RESILIENT HERITAGE
ST AUGUSTINE

FLOOD MITIGATION DESIGN GUIDANCE FOR HISTORIC RESIDENCES

CITY OF ST. AUGUSTINE, FLORIDA

PDP
PRESERVATION DESIGN PARTNERSHIP, LLC

August 2021

The *Guidance document* was prepared in response to flood damage by Hurricane Matthew in 2016 and Hurricane Irma in 2017 in the city's Abbott Tract, Lincolnville, and Model Land Company Historic Districts. However, the information presented in this document can be applied to all of the city's historic properties.

We would like to express our appreciation to the City of St. Augustine and its Preservation Officer, Jenny Wolfe, as well as the Florida Department of State, Division of Historical Resources, for their support in the completion of this project.

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Lincolnville: Lincolnville is defined by a period of rapid growth beginning in 1866 with the settlement of former black slaves and ending around 1930 as a solidly black community. Lincolnville consists primarily of wood frame vernacular residences from this period as well as some churches, commercial structures and other buildings that contribute to the neighborhood's historic character. The close proximity to Maria Sanchez Creek and tidal marshes of the Matanzas and San Sebastian Rivers makes Lincolnville prone to regular flooding.

Model Land Co.: Construction in this area began in 1873 when E.F. Joyce subdivided and sold lots for residential development resulting in about a dozen houses by 1885. Henry Flagler purchased the property and following the construction of the Hotel Ponce de Leon, he constructed elaborate winter residences for senior officials of the Flagler organization. He later expanded his landholdings to the west by filling in marshes of the San Sebastian River and Maria Sanchez Creek. In 1903, he conveyed title of the undeveloped thirty-seven acres to his Model Land Co. real estate firm, which then built residences for the working class of St. Augustine from 1914 to 1930, many in the Bungalow and Mediterranean Revival styles. Today, the northern portion of the neighborhood is primarily residential with Flagler College dominating land holdings to the south.

View of the City of St. Augustine, Fla. Norris, Weller & Swift. Brockton, Mass. 1885 (Image courtesy of City of St. Augustine.) The earliest settlement was concentrated around what is now known as the Town Plan Historic District and continued to the north, in the Abbott Tract, followed by Lincolnville and later Model Land Company. To maximize development potential during the city's periods of growth, marshy lands were infilled to allow for the construction of additional housing and hotels. The proximity to waterways make all of these historic districts susceptible to flooding.

Abbott Tract: The Abbott Tract Historic District is the first development outside of the colonial city and includes the largest concentration of 19th century buildings in St. Augustine. The district's buildings are largely residential, ranging from one-story framed residences on small lots to more elaborate monumental residences. Some of the former residences on San Marco Avenue have been adapted for commercial purposes.

Flooding has been an ongoing issue for St. Augustine as demonstrated by this 1944 photograph. (Photograph courtesy of Florida Memory.)

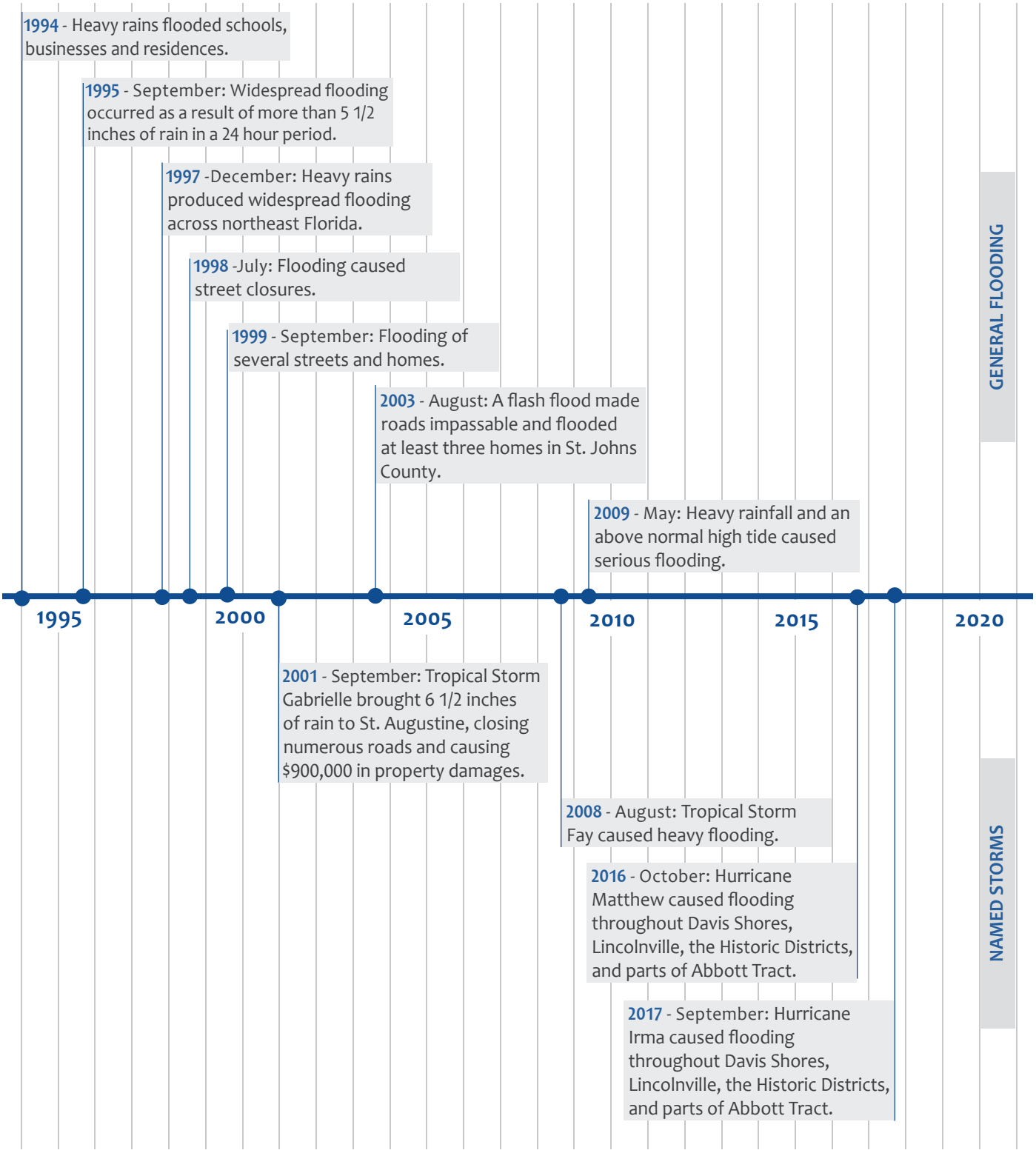
1 Introduction

Founded on September 8, 1565, St. Augustine is the oldest, continuously occupied European-established settlement within the borders of the continental United States. Today, the City of St. Augustine has five local Historic Districts and three locally designated Landmark Buildings and has completed approximately 800 excavations at archaeological sites. The largest concentration of the City's most significant historic resources, including Spanish Colonial buildings and archaeological remains, can be found in the National Historic Landmark designated Town Plan Historic District. In addition, there are seven National Register Historic Districts. There are also numerous individual properties designated as National Historic Landmarks and structures listed in the National Register of Historic Places.

St. Augustine is a low-lying city, crisscrossed by waterways. As the city was built-out to meet the ongoing housing demands, marshy land was infilled to maximize development opportunities. Recent hurricanes and the noticeable impacts of climate change, including more frequent and intense storms coupled with sea level rise, has increased the awareness of the vulnerability of many of St. Augustine's historic properties.

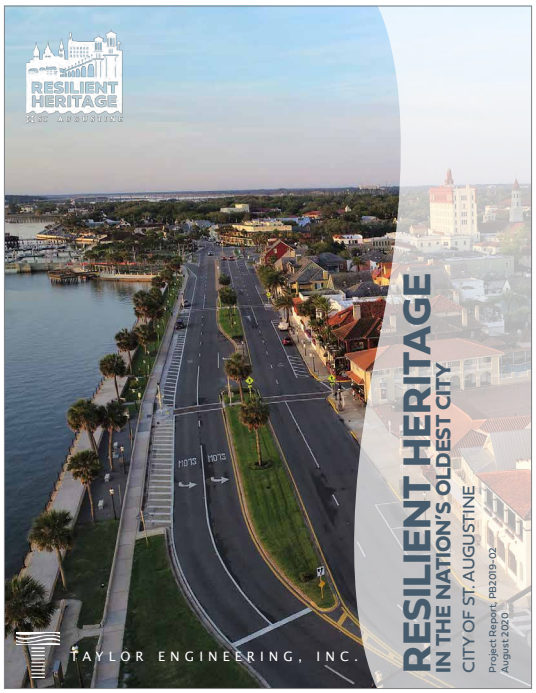
The information presented in this *Guidance* document was prepared to provide information to owners and tenants on evaluating options to minimize the impact of flooding on residential properties in the city's 19th and 20th century Historic Districts. It includes an overview of flood insurance and floodplain management requirements, and identifies strategies for minimizing the impact on historic integrity when implementing flood mitigation measures. This *Guidance* document should be considered as a supplement to consultation with architects and engineers; the St. Augustine City Code, the Florida Building Code; and, where applicable, the Historic Architectural Review Board (HARB) review process.

ST. AUGUSTINE: RECENT FLOOD EVENTS (1994- PRESENT)



Floodplain management within a historic residential setting strives to balance each property owner's desire to protect their home with maintaining the historic character of the neighborhood.

2 Flooding



The city commissioned Resilient Heritage to assesses the impact of flooding on St. Augustine's historic resources. (www.citystaug.com/733/Preservation-Projects.)

Over 76% of the parcels located within St. Augustine's local and National Register Historic Districts are located within a floodplain, making many of the city's historic buildings vulnerable to flooding and associated damage. *(Resilient Heritage, page 11.)* The waterways surrounding the city can be affected by normal rainfall coinciding with peak tides, tidal surges accompanying coastal storms, intense rainfall, tropical storms and hurricanes, resulting in overbank flooding that can impact roadways and buildings. This is exacerbated by the City's high water table and poor drainage qualities of some local soil that impedes groundwater absorption, resulting in stormwater being directed to the city's stormwater collection system. Like many of the country's older cities, St. Augustine's aging and undersized infrastructure is unable to handle the needs of its residents and businesses as well as the every increasing demands associated with stormwater collection from its roadways.

Two recent events, Hurricane Matthew in 2016 and Hurricane Irma in 2017 impacted many of the city's historic properties including those found in the city's National Register and locally designated Historic Districts. ***The economic impact assessment of the recent hurricanes presented in Resilient Heritage found there was a significant increase in building permits in a storm year, representing approximately $11.7 million dollars more in construction related activity, greatly impacting the city's property owners. Similarly, there is a significant impact on tourism, resulting in forgone economic loss of approximately $20 million in tourist expenditures, resulting in a loss of jobs and estimated salaries of approximately $12.27 million.***

The pale blue areas, covering the majority of St. Augustine's historic districts, 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 generally defined as Zone AE, in which the base flood elevations are determined. The light brown represents areas of historically 0.2% annual chance flood (also known as the 500-year flood zone). The areas difined by the yellow boundaries represent the Abbott Tract, Lincolnville, and Model Land Company Historic Districts. (Flood Insurance Rate Maps are also available through FEMA's Map Service Center at https://mcs.fema.gov/portal/home.)

FLOOD-PRONE WATERWAYS

- Hospital Creek
- Maria Sanchez Lake
- Matanzas Bay
- Oyster Creek
- Salt Run
- San Sebastian River

SPECIAL FLOOD HAZARD AREAS

An area in the floodplain subject to a 1 percent or greater chance of flooding in any given year. Special flood hazard areas are shown on FIRMs as Zone A, AO, A1-A30, AE, A99, AH, V1-V30, VE or V. [Also defined in Florida Building Code, Building Section 202.] [- SAFM]

The Special Flood Hazard Area (SFHA) is based upon historical data. It 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 front house that could be inundated in a storm), while A Zones are not. ***Nearly all of St. Augustine's Historic Districts are within AE Zones.***

AE ZONE

Areas subject to inundation by the 1-percent-annual-chance flood event determined by detailed methods. Base Flood Elevations (BFEs) are shown. Mandatory flood insurance purchase requirements and floodplain management standards apply.

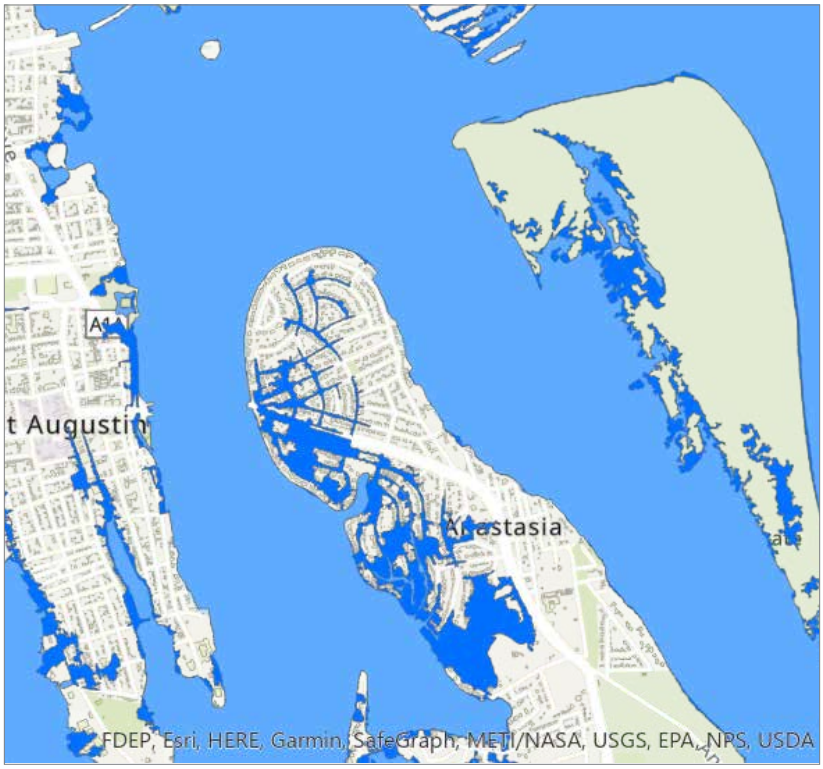
FLOODSMART

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

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]

Buildings constructed or substantially improved after the community's initial FIRM should have been constructed in compliance with the local floodplain ordinance. Most historic buildings are pre-FIRM structures.



St. Augustine is susceptible to flooding from multiple directions. The map indicates potential flood water pathways.

Identifying Flood Risk

Flooding can occur from a variety of natural sources including storms, precipitation, the ocean, bays, harbors, rivers, streams, and creeks. Flooding can also occur as a result of failures of man-made infrastructure such as water and storm water systems. Although flood threat from infrastructure failure is often sudden and unpredictable, low-lying, flood prone areas located adjacent to or near waterways, also known as floodplains, are mapped by the Federal Emergency Management Agency (FEMA). Information regarding a property's flood vulnerability can be found on FEMA's Flood Insurance Rate Maps (FIRMs) available online through FEMA's Flood Map Service Center, which can be searched by street address. FIRMs serve as the basis for floodplain regulation and management, as well as a tool for determining flood insurance premiums. ***However, FIRMs are based upon historical or current flood data and do not address future threats such as subsidence and sea level rise.***

The FIRMs identify the extent of the 1% floodplain of the ground, also known as the 100-year floodplain, or Special Flood Hazard Area (SFHA), representing the properties at the greatest risk of flooding. Buildings outside of the SFHA with levels below grade, such as crawlspaces and garages, may be equally vulnerable to flooding while buildings that are a few steps above grade (such as many of St. Augustine's residences) are less vulnerable. In addition, properties outside of designated floodplains often experience flooding during major storm events, such as hurricanes and tropical storms.

INCREASING FLOOD RISK

Like many communities in Florida, St. Augustine is experiencing an increase in the rate and intensity of flooding over historical trends. Roads that used to weather a storm can now become impassable; temporary ponds form after heavy rains; and property owners have to address new, more frequent, or more severe impacts, such as flood waters inundating their homes. Increased precipitation attributed to climate change is one of the key contributing factors, made worse when occurring during high tide or accompanied by the high winds of a strong storm or hurricane. These factors can occur separately or together, and all stress infrastructure systems that, in some cases, have already begun to fail due to age and/or lack of maintenance.

Severe hurricane winds and changing wind patterns can contribute to more frequent coastal flooding and higher storm surge, while St. Augustine's high watertable 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 and visitors alike, there is also a substantial economic impact on the City as a whole.


EPA United States Environmental Protection Agency

August 2016
EPA 430-F-16-011

What Climate Change Means for Florida

Florida's climate is changing. The Florida peninsula has warmed more than one degree (F) during the last century. The sea is rising about one inch every decade, and heavy rainstorms are becoming more severe. In the coming decades, rising temperatures are likely to increase storm damages, harm coral reefs, increase the frequency of unpleasantly hot days, and reduce the risk of freezing to Florida's agriculture.

Climate is changing because the earth is warming. People have increased the amount of carbon dioxide in the air by 40 percent since the late 1700s. Other heat-trapping greenhouse gases are also increasing. These gases have warmed the surface and lower atmosphere of our planet about one degree during the last 50 years. Evaporation increases as the atmosphere warms, which increases humidity, average rainfall, and the frequency of heavy rainstorms in many places—but contributes to drought in others.

Greenhouse gases are also changing the world's oceans and ice cover. Carbon dioxide reacts with water to form carbonic acid, so the oceans are becoming more acidic. The surface of the ocean has warmed about one degree during the last 80 years. Warming is causing snow to melt earlier in spring, and mountain glaciers are retreating. Even the great ice sheets on Greenland and Antarctica are shrinking. Thus the sea is rising at an increasing rate.

Temperature change (°F)

Rising temperatures in the last century. South Florida has warmed more than the rest of the state. Source: EPA, Climate Change Indicators in the United States.

Rising Seas and Retreating Shores

Along the Atlantic and Gulf Coasts of Florida, the land surface is also sinking. If the oceans and atmosphere continue to warm, sea level along the Florida coast is likely to rise one to four feet in the next century. Rising sea level submerges wetlands and dry land, erodes beaches, and exacerbates coastal flooding.

Coastal cities like West Palm Beach will likely need to take adaptive measures, such as building larger seawalls, elevating structures, and nourishing beaches, to avoid damage from sea level rise. Credit: Peter G. Merrill, Treasure Coast Regional Planning Council.

Storms, Homes, and Infrastructure

Tropical storms and hurricanes have become more intense during the past 20 years. Although warming oceans provide these storms with more potential energy, scientists are not sure whether the recent intensification reflects a long-term trend. Nevertheless, hurricane wind speeds and rainfall rates are likely to increase as the climate continues to warm.

Cities, roads, railways, ports, and water supplies in Florida are vulnerable to the impacts of storms and sea level rise. Greater wind speeds and the resulting damages can make insurance for wind damage more expensive or difficult to obtain. Whether or not storms become more intense, coastal homes and infrastructure will flood more often as sea level rises, because storm surges will become higher as well. As a result, rising sea level is likely to increase flood insurance premiums.

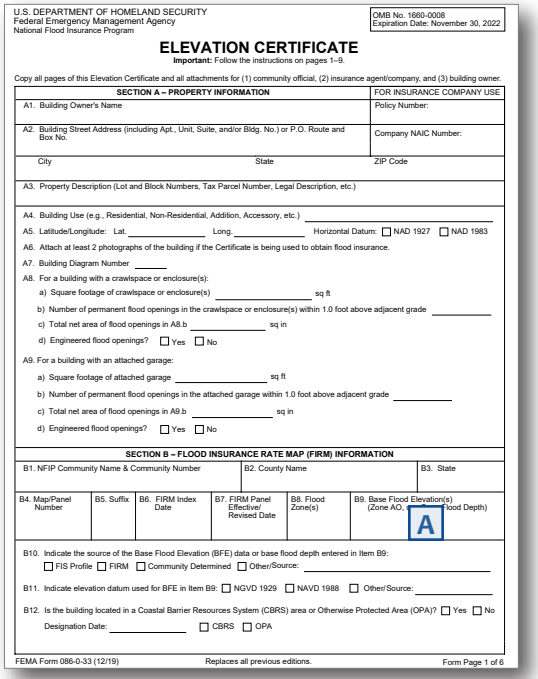
Changing climate is also likely to increase inland flooding. Since 1958, the amount of precipitation during heavy rainstorms has increased by 27 percent in the Southeast, and the trend toward increasingly heavy rainstorms is likely to continue. More intense rainstorms can increase flooding because rivers overtop their banks more frequently, and more water accumulates in low-lying areas that drain slowly.

"Along the Atlantic and Gulf Coasts of Florida, the land surface is also sinking. If the oceans and atmosphere continue to warm, sea level along the Florida coast is likely to rise one to four feet in the next century. Rising sea level submerges wetlands and dry land, erodes beaches, and exacerbates coastal flooding."

- Environmental Protection Agency, August 2016

ELEVATION CERTIFICATE

The best way to obtain an accurate flood risk assessment for a specific property is to acquire an Elevation Certificate, typically prepared by a licensed surveyor, but they can be obtained from an architect or engineer. The Elevation Certificate will identify the height of the lowest floor relative to the Base Flood Elevation (BFE) or SFHA. ***The height of the lowest occupied floor, which may be the basement, can be used to calculate flood insurance rates and determine the height to which the building must be protected to comply with St. Augustine's floodplain management regulations. Elevation Certificates are also required when constructing a new building or an addition to an existing building to ensure compliance with floodplain regulations. They can also be commissioned by owners of existing properties within a floodplain whose lowest occupied floor is above the BFE to potentially take advantage of flood insurance rate reduction.*** Elevation Certificates are not performed by city officials, however the Planning and Building Department may have a copy on file associated with recent permit activities.


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)

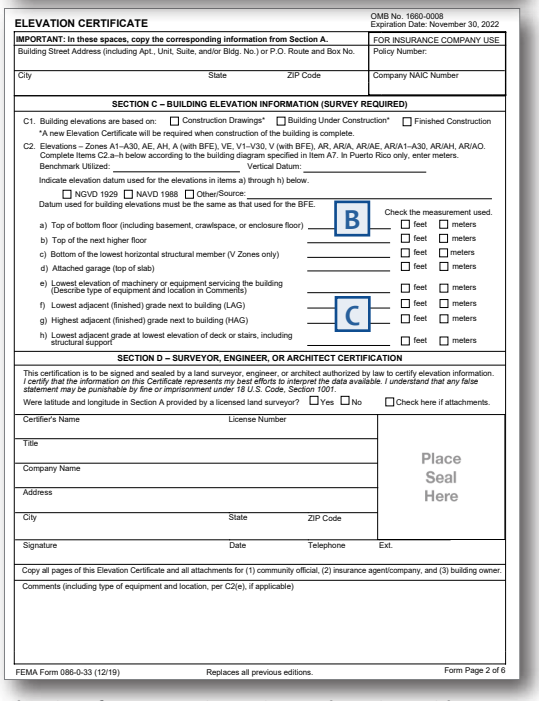
A

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


ELEVATION CERTIFICATE

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

IMPORTANT: In these spaces, copy the corresponding information from Section A. | FOR INSURANCE COMPANY USE

Building Street Address (including Apt., Unit, Suite, and/or Bldg. No.) or P.O. Route and Box No. | Policy Number:

City | State | ZIP Code | Company NAIC Number

SECTION C – BUILDING ELEVATION INFORMATION (SURVEY REQUIRED)

C1. Building elevations are based on: ☐ Construction Drawings* ☐ Building Under Construction* ☐ Finished Construction
*A new Elevation Certificate will be required when construction of the building is complete.

C2. Elevations – Zones A1–A30, AE, AH, A (with BFE), VE, V1–V30, V (with BFE), AR, AR/A, AR/AE, AR/A1–A30, AR/AH, AR/AO. Complete Items C2.a–h below according to the building diagram specified in Item A7. In Puerto Rico only, enter meters.
Benchmark Utilized: _____ Vertical Datum: _____
Indicate elevation datum used for the elevations in items a) through h) below.
☐ NGVD 1929 ☐ NAVD 1988 ☐ Other/Source: _____
Datum used for building elevations must be the same as that used for the BFE.

B

Check the measurement used.

a) Top of bottom floor (including basement, crawlspace, or enclosure floor) _____ ☐ feet ☐ meters
b) Top of the next higher floor _____ ☐ feet ☐ meters
c) Bottom of the lowest horizontal structural member (V Zones only) _____ ☐ feet ☐ meters
d) Attached garage (top of slab) _____ ☐ feet ☐ meters
e) Lowest elevation of machinery or equipment servicing the building (Describe type of equipment and location in Comments) _____ ☐ feet ☐ meters
f) Lowest adjacent (finished) grade next to building (LAG) _____ ☐ feet ☐ meters
g) Highest adjacent (finished) grade next to building (HAG) _____ ☐ feet ☐ meters
h) Lowest adjacent grade at lowest elevation of deck or stairs, including structural support _____ ☐ feet ☐ meters

C

SECTION D – SURVEYOR, ENGINEER, OR ARCHITECT CERTIFICATION

This certification is to be signed and sealed by a land surveyor, engineer, or architect authorized by law to certify elevation information. *I certify that the information on this Certificate represents my best efforts to interpret the data available. I understand that any false statement may be punishable by fine or imprisonment under 18 U.S. Code, Section 1001.*

Were latitude and longitude in Section A provided by a licensed land surveyor? ☐ Yes ☐ No ☐ Check here if attachments.

