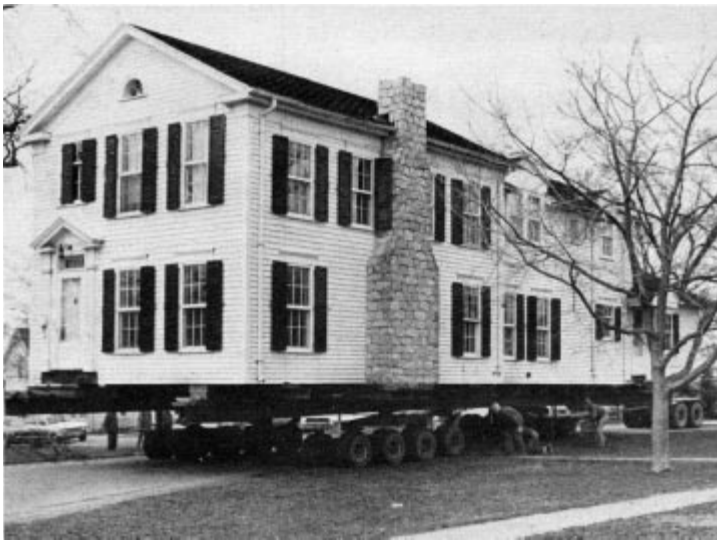
Have Building Will Travel

Three generations of experience make structural moves go smoothly

by Fred Balagna & Anne Lockwood

George M. Pullman, famous inventor of the Pullman sleeping car, made his first fortune moving buildings. Something of a showman, Pullman once raised a four-story Chicago hotel without evacuating a single guest. Moving is still a "main event" in any town, and the sight of a historic building trundling down the street always draws a crowd of sidewalk superintendents.

Our company has operated as a family business for three generations. We're called "structural movers," not house movers, because we don't want to be confused with businesses that move household belongings. A structural mover can shift a house from a flood plain or move a well-built house to a better lot. We've moved houses back from busy roads and elevated houses so the general contractor could dig a basement or repair a foundation. We've also saved a fair number of historic buildings from demolition. Most small cities have a least one moving specialist who can help a contractor plan and execute a move.



Convenience

Convenience is key in structural moving. While no move can be entirely hassle-free, the general contractor can point out to an undecided or skeptical owner that structural moving can be less disruptive than finding a new house and renting a U-Haul. The owners don't need to move out their furniture or clothes. They can carry on business as usual, even while we're moving the house to its new location.

Back in 1946, my father moved a house 35 miles, and when we stopped for lunch the woman who owned the house fed us a full farmer's dinner. She had her water in canisters, and we had tied the bottled gas to the porch.

Today it's even easier. We can put plastic extensions on the water supply and sewer pipes while we're jacking up the structure. To make the structure accessible while the foundation subs are building the new foundation, we normally build a ramp so the owner can get in and out of the house. The water heater can also be a problem, but if we find a place where it won't get in the crew's way, we can even supply warm water until moving day.

A mover cuts down the general contractor's work by planning the route, loading and unloading the structure, and transporting it. The general contractor hires the foundation, plumbing, and electrical subs, and the general contractor coordinates all the finish and foundation work.

A move generally takes 30 to 60 days, depending on how much outside work (sidewalk, porch, and driveway) the general contractor must finish once the building reaches the new site. Loading up the structure and moving it only takes a week.

Look Before You Leap

Because house-moving is an extensive project, both the general contractor and the owner need to decide if the move is worth the expense. Most housemovers charge by the square foot. Rates vary depending on the number of stories, the number of fireplaces and chimneys, and the material (brick or frame). We quote a "ballpark" figure of $7.50 to $8.50 per square foot for one-story masonry buildings and $5 to $6 per square foot for a simple frame house. But that's just the base fee.

