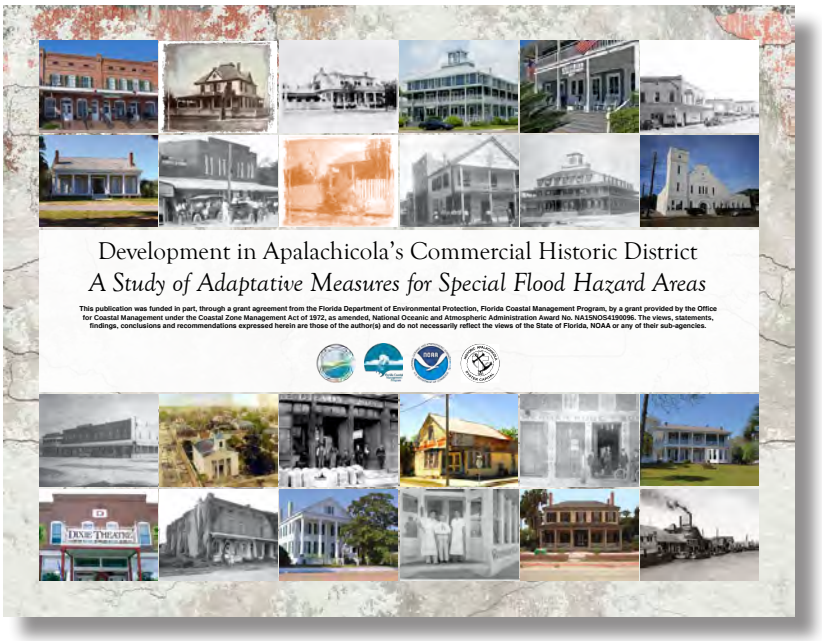
As with cultural resource hazard mitigation plans, historic preservation elements should be used to set goals, objectives, and actions specifically related to flood vulnerability and management; hazard mitigation; historic properties; and archaeological sites. The preservation planning team should utilize the hazard mitigation planning process framework to the degree that makes sense for the community and its resources. Counties and municipalities without a separate historic preservation element should still use their comprehensive plan to address local historic preservation and archaeological concerns, either in an optional element or as part of the Future Land Use, Housing, and Coastal Management Elements. *(Refer to Comprehensive Plans: Historic Preservation Elements, page 4.7.)*

COMPREHENSIVE EMERGENCY MANAGEMENT PLANS

County emergency management divisions are required to maintain a local Comprehensive Emergency Management Plan (CEMP) that should describe the basic strategies, assumptions, and mechanisms enabling the County to support local emergency management efforts through preparedness, response, recovery, and mitigation. The CEMP is intended to provide a framework for counties to coordinate with all local jurisdictions, contiguous and regional jurisdictions, and state and tribal governments. The CEMP is divided into 2 parts:

1. **Basic Plan with Recovery Operations (Annex I) and Mitigation Activities (Annex II)**
    - The purpose, scope and methodology of the plan, direction and control, organizational structure, alert notification and warning, four phases of emergency management (preparedness, response, recovery, and mitigation) actions, responsibilities, authorities, and references
    - Annex I outlines the steps taken during the recovery efforts following an emergency or a disaster
    - Annex II outlines the mitigation activities before, during, and immediately following a disaster
2. **Emergency Management Capability Assessment**
    - Demonstrates the county's capacity to perform the activities outlined in their Comprehensive Emergency Management Plan, standard operating procedures and other support documents/ activities that are involved in the emergency management program

Historic buildings, other cultural resources, and natural resources are typically addressed jointly in a single annex. *(Refer to Incorporating Historic Resources Into a Comprehensive Emergency Management Plans [CEMP], sidebar page 4.8, and Chapter 9, Response: Hazard Mitigation for Historic Resources.)*



Between 2011 and 2018, the Florida Department of Economic Opportunity supported Adaptation Pilot Projects and Community Resilience Initiatives across the state. These projects collected data specific to each community and developed adaptation strategies that can provide a model for other areas in the state. Apalachicola completed design guidance with the assistance of Florida A&M University. (www.floridadep.gov)

ADAPTATION PLANS

The Florida Department of Environmental Protection (DEP) and the Florida Department of Economic Opportunity (DEO) created an Adaptation Planning Guidebook in 2018 to assist Florida communities in preparing for and dealing with the effects of sea level rise, especially coastal flooding, erosion, and ecosystem changes. Following the Guidebook, local governments can adopt or amend an Adaptation Plan based on Florida's existing laws, requirements, and recommendations. The appendix includes methods to address the impacts on cultural and natural resources.

Components of the Guidebook include the following recommendations:

- Conduct a survey of existing conditions and develop the context for which the planning exercise wil be executed
- Determine vulnerable structural and social assets by using data and analysis that can be used to support future planning initiatives
- Develop community-supported adaptation strategies using various engineering, political, and planning solutions that address known vulnerabilities
- Incorporate adaptation strategies into funding and project management mechanisms

Climate-change data and predictions of its impact are continuing to evolve. Flooding, including sea level rise, storm surge, and increased precipitation, should be considered parts of the hazard mitigation

planning process. *(Refer to Chapter 8, Planning: Hazard Mitigation for Historic Resources.)* In 2008, the Governor's Action Team on Energy and Climate Change developed an extensive planning document with resources identifying Florida's vulnerability to climate change. *(drought.unl.edu/archive/plans/Climate/state/FL_2008.pdf)* In addition, there are a number of other federal, state, and county entities with resources that can provide valuable, localized information regarding the potential impacts. *(Refer to Chapter 15, Mitigation Partners.)*

Zoning height limits establish a relationship of the building to the street. Infill construction must meet current zoning heights unless an overlay zone or other height maximum is established.

MODIFY ZONING ORDINANCE

Community-wide zoning modifications can control significant changes to individual properties to protect the existing historic character of an area. This means of protection can occur outside of the hazard mitigation planning process. If protecting historic character is a goal, a community can monitor and limit extreme elevations, new construction, and significant additions by adopting the following measures:

- **Zoning code heights**: Municipal zoning codes typically include maximum allowable building heights within defined areas. These heights have be traditionally measured from the crown of the road or adjacent grade. In flood-prone historic neighborhoods, maximum heights can be defined in a manner that is compatible with existing buildings, while limiting first floor elevation to the FBC Design Flood Elevation (DFE) or as locally mandated. This will establish a consistent height for existing and new buildings in a historic district, maintain similar first floor heights, and allow the historic form and roof slopes to be integrated into new construction.
- **Streetscape rhythm**: Buildings and side yards; porches and stoops; and windows, storefronts, and doors collectively establish patterns

Increasing permeable surfaces will allow for the slower absorption of stormwater and absorption onsite rather than contributing to runoff.

along a streetscape. By identifying these patterns and promoting conformance with existing conditions, the design or historic review authority can recommend and approve designs sympathetic to surrounding conditions while meeting floodplain regulation requirements.

- **Building setback and environmental buffer requirements**: Another method to influence the streetscape and allow for stormwater management areas is to increase the open space between shoreline features and buildings or other non-pervious surface areas.
- **Limit lot coverage or impervious surface ratio**: These limitations help to restrict inappropriately-sized additions or alterations that can affect a historic building's integrity and also aid in decreasing the square footage of impervious surfaces. Promoting the use of pervious surfaces increases stormwater absorption through the ground, thereby reducing runoff, and the volume of water that must be handled by the storm water system, potentially improving water quality.
- **Implement low-impact development standards**: Low impact development standards manage stormwater through a variety of methods that mimic or preserve natural drainage processes to reduce stormwater runoff, which can help reduce nuisance or tidal flooding in a community. Because these standards promote the restoration of green and aquatic habitat in a community, they can help to blunt the effects of inappropriate in-fill by encouraging the restoration of community features, such as parks, that may have been altered or destroyed.
- **Limiting stormwater runoff from a property**: Capturing rainwater and preventing runoff on a property-by-property basis can help to reduce

A building was elevated and garage space was added to the ground floor.

the amount flooding at a specific property. Where these limitations prescribe the use of rain barrels, rain gardens, pervious paving, and other methods, a historic community's design guidelines can suggest ways to minimize impacts to the integrity of the historic district.

- **Limiting parking under single- and two-family residential buildings**: Another way to restrict extreme elevations is to place limitations on parking beneath residential structures. Limiting parking underneath small occupancy residential buildings helps to protect the sidewalk culture of a historic district and preserve the streetscape's historic appearance and rhythm.
- **Screening parking for large-scale residential and non-residential buildings**: Locating parking behind rather than under large-scale residential and non-residential buildings can minimize a building's height. Introducing non-residential functions at the ground floor, such as retail or office use, can visually reduce elevation heights.
- **Encouraging character-defining elements like front porches in residential construction in lieu of garage doors**: Garage doors along a streetscape present a uniform, blank wall, and increase a feeling of emptiness along the streetscape. Front porches and other character-defining features such as landscaping increase the visual interest of the streetscape and social interaction as well as create a lively pedestrian experience.
- **Overlay zones:** If the intent is to adopt multiple measures addressing environmental challenges like flooding, a geographical area can be defined as an added regulatory layer–an overlay–in the zoning code. This method is more successful with significant community participation and sufficient data documenting the basis for the overlay.
- **Zoning ordinance definitions:** Ensure that definitions in the zoning ordinance align with definitions in the building and/or floodplain

management code or provide cross-references. The definition of Substantial Improvement, which establishes whether or not historic buildings are excepted from meeting floodplain requirements under certain circumstances, often vary across Florida's communities. The state model and a draft 2018 study recommend that communities use a formal variance process rather than an exception or exemption process. *(Refer to Implementing Floodplain Regulations, page 2.10.)*

By their nature, zoning ordinances are unique to each municipality. ***Existing zoning ordinances should be reviewed through the lens of flood mitigation to uncover specific issues that, if modified, promote increased resilience while protecting the historic integrity of properties.*** They can also be modified to address stormwater runoff. *(Refer to Zoning Options, page 12.9.)* However, ***zoning ordinance modifications typically will not include recommendations that are sympathetic to historic properties or to historic materials. These issues can be addressed through design guidelines for flood mitigation.*** *(Refer to Develop Design Guidelines for Storm Mitigation, page 4.19.)*

A historic building was elevated and constructed with a new brick pier foundation compatible with the original building.

MODIFY BUILDING CODE REQUIREMENTS

As with zoning codes, building code compliance is typically triggered upon submission of a building permit application to construct a new building or modify an existing building. Municipalities can impose building code regulations stricter than state requirements for flood and wind resistance for new or Substantially Improved buildings. *(Refer to Building Code Options, page 12.10.)*

FLOOD REQUIREMENTS

As a baseline, building codes should require compliance with the National Flood Insurance Program (NFIP) for new construction in a flood-prone area. *(Refer to National Flood Insurance Program, page 2-3.)* The International Code Council and FEMA developed *Reducing Flood Losses Through the International Codes: Coordinating Building Codes and Floodplain Management Regulations*, 5th Edition (2019) to provide guidance to municipalities considering code modifications. *(www.fema.gov/media-library/assets/documents/96634.)*

More stringent building code requirements will also benefit municipalities who participate in the Community Rating System (CRS). *(Refer to Participate in the Community Rating System, page 4.23, and Modify Local Floodplain Regulations, page 4.17.)* Possible building code requirements to reduce potential flood-related damage include:

- Designing a building's structural system to withstand flood impacts;
- Locating all living space above the DFE;
- Limiting allowable use of the building below the DFE;
- Locating building systems above the DFE;
- Requiring flood-resistant materials below the DFE; and
- Providing floodwater evacuation pathways for areas below the DFE.

KEY WEST: FOUNDATIONS AND SUBSTANTIAL IMPROVEMENT

Many local ordinances allow historic buildings meeting certain requirements to be exempted from Substantial Improvement requirements. The City of Key West includes this provision in their definition of Substantial Improvement and goes further to specify that buildings with new foundations are not included in that exemption:

City of Key West Ordinance

Substantial Improvement: Structures that have been moved, or structures that have new, replaced, or substantially modified foundations are considered to be substantially improved. The term does not, however, include ... any alteration of a historic structure provided the alteration will not preclude the structure's continued designation as a historic structure and the alteration is approved by variance issued pursuant to section 34-129 of this ordinance, unless the building has been moved or the foundation replaced.

[Section 34-131]

This building being elevated in Key West required a new foundation, making it exempt from the local definition of Substantial Improvement.

Building code modifications written with flood issues in mind promote greater resilience; however, such modifications are typically only required as part of a larger renovation project. For example, either wet floodproofing, dry floodproofing, elevation, or relocation is typically required for Substantially Improved or Substantially Damaged buildings to comply with NFIP requirements. *(Refer to Historic Properties and Floodplain Regulations, page 2.11, and Chapter 13, Property Mitigation Strategies.)*

Although some building code-required modifications for flood resilience may be appropriate for most properties, such as elevating building systems, others may be at odds with the preservation of historic resources. Requirements that affect portions of buildings below the DFE can be particularly contentious. For example, by limiting the use of lower floor levels, there may be an unintended consequence of property owners seeking to elevate their buildings, build an addition or extra story, or modification of interior floor heights and, consequently, window heights. To address this conflict, a community can establish mitigation best practices, conveying preferences through tools such as design guidelines. *(Refer to Develop Design Guidelines for Storm Mitigation, page 4.19.)* Care should be taken to balance the resilience code modification, requirements for compliance and the preservation of historic properties. *(Refer to Repair and Rebuilding, page 10.4, and Chapter 13, Property Mitigation Strategies.)* For example, the construction of a new code-compliant building with an increased first floor height in a historic context can have a negative impact on a streetscape and the surrounding district.

WIND REQUIREMENTS

Wind retrofits are voluntary mitigation actions taken on existing buildings. Similar to flooding, building code requirements for wind mitigation can improve a building's resilience. However, this too may be at odds with traditional preservation practice.

The Florida Building Commission is responsible for the development and subsequent updates of the Florida Building Code (FBC). The Commission also maintains an online database of building products that are compliant with the FBC. Products are organized into seven categories:

- Panel walls
- Exterior doors
- Roofing
- Skylights
- Windows
- Shutters
- Structural components

Some areas of the state have adopted more stringent requirements than the FBC, with specific products identified to reduce potential wind damage. For example, Miami-Dade and Broward counties are state-designated Wind-Borne Debris regions and require that building products are rated for use in a High Velocity Hurricane Zone, which is a more wind-resistant requirement than the FBC. *(Refer to Hurricane Wind Scale, sidebar page 3.3.)*

Municipalities outside of state-designated regions may elect to adopt more rigorous standards to better protect properties within their community. Products that have been previously approved by the Florida Building Commission for a specific application may be used during a repair or rehabilitation requiring a building permit. New or alternative products can also be submitted to the Commission for its review and approval. Alternative product review requires the submission of detailed supporting documentation. Products outside of the seven categories are subject to review by the local building official.

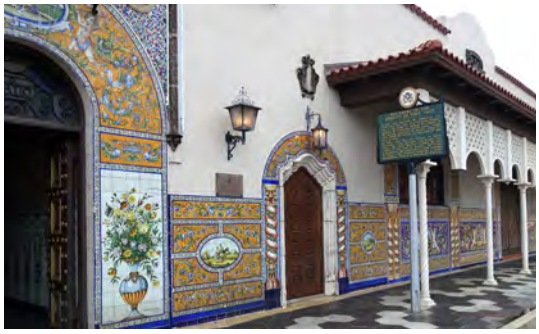
One of the more challenging products to be addressed by the preservation community is windows. From a preservation perspective it may be desirable to retain historic wood windows, although they typically perform poorly in severe winds without supplemental protection. A broken window can provide a pathway for severe winds to enter a building and the subsequent internal pressure and suction to cause significant structural damage. Preservation officials need to balance the need to preserve historic building materials, such as windows, with the potential wind damage in a severe storm. It may also be prudent to identify FBC and/or local government-approved product options that are appropriate for local building types and styles and coordinate approved alternates with local design guidelines. *(Refer to Develop Design Guidelines for Storm Mitigation, page 4.19, and Chapter 3, Wind Retrofitting.)*

Historic windows are a character-defining feature and should be preserved if possible.

MODIFY LOCAL FLOODPLAIN REGULATIONS

Much of the responsibility for floodplain management occurs at the municipal level with standards, assistance, and guidance from the state and federal governments. To allow residents to have access to flood insurance through the National Flood Insurance Program (NFIP), a floodplain regulations must be locally adopted and enforced to restrict development within the Special Flood Hazard Area (SFHA). In some municipalities the local floodplain regulations may be codified as an independent ordinance, or it may be a subset of another ordinance, such as planning and zoning.

One of the critical elements in floodplain regulations as they relate to preservation is the definition of a "historic structure." When referring to historic properties, the NFIP model ordinance, which serves as the basis for many local ordinances, uses FEMA's definition of a "historic structure." *(Refer to Implementing Floodplain Regulations, page 2.10.)* FEMA's definition varies from those utilized by the National Park Service or DHR to describe properties of historic and cultural importance based upon the criteria for listing on the National Register of Historic Places. Further complicating matters, local governments will often set their own criteria for identifying what is "historic," which will be accepted by DHR if the municipality is a Certified Local Government (CLG) under the Certified Local Government Program, jointly administered by the National Park Service and DHR.



A historic building listed in the National Register may be exempted from meeting floodplain requirements depending on local and state ordinances.

Depending on how "historic" is defined in municipal floodplain regulations, compliance requirements are often relaxed for historic properties. Although it may appear to be beneficial, not mandating compliance:

- Maintains the vulnerability of historic buildings to flooding and associated damage;
- May foster a belief that the flood risk is somehow reduced or eliminated;
- Does not relieve property owners from the responsibility of obtaining flood insurance, if required;
- May place property owners seeking alterations to reduce insurance costs at odds with local design or historic review authorities that strive to minimize alterations not otherwise required; and
- May reduce the municipality's potential classification under the Community Rating System (CRS), impacting the ability for discounted flood insurance rates for all property owners. *(Refer to Community Rating System, page 2.18, and Participate in the Community Rating System, page 4.23.)*

Factors that may dissuade local governments from waiving floodplain requirements for historic structures are the federal Flood Insurance Affordability Act (FEMA, 2014) and the recently released FEMA Risk Rating 2.0 - Equity in Action (FEMA, 2021). The actual actuarial rate for a property, thus incentivizing compliance by property owners seeking to avoid rising flood insurance premiums. Among other factors, Risk Rating

2.0 considers property size, replacement costs, and prior claims. *(Refer to Federal Flood Regulations, page 2.3.)* The Department of Economic Opportunity (DOE) conducted several pilot projects with Florida coastal communities to develop provisions for Adaptation Action Areas and to address Peril of Flood in their ordinances and comprehensive plans. (The project is now managed by Florida Department of Environmental Protection, *www.floridadep.gov.*)

DEVELOP INCENTIVES FOR SENSITIVE MITIGATION

To encourage historic property owners to implement sensitive hazard mitigation actions, local governments can develop incentives ranging from financial to zoning bonuses. Financial incentive programs can be implemented in a comparable manner as preservation tax credits with municipalities defining appropriate mitigation options for their historic properties and providing local tax credits or tax rebates for compliant modifications. These modifications can include improving the flood resilience of buildings or reducing impervious surface coverage to diminish storm water runoff.

Non-financial incentives at individual properties can include expediting reviews, or relaxation of bulk area requirements and setbacks, such as permitting a rooftop addition or allowing a free-standing garage without a side yard setback to prevent extreme elevations resulting from under-building parking.

There are also unrelated incentives that may be eligible for grant funding to encourage more appropriate mitigation. Non-preservation incentives with community-wide impact on the reduction of stormwater runoff could include landscape enhancements, such as the purchase and planting of shade trees, installation of pervious pavers, and landscaping improvements that restore native plantings in public space. *(Refer to Landscape Options, page 12.7.)* Private property owners could be similarly encouraged with the community distribution of free trees and rain barrels as well as promotion of native plantings.

Whether financial or non-financial, the mitigation measures and incentives should be carefully developed in a manner that minimizes the effect on the historic integrity of the property and its surrounding context, otherwise the property's eligibility for historic preservation financial incentives outside of the community, i.e. at the state and federal level, may be compromised. In addition, if the property was benefiting from waivers related to full compliance with the floodplain ordinance or building code based upon its designation as a historic building, the loss of historic designation may trigger the requirement for full floodplain regulation and building code compliance. *(Refer to 107.5 Historic Buildings, sidebar page 2.13.)*

EXISTING FINANCIAL INCENTIVES

Florida communities can use the following tools to encourage private preservation investments and compatible storm mitigation:

- **Ad Valorem Tax Exemption for Historic Preservation:** Allows certified local governments to administer a property tax exemption for up to 10 years up to the value of a qualified rehabilitation for designated historic structures. Communities without a CLG can defer to the Florida Division of Historical Resources (DHR) for review to apply the same benefit. The effect of the exemption decreases the taxable value of real property thus reducing property taxes.
- **Community Redevelopment Area (CRA) and Tax Increment Financing (TIF):** Qualified CRAs can use TIF to fund building rehabilitations, facade improvements, and infrastructure improvements in historic areas depending on local priorities and an approved management plan.
- **Local Option Sales Tax:** Upon approval by voters and the local jurisdiction, discretionary sales tax revenue can be used for historic rehabilitation, among other priorities.
- **Tourist Development Tax:** Known as the 'bed tax' or 'resort tax,' funds can be used toward cultural, arts, and entertainment programs and activities that promote tourism as managed by the county jurisdiction in accordance with Florida law.

Storm Guidance for Florida's Historic Properties is a companion to this document. It can provide guidance for local historic property flood and wind mitigation projects until local guidelines are prepared.

DEVELOP DESIGN GUIDELINES FOR STORM MITIGATION

When faced with increased storm threat and insurance premiums, historic property owners should be empowered to "do something" to protect their resources from flood and wind-related damage. As is often the case, many off-the-shelf solutions are not sensitive to the unique characteristics of historic resources.

Local preservation planners and advocates will often be the "front line" in addressing flood and wind mitigation at historic properties, particularly in those municipalities with a formal HPC review process. ***To the extent possible, flood and wind mitigation planning should proactively identify community-preferred mitigation alternatives appropriate to local resources based upon the type and level of risk to provide guidance to property owners exploring individual solutions.***

As a starting point, preservation planners, advocates, stakeholders, and local design or historic authorities should identify clear policies that address flood mitigation in their community. Policies should include statements that aim to:

- Identify historic adaptations for flooding and wind mitigation in the community for specific building types and their appropriateness within today's context *(refer to Community's Relationship to Water, page 8.15 and Chapter 3, Wind Retrofitting)*;
- Define acceptable building elevation heights relative to the Design Flood Elevation (DFE) *(refer to Location Definitions, sidebar page 2.7)*;

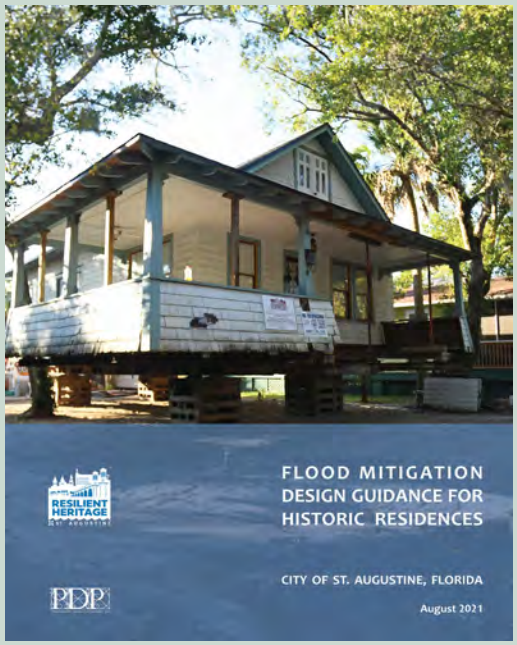
- Identify appropriate materials and design considerations for higher foundations, extended stairs, flood openings, and flood barriers;
- Identify acceptable damage-resistant materials or treatments for flood-prone areas; and
- Identify acceptable wind resilience materials for vulnerable areas. *(Refer to Wind Requirements, page 4.16.)*

Municipalities should include these statements in master plans and historic preservation elements to increase their impact on the local decision-making process. *(Refer to Addressing Preservation and Severe Storms in Local Planning Initiatives, page 4.6.)*

Local design or historic review authorities often have another tool in their arsenal that can be adapted to address flood mitigation at historic properties: Design guidelines. As part of the historic preservation review process, many communities prepare design guidelines to provide both information and guidance to property owners, architects, and contractors for proposed exterior alterations to designated properties. These guidelines often include explanations in plain English; photographs and drawings that clarify and illustrate the review process; and building and zoning code requirements, as well as appropriate and inappropriate design approaches and materials.

A similar guidelines strategy can be employed to address flood and wind mitigation options and recommendations. To be meaningful, the following should be considered:

- Types of historic resources in the community;
- Location of historic properties relative to the 1% and 0.2% floodplains;
- Level of wind vulnerability;
- Relative height of the floor levels to the ground plane (DFE);
- Type of flooding (coastal with driving wind, tidal, flash floods, or ground water);
- Duration of flooding (regular cycles, sudden and fast draining, or prolonged water exposure);
- Local floodplain, zoning, and design requirements;
- Flood design requirements (some municipalities impose more stringent requirements than the National Flood Insurance Program [NFIP] often as part a goal for participation in the Community Rating System [CRS]) *(refer to Participate in the Community Rating System, page 4.23)*;
- Wind requirements such as location within a Wind-Borne Debris Region or locally-imposed requirements *(refer to Wind Requirements, page 4.16)*;
- Maintenance recommendations *(refer to Encourage Property Maintenance, page 4.24)*;
- Recommendations for building systems and equipment *(refer to Basic Improvements, page 13.2)*;
- Site mitigation options *(refer to Landscape Improvements, page 13.2)*;



ST. AUGUSTINE'S FLOOD MITIGATION DESIGN GUIDANCE FOR HISTORIC RESIDENCES

The 2021 Flood Mitigation Design Guidance for Historic Residences specifically addresses flood mitigation measures for late-19th and early-20th century residences in St. Augustine's historic districts. It includes an overview of the regulations governing the rehabilitation of historic residences and provides guidance on repairs, improvements, and new construction.

[www.citystaug.com]

The National Park Service continues to update its flood mitigation guidance as reflected in the 2021 "Guidelines on Flood Adaptation for Rehabilitating Historic Buildings." (www.nps.gov)

- Building mitigation options *(refer to Building Flood Mitigation, page 13.3)*; and
- Variation in appropriate mitigation options based upon designated level of historic significance, if applicable.

Communities can elect to prepare flood and/or wind mitigation design guidelines as a stand-alone document or a chapter in an existing design guidelines document. If a municipality has existing design guidelines, the ***existing guidelines should be reviewed and updated so that existing recommendations and requirements are current and do not conflict with flood and wind mitigation recommendations.***

Like all design guidelines, those prepared for flood mitigations should reflect the most recent version of *The Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for Preserving, Rehabilitating and Reconstructing Historic Buildings*. The 2017 update includes several sections that address resilience to natural hazards. The National Park Service (NPS) is regularly updating guidance on hazard mitigation, including flooding, and in November 2021 released the *Guidelines on Flood Adaptation for Rehabilitating Historic Buildings*. Design guidelines should incorporate current information at the time of preparation.

Design guidelines can be funded through the Certified Local Government (CLG) competitive grant program administered by DHR. If the municipality is a CLG, it is recommended that DHR be provided the opportunity for review prior to local adoption or use. DHR review will confirm that proposed recommendations will not negatively impact the integrity of the resources or result in their de-listing or ineligibility for financial incentives such as tax credits or grants.

DEVELOP A LOCAL ARCHAEOLOGICAL PROGRAM

Each Florida community has the opportunity to preserve and protect its archaeological heritage by incorporating the protection of underground or underwater resources into their planning process. By addressing anticipated challenges to the state's archaeological heritage brought on by climate change, local communities can plan for site preservation and mitigation prior to a disaster. Steps toward archaeological preservation can be built into existing disaster management, recovery, and hazard mitigation plans following a few key strategies that do not necessitate implementation of an local regulations. The Florida Public Archaeological Network (FPAN) and DHR are available to provide guidance. *(Refer to Develop a Local Archaeological Program, page 6.4.)*

A colonial well been stabilized for preservation on site but is being lost to erosion.

DEVELOP AN ECONOMIC ASSESSMENT ANALYSIS OF LOCAL HISTORIC RESOURCES

Historic resources provide a sense of place to many of Florida's communities. In addition to providing a unique place to live, there is research that indicates economic value of historic areas is a premium compared to other areas. *(Refer to Chapter 7, Economic Indicators of Storm Impacts.)* Heritage tourism can be measured across the state, however, more nuanced economic analyses can be prepared by local communities to demonstrate the value of heritage tourism and historic preservation. This may encourage both public and political support of preservation activities in addition to providing valuable data to support local mitigation projects with state and federal funds.

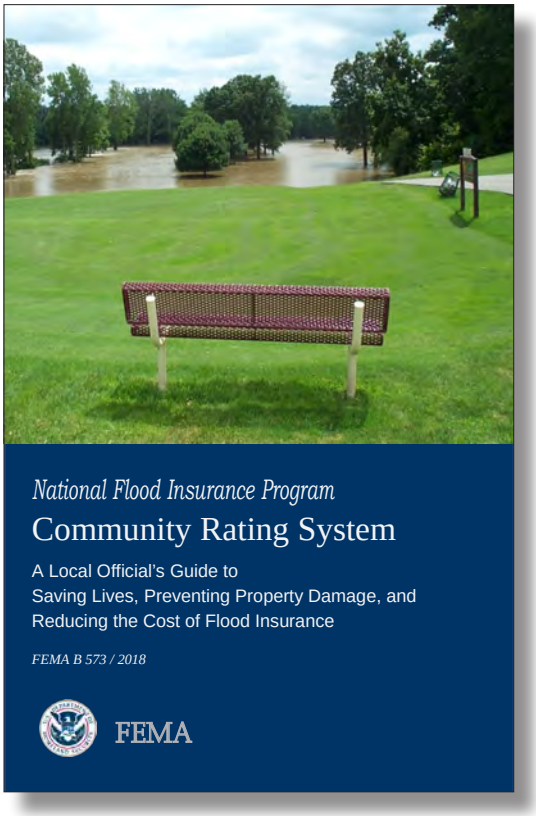
Detailed economic indicators that correlate local mitigation needs and historic preservation goals can include an assessment of building permits, historic property incentives, and business turnover. Communities are encouraged to quantify the value of their local historic resources. *(Refer to Chapter 7, Economic Indicators of Storm Impacts.)*

Reducing flood risk can mean changing access to individual buildings and its orientation on a lot.

PARTICIPATE IN THE COMMUNITY RATING SYSTEM

Just as flood insurance rates can be reduced by lowering the flood damage risk at individual properties, rates can also be dramatically reduced for communities participating in the NFIP's Community Rating System (CRS) (FEMA, 2018). *(Refer to Community Rating System, page 2.18.)* The CRS is a voluntary incentive program that recognizes and encourages community floodplain management efforts that exceed the minimum National Flood Insurance Program (NFIP) requirements. Flood insurance premiums in Special Flood Hazard Areas (SFHAs) can be reduced by up to 45% for Class 1 communities that have substantially reduced their potential damage from flooding. *(Refer to Chapter 2, Floodplain Management for Historic Buildings and National Flood Insurance Program, page 2.3.)*

The Florida State Floodplain Management Program under the Division of Emergency Management (DEM) is available to assist those seeking to get more information and to assist with the application process. *(www.floridadisaster.org)* In addition, FEMA has several publications available regarding the CRS program, including *Small Communities in the CRS*, which outlines common issues for local governments seeking to participate in the program. *(crsresources.org/files/200/small-communities-in-the-crs.pdf)*



Participation in the CRS program benefits communities and individual property owners.

Participation in the CRS will generally improve the ability of a community and its property owners to recover from flooding, including historic properties. As indicated above, communities can increase their CRS classification by requiring a reduction in flood risk at existing developments. ***Although many large-scale flood mitigation options can be considered, achieving the best classification will likely require the modification of individual properties. For historic properties, this could require more extreme alterations and impact the historic integrity of existing buildings.***

Historic preservation planners should work with the floodplain administrator in the CRS application process to seek a balance between protection and preservation. If the affected properties are locally designated, proposed mitigations may need to be coordinated with the local design or historic review authority. Similarly, if the property has received or anticipates receiving state of federal governmental funding, it is best to contact DHR prior to completing any work to verify review requirements. *(Refer to Historic Property Project Review sidebar, page 4.25.)*

ENCOURAGE PROPERTY MAINTENANCE

In many ways, a well-maintained property and building provides the best investment in reducing the potential damage from hazards such as flooding and wind damage. All materials deteriorate over time, but without regular repair deterioration can accelerate. ***Maintenance can slow down natural deterioration and mitigate potential risks associated with hazards, providing the basis for protecting historic properties and collections, and, more importantly, human life. Fostering long-term preservation of a historic property is a critical aspect of good stewardship.***

The primary hazard of flooding is often accompanied by secondary hazards such as high winds and followed by fire. There are simple maintenance measures that can reduce the vulnerability of historic properties to primary and secondary hazards that should be completed at all vulnerable properties, including:

- Grading land to promote positive drainage away from historic buildings (contact local officials for any required review and approval of potential impacts on neighboring properties, sidewalks, archaeology, or roadways)
- Trimming overhanging tree limbs and removing rotted trees that might crash through a roof, take down electric and telephone lines, or block a roadway in a wind storm
- Clearing site debris that might become water-borne or air-borne in high winds; clog storm drains; provide fuel for a fire; harbor pests; and damage the historic building or surrounding building
- Ensuring oil and propane tanks, including those for outdoor grills, ovens, or kilns, and associated connections, are well maintained and anchored to prevent flotation
- Removing clutter and unnecessary storage in a building, particularly if items are hazardous, highly flammable, or located in a flood-prone area
- Maintaining roofing, flashing, gutters, and downspouts to direct stormwater away from buildings and allow absorption on the property
- Reinforcing roof framing to support wind loads
- Repointing masonry and repairing stucco, including chimneys, walls, foundations, and piers, to prevent collapse and stormwater infiltration
- Replacing or securing missing or dislodged siding to prevent stormwater infiltration and potential for wind-borne debris
- Replacing cracked window glass that can shatter in a wind storm and allow water infiltration
- Sealing openings between building components or around penetrations such as hose bibs or conduits through walls
- Maintaining shutters in an operational condition to protect windows from air-borne debris in a wind storm
- Replacing cracked pipes to prevent plumbing leaks or sewer failure

INTERNATIONAL PROPERTY MAINTENANCE CODE (IPMC)

Communities can use the IPMC standards for exterior maintenance requirements as a framework to expand on the following:

- Structural members
- Foundation walls
- Exterior walls
- Roofs and drainage
- Decorative features
- Overhang extensions
- Stairways, decks, porches, and balconies
- Chimneys and towers
- Window, skylight, and door frames

[www.codes.iccsafe.org]

Maintenance requirements can be adopted as part of a local building code tailored to a community's needs, or the IPMC standards can be adopted.

Building maintenance can reduce potential damage from heavy rain and winds.

- Replacing batteries in smoke and carbon monoxide detectors to provide notification of a fire or gas leak
- Locating a fire extinguisher in an accessible location

A poorly maintained building, particularly one that is structurally compromised, is a poor candidate for wet floodproofing, dry floodproofing, elevation, or relocation. Similarly, severe winds can dislodge building features and site elements, turning them into airborne projectiles.

PLAN STORM RESPONSE AND RECOVERY FOR HISTORIC RESOURCES

Just as emergency management teams plan to address the protection of life and property after a flood or wind storm, historic and cultural properties can also benefit from advanced planning that facilitates response and recovery efforts. The inclusion of historic preservation in emergency response and disaster planning can help to protect the municipality's resources and avoid the unnecessary loss of historic materials. To ensure that historic and cultural resources are considered, it is important to work with the local emergency management office and first responders to provide them with information on the location of historic resources and how to treat those resources during response operations, as well as to develop a protocol for engagement by historic preservation professionals in the response and recovery phases of an incident. This includes the development of resources and procedures to expeditiously respond to hazards at historic properties in a manner that preserves historic fabric and character.

CREATE AN EXPEDITED REVIEW PROCESS FOR DISASTER RESPONSE

In the aftermath of a disaster, decisions must be made quickly to protect people and property. Consequently, historic preservation concerns must follow life-safety priorities and cannot be at the forefront of the decision-making process. Although municipalities will often establish a process for expedited permit reviews, preferably in advance of a disaster, they will not necessarily have the capacity for historic preservation review in the wake of an emergency. To better protect historic resources, it is necessary that building code staff be familiar with historic preservation requirements and be able to access preservation representatives in a crisis.

An expedited historic property review process can include the identification of stabilization measures and minor repairs that can be completed without formal design or historic review authority approval. Similarly, planning or building department staff can be authorized to approve certain changes utilizing the previously approved design guidelines when available. *(Refer to Develop Design Guidelines for Storm Mitigation, page 4.19.)* This could expedite stabilization and provision of a weather-tight building enclosure while reducing the administrative burden on property owners during the recovery process.

HISTORIC PROPERTY PROJECT REVIEW

Prior to undertaking any improvements, it is important to understand whether alterations to a property are subject to historic review. Municipalities must provide property owners with clear direction as to whether they are subject to historic review through their design or historic review authority. When recovering from a severe storm, it may be beneficial to waive local formal review to expedite recovery. Regardless of local review procedures, DHR review may be required pursuant to Section 106 of the National Historic Preservation Act or other applicable rules and regulations.

Project review will ensure that, to the degree possible, proposed alterations do not affect the property's historic integrity, and, consequently, its funding eligibility.

Although immediate stabilization repairs, including the installation of temporary shoring and roof tarps, should be undertaken as soon as possible to reduce the potential for additional damage, property owners should consult with DHR in advance for mitigation projects and long-term repairs in the aftermath of a disaster.

IDENTIFY PRESERVATION PARTNERS TO ASSIST IN POST-STORM REVIEW PROCESS

Prior to a severe storm event, it is important to identify preservation partners from adjacent communities and the county who will be able to assist in the review of preservation issues and provide information regarding preservation assistance programs. Preservation partners who are not personally affected by the storm event can assist in providing a more immediate response to a large number of property owners. These partners can include representatives from adjoining communities as well as DHR and FEMA.

ESTABLISH A DEBRIS SALVAGE PLAN

Flooding and high winds disburse debris comprised of building components and interior features. Some of the more vulnerable construction components include porches, balconies, railings, windows, shutters, fences, etc. If lost, historic materials and components can be costly and difficult to replace and, if replacement in kind is not the priority of the owner, the historic character of a building or structure can be compromised by an insensitive alteration or an off-the-shelf alternative.

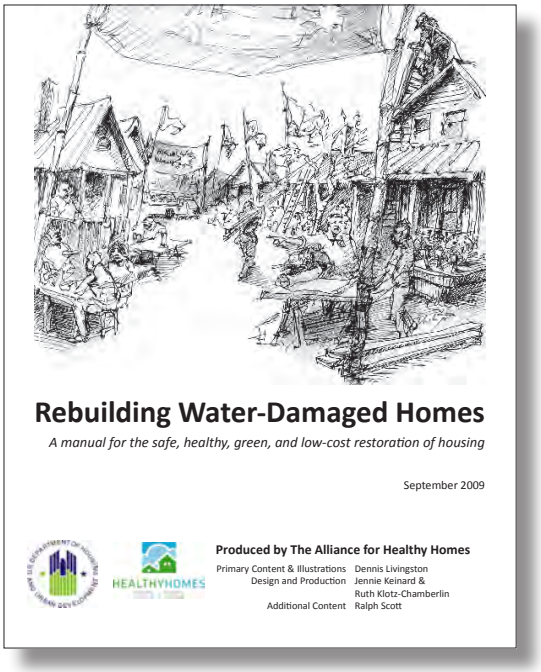
One of the best tools for minimizing the loss of historic materials is to develop a salvage plan, which can also be promoted as a sustainable alternative to disposal. To be effective, a plan should include training personnel to sort debris and salvage historic materials and components rather than discarding all debris in a landfill. In the aftermath of a disaster, the salvaged items can be made available to owners seeking to complete repairs.

Building debris is often discarded after a flood. An established salvage plan can help save dislodged building components for potential reinstallation.

DEVELOP INFORMATION FOR PROPERTY OWNERS

Immediately after a disaster, property owners will seek guidance about recovery, including what they should and can do to protect their properties and return to "normal." This includes everything from who should verify structural stability to how to document damage and prevent secondary damage, such as mold, in the aftermath of a flood. While general information related to property owner response is available from the local emergency management office, owners of historic properties will have additional questions related to whether specific reviews are required, or if historic preservation assistance is available in the form of technical expertise or grant funding.

Specifically, information about recommended strategies for mitigation and repairs of historic resources must be provided to encourage property owners to conduct sensitive repairs and reduce the unnecessary loss of historic materials. Website information should be made available, and pamphlets should be printed and ready for distribution to owners considering mitigation projects in the aftermath of a severe storm. Making this information available to historic property owners immediately after a flood will streamline the review process and facilitate the recovery effort. These materials should clarify that careful consideration must be given to properties receiving preservation financial incentives such as easements, grants, and tax credits when evaluating flood stabilization and mitigation measures. *(Refer to Historic Property Project Review, sidebar page 4.25.)*



A lot of helpful information is available online to supplement local publications. (www.hud.gov/sites/documents/AFHH_WATER_DAMAGED.PDF) Refer to Appendix A, Resources, for additional information.

While municipalities are encouraged to develop information specific to their circumstances, the National Park Service continues to develop resources that specifically address the relationship between flooding and historic properties and makes those available on their website. *(www.nps.gov)* Their recently published *Guidelines on Flood Adaptation for Rehabilitating Historic Buildings* (November 2021) provides a framework for sensitive flood adaptation strategies. *(www.nps.gov/orgs/1739/upload/flood-adaptation-guidelines-2021.pdf)*

Preservation-specific, flood recovery information that can be prepared in advance of flood. Information can include:

- Floodplain ordinance definition for a "historic structure" and how the definition relates to local resources;
- Local code requirements that may be waived or triggered for a designated "historic structure" *(refer to Historic Properties and Floodplain Regulations, page 2.11, and Wind Requirements, page 4.16.)*;
- Identification of activities that may impact eligibility for listing on the Statewide Inventory or National Register of Historic Places;
- Procedures for documenting flood and wind damage at historic properties;
- Options for protecting historic materials from mold and for "drying-out" without causing further damage;
- Design guidelines with options for improved storm resiliency *(refer to Develop Design Guidelines for Storm Mitigation, page 4.19)*;
- Review requirements and processes for historic properties locally, if applicable, and Section 106 review from DHR *(refer to Historic Property Project Review, sidebar page 4.25)*; and
- Contact information and websites for departments and agencies that may provide assistance or be required for permit approval.

Although the administrative requirements can be daunting, property owners should be encouraged to work with officials at all levels to ensure that requirements are understood and approvals are in place prior to commencing rebuilding efforts. In the long run, this can save them both time and money and get their building back into service faster.

REFERENCES

Note: All references are available online unless otherwise noted. References that are only available as online resources are noted as "online resource." Refer to *Appendix A: Resources* for web links.

FEMA. *Integrating Historic Property and Cultural Resource Considerations into Hazard Mitigation Planning [FEMA 386-6]*, 2005.

U.S. Department of the Interior [National Park Service]. Guidelines on Flood Adaptation for Rehabilitating Historic Buildings (2021).

U.S. Department of the Interior. The Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for Preserving, Rehabilitating, Restoring & Reconstructing Historic Buildings (2017).

St. Augustine, 1944. (Florida Memory)

5 CASE STUDIES

Florida's communities are at the forefront of addressing storm mitigation. Municipal resources across the state are being stretched to address mitigation initiatives while striving to maintain regular facilities and services for their residents. The collective knowledge gained by municipalities from implementing mitigation measures can serve as a resource for others facing similar challenges.

During the Storm Guidance Project planning stage, the Project Team recommended the development of Case Studies as a survey to inform the document preparation. In September 2021, DHR selected eighteen communities across the Florida to be reviewed by the Project Team. The locations were selected to represent the diversity of the state's historic communities using the following factors:

- Location
- Size
- Flood/storm vulnerability
- Types of resources
- Extent of preservation program(s)

The goal was to identify similarities, differences, and best practices that could be a resource for communities across the state, particularly related to flooding. From October 2021 through March 2022, the Project Team conducted preliminary research, performed community outreach, developed the individual Case Studies, and synthesized the findings in a full report. *(Refer to Appendix C, Case Studies.)*

CASE STUDY COMMUNITIES

A. Port St. Joe
B. Apalachicola
C. Cedar Key
D. Hyde Park, Tampa
E. St. Pete Beach
F. St. Petersburg
G. Venice
H. Fort Myers
I. LaBelle
J. Everglades City
K. Key West
L. Lake Worth Beach
M. Stuart
N. Leesburg
O. Daytona Beach
P. St. Augustine
Q. Jacksonville
R. Fernandina Beach

CASE STUDY IMPLEMENTATION

PRELIMINARY RESEARCH

Preliminary research was collected in advance of each site visit to provide the context for community outreach. The information was collected from digitally-accessible resources to identify the following factors:

- Cultural resources found in the Florida Master Site File (FMSF) and local preservation websites
- Historic development patterns
- Flood vulnerability using the most recent FEMA maps
- Recent storm events
- Local resiliency efforts
- Existing preservation and/or archaeological programs
- Municipal size and budget
- Governmental staffing capacity

Property owners encountered during site visits shared their challenges with flood mitigation.

Tidal flooding and nuisance flooding can occur independent of a storm event.

Community meetings varied in size and number of attendees but worked together to report on their challenges.

During the course of research, a nor'easter impacted the northeast Florida coast.

Storm water drains in most communities do not function during significant rain and tidal events.

Wave action from vehicles can cause additional flooding and erosion problems.

COMMUNITY OUTREACH

The Project Team visited each community for one day from October to December 2021. In all but three communities, the Project Team met with a variety of local representatives including government officials, preservation planners, floodplain managers, building code officials, resiliency officers, architects, residents, and museum personnel. (Representatives of Cedar Key, LaBelle, and St. Pete Beach were unavailable at the time of the site visit.) A conversation with each group focused on historic resources and how they are addressing issues related to the community as a whole, including:

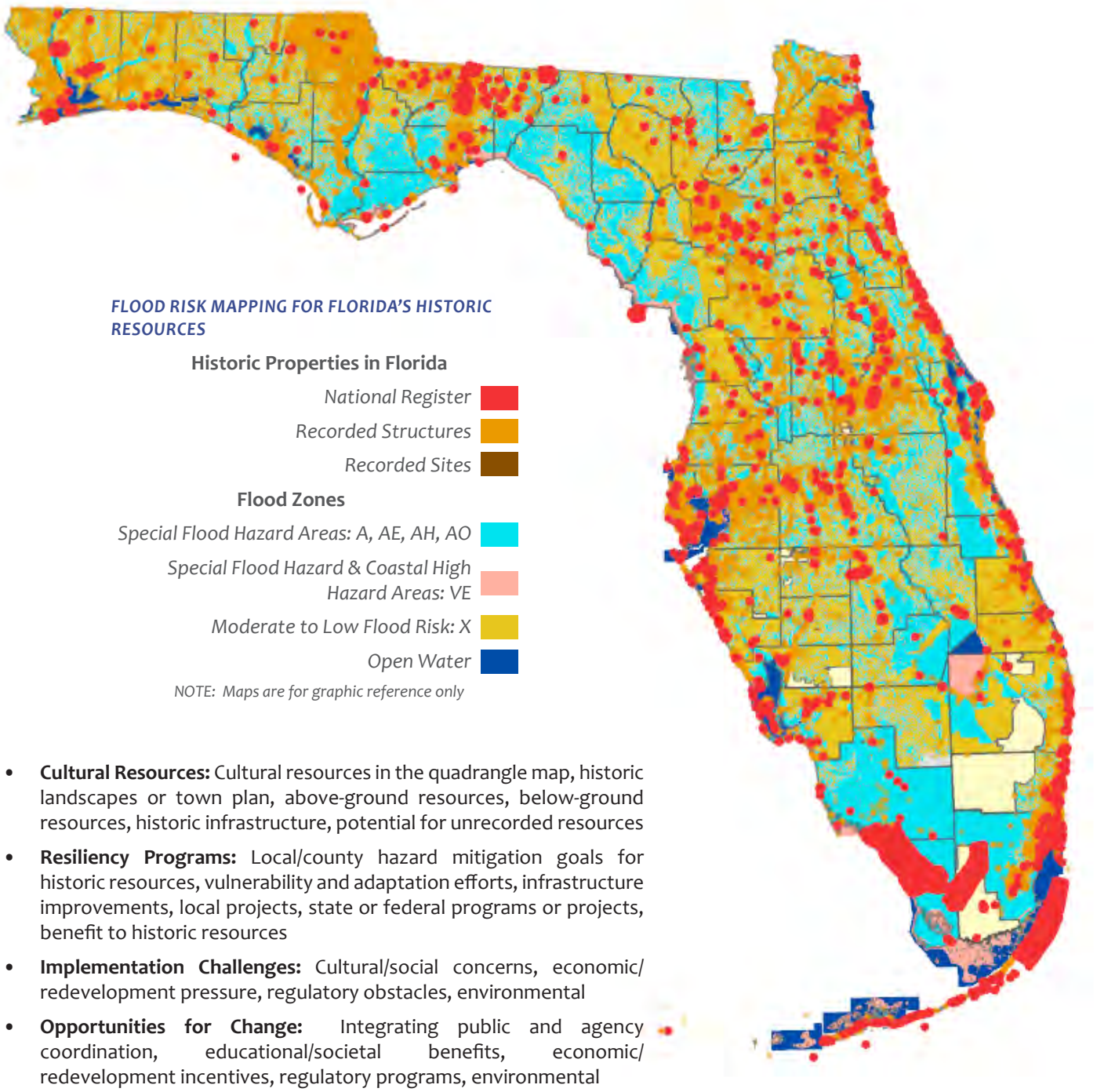
- Impacts of prior storm events
- Current flooding challenges
- Citizen awareness related to storm hazards
- Impacts on individual properties of FEMA map revisions and changes to flood insurance calculation process
- Local regulatory capacity and processes, including hazard mitigation, floodplain management, zoning, building construction and enforcement department, historic preservation, and archaeology
- Prior, ongoing, and future community vulnerability assessments/ resiliency efforts, including funding sources and grant administration
- Undocumented historic and archaeological resources
- "Wish list" of resources/assistance from state departments and agencies

Informed by the preliminary research and information from the local interviews, the Project Team toured each community to review historic and archaeological resources that were vulnerable to flooding and photographed observations.

CASE STUDY DEVELOPMENT

The information gathered during the preliminary research and community outreach was synthesized into individual site visit reports categorized as follows:

- **Municipal Profile:** Size, demographics, budget, and current industry
- **Historic Significance:** History and development
- **Flood/Storm Vulnerability:** Significant past storms, Community Rating System (CRS) score, percentage of households with flood insurance, type of vulnerability *(refer to Community Rating System, page 218, and Participate in the Community Rating System, page 4.23)*
- **Situation Overview:** Current vulnerability and storm impacts on buildings, infrastructure, and shorelines
- **Regulatory Summary:** Comprehensive plan, historic preservation, and regulations impacting the floodplain *(refer to Historic Properties and Floodplain Regulation, page 2.11, and Comprehensive Plan Elements, page 4.7)*



- **Cultural Resources:** Cultural resources in the quadrangle map, historic landscapes or town plan, above-ground resources, below-ground resources, historic infrastructure, potential for unrecorded resources
- **Resiliency Programs:** Local/county hazard mitigation goals for historic resources, vulnerability and adaptation efforts, infrastructure improvements, local projects, state or federal programs or projects, benefit to historic resources
- **Implementation Challenges:** Cultural/social concerns, economic/ redevelopment pressure, regulatory obstacles, environmental
- **Opportunities for Change:** Integrating public and agency coordination, educational/societal benefits, economic/ redevelopment incentives, regulatory programs, environmental
- **Resources:** Local information referenced in the preparation of the Case Study Reports

During the preparation of the Case Study reports, the Project Team reached out to the community representatives for clarification or to provide supplemental information, making every effort to achieve consistency across the eighteen communities. The completed individual Case Study reports were shared with participants in the community outreach effort to gather any additional feedback prior to preparing the final report.

Map created in ArcGIS using data collected from FEMA National Flood Insurance Program and Florida Master Site File.

Mechanical systems are vulnerable to flooding and are often required to be elevated.