Certifier's Name | License Number | Place Seal Here

Title

Company Name

Address

City | State | ZIP Code

Signature | Date | Telephone | Ext.

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

Comments (including type of equipment and location, per C2(e), if applicable)

FEMA Form 086-0-33 (12/19) Replaces all previous editions. Form Page 2 of 6

The City of St. Augustine strives to keep its residents safe and minimize the increasing risk of flood-related property damage. In consideration of rising sea levels, the City has established a Design Flood Elevation (DFE) that is one-foot higher than the Base Flood Elevation (BFE). To meet St. Augustine's floodplain management requirements, which the top of the bottom floor, typically the first floor, (B) must be at least one-foot higher than the Base Flood Elevation (A). The height of the first floor above the ground is calculated as the difference between the top of the bottom floor and highest adjacent grade next to the building (B minus C). *(Refer to Floodplain Management for Historic Properties, page 2.8.)*

Flood insurance, which is available through the National Flood Insurance Program (NFIP) and private companies, can allow property owners the financial means to more quickly recover from a flood.

Federal Flood Regulations

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

HARB: Historic Architectural Review Board

LiMWA: Limit of Moderate Wave Action

NFIP: National Flood Insurance Program

NOAA: National Oceanic and Atmospheric Administration

NPS: National Park Service

SAFM: St. Augustine Floodplain Management Ordinance

SFHA: Special Flood Hazard Area

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, delineating 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, thus reducing 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. The cost of premiums varies with the level of risk; for example, less flood-prone properties will have lower premiums than those in more vulnerable locations. With flood insurance, a property owner or tenant is eligible to receive funds for recovery following a flood event. Flood insurance is typically available to cover damage to both the property (i.e., residential and commercial buildings) and contents (i.e. furnishings and objects). As a participant in the Community Rating System, St. Augustine's property owners and tenants are eligible for discounted flood insurance premiums. *(Refer to Community Rating System, sidebar page 2.7.)*

The first floor of this homes was built above today's anticipated height of floodwater and may benefit from lower flood insurance premiums if the lower level is unoccupied.

PROPERTY FLOOD INSURANCE

NFIP insurance is currently available to all owners and tenants of eligible residential and commercial properties throughout St. Augustine, 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 when considering forgoing 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.***

Some alterations required to protect a property from flooding (e.g., elevation, wet floodproofing, or dry floodproofing) and to achieve lower insurance premiums can sometimes be at odds with best practices for historic preservation. The key is to balance the extent of change required for flood protection with the historic character. *(Refer to Building Elevation, page 4.1, and Wet Floodproofing, page 5.1.)* 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. All contributing properties in St. Augustine's National Register and locally designated historic districts in addition to all individually Landmarked properties meet the criteria of "Historic Structures" under the NFIP. *(Refer to Local Floodplain Management, page 2.7, Floodplain Management for Historic Properties, page 2.8, and Substantial Improvement, sidebar page 2.8.)*

WIND INSURANCE

The most severe flooding in St. Augustine typically occurs when the city is impacted by either a tropical storm or hurricane. Severe winds can cause damage to buildings both directly and indirectly with falling tree limbs and airborne debris. Unlike flood insurance, in the state of Florida wind insurance is included as part of a typical homeowner's insurance policy. Property owners should verify the adequacy of their coverage.

FLOOD INSURANCE COVERAGE

Subsidized 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 coverage amounts:

	Commercial	Residential
Building	$500,000	$250,000
Contents	$500,000	$100,000

Flood insurance is also available from private companies, although amounts may vary. Properties identified as repetitive loss properties, may have potential claim limits.

PRESIDENTIAL DISASTER DECLARATION 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 and even with a disaster declaration, not every impacted property will qualify for assistance. In both cases the property owner would be financially responsible for necessary repairs through flood insurance or other means.***

Following a Presidential Disaster Declaration, federal funding may be available from the:

- **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 2018, the IHP program grant limit was increased to $34,900. *(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. *(www.sba.gov.)*
- **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/.)*

Local Floodplain Management

Nuisance flooding is a regular part of life in St. Augustine.

COMMUNITY RATING SYSTEM

The Community Rating System (CRS) program. The CRS is a voluntary program that recognizes and encourages community floodplain management activities that exceed NFIP requirements. A goal of the CRS is to reduce a property's vulnerability to flooding. One of the ways that municipalities achieve the goal is to require that buildings be elevated or constructed above the BFE, lessening the potential impact.

The City of St. Augustine has established a Design Flood Elevation (DFE) that is one foot above the Base Flood Elevation (BFE). The additional height requirement is referred to as freeboard. ***The city's higher standards have allowed St. Augustine to achieve a CRS rating of 5, providing property owners with up to a 25% reduction in their flood insurance premiums.*** The rating will vary to reflect flood protection measures implemented by the city and regular NFIP audits.

To be compliant with St. Augustine's floodplain regulations, the lowest floor of residences must be at or above the city's DFE or wet-floodproofed. However, a variance can be sought for designated historic properties. Dry floodproofing is not a compliant option for residences seeking to participate in the NFIP nor under St. Augustine's regulations. *(Refer to Wet Floodproofing, page 5.1, and Appendix A: Glossary, page A.4, for Dry Floodproofing.)*

Floodplain management requirements are intended to reduce the risk to human life, property, and building contents related to flooding. The City of St. Augustine's Planning and Building Department administers the floodplain management regulations that have been adopted by the city. The adoption of local floodplain management requirements allows the city to participate in the National Flood Insurance Program (NFIP), thus allowing its residents to apply for flood insurance and the community to receive assistance in the event of a disaster. *(Refer to National Flood Insurance Program, page 2.5.)* Although the NFIP establishes minimum requirements for floodplain management, the city's regulations are more stringent, encouraging increased protection for the city's properties and expedited recovery in the event of a flood. *(Refer to Community Rating System, sidebar at left.)*

Although property owners are encouraged to implement floodplain management requirements pro-actively and as part of minor construction and repair projects, there are some construction activities that require compliance. ***Proposed property improvements within a SFHA must comply with all applicable St. Augustine City Code requirements, including the floodplain management regulations, found in the City of St. Augustine's Code of Ordinances.***

Within a designated floodplain, there are many types of work subject to floodplain management regulations that are applicable to all properties, including those designated as historic within the city unless a variance is granted. *(Refer to Floodplain Management for Historic Properties, page 2.8.)* Flood Examples include, but are not limited to:

- Modifying or adding any building system or equipment, including electrical, plumbing, heating, air conditioning, and generators *(refer to Relocation of Critical Systems & Equipment, page 3.4, and Back Flow Prevention, page 3.5)*;
- Installed finishes, doors, and windows vulnerable to flooding *(refer to Use of Flood Damage-Resistent Materials in Flood-Prone Locations, page 18)*;
- Limiting the use of basements and flood-prone areas to parking, building access, and storage *(refer to Wet Floodproofing, page 5.1);*
- Undertaking substantial improvements to existing structures *(refer to Substantial Improvement, sidebar, page 2.8)*;
- Constructing an addition to an existing structure; and
- Erecting a new building.

Property owners considering complex alterations and new construction should contact the Planning and Building Department to determine the floodplain management regulations applicable to a proposed project and to better understand the permit review process. In addition, there are numerous helpful resources available from the city and the federal resources. *(Refer to Appendix B: Resources, page B.1, and Construction Approval in the Floodplain (SFHA), sidebar page 2.12.)*

FLOODPLAIN MANAGEMENT FOR HISTORIC PROPERTIES

Historic properties in St. Augustine include those designated as a contributing resource to a National Register Historic District, a local historic district, an individually designated National Register property, or an individually Landmarked property. ***Although the NFIP provides provisions for historic properties, all properties in St. Augustine are subject to the City's floodplain regulations, including historic properties unless granted a variance based upon their historic designation.*** It should be noted that any variance for floodplain compliance:

- Leaves buildings vulnerable to flooding and damage;
- Does not otherwise 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.

If a property has been substantially damaged and the necessary repairs would cause the building to lose its historic designation, a flood protection variance can be sought to forego full floodplain management compliance. However, ***if alterations occur at a property as a result of substantial damage or as part of a substantial improvement causing it to lose its historic designation, the property must comply with all requirements of the city's Floodplain Management Ordinance and the Florida Building Code. To minimize future costs of flood recovery for all buildings, including those granted a variance to maintain historic integrity, it is recommended that mechanical equipment and systems be located at least 18" above the Base Flood Elevation (BFE).*** In addition, flood damage-resistent materials should be used in areas up to 18" above BFE. *(Refer to Basic Improvements, page 3.1.)*

Floodplain management for historic properties balances the protection of human life and property with the maintenance of historic character.

HISTORIC ARCHITECTURAL REVIEW BOARD

Historic preservation review by the St. Augustine Historic Architectural Review Board (HARB) for flood mitigation is only applicable to those properties that would otherwise be subject to review. The goal of historic preservation review is to improve the resilience to flood hazards while minimizing the impact on historic setting, materials, features, and finishes.

The St. Augustine HARB has jurisdiction over all proposed exterior alterations to properties in locally designated historic districts. Proposed exterior improvements to address flood mitigation, whether proactively to provide protection, emergency repairs following a flood event, or larger projects to make buildings serviceable, fall within HARB's jurisdiction. Immediately following a flood, HARB encourages stabilization repairs, including the installation of temporary shoring and roof tarps. Quick action has the potential to reduce additional damage and secondary damage such as mold.

In its review of flood mitigation measures, HARB utilizes the same criteria as it does for other types of alterations. Their goal is to maintain integrity, or the ability of a property to convey its historic significance. This includes proposed additions intended to offset loss of usable space at existing buildings. However, HARB recognizes that mitigation interventions at each historic property are unique and HARB will consider each application on a case by case basis during their review process. *(Refer to Maintaining Historic Character, page 4.4.)*

FLORIDA DIVISION OF HISTORICAL RESOURCES REVIEW

The Florida Division of Historical Resources (DHR) reviews flood mitigation and repair measures for historic properties to ensure, to the degree possible, that the proposed alterations do not affect the property's historic character, integrity, and eligibility for funding. DHR reviews properties that are:

- Receiving federal tax credits;
- Receiving state or federal funding; or
- Receiving state or federal permits.

Prior to undertaking any further work, DHR should be contacted to review properties under their jurisdiction. DHR review is not a substitute for local HARB review. If there are differences of opinion between HARB and DHR review, the more stringent option will typically apply. *(Refer to Presidential Disaster Declaration Funding, sidebar page 2.6.)*

Sandbags are a mitigation measure that can reduce the impact of flooding. However, sandbags and associated plastic sheets must be properly installed to be effective. (Photograph courtesy of the City of St. Augustine.)

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). [- SAFM]

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. [- SAFM]

Freeboard: An additional amount of height above the Base Flood Elevation (BFE) used as a factor of safety (e.g., 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 St. Augustine's floodplain management regulations.

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. [- SAFM]

Flood Mitigation

Flood mitigation entails actions taken by municipalities and individuals that decrease the negative effects of flooding, with the primary aim of protecting of human life and property. ***Mitigation projects can be undertaken as protective measures, in anticipation of potential flooding, but are more often a reaction to flooding, during or immediately following the recovery process.***

When considering mitigation after a flood, there is a tendency to strive to return to "normal" pre-flood conditions. Although emotionally comfortable, reinstating a condition that is prone to flood damage is not necessarily in a property owner's best long-term interest. The careful selection of mitigation options allows both a community and its constituents to be forward-thinking, particularly in considering rising flood vulnerability associated with increased storms, precipitation, and development in flood-prone areas.

A wide range of mitigation measures can be implemented to address flooding of various types and extents. ***Community-wide mitigation options tend to be larger and beneficial to an expanded area, such as the seawall along the Mantazas River, the Lincolnville drainage improvement project, and more rigorous construction codes that improve a structure's ability to withstand a flood or storm. By contrast, property-specific mitigation options initiated by an owner or tenant are typically implemented to reduce flood impact at a single parcel. In some circumstances, community-wide mitigation may alleviate the need for individual property mitigation, but are usually completed in conjunction with complementary property-specific mitigation options for the best long-term protection.***

WIND MITIGATION

Many of St. Augustine's most significant flood events are related to severe storms, accompanied by high winds. Both wind gusts and flying debris can be damaging to properties, particularly to a building's roof and windows.

- **Roofs:** At roofs, wind can cause shingles and tiles to be removed, creating and opening for stormwater to enter a building. In more severe cases, uplift can dislodge a roof if it is not properly secured. To reduce potential wind damage at roofs, it is recommended that self-adhered underlayment be installed in lieu of roof felt when roof replacement is undertaken. The roofing contractor should also verify whether roofs are properly secured with tie downs and gable braces.
- **Windows:** Windows are highly vulnerable to breakage during a storm, particularly from flying debris. Although plywood is often installed at window openings preceding a storm, there are several semi-permanent options that can be considered. These include plastic barriers and hurricane fabrics, both of which require anchor installation in advance of a storm. It may also be possible to install hurricane-resistent windows or hurricane shutters where historic windows are no longer extant and historic integrity would not be impacted.

Larger properties with generous setbacks provide more opportunities for stormwater absorption and can easily accommodate extended stairs when elevation is considered as a mitigation option.

HISTORIC PROPERTY FLOOD MITIGATION CONSIDERATIONS

Property-specific mitigation options are determined by individual owners or tenants within the requirements of local zoning, floodplain, and building code, and where applicable, the Historic Architectural Review Board (HARB). If the property-mitigation receives federal funding, review by Florida's Department of Historic Resources may also be required. *(Refer to Florida Division of Historical Resources, sidebar page 2.8.)* Implementation of property mitigation measures may have the added benefit of reducing flood insurance rates if compliant with the National Flood Insurance Program (NFIP).

Some of the considerations when evaluating flood mitigation options for properties include:

- **Level of flood vulnerability:** The level of a building's flood vulnerability can be determined by documenting the height of floodwater at a building during a prior storm event, consulting a Flood Insurance Rate Map (FIRM), or obtaining an Elevation Certificate. *(Refer to Identifying Flood Risk, page 2.3, and Elevation Certificate, page 2.4.)* It should be noted that FIRMs identify the flood risk at the ground on which a building sits, while Elevation Certificates identify the vulnerability at the habitable floor level. Basic improvements may be sufficient to protect buildings with lower vulnerability, while those with higher vulnerability may need to be elevated or wet floodproofed to protect from flooding.
- **Size and setbacks of parcel:** Floodproofing measures should protect a property without increasing the potential for flooding on adjacent parcels. Larger parcels with generous setbacks tend to facilitate stormwater absorption and increased options for floodproofing. Additionally, if considering building elevation, it is easier to add extended access stairs and ramps at large parcels. *(Refer to Stair Configurations, page 4.20.)*
- **Historic configuration:** At single-family homes, individual property owners can pursue the flood mitigation measures they feel are most appropriate. At attached or semi-attached homes that share a party wall(s) it is typically not possible to elevate unless all of the neighbors agree to work together.

Buildings whose first floors are located close to the surrounding ground level are more vulnerable to flooding than neighboring buildings on piers.

Queen Anne houses, which often include towers, chimneys and porches, can be more challenging to elevate than buildings with simpler geometries.

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. [- FEMA]

For insurance rating purposes, a building's floodproofed design elevation must be at least (12" - St. Augustine as of the date of this publication) above the Base Flood Elevation (BFE) to receive full rating credit for the floodproofing. If the building is floodproofed only to the BFE, the flood insurance rates will be considerably higher.

GUIDELINES FOR FLOOD ADAPTATION FOR REHABILITATING HISTORIC BUILDINGS

In June 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.)* The *Guidelines* include information on some mitigation options for non-residential properties that are not included in this document.

PRESERVATION RECOMMENDATIONS

- ❑ Retain historic building features
- ❑ Salvage and reuse features that cannot be retained
- ❑ Reconstruct features that cannot be salvaged, including foundation transitional features such as wood skirt boards and masonry water tables
- ❑ Minimize alteration of character defining features
- ❑ Integrate required new design elements and materials that are visually appropriate for the historic character

The best option for vulnerable wood-framed buildings is usually elevation.

- **Building type and style:** The historic relationship of a building to the ground will vary based on the type, style, and massing, with some forms of elevation lending themselves to some options. For example, slab-on-grade construction tends to be more challenging to elevate than a house supported by piers.
- **Historic building material:** Wood-framed buildings cannot be wet floodproofed nor are they good candidates for temporary barriers and shields, but they do tend to be easier to elevate. Temporary barriers and shields may offer protection to masonry and concrete buildings, which may be good candidates for wet floodproofing or elevation.
- **Potential for flood insurance premium reduction:** Residential property owners can achieve flood insurance rate reductions for an approved building elevation or wet floodproofing project. *(Refer to Floodproofing Certificate, sidebar at left.)* Others measures, such as basic improvements, can reduce damage from floodwater but will not result in insurance premium reductions. *(Refer to Basic Improvements, page 3.1.)*
- **Implementation costs:** Many of the basic repairs that can reduce the impact of flooding are relatively inexpensive, although the more complex options, such as building elevation and wet floodproofing, are significantly more costly. *(Refer to Construction Approval in the Floodplain (SFHA), sidebar page 2.12, for funding for opportunities for elevating existing buildings.)*
- **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 tend to 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 city's Floodplain Management ordinance. When selecting flood mitigation options, every effort should be made to minimize the impacts on the building's historic integrity. *(Refer to Floodplain Management for Historic Properties, page 2.8.)*

Although basic improvements can improve the flood resilience of many properties, elevation is often the best long-term mitigation option for vulnerable wood-framed buildings.

RESIDENTIAL FLOOD MITIGATION OPTIONS

There are three general categories of flood mitigation options for residential properties, all of which should be planned in a manner that is compatible with the historic building and its setting.

- **Basic Improvements:** ***Simple, low-impact strategies that can be applied to almost all properties and are relatively easy and inexpensive to complete***
  Basic improvements do not typically require the services of a design professional. The location of building systems and equipment above floodwater are required for both building elevation and wet floodproofing. Basic improvements on their own can reduce the impact of flooding and facilitate recovery, however, it is unlikely that they will result in reduced flood insurance premiums.
- **Building Elevation:** ***Raising a building so the lowest habitable floor and building systems are located above the Base Flood Elevation (BFE)***
  Although all buildings can be elevated, it is typically easier and less costly to elevate a wood-framed building than a masonry or concrete building. Both residential and non-residential buildings may be elevated for flood insurance premium reductions.
- **Wet Floodproofing:** ***Measures applied to a building that allows floodwater to enter a building and rise at the same rate and to the same level as floodwater outside of a building***
  Wet floodproofing can be applied to masonry or concrete buildings, and may be the best option for residential and non-residential buildings that are difficult to elevate. Both residential and non-residential buildings may be wet floodproofed for flood insurance premium reductions.

The majority of 19th and 20th century historic residences are wood-framed, lending themselves to building elevation as the most effective flood mitigation option. Most new residential construction tends to be wet floodproofed. ***Building alterations, such as elevation and wet floodproofing are more complex, require the assistance of a design professional, and typically have the greatest impact on the integrity of historic properties.*** The historic property tax exemption can be used to help offset more costly mitigation options.

CONSTRUCTION APPROVAL IN THE FLOODPLAIN (SFHA)

The Planning and Building Department is available to assist applicants in determining the flood mitigation option that is most appropriate for their circumstances. The Planning and Building Department may be able to assist residential property owners in obtaining a federal grant to finance up to 75% of the cost of elevating their home. *(Refer to Florida Division of Historical Resources Review, sidebar, page 2.8.)*

DESIGN PROFESSIONALS

Given the unique characteristics of each property, some mitigation options will be more effective than others. Consultation with a licensed architect or engineer can identify a mitigation strategy best suited to a property's conditions and needs.

The National Flood Insurance Program (NFIP) has established specific compliance requirements for flood mitigation projects. ***In addition to complying with the Florida Building Code, alterations to buildings located within locally designated floodplains must also comply with the floodplain management and historic property regulations a found in the St. Augustine City Code.***

The review process for elevation and wet floodproofing, requires the preparation of drawings by a licensed architect or structural engineer. Improperly installed or constructed elevation or wet floodproofing alterations can result in significant damage to an existing building and prevent owners from benefiting from reduced flood insurance premiums. ***To expedite the review process, consultation with an architect or structural engineer who has specific experience with flood mitigation alterations and St. Augustine requirements is highly recommended.***

A licensed architect, engineer, or surveyor is also required to prepare an Elevation Certificate to take advantage of reduced flood insurance rates. *(Refer to Elevation Certificate, page 2.4.)*

Poorly maintained buildings are more suspectable to storm damage from floodwater and high winds due to wear and tear on roof, clapboards, and associated fasteners.

3 Basic Improvements

Basic improvements are generally simple, low-impact strategies that are relatively simple and inexpensive to complete, and in some instances, do not require the services of a design professional. Although they typically will not result in a reduction in flood insurance premiums, they can potentially reduce the damage caused by flooding.

Whether or not a more complex mitigation project is anticipated, there are several relatively low-cost basic improvements that can be undertaken by property owners to improve flood resilience and recovery. These basic improvements are relatively easy to complete, and if carefully executed, do not require significant modification of historic residences and typically have limited impact on historic integrity. ***Multiple basic improvements can often be implemented at a single property, improving its resiliency and flood recovery success.***

Basic improvements can include:

- Maintenance of historic resources and properties;
- Relocation of critical systems and equipment above the Design Flood Elevation (DFE);
- Installation of back flow preventers;
- Installation of secondary power sources to allow electrical independence in the aftermath of a storm;
- Use of flood damage-resistant materials in flood-prone locations;
- Temporary door and window barriers; and
- Landscape improvements.

BASIC IMPROVEMENT REQUIREMENTS

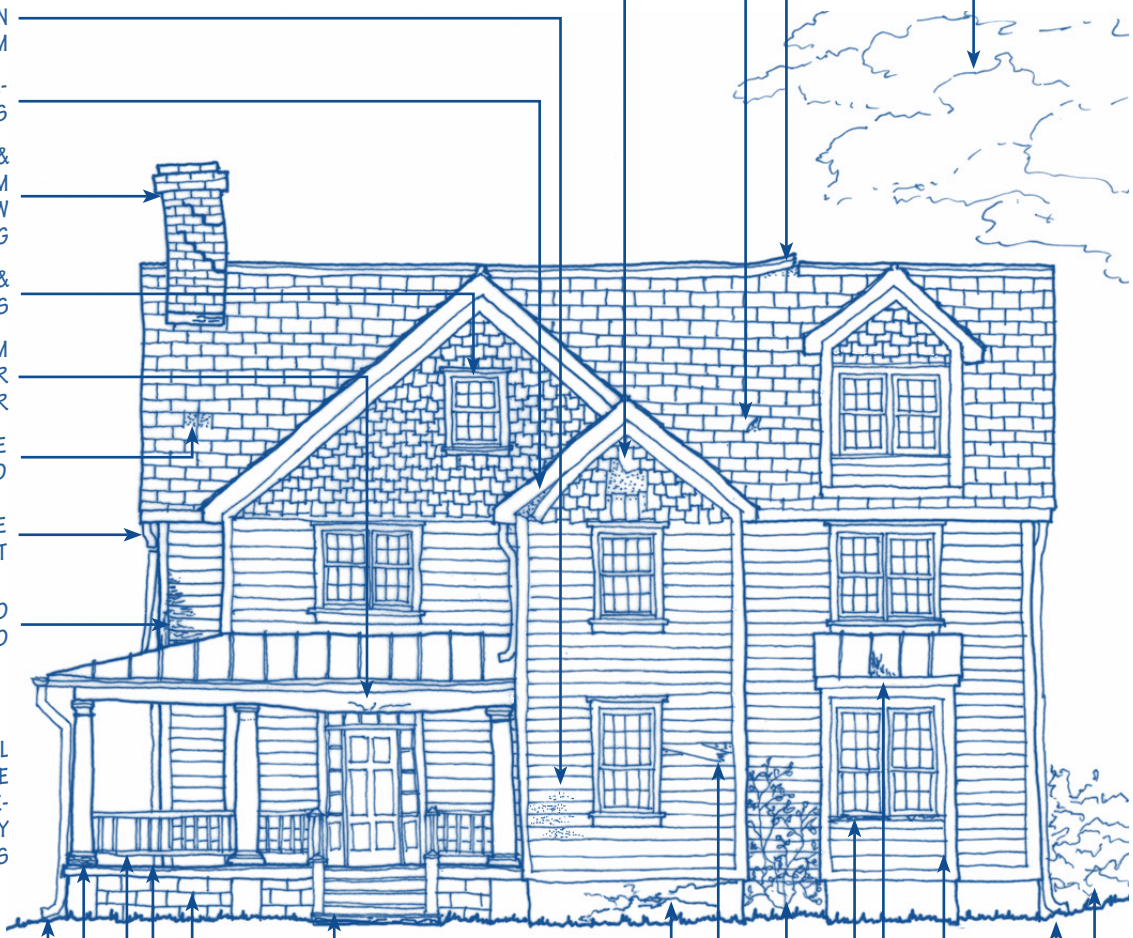
Some basic improvements are required as part of a building elevation or wet floodproofing project including the location of systems and equipment above the DFE and use of flood damage-resistent materials.

