

Overview of the Elevation Techniques

Homeowners had a choice of three techniques for elevating their substantially damaged houses.

Technique 1– Extend the Walls of the House Upward and Raise the Lowest Floor

Technique 1 is appropriate for houses with concrete or masonry walls, but not for houses with other types of walls, such as those framed with wood studs, which would be more vulnerable to flood damage. This technique is usually appropriate when the depth of the base flood at the house is no more than 4 or 5 feet above grade. The elevation process begins with the temporary removal of the roof and roof framing, in a single piece if possible (Figure 10). This is commonly done with a crane. The roof is then stored on site so that it can be reinstalled later. The next step is to remove the windows and doors.

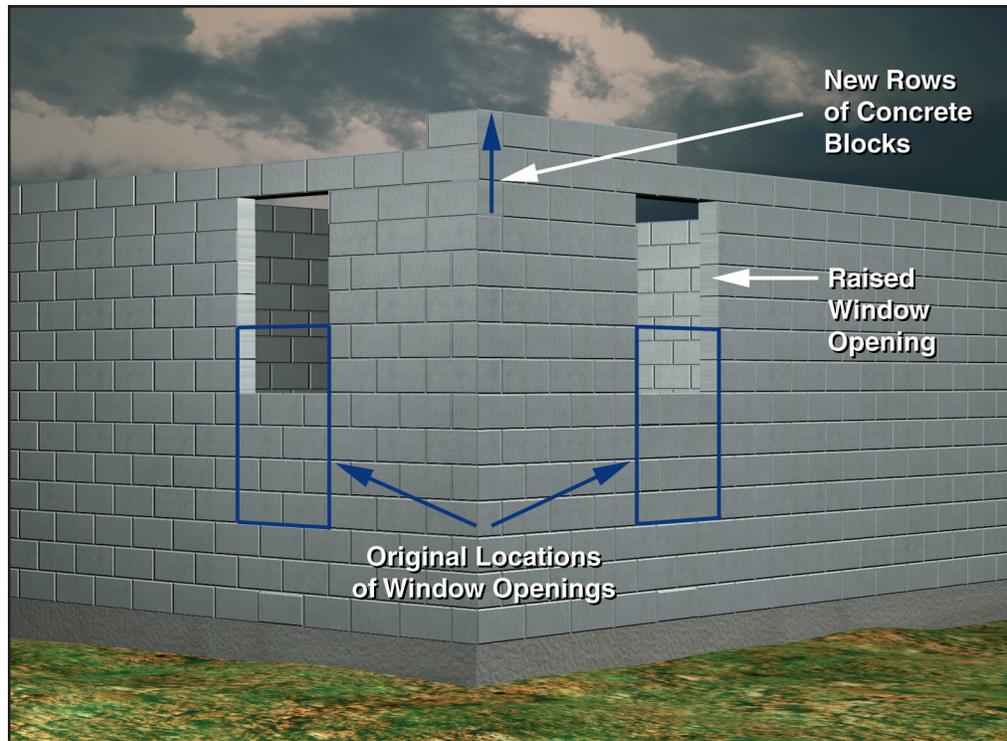
Figure 10
The first step in Technique 1 is removing the roof.



After the roof, windows, and doors are removed, several courses of concrete block are added to the tops of the existing walls and to the bottoms of the window openings (Figure 11). A corresponding number of blocks are removed from the tops of the window openings so that the size of the windows will remain the same. In addition, although not shown in Figure 11, concrete bond beams are formed in place at the tops of the extended walls to provide structural reinforcement.

Figure 11

The tops of the walls and bottoms of the window openings are raised with concrete blocks.



Blocks are removed from the walls of the house at selected locations within 1 foot of the ground (Figure 12). The resulting openings will allow flood waters to flow into and out of the lower area of the house so that the water pressures on both sides of the walls will remain the same. The roof and windows are then replaced, and a new wood-frame floor is constructed above the flood level (Figure 13).

Figure 12
Openings are created in the walls near the ground.