RECURRING THEMES AND EMERGING TRENDS

Performing eighteen site visits over a nine-week period provided a vulnerability and resiliency "snapshot" of Florida's historic resources, with local emphasis on flooding. With the generosity of time from local community members and the opportunity to tour vulnerable areas, the Project Team was able to identify several recurring themes and emerging trends informed the Guidance Documents for the long-term protection of the state's historic resources.

Current scientific projections indicate Florida will be impacted directly and indirectly by sea level rise; however, local and state social and political values will ultimately establish the tipping points that lead to adaptation. *(Refer to Climate Change, page 1.8, and Chapter 14, Adaptation.)* One of the more distinguishing characteristics between the visited communities is the degree to which sea level rise is identified as a vulnerability and whether there are programs in place or in development to plan for the perceived increased risk. *(Refer to Assess and Document Historic Property Flood Risk, page 8.15.)*

INFRASTRUCTURE

One of the shared concerns of all the communities was the capacity and/or condition of their stormwater management system and their overall inability to address current and projected needs. *(Refer to Stormwater Management, page 12.6, and Utility Infrastructure Improvements, page 12.11.)* The specific concern varied by location but generally related to:

- Age
- Integrity
- Capacity
- Discharge height
- Backflow prevention, and
- Combined stormwater and sewer effluence

The Project Team reviewed other above-ground infrastructure with respect to cultural resources and included a visual survey of bridges and other transportation systems identified in the area. However, a detailed review of these types of above-ground infrastructure was not included in this Guidance Project because of their unique structural assessment requirements. Rather, the Florida Department of Transportation (FDOT) maintains an inventory of bridges and routinely surveys them in consultation with the Division of Historical Resources. Railroad networks owned by private entities generally do not require consultation with FDOT. *(Refer to Transportation Infrastructure Improvements, page 12.13.)*

RESILIENCE

Resilience is our ability to prevent a short-term hazard event from turning into a long-term community-wide disaster. While most communities effectively prepare themselves to respond to emergency situations, many are not adequately prepared to recover in the aftermath.

[NOAA, www.noaa.gov]

HURRICANES IAN AND NICOLE

Hurricanes Ian and Nicole were significant storm events for many Florida communities, including several of the case study communities. Because these occurred in September and November of 2023, respectively, they were not included in the Case Study discussions with community representatives. However, they were added to the list of significant storm events for the affected areas in the individual reports.

ASSISTANCE CHALLENGES

Among the eighteen communities, there was general concern regarding the lack of clarity and administrative burdens associated with obtaining sufficient federal funding that addresses community needs in a timely manner.

- **Federal funding** assistance can operate in opposition to community needs. Buildings in a floodplain or evacuation zone are ineligible for federal funding such as hardening or mechanical upgrades, although these buildings may be most suitable for supply distribution and logistics during a storm recovery. *(Refer to Funding for Recovery, page 10.7.)*
- ***Compliance procedures and eligibility factors in the immediate aftermath of a storm event can overwhelm a local government*** that is not operational because of personal, social, and facility impacts.
- ***Direct help from agencies outside the impact zone to help conduct damage assessments and process paperwork in the aftermath of a storm*** was a common request. *(Refer to Plan Storm Response and Recovery for Historic Resources, page 4.25, Chapter 9, Response: Hazard Mitigation Planning for Historic Resources, and Chapter 10, Recovery: Hazard Mitigation Planning for Historic Resources.)*
- ***The National Flood Insurance Program's new rating system, insurance premium increases, and the lack of clear information to share with property owners was a common frustration.*** Also, questions regarding the data used for assessing a property's risk and valuing the property remain unclear to floodplain administrators fielding questions from their residents. *(Refer to National Flood Insurance Program, page 2.3.)*

MITIGATION BARRIERS

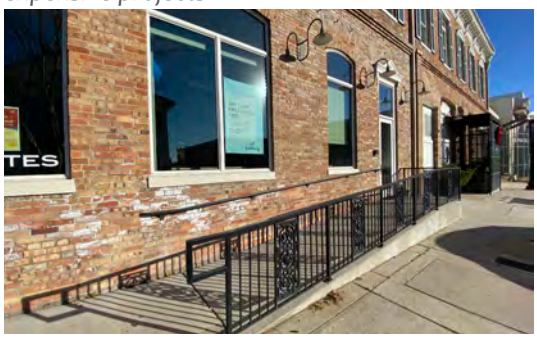
Barriers to mitigation were expressed in different ways across the visited communities. The wide inventory of obstacles highlights the need for more information on mitigation requirements, methods, and trained professionals to carry-out mitigation construction projects.

- ***The affordability of mitigation measures for municipalities and property owners was an overwhelming concern.***
- ***Frustration was expressed about the perceived distinction between the full- or part-time use of property for permanent residency.***
- ***There is a recognized need for multiple, community-wide mitigation measures rather than a single "magic bullet."*** Communities that are implementing resiliency strategies are at least partially developing living shorelines and water gardens, elevating road systems, hardening edges, increasing infrastructure improvements, and using permeable paving materials. *(Refer to Chapter 12, Community Flood Mitigation Strategies.)*
- ***Coordinated communication programs are needed*** to provide citizens the information they need to implement property-specific measures in tandem with community mitigation measures to improve their overall resiliency. *(Refer to Develop Design Guidelines for Storm Mitigation, page 4.19, and Develop Information for Property Owners, page 4.26.)*

Courthouses and city halls are prominent historic resources that may be repurposed during storm recovery.

The marks of Hurricane Michael were very visible during the Gulf Coast site visits.

Elevated roadway networks may not be compatible for every community and are expensive projects.



ADA requirements can be sensitively included during flood mitigation projects.

Historic properties are afforded some flexibility in the Florida Building Code for flood mitigation.

Height may be measured from grade, finish floor elevation, or the crown of the road; all of which will influence how a property is redeveloped.

Balancing permeable surfaces is important to increase on-site water percolation.

Local historic districts should have unique resiliency options that maintain historic integrity.

REGULATORY BARRIERS

The Florida Building Code (FBC) establishes the requirements for all buildings in Florida. However, local jurisdictions have the option of imposing stricter standards on their community than those in the FBC, which, in combination with local zoning ordinances, provides a patchwork of regulatory requirements.

- The FBC allows for exemptions from strict application of the local building and floodplain management ordinances. The exemption allows many historic buildings to remain unchanged, but leaves them vulnerable to potential flood and storm damage. ***Each community must balance the improved safety and historic integrity.*** An example of a creative workaround to improve a building's resilience without specifically eliminating the floodplain management exemption for historic properties has been implemented in the City of Key West. They developed requirements that mandate compliance with the floodplain management ordinance by adding building code requirements specifically related to construction projects that impact building foundations. *(Refer to Modify Building Code Requriements, page 4.14.)*
- ***The definition of building height is found in zoning ordinances and varies in how it is measured.*** Some communities are integrating a Design Flood Elevation as the benchmark for measuring height, while others are using adjacent grade or the crown of the frontage road. Although tying height to a fixed point has been a widely accepted practice in the past, it may limit the ability to elevate a historic building or to design a new building that is stylistically appropriate within a historic context. An alternative strategy ties the height of both the first floor and the building to a locally-established Design Flood Elevation to maintain consistency within the historic context. *(Refer to Modify Zoning Ordinance, page 4.11, and Zoning Options, page 12.4.)*
- Many communities have recently adopted, or are considering adoption of, ***impervious surface requirements, limitations to building on fill, and requirements to limit or prevent stormwater runoff onto adjacent properties.*** These measures are typically triggered with a development or building permit application, so their impact on historic resources are typically limited. *(Refer to Landscape Options, page 12.7.)*
- Florida's property rights and home rule approach to governing has shifted property regulatory authority and responsibility to local governments. This has allowed local elected officials to implement policies impacting all aspects of government, including resilience, mitigation efforts, and historic preservation. Until 2011, the Florida Division of Community Affairs had a substantial role in state and local growth management policies. The shifting of the responsibility increases pressure on local governments to create their own policies that may be more likely to face a legal challenge than would a state policy. Increasing the legal confusion, the Florida Legislature has implemented single-issue pre-emptions that are potential threats to mitigation in some communities. ***Local governments must weigh the advantages and disadvantages to increasing centralized leadership of flood mitigation policy.***

CASE STUDY SUMMARY

The following is a summary of the observations and challenges recognized during the site visits and addressed in more detail in the individual Case Study reports:

MITIGATION HESITATION

- Costs for any particular mitigation activity are either unknown and/or extremely high.
- Federal financial programs are onerous and/or have ambiguous requirements beyond the capacity of an individual property owner or small community.
- Options for mitigation are potentially complex, difficult to understand, and can overwhelm city staff and property owners resulting in apathy, lack of participation, or lack of prioritization.
- There is little access to professional resources to guide decision-making for property owners and city officials.

MITIGATION RESISTANCE

- Costs can be burdensome/unattainable for people and communities that are economically disadvantaged.
- Properties that are not owner-occupied and are used as rentals are not obligated or committed to mitigate since they continue to provide income even without mitigation.
- Out-of-state homeowners may use the local property seasonally and may be less concerned about the risk of loss to the property.
- Property owners may fear mitigation will impact other code compliance issues that would not otherwise apply if not for the mitigation construction.

MITIGATION OBSTACLES

- Public agencies may lack right-of-way or open land areas available for large-scale, community stormwater mitigation projects.
- High property values can prohibit property acquisition needed for flood mitigation projects.
- Competing priorities within a local government may conflict with currently-seated officials and social necessities, such as affordable housing.
- There is a lack of trained contractors to perform the type of specialized work required for flood mitigation particularly for historic properties.
- City stormwater systems are undersized, may be combined with sewer effluence, and are already backlogged with deferred/unfunded maintenance.

Monolithic architectural building typologies will have unique mitigation alternatives.

Historic resources most vulnerable may not be owner occupied or used only seasonally.

Clay tile roofs are important features that can be lost due to insurance company requirements.

Bridges are a part of local and state infrastructure that require a lot of maintenance investment.

Wind mitigation has been a long-accepted and mandated requirement in some coastal areas.

Areas not directly impacted by flooding may experience increased development pressure.

Areas without street infrastructure can be more vulnerable to flooding.

Waterfront views are valuable community resources that can challenge mitigation options.

MITIGATION TUNNEL VISION

- Property owners and officials may not have access to comprehensive mitigation assessments and rely instead on single and disconnected systems and methods that are not systematically implemented.
- Contractors may promote limited mitigation options focused on their area of expertise or "off-the-shelf" solutions when there are many other options that should be evaluated.

ECONOMIC CHALLENGES

- Community-wide mitigation projects tend to be dependent on state or federal funding, typically requiring an arduous administrative process and significant delay until payments are received.
- Florida property values are continuing to increase. While select coastal areas like Miami may be experiencing real estate fluctuations based on flood risk, many other communities are not seeing this in their markets.
- Many communities are largely dependent on a tourism economy supported by a service industry that requires affordable housing and transportation.
- In half of the communities visited, the historic commercial centers are subject to flooding, which will create multiple costs associated with loss of tourism revenue, and eventually the ability to be occupied.

SOCIAL CHALLENGES

- Property turn-over brings residents from areas with varied understanding of flood impacts and potentially divergent expectations and understanding of flood risk/tolerance than the long-time residents.
- There is disparity in the quality of existing infrastructure and city-planned improvements for infrastructure between affluent neighborhoods and minority- or economically-disadvantaged areas, regardless of flood risk.
- Vulnerability and increased future flood risk is not factored into cost-benefit analysis of city infrastructure improvements.
- Property buy-outs or other retreat options are not socially or politically acceptable parts of a realistic adaptation action area policy.
- The community social fabric relies on public and religious institutions for resources, comfort, and continuity. When they are damaged, they may not be prioritized for repair due to their vulnerability in an evacuation zone, and that impacts the community's social and physical recovery process.
- In affluent communities, waterfront areas are prioritized for recreational space and natural viewshed; reducing these for mitigation improvements would not necessarily be supported.

- Mobile home parks are aging and can continue to be used and maintained. They tend to serve older residents on fixed incomes and lower-income families, but they are a high risk for wind damage and flooding from storm events.
- Smaller and rural communities experience more disparity in their ability to invest in infrastructure systems, which may include combined storm and sanitary sewer systems that cause additional health concerns when the systems are overwhelmed from flooding or experience power outages.

GOVERNMENT AGENCY AND POLICY DISCONNECTS

- Florida Department of Transportation (FDOT) projects may not be planned with local community input or built with local government review requirements.
- There is a disparity between the capacity of the Florida Division of Historical Resources (DHR) and local expectations of their role in regulating compatibility and performing cultural resource management responsibilities.
- Distinct government mistrust pervades in some areas, while others exhibit an over-reliance on state and federal government services.
- Elimination of the Division of Community Affairs (DCA), which had a significant role in long range community planning and regulatory systems, increased the burden on local governments. Some could create substitute regulations and others were not capable of creating replacement programs; furthermore, they were subject to legal challenges.
- New state regulations on specific industries and practices reduces local government authority to apply regulations that address unique local problems.
- Varied interpretations of the Florida Building Code (FBC) may exempt historic structures from substantial improvement and floodplain management requirements.
- Zoning definitions of height that do not incorporate a Design Flood Elevation (DFE) conflict with flood mitigation and design compatibility.
- Zoning definitions of impervious surface ratio may or may not distinguish between paved areas and land covered by structures.
- Florida's homestead exemption program does not protect homeowners in the midst of a flood mitigation project that causes their home to be uninhabitable. If the home is not occupied at the time of the property tax assessment, the exemption could be lost.
- There is perceived subjectivity within the design review process of architectural compatibility, resulting in divergent opinions from staff and board members.

Rural communities have vestiges of homestead-era design and orientation to waterways.

Maintenance of evacuation routes and elevated roadways should address property impacts.

Commercial property owners can collaborate for collective mitigation projects.

Building elevation projects can create a long period of time that the home is unoccupied and risk losing homestead exemption status.

Xeriscaping can reduce water maintenance; however, it may impact drainage capacity.

Many of Florida's coastal communities have had different variations of working waterfronts.

A variety of permeable pavers have been developed that can look like traditional brick.

Most communities use the standard Base Flood Elevation requirement or additional freeboard.

ENVIRONMENTAL

- Landscape elements that are not native or flood tolerant may be seen as community assets, conflicting with practical flood mitigation projects. *(Refer to Landscape Options, page 12.7.)*
- Water management entities, including U.S. Army Corps of Engineers (USACE) and their management of Lake Okeechobee, can cause localized flooding and water quality issues.
- The benefits and practice of installing more natural shoreline improvements is not as well understood in comparison with the anticipated result of hardening, such as building sea walls and raising roads. *(Refer to Natural Shoreline Protection, page 12.4.)*
- Communities situated on a bay or coastal waterway have a significant dependence on that waterfront for natural resources, fishing, and recreational tourism.
- Historically, communities that used waterfront areas for industry will have a high likelihood of contaminants and may require mitigation for construction projects. In the meantime, this may contribute to poor water quality and reduced ability for natural shoreline resources to thrive.

PROPERTY AND FLOOD INSURANCE

- Home insurance industries are increasing restrictions for new mortgages, including the requirement to replace building roofs that are incompatible with the building's historic materials, design features, or structural necessity. *(Refer to Basic Mitigation Package, page 3.7.)*
- The National Flood Insurance Program lacks transparency in the eyes of local governments and has not performed needed outreach to support the new flood rating system. *(Refer to National Flood Insurance Program, page 2.3.)*

NOTABLE ADAPTATION TRENDS

- There is an increased use of permeable pavers and design flexibility for parking requirements that reduce impermeable surfaces.
- Communities have begun to alter height definitions to account for a design flood elevation to avoid the conflict of height maximums.
- Mobile homes may have transitioned to recreational vehicles with site amenities, built as stand-alone, unoccupiable structures that meet building codes for structures such as storage and pole barn units.

CASE STUDY MATRIX	A. PORT ST. JOE	B. APALACHICOLA	C. CEDAR KEY	D. TAMPA	E. ST. PETE BEACH	F. ST. PETERSBURG	G. VENICE	H. FORT MYERS	I. LABELLE	J. EVERGLADES CITY	K. KEY WEST	L. LAKE WORTH BEACH	M. STUART	N. LEESBURG	O. DAYTONA BEACH	P. ST. AUGUSTINE	Q. JACKSONVILLE	F. FERNANDINA BEACH
Population (2020)	3,357	2,347	687	384,959	8,879	258,308	25,463	86,395	4,966	352	26,444	42,219	17,425	27,000	72,647	14,329	949,611	13,052
Community Rating Score (* County CRS Participation)	10	7*	9	5	6	5	6	9	8*	5*	5	7	7*	7*	6	5	6	6
Qualified preservation staff				●		●	●	●			●	●	●		●	●	●	●
Certified Local Government (CLG)				●	●	●		●			●	●		●	●	●	●	●
Historic preservation in Comprehensive Plan	●	●		●		●	●		●		●	●			●	●	●	●
Designated historic district(s)		●	●	●		●	●				●	●			●	●	●	●
Codified archaeology review						●					●					●		
Design guidance for flood mitigation		●														●		
Historic preservation in Local Mitigation Strategy (LMS)				●							●					●		●
Economic evaluation of historic resources																●		
Dedicated resiliency staff				●							●	●				●	●	
Vulnerability assessment		●	●	●		●	●				●	●				●		

CASE STUDY MATRIX	A. PORT ST. JOE	B. APALACHICOLA	C. CEDAR KEY	D. TAMPA	E. ST. PETE BEACH	F. ST. PETERSBURG	G. VENICE	H. FORT MYERS	I. LABELLE	J. EVERGLADES CITY	K. KEY WEST	L. LAKE WORTH BEACH	M. STUART	N. LEESBURG	O. DAYTONA BEACH	P. ST. AUGUSTINE	Q. JACKSONVILLE	F. FERNANDINA BEACH
Adaptation Action Area (AAA) policy																●	●	
Sea level rise included in mitigation planning						●	●									●		
DFE and/or substantial improvement in code for HP				●		●					●	●				●		●
Participates in NFIP CRS			●	●	●	●	●				●	●			●	●	●	●
Local incentives for flood mitigation																●		
Stormwater management plan							●				●		●		●	●		
Flood risk outreach program			●	●			●									●		
Public reporting of flooding				●		●										●		
Social inequity programs				●		●	●				●							
Environmental sustainability programs				●		●										●		
Federally funded infrastructure planned/ completed							●									●		

REFERENCES

Material produced in this report was collected from multiple sources during October 2021 through March 2022. Electronic media including websites and e-mail was used and supplemented with verbal conversations between meetings, site visits, and telephone conversations. Specific community sources identified in the case reports are noted at the end of each case report. The following is a collection of the websites that were used to populate census, historical, photographic, and archival information:

- Esri ArcGIS Hub, account required. *(www.hub.arcgis.com)*
- Federal Emergency Management Agency, Community Rating System Participating Communities *(www.fema.gov/floodplain-management/community-rating-system)*
- Federal Emergency Management Agency, National Flood Insurance Program, National Flood Hazard Layer Geospatial Database. *(www.fema.gov/flood-maps/national-flood-hazard-layer)*
- Federal Emergency Management Agency, National Flood Insurance Program, Flood Insurance Data and Analytics *(nfipservices.floodsmart.gov/reports-flood-insurance-data)*
- Florida Department of Environmental Protection, Geospatial Open Data. *(www.geodata.dep.state.fl.us)*
- Florida Division of Historical Resources, Florida Master Site File FMSFweb service, account required. *(www.flheritage.com/PRESERVATION/SITEFILE/FMSFWEB)*
- Florida State Library and Archives of Florida, Florida Memory, photographs and maps. *(www.floridamemory.com)*
- Library of Congress, photographs and maps. *(www.loc.gov)*
- National Oceanic and Atmospheric Administration, Office for Coastal Management, Digital Coast. *(www.coast.noaa.gov/digitalcoast)*
- United States Geological Survey, USGS Topographical Maps. *(www.usgs.gov)*
- U.S. Census Bureau, 2020 Decennial Census, multiple Florida city profiles. *(www.data.census.gov)*
- University of Florida, George A. Smathers Library Digital Collections. *(ufdc.ufl.edu/)*

Turtle Mound, ca. 1937. (Florida Memory)

6 ARCHAEOLOGY

ARCHAEOLOGY REPORT

The following pages are summarized from the full report, available in *Appendix D: Archaeology*, by Greg Charles Smith, Ph.D., RPA.

UNDERSTANDING ARCHAEOLOGY

Archaeology is the scientific study of human history and prehistory through the excavation of sites and the analysis of remains left behind by earlier populations. Archaeological sites reveal elements of human culture and behavior that may not exist in documents. They provide significant insights on behavior, diet, housing, settlement patterns, hunting, agriculture, interactions with other cultures and groups, and potentially early adaptations to climate change.

Several elements contribute to an archaeologist's ability to glean information from a site. One of the most easily recognizable elements are artifacts, which are the products of human activity left behind. Early period artifacts may include discarded pottery; food remains; and stone, bone, and shell tools and ornaments. Later period sites may contain glass; metal tools and utensils; clothing related items; leather; gun parts; hardware; beads and ornaments; and farm and construction materials. A key element of archaeological research analyzes site context and features that are more fragile. Without the site context, artifacts lack narrative, and the ability to learn from earlier lifeways and study comparisons with modern culture is limited. *(Refer to Appendix D: Archaeology for more detailed information.)*

Like buildings, archaelogical sites are vulnerable to flooding and require preservation through documentation or mitigation to provide information about earlier settlements. While the locations of many archeological sites have been documented, a significant number are unknown.

Located near the Venice Inlet, Snake Island is subject to constant erosion and is under management of the West Coast Inland Navigation District.

HISTORIC PRESERVATION

A historic property is any pre-historic or historic district, site, building, structure, or object included in, or eligible for inclusion on, the National Register of Historic Places, including artifacts, records, and remains related to such a property or resource. Like historic structures, archaeological sites are an important part of every community's heritage, and they need responsible local stewardship. The protection of Florida's cultural resources should be an integral part of mitigation planning in every flood-prone community to address hazards related to storm surge, flooding, and sea level rise. Specifically, policies related to land use, hazard mitigation, resiliency, and emergency management at the local and regional levels should try to anticipate actions that have potential to harm archaeological resources or increase the potential for site preservation.

Site protection is broadly termed "Cultural Resource Management." Some Florida counties and cities have adopted their own cultural resource management plans in zoning codes, comprehensive plans, or informal policies to ensure that archaeological sites are identified and protected. Florida's public lands such as state parks, forests, land preserves, and others with archaeological resources are required to address cultural resources in a management plan as outlined in Florida Statutes (267.031, Florida Statutes).

Identifying historic sites is essential and is the first step toward preservation. ***The Florida Master Site File (FMSF) is the state's official inventory of cultural resources.*** The Division of Historical Resources (DHR) under the Florida Department of State administers the FMSF in Tallahassee. In accordance with the requirements of *Section 101 of the National Historic Preservation Act, revised in 1966*, the DHR also established procedures for conducting archaeological surveys, evaluation, protection, and potential mitigation.

FLORIDA'S ARCHAEOLOGICAL SITES

Over 16,000 archaeological sites have been recorded in Florida, representing an ancient and diverse heritage spanning over 14,000 years of human occupation. Many sites in coastal environments are increasingly vulnerable to the effects of intensifying and more frequent storms, sea level rise, and increasing boat traffic. Many land sites are located directly adjacent to Florida's waters, and are affected by erosion caused by storm surge, temporary flooding, and/or permanent inundation. *(Refer t0 Shifting Landscapes: Sinkholes, Subsidence, and Erosion, page 1.6, and Climate Change, page 1.8.)*

Rural and urban archaeological sites include:

- Native American villages, encampments, shelters, shell mounds and middens, and resource procurement areas
- Colonial towns and farmsteads
- Plantations, fortifications, and battlefields
- Industrial complexes such as mills, tanneries, or iron furnaces
- Infrastructure, such as historic military roads, dams, or canals
- Historic residential and commercial sites
- Cemeteries

Common underwater archaeological sites Include:

- Shipwrecks
- Piers, wharves, boatyards, landings,
- Inundated sites from all time periods that become submerged

DEFINITIONS

Pre-contact era:

- Also referred to as Prehistoric
- Native peoples who inhabited the Americas prior to European settlement

Historic era:

- Follows written record of human activity after European colonial contact and settlement

Any dredging projects will likely be subject to a review for potential impacts on archaeological resources.

ARCHAEOLOGICAL SITE MANAGEMENT

The primary legal authorities on the federal and state levels are Section 106 of the National Historic Preservation Act (NHPA), as implemented by 36 CFR Part 800, Chapter 267, Florida Statutes (F.S.), and Rule 1A-46, Florida Administrative Code. Section 106 of the NHPA requires that every federal agency take into account how each agency undertaking could affect historic resources.

The intent of Florida Statute Chapter 267 is to establish regulations and to foster quality assurance through the standardization of work and reporting requirements. At least twenty Florida statutes contain provisions pertaining to historic preservation. Florida's historic preservation policy includes identification, evaluation, registration, protection, enhancement, and education. *(Refer to Appendix D: Archaeology.)*

LOCAL REGULATIONS

In Florida, direct regulation of activity affecting archaeological sites may occur at the level of municipal or county government, or both. Federal and state laws do not mandate a local historic preservation program. Prior to 2011, Florida statutes specifically listed historic preservation as an optional element for a required comprehensive plan, and it was included by a number of communities. Communities still have the option of including this element even though it is no longer named in the state statutes and can include a variety of goals and objectives that promote hazard mitigation and encourage disaster planning for cultural resources.

Many local governments may have a historic preservation ordinance, regardless of whether there is a specific element addressing cultural resources in the comprehensive plan. Regardless of whether a local government adopts an optional element or sub-element addressing culturing resources and promotes mitigation, consideration of cultural resources can be included as a goal, objective, or policy, especially with regard to land use.

In terms of policy making, Florida statutes permit local governments with a coastal management element to adopt an Adaptation Action Area (AAA), which identifies one or more areas that experience coastal flooding due to extreme high tides and storm surge, and that are vulnerable to the related impacts of rising sea. Such a designation can assist a local government in prioritizing resources for adaptation planning, prioritizing protection of threatened cultural resources, and in consolidating data and plans related to a community's response to coastal flooding.

COASTAL ARCHAEOLOGICAL SITES

Local governments abutting the Gulf of Mexico or the Atlantic Ocean, or that include or are contiguous to waters of the state, are required to include a coastal management element in their comprehensive plan. The coastal management element is to guide each local government's actions to "[p]reserve historic and archaeological resources, which include the sensitive adaptive use of these resources."

CERTIFIED LOCAL GOVERNMENTS

The Certified Local Government (CLG) program was enacted as part of the NHPA Amendments of 1980. The program links three levels of government–federal, state, and local – into a preservation partnership for the identification, evaluation and protection of historic properties and archaeological sites. Designation as a Certified Local Government (CLG), either as a municipality or a county, makes historic preservation a public policy through passage of a historic preservation ordinance. Per federal regulations, communities that participate in the CLG program are automatically prioritized for funding allocations annually from the DHR.

Examples of local regulations can usually be found on municipal websites and in Municode *(library.municode.com)*, most often in the land development code or administrative section. There are varying degrees of regulations in different jurisdictions. Prior to begining any project, one of the first objectives should be to identify how sites are identified and thus subject to review. ***Some local governments have inserted directives and/or penalties for impacting any known sites, while others have broadened their regulations to include any areas within designated site probability zones.*** Certificates to Dig or Certificates of Appropriateness (COAs) may be required. Local regulations and codes may also include a specific archaeological ordinance that addresses a range of protection measures and staff positions, as in St. Augustine, or they may contain other directives and approaches to the protection and preservation of archaeological sites.

BUILDING A LOCAL ARCHAEOLOGY PROGRAM

Each Florida community has an opportunity to preserve and protect its archaeological heritage by incorporating this responsibility into its planning process. By addressing anticipated challenges to our archaeological heritage brought on by climate change, local communities can plan for site preservation and mitigation prior to a crisis situation. Archaeological preservation can be built into existing disaster management, recovery, and hazard mitigation plans following a few key strategies.

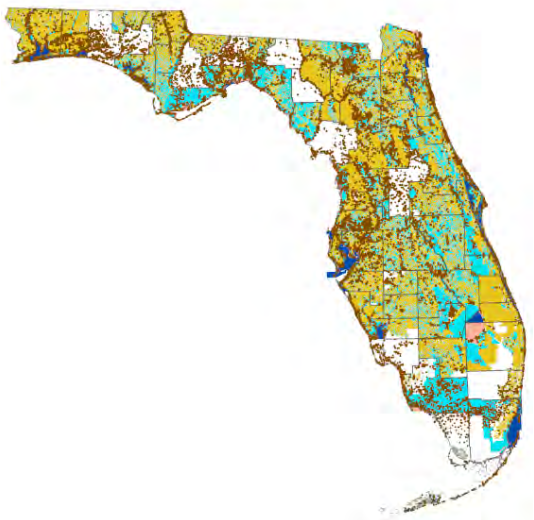
1. Conduct an inventory of known sites through consultation with the Florida Division of Historical Resources (DHR), local academic institutions, and professionals including the Florida Public Archaeology Network (FPAN).
2. Develop a model of areas that may have unidentified archaeological resources (e.g. an archaeological probability model) and routinely update the model based on current research.
3. Prepare a Cultural Resource Management Plan, Historic Preservation Master Plan, Historic Preservation Element for a Comprehensive Plan, etc. to establish community priorities, goals, and policies for identifying and evaluating project impacts on archaeological resources.
4. Adopt local regulations to include requirements for identifying, documenting, and evaluating impacts on archaeological resources for public and private development activities.
5. Engage community advocates, academic institutions, and research professionals in public archaeology workshops and other digital and print media campaigns.

Once a foundation for a program is established, a more robust archaeology program can be established that broaden the engagement strategy to be more public facing. This approach:

> ***... can encourage archaeologists and members of the public to ask what steps during the process of information recovery and dissemination can be used as opportunities for volunteerism, for creative place-making projects, and for recreation of different forms when combined with the work of other departments,organizations, or developers. Each of these provide opportunities for "value" to be created for the city, usually in the form of human or social capital, but not necessarily excluding the monetary form***
> *[Baugher, et al., 2017]*

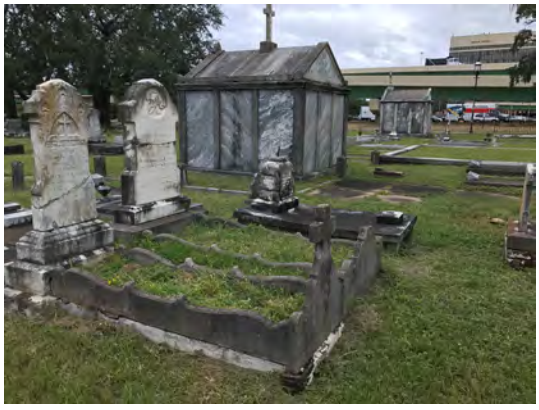
Many of the state's public archaeological programs involve citizen volunteers who participate alongside professional archaeologists.

THREATS TO ARCHAEOLOGICAL SITES



An estimated 21,978 sites out of 37,472 recorded sites on the FMSF are within a Special Flood Hazard Area. Sites are shown in brown and related flood zones include the turquoise and pink shaded areas.

The U.S. Army Corps has been maintaining and protecting shoreliness across the country.



Some Florida cemeteries feature below- and above-ground vaults.

Florida's unique and varied natural environments have attracted human occupation for over 12,000 years. When people use a location for a long time, soil and artifacts accumulate on top of each other over decades and centuries. ***A single archaeological site may contain evidence of many different societies and their activities through time up to the present day.*** When a site is disrupted by erosion or flooding, it is destroyed and all of the important information is lost.

Archaeological sites in communities adjacent to a waterway, the Atlantic Ocean, or the Gulf of Mexico, or those that incorporate islands are highly likely to be threatened or already affected by coastal hazards including hurricanes, tropical storms, nor'easters, and unusually high "king tides." As sea level rise continues, coastal sites are eroded, flooded, or completely inundated, resulting in site contents being negatively affected by shifting soil, leaching, and changes in soil chemistry. Accompanying sea level rise, a higher water table and increased precipitation cause damage to artifacts, soil layers, and cultural features (firepits, trash pits, burials, etc.) when sites become saturated by water.

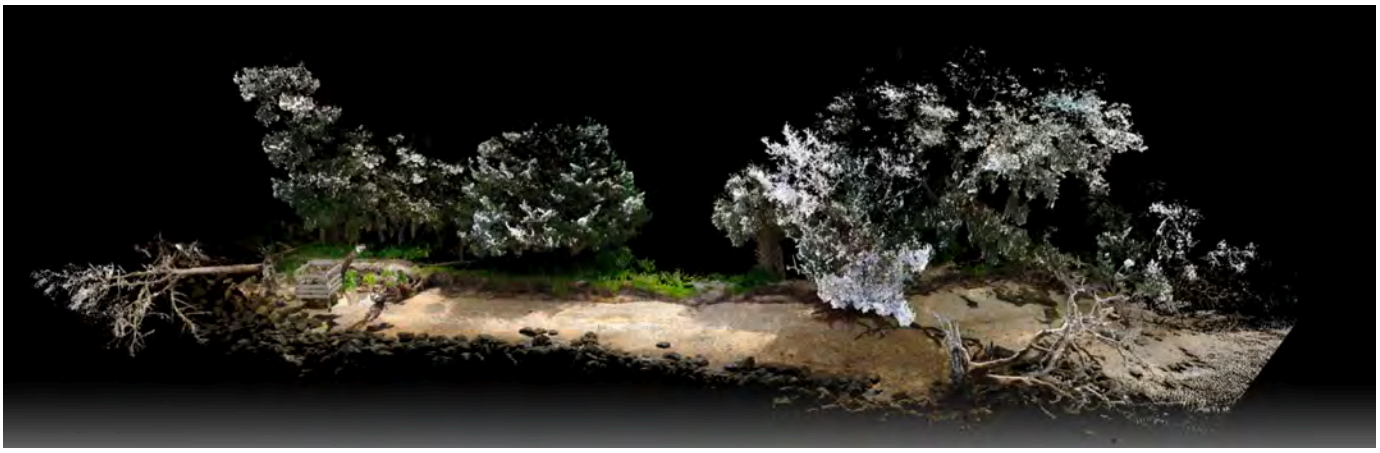
Future storm surges will be exacerbated by anticipated sea level rise nationwide, which can be especially dangerous for southeast Florida, already experiencing hurricane-strength storms that have been increasing in frequency and intensity. ***Coastal erosion is the process by which local sea level rise, strong waves, and coastal flooding combine to wear down or carry away soils, sands, and trees along the coast.*** Cultural deposits at sites become dislodged, which causes them to wash away as coastal bluffs literally fall away from the land. The resultant wave action from increased boat traffic, especially in riverine coastal areas, has greatly affected river banks; causing substantial erosion of soils and site elements. Wave action and storm surge are having similar effects.

UNDERWATER ARCHAEOLOGICAL SITES

Underwater archaeological sites along coastlines are subject to frequent episodes of being covered and uncovered by alternating processes of sedimentation and erosion. The impacts of hurricanes and severe storms can accelerate these processes through increased wave action and higher tides. The effects of erosion and sedimentation on submerged or intertidal sites can be either positive (when a previously exposed site becomes buried and protected) or negative (when a once-buried shipwreck site becomes exposed).

CEMETERIES

As a result of hurricanes and severe storm conditions, cemeteries can be affected by flooding and damage from high winds and water. One common impact to cemeteries occurs when trash, fallen tree limbs, downed trees, other debris, and materials that are displaced float into the cemetery. At the same time, strong winds are a big threat to cemeteries when trees are uprooted or large limbs snap off, impacting burried human remains, gravestones, standing markers, and monuments. Cemetery debris cleanup after a storm can cause damage if not carefully executed, but is necessary to assess damage.



Photogrammetry and laser scanning are enabling detailed documentation of vulnerable sites. (Florida Public Archaeology Network)

ARCHAEOLOGICAL SITE MITIGATION

In the case of archaeology, "mitigation" refers to the reduction or elimination of site damage through one or more of several methods. ***The first step is always to revisit a previously recorded site to determine its current condition.*** All the below options can be regarded as "mitigation" when archaeological potential is identified and examined, and solutions sought to mitigate damage to or loss of archaeological sites and deposits. It is important that all site mitigation techniques be conducted in compliance with Section 106 requirements.

MITIGATION METHODS

- **Archaeological Site Monitoring:** Archaeological monitoring involves site visitation to identify, protect, and/or document archaeological information or materials.
- **Photogrammetry:** Photogrammetry is the art and science of extracting 3D information from photographs; it is increasingly used to rapidly collect data from both terrestrial and underwater sites and shipwrecks.
- **Beach Nourishment:** Beach nourishment involves placing sand from offshore and/or onshore sources on sections of coastline to maintain and restore eroding beaches and adjacent sites. Renourishment is not the best choice for archaeological site protection and, when needed periodically, is can become costly. *(Refer to Natural Shoreline Protection, page 12.4.)*
- **Intentional Site Burial:** Covering archaeological sites with dredge spoil, sand, or other surfacing is not a new idea since the natural burial of sites is a common occurrence, most notably at shipwreck sites. To determine the best design, a multidisciplinary team including an archaeologist, a geologist, and an engineer is recommended, with each having specific responsibilities in developing the site burial design plan.
- **Site Stabilization:** Florida has published two guides, *Best Management Practices: an Owner's Guide to Protecting Archaeological Sites*, and *Archaeological Stabilization Guide: Case Studies in Protecting Archaeological Sites* (Glowacki et al. 2000 a, b). *Best Management*

SUCCESSFUL ARCHAEOLOGICAL MITIGATION METHODS

- Intentional site burial
- Site stabilization through hard construction (seawalls, groins, jetties, breakwaters)
- Soft, nonstructural stabilization such as creation of living shorelines
- Combinations of these methods
- Coastal engineers should be involved in the design and implementation of mitigation measures, and even then, they may not be lasting solutions

Data collection through archaeological excavations is the most common method of site mitigation.

Practices describes site-management practices and strategies that apply to privately owned sites and those owned/managed by local, state, and federal agencies.

- **Data Recovery:** Archaeological data recovery is the most common way to mitigate adverse effects to a known National Register of Historic Places-listed or -eligible archaeological site. It usually involves large-scale excavations, multidisciplinary specialists, laboratory analysis (of artifacts, faunal remains, and soil samples), curation of all materials, and completion of reports. The goal of data recovery is to record, recover, and preserve all archaeological data associated with the site. If sufficient site data (e.g., size, activity areas, artifact concentrations, etc.), are not available it may be necessary to conduct more testing before finalizing the data recovery plan.
- **Preservation in Place (No Action):** While not a mitigation measure, it should be pointed out that American archaeology has long advocated a "preservation in place" strategy as a means of avoiding future impacts to archaeological sites without further digging. When avoidance involves coastal sites that are continually damaged or destroyed by severe weather hazards, preservation by avoidance does not provide a solution, and other mitigation options need to be considered.

INTEGRATE ARCHAEOLOGICAL RESOURCES INTO HAZARD MITIGATION PLANNING

Because archaeological sites are primarily underground and not usually visible, not everyone is aware that sites can be all around them, both within and near their community. Much of the public only relates to observable/tangible cultural resources such as buildings, bridges, roadways, and other above ground aspects of the built environment. Similarly, there are coastal municipalities that are not considering archaeological resources as part of their pre- and post-hazard planning or preservation programs. Institutions with archival collections and museum facilities can be used as an essential resource for conserving archaeological collections, providing opportunities for public education, and guiding protective polices. What is needed is proactive, holistic resiliency planning that protects, or mitigates adverse effects to, both above and below ground cultural resources (specifically archaeological sites, cemeteries, shipwrecks, and other inundated sites).

The goal is to specifically integrate archaeological resources (sites, cemeteries, shipwrecks, and inundated sites) into the local consciousness, hazard preparedness and response measures, and the application of site mitigation techniques.

Further guidance is provided in *Appendix D, Archaeology* to help shape recommendations for intstormdisaster mitigation policies based on current disaster management and historic preservation laws, regulations, and policies. It includes objectives and goals that can be integrated into local planning documents.

CLIMATE CHANGE AND ARCHAEOLOGICAL RESOURCES

We may not be able to stop erosion of archaeological sites in Florida, but it is the duty of archaeologists to study and describe site loss as it happens. This (monitoring) is likely the only mitigation measure reasonable for a majority of sites across Florida.

[Florida Public Archaeology Network]

REFERENCES

Note: All references are available online unless otherwise noted. References that are only available as online resources are noted as "online resource." Refer to *Appendix A: Resources* for web links.

Baugher S. Appler D. R. & Moss W. (2017) Urban Archaeology Municipal Government and Local Planning: Preserving Heritage Within the Commonwealth of Nations and the United States. Springer. https://doi.org/10.1007/978-3-319-55490-7

Florida Department of State. Best Management Practices: An Owner's Guide to Protecting Archaeological Sites, 2000.

Florida Historical Resources Act, Chapter 267, Florida Statutes.

U.S. Department of the Interior. The Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for Preserving, Rehabilitating, Restoring & Reconstructing Historic Buildings (2017).

Orlando area, ca. 1880. (Florida Memory)

7 ECONOMIC INDICATORS OF STORM IMPACTS

Tourism represents one of the drivers of Florida's economy. In 2019, Florida travelers spent approximately $52.5 billion dollars with approximately $3.0 billion attributed to heritage tourism.

[Source: TravelTrak Survey and Visit Florida data as analyzed by Rutgers Economic Service (R/ECON^{tm})]

Many of Florida's severe storms are "named" tropical storms or hurricanes. They are often predicted several days in advance of landfall, allowing residents, businesses, and tourists the ability to prepare and evacuate to safety if necessitated. After the threat or storm has passed, people return to resume their lives or pick up the pieces within days, weeks, or longer as the severity of conditions dictates. As a result, the correlation between a storm and its associated economic impact can be felt in spending on Florida's Main Streets and through overnight stays in hotels and similar accommodations across historic communities.

The direct impact of severe storms on real estate values is less clear. The case study communities did not include substantial numbers of commercial properties and those properties tend to sell less frequently. The correlation of severe storms with residential real estate was also challenged. Data regarding the value of building permits issued for rehabilitation project were not available for this study. In addition, the state's residential property values have been significantly impacted by the influx of residents due to the COVID-19 pandemic.

Sixteen of the eighteen communities included in Case Studies were reviewed and included in the economic analysis prepared for this study. *(Refer to Chapter 5, Case Studies.)* The Cities of Jacksonville and St. Petersburg were excluded due to their size and high number of economic variables.

LOCAL ECONOMIC ANALYSIS

While the information gathered as part of this study addresses the impact of heritage tourism across the state, more nuanced economic analyses can be prepared by local communities to demonstrate the value of heritage tourism and historic preservation. This may encourage both public and political support of preservation activities in addition to providing valuable data to support local mitigation projects with state and federal funds.

ECONOMIC INDICATORS AND HISTORIC PRESERVATION

Tourism and job data are collected statewide in a comprehensive manner that is consistent year to year. Other economic indicators will depend on the manner that a local government operates within its delegated authority. For this reason, Florida communities are encouraged to develop economic plans based on data gathered from their unique systems and databases to monitor impacts from storm events and plan accordingly for targeted resiliency investments.

Economic indicators correlating local mitigation needs and historic preservation goals can include:

- **Building permits:** Assess storm repair costs and mitigation costs, using valuation data for designated historic and older buildings, distinguishing residential and non-residential uses
- **Ad-valorem exemptions for historic properties:** Evaluate taxable values pre- and post-construction as a measure of private investments in historic properties
- **Impact or utility connection fees:** Compare activity and value of fees accruing in a historic district against non-historic areas
- **Sign permits or business licenses:** Monitor business start-ups, turn-over, and non-renewal rates

RESILIENT HERITAGE IN THE NATION'S OLDEST CITY

Using a National Park Service Hazard Mitigation Grant, the City of St. Augustine published a multi-disciplinary report in 2020 that included an economic assessment by PlaceEconomics.

Key findings:

- Heritage tourists spend an average of $1,616,780 each day, contributing to 29 jobs annually and $970,017 in daily income
- Tourism is reduced a week before a storm event and the decline lasts 3-4 weeks after an event
- Approximately $20 million is lost in tourism expenditures following a storm event, affecting 300 direct and indirect jobs
- If 50% of historic resources were lost, it is estimated that heritage visitor parties would reduce by 34%, equating to a loss of and $549,705 in tourist expenditures daily
- Historic districts comprise 7% of the land area, 41% of the city's assessed property value; 50% of which is in a flood-risk zone
- Property values for flood-risk areas in the five-year study window did not reflect an impact from storm events

Notes:

The population for St. Augustine is 14,329 compared to St. Johns County at 273,425 (*2020 U.S. Census, www.census.gov*)

Average annual visitors to St. Johns County including St. Augustine is 5.4 million, excluding repeat and seasonal visitors

[www.citystaug.com]

Port St. Joe is a Gulf coast community that suffered physical and economic damage from Hurricane Michael.

THE POTENTIAL ECONOMIC CONSEQUENCES OF FLOODING ON FLORIDA'S HISTORIC COMMUNITIES

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THE POTENTIAL ECONOMIC CONSEQUENCES OF FLOODING ON FLORIDA'S HISTORIC COMMUNITIES

This Introduction and Summary of Findings was extracted from the full report, available in *Appendix E: Economics.*

INTRODUCTION

State hazard plans demonstrate different levels of commitment in the manner in which they link historic resources and their preservation to mitigation plans. Compared to other hazards, like wildfires and tornadoes, planners have access to much more information on the degree to which historic resources are exposed to floods. With this in mind, the National Park Service's (NPS) Certified Local Governments (CLG) program and the National Trust for Historic Preservation's Main Street Program promote community resilience. Moreover, the State of Florida is a national leader in disaster planning and, in addition, has a particularly strong CLG program.

Interestingly, about a quarter of the properties on Florida's National Register (NR) sit within the 100-year flood plain and may therefore be vulnerable to flooding. Listings of historic properties (national and local) associated with businesses tend to be buildings or districts of buildings. Most important to the aims of this study, districts associated with businesses typically include the downtown areas, often the focus of tourism and small-scale, retail-oriented economic development efforts. This high number of historic commercial sites in floodplains is a cause for concern by local landowners and local governments that is explored more thoroughly as "Main Street Program" economic impacts to the state.

There is a consensus in the empirical literature that local historic districts generate price premia for properties within their boundaries.[1] The

magnitude of the premia naturally varies with the restrictiveness and degree of enforcement of local ordinances.[2] If historic buildings within a historic district are compromised–for example, through premature demolition following a flood event–both the property owner and community lose a key asset. History, cultural heritage, and architectural value are lost, never to be recovered. Old places matter! [3]

But more than just property price premia, historic resources bestow numerous other benefits to communities. They contribute to economic development through building preservation, heritage tourism, and business activity on main streets and along commercial corridors.[4] Indeed, historic preservation is a natural policy for urban revitalization, particularly in aging central-city neighborhoods. Its historic aspect has near universal appeal as a characteristic that new construction in declining neighborhoods lack. They also provide a sense of place by helping to further educate local citizens of their area's heritage.[5]

In 2015, of the 454 National Register listings in Florida's floodplains, nearly half (49.8 percent) were located in CLG communities.[6] This suggests that a substantial number of communities that pride themselves on their historic character are at risk of losing historic resources if they do not properly prepare themselves to deal with floods. A somewhat more optimistic view is that many historic resources at risk from flooding are in communities that are experienced in protecting historic sites from development pressures; thus, they likely also have the capacity to enable mitigation measures that can enhance the resilience of properties to flooding.

It is with the above in mind that the State of Florida decided, as part of a larger study on local disaster risk assessment, to address the economic impact of flooding events on its historic communities. A core part of any such effort must include an assessment of the economy that is at risk. Given the above, this portion of the report examines the magnitude of heritage tourism's economic contribution of to the State of Florida. It reviews the contribution for the year 2019, the last year prior to the COVID-19 pandemic. This is followed by the economic contribution of investments made through Florida's Main Street Program, including long-term retail jobs that the program attributes to those investments. These two components, Florida's heritage tourism and its Main Street program are two tangible and readily measured aspects of the state's historic preservation efforts. Indeed, the total economic contribution of heritage tourism is ultimately the best single economic measure of federal, state, and local efforts in this regard.

Note, given the focus of this report is on the flooding's effect on businesses, it does not cover property values. This is because there are few commercial and mixed-use properties in many of the sample communities covered in this report; moreover, they sell far less frequently than do residential properties. Thus, a statistically viable measurement of changes (pre- to post-flood) in the values of commercial, industrial, and mixed-use properties would be rather difficult, given the large span of time covered herein.

Prior reports on the economics of historic preservation activities in the State of Florida also roughly estimated the amount of annual rehabilitation construction in historic districts. Data on the value of permits issued

Fernandina Beach is an active Florida Main Street Program community in northeast Florida.

Key West has survived many storm impacts and maintains robust tourism and construction industries.

Daytona Beach is one of Florida's east coast communities with some residential areas situated on high ground of a relict dune system.

by place as reported by the U.S. Census were key to these analyses. Unfortunately, the latest readily data on permits for residential alterations and remodeling are from 1994. Those for the value of alterations to commercial and industrial structures have been unavailable for even a longer period. Moreover, the prior analyses asked communities in the state to remit the value of alterations and remodeling permits issued to properties for a sample of communities. Ultimately, due to the lack of viable basic data on permit values, this effort was not undertaken for the present study.

Nonetheless, following this broad, statewide perspective, the report hones in on the impact of floods for a selected set of sixteen historic Florida communities. The communities are dispersed geographically across the state and vary substantially in size, from Everglades City to Daytona Beach. Moreover, some, like St. Augustine, flood frequently; others, like Hyde Park and LaBelle, had few, if any, flood events during the study timeframe. To examine the economic impact of floods on these communities, we examine several measures. One is analyzed at the community level–Airbnb rentals. These data are uniquely available to and, hence, analyzed by a study team in the Economic Impact Analysis Program of the Food and Resource Economics Department at the University of Florida in Gainesville. The other measures–gross sales, taxable sales, sales tax revenues, and tourism jobs–are county-level analyses.

ENDNOTES

1 Mason, Randall. (2005) *Economics and Historic Preservation: A Guide and Review of the Literature*, Metropolitan Policy Program, Brooking Institution, September 1.

2 Coulson, N. Edward & Michael L. Lahr. (2005). Gracing the land of Elvis and Beale Street: Historic designation and property values in Memphis. *Real Estate Economics*, 33(3), 487–507. doi:10.1111/j.1540-6229.2005.00127.x

Leichenko, Robin M., N. Edward Coulson, & David Listokin. (2001). Historic preservation and residential property values: An analysis of Texas cities. *Urban Studies*, 38(11), 1973–1987. doi:10.1080/00420980120080880

Thompson, Eric, David Rosenbaum, and Benjamin Schmitz. (2011). Property values on the plains: The impact of historic preservation. *Annals of Regional Science*, 47, 477–491. doi:10.1007/s00168-010-0373-9

3 Mayes, Thompson M. (2018). *Why old places matter: How historic places affect our identity and well-being*. Rowman & Littlefield.

