

HURRICANE

*Katrina*

IN THE GULF COAST

# J. Historic Buildings Pre- and Post-Disaster Mitigation

## J.1 Pre-Event Mitigation

Throughout the region, old buildings can be further weakened from storms, which can have a long-term toll beyond the immediate wreckage. The use of pre-hazard mitigation techniques can benefit building owners and the community in various ways and to varying degrees.

Natural hazards such as hurricanes do not have to result in a natural disaster. There are proven design and construction techniques that can reduce or eliminate the threat of damage to buildings from these natural hazards and these techniques should be applied to all historic properties. However, some of the most vulnerable historic buildings are those that stand empty, waiting for restoration. Mothballing, which means to stabilize and temporarily protect a building from further deterioration, when undertaken before the next hurricane or other natural disaster strikes, can significantly reduce the likelihood of damage.

### J.1.1 Mothballing

Mothballing is simply undertaking efforts to stabilize a historic structure to prevent further deterioration, although it can apply to any vacant structure deemed worth saving. During a major storm event like Hurricane Katrina, the deterioration and/or destruction of vacant and neglected buildings can be intensified.

#### J.1.1.1 Mothballing (Background)

Standing empty, a building is subject to progressive deterioration such as roof leaks; malfunctioning roof drainage such as internal drains or gutters and downspouts becoming non-functional; windows deteriorating to the point where many do not keep the elements out; trees growing along the foundation lines; and surface runoff flowing into basement windows. The first step in a program of historic preservation and adaptive reuse, meaning to change the functional use of a building from its original intent, is to arrest this deterioration, make the building sound, and “mothball” it until plans for its future use can be determined. Each vacant property of historic or potential historic value needs a mothballing plan.

#### J.1.1.2 Mothballing Plan (Application)

The first step toward mothballing is to obtain a listing and evaluation of historical or potentially historical buildings that the State Historic Preservation Office (SHPO) is considering for mothballing.

In mothballing a building, keeping it sound and dry, and arresting progressive deterioration while an adaptive reuse and historic preservation plan is being developed is imperative. The following steps should form a part of any pre-event mitigation plan.

To mitigate water intrusion issues:

- **Roofs:** Inspect and perform temporary repairs as needed. If the roof has deteriorated to the point where re-roofing is necessary, either install a permanent roof if funding permits, or install a temporary roof. Perform followup yearly inspections.
- **Gutters, downspouts, and drains:** Gutters and roof drains should be cleared of debris. Repair sections of gutter that are missing or damaged. Repair missing and damaged downspouts and reconnect to the storm drainage system, if available.
- **Flashing and trim:** Missing or damaged flashing should be repaired or replaced.
- **Doors and windows:** Exterior openings such as doors, windows, and louvers must also be minimally restored. Missing shutters should be replaced and all shutters closed and secured. Wood windows and other wood components suffering from rot, damage, or missing glass panes should be replaced. Glazing compound that has deteriorated to the point where the weather is no longer being excluded at the perimeters of the glass panes should be repaired. Operating hardware such as handles, locks, and latches should be replaced if missing or nonfunctional. Sealants between the window perimeters and the surrounding surfaces that have deteriorated to the point where the weather is no longer being excluded should be replaced. Missing doors, including hardware, should be replaced to keep wind and rain out.

As a less expensive alternative, windows could be boarded (either all windows or only missing windows) until implementation of an adaptive reuse.

- **Wood siding and trim:** Wood siding and trim needs to be reattached where loose to prevent further loss from wind. Wood should be painted to protect it from the elements.
- **Wood flooring:** It could be worthwhile to remove the occasional floorboard to allow for expansion to occur from swelling, without causing permanent damage to the boards if there is a potential for flooding.
- **Masonry walls:** Secure masonry veneers into the façade if they are in danger of falling out; concentrate on those whose deterioration allows water or vermin entry, or where pieces are in danger of falling and causing injury. Execute a regimen of selective tuck pointing of deteriorated mortar at selected areas of the building façade.
- **Additions and alterations:** Building elements that have been installed relatively recently and are not historically significant but are, however, structurally sound and mostly weathertight, should remain, with some nominal repairs for the purpose of mothballing. Upon execution of an adaptive reuse or restoration, the disposition of these elements can be determined.
- **Hazardous material:** It should be noted that some historic buildings may contain asbestos or lead-based paints; proper handling of these hazardous materials will need to be observed during both demolition and restoration.

