

FOUNDATIONS



Heavy Lift Raising 250 tons of house safely above the flood

BY RICH SANGIORGI

Just over a year after Hurricane Sandy washed through his Long Island, N.Y., home, I sat down to talk with Rich Sangiorgi, a contractor with 30 years in commercial exteriors. In addition to his thriving commercial business, Rich runs a modular house building company. And he is now teaming up with Joe DeNicholas, the sixth-generation house mover who successfully raised Sangiorgi's waterfront home 11 feet higher than it stood a year ago.

We sat on the unheated second floor while a vibrating plate compacted fresh fill beneath the house. It was the final phase of elevating the home, yet the project was far from finished. Sangiorgi's crew had only just started renovating the gutted first floor, and formwork for new re-

taining walls surrounded the house like a fortress. Hundreds of yards of fill still needed to be placed to bring the landscaping around the 4,300-square-foot custom home up to finish grade. But the project was far enough along that Sangiorgi could breathe easy again and was looking ahead to other lifting jobs for past customers who had turned to him for help in the aftermath of Sandy's surge. Not only has Sangiorgi had to become a quick student in the technical intricacies of raising existing buildings above flood elevation, but he has also had to become a master at navigating the insurance and regulatory maze that has delivered its own blow to everyone rebuilding after the storm. This article is based on that interview. —Clayton DeKorne, executive editor

Photo: M. Sangiorgi



The big lesson for me in all this is that there's so much more to elevating a house than just house lifting. When I first started getting bids, house lifters were telling me that it would cost around \$40,000. At that time I had no idea that the excavation alone would cost more than \$40,000. A lifter is not going to tell you everything you have to do before and after the house is raised. You have to really plan it through.

I've been lucky in my training. In the fast-paced, competitive world of commercial contracting, you have to plan ... and then plan again. Coordinating trades and sticking closely to a critical-path schedule is everything. On a project like this, though, where at first I didn't know all the steps to take, it was different. Nobody knew the steps. Down in New Orleans, after dealing with Hurricane Katrina in 2005, I'm sure there are now lots of guys who know, but not on Long Island after Sandy. We are only now just beginning to put it all together.

Some of the important steps in a lift were clear as I began to

think it through, but many were not obvious at first. Thankfully, we had good guidance from Joe DeNicholas, our lifter.

Financing. This is always the first thing on everyone's mind, and it has proved to be a very complex issue after Sandy. I was lucky in that I was able to self-finance and get all my labor at cost. I was able to move forward without waiting for the insurance company. In fact, my insurance won't cover anything but the replacement of the interior. The house took on just over a foot of water, so this meant that the insurer would replace the first 4 feet of wall finishes and insulation, and all the wiring (1). When the water rises over outlet height, water wicks up the paper insulation and can damage wiring all the way to the second floor. Insurance companies aren't going to take a risk on anything that might lead to a fire, so they pay 100% on all mechanicals. But they won't cover the cost of raising the house, even if the flood elevation is recalibrated, as it was across the region after Sandy. This means that if you opt to raise the house, you

Photos: 1 and 2, Clayton DeKorne



won't see a dime of insurance money until work on the interior begins. For this reason a lot of people took ridiculously low settlements—\$30,000 to \$60,000 to redo an entire house. In this market, you can barely put in a kitchen or bath for \$30,000, let alone an entire first floor. And forget about lifting it.

"I see no point in rebuilding if you're not lifting above flood elevation." No bank will touch it in the future, so now a lifetime investment is only worth the cost of the land. No one wants to be told they will have nothing to leave their children.

My first advice to everyone was to wait. The settlements offered last year were too out of whack to last long. It has taken a while, and it was an excruciating wait for many of my customers, but it looks like it will pay off. The New York Rising Housing Recovery program finally kicked in with the first awards letters coming out this past October, a year after the storm. New York Rising was set up with federal funds to fill in the obvious shortfalls from insur-

ance and FEMA funds. Now they are suddenly agreeing to pay up to \$160 per square foot to rebuild, which begins to come close. New construction in this market is around \$175 to \$200 per square foot, so it's in line.