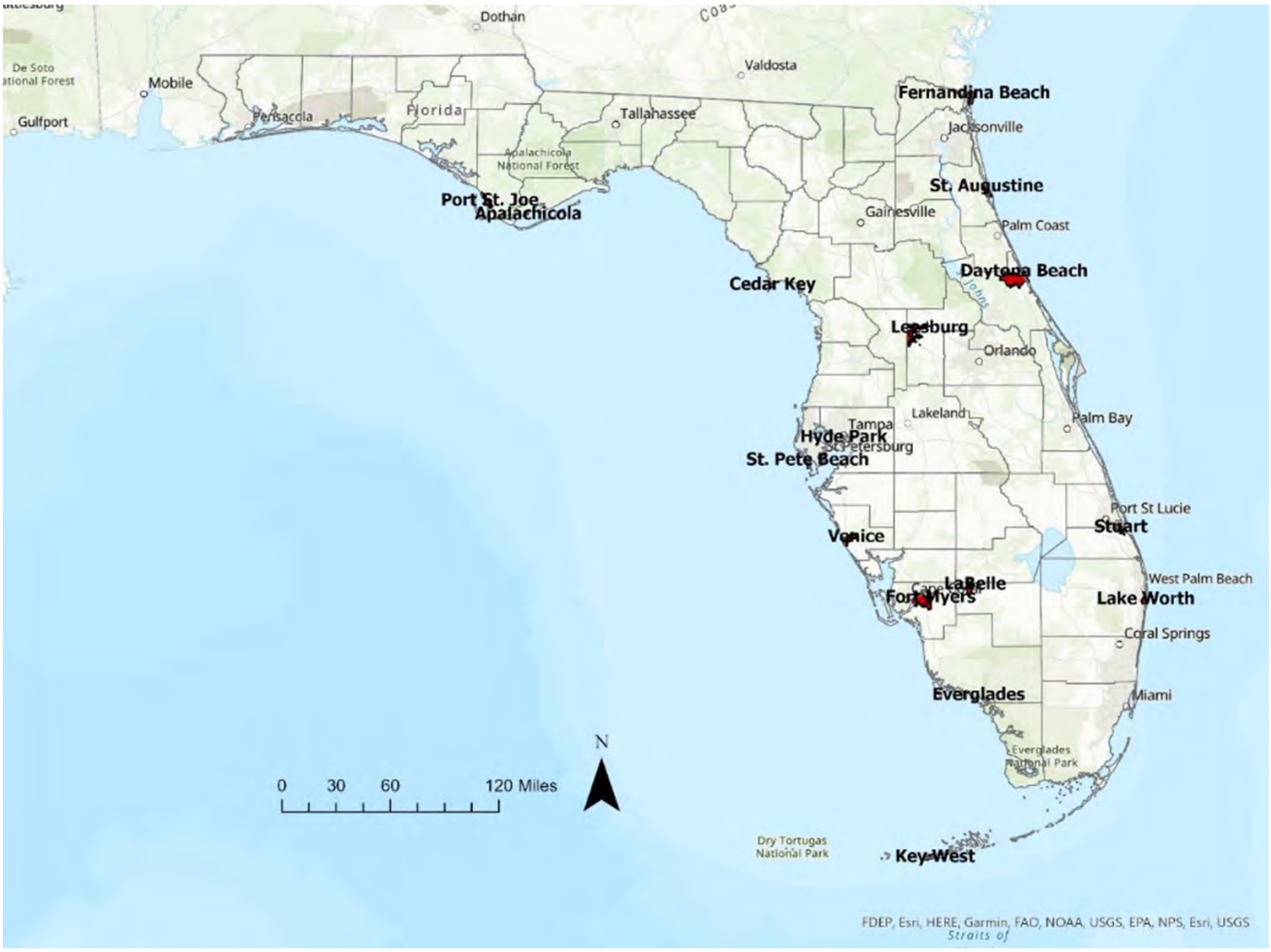
4 Listokin, David, Barbara Listokin, & Michael L. Lahr. (1998). The contributions of historic preservation to housing and economic development, *Housing Policy Debate*, 9(3) 43178. doi:10.1080/10511482.1998.9521303.

Bradbury, Susan L. (2011). An evaluation of Iowa's rural Main Street Program, Journal of Rural and Community Development, 6(2), 71–84.

Rypkema, Donovan R. & Caroline Cheong. (2013). Measuring Economic Impacts of Historic Preservation, 2nd ed. A Report to the Advisory Council on Historic Preservation. Washington, DC: Advisory Council on Historic Preservation.

5 Barthel, Diane. (1996). Getting in touch with history: The role of historic preservation in shaping collective memories, *Qualitative Sociology*, 19(3), 345–364.

6 Appler, Douglas & Andrew Rumbach. (2016). Building community resilience through historic preservation. *Journal of the American Planning Association*, 82(2), 92-103.



Map of sixteen communities reviewed as part of this economic analysis.

SUMMARY OF FINDINGS

HERITAGE TOURISM

Table S1 displays the direct expenditures by all heritage travelers, relative to the total spending for all Florida travel. Total Florida traveler spending in 2019 was about $52.5 billion. Of that, nearly $3.0 billion (about 5.6 percent) is attributed to heritage tourism.

TABLE S1. FLORIDA TRAVELER SPENDING, 2019

	TOTAL TRAVELER SPENDING (MILLIONS)	TOTAL HERITAGE TRAVEL SPENDING (MILLIONS)	HERITAGE TRAVEL SPENDING (%)
Day Trip	$2,116	$57	2.7%
Overnight	$50,371	$2,901	5.8%
Day and Overnight	$52,487	$2,958	5.6%

Source: TravelTrak Survey and Visit Florida data as analyzed by Rutgers Economic Service (R/ECON™).

Compared to non-heritage travelers, heritage travelers were more likely to be under 55 years of age, ethnic or racial minorities, and more educated. They were slightly more likely to be Floridians as opposed to tourists from outside of the state and to have earn more household income. Heritage travelers generally spent in patterns like other tourists in Florida but spent a bit less on lodging and dining, despite slightly longer stays.

The R/ECON™ I–O Model for the State of Florida was applied to the spending in Table S1 translated the nearly $3 billion in direct spending by Florida heritage travelers into total economic benefits shown in Table S2 below. It contributes over 51 thousand jobs, nearly $1.9 billion in household income, and over $3 billion in net wealth (GDP) to the state. It adds even more when the whole nation's economy is counted.

TABLE S2. TOTAL ECONOMIC IMPACTS OF FLORIDA

	FLORIDA	OUTSIDE FLORIDA	TOTAL (U.S.)
Jobs*	51,440	15,004	66,444
Income ($000)	$1,914,336	$905,554	$2,819,889
GDP ($000)	$3,041,305	$1,443,334	$4,484,638

Source: TravelTrak Survey and Visit Florida data as analyzed by Rutgers Economic Service (R/ECON™).

**Note: Person-year, full-time or full-time equivalent*

FLORIDA'S MAIN STREET PROGRAM (FMSP)

The FMSP started just five years after the National Main Street Program in communities like DeLand in 1985 and Fort Pierce in 1988. Since then, it has provided technical assistance to more than 80 Florida communities. At the present, the FMSP encompasses 39 accredited communities and 8 apprentice communities.

Since its inception, the FMSP has enabled total private investment of $1.6 billion and total of public investment of $2.9 billion–a cumulative total investment of $4.5 billion (see Table S3). Moreover, it has also enabled 7,575 new businesses and 27,479 jobs.

TABLE S3: CUMULATIVE STATISTICS FROM THE FLORIDA MAIN STREET PROGRAM THROUGH MARCH 2022 (MILLION $, NOMINAL)

COMPONENT	1985-2022
Net Businesses	7,575
Net Gain in Jobs Created	27,479
Private Investment	$1,617
Public Investment	$2,881
Total Investment	$4,499

Source: Florida Division of Historical Resources, 2022.

Table S4 summarizes the effects of the annual average Florida Main Street investments for the state of Florida. On average, it annually program creates about 1,888 jobs (71 percent of the total jobs generated nationally), $90.4 million in labor income (65 percent of the income generated nationally), and $144 million in wealth (65 percent of the wealth added to national GDP). Such economic leakage is typical for construction activity in states like Florida that do not produce much construction material (cf., California, Michigan, and Texas).

TABLE S4. TOTAL ECONOMIC IMPACTS OF FLORIDA MAIN STREET PROGRAM, AVERAGE ANNUAL INVESTMENT, 2017-2021

	FLORIDA	OUTSIDE FLORIDA	TOTAL (U.S.)
Jobs	1,888	781	2,669
Income ($000)	$90,377	$48,552	$138,929
GDP ($000)	$144,835	$78,389	$223,224

Source: Florida Division of Historical Resources as analyzed by Rutgers Economic Service (R/ECON™).

THE ECONOMIC IMPACTS OF FLOODING IN FLORIDA'S HISTORICAL COMMUNITIES

Historically speaking, Florida cities were mostly located along its coasts, although some also were founded on the state's inland coastal plain. All of them are exposed to risks from floods and other natural hazards. For detailed analyses, sixteen communities were identified (see Table S5) with some sensitivity to geographic and demographic diversity, as well as their exposure to flooding.

TABLE S5. THE COUNTIES AND SHARE OF AREA AT RISK OF FLOODING FOR THE 16 SELECTED HISTORIC COMMUNITIES

COMMUNITY	COUNTY	AREA AT RISK
Apalachicola	Franklin	60.1%
Cedar Key	Levy	95.3%
Daytona Beach	Volusia	51.2%
Everglades City	Collier	99.8%
Fernandina Beach	Nassau	38.1%
Fort Myers	Lee	41.1%
Hyde Park	Hillsborough	18.6%
Key West	Monroe	90.7%
LaBelle	Hendry	11.4%
Lake Worth	Palm Beach	25.4%
Leesburg	Lake	37.7%
Port St. Joe	Gulf	52.4%
St. Augustine	St. Johns	76.9%
St. Pete Beach	Pinellas	99.9%
Stuart	Martin	6.4%
Venice	Sarasota	32.7%

There is a paucity of publicly available data at the community level. This made it difficult to estimate economic impacts of flooding on the sixteen selected communities. Because of this, only an analysis of Airbnb rental data could be performed at this level of geography. Other related data on retail sales and jobs were also analyzed, but at the county level.

AIRBNB

While flooding negatively affected Airbnb rentals in Florida's historic communities, the effects were tough to gauge. This is because, until recently, many of the smaller communities had few rental properties. On average the 16 communities lose on the order of 7 percent of their Airbnb reservation days during the month of a flood. Findings suggest that larger historic communities were more heavily affected. Despite the loss of reservation days, however, losses in Airbnb revenues were not as evident, at least among smaller communities.

SALES ACTIVITY

Business activity in Florida is subject to sales and use tax. Monthly data on gross sales, taxable sales, and sales tax collections by county are available from the Florida Department of Revenue. A series of these data for 2015 through 2021 was analyzed controlling for flood events. During the month of floods, an average drop of 3.6 percent was observed for gross sales, 3.7 percent for taxable sales, and 3.4 percent for sales tax revenues within the counties of the 16 communities. For the month following a flood event two of the measures fall further—taxable sales drop of 1.4 percent more and sales tax revenues drop 2.0 percent more. Gross sales do not; perhaps because exempt organizations in the 16 counties pick up their spending during recovery efforts. Within three months of a flood event, sales tend to fully recover.

TOURISM-RELATED JOBS

Tourism-related job losses from flood events are smaller and more temporary than those for sales. Such jobs tend to fall half as far during the month of the event (1.5 percent versus around 3.5 percent). Moreover, no effects tend to appear after that month with a full recovery in three months. Job losses, no matter how temporary, are experienced more heavily in Leisure and Hospitality activities than in Retail activities (an average drop of 1.9 percent versus 0.9 percent).

Lake County, ca. 1910. (Florida Memory)

8 PLANNING: HAZARD MITIGATION FOR HISTORIC BUILDINGS

(continued, page 8.2)

Hazard mitigation planning is the process by which states and municipalities identify and implement policies and actions to reduce their vulnerability to hazards and establish a framework to respond to a disaster. Hazard mitigation plans identify an area's vulnerability to the effects of the natural and man-made hazards, including flooding and high winds, as well as the goals, objectives, and actions required for minimizing future loss of life, injury, property damage, and economic disruption because of hazard events. ***Although municipalities may not prioritize historic and cultural resources in their hazard mitigation planning, the protection of these resources can be integral to a community's economic success and recovery in the aftermath of a flood event.***

The framework for the hazard mitigation planning process follows the Emergency Management Cycle, as established by the federal government, to protect life and property as well as reduce the impacts of hazard events by encouraging states and local communities to understand and mitigate risks in advance of an event. *(44 CFR 201; Title 44: Emergency Management and Assistance; Code of Federal Regulations; Part 201: Mitigation Planning.)* The Emergency Management Cycle is a regulated policy framework with a constant, cyclical process comprised of four phases: planning/preparedness, response, recovery, and mitigation. To improve a community's ability to withstand a storm event, planning and preparation, coupled with mitigation projects, can facilitate storm recovery. When a storm occurs, response and recovery are followed by mitigation measures to improve storm resilience and adapt to changing threats. With the increases in severe storm and sea level rise, climate adaptation should also be considered as part of the planning process. *(Refer to Climate Change, page 1.8.)*

Challenges in Fort Myers' historic downtown area result from significant amounts of paved surfaces and flooding from storms.

FEMA DEFINITIONS FOR HAZARD MITIGATION PLANNING

Hazard: Something that is potentially dangerous or harmful, often the root cause of an unwanted outcome.

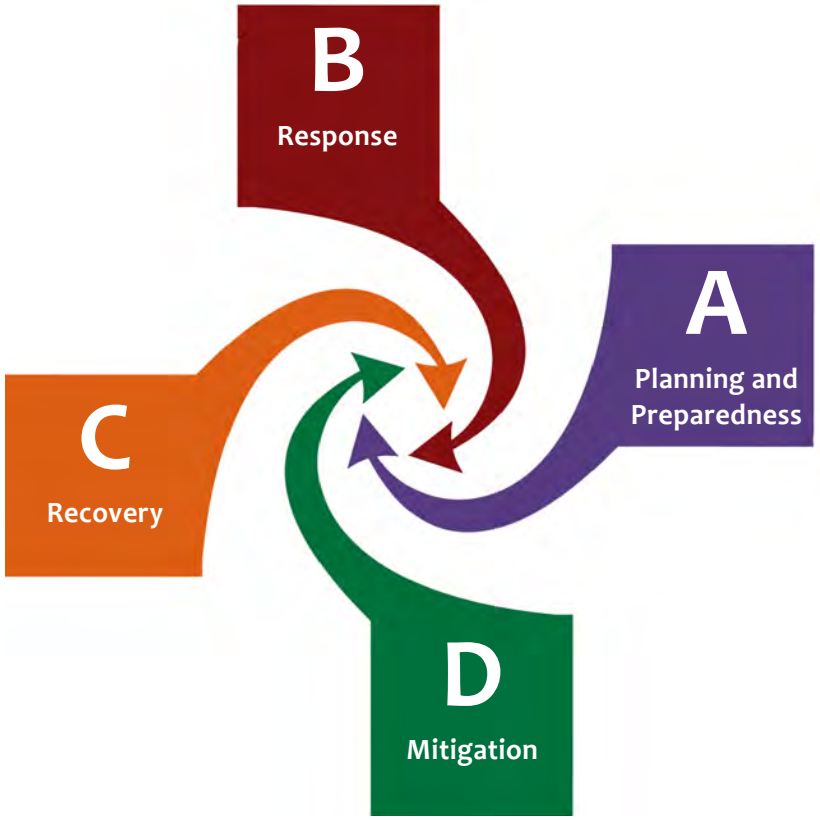
Hazard Mitigation: Any action taken to reduce or eliminate the long-term risk to human life and property from hazards. The term is sometimes used in a stricter sense to mean cost-effective measures to reduce the potential for damage to a facility or facilities from a disaster or incident.

Hazard-Specific Annexes: Individual chapters in an emergency operations plan that describe strategies for managing missions for a specific hazard. They explain the procedures that are unique to that annex for a hazard type and may be short or long depending on the details needed to explain the actions, roles, and responsibilities. The information in these annexes is not repeated elsewhere in the plan.

The preparation of a local hazard mitigation plan is guided by county emergency management personnel, often supplemented by experienced, outside, professional consultants with expertise in plan preparation. The planning team relies on representation from all levels of government, including planning, infrastructure, transportation, health and human safety, and housing and community development. A core part of any such effort must also include an assessment of the economy that is at risk. Planning for the financial loss must take into consideration reduced tourism before and after an event, actual repair costs and costs from loss of use, and employment impacts. *(Refer to Chapter 7, Economic Indicators of Storm Impacts.)*

Florida Main Street communities and historic districts and sites add value to heritage tourism in a state where tourism is a top industry. ***Although preservation planners and advocates are typically not involved in the preparation of hazard mitigation plans, with community support, they can participate in the process and assist those communities with prioritizing historic preservation with economic impacts.*** Compared to other hazards, like wildfires and tornadoes, planners have access to much more information on the degree to which historic resources are exposed to floods. While flood risk is often shared across a community, wind risk is determined by the specific characteristics and level of protection at individual buildings. Preservation planners can also assist in the individual evaluation of potential wind risk for historic buildings. *(Refer to Identify Historic Properties Within Flood-Prone Areas, page 4.3, and Chapter 3, Wind Retrofitting.)*

(continued from page 8.1)



- IDENTIFY HISTORIC PROPERTIES
- IDENTIFY FLOOD RISK
- ESTABLISH PRESERVATION PRIORITIES
- PREPARE EMERGENCY RESPONSE PLAN

The Emergency Management Cycle.

PLANNING AND PREPAREDNESS

Planning is the starting point of the Emergency Management Cycle and the first step in protecting historic properties from storm events. The planning process allows a community to evaluate their level of flood vulnerability and ways to reduce damage from flooding, and to a lesser extent, severe winds (flood and wind mitigation); consider their efficacy and potential impact on historic integrity; select appropriate measures for their community; and develop a prioritized plan for their implementation within a specific timeframe. This can be completed through the hazard mitigation planning process as well as through other local planning efforts. *(Refer to Addressing Preservation and Disasters in Local Planning Initiatives, page 4.6.)*

Recognizing the importance of historic properties, FEMA produced *Integrating Historic Property and Cultural Resource Considerations into Hazard Mitigation Planning (Publication 386-6)*, on which this chapter is based. While not intended to replace FEMA's guidance, this *Guidance* document contains information based on the planning experience of communities for Florida-specific resources as demonstrated in the Case Studies. *(Refer to www.fema.gov and Chapter 5, Case Studies.)*

The hazard mitigation planning process also provides the opportunity for communities to evaluate their historic preservation, zoning, and building regulatory framework and implement improvements to better

FLORIDA ENHANCED STATE HAZARD MITIGATION PLAN 2018 UPDATE

The State of Florida's Hazard Mitigation Plan (HMP) captures historic disaster experiences, and reflects the natural and human-caused hazards Florida faces, based on current science and research. The State HMP outlines a strategy to reduce risks from hazards, and serves as the basis for prioritizing future project funding.

[Florida Hazard Mitigation Plan, 2018]

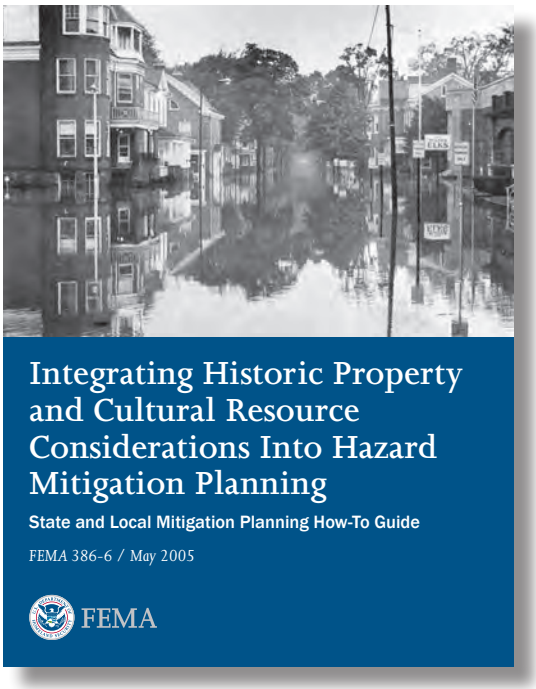
protect their historic resources. Protection can be preventative, such as developing design guidelines and parameters for property owners to improve their flood and wind resilience in a manner that is sensitive to the historic integrity, as well as responsive in establishing protocols to address the protection of historic resources following a severe storm. *(Refer to Develop Design Guidelines for Storm Mitigation, page 4.19, and Plan Storm Response and Recovery for Historic Resources, page 4.25.)*

A municipality may initiate the planning process in response to known threats, often brought to light through disaster and subsequent recovery, or proactively as part the mandated hazard mitigation plan update. ***Although proactively working in the framework of the hazard mitigation planning process is the best way to ensure that historic property protection is viewed within the larger context of a community's disaster preparedness, municipalities should consider all options for planning and select the best option for their needs.***

HAZARD MITIGATION PLANNING FOR HISTORIC PROPERTIES

Although historic properties and cultural resources may not be an initial priority in storm mitigation planning, their significance to a community's sense of place can serve as a key motivation for recovery. In addition, historic resources are often integral to a municipality's economic success, fueling heritage tourism, housing Main Street commercial districts, or representing a significant number of residential properties. One of the most effective ways to make the protection of historic resources a priority in the hazard mitigation process is for historic preservation advocates to work with their community planners and emergency management personnel to convey the importance of historic preservation to the community and ensure that these authorities include recommendations in support of their protection in hazard mitigation plans.

One of the challenges local governments face in efforts to provide protection to their historic resources is that many hazard mitigation plans are prepared by counties rather than local governments. Because of the breadth of the area they cover, county-wide plans should identify similar flood risks shared by adjacent communities with the goal of promoting an integrated approach to large-scale, cross-community, mitigation projects. ***However, county-wide plans may fail to acknowledge or provide special protection for those areas that give a community its sense of place, such as historic neighborhoods, particularly if historic resource survey documentation is unavailable.*** Local planners, and where available, preservation planners, should participate in the county-wide hazard mitigation planning process to ensure their distinctive resources are considered in the preparation of the plan. *(Refer to Identify Historic Properties Within Flood-Prone Areas, page 4.3, and Gather Information, page 8.9.)*



FEMA 386-6 is a useful tool for integrating historic and cultural resources into the hazard mitigation planning process. However care should be used to ensure the requirements of recent legislation are considered as part of the implementation process, including the Biggert-Waters Flood Insurance Reform Act of 2012, the Homeowners Flood Insurance Affordability Act of 2014, and FEMA Risk Rating 2.0 – Equity in Action. (Refer to National Flood Insurance Program, page 2.3.)

EVALUATE OPTIONS FOR PLANNING

Local governments have the ultimate responsibility to plan for their own futures, making decisions regarding where to invest their resources, and in the case of historic properties, identify those properties that will receive the greatest resources towards their protection. Communities have several options for planning that may address the subject of flooding and historic resources. The types of local plans can include:

- Hazard mitigation plans;
- Master plans;
- Stormwater master plan;
- Historic preservation elements;
- Coastal management elements;
- Emergency management plans; and
- Climate or resiliency adaptation plans.

The hazard mitigation planning process is the best way to integrate the protection of historic resources into the emergency management framework, while other local plans can expand upon a community's goals in a specific topic area beyond hazard mitigation but should have consistent recommendations and support the community's flood resiliency goals. For example, a municipality's historic preservation element may address administrative procedures with the application review process, which would not be appropriate in a hazard mitigation plan, while recommendations for design guidelines addressing storm mitigation should be consistent in both documents. *(Refer to Addressing Preservation and Severe Storms in Local Planning Initiatives, page 4.6, and Develop Design Guidelines for Storm Mitigation, page 4.19.)* However, municipalities may find that the intensive planning and public outreach required for the hazard mitigation planning process provides a good opportunity to obtain the necessary input to comprehensively update other local plans.

The Florida Enhanced State Hazard Mitigation Plan 2018 Update is effective August 24, 2018, through August 24, 2023. (www.floridadisaster.org)

Although the hazard mitigation planning process can be challenging to navigate due to the involvement of multiple agencies, it is the most effective tool for a community's preservation planners and local design or historic review authority to use in order to best prepare for and respond to natural disasters. The recommendations of local hazard mitigation plans inform the recommendations for the State Hazard Mitigation Plan and have the potential to focus resources on the protection of historic properties.

All 67 counties in Florida have a Local Mitigation Strategy (LMS). FDEM reviews these plans and works closely with the counties to assure that the county hazard mitigation plans meet all required criteria and recommendations aligned with best practices. To maintain FEMA compliance, local governments must prepare and update hazard mitigation plans every five years. Local hazard mitigation plans can be prepared by a team that includes a team of paid consultants working with county or municipal staff, and local jurisdictions. Throughout the process, the planning team identifies vulnerable properties, infrastructure and populations, and prioritizes mitigation projects to reduce those

vulnerabilities. The Florida Enhanced State Hazard Mitigation Plan 2018 Update includes funding opportunities for projects related to historic properties that can be revised to fit local needs and included in a hazard mitigation plan.

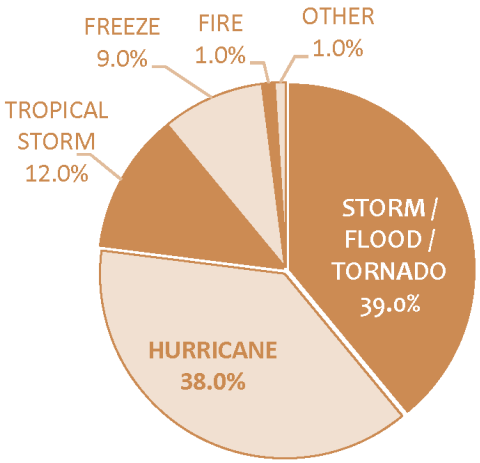
At a minimum, a Florida LMS should address the state's highest risks related to extreme weather including flooding, tropical cyclones, severe storms, wildfire, erosion, extreme heat, and sea level rise. Local plans can address additional issues such as earthquakes and agricultural disruption as conditions warrant. For the purposes of this section, the focus will be on flood hazards, although many of the tools and processes can be adapted to address other hazards, including wind. It should also be noted that flooding and high wind are often accompanied by secondary hazards such as fires. *(Refer to Secondary Threats, page 1.6.)*

If the planning team works in the hazard mitigation planning framework, information can be prepared as an annex, or standalone component, of the larger hazard mitigation plan, or as a chapter within a plan. There are advantages and disadvantages to each option. The annex approach is recommended as it allows greater focus on the protection of historic resources and provides an opportunity for the preservation planner and the public to have greater input. However, the chapter approach ensures the integration of historic resource protection in the larger community planning process, allowing the preservation-friendly recommendations to be considered within the context of a municipality's mitigation framework, potentially providing greater community buy-in. Although the annex approach is preferable, it is critical to ensure that whichever option is selected, the recommendations are supported within the larger planning process, reinforcing and not conflicting with actions identified in the remainder of the hazard mitigation plan.

Draft plans must first be reviewed by the Florida Division of Emergency Management (FDEM) for fulfillment of submission requirements and consistency with the current Florida Hazard Mitigation Plan. Following FDEM approval and prior to local adoption, plans are submitted to FEMA for review. Approval by FEMA confers eligibility for Hazard Mitigation Assistance Program (HMA) funding for projects included in the plan.

Recognizing that communities are continuously evolving, with changes in development, infrastructure, industry, and potential impacts from emergency events, local communities are required to update their FEMA-approved hazard mitigation plans every five years to remain eligible for funding. Advocates for historic preservation should take the opportunity to participate in the planning process on this cyclical basis. *(Refer to Write, Adopt, and Implement the Plan, page 4.28.)*

While participating in the planning process, it is important to keep in mind that there may be conflict between guidance for preservation and floodplain management, and that neither framework has caught up to climate change. *(Refer to Climate Change, page 1.8, Historic Properties and Floodplain Regulations, page 2.11, and Establish a Planning Timeframe, page 8.14.)* In many regards, this Guidance document is intended to help bridge those gaps; however, it should be noted that the integration of climate change into planning is continuing to evolve as more information is learned.



FLORIDA MAJOR DISASTER DECLARATIONS

Major Disaster Declarations, by Type, in Florida from 1953-2016. (Florida Enhanced State Hazard Mitigation Plan 2018 Update, www.flordadisaster.org)

HIGH HAZARDS IN FLORIDA

The following hazards are categorized as high likelihood by in the Florida Enhanced State Hazard Mitigation Plan 2018 Update:

- Flood
- Tropical cyclones
- Severe storms
- Wildfire
- Erosion
- Extreme heat
- Transportation incident
- Cyber incident
- Terrorism
- Agricultural disruption

Future mitigation projects planned with input from the preservation staff will address flooding to historic buildings around Lake Maria Sanchez in St. Augustine as part of a larger DEP grant program.

RECRUIT A TEAM

Flood mitigation and historic preservation are specialized fields with little overlap in their purpose and daily function. ***Historic preservation professionals or advocates are rarely represented in the typical hazard mitigation planning process that is usually led by the local emergency management office.*** Until integration of these disciplines becomes more widespread, planners and emergency managers must collaborate and seek specialized individuals to identify issues and develop creative solutions to meet a community's needs. Although it is ideal to have a full team in place at the beginning of the process, it is more likely that the process will begin with a small group that will expand as goals are formalized and progress made.

To engage in the process, preservation planners, members of the local design or historic review authority and/or representatives of local preservation group should request to participate as a member of the technical team for the next hazard mitigation plan update. *(Refer to Write, Adopt, and Implement the Plan, page 8.28.)* It may not be logistically possible for the local emergency management office to include all interested parties on the technical team, and participants that are included should be aware of the significant time commitment required. The preservation advocates(s) on the technical team should ensure that they coordinate with and share information with groups that are interested but unable to participate.

As an alternative, the local design or historic review authority, preservation planners, or advocacy groups should consider developing a separate hazard mitigation plan for cultural resources, either as an official addendum to the local hazard mitigation plan or as a guiding document for future planning. *(Refer to Addressing Preservation and Severe Storms in Local Planning Initiatives, page 4.6.)* This approach allows the organizing group to establish a preservation-friendly team with a breadth of expertise in cultural resources.

Valuable team members should include interdisciplinary experts with different experiences and points of view. Although each community will have varying needs and available expertise, the range of experts and advocates for the preservation team can include (in no particular order):

- Elected officials with an interest in historic preservation;
- Local design or historic review authority;
- Preservation planners or planners with an interest in preservation;
- Local building, planning, and zoning personnel;
- Floodplain administrators;
- Emergency managers;
- Water management district representatives;
- GIS Mapping specialists;
- Professional preservation architects, landscape architects, and archaeologists;
- Representatives of local historical and archaeological societies, private museums, and archives;

- Business representatives from historic commercial districts;
- Representatives from public historic sites, parks, and "friends" groups;
- Civic association representatives from designated residential districts – making a special effort to include traditionally marginalized communities;
- Preservation advocacy organizations;
- Tourism bureau representatives;
- Florida Division of Historical Resources (DHR) representatives;
- Local Heritage Area representatives;
- Main Street managers, staff, or volunteers; and
- Local colleges and universities with programs related to historic preservation or cultural heritage.

Ideally, the team will represent all parties essential to local preservation planning. However, logistics and competing priorities can make coordination difficult. The organizer may wish to establish a core team as a subset of the larger preservation planning team to participate regularly and engage in planning meetings. A representative of the core team would provide the preservation team with regular reports and solicit feedback.

In addition to participating in the hazard mitigation planning process, the local team members can assist in developing tools and mechanisms to address flood mitigation of historic properties through municipal regulatory and planning processes ranging from zoning and building code modification to developing a local historic resource response plan. *(Refer to Chapter 4, Local Tools: Preservation and Storm Mitigation.)*

They can:

- Evaluate the current regulatory framework and support for historic properties and floodplain management *(refer to Modify Local Floodplain Regulations, page 4.17)*;
- Identify ways to integrate flood and wind mitigation for historic properties in community planning goals *(refer to Addressing Preservation and Severe Storms in Local Planning Initiatives, page 4.6)*;
- Review existing historic resource documentation and flood vulnerability and identify areas for additional evaluation and documentation *(refer to Identify Historic Properties in Flood-Prone Areas, page 4.3)*;
- Evaluate potential implementation of identified goals in the Community Rating System (CRS) and potentially revise local zoning and building codes to reduce floodplain development and potential impacts from a flood event *(refer to Modify Zoning Ordinance, page 4.11, Modify Building Code Requirements, page 4.14, Participate in the Community Rating Ststem, page 4.23)*;
- Assess the potential economic impact of a severe storm and recovery on locall residents and businesses *(refer to Develop an Economic Assessment Analysis of Local Historic Resources, page 4.22)*;

Planners will need to identify above-and below-ground impacts that could result from natural hazards and mitigation projects.

- Develop a framework of preferred options for landscape improvements appropriate to local conditions to mitigate flooding and wind damage *(refer to Landscape Options, page 12.7)*;
- Identify flood-vulnerable archaeological sites and develop a mitigation strategy *(refer to Develop a Local Archaeological Program, page 4.3.)*
- Develop design guidelines for storm mitigation appropriate to the local character *(refer to Develop Design Guidelines for Storm Mitigation, page 4.19)*;
- Prepare information on protective measures for historic properties for owners in advance of a storm and response *(refer to Develop Information for Property Owners, page 4.26)*; and
- Develop a coordinated local response to protect historic resources and fabric following a flood and/or wind event *(refer to Plan Storm Response and Recovery for Historic Resources, page 4.25)*.

As part of the hazard mitigation planning process, the local team members can play an important role in developing and implementing a public engagement and communications strategy, in addition to promoting the plan as advocates within their organizations or within their constituent groups.

Since the hazard mitigation planning process is cyclical, completed every five years, the planning team can be formed at any time in conjunction with or prior to a hazard mitigation plan update. The planning process can take a significant amount of time and ideally, when it is time for the next plan update, the planning team will have the needed information and public support to include historic and cultural properties in the hazard mitigation plan whether or not they had been previously included.

GATHER INFORMATION

Each community has the responsibility of making difficult choices regarding their priorities and how to best utilize available funding and personnel in support of their fellow citizens. ***To get a better sense of how to prioritize their efforts, communities seeking to protect their historic resources from flooding will need to begin with an analysis and assessment of their current programs, initiatives, and resources that can be thought of as the "starting point" for the hazard mitigation planning process.***

Historic landmarks and city or county administration needs may be prioritized in planning efforts.

A community's starting point should be identified to:

- Establish parameters for planning, including the type of plan(s) in addition to available mitigation and funding options;
- Direct available energy and resources towards the overall goal of protecting historic resources;
- Reveal deficiencies in current information, processes, and resources as well as indicate opportunities for improvement; and
- Identify potential partners who can assist in various aspects of the work–such as seeking guidance from DHR–on the prioritization of historic resource data collection or funding for evaluating flood vulnerability.

The analysis will identify strengths that will assist them in the process and weaknesses that may challenge their progress. Communities that have experienced flooding might have a robust emergency management plan and dedicated resources towards flood mitigation. Other communities that have not experienced damaging floods may have a heightened interest in protecting historic districts that fuel their tourism economy and define their sense of place. By gathering initial information, community funding and personnel can be directed toward areas in which improvement can be made and develop a process for integrating historic resources into hazard mitigation planning process.

Some of the information that should be collected is identified in the subsections below.

EXISTING PLANS

As part of outreach to state and local partners, the preservation hazard mitigation planning team should collect municipal planning documents and maps to understand what their community has already established regarding the identification and protection of historic properties. *(Refer to Addressing Preservation and Severe Storms in Local Planning Initiatives, page 4.6.)* These documents include, but are not limited to:

- State and local hazard mitigation plans;
- Floodplain management plans;
- Disaster response and recovery plans;
- Emergency operations plans;
- State preservation plans and preservation elements within master plans;
- Community or site-specific master plans;
- Heritage area management plans;
- Master plans;
- Stormwater management plans;
- Economic development plans, including Main Streets and arts and entertainment districts; and
- State and local transportation plans, including scenic byways.

LEVEL OF FLOOD VULNERABILITY

The level and immediacy of a community's historic resources flood vulnerability will vary based upon geographic location, geology, hydrology, and the specific types and relative locations of those historic properties. In addition to assessing the impact on buildings, a community's infrastructure should be evaluated for condition, stability, and capacity including transportation, utilities, water supply, sewage treatment, and storm water management, all of which can impact risk and recovery. To understand the starting point, each community should gather information to evaluate the flood risk, with the understanding that levels of risk may be unique to each resource. *(Refer to Evaluating a Property's Flood Risk, page 2.16, and Identify Historic Properties Within Flood-Prone Areas, page 4.3.)*

Buildings situated an elevations lower than the street face an increased risk to flooding which can be identified on topography maps, GIS maps, and street surveys.

Little elevation change and natural shorelines will increase flood risk to older and historic properties.

Although not required, FEMA and the State of Florida encourage local communities to consider risks with respect to a timeframe that incorporates future climate projections for sea level rise, increased precipitation and other factors, depending on the location and timeframe for planning. The *2022 Sea Level Rise Technical Report* from NOAA and NASA projects that Florida's coasts will experience nearly a foot of sea level rise in twenty years and will rise 18 inches by 2050. The municipal floodplain administrator may be able to provide more specific GIS mapping that identifies the limits of current floodplain, and predictive models that indicate the potential effects of storm surge, sea level rise, coastal erosion, increased precipitation, and other natural hazards associated with flooding. *(Refer to Chapter 1, Storm Vulnerability.)*

IDENTIFY HISTORIC PROPERTIES VULNERABLE TO FLOODING

As a first step, the planning team should overlay a map of known historic properties on a map of the areas determined to be vulnerable to flooding. Known historic properties include those determined eligible for listing, or are already listed on, the National Register or properties identified in local inventories (via local preservation planners or local design or historic review authority), and properties identified as culturally, historically, or archaeologically significant in existing planning documents. Communities with incomplete or outdated information regarding historic properties will need additional documentation as part of the planning process. *(Refer to Assess and Document Historic Property Flood Risk, page 8.15.)*

Traditionally, historic resource surveys covered limited geographic areas and were limited to difficult-to-access paper files. ***More often, survey data is comprehensively linked to Geographic Information System (GIS) mapping software, which is useful for both cultural resource and flood management and for facilitation of community planning and mitigation.*** GIS mapping can also benefit regulatory reviews by the local design or

historic review authority and the preparation of master plans and historic preservation elements in establishing community goals pertaining to historic properties. *(Refer to Addressing Preservation and Severe Storms in Local Planning Initiatives, page 4.6.)* Documentation assessing and individual property's flood vulnerability may or may not be available but should be collected as part of the survey process. Ideally, this would include property Elevation Certificates, typically prepared as part of a new construction or renovation project, or by property owners seeking to reduce their flood insurance premiums. *(Refer to Identify Historic Properties Within Flood-Prone Areas, page 4.3, and Evaluating a Property's Flood Risk, page 2.16.)*

PRESERVATION REGULATORY FRAMEWORK

Some communities have a strong preservation regulatory framework supported by its citizens and local authorities, while other jurisdictions have limited local recognition of and support for their historic and cultural properties. ***Starting from a position where preservation is locally valued facilitates the prioritization of mitigation efforts directed toward historic resources.*** A strong, local regulatory framework may include participation in the Certified Local Government (CLG) process; an active local design or historic review authority with a robust historic district ordinance; a historic preservation component; the identification of preservation as goal in a master plan; or a supporting directive such as preservation design guidelines. *(Refer to Addressing Preservation and Severe Storms in Local Planning Initiatives, page 4.6, and Develop Design Guidelines for Storm Mitigation, page 4.19.)*

AVAILABILITY OF PERSONNEL AND FINANCIAL RESOURCES

Financial resources and knowledgeable, committed preservation personnel are equally necessary for the successful protection of historic resources. ***Advocacy is crucial to securing funding in the context of competing local interests. Authorities will be more inclined to dedicate financial resources if the preservation of historic properties is visibly supported by a dedicated team of community leaders and volunteers and there is an economic analysis identifies the local value of historic preservation efforts.*** Ideally, preservation-friendly municipal officials can participate in the local planning team or serve in an advisory role. *(Refer to Recruit a Team, page 8.7, and Develop an Economic Assessment Analysis of Local Historic Resources, page 4.22.)*

DEGREE OF COMMUNITY SUPPORT

Political will often reflects the degree of community support for an issue and can make the difference between the protection or loss of historic properties. The level of existing community support will be a key factor in determining the public engagement strategy. At the beginning of the planning process, the team should ascertain community sentiment and consider opportunities for engagement with special efforts aimed at marginalized or vulnerable communities that may be difficult to reach. *(Refer to Engage the Public, page 8.13.)*

Preservation programs with broad community support usually include Florida Main Street and CLG communities like Fernandina Beach.

ENGAGE THE PUBLIC

Successful plans require robust public input and support. ***Public outreach strategies should attempt to engage the widest range of citizens. Special consideration should be given to communities that may be particularly vulnerable to flooding and may have historically or culturally significant properties that have not been adequately documented, such as financially-challenged communities or those with significant elderly or immigrant populations.*** Ongoing outreach can educate citizens about the potential effects of flooding and the potential effects of mitigation measures on the historic properties that matter to them. It can extend beyond the hazard mitigation planning process to address initiatives, planning, and preparedness issues relevant in the community. It can also serve as a forum for citizens to identify places that they consider to be significant that might not be included in any historic inventories. This feedback might identify significant properties that could be eligible for inclusion on the National Register of Historic Places or a local register, or may not be listed, but are identified as culturally valuable to the community.

When developing the public engagement strategy, the planning team should clearly define goals and structure outreach to inform stakeholders and citizens of the process on a regular basis. The planning team should identify the key moments in the hazard mitigation planning process in which public input would be valuable, which may include the identification of local priorities, and when public updates are appropriate. The planning team can develop an overall schedule that includes meeting dates, allowing community members to plan ahead. *(Refer to Establish Local Preservation Priorities, page 8.21.)*

Singular community landmarks can serve as a starting point to gather community support for preservation planning.

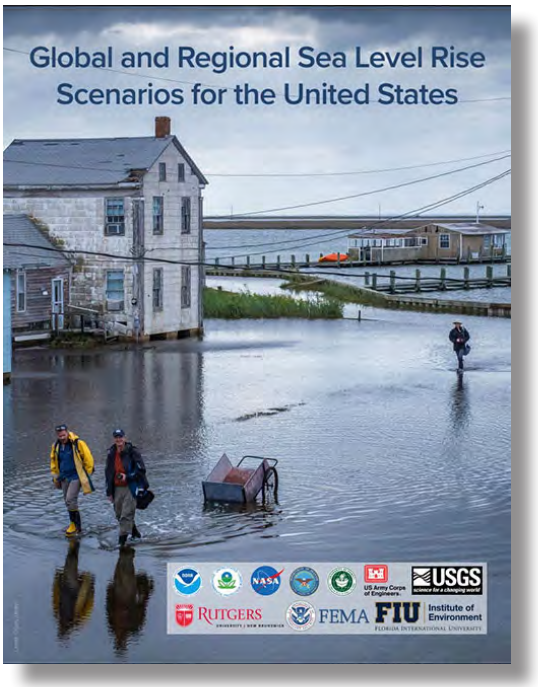
The public engagement process can include meetings, events, print media, websites, e-mail blasts, social media, news articles, video streaming, pamphlets, list-serves, workshops, and conferences. To maximize participation, strategies should be considered to increase attendance, including holding meetings in various locations and outside of standard work hours; ensuring adequate access by public transportation; providing interpretation for non-English speakers; including child-friendly activities; and/or providing food or child care. There may be dedicated funding opportunities for the public engagement portion of the hazard mitigation plan.

Some issues to consider in a community engagement forum include:

- What are the characteristics of typical flooding and severe winds in the community? Is it getting worse? Are adjacent communities addressing similar issues? Is there an opportunity to work together?
- Have historic resources been identified? Are historic resources vulnerable to flooding and wind damage? Have the citizens been given the opportunity to designate what is locally important?
- What is the community's threshold for risk? What is the relationship to water?
- Is the community in a Wind-Borne Debris Region?
- What defines/maintains sense of place? How can the community change and still protect what's meaningful? Are all neighborhoods/ citizens represented in the evaluation?

- Is the community willing to compromise in terms of historic integrity and how does that influence preferences for mitigation actions and to what extent? What can be compromised and what cannot be compromised to maintain sense of place?
- Are individual property owners implementing mitigation projects? How are they making their choices? Is there information to assist them? What are the impacts on the property's historic integrity? Are there impacts on neighboring properties?
- Should both community-wide and building-specific mitigation be considered separately? Is there a benefit in encouraging specific property mitigation projects to supplement or enhance community-wide projects?

After reviewing responses to these questions, a community will be in a better position to develop mitigation goals, strategies, and actions that balance preservation and protection of historic resources through the hazard mitigation planning process as well as local planning and preparedness efforts. Ideally, the engagement process extends beyond the hazard mitigation process and becomes a part of the local decision-making process. Community updates can also be a regular agenda item in a regularly-held meeting, such as a local design or historic review authority, historical society, business or civic association meeting, or incorporated into a public gathering or event.



2022 Sea Level Rise Technical Report
www.oceanservice.noaa.gov

ESTABLISH A PLANNING TIMEFRAME

Each community must identify flood hazards, including where floods are likely to occur; assess the vulnerability of the community and in some cases, specific properties; and identify mitigation goals, strategies, and actions to reduce the impact of flooding. Although periodically updated, FEMA's Flood Insurance Rate Maps (FIRMs), the most important baseline for flood management, provide information about the most vulnerable areas within a community's floodplain based only upon historical data. *(Refer to Flood Insurance Rate Maps, page 2.6.)*

Because of the anticipated change in flood risk over time, a community should establish timeframe(s) for planning that are accepted by both governmental officials and citizens, and allow for realistic, achievable implementation goals. If the planning timeframe is too long, it may be perceived as a problem for future property owners or generations. If too short, the timeframe may not allow for adequate long-term protection, thereby requiring additional ongoing planning and implementation of mitigation to reduce future threats. To encourage the implementation of mitigation measures by private property owners, communities might consider a timeframe of thirty years, the length of most homeowners' mortgages. A thirty-year timeframe would also allow communities to utilize anticipated sea level rise predictions for the year 2050. *(Refer to Assess and Document Historic Property Flood Risk, page 8.15.)*

SEA LEVEL RISE IN FLORIDA

The United States is expected to experience as much sea level rise by the year 2050 as it witnessed in the previous hundred years. That's according to a NOAA-led report updating sea level rise decision-support information for the U.S. released today in partnership with half a dozen other federal agencies.

The Sea Level Rise Technical Report provides the most up-to-date sea level rise projections for all U.S. states and territories by decade for the next 100 years and beyond, based on a combination of tide gauge and satellite observations and all the model ensembles from the Sixth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC). The report projects sea levels along the coastline will rise an additional 10-12 inches by 2050 with specific amounts varying regionally, mainly due to land height changes.

[Sea Level to Rise up to a Foot by 2050, Interagency Report Finds, Feb. 15, 2022, *www.jpl.nasa.gov*]

ASSESS AND DOCUMENT HISTORIC PROPERTY FLOOD RISK

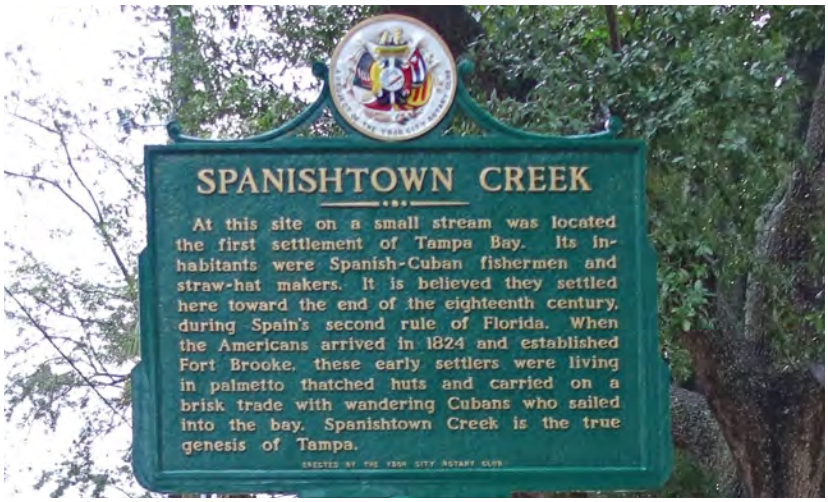
For a community's historic properties to be accounted for in the planning process, all vulnerable historic and cultural resources should be identified and included in the hazard mitigation plan. The understanding of flood risk includes an understanding of the impacts of flooding in a community, each historic property's location, and is physical characteristics. When this information is coupled with the potential economic impacts from flooding, the planning team, informed by feedback from stakeholders and the public, will be in a better position to make informed choices for the protection of a community's historic properties.

COMMUNITY'S RELATIONSHIP TO WATER

It is important to consider the complexity of historic and contemporary relationships to water on the community, district, or neighborhood level. Layered with social, cultural, historical, and physical dimensions, these relationships can inform an understanding of historic resources in context. It is important to acknowledge that although the information below focuses on historic buildings, many kinds of historic and cultural resources reflect a community's relationship to water. These physical resources can include historic landscapes and archaeological sites as well as water features such as bridges, wharves, docks, piers, and lighthouses. *(Refer to Chapter 6, Archaeology.)* ***In addition, there may be intangible heritage in a community associated with water-based recreation, industry, or other activities.*** To the extent possible, all aspects should be considered both in the planning process and in evaluating mitigation options. To better understand how to protect historic properties for the future, it may be beneficial to review the factors below. *(Refer to Chapter 5, Case Studies.)*

Port St. Joe has had an industrial waterfront area and now includes port and recreation facilities. (ca. 1940, Florida Memory)

- **Past Flood and Storm Events:** With many of Florida's historic communities located adjacent to waterways, it may be beneficial to gather information about previous flood or storm events, specifically noting the physical effects of these events on the landscape and buildings over time. During the public engagement and documentation process, communities may wish to solicit "storm stories" or compile oral histories from the public about flooding and storm events and resulting community changes. *(Refer to Flooding, page 1.2.)*
- **Flooding Source:** In assessing a community's physical relationship to water, it is important to keep in mind that waterways were often altered over time by a change in course or by being covered over with development. In many cases, historic streams and former wetlands, now developed, contribute to current flooding and restoring these areas can contribute to mitigation efforts. *(Refer to Stormwater Management, page 12.6.)* Historic maps and atlases can provide clues to how development responded to those changes, and how this evolution is (or is not) visible in the current environment. *(Refer to Appendix C, Case Studies.)* It is also prudent to understand the potential future impact of flooding whether by increased development in a floodplain or sea level rise.



Spanishtown Creek in Tampa's Hyde Park has been historically developed.

- **History of Adaptation:** ***An understanding of past historic mitigation or adaptation measures can suggest options for the future.*** Through history, owners of properties in vulnerable locations have made unofficial adaptations to minimize the impact of flooding. These adaptations can inform workable solutions for mitigation options. *(Refer to Selecting Preservation-Sensitive Mitigation Options, page 11.4.)*
- **Community Infrastructure:** In any given community, an infrastructure issue or another community-wide issue affecting numerous properties may guide the mitigation timeline. For example, access to fresh water, sewage treatment, electricity, and roadways are critical for human life. If access to these resources is compromised long-term, it will be unlikely that people will choose to remain in the community. Understanding when these systems will probably be affected by an adverse event and the likelihood of their restoration to functionality may dictate a timeframe in which an infrastructure must be restored for a community to remain in its location *(refer to Chapter 15, Adaptation and Appendix C, Case Studies.)* These may be assessed by developing a matrix of tipping points and infrastructure similar to the pilot studies completed in St. Augustine, Escambia County, and Clearwater. *(Florida Department of Economic Opportunity, www.floridajobs.org.)*

FLOOD VULNERABLE HISTORIC PROPERTY DOCUMENTATION

Baseline survey documentation is essential in establishing community preservation goals and strategies. As a first step, the planning team should overlay a map of historic properties, identified from the sources described above, on a map of the area determined to be vulnerable to flooding. *(Refer to Identify Historic Properties Within Flood-Prone Areas, page 4.11.)* Ideally, for the purposes of hazard mitigation planning, a consultant team will document historic properties and assess flood vulnerability at the same time. This can streamline the planning process, since local planners rarely have the time and/or expertise required to

undertake this step on their own. Hazard mitigation planning funds can support surveys of historic properties if those surveys also identify hazard risks and recommend mitigation measures, or if they include completing Elevation Certificates for historic structures. *(Refer to Evaluating a Property's Flood Risk, page 2.16.)* Likewise, preservation planning funds, such as those available through the Certified Local Government (CLG) program administered by DHR, can be used to conduct vulnerability assessments in tandem with historic property documentation.

In addition to location within a flood-prone area, other factors can influence a property's degree of risk and possible level of flood damage. A building's horizontal and vertical location within the floodplain and its foundation type are both factors in determining a property's flood insurance rate and premium. *(Refer to Property Flood Risk, page 2.3.)* ***For the purposes of hazard mitigation planning, a property-by-property survey will form a more complete understanding of a community's historic property flood hazard.*** *(Refer to Identify Historic Properties Within Flood-Prone Areas, page 4.3.)* If possible, separate records should be created for each historic resource on a property, such as a main house or individual outbuilding. FEMA also provides guidance on conducting a vulnerability assessment for historic properties and cultural resources in its publication, *Integrating Historic Property and Cultural Resources Considerations into Hazard Mitigation Planning (FEMA 386-6, 2005, www.fema.gov)*.

In completing a vulnerability assessments for individual historic properties, there are several areas that call for attention:

The condition of a building may impact the ability of the structure to be elevated.

Additionally, review boards may take into consideration elevation heights of adjacent properties which may require an Elevation Certificate.