### J.1.1.3 Site Corrections and Miscellaneous Issues

- In places where ground slope against the building façade is either flat or toward the building, increase the grade immediately adjacent to the façade to achieve positive drainage away from the building. In some areas, existing masonry and concrete window wells around basement windows will need to be built up to retain the extra height of the earth.
- On tree-covered sites, remove all insignificant trees within 20 feet of a structure to minimize potential damage from wind-fallen trees. In addition, tree growth close to foundations can weaken the structure because the root growth along the foundation line can undermine the footings.
- Clear site drainage systems of sediment and debris in inlets and pipes.

## J.1.2 Priorities and Permutations

Recommendations described previously should be given priority. When taken together, they comprise a comprehensive mothballing plan for arresting ongoing deterioration. It is understood, however, that all of the funds needed to implement this comprehensive plan are not necessarily available. With this in mind, it is necessary to consider a plan whereby those items of greatest need are given highest priority and implemented first, with other items of lesser need implemented second, third, fourth, etc. The schedule of items implemented would have to match the flow of available funds, in a phased approach. High priority should be given to items that will correct progressive deterioration that is most advanced and is occurring at the greatest speed, or will affect components of historic significance, with highest priority given to those items with the highest cost-effectiveness. Lower priority should be given to items that will correct

less advanced or slower progressive deterioration, assuming that these can wait some finite time period until funds become available.

### **J.1.2.1 Objectives**

The objectives of a Condition Assessment and Mothballing Report are to visually assess the general condition of the facility and its building systems, assess the nature and cause of progressive deterioration, and develop a mothballing plan for making the building sound and watertight for the near future, while a plan of adaptive reuse is developed.

### **J.1.2.2 Scope**

To accomplish these objectives, the Scope of Work should include the following tasks:

1. Review available documentation, such as drawings, previous reports, histories, Web sites, and/or reports of building code violations.
2. Interview site management or maintenance personnel knowledgeable of the physical characteristics, maintenance, and repair of the property.
3. Conduct a walk-through survey of the property to obtain information on material systems and components in order to provide a brief description, identifying observable physical deficiencies, and to obtain information needed to develop the mothballing plan.
4. Prepare Opinions of Probable Costs to remedy observed physical deficiencies, and implement the mothballing plan.
5. Prepare the report, documenting the findings and results of the preceding tasks.

## **J.2 Post-Event Mitigation**

**T**he primary damage to historic buildings in a flood disaster is from immersion of building materials in floodwaters, the moving force of which can cause structural collapse. Storm and sanitary sewer backup during flooding is a major cause of damage to buildings. In addition, floods may also cause a fire due to ruptured utility lines; growth of mold and mildew; and swelling, warping, and disintegration of materials due to prolonged presence of moisture.

Following a wind event such as a hurricane, inspect and make repairs as needed to prevent water entry and to mitigate potential life-safety problems.

### **J.2.1 First Steps**

The most important single step is to air out wet buildings, open doors and windows, remove airtight coverings such as aluminum and vinyl siding, and run fans. In refurbishing flooded buildings, it is vital to reinstate the drainage systems to remove water from the structure and foundations. This includes ground drainage, surface drainage, and basements, with the use of sumps, if necessary.

## J.2.2 Identification of Problem Areas

It is also important to identify areas in the structure where water and moisture are trapped, so that appropriate measures can be taken to allow drying and prevent decay to vulnerable materials, as well as minimize mold growth. Most historic buildings are inherently durable and are relatively resistant to flooding due to the use of materials such as cypress framing and lime or cement plaster.