In addition, Planning and Building Department approval may be required for some work subject to the St. Augustine City Code and Florida Building Code including:

- Installation of building systems and equipment;
- Installation of back-flow preventers;
- Installation of solar panels and generators;
- Changes to impervious surface coverage; and
- Modification of site drainage patterns.

HARB approval may also be required for exterior modifications of properties under their jurisdiction. *(Refer to Historic Architectural Review Board, page 2.8.)*

TYPICAL BUILDING MAINTENANCE NEEDS



TRIM OVERHANGING TREE LIMBS & CLEAN GUTTERS

RE-FASTEN RIDGE CAP

REPLACE CRACKED TILE

RE-NAIL LOOSE SHINGLES, REPLACE MISSING SHINGLES

PEELING PAINT INDICATES POSSIBLE CONDENSATION PROBLEM

RE-FASTEN LOOSE TRIM; RE-CAULK JOINTS

CHIMNEY CRACKED & LEANING; REBUILD FROM ROOF LINE, INSTALL NEW FLASHING

CAULK AROUND WINDOW & DOOR FRAMES

BOWED & CRACKED BEAM - CONSULT ARCHITECT OR ENGINEER

REPLACE MISSING TILE IN-KIND

REPAIR GUTTER; REPLACE DOWNSPOUT

REPLACE ROOTED WOOD SIDING IN-KIND

GENERAL: SCRAPE ALL LOOSE PAINT; PRIME BARE WOOD AND METAL; RE-PAINT WITH HISTORICALLY APPROPRIATE COLORS

INSTALL SPLASH BLOCK

REPAIR ROTTED COLUMN BASE

DUPLICATE MISSING BALUSTER

REPLACE ROTTED WOOD PORCH DECKING

REPLACE WITH LATTICE FOR DRAINAGE & VENTILATION

REBUILD ROTTED STEPS & CHECK FOR PESTS

FOUNDATION BULGE - REPAIR CAUSE & PATCH STUCCO

RE-NAIL LOOSE BOARD

REMOVE IVY

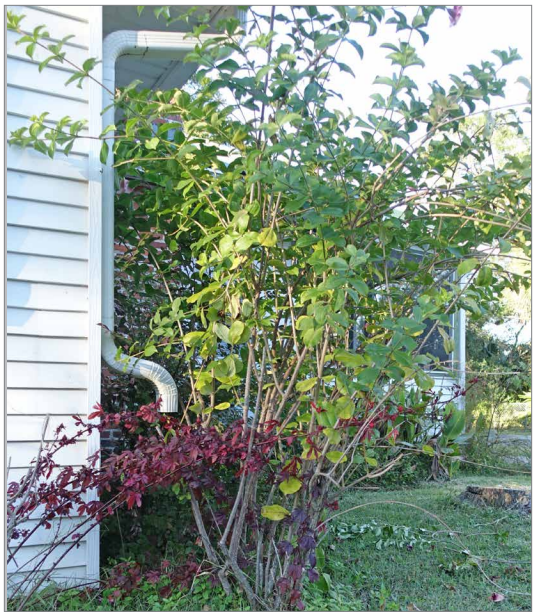
REPAIR / REPLACE ROTTED SILL

REPLACE RUSTED METAL ROOF

CAULK SIDING & TRIM SEAM

REDIRECT DRAINAGE & INSTALL SPLASH BLOCK

REMOVE SHRUBS



Downspouts should be oriented to discharge stormwater to allow flow away from and not towards building foundations.

High winds associated with tropical storms and hurricanes can topple and uproot trees.

Replacing damaged or missing siding can prevent stormwater infiltration and prevent it from becoming airborne debris.

MAINTENANCE

Regular maintenance helps to:

- Preserve buildings, structures, and properties;
- Protect real estate values and the investment;
- Protect buildings, structures, and properties from flood damage; and
- Keep St. Augustine an attractive place to live, work, and visit.

Flooding is often accompanied by secondary factors, such as high winds, and can be 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 properties, including:

- Grading land to promote positive drainage away from historic buildings (City approval should be sought for potential impact on neighboring properties, sidewalks, archaeology, or roadways, as required);
- Trimming overhanging tree limbs that might crash through a roof or take down electric and telephone lines in a wind storm;
- Clearing site debris that might become waterborne or airborne (if high winds accompany the flood), clog storm drains, provide fuel for a fire, and harbor pests or cause damage to the historic building or surrounding buildings;
- Ensuring oil and propane tanks, including barbecue grills, 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 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 airborne debris in a wind storm;
- Replacing cracked pipes to prevent plumbing leaks or sewer failure; and
- Replacing batteries in smoke and carbon monoxide detectors to provide notification of a fire or gas leak.

Regular maintenance is an important factor in the long-term protection of all buildings and structures. However, a poorly maintained building, particularly one that is structurally compromised, is a poor candidate for floodproofing since the floodwater can more easily enter a building and further destabilize its structure.

The height of the floodwater impacted the electrical service for this house. (Photograph courtesy of the City of St. Augustine.)

RELOCATION OF CRITICAL SYSTEMS & EQUIPMENT

Damage to building systems and equipment can be a potentially costly effect of flooding. Traditionally, building systems and equipment are often located in a crawlspace, on the first floor, or at exterior grade. ***Even short-term exposure to floodwater can permanently damage any of these systems, making them useless in the flood recovery process.*** In addition, relocating equipment to a higher elevation level may limit an environmental hazard by preventing gas, oil, and chemicals from mixing with flood water, in addition to electrification.

The types of systems and equipment that could be impacted include:

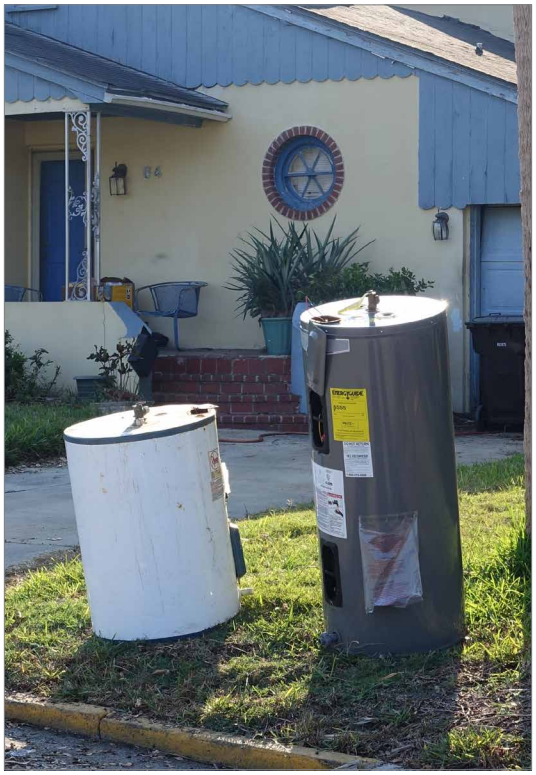
- Heating;
- Hot water;
- Air conditioning;
- Electrical / Security / Communications; and
- Kitchen / Laundry Appliances.

Relocation will often require raising the systems and equipment to higher levels, at a minimum to the DFE. This includes not only major equipment but raising secondary elements such as electrical outlets, junction boxes, switches, disconnects, panels, and meters. Care should also be taken to identify locations that minimize potential damage resulting from wind damage to the roof and windows. (Refer to *Wind Mitigation*, page 2.9.)

All relocated equipment should be installed in a manner that meets the Florida Building Code, the St. Augustine City Code, and the manufacturers' requirements including clearances, access, and ventilation. At the interior of a building, the equipment and appliances can be placed on raised platforms or relocated to upper floors can result in the loss of habitable space. This can include boilers, water heaters, electrical panels, washers, and dryers.

Relocation of exterior equipment may require mounting on roofs, freestanding platforms, or wall platforms. Every effort should be made to minimize the visibility of all equipment by selecting a visually inconspicuous location and screening materials such as shrubs and fencing from both the public way and neighboring properties. *(Refer to Foundation Screening, page 4.12.)*

Exterior equipment should be installed so that it is elevated above the anticipated floodwater height. As the shrubs grow, they will provide visual screening.



Building systems and equipment are vulnerable to damage from floodwater and can be costly to replace.

PROTECTING BUILDING SYSTEMS

FEMA publication P-348, Edition 2, *Protecting Building Utility Systems From Flood Damage Principles and Practices for the Design and Construction of Flood Resistant Building Utility Systems* (February 2017) provides guidance on the protection of residential systems and equipment.

Municipal back flow preventers can protect contaminated water from entering the water supply in a neighborhood. Individual property owners can also install back flow preventers at water lines to protect their homes.

Propane tanks can provide an alternative fuel source however, they should be secured , such as the strap tie-down in this example, to prevent floatation during a flood event.

BACK FLOW PREVENTION

During a heavy rain or storm condition in which the flow in the sewer system exceeds the available pipe capacity, plumbing fixtures are vulnerable to backups. This is particularly true in cities with combined water and sewer systems like St. Augustine. In addition, the fresh water supply can become contaminated if inundated with flood water.

To minimize the potential for sewage backup through floor drains, toilets, and sinks, it is prudent to have drainage systems and associated vent pipes cleaned on a regular basis. To protect water supply lines, a back flow preventer, or a backwater valve, can be installed. A back flow preventor is a device that's installed on pipes that allows water to flow in one direction but never in the opposite direction to prevent the water supply from becoming contaminated.

Secondary power sources, such as solar panels, can facilitate recovery from a flood. The visual impact of solar panels can be mitigated with placement on secondary elevations; installation parallel to the roof surface; selecting a frame-less panel that matches the roof color; and maintaining a consistent minimum offset of 6-inches from eaves, rakes, and ridges.

INSTALLATION OF SECONDARY POWER SOURCES

Loss of power often occurs as the result of flooding, particularly when accompanied by high winds. This could be property specific – loss of power at a building – or impact multiple properties – downed electrical lines in a neighborhood. An independent power source, such as solar collectors or a generator, can provide a means of facilitating recovery after a flood, allowing equipment such as sump pumps and fans to remain operational, thus, speeding up a return by occupants. Like the relocation of critical systems, every effort should be made to minimize the visibility of secondary power sources and propane tanks.

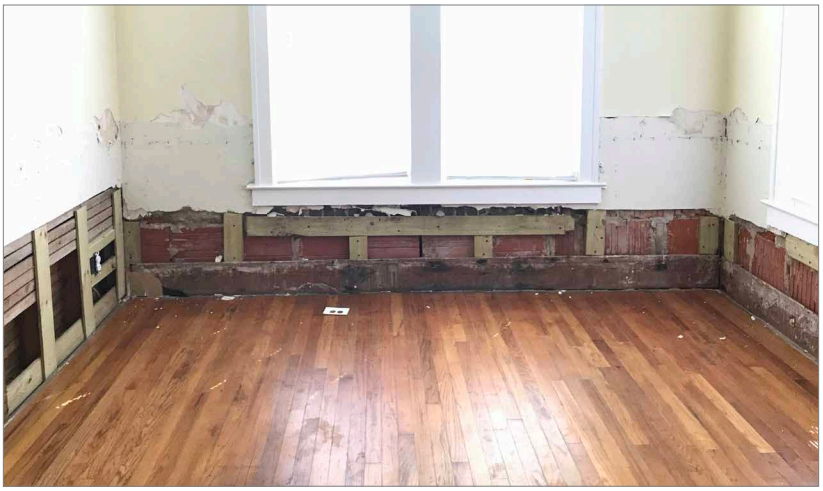
Care should be taken when repowering building systems after a flood event. Water logged power sources can be hazardous and cause accidental injury, electrical overload, and system and equipment damage.

Following a flood, dumpsters collect damaged materials and furnishings and temporary storage units hold salvageable items while the house is repaired.

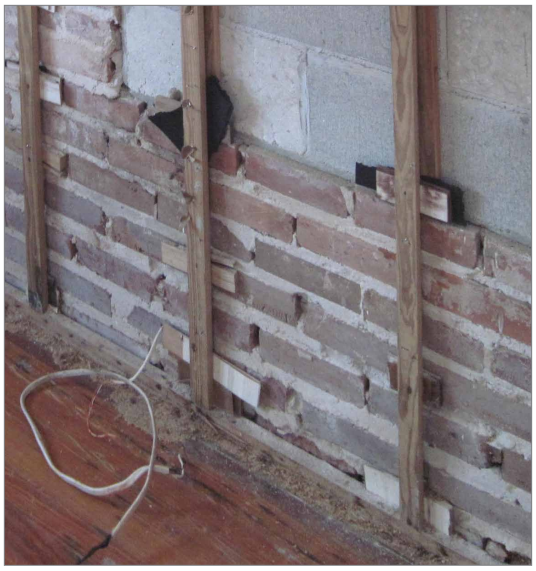
USE OF FLOOD DAMAGE-RESISTANT MATERIALS IN FLOOD-PRONE LOCATIONS

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. Several interior materials popularized during the mid-20th century that appear to be water resistant are also rated "unacceptable" for flood resistance including solid wood doors and flooring, linoleum tile, and regular plywood.

Brick, which is a common exterior material for historic buildings, is classified as having an "Acceptable" flood resistance without the application of any coatings. It should be noted that FEMA's material ratings are for individual materials rather than wall and floor assemblies. Therefore, each component in an assembly should be evaluated for flood resistance. For example, although individual bricks may be acceptable, brick walls can only provide protection if all components of the wall assembly are acceptable, and well maintained. This includes ensuring that mortar joints are repointed and that joints and penetrations are sealed.



Lower portion of wall finish removed in Lincolnville home to allow the cavity to dry out following a flood revealing sub-standard work from prior recovery effort. Electrical service should be elevated if home remains at current elevation. It is always prudent to use licensed contractors. (Photograph courtesy of the City of St. Augustine.)



Although the brick may be an acceptable flood resistent material, the lack of mortar provides a path for flood water ingress. (Photograph courtesy of the City of St. Augustine.)

FLOOD-RESISTANT MATERIALS

Materials identified by FEMA as flood resistant and available in the following documents:

FEMA Technical Bulletin 2: *"Flood Damage-Resistant Material Requirements for Buildings Located in Special Flood Hazard Areas in accordance with the National Flood Insurance Program"* (2008)

FEMA Technical Bulletin 7: *"Wet Floodproofing Requirements for Structures Located in Special Flood Hazard Areas in accordance with the National Flood Insurance Program"* (1993)

Compliance with NFIP non-structural elevation wet floodproofing requirements may necessitate replacement of historic materials with alternative flood damage resistant materials below the BFE/DFE.

COQUINA

Coquina, found at many of St. Augustine's oldest buildings, is a sedimentary limestone rock composed almost entirely of shell and fossil fragments. It can be a fairly porous material that allows water to flow through, particularly when submerged for extended periods of time. Although not characterized by FEMA for flood resistance, it should be treated as an "unacceptable" material and be protected from prolonged exposure to floodwater.

In the 2015 publication Flooding and Historic Buildings, Historic England's conclusions differ from FEMA's Technical Bulletin 2, Flood Damage-Resistant Materials Requirements, regarding historic materials and flooding.

FLOOD RESISTANT MATERIALS: AN ALTERNATIVE APPROACH

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.

Flooding and Historic Buildings

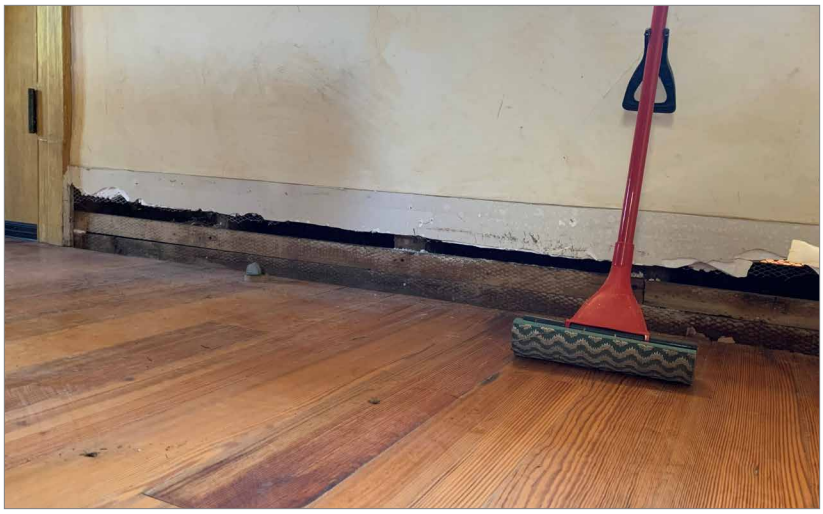
Although relatively resistant to flood damage, historic-building materials can all suffer some degradation and may need appropriate treatment. These materials include stone, solid brick-and-mortar walls, timber frames, wattle-and-daub panels, timber boarding and paneling, earthen walls and floors, lime-plaster 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

(www.historicengland.org.uk/advice/technical-advice/flooding-and-historic-buildings/)



Removable baseboards and cornices can help dissipate standing interior water and promote air circulation, thus reducing the potential for mold.

Property owners should consider both interior and exterior materials, furnishings, and equipment and where they are installed to improve their resiliency and ability to recover from a flood. Options to consider include:

- **Floors:** Selecting flood finishes that are easy to clean and disinfect. A possibility would be to install a solid-surface material including tile or polished concrete flooring instead of carpet or wood laminate.
- **Walls:** Drywall (gypsum board) walls, and to a lesser extent plaster walls, are particularly vulnerable to flooding, particularly if exposed to flood water for long periods of time. Not only does the material deteriorate, but the inside of the wall cavity is often prone to developing mold. A method of reducing the possibility of mold is to remove any standing water and ventilate the room and wall cavity as quickly as possible. This can include installing baseboards and room cornices in a manner so they can easily be removed and installing dehumidifiers and fans to keep air circulating.

Furnishings can be carefully selected to reduce costly replacement. This can include chairs and storage units, such as shelving and drawers, raised above the floor on metal legs instead of resting directly on the floor. Electronics and power cords should be located above floodwater levels and vulnerable items stored in plastic bins.

Sandbags are often used as part of a barrier system to reduce or prevent floodwater from entering through doors and windows. They must be properly installed to be effective, and treated as hazardous waste if they come in contact with floodwater.

BARRIERS & SHIELDS – DOORS & WINDOWS

Even a few inches of floodwater entering a home can have a devastating impact, necessitating costly repairs. To protect masonry and concrete buildings from low-level flooding, temporary barriers and shields can be installed at vulnerable door and window openings. ***Although not compliant with the NFIP at residential buildings and therefore not eligible for a reduction in flood insurance premiums, temporary barriers and shields can reduce flood damage.***

Barriers and shields can be engineered to withstand several feet of floodwater for long durations of time. However, at residential buildings, far simpler alternatives, such as sandbags, are employed for protection. Relying on sandbags can be problematic. They must be obtained and positioned prior to a flood event, must be properly stacked to prevent water seepage, and disposed of as contaminated waste if they come in contact with floodwater. As a relatively low-cost alternative to sandbags, it may be possible to install a metal plate barrier at vulnerable door and window openings. ***If properly fitted and sealed, these barriers can be effective to relatively low flood water heights of a couple of feet, for relatively short durations of time before seepage becomes serious.***

To minimize potential seepage, the barrier and shield systems typically include gaskets at the junction of components and where they meet the building wall, door or window sill, or ground surface. To be effective, the installation of barriers and shields should be combined with the sealing of openings at the perimeter of the building including open mortar joints and crevices around penetrations such as hose bibs and conduits, as well as regular maintenance. *(Refer to Maintenance, page 3.1, and Joint Sealers, sidebar at right.)*

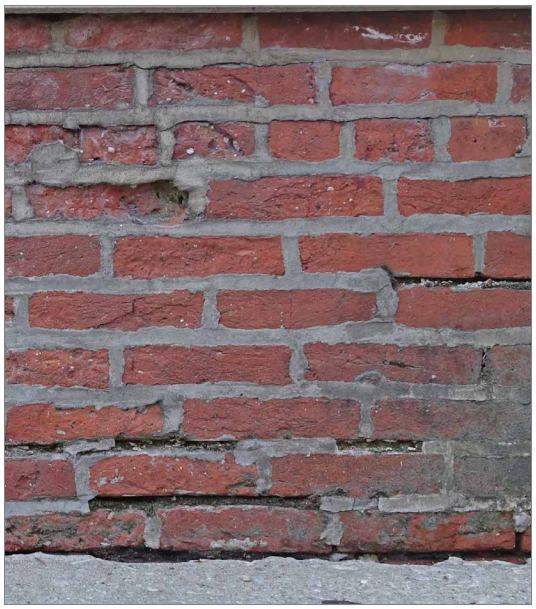
Sealing opening around penetrations such as hose bibs is recommended to reduce floodwater seepage, particularly if a barrier or shield system will be employed to minimize floodwater damage.

JOINT SEALERS

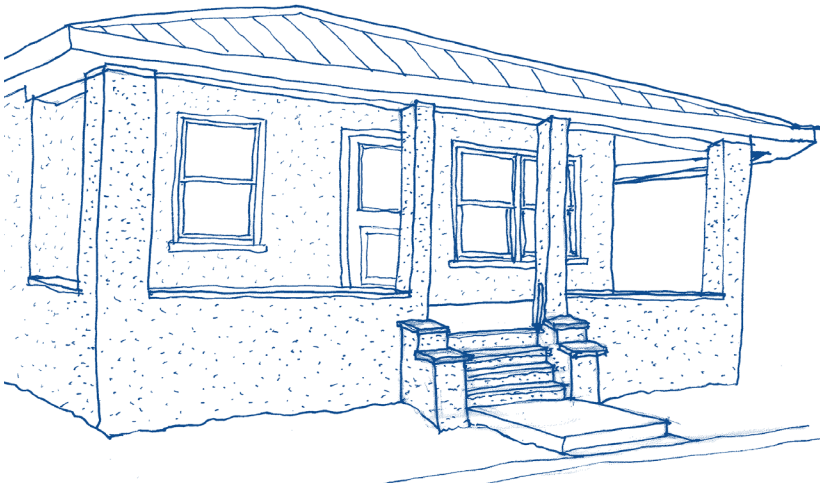
Many buildings have joints or gaps at penetrations, where dissimilar materials meet, or where different elements are joined. To improve the effectiveness of dry floodproofing, all crevices and gaps must be sealed to provide a continuous barrier at the wall and slab.

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, or between components of a flood gate or barrier. *(Refer to Door Barrier diagram, sidebar page 3.9.)*

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 can become brittle, crack and lose their water tightness, lowering their effectiveness as a water barrier. As a result, they require frequent replacement, and become a long-term maintenance obligation.

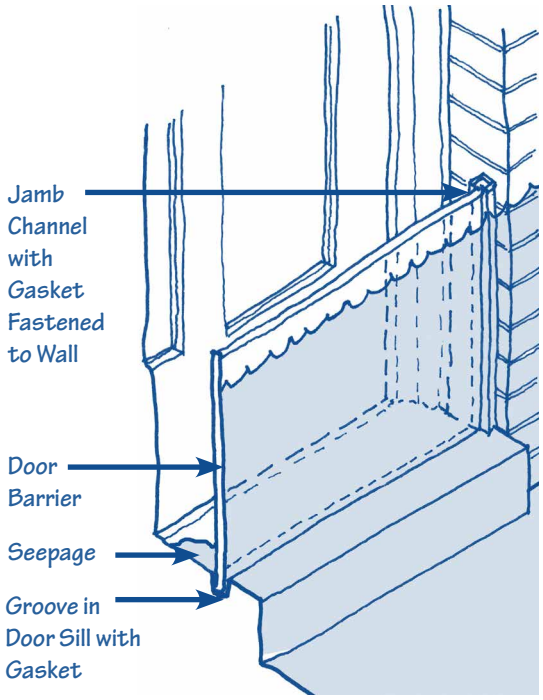


Openings at the perimeter of a building including open joints between bricks and openings between paving and walls can provide paths for floodwater ingress. Regular maintenance at vulnerable areas, including repointing and sealing gaps, can reduce floodwater entry.