- **Elevation of Habitable Space:** The most useful assessments evaluate flood vulnerability on a structure-by-structure basis, not just via FIRMs and other generalized mapping tools. One of the best ways to accurately determine an individual building's flood risk is by commissioning an Elevation Certificate. ***An Elevation Certificate identifies a property's specific vulnerability to flood risk by analyzing the height of the lowest occupied floor of a building, including basements, relative to the Base Flood Elevation (BFE).*** Basements, where they exist, may include building systems and appliances, which tend to be highly vulnerable to water damage, resulting in a higher level of risk during a flood event. Not all buildings in a flood-prone community or within the Special Flood Hazard Area (SFHA) will have completed Elevation Certificates, with those that are available likely retained by the local floodplain administrator. It is likely that the community will also need to conduct vulnerability assessments for historic structures as part of its planning process. *(Evaluating a Property's Flood Risk, page 2.16.)*
- **Building Condition:** A building's condition is a key factor in assessing its vulnerability and mitigation options. ***Buildings that are in poor to fair condition will be less likely to withstand a flood event or the implementation of mitigation measures than a well-maintained building.*** This is particularly true if building mitigation includes wet floodproofing, dry floodproofing, elevation, or relocation. Maintenance needs should be identified since a well-maintained property can provide the most cost-effective investment in reducing the potential flood and wind damage. *(Refer to Encourage Property Maintenance, page 4.24.)*

- **Building Foundation Design and Materials**: Historically, wood-framed buildings in flood prone areas were supported by brick or block piers, elevating the building's structure and contents above flood level and allowing ventilation and drying of the soil below. Similarly, basements and crawlspaces may have been constructed with dirt floors to allow slow, outward water seepage and promote drying after a flood. ***Flood vulnerability can increase with changes to historic building materials and construction techniques, such as the solid infilling of the area between piers and the finishing of basements, where they exist.*** This can be exacerbated where historic materials have been replaced with newer materials, many of which are more susceptible to flood damage.

  The hazard assessment should also note the presence of potentially damage-resistant historic materials such as wood, plaster, stone, and brick, as well as non-historic materials. Material and equipment damage can result from direct water contact or develop as a secondary effect in the form of mold, mildew, and rust. *(www.fema.gov/flood-resistant-material.)* *(Refer to Wet Floodproofing, page 13.4.)*

- **Prior Flood History:** Documentation of prior flood history may be available from several sources. These can include reports or records from FEMA (NFIP) or a local floodplain administrator; published and unpublished local histories; building department records; historical photographs; and newspaper, newsletter, or magazine accounts of flooding. In addition, meeting minutes or treasurer's reports from local organizations, such as religious institutions, house museums, or clubs can identify storm- or flood-related expenditures. *(Refer to Community's Relationship to Water, page 8.15.)*

- **Secondary Hazards and Risks:** In locations where flooding might be a primary risk, there are often secondary risks associated with an event. Coastal storms are often accompanied by high winds, which can result in toppled trees and flying debris. Downed electrical lines can result in loss of power and increased fire threat. Fire can also be caused by lightning strikes, ruptured gas lines, and disconnected or damaged appliances and propane tanks. *(Refer to Chapter 1, Storm Vulnerability, and Chapter 3, Wind Retrofitting.)*

Fallen trees can damage buildings and pull down electrical lines.

The assessment and documentation process can provide the framework for a future National Register historic district nomination, should one be desired. *(Refer to Identify Historic Properties Within Flood-Prone Areas, page 4.3, and Historic and Cultural Resource Documentation, sidebar page 14.6.)* Surveying districts also helps identify resources that may be individually eligible for inclusion in the National Register of Historic Places. While DHR must concur on formal eligibility, this information can be used when developing hazard mitigation priorities and as part of the historic preservation review process for federal or state undertakings.

Not every historic property surveyed will meet the criteria for federal or local designation, and in some cases, designation is not desirable. ***Without a formal designation or determination of eligibility for the National Register, or local designation by a DHR approved local program such as a Certified Local Government (CLG), a property will be treated as "non-historic" and will be required to meet the floodplain regulations if alterations fall under the local government's definition of "Substantial***

Historic building materials and construction methods are unique and should be factored into repair costs.

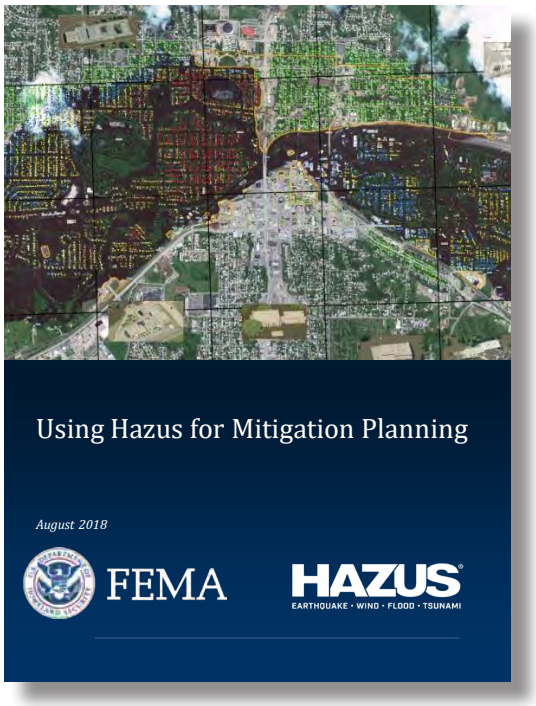
Improvements" or "Substantial Damage." *(Refer to Implementing Floodplain Regulations, page 2.10.)*

To access the greatest potential benefits, including relaxation of floodplain and building code requirements as well as financial support, a property should be listed on the National Register of Historic Places, either individually or as a contributing resource within a historic district. Depending on the local regulatory framework, National Register designation and local designation may provide:

- Recognition of what is locally significant and potential higher consideration for protection through the hazard mitigation planning process;
- Access to historic preservation funding; and
- Protection through historic preservation project review to minimize historically inappropriate alterations.

Some local governments, via their local floodplain ordinances, do not require historically-designated properties to meet all flood-related code requirements. Although this allows the property to retain–at least for the time being–its historic integrity, appearance, materials, and relationship to its context, the property will remain vulnerable to flooding. The exemption also requires property owners to balance the competing needs of preservation and resiliency. *(Refer to Historic Propertues and Floodplain Regulations, page 2.11.)*

ESTIMATE ECONOMIC IMPACT FOR VULNERABLE PROPERTIES



FEMA's 2018 Using HAZUS for Mitigation Planning can be used to estimate potential damage, economic loss, and social impacts from earthquake, flood, tsunami, and hurricane wind hazards. (www.fema.gov)

One tool that can be utilized to calculate financial impact at a property is FEMA's HAZUS software, which provides models for estimating potential losses for physical damage to buildings and infrastructure, economic losses, and social impacts from earthquakes, tsunamis, floods, and hurricanes utilizing GIS technology. *(https://www.fema.gov/hazus/)* HAZUS estimates are generally provided during the update of a hazard mitigation plan by the contractor who is updating the plan, but they may also be developed by a municipality's GIS staff. ***Keying historic and cultural property information to a GIS database through a historic resources inventory facilitates the HAZUS documentation process.*** It should be noted that the HAZUS software is limited in that it treats all buildings as the same, without accounting for the unique nature of the design, construction, and materials of historic buildings. Building cost data references can be used to calculate a replacement cost; however, a multiplier should be used to account for the uniqueness of historic buildings (e.g. custom construction; custom fixtures such as built-in cabinetry; and unusual, rare, or superior building materials).

In addition to the replacement cost for a building or portion thereof, the cost estimate should also include displacement time, functional downtime, and replacement of contents. Guidance for estimating these costs and different methodologies for estimating the replacement cost for a building can be found in FEMA 386-6, *Integrating Historic Property and Cultural Resource Considerations into Hazard Mitigation Planning* (2005). *(www.fema.gov)*

GUIDELINES ON FLOOD ADAPTATION FOR REHABILITATING HISTORIC BUILDINGS

The National Park Service recommends the planning and assessment approach to reduce flood risk below to in their *Guidelines on Flood Adaptaion for Rehabilitation Historic Buildings* (2021). *(www.nps.gov/orgs/1739/upload/flood-adaptation-guidelines-2021.pdf)*

RECOMMENDED	NOT RECOMMENDED
Identifying historic materials, features, and spaces that are important in defining the historic character of the property when planning and undertaking flooding adaptation treatments.	
Developing and implementing a plan to reduce the risk of damage or destruction to the historic building.	Failing to proactively analyze and address a flooding risk
Identifying and evaluating the vulnerabilities of the historic property to the impacts of flooding using the most current climate information and data available.	Failing to identify and periodically reevaluate the potential vulnerability of the building, its site, and setting to the impacts of flooding.
Assessing the potential impacts of known vulnerabilities on character-defining features of the building, its site, and setting. Reevaluating and reassessing potential impacts on a regular basis.	
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 safe location with at least one duplicate at a secure site.	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 work.
Maintaining the building, its site, and setting in good repair, and regularly monitoring character-defining features.	Failing to regularly monitor and maintain the property and the building systems in good repair.
Using and maintaining existing historic and nonhistoric characteristics, features, and materials of the historic building, its site, setting, and larger environment (such as a site wall that keeps out flood waters) that may help to avoid or minimize the impacts of flooding.	
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.	Carrying out adaptive measures intended to address the impacts of flooding that are unnecessarily invasive or will otherwise adversely impact the historic character of the building, its site, or setting.
Ensuring that, when planning work to adapt for flooding, all feasible alternatives are considered, and that the options requiring the least alteration are considered first.	
Replacing damaged or deteriorated historic materials in kind where the traditional material is flood-damage resistant. Replacing damaged or deteriorated historic materials that are not resilient to flooding with proven flood-damage resistant substitute materials that match the appearance and design.	

RECOMMENDED	NOT RECOMMENDED
Utilizing local and regional traditions (such as elevating residential buildings) for adapting buildings in response to flooding when compatible with the historic character of the building, its site, and setting.	Utilizing an adaptation treatment traditionally used in another region or one typically used for a different building type or architectural style which is not compatible with the historic character of the property.
Using special exemptions and variances when prescribed adaptive treatments to protect buildings from flooding would otherwise negatively impact the historic character of the building, its site, and setting, while still taking steps to address or help minimize flood risk.	Using a special exemption or variance to avoid taking any steps to address or help minimize the impacts of flood risk on a historic property.
Considering adaptive options, whenever possible, that would protect multiple historic resources, if the treatment can be implemented without negatively impacting the historic character of the overall historic property, district, or archeological resources, other cultural or religious features, or burial grounds.	Failing to consider other properties nearby in planning flood adaptations, therefore increasing the risk or exposure to neighboring properties.
Reassessing the risks, property conditions, and local, state, and federal regulations on a regular schedule and after any flood event.	

Community meetings to identify preservation priorities should include local experts in preservation, floodplain management, and the business community along with general public.

ESTABLISH LOCAL PRESERVATION PRIORITIES

It is logistically and financially unfeasible to protect all the historic resources within a community from flooding; therefore, it is necessary for the planning team to identify which resources are the most important to its citizens, and the feasibility of mitigation for those properties. Each historic place has certain resources that are intrinsically linked to the sense of the place and community. ***The process of prioritizing which historic resources to protect from flood hazards requires thoughtful consideration and engagement with the public about what is important in conveying the history of the community; what really makes it feel like home; and how those historic resources contribute to the area's economic vitality.*** *(Refer to Selecting Preservation-Sensitive Flood Mitigation Options, page 11.4.)*

Establishing preservation priorities for flood protection do not exist in a vacuum. Other state and local planning documents may contain priorities related to historic resources that should be consulted and considered. *(Refer to Addressing Preservation and Severe Storms in Local Planning Initiatives, page 4.6.)* Aligning priorities across planning documents will help develop mitigation actions for historic resources that are integrated with existing planning programs and initiatives and may also help to identify potential sources of funding for mitigation actions beyond the traditional hazard mitigation project funding sources. ***Because these other plans have gone through a similar vetting process with the state and local government and the public, it may be easier to garner support***

for the mitigation actions developed based on a previously prioritized list of historic resources. The more community support there is behind preservation flood mitigation projects, the more likely those projects will be successfully implemented. *(Refer to Engage the Public, page 8.13.)*

To establish local preservation priorities, it is recommended that the following four factors be used to evaluate historic resources to determine their overall importance to the community:

- Critical to sense of place;
- Vulnerable to flood hazards;
- Economic contribution; and
- Other considerations.

This four-factor method also shifts the prioritization decisions from a top-down approach, focused on planners and preservationists, to a more balanced approach that can facilitate meaningful community input, potentially challenging established preservation priorities.

CRITICAL TO SENSE OF PLACE

What resources contribute to the community's sense of place, identity, and cultural heritage? ***The public response may not agree with a traditional preservation professional's definition of a historic or cultural resource, but should be considered.*** Examples of critical resources could include:

- A Main Street or residential streetscape;
- A historic neighborhood;
- A town plan;
- Historic community gathering places such as houses of worship, schools, and community centers;
- A historic park; and
- Historic civic buildings.

Venice has an active Florida Main Street Program and the town plan was designed by John Nolen.

Venice is recorded on the National Register of Historic Places in part due to the town plan.

VULNERABLE TO FLOOD HAZARDS

Using information from the risk assessment, the first step is to identify the level of risk faced by the resource. Risk should be defined prior to the prioritization process, and the definition for risk should be consistently applied to each resource that is evaluated. The risk could be defined as a range of possibilities from high risk being equal to 50% to complete destruction of the building (where the cost to return the building to its pre-damaged condition would equal or exceed 50% of the property's pre-damaged market value); moderate risk equal to less than 50% damage; and low risk equal to little or no damage.

High risk could also be defined as all resources in Special Flood Hazard Areas (SFHAs); moderate risk as all resources in the 0.2% annual flood zone; and low risk as all properties beyond the 0.2% annual flood zone. A third definition might be that high risk is all properties in V zones (SFHA, but subject to wave action where waves are 3-feet high or greater) and within the limit of moderate wave action (also referred to as the Coastal A Zone, the portion of the SFHA that is subject to breaking waves of 3 to 1.5 feet high); moderate being properties located in the portions of the

Buildings in Miami's Little Haiti are vulnerable to encroaching development as higher ground becomes more valuable.

SFHA subject to waves that are one and half feet high or less; and low risk being properties in the 0.2% annual flood zone. ***For any evaluation of risk, communities should integrate predictive flood modeling, including increased precipitation, sea level rise and storm surge, which are not reflected in FIRM mapping.*** *(Refer to Flood Insurance Rate Maps, page 2.6, and Flood Insurance Rate Map Terminology, sidebar page 2.9.)*

ECONOMIC CONTRIBUTION OF VULNERABLE PROPERTIES

Does the individual resource contribute to the economy of the community? Is the resource an economic driver in the community, such as a tourist destination, historic neighborhood, or downtown where revitalization is occurring? Examples of resources that contribute economically to a community are a historic marketplace or Main Street, a destination like Miami Beach, or a smaller community like St. Augustine. It is more challenging to quantify certain economic impacts such as property values and the ability to retain and attract new residents and business owners, but they can have a significant economic impact in a community. *(Refer to Chapter 7, Economic Indicators of Storm Impact.)*

OTHER CONSIDERATIONS

This factor is meant to be user-defined and adapted to local circumstances based upon community input to provide flexibility in evaluating the attributes of resources that are not captured by the other three evaluation factors. For example, "Other Considerations" could be used to assign value to un-surveyed properties without documented historic and architectural significance to prevent bias in favor of properties that are listed in the National Register or a local inventory. This factor could also be used to evaluate resources that lack integrity or are otherwise ineligible for listing in the National Register or for local designation, but are important to the intangible culture of the community (i.e. a working waterfront or fish processing sheds that may not meet the traditional definition of "historic," but may be culturally significant). Conversely, "Other Considerations" could be used to evaluate the level of significance of a property: Is the resource National Register-designated, locally designated, or evaluated and not designated because it did not meet the required criteria; or does the property contribute/not contribute to a National Register or locally designated historic district?

Community outreach should include multiple platforms for public participation to identify significant places of heritage.

Public engagement will help rank and identify a prioritized list of resources to be protected. *(Refer to Engage the Public, page 8.13.)* The evaluation process begins with determining the ranking value. A basic ranking system such as high/medium/low might be easiest to communicate to the public; however, it may be desirable to have a more nuanced ranking system to weigh the different factors based on what the planning team and/or public feel are most important. This can be done by using a numerical value, such as 1 to 10 for each of the four factors, generating a cumulative score for each resource. The information can be compiled in a table, providing a clear comparison between resources. The resources that receive the highest rank or score represent a community's top priorities for protection. This type of community-based prioritization fosters public support for historic resource protection.

RANKING HISTORIC RESOURCE VALUE TABLE					
RESOURCE	CRITICAL	VULNERABLE	ECONOMIC	OTHER	PRIORITY SCORE

A table can be a useful tool to establish preservation priorities in the protection of historic resources in a community.

FEMA presents an alternate prioritization approach in *Integrating Historic Properties and Cultural Resources Considerations into Hazard Mitigation Planning* (FEMA 386-6), focusing on professional preservation evaluation factors. FEMA's cultural resource prioritization factors are: geographic context of significance (national, tribal/state, local), level of significance, degree of integrity, economic importance and public sentiment. This method has the advantage of being vetted by FEMA, however, the disadvantages include:

- Requiring leadership by a historic preservation professional or someone with experience in historic preservation;
- Prioritizing National Register-designated properties over those that are locally-designated and unstudied cultural resources; and
- Shifting resource prioritization heavily towards the planning team and away from the public.

Each community should develop their own approach to establishing their preservation priorities. There is no "right" or "wrong" answer. Whatever approach is utilized, it should be applied consistently to be representative of the over-arching community goals.

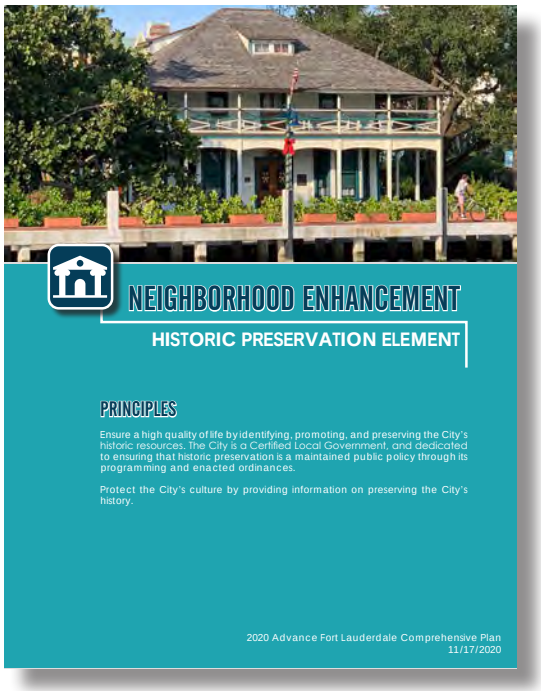
DEVELOP MITIGATION GOALS AND OBJECTIVES

An understanding of the community's timeframe for planning goals, flood-vulnerable historic resources, and the local priorities provide the basis for developing a flood mitigation strategy for historic properties.

Mitigation goals related to the protection of historic resources should be broad statements that describe what the plan is trying to achieve. Examples of goals include:

- Enhance the ability of historic resources to withstand a flood or severe wind event;
- Identify a way to protect historic resources located along a waterfront or in the commercial downtown; and/or
- Ensure continued heritage tourism by developing a plan to protect significant structures.

Camp Helen State Park's cottages withstood Hurricane Michael and are valued for their historic, natural, and recreational heritage.



Comprehensive plans can be used to identify and record community preservation priorities.

Once goals are established, they should be checked against the local planning documents to ensure that the recommendations are consistent with other community goals. *(Refer to Addressing Preservation and Flooding in Local Planning Initiatives, page 4.6.)* If the goals are consistent, the preservation perspective will reinforce the community's larger goals. If complementary goals are not identified or there is a conflict, engagement is required to establish common goals between local regulators and the community at large.

Unlike goals, which are broad statements, objectives are specific measurable strategies for protecting historic properties. Examples of objectives to enhance the ability of historic resources to withstand a flood event can include:

- Educate the public regarding flood threat to private property *(refer to Engage the Public, page 8.13)*;
- Promote regular maintenance to reduce vulnerability *(refer to Encourage Property Maintenance, page 4.24)*;
- Assess appropriate mitigation options for individual properties *(refer to Chapter 13, Property Flood Mitigation Strategies)*;
- Develop design guidelines to clarify appropriate mitigation options *(refer to Develop Design Guidelines for Storm Mitigation, page 4.19*); and/or
- Provide property owners with information about existing financial programs to assist in mitigation implementation. *(Refer to Develop Information for Property Owners, page 4.26, and Funding for Recovery, page 10.7.)*

As in other stages of the planning process, the planning team should seek and incorporate community input to ensure that the preservation goals and objectives fit within the larger hazard mitigation plan, as well as the objectives of the local population. Public engagement also provides an opportunity to address differences of opinion prior to investing time developing appropriate historic preservation options. *(Refer to Engage the Public, page 8.13.)*

IDENTIFY, EVALUATE, AND PRIORITIZE HISTORIC PROPERTY MITIGATION OPTIONS

In developing preservation mitigation priorities, it is important to understand which community resources are most important to protect, the cost implication of providing that protection, and how the preservation priorities fit into the larger context of the local overall hazard mitigation plan. Flood mitigation options can range from large-scale community projects to smaller property-specific mitigations. ***Preservation professionals or advocates participating in hazard mitigation plan development can help articulate potential impacts of different treatments to historic properties on a community-wide basis as well as individual properties.*** *(Refer to Selecting Preservation-Sensitive Flood Mitigation Options, page 11.4.)* Each strategy will have a different ease of implementation, level of support, financial requirements, and implementation timeline.

Balancing mitigation options with the traditional approach to historic preservation can be a challenge. From the preservation perspective, each flood or wind mitigation option must be considered based on its potential impact on the historic integrity of the individual property as well as on its surroundings. Actions on an individual property may affect the integrity of a historic district. Similarly, community-wide flood mitigation strategies will have effects on both the district as a whole and on individual properties.

In reviewing mitigation options, the planning team should give special consideration to the factors listed below.

- **Community-Wide Mitigation Strategies.** Community-wide flood mitigation projects, such as infrastructure improvements, typically benefit from community support and protect multiple properties, both historic and non-historic. They can also protect vulnerable populations and their cultural heritage, particularly in communities with fewer financial means for implementing individual property mitigation projects. Community-wide mitigation projects may allow a local government to capture additional credits in the Community Rating System (CRS), if the community participates in the program, which may help the community to achieve a higher classification. ***However, some community-wide options can alter or destroy historic and cultural resources and their context, requiring careful consideration and evaluation.*** *(Refer to Participate in the Community Rating System, page 4.28, Selecting Preservation-Sensitive Flood Mitigation Options, page 11.4, and Chapter 12, Community Flood Mitigation Strategies.)*
- **Added Community Benefit:** A community-wide mitigation project might include the construction of structural features, such as a levee or a seawall, which could be designed to double as a linear park or bike trail. This allows flood resilience to be improved while adding a community benefit for its residents. At an individual property, this can include the sensitive integration of parking in lieu of flood-vulnerable inhabited space; thus, allowing for a reduction in impervious surface coverage if surface parking is replaced with landscaping. *(Refer to Chapter 11, Mitigation: Hazard Mitigation for Historic Resources.)*
- **Scalability:** Given financial constraints and long-term changes in vulnerability due to climate change, communities should consider the degree to which mitigation options are scalable and can be built upon as time passes and flood conditions worsen. As an example, the construction of shoreline protection should anticipate enhancement, such as increasing the height of a seawall, to mitigate future sea level rise.
- **History of Adaptation.** Communities with a long history of flood vulnerability may also have a history of flood adaptation of buildings, including elevation or relocation. Continuing this traditional adaptation approach in a manner that is consistent with the historic precedent may minimize the impact of the proposed mitigation and provide a good option for property-specific mitigation. *(Refer to Flood Vulnerable Historic Property Documentation, page 8.16.)*

Seawalls are a common and traditional approach for community-wide mitigation strategies.

Community-wide mitigation projects such as elevating infrastructure are costly and can have unintended consequences.

In evaluating mitigation options, it is important to keep in mind that it is unlikely that resources will be available to treat all historic properties equally, and that some historic properties will not be adequately protected. The planning team should consider multiple options simultaneously, from large-scale community-wide projects to readily achievable short-term options that can be implemented faster or incrementally. *(Refer to Chapter 11, Mitigation: Hazard Mitigation for Historic Resources.)*

Some mitigation options can be implemented with limited resources, while others will require significant planning, personnel, and funding. In the evaluation process, mitigation options should be prioritized to include long-term, intermediate, and more readily-achievable short-term goals. The long-term goals typically include community-wide options, while the short-term goals will rely more heavily on municipal planning and preparedness activities such as the preparation of flood mitigation design guidelines, modification of building and zoning codes, and the development of information for historic property owners. *(Refer to Chapter 4, Local Tools: Preservation and Storm Mitigation.)*

The following criteria can be used to evaluate the best mitigation options for a community:

- **Local Preservation Priorities:** In selecting mitigation options, it is important to evaluate whether those options meet local preservation priorities and protect historic resources with the least intrusive mitigation measures. *(Refer to Establish Local Preservation Priorities, page 8.21, and Selecting Preservation-Sensitive Flood Mitigation Options, page 11.4.)*
- **Cost Effectiveness:** Mitigation options must be cost-effective. The planning team can illustrate cost-effectiveness by comparing the cost of implementation to the cost of the potential damage if nothing were done. If the value associated with the implementation equals or is lower that the potential flood loss, FEMA considers the mitigation option to be cost-effective, qualifying the option for possible FEMA funding. The cost associated with the do-nothing approach includes:
  - The values calculated as part of a Historic Property Hazard Assessment *(refer to Establish Local Preservation Priorities, page 8.21)*; and
  - The reduction of the tax base for significantly damaged, relocated or demolished properties.
- **STAPLEE Evaluation:** The STAPLEE analysis, a tool developed by FEMA, can be used to evaluate mitigation options for historic resources in a community. It utilizes the following criteria: Social, Technical, Administrative, Political, Legal, Economic, and Environmental (STAPLEE) favorability. The STAPLEE Action Evaluation Table is included in FEMA publication 386-6, *Integrating Historic Property and Cultural Resource Considerations into Hazard Mitigation Planning: State and Local Planning How-To Guide* (May 2005). Each potential mitigation option is evaluated by ranking it for multiple factors in a STAPLEE table devoted to that option.

  Evaluating mitigation options using these three criteria will narrow potential mitigation options to those most appropriate and

STAPLEE Criteria	S (Social)		T (Technical)			A (Administrative)			P (Political)			L (Legal)			E (Economic)				E (Environmental)				
Considerations → for Alternative Actions ↓	Community Acceptance	Effect on Segment of Population	Technical Feasibility	Long-term Solution	Secondary Impacts	Staffing	Funding Allocated	Maintenance / Operations	Political Support	Local Champion	Public Support	State Authority	Existing Local Authority	Potential Legal Challenge	Benefit of Action	Cost of Action	Contributes to Economic Goals	Outside Funding Required	Effect on Land/Water	Effect on Endangered Species	Effect on HAZMAT / Waste Site	Consistent with Community Environmental Goals	Consistent with Federal Laws[1]

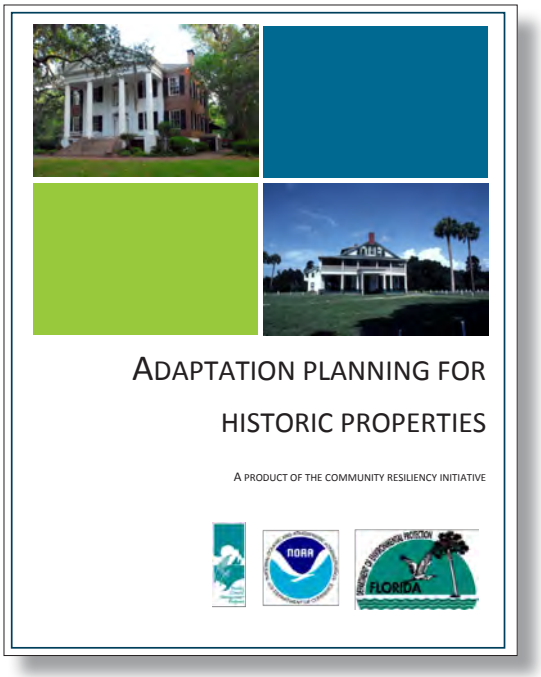
FEMA's STAPLEE criteria can be used to evaluate mitigation options for historic properties.

feasible to implement in a given community. DHR is available for consultation during the STAPLEE review process to help evaluate whether proposed mitigation options are consistent with historic preservation review criteria. *(Refer to Historic Property Project Review, sidebar page 4.25.)*

Ultimately, the hazard mitigation planning team, under the guidance of the municipal emergency management office, will identify the mitigation options that are best for the community, which can include preservation. Selected mitigation options should be clear, achievable, and consistent with the municipality's overall hazard mitigation plan goals.

WRITE, ADOPT, AND IMPLEMENT THE PLAN

The municipal hazard mitigation plan implementation strategies detail how and when a community will advance mitigation options, including realistic budgets and schedules. Developing sound strategies will include consulting with stakeholders to identify potential funding sources and partnership opportunities. ***Preservation professionals and advocates, including DHR, can provide feedback on whether the proposed mitigation options could negatively impact the historic integrity of historic resources and suggest ways to minimize that impact. In addition, a review of mitigation options by DHR can establish community-wide criteria for state review of individual applications, such as building elevation heights.*** It can also assist in DHR approval of applications for historic preservation tax credits. *(Refer to companion document, Storm Guidance for Florida's Historic Properties.)*



Florida DEP commissioned an adaptation study for historic properties in 2015. (www.floridadep.gov)

The municipal hazard mitigation plan will be prepared under the guidance of the local emergency management office. The role of preservation planners in the preparation of the plan will vary from consulting the larger group to writing the chapter or annex devoted to the protection of historical and cultural resources, depending on the planner's level of participation in the process. However historic properties are addressed, hazard mitigation plans for cultural resources should include:

- A summary of the planning process itself, including the sequence of actions taken and a list of team members and stakeholders who participated;
- A description of hazards considered and cultural resources identified;
- The results of the risk assessment and estimation of loss;
- Local preservation priorities;
- Mitigation goals and objectives;
- Mitigation actions that will help accomplish the established goals and objectives;
- Strategies that detail how the mitigation actions will be implemented and administered; and
- Documentation of the public engagement activities or process conducted for the preservation component of the plan.

The emergency management division team must ensure the support of partners and local leaders; shepherd the plan through to adoption by the local jurisdiction and approval by FDEM and FEMA; and communicate the final plan to the public. ***It is important to ensure that the defined strategies are consistent with other local planning documents including master plans and historic preservation elements. Updates of other planning documents should be completed as needed.*** *(Refer to Addressing Preservation and Severe Storms in Local Planning Initiatives, page 4.6.)*

Prior to submission to FEMA, the plan must go to FDEM for an initial review and approval. This ensures that local hazard mitigation plans are consistent with the state's mitigation goals and objectives and that the plan meets FEMA's requirements. Following FEMA approval of the plan, it is adopted by the local municipality, or in the case of a county-prepared plan, each municipality by ordinance. With adoption, the mitigation strategies within the plan are eligible to receive Hazard Mitigation Assistance Program (HMA) funding. *(Hazard Mitigation Assistance Program and Policy Guide, www.fema.gov, FEMA–2022–0023) (Refer to Funding for Recovery, page 10.7.)*

Hazard mitigation planning is a cyclical process that is never "done." Local hazard mitigation plans must be approved by FEMA and updated at least every five years to be current, thus allowing a community to remain eligible for funding under FEMA's Hazard Mitigation Assistance programs. ***The time between updates can be used to lay the framework for enhancing historical and cultural resource protection in future updates and to build local support. It can also be used to improve local planning and preparedness to reduce the impacts of future flooding.*** *(Refer to Chapter 4, Local Tools: Preservation and Storm Mitigation.)*

REFERENCES

Note: All references are available online unless otherwise noted. References that are only available as online resources are noted as "online resource." Refer to *Appendix A: Resources* for web links.

44 C.F.R. § 201. Title 44: *Emergency Management and Assistance; Code of Federal Regulations*; Part 201: Mitigation Planning.

Federal Emergency Management Agency (FEMA). *CRS Users Groups*, Community Rating System Resources webpage (2019), online resource.

FEMA. *Flood Damage-Resistant Materials Requirements for Buildings Located in Special Flood Hazard Areas in accordance with the National Flood Insurance Program* [Technical Bulletin 2] (2008).

FEMA. *Flood Map Service Center,* online resource.

FEMA. *Hazus*, online resource.

FEMA. *Integrating Historic Property and Cultural Resource Considerations into Hazard Mitigation Planning [FEMA P-386-6]* (2005).

International Code Council (ICC) and FEMA. *Reducing Flood Losses Through the International Codes: Coordinating Building Codes and Floodplain Management Regulations*, 5th Edition (2019).

U.S. Department of the Interior [National Park Service]. *Guidelines on Flood Adaptation for Rehabilitating Historic Buildings* (2021).

U.S. Department of the Interior [National Park Service]. *The Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for Preserving, Rehabilitating, Restoring & Reconstructing Historic Buildings* (2017).

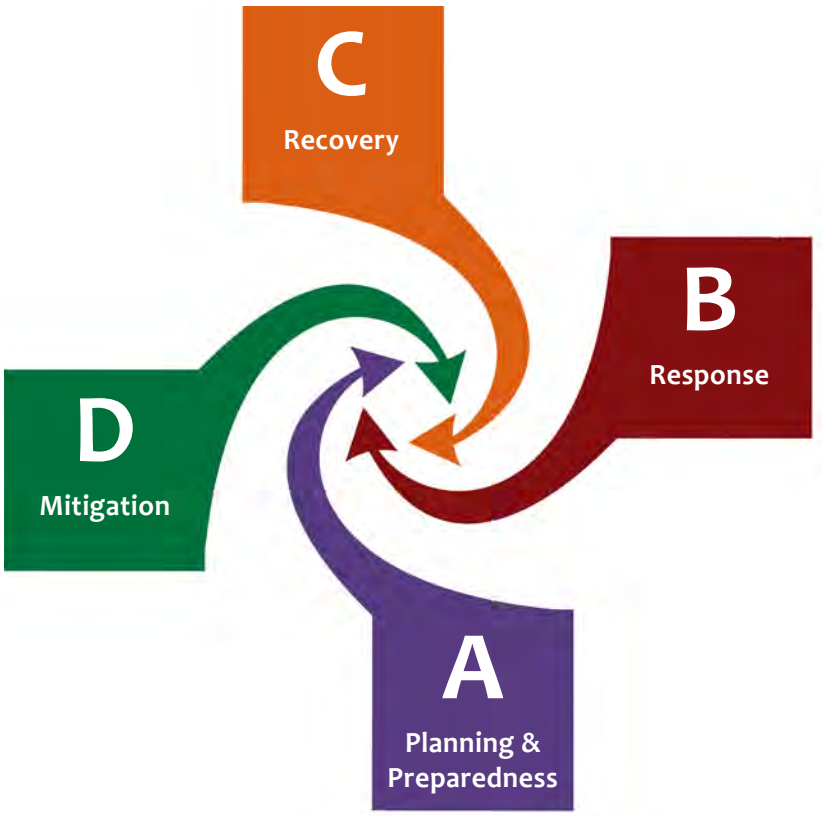
Cedar Key, 1896. (Library of Congress)

9 RESPONSE: HAZARD MITIGATION FOR HISTORIC RESOURCES

Emergency response focuses on life safety and, secondarily, limiting property damage. As a result, historic preservation ranks lower among the responder's priorities. ***Response is always a local effort and the activities included in a response are typically guided by the local emergency manager and will include the mobilization of different departments and agencies; the allocation of resources; and the direction of damage assessments tailored to the specific nature and extent of the emergency.***

The immediate response can include:

- Establishing communications between the municipal, state, and federal government agencies;
- Gathering information regarding impacted properties;
- Executing an assessment strategy;
- Facilitating first responders (police, fire, medical personnel) conducting search and rescue operations;
- Conducting fire suppression;
- Clearing debris to facilitate evacuation and first responder activities;
- Identifying structurally unsound buildings;
- Providing a safe location to meet basic human needs for food, water, shelter, and medical care; and
- Restoring essential community services.



- **LIFE-SAFETY**
- **ASSESS DAMAGE**
- **STABILIZE HISTORIC RESOURCES**

RESPONSE

Conducting emergency operations to save lives and property, including positioning emergency equipment and supplies; evacuating potential victims; providing food, water, shelter, and medical care to those in need; and restoring critical public services.

[*A Nation Prepared*, FEMA, www.fema.gov]

RESPONSE COORDINATION

The response for smaller-scale emergencies may be addressed through local policies, procedures, and plans as outlined in the local emergency management plan. If the scale or severity of the emergency warrants, the local emergency manager can declare a State of Emergency, either in advance or following a severe storm, to facilitate operations outside of normal activities. This can include activating existing Memoranda of Understandings with neighboring jurisdictions to supplement their own resources or requesting assistance from Florida Division of Emergency Management (FDEM) for response and recovery efforts when the local resources are exhausted or insufficient.

PRE-STORM ACTIVITIES

If there is adequate notice in advance of a flood or wind event, such as an anticipated severe storm, community response can include mobilization to protect buildings prior to evacuation of the threatened area. When considering actions to minimize damage from flooding, property owners should be encouraged to assess and mitigate potential secondary damage associated with high winds, often associated with hurricanes, and fire, which could result from electrical or fuel system damage. Proactive actions that can be taken by property owners in advance of a severe storm emergency may include:

- Relocating possessions and equipment to the upper floors of a building or to higher ground;

Stuart's House of Refuge takes precaution to store sensitive items and technology equipment in the attic out of flood range.

- Relocating or securing outdoor furnishings and equipment including any grills, cooking, or heating equipment;
- Clearing gutters, downspouts, and storm drains;
- Clearing and securing floor drains;
- Ensure that any sump pumps are functional and power supply is above projected flood water height;
- Disconnecting electrical appliances and equipment and relocating above potential water height;
- Securing fuel and propane tanks and shutting off valves;
- Installing window and roof vent protection from high winds; and/or
- Placing sandbags and/or activating flood barriers.

In the event of sudden incidents in which there is little to no warning, such as a flash flood, response is activated at the initiation of the incident. *(Refer to Storm Guidance for Florida's Historic Properties, Pre-Storm Activities, page 10.3.)*

STORM RESPONSE

Depending on the nature and severity of the emergency, coordination with multiple entities may be required. For response to larger-scale events, an emergency response center may be established to facilitate the allocation of information and resources to address the community's needs. The emergency response center is typically coordinated by the

Smaller communities can be heavily burdened in the immediate response period to provide data for a federal disaster declaration. Preservation experts and trained volunteers can assist in recording damage on FEMA's Preliminary Damage Assessment forms and marking high water marks.

local emergency manager and ideally, a preservation planner would be available once it is activated. If the municipality is overwhelmed by the response, the emergency manager can request assistance from FDEM. If warranted by the severity of the situation, Florida's governor can request a Disaster Declaration from the President, which initiates FEMAs involvement in the response effort. *(www.fema.gov/disaster-declaration-process.)*

The Florida Department of Environmental Protection (DEP) serves as the lead agency in the state's emergency management activities that relate to cultural resources. The Florida Division of Historical Resources (DHR), a part of Florida Department of State, works directly with federal, state, and local partners to provide preservation information including inventories of potentially affected historic resources during response and recovery operations. ***Municipalities may also appoint a preservation representative, either from the local jurisdiction or the county, to serve in the emergency response center and assist in identifying resources to protect historic properties.***

In the immediate aftermath of a flood or severe wind storm, response activities focus on life safety operations including rescue and providing medical care. After life safety operations cease, response activities shift to meeting basic human needs, such as food and shelter, and restoring critical infrastructure such as providing electricity and clearing debris from roadways. ***Historic preservation involvement in the response effort commences when activities shift towards damage assessment and debris clearance.*** Some of the functions that can be performed by historic preservation professionals and advocates include:

DHR ROLE IN RESPONSE

DHR can serve as a resource for municipalities during a emergency response by:

- Coordinating preservation activities with other response functions as a member of the emergency management center team;
- Identifying procedures to collect, label, and store displaced building elements for reinstallation rather than disposal;
- Prioritizing preservation concerns and organizing specialized assistance;
- Encouraging use of qualified design professionals and contractors to assist in evaluation and stabilization of historic properties;
- Providing information about cleanup, drying out flooded properties, etc.; and/or
- Providing information regarding funding opportunities to repair and rehabilitate historic properties.
- Performing initial inspections and damage assessments of historic properties that can utilize newer technologies including drones and laser scanning or mobile tablets with integrated GIS;
- Marking high water marks on nearby utility poles;
- Coordinating volunteer inspection and information teams;
- Prioritizing resource allocation for building protection by determining high priority (requiring stabilization); medium priority (requiring protection from the elements and building security such as roof tarps and plywood window coverings); and low priority (requiring little to no action during response and recovery phases); and/or
- Assisting with debris sorting to ensure that historic building components and other cultural resources are retained and not disposed of as waste. *(Refer to Establish a Debris Salvage Plan, page 4.26.)*

REFERENCES

Note: All references are available online unless otherwise noted. References that are only available as online resources are noted as "online resource." Refer to *Appendix A: Resources* for web links.

FDEM. FDEM E*HP Greenbook: An all-in-one Guide to Assist Applicants in Navigating the Complexities Involved with FEMA PA and EHP Compliance.* (2022).

FEMA. *Integrating Historic Property and Cultural Resource Considerations into Hazard Mitigation Planning [FEMA P-386-6]* (2005).

FEMA. *The Disaster Declaration Process*, online resource.

NCPTT. *Rapid Building and Site Condition Assessment*, ncptt.nps.gov/blog/ncptts-updated-assessment-tools-aid-in-disaster-response-and-recovery/

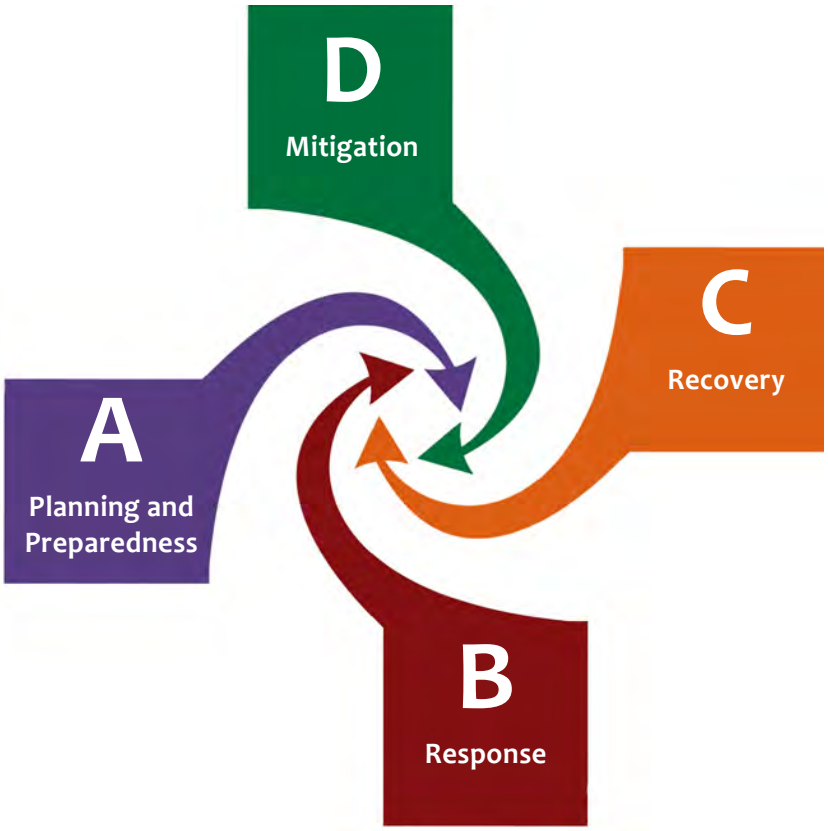
Caryville, 1929. (Florida Memory)

10 RECOVERY: HAZARD MITIGATION FOR HISTORIC RESOURCES

Recovery entails restoring and rebuilding a community's physical, social, and economic structure following a disaster such as flooding or severe winds. As response efforts wane, energies are shifted towards recovery and return to "normal."

Short term needs associated with recovery begin with the restoration of critical services, such as access to water and electricity. As recovery continues, it transitions towards physically rebuilding the community, both infrastructure and buildings, including the longer-term process of providing temporary housing, repairing existing structures, and addressing the community's social and economic needs. The scale of recovery projects can range from community-wide efforts to the repair of individual properties. By addressing recovery needs as quickly as possible, a community can regain its self-sufficiency, minimizing disruption of daily life and commerce by stabilizing housing and businesses.

Like response, community-wide recovery is overseen by the municipality and is guided by an Emergency Management Plan. The Emergency Management Plan describes the strategies and procedures for coordinating recovery efforts across all departments and agencies and guides the operation. Through Recovery Support Function annexes, the Emergency Management Plan identifies actions and activities that agencies will take to facilitate access to resources as well as coordination among state and federal agencies, non-governmental partners, and community stakeholders. *(Refer to Comprehensive Emergency Management Plans, page 4.9.)* ***In the shift from response to***



- **ASSESS DAMAGE**
- **STABILIZE HISTORIC RESOURCES**
- **PLAN FOR REBUILDING**

RECOVERY

Rebuilding communities so individuals, businesses, and government infrastructure can function on their own, return to normalcy, and are protected against future hazards.

[*A Nation Prepared*, FEMA, *www.fema.gov*]

recovery, the responsibility for managing private property response shift to the property owner. This includes site issues such as debris removal as well as building repair.

Historic preservation is under FEMA's Natural and Cultural Resources Recovery Support Function (NCR RSF), and may be implemented through the local planning and zoning office. *(www.fema.gov/news-release/2018/03/07/natural-and-cultural-resources-recovery-support-function.)* Through the NCR RFS, the agency aids communities seeking to preserve, protect, conserve, rehabilitate, and restore natural and cultural resources during the recovery from a disaster. The NCR RFS identifies supporting agencies that may aid in the recovery process, including DHR, FEMA Office of Environmental Planning and Historic Preservation for Region IV, and non-governmental partners. *(www.fema.gov/office-environmental-planning-and-historic-preservation.)* The emergency manager and director of planning and zoning should have a copy of the NCR RSF, if avaiable, which may be activated with or without a Presidential Disaster Declaration to support the recovery effort. ***Even if a community chooses not to follow NCR RSF process, they should adopt policies and procedures to protect historic resources from recovery actions that may impact historic resources.***

COMMUNITY-WIDE RECOVERY

In addition to restoring essential services and repairing or rebuilding critical infrastructure, community-wide recovery projects can include protection projects, such as installing a bulkhead or fortifying a levee, as well as infrastructure repairs, like improving stormwater drainage systems. Community recovery projects, particularly those for which state and federal funding is required, will largely be based upon the mitigation projects identified in the adopted municipal hazard mitigation plan. As a result, it is critical that preservation projects be identified in the plan and prioritized for implementation. *(Refer to Write, Adopt, and Implement the Plan, page 8.28.)*

The recovery process can also provide the opportunity for municipalities to conduct surveys to assess the risk of flooding at historic properties. *(Refer to Flood Vulnerable Historic Property Documentation, page 8.16, and Chapter 12, Community Flood Mitigation Strategies.)* ***Documentation projects that also evaluate flood risk and provide actions for mitigation may be identified in hazard mitigation plans. DHR is available to assist communities in the identification of documentation projects.*** *(Refer to Flood-Vulnerable Historic Property Documentation, page 8.16, and Historic and Cultural Resource Documentation, sidebar page 14.6.)*

BUILDING RECOVERY

ASSESSMENT AND STABILIZATION

Flood waters have the potential to cause considerable damage to structures, rendering them unsafe for occupation. Addressing recovery needs quickly can minimize disruption to businesses and housing as well as minimize further damage to buildings.

After floodwaters recede, initial assessments should proceed as quickly as possible to identify buildings that are structurally unsound to determine whether property owners can safely return. Preservation professionals can aid in the initial assessment process and provide recommendations regarding appropriate stabilization methods to protect historic resources. The local preservation planner generally leads this effort, with assistance of preservation partners supplemented by technical assistance from DHR. In the event of a Presidential Disaster Declaration, FEMA's Office of Environmental and Historic Preservation can assist in the effort. *(Refer to Chapter 9, Response: Hazard Mitigation for Historic Resources.)*

Once public safety has been assured, affected historic resources should be stabilized as quickly as possible. This should be followed by a more detailed assessment to better understand the extent of damage prior to allowing occupants to return. With the agreement of the local emergency manager and available expertise, assessments of historic properties can be conducted by preservation professionals, architects, engineers, and contractors. ***As needed, assessments should be followed by quick, temporary stabilization measures to minimize additional damage, such as installing shoring, tarping a compromised roof, or securing window and door openings. This should be followed by efforts to prevent secondary damage such as mold by providing ventilation and installing plywood at openings to secure damaged windows and prevent vandalism.***

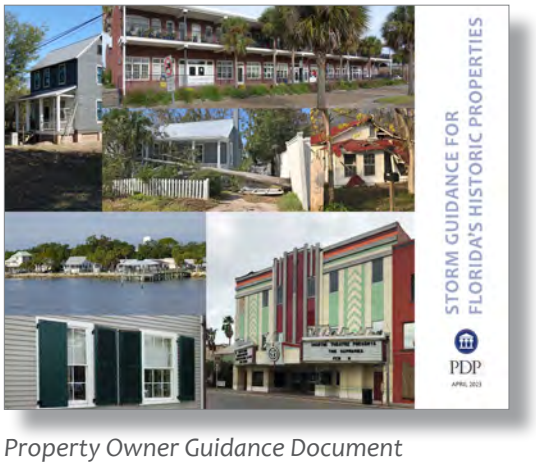
Historic properties that are deemed substantially damaged may need to meet additional code requirements during the repair process.

REPAIR AND REBUILDING

The administrative requirements for repairing and rebuilding historic properties can be daunting. Without prior preparation, historic preservation concerns can be lost in the post-event confusion. By working with local officials in advance of a severe storm, zoning ordinance modifications can be implemented to limit building heights; design guidelines can be prepared to encourage compatible alterations and construction within a historic context; and building codes can be modified to improve the resilience of historic buildings in a manner that maintains their historic integrity. *(Refer to Modify Zoning Ordinance, page 4.11, Develop Design Guidelines for Storm Mitigation, page 4.19, and Modify Building Code Requirements, page 4.14.)* If the local regulatory framework does not have sufficient provisions for addressing historic properties, local preservation planners can also work with local officials in the aftermath of a severe storm, providing information on "best practices" developed by similar communities. DHR is available to serve as a repository for information provided by municipalities.

As individual property owners plan to repair or rebuild their properties following a severe storm, several factors may influence the types of required reviews and approvals, some of which are identified below:

- **Level of Damage Incurred:** If damage to the building is such that the cost to restore the building to its pre-damaged condition would equal or exceed 50% of the market value of the building under the local floodplain ordinance, this condition would likely meet the definition of "Substantial Damage." (Municipalities may utilize a more rigorous metric to calculate Substantial Damage.) Repairing this damage will require that the property also be brought into compliance with local



Property Owner Guidance Document

floodplain regulations. However, the municipal floodplain ordinance may identify potential exceptions for properties that meet the ordinance's definition of "historic structures." *(Refer to Historic Properties and Floodplain Regulations, page 2.11.)*

- **Value of Anticipated Improvements:** If the cost to improve a building equals or exceeds 50% of the market value of the building, those improvements would likely meet the definition of "Substantial Improvement," which would require the property be brought into compliance with municipal floodplain regulations. (Municipalities may utilize a more rigorous metric to calculate Substantial Improvement.) The municipal floodplain ordinance may identify potential exceptions for properties that meet the ordinance's definition of "historic structure." *(Refer to Historic Properties and Floodplain Regulations, page 2.11.)*
- **Municipal Floodplain Regulation Requirements:** Whether a building meets the local floodplain's definition of "historic structure" will affect the degree to which the building must comply with the regulations. However, a floodplain permit would still be required for the development of any property located within the Special Flood Hazard Area (SFHA).
- **Municipal Building Code Requirements:** Work to repair a building will likely require a building permit and compliance with all current municipal building codes and may require correction of previously existing violations. Local adoption of the Florida Building Code (FBC) may include exemptions for buildings that meet the code's definition of a historic structure, as long as the lack of compliance does not constitute a safety hazard and the building will remain historic. *(Refer to Modify Building Code Requirements, page 4.14.)*
- **Local Historic Preservation Requirements:** If a property falls under the jurisdiction of a local design or historic review authority it may be subject to review for compliance with the historic preservation criteria of the municipality's zoning code or design guidelines related to alterations at historic properties prior to the issuance of a building permit. *(Refer to Historic Property Project Review, sidebar page 4.25.)*
- **Funding Source Requirements:** Grant funds and loans frequently have conditions and restrictions governing their use. For example, funding from the National Park Service or DHR requires compliance with *The Secretary of the Interior's Standards for the Treatment of Historic Properties* (U.S. Department of the Interior, 2017) and may require that an easement be taken over the exterior and/or interior of the property for a set period of time. *(Refer to Historic Property Project Review, sidebar page 4.25.)* ***Some grants may require a match in the form of direct or in-kind funds and place restrictions on the source of the direct funding. Eligibility requirements and grant conditions should be carefully considered before applying for grant funding.*** If the property is listed in or determined eligible for listing in the National Register of Historic Places, federal or state funds, permits, or licenses will trigger historic preservation review by the lead federal agency and DHR.

