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Challenges on the Coast—Flood Mitigation and Historic Buildings

By Roderick Scott, CFM and Louise Scott, AICP, CFM

As historic preservationists and Certified Flood Managers (CFM) both my wife Louise and I have spent our professional careers working with historic buildings and their owners. We live in Mandeville - a historic coastal Louisiana community which is at ground zero for climate change and sea level rise. Located on the north shore of Lake Pontchartrain, Mandeville has experienced seven major flood events/hurricanes in 13 years since Katrina in 2005 and from these events we have been adapting our historic buildings for flood mitigation.

Adaptation and flood hazard mitigation has been a learning experience. In the early days after Katrina, there was no guidance for this work as far as historic buildings were concerned and some of the earliest projects lacked compatible design elements. Louisiana has now elevated over 35,000 homes and the first 10,000 or so were strictly engineered solutions. Now all Mandeville projects must pass through design review from a group of architects on the design review committee as well as the city's Historic Preservation District Commission to receive a Certificate of Appropriateness (COA) and get a building permit. Mandeville is now just over 74% flood hazard mitigated in the

surge zone in the first four blocks adjacent to the north shore of Lake Pontchartrain and because of this work the community is much more resilient after a flood event.

All preservation is local. We are now in a historic era of a changing climate and increasing risks from flooding in many areas of the country. Flooding is the largest annual damage cost in America. It is critical that historic preservation staff and commissioners learn as much as possible about flood hazard mitigation so that they can establish a way to educate and guide historic property owners as they adapt their buildings to reduce flood risk and



Credit: Roderick Scott and Louise Scott

Example of a low elevation project in New Orleans. This ca. 1880 dwelling was originally built on a slight brick pier foundation.

lower rapidly increasing National Flood Insurance Program (NFIP) policy premiums. The NFIP is now in year four of the removal of subsidized premium rates on all older and historic buildings built before the first flood map was adopted by a community. It is very important for you to know when the first flood map was adopted in your community in order to better understand which buildings are

being impacted by these rate increases. Another important point is that only elevation or relocation of a home/residential building are accepted projects for flood mitigation certification to lower flood risk and insurance premiums.

The NFIP was created in the late 1960's to insure mortgages and protect lenders and property owners of buildings located in high flood hazard areas. Due to

our historic settlement patterns of developing along the waterways and coastal areas, a large number of our historic buildings are located in these flood zones. For the last 40 years the NFIP has provided artificially low flood premium rates on these buildings due to their being built prior to flood map elevation requirements. These pre-Flood Insurance Rate Map (FIRM) buildings have a high flood



Credit: Roderick Scott and Louise Scott

The same dwelling after being elevated 3.5 feet on both a solid and open pier concrete foundation. New stairs and a safety railing to match the original railing were added. This was a project completed for Rebuild Together New Orleans.



Credit: Roderick Scott and Louise Scott

The low elevation mitigation of this dwelling in Owego, New York of four-feet included adding slatted wood panels under the porch, new hand rails and stairs.

risk due to their not being located at the minimum elevation requirements for the flood maps and disproportionately represent the numbers of buildings impacted by flood events. The artificially low policy premium rates, combined with the historic building flood mitigation exemption in local flood ordinances, have both contributed to the owners of historic pre-FIRM buildings not undertaking flood mitigation projects.

Today, the negative financial impacts of not flood hazard mitigating the historic pre-FIRM buildings are rapidly changing the financial equation for ownership of these buildings. This is due to the rapidly increasing cost of actuarial rates for flood policy premiums. The issue of how we move ahead in our communities with flood hazard mitigation and what that will look like is creating great debates in the preservation community. One

of the biggest questions is how flood mitigation projects will affect a property or district's loss of historic integrity and context.

Our view is that because we are in an unprecedented era of a changing climate and increasing flood risks, elevation and other mitigation approaches for historic buildings should not result in a loss of integrity or be considered adverse effects if that is the only reasonable alternative for a property to be preserved. Flood hazard mitigation-elevation projects mostly impact the existing building foundation and stair(s). The other area of integrity impacted is the relationship between the building and the ground surrounding it and the visual relationship between the sidewalk/street and the newer higher building. Another area of integrity impacted by elevation is in historic districts where the first elevations create a different roof height.

As long as we recognize that this is a period of transition for the districts and that ultimately most or all of the historic buildings will be flood hazard mitigated, then the concept recognizes that this is another step in the district's evolution if it is to remain affordable and livable.

Following the devastation of Hurricane Katrina, both Louisiana and Mississippi completed design guidelines for the flood mitigation of historic buildings. These detailed guidelines provide recommendations for historic building elevation such as the use of grading or terracing, increasing the height of foundations, and appropriate rebuilding

of stairs. Many communities have utilized these publications as they revise their own design review guidelines. However, most recommendations for elevation deal with pre-World War II properties and do not address elevation for those built on concrete slabs in the mid-20th century. With post-WWII construction becoming more important in preservation planning and included in historic districts, we need design guidelines for the elevation of these "recent past" buildings as well.