To figure out the additional costs, the structural mover needs to measure the house, plan the route, and find out whether any obstacles stand in the way. Depending on the route and the height and width of the structure, the owner may have to pay the phone and power companies to drop lines and tree trimmers to cut overhanging branches (see Figure 1). Legally the utility companies must provide 18-foot clearance. If the wires hand lower, the company must service them free of charge. However, the structures we move are often over 18 feet high. If we need the power and phone companies to drop lines, we have to pay them for the number of men it takes to do the job, the equipment they use, and the time they spend. Consequently, a move can get very expensive. If we're moving a historic structure for a non-profit organization, occasionally the utility companies donate their services.

More often, we run into difficulties with the width of the roads. If we are using a public throughway, we need to make adjustments for trees, porches, and anything else that will block our route. City arbor departments are sometimes reluctant to allow us to cut overhanging city trees in order to move a house from a downtown site. Occasionally, we even need to widen the road. We moved one home away from a rural site on the Mackinaw River in Illinois, and we had to widen the road 12 feet.

To move any structure, you need permits from the state, county, and township. In my experience, most counties and townships don't charge for the permits; however, most states do. Some states include a police escort in the fee. The police help primarily with the traffic control. You can request a table of the fees and a manual of elevations and clearances from your state's Department of Transportation.

Preparing the New Location

While the owner is responsible for finding a new lot, the structural mover and general contractor must ensure that there are no hidden problems with the site. The most serious problem occurs if there is a restrictive covenant on the lot that forbids moving existing homes onto it. Counties sometimes have subdivision quality requirements that exclude everything but new construction. Check the zoning before the project is too far along.

The mover should also visit the new site and make sure it is large enough to get the moving equipment in and out.

Finding a lot big enough for the moving equipment can be a problem if you're planning to move the building to an infill site. These lots are typically narrow, and it could be difficult to slide the house into the middle of the block without tearing up neighboring yards.

Before the structural mover begins his part of the job, the general contractor needs to make a detailed layout of the old foundation and begin work to prepare the new site. Once plans of the existing foundation have been drawn up, the general contractor can give them to the excavating and foundation subs, and work can begin. Before the house arrives, the general contractor needs to stake out the site and the excavating sub must complete the excavation. If the owner wants a basement, the foundation sub should put in the basement footings and install a gravel base inside those footings. The movers will need to set cribbing on the gravel fill.

Jacking It Up

The type of structure we're moving determines how we lift it off the foundation. We normally use a steel beam method because it's easy and convenient. First, we decide how many beams to use and what size they should be. The weight of the house determines the beam placement and beam size. To elevate a medium-sized structure, we generally use I-beams with a 12-inch flange. If we're moving a larger building, we use 15-inch I-beams up to 80 feet in length. We can also safely lift chimneys and other heavy building elements by placing support underneath them. To insert the beams under the house, we punch holes in the foundation, leaving enough of the foundation intact to support the structure.

Next we transfer the weight onto heavy timber cribbing which we stack under the beams. A local saw mill custom makes our cribbing in the dimensions of 4x4, 4x6,and 6x6 with lengths 4 to 8 feet long. To figure out what size cribbing to use, and how much we'll need, we rely on a rule of thumb: "For every foot up a foot wide." For example to raise the building 4 feet, we build a 4-foot box at each jacking station. Stacking the cribbing like Lincoln logs (see Figure 2), we leave just enough room to insert our jacks.

When jacking up a typical one-story house, we generally use a "three-point" system. We lift the house at one point, but leave the other two points supported on cribbing. As we jack the house, we insert more cribbing.

Twenty-ton hydraulic jacks do the job most of the time. If a 20-ton jack can't handle the weight, we double up to 40. We've found that same-sized jacks operating the same way and work well together.

The newest technology for structural movers today is the unified jack. This type of jack lifts the house in several places simultaneously. Consequently, the house stays absolutely level.

Although unified jacks save time, in my opinion, they should be used with caution. I've worked with them in the past, and I don't feel comfortable raising a structure 16 inches off the cribbing with only two men working the jacks. If one of those jacks failed, it would destroy the house. To maintain a safety margin, I want a worker manning every jack.

