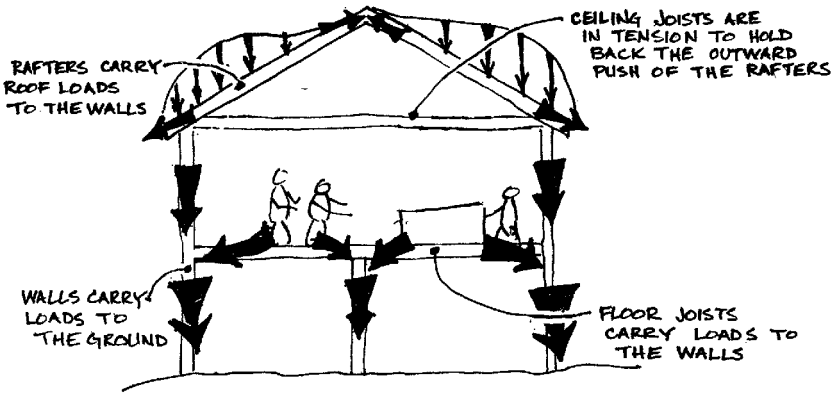

drawing by Harris Hyman

Delicate Demolition

The fine art of removing just the right stuff

by Harris Hyman

The first step in renovation often is demolition—smashing the old stuff and getting it out of the way for new construction. Swing that sledge! Bang! Smash! Wreck! It looks like an ideal task for working off a lifetime of insults, frustrations and hostilities. If you truly begin to think this way, however, you are in for lots and lots of headaches.

Small-scale demolition (such as for a room or building interior) must be a thoughtful activity. The wrecker must ask (and answer) three important questions that deserve careful contemplation:

- How little can I destroy to accomplish my project?
- How can I be sure that the building won't fall down?
- How am I going to clean up the mess?

It all begins with a pause and a look at the building. Later on, you can pick up the sledge.

Controlling the Damage

The first question really is the hardest to answer. It controls the job. Too much demolition requires extra rebuilding and can lead to structural problems; too little leaves obstacles in the way. Excess demolition also causes the project to enlarge. Additional demolished space must be rebuilt immediately as part of the project, or it remains as an eyesore.

And, even though an expanded project often can be more profitable, it also can exceed the owner's budget and time schedule. When this happens...well, we've all been down this road once or twice. Some of us even do it as a normal business practice. Personally, overruns fill me with anxiety.

Taking out just what you need can be called "surgical demolition." This probably is not the place to compare the skills of surgeons and finish carpenters, but neither practitioner with any judgment starts without first taking a good look at the project.

A solid answer to the first question saves time, effort, materials and problems. Casual demolition of everything in sight may clean things up and clear the space for new work, but demolition that is not done can be very effective as well. It often is possible to keep the existing wall finishes, moldings, electric wiring, windows and trim. And it also is possible to save adjoining rooms that may not need renovation.

Structural Concerns

The second question is straightforward, but it often is time-consuming to answer. The wrecker needs to get a good working picture of the structural design of the building.

Structural design is more than just picking out the right size for a beam: it is an exercise in systems. Each load on the building is supported directly by beams, columns or walls, and this load is carried down to the ground by a series of other beams, columns and walls.

Look at the roof, for example. The roof rafters carry the snow load, but these rafters must be supported by walls or girders and restrained from collapsing. The walls or girders that support the rafters must, in turn, be supported from racking or bending as they transfer the load to the ground.

Loads on any building take a path, eventually ending at the earth. Each structural element in this path must be strong enough to carry the load and the structure it supports. The structural engineer is interested in both the strength of the individual parts and in the "flow" of the load from one member to the next.

The prudent demolisher, then, takes a careful look at the building to get an idea of the structural system and the loading flow. When major load-bearing components are taken out, the building must be held together until the components are replaced or the system can be revised to carry the load to the ground. At some point, the builder must know *exactly* what is going on with the building.

Look at the Plans

The most common, and probably the most useful, way to learn about the structural system is to look at a set of plans. The problem is that plans don't exist for most houses (or for most public buildings, for that matter). In these cases, a set of measured drawings should be prepared. This may appear to be an unnecessary expense, but once the plans exist, they become useful in a variety of ways—primarily for planning and estimating the project. The structural analysis made possible by the drawings often is just an additional benefit.

The use of overlays helps to evaluate the structure. This requires that the floor plans are printed on transparent sheets, which then can be placed directly over one another. This enables the builder to see which walls are lined up with other walls, where columns are likely to be, etc., and to make some educated guesses about the joisting. An overall understanding begins to develop at this point.