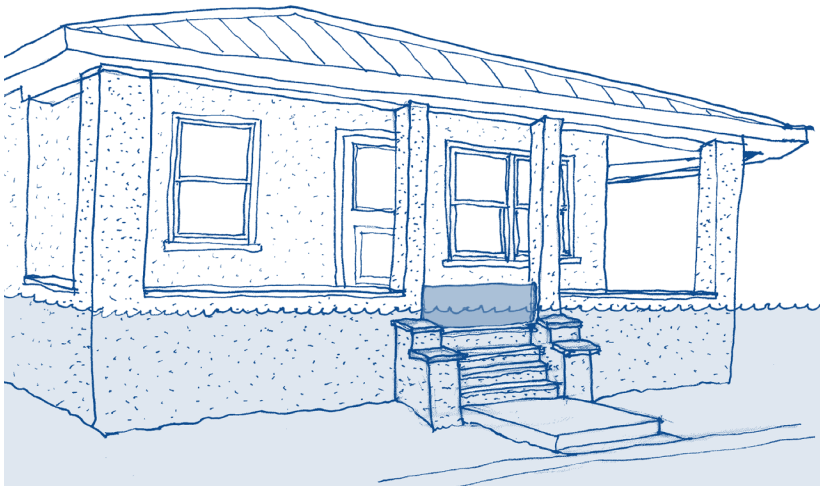


Although not compliant with the National Flood Insurance Program, temporary barriers can be installed at openings in masonry porches on masonry buildings in lieu of sandbags. To maximize effectiveness, the height of the barrier should be similar to the height of the knee wall and similar barriers should be added to all low openings, such as back doors. Barriers should not be installed unless the structure is well maintained since the water pressure could result in significant wall pressure that can compromise the roof supports.

Similar to the door example, at left, a gasketed channel should be installed on the porch piers and a groove cut into the top landing. Flood barriers should be installed immediately in advance of the flood. It is prudent to have a sump pump available to remove any seepage.



Door barriers can provide temporary protection from rising floodwater. Simpler versions can be fabricated with channels permanently mounted in sealant to the door jambs with a groove cut into the sill. The panel, which can be metal or marine grade plywood, slots into the channel and groove. Water seepage can be reduced by a gasket at the perimeter of the panel.



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, 2020, page 39.)

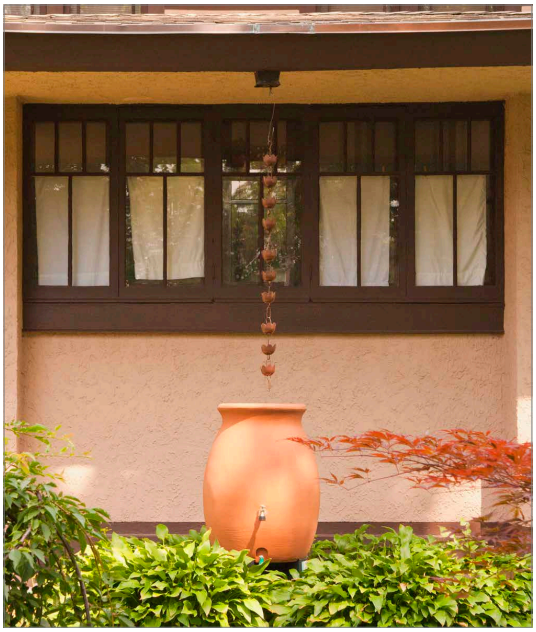
LANDSCAPE IMPROVEMENTS

Landscape improvements can be relatively low impact, inexpensive to implement, and integrated into a designed landscape, particularly at new areas of development. Many properties in St. Augustine's Historic Districts have very little land area that is not covered by buildings, sidewalks, walkways, patios, driveways, and swimming pools. As a result, the opportunity to improve flood resilience with landscape improvements in this densely built-out setting is very limited, and generally relies on capturing stormwater for on site absorption to prevent it from running into a street drain or onto a neighboring property.

- **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, and paved surfaces. Any rainfall or other form of water that hits these impervious surfaces becomes runoff, increasing the propensity for neighborhood flooding. Because of their limited absorption, impervious surfaces have the added effect of reducing infiltration into the ground, thus reducing the replenishment of aquifers. Berms can be located to promote stormwater absorption and trees planted to provide a vertical landscape feature and improve absorption. (Refer to table above.)
- **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.
- **Shade trees** can be environmentally beneficial by promoting stormwater absorption, thus reducing runoff and the ambient temperature. If tree limbs shade a roof, they can also reduce interior temperatures although care should be taken to locate trees in a manner that minimizes the potential for limbs damaging buildings in a storm.
- **Native plants** absorb water to a greater degree than non-native plants, require less maintenance, and can tolerate the range of temperature extremes from very wet to very dry soil.
- **Rain barrels** are located at the base of buildings to collect stormwater discharged from roof surfaces through downspouts, that can then be used to water gardens rather than being directed to storm drains. Rain barrels should not be located in the right-of-way where may block the pedestrian flow on sidewalks, and to the extent possible that limits their visibility from the public way should be limited.

Gravel between driveway pavers is an attractive way to promote stormwater absorption and reduce runoff.

The gravel along the edge of this driveway and lush plantings reduces stormwater runoff by promoting absorption.



Rain barrels can collect stormwater discharge from roof surfaces and be used to water gardens.

Slab-on-grade ranch houses, and their chimneys, can be successfully elevated. Care should be taken when addressing the raised foundation. (Photograph courtesy of the City of St. Augustine.)

4 Building Elevation

Historic buildings and structures are increasingly vulnerable to the effects of environmental change including flooding from high tides and severe storms. As individual property owners are struggling with how to best protect their homes, they are challenged with balancing the level of desired protection with the maintenance of their community's historic character.

Building elevation is a common option considered by residential property owners to improve flood resilience. Elevation is the process of raising the habitable portion of a building above the anticipated flood level to minimize future loss. ***One of the benefits of properly completed building elevations are that they can significantly decrease future flood damage and flood insurance premiums.*** However, elevation can be both costly and significantly impact the historic character of individual properties and surrounding neighborhoods, and negatively impact archaeological resources. *(Refer to Presidential Disaster Declaration Funding, sidebar page 2.6, and Construction Approval in the Floodplain (SFHA), sidebar page 2.12, for potential elevation funding options.)* Property owners should balance the practical implications of elevations with maintaining the historic character of their residence within their neighborhood context. This includes avoiding extreme building elevation heights to minimize the impact on historic character.

The majority of properties in each of St. Augustine's Historic Districts maintain their historic integrity. As more properties complete mitigation projects, including building elevation, that integrity can be compromised, threatening their National Register designation. If the districts are no longer eligible to be characterized as "historic," property owners will be required to comply with all of the city's floodplain management requirements and those of the Florida Building Code. *(Refer to Floodplain Management for Historic Properties, page 2.8.)*

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]

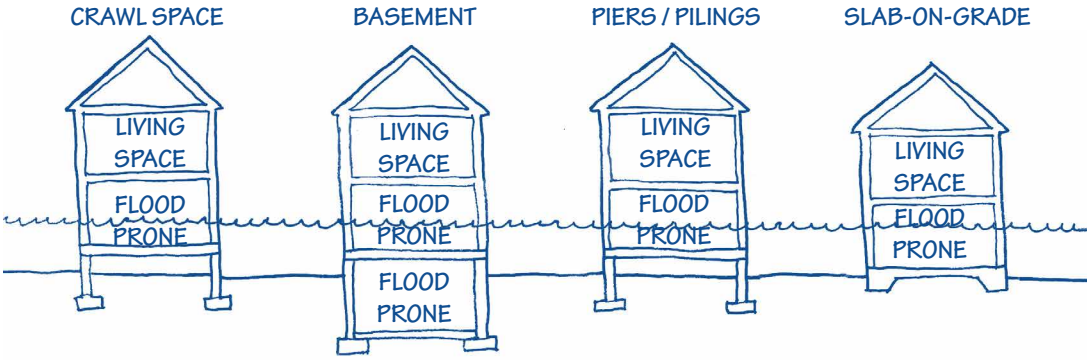
ZONE A ELEVATION OPTIONS

PRE-ELEVATION FOUNDATION TYPES

FLOOD-PRONE LOWER PORTION OF BUILDING

BFE/DFE

GRADE



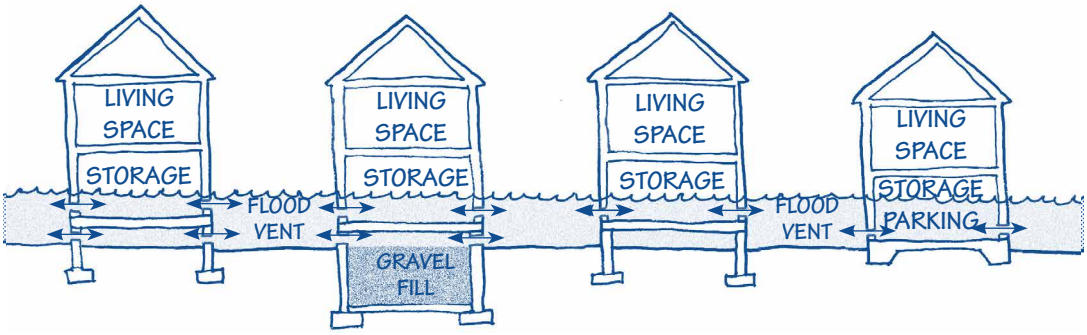
Areas below BFE/DFE are more vulnerable to flooding. Higher insurance premiums would apply to properties with occupied areas below the BFE.

NON-STRUCTURAL ELEVATION

LIMIT USE BELOW BFE/DFE; FREE PASSAGE OF FLOOD WATER THROUGH BUILDING

BFE/DFE

GRADE



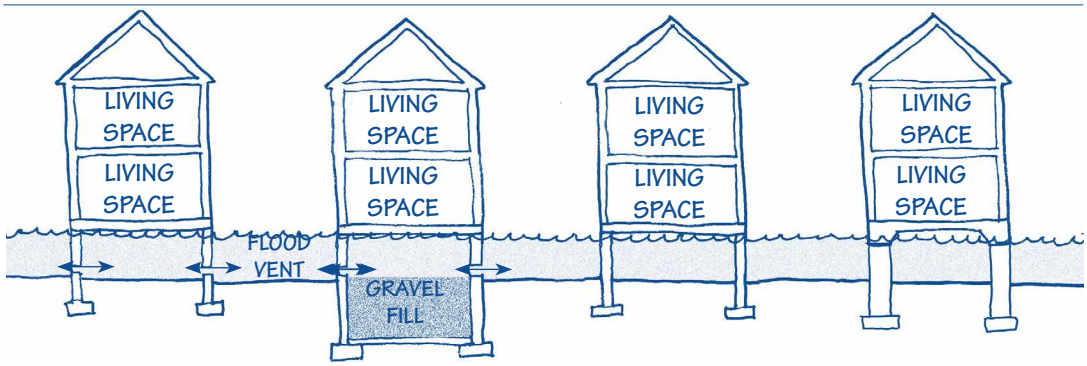
The abandonment of flood-vulnerable areas reduces the habitable space and limits the use below the BFE/DFE to storage and parking. Flood vents are installed to allow the free flow of water in and out of the building, and basements are often infilled with gravel to prevent potential wall collapse.

INCREASE PIER & FOUNDATION HEIGHT

ELEVATE LIVING SPACE ABOVE BFE/DFE & ABANDON BASEMENT

BFE/DFE

GRADE



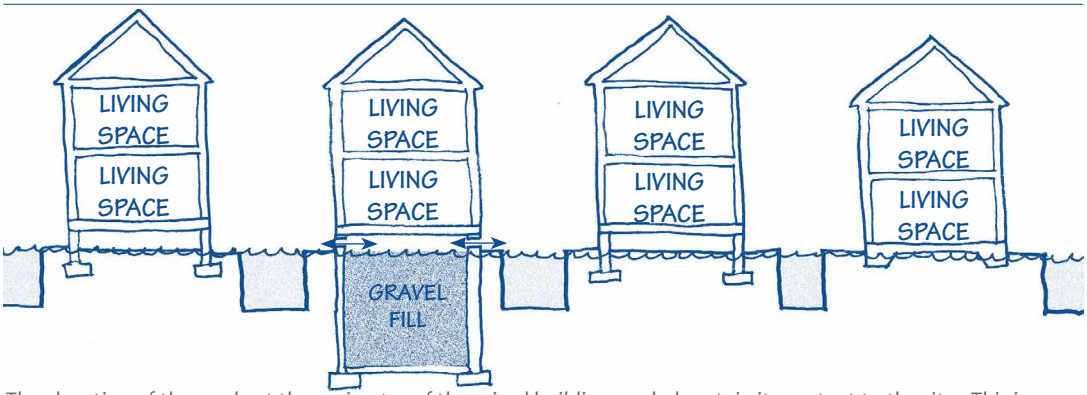
Supporting the building on higher piers, piles, or foundation walls can reduce vulnerability at habitable spaces.

ELEVATE BUILDING & SITE

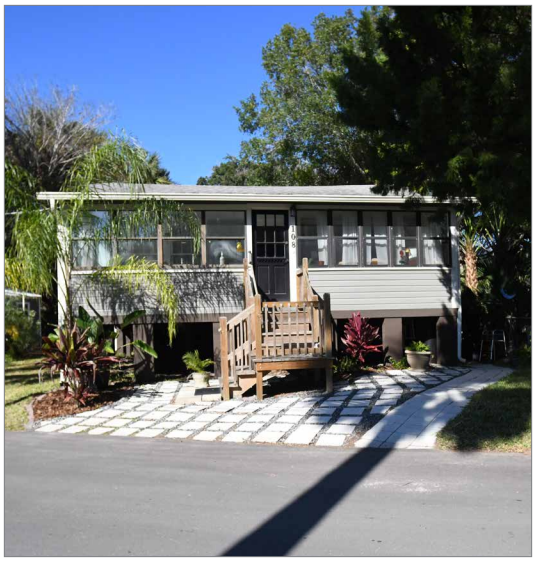
RE-GRADE BUILDING PERIMETER & RELOCATE HOUSE AT HIGHER HEIGHT

BFE/DFE

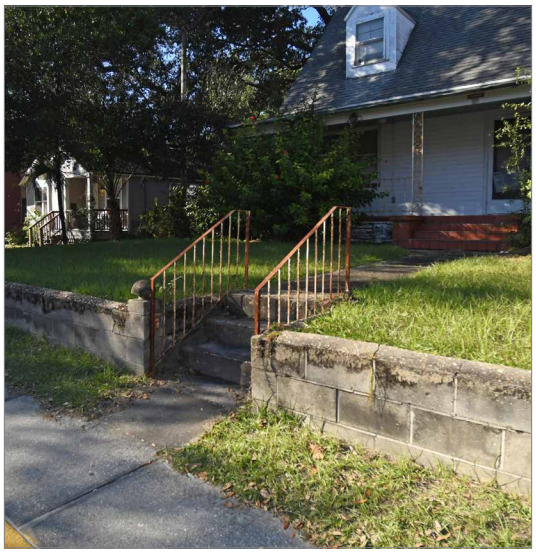
GRADE



The elevation of the grade at the perimeter of the raised building can help retain its context to the site. This is typically only feasible at larger parcels. Care should be taken to prevent stormwater runoff onto adjacent parcels.



This one-story house has been elevated on piers. The piers and building base have been painted dark brown, reducing their visibility. The spaced driveway pavers allow for stormwater absorption.



A few buildings in St. Augustine were constructed on elevated sites. Elevating both a building and site maintains the historic context but it can increase stormwater runoff onto neighboring properties. Public Works should be consulted regarding potential stormwater runoff from a parcel when alterations are being considered.

PRESERVATION RECOMMENDATIONS

- ❑ Limit elevation of the first floor of existing buildings to the DFE + 1-foot
- ❑ Limit the first floor height of potential new construction or additions that must meet floodplain requirements to the DFE + 1-foot

ELEVATION OPTIONS

There are four general categories for building elevation:

- Non-structural elevation by abandoning flood-vulnerable areas of a building and relocating uses to higher, non-vulnerable areas – This could be as simple as abandoning portions of the basement or vulnerable first floor areas;
- Elevating the building and supporting it on piers or piles;
- Elevating the building and supporting it on higher foundation walls; and
- Elevating the site and building.

Each of these elevation types may be utilized on their own, or in combination, to suit local conditions. For a residence with a floor height that is vulnerable to flooding, raising all equipment and systems above the BFE/DFE, whether wall mounting or to a higher floor level, is a simple option with little or no impact on the exterior of the building. *(Refer to Relocation of Critical Systems & Equipment, page 3.4.)* In instances where the flood vulnerability is greater, such as a traditional masonry home with a wood porch and a basement, it may be appropriate to elevate a masonry building onto a higher foundation wall; support the wood porch on higher piers; relocate all of the systems to upper floor levels and abandon the first floor. Similarly, a wood framed residence may be elevated on higher piers while the masonry chimney would require an extended foundation, ideally matching the chimney material. *(Refer to Historic Property Flood Mitigation Considerations, page 2.10, Elevation Case Studies, page 4.13.)*

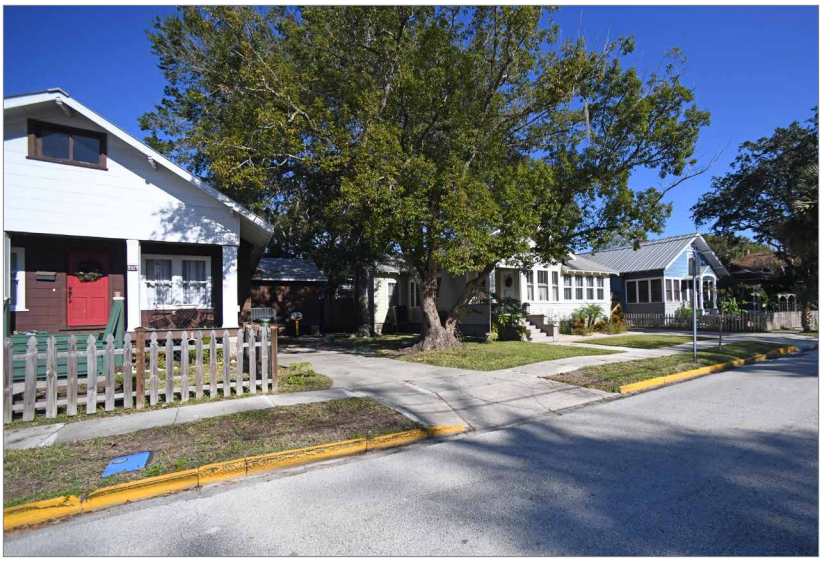
HEIGHT OF BUILDING ELEVATION

Individual property owners will make personal determinations regarding whether to elevate their buildings and there will be a period in which some properties are elevated, and others are not. One of the greatest challenges is limiting building elevation to a height that provides the community-identified level of safety while minimizing the impact on the historic character.

Some of the height considerations when considering elevation include:

- The St. Augustine City Code identifies the maximum allowable building height, currently established as 35-feet measured from the DFE.
- All additions to existing residential buildings and new residences, and substantially improved residences are required to have their lowest habitable floors elevated either to or above the DFE, or be wet floodproofed unless granted a variance as a historic property. *(Refer to Substantial Improvement, sidebar page 2.8, and Wet Floodproofing, page 5.1.)*
- Substantial elevation, such as raising a one-story cottage by a full story, can dramatically impact its historic integrity and dwarf its neighbors, negatively impacting the character of the surrounding streetscape, particularly in neighborhoods with a lot of small parcels, such as Lincolnville or the Abbott Tract.

Consistency regarding the goals of elevation and design parameters that work for the individual characteristics of a neighborhood can improve the outcome. Therefore, applying a height standard consistent with the BFE/DFE for new construction will limit the "lollipop" houses that often loom over smaller-scale historic residences, particularly in neighborhoods with one-story residences on smaller parcels.



The houses are all different but share similar features. They have similar forms, setbacks, gable roofs, and materials.

MAINTAINING HISTORIC CHARACTER

Owners of historic properties need to balance the practical implications of building elevations with maintaining the historic character of their residence and within their neighborhood context. This can be best achieved by identifying clear parameters related to appropriate flood mitigation measures to provide for safety without destroying neighborhood character. These parameters consider localized flood risk; floodplain management requirements; parcel site limitations; as well as building type, style, and materials.

Property owners must consider an enormous number of administrative and design factors in their decision-making process when considering elevating a historic building, some of which may be conflicting. An understanding of the varying requirements can help assess the long-term benefits of different elevation options.

Proposed alterations should be considered holistically for their impact on the individual building as well as within the larger neighborhood context. To the extent possible, proposed alterations to historic buildings should retain:

- The overall building proportions, appropriate to typology and style;
- Historic access and orientation;
- The composition of character-defining building elements;
- Historic building features, including appendages such as porches, bays, and chimneys; and
- Character-defining materials and features.

When retention in place is not possible, it may be feasible to salvage character-defining elements for sensitive reuse as required to accommodate the building elevation. Where salvage is not feasible, historic elements can be reconstructed in an integrated manner with the elevation.

As appropriate, design elements and features at the existing building should be thoughtfully copied, complemented, or contrasted to accommodate the increased building height.

WHAT IS HISTORIC?

For the purposes of flood mitigation projects, a historic building is 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]

PRESERVATION DEFINITIONS

Historic character refers to all visual aspects and physical features that comprise the appearance of historic properties and extends to the setting of historic properties to include a building's relationship to the environment and adjacent streets and buildings, landscape plantings, views, and the presence of accessory features.

Historic integrity is the authenticity of a property's identity, evidenced by the survival of physical characteristics that existed during the property's historic period including evaluation of any changes that may have occurred through time which could contribute to the building's later-acquired historic character and significance. An overall sense of past time and place are evident in the composite of seven qualities: location, design, setting, materials, workmanship, feeling, and association.

Historic period is the primary time line for which the historic building derived its historic association with an event, person, place, pattern of development or other historic context.

PRESERVATION RECOMMENDATIONS

- ❑ Identify a property's character-defining elements
- ❑ Retain or integrate key elements into elevation strategy
- ❑ Minimize destruction of archaeological resources

Many of St. Augustine's historic residences are plain wood-framed buildings. This house includes Victorian-period detailing at the front gable and two-story porch.

The building type is a foursquare in the Mediterranean Revival style.

TYPE VS. STYLE

A building type addresses the overall size, shape, and proportions of a building. 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. A front-gabled house can have an Italianate bracketed cornice, a Greek Revival Frieze, or Colonial Revival pedimented door surround.

PRESERVATION RECOMMENDATIONS

- ❑ Identify building type and style - The City of St. Augustine has information available regarding the type and style of buildings in the local and National Register Historic Districts
- ❑ Understand the building's character-defining characteristics and context
- ❑ Identify examples that are appropriate within the historic context

BUILDING TYPES & STYLES

St. Augustine's historically designated residences date to 16th century European settlements well into the 20th century. Historic building types include everything from grand vacation houses, to bungalows and shotgun houses. Residences were constructed of stone, coquina, brick, concrete block as well as wood framing. Historic building styles include Spanish Colonial, Queen Anne, Italianate, Colonial Revival, Mediterranean Revival, and Mid-Century Modern. The characteristics of St. Augustine's historic residential building types vary in size, height, form, and appendages that include porches, bays, and chimneys.

In most cases, elevating buildings alters the relationship of the building to the ground, introducing visual verticality. As such, buildings that have a vertical emphasis, such as a 3-story Queen Anne with a corner tower, can be easier to sensitively elevate than a 1-story cottage.

Although it is not possible to identify every elevation option, a framework for selecting appropriate alterations can property owners make appropriate choices for their homes. Examples provided in the Elevation Case Studies address a variety of St. Augustine's residential building types to identify strategies for addressing elevation in a variety of contexts. *(Refer to Elevation Case Studies, page 4.13.)*

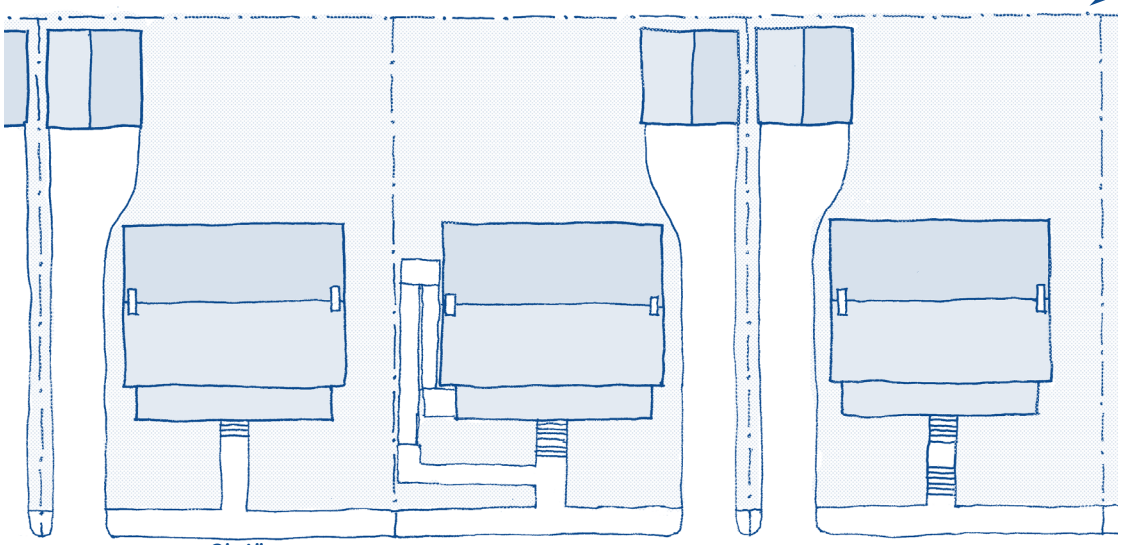
PARCEL CONFIGURATIONS

The diagrams below depict the same sized house on three parcel sizes in the rows, large, medium and small. To show different levels of flood risk, each house is elevated either 2'-4", 4'-8" or 7'-0" above grade. It becomes more challenging to install extended stairs as parcels and setbacks become smaller and elevation heights increase. *(Refer to Stair Configurations, page 4.20.)*

HEIGHT / BASE FLOOD ELEVATION

PARCEL SIZE

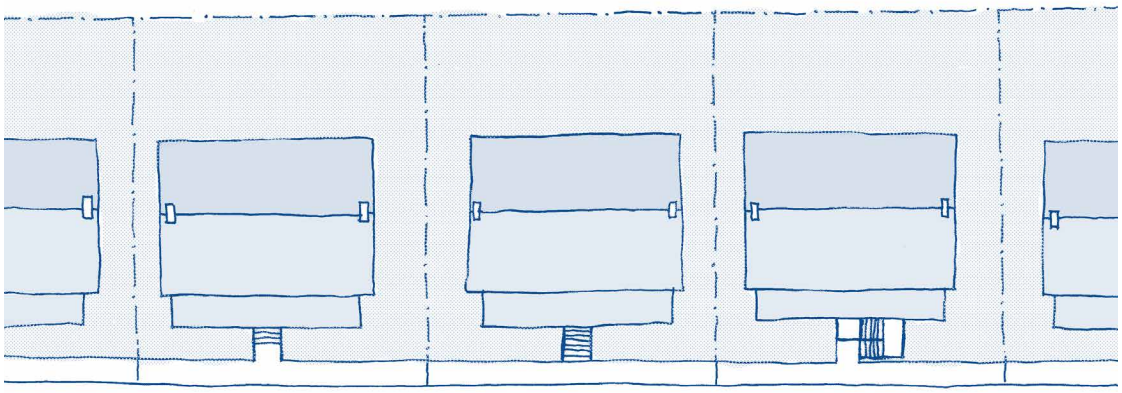
LARGE PARCEL WITH LARGE SETBACKS
ACCESS WALKWAY & DRIVEWAY



1ST FLOOR HEIGHT ABOVE GRADE

Large parcels with generous setbacks provide greater flexibility for maintaining stair alignments and incorporating intermediate landings and accessible ramps.