Historic Mediterranean Revival buildings usually have clay tile roofs that can cause challenges when seeking new insurance coverage.

- **Flood Insurance Company Requirements:** Different requirements may or may not be triggered based upon whether a property is covered by flood insurance, and the insurance company's requirements. For example, FEMA-funded mitigation projects require that property owners maintain flood insurance as a condition to receive funding. *(Refer to National Flood Insurance Program, page 2.3.)*
- **Property Insurance Company Requirements:** Wind insurance is often covered under property insurance in Florida. Insurance companies may impose specific requirements for repair or rebuilding as a condition of writing a policy. *(Refer to Wind Insurance, page 3.4.)*

Repairing and rebuilding may also provide the opportunity for owners to rectify an existing condition that makes their property susceptible to costly flood or wind damage. This can include elevating building systems above the Design Flood Elevation (DFE), improving structural connections between building elements, and providing floodwater evacuation pathways for low-lying areas. *(Refer Modify Building Code Requirements, page 4.14.)* ***On a larger scale, previously under utilized or dilapidated historic buildings can be rehabilitated incorporating flood resilience measure. For example, this might include breathing new life into historic commercial buildings along a Main Street corridor or adaptively reusing a warehouse for multifamily housing***.

Prior to beginning any repair or rebuilding project, it is best for property owners to work with officials at all levels to ensure that requirements are understood, and approvals are in place prior to commencing work. In the long run, this can save both time and money.

FUNDING FOR RECOVERY

Community-wide and private properties share many of the same funding opportunities, except for flood insurance. Post-disaster assessments can provide a better understanding of a community's need and form the basis for requesting a Presidential Disaster Declaration, which may trigger funding opportunities from FEMA, as administered by FDEM. *(Refer to Chapter 9, Response: Hazard Mitigation for Historic Resources.)* (Approximately half of all declared disasters receive FEMA funding, with the remainder ineligible.) *(Refer to Storm Guidance for Florida's Historic Buildings, Presidential Disaster Declaration Funding, sidebar page 2.20.)* Other financial assistance from public and private entities may be available, as identified below.

- **Flood insurance** funding is limited to affected properties with an active policy, with limits established by the policy for both buildings and contents. *(Refer to FLood Inssurance Coverage, sidebar page 2.4.)*
- **Wind Insurance** is included in any building insurance policies. Property owners should be encouraged to contact their policy agents to verify the adequacy of their coverage. *(Refer to Wind Insurance, page 3.4.)*
- **U.S. Department of Housing and Urban Development** (HUD) is able to provide financial assistance to affected areas following a Presidential Disaster Declaration through low to moderate income loans to municipalities, individuals, and businesses for housing, infrastructure, and business recovery efforts. These may include Community Development Block Grants (CDBG). *(www.hud.gov/info/disasterresources)*
- **U.S. Small Business Administration** (SBA) is able to provide low income loans to affected areas following a Presidential Disaster Declaration for damage cause to homes and personal property; business and economic injury losses. *(disasterloan.sba.gov/ela/)*

Although all affected properties may be eligible for certain types of federal funding, such as FEMA's Hazard Mitigation Assistance Program (HMA), ***some funding sources will be limited to identified or designated historic properties, with eligibility requirements varying among programs.*** *(www.fema.gov/media-library/assets/documents/103279)* Following stabilization, the local government should contact emergency management lead and support agencies, including FDEM, DHR, and the Florida Department of Economic Opportunity. Potential sources of funding specifically directed towards historic properties include DHR and the National Park Service (NPS). *(Refer to National Flood Insurance Program, page 2.3.)*

Emergency funding may be available for projects from DHR. ***However, in most cases, work completed prior to authorization is not eligible for funding or may disqualify a project from eligibility altogether.*** As a result, identifying potential funding and contacting the funding agency as soon as possible to understand program requirements will provide the highest potential for financial assistance.

Historic buildings that lack funding support for repairs can continue to deteriorate and increase costs of rehabilitation.

Eligibility and conditions of funding will vary between programs. For example, for a post-disaster project to be eligible for FEMA funding, it must be identified in an approved local mitigation strategy. However, if used to mitigate flood-prone properties, this funding will only apply to those properties covered by an active flood insurance policy. *(Refer to Identify, Evaluate, and Prioritize Historic Property Mitigation Options, page 8.25.)* Purchase of flood insurance prior to the commencement of the property mitigation project is mandatory, and the flood insurance policy must be maintained throughout the life of the property. ***Therefore, it is critical for local historic preservation advocates to work with local emergency management personnel to identify mitigation projects to be included in a hazard mitigation plan; understand the regulatory responsibilities required and educate property owners, preferably in advance of a disaster; and advocate for the selection of those projects post-disaster.*** *(Refer to Develop Mitigation Goals and Objectives, page 8.24.)*

Most post-disaster projects will involve physical construction efforts in terms of stabilization, rebuilding, and mitigation. Projects that include funding through either federal or state sources, or that require federal or state permits, will be subject to historic preservation review by DHR. *(Refer to Historic Property Project Review, sidebar page 4.25.)* ***If projects are identified in a hazard mitigation plan, the local government may seek non-construction funding for community-wide preservation projects such as architectural and historical documentation and surveys as long as these projects also address mitigation planning.*** For this reason (among others), DHR recommends a combined approach that includes both property documentation and a risk assessment to identify which properties are vulnerable to natural hazards and identify potential mitigation options. *(Refer to Assess and Document Historic Property Flood Risk, page 8.15.)*

When pursuing funding, consideration should be given to:

- Requirements for cost-sharing or matching funds;
- Whether the funds are a grant or a loan and, in the case of a loan, the conditions of repayment;
- Whether funds are immediately available, or whether the property owner must front the costs with expectation of reimbursement;
- The timeframe for funding or reimbursement; and
- Whether the proposed repair, reconstruction, or rehabilitation project will compromise the property's historic integrity and/or continued eligibility for listing on the National Register of Historic Places.

If a proposed project may compromise the historic integrity of a property and its continued National Register eligibility, the municipality and property owner should consider three potential scenarios:

- The property may no longer be eligible for most historic preservation incentive programs, including state and federal tax credits and grants;
- ***If the property has benefited from prior funding through these programs, the beneficiary may have to return funds received; and***
- Based upon the provisions of the local floodplain ordinance, properties that lose historic designation may be newly required to comply with stricter floodplain regulations, which can include substantial modifications, further impacting historic integrity and incurring additional costs for the property owner. *(Refer to 107.5 Historic Buildings, sidebar page 2.13.)*

REFERENCES

Note: All references are available online unless otherwise noted. References that are only available as online resources are noted as "online resource." Refer to *Appendix A: Resources* for web links.

U.S. Department of the Interior [National Park Service]. *Guidelines on Flood Adaptation for Rehabilitating Historic Buildings* (2021).

U.S. Department of the Interior [National Park Service]. *The Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for Preserving, Rehabilitating, Restoring & Reconstructing Historic Buildings* (2017).

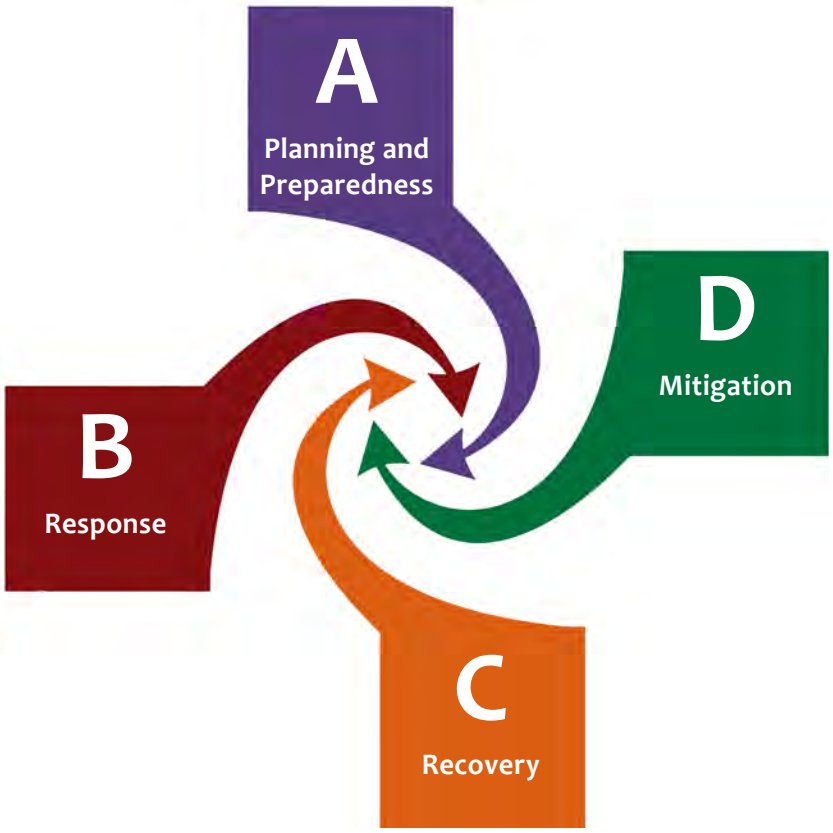
Chattahoochee, 1925. (Florida Memory)

11 MITIGATION: HAZARD MITIGATION FOR HISTORIC RESOURCES

Storm mitigation comprises actions taken by communities and individuals that decrease the negative effects of flooding, with the primary aim of protecting of human life and property. Wind mitigation includes actions taken by individuals to decrease the effects of strong winds. ***Mitigation can occur as a protective measure in anticipation of a potential flooding or strong winds, but more likely as a reaction to a storm event, during or immediately following the recovery process.***

When considering mitigation after a flood or severe wind storm, there is a tendency to strive to return to "normal" pre-storm conditions. ***Although an emotionally comfortable response, reinstating a condition that is known to be prone to flood or wind damage is not necessarily in a community's or property owner's best long-term interest.*** However, the careful selection of mitigation options allows both a community and its property owners to be forward-thinking. This is particularly true when considering increasing flood vulnerabilities associated with sea level rise, subsidence, increased precipitation, overdevelopment, and increased severe wind storms associated with climate change.

There are a wide range of flood mitigation measures that can be implemented and can be identified to address flooding of various types and extents. ***Community-wide mitigation options tend to be larger, beneficial to an extended area, and may alleviate the need for individual property mitigation. By contrast, property-specific mitigation options are initiated by an owner and are typically be limited to reducing flood impact at a single parcel.*** *(Refer to Chapter 12, Community Flood Mitigation Strategies, and Chapter 13, Property Flood Mitigation Strategies.)* Wind



- IMPLEMENT PROTECTIVE ACTIONS
- COMMUNITY-WIDE MITIGATION
- PROPERTY-SPECIFIC MITIGATION

MITIGATION

Mitigation is the effort to reduce loss of life and property by lessening the impact of disasters. In order for mitigation to be effective we need to take action now — before the next disaster — to reduce human and financial consequences later (analyzing risk, reducing risk, and insuring against risk).

[FEMA, *www.fema.gov*]

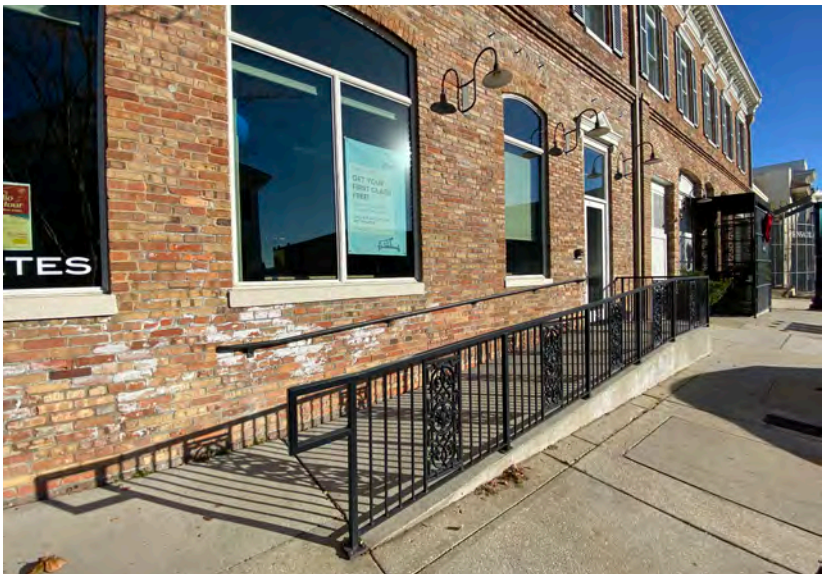
mitigation measures are implemented by individual property owners and the appropriate retrofitting options are based upon specific building characteristics. *(Refer to Chapter 3, Wind Retrofitting.)*

WHOLISTIC APPROACH TO STORM MITIGATION

Flood mitigation typically benefits from a holistic approach, with the type, extent, frequency, and severity of flooding being key considerations in identifying appropriate options. A holistic approach may have the added benefit of preventing the unintentional consequence of increasing flood vulnerability at unprotected adjacent areas following a targeted implementation project. It is therefore prudent to evaluate protection options on a neighborhood or community-wide basis and/or engage adjacent properties or communities with similar flood challenges to evaluate and implement protection options together. *(Refer to Chapter 12, Community Flood Mitigation Strategies.)* In areas where the likely severity and frequency of flood events is low and limited to a small number of parcels, property-specific modifications may provide sufficient protection. *(Refer to Chapter 13, Property Flood Mitigation Strategies.)* Where flooding is prevalent and widespread, communities will likely benefit from a combination of local initiatives to improve community resilience, community-wide mitigation strategies providing protection to multiple properties, in addition to property-specific measures implemented by individual owners in response to specific vulnerabilities. *(Refer to Chapter 4, Local Tools: Preservation and Storm Mitigation.)*

Building elevation can have a significant impact on the historic appearance of a building.

Local initiatives are largely administrative and include community resiliency improvements such as strengthening local codes and ordinances, participating in the Community Rating System (CRS), and encouraging property maintenance. *(Refer to Community Rating System, page 2.18, and Chapter 4, Local Tools: Preservation and Storm Mitigation.)* Community-wide mitigation options are identified through the local hazard mitigation planning process, which is guided by the emergency management personnel with input from a planning team that may include the expertise of professional consultants and ideally preservation planners with significant public engagement and support. *(Refer to Chapter 8, Planning: Hazard Mitigation for Historic Resources.)* They provide protection to properties whose owners do not have the financial means to implement projects on their own accord but tend to be costly and take a long to complete. However, property-specific mitigation options are determined by individual owners within the requirements of local zoning, floodplain, and building code, including local historic preservation commissions where applicable, and may have the added benefit of reducing property flood insurance rates if compliant with the National Flood Insurance Program (NFIP). *(Refer to National Flood Insurance Program, page 2.3.)*



Improving flood resistance at a historic property may also require accessibility improvements. Guidance for accommodating both goals can be provided by preservation experts.

SELECTING PRESERVATION-SENSITIVE FLOOD MITIGATION OPTIONS

The practice of flood mitigation, although intended to protect life and property, can conflict with historic preservation. To provide protection, mitigation requires change, often radical change, which can destroy or challenge current interpretations of historic integrity. As guided by *The Secretary of the Interior's Standards for the Treatment of Historic Properties*, the practice of preservation has traditionally been geared towards minimizing change at historic properties. ***The 2017 update of The Standards acknowledges that the best guidance for evaluation of flood mitigation options for historic properties will require trade-offs, balancing long-term protection while preserving the greatest degree of character and historic integrity.*** The National Park Service's (NPS) recommendations and each community's flood vulnerability continues to evolve, with adjustments in acceptance of appropriate goals. ***In November 2021, NPS released the Guidelines on Flood Adaptation for Rehabilitating Historic Buildings, which provides information about how to sensitively adapt historic buildings to be more resilient to flooding hazards.***

The inclusion of local preservation planners and advocates in the local initiatives and hazard mitigation planning processes can balance a community's need for flood mitigation and its long-term preservation objectives.

Flood mitigation projects typically have the following goals:

- **Mitigate direct impacts i**ncluding erosion, high wave action, high-velocity water flow, and debris impact
- **Mitigate secondary impacts** such as rain and wind impacts that can damage buildings

- **Mitigate property damage** to buildings and infrastructure including damage to community-wide infrastructure, individual building systems, and long-term damage associated with water infiltration such as mold

To evaluate and select flood mitigation alternatives that meet community goals and protect historic properties, planners and preservation advocates should have an in-depth knowledge of:

- The location, significance, character, and integrity of local historic and cultural properties;
- How citizens value these properties, including which properties are deemed particularly important to the local sense of place;
- The extent to which those properties are vulnerable to flooding;
- How those properties are regulated, including whether they are locally designated and subject to review by a local design or historic review authority; and
- How proposed mitigation measures might adhere to or conflict with *The Secretary of the Interior's Standards for the Treatment of Historic Properties, 2017*. *(For more detail on the relationship of preservation planning considerations within the hazard mitigation planning process, refer to Chapter 8, Planning: Hazard Mitigation for Historic Resources.)*

As part of the process of grappling with flood mitigation, one of the most difficult things for a community to accept is that while it can reduce the effect of flooding on historic properties, it may be impossible for a municipality to protect all historically and culturally significant properties. Financial and personnel resources are limited, requiring hard choices, which should be proactively decided during the hazard mitigation planning process.

The hazard mitigation planning process provides a means of identifying a community's mitigation priorities based upon its vulnerability, availability of resources, and the community's will. *(Refer to Chapter 8, Planning: Hazard Mitigation for Historic Resources.)* To assist property owners in selecting mitigation options, communities can establish criteria through design guidelines for flood mitigation that balance local flood vulnerabilities with building characteristics and preservation goals. *(Refer to Develop Design Guidelines for Storm Mitigation, page 4.19, and the companion Storm Guidance for Florida's Historic Properties.)*

REFERENCES

Note: All references are available online unless otherwise noted. References that are only available as online resources are noted as "online resource." Refer to *Appendix A: Resources* for web links.

Federal Emergency Management Agency (FEMA). *National Floodplain Insurance Program Floodplain Management Bulletin: Historic Structures [P-467-2]* (2008).

FEMA. *Integrating Historic Property and Cultural Resource Considerations into Hazard Mitigation Planning [FEMA P-386-6]* (2005).

U.S. Department of the Interior [National Park Service]. *Guidelines on Flood Adaptation for Rehabilitating Historic Buildings* (2021).

U.S. Department of the Interior. *The Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for Preserving, Rehabilitating, Restoring & Reconstructing Historic Buildings* (2017).

Fort Lauderdale, 1947. (Florida Memory)

12 COMMUNITY FLOOD MITIGATION STRATEGIES

Community-wide flood mitigation strategies can provide protection from floods, lessen the severity of flood-related damage, or assist in or promote response and recovery efforts. ***The potential impact of large-scale physical mitigation options on historic integrity is generally reduced if the mitigation is physically remote from historic and archaeological resource.*** As a general rule, community-wide strategies will:

- Reduce or mitigate the extent of flood threat within the risk management timeframe;
- Benefit a large number of properties, whether they are historic or not;
- Create an environment which facilitates the continued population and lifestyle associated with the intangible sense of place; and
- Encourage community-wide buy-in, since the approach protects all properties rather than being geared towards only historic properties.

The appropriate strategies to consider for each community will depend on the risk management timeframe as well as the type and level of threat or vulnerability. *(Refer to Establish a Planning Timeframe, page 8.14.)* In addition, it is valuable to consider implementation of a variety of options simultaneously in order to increase the likelihood of effectiveness. Like property-owner initiated construction projects or mitigation measures at individual properties, some large-scale options adjacent to historic resources may have a negative impact on the historic context of a resource. For example, significantly increasing the height of a sea wall adjacent to a historic district can obstruct the visual and physical connection to the water, altering the historic context and sense of place.

Strategies that are best geared toward community-wide implementation include:

- Shoreline or bank protection;
- Stormwater management systems upgrades;
- Utility and infrastructure improvements; and
- Transportation infrastructure improvements, including roadways and bridges.

As part of the evaluation process for community-wide mitigation strategies, the local planning team should take the following considerations into account:

- They require planning and analysis to identify potential long-term benefit;
- They should be scalable to address increased flood vulnerability from climate change, sea level rise, subsidence, and overdevelopment;
- Many strategies can be costly to implement, and implementation funding must be balanced against other community needs *(funding may be available through FEMA'a Hazard Mitigation Assistance Grant Program [HMA] – refer to Funding for Recovery, page 10.7)*;
- To be effective, several strategies – particularly the natural strategies – require control of large areas of land, some of which may be in private ownership;
- The implementation of the strategy could increase the severity of the threat on adjoining unprotected areas;
- There must be both political will and community buy-in to execute the project;
- Significant time may be required for implementation, and local support for the project might not be sustained;
- There may be unintended consequences of impacting archaeological resources *(refer to Chapter 6, Archaeology)*;
- A community must make a commitment to maintain the improvements so that they remain effective as long as possible; and
- There could be secondary consequences associated with a strategy – such as a decrease in the local tax base associated with undeveloped or underdeveloped real estate.

For shoreline protection and stormwater management projects, options range from emulating the natural landscape at one extreme, to building "structured" or "hard" adaptations at the other. Long-term, "natural" strategies are likely to be more effective than structural improvements because they tend to be more adaptable as the level of risk increases, and they require less maintenance over time. In addition, from a preservation point of view, natural strategies may provide a more historically appropriate setting by reestablishing a lost historic context. Many of the "natural" approaches are also scalable in that they can be adapted to a single property or across a municipality, providing equal protection to large areas irrespective of property values or the means of individual owners.

When evaluating any mitigation option, it is important to consider the potential preservation implications, direct and long-term costs associated with maintenance, and the potential impact on property tax revenue.

A marsh restoration project is underway along one of Cedar Key's most vulnerable shorelines.

Seawalls such as the one in St. Pete Beach require maintenance to provide the best protection.

SHORELINE PROTECTION

Shorelines occur along any body of water including oceans, bays, lakes, rivers, and streams. During severe storm events, water levels will typically rise and the effect will often be compounded by wave action, storm surge, or high-velocity water flow. A range of shoreline protection measures can provide protection for communities and individual properties. These generally fall within two broad categories, those that are constructed, "hard" or "armored" adaptations; and "soft," "natural," or "landscape" adaptations that emulate a more natural condition.

STRUCTURAL SHORELINE PROTECTION

Hard adaptations are structural elements constructed to protect shorelines from wave impact-induced erosion, and from the high-velocity flow of floodwater. These elements can be located immediately at or along the shoreline, or in the case of lessening the effects of wave action, can be located offshore. Shoreline armoring protects development by reinforcing the shoreline to prevent it from retreating or eroding. Examples of shoreline armoring include seawalls, bulkheads, and revetments.

ON-SHORE

There are several structural protective measures that can be constructed parallel to a shoreline to fortify it against potential flood-related damage, including those listed below:

- **Sea walls** are vertical walls constructed along a shoreline to provide protection from waves on one side and to retain earth on the other, possibly extending above existing grade. They are constructed to reflect incoming wave energy back out towards the water. It should be noted that they do not protect the land at the base of the wall from erosion and can accelerate damage to unprotected adjacent shorelines.
- **Bulkheads** are like seawalls in that they are vertical walls that extend along a shoreline and retain soil. However, unlike sea walls, bulkheads provide minimal protection from waves. They prevent shoreline erosion but can also create erosion in adjacent unprotected areas (as in those lacking bulkheads).
- **Revetments and rip-rap** are fortified slopes or banks made of boulders or chunks of concrete that disperse wave energy upon impact. They prevent erosion and improve the structural stability of soil slopes, providing similar protections as sea walls.
- **Flood barriers, levees, dikes, and embankments** are designed to contain water and provide protection against high floods. They can be constructed of natural or artificial materials. When located along a river, they confine the flow of water, increasing its velocity and limiting the potential absorption of floodwater across a wider area.
- **Floodgates** control water flow through a flood barrier and must be operational to control the retention and equalization of water levels.

STRUCTURAL SHORELINE

One of the distinct advantages of structural shoreline protection is that it can provide equal protection to many properties in a vulnerable area. However, these measures present challenges such as:

- High construction costs
- Necessity for regular maintenance
- Increased erosion and flooding at nearby unprotected shorelines
- Alteration of the natural characteristics of the shoreline

Structural shoreline protection has the following potential preservation benefits and challenges:

Potential Preservation Benefits:

- Reduction of the potential flood damage risk at large numbers of properties and historic districts without requiring significant alteration of individual buildings and structures
- Potential protection of historic landscapes, landscape features, and archaeological resources

Potential Preservation Challenges:

- Alteration of the physical and visual relationship of historic resources to the shoreline, particularly if the implementation blocks view and access to water
- Possible requirement for destruction or alteration of cultural resources located along the shore, particularly archaeological resources, both on land and in the water, and historic landscapes

OFF-SHORE

Off-shore options, including those described below, can limit the effects of storm surge and wave action.

- **Breakwaters** are typically constructed of large boulders ranged in a linear or curvilinear form, with one end in contact with the shoreline. *(Refer to Oyster Shell Breakwaters, page 12.5.)* As incoming waves hit a breakwater, the wave intensity and force is greatly reduced before it approaches the shoreline. Thus, a breakwater provides protection of the shore and may also provide a protected harbor for boats.
- **Jetties** are like breakwaters in that they are constructed of large boulders in the water. However, they are constructed in pairs at the mouth of a navigable channel such as where a river discharges into a bay. Jetties provide a buffer from storm surge and serve to confine the tidal flow of water to within the channel. In addition, they help maintain a navigable depth within the channel.

Mangrove stands are one of Florida's best natural shoreline defenses.

NATURAL SHORELINE PROTECTION

Natural shoreline protections, also known as non-structural or "soft" measures, are based on emulating the natural ecosystem of a specific area. These can be the basis for flood-resilient design. In considering the treatment options, it is important to have a clear understanding of the local natural environmental conditions and how water is managed in the community.

Natural shoreline protections utilize natural materials to absorb rainfall and intense storm surge. They can be more effective and less costly than structural measures, but they also typically require maintenance.

ON-SHORE

There are several natural protective measures, including those described below, that can be constructed parallel to a shoreline to fortify it against potential flood-related damage.

- **Wetland reclamation** seeks to reestablish wetlands that have been removed or reduced over time. Wetlands are areas that are saturated with water and provide a distinct ecosystem for vegetation and fauna. This vegetation can filter water and promote ground absorption. In a flood event, it can store floodwater as well as reduce the effects of storm surge.

Dunes along the Venice coastline provide protection and require cyclical renourishment.

- **Floodplain restoration** involves increasing the area for water disbursement and storage adjacent to a water body or channel such as a river, stream, or dry creek bed that is subject to inundation during a rain or flood event. Floodplain restoration, which often requires a reduction in impervious surface coverage, facilitates water absorption and potentially reduces the velocity of water flow, downstream flooding, and flash floods. *(Refer to Landscape Options, page 12.7.)*
- **Mangrove habitat establishment** involves planting young mangroves along a sheltered portion of a shoreline. As the mangroves grow and expand, they establish aerial roots that can provide effective shorelines stabilization and erosion control. A mature mangrove stand can mitigate wave height and storm surge, reducing the impacts of nor'easters, tropical storms, and hurricanes.
- **Dune re-establishment** seeks to replace dunes that have been removed or reduced over time. Dunes are sand hills typically located on the shore of a large body of water such as an ocean, bay, or lake. They can provide protection from flooding and storm surge. Dunes are naturally formed by blowing sand but can be manmade (also known as engineered). Because they are formed of particulate matter, they can be highly susceptible to damage in a storm event. Established vegetation, with a dense root network and few intermediate pathways between dunes, reduces dune vulnerability.
- **Beach nourishment** is the addition of sand to an eroded beach to replace lost sand or to widen an existing beach to provide protection from inland flooding and storm surge. Beach nourishment is often completed in conjunction with dune enhancement. Because beaches are relatively unprotected, they are highly vulnerable to scour and erosion in the event of a storm or flood.

OFF-SHORE

Like their structural counterparts, natural off-shore options, such as oyster shell breakwaters, can limit the effects of storm surge and wave action.

- **Oyster shell breakwaters** are a natural, living breakwater that is like those constructed of boulders, concrete, or rocks, except they are constructed of oyster shells. *(Refer to Breakwaters, page 12.4.)* As incoming waves hit a breakwater, the wave intensity and force is greatly reduced as it approaches the shoreline. Thus, a breakwater provides protection of the shore. It may also provide a protected harbor for boats.

Natural shoreline protection has the advantage of being constructed of native, regionally appropriate materials, reducing the visual impact of the interventions and promoting biodiversity. Wetlands and floodplains have the added advantage of providing water storage, promoting infiltration, and reducing potential downstream flooding. However, both require large land areas to be effective, limiting potential developable land. Dunes and beach nourishment can be effective protective measures for beaches and shorelines; however, they are highly susceptible to damage from erosion or a storm event, particularly if not vegetated.

NON-STRUCTURAL SHORELINE

Like structural protection, natural shoreline protection presents issues including:

- High construction costs
- Necessity for regular maintenance
- Requirement for large areas of undeveloped land

Potential Preservation Benefits:

- Reduction of the potential flood damage risk at large numbers of properties and historic districts without requiring alteration of individual buildings and structures
- Potential to protect historic landscapes, landscape features, and archaeological resources
- Potential to reestablish historic context, settings, and landscapes

Potential Preservation Challenges:

- Alteration of the physical and visual relationship of the historic resources to the shoreline, particularly if implementation blocks water
- Possible requirement for destruction or alteration of resources located along the shore, particularly archaeological resources both on land and in the water, and historic landscapes, particularly for natural shoreline protection measures such as wetlands and floodplains, which require large land areas to be effective

STORMWATER MANAGEMENT

In addition to flooding along shorelines of a water body, flooding can also occur because of precipitation, or stormwater, in the form of rain. In a developed landscape, the ability of the land to absorb stormwater is reduced due to the presence of impervious surface coverage, unplanted areas, and areas planted with shallow-rooted and non-native species. Developed landscapes can be urban or rural and include homes, businesses, roadways, paved surfaces, and swimming pools as well as man-made landscapes such as farms and golf courses. By reducing soil absorption capacity and altering drainage patterns, alteration of the landscape can have a detrimental effect on the way a site processes water, leading to uncontrolled water flow, erosion, and localized flooding. Possible improvements to address inland flooding include both engineered and natural options.

Concrete pipes under roadways connect culverts to serve as a drainage ditch.

ENGINEERED OPTIONS

- **Drainage ditches** are a surface drainage system for removing excess water from a land surface. These are typically employed in less developed and rural areas and consist of depressed channels, often located adjacent to roadways, that can discharge into large drains or a body of water. Drainage ditches can be hard construction, made of natural materials, or a combination of the two. The use of natural materials increases the propensity for soil absorption of stormwater. Culverts, often part of a drainage ditch system, are engineered channels or pipes that allow stormwater to flow under intersecting roads, driveways, and railroads.
- **Stormwater management systems** channel the flow of stormwater and remove it, often through subsurface piping or culverts, and are typically utilized in cities, towns, and more developed communities. The level of complexity of a stormwater management system will likely be greatest in urban areas due to the dense level of development and the preponderance of impervious surface coverage. In most cities, it is not uncommon to have intakes that collect stormwater draining from road and sidewalk surfaces, and possibly also roof surfaces, into a piping system that conveys stormwater to a water treatment facility. The water treatment facility will then remove pollutants and contaminants including grease, automobile oil, pesticides, and animal waste bacteria before discharging stormwater back into an adjacent body of water. The conveyance, such as piping, limits or prohibits the potential for stormwater absorption, and the rapid discharge from the water treatment facility during a storm event can overwhelm a body of water. In addition, many older cities have combined stormwater and sewage systems that are often undersized relative to development, particularly when combined with significant storm events. When the water treatment facility is overwhelmed, untreated stormwater, and in some municipalities also sewage, is discharged directly into waterways, backs up into the stormwater system, and potentially collects on roadways or moves up through plumbing fixtures.

ENGINEERED STORMWATER MANAGEMENT

Like other options that provide large-scale protection, engineering options face similar issues, including:

- High cost to upgrade systems
- Necessity for regular maintenance
- Requirement address changing weather and extreme precipitation

Potential Preservation Benefits:

- Existing systems that can be upgraded/ maintained in place serve multiple properties and historic districts without additional adverse effect
- Increased effectiveness when used in combination with green infrastructure, which may result in lower project costs

Potential Preservation Challenges:

- Increasing capacity of systems could damage or destroy archaeological resources if additional excavation is required to implement upgrades
- Undersized/outdated systems will cause or exacerbate flooding during storms

- **Pumping stations** supplement a stormwater management system by pumping floodwater out of a vulnerable area. They require an uninterrupted power or fuel supply to remain operational in a flood event.
- **Water storage areas and retention ponds** are man-made areas used to contain stormwater and slowly drain it to minimize the dependence on stormwater management systems and pumping stations. A disadvantage of this approach is that a man-made pond can create a new ecosystem that is incongruous with the natural landscape and historic setting in addition to reducing the developable land.

Like structural shoreline protection, inland structural or engineered improvements can provide equal protection to many properties in an affected area. However, they share some common issues, including the need to increase capacities over time as conditions worsen and development adds to the impervious surface coverage in the watershed.

Landscape areas can be planted and direct stormwater to retaining areas with native plants that are more likely to absorb stormwater.

LANDSCAPE STORMWATER MANAGEMENT

Potential Preservation Benefits:

- Direction of stormwater away from historic resources by levees, berms, and swales
- Visually unobtrusive collection of stormwater by such measures as levees, berms, swales, and rain gardens of appropriate scale with carefully chosen plantings
- A potentially more appropriate context for historic resources with reduction in impervious surface

Potential Preservation Challenges:

- Alteration of historic landscapes, settings and potential archaeological resources during construction, particularly at dramatic grade changes
- Alteration of the physical and visual relationship of the historic resources to the landscape

LANDSCAPE OPTIONS

Landscape measures can be utilized on a large-scale in an urban or suburban setting or at an individual property. Contrary to many of the structural or engineered measures, they can be relatively low impact, inexpensive to implement, and integrated into a designed landscape, particularly at new areas of development. Many of these landscape measures either preserve or mimic natural landscape systems, featuring native plant species, diverse wildlife, and rich soils from the decomposition of plants and trees, thereby facilitating both shallow and deep absorption of stormwater.

- **Levees and berms** are landscaped hills that can be used to protect areas from flooding or, if continuous, to contain floodwater and encourage infiltration. They can be effectively utilized across multiple sites, at an individual parcel, or to protect a single building. *(Refer to Perimeter Barriers, page 13.11.)*
- **Swales** are either natural or man-made depressed landscaped channels used to manage stormwater runoff and promote infiltration by slowing the waterflow. Like levees and berms, they can be effective across multiple sites, or on a single parcel, where they are often constructed to direct stormwater away from building foundations. They can also direct stormwater towards a wetland area, drywell, or rain garden to promote infiltration.

TREE SPECIES	GALLONS OF WATER INTERCEPTED IN YEAR 1	GALLONS OF WATER INTERCEPTED IN YEAR 15	GALLONS INTERCEPTED OVER 15 YEARS
4" Live Oak	481	7,283	48,375
8" Live Oak	1,491	9,349	71,949
12" Live Oak	2,843	11,507	98,772
4" Yaupon Holly	155	486	5,676
8" Yaupon Holly	548	548	8,226

Planting trees and shrubs can aid in stormwater absorption by intercepting water through their root systems. (Resilient Heritage, City of St. Augustine, 2020, page 39.)

Paved areas can be converted to permeable pavers to reduce stormwater runoff.

- **Reduction of impervious surfaces and introduction of permeable surfaces** provides a means of increasing infiltration and decreasing stormwater runoff. Impervious surfaces include roofed buildings and structures, roadways, parking areas, paved surfaces, and swimming pools. Any rainfall or other form of water that hits these impervious surfaces becomes runoff, increasing the propensity for flooding downstream and increased pollution. Because of their limited absorption, impervious surfaces have the added effect of reducing infiltration into the ground, thus reducing the replenishment of aquifers. As another strategy to reduce the impact of runoff, roadways and paved surfaces can be sloped towards drainage ditches in lieu of curbed asphalt that discharges into a stormwater system. *(Refer to Zoning Options, page 12.9.)*
- **Rain gardens** are gardens located in depressed areas of land, often near paved surfaces, that collect stormwater runoff and promote infiltration; they often incorporate native plants. Rain gardens may harbor mosquitos if standing water exceeds a week and may be unwelcomed in more populated areas.
- **Shade trees** can promote stormwater absorption and reduce runoff and ambient temperature. If tree limbs shade a roof, they can also reduce interior temperatures. Trees should be positioned to minimize the potential for limbs to damage buildings during high winds. In addition, rotted trees are vulnerable to toppling in high winds and should be removed as part of site maintenance. *(Refer to table above and Chapter 3, Wind Retrofitting.)*
- **Native plants** absorb water to a greater degree than non-native plants, do not require significant maintenance, and can tolerate the range of extremes from very wet to very dry soil and Florida's higher temperatures.
- **Rain barrels** are located at the base of buildings to collect stormwater discharged from roof surfaces through downspouts. These are a property-specific mitigation measure.

Stormwater can be collected in rain barrels and provide water for irrigation.

The spaces between pavers can absorb stormwater, but regular cleaning is required.

The asphalt has been removed from the edge of this parking area to provide a landscaped area that collects and absorbs stormwater runoff.

ZONING

Potential Preservation Benefits:

- Reduction of additional runoff associated with construction and new development
- Regulating height of building
- Maintaining streetscape rhythm and patterns

Potential Preservation Challenges:

- Visual obstacles can be potentially inappropriate landscape improvements including berms, swales, and on-site drywell requirements at historic properties seeking to construct an addition or secondary building, as well as at new development in a historic district

ZONING OPTIONS

Governments use zoning codes to control land development and land use. Municipalities can regulate development and improvements in a manner that promotes infiltration and minimizes runoff and overburdening existing waterways and stormwater systems. Because local regulatory review is typically initiated by a request for a building permit, the use of zoning regulations to limit or reduce runoff is often only initiated in cases of new development, a Substantial Improvement, erection of a new building or structure, or the expansion of the footprint of an existing building or structure. Even if no physical changes are required to be implemented on historic properties, any changes made on other properties in the community to reduce runoff can provide relief to existing and historic properties. If changes are required at historic properties, the community should consider establishing design parameters to ensure that alterations are in keeping with the historic character of the buildings and their setting. *(Refer to Develop Design Guidelines for Storm Mitigation, page 4.19.)*

Potential means for reducing runoff utilizing zoning include:

- Utilizing berms, swales, and potentially landscape walls to retain stormwater on site;
- Minimizing impervious surface coverage including driveways, parking areas, walkways, patios, and swimming pools and draining these to the site and not to the public roadway;
- Installing permeable paving only where required;
- Disconnecting roof and subsurface drainage from the municipal stormwater system and encouraging on-site infiltration;
- Encouraging the use of rain barrels and stormwater to irrigate gardens;
- Removing roadway and parking curbs and installing drainage ditches and/or rain gardens along roadways and around parking areas;
- Requiring an on-site dry well to promote slow stormwater infiltration where the capacity of the land area is inadequate to provide natural absorption at a sufficient rate;
- Requiring replacement or planting of shade trees to promote stormwater absorption and provide sun screening; and
- Increasing the use of native plantings with their typically deeper root systems to encourage infiltration. (These provide the added advantage of minimizing the need for supplemental irrigation and fertilization.)

Zoning modifications can also be used to improve stormwater management and manage alterations at historic buildings such as building elevation heights and streetscape rhythm. *(Refer to Modify Zoning Ordinance, page 4.11.)*

Property damage from a storm event can reveal other building weaknesses.

BUILDING CODE OPTIONS

Building codes set the standards for safe construction. Although the Florida Building Code is the basis for construction reviews, codes can be modified locally to address specific concerns such as flooding and wind mitigation. *(Refer to Modify Building Code Requirements, page 4.14.)*

Stormwater retention areas can collect water and allow it to drain slowly while being filtered to reduce pollutants into natural waterbodies.

FLOODPLAIN MANAGEMENT OPTIONS

A community's floodplain management ordinance can also address community-wide mitigation strategies for reducing flooding through incorporating higher standards than required by the National Flood Insurance Program (NFIP). *(Refer to National Flood Insurance Program, page 2.3.)* An example is the inclusion of a compensatory storage clause in the local floodplain ordinance. Such a clause requires owners or developers to provide floodwater storage on or adjacent to their property if their development reduces floodwater storage in the floodplain. A non-preservation benefit of including higher standards in the floodplain ordinance is the potential to capture additional credits for communities that participate in the Community Rating System (CRS). *(Refer to Community Rating System, page 2.18.)*

BUILDING CODE

Potential Preservation Benefits:

- Reduces the potential for flood-related damage

Potential Preservation Challenges:

- Potentially difficult to implement at historic buildings
- May have significant impact on an individual building or a new building constructed within a historic context, based upon the relative elevation of buildings to the floodplain

FLOODPLAIN MANAGEMENT

Potential Preservation Benefits:

- Reduces the potential for flood-related damage

Potential Preservation Challenges:

- Depending on how the volume capturing the compensatory storage is constructed, it could have an adverse effect on the integrity of a historic property or district

UTILITY INFRASTRUCTURE

Potential issues related to the improvement of utility infrastructure include:

- May require elevation or hardening to make it less susceptible to damage from flooding or associated debris, modification, or replacement; or relocation to reduce flood vulnerability
- Alternative systems may be needed during an upgrade
- Costly to construct
- Require regular maintenance

Potential Preservation Benefits:

- Mostly "invisible" and considered necessities rather than visually obtrusive
- Potential to protect historic buildings, structures, settings, and archaeological resources

Potential Preservation Challenges:

- Potential abandonment of historic buildings and structures due to failure of infrastructure to provide needed services such as access to fresh water, sewage disposal, and electricity
- Potential to impact historic landscapes and archaeological resources due to installation of new inland structural improvements, i.e. trenching for new stormwater piping and separation of stormwater and sewage
- Possible destruction or alteration of resources, particularly archaeological resources and historic landscapes, if below-grade
- In the case of water storage areas and retention ponds, potential alteration of the physical and visual relationship of historic resources to the landscape with the introduction of a large-scale body of water where none previously existed

Pump stations elevated out of the floodplain provide the best chance of continued service during flooding and can impact natural views.

UTILITY INFRASTRUCTURE IMPROVEMENTS

Utility Infrastructure includes utilities needed for modern-day survival such as access to fresh water, sewage disposal, and electricity. If disrupted, quality of life can become severely compromised, limiting the ability of an area to remain habitable. In most communities, water, sewer, and electrical service are public utilities relying on processing, generating, and treatment plants.

Utility infrastructure facilities must be located and constructed to minimize service interruption in the event of a flood event. In addition, they require regular maintenance upgrading to ensure that a potential system failure, such as a burst water main, does not result in a flood. In communities that rely on well water and/or septic systems, sea level rise and subsidence can cause the water supply and soil to become compromised by brackish water and contaminated with bacteria from untreated sewage. In these cases, alternative water supply and sewage treatment may be required to allow continued occupancy. Communities typically benefit from the separation of stormwater from sewage systems to reduce the load on infrastructure facilities. *(Refer to Stormwater Management, Engineered Options, page 12.6, and Chapter 5, Case Studies.)*

While the fresh water supply and sewage are vulnerable to flooding, the electrical supply can be very vulnerable to high winds. Winds can knock down trees that can impact power lines. *(Refer to Chapter 3, Wind Retrofitting.)*

MIAMI BEACH: ROADWAY ELEVATION

The City of Miami Beach is located on a barrier island that is approximately seven miles long and one mile wide, and is extraordinarily vulnerable to the impacts of sea level rise and climate change. The City has begun a multi-year project to adapt to rising waters. The work being conducted includes:

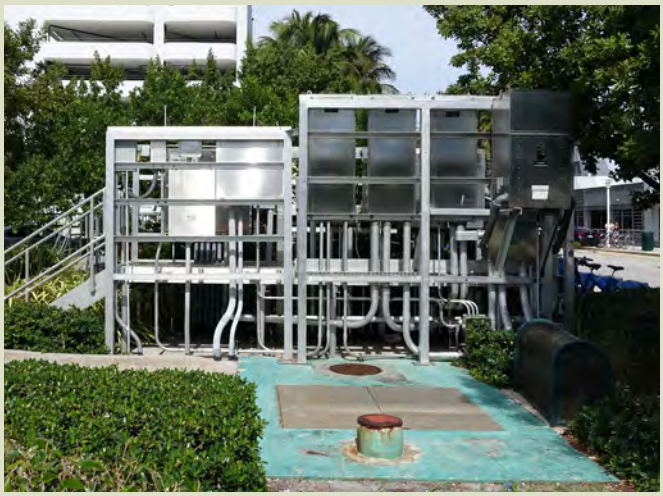
- Installing approximately 80 pump stations
- Increasing the western seawall by four to five feet
- Elevating the height of roadways several feet

Although implementation of the mitigation plan is still in progress, the project is not without controversy, particularly the elevation of the roadways. Although the long-term anticipation is for buildings to be elevated to meet the new roadway height, elevating a building is the responsibility and a choice of individual property owners, which they may or may not choose to implement in the near future.

Some of the issues associated with the roadway elevation include:

- Altering the visual relationship of buildings to the street
- Introduction of stairs and ramps from the prior sidewalk height to the raised sidewalk height
- Increasing the flood vulnerability of buildings below the new sidewalk level if pump stations fail to operate
- Challenges by flood insurance companies who sought to deny coverage after classification of a former "first floor" as a "basement"

Elevated roadways in Miami Beach have changed the interaction between buildings and the street.



Massive pump stations in Miami Beach constructed above the floodplain to mechanically control stormwater flow.

TRANSPORTATION INFRASTRUCTURE

Potential issues related to the improvement of transportation infrastructure include:

- Roadways, bridges, and causeways may require further elevation or structural enhancement as flood conditions worsen
- Costly to construct
- Require regular maintenance

Potential Preservation Benefits:

- Mostly "invisible" and if not a contributing feature, considered necessities rather than visually obtrusive
- Potential to protect historic buildings, structures, settings, and archaeological resources

Potential Preservation Challenges:

- Potential impact of raised transportation infrastructure, such as roadway and rail lines, that may re-direct stormwater towards vulnerable historic resources.
- Potential abandonment of historic buildings and structures due to failure of infrastructure to provide needed services including access by road
- Potential abandonment, modification, or removal of historic bridges
- Potential to impact historic landscapes and archaeological resources due to installation of new or elevated transportation infrastructure
- Possible destruction or alteration of resources, particularly archaeological resources and historic landscapes, through construction activities
- Alteration of the physical and visual relationship of the historic resources to the landscape through construction

Emergency evacuation routes that are improved by raising the roads can cause additional stormwater impact to building below the new roadway height.

TRANSPORTATION INFRASTRUCTURE IMPROVEMENTS

Transportation infrastructure, including roadways, bridges, and causeways, provide a transportation network for communities as well as a potential means of evacuation in a flood event. Establishing raised roadways or raising the elevation of existing roadways can prevent nuisance flooding and allow safe passage in more severe conditions. In addition to ensuring the roadway surface remains passable, bridge and causeway structural support systems may also require adaptation. This can include providing sufficient height and openings between structural members to allow the free flow of water without trapping debris, and a support system adequate to withstand the force of running water.

Bridges in Jacksonville cross the St. Johns River and historically opened the city to expanded development with vehicle travel and railway transport.

COMMUNITY MITIGATION STRATEGIES MATRIX

The following matrix is intended to provide a brief overview of the potential flood benefits and issues associated with the options presented in this section. Refer to the text boxes in the narrative for potential preservation benefits and challenges.

STRATEGY	TYPE	POTENTIAL FLOOD BENEFITS	POTENTIAL ISSUES
SEAWALLS, BLUKHEADS, REVENTMENTS, RIP-RAP	Shoreline / Structural	• Provides protection from wave action • Stabilizes shoreline	• Encouragement of continued development closer to the shoreline – possibly providing a false sense of security • Possible increased shoreline damage at nearby unprotected areas • Adaptability necessary to allow modification with increased threat
FLOOD BARRIERS – LEVEES, DIKES, EMBANKMENTS	Shoreline / Structural	• Provides protection from high floodwaters	• Water velocity increase in creeks, streams, and rivers • Continued development encouraged – possibly providing a false sense of security • Possible increased shoreline damage at nearby unprotected areas • Adaptability necessary to allow modification with increased threat
BREAKWATERS, JETTIES	Shoreline / Structural	• Decreases shoreline wave impact • Provides added benefit of creating a potential harbor	• Adaptability necessary to allow modification with increased threat
ESTABLISHMENT OF WETLANDS	Shoreline / Natural	• Promotes water absorption • Dissipates storm surge	• Fewer issues with installations that do not require property acquisition or abandonment • Acquisition and/or abandonment of property possibly necessary if significant land area required to be effective
FLOODPLAIN RESTORATION	Shoreline / Natural	• Promotes water absorption • Reduces the velocity of running water • Reduces the potential for downstream flooding	• Possible costly acquisition and/or abandonment of property • Reduction of tax base growth with prevention of future development

STRATEGY	TYPE	POTENTIAL FLOOD BENEFITS	POTENTIAL ISSUES
MANGROVE STANDS	Shoreline / Natural	• Stabilizes shoreline • Provides protection from wave action • Dissipates storm surge	• Reduces shoreline access
DUNES	Shoreline / Natural	• Reduces inland flooding • Reduces the effects of storm surge	• High susceptibility to damage in a storm event
BEACH NOURISHMENT	Shoreline / Natural	• Reduces inland flooding • Reduces the effects of storm surge	• High susceptibility to damage in a storm event
OYSTER REEF BREAKWATERS	Shoreline / Natural	• Decreases shoreline wave impact • Provides added benefit of creating a potential harbor	• Adaptability necessary to allow modification with increased threat
DRAINAGE DITCHES	Inland Structural Improvements	• Removes excess water from land surface • Reduces reliance on stormwater management system • Increases potential infiltration	• Possibility of discharge of untreated stormwater directly into waterway
STORMWATER MANAGEMENT SYSTEMS / PUMPING STATIONS	Inland Structural Improvements	• "Invisibly" collects stormwater and removes it from developed areas, diverting it to treatment facilities	• Difficulty of upgrading older systems – often near or at capacity due to increased development and potential combined stormwater/ sewage • Susceptibility of older systems to failure due to aging infrastructure • Possibility of untreated sewage discharge into waterway or back-up during flood events, particularly with combined sewage and stormwater systems • Adaptability necessary to allow modification with increased threat and floodproofing necessary to the DFE if within the Special Flood Hazard Area (SFHA, 1% floodplain)

STRATEGY	TYPE	POTENTIAL FLOOD BENEFITS	POTENTIAL ISSUES
WATER STORAGE AREAS	Inland Structural Improvements	• Increases infiltration • Decreases runoff	• Low impact if within public realm • Possible necessity to acquire and/or abandon of property if significant land area is required to be effective
LEVEES, BERMS	Inland Structural Improvements / Landscape	• Diverts stormwater • Protects from flooding • Contains stormwater to encourage infiltration if continuous	• Diversion of problem water to other areas
SWALES	Landscape	• Diverts stormwater • Contains stormwater to encourage infiltration	• Diversion of problem water to other areas
REDUCE IMPERVIOUS SURFACE COVERAGE	Landscape / Zoning	• Increases infiltration • Decreases runoff	• Low impact within public realm • Reduction of tax base growth with prevention of future development • Possible high cost of acquisition and abandonment and/or limited development potential of property
RAIN GARDENS	Landscape	• Increases infiltration • Decreases runoff	• Low impact within public realm
RAIN BARRELS	Landscape	• Collects storm water from roof drains for future use • Decreases runoff or stormwater system discharge	• Low impact
SHADE TREES	Landscape	• Increases water absorption • Minimizes supplemental watering, fertilization, and care	• Low impact
NATIVE PLANTS	Landscape	• Increases water absorption • Minimizes supplemental watering, fertilization, and care	• Low impact
ZONING REGULATION IMPROVEMENTS	Zoning	• Increases infiltration / decrease runoff • Establishes height for building elevation • Maintains streetscape rhythms	• Reduction of tax base growth with limiting or prevention of future development • Possibly costly acquisition and/or abandonment of property

STRATEGY	TYPE	POTENTIAL FLOOD BENEFITS	POTENTIAL ISSUES
BUILDING CODE MODIFICATIONS	Required compliance with all NFIP and FBC regulations or local if more stringent	• Reduces the potential for flood-related damage	• Possibility of difficult implementation at existing buildings
UTILITY INFRASTRUCTURE IMPROVEMENTS – WATER, SEWAGE, ELECTRIC	Structural Improvement	• Possibly makes systems more resistant, allowing continued functionality of water sewer and electrical systems via replacement, modification, or hardening	• Low impact if within public realm • Adaptability necessary to allow modification with increased threat
TRANSPORTATION INFRASTRUCTURE IMPROVEMENTS	Structural Improvement	• Maintains access to historic communities and resources • Provides increased clearance for floodwater by removal of or raising of a bridge or causeway	• High impact if contributing historic feature (i.e. bridge) • Low impact if non-contributing historic feature • Possible impact if elevation diverts stormwater towards historic resources

REFERENCES

Note: All references are available online unless otherwise noted. References that are only available as online resources are noted as "online resource." Refer to *Appendix A: Resources* for web links.