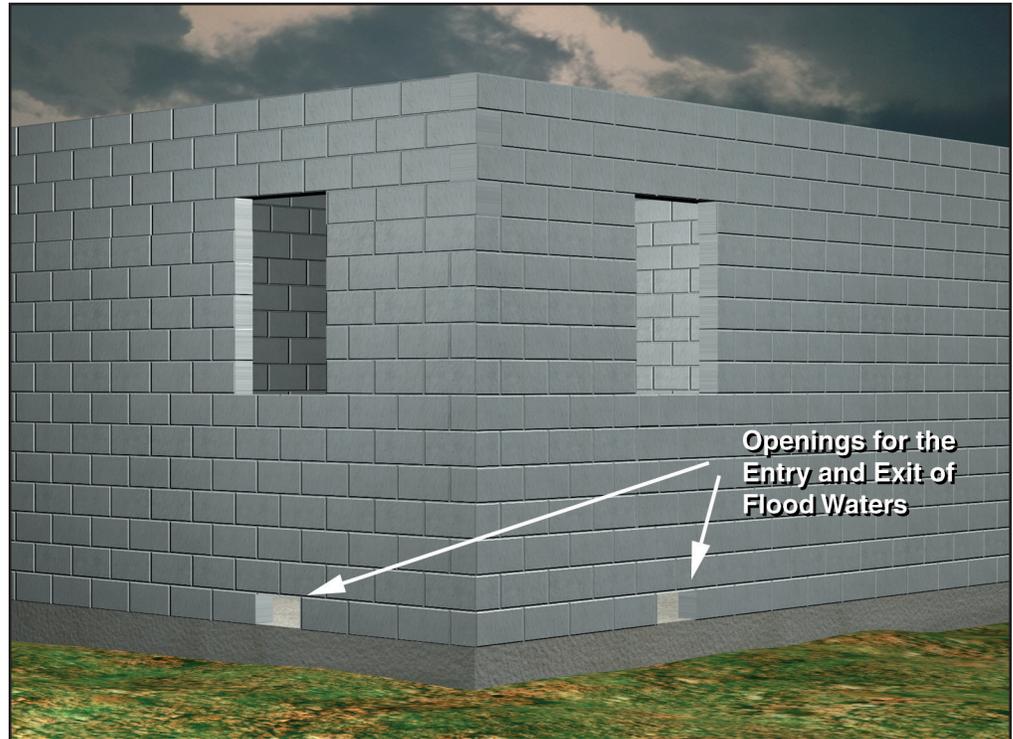
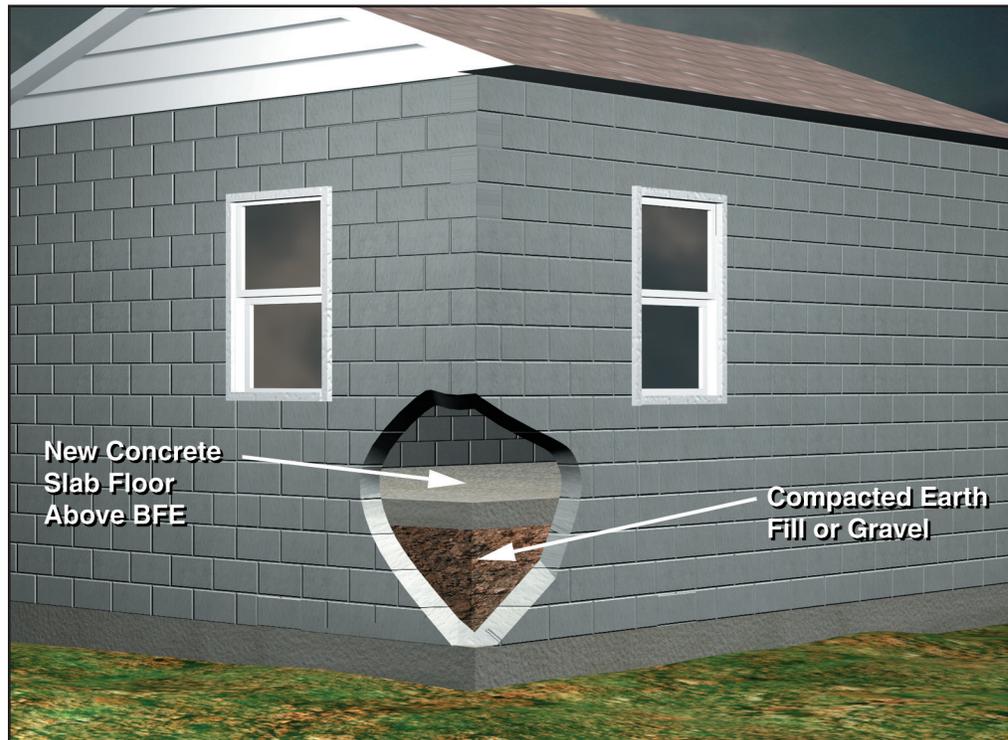


