

FLOOD IMPACT IN ST. AUGUSTINE

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. 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 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.

Along with nuisance flooding, Hurricane Matthew in 2016 and Hurricane Irma in 2017 has impacted many of the city's historic properties. **The economic impact assessment of the recent hurricanes presented in 2018 Resilient Heritage publication 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.**

Resources for more information at www.citystaug.com and the Planning and Building Department (904)825-1065.



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ANNUAL MAINTENANCE

Flooding is often accompanied by secondary factors, such as high winds, and can be followed by fire. Simple maintenance measures can reduce the vulnerability to primary and secondary hazards that should be completed at all properties, including:

Roof

- ❑ 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

Exterior Walls

- ❑ 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
- ❑ Sealing openings between building components or around penetrations such as hose bibs or conduits through walls

Openings

- ❑ Replacing cracked window glass that can shatter in a wind storm and allow water infiltration
- ❑ Maintaining shutters in an operational condition to protect windows from airborne debris in a wind storm

Building Interior

- ❑ Removing clutter and unnecessary storage in a building, particularly if items are hazardous, highly flammable, or located in a flood-prone areas
- ❑ Replacing cracked pipes to prevent plumbing leaks or sewer failure
- ❑ Replacing batteries in smoke and carbon monoxide detectors to provide notification of a fire or gas leak

Foundation / Site

- ❑ Trimming overhanging tree limbs that might crash through a roof or take down electric and telephone lines in a wind storm

❑ Grading land to promote positive drainage away from historic buildings (City approval should be sought for potential impact on neighboring properties, sidewalks, or roadways, as required)

- ❑ Clearing site debris that might become waterborne or airborne, 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

A well maintained building, particularly one that is structurally sound, is more likely to withstand flooding than a poorly maintained building.

RELOCATE 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 systems and equipment that could be impacted by floodwater include:

- ❑ Heating
- ❑ Hot water
- ❑ Air conditioning
- ❑ Electrical / Security / Communications
- ❑ Kitchen / Laundry Appliances

Relocation will often require raising the systems and equipment to higher levels, at a minimum to the Design Flood Elevation. This includes not only major equipment but raising secondary elements such as electrical outlets, junction boxes, switches, disconnects, panels, and meters. Consideration should also be given to minimizing equipment damage from potential wind-damaged roofs or windows.

INSTALL BARRIERS & SHIELDS – DOORS & WINDOWS

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.**

As a relatively low-cost alternative to sandbags, it may be possible to install a metal plate barrier at vulnerable door and window openings. Prior to a flood, channels must be installed to receive the panels. **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.**

IMPROVE LANDSCAPE

Improve flood resilience by capturing stormwater for on site absorption to prevent it from running into a street drain or onto a neighboring property.

- ❑ **Reduce paved impervious surfaces** - Increase permeable surfaces like gardens, lawns, and rain gardens utilizing berms to prevent stormwater from running onto a street or neighboring property
- ❑ **Install rain gardens** - Gardens located in depressed areas of land, often near paved surfaces, that collect stormwater runoff and often incorporate native plants.
- ❑ **Plant shade trees** - promotes stormwater absorption and reduces the ambient temperature. Tree limbs shading a roof 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.
- ❑ **Plant native trees and plants** - require less maintenance, and can tolerate the range of temperature extremes from very wet to very dry soil. Live oaks and yaupon hollies are both tolerant of local conditions.
- ❑ **Install rain barrels** - collect stormwater discharged from roof surfaces through downspouts, that can then be used to water gardens rather than being directed to storm drains.

PRE-STORM ACTIVITIES

- ❑ **Protective Materials** – Collect sandbags, plywood, plastic sheathing, lumber & tools on site
- ❑ **Clean-up Materials** – Collect sump pumps, wet-vacuums, bleach, cleaning supplies, rubber gloves, protective clothing & fans
- ❑ **Important Contacts** – Collect telephone numbers & account numbers
- ❑ **Recovery Plan** – Identify licensed contractors, electricians, plumbers, clean-up crews, service providers & telecommunication companies