- **Wood paneling:** Immediately after the waters recede, any water trapped behind the paneling must be allowed to drain out. This can be done by drilling holes in the bottom of the panels. If there has been extensive saturation of paneling, it may be necessary to dismantle and dry the panels to avoid distortion.
- **Wood floors:** As wood becomes wet, it swells. When wood floors are saturated, they expand and buckle. After a flood, if the immersion has not been too prolonged, it may not be too late to prevent such damage. If the flooring does buckle, it will have to be taken up carefully and stacked, allowing each board to dry to its pre-flooded moisture content. If the boards have not buckled, but have cupped excessively, they will have to be replaced, although minor cupping may be acceptable. If the floor is not of great historic value, resand it to level the surface.
- **Drainage:** Backup and overflow of foul water and sewage systems are not an uncommon consequence of flooding.

## J.2.3 Accelerated Drying

There are a number of measures that are commonly used after flooding. These measures improve drying and reduce the time required before refurbishment and reoccupancy can occur. These measures are laid out in order of priority.

1. Drain water clear of the structure and, if required, prevent further water penetration by the use of temporary roof and ground drainage systems.
2. Remove all damp materials and debris from the structure, including all damp carpets, furnishings, and collapsed building materials.
3. Demolish or remove all parts of the structure not to be retained or refurbished. Remove any damp plaster or drywall to expose the structure.
4. Provide through-ventilation to all parts of the structure, including all structural cavities such as sub-floor voids and wall cavities. Prop doors and windows and partially open millwork to allow air circulation.
5. Identify all trapped moisture in the structure. Where possible, remove all impermeable finishes from trapped moisture areas.
6. Use heaters, dehumidifiers, fans, and other devices to facilitate drying. If heating and mechanical systems are online, running them will assist in expediting drying time.

### J.2.4 Relocation of Historic Buildings

Although consideration for relocation should be given to historical buildings that are located in an area prone to flooding from hurricanes, all properties that have sustained significant damage from a hurricane should be evaluated for possible relocation as part of the restoration process. Relocating a building to higher ground will reduce the risk of further damage from future hurricanes. Hotel Magnolia (see Figure J-1) underwent relocation after being badly damaged in 1969 from Hurricane Camille. As a result, the hotel experienced only minimal flooding.

Figure J-1.  
Built by John Holm in 1847, the Magnolia Hotel, badly damaged from Hurricane Camille in 1969, was moved 100 yards north and restored by the City of Biloxi in 1972. While the main structure remains intact, the wood railing and one wood stair to the second floor porch were damaged; the other wood stair was completely destroyed (Biloxi, Mississippi).



### J.2.5 Elevating Historic Buildings

If for whatever reason a historic building is non-movable, consideration should be given to raising the building to a higher elevation, preferably above the flood level. Working with state and local preservation offices, successful designs can be achieved to preserve the aesthetic as well as the historical value of the property. An alternative consideration if the building can't be raised aesthetically is to raise the ground below the structure, effectively raising the building to a higher elevation.

### J.2.6 Alternate Protection of Historic Buildings

An alternate to relocation or raising a historic structure is the construction of barriers such as floodwalls or berms or a combination of both. Floodwalls can be constructed around historic districts, protecting several buildings at one time.

### J.2.7 Data Base of Historic Buildings

Equally important to both pre-event and post-event mitigation is having a reliable inventory of all historical properties as well as other resources of the area, including maps of historic buildings sites. It is also important to have names and contact information of contact persons responsible for making decisions relative to historic buildings. A reliable inventory can help in quick response as well as collaboration between regional and state agencies concerned with historical preservation, helping to mitigate the damage to flooded historic buildings.

Many programs are written to outline mitigation procedures. However, it is imperative that these programs offer solutions to help communities decide what to do and how to implement the solutions so as not to further damage historic properties.