Figure 13
A new wood-frame lowest floor is constructed above the flood level, and the roof, windows, and doors are reinstalled.



A homeowner who chooses Technique 1 may decide to build a new concrete slab floor instead of a wood floor (Figure 14). When this option is chosen, compacted fill dirt or gravel is placed on top of the old slab and the new slab floor is poured on top. Because the area below the new floor is filled with dirt or gravel, wall openings are not required.

Figure 14
An alternative to building an elevated wood-frame floor is installing a new, elevated concrete slab floor on fill placed over the old slab.



Technique 2 – Convert the Existing Lower Area of the House to Non-Habitable Space and Build a New Second Story for Living Space

When the depth of the base flood at the house is more than 4 or 5 feet above grade, the homeowner will usually find it more practical to add an entire second story to the house. The lower area of the house is then converted to non-habitable space that may be used only for parking, storage, or access to the upper story. Flood waters may still enter this non-habitable lower area. For this reason, Technique 2, like Technique 1, is appropriate for houses with concrete or masonry walls, but not houses with other types of walls.

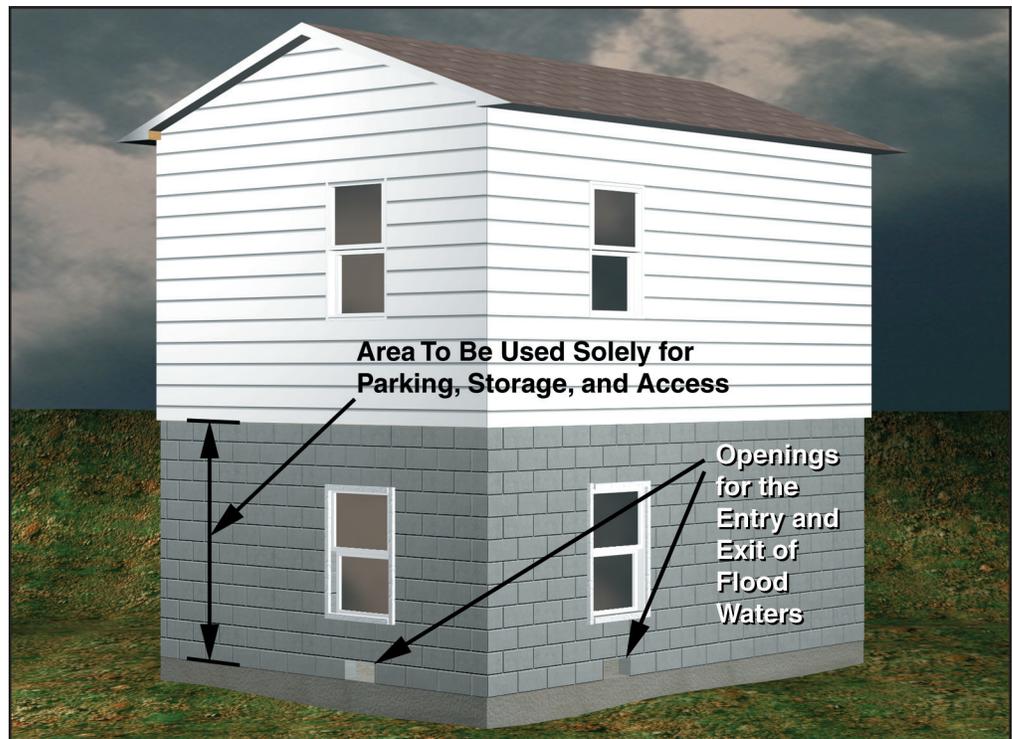
As in Technique 1, the repairs begin with the temporary removal of the roof and roof framing (Figure 10). After the roof is removed, construction of the new second story begins. First, a new wood-frame floor is built on top of the existing lower-story walls. The second-story walls are framed with metal or wood studs and set in place on the floor (Figure 15).