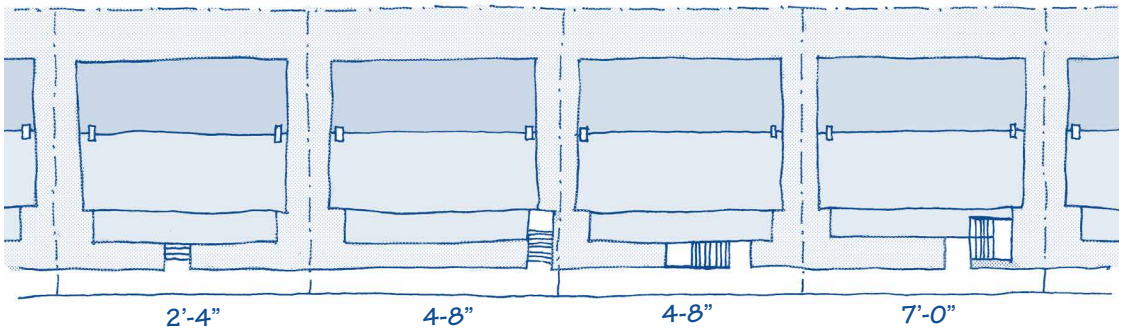
MEDIUM PARCEL WITH SMALL SETBACKS
ACCESS WALKWAY



1ST FLOOR HEIGHT ABOVE GRADE

At sites with limited front yard setbacks, extended stairs may require re-orientation to fit within the property boundaries.

SMALL PARCEL WITH MINIMAL SETBACKS
ACCESS WALKWAY



1ST FLOOR HEIGHT ABOVE GRADE

Narrow setbacks can limit options for extended stairs. If needed, it may be necessary to remove a portion of the porch to accommodate elongated stairs.

PRESERVATION RECOMMENDATIONS

- ❑ Maintain relative visual setbacks and building heights between adjacent parcels
- ❑ Consider potential options for building relocation while maintaining the surrounding historic character and visual relationship between adjacent parcels at larger properties
- ❑ Work with Planning and Building Department to identify appropriate options for extended stairs located within front or side yard setbacks that maintain historic character
- ❑ Identify screening elements to conceal expanded foundation walls, piers, stairs, and mechanical equipment that are consistent with the space limitations and historic character

PARCEL SIZE & CONFIGURATION

Like topography, the size of parcels in historic districts and at historic parcels can vary dramatically from closely spaced, compact residences on relatively small lots and minimal setbacks, to generous suburban style lots with larger setbacks. When considering options for elevation, the size and configuration of parcels can have a substantial impact on elevation options and screening possibilities.

At larger parcels, it may be possible to elevate the grade beneath the residence, relocate it onto a higher portion of the parcel (although building on fill is discouraged), or relocate it away from vulnerability. If the distance between the building and the ground is not dramatically altered, it easier to screen including higher foundations or pier supports, expanded stairs, and raised mechanical equipment. If modifying the height of a site by regrading, care should be taken to prevent stormwater runoff onto adjacent properties.

Smaller sites do not provide the same opportunity for relocation, and if a residence could be relocated, their relationship with adjoining parcels may be compromised. Those with narrow front and/or side yard setbacks, can present a significant challenge, particularly to accommodate extended stairs and associated screening required for higher elevations.

The houses are all different but share similar features. They have similar forms, small setbacks, gable roofs, front porches, and materials. Given the small parcel size, adding stairs to an elevated house would be a challenge.

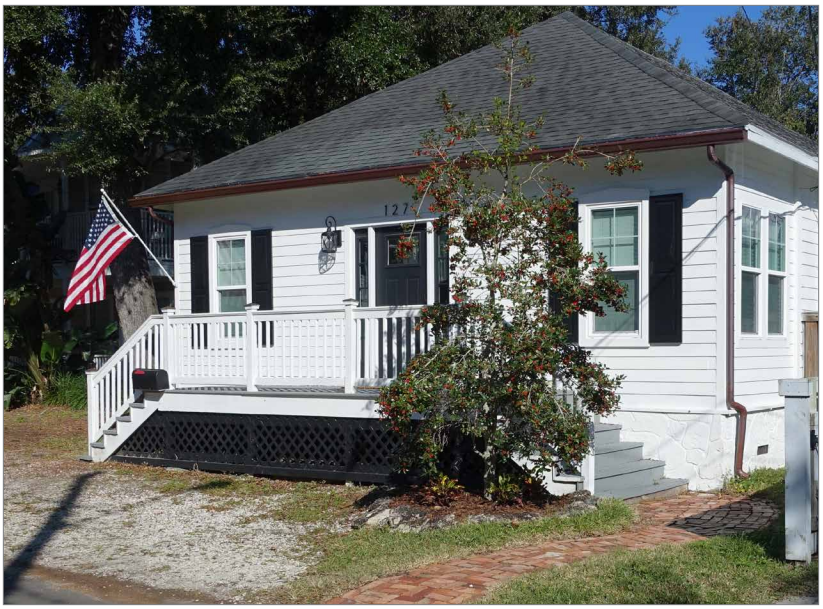
PRESERVATION RECOMMENDATIONS

- ❑ Minimize alteration of existing walkways, driveways and parking areas to the extent possible to maintain historic setting
- ❑ Provide landscape screening to visually minimize the impact of required alteration
- ❑ Maintain existing curb cuts and limit front yard paving
- ❑ Maintain front porches
- ❑ Limit additional garage doors under living story, particularly front-facing garage doors

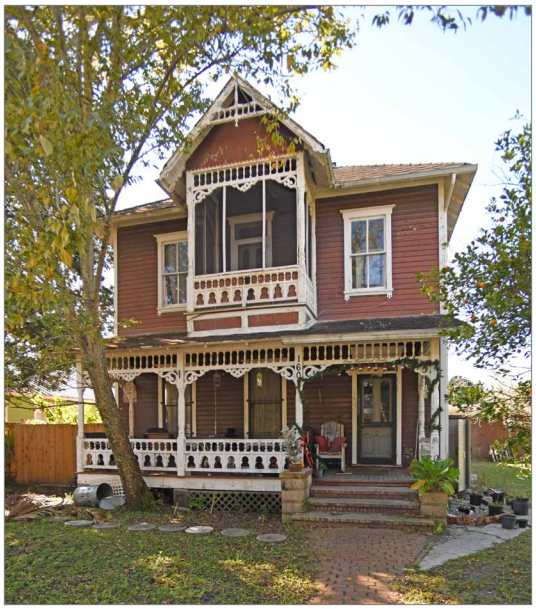
ACCESS & PARKING

St. Augustine's historic homes can be entered directly from a sidewalk or may include a walkway to the front entrance and potentially a driveway with a parking area near the house. Based upon the size and configuration of the site and relative height of a proposed elevation, it may be necessary to utilize existing walkways, driveways, and parking areas to accommodate extended stairs, requiring the alteration of historic alignments.

Property owners will often seek increased building elevation to allow for parking beneath their residences. This will typically necessitate relocated and potentially wider curb cuts, front yard paving for vehicular access, and the elimination of front porches. Furthermore, the addition of garage doors under the living story facing the street can greatly alter the historic character of the streetscape particularly when introduced at the front elevation.



The porch is located approximately 3 1/2-feet above grade. The split stairs accommodate the stair length without discharging into the street.



Porches and stairs can be significant components of historic residences and should be retained whenever possible.

STAIRS, PORCHES & STOOPS

Stairs are often a character-defining feature, leading to a porch or stoop to access a primary entrance door. The combination of stais, porches and/or stoops can be key elements in defining a building's type and style. Increased building elevation heights require longer stair runs to access the raised living floor level. To the extent possible, extended stairs should retain the original orientation and configuration, as well as relationships to the primary entrance door, walkways, and sidewalks. This can pose significant challenges when the parcel size and setbacks are restricted. *(Refer to Parcel Size and Configuration, page 4.6.)*

Building codes establish the minimum number of steps required and their associated length relative to the height of the living surface above exterior grade. For example, a floor surface that is 4-feet above grade requires a minimum of 7 steps, at a minimum length of 6'-5". *(Refer to Stair Configurations, page 4.20.)*

Handrails and guardrails are an important component of stairs, porches, and stoops. With the extended height, it may be necessary to extend or introduce handrails and guardrails where they did not previously exist. Handrails and guardrails should be compatible to the building type, style, and location, with attention the typical historic materials and features, such as newel posts. Additionally, their height must meet Florida Building Code requirements.

Accessibility

Providing access to an elevated building to individuals with physical disabilities is especially challenging. The length of ramps meeting accessibility requirements to accommodate extended heights can be prohibitive, particularly at smaller parcels. A ramp for an elevation of 4-feet above grade must be at least 53-feet long. If the installation of a ramp is not feasible, an accessible lift or elevator can be installed. When installing a lift or elevator, consideration should be given to limiting the visibility of roof penetrations and installing associated mechanical equipment above the DFE.

Ramps become very long as buildings are elevated.

PRESERVATION RECOMMENDATIONS

- ❑ Extend stairs in a manner that maintains historic alignments and relationship with the entrance door to the extent possible
- ❑ Align extended piers with vertical elements such as porch columns or posts and corners of stair landings
- ❑ Install screening to visually minimize porch piers, stair supports, and ramps
- ❑ Install railings that are compatible with the historic building type and style
- ❑ Minimize visual impact of accessible elevators or lifts

PRESERVATION RECOMMENDATIONS

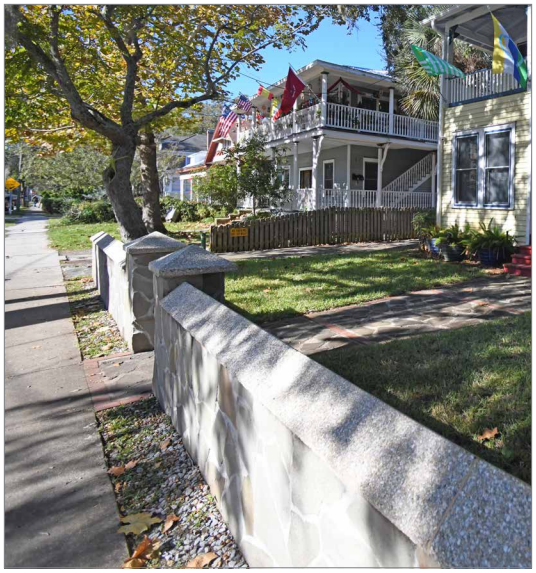
- ❑ Extend stairs in a manner that maintains historic alignments and relationship with the entrance door to the extent possible
- ❑ Locate extended foundation of building walls, bays, and chimneys to align with existing wall plane
- ❑ Locate extended piers to align with vertical elements such as porch columns or posts
- ❑ Maintain the existing fenestration pattern and reflect it in the extended foundation as appropriate

PROMINENT ALIGNMENTS & ARRANGEMENTS

A street façade often includes a home's most ornate and significant building elements, helping to define its style. Significant building features, their alignments, and decorative elements on the street façades can guide the parameters of an elevation. Some of these elevation features may include:

- The primary entrance door;
- The porch (or stoop), and associated steps, railings, columns, and piers;
- Chimneys;
- Projecting bays;
- Towers; and
- Windows.

Historic arrangements can be symmetrical, as in a Colonial Revival home with central doors and aligned windows, or asymmetrical, typical of Queen Anne and many Arts and Crafts bungalows. Alterations associated with a building elevation should complement the alignments, arrangements, and materials of the historic structure.



Historic landscape features, such as this wall and shade tree, should be retained if possible as flood mitigation measures are implemented.

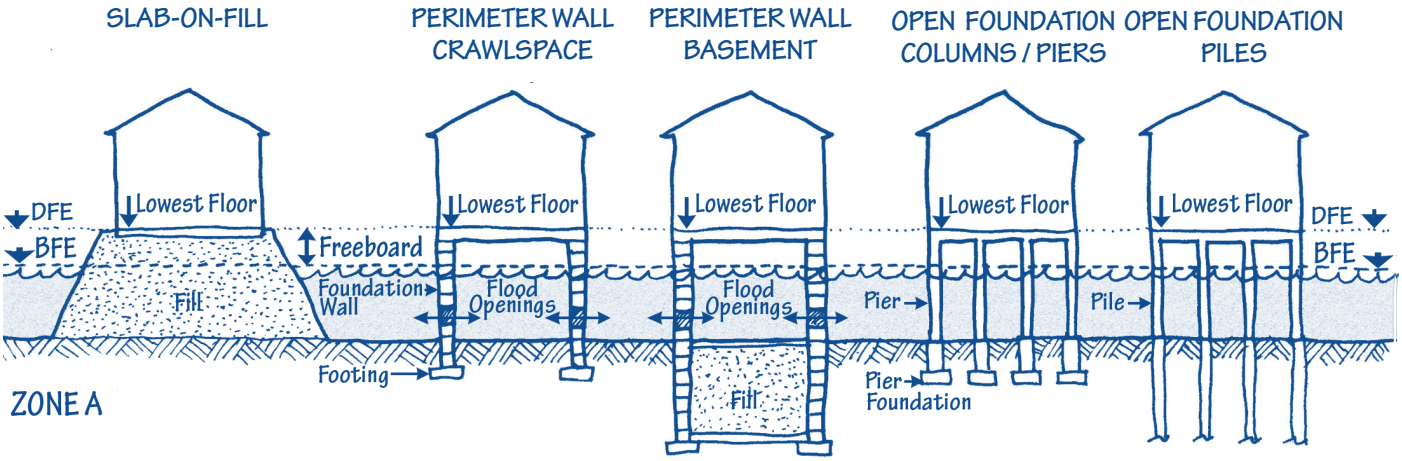
The entrance stairs are often oriented towards the primary entrance door.

PRESERVATION RECOMMENDATIONS

- ❑ Minimize alteration of character-defining landscape features to the extent possible to maintain historic setting
- ❑ Prevent stormwater drainage onto neighboring parcels and minimize drainage onto the roadway

LANDSCAPE FEATURES

Landscape features at a historic property can be significant in defining a sense of place. Landscape features can include a tree canopy over a roadway, fences and walls marking a property's boundaries, and mature shrubs at the foundation. Significant landscape features may need to be removed and/or relocated to implement certain elevation strategies. Raising the grade beneath the building may have the most significant impact on landscape features, including trees, landscape walls, and fences. It may be possible to relocate plantings to accommodate building elevation activities and extended stairs. *(Refer to Foundation Screening, page 4.12, for landscaping utilized for screening and Landscape Improvements, page 3.10, for additional resilient design recommendations for landscapes.)*



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

BUILDING FOUNDATIONS

Foundations support buildings above the ground but in some instances, also must be designed to restrain buildings from the force of floodwater and wave action and high winds. In addition to holding a building up, a flood resilient foundation resists buoyancy to prevent a building from floating off its foundation. Given the significant role they play in the structural performance of a building, foundations must be engineered to ensure a building's long-term stability. Any building required to be in full compliance with NFIP requirements must meet or exceed NFIP foundation design criteria. This includes all new construction as well as any existing building determined to be Substantially Damaged or Substantially Improved unless a variance is granted for a historically-designated property. *(Refer to Substantial Improvement, sidebar page 2.8, and Substantially Damaged, Appendix A, Glossary, page A.1.)*

In evaluating compliance, FEMA classifies foundations as either open or closed.

- **Open foundations**, found at buildings supported by piers or piles, allow flood water to freely pass under the building. Open foundations are often found at wood-framed buildings, porches, and in coastal environments. Although not appropriate for all building types, styles, and materials, open foundations typically allow for increased elevation heights and are less susceptible to flood damage, particularly in coastal zones, where foundation are vulnerable to wave storm surge damage. *(Refer to Foundation Screening, page 4.12, for NFIP requirements for architectural treatments, such as lattice.)*
- **Closed foundations** have perimeter masonry or concrete construction that enclose all or part of a building's perimeter that prohibit the flow of flood water. Closed foundations can be found at buildings with basements and crawlspaces, and depending on their design, slab-on-grade construction.

  Closed foundations are vulnerable to lateral pressure of raised floodwater against building walls. This could lead to structural failure or collapse. A manner of reducing the pressure is to allow the unimpeded flow of water in and out of the foundation so that the interior and exterior water heights rise and fall at the same rate and to the same levels. The unimpeded transfer of floodwater through flood openings equalizes the lateral forces, significantly reducing the strain on the building's structure.

This open foundation house is supported by brick piers. Brick is a common pier material at historic homes. When elevating a house, brick can be applied over concrete to maintain the historic appearance.

This home has a closed foundation with regularly-spaced flood openings along the side elevation.

FOUNDATION REQUIREMENTS

FEMA's **Hurricane Sandy Recovery Fact Sheet No. 2,** *Foundation Requirements and Recommendations for Elevated Homes* (May 2013), provides guidance on foundation design to improve flood resistance.

NFIP FLOOD OPENING REQUIREMENTS

The minimum requirements for flood openings as established by the National Flood Insurance program (NFIP) are as follows:

A minimum of two openings having a total net area of not less than one square inch for every square foot of enclosed area subject to flooding,

The bottom of all openings shall be no higher than one foot above grade. Garage doors do not meet the National Flood Insurance Program (NFIP) minimum requirements for openings.

Flood water must be able to freely flow in and out of all enclosed areas without requiring electrical, mechanical, or manual operation. This includes exterior walls as well as interior walls separating enclosed spaces. To allow the free flow of water, a minimum of two flood openings are required and they must be located on different walls. Any modification to or covering of flood openings such as louvers, screens, or netting, should be installed in a manner that does not impede the free flow of flood water.

FEMA's **Technical Bulletin No 1**, *Requirements for Flood Openings in Foundation Walls and Walls of Enclosure: Below Elevated Buildings in Special Flood Hazard Areas in Accordance with the National Flood Insurance Program (March 2020)* provides guidance that conforms within accordance with the National Flood Insurance Program, addressing the requirements for flood openings for enclosed foundations.

PRESERVATION RECOMMENDATIONS

- ❑ Extend foundations and piers in a manner that is consistent with the existing building foundation
- ❑ Cover concrete or concrete block foundation elements with stone, brick, or stucco to be more compatible with the historic building materials or utilize tinted concrete
- ❑ Locate flood openings in a manner that minimizes visibility without impeding functionality, typically at both side elevations
- ❑ Provide foundation screening to minimize visual impact of elevation and flood vents without impeding their function

The size of the building and area of free water flow of the flood openings is key to determining the number of required flood vents. When proposing the installation of a non-traditional flood opening, care should be taken to verify there is adequate water flow.

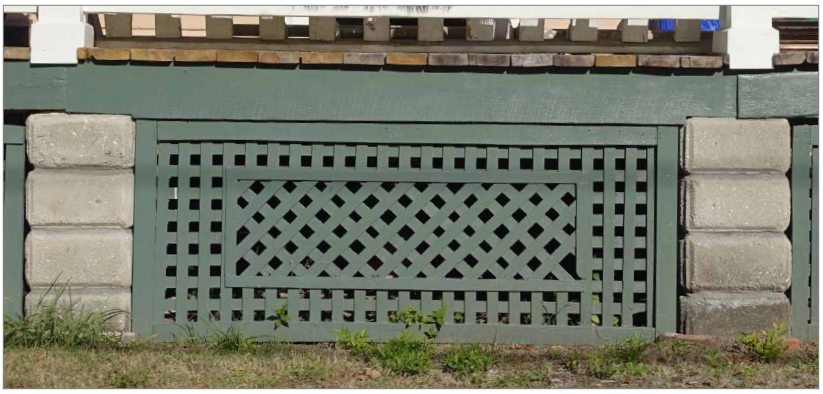
Flood openings allow the passage of floodwater in and out of a building without mechanical intervention such as sump pumps. They must be of sufficient size, number, and location to be able to quickly equalize interior and exterior water levels. They will typically be located around the perimeter of a building or foundation, no more than 12-inches above the adjacent exterior grade height, and may also be needed between adjacent, enclosed spaces, such as in interior foundation walls. In the case of a filled or abandoned basement, the installation of flood openings and drainage through the basement slab may be required.

Many manufactured flood openings are metal louvers or vents. Some flood openings are designed to be more in keeping with the architectural character of historic buildings. They should be selected and installed to allow the free flow of water and to prevent animal infestation. Care should be used if considering insect screening as it can trap debris, hindering water flow.

In addition to providing openings for flood water, it is important to ensure that all building spaces are well ventilated after a flood. Secondary damage after a flood such as mold and rot can be reduced with adequate ventilation. Operable windows can typically be used to ventilate inhabited spaces, while ventilation of abandoned basements or areas below raised finished floors can be more challenging. Some flood vents are designed to allow ventilation and can eliminate the need for additional air vents.

To improve resilience, piers, piles, and most closed foundations are constructed with either concrete or filled concrete block, which are typically not compatible with historic stone and brick foundation materials. To improve visual compatibility, it is possible to install a stone or brick veneer, stucco, or colored concrete to match the historic material.

When evaluating elevation options for historic buildings, the consideration must balance safety with historic character. To the extent possible, the visual qualities of historic building foundation materials should be continued at the foundation. However, NFIP design parameters that minimize damage in the event of a flood are often not historically sensitive.



This custom lattice provides foundation screening between the piers. The use of diagonal or square lattice should be appropriate for the building's style.

FOUNDATION SCREENING

Screening of extended foundations can serve to mitigate the adverse impact of a building elevation and elevated mechanical equipment. Screening can be achieved utilizing landscaping or architectural elements. However, the use of screening elements must be designed in a manner that does not impede the flow of flood water, particularly in Coastal High Hazard Areas *(Refer to Special Flood Hazard Areas, sidebar page 2.3.)* At parcels with narrow setbacks, raised planter walls can be utilized to mitigate the visual impact of elevations, incorporating stairs "buried" into the landscape, although care should be taken to prevent stormwater run-off onto adjacent parcels. *(Refer to Landscape Improvements, page 3.10.)*

Landscape screening can be utilized at the base of a building and can be scaled to minimize the visual impact of the elevation. For example, the use of taller plantings and small trees will likely be more successful than just low ground cover at higher building elevation projects. Similarly, utilizing vegetation native to St. Augustine, will generally be more appropriate, encourage stormwater absorption, and require less maintenance. If it is not possible to locate mechanical equipment away from public view, it can be screened with vegetation or architectural elements such as fencing.

Architectural screening, in the form of lattice or panels, is generally utilized on pier or piling support systems. Similar to building foundation walls, extended piers, either those supporting a residence or an appendage such as a porch, should be screened in a manner that is sensitive to the character of the building. Lattice should be installed at the rear of or between and recessed from outer face of piers. Additionally, the walls, lattice or screening should be designed and installed in a manner that allows them to break-away or collapse to allow unimpeded water flow. *(Refer to Building Foundation Screening Requirements, sidebar at right.)*

Decorative concrete block is used as foundation screening between the piers at this residence.

The evergreen hedge provides manicured, year-round foundation screening.