Elevation is used to reduce flooding risk and the rapidly rising flood insurance premiums as well as to preserve the property. The base design

for a flood mitigation project is in most cases dependent on the flood zone the building is located in. The Federal Emergency Management Agency (FEMA) provides information on a community's flood zone and this will vary depending on elevation above sea level and flood risk. One approach by FEMA is identifying VE Zones which are the highest at flood risk with a minimum of three foot waves over the base flood levels. For historic buildings in VE Zones (VE is used because in these zones the primary damage is from wave velocity), foundations need to be open pier design and can range from a few feet to twelve to fourteen feet in height from the ground. The A-Zones, the next most volatile zones, especially the coastal AE-zone where wave heights are up to three-feet in height above the base flood levels, can have enclosures below the floor but the area must have flood vents to relieve pressures on the foundation walls.



Credit: Roderick Scott and Louise Scott

Example of a high elevation project in Mandeville, Louisiana. This Bungalow dwelling was built on a brick foundation.



Credit: Roderick Scott and Louise Scott

The Bungalow dwelling after elevation to eight feet

The elevation of historic buildings to the required heights in VE Zones can have a major visual impact to their architectural character. These visual effects can be mitigated by utilizing vegetation of differing heights and thickness. The open pier foundations should screen the area under the building using lattice or other appropriate materials. The materials used between the piers should be installed to pivot up underneath the building to allow for the free passage of the flood waters. Columns on porches need to continue downwards through piers in the new foundation. This not only provides a pleasing visual line but provides the design a continuous loading and connections from roof to the foundation. The A and AE-zone foundations can have an enclosure beneath the entire foundation but must have flood vents to reduce hydrostatic pressures and make sure the flood vents are accurately measured for flow. Not all flood vents are the same and the flood policy premium rates can be higher if the vents turn out to be measured inaccurately.

When buildings are elevated the stair height must be increased also. The rebuilt stairs may maintain the appearance and details of the original or be new but compatible with the property's architectural design. The VE-zone stair construction must be designed with some permeability to not cause an increase in wave heights on surrounding properties. The A and AE-zones stairs can be solid underneath up to perhaps eight-feet but the weight of solid stairs can be a concern. Stairs can come straight down from the porch to the ground or come down from the porch to a landing and then split directions to the ground. There can also be a switch back design at the mid-landing. Your community will need to work with property owners and designers to get the best solution for each project. The design of these new stairs may encroach into the front or side yard setbacks in violation of the existing zoning. This would require a variance

and communities need to decide how they want that to address zoning changes to accommodate flood mitigation. The easier the setback and height variance processes are for a flood mitigation project, the more we encourage the property owner to plan, finance and execute the elevation project to be the best possible solution for the historic property.

In addition to the elevation of the historic property by increasing foundation height, another approach in the guidelines is to increase the height of the land through grade changes or terracing. However, this alternative is controversial in many flood zone communities. The concept of "no adverse impact - NAI" development cites the issue of filled sites contributing to the flooding of neighbors. NAI is not in the building codes yet but it is a concern by those in the communities facing this issue.

Another important consideration is how to successfully adapt elevated historic buildings for compliance with the Americans with Disability Act (ADA). Many residents along the coast are elderly or have some physical handicap and will need homes which are accessible. Installing ADA compliant ramps to a property which is elevated eight feet or more may be impractical given the pitch and length of the ramp which would be required. An alternative approach is the installation of chair lifts which can provide access to an elevated building. These mechanized lifts are non-historic features but their appearance can be mitigated through landscaping or screening on a rear or side elevation.

In conclusion, we are in a historic era of climate change and our historic building owners and communities must adapt to be more resilient. Preservationists want to preserve a community's historic resources and historic building owners want to preserve their buildings and their property values. By discussing and sharing our experiences in this growing area of flood hazard mitigation we will



Credit: Roderick Scott and Louise Scott

This ca. 1963 Ranch style dwelling in Mandeville, Louisiana required raising its concrete slab along with the rest of the house to meet the Base Flood Elevation of four feet.

preserve those irreplaceable historic buildings that provide such an important sense of place in our communities.

Further Information:

To see the flood zones in your community go to:

<https://msc.fema.gov/portal/search> .

FEMA has a retrofit publication for homeowners - https://www.fema.gov/media-library-data/1404148604102-f210b5e43aba0fb-393443fe7ae9cd953/FEMA_P-312.pdf .

All flood hazard mitigation/new foundation designs in flood zones must comply with the American Society of Civil Engineers (ASCE) 24-14. FEMA has a coastal construction guide publication P-55:

<https://www.fema.gov/media-library/assets/documents/3293>

For National Flood Insurance Programs and Historic Structures go to: FEMA publication P-467-2:

https://www.fema.gov/media-library-data/20130726-1628-20490-7857/tb_p_467_2_historic_structures_05_08_web.pdf

"Flood Hazard Mitigation for Historic Buildings," Winter 2017 issue of *The Alliance Review*

Design Guidelines for flood hazard mitigation, Mississippi - http://www.msdisasterrecovery.com/documents/historic_properties-hpc.pdf

Design Guidelines for flood hazard mitigation, Louisiana:

<https://www.crt.state.la.us/cultural-development/historic-preservation/education/elevation-guidelines/index> ■