STORM PREPARATION

PROPERTY

- ❑ **Tree Limbs** - Trim overhanging tree limbs that might crash through a roof or take down electric and telephone lines in a wind storm
- ❑ **Site Debris** - Clear debris that might become waterborne or airborne, clog storm drains, provide fuel for a fire, or cause damage to buildings
- ❑ **Site Drains/Gutters/Downspouts/Floor Drains** – Clear for water flow
- ❑ **Oil and Propane Tanks** - Secure barbecue grills & close at main valve
- ❑ **Relocate Potted Plants** - Elevate above flood height and protect from wind
- ❑ **Outdoor Furnishings** - Relocate to interior or secure
- ❑ **Document Property** - Inventory and photograph property, equipment, furnishings damage
- ❑ **Swimming Pools** - Partially drain

EXTERIOR BUILDING

- ❑ **Roof Hatches/Operable Skylights/Ventilators** - Secure and brace
- ❑ **Shutters** - Secure or install plywood, mylar, or other temporary window coverings to building wall, not window or door frames
- ❑ **Windows/Doors** - Secure & brace inward swinging windows and doors
- ❑ **Temporary Barriers/Shields** - Install at flood vulnerable openings, sandbags or metal panels

INTERIOR

- ❑ **Furnishings** - Remove breakable items from walls and cabinets, elevate vulnerable items, roll up rugs, close window treatments including interior blinds, drapes & interior shutters; be mindful that roof and window damage can occur if flooding is associated with a storm event when considering where to temporarily relocate items
- ❑ **Utilities** – Turn off electricity at panel/gas to equipment, water heater, stoves, oven & dryer
- ❑ **Important Documents** – Insurance policies, deeds, leases, photo albums - Place in a waterproof, fireproof & portable container – Maintain duplicates off site

AFTER THE FLOOD

SAFETY

- ❑ **Electricity** – Avoid standing in flood water unless electricity is turned off at the circuit breaker; when restarting electricity, take caution not to cause electrical overload, allow system & equipment to dry out and not water logged
- ❑ **Utilities** – Contact Florida Power and Light and gas service provider for emergencies, service resumption, or meter inspection if in contact with floodwater
- ❑ **Unsafe Buildings / Conditions** – Report to the Planning & Building Department
- ❑ **Stabilize Building** – Tarp damaged roof & stabilize structure
- ❑ **Secure** – Prevent building intruders

ASSESS & RECORD DAMAGE

- ❑ **Document Losses** – Inventory and photograph property, equipment, furnishings damage
- ❑ **Insurance Company** – File claims

CLEANING UP & DRYING OUT

- ❑ **Remove Water** – Use sump pump & wet vacuum
- ❑ **Building Materials** – Remove & discard damaged carpets, baseboards, wall surfaces & insulation
- ❑ **Furnishings** – Discard if cannot be cleaned
- ❑ **Ventilation** – Open windows & operate fans to dry out materials and minimize mold growth, remove baseboard and cornice to ventilate wall cavities and minimize mold growth
- ❑ **Clean / Disinfect** – Use bleach & water solution, particularly kitchen surfaces, equipment & utensils

CARING FOR FLOOD-DAMAGED HISTORIC BUILDING MATERIALS

Historic building materials can often be salvaged if properly cared for after floodwaters recede. Factors impacting the potential success of drying out a building include:

- Building materials
- Height of floodwater
- Duration of flooding
- Containments in floodwater
- Duration prior to commencement of controlled drying

There are two principal causes of floodwater damage to historic building materials, the initial contact and secondary damage resulting from increased moisture and relatively humidity, such as mold growth.

