2008

Elevation Options for Slab Houses

UNO-CHART
University of New Orleans

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(CHART) Center for Hazards Assesment, Response, and Technology

The lowest habitable floor of houses located inside levee protected areas that have been "substantially damaged" (51% or more damaged), must be elevated to be either three feet above grade, or the Base Flood Elevation (BFE) level, whichever is higher. Contact your local permit official to determine how high you should elevate. Whether the BFE or three feet above grade is used as the standard, you can elevate above the minimum requirement. Flood insurance premiums decrease for each foot that a home is elevated above the BFE (up to three feet).

Insurance premiums are likely to increase greatly if a substantially damaged home is not elevated. The decision of how high to elevate a house should include the considerations of potential height of future floodwaters, potential increased windstorm vulnerability, the effect on homeowners insurance, and accessibility issues for the physically challenged.

FEMA recognizes four main approaches for homeowners considering the elevation of slab homes. If the house has not yet been restored to pre-hurricane condition, any of the four techniques described below might be technically possible. However, cost, practicality, accessibility, and engineering advice are all critical concerns. For houses that have already been restored, slab elevation may be the most cost effective option.

The funding programs currently available for mitigation against future flood damage can be applied to each of the elevation methods described here.

In preparing to elevate a house, it is highly recommended that homeowners acquire: written estimates from several contractors; evidence of the quality of the chosen contractor's previous work; advice from an engineer independent of the elevation contractor; and advice from an insurance agent on whether to purchase builder's risk insurance for the duration of the construction.

Mitigation measures such as raising appliances and other utility connections should be implemented along with house elevations. In addition to elevation, other mitigation measures such as dry or wet flood-proofing can be employed but are not recognized by FEMA as a means of compliance to the NFIP requirements for residential structures, and might not qualify for insurance policy discounts.

Before Add-On

After Add-On

Second Story Add-On - Converts the existing lower area of the house to "non-habitable" space and builds a new second story living area. (This is often called a "raised basement" house.) The roof is removed and the framing for the second story is constructed. On the ground floor, vents/openings are required to be added to allow the entry and exit of future flood waters. Electric and plumbing outlets are not allowed by code. Next, the original or rebuilt roof is installed with hurricane straps and the second story siding is added. Finally, the lower floor is converted into a non-habitable space for storage, parking, and/or building access. The lower floor must meet the FEMA guidelines and will not be insurable by the National Flood Insurance Program as living space. An engineer should be consulted to determine if the existing foundation can support the additional loads imposed. A new foundation system may be required.

Wall Extension - Extends the existing walls of the house upward and raises the lowest floor. In this option, the roof is removed and the structural framing members supporting the roof are extended upward (less than one-story). New bricks or other siding material are then added to complete the exterior renovation. Then, a new wood frame lowest floor is constructed above the original one and above the flood level with vents/openings underneath to allow entry and exit of future floodwaters. Finally, the roof is re-installed with hurricane straps and all necessary structural modifications, to meet the new wind code. An engineer should be consulted to determine if the existing foundation can support the additional loads imposed. A new foundation system may be required.

* These techniques are appropriate for masonry houses.

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Slab Separation **–** Lifts the house by detaching the entire structure from the slab foundation. Exterior siding must be removed, but may, in some cases, be reinstalled later. The house is braced, and beams are placed through the house to support it as it is raised (which means interior walls must be redone). Next, the house is raised in small increments with hydraulic jacks. "Cribbing" (normally stacked oak beams) is placed beneath the steel beams to provide a support for the hydraulic jacks and a safety backup to prevent a catastrophic collapse of the house. This process is repeated until the desired elevation height is reached. Piers are constructed for support on top of the existing slab. Foundation walls, which add extra support to the elevated structure, can be constructed, with vents/ openings for the entry and exit of future flood waters, to create a new under-house garage or storage area (non-habitable space).

Slab Elevation - Lifts the entire house with slab floor attached, and places it on a new foundation higher off the ground. First, trenches are dug immediately below the slab to expose the slab footing. Then, tunnels are dug under the slab to allow for the insertion of steel beams. If pilings are present beneath the slab (common in Metro New Orleans) the pilings will be detached from the slab. Next, the house is raised in small increments with hydraulic jacks. "Cribbing" (normally stacked oak beams) is placed beneath the steel beams to provide support for the hydraulic jacks and a safety backup to prevent a catastrophic collapse of the house. This process is repeated until the desired elevation height is reached. Next, rebar (steel reinforcing) is laid in trenches around the perimeter of the house and other necessary areas, and cement is poured in the trenches of the foundation system to form a (steel-reinforced) chain wall. Finally, a new foundation wall is built below the raised slab with vents/openings for the entry and exit of floodwaters.

This technique is generally considered the most cost-effective for houses that are already restored, although repairing restored walls may not be covered under the current public funding options available. Plumbing repair is potentially more difficult with this option than with others. The slab elevation method is relatively new to the New Orleans area, so long-term stability of structures elevated with this technique has yet to be proven.

The elevation (or raising) of an existing home after a disaster is an important way to reduce damage from possible future flooding. It can reduce flood insurance costs and increase the value of the house. It can also prevent tremendous inconvenience and suffering. Raising the living space of slab homes is generally more expensive and more complex than raising the living space of non-slab homes.

Generally, slab-elevation and slab separation are more expensive than elevating non-slab homes (those on piers, pilings, or chainwalls). The following list of factors typically affect the cost of elevating a house:

1. Size- The larger the house, the higher the cost.

2. Siding- Generally, houses with brick veneer cost more to elevate than those with wood siding or stucco. For jack elevations, interior and exterior wall damage may result, although the brick wall may survive. The wall extension option is a way of retaining brick veneer, by adding more bricks.

3. Chimneys- Fragile masonry requires extra time to dismantle and/or brace during elevation. Non-masonry chimneys would not add significant cost to the project.

4. Interior- The inside walls of homes (sheetrock, plaster, etc.) may be damaged by any method of elevation.

5. Proximity to Other Structures- The greater the distance between the house and adjacent structures, the easier it is for contractors to move equipment on and off of the site, which is reflected in the cost.

6. Height of House Elevation- Higher elevation results in more expense for materials/labor. In addition, engineering concerns become more critical as the height of elevation increases, given the added potential vulnerability of the structure to high winds. Second engineering opinions are particularly worthwhile in cases involving significant elevation.

7. Additions- Existing additions tend to increase the complexity of the elevation job, and thus the cost.

8. Utilites- Must be brought up to code after your home is elevated. This should be considered in your total cost.

Prepared by the Center for Hazards Assessment, Response, and Technology (CHART) at The University of New Orleans (UNO) with support from Public Entity Risk Institute (PERI). Contact: chartoutreach@uno.edu or (504) 280-4017.