2020 Florida Building Code, 7th edition.

IPCC, 2022: *Climate Change 2022: Impacts, Adaptation, and Vulnerability. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge University Press.

U.S. Department of the Interior [National Park Service]. *Guidelines on Flood Adaptation for Rehabilitating Historic Buildings* (2021).

U.S. Department of the Interior. *The Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for Preserving, Rehabilitating, Restoring & Reconstructing Historic Buildings* (2017).

New Smyrna Beach, 1925. (Florida Memory)

13 PROPERTY FLOOD MITIGATION STRATEGIES

While municipalities implement flood protection measures to protect entire communities, benefits spread to residential, business, and institutional property owners as they take various measures to reduce the effects of flooding on their properties. There are three general categories of property-specific mitigation options available:

- Landscape improvements;
- Basic improvements; and
- Building mitigation.

As implied, landscape mitigation options occur within a site and are generally geared towards managing stormwater and providing shoreline protection. Basic improvements are generally simple, low-impact strategies that are relatively easy and inexpensive to complete. Building mitigation strategies are often more complex, likely require the assistance of a design professional, and typically have the greatest impact on the integrity of historic resources. *(Refer to companion Storm Guidance for Florida's Historic Buildings.)* Proposed mitigation measures at designated historic properties may be subject to local design or historic review authority or DHR review. *(Refer to Historic Property Review, sidebar page 4.25.)*

Property-specific mitigation measures can greatly reduce the potential for flood or wind damage. *(Refer to Chapter 3, Wind Retrofitting.)* However, flood mitigation measures can provide property owners with a false sense of security, both in the efficacy of their own improvements, and in the ability for the community to recover sufficiently to allow

the area to become habitable. A property owner who has completed mitigation measures may assume that it is safe not to evacuate in the event of a storm. Similarly, improvements to an individual property may greatly exceed the ability of a community to recover from a flood event. Necessary community infrastructure includes the ability of emergency personnel to do their jobs in addition to traditional utility infrastructure and safe access by roadways and bridges. *(Refer to Utility Infrastructure Improvements, page 12.11, and Transportation Infrastructure Improvements, page 12.13.)*

LANDSCAPE IMPROVEMENTS

Except for dense, urban environments, individual properties often include a combination of land and one or more buildings or structures. As presented in the community-wide strategies, many of the landscape measures are scalable, meaning they can be applied across a community or district or at an individual property. *(Refer to Stormwater Management, page 12.6 and Storm Guidance for Florida's Historic Buildings, Chapter 5, Landscape Improvements.)* These include:

- Bulkheads and rip-rap;
- Mangrove stands;
- Retention ponds and dry wells;
- Swales and berms;
- Disconnection from stormwater drainage;
- Impervious surface reduction / pervious surface introduction;
- Rain gardens and rain barrels; and;
- Shade trees and native planting.

BASIC IMPROVEMENTS

A first step for many property owners will include basic improvements that are relatively easy to complete and are low cost, typically with nominal impact on historic integrity. *(Refer to the companion Storm Guidance for Florida's Historic Buildings, Chapter 4, Basic Improvements.)* In addition to interior building improvements, which are often not subject to preservation review, basic exterior improvements can include:

- Maintenance of historic resources and properties *(refer to Encourage Property Maintenance, page 4.24)*;
- Relocation of critical systems and equipment above flood-prone elevations;
- Installation of back-flow preventers;
- Installation of solar collectors or generators to allow electrical independence after a storm; and
- Use of flood damage-resistant materials in flood-prone locations.

MITIGATION CONSIDERATIONS

One of the greatest challenges for local preservation reviewers is to balance a proposed mitigation project with the traditional approach to historic preservation, which mitigates change through compatible design. The practice of flood mitigation, intended to protect life and property, is often at odds with historic preservation.

When conducting a preservation review of mitigation options for existing buildings, it is critical to understand the:

- Level of flood vulnerability;
- Florida Building Code (FBC) compliance requirements;
- Whether non-compliance with the FBC may result in significant building damage or loss; and
- Community's acceptance of change of its historic resources.

(Refer to Chapter 2, Floodplain Management for Historic Buildings, and Chapter 11, Mitigation: Hazard Mitigation for Historic Properties.)

In addition, if a property owner is considering a building mitigation project it would be prudent to recommend wind retrofitting at the same time. *(Refer to Chapter 3, Wind Retrofitting.)* Both flood and wind mitigation projects can be highly disruptive and there may be cost and time savings if completed together.

MITIGATION REVIEW AND APPROVAL REQUIREMENTS

Most property mitigation strategies will require municipal building, zoning, and floodplain management compliance. Most municipal regulations include a provision that limits or prohibits stormwater runoff onto adjacent properties. In addition to local review, Florida Department of Environmental Protection and regional water management agency approval may be required prior to proceeding with a project. *(www.floridadep.gov/lands)*

Substantial Improvement requirements can require other changes to meet the building code.

FLOOD WATER PRESSURE AND FORCES

Flood water can put pressure on a building's structural elements in a variety of ways:

- **Lateral pressure** represents the horizontal weight of flood water or saturated soil on a basement, foundation wall, or support piers, with the greatest pressure at the deepest depths
- **Water currents** from storm surge or high winds can knock a building or an appendage like a porch or carport off its foundation and direct water-borne projectiles into building walls *(Refer to Porches and Carports, page 3.11)*
- **Buoyancy**, or uplift, can raise building slabs and lift a building or a porch off its foundation

Successful building flood mitigation projects should evaluate potential forces at a specific building and implement measures to prevent serious damage from a flood event.

ADDITIONAL STORM GUIDANCE

The accompanying *Storm Guidance for Florida's Historic Buildings* provides more in depth information for property owners considering mitigation projects. Relevant chapters include:

3. *Wind Retrofitting*
4 *Basic Improvements*
5 *Landscape Improvements*
6 *Wet Floodproofing*
7. *Dry Floodproofing*
8. *Elevating or Relocating*

BUILDING FLOOD MITIGATION

In addition to landscape mitigation measures, there are also several building alterations that can be implemented to increase flood resistance and/or reduce flood insurance premiums. Under the National Flood Insurance Program (NFIP), buildings located within Special Flood Hazard Areas (SFHAs) that participate in the program may be required to meet specific design criteria to minimize potential damage from future flood events. Compliance with municipal floodplain regulations is required for new construction, repair of "Substantially Damaged" buildings, and buildings that are "Substantially Improved." *(Refer to Repair and Rebuilding, page 10.4.)* Unfortunately, alterations may also compromise a property's historic integrity to such an extent that it may no longer be considered historic according to the criteria of the National Register of Historic Places or local designation criteria.

Through *The Secretary of the Interior's Standards for the Treatment of Historic Properties* (U.S. Department of the Interior, 2017), the National Park Service (NPS) provides guidance on the effects of alterations, demolition, and relocation within a historic context, generally making recommendations for minimal impact on both historic fabric and context. ***The 2021 Guidelines on Flood Adaptation for Rehabilitating Historic Buildings, developed by the NPS provides recommendations for flood resilience and mitigation at historic properties. Even with the NPS guidance on building elevations and elevation of new construction within the historic context, these mitigation options are often the most challenging for local planners, local design or historic review authorities (, and citizens trying to protect their historic communities.*** Understanding this challenge, *Storm Guidance for Florida's Historic Properties* were prepared as a companion document to this *Guide* to provide a framework for municipalities to develop locally appropriate elevation criteria.

Examples of building mitigation options include:

- Wet Floodproofing;
- Dry Floodproofing and Perimeter Barriers;
- Building Elevation;
- Relocation; and
- Acquisition and Demolition.

If local preservation planners are considering these options, communities should reduce their impact by establishing limits under existing local ordinances including zoning and historic preservation. *(Refer to Modify Zoning Ordinance, page 4.11, and Develop Design Guidelines for Storm Mitigation, page 4.19.)* Policy statements should limit mitigation options to compatible design. For example, local policies can require maintaining as much historic fabric as possible and restricting building elevation to specific heights relative to the Base Flood Elevation (BFE) or Design Flood Elevation (DFE), lessening impacts. As each option is evaluated, communities should also evaluate the existing local preservation regulatory review process and criteria to identify inconsistencies that will need to be addressed as part of the implementation process.

WET FLOODPROOFING

Wet floodproofing allows floodwaters to enter an enclosed area of a building and rise at the same rate, and to the same levels, as floodwaters outside of the building. As a result, the lateral and buoyancy forces are equalized across the interior and exterior, significantly lessening the strain on the building's structure. *(Refer to Flood Water Pressure and Forces, sidebar page 13.3.)*

To be compliant with the NFIP, wet floodproofing relies on automatic passage of floodwater in and out of a building so pressures remain equalized. In addition, spaces located below the Design Flood Elevation (DFE) should be considered "wet," so use of these spaces should be limited to non-living functions, and materials used should be moisture tolerant. These criteria apply to all wet floodproofed floor levels, including basements.

Wet floodproofing may be the best alternative for buildings that are required to comply with NFIP design criteria and are technically difficult to elevate or relocate. This can include residential, commercial, or institutional buildings, and is often the best alternative for very large or complex structures, or buildings that share party walls such as attached houses or commercial buildings. To meet wet floodproofing requirements, it may be necessary to abandon or limit the use of a portion of a building. This could pose an economic challenge to the building owner, who might seek to compensate for lost space by altering the building with an incompatible addition.

USES BELOW BASE FLOOD ELEVATION

To be considered wet floodproofed, the allowable uses of enclosed space below the DFE should be limited to minimize potential flood damage. At residential buildings, permissible uses include building entrances, storage, and parking. In a wet floodproofed area, all building systems must be located above the DFE. In the case of existing buildings, options that allow modification and/or abandonment of lower floor levels to comply with a municipality's floodplain regulations can include the following:

Basements

- **Abandon the use of the crawlspace or basement:** The basement may need to be partially or fully infilled with a water permeable material like gravel to provide sufficient resistance against the lateral forces of floodwater. All buildings systems and equipment should be relocated above the DFE.
- **Allow floodwater to freely enter and leave the building:** This might include adding flood openings in the walls and providing openings for floodwater to infiltrate the soil through the floor slab. In addition, a sump pump with a secondary power supply above the DFE should be required for expelling residual water during and after an event.
- **Modify basement window and door openings:** Depending on their location, basement windows and doors can be modified to allow drainage or ventilation to facilitate drying of area after an event.

Basements are not common in Florida but may be found in areas with elevation changes on site.

FLOOD DAMAGE RESISTANT MATERIALS: AN ALTERNATIVE APPROACH

In the publication, *Flooding and Historic Buildings* (2015), Historic England's conclusions differ from FEMA's National Flood Insurance Program Technical Bulletin 2, *Flood Damage-Resistant Materials Requirements* (2008), regarding historic materials and flooding.

Flooding and Historic Buildings

> *Although relatively resistant to flood damage, historic-building materials can all suffer some degradation and may need appropriate treatment. These materials include stone, solid brick-and-mortar walls, timber frames, wattle-and-daub panels, timber boarding and paneling, earthen walls and floors, lime-plaster walls and ceilings and many decorative finishes.*
>
> *Organic materials such as timbers swell and distort when wet and suffer fungal and insect infestations if left damp for too long. If dried too quickly and at temperatures that are too high, organic materials can shrink and split, or twist if they are restrained in panels. Inorganic porous materials do not generally suffer directly from biological attack.*
>
> *Significant damage can occur when inherent salt and water (frost) crystals carried through the substrate are released through inappropriate drying or very cold conditions.*
>
> [Historic England, 2015]

To best preserve historic building components, English Heritage recommends a slow, temperature-controlled, carefully monitored process of drying-out. Although they acknowledge that there will be some material degradation, particularly for high floods or if the floodwater contains salts or other contaminants, they argue that many historic materials can be saved with proper care. This approach may be an appropriate alternative to material replacement where not otherwise required for NFIP compliance.

First Floors

- **Raise the Floor:** If sufficient first floor ceiling height is available, raise the floor above the DFE. This may require the modification of stairs, adjustment of interior furnishings such as kitchens and bathrooms; adjustment of doors, and alteration of windows.
- **Limit First Floor Use:** If the floor level is below the DFE and sufficient floor to ceiling height is not available to raise the floor, the use of the first floor may be limited to a building entrance, parking, and storage at residential buildings. This may require re-configuration of upper building floors to accommodate formerly first floor public spaces such as living rooms, kitchens, etc.
- **Change First Floor Use:** Where permitted by local zoning, it may be possible to modify the use of a flood-vulnerable first floor from residential to non-residential use such as commercial. Relocation of flood vulnerable systems and equipment above the DFE is highly recommended.

FLOOD DAMAGE-RESISTANT MATERIALS

Certain materials are less affected by being submerged in water than others. FEMA categorizes building materials in one of five levels to rank their potential resistance to flood, ranging from those that require a constant dry environment to those that can withstand high flood exposure.

> Flood-resistant material includes any building product capable of withstanding direct and prolonged contact with floodwaters without sustaining significant damage. Prolonged contact is defined as at least 72 hours. Significant damage is any damage requiring more than low-cost cosmetic repair (such as painting). All structural and non-structural building materials at or below the Base Flood Elevation (BFE) must be flood resistant.
>
> [FEMA]

The materials evaluated include both structural and finish materials, with many traditionally historic materials considered "unacceptable" below the BFE, including plaster; solid wood doors, solid wood floors, trim, and cabinets; and wallpaper. In addition, several materials popularized during the mid-20th century that appear to be water resistant are also rated "unacceptable," such as asphalt, ceramic and linoleum tile, and non-ferrous metals including aluminum, copper, and zinc tiles *(FEMA 2008). (Technical Bulletin 2, Flood Damage-Resistant Materials Requirements, www.fema.gov.)* ***One thing to keep in mind is that the FEMA standards are for materials, not floor or wall assemblies. Therefore, all components of an existing or proposed assembly should be reviewed.***

FEMA, through ASCE 24-14 *Flood Resistant Design and Construction,* requires that flood damage-resistant materials be used in the Special Flood Hazard Area (SFHA) to a the minimum DFE height (American Society of Engineers, 2015).

FLOOD OPENINGS

Flood openings allow the passage of floodwater in and out of building without mechanical intervention such as sump pumps. They must be of sufficient size and number to be able to quickly equalize interior and exterior water levels. They will typically be located around the perimeter of a building or foundation, close to the adjacent grade height, and may also be needed between adjacent enclosed spaces, such as in interior foundation walls.

In cases in which all or portions of floors have been abandoned, flood openings must be located in a manner that allows the relative level of the water, at the interior and exterior of the building, to be equalized. In the case of an abandoned basement, installation of drainage through the basement slab may be required.

Many manufactured flood openings are metal louvers or vents. Flood openings can be designed to be more in keeping with the architectural character of the building as long as they are designed to allow the free flow of water and prevent animal and insect infestation.

In addition to flood openings, it is important to consider how spaces will be ventilated in the event of a flood. Secondary damage, such as mold and rot, after a flood can be reduced with adequate ventilation. Although operable windows can typically be used for inhabited spaces, ventilation of abandoned basements or areas below raised finish floors can be more challenging.

BUILDING SYSTEMS AND EQUIPMENT

A potential costly effect of flooding can be damage to building systems and equipment. Traditionally, building systems and equipment are often located in a basement, first floor, or at exterior grade. This can include boilers, water heaters, electrical and internet service, air conditioning equipment, generators, and appliances. Exposure to floodwater can irrevocably damage any of these systems, rendering them useless in the flood recovery process.

Two options to address building systems and equipment are protection in place or relocation to an area that will not be affected by floodwater. If the floodwater depth is not too deep, it may be possible to protect equipment in place by dry floodproofing the equipment, that is, constructing perimeter floodwalls with secondary drainage such as a sump pump to remove any water seepage. *(Refer to Dry Floodproofing, page 13.7.)*

Relocation will often require raising the systems and equipment to higher levels. This includes not only major equipment, but raising secondary elements such as electrical outlets, junction boxes, switches, panels, and meters. Relocated equipment should be installed in a manner that meets both manufacturers' and local code requirements, including clearances, access, and ventilation. At the interior of a building, the relocation of equipment to upper floors can result in the loss of habitable space. ***Relocation of exterior equipment may require mounting on roofs, walls, and platforms as well as providing screening to minimize visibility.***

WET FLOODPROOFING

Potential Preservation Benefits:

- Historic buildings can remain at original location and elevation and visible impact can be minimized
- It might be possible to minimize exterior alterations, retaining the exterior integrity, which under many programs and jurisdictions is the extent of preservation regulatory review
- Typically, abandonment of a crawlspace or basement will not significantly impact historic integrity

Potential Preservation Challenges:

- Loss of historic materials on the interiors of buildings is detrimental regardless of whether changes to interior spaces are regulated (such a loss of historic fabric would likely not be allowable under many financial incentive or easement programs)
- Abandonment or reconfiguration of a first floor often involves modification to windows and doors and thus can significantly alter the integrity of the interior of a building, as well as potentially the exterior
- Loss of space associated with abandonment or relocation of systems may necessitate construction of an addition or rooftop addition, impacting the exterior appearance of the building
- Flood openings must be sensitively designed for compatibility, as should openings and mechanisms to promote ventilation
- Wholesale removal of historic materials may be required below a specific elevation to meet NFIP requirements, including wood and plaster components
- Application of waterproofing membranes, sealers, etc,. for proper wet floodproofing can potentially trap moisture in historic buildings and building materials during non-flood periods, leading to deterioration
- The elevation of exterior building systems and equipment often increases their visibility, making screening more challenging
- The level of alteration required for effective implementation might compromise historic integrity

DRY FLOODPROOFING

To be effective, dry floodproofing must keep all, or almost all, water out of a building. Essentially, it provides a "wetsuit" at the exterior of the flood-prone areas of the building to prevent infiltration through:

- Wall surfaces,
- Floor slabs,
- Window and door openings, and
- Joints and gaps at pipe penetrations and between different materials.

In considering whether dry floodproofing is a viable option, it is important to understand the potential depth and duration of the flood and the characteristics of the building. In a flood event, standing water and saturated soil exert two types of forces: lateral and buoyancy. There may be additional forces imposed by wave action or debris impact from flowing water. The type and method of construction must be able to withstand the anticipated forces for dry floodproofing to be a feasible alternative. *(Refer to Water Pressure and Forces, sidebar page 13.3.)*

Dry floodproofing can be utilized at non-residential buildings and is eligible for flood insurance premium discounts under the NFIP upon successful project completion. The NFIP does not permit or provide flood insurance discounts for the dry floodproofing of residential buildings. However, residential property owners may seek a variance for a dry floodproofing project for historic residential structures only when other adaptations that would mitigate the building to the BFE would cause the structure to lose its historic designation.

Dry floodproofing – keeping floodwater out of a building – is only viable as an option in situations the meet the criteria described below.

- The depth of floodwaters is relatively low, typically no higher than to two to three feet so that lateral forces are limited. (The height may be increased with significant engineering interventions.)
- The exterior building and foundation walls can withstand the lateral forces, wave action, and flood-borne debris impact forces. This limits viable wall materials to load-bearing masonry and concrete.
- The building and basement slab can resist buoyancy forces.
- Window and door openings can be effectively sealed to protect against the anticipated lateral force of the floodwater and to prevent infiltration for the flood's duration. This will generally require human action in anticipation of a potential flood event. *(Refer to Barriers and Shields – Windows and Doors, page 13.9.)*
- Minor openings such as pipe penetrations and crevices can be effectively sealed to minimize seepage.
- The duration of flooding is limited. Seepage can accelerate as materials are saturated and exposed to water for longer periods of time.
- Water seepage can be removed until floodwaters recede. This typically requires a sump-pump or other mechanical system that will remain operational even with a power failure.

Ground-level alterations may be required to effectively dry floodproof a building, particularly when window sills are close to the ground.

Because the feasibility of dry floodproofing is so site-specific, it is important to have a structural engineer evaluate the structural soundness of the building to determine whether it can withstand flood-related forces.

Condition assessments are essential to understand whether a historic building can withstand potential flood loads and dry floodproofing can be considered.

CONSTRUCTION TYPES

As a general rule, only buildings with masonry bearing walls and/or concrete foundations are potential candidates for dry floodproofing. *(Refer to Assess and Document Historic Property Flood Risk, page 8.15.)*

- **Masonry buildings** include stone, brick, and block construction, and have walls composed of masonry units bonded with mortar, grout, or sealant. The wall assembly tends to be continuous from the roof to the foundation, often providing sufficient structural capacity to withstand the lateral force of water or capable of being reinforced to have sufficient capacity. Conversely, their irregular surface can be difficult to waterproof and they often have openings or voids through which water might pass: Either naturally in porous stone, such as limestone or caliche, or designed, such as weep holes, or openings that develop over time through deterioration or lack of maintenance.
- **Concrete buildings** and slabs might appear to be waterproof but concrete is a very porous material and typically allows water seepage. In addition, concrete may be vulnerable to seepage at transitions between structural members or between installation "pours." Because of concrete's relatively smooth surface, the application of a waterproofing membrane can often be readily accomplished. The structural capacity of concrete to resist lateral and buoyancy forces is influenced by the thickness of the concrete, the size and configuration of reinforcing, and the manner in which it was constructed.
- **Wood-framed buildings**, typically constructed of wood studs with exterior clapboard, shingles, or siding, are generally porous, with many small holes and crevices that allow water seepage. In addition, wood-framed structures are vulnerable to water penetration at the connection between the foundation and the wall framing. As a result, effective dry floodproofing of wood-framed buildings is typically limited to a continuous masonry or concrete foundation or basement.

WALL AND SLAB SURFACE SEALERS

To prevent infiltration through masonry and concrete walls and slabs, the surfaces must be sealed. Wall and slab sealants generally fall into two categories, either asphalt-based coatings that can be brush- or spray-applied or a heavy-duty rubber membranes. It is generally most effective to seal a building at the exterior wall, foundation wall, or slab surface to prevent prolonged saturation of building materials during a flood event.

Because the building's "wetsuit" needs to be continuous, or as continuous as possible, this can present challenges at existing buildings in which foundations need to be exposed to apply the protection. Slabs may need to be replaced to allow installation of an underlying sealant barrier. There are different challenges above-ground where building

materials or aesthetic considerations, such as historic preservation regulations, may limit options for the application of wall sealant systems. In these cases, it may be necessary to rely on joint sealers to minimize infiltration. *(Refer to Historic Property Project Review, sidebar page 4.25.)*

JOINT SEALERS

Many buildings have joints or gaps at penetrations where dissimilar materials meet or where different elements are joined. To improve the effectiveness of dry floodproofing, all joints and gaps must be sealed to provide a continuous barrier at the wall and slab.

Joint sealers generally come in two categories, sealants and gaskets. Sealant is typically a flexible, putty-like material that adheres to surfaces and forms a watertight seal. Gaskets are generally rubber and are compression-fit to form a water-resistant seal between two materials. While sealants adhere to adjacent materials, gaskets can be utilized as a sealer between two joining parts, such as around an operable door or window.

One of the difficulties associated with sealants and gaskets is that they tend to degrade and fail relatively quickly. As they begin to fail, they lose their water tightness, becoming ineffective as a water barrier.

BARRIERS AND SHIELDS – WINDOWS AND DOORS

Barriers and shields can provide temporary protection against floodwater entering doors and windows and are installed immediately preceding an anticipated flood event. The range of barriers and shields includes sandbags, drop-in or roll-up barriers, shields at door openings, floating barriers, and engineered barriers secured to building walls and the ground. With the exception of the engineered barriers, the other forms of protection are typically limited structurally to a maximum of two to four feet of floodwater.

Shields and barriers are generally constructed of metal, with heavier gauges for more sophisticated engineered applications. To minimize potential seepage, the shield and barrier systems typically include gaskets where components join and where they meet the building wall or ground surface.

The following factors should be considered when contemplating utilizing barriers and shields at windows and doors:

- **Available manpower:** Most, such as drop-down or roll-up barriers, window and door shields, and engineered barriers, are dependent on individuals to install them preceding an event (with the exception of floating flood barriers). Sufficient trained manpower must be available and in place for the implementation. Therefore, this approach is most effective when there are a limited number of openings requiring protection and sufficient advance notice. Consequently, this approach is less effective in flash flood events.
- **Building evacuation:** Since exit doors typically swing out, barriers and shields that prevent doors from operating should only be installed after a building has been evacuated.

Industrial facilities may be better candidates for automated dry floodproofing mechanisms.

- **Sandbags:** Sandbags require substantial available materials, onsite trained personnel to properly stack bags, and appropriate disposal methods if contaminated by floodwater.
- **Certification:** The Association of State Floodplain Managers and USACE National Nonstructural / Floodproofing Committee have implemented a national program to test and certify flood barriers. The barriers tested under the program, the National Flood Barrier Testing and Certification Program, are evaluated for material properties, consistency in manufacturing, and resistance to water forces. *(nationalfloodbarrier.org)* It is recommended that if using flood barriers, that the program website be consulted and certified barriers chosen in lieu of untested, non-certified barriers.

FENESTRATION MODIFICATION

An alternative to installing a barrier or shield at existing window and door openings would be to modify low-lying openings to prevent floodwater infiltration. In the case of very low openings, such as basement windows, this could mean infilling the opening. For windows and unused doors with sill heights vulnerable to flooding, it might mean infilling the lower portion of the opening and raising the sill.

In either case, the infill material must provide a watertight seal and have sufficient structural capacity to withstand the lateral force of floodwater. This generally suggests infilling with masonry or concrete. However, permanent modification of windows and doors can dramatically change the exterior appearance of a building.

SECONDARY DRAINAGE SYSTEM

No matter how effective a dry floodproofing system is, it is highly likely that some water will seep into the building through the walls, joints, and underlying slab. Therefore, it is prudent to have a drainage- and under-drainage system with a sump pump to evacuate any accumulated water. In addition, building systems should be installed so that they will not be damaged by seepage. *(Refer to Wet Floodproofing, page 13.4.)*

MAINTENANCE

One of the key requirements of a dry floodproofing option is a well-maintained building. *(Refer to Encourage Property Maintenance, page 4.24.)* During a flood event, the force of the water can easily undermine a compromised structural system. In addition, any small gap or opening can provide a path for water seepage. Therefore, for dry floodproofing to be effective it is critical to ensure that:

- Structural framing is sufficient to resist forces;
- Masonry and concrete walls have sufficient lateral load capacity;
- Masonry walls are fully pointed; and
- All joints are properly sealed, including around window and door frames, pipe penetrations, etc.

DRY FLOODPROOFING CAUTIONS

Although dry floodproofing can provide protection from water infiltration during a flood event, the application of permanent or semi-permanent sealers and waterproof membranes can lead to deterioration of building materials by trapping moisture or promoting condensation, both of which can lead to material degradation of masonry, concrete, and wood. In the case of wood, increased moisture can promote rot, mold and insect infestation, such as termites and carpenter ants, in both exterior wall elements and in other parts of the building such as floor framing and interior finishes.

DRY FLOODPROOFING

Potential Preservation Benefits:

- Historic buildings can remain at original location and elevation and visible impact can be minimized

Potential Preservation Challenges:

- Installation of waterproofing materials may necessitate modification of historic appearance
- Proper floodproofing application of waterproofing membranes, sealers, etc., has the potential to trap moisture in historic buildings and building materials during non-flood periods, potentially leading to deterioration
- Attachment or installation locations for barriers and shields can be obtrusive
- Interior structural elements may require reinforcing
- Lower elevation window and door openings may be infilled or modified to achieve waterproofing and provide required lateral resistance to floodwater
- The elevation of exterior building systems and equipment often increases their visibility, making screening more challenging

PERIMETER BARRIERS

Potential Preservation Benefits:

- Historic buildings can remain at original location and elevation and visible impact can be minimized
- Temporary barriers can reduce or prevent flood damage minimizing lasting effects at historic buildings

Potential Preservation Challenges:

- Permanent barriers, such as a surrounding levee or landscape wall, alter the historic context of a building
- Permanent barriers can prevent adequate drainage away from the protected building, essentially trapping moisture near the foundation, potentially leading to the degradation of historic materials

Vizcaya, located in Miami, uses deployable barriers to protect its historic architectural and landscape features from flooding. (Courtesy of Adrienne Burke)

Permanent perimeter walls and floodgates are engineered to keep floodwater away and may be effective for groupings of buildings or significant large buildings.

PERIMETER BARRIERS

Similar to dry floodproofing, perimeter barrier provide a continuous obstruction to keep floodwater away from the perimeter of a building, or group of buildings, either permanently or immediately preceding a flood event. Permanent barriers can include masonry or concrete floodwalls or levees. (In some cases, existing masonry site walls can be modified to have sufficient strength to act as a floodwall.) Because levees are constructed of sloped earth, they require significantly more space than floodwalls. To be effective, both options should be engineered to assure that they:

- Are located in soils that are impermeable and can withstand the forces associated with rising floodwater (floodwater can percolate up through porous soil);
- Are of sufficient height to provide protection during a flood event;
- Have sufficient structural capacity to withstand the lateral force of floodwater;
- Include temporary barriers to seal off openings at walkways and driveways;
- Are watertight above and below grade to minimize seepage; and
- Include a secondary drainage system within the perimeter to remove groundwater, rain, or seepage.

An important consideration for a permanent barrier system is that many of the same mechanisms used to prevent water from approaching a building during a flood event will tend to trap or collect water adjacent to a building. Prolonged periods of soil saturation can impact landscaping have long-term ramifications for building materials.

Temporary barrier systems can include water-filled rubber tubes or structural wall systems installed immediately preceding a flood event. The empty tubes are laid on the ground and filled with water; they might provide up to two-feet of protection depending on the contour of the land and whether joints between sections are properly sealed. Temporary structural wall systems typically require installation into pre-mounted anchors on the ground and can provide protection to higher elevations. Both of these options rely on human intervention to establish a continuous perimeter barrier and do not necessarily include a secondary drainage system to evacuate water collected within the barrier. *(Refer to Barriers and Shields – Windows and Doors, page 13.9.)*

ELEVATING

Building elevation is raising a building so its lowest habitable floor is at or above the base flood elevation in order to achieve the desired level of protection. ***Elevating a building can radically alter its appearance and impact its historic integrity.*** Elevation typically involves abandoning basements and crawlspaces, and raising the first floor level onto an extended support system above the flood threat. Elevation of slab-on-grade buildings can either include the original slab or abandon it in place, while constructing a new support system. Although methods of lifting and supporting the building will vary from location to location, relying on the expertise of trained design professionals, there are some common issues that must be addressed.

- **Feasibility:** Some buildings might be extremely difficult to elevate with feasibility dependent on size, configuration, or construction type, such as commercial buildings or residences with common party walls, or whether or not they are sufficiently stable to lift.
- **Appearance:** The greater the height of the elevation, the greater the exposed foundation, altering the appearance and proportions of the building and its relationship to its neighbors along the streetscape.
- **Foundation Modification:** Although it might be possible to extend existing foundation walls or piers, they may not have sufficient strength or stability to be reused.
- **Access:** Elevation requires modification of building access, including stairs, and could include the installation of a ramp or elevator, particularly if required by the Americans with Disabilities Act(ADA). Consequently, it may be difficult to maintain entrance stair orientation for buildings located close to a front property line and to provide access for physically-challenged individuals.
- **Building Equipment and Systems:** All equipment and systems previously located in the now abandoned basement or crawl space will need to be relocated within the building interior, resulting in loss of habitable space. All interior and exterior equipment should be located above the locally-designated Design Flood Elevation (DFE). All connections will require extension and potentially weatherproofing.

Depending on the type of construction, elevation can be achieved by first lifting the building and then either extending the existing support system or constructing a new support system. The support system will need to provide for both the vertical support of the building, and for resistance to the lateral forces related to the increase in height, potential wind load, storm surge, and debris impact. *(Refer to Chapter 3, Wind Retrofitting.)* As a result, lateral reinforcing or stronger, non-traditional building materials may be required, such as filled concrete block or cast-in-place concrete. Based on the original foundation or pier materials and architectural style, it may be possible to mimic the appearance of the original material with a brick or stone veneer, as appropriate, or tinted stucco or concrete, which could visually reduce the impact of the higher foundation.

Prior to Elevation: Buildings on continuous foundation walls or piers are usually good candidates for elevation.

ELEVATING

Potential Preservation Benefits:

- Historic buildings can remain on original parcel

Potential Preservation Challenges:

- The relationship between the historic building and the ground plane is altered, as is the relationship to site features and possibly landscape elements such as trees, gardens, site walls, and fencing
- The visual relationship between a historic building and neighboring buildings on the site or along the streetscape is altered
- Given the expense and interruption associated with elevation, property owners might elect to elevate higher than mandated, increasing the impact on historic integrity if unrestricted by zoning code
- Elevation can significantly alter the basic proportions of a building from horizontal to vertical, which could be stylistically inappropriate, particularly for slab-on-grade construction, such as ranch houses
- The elevation of exterior building systems and equipment has the potential to increase their visibility, making screening more challenging
- Elevation of wood-framed buildings requires a taller foundation or piers, increasing their visual prominence; structural materials required to resist loads and forces may not be historically appropriate, requiring sensitively-designed screening

After Elevation: A compatible design should be carefully chosen for the newly constructed foundation wall.

ELEVATING

Potential Preservation Challenges (continued):

- Elevation of masonry buildings, or elements such as chimneys, typically requires the addition of masonry infill, which may be difficult to match to original materials
- Lower level features, such as basement windows and doors, will likely be removed or replaced with flood vents as part of building elevation
- Stairs, porches, or landings may require modification; Depending on the change in height and location of the building relative to the lot lines, the modification might necessitate relocation of the historic entrance
- Providing access for disabled persons is more challenging, impacting non-residential, commercial, and institutional buildings as well as some residences
- Overall level of alteration required for effective implementation might compromise historic integrity of the building and surrounding district

NON-STRUCTURAL ELEVATION

Non-structural elevation is a form of wet floodproofing that entails the abandonment and floodproofing of living uses at flood-prone levels of a building that cannot be lifted, like attached commercial buildings, or has not been elevated, such as a basement. *(Refer to the companion Storm Guidance for Florida's Historic Properties, Chapter 6, Wet Floodproofing, and Wet Floodproofing, page 13.4.)*

As part of elevating the building, the abandoned lower level must be addressed. This can include:

- Removal of abandoned equipment and hazardous materials prior to stabilizing the support system and infilling the basement or crawlspace;
- Modification of the area below the first floor to be wet floodproofed, providing flood openings to allow the free passage of water; and/or
- Re-grading the area below the first floor to promote drainage away from the building foundation.

In addition to elevating the building, it may be desirable to also raise the grade around the building to maintain the relative height of the building above grade. On larger parcels, it may be possible to construct a berm that gradually extends up to the required height, while smaller parcels may require the installation of retaining walls to address the grade change. The significant runoff impact of raising all or a part of the grade should be considered at adjacent parcels and impact on the municipal stormwater system.

An important consideration is whether elevating a building may be considered at odds with local zoning ordinances. Many zoning ordinances measure building height from adjacent grade or crown of roadway. This may conflict with the height required for flood safety and compliance with the DFE and require new construction in historic districts to have squat roof slopes that are out of character with their historic neighbors. The potential impact can be reduced if allowable building height is tied to the DFE instead of adjacent grade or crown of roadway. *(Refer to Modify Zoning Ordinance, page 4.11, and Chapter 5, Case Studies.)*

Given the logistical challenge and cost associated with elevating a building, many property owners seek to raise a building a full story, often well above the required DFE, to achieve "bonus" space for parking or storage. As individual properties are raised, this can have a significant impact on historic streetscapes, particularly in districts with consistent scale, form, massing, floor-to-floor heights, and fenestration patterns. Similarly, conformance with floodplain regulations typically requires that new buildings, and significant additions to existing buildings, be constructed to meet current elevation requirements. As a result, they can have similarly detrimental impacts on a historic streetscape.

Under the requirements of the National Flood Insurance Program (NFIP), buildings located within Special Flood Hazard Areas (SFHAs) that participate in the Program may be required to meet specific design criteria to minimize potential damage from future flood events. Compliance with floodplain regulations is required for new construction, repair of Substantially Damaged buildings, and buildings that are Substantially Improved. *(Refer to Repair and Rebuilding, page 10.4.)* Municipal requirements may establish a Design Flood Elevation (DFE) above the Florida Building Code (FBC) DFE, such as an additional one to two feet. *(Refer to Implementing Floodplain Regulations and Ordinances, page 2.10.)*

RELOCATING

Relocation involves moving a building out of a flood area onto a portion of the existing parcel that is at a higher elevation, if available, or onto a different parcel. It provides an alternative to demolition for situations where it is not feasible for the building to remain in place.

Some of the factors determining the level of difficulty in moving a building include:

- **Foundations:** Buildings resting on piers or with basements facilitate the installation of lifting beams. Slab-on-grade buildings can be more challenging.
- **Size:** Smaller buildings are easier to move than larger, multi-story buildings.
- **Footprint Geometry:** Simple rectangular buildings are easier to move than buildings with multiple wings and complex footprints.
- **Material:** Wood-framed buildings are lighter than masonry buildings, and therefore easier to move.
- **Condition:** Buildings in good condition are better candidates for relocation than buildings in poor or fair condition. *(Refer to Encourage Property Maintenance, page 4.24.)*

The actual process of moving a building is similar to building elevation in that it generally involves lifting it off its foundation. From there it is placed onto a flatbed truck, driven to its new location, and set upon a new foundation. Because the building is being moved horizontally, and not simply lifted vertically and set down again, relocation is a complex process that involves:

- Finding an available, appropriate parcel;
- Ensuring that there is an accessible route to the new location and minimizing obstructions such as underpasses, utility lines, traffic signals, and narrow or low load capacity roadways and bridges;
- Securing the required permits;
- Constructing a foundation and providing utility hook-ups at the new site;
- Disconnecting utilities at the existing site;
- Reinforcing the existing building to ensure it can survive the stress of moving;
- Bracing chimneys, porches, and other projecting elements, or carefully dismantling them in a manner that allows reassembly at the new site;
- Inserting a structural support system under the building and detaching it from and lifting it off its existing foundation;
- Placing the building and its structural support system onto a trailer;
- Transporting the building to the new location;
- Lowering the building onto the new foundation;
- Connecting the utilities;

The Cape San Blas Lighthouse and Keeper's Quarters were relocated to Port St. Joe to reduce the threat of erosion, flood, and wind damage.

RELOCATING

Potential Preservation Benefits:

- Historic buildings and structures can be saved

Potential Preservation Challenges:

- Historic context is lost
- Recreating historic relationships between site elements and surroundings can be difficult; for example, a building's or structure's relationship to a shoreline might be difficult to duplicate
- Relationship to adjoining buildings and sites is lost
- Building may be moved out of the historic district boundaries
- Building may be de-listed if historic context is not maintained

- Finishing the new site, including regrading and installing paving and plantings;
- Removing and/or addressing contaminated materials including septic systems and fuel storage tanks; and
- Restoring the former site to address local requirements, potentially including removal of utilities, backfilling the basement, removing paving, regrading, and replanting the site to a more "natural" landscape.

DEMOLISHING

Demolition involves the intentional tearing down of all or part of a building or structure. In flood-prone areas, demolition may be proposed if a building has been extensively damaged by a flood event. Considerations for the future cleared site include the following possibilities:

- Potential replacement of a non-flood-compliant building with a flood-compliant building, with all that entails, including higher floor elevations and flood resistant materials, which may be incompatible with the historic context;
- Allowing an area regularly affected by flood to return to a more natural state as part of a buy-out or similar program *(Refer to Acquisition Program sidebar, page 2-)*;
- Disconnecting utilities at the existing site;
- Removal of or addressing contaminated materials at the property including septic systems and fuel storage tanks; and
- Restoring the site to address local requirements, potentially including removal of utilities, backfilling of the basement, removal of paving, regrading, and replanting the site to a more natural landscape.

Demolition of some buildings may also be used to reduce the risk of flooding at others. This can occur when developed sites are returned to a more natural setting such as wetlands or floodplains. In considering this adaptation option, the relative significance of the saved and sacrificed properties should be evaluated as should their flood vulnerability. Another consideration is whether the property has been abandoned through migration, and whether the property is slated for demolition to improve the functionality of the floodplain as part of a buy-back program. *(Refer to Acquisition Program, sidebar page 2.15, and Chapter 14, Adaptation.)*

Documentation should precede the demolition of any historic resource and should be a requirement in a historic district ordinance, a floodplain management ordinance, or as part of the permitting process for any building over a certain age (subject to current Florida Statutes). The extent of required documentation can be as basic as exterior photographs or sufficiently detailed to meet the standards of the Historic American Building Survey (HABS). ***Whenever possible and appropriate, documentation should be shared with DHR for inclusion on the Florida Master Site File to provide a lasting contribution to the understanding of the state's architecture, engineering, archaeology, and culture.*** *(Refer to Identify Historic Properties Vulnerable to Flooding, page 8.11, and Historic and Cultural Resource Documentation, sidebar page 14.6.)*

New construction can alter the scale and character of a historic streetscape.

DEMOLISHING

Potential Preservation Benefits:

- Restoration of sites and natural landscape conditions
- Reduction of risk of flooding at adjacent historic properties

Potential Preservation Challenges:

- Loss of historic resource
- Alteration of historic context, particularly along the streetscape within a historic district
- Possible damage to archaeological resources

PROPERTY FLOOD MITIGATION OPTIONS MATRIX

The following matrix is intended to provide a brief overview of the potential issues and impacts associated with the options presented in this section. Refer to the text boxes in the narrative for potential preservation benefits and challenges.

STRATEGY	POTENTIAL DESIGN OPTION	POTENTIAL ISSUES	ADDITIONAL CONSIDERATIONS
WET FLOODPROOFING	Abandon enclosed crawlspace or basement level if below DFE	• Modification of enclosed crawlspace or basement to allow floodwater to enter and drain from building • Installation of flood openings and potentially ventilation • Modification of basement window and door openings to accommodate floodproofing • Relocation of building systems and equipment above DFE	• Basement windows and doors must be modified • Flood and ventilation openings must be provided • Elevation of exterior and interior systems and equipment may require alteration of interior spaces or new construction to house the equipment
	Raise first floor level above DFE while maintaining exterior walls at existing elevation	• Modification of basement and first floor structures to address lateral and buoyancy forces • Installation of raised first floor level and modification of stairs • Modification of windows and doors at basement and potentially first floor • Installation of flood openings and potentially ventilation • Replacement of existing materials with flood damage-resistant materials • Relocation of building systems and equipment	• Basement windows and doors must be modified • Flood and ventilation openings must be provided • Historic materials may be removed and replaced with flood damage-resistant materials that do not retain the appearance, workmanship, etc. of the original material • Exterior systems and equipment must be elevated above DFE
	Abandon basement and first floor	• Modification of basement and first floor structures and first floor walls to address lateral and buoyancy forces • Removal of all functions with the exception of storage, garage, and entry at residential • Modification of windows and doors at basement and first floor • Installation of flood openings and potentially ventilation • Replacement of historic materials with flood damage-resistant materials • Relocation of building systems and equipment	• Basement and first floor windows and doors must be modified • Garage doors may be added • Flood and ventilation openings must be installed • Historic materials may be removed and replaced with flood damage-resistant materials that do not retain the appearance, workmanship, etc., of the original material • Exterior systems and equipment may be elevated above DFE

STRATEGY	POTENTIAL DESIGN OPTION	POTENTIAL ISSUES	ADDITIONAL CONSIDERATIONS
DRY FLOODPROOFING (Not NFIP compliant for residential buildings)	Sealing walls and slabs	• Possible requirement for trenching of building perimeter to apply sealer material below-grade • Possible requirement for new basement slab with secondary drainage system below • Structural modifications to address lateral and buoyancy forces • Application and maintenance of joint sealers at all openings and penetrations • Relocation of building systems and equipment	• Trenching may damage or destroy archaeological resources • Wall sealers may trap moisture in wall system or promote condensation • Windows and doors may require modification to withstand lateral loads and prevent seepage • Exterior systems and equipment may be elevated
	Window and door barriers and shields	• Pre-installation of anchors or channels adjacent to each affected opening • Installation of barriers and shields in an accessible location • Regular inspection and maintenance of anchors, channels, and panels • Installation training and regular practice in preparation for flooding • Emergency operations plan to address installation in advance of flood event and protocol for building evacuation • Access to sufficient materials, assembly and proper installation of temporary sandbags in advance of flood event	• Channels and anchors may be visible at building exterior • Sandbags can become hazardous waste requiring proper handling and disposal if floodwater is contaminated
	Fenestration modification	• Installation of waterproof infill in openings or portions of openings able to withstand force of lateral loads	• Alteration of window and door openings can impact the historic integrity of the building and may cause more damage to the building if they fail
PERIMETER BARRIER (Not NFIP compliant for residential buildings)	Site walls and levees	• Sufficient available land around building(s) and structure(s) • Sufficient soil capacity to withstand water forces • Limited opening for walkways or driveways • Requires installation of barriers or shields in advance of flood event • Secondary drainage system with emergency power to remove seepage during flood event	• Historic landscapes and archaeological resources may be affected • Site wall or levee might not be appropriate in historic context • Storm water may be trapped at perimeter of building foundation, degrading materials
	Temporary barriers	• Effectiveness generally limited to two feet • Installation in advance of flood event	• None

STRATEGY	POTENTIAL DESIGN OPTION	POTENTIAL ISSUES	ADDITIONAL CONSIDERATIONS
ELEVATING	Elevate building or structure	• Size, configuration, or materials may make elevation cost prohibitive • Vertical extension of building foundation and building elements such as chimneys • Extension of building systems, equipment, and associated connections; removal of abandoned equipment and hazardous materials • Abandonment of former basements; potential need for infill and grading or wet floodproofing and removal of windows and doors • Extension of access stairs and potentially ramps and elevators • Potential introduction of handrails and guardrails at extended stairs and porches • Introduction of screening material, such as lattice, between extended piers	• Level of alteration required for effective/desired implementation might compromise historic integrity • Relationship between building and ground plane as well as adjacent buildings will be altered • Significant elevation change can alter stylistic proportions • More of the foundation or piers will be exposed • Basement-level openings will be lost • Modification of stairs, ramps, and potentially porches necessitated • Property owners might desire higher elevation than required to provide off-street parking • Excavation around foundation to accommodate cribbing and elevation equipment may damage or destroy archaeological resources
	Elevate ground plane with building or structure	• Sufficient area required around building to berm-up to raised foundation or construct retaining walls to provide a "plinth" • Grading in a manner to prevent runoff onto adjacent parcels • Vertical extension of building foundations, piers, and building elements such as chimneys • Extension of building systems, equipment, and associated connections • Removal of abandoned equipment and hazardous materials • Abandonment of former basements • Potential need for infill and grading or wet floodproofing and removal of windows and doors • Removal and reinstallation of paving at new elevated grade	• Relationship between building and adjacent buildings will be altered • Site regrading may impact historic landscapes or archaeological resources • Berming or retaining walls may be inconsistent with historic context • Excavation around foundation to accommodate cribbing and elevation equipment may damage or destroy archaeological resources • Minimal impact to archaeological resources away from elevated building if fill is brought in from off-site • Secondary buildings on site, such as garages, may need to be elevated or demolished

STRATEGY	POTENTIAL DESIGN OPTION	POTENTIAL ISSUES	ADDITIONAL CONSIDERATIONS
RELOCATING	Relocate on same or different parcel	• Preparation of new building location, foundation, and utility hook-ups • Clearance of a path to move building; move building • Abandonment of former location with removal of utilities, hazardous materials, foundations, and paving • New paving and landscaping at new location	• Building will be severed from historic context, which may be difficult to recreate at new site • Loss of building at former site may create a "hole" in the streetscape • Historic landscapes and archaeological resources may be affected • Secondary buildings and structures might not be relocated, altering historic relationship
DEMOLISHING	Site abandonment	• Abandonment of location and removal of utilities, hazardous materials, foundations, and paving	• Historic resource will be lost • Historic context, particularly along a streetscape, will be lost • Appropriate landscaping should be provided
	Replacement with compliant building	• New construction must meet all current regulatory requirements, including height of lowest occupied floor relative to DFE	• Compliant building may be incompatible within historic context
DO NOTHING (Not Mitigation)	Should be limited to properties not required to have flood insurance	• Financial burden for flooding rests with property owner	• Existing conditions are maintained until potential flood impact or change of ownership • Likelihood is increased for more significant damage if and when flooding occurs

REFERENCES

Note: All references are available online unless otherwise noted. References that are only available as online resources are noted as "online resource." Refer to *Appendix A: Resources* for web links.

Federal Emergency Management Agency (FEMA). *National Floodplain Insurance Program Floodplain Management Bulletin: Historic Structures [P-467-2]* (2008).

FEMA. *Flood Damage-Resistant Materials Requirements for Buildings Located in Special Flood Hazard Areas in accordance with the National Flood Insurance Program* [Technical Bulletin 2] (2008).

Florida Building Code, www.floridabuilding.org (2020)

Historic England. *Flooding and Historic Buildings* (2015).

U.S. Department of the Interior [National Park Service]. *Guidelines on Flood Adaptation for Rehabilitating Historic Buildings* (2021).

U.S. Department of the Interior. *The Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for Preserving, Rehabilitating, Restoring and Reconstructing Historic Buildings* (2017).

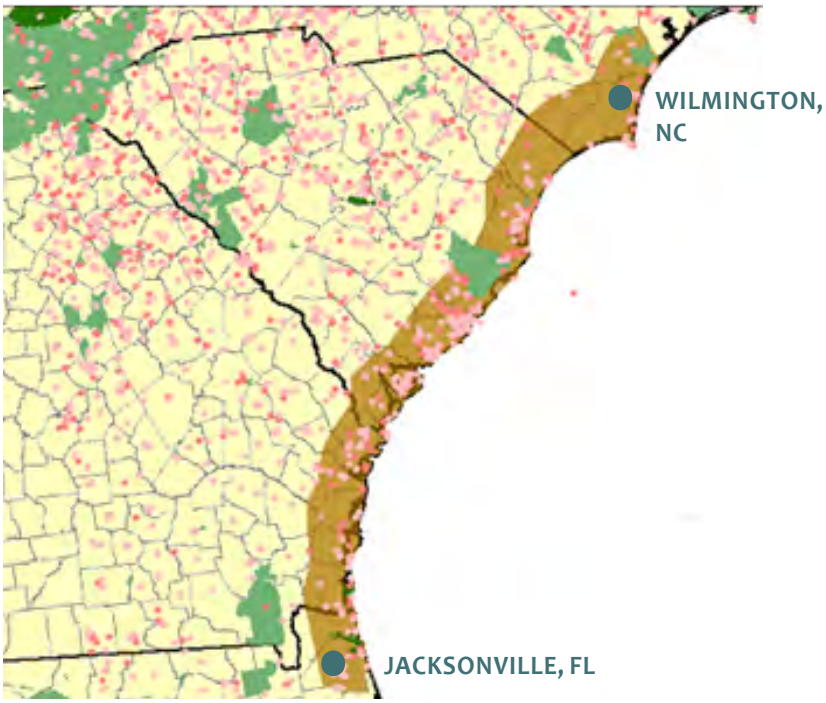
Everglades City, 1925. (Florida Memory)

14 ADAPTATION

Although currently not included in the emergency management cycle, adaptation is gaining importance in communities wishing to address increasing nuisance flooding, precipitation, and more intense storm events. Often used interchangeably, climate adaptation and hazard mitigation are different yet related concepts. Within the current emergency management context, mitigation focuses on reduction of harm from known hazards and relies primarily on historic trends. Adaptation planning goes one step further: It anticipates future conditions and attempts to adjust natural and human systems to respond to and take advantage of those conditions. ***Both mitigation and adaptation involve steps to improve community resilience to flooding, but adaptation is typically more expansive and can be long term, including social, cultural, economic, structural, and environmental factors.***

Adaptation means "change." Physical changes to structures and the environment can dramatically extend the life of a community in an environment susceptible to flooding. The ability to remain in flood-prone areas is dependent on a community's willingness to embrace the changes needed to become more resilient and to accept the risk posed by flood hazards. As the challenges of living in a place increase, adaptation may require a community to acknowledge that remaining in place is no longer feasible and it will be necessary to abandon that area. Whatever the given situation, a community threatened by increased flooding must plan to manage the changes required to remain in place or to migrate to new locations.