A personal experience helps to illustrate this point. I've been drawing since I was about 10 years old, so I instinctively prepare plans for almost every project. I thought this was just my own working style until one job completely convinced me of the value of using graphics. The project was the conversion of a large, cut-granite mansion into an office building and living quarters. Additional doors were required for fire safety, and I wanted to cut one through a stone wall.

After staring at overlaid floor plans for a couple of days, I noticed a large, round, stone tower floating with no apparent support. The old masons were pretty good, but they rarely defied gravity; the tower probably was held up by some steel beams. A little exploration with a hammer and chisel showed a web of steel beams tied together directly above the lintel for my proposed door. Had I just kicked a hole in the wall without really looking, the tower would have fallen. Eventually some falsework was placed to hold up the steel and a reinforced-concrete lintel, and doorposts were placed in the wall. The new door is in, and the tower still floats with no apparent support.

I must admit to some luck in guessing at the actual structural design without making a serious error. After this experience, however, I've always worked over the plans long enough to be reasonably certain of the structural system. It's easy to just "see" it in a simple building, but in a complex building the structure may not be obvious. So my advice is to pile up the overlays. (By the way, most of New England is within an hour's drive of a 24-inch Xerox machine that can make vellum transparencies from paper plans.)

When the surrounding structure is removed, there might be a sag. My own limits for sag are half an inch within 10 minutes of demolition and one inch within 24 hours. If these limits are exceeded, it's likely that important structure has been removed and will have to be replaced.

Preventing Failure

On the actual job, there are two useful practices that help to prevent structural failure. The first is to saw through all vertical members rather than knocking them out with a sledge or crowbar. If there is a load on a particular member, the saw will bind. This is especially true when working with a hand saw; a reciprocating saw sometimes has enough power to overcome the load, and it will go unnoticed. When the saw binds, what do you do? Stop and check things: the load is coming from *somewhere.*

The second is to measure the heights of ceilings and the headers of openings prior to demolition. Mark the heights on the floor or wall with a crayon. When the surrounding structure is removed, there might be a sag. My own limits for sag are half an inch within 10 minutes of demolition and one inch within 24 hours. If these limits are exceeded, it's likely that important structure has been removed and will have to be replaced. I like to have falsework with a one-inch clearance set up before knocking out the columns or the walls.

A note on safety is worth mentioning here. Working alone at demolition is foolish and dangerous. Even if you don't knock out a post that causes the ceiling to fall, you can pull something loose onto yourself, step on a nail or get hurt in a startling variety of ways. Just look at the statistics for worker's compensation.

A partner can watch as you remove critical pieces and warn you if things start getting a little out of hand. A second person also can help carry big pieces through finished spaces without banging up the furniture and the trim.

The third question relates to cleaning up the. work. Demolition is messy. It creates dust, dirt, stuff to be swept up, and pieces to carry out. It is full of nails and jagged ends of BX cable. The debris must be removed from the immediate area of renovation—and usually from the property. Plaster dust penetrates areas of the building that may still be in use. A rainstorm can make a real mess of heaps of plaster that are outside.

Plan to keep the job clean. Estimate the expected amount of debris, and make the necessary allowance. A moderate heap can be removed when the demolition is done. A lot of stuff may call for a daily stop at 2 p.m. to clean up the day's work. Maybe there even should be an extra helper to start moving the debris as soon as it is torn apart.

The mess also is unsafe. When I first started working, the use of safety glasses, respirators, hard hats and leather gloves was considered both excessively cumbersome and downright sissy. Fortunately, they now are a normal part of the construction scene, and all workers with a reasonable regard for their own bodies wear them. The gloves and safety glasses are pretty obvious protection against immediate hazards, but the gypsum and silicates in plaster and wallboard can give the lungs a long-term beating. Old ways do die hard, though; I still wear a hard hat only around steelwork and structural concrete.

Asbestos is a *serious* safety mess. When asbestos comes up on site, call for help. Direct safety aspects aside, your insurer and the state health departments may have something to say about it if you don't.

Asbestos is a *serious* safety mess. In the 1930s and '40s, asbestos was regarded as one of the greatest technological solutions to our problems. It was fireproof, long-lasting and resistant to heat. At some high cost, we subsequently learned that the stuff was quite hazardous. It now joins arsenic and lead compounds in the "great stuff we used to use when we didn't know any better" category. When asbestos comes up on site, call for help. Direct safety aspects aside, your insurer and the state health departments may have something to say about it if you don't.

Demolition. Hardly work for the crude, is it? ■

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