Figure 15
The new second-story floor and walls are built on top of the existing lower story.



Some homeowners prefer that the second story be constructed of masonry, but wood- or metal-framing is more common, primarily because it is lighter and less expensive. The roof is replaced, and blocks are removed from the walls to allow flood waters to enter and exit. Exterior sheathing is then added to the framed walls of the second story, the new windows are installed, and siding or stucco is applied to the sheathing (Figure 16).

Figure 16
The new second-story walls are covered with siding or stucco.



Technique 3 – Lift the Entire House, With the Floor Slab Attached, and Build a New Foundation To Elevate the House.

Technique 3 can be used for houses with wood-frame or masonry walls and is appropriate for a wide range of flood levels. This technique is very different from Techniques 1 and 2. Here, the entire house, including its slab floor, is lifted above the flood level and new masonry foundation walls are built below it. The most common method of lifting the house is to place metal I-beams below the slab and raise the house with jacks.

First, trenches are dug to expose the foundation walls immediately below the slab. Holes are then cut in the foundation walls at intervals around the house, and tunnels are dug under the slab (Figure 17). Jacks are placed in the trenches and large I-beams are inserted through the tunnels and allowed to rest on the jacks. Smaller I-beams are then inserted through the tunnels at right angles to the larger beams and positioned on top of them. The smaller beams support the slab when the house is raised (Figure 18).

Figure 17
Trenches and tunnels under the slab provide access for the jacks and I-beams that will lift the house.