Each community in Florida has a different level of flood vulnerability and different circumstances that will inform their potential level of



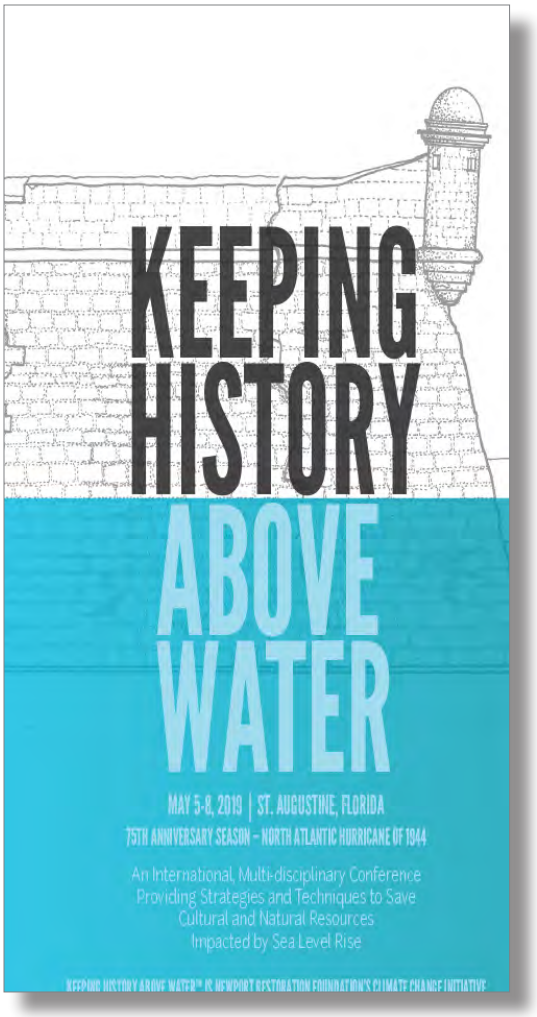
The Gullah Geechee nation extends along the Atlantic coast essentially from Wilmington, North Carolina to Jacksonville, Florida. Throughout their history, the Gullah Geechee people have adapted to their environment, with their cultural identity, food ways, and sacred sites tied to the health of the land. Increasingly, the historical and sacred sites associated with the Gullah Geechee are vulnerable to development and sea level rise.

The Gullah Geechee Nation is currently collaborating with the US Environmental Protection Agency (EPA) to develop a network of green infrastructure projects. The culturally appropriate adaptation solutions include buffering storm surge and mitigating the impacts of sea level rise impacts while also protecting local food production, historic sites, and cultural traditions.

[Map by National Park Service]

adaptation. Persistent flooding, worsened by climate change that progressively changes the landscape or a sudden occurrence such as a major storm or flash flood, can make continued life in an area undesirable. Some communities have access to human and financial resources for adaptation; some do not. For communities highly vulnerable to flooding, more change or adaptation will be needed to mitigate the effects of flood hazards and increase the community's ability to withstand and recover from those effects. Major interventions may have serious consequences on daily routines, the community setting, or residents' quality of life. Outside factors, including the future role and requirements of the National Flood Insurance Program (NFIP), may set boundaries on what is or is not possible for adaptation.

Adaptation will require rethinking how the community looks and feels, what aspects of the community are most characteristic and most valued, what can be saved for the future, what types of mitigation can be used to increase resiliency, where to invest, and what types of economic activity to support. Frequently, adaptation planning requires identifying areas where the community will physically shrink and areas that will expand and grow. As with all planning efforts, decisions should be made through a deliberative process with extensive public input and captured and integrated across all the planning documents that guide community development: Hazard mitigation plans, master plans, historic preservation elements, and economic development plans, among others, as well as planning for capital improvement projects. *(Refer to Addressing Preservation and Flooding in Local Planning Initiatives, page 4.6.)* Because it is a new process, adaptation requires ongoing communication with the public as efforts progress, to ensure that support remains constant and to resolve any obstacles or issues as they appear. *(Refer to Engage the Public, page 8.13.)*



As greater numbers of communities are challenged by flooding of historic resources, professional workshops, conferences, and seminars are being offered to share ideas and approaches to better address the issues.

PLANNING FOR ADAPTATION

This *Guidance* document recommends a hazard mitigation planning process that includes climate projections, which will enable communities to begin the climate adaptation process. Some Florida jurisdictions, such as Monroe County and Titusville, have already incorporated climate adaptation planning into hazard mitigation plans. ***During this transitional time, planners also must grapple with communities and citizens at varying stages of acknowledgement of increased flooding and climate change.*** While a single event such as a flash flood or strong storm may raise attention, the slow, progressive effects of rising water have been, and will be, unfolding for decades. *(Refer to Climate Change, page 1.8.)*

Flood impacts vary from subtle to dramatic, depending on the environmental and physical characteristics of each location, and local social, cultural, and economic factors influence the response of populations in flood-prone areas. Due to these circumstances, residents of some communities believe that sea level rise and climate change are remote threats that might affect future generations, while others see their way of life disappearing before their eyes. It is also likely that stakeholders within the same community will have very different perceptions of the problem, making planning and decision-making extremely difficult.

Currently, the effects of a changing climate are manifesting in these ways, among others:

- Coastal towns are experiencing more nuisance flooding;
- Shorelines and river banks are actively eroding at a faster rate;
- Brackish water is intruding into low-lying areas, preventing farming, killing tree stands, and converting solid land to marsh;
- Wetter spring seasons and longer summer seasons affect many industries that depend on natural resources, including agriculture and fishing;
- Increased heat impacts human comfort and historically native plant, insect, and animal species; and
- Coastal storms have storm surges that are deeper and reach further inland and into back bays due to warm, expanding oceans, and a higher elevation of mean sea level.

Regardless of the debate over why these changes are occurring or what to call these changes, local municipalities should begin planning now to address current natural hazards and anticipated future conditions. The key to adapting historic properties and communities to be more resilient in the face of the coming changes is to be proactive in crafting policies, plans, and ordinances. With the increasing impact of flooding, local governments are faced with ever-harder choices regarding the use of limited resources to protect their communities.

As part of their planning processes, local governments should utilize available tools and resources to guide their mitigation decisions. The Florida Climate Institute is a statewide initiative with a multi-disciplined

COMMUNITY IMPACT OF FLOODING

In addition to affecting historic properties, flooding can remove the intangible qualities traditionally associated with a community. The closing of a school for lack of students, loss of a grocery store, or inability to perform traditional local work, such as farming or fishing, may cause young families to move where there are more opportunities, resulting in the slow abandonment of the community.

network of ten member universities. Projects are conducted to advance the study of climate change, educational programming, and outreach activities. Their mission includes improving the understanding and the impact of climate variability, climate change, and sea level rise on the economy, ecosystems, and human-built systems; developing technologies and information for creating opportunities and policies that reduce economic and environmental risks; and engaging society in research, extension and education programs for enhancing adaptive capacity, and responses to associated climatic risks. Within the state, the Florida Division of Emergency Management (FDEM) is available to consult with communities in the preparation of local hazard mitigation plans and the Florida Department of Environmental Protection (FDEP) has a number of entities and affiliated organizations that address flooding and floodplain management. *(Refer to Chapter 15, Mitigation Partners.)*

For historic communities, adaptation planning can build on the community's inherent resiliencies and relationship to water while looking for solutions that provide both physical protection and support of traditional lifeways. Marsh restoration projects, for example, can absorb and reduce storm surge and create habitat for fish and shellfish. Similarly, constructing oyster reefs off-shore creates habitat as well as breakwaters that reduce wave energy during storms. Daylighting historic streams, and restoring channelized and submerged or buried waterways and buried wetlands to their natural appearance, configuration, and function, has a double benefit of better stormwater management and partial restoration of the historic setting. Adaptation strategies like these serve multiple purposes: In addition to hazard reduction and increasing the habitat of aquatic life, they contribute to economic resiliency for traditional water-based industries and recreation, while enhancing the historic and natural features of a community that make it attractive for heritage tourism. Since many historic communities in Florida are water-oriented, whether coastal or riverine, adaptation strategies should consider how to adapt the buildings and infrastructure as well as the natural systems that also support the community.

Within the framework of adaptation planning, climate mitigation can also imply greenhouse gas reduction. In this context, planners often value historic communities that were built prior to automobiles and can easily re-adapt to pedestrian routes and, in some cases, emphasize biking. Climate adaptation also emphasizes the retention and reuse of building fabric, which can benefit historic buildings, although the proposed treatments of older and historic properties do not always adhere to *The Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for Preserving, Rehabilitating, Restoring and Reconstructing Historic Buildings* (U.S. Department of the Interior, 2017), which form the basis for preservation practice in the United States.

OFFICE OF RESILIENCE AND COASTAL PROTECTION

The Office of Resilience and Coastal Protection, of the Florida Department of Environmental Protection (FDEP), has worked with cities and counties through its local and regional planning initiatives to understand the potential impacts of climate change and coastal hazards. Efforts to protect and strengthen natural resources recognizes that coral reefs, mangroves, oyster reefs, and marshes are a first line of defense. The Coastal Resilience Program provides funding and technical assistance while promoting sea level rise planning across state, regional, and local agencies.

[www.floridadep.gov]

University of Florida's Envision Heritage Program created interactive sea level rise visualizations for Cedar Key. (dcp.ufl.edu/historic-preservation/envision-cedar-key-phase-ii/)

APPROPRIATE PHYSICAL ADAPTATION FOR HISTORIC PROPERTIES AND COMMUNITIES

RESILIENCE TO NATURAL HAZARDS

The subject of Resilience to Natural Hazards was addressed as part of the 2017 edition of *The Secretary of the Interior's Guidelines for Rehabilitation*.

> 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.
>
> [NPS]

The philosophical approach to historic preservation, particularly with the passage of the National Historic Preservation Act of 1966, has favored minimizing radical change to historic properties. This approach has successfully allowed many communities to identify and protect the character that defines a sense of place, but it has largely ignored the context of environmental change, leaving many historic properties vulnerable to natural hazards, including flooding. *The Secretary of the Interior's Standards and Guidelines* (2017) addresses resilience to natural hazards, recommending the least amount of intervention needed to achieve protection of a historic property from natural hazards. The *NPS Guidelines* recognize that minimal intervention may not be enough to protect a property and that more invasive interventions may be necessary to ensure the continued survival of the building, despite the loss of some of the building's historic character. The National Park Service's 2021 *Guidelines on Flood Adaptation for Rehabilitating Historic Buildings* (*NPS Flood Guidelines*) take a step further by providing recommendations with the goal of reducing flood risk and achieving greater resilience. *(Refer to National Park Service: Planning and Assessment for Flood Risk Reduction, matrix page 8.20.)*

Most local governments and the Florida Division of Historical Resources (DHR) utilize *The Secretary of the Interior's Standards* as the criteria for regulatory reviews regarding alterations to historic properties.

HISTORIC AND CULTURAL RESOURCE DOCUMENTATION

TRADITIONAL METHODS OF PROPERTY DOCUMENTATION

Depending on the type and significance of the historic property and the goals for documentation, a local government or preservation advocate may consider the following options:

- **Florida Master Site File.** Anyone can prepare Historic Structure form(s), including all required supporting documentation, and submit the information to DHR. Eligible properties are those approximately 50 years of age or older unless other historic or significant factors are identified. Information regarding documentation requirements, form fields, and survey registration are available through the Division of Historical Resources (DHR). *(www.flheritage.com)*
- **National Register of Historic Places Nomination.** For properties where formal designation is desired (for example, where historic preservation project review would be beneficial in the event of FEMA actions), preservation planners, consultants, or advocates can complete the National Register nomination form, including all required supporting documentation, and submit the information to DHR.
- **Local Inventory Collection.** Where properties would benefit from local designation, or if data collected is not sufficient to support a submission to the DHR or the National Register, planners may elect to complete a local property inventory form and supporting documentation and submission to local department of planning and zoning.
- **Historic American Buildings Survey (HABS) / Historic American Engineering Record (HAER) / Historic American Landscapes Survey (HALS).** For extremely significant or rare historic properties, local planners and advocates may wish to propose HABS / HAER / HALS documentation and submission to the Library of Congress. *(www.loc.gov)*

COMMUNITY-BASED METHODS OF DOCUMENTATION

- **Oral Histories.** Through audio or video interviews, volunteers can record oral histories of the community, particularly those aspects that may be lost or altered by increased flooding. Ideally, this process should be overseen by a professional or volunteer with experience in collecting oral histories. The local government can help facilitate this process and/or help locate an appropriate repository for the data, such as a local university or library.
- **Digital Archives.** A local government or non-profit group can encourage community members to share family photos and documents to be scanned and digitally archived. As with oral history collection, this process should be overseen by someone with experience, and options for data collection should be considered in advance.

EMERGING METHODS OF DOCUMENTATION

- **Drones.** Using photographic and geographic data collected by a camera and GPS device mounted to a drone flown at a low altitude, a high resolution three-dimensional model of a streetscape, building, or landscape can be created.
- **Laser Scanning.** The process of 3D laser scanning (or phase-shift/phase-comparison scanning) generates a collection of xyz coordinates that are used to create a high-resolution three-dimensional model of a streetscape, building, or landscape. Laser scanning can be a cost-effective means of accurately capturing a space three-dimensionally.

At severely-damaged buildings, repair work could cause unintended collapse.

The *Standards*, and more specifically the *Standards for Rehabilitation*, recognize that physical change may be necessary to allow the continued use of historic buildings and sites. Given the new acknowledgement of natural hazards in the *NPS Flood Guidelines*, and the imminent threat from flooding facing many historic Florida communities, it may be necessary to adapt the philosophical approach to interpretation of the *Standards* and the level of change deemed acceptable. Flood vulnerability may require high-risk communities to rethink the recommended level of physical adaptation required to balance the desire to maintain historic fabric with the need to sustain building occupancy.

Simultaneously it must also be recognized that, for a variety of reasons, it will not be possible to save all historic resources. With the acceptance that physical loss of place might be inevitable comes the responsibility to document the historic fabric before it is lost. In addition to the abandonment and disappearance of physical features, historic places also have socio-cultural traditions and practices that can be lost when the people who occupy those places relocate.

To document historic places and cultural heritage threatened by flooding, communities should consider a combination of traditional historic property documentation, more informal community-based methods of documentation, and, in some cases, the use of emerging technologies such as drones and laser scanning to achieve more complete documentation. In cases of anticipated severe flooding, documentation can help capture the memory of a community through the voices of its residents prior to their migration. *(Refer to Historic and Cultural Resource Documentation, sidebar page 14.6.)*

Preservation planners and historic preservation commissions should also strive to work with local emergency managers and floodplain administrators to guide changes to infrastructure and the landscape. For example, although it may have a detrimental impact to some historic properties, it may be necessary to conduct a stream daylighting or marsh restoration project in an area that was historically filled and built upon to protect other properties, in effect sacrificing one group of historic resources for another. ***Large-scale physical changes must have community-buy in to be effective, transparent, and fair, and these decisions must not be made lightly, but rather through a deliberative planning process and incorporation into the community's planning documents that guide the community's vision of its continuing evolution.*** *(Refer to Addressing Preservation and Severe Storms in Local Planning Initiatives, page 4.6, and Engage the Public, page 8.13.)*

MIGRATION

Migration is already occurring across Florida. For example, increased development in Miami is occurring in areas with higher ground, such as Little Haiti, displacing residents and eroding the neighborhood's cultural identity. As areas once farmed have become too wet for too much of the growing season, and traditional methods of subsistence cease, those economic systems collapse and disappear. For historic communities vulnerable to flood hazards, out-migration will likely continue as flooding progressively worsens.

Progressive flooding can result in:

- Interrupted access as roadways and bridges become impassable;
- Lack of fresh water as well water becomes contaminated with brackish water;
- Sewer system backups that necessitate costly and frequent upgrading;
- Local industry interruptions, which mean that businesses are no longer sustainable in a flood-prone environment; and
- Loss of employment opportunities and resultant out-migration of population.

Out-migration need not erase a historic community. Adaptation planning can encompass strategies for relocating historic communities and historic buildings. Philosophically, preservationists and planners will need to grapple with adapting their preservation paradigm and interpretation of the *Standards* to the circumstances they will face. Relocation of historic structures may become less contentious and more accepted as a method of preservation as well as flood protection. If historic communities are determined to be of very high significance, they can be relocated wholesale. This is already occurring elsewhere in the United States among Native American communities, most notably in the Isle de Jean Charles, Louisiana, and in the City of Shishmare, Alaska. Relocation of an entire historic community to a similar setting could preserve both tangible and intangible heritage, especially if water-oriented communities are relocated to areas that allow for traditional water-oriented practices to continue (e.g, boatbuilding, fishing, and oystering).

PORTSMOUTH VILLAGE, NORTH CAROLINA

Portsmouth Village was established in the 18th century as a fishing village. The last residents left the island in 1971, and in 1976 the land came under the ownership of the National Park Service as part of the Cape Lookout National Seashore, which is listed on the National Register of Historic Places. Currently, the Village is only accessible by boat. Volunteers assist with the preservation of the twenty-one buildings as well recording the stories of former residents at their biannual meetings and Portsmouth homecomings.

[NPS, www.nps.gov/calo/planyourvisit/visit-portsmouth.htm]

The First Baptist Church of Boca Grande experienced wind damage to the roof and steeple from Hurricane Ian in 2022.

ACCEPTING LOSS AND MOVING FORWARD

Change can be frightening. In many ways, acceptance of the need for adaptation requires being able to say goodbye to the way we have known a community and its culture and to acknowledge the passing or changing of a way of life before moving on to a new way of looking at a community.

As some climate scientists and activists have noted, the loss of a community due to flooding has similarities to loosing a loved one. In her 1969 book *On Death & Dying*, Swiss psychiatrist Elisabeth Kübler-Ross identified five stages in the grieving process. Similar stages can be identified in the process of accepting the need for adaptation.

1. **Denial**: Belief that severe storms do not pose an immediate threat, and if it will become a concern, it will be far in the future, not affecting me or my children.
2. **Anger**: Realization that flooding is affecting me or my community, and the unfairness of the burden it is placing on me because my property floods, my flood insurance premiums are increasing, or my community must make infrastructure improvements.
3. **Bargaining**: Recognition that I have a problem, accompanied by the conviction that I can fix the problem by implementing a mitigation measure, be it floodproofing, elevation, relocation, wind retrofitting, or demolition.
4. **Depression**: Sadness and hopelessness in the inevitability that my community may change radically or be abandoned and that its social and cultural structure may disappear because of the loss of population, buildings, landscapes, and infrastructure.
5. **Acceptance**: Acknowledgement of the fact that severe storms are a problem, everything cannot be saved, and that what can be saved will be different from what it was – establishing a "new normal." I have to move on.

Adaptation shapes a future path that recognizes the significance of the past and incorporates elements before they are erased. It is the responsibility of communities to identify their own goals as they adapt to changing conditions, whether it be implementing physical changes to historic properties or migrating and re-establishing the community in less risky locations. However, if communities fail to act and do not plan for the future, the results could be devastating, including ad hoc abandonment and dispersal. Historic communities have long legacies of evolution and change. Through adaptation, those changes can be planned for and managed to promote the protection, preservation, and reuse of historic buildings, while ensuring that the communities themselves continue to survive and thrive.

REFERENCES

Note: All references are available online unless otherwise noted. References that are only available as online resources are noted as "online resource." Refer to *Appendix A: Resources* for web links.

Flavelle, Christopher and Patricia Mazzei. *Florida Keys Deliver a Hard Message: As Seas Rise, Some Places Can't Be Saved*. New York Times, December 4, 2019. www.nytimes.com

Kübler-Ross, Elisabeth. *On Death & Dying* (1969).

U.S. Department of the Interior [National Park Service]. *Guidelines on Flood Adaptation for Rehabilitating Historic Buildings* (2021).

U.S. Department of the Interior [National Park Service]. *Heritage Documentation Programs*, online resource.

U.S. Department of the Interior. *The Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for Preserving, Rehabilitating, Restoring and Reconstructing Historic Buildings* (2017).

Calhoun County, 1916. (Florida Memory)

15 MITIGATION PARTNERS

Standards and requirements for addressing storm mitigation are established by the federal government through the Federal Emergency Management Agency (FEMA). Florida utilizes the federal guidance to establish more restrictive state standards and requirements, particularly tailored to the vulnerabilities encountered with severe storms and hurricanes, including high winds, storm surge, and flooding. Local governments, in turn, can either adopt the state requirements or more stringent requirements.

A clear understanding of the activities of the various federal and state entities involved in storm mitigation and preservation, and how they work together, can assist communities seeking to protect their historic resources. The federal, state, regional and county agencies, departments, and organizations listed on the following pages can provide resources and assistance at the various stages of the emergency management cycle. This section includes a list of key partners, primarily representative of federal and state levels, their identified roles in hazard mitigation and the emergency management cycle, and their support functions on behalf of municipal resiliency efforts. The functions and programs offered by the partners may change, but current information should be available on their websites.

It is important to be aware that the primary mission of many of the identified agencies and departments, and therefore their strategies and recommendations, may be at odds with the traditional approach to historic preservation as defined by *The Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for*

Preserving, Rehabilitating, Restoring and Reconstructing Historic Buildings (2017), maintained and promulgated by the National Park Service. *(www.nps.gov)* However, most state and federal agencies are required to consider their actions and potential affects on historic resources particularly for any agency-funded or -permitted project. The Florida Division of Historical Resources (DHR) is available to provide guidance, particularly as local communities consider appropriate mitigation measures to protect historic resources and to assist with any state and federal compliance measures.

CONTACT

Phone: 770.220.5200

www.fema.gov

FEDERAL EMERGENCY MANAGEMENT AGENCY

MISSION:

Helping people before, during and after disasters.

At the federal level, FEMA is the lead agency for emergency response activities. Florida is within the FEMA Region 4 Office based in Atlanta, GA, which focuses on strategic programming related to environmental planning and historic preservation, and risk mapping, assessment, and planning.

COORDINATING ACTIVITIES

PLANNING/PREPAREDNESS:

- Administers the National Flood Insurance Program (NFIP) *(refer to National Flood Insurance Program, page 2.3)*
- Publishes Flood Insurance Rate Maps (FIRMs) to identify areas most likely to flood *(refer to Flood Insurance Rate Maps, page 2.6)*
- Funds and approves updates to state and local hazard mitigation plans *(refer to Write, Adopt, and Implement the Plan, page 8.28)*
- Provides preparedness guidance via publications, education, and outreach activities
- Conducts training and exercises at all levels of government

RESPONSE & RECOVERY:

- Manages response to Presidential Disaster Declarations as well as recovery programs and activities *(Refer to Chapter 9, Response: Hazard Mitigation for Historic Resources)*
- Coordinates federal agencies during response and recovery *(refer to Chapters 9, Response: Hazard Mitigation for Historic Resources, and Chapter 10, Recovery: Hazard Mitigation for Historic Resources)*

MITIGATION:

- Provides pre- and post-disaster mitigation planning and project funding *(Refer to Funding for Recovery, page 10.7)*
- Provides guidance on how to retrofit and protect buildings against natural hazards

UNITED STATES ARMY CORPS OF ENGINEERS

MISSION:

Deliver vital engineering solutions, in collaboration with our partners, to secure our Nation, energize our economy, and reduce disaster risk.

The United States Army Corps of Engineers (USACE) is responsible for building and maintaining hurricane and storm damage reduction infrastructure on federal lands as well as supporting these endeavors on other lands and waterways with technical and financial support. They are most visible for dredging and maintaining navigational channels, beach nourishments, and in Florida, Everglades restoration activities.

COORDINATING ACTIVITIES:

- Conduct emergency operations management
- Operate Flood Risk Management Program to manage and reduce flooding with planning, response, and recovery efforts across all levels of government and tribal partners

PREPAREDNESS:

- Provides flood risk/water resources technical assistance to communities through the Floodplain Management Services Program, Planning Assistance to the States Program, and the National Hurricane Program

RESPONSE & RECOVERY:

- Provides support and technical assistance to FEMA and communities during and following disasters

MITIGATION:

- Provides nonstructural approaches to floodproofing that are intended to reduce damage from encroaching flood water by altering a property, including acquiring and/or relocating a building; preparing emergency measures, such as sandbagging; and floodproofing.
- Maintains, repairs, and constructs resiliency structures such as levees and floodwalls and promote alternatives like land acquisition and floodproofing to improve the natural environment through its Civil Works program
- Reviews and issues permits for commercial, residential, and transportation projects as well as landowner projects for driveways, shorelines, and homes within their jurisdiction of waterways and lands
- Provides technical assistance to communities so they can construct mitigation projects

CONTACT

www.usace.army.mil

FLORIDA SILVER JACKETS

The Silver Jackets are an interagency team with federal, state, tribal and local agencies who work together to learn from one another and apply their knowledge to reduce the risk from flooding and other natural disasters; and, enhance response and recovery efforts from these types of events. The state has the leadership role with the support of federal partners. The goal is to bring resources, funding, and programs together to help meet the goals of the state as it relates to reducing flood risk. Florida's team includes the state's Division of Emergency Management, Department of Environmental Protection, Department of Transportation, Floodplain Managers Association, and the Federal Emergency Management Agency, Army Corps of Engineers, along with many other federal, state and local agencies.

SCENARIO

Communities situated near shorelines or regulated waterways may desire improvements projects such as shoreline hardening, breakwaters, municipal piers that will require a USACE permit and compliance with any associated conditions.

CONTACT

National Park Service
1849 C Street NW
Washington, DC 20240
(202) 208-6843
www.nps.gov

SCENARIO

During the development review process related to a historic property, city staff and/or the historic review board may need to cite best practices and guidelines for the treatment of a specific building material or feature when making recommendations in response to the proposed development.

NATIONAL PARK SERVICE

MISSION:

The National Park Service preserves unimpaired the natural and cultural resources and values of the National Park System for the enjoyment, education, and inspiration of this and future generations. The Park Service cooperates with partners to extend the benefits of natural and cultural resource conservation and outdoor recreation throughout this country and the world.

For most local governments, National Park Service (NPS) references and guidance represent the best practices for the treatment of historic properties. Most of these resources are available in print and online. In more direct encounters, the National Park Service is the final step in the National Register or Landmark designation process and is the gatekeeper for Historic Preservation Fund grants.

COORDINATING ACTIVITIES:

- Establishes national preservation guidelines
- Publishes Technical Bulletins and Preservation Briefs
- Administers the federal tax credit
- Administers the National Register and National Landmark program
- Administers the Certified Local Government Program
- Administers funding from the Historic Preservation Fund

PREPAREDNESS:

- Federal grant funds can be used to develop emergency plans, to survey historic resources, and develop design guidelines

RESPONSE & RECOVERY:

- NPS staff may provide field and technical support to FEMA to identify impacts to historic resources and to review proposed recovery projects receiving federal funds, typically through the Certified Local Government Program (CLG) administered by the Florida Division of Historical Resources (DHR)

MITIGATION:

- Provides guidelines for compatible flood mitigation techniques as well as general maintenance and repair advice

ADVISORY COUNCIL ON HISTORIC PRESERVATION (ACHP)

MISSION:

Promote the preservation, enhancement, and sustainable use of our nation's diverse historic resources, and advises the President and the Congress on national historic preservation policy.

Local governments may encounter the Advisory Council on Historic Preservation (ACHP) if there are federally-funded or -permitted projects that have adverse affects on historic or archaeological resources, particularly if they are National Historic Landmarks. The ACHP is an independent federal agency tasked with ensuring that federal agencies follow the requirements of the National Historic Preservation Act, Section 106.

COORDINATING ACTIVITIES:

- Participates in Section 106 reviews, provides technical assistance, and develops regulations
- Administers training programs
- Preserve America community designations and awards
- Participates in inter-agency initiatives focused on Native American issues
- Develops policy statements to provide guidance on key preservation issues

CONTACT

Advisory Council on Historic Preservation
401 F Street NW, Suite 308
Washington, DC 20001
(202) 517-0200
www.achp.gov

SCENARIO

A hazard mitigation grant may be funded from FEMA for a local government to construct a community flood mitigation project that affects a building or archaeological site that is designated as a National Historic Landmark, which will require formal notice provided to the ACHP and an invitation to comment.

CONTACT

Florida Division of Emergency Management
2555 Shumard Oak Boulevard
Tallahassee, FL 32399-2100
850.815.4000
www.floridadisaster.org

SCENARIO

A local government can increase their Community Rating System (CRS) score under the National Flood Insurance Program (NFIP) under guidance from FDEM.

FLORIDA DIVISION OF EMERGENCY MANAGEMENT

MISSION:

Coordinate, collaborate and communicate with our community stakeholders for a resilient Florida.

The Florida Division of Emergency Management (FDEM) is the lead state agency as a liaison with the Federal Emergency Management Agency (FEMA) and leader of the State Emergency Response Team.

COORDINATING ACTIVITIES:

PLANNING/PREPAREDNESS:

- Produces state-wide preparedness plans (e.g. *Florida Hazard Mitigation Plan* and *Florida Emergency Operations and Response Plan*)
- Conducts training programs and exercises for state and local partners and public outreach
- Reviews and approves local hazard mitigation plans before they go to FEMA for final approval
- Reviews all county CEMPs for compliance with Florida Administrative Code 27P-6 and Florida Statutes 252
- Applies for and manages grants as the tate administrative agency and official applicant for FEMA grants
- Manage the update of regional hurricane evacuation studies, ensure such studies are done in a consistent manner, and ensure that the methodology for modeling storm surge is approved by the National Hurricane Center

RESPONSE & RECOVERY:

- Works with FEMA to request Presidential Disaster Declarations
- Manages FEMA mitigation and recovery programs post-disaster that includes both Individual and Public Assistance programs as authorized by the Robert T. Stafford Disaster Relief and Emergency Assistance Act
- Operates and manages the state Emergency Operations Center and may also operate and manage the state's Joint Information Center
- Operates and manages the state's support to local disaster response and coordinates between federal agencies, state agencies, private sector partners, and volunteer organizations

MITIGATION:

- Applies for and administers mitigation programs and projects funded through FEMA's programs including: Flood Mitigation Assistance (FMA); Pre-Disaster Mitigation & Pre-Disaster Mitigation Competitive (PDM & PDM-C); and the Hazard Mitigation Grant Program (HMGP)
- Develops and oversees mitigation projects in local communities

FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION

MISSION:

The Florida Department of Environmental Protection protects, conserves, and manages the state's natural resources and enforces its environmental laws.

The Florida Department of Environmental Protection (DEP) coordinates with local governments and other agencies to protect and restore water quality and supply and to provide funding assistance for water restoration and infrastructure projects, as well as coordinates the protection of Florida's submerged lands and coastal areas.

COORDINATING ACTIVITIES:

- Acquires lands for public protection and oversight for management of activities on public lands
- Manages Florida parks, greenways, and trails
- Implements state laws providing for the protection of the quality of Florida's drinking water, ground water, rivers, lakes, estuaries, and wetlands; and the reclamation of mined lands
- Regulates activities in, on, or over surface waters or wetlands, as well as any activity involving the alteration of surface water flows
- Resilient Florida legislation (2021) ensures a coordinated approach to Florida's coastal and inland resiliency, enhancing efforts to protect inland waterways, coastlines, and shores, which serve as invaluable natural defenses against sea level rise
- Manages Florida Resilient Coastlines program with funding and technical assistance, and promotes a coordinated approach to sea level rise planning among state, regional and local agencies.

CONTACT

Florida Department of Environmental Protection
3900 Commonwealth Boulevard
Tallahassee, FL 32399-3000

850.245.2118

www.floridadep.gov

SCENARIO

Local governments will require a DEP and/or water management district Environmental Resource Permit for alterations of surface water flows such as activity that generates stormwater runoff from uplands construction, dredging, filling in wetlands and other surface waters, docks, use of state-owned submerged lands and state waterways.

CONTACT

Northwest Florida
81 Water Management Drive
Havana, FL 32333
850-539-5999
www.nwfwater.com

Suwannee River
9225 CR 49
Live Oak, FL 32060
386-362-1001
800-226-1066
www.mysuwanneeriver.com

St. Johns River
P.O. Box 1429
Palatka, FL 32178
386-329-4500
800-451-7106
www.sjrwmd.com

Southwest Florida
2379 Broad St.
Brooksville, FL 34604
352-796-7211
800-423-1476
www.swfwmd.state.fl.us

South Florida
3301 Gun Club Road
West Palm Beach, FL 33406
561-686-8800
800-432-2045
www.sfwmd.gov/

SCENARIO

Local governments will need to coordinate construction projects impacting consumptive use of water, well construction, or requiring other environmental resource permitting with their regional water management district.

FLORIDA WATER MANAGEMENT DISTRICTS

MISSION:

The four core mission areas of the water management districts are: (1) water supply, (2) water quality, (3) flood protection and floodplain management, and (4) natural systems.

The Department of Environmental Protection (DEP) is responsible for the administration of the water resources at the state level and exercises general supervisory authority over the state's five water management districts, which are responsible for the administration of the water resources at the regional level. The state's five water management districts include the Northwest Florida Water Management District, the Suwannee River Water Management District, the St. Johns River Water Management District, the Southwest Florida Water Management District, and the South Florida Water Management District.

COORDINATING ACTIVITIES:

- Develops a Regional Water Supply Plan setting forth projects, costs, and projections over a 20-year period that are needed to meet all existing and future reasonable-beneficial uses and to sustain the water resources and related natural systems and may also cost-share the implementation of many of those projects
- Performs a significant amount of water quality monitoring and assessments. For waterbodies within their regions, the districts construct or help fund the construction of water quality projects to benefit the state's waterbodies, and administer regulatory programs designed to achieve the protection of the state's water quality
- Constructs, operates, and maintains flood protection structures throughout their regions to prevent increases in flooding events
- Evaluates and protects natural systems through the implementation of the Minimum Flows and Levels program and through reservations of water

FLORIDA DEPARTMENT OF ECONOMIC OPPORTUNITY

MISSION:

In collaboration with our partners, DEO assists the Governor in advancing Florida's economy by championing the state's economic development vision and by administering state and federal programs and initiatives to help visitors, citizens, businesses, and communities.

The Florida Department of Economic Opportunity (DOE) was Created in 2011 after dissolution of the Department of Community Affairs and the combination of the Office of Tourism, Trade, and Economic Development; Department of Community Affairs; and the Agency for Workforce Innovation. Local governments working with any federal programs related to housing, energy, community development block grant programs, opportunity zones, resiliency and hazard mitigation grants; or require state agency permits; and those creating or maintaining local government planning initiatives will intersect with the DEO.

COORDINATING ACTIVITIES:

- Areas of critical state concern
- Comprehensive planning
- Community and economic development
- Community resiliency and disaster preparedness planning
- Developments of regional impact and Florida quality developments
- Homeowners association declaration and covenants and revitalization
- Land development regulations
- Weatherization assistance program
- Community Services Block Grant Program (CSBG)
- Rural Economic Development Initiative
- Opportunity Zone Program

CONTACT

Department of Economic Opportunity
107 East Madison Street
Caldwell Building
Tallahassee, FL 32399-4120

Phone: 850.245.7105

www.floridajobs.org

SCENARIO

Local governments can apply for Community Planning Technical Assistance (CPTA) grants to create innovative plans and development strategies to promote a diverse economy, vibrant rural and suburban areas, and meet statutory requirements for planning, while also protecting environmentally sensitive areas. Understanding that many Florida communities have been impacted by hurricanes, CPTA grants may also be used to assist with disaster recovery, resiliency, and economic development planning.

CONTACT

Division of Historical Resources
R.A. Gray Building
500 S. Bronough Street
Tallahassee, FL 32399-0250
Phone: 850.245.6333 / Fax: 850.245.6436
www.flheritage.com

SCENARIO

FEMA may provide funds for a local hazard mitigation project whether it is a community-wide project like a seawall or individual property mitigations for demolition or rehabilitation. The local government agency and/or property owner responsible for the project will be required to provide a professional report to DHR regarding the impacts of that project on historic and archaeological resources. DHR may provide comments, request additional information, and/or participate in developing a mitigation plan when historic or archaeological resources will be adversely affected.

FLORIDA DIVISION OF HISTORICAL RESOURCES

MISSION:

To inspire a love of history through preservation and education.

Local governments wishing to pursue National Register designations; projects that require a state or federal permit; or projects that are state- or federally-funded, receive grant funds, or administer property tax exemptions for historic preservation rehabilitations will need to work with the Division of Historical Resources (DHR).

COORDINATING ACTIVITIES:

- Reviews applications for federal tax credits for the rehabilitation of historic properties, reviews applications for property tax relief projects in communities not qualified to review locally, consults with property owners and building officials to determine if special accessibility exceptions apply to historic buildings
- Provides architectural technical assistance to the public on historic rehabilitation projects
- Provides technical assistance to ensure compliance with state and federal laws mandating a project's impacts on historic and archaeological properties
- Assists in the preparation of historic preservation elements for state land management plans
- Reviews historic preservation aspects of local government comprehensive plans
- Allocates state funds appropriated by the Florida Legislature and federal funds apportioned to the state by the U.S. Department of the Interior, National Park Service, for the preservation and protection of the state's historic and archaeological sites and properties
- Assists in the management of cultural resources located on state lands
- Preserves and curates artifacts recovered from state lands
- Offers guidance on how to respond if an unmarked grave site is encountered
- Assists in the survey, designation, and preservation of thousands of historic and cultural resources and increases public awareness of historic preservation through the Florida Certified Local Government (CLG) Program
- Maintains the State of Florida official inventory of historical and cultural resources, including archaeological sites, historical structures, historical cemeteries, historical bridges, historic districts; and landscapes and linear features
- Administers National Register nominations with review and recommendation of the Florida National Register Review Board

FLORIDA REGIONAL COUNCILS ASSOCIATION (FRCA)

MISSION:

Further the interests of the Regional Planning Councils (RPCs) in Florida as these interests relate to their service to their local governments and their citizens, the promotion of these interests, the promotion of harmonious, productive relationships among the several member RPCs, the promotion of harmonious, productive relationships among member RPCs and any and all state and federal agencies as well as private groups whose interests overlap those of member RPCs, and to do any and all things necessary to assure that Florida's RPCs are effective service organizations to the people of Florida.

The Florida Regional Councils Association is an alliance of Florida's ten Regional Planning Councils (RPCs) and serves to enhance regional collaboration throughout the state. Planning Councils are multi-purpose entities comprised of local governments that solve problems at the regional level and help communities grow.

COORDINATING ACTIVITIES:

- Promote the interests of regional planning in Florida
- Promote the development of each region and entire state
- Protect representation of local governments

CONTACT

Florida Regional Councils Association
2507 Callaway Road
Suite 200
Tallahassee, FL 32303

Phone: 850.457.1426

www.flregionalcouncils.org/contact

SCENARIO

During a comprehensive plan update, the regional council will be engaged in the process to provide comments and support.

FLORIDA REGIONAL PLANNING COUNCILS (RPC)

MISSION:

Regional Planning Councils include an association of member local governments that can promote regional strategies, partnerships, and solutions for economic competitiveness, and quality of life issues.

COORDINATING ACTIVITIES:

- Provides compliance assistance with the interpretation of comprehensive plans and land development regulations
- Prepares land development regulation map and text amendments, special exemptions, and permits, concurrency assessments for plats, and site and development plans
- Provides administrative assistance on community development projects for member counties and municipalities
- Assists with Community Development Block Grant (CBDG) programs
- Participates in local emergency response planning
- Conducts technical research and planning initiatives to assist decision making processes for member communities related to resiliency and climate change as well as transportation and agricultural industries

CONTACT

Emerald Coast
850.332.7976
www.ecrc.org

Appalachia
850.488.1616
www.arpc.com

North Central Florida
352.955.2200
www.ncfrpc.org

Northeast Florida
904.279.0880
www.nefrc.org

East Central Florida
407.245.0300
www.ecfrpc.org

Central Florida
863.534.7130
www.cfrpc.org

Tampa Bay
727.570.5151
www.tbrpc.org

Southwest Florida
844.988.8244
www.swfrpc.org

Treasure Coast
772.221.4060
www.tcrpc.org

South Florida
954.924.3653
www.sfregional council.org

FLORIDA TRUST FOR HISTORIC PRESERVATION

MISSION:

Promote the inclusive sharing of the diverse architectural, historical, and archaeological heritage of Florida.

The Florida Trust for Historic Preservation is the state's non-profit dedicated to protecting Florida's extraordinary heritage and history through advocacy, connecting, education, and stewardship. Before, during, and after disasters the Florida Trust can provide regional contacts and volunteer support to help communities protect their historic resources.

COORDINATING ACTIVITIES

- Provides volunteer technical and professional assistance to assess historic property damage and plan for compatible repairs
- Advocates for state and federal financial assistance to assist in planning and recovery efforts
- Conducts training and educational workshops on the repair and maintenance of historic building materials

CONTACT

Florida Trust for Historic Preservation
906 E Park Street
Tallahassee, FL 32301
850.224.8128
www.floridatrust.org

SCENARIO

Communities without access to robust historic preservation programs within their local government may need assistance to develop relationships with area professionals and guidance for obtaining local technical expertise.

FLORIDA PUBLIC ARCHAEOLOGY NETWORK

MISSION:

Promote and facilitate the stewardship, public appreciation, and value of Florida's archaeological heritage through regional centers, partnerships, and community engagement.

The Florida Public Archaeology Network (FPAN) is a statewide network with regional centers dedicated to public outreach and assisting local governments and the Florida Division of Historical Resources (DHR), in order to promote the stewardship and protection of Florida's archaeological resources.

COORDINATING ACTIVITIES (UPON REQUEST):

- Assists with identifying possible grants and funding sources for archaeological education and preservation
- Provides guidance for Certified Local Governments (CLGs)
- Provides archaeological resource training for government employees
- Lists sites in the Florida Master Site File (FMSF) and the National Register of Historic Places
- Navigates the state review and compliance process
- Offers training programs, workshops, and informational presentation

CONTACT

Florida Public Archaeology Network
207 E Main Street
Pensacola, FL 32502
850.595.0050
www.fpan.us

SCENARIO

A local government that is unfamiliar with their region's archaeological heritage and proper stewardship techniques can contact the FPAN office in their region to obtain information and additional resources.

FLORIDA SEA GRANT

CONTACT

Florida Sea Grant College Program
2306 Mowry Road, Bldg. 164
Gainesville, FL 32611
352.392.5870
www.flseagrant.org

SCENARIO

Technical expertise and case study evaluations may be necessary to evaluate community vulnerabilities, policy changes, and adaptation modeling.

MISSION:

Florida Sea Grant envisions a future with a resilient coastal zone where people use natural resources in ways that are beneficial to the economy and society and that preserve their quality and abundance for future generations.

Florida Sea Grant is a university-based program that supports research, education and outreach to conserve coastal resources and enhance economic opportunities. Outreach programs cooperate under the UF/IFAS Extension and coastal counties of Florida hosted from the University of Florida. Specific focus areas include climate change and coastal hazard.

COORDINATING ACTIVITIES

- Leverages federal and state resources to fund applied research, inform policy, train students and workers, and educate and engage public
- Provides educational materials to help explain flood insurance

PROGRAM FOR LOCAL ADAPTATION TO CLIMATE EFFECTS

CONTACT

PLACE: SLR
1815 Popps Ferry Road
Biloxi, MS 39532
228.388.4710
www.placeslr.org

SCENARIO

While the study area includes the Gulf Coast from Mississippi to the Florida Panhandle, many climate change resources are published to help communities and individuals understand the applied social impacts of coastal hazards.

MISSION:

PLACE: SLR will foster a network of individuals and organizations working to enhance resilience to coastal inundation under rising sea levels in a changing climate. It will increase access to and application of relevant research, stimulate dialogue around vulnerabilities and adaptation strategies, and provide resources that facilitate resilience and mitigation actions. These goals will be achieved by working directly with stakeholders across the coastal northern Gulf of Mexico to identify critical gaps and address them by leveraging the resources and expertise of the network.

The purpose of Program for Local Adaptation to Climate Effects (PLACE: SLR) is to increase resilience to climate change along the northern Gulf of Mexico. The program focuses on resilience issues related to sea-level rise and coastal flooding hazards including hurricanes, nuisance flooding, erosion, coastal habitat degradation and loss, saltwater intrusion, and stormwater flooding. Projects advance resiliency efforts by identifying and addressing needs of coastal decision-makers and stewards of the built and natural environments.

MUNICIPAL GOVERNMENT

At the local level, county and municipal governments will often have an Office of Emergency Management, a Department (or Division of) Planning and Zoning, and may have a historic preservation commission (HPC), which may all participate in creating and implementing hazard mitigation plans and projects. The specific roles of each organization or group will vary based upon the municipal governmental structure, and they may be supported by other governmental departments, often, nonprofit partners.

- **Office of Emergency Management** (OEM) – Responsible for conducting preparedness, response, recovery, and mitigation activities.
- **Department of Planning and Zoning** – Responsible for coordinating long-range planning through the development and implementation of a municipal master plan. Enforces the zoning ordinance (that may address the treatment of properties in a historic district), processes building permits, and reviews development proposals. If a community has a local historical commission, it is often housed under Planning and Zoning. A representative from Planning and Zoning is often part of the planning team in updating the hazard mitigation plan. *(Refer to Chapter 4, Local Tools: Preservation and Storm Mitigation.)*

COORDINATING ACTIVITIES

Examples of emergency management activities typically conducted by an OEM include:

PLANNING/PREPAREDNESS

- Educates and conducts outreach to communicate disaster/hazard event preparedness information to citizens, businesses, and communities
- Acts as team lead in the preparation of local hazard mitigation, Continuity of Operations, and Emergency Operations plans
- Conducts training and exercises to ensure the plans are functional and, if not, revise the plans
- Operates watch and warning systems

RESPONSE & RECOVERY

- Runs the local Emergency Operations Center and takes the lead in incident management, and guides and coordinates response and recovery efforts

MITIGATION

- Serves as the leader for implementing the mitigation actions in the local hazard mitigation plan, and manages and conducts mitigation projects

LOCAL VOLUNTEERS

Although not formally part of the emergency management process, local volunteers, including historic preservation commissions (HPCs), business associations, civic associations, nonprofit organizations, and private citizens, can play a supporting role in all phases of the process, particularly in jurisdictions with limited governmental resources. Participation can also draw attention to areas of interest, such as the protection of cultural resources. *(Refer to Engage the Public, page 8.13.)*

Glades County, 1951. (Florida Memory)

APPENDIX A RESOURCES

Most of the organizations identified in this section have information available on their websites and can assist in planning and funding a mitigation project.

Note: Included websites are for the home page of the organization and are current as of April 2023.

The following are titles of recommended publications and other resources:

FLOOD AND WIND IMPACTS: HISTORIC PROPERTIES

The Secretary of the Interior's Standards (SOIS) for the Treatment of Historic Properties with Guidelines for Preserving, Rehabilitating, Restoring, and Reconstructing Historic Buildings (2017)

U.S. Department of the Interior, National Park Service Technical Preservation Services, 2017

Provides general guidance for all historic resources and is the regulatory document for projects receiving federal funds or permits that may affect their preservation, rehabilitation, restoration, or reconstruction

www.nps.gov

The Secretary of the Interior's Standards for Rehabilitation and Guidelines on Flood Adaptation for Rehabilitating Historic Buildings

U.S. Department of the Interior, National Park Service Technical Preservation Services, 2021

Provides technical preservation guidance specific to historic properties at risk for flooding

www.nps.gov

Treatment of Flood Damaged Older and Historic Buildings

National Trust for Historic Preservation, Richard Wagner and Claudette Hanks Reichel, 1993

Advises historic property owners how to begin immediate and long-term repairs for a flood-damaged historic property

www.savingplaces.org

Make Mitigation Happen: Mitigating Your Home Could Translate to Savings and Peace of Mind.

Florida's Foundation, Florida Department of State, Florida Division of Emergency Management, (2013)

Provides mitigation guidance to protect homes from hurricanes

www.floridadisaster.org

Protecting Your Historic Home from Natural Disasters

National Park Service Center for Training and Technology and the Louisiana Division of Historic Preservation, 2015

Helps residential property owners identify the means to minimize risk and prepare for future disasters, as well as provide critical environmental and historic preservation information

www.ncptt.nps.gov

Disaster Planning for Florida Historic Resources and Disaster Mitigation for Historic Structures: Protection Strategies

1000 Friends of Florida, Florida Department of State, Division of Historical Resources, Florida Division of Emergency Management, 2006 and 2008

Illustrates the basic principles of disaster mitigation for Florida's historic resources as well as mitigation and planning objectives

www.floridadisaster.org

Resilient Heritage in the Nation's Oldest City: St. Augustine

City of St. Augustine and Taylor Engineering et. al., 2020

Explains the comprehensive basis for disaster mitigation at the local level with respect to archaeological and historic preservation, economic impacts and incentives, regulatory initiatives, and creative adaptation measures

www.citystaug.com

Flood Mitigation Design Guidance for Historic Residential Property Owners

City of St. Augustine and Preservation Design Partnership, 2021

Outlines specific physical site and building mitigation and preservation techniques for historic residential property owners within the context of floodplain management for traditional 19th century architecture

www.citystaug.com

Drying Out Water Damaged Buildings – Video

North Carolina State Historic Preservation Office, 2018

Offers a tutorial on the specific means and methods for drying out a historic wood-frame building

www.ncdcr.gov

Resilient Rehab: A Guide to Historic Buildings in Miami-Dade County

Miami-Dade County Office of Historic Preservation and Shulman + Associates, 2021

Updates traditional historic preservation design guidelines to include a focus on resilient building strategies

www.miamidade.gov

Buoyant City: Historic District Resiliency and Adaptation Design Guidelines

City of Miami Beach and Shulman + Associates et. al., 2020

Identifies the challenges of flooding in historic districts along with opportunities for creative adaptation and resiliency initiatives

www.miamibeachfl.gov

Flooding and Historic Buildings

Historic England, 2015

Discusses a wholistic approach to flood mitigation with special focus on unique building materials and acceptable conservation techniques for historic buildings

historicengland.org.uk

Flood Damage to Traditional Buildings

Historic Environment Scotland, 2014

Recognizes the increased severity and occurrence of flooding and erosion and the need for more guidance to protect traditional buildings from damage

www.historicenvironment.scot

Rebuilding Water Damaged Homes: A Manual for the Safe, Healthy, Green, and Low-cost Restoration of Housing

U.S. Department of Housing and Urban Development, The Alliance for Healthy Homes, and Dennis Livingston, 2009

Focuses on recovery processes by homeowners/tenants and contractors as a workbook for educational seminars on repair of pre-WWII homes using low-cost strategies and maximum energy efficiency where possible

www.hud.gov

FLOODPLAIN AND COMPLIANCE POLICIES

Florida Building Code, Existing Building, 7th Edition (FBC)

International Code Council, Inc., 2020

Regulates the repair, alteration, change of occupancy, addition to, and relocation of, existing buildings in Florida; enforced by local governments and maintained by the Florida Building Commission in accordance with Florida Statutes

codes.iccsafe.org

FEMA Floodplain Management Bulletin – Variances and the National Flood Insurance Program

Federal Emergency Management Agency P-993, 2014

Assists local governments and reviews requests for variances to floodplain requirements with respect to the National Flood Insurance Program (NFIP)

www.fema.gov

FEMA Floodplain Management Bulletin - Historic Structures

Federal Emergency Management Agency P-467-2, 2008

Addresses how the National Flood Insurance Program (NFIP) treats historic structures and identifies mitigation measures to protect historic resources from floods

www.fema.gov

Florida Department of Emergency Management: The Florida Greenbook of Environmental and Historic Preservation Compliance

Guides applicants for a FEMA Public Assistance funding programs through environmental and historic preservation compliance requirements

www.floridadisaster.org

National Flood Insurance Program (Florida Hazards)

Identifies pertinent resources to view Flood Insurance Rate Maps (FIRMs), advice on flood insurance, and planning for a flood event

www.floridadisaster.org

FINANCIAL ASSISTANCE PROGRAMS

Disaster Recovery Assistance Programs for Historic Properties

Florida Division of Historical Resources, 2017

Summarizes the recovery programs available at the state and national level for historic properties impacted by natural disasters

www.flheritage.com

Federal Emergency Management Agency (FEMA)

Offers preparedness, mitigation, resilience, and emergency grants through a variety of different programs within the agency

www.fema.gov

U.S. Department of Housing and Urban Development (HUD) Disaster Resources

Shares information on current and past disaster assistance programs that may be available to communities and individuals

www.hud.gov

US Army Corps of Engineers (USACE) Flood Risk Management Program

Focuses on the policies, programs, and expertise of the USACE to reduce overall flood risk from building community infrastructure and to planning initiatives at a large scale

www.iwr.usace.army.mil

Florida Department of Economic Opportunity Office of Long Term Resiliency

Supports communities following disasters with housing, infrastructure, and economic development through the HUD Community Development Block Grant Program

www.floridajobs.org

Florida Department of Emergency Management Hurricane Loss Mitigation Program

A state-funded mitigation program aimed at minimizing damages caused by hurricanes by promoting property resiliency through retrofits made to residential, commercial, and mobile home properties

www.floridadisaster.org

INTERACTIVE RESEARCH

National Oceanic and Atmospheric Administration (NOAA)

www.noaa.gov

In Harm's Way: Hurricane Ida's Impacts on Socially Vulnerable Communities

storymaps.arcgis.com/stories/780e11bd19cc4dfca54ac8fb1d5e926f

Office for Management Digital Coast Data Resources

coast.noaa.gov/digitalcoast

Sea Level Rise Viewer

coast.noaa.gov/slr/

Florida Public Archaeology Network (FPAN) Tidally United Summits and HMS Florida Program

www.fpan.us

Hurricane Retrofit Guide

Division of Emergency Management, Bureau of Mitigation (2010)

apps.floridadisaster.org/hrg

Florida Wind Insurance Savings Calculator

Division of Emergency Management

apps.floridadisaster.org/wisc

FEDERAL EMERGENCY MANAGEMENT AGENCY (FEMA) TECHNICAL PUBLICATIONS

The Federal Emergency Management Agency (FEMA) has numerous publications available to address construction in flood-prone areas available on their website at *www.fema.gov*.