Foundation design. Permitting was not really that big a deal because we had an engineer. I had renovated the house 10 years ago and pulled out a lot of the CMU foundation, replacing it with poured concrete. At that time, we sunk 50 helical piles beneath the footings to keep them from settling. These piles had been retrofit around the perimeter and only supported one side of the footing. After taking soil samples and pulling the old pile reports, the engineer recommended adding 15 new helical piles. Most of these were placed on the inside of the footing to counterbalance the existing piles. After sinking each pile, the drive head gets cut off with a portable band saw and the pile stem is bolted to a bracket (2) that supports the footing edge (3). On mid-span footings



running through the house, we cut out the old footing and sunk the piles dead center. These piles got a steel bearing plate (4), around which we formed and poured a new concrete pile cap. The foundation walls running over these caps act as grade beams. Because they are heavily reinforced, we didn't need continuous footings running from pile to pile, but since they already existed, they certainly didn't hurt.

Lifting skills. You need to find a good lifter. I interviewed every lifter on Long Island before making a decision. Don't skimp on gaining as much information as possible.

In the end, the decision was easy. I went with a house mover that had been in the business for well over 100 years, and this company was the only one that said I didn't need to remove all the brick veneer from the house. This house also had a fireplace and chimney in the back that weighs several tons by itself, all concentrated in one point that had most of the lifters shaking their heads. But for

a company that specializes in moving irreplaceable historic buildings down the throughway, lifting a house straight up and setting it back down in exactly the same spot is a no-brainer, no matter how much that house weighs. The hydraulic rig that the lifter brought to the site raises 24 jacks perfectly evenly at the same time. DeNicholas and his crew can monitor the pressure on each jack as the house goes up and can back off as soon as there's a snag that is exerting an off-kilter force on the structure (5). This way there's no twisting or racking as the house is raised.

As a result of the lift, we only had one interior crack on a veneer-plastered wall. None of the brick and stucco exterior cracked from the lift except a small portion of the chimney base that we were unable to support. Everywhere else, my crews had bolted steel angle-iron to the sills when the brick was installed (6). As long as the building frame was well supported by the mover's steelwork, there was no risk to the cladding.

Photos: 6 and 7, Clayton DeKorne; 8, E. Bonfini



Photo: Clayton DeKorne

THE LIFT BEGINS

Utilities. All sewer, water, gas, and electricity lines running into the house must be disconnected. This is obvious, but chasing down all the pipes and wires can be painstaking work in a flooded crawlspace. They don't always rise out of the ground in one place, particularly in an older home with several additions. Of course, all the utilities had been shut off soon after the storm. But a simple water pipe that remains connected can create a lot of stress when the house goes up. This kind of stress is what cracks finishes. You want the house to rise up without a hitch, literally. And even though we got everything right on the lift, we still had to cut the plate out around the power main when we set the house back down (7). There's nothing like experience to develop an eye for all these details.

Site work. I never expected how much site work would be involved. Any kind of deck, patio, driveway—anything attached to the house—has to come off. Look around the site. It's not just the house

you need to think about. You need access all the way around it with a Bobcat, which means ripping out most of the landscaping and ramping the site. This can be heartbreaking for an owner who has invested years in developing his own little paradise. I just had to swallow it, but you'll probably want to warn your customers of what to expect. There's a lot of emotion after a flood, and the more the customer knows what to expect, the easier it will be to absorb.

Cutting the foundation. There are two basic ways to lift a house: you can either come underneath it or you can go through it. With a house on a crawlspace, most lifters will want to go underneath, and this means you have to cut through the foundation to thread a gridwork of steel beams underneath the first floor.

Slab houses are usually cut away from the slab and the floorless frame is lifted by punching holes through the first-floor walls for the lifter's steelwork. The steel is supported on headers, either existing ones at openings or new ones you frame in. As more and more lifters are gaining experience, this option is gaining a lot of traction, even with non-slab houses. It's usually much easier to pop a hole through a framed wall than through a foundation wall.

In our case, however, where I wanted to keep the brick, going underneath worked better. But cutting the concrete required a huge investment of time. We used a "cut and break" tool (8), which is a lot safer and doesn't throw as much water as a concrete chain saw, but it is slow going. Each hole took a couple of hours of plunging the blade in every few inches and then snapping a chunk off. Blades ran us about \$400 per set. We used more than \$1,000 worth of blades to cut roughly 20 square holes that were 2-by-2-feet each.

Lifting. Before the lifter threaded his steel through the crawlspace, we had to dig below the footing elevation at every location next to a footing where the lifter needed a cradle (the stack of hardwood 4x4s that support each jack). This was to eliminate the possibility of a footing collapse due to the increased soil pressure from the intense point loads near a footing.