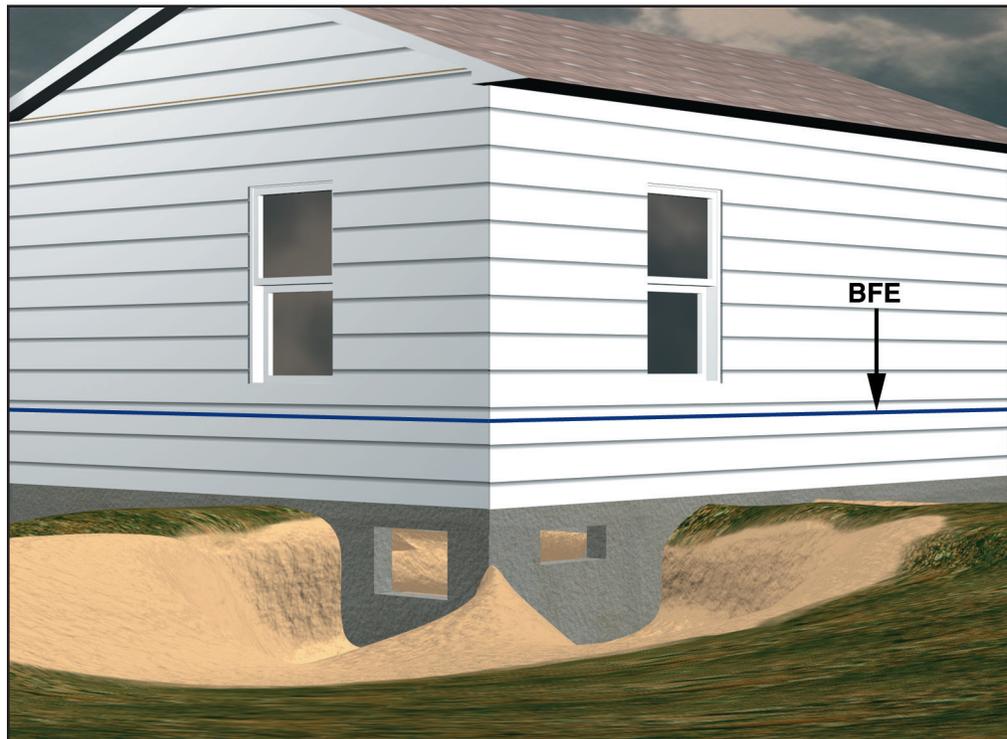
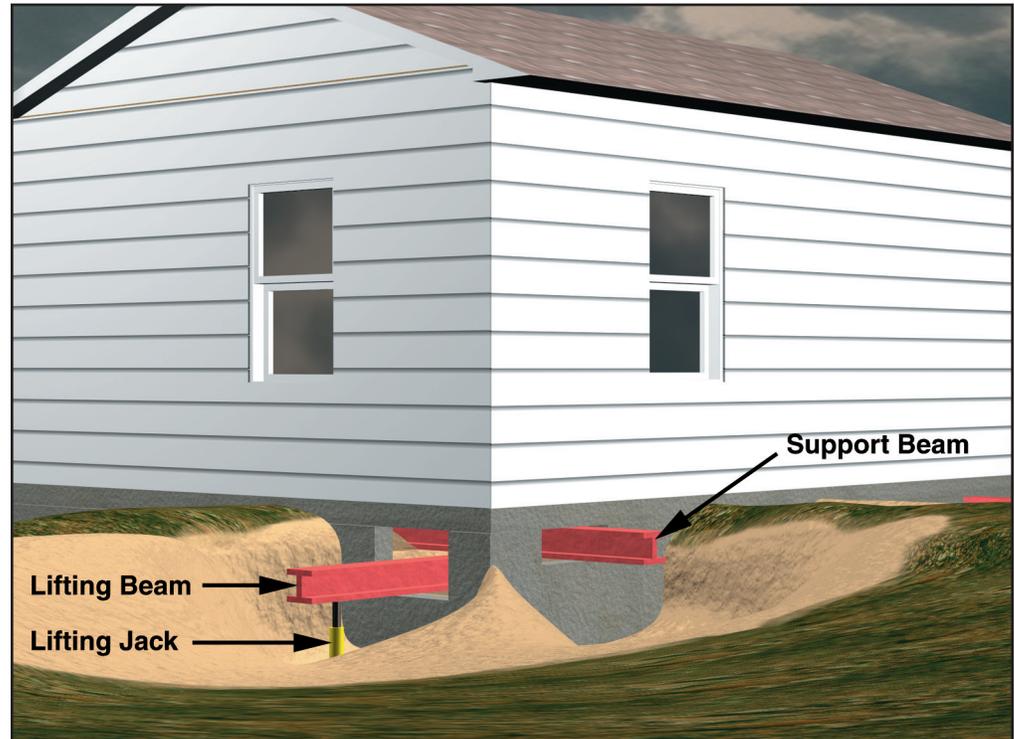
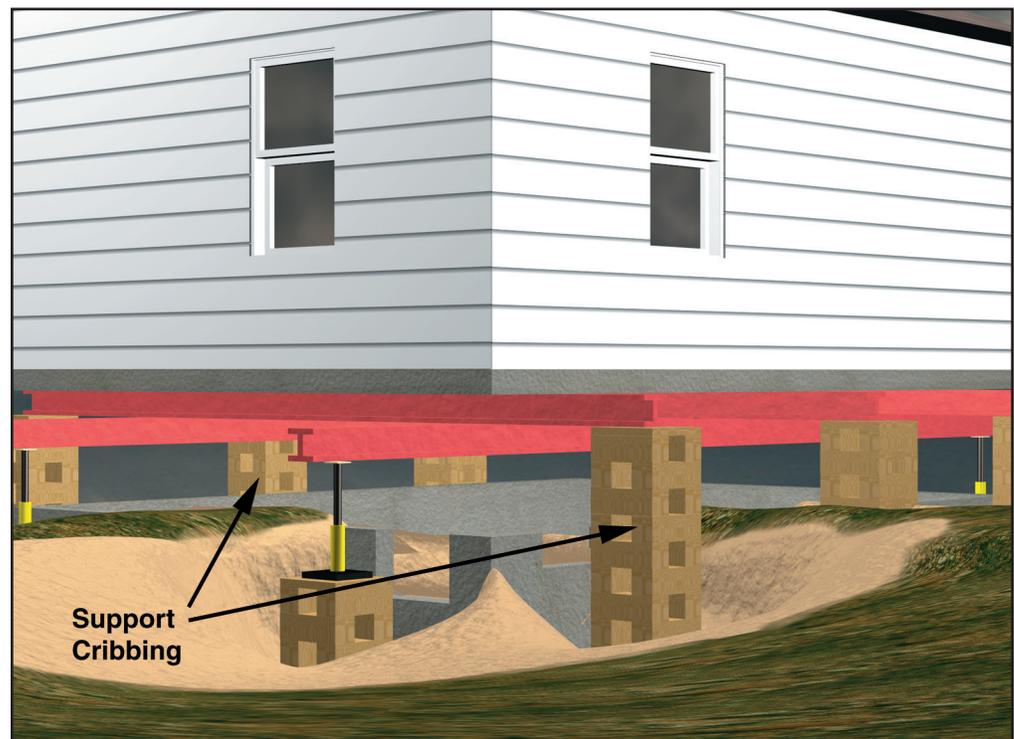