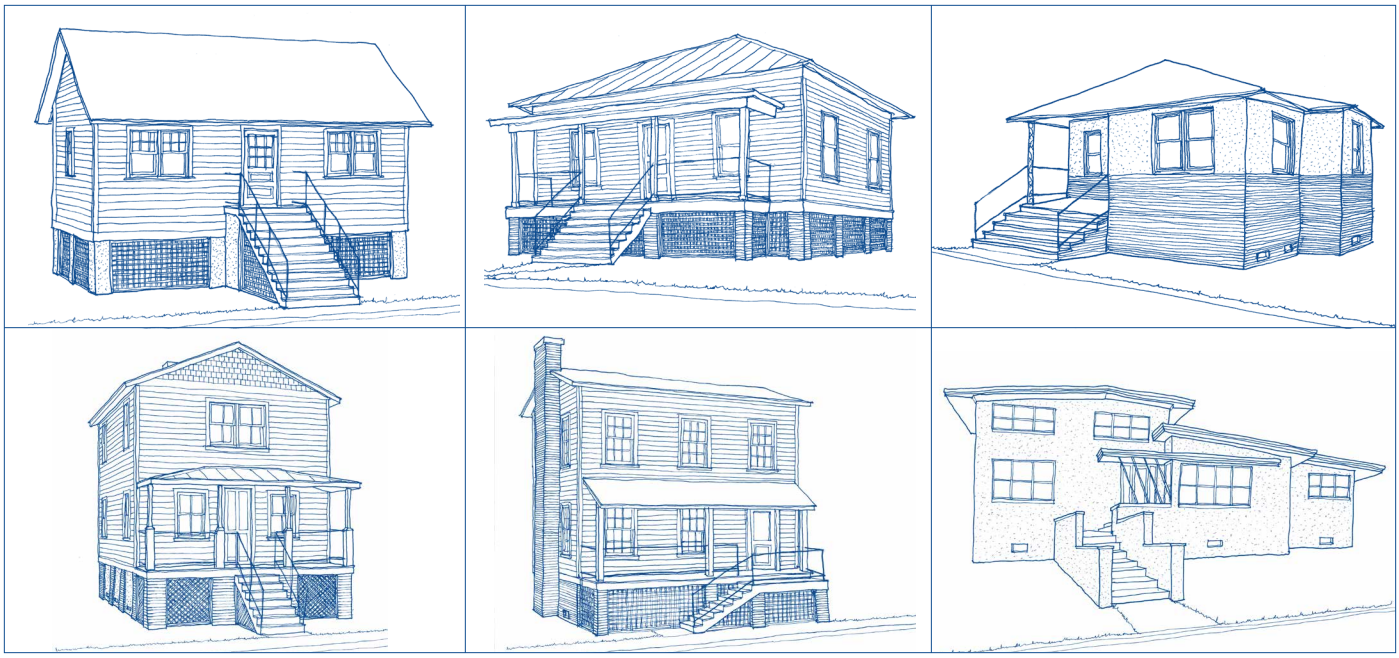
The landscaping around the house is very lush and conceals the foundation.

BUILDING FOUNDATION SCREENING REQUIREMENTS

FEMA's **Technical Fact Sheet No. 27,** *Enclosures and Breakaway Panels* (December 2010) summarizes design and building code requirements for architectural screenings, differentiating requirements for various hazard zones.

PRESERVATION RECOMMENDATIONS

- ❑ Utilize landscape screening that is scaled to the proposed elevation
- ❑ Indigenous plantings, including evergreens, as appropriate to the location
- ❑ Install architectural foundation screening between or behind piers that is consistent with the building type and style



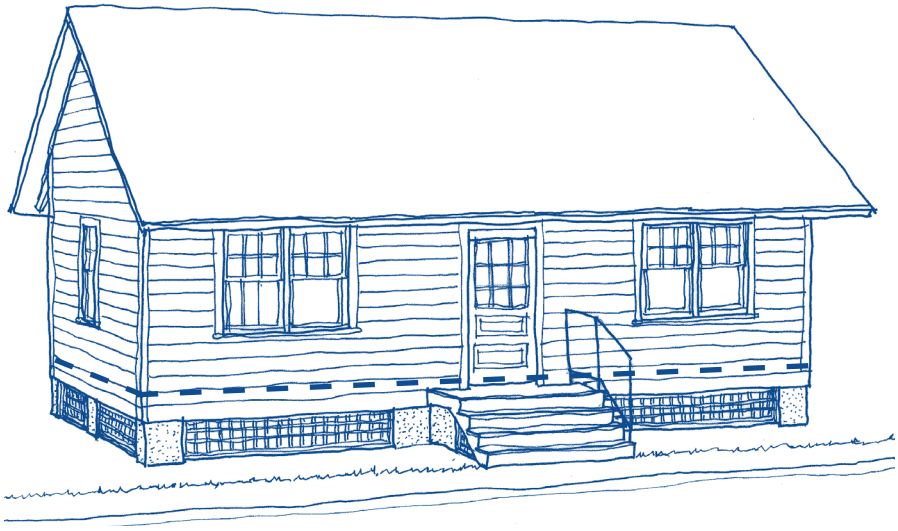
Elevation Case Studies

The following pages include illustrations of a variety of house types similar to those that can be found in St. Augustine's Historic Districts. Each example is elevated approximately 1-foot above the DFE, approximately three to five feet above adjacent grade in compliance with freeboard requirements at the time of this publication. Many of the examples include limited front yard setbacks, making stair configurations more challenging.

For elevation each type, it is assumed that:

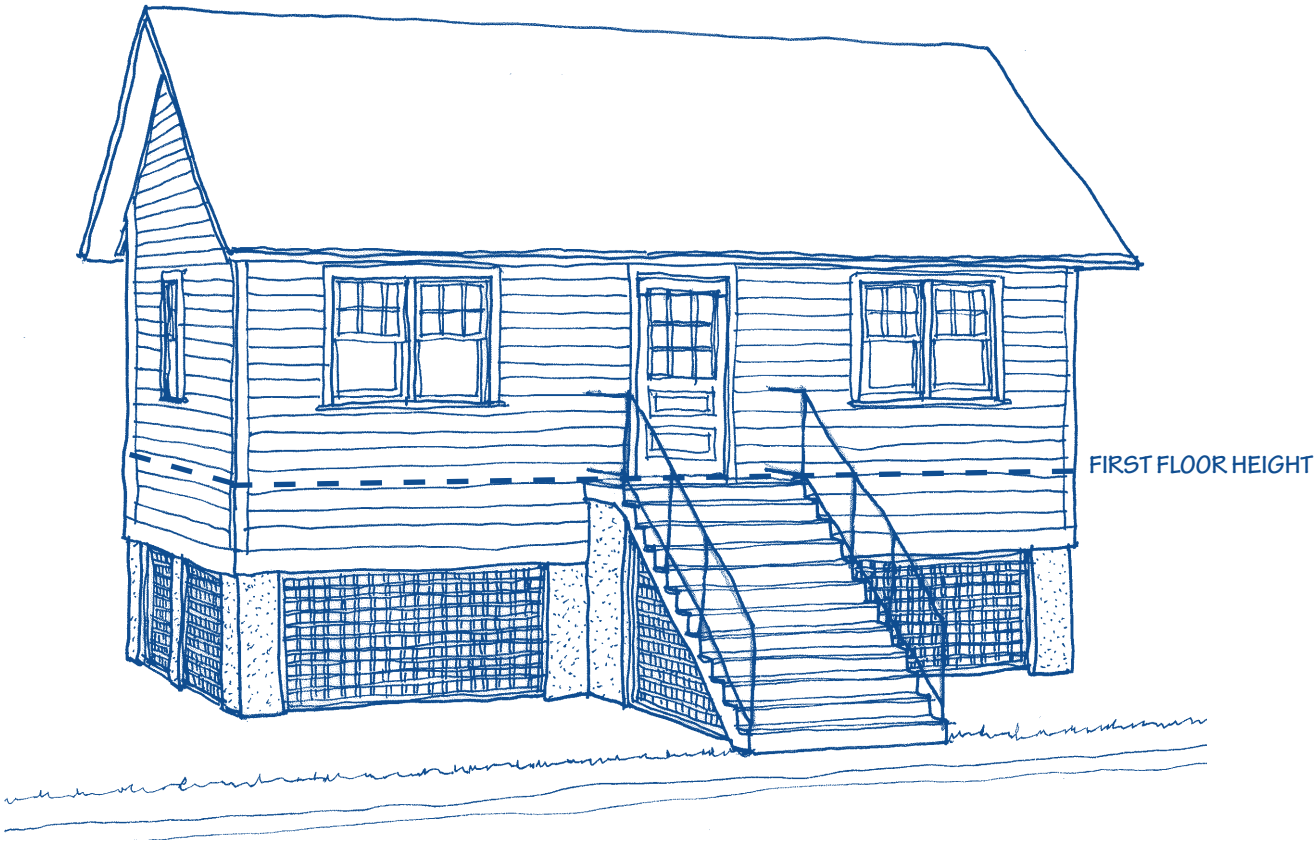
- Existing basements, where they exist, will be abandoned and infilled *(refer to Building Foundations, page 4.10)*;
- Building systems and equipment will be elevated in an inconspicuous manner *(refer to Relocation of Critical Building Systems & Equipment, page 3.4)*;
- Stylistically appropriate railings, simplified for drawing clarity, will be included at stairs, landings, and porches *(refer to Stairs, Porches & Stoops, page 4.8)*;
- Flood openings will be installed at side elevations where possible *(refer to Building Foundations, page 4.10)*;
- Parking and garage doors will not be introduced at street-facing façades *(refer to Access & Parking, page 4.7)*; and
- Landscape screening will be introduced to obscure extended foundations and lattice will be installed at the rear of or between and recessed from outer face of piers *(refer to Foundation Screening, page 4.12)*.

The recommendations in the case studies are intended to meet the requirements of the NFIP and the St. Augustine floodplain management regulations. However, property owners should work with a professional architect or engineer to ensure municipal compliance.



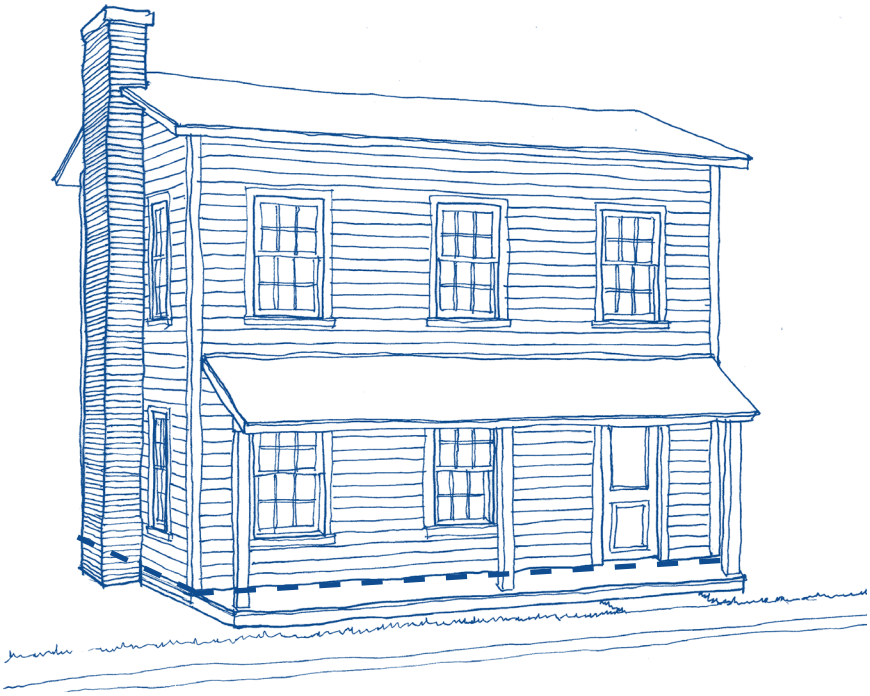
7'-0" ABOVE ADJACENT GRADE

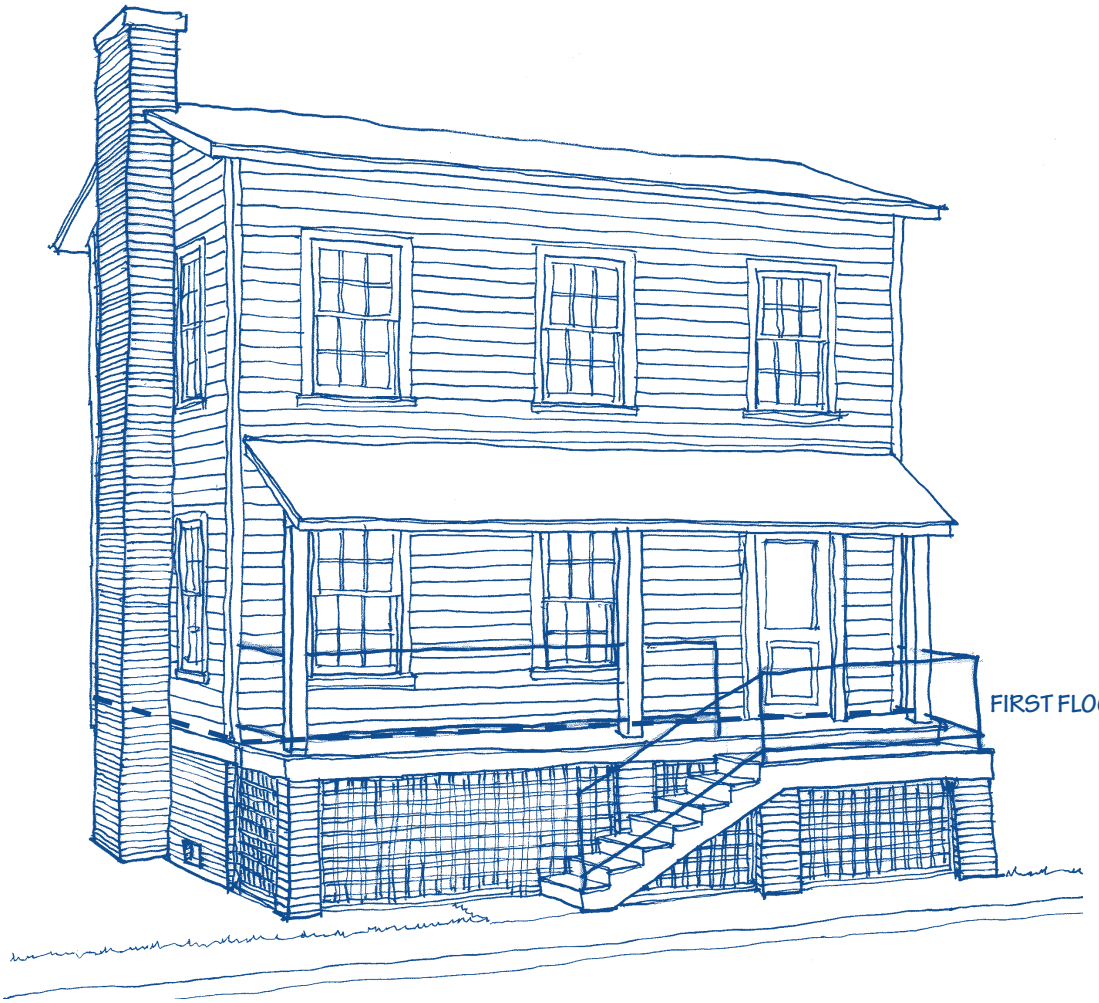
- ❑ Historic building features retained including door, windows & siding
- ❑ Extended piers with colored stucco or concrete to match historic condition
- ❑ Square wood lattice between building piers and under wood stair
- ❑ Compatible wood stair, landing & railing
- ❑ Access orientation towards street maintained requires 14'-6" setback from sidewalk edge

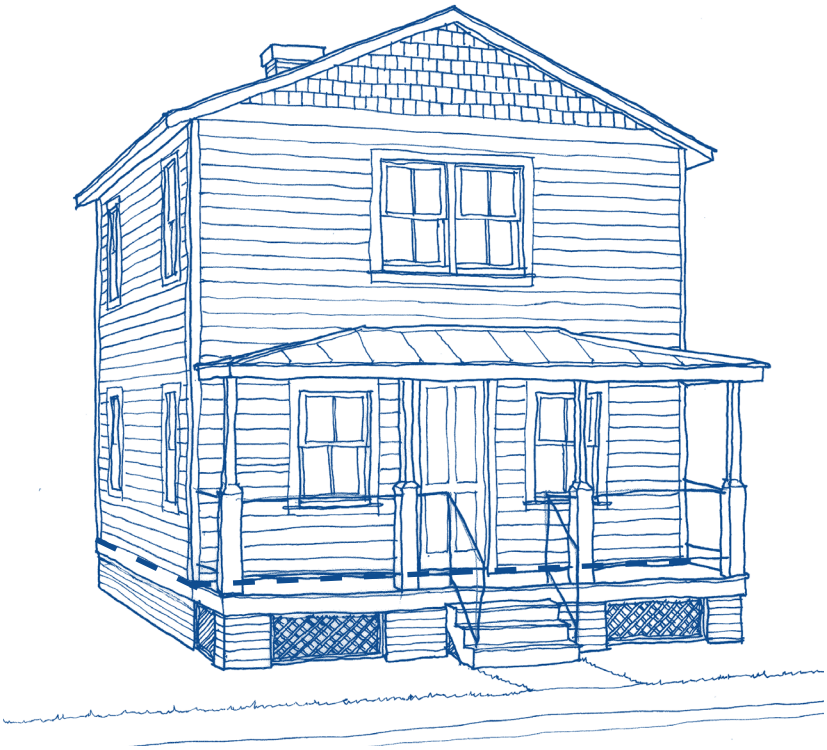


4'-8" ABOVE ADJACENT GRADE

- ❑ Historic porch retained
- ❑ Historic chimney retained & extended
- ❑ Historic building features retained including door, windows & siding
- ❑ Extended brick foundation walls with flood vents at side elevations
- ❑ Extended brick piers at porch
- ❑ Square wood lattice between building piers and under wood stair
- ❑ Compatible wood stair, landing & railing
- ❑ Access stair re-orientation towards side to allow setback to remain

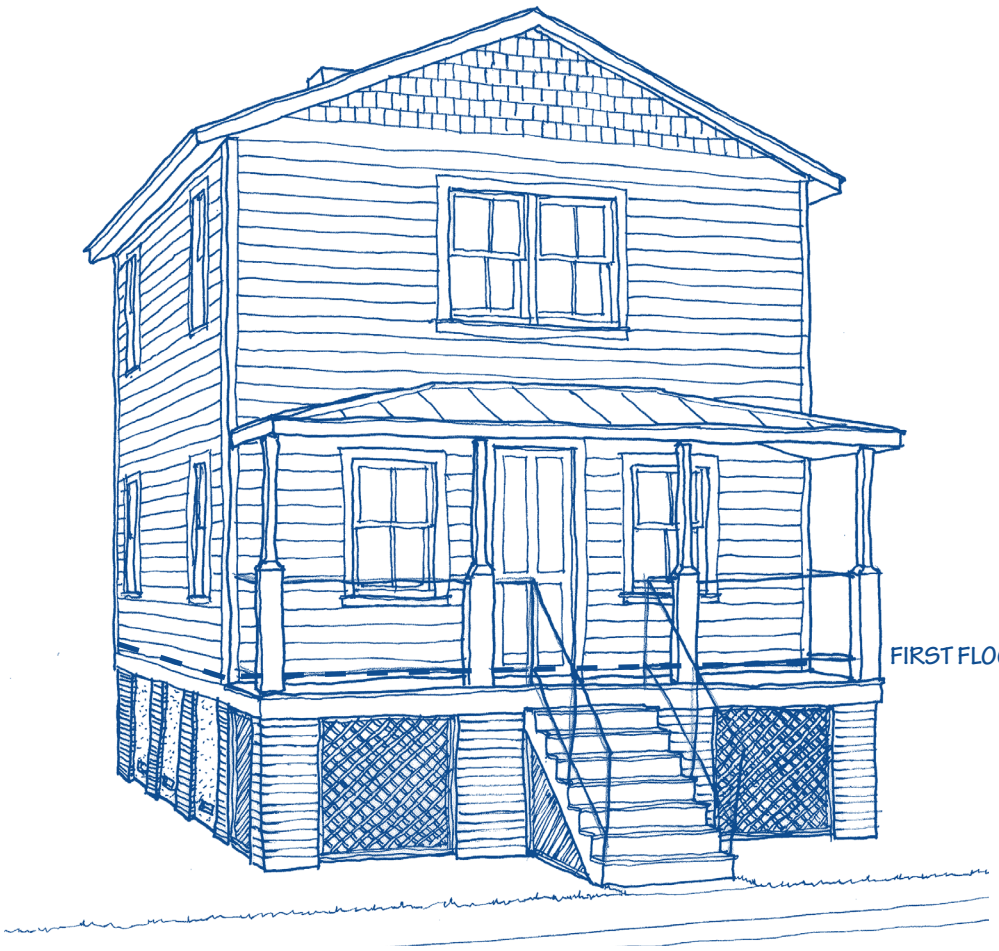






4'-8" ABOVE ADJACENT GRADE

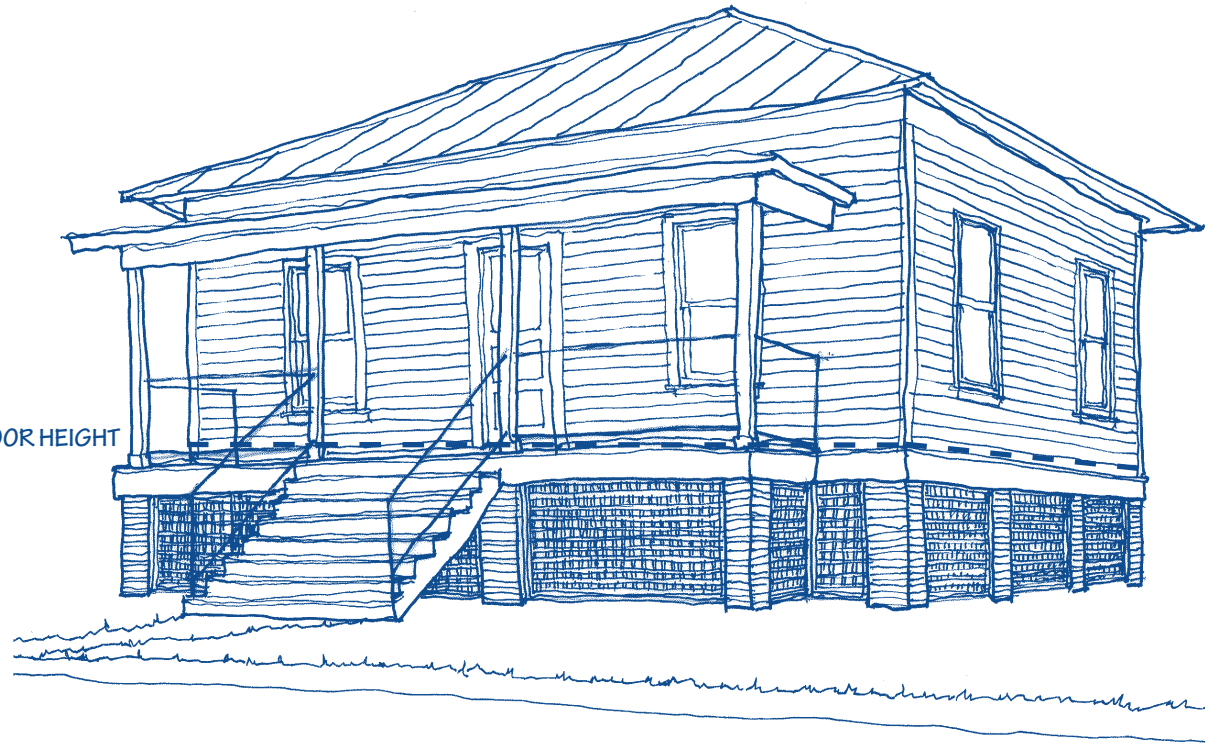
- ❑ Historic porch retained
- ❑ Historic chimney retained
- ❑ Historic building features retained including door, windows & siding
- ❑ Extended brick piers with stucco foundation walls & flood vents at side elevations
- ❑ Extended brick piers at porch
- ❑ Diagonal wood lattice between building piers and under wood stair
- ❑ Compatible wood stair, landing & railing