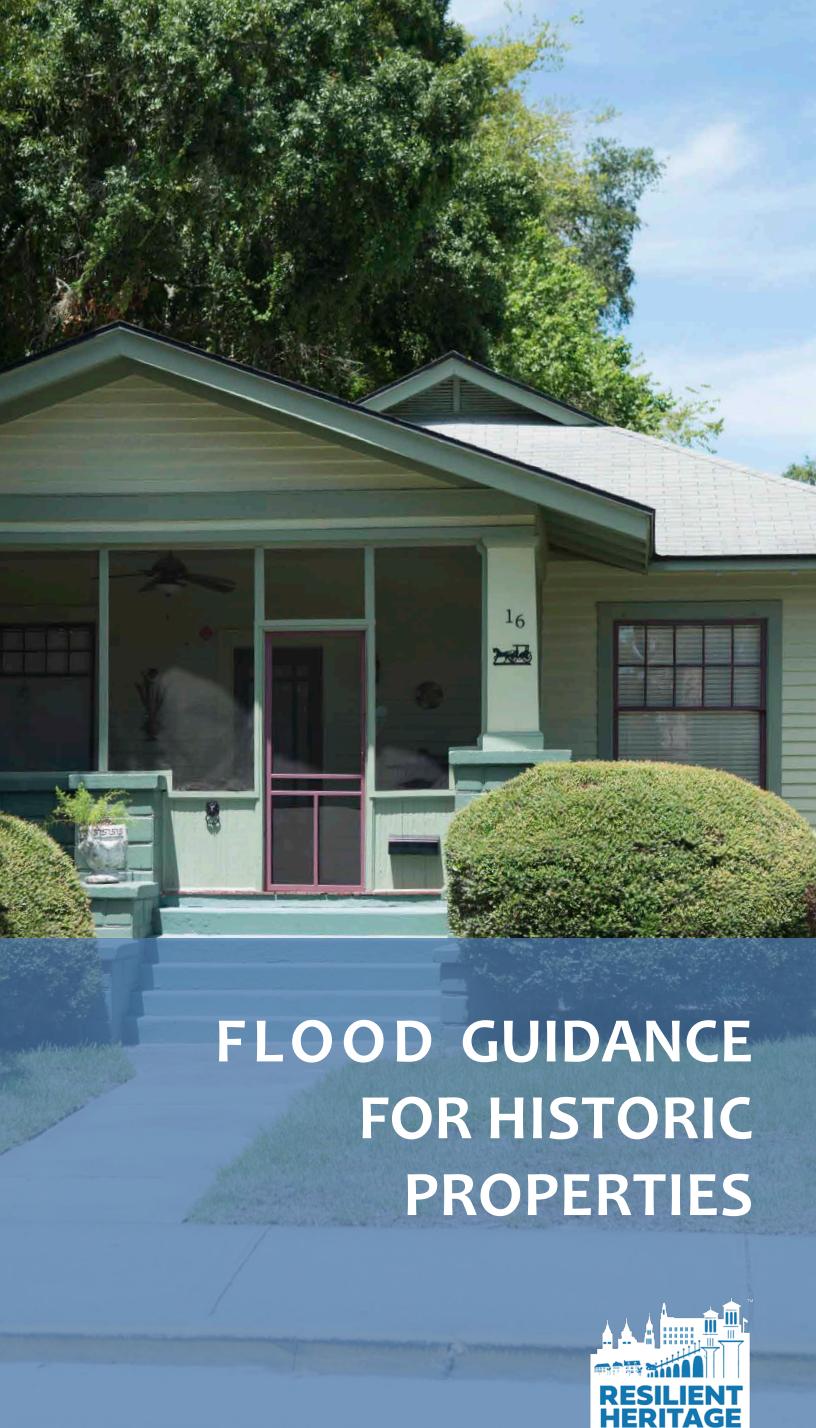
CLEANING UP

After the electricity has been disconnected and a building is deemed safe to enter, standing water can be removed and flood damaged materials, equipment, and furnishings can be discarded. As soon as feasible, mud and silt should be removed, preferably when wet with plastic shovels to avoid scarring materials. Mud and silt can enter wall cavities under baseboards and through electrical outlets and air ducts. All surfaces and openings should be thoroughly cleaned and dried prior to closing wall openings.

DRYING OUT

Historic building materials, such as plaster and solid wood trim and flooring can be salvaged if dried out slowly. However, newer building materials such as drywall and wood laminates must be discarded if wet by floodwater. The rate of drying will largely depend on the ambient relative humidity. When humidity rates are high, like during St. Augustine's summers, the rate of drying needs to be slowed to prevent cracking of plaster and warping of wood.

Open all doors and cabinets and provide cross ventilation, aided by fans, to improve the effectiveness of the drying process. Humidifiers should be used with caution since they can dry out materials too quickly but modest heating can be used in cooler temperatures. Contractors can be retained to assist with recovery. However, they should be licensed and preferably have experience with historic buildings.



FLOOD GUIDANCE FOR HISTORIC PROPERTIES



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