



Moving a House

Skill, experience and hard work give new life to an old home

by Tim Snyder

Raising houses from their foundations and transporting them to new locations is something of an American tradition. Illustrated records of house-moving exist as far back as the late 18th century, and by the mid-1800s an assortment of house-moving tools and techniques had already developed. Visitors from Europe were astonished by this phenomenon, which was unfamiliar to them. Perhaps the American penchant for house-moving had something to do with the openness of the land, the need to widen roads as pioneer settlements became towns, and pure Yankee ingenuity. Even today the vocation of moving houses is often handed down from father to son. "It's not something you can learn from a book," says Robert Kennelly, of Southampton, N.Y. When I went to visit this well-known house-mover, he was working on the project described in this article. Kennelly has moved thousands of houses since buying out an old-time house-mover some 35 years ago, and even as we drove down old Route 25 he would occasionally point to a house he had moved and relate some of the story behind its relocation.

Eastern Long Island is a good location for a house-mover. It's relatively flat and still has more potato farms than shopping malls or housing developments. Many of the beach houses (which are usually large enough to qualify as mansions) built on the main dune sooner or later need to be shifted back as the coastline erodes. And there are also a great number of old houses, built when clipper ships and whalers crowded the harbors of Greenport, Southampton and Sag Harbor. The project shown here was one such house. Kennelly's clients had already purchased a lot and were looking for an old house of historical value to move to the site. The two-story Colonial they eventually found near Cutchogue, on Long Island's North Fork, had been built in 1720. The owners were willing to sell the house separately from the lot, so all that remained was to find a good house-mover.

Planning the job—Underpasses, bridges, narrow roads, trees and utility wires are some of the obstacles that can stand between a house and its new destination. One of the first things Kennelly does when asked about the feasibility of a move is to figure out a route that fits the dimensions of the house. The size of the house, rather than its weight, is the critical factor.

Except in cases where a house is to be moved only a short distance—just down the street, for example, or to another part of the same lot—the house-mover's strategy usually calls for cutting the building into manageable parts, each of which is supported by steel I-beams and then trucked to the new site. Utility lines are one of the main reasons for this "divide and conquer" approach. Two-story buildings cannot fit beneath the 18-ft. minimum clearance and the cost for raising power lines, even from one town to the next, is prohibitively high.

Ideally, a new foundation or new footings will be waiting for the house when it arrives; assembly occurs in the reverse order of the take-apart sequence. Usually new beams must be installed along the cut-lines to reinforce these joints. Replacing shingles, repairing rotten sill

beams, and various other carpentry repairs are performed at this time.

For this small post-and-beam Colonial, Kennelly's plan was to cut off the two small lean-to additions at the back of the house and separate the roof from the main part of the building (photo, facing page). Each of the four parts was to be moved separately and re-assembled at the new site, some 20 miles away.

The work begins—Any house-moving can easily get bogged down if the crew isn't carefully supervised or the work schedule doesn't go according to plan. One of the first things I noticed about Kennelly's crew was the speed with which they worked. Lyle Smith, a foreman who has worked with Kennelly for over 25 years, skillfully shifts his five-man crew from one part of the house to another; several jobs get done at once. Plumbing and heating lines usually get cut first. The cut location is in the basement, just below the first floor. The pipes (or ductwork, if the house has forced-air heating) must not extend below the main floor joists, but they can't be so close to the subfloor that reconnection will be cramped. While this is being done, the rest of the crew is busy digging trenches to expose sections of the foundation that have to be removed so the steel I-beams can be run under the house.

Kennelly hired a mason to take out the stone chimney at the center of the house. In general, chimneys are left intact during a move, but in this case the old, lime-based mortar between the stones had disintegrated, and the structural integrity of the chimney was doubtful.

Massive I-beams, known simply as "steel" to house-movers, form the base on which a house rests during a move (drawing, p. 61). The beams that run the length of the house are called main steel; they are most frequently used in pairs. Cradle steel beams are set on top of the main steel, at a 90° angle to the longer beams. This strong grid supports the sills and other framing members of the house. The main steel goes in first, and while these beams are being slid into position, level beds are prepared beneath the house for the 8x8 oak cribbing beams. Like most old houses this one had only a partial basement, so digging in under the house was real ground-hog work. Once the cradle steel is in position, the crew begins laying in the cribbing to raise the steel up against the sill beams of the house. Careful shimming keeps each beam in contact with the frame of the house. Since the hand-hewn timbers in this old house are of different sizes, shimming was more extensive than it would have been for a house constructed from dimensioned lumber. Kennelly uses enough steel to provide more bearing surface than the original foundation afforded; this is one of the secrets of keeping a house, or part of a house, structurally secure during a move.