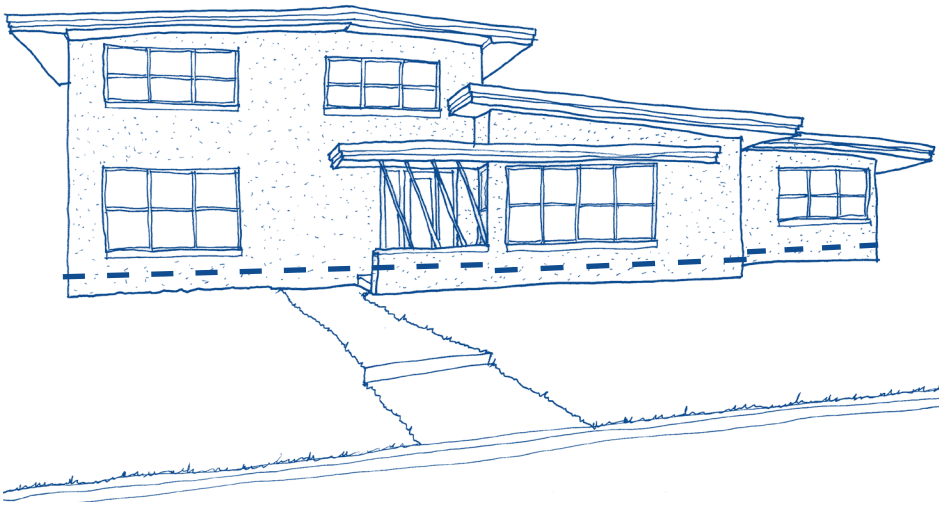


FIRST FLOOR HEIGHT

4'-8" ABOVE ADJACENT GRADE

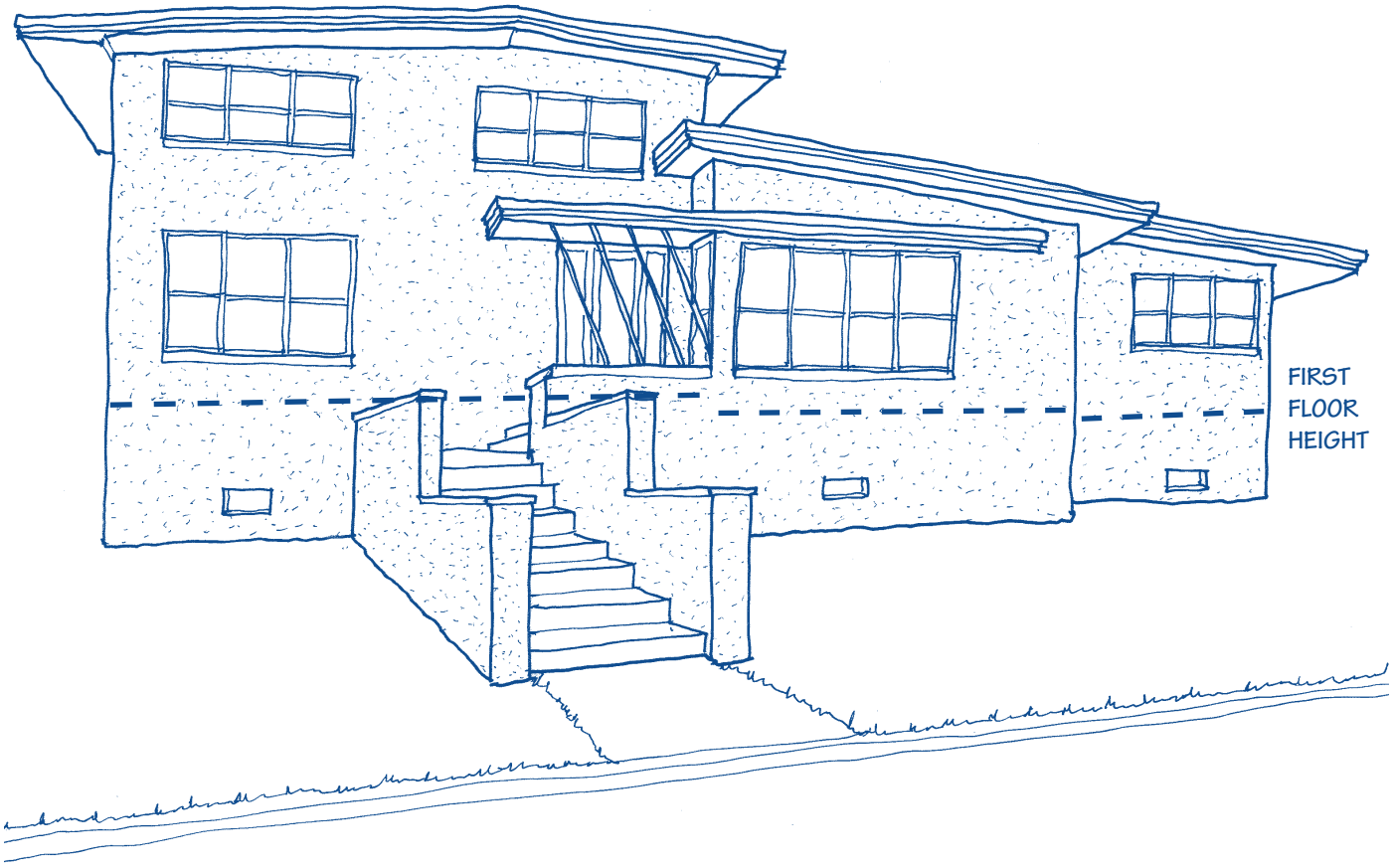
- ❑ Historic building features retained including door, windows & siding
- ❑ Extended brick piers to match historic condition
- ❑ Square wood lattice between building piers
- ❑ Compatible wood stair, landing & railing
- ❑ Access orientation towards street maintained





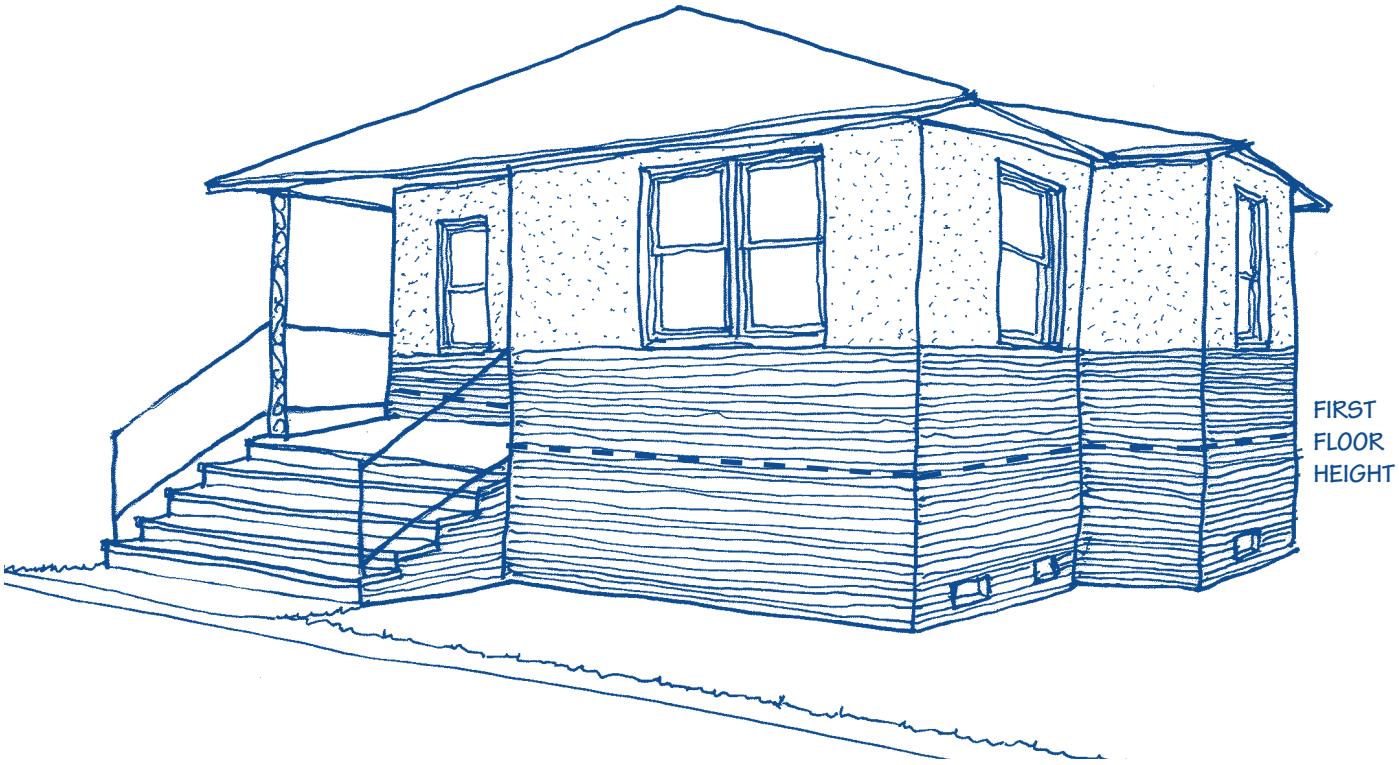
7'-0" ABOVE ADJACENT GRADE

- ❑ Maintained building geometry inset porch & projecting bay
- ❑ Historic building features retained including windows, stucco wall surfaces & diagonal porch braces
- ❑ Extended foundation walls with matching stucco
- ❑ Flood vents at front elevation should be relocated to side if possible
- ❑ Compatible masonry stair, landing & railing
- ❑ Access orientation towards street maintained with stair complementing building materials



3'-6" ABOVE ADJACENT GRADE

- ❑ Maintained inset porch & projecting bay
- ❑ Historic building features retained including windows & masonry wall surfaces
- ❑ Extended foundation walls with matching masonry
- ❑ Flood vents at side elevations
- ❑ Compatible masonry stair, landing & railing
- ❑ Access orientation towards street maintained requires 7'-0" setback from street edge



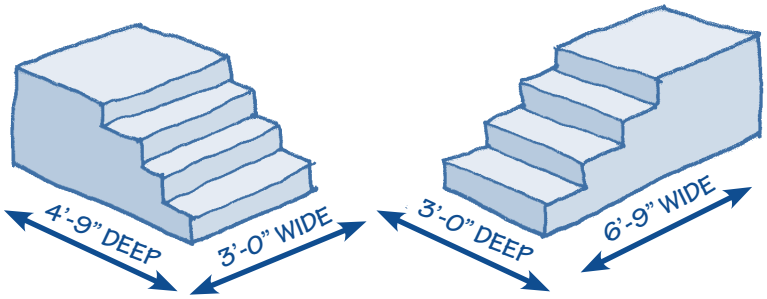
STAIR CONFIGURATIONS

THE CONFIGURATIONS & DIMENSIONS OF STAIRS INCLUDED IN THE ILLUSTRATED CASE STUDIES CAN PROVIDE ASSIST IN DETERMINING APPROPRIATE OPTIONS FOR EXISTING SITE CONSTRAINTS AT AN ELEVATED HOUSE.

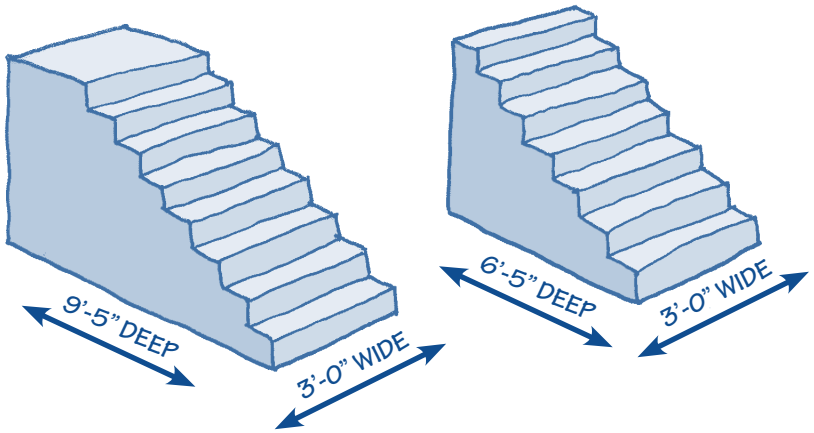
THE FOLLOWING ASSUMPTIONS WERE MADE REGARDING DIMENSIONS:

- LANDINGS ARE 3'-0" DEEP
- STAIRS ARE 3'-0" WIDE
- STAIR TREADS ARE 11" DEEP AND RISERS 7" HIGH
- THERE IS A STEP UP ONTO A PORCH FOR STAIRS WITHOUT A TOP LANDING

FIRST FLOOR 2'-4" ABOVE ADJACENT GRADE



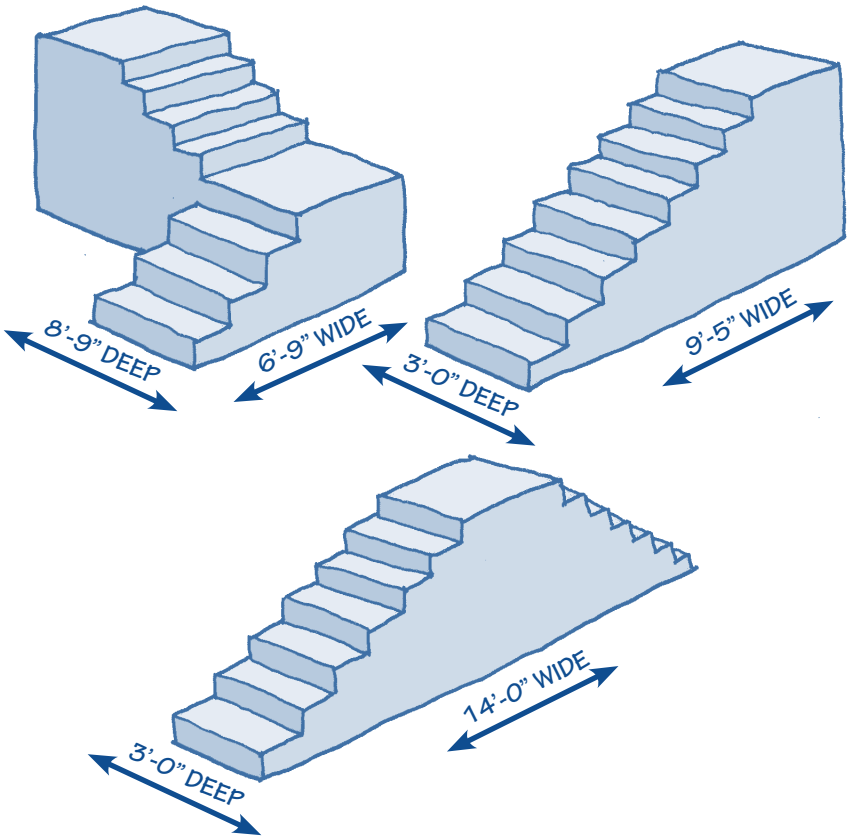
FIRST FLOOR 4'-8" ABOVE ADJACENT GRADE



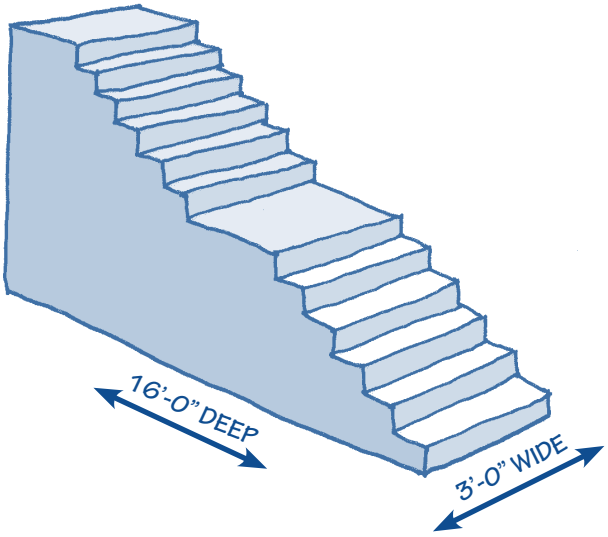
STAIR DIMENSION MATRIX

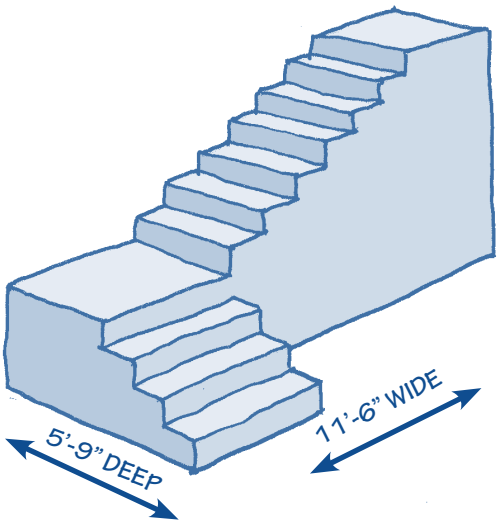
THE MATRIX BELOW CAN BE UTILIZED TO PLAN FOR EXTENDED STAIRS.

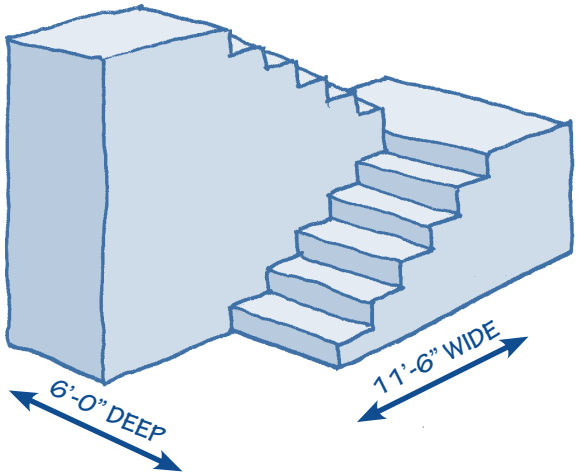
Height to Living Floor from Grade	Number of Steps	Stair Length Excluding Landings	Ramp Length Including Minimum Required Landings
7"	1	11"	7'-0"
1'-2"	2	1'-10"	14'-0"
1'-9"	3	2'-9"	21'-0"
2'-4"	4	3'-8"	28'-0"
2'-11"	5	4'-7"	35'-0"+5'
3'-6"	6	5'-6"	42'-0"+5'
4'-1"	7	6'-5"	49'-0"+5'
4'-8"	8	7'-4"	56'-0"+5'
5'-3"	9	8'-3"	63'-0"+10'
5'-10	10	9'-2"	70'-0"+10'
6'-5	11	10'-1"	77'-0"+ 0'
7'-0"	12	11'-0"	84'-0"+10'
7'-7"	13	11'-11"	91'-0"+15'
8'-2"	14	12'-10"	98'-0"+15'
8'-9"	15	13'-9"	105'-0"+15'

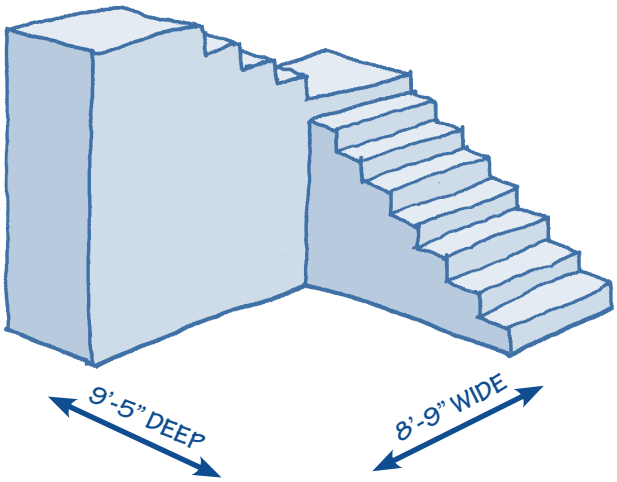


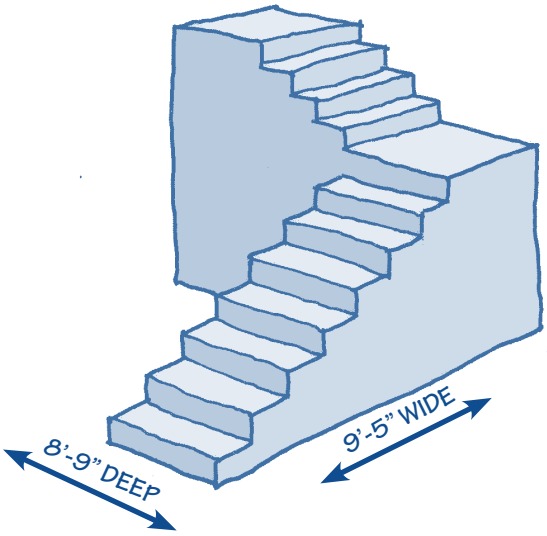
FIRST FLOOR 7'-0" ABOVE ADJACENT GRADE

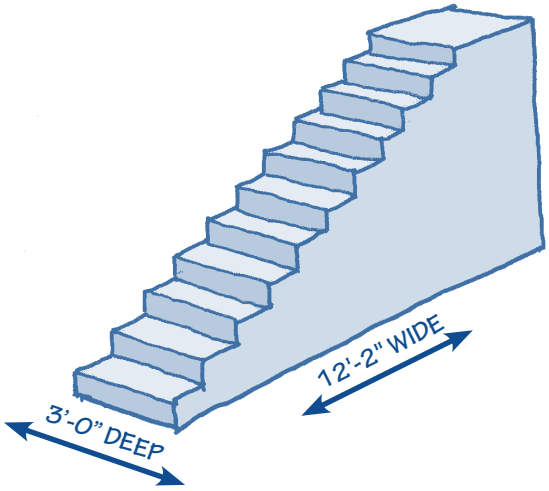












BUILDING ELEVATION CHECKLIST FOR HISTORIC PROPERTIES

EXISTING FEATURES

- ❑ Maintain existing house walls, porches, chimneys, and bays
- ❑ Maintain the historic configuration of window and door openings
- ❑ Maintain historic landscape elements such as walkways, fences, and walls
- ❑ Maintain mature trees and shrubs
- ❑ Limit on-site driveways and parking to existing locations

BUILDING WALL EXTENSIONS

- ❑ Extend masonry wall material or piers to be compatible with existing material
- ❑ Install true or veneer brick or stone to match historic material if concrete support is installed to meet National Flood Insurance Program (NFIP) requirements
- ❑ Install colored concrete or stucco to match historic material if brick or stone finish is financially infeasible
- ❑ Install flood openings on secondary elevations
- ❑ Install metal louvers and flood vents that are compatible in color with the wall to minimize the visual impact
- ❑ Install wood lattice or similar screening material between extended piers or piles that is compatible to style of the house - Typically, square lattice at Colonial Revival houses and diagonal lattice at Victorian period houses behiind or recessed from outer face of piers
- ❑ Avoid installing horizontal board lattice, which is typically inappropriate for historic residences

PORCH EXTENSIONS

- ❑ Locate porch piers under the center line of columns and at corners of stair landings
- ❑ Install new piers to match historic masonry whenever possible
- ❑ Install true or veneer brick or stone to match historic material if concrete support is installed to meet National Flood Insurance Program (NFIP) requirements
- ❑ Install colored concrete or stucco to match historic material if brick or stone veneer is financially infeasible
- ❑ Install wood railings that are compatible to the style of the house in style and detailing, as required by the Florida Building Code

STAIR EXTENSIONS

- ❑ Maintain the principal exterior building access orientation and features for stairs, including railings, and landings
- ❑ Construct new stairs and landings of materials compatible for house - Typically wood at wood framed houses and porches and stone or brick at stone or brick houses or those without a porch
- ❑ Install railings that are compatible with existing historic railings or the historic character of the house that are of traditional materials and detailing including terminations such as newel posts at wood railings and lambs tongues at metal railings

SYSTEMS & EQUIPMENT

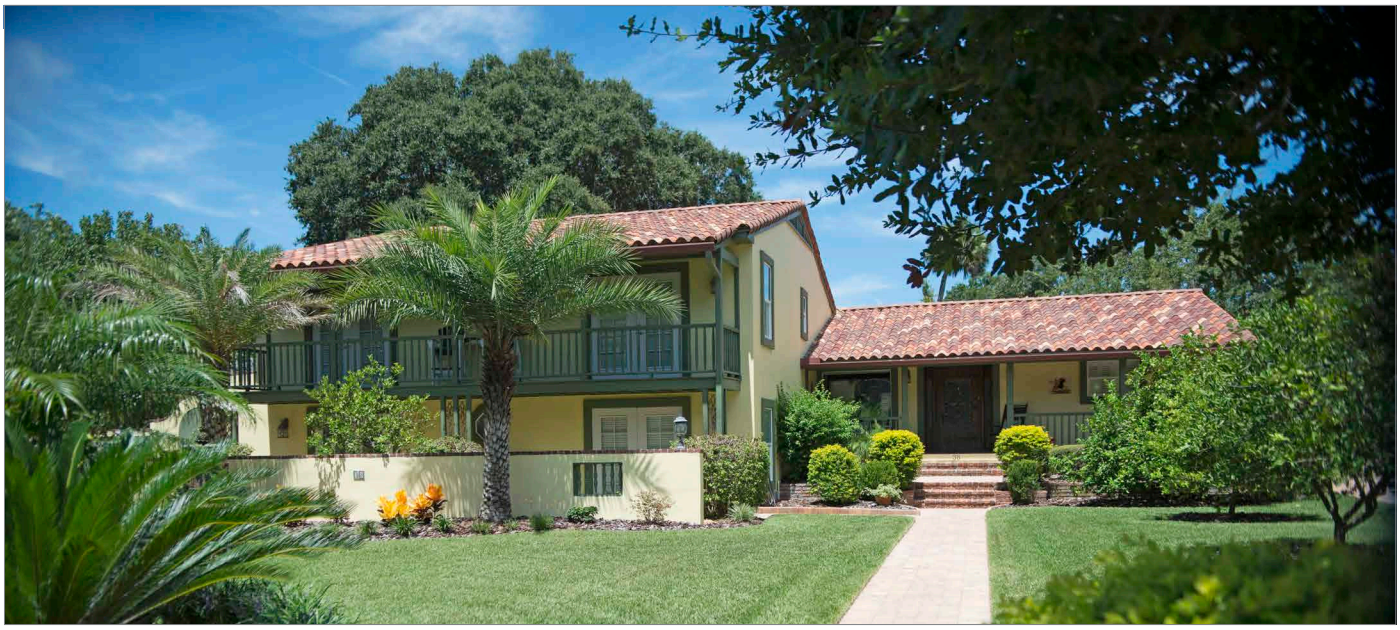
- ❑ Relocate all building systems and equipment out of flood prone areas to an inconspicuous location
- ❑ Screen systems and equipment with landscaping or fencing to minimize visibility

LANDSCAPING

- ❑ Avoid elevating a building on fill
- ❑ Avoid adding parking in front yards or under houses
- ❑ Avoid new curb cuts in front of houses
- ❑ Replace asphalt or concrete driveways with permeable material to improve storm water absorption
- ❑ Install landscaping of varying heights and forms, including evergreens like Youpon holly, palms, and magnolias to add visual interest along the sidewalk complementing arrangement of building façade and entrance path
- ❑ Locate plants so they do not interfere will flood vent operation as they grow
- ❑ Install vegetation that is native to St. Augustine to minimize the need for watering and fertilizers
- ❑ Install fences or walls to conceal raised foundations or relocated systems and equipment.