At the garage, where there's no sill, cradles had to be extended to the garage door header (9), and the front porch had to be supported on cross beams built out on cantilevered sections of steel.

The hydraulic jacks have a throw of about 16 inches (10). We needed to go up to 10 feet 7 inches. To do this the lifter has to "jump the jacks." It's kind of the way crane operators will leapfrog their way up a skyscraper, lifting one crane over itself, and when that one's set, it pulls the lower one over itself. In this case, some extended jacks support the house, while others are backed off and their cradles stacked higher, so this set of jacks can be extended, and so forth. Each time a lifter jumps the jacks, it costs more money.

Foundation rebuild. With the house lifted, it was time to install the helical piles according to the design and to form out the footings, as described earlier. We could then stand the foundation forms. For this, you need to work with a patient foundation crew. The foundation walls needed to have pockets formed out to accommodate the lifter's steel, and the crew needed to work pieces to fit around tight enclosed spaces. In some cases it's painstaking work, but care and attention will pay off when it comes time to reset the house. You don't want to be jackhammering new concrete because



someone was impatient about setting formwork.

We used a pump truck with a 100-foot boom to get the concrete to the back of the house, and the pressure on this hose was tremendous. It was harrowing for the crew to try to bend that hose into the form with less than a foot of access between the house and the top of the forms (11). If I had to do it all over again, I would have paid for another jump on the jacks to give ourselves more room. It would have been safer and a lot less stressful.

I could have gone with CMU foundation walls. You can lift to the final elevation and just build the CMU up to meet the house. While this is certainly more affordable on several counts, I have seen what wave action can do to a block wall, and I just didn't want to take the chance. A reinforced concrete wall is considerably stronger, and resisting storm surge is the whole reason for doing this work. Why skimp?

We poured 4,000-psi concrete. Code here only requires 3,000 psi,

but I wanted to give ourselves a higher margin of safety. We conducted "tube tests" by pouring concrete into plastic cylinders that we stored in a box next to the foundation so they would cure at the same rate. The cylinders are then crushed to measure the cured compressive strength. We tested at seven days and at 21 days. After seven days you can begin cutting new sills, but you usually can't bolt these down tight and set the house back down until the pour samples test out near 3,000 psi.

Resetting the house. When it came time to finally set the house back down, we first had to go around and check every part of the house that would touch the sill. In several places we had to cut out parts of the old frame that would hang up on the new, leveled sill plates, and even chip out some of the form squeeze-out to avoid a hang-up as the steel work was lowered into the pockets that had been formed into the wall.

DeNicholas runs a crew of about 10 guys, so he has lots of hands on



deck to move cradles and jump the jacks as the house is going up. Just as many guys are needed when the house is coming down. You need eyes on every part of the floor as a house is lowered. Every time a sill or wire or part of the new foundation touches, someone calls out and the jacks are paused while the snag is cleared. The first time the floor of our house hit a new sill plate at the back of the house, we discovered that these plates were high relative to the rest of the house. I called for cutting out a short section of sill plate instead of the grim alternative: days of shimmying the rest of the house to the new sill. Once this high plate was gone, the house settled perfectly into place.

Final steps. There is still an enormous amount of site work to complete, and the utilities must be connected. We now have retaining walls all along the site perimeter (12) and have begun the task of hauling recycled concrete fill, over which I'll lay top soil. A conveyor truck is helping to speed the work of getting sub-slab fill beneath the house, and to spread it around the site (13). But at least

now work can begin on remodeling the interior. Finally.

Experiencing a flood that makes you leave your house takes a toll on people. But there are upsides to the rebuilding, and customers need to be shown the value that they are getting. Things such as replacing rotted sills and eliminating the damp crawlspace. In the end you get a drier, healthier home, and a chance to fix a lot of old problems. Homeowners need to be educated about the value of these improvements.

I have no doubt that five years down the road I'm going to be better off. My home will be worth more and I'll have the option to sell it at market rate. If I hadn't lifted it, it would become a scraper. I'd get the price of the land, and no more. Customers need to know that they are not just going to survive but will thrive because of the work we put into their house.

Rich Sangiorgi runs Elite Wall Systems and Rainbow Homes based in Deer Park, N.Y.