The next step is to jack the house up to its final height, so that the sliding steel can later be placed under (and at a 90° angle to) the main steel. Sliding steel is a misleading term, since these beams serve as a stationary surface for the main steel to slide on as the house is winched off its original foundation. Over 20 years ago, Kennelly developed special hydraulic jacking rams to do most

The moving experience

Houses are dear to our hearts but the property they sit on sometimes isn't. As a result Americans frequently move their houses. Each year about 85,000 houses are moved, according to *The House and Building Mover*, a trade journal for the nation's 2,000-plus house-moving contractors.

Movers cite a host of reasons, mostly economic, for all this activity. As real estate values rise, people move their houses and subdivide the property for development. A change from residential to commercial zoning also prompts house-moving.

Faced with a crumbling foundation, some people lift their house to repair timbers, sill and frame. Often a new base is built on the same property, and the house is shifted just a short distance. Winterization of a vacation home and the addition of a basement to an existing home are related reasons.

There are people who move bargain houses that housing authorities or historical societies want relocated and preserved. Properties with unpaid taxes, condemned structures and historic landmarks are often rescued by moving them out from under the shadow of a wrecker's ball and crane.

Finally, people move their houses to get out of the way of riverbank or beach erosion, reservoir or dam building, new highways or existing roads that are heavily trafficked.

Moving an existing house is usually less expensive than building the same structure at a new location. Consider these recent house-moving jobs and their costs:

- In Boulder, Colorado, a two-story wood-frame Victorian house was moved 10 miles. The cost, including permits, was \$11,000.

- In Eugene, Oregon, a pair of 50-year-old, two-story bungalows were moved seven blocks in the same neighborhood. The cost, including new foundations and utility charges, was \$14,800 for both houses.

- In San Francisco, California, 12 landmark wood-frame Victorian houses slated for demolition were moved at an average cost of \$12,829 each—plus \$3,420 for utilities, \$1,972 for engineering and \$3,227 for soil compacting.

No two jobs are alike, as any house-mover will say. In the absence of standard practices, it's important to manage the major elements of the moving process. These include the house and lot, a mover and several contractors who will prepare the new site and get the house back to livable condition once it's relocated.

Other important elements of the job that add to the cost include consulting fees for a lawyer, architect and engineer; permits for moving, building or renovations, and sanitary system; utilities and subcontractors for disconnecting and restoring service for water, sewage, cable TV, telephone, heating and air conditioning, electricity and plumbing; wire costs for moving, dropping or raising telephone lines, cable TV wires, traffic lights or utility power lines along the route between house locations.

If you are about to move a house, you should obtain bids from several house-moving contractors. Ask for references to a mover's previous clients and call them. In the absence of standard prices, look for a mover with experience in the area. In general, a reputable mover who is familiar with local officials, road conditions and administrative details will do a better job than someone without local contacts.

Two useful publications about moving houses are *Housemoving* (\$3.50, payable to the City of Eugene) from the Housing and Community Conservation Dept., 777 Pearl St., Room 106, Eugene, Ore. 97401; and *Moving Historic Buildings*, \$3.50 (Stock No. 024-016-00109-5) from the U.S. Govt. Printing Office, Washington, D.C. 20402. —K.L.



Lifting the roof: A small bulldozer (above) hoists cradle steel beams into place beneath the top plate. Underneath the sill beams, main and cradle steel support the house, which has already been jacked up from its foundation. The roof has been cut away, and main steel has been let in under the roof. To make sure the roof won't snag when the cranes lift it, the crew jacks up the main steel beams a few inches, adding new cribbing (right) to maintain the separation. Under the house, sliding steel is positioned beneath and at right angles to the lower main steel beams. Below, as the cranes pull on all four ends of the roof main steel and lift the roof free, Kennelly watches as the main section of the house is winched out from under the suspended roof.



of the heavy lifting. He still uses them today. (One set is rated at 65 tons, the other at 25. Only the 25-tonners were needed on this job.) They are placed under the main steel and activated simultaneously by remote control to lift the house in increments of 8 in. Workers position blocks under the elevated steel, the hydraulic pressure is relieved, and the house sits 8 in. higher. Then the process is repeated and the building moves up, block by block.

When I first arrived at the site, all the preliminary lifting was done and the crew was preparing to separate the roof from the main part of the house. Main steel beams had already been lifted up to the second floor, supported by cribbing on the outside of the house. The sliding steel hadn't been positioned yet because it would have gotten in the way of the bulldozer used to lift the cradle steel for the roof into position.

The cut separating the roof was made just below the sills of the gable windows in order to leave these frames and sashes intact. After snapping a chalkline on the inside walls to mark the cut line, a crewman used a reciprocating saw to cut through the walls. Beams required a hand saw, and often a circular saw could be used for long stretches of shingles and furring strips. The cutting edges of all these tools were soon dulled by the wrought iron nails they encountered.

Like the grid supporting the main section of the house, main and cradle steel were positioned under the top plate of the second floor, supported by cribbing on the outside of the house. Kennelly elected to use two cranes (see photo, p. 58) to lift the roof free rather than cribbing the roof up with hand jacks and then letting it down again, block by block. Positioned at both ends of the house and hooked onto all four ends of the roof main steel, the cranes could do the job in a single morning. By hand, it would have taken two days. The trunnels (wooden pegs) that secured the top plate to the second-floor posts had to be pounded out with a long drift pin. Then

the crew raised the roof section up a few inches, just to make sure the break with the second floor was complete and there would be no binding when the cranes started to winch.