Figure 18
With I-beams and jacks in place, the house is ready to be lifted.



The house is then jacked up. When the jacks have extended as far as possible, the house must be supported temporarily while the jacks are raised. Both the house and the jacks are usually supported on “cribbing”—temporary piles of crisscrossed timbers (Figure 19). The jacks are then used to raise the house higher.

Figure 19
The house is temporarily supported on cribbing.



This process is repeated until the house is raised to the desired height. The foundation walls are then extended upward with additional rows of concrete block (Figure 20). As in the previous techniques, openings are made in the walls within 1 foot of the ground so that flood waters will be able to flow into and out of the area below the elevated floor. The jacks and beams are removed, and the openings left around the beams are filled with blocks (Figure 21).

Figure 20
New, extended
foundation walls are
constructed with
concrete blocks.

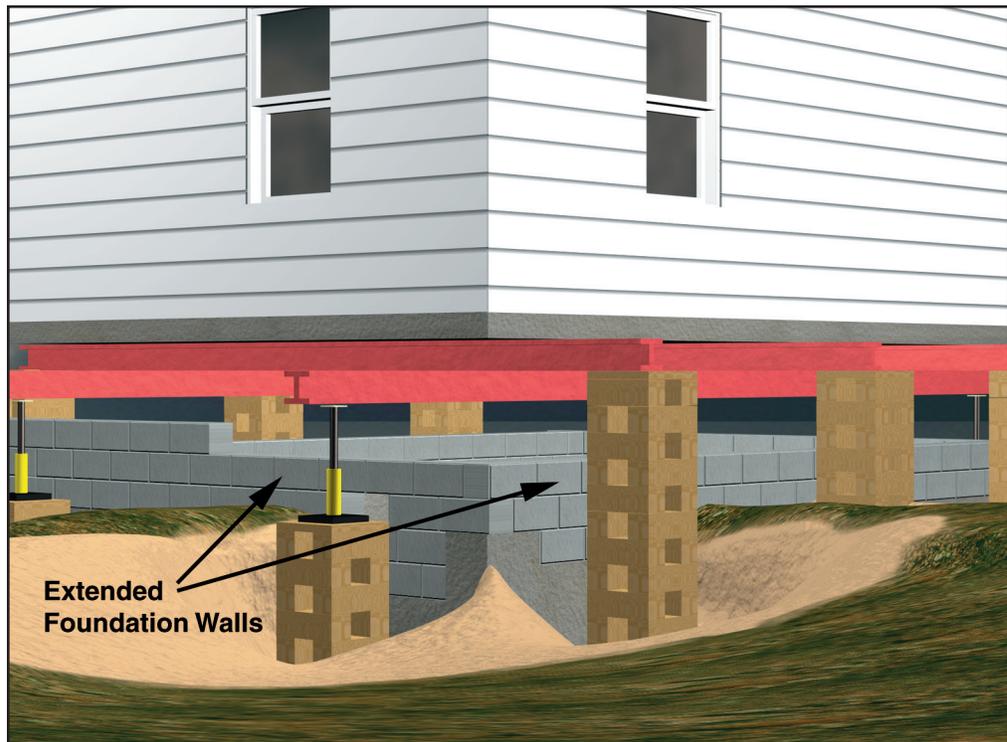


Figure 21
Elevated house and
slab on new, extended
foundation walls.