GARAGES

- ❑ Install flood openings below the BFE to be compatible with NFIP requirements - Garage doors do not meet the requirements of flood openings
- ❑ Construct garages that are compatible to the historic nature of the residence and neighborhood character
- ❑ Orient garage doors away from the primary building façade



This home has three levels, two in the main block and an intermediate level at the one-story section to the right. The lower level of the main block is most vulnerable to flooding and it could be wet floodproofed. Wet Floodproofing would include relocating any systems or equipment to a higher level.

5 Wet Floodproofing

Wet floodproofing is a flood mitigation alternative that can comply with St. Augustine's floodplain management requirements for residential and non-residential buildings that does not have an enclosure below grade on all four sides. ***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.*** The unimpeded transfer of floodwater through flood openings equalizes the lateral and buoyancy forces, significantly lessening strain on the building's structure. *(Refer to Building Foundations, page 4.10.)*

To be compliant with the NFIP, wet floodproofing relies on automatic passage of floodwater in and out of a building. ***In addition, spaces located below the flood protection elevation should be considered "wet," use of these spaces should be limited to non-living functions, and flood damage-resistant materials utilized. Potential uses include parking, building access including stairs and elevators, and incidental, low-value storage.*** *(Refer to Use of Flood Damage-Resistant Materials in Flood-Prone Locations, page 3.6.)* In addition, building systems and equipment should be located above the Design Flood Elevation (DFE). *(Refer to Relocation of Critical Systems & Equipment, page 3.4.)* These criteria apply to all wet floodproofed floor levels, including basements.

Wet floodproofing is often utilized for new residential buildings and may be the best alternative for masonry or concrete buildings that are required to comply with NFIP design criteria and are technically difficult to elevate or relocate. This can include very large or complex buildings, or slab on grade buildings. To meet wet floodproofing requirements, it may be necessary to abandon or limit the use of a portion of a building. Any newly constructed addition to replace abandoned space must comply with floodplain management requirements and is subject to compliance with the St. Augustine City Code and the Florida Building Code.

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]

If elevation of a 1-story masonry building is not an option, there are alternatives that can improve resilience. It may be possible to add a second floor addition, add flood openings to the current first floor, and limit its use to parking, storage and entry. Adding a second floor would be a substantial improvement and would result in the loss of historic designation, resulting in the requirement for full compliance with floodplain management requirements.

USES BELOW DESIGN FLOOD ELEVATION

To be considered wet floodproofed, the allowable uses of enclosed space below the flood protection elevation should be limited to minimize potential flood damage. *(Refer to Relocation of Critical Systems & Equipment, page 3.4.)* Uses that are permitted include building entrances, storage, and parking. To be considered wet floodproofed, all building systems must be located above the Design Flood Elevation (DFE). In the case of existing buildings, modification and/or abandonment of the lowest floor levels to comply with St. Augustine's floodplain management requirements can include the following options:

Potential Lower Level Modifications

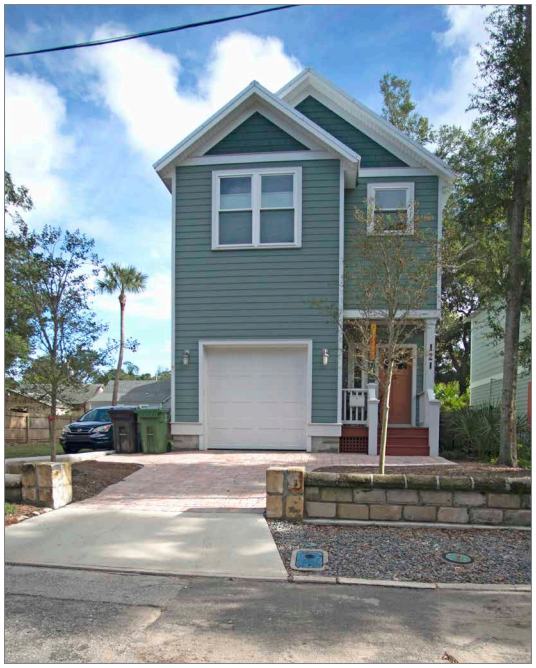
- **Allow floodwater to freely enter and leave the building.** This might include adding flood openings in the walls and providing openings for floodwater to infiltrate the soil through the floor slab. In addition, a sump pump with a secondary power supply above the flood protection-elevation should be considered to expel residual water during and after an event. *(Refer to Building Foundations, page 4.10.)*
- **Modify lower level window and door openings.** Depending on their location, lower level windows and doors might require modification to allow drainage or ventilation to facilitate drying after a flood.

Potential First Floor Modifications

- **Raise the floor.** If sufficient first floor ceiling height is available, raise the floor level above the DFE. This may require the interior modification of stairs, adjustment of interior doors, and may potentially alter the relationship between the floor height and the 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 non-residential uses or if residential to a building entrance, parking, and storage. This may require re-configuration of upper building floors to accommodate formerly first floor public spaces, such as living rooms or kitchens.

If wet floodproofing were to be considered for this existing masonry building, the current use of the first floor as living space would need to be abandoned. The first floor could be modified to have the use limited to an entrance to the second floor, storage, or parking with the addition of a driveway.

In this example of wet floodproofing of a new residence in Lincolnville, the front elevation (at left) is compatible with scale, form, and stylistic components of many of the neighboring houses. The ground level parking area is accessed from the rear and could be largely concealed with vegetation.



New residences constructed in flood-vulnerable locations are often wet floodproofed. To the extent possible, the form, scale, and materials of new construction should be compatible with neighboring existing buildings. This example includes a small front porch at the entry. In addition, the site has been raised, reducing its flood vulnerability. Flood impacts to adjacent properties should be mitigated.

WET FLOODPROOFING IN A HISTORIC CONTEXT - NEW RESIDENCES

Most new residences in St. Augustine's flood-vulnerable neighborhoods are designed to be wet floodproofed. Although a goal of preservation in flood vulnerable areas is to retain historic residences that have been modified to the extent required for safety, new construction within a historic district can have a significant impact on the visual sense of a neighborhood. The following design principles should be considered for new construction when compared to neighboring buildings:

- **Scale: Height & Width:** The proportions of the new building.
- **Building Form & Massing:** The three-dimensional relationship and configuration of the new building, its walls and roof.
- **Setback:** The distance between the new building to the street and between adjacent property lines.
- **Orientation:** The location of the primary entrance door or front façade.
- **Architectural Elements & Projections:** The size, shape, proportions, and locations of entrances, porches, chimneys, dormers, and elements that contribute to an overall building's shape and silhouette.
- **Alignment, Rhythm & Spacing:** The effect the new building will have on the existing patterns on its block.
- **Façade Proportions:** The relationship of window and door patterns in their size, shape, and location of the new building façade and building elements to each other.
- **Trim & Detail:** The moldings, decorative elements, and features of a building that are secondary to major surfaces such as walls and roofs.
- **Materials:** The substance of which something is composed or constructed.

Considerations of style are excluded because new buildings should not imitate or replicate historic buildings.

WET FLOODPROOFING CHECKLIST FOR HISTORIC PROPERTIES

EXISTING FEATURES

- ❑ Maintain existing house walls, porches, chimneys, and bays
- ❑ Maintain the historic configuration of window and door openings
- ❑ Maintain historic landscape elements such as walkways, fences, and walls
- ❑ Maintain mature trees and shrubs
- ❑ Limit on-site driveways and parking to existing locations

SYSTEMS & EQUIPMENT

- ❑ Relocate all building systems and equipment out of flood prone areas to an inconspicuous location
- ❑ Screen systems and equipment with landscaping or fencing to minimize visibility

FLOOD OPENINGS

- ❑ Install flood openings on side elevations when possible
- ❑ Install metal louvers and flood vents that are compatible in color with the wall to minimize the visual impact

PARKING AT EXISTING BUILDING

- ❑ Install flood openings below the BFE to be compatible with NFIP requirements - Garage doors do not meet the requirements of flood openings
- ❑ Orient garage doors away from the primary building façade

LANDSCAPING

- ❑ Avoid adding parking in front yards or under houses
- ❑ Avoid new curb cuts in front of houses
- ❑ Replace asphalt or concrete driveways with permeable material to improve storm water absorption
- ❑ Install landscaping of varying heights and forms, including evergreens like Youpon holly, palms, and magnolias to add visual interest along the sidewalk complementing arrangement of building façade and entrance path
- ❑ Locate plants so they do not interfere will flood vent operation as they grow
- ❑ Install vegetation that is native to St. Augustine to minimize the need for watering and fertilizers
- ❑ Install fences or walls to conceal raised foundations or relocated systems and equipment

ADDITIONS & NEW RESIDENCES

- ❑ Avoid building on fill
- ❑ Construct additions that comply with floodplain management requirements in an unobtrusive manner to compensate for lost interior space
- ❑ Construct new residences in a manner that is compliant with wet floodproofing requirements and compatible with the character of the surrounding historic context including limiting the overall building height and integrating front porches
- ❑ Avoid installing parking or garages in a manner that is visible from the primary elevation or front façade

Appendix A Glossary

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

HARB: Historic Architectural Review Board

LiMWA: Limit of Moderate Wave Action

NFIP: National Flood Insurance Program

NOAA: National Oceanic and Atmospheric Administration

NPS: National Park Service

SAFM: St. Augustine Floodplain Management Ordinance

SFHA: Special Flood Hazard Area

The definition sources referenced in the glossary:

- **FBC:** Florida Building Code
- **FEMA:** Federal Emergency Management Agency
- **NFIP:** National Flood Insurance Program
- **NOAA:** National Oceanic and Atmospheric Administration
- **NPS:** National Park Service
- **SAFM:** St. Augustine Floodplain Management Ordinance

Definitions provided herein are for reference only. Check source to confirm the most recent definitions for legal use.

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]

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]

Alteration of a Watercourse. A dam, impoundment, channel relocation, change in channel alignment, channelization, or change in cross-sectional area of the channel or the channel capacity, or any other form of modification which may alter, impede, retard or change the direction and/or velocity of the riverine flow of water during conditions of the base flood. [SAFM]

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]

Appeal. A request for a review of the floodplain administrator's interpretation of any provision of this article. [SAFM]

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. [SAFM]

Base Flood. A flood having a 1-percent chance of being equaled or exceeded in any given year. [Also defined in Florida Building Code, Building, Section 202.] The base flood is commonly referred to as the "100-year flood" or the "1-percent-annual chance flood." [SAFM]

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 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). [Also defined in Florida Building Code, Building, Section 202.] [SAFM]

Basement. The portion of a building having its floor subgrade (below ground level) on all sides. [Also defined in Florida Building Code, Building, Section 202; see "Basement (for flood loads)".] [SAFM]

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 High Hazard Area. A special flood hazard area 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. Coastal high hazard areas are also referred to as "high hazard areas subject to high velocity wave action" or "V Zones" and are designated on flood insurance rate maps (FIRM) as zone V1-V30, VE, or V. [SAFM]

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: [Also defined in Florida Building Code, Building, Section 202.]

(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. [SAFM]

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. [Also defined in Florida Building Code, Building, Section 202.] [SAFM]

Development. Any man-made change to improved or unimproved real estate, including but not limited to, buildings or other structures, tanks, temporary structures, temporary or permanent storage of equipment or materials, mining, dredging, filling, grading, paving, excavations, drilling operations or any other land disturbing activities. [SAFM]

Digital Flood Insurance Rate Maps (DFIRMs). Digitally converted Flood Insurance Rate Maps developed in conjunction with FEMA.

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]

Encroachment. The placement of fill, excavation, buildings, permanent structures or other development into a flood hazard area which may impede or alter the flow capacity of riverine flood hazard areas. [SAFM]

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.

Exceptional Hardship. The exceptional or unreasonable hardship associated with the land that would result from a failure to grant the requested variance. Mere economic or financial hardship alone is not unreasonable or exceptional. Inconvenience, aesthetic considerations, physical handicaps, personal preferences or the disapproval of one's neighbors likewise cannot, as a rule, qualify as an unreasonable or exceptional hardship. All of these problems can be resolved through other means without granting a variance, even if the alternative is more expensive, or requires the property owner to build elsewhere or put the parcel to a different use than originally intended. [SAFM]

Existing Building and Existing Structure. Any buildings and structures for which the "start of construction" commenced before October 6, 1972. [Also defined in Florida Building Code, Building, Section 202.] [SAFM]

Federal Emergency Management Agency (FEMA). The federal agency that, in addition to carrying out other functions, administers the National Flood Insurance Program. [SAFM]

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: [Also defined in Florida Building Code, Building, Section 202.]

(1) The overflow of inland or tidal waters.

(2) The unusual and rapid accumulation or runoff of surface waters from any source. [SAFM]

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. [Also defined in Florida Building Code, Building, Section 202.] [SAFM]

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: [Also defined in Florida Building Code, Building, Section 202.]

(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. [SAFM]

Flood Insurance Rate Map (FIRM). The official map of the city on which the Federal Emergency Management Agency has delineated both special flood hazard areas and the risk premium zones applicable to the city. [Also defined in Florida Building Code, Building, Section 202.] [SAFM]

Flood Insurance Study (FIS). The official report provided by the Federal Emergency Management Agency that contains the flood insurance rate map, the flood boundary and floodway map (if applicable), the water surface elevations of the base flood, and supporting technical data. [Also defined in Florida Building Code, Building, Section 202.] [SAFM]

Floodplain. Any land area susceptible to being inundated by floodwaters from any source. [NFIP]

Floodplain Administrator. The office or position designated and charged with the administration and enforcement of this article (may be referred to as the floodplain manager). [SAFM]

Floodplain Development Permit or Approval. An official document or certificate issued by the city, or other evidence of approval or concurrence, which authorizes performance of specific development activities that are located in flood hazard areas and that are determined to be compliant with this article. [SAFM]

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. [NFPI]

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-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 or other riverine 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 one (1) foot. [Also defined in Florida Building Code, Building, Section 202.] [SAFM]

Floodway Encroachment Analysis. An engineering analysis of the impact that a proposed encroachment into a floodway is expected to have on the floodway boundaries and base flood elevations; the evaluation shall be prepared by a qualified Florida licensed engineer using standard engineering methods and models. [SAFM]

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]

Florida Building Code. The family of codes adopted by the Florida Building Commission, including: Florida Building Code, Building; Florida Building Code, Residential; Florida Building Code, Existing Building; Florida Building Code, Mechanical; Florida Building Code, Plumbing; Florida Building Code, Fuel Gas. [SAFM]

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, including only docking facilities, port facilities that are necessary for the loading and unloading of cargo or passengers, and ship building and ship repair facilities; the term does not include long-term storage or related manufacturing facilities. [SAFM]

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]

Highest Adjacent Grade. The highest natural elevation of the ground surface prior to construction next to the proposed walls or foundation of a structure. [SAFM]

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 authenticity of a property's identity, evidenced by the survival of physical characteristics that existed during the property's historic period including evaluation of any changes that may have occurred through time which could contribute to the building's later-acquired historic character and significance. An overall sense of past time and place are evident in the composite of seven qualities: location, design, setting, materials, workmanship, feeling, and association. [CoSA]

Historic Period. The primary time line for which the historic building derived its historic association with an event, person, place, pattern of development or other historic context. [CoSA]

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]

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). An official determination issued by FEMA that amends or revises an effective flood insurance rate map or flood insurance study. Letters of map change include:

Letter of Map Amendment (LOMA). An amendment based on technical data showing that a property was incorrectly included in a designated special flood hazard area. A LOMA amends the current effective flood insurance rate map and establishes that a specific property, portion of a property, or structure is not located in a special flood hazard area.

Letter of Map Revision (LOMR). A revision based on technical data that may show changes to flood zones, flood elevations, special flood hazard area boundaries and floodway delineations, and other planimetric features.

Letter of Map Revision Based On Fill (LOMR-F). A determination that a structure or parcel of land has been elevated by fill above the base flood elevation and is, therefore, no longer located within the special flood hazard area. In order to qualify for this determination, the fill must have been permitted and placed in accordance with the city's floodplain management regulations.

Conditional Letter of Map Revision (CLOMR). A formal review and comment as to whether a proposed flood protection project or other project complies with the minimum NFIP requirements for such projects with respect to delineation of special flood hazard areas. A CLOMR does not revise the effective flood insurance rate map or flood insurance study; upon submission and approval of certified as-built documentation, a letter of map revision may be issued by FEMA to revise the effective FIRM. [SAFM]

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 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. [Also defined in Florida Building Code, Building, Section 202.] [SAFM]

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]

Market Value. The price at which a property will change hands between a willing buyer and a willing seller, neither party being under compulsion to buy or sell and both having reasonable knowledge of relevant facts. As used in this article, the term refers to the market value of buildings and structures, excluding the land and other improvements on the parcel. Market value may be established by a qualified independent appraiser, actual cash value (replacement cost depreciated for age and quality of construction), or tax assessment value established by the St. Johns County Property Appraiser plus ten (10) percent. Appraisals by qualified independent appraisers shall not use the "income capitalization approach," which based value on the use of the property and not on the structure. [SAFM]

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 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). 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. For the purposes of administration of this article and the flood resistant construction requirements of the Florida Building Code, structures for which the "start of construction" commenced on or after October 6, 1972 and includes any subsequent improvements to such structures. [SAFM]

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]

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]

Permit for Floodplain Development. A permit is required before construction or development begins within any 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]

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]

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]

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]

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]

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 in the floodplain subject to a 1 percent or greater chance of flooding in any given year. Special flood hazard areas are shown on FIRMs as zone A, AO, A1-A30, AE, A99, AH, V1-V30, VE or V. [Also defined in Florida Building Code, Building Section 202.] [SAFM]

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. [Also defined in Florida Building Code, Building Section 202.] [SAFM]

Sea Level Rise. The increasing of the average global sea level. [NOAA]

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]

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.

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 building or structure whereby the cost of restoring the building or structure to its before-damaged condition would equal or exceed fifty (50) percent of the market value of the building or structure before the damage occurred. [Also defined in Florida Building Code, Building Section 202.] [SAFM]

Substantial Improvement. Any repair, reconstruction, rehabilitation, alteration, addition, or other improvement of a building or structure, the cost of which equals or exceeds fifty (50) percent of the market value of the building or structure before the improvement or repair is started. If the structure has incurred "substantial damage," any repairs are considered substantial improvement regardless of the actual repair work performed. The term does not, however, include either: [Also defined in Florida Building Code, Building, Section 202.]

1. Any project for improvement of a building required to correct existing health, sanitary, or safety code violations identified by the building official and that are the minimum necessary to assure safe living conditions.
2. Any alteration of a historic structure provided the alteration will not preclude the structure's continued designation as a historic structure. [SAFM]

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 loadcarrying capacity of any story in any horizontal direction has been reduced by more than 33 percent from its predamage 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 predamage 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]

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 from the requirements of this article, or the flood resistant construction requirements of the Florida Building Code, which permits construction in a manner that would not otherwise be permitted by this article or the Florida Building Code. [SAFM]

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]

Watercourse. A river, creek, stream, channel or other topographic feature in, on, through, or over which water flows at least periodically. [SAFM]

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]

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 subject to inundation by the 1-percent-annual-chance flood event generally determined using approximate methodologies. Because detailed hydraulic analyses have not been performed, no Base Flood Elevations (BFEs) or flood depths are shown. Mandatory flood insurance purchase requirements and floodplain management standards apply. [NFIP]

Zone A99. Areas subject to inundation by the 1-percent-annual-chance flood event, but which will ultimately be protected upon completion of an under-construction Federal flood protection system. These are areas of special flood hazard where enough progress has been made on the construction of a protection system, such as dikes, dams, and levees, to consider it complete for insurance rating purposes. Zone A99 may only be used when the flood protection system has reached specified statutory progress toward completion. No Base Flood Elevations (BFEs) or depths are shown. [NFIP]

Zone AE and A1-30. Areas subject to inundation by the 1-percent-annual-chance flood event determined by detailed methods. Base Flood Elevations (BFEs) are shown. Mandatory flood insurance purchase requirements and floodplain management standards apply. [NFIP]

Zone AH. Areas subject to inundation by 1-percent-annual-chance shallow flooding (usually areas of ponding) where average depths are between one and three feet. Base Flood Elevations (BFEs) derived from detailed hydraulic analyses are shown in this zone. Mandatory flood insurance purchase requirements and floodplain management standards apply. [NFIP]

Zone AO. Areas subject to inundation by 1-percent-annual-chance shallow flooding (usually sheet flow on sloping terrain) where average depths are between one and three feet. Average flood depths derived from detailed hydraulic analyses are shown in this zone. Mandatory flood insurance purchase requirements and floodplain management standards apply. [NFIP]

Some Zone AO have been designated in areas with high flood velocities such as alluvial fans and washes. Communities are encouraged to adopt more restrictive requirements for these areas.

Zone AR. Areas that result from the decertification of a previously accredited flood protection system that is determined to be in the process of being restored to provide base flood protection. Mandatory flood insurance purchase requirements and floodplain management standards apply. [NFIP]

Zone V. Areas along coasts subject to inundation by the 1-percent-annual-chance flood event with additional hazards associated with storm-induced waves. Because detailed hydraulic analyses have not been performed, no Base Flood Elevations (BFEs) or flood depths are shown. Mandatory flood insurance purchase requirements and floodplain management standards apply. [NFIP]

Zone VE and V1-30. Areas subject to inundation by the 1-percent-annual-chance flood event with additional hazards due to storm-induced velocity wave action. Base Flood Elevations (BFEs) derived from detailed hydraulic analyses are shown. Mandatory flood insurance purchase requirements and floodplain management standards apply. [NFIP]

Appendix B Flood Resources

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 30, 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

- Technical Bulletin 0: User's Guide to Technical Bulletins (July 2019)
- Technical Bulletin 1: Requirements for Flood Openings in Foundation Walls and Walls of Enclosure: Below Elevated Buildings in Special Flood Hazard Areas in Accordance with the National Flood Insurance Program (March 2020)
- Technical Bulletin 2: Flood Damage-Resistant Materials Requirements (August 2008)
- Technical Bulletin 3: Non-Residential Floodproofing - Requirements and Certification (1993)
- Technical Bulletin 4: Elevator Installation (November 2010)
- Technical Bulletin 5: Free-Of-Obstruction Requirements (August 2008)
- Technical Bulletin 6: Below-Grade Parking Requirements (1993)
- Technical Bulletin 7: Wet Floodproofing Requirements (1993)
- Technical Bulletin 8: Corrosion Protection for Metal Connectors in Coastal Areas (1996)
- Technical Bulletin 9: Design and Construction Guidance for Breakaway Walls (June 2019)
- 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 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-1037 Reducing Flood Risk to Residential Buildings That Cannot Be Elevated (September 2015)

ADDITIONAL RESOURCES

City of St. Augustine. *Resilient Heritage in the Nation's Oldest City*. (Taylor Engineering, 2020)

www.citystaug.com/DocumentCenter/View/4058/St-Augustine-Resilient-Heritage-Report

Historic England. *Flooding and Historic Buildings.* (2015)

www:historicengland.org.uk/advice/technical-advice/flooding-and-historic-buildings/

Historic Scotland. *Flood Damage to Traditional Buildings.* (2014)

www.historicenvironment.scot/archives-and-research/publications/publication/?publicationId=13349883-20bf-48ec-afd9-a59500e9a44e

Livingston, Dennis. *Rebuilding Water-Damaged Homes. (2009)*

www.hud.gov/sites/documents/AFHH_WATER_DAMAGED.PDF

National Park Service. *Guidelines for Flood Adaptation for Rehabilitating Historic Buildings.* (2021)

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

National Park Service. *Secretary of the Interior's Standards for the Treatment of Historic Properties.* (2017)

www.nps.gov/tps/standards/treatment-guidelines-2017.pdf

National Trust for Historic Preservation. *Treatment of Flood Damaged Older and Historic Buildings.* (Information Booklet No. 82, 1993)

www.ncptt.nps.gov/wp-content/uploads/NTHP-Information-Booklet-82-Flood-Damage-and-Older-Homes.pdf?b5c287

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