HURRICANE SANDY IN NEW JERSEY AND NEW YORK: MITIGATION ASSESSMENT TEAM REPORT - RECOVERY ADVISORIES AND FACT SHEETS FOR HURRICANE SANDY

- RA1. Improving Connections in Elevated Coastal Residential Buildings (February 2013)
- RA2. Reducing Flood Effects in Critical Facilities (April 2013)
- RA3. Restoring Mechanical, Electrical, and Plumbing Systems in Non-Substantially Damaged Residential Buildings (April 2013)
- RA4. Reducing Interruptions to Mid- and High-Rise Buildings During Floods (March 2013)
- RA5. Designing for Flood Levels Above the BFE After Hurricane Sandy (April 2013)
- RA6. Protecting Building Fuel Systems from Flood Damage (April 2013)
- RA7. Reducing Flood Risk and Flood Insurance Premiums for Existing Residential Buildings in Zone A (November 2013)
- Fact Sheet 1. Cleaning Flooded Buildings (May 2013)
- Fact Sheet 2. Foundation Requirements and Recommendations for Elevated Homes (May 2013)

FEMA FACT SHEETS

- Community Rating System (June 2017)
- Historic Structures and The Biggert-Waters Flood Insurance Reform Act of 2012
- Historic Preservation and Cultural Resources: Protecting Our Heritage (July 2016)
- Technical Fact Sheet 1.2: Summary of Coastal Construction Requirements and Recommendations

FEMA TECHNICAL BULLETINS

The following Technical Publications are for buildings in Special Flood Hazard Areas in accordance with the National Flood Insurance Program:

- **Technical Bulletin 0:** User's Guide to NFIP Technical Bulletins (June 2021)
- **Technical Bulletin 1:** Requirements for Flood Openings in Foundation Walls and Walls of Enclosure: Below Elevated Buildings (March 2020)
- **Technical Bulletin 2:** Flood Damage-Resistant Materials Requirements (August 2008)
- **Technical Bulletin 3:** Non-Residential Floodproofing Requirements and Certifications (January 2021)

- **Technical Bulletin 4:** Elevator Installation (June 2019)
- **Technical Bulletin 5:** Free-of-Obstruction Requirements (March 2020)
- **Technical Bulletin 6:** Below-Grade Parking Requirements (January 2021)
- **Technical Bulletin 7:** Wet Floodproofing Requirements and Limitations (May 2022)
- **Technical Bulletin 8:** Corrosion Protection for Metal Connectors in Coastal Areas (August 2019)
- **Technical Bulletin 9:** Design and Construction Guidance for Breakaway Walls Below Elevated Coastal Buildings (September 2021)
- **Technical Bulletin 10:** Ensuring That Structures Built on Fill in or Near Special Flood Hazard Areas Are Reasonably Safe from Flooding (May 2001)
- **Technical Bulletin 11**: Crawlspace Construction (November 2001)

FEMA - MISCELLANEOUS

FEMA FL-RA1, Successfully Retrofitting Buildings for Wind Resistance - Hurricane Michael in Florida (June 2019)

FEMA FL-RA2, Best Practices for Minimizing Wind and Water Infiltration Damage (June 2019)

FEMA P-234: Repairing Your Flooded Home (October 2010)

FEMA P-259, 3rd Edition: Engineering Principles and Practices of Retrofitting Floodprone Residential Structures (2012)

FEMA P-312, 3rd Edition: Homeowner's Guide to Retrofitting: Six Ways to Protect Your Home from Flooding (2014)

FEMA P-348, Edition 1, Protecting Building Utilities from Flood Damage (2019)

FEMA 386-6, Integrating Historic Property and Cultural Resource Considerations into Hazard Mitigation Planning (2006)

FEMA P-467-2, Floodplain Management Bulletin: Historic Structures (2008)

FEMA P-499 Home Builder's Guide to Coastal Construction (2010)

FEMA P-758 Substantial Improvement/Substantial Damage Desk Reference (2010)

FEMA P-804, Wind Retrofit Guide for Residential Buildings (December 2010)

FEMA P-936, Floodplain Management Bulletin - Floodproofing Non-Residential Buildings (2013)

FEMA P-1037 Reducing Flood Risk to Residential Buildings That Cannot Be Elevated (September 2015)

Protect Your Property from Severe Winds (September 2021)

This brochure provides homeowners and renters with steps to prepare for and reduce disaster damage from severe winds.

Pinellas County, 1950. (Florida Memory)

B GLOSSARY

APPENDIX

ACRONYMS

BFE	Base Flood Elevation
CRS	Community Rating System
DEM	Division of Emergency Management
DFE	Design Flood Elevation
DHR	Division of Historical Resources
FBC	Florida Building Code
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
GIS	Geographic Information System
LiMWA	Limit of Moderate Wave Action
NFIP	National Flood Insurance Program
NOAA	National Oceanic and Atmospheric Administration
NPS	National Park Service
SFHA	Special Flood Hazard Area

This glossary includes terminology commonly referenced in flood mitigation. ***Definitions provided are for reference only. It is important to confirm the most recent definitions for legal use within each municipality.***

The definition sources referenced in this glossary are from the following resources:

- **FBC:** Florida Building Code
- **FEMA:** Federal Emergency Management Agency
- **NFIP:** National Flood Insurance Program
- **NOAA:** National Oceanic and Atmospheric Administration
- **NPS:** National Park Service

1% Annual Chance Floodplain (100-year Floodplain). An area that has a 1% chance of flooding in any given year. Properties can experience a "100-year flood" in two consecutive years, just as it is possible for properties to flood even if they are located outside of the floodplain, particularly in a severe weather event such as a hurricane.

0.2% Annual Chance Floodplain (500-year Floodplain). An area that has a 0.2% chance of flooding in any given year.

100-year Flood. See base flood. [NFIP]

Accessible. A site, building, facility, or portion thereof that complies with the Florida Building Code. [FBC]

Accessory Structure. An accessory structure is a structure which is on the same parcel of property as a principal structure and the use of which is incidental to the use of the principal structure. For example, a residential structure may have a detached garage or storage shed for garden tools as accessory structures. Other examples of accessory structures include gazebos, picnic pavilions, boathouses, small pole barns, storage sheds, and similar buildings. National Flood Insurance Program (NFIP) regulations for new construction generally apply to new and substantially improved accessory structures. [NFIP]

Adaptive Reuse. The conversion of functional change of a building from the purpose or use for which it was originally constructed or designed. [FBC]

Adaptive Use. A use for a building other than that for which it was originally designed or intended. [FBC]

Addition. An extension or increase in floor area, number of stories, or height of a building or structure. [FBC]

Alteration. Any construction or renovation to an existing structure other than a repair or addition. [FBC]

Anchored. Adequately secured to prevent flotation, collapse or lateral movement. [NFIP]

Anchoring. If a proposed building site is in a flood-prone area, all new construction and substantial improvements shall be designed (or modified) and adequately anchored to prevent flotation, collapse, or lateral movement of the structure resulting from hydrodynamic and hydrostatic loads, including the effects of buoyancy. There are specific requirements for manufactured homes and structures in V Zones. [NFIP]

Architectural Style. Refers to the decorative elements applied to a specific form, such as brackets or a type of window or door, and is often associated with specific construction periods.

Architectural Type. Addresses the overall size, shape, and proportions of a building.

ASCE 24. A standard titled flood resistant design and construction that is referenced by the Florida Building Code. ASCE 24 is developed and published by the American Society of Civil Engineers, Reston, VA.

Base Flood. A flood having a one percent chance of being equaled or exceeded in any given year. This is the regulatory standard also referred to as the "100-year flood." [NFIP]

Base Flood Depth (BFD). The depth shown on the Flood Insurance Rate Map (FIRM) for Zone AO that indicates the depth of water above highest adjacent grade resulting from a flood that has a 1% chance of equaling or exceeding that level in any given year. [NFIP]

Base Flood Elevation. The elevation of surface water resulting from a flood that has a 1% chance of equaling or exceeding that level in any given year. The BFE is shown on the Flood Insurance Rate Map (FIRM) for zones AE, AH, A1–A30, AR, AR/A, AR/AE, AR/A1– A30, AR/AH, AR/AO, V1–V30 and VE. [NFIP]

Basement. (for flood loads). The portion of a building having its floor subgrade (below ground level) on all sides. This definition of "Basement" is limited in application to the provisions of Section 1612. [FBC]

Breakaway Wall. A wall that is not part of the structural support of the building and is intended through its design and construction to collapse under specific lateral loading forces, without causing damage to the elevated portion of the building or supporting foundation system. [NFIP]

Certifications. Certain activities (e.g., floodproofing design, V-Zone construction design, survey of building elevations, hydrologic and hydraulic analyses, survey and topographic data) require certification by a licensed professional architect, engineer, surveyor, or the community floodplain administrator. [NFIP]

Climate Change. Climate is determined by the long-term pattern of oceanic and atmospheric conditions at a location. Climate is described by statistics, such as means and extremes of temperature, precipitation, and other variables, and by the intensity, frequency, and duration of weather events. Over Earth's history, indications of climate change have been recorded in fossils and ice core samples. At one extreme, climate change can result in extended periods of heat and drought; at the other, extensive glaciation. Currently, our planet's global surface temperature is rising. This change is linked to human activities that increase the amount of greenhouse gases (e.g., carbon dioxide and methane) in the atmosphere. It is important to understand climatic processes because they have the potential to affect environmental conditions. [NOAA]

Coastal A Zone. Area within a special flood hazard area, landward of a V zone or landward of an open coast without mapped coastal high hazard areas. In a coastal A zone, the principal source of flooding must be astronomical tides, storm surges, seiches or tsunamis, not riverine flooding. During the base flood conditions, the potential for breaking wave height shall be greater than or equal to 1 ½ feet (457 mm). The inland limit of the coastal A zone is (a) the Limit of Moderate Wave Action if delineated on a FIRM, or (b) designated by the authority having jurisdiction. [FBC]

Coastal High Hazard Area. Area within the special flood hazard area extending from offshore to the inland limit of a primary dune along an open coast and any other area that is subject to high-velocity wave action from storms or seismic sources, and shown on a Flood Insurance Rate Map (FIRM) or other flood hazard map as velocity Zone V, VO, VE or V1-30. [FBC]

Community Rating System (CRS). A program developed by FEMA to provide incentives for those communities in the Regular Program that have gone beyond the minimum floodplain management requirements to develop extra measures to provide protection from flooding. [NFIP]

Crawlspace. Crawlspace foundations are commonly used in some parts of the nation to elevate the lowest floors of residential buildings located in Special Flood Hazard Areas (SFHAs) above the Base Flood Elevation (BFE). Crawlspaces should be constructed so that the floor of the crawlspace is at or above the lowest grade adjacent to the building. Crawlspaces that have their floors below BFE must have openings to allow the equalization of flood forces. [NFIP]

Cumulative Damage Building. Any building that has incurred flood-related damage as a result of two or more flooding events in which the cumulative amounts of payments equals or exceeds the fair market value of such building, as determined through use of the following procedure. To determine whether a building has been cumulatively damaged, a loss percentage will be calculated, for each loss, equal to the claim payment amount for that loss divided by the fair market value of such building on the day before each loss. [NFIP]

Cumulative Damage Property. Either a cumulative damage building or the contents within a cumulative damage building, or both. [NFIP]

Dangerous. Any building, structure or portion thereof that meets any of the conditions described below shall be deemed dangerous:

1. The building or structure has collapsed, has partially collapsed, has moved off its foundation, or lacks the necessary support of the ground.
2. There exists a significant risk of collapse, detachment or dislodgement of any portion, member, appurtenance or ornamentation of the building or structure under service loads. [FBC]

Design Flood. The flood associated with the greater of the following two (2) areas:

(1) Area with a floodplain subject to a 1-percent or greater chance of flooding in any year; or

(2) Area designated as a flood hazard area on the city's flood hazard map, or otherwise legally designated. [FBC]

Design Flood Elevation (DFE). The elevation of the "design flood," including wave height, relative to the datum specified on the city's legally designated flood hazard map. In areas designated as zone AO, the design flood elevation shall be the elevation of the highest existing grade of the building's perimeter plus the depth number (in feet) specified on the flood hazard map. In areas designated as zone AO where the depth number is not specified on the map, the depth number shall be taken as being equal to two (2) feet. [FBC]

Digital Flood Insurance Rate Maps (DFIRMs). Digitally converted flood insurance maps developed in conjunction with FEMA.

Doublewide Manufactured (Mobile) Home. A manufactured (mobile) home that, when assembled as a nonmovable, permanent building, is at least 16 feet wide and has an area within its perimeter walls of at least 600 square feet. [NFIP]

Dwelling. A building designed for use as a residence for no more than 4 families or a single-family unit in building under a condominium form of ownership. [NFIP]

Dry Floodproofing. A combination of design modifications that results in a building or structure, including the attendant utilities and equipment and sanitary facilities, being water tight with walls substantially impermeable to the passage of water and with structural components having the capacity to resist loads as identified in ASCE 7. [FBC]

Elevated Building. A building that has no basement and that has its lowest elevated floor raised above ground level by foundation walls, shear walls, posts, piers, pilings, or columns. Solid (perimeter) foundations walls are not an acceptable means of elevating buildings in V and VE zones. [NFIP]

Elevation Certificate. A community's permit file must have an official record that shows new buildings and substantial improvements in all identified Special Flood Hazard Areas (SFHAs) are properly elevated. This elevation information is needed to show compliance with the floodplain management ordinance. FEMA encourages communities to use the Elevation Certificate developed by FEMA to fulfill this requirement since it also can be used by the property owner to obtain flood insurance. [NFIP] MAY NO LONGER BE 'REQUIRED' BUT CAN POTENTIALLY IMPACT FLOOD INSURANCE RATE UNDER FEMA 2.0.

Elevators. The National Flood Insurance Program (NFIP) regulations require that elevators and their associated equipment be protected from flood damage. The best way to do this is to locate mechanical equipment associated with the elevator above the Base Flood Elevation (BFE). NFIP flood insurance coverage is limited for elevator equipment. New or replacement equipment relevant to an elevator, installed on or after October 1, 1987, and located below the lowest floor of an elevated building or in a basement is not covered by flood insurance. [NFIP]

Enclosure. That portion of an elevated building below the lowest elevated floor that is either partially or fully shut in by rigid walls. [NFIP]

Encroachments. Encroachments are activities or construction within the floodway including fill, new construction, substantial improvements, and other development. These activities are prohibited within the adopted regulatory floodway unless it has been demonstrated through hydrologic and hydraulic analyses that the proposed encroachment would not result in any increase in flood levels. [NFIP]

Equipment or Fixture. Any plumbing, heating, electrical, ventilating, air conditioning, refrigerating, and fire protection equipment, and elevators, dumb waiters, escalators, boilers, pressure vessels and other mechanical facilities or installations that are related to building services. Equipment or fixture shall not include manufacturing, production, or process equipment, but shall include connections from building service to process equipment. [FBC]

Erosion. The collapse, undermining, or subsidence of land along the shore of a lake or other body of water. [FEMA]

Event Flooding. Occasional flooding that has a specific cause, typically a storm or a devastating failure of infrastructure.

Existing Construction. For the purposes of determining flood insurance rates, structures for which the "start of construction" commenced before the effective date of the Flood Insurance Rate Map (FIRM) or before January 1, 1975, for FIRMs effective before that date. "Existing construction" may also be referred to as "existing structures."

Existing Structure. For application of provisions in flood hazard areas, an existing structure is any building or structure for which the start of construction commenced before the effective date of the community's first flood plain management code, ordinance or standard. [FBC]

Federal Emergency Management Agency (FEMA). 1) An agency within the U.S. Department of Homeland Security charged with responding to Presidentially-declared disasters. 2) Federal Emergency Management Agency (FEMA). The Federal agency under which the NFIP is administered. In March 2003, FEMA became part of the newly created U.S. Department of Homeland Security. [NFIP]

Fill. Earthen fill is sometimes placed in a Special Flood Hazard Area (SFHA) to reduce flood risk to the filled area. The placement of fill is considered development and will require a permit under applicable Federal, state and local laws, ordinances, and regulations. Fill is prohibited within the floodway unless it has been demonstrated that it will not result in any increase in flood levels. Some communities limit the use of fill in the flood fringe to protect storage capacity or require compensatory storage. The use of fill is prohibited for structural support of buildings in V Zones. [NFIP]

Flood or Flooding. A general and temporary condition of partial or complete inundation of normally dry land from:

(1) The overflow of inland or tidal waters.

(2) The unusual and rapid accumulation or runoff of surface waters from any source. [FBC]

Flood Damage-Resistant Materials. Any construction material capable of withstanding direct and prolonged contact with floodwaters without sustaining any damage that requires more than cosmetic repair. [FBC]

Flood Elevation Determination. A determination by the Administrator of the water surface elevations of the base flood, that is, the flood level that has a one percent or greater chance of occurrence in any given year. (NFIP)

Flood Hazard Area. The greater of the following two areas:

(1) The area within a floodplain subject to a 1-percent or greater chance of flooding in any year.

(2) The area designated as a flood hazard area on the city's flood hazard map, or otherwise legally designated. [FBC]

Flood Insurance Rate Map (FIRM). Official map of a community on which FEMA has delineated the Special Flood Hazard Areas (SFHAs), the Base Flood Elevations (BFEs) and the risk premium zones applicable to the community. [NFIP]

Flood Insurance Study (FIS). The official report provided by the Federal Emergency Management Agency that contains the Flood Insurance Rate Map (FIRM), the Flood Boundary and Floodway Map, the water surface elevation of the base flood and supporting technical data. [FBC]

Flood Map. A Flood Insurance Rate Map (FIRM), Flood Boundary and Floodway Map (FBFM), and Flood Hazard Boundary Map (FHBM) are all flood maps produced by FEMA. The FIRM is the most common type of map and most communities have this type of map. At a minimum, flood maps show flood risk zones and their boundaries, and may also show floodways and Base Flood Elevations (BFEs). The FBFM is a version of a flood map that shows only the floodway and flood boundaries. [NFIP]

Flood Opening. An opening in an enclosed structure intended to automatically allow the free passage of water between the exterior and the interior to reduce hydrostatic loads. [FBC]

Floodplain. Any land area susceptible to being inundated by floodwaters from any source. [NFIP]

Floodplain Management.

a. The operation of an overall program of corrective and preventive measures for reducing flood damage, including but not limited to, emergency preparedness plans, flood-control works and floodplain management regulations.

b. Floodplain management is a decision-making process that aims to achieve the wise use of the nation's floodplains. "Wise use" means both reduced flood losses and protection of the natural resources and function of floodplains. [NFIP]

Floodplain Management Ordinances. Once FEMA provides a community with the flood hazard information upon which floodplain management regulations are based, the community is required to adopt a floodplain management ordinance that meets or exceeds the minimum NFIP requirements. The overriding purpose of the floodplain management regulations is to ensure that participating communities take into account flood hazards, to the extent that they are known, in all official actions relating to land management and use. [NFIP]

Floodplain Management Regulations. Zoning ordinances, subdivision regulations, building codes, health regulations, special purpose ordinances (such as a floodplain ordinance, grading ordinance and erosion control ordinance), and other applications of police power. The term describes such State or local regulations, in any combination thereof, which provide standards for the purpose of flood damage prevention and reduction. [NFIP]

Floodproofing. Any combination of structural and non-structural additions, changes, or adjustments to structures which reduce or eliminate flood damage to real estate or improved real property, water and sanitary facilities, structures and their contents. [NFIP]

Floodproofing Certificate. Documentation of certification by a registered professional engineer or architect that the design and methods of construction of a nonresidential building are in accordance with accepted practices for meeting the floodproofing requirements in the community's floodplain management ordinance. This documentation is required for both floodplain management requirements and insurance rating purposes. [NFIP]

Flood-Related Erosion. The collapse or subsidence of land along the shore of a lake or other body of water as a result of undermining caused by waves or currents of water exceeding anticipated cyclical levels or suddenly caused by an unusually high water level in a natural body of water, accompanied by a severe storm, or by an unanticipated force of nature, such as a flash flood or an abnormal tidal surge, or by some similarly unusual and unforeseeable event which results in flooding. [NFIP]

Flood-Resistant Material. Flood-resistant material includes any building product capable of withstanding direct and prolonged contact with floodwaters without sustaining significant damage. Prolonged contact is defined as at least 72 hours. Significant damage is any damage requiring more than low-cost cosmetic repair (such as painting). All structural and non-structural building materials at or below the Base Flood Elevation (BFE) must be flood resistant. [NFIP]

Floodway. The channel of a river, creek, or other watercourse and the adjacent land areas that must be reserved in order to discharge the base flood without cumulatively increasing the water surface elevation more than a designated height. [FBC]

Flood Zones. Flood hazard areas identified on the Flood Insurance Rate Map are identified as a Special Flood Hazard Area (SFHA). SFHA are defined as the area that will be inundated by the flood event having a 1-percent chance of being equaled or exceeded in any given year. The 1-percent annual chance flood is also referred to as the base flood or 100-year flood. SFHAs are labeled as Zone A, Zone AO, Zone AH, Zones A1-A30, Zone AE, Zone A99, Zone AR, Zone AR/AE, Zone AR/AO, Zone AR/A1-A30, Zone AR/A, Zone V, Zone VE, and Zones V1-V30. [NFIP]

Foundation. Without a proper foundation, an elevated building can suffer damage from a flood due to erosion, scour, or settling. The National Flood Insurance Program (NFIP) regulations provide performance standards for anchoring new buildings and foundation and fill placement standards for buildings, for manufactured homes, and in V Zones. However, the NFIP performance standards do not specify how a building's foundations are to be constructed in A Zones. The national model building codes address building foundations and the proper placement, compaction, and protection of fill. [NFIP]

Foundation Walls. Masonry walls, poured concrete walls or precast concrete walls, regardless of height, that extend above grade and support the weight of a building. [NFIP]

Freeboard. An additional amount of height above the Base Flood Elevation used as a factor of safety (e.g., 2 feet above the Base Flood) in determining the level at which a structure's lowest floor must be elevated or floodproofed to be in accordance with state or community floodplain management regulations. [NFIP]

Functionally Dependent Use. A use which cannot perform its intended purpose unless it is located or carried out in close proximity to water. This term includes only docking facilities, port facilities that are necessary for the loading and unloading of cargo or passengers, and shipbuilding and ship repair facilities, but does not include long-term storage or related manufacturing facilities. [NFIP]

Garages. **Attached Garages**. A garage attached to a residential structure or in an enclosed area below an elevated building may have the garage floor slab below the Base Flood Elevation (BFE). Because such a garage is an enclosed area below the BFE, openings are required either in the exterior walls of the garage or in the garage doors themselves. [NFIP]

Grade Elevation. The lowest or highest finished ground level that is immediately adjacent to the walls of the building. Use natural (pre-construction), ground level, if available, for Zone AO and Zone A (without BFE). [NFIP]

Grandfathering. An exemption based on circumstances previously existing. [NFIP]

Hazard. Something that is potentially dangerous or harmful, often the root cause of an unwanted outcome. [FEMA]

Hazard Mitigation. Any action taken to reduce or eliminate the long-term risk to human life and property from hazards. The term is sometimes used in a stricter sense to mean cost-effective measures to reduce the potential for damage to a facility or facilities from a disaster or incident. [FEMA]

Hazard-Specific Annex. Individual chapters in an emergency operations plan that describe strategies for managing missions for a specific hazard. They explain the procedures that are unique to that annex for a hazard type and may be short or long depending on the details needed to explain the actions, roles, and responsibilities. The information in these annexes is not repeated elsewhere in the plan. [FEMA]

High Hazard Area. An area of special flood hazard extending from offshore to the inland limit of a primary frontal dune along an open coast and any other area subject to high velocity wave action from storms or seismic sources. The coastal high hazard area is identified as Zone V on Flood Insurance Rate Maps (FIRMs). Special floodplain management requirements apply in V Zones including the requirement that all buildings be elevated on piles or columns. [NFIP]

Highest Adjacent Grade. The highest natural elevation of the ground surface prior to construction next to the proposed walls of a structure. In AO Zones, all new construction and substantial improvements of residential structures shall have the lowest floor including basement elevated above the highest adjacent grade at least as high as the depth number specified in feet on the community's Flood Insurance Rate Map (FIRM); or at least two feet if no depth number is specified. [NFIP]

Historic Building. For the purposes of this code and the referenced documents, an historic building is defined as a building or structure that is:

1. Individually listed in the National Register of Historic Places; or
2. A contributing property in a National Register of Historic Places listed district; or
3. Designated as historic property under an official municipal, county, special district or state designation, law, ordinance or resolution either individually or as a contributing property in a district; or
4. Determined eligible by the Florida State Historic Preservation Officer for listing in the National Register of Historic Places, either individually or as a contributing property in a district. [FBC]

Historic Character. The essential quality of an historic building or space that provides its significance. The character might be determined by the historic background, including association with a significant event or person, the architecture of design, or the contents or elements and finishes of the building or space. [FBC]

Historic Context. A unit created for planning purposes that groups information about historic properties based on a shared theme, specific time period and geographical area. [NPS]

Historic Fabric. Original or added building or construction materials, features and finishes that existed during the period that is deemed to be most architecturally or historically significant or both. [FBC]

Historic Integrity. The ability of a property to convey its historical associations or attributes measured by location, design, setting, materials, workmanship, feeling, and association. [NPS]

Historic Preservation. A generic term that encompasses all aspects of the professional and public concern related to the maintenance of an historic structure, site or element in its current condition, as originally constructed, or with the additions and alterations determined to have acquired significance over time. [FBC]

Historic Site. A place, often with associated structures, having historic significance. [FBC]

Historic Structure. A building, bridge, lighthouse, monument, pier, vessel or other construction that is designated or that is deemed eligible for such designation by a local, regional or national jurisdiction as having historical, architectural or cultural significance. [FBC]

Impervious Surface. Surfaces and other forms of development impenetrable to water and reduce the infiltration of water into the ground. [NOAA]

Increased Cost of Compliance. Coverage for expenses that a property owner must incur, above and beyond the cost to repair the physical damage the structure actually sustained from a flooding event, to comply with mitigation requirements of state or local floodplain management ordinances or laws. Acceptable mitigation measures are elevation, floodproofing, relocation, demolition or any combination thereof. [NFIP]

Insurance, Commercial. Coverage for commercial buildings and their contents against loss caused by fire, windstorm, and many other causes of loss, or perils. [Florida Department of Financial Services]

Insurance, Flood. A separate policy that can cover buildings, the contents in a building, or both, damaged from flooding.

Insurance, Homeowners. Protects financial interests for damages from a covered peril. A peril is something that causes or may cause injury, loss, or destruction, such as a fire, tornado, or hurricane. [Florida Department of Financial Services]

Insurance, Windstorm. Generally required to be included as part of a typical homeowner's insurance policy (Florida Statute 627.712) and by installing wind mitigation features a property owner may be eligible for a reduction in the windstorm premium. [Florida Department of Financial Services]

Integrity. The authenticity of a property's historic identity, evidenced by the survival of physical characteristics that existed during the property's historic or prehistoric period. [NPS]

Letter of Map Change (LOMC). A general term used to refer to the several types of revisions and amendments to FEMA maps that can be accomplished by letter. Letters of map change include:

Letter of Map Amendment (LOMA): An amendment to the currently effective FEMA map which establishes that a property is not located in a Special Flood Hazard Area (SFHA). A LOMA is issued only by FEMA.

Letter of Map Revision (LOMR): FEMA's modification to an effective Flood Insurance Rate Map (FIRM), or Flood Boundary and Floodway Map (FBFM), or both. Letter of Map Revisions are generally based on the implementation of physical measures that affect the hydrologic or hydraulic characteristics of a flooding source and thus result in the modification of the existing regulatory floodway, the effective Base Flood Elevations (BFEs), or the Special Flood Hazard Area (SFHA).

Letter of Map Revision Based On Fill (LOMR-F): FEMA's modification of the Special Flood Hazard Area (SFHA) shown on the Flood Insurance Rate Map (FIRM) based on the placement of fill outside the existing regulatory floodway.

Conditional Letter Of Map Revision (CLOMR): FEMA's comment on a proposed project that would, upon construction, affect the hydrologic or hydraulic characteristics of a flooding source and thus result in the modification of the existing regulatory floodway, the effective Base Flood Elevations (BFEs), or the Special Flood Hazard Area (SFHA). The letter does not revise an effective NFIP map, it indicates whether the project, if built as proposed, would be recognized by FEMA. FEMA charges a fee for processing a CLOMR to recover the costs associated with the review. [NFIP]

Limit of Moderate Wave Action (LiMWA). Line shown on FIRMs to indicate the inland limit of the 1 ½- foot (457 mm) breaking wave height during the base flood. [FBC]

Load-Bearing Element. Any column, girder, beam, joist, truss, rafter, wall, floor or roof sheathing that supports any vertical load in addition to its own weight or any lateral load. [FBC]

Local Floodplain Management Ordinance. An ordinance or regulation adopted pursuant to the requirements in Title 44 Code of Federal Regulations, Parts 59 and 60 for participation in the National Flood Insurance Program. [FBC]

Lowest Adjacent Grade. The lowest point of the ground level immediately next to a building. [NFIP]

Lowest Floor. The lowest floor of the lowest enclosed area (including a basement). An unfinished or flood-resistant enclosure, usable solely for parking of vehicles, building access or storage in an area other than a basement area, is not considered a building's lowest floor provided that such enclosure is not built so as to render the structure in violation of requirements. [NFIP]

Lowest Floor Elevation (LFE). The measured distance of a building's lowest floor above the National Geodetic Vertical Datum (NGVD) or other datum specified on the FIRM for that location. [NFIP]

Lowest Horizontal Structural Member. In V Zones, new construction must have the elevation of the lowest horizontal structural member at or above the Base Flood Elevation (BFE). Horizontal structural members are obstructions and can transmit the force of wave impacts to rest of the structure. This elevation is used as the reference level to determine insurance rates. This contrasts with construction and insurance rating in A Zones, which uses the elevation of the lowest floor including basement as the reference level. [NFIP]

Manufactured (Mobile) Home. A structure built on a permanent chassis, transported to its site in one or more sections and affixed to a permanent foundation. "Manufactured (mobile) home" does not include recreational vehicles. [NFIP]

Map Revision. A change in the Flood Hazard Boundary Map (FHBM) or Flood Insurance Rate Map (FIRM) for a community which reflects revised zone, base flood or other information. [NFIP]

Masonry Walls. Walls constructed of individual components laid in and bound together with mortar. These components can be brick, stone, concrete block, etc. [NFIP]

Mean Higher High Water (MHHW). A tidal datum. The average of the higher high water height of each tidal day observed over the National Tidal Datum Epoch. For stations with shorter series, simultaneous observational comparisons are made with a control tide station in order to derive the equivalent datum of the National Tidal Datum Epoch. [NOAA]

Mean Sea Level. For purposes of the National Flood Insurance Program, the National Geodetic Vertical Datum (NGVD) of 1929 or other datum, to which base flood elevations shown on a community's Flood Insurance Rate Map are referenced. [NFIP]

Mechanical Equipment. The National Flood Insurance Program (NFIP) requires that all mechanical equipment in new or substantially improved structures be elevated to above the BFE or designed so that floodwaters cannot infiltrate or accumulate within any component of the system. This would include electrical, heating, ventilation, plumbing, and air conditioning equipment and other service facilities. [NFIP]

National Flood Insurance Program (NFIP). 1) The NFIP is a program that makes federally-backed flood insurance available in those states and communities that agree to adopt and enforce flood-plain management ordinances to reduce future flood damage. [NFIP]

National Flood Insurance Program (NFIP). The program of flood insurance coverage and floodplain management administered under the Act and applicable federal regulations promulgated in Title 44 of the Code of Federal Regulations, Subchapter B. [NFIP]

National Geodetic Vertical Datum (NGVD) of 1929. National standard reference datum for elevations, formerly referred to as Mean Sea Level (MSL) of 1929. NGVD 1929 may be used as the reference datum on some Flood Insurance Rate Maps (FIRMs). [NFIP]

Natural grade. The grade unaffected by construction techniques such as fill, landscaping or berming. [NFIP]

New Construction. Buildings for which the "start of construction" commenced on or after the effective date of an initial Flood Insurance Rate Map (FIRM) or after December 31, 1974, whichever is later, including any subsequent improvements.

a. For Floodplain Management Purposes: Structures for which the start of construction commenced on or after the effective date of a floodplain management regulation adopted by a community and includes any subsequent improvements to such structures. [NFIP]

North American Vertical Datum (NAVD) of 1988. The vertical control datum established for vertical control surveying in the Unites States of America based upon the General Adjustment of the North American Datum of 1988. It replaces the National Geodetic Vertical Datum (NGVD) of 1929. [NFIP]

Nuisance Flooding. Minor, recurrent flooding that takes place at high tide. It occurs when the ocean has reached the "brim" locally. Because of sea level rise, nuisance flooding in the United States has become a "sunny day" event—not necessarily linked to storms or heavy rain. [NOAA]

Obstructions. All new construction and substantial improvements in V Zones must have the space below the lowest floor either free of obstruction or constructed with non-supporting breakaway walls. Foundations that offer minimal resistance to floodwaters passing beneath an elevated building are required in V Zones. Fill is prohibited for the structural support of buildings in V Zones. [NFIP]

Openings. In A Zones, all new construction and substantial improvements may have fully enclosed areas below the lowest floor that are usable solely for vehicle parking, building access, or storage, in an area other than a basement, which are subject to flooding. These enclosed areas must be designed to automatically equalize hydrostatic flood forces on exterior walls by allowing the entry and exit of floodwaters. [NFIP]

Participating Community. A community for which FEMA has authorized the sale of flood insurance under the NFIP. [NFIP]

Participation in the NFIP. Participation in the National Flood Insurance Program (NFIP) is voluntary. To join, the community must:

1. Complete an application;
2. Adopt a resolution of intent to participate and cooperate with FEMA;
3. Adopt and submit a floodplain management ordinance that meets or exceeds the minimum NFIP criteria. The floodplain management ordinance must also adopt any FIRM or FHBM for the community.

Within participating communities, the Federal government makes flood insurance available throughout the community. [NFIP]

Perimeter Barrier. A continuous barrier to keep the flood water away from the perimeter of a building or group of buildings, either permanently or immediately preceding a food event. These barriers can be permanent or deployable immediately preceding a food event.

Permit for Floodplain Development. A permit is required before construction or development begins within any SFHA.

Special Flood Hazard Area (SFHA). If FEMA has not defined the SFHA within a community, the community shall require permits for all proposed construction or other development in the community including the placement of manufactured homes, so that it may determine whether such construction or other development is proposed within flood-prone areas. Permits are required to ensure that proposed development projects meet the requirements of the NFIP and the community's floodplain management ordinance. [NFIP]

Persistent Flooding. See Nuisance Flooding.

Positive Roof Drainage. The drainage condition in which consideration has been made for all loading deflections of the roof deck, and additional slope has been provided to ensure drainage of the roof within 48 hours of precipitation. [FBC]

Post-FIRM Building. A building for which construction or substantial improvement occurred after December 31, 1974 or on or after the effective date of an initial Flood Insurance Rate Map (FIRM), whichever is later.

Post-Flood Insurance Rate Map (FIRM) Buildings. New construction and those built after the effective date of the first FIRM for a community. Insurance rates for Post-FIRM buildings are dependent on the elevation of the lowest floor in relation to the Base Flood Elevation (BFE). [NFIP]

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). [NFIP]

Preservation. The act or process of applying measures necessary to sustain the existing form, integrity and materials of an historic building or structure. [FBC]

Primary Residence. A single family building, condominium unit, apartment unit, or unit within a cooperative building that will be lived in by the policyholder or the policyholder's spouse for:

- More than 50% of the 365 calendar days following the current policy effective date; or
- 50% or less of the 365 calendar days following the current policy effective date if the policyholder has only one residence and does not lease that residence to another party or use it as rental or income property at any time during the policy term. [NFIP]

Primary Residential Property. Either a primary residence or the contents within a primary residence, or both. [NFIP]

Principal Residence. A single-family dwelling in which, at the time of loss, the named insured or the named insured's spouse has lived for either 80% of the 365 days immediately preceding the loss or 80% of the period of ownership, if less than 365 days. [NFIP]

Proper Openings. Enclosures (Applicable to Zones A, A1-A30, AE, AO, AH, AR and AR Dual). All enclosures below the lowest elevated floor must be designed to automatically equalize hydrostatic flood forces on exterior walls by allowing for the entry and exit of floodwaters. A minimum of 2 openings, with positioning on at least 2 walls, having a total net area of not less than 1 square inch for every square foot of enclosed area subject to flooding must be provided. The bottom of all openings must be no higher than 1 foot above the higher of the exterior or interior (adjacent) or floor immediately below the openings. [NFIP]

Provisional Rating. A method for placing flood coverage prior to the receipt of a FEMA Elevation Certificate. [NFIP]

Recreational Vehicle. A vehicle which is:

a. Built on a single chassis;
b. 400 square feet or less when measured at the largest horizontal projection;
c. Designed to be self-propelled or permanently towable by a light duty truck; and
d. Designed primarily not for use as a permanent dwelling but as temporary living quarters for recreational, camping, travel, or seasonal use.

A recreational vehicle placed on a site in a Special Flood Hazard Area (SFHA) must meet the elevation and anchoring requirements for manufactured homes, unless it:

a. Is on the site for fewer than 180 consecutive days, or
b. Is fully licensed and ready for highway use.

Ready for highway use means that it is on its wheels or jacking system, is attached to the site only by quick disconnect type utilities and has no permanently attached additions. [NFIP]

Rehabilitation. Any work, as described by the categories of work defined herein, undertaken in an existing building. [FBC]

Rehabilitation, Historic Building. The act or process of making possible a compatible use of a property through repair, alterations and additions while preserving those portions or features which convey its historical, cultural or architectural values. [FBC]

Repair. The reconstruction or renewal of any part of an existing building for the purpose of its maintenance or to correct damage. [FBC]

Repetitive Loss Structure. An NFIP-insured structure that has had at least 2 paid flood losses of more than $1,000 each in any 10-year period since 1978. [NFIP]

Replacement Cost Value (RCV). The cost to replace property with the same kind of material and construction without deduction for depreciation. [NFIP]

Reroofing. The process of recovering or replacing an existing roof covering. See "Roof recover" and "Roof replacement. [FBC]

Resilience, Flood. The ability to withstand, respond to, and recover from a flooding or storm event.

Restoration. The act or process of accurately depicting the form, features and character of a property as it appeared at a particular period of time by means of the removal of features, and repair or replacement of damaged or altered features from the restoration period. [FBC]

Retrofit. The voluntary process of strengthening or improving buildings or structures, or individual components of buildings or structures, for the purpose of making existing conditions better serve the purpose for which they were originally intended or the purpose that current building codes intend. [FBC]

Riverine Flooding. Occurs when streams and rivers exceed the capacity of their natural or constructed channels to accommodate water flow and water overflows the banks, spilling out into adjacent low-lying, dry land. [FEMA]

Roof Recover. The process of installing an additional roof covering over a prepared existing roof covering without removing the existing roof covering. [FBC]

Roof Repair. Reconstruction or renewal of any part of an existing roof for the purposes of its maintenance. [FBC]

Roof Replacement. The process of removing the existing roof covering, repairing any damaged substrate and installing a new roof covering. [FBC]

Roof Section. A separating or division of a roof area by existing expansion joints, parapet walls, flashing (excluding valley), difference of elevation (excluding hips and ridges), roof type or legal description; not including the roof area required for a proper tie-off with an existing system. [FBC]

Setback. Setbacks may be used to keep development out of harm's way. Setback standards establish minimum distances that structures must be positioned (or set back) from river channels and coastal shorelines. Setbacks can be defined by vertical heights or horizontal distances. Setbacks are not required by the National Flood Insurance Program (NFIP). The Community Rating System (CRS) credits setbacks under Higher Regulatory Standards, Special Hazards Regulations. [NFIP]

Severe Repetitive Loss Building. Any building that:

1. Is covered under a Standard Flood Insurance Policy made available under this title;
2. Has incurred flood damage for which:
    a. 4 or more separate claim payments have been made under a Standard Flood Insurance Policy issued pursuant to this title, with the amount of each such claim exceeding $5,000, and with the cumulative amount of such claims payments exceeding $20,000; or
    b. At least 2 separate claims payments have been made under a Standard Flood Insurance Policy, with the cumulative amount of such claims payments exceed the fair market value of the insured building on the day before each loss. [NFIP]

Severe Repetitive Loss Property. Either a severe repetitive loss building or the contents within a severe repetitive loss building, or both. [NFIP]

Solid (Perimeter) Foundation Walls. Walls that are used as a means of elevating a building in A Zones and that must contain sufficient openings to allow for the unimpeded flow of floodwaters more than 1 foot deep. [NFIP]

Special Flood Hazard Area. An area having special flood, mudflow or flood-related erosion hazards and shown on a Flood Hazard Boundary Map (FHBM) or a Flood Insurance Rate Map (FIRM) Zone A, AO, A1-A30, AE, A99, AH, AR, AR/A, AR/AE, AR/AH, AR/AO, AR/A1-A30, V1-V30, VE or V. The SFHA is the area where the National Flood Insurance Program's (NFIP's) floodplain management regulations must be enforced and the area where the mandatory purchase of flood insurance applies. For the purpose of determining Community Rating System (CRS) premium discounts, all AR and A99 zones are treated as non-SFHAs. [NFIP]

Start of Construction. The date of issuance of permits for new construction and substantial improvements, provided the actual start of construction, repair, reconstruction, rehabilitation, addition, placement, or other improvement is within one hundred eighty (180) days of the date of the issuance. The actual start of construction means either the first placement of permanent construction of a building (including a manufactured home) on a site, such as the pouring of slab or footings, the installation of piles, the construction of columns.

Permanent construction does not include land preparation (such as clearing, grading, or filling), the installation of streets or walkways, excavation for a basement, footings, piers, or foundations, the erection of temporary forms or the installation of accessory buildings such as garages or sheds not occupied as dwelling units or not part of the main buildings. For a substantial improvement, the actual "start of construction" means the first alteration of any wall, ceiling, floor or other structural part of a building, whether or not that alteration affects the external dimensions of the building. [FBC]

Sea Level Rise. The increasing of the average global sea level. [NOAA]

Storage. All new construction and substantial improvements must have any fully enclosed area below the lowest floor useable solely for storage, parking or access. The type of storage permitted in an enclosed lower area should be limited to that which is incidental and accessory to the principal use of the structure. For example, if the structure is a residence, storage should be limited to items such as lawn and garden equipment, snow tires, and other low damage items which will not suffer flood damage or can be conveniently moved to the elevated part of the building. [NFIP]

Storm Surge. The abnormal rise in seawater level during a storm, measured as the height of the water above the normal predicted astronomical tide. The surge is caused primarily by a storm's winds pushing water onshore. The amplitude of the storm surge at any given location depends on the orientation of the coast line with the storm track; the intensity, size, and speed of the storm; and the local bathymetry. [NOAA]

Structure. A walled and roofed building, other than a gas or liquid storage tank, principally above ground and affixed to a permanent site as well as a manufactured home on a permanent foundation. [NFIP]

Subgrade Crawlspace. A crawlspace foundation where the subgrade under-floor area is no more than 5 feet below the top of the next-higher floor and no more than 2 feet below the lowest adjacent grade on all sides. [NFIP]

Subsidence. Sinking of the ground because of underground material movement—is most often caused by the removal of water, oil, natural gas, or mineral resources out of the ground by pumping, fracking, or mining activities. [NOAA]

Subsidence can also be caused by natural events such as earthquakes, soil compaction, glacial isostatic adjustment, erosion, sinkhole formation, and adding water to fine soils deposited by wind (a natural process known as loess deposits). Subsidence can happen over very large areas like whole states or provinces, or very small areas like the corner of your yard. In the Chesapeake Bay area, for example, land subsidence may be caused by a combination of sediment loading (when rivers deposit sediment in an area that then sinks under the additional weight) and sediment compaction after groundwater is removed. [NOAA]

Substantial Damage. Damage of any origin sustained by a structure whereby the cost of restoring the structure to its before-damaged condition would equal or exceed 50 percent of the market value of the structure before the damage occurred. [FBC]

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 is 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. [FBC]

Substantial Structural Damage. A condition where one or both of the following apply:

1. The vertical elements of the lateral force-resisting system have suffered damage such that the lateral load-carrying capacity of any story in any horizontal direction has been reduced by more than 33 percent from its pre-damage condition.
2. The capacity of any vertical component carrying gravity load, or any group of such components, that supports more than 30 percent of the total area of the structure's floor(s) and roof(s) has been reduced more than 20 percent from its pre-damage condition and the remaining capacity of such affected elements, with respect to all dead and live loads, is less than 75 percent of that required by the Florida Building Code, Building for new buildings of similar structure, purpose and location. [FBC]

Substantially Damaged Property. Either a substantially damaged building or the contents within a substantially damaged building, or both. [NFIP]

Swimming Pools. A pool adjacent to an elevated V Zone building may be constructed at grade or elevated so that the lowest horizontal structural member supporting the pool is at or above the Base Flood Elevation (BFE). A design professional must assure community officials that a pool beneath or adjacent to an elevated V Zone building will not divert waves and increase the potential damage to any nearby buildings. [NFIP]

Travel Trailer. Under the NFIP, a travel trailer can be considered a building only if it is without wheels, built on a chassis and affixed to a permanent foundation and regulated under the community's floodplain management and building ordinances or laws. [NFIP]

Unsafe. Buildings, structures or equipment that are unsanitary, or that are deficient due to inadequate means of egress facilities, inadequate light and ventilation, or that constitute a fire hazard, or in which the structure or individual structural members meet the definition of "Dangerous," or that are otherwise dangerous to human life or the public welfare, or that involve illegal or improper occupancy or inadequate maintenance shall be deemed unsafe. A vacant structure that is not secured against entry shall be deemed unsafe. [FBC]

Variance. A grant of relief by a participating community from the terms of its floodplain management regulations. [NFIP]

Vulnerability. The susceptibility of human settlements to the harmful impacts of natural hazards. [FEMA]

V-Zone Certificate. National Flood Insurance Program (NFIP) regulations require coastal communities to ensure that buildings built in V Zones are anchored to resist wind and water loads acting simultaneously. Buildings in V Zones are subject to a greater hazard than buildings built in other types of floodplains. Not only do they have to be elevated above the Base Flood Elevation (BFE), they must be protected from the impact of waves, hurricane-force winds and erosion. [NFIP]

Water Surface Elevation. The height, in relation to the National Geodetic Vertical Datum (NGVD) of 1929, (or other datum, where specified) of floods of various magnitudes and frequencies in the flood plains of coastal or riverine areas. [NFIP]

Wet Floodproofing. Wet Floodproofing includes permanent or contingent measures applied to a structure or its contents that prevent or provide resistance to damage from flooding while allowing floodwaters to enter the structure or area. Generally, this includes properly anchoring the structure, using flood resistant materials below the Base Flood Elevation (BFE), protection of mechanical and utility equipment, and use of openings or breakaway walls. [NFIP]

Wind Retrofit, Existing Building. Voluntary mitigation actions taken on existing buildings. For a building retrofit to be effective, the building needs to achieve the performance level selected by the building owner or operator (the target performance level) and be commensurate with the level of the wind event for which the retrofit was designed. [FEMA]

Zone. A geographical area shown on a Flood Hazard Boundary Map (FHBM) or a Flood Insurance Rate Map (FIRM) that reflects the severity or type of flooding in the area. [NFIP]

Zone A. Areas with a 1% annual chance of flooding and a 26% chance of flooding over the life of a 30-year mortgage. Because detailed analyses are not performed for such areas; no depths or base flood elevations are shown within these zones. [NFIP]

Zone A99. Areas with a 1% annual chance of flooding that will be protected by a Federal flood control system where construction has reached specified legal requirements. No depths or base flood elevations are shown within these zones. [NFIP]

Zone A1-30. These are known as numbered A Zones (e.g., A7 or A14). This is the base floodplain where the FIRM shows a BFE (old format). [NFIP]

Zone AE. The base floodplain where base flood elevations are provided. AE Zones are now used on new format FIRMs instead of A1-A30 Zones. [NFIP]

Zone AH. Areas with a 1% annual chance of shallow flooding, usually in the form of a pond, with an average depth ranging from 1 to 3 feet. These areas have a 26% chance of flooding over the life of a 30-year mortgage. Base flood elevations derived from detailed analyses are shown at selected intervals within these zones. [NFIP]

Zone AO. River or stream flood hazard areas, and areas with a 1% or greater chance of shallow flooding each year, usually in the form of sheet flow, with an average depth ranging from 1 to 3 feet. These areas have a 26% chance of flooding over the life of a 30-year mortgage. Average flood depths derived from detailed analyses are shown within these zones. [NFIP]

Zone AR. Areas with a temporarily increased flood risk due to the building or restoration of a flood control system (such as a levee or a dam). Mandatory flood insurance purchase requirements will apply, but rates will not exceed the rates for unnumbered A zones if the structure is built or restored in compliance with Zone AR floodplain management regulations. [NFIP]

Zone B and X (Shaded). Area of moderate flood hazard, usually the area between the limits of the 100- year and 500-year floods. B Zones are also used to designate base floodplains of lesser hazards, such as areas protected by levees from 100-year flood, or shallow flooding areas with average depths of less than one foot or drainage areas less than 1 square mile. [NFIP]

Zone C or X (Unshaded). Area of minimal flood hazard, usually depicted on FIRMs as above the 500-year flood level. Zone C may have ponding and local drainage problems that don't warrant a detailed study or designation as base floodplain. Zone X is the area determined to be outside the 500-year flood and protected by levee from 100- year flood. [NFIP]

Zone D. Areas with possible but undetermined flood hazards. No flood hazard analysis has been conducted. Flood insurance rates are commensurate with the uncertainty of the flood risk. [NFIP]

Zone V. Coastal areas with a 1% or greater chance of flooding and an additional hazard associated with storm waves. These areas have a 26% chance of flooding over the life of a 30-year mortgage. No base flood elevations are shown within these zones. [NFIP]

Zone VE and V1-30. Coastal areas with a 1% or greater chance of flooding and an additional hazard associated with storm waves. These areas have a 26% chance of flooding over the life of a 30-year mortgage. Base flood elevations derived from detailed analyses are shown at selected intervals within these zones. [NFIP]

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