With our jacking system, we only put the structure completely in the air on lift-off and set-down. Once we raise the house off the foundation, we maintain contact with cribbing on one side most of the way. We never allow the differential between the raise and the jack head to be more than 4 inches. As long as we keep the beams parallel and level, the house will stay balanced.

While we're jacking a house, we keep a crew of four men and a supervisor on the job. The supervisor handles red tape, public relations, and some labor. You really need an extra person to answer questions and relieve other crew members. For safety's sake, workers must exercise common sense and good judgment. Because of the danger involved, we need people who are on the ball.

Figure 1. *This house required tree trimmers to cut back branches because it was too wide for the road. Fifty feet ahead of the house, phone company workers drop a low hanging line.*

Figure 2. *Stacked like Lincoln logs, squares of cribbing support I-beams, which support the house.*

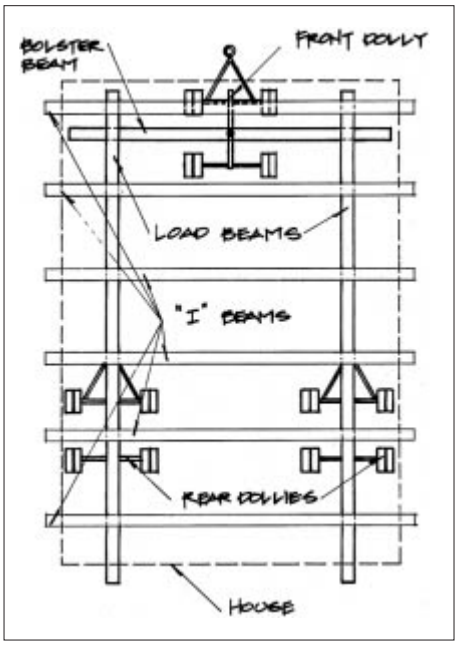


Figure 3. *A three-point move provides a margin of safety. The front dolly supports a bolster beam which functions like the shock absorbers of a car. Rear dollies are positioned beneath load beams.*

Figure 4. *A cable from the truck loops around the pulley on the front dolly.*

Moving Day

To move the structure once we've got it in the air, we use a triangular configuration of three dollies which we position under the load beams (see Figure 3). As soon as the dollies are in place beneath the load beams, we remove the cribbing and move the building to the new site. We place a bolster beam near the front so if we need to elevate the back two dollies, the house will rock across the beam in front. By using this three-point suspension, we put little stress on the house. It's similar to the springs on your car; it allows us to negotiate uneven terrain safely. A cable from the truck attaches to the front dolly (see Figure 4).

There are weight limitations, however, on what we can move using a three-dolly configuration. The more weight we have concentrated in one spot, the larger the beams we need to support that weight. For this reason, 300 tons is about the most we can maneuver. More than that and the large beam size would make it impossible to work around the structure.

When we reach the new site, we unhook the truck from the front dolly and drive to the opposite side of the excavated lot. Then we hook up the truck and pull the dollies onto the cribbing. Once the house is in position, we jack it up an extra 4 to 6 inches, so the foundation sub has room to work. To remove the dollies, we place cribbing on two sides of the wheels, reestablish the weight on the cribbing, and slide the dollies out.

When the foundation is completed, minus the openings for the steel beams, we set the house down by reversing the procedure we used to jack it up. Then we slide out the steel beams and fill in the openings.

If the client wants a concrete foundation, the general contractor may run into problems trying to create an aesthetically pleasing appearance for the foundation because of the necessary openings for the steel beams. We can't remove any of the beams that extend underneath the main support of the house until we have something to support the weight of the house. Recently, we discovered a way around the problem. We put in 6 feet of concrete and used concrete block on the top 2 feet of the wall. After removing the beams, we filled in the missing block, covered the outside with brick veneer, and the foundation looked as good as the original.

My advice to a general contractor in charge of a structural move would be to carefully plan ahead and try to stay patient. Sometimes it's difficult coordinating the schedules of the owner, the structural mover, the utility companies, and the police escort (as well as the other subs). With advanced planning, however the move can be accomplished successfully with minimum delays. ■

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