Lift-off—The two cranes arrived early one morning, and the air was soon charged with excitement. In spite of the extensive preparation and triple-checking, the potential for disaster seemed greatest at this point. The house had been divided like a giant birthday cake and was, in relative terms, equally delicate.

The two sliding steel beams were placed under the two main steel beams, which supported the main section of the house. Then the entire top surface of the sliding steel was coated with a soap paste, followed by a sprinkling of graphite flakes. This treatment provided a slick surface for the main steel beams to slide on. The main steel beams were connected with chain (see drawing, below) so they wouldn't pull apart as the house was winched across the sliding steel.

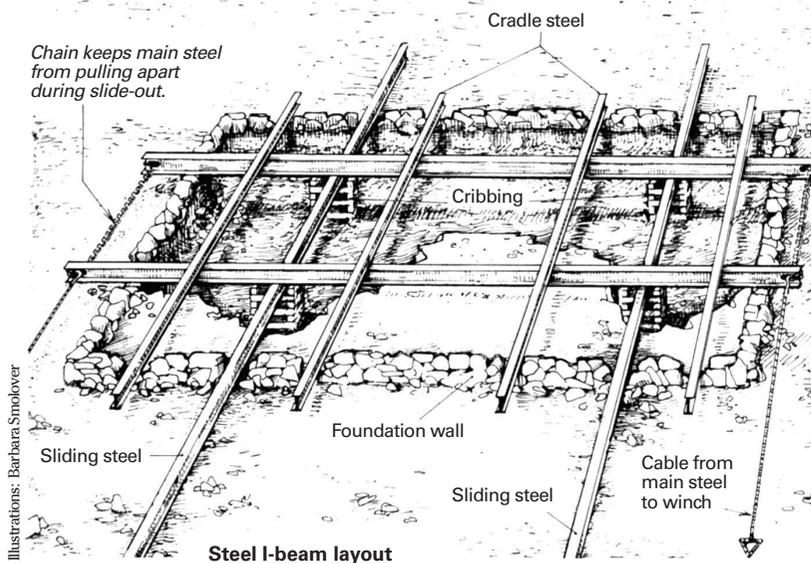
Once the cable connections were secure at the ends of the roof's main steel, the lift-off could be made. Coordinating the controls of their respective cranes, both operators gently raised the roof about 3 ft. above the rest of the house. As soon as the roof was steady, Kennelly gave the signal to start his two truck-mounted winches. The bottom section of the house slid forward out from under the suspended roof. The crane operators turned their booms slightly so the I-beams would clear the cribbing as they lowered the roof section. In about 15 minutes, the entire lift, slide, and lower operation was complete. To protect the interior of the house from the weather, the second floor had to be temporarily sheathed and covered with plastic sheeting.

On the road—With each section of the house on its own, Kennelly could start transporting them to the new site. The main steel beams on

each piece had to be jacked up off the sliding steel so that dollies could be let in underneath them. The wheeled dollies are low-slung, so that the structure moving on them is as close to the ground as possible, allowing maximum clearance above. It's also important to position the dollies so that there will be even weight distribution when the truck hooks onto the house. The crew had to build a special rig on the protruding main steel that would fit onto the bearing plate of the tractor.

Kennelly moved the smaller lean-to sections and roof first, giving him a chance to measure clearances along the transport route and anticipate tight squeezes that would occur later, when the larger main section hit the road. Road signs were temporarily removed, and overhanging branches trimmed. On the morning of the big move, the police escort arrived on schedule and started to shunt traffic to alternate routes, giving the house an open road. Maximum speed was 15 m.p.h., with quite a few stops along the way to trim more branches. At intersections, traffic lights were the main obstacle, but skillful zig-zagging by the driver avoided them.

With the fragmented house finally delivered to its new home (photo below), the movers could breathe a sigh of relief. It would be only a brief rest, however, since in a few days the cranes would be called in to start putting everything back together. For all the excitement reflected in the faces of many onlookers along the route, moving houses is still a dangerous occupation. Even with the greatest respect for precision and safety, the element of risk is always present. No one knows this better than Kennelly, who was hit by a falling I-beam during a move 12 years ago. Lucky to be alive, he walks with amazing spryness for one who is paralyzed below both knees. As to the possibility of his retirement, he hasn't given it a thought. "Every job is different," he says, "and it's a good feeling to save an old house—give it new life in a new location." □



The house moves slowly down the road, above right, with its steel framework resting on dollies and hooked up to a powerful truck. Tree-trimming work is greatest along narrow streets like this one. Right, the new owners watch as the main section joins the rest of the house at its new location. Dollies in the foreground were used to transport the roof.