

Remodeling Basements

by Paul Eldrenkamp



PETER RINTYE

Check for moisture problems, utility bottlenecks, and code requirements before breaking out the tools

Turning a basement into pleasant, useful living space is always a challenge. My first task, whenever I go to meet a customer who has called about remodeling a basement, is to listen carefully to get a feel for the customer's vision of the finished basement. Next, I take time to evaluate the existing conditions, looking for items that may affect the cost or feasibility of the project.

Detective Work

With very few exceptions, most obstacles can be overcome, but at a cost. My goal during the initial visit is to identify any problem spots, assess their impact on the project, and find out whether my initial cost figures match the customer's budget. Here's what I look for on the first site visit.

Excessive moisture. My first concern is, Can I make this basement dry? At best, the basements in my area have high humidity levels; at worst, there is actually standing water. I carefully assess the level of moisture and figure out the strategies I'll use to mitigate it. I look for mildew or water stains at the base of partitions, dampness or mildew



Always direct roof runoff away from the foundation. The author prefers to run downspouts into a dedicated PVC drain to daylight.

Existing mechanicals. I take a few minutes to size up any furnaces, hot-water heaters, and electrical panels. I ask the customer if they're comfortable on the coldest days, if they ever run out of hot water, or if they notice a drop in water pressure. If they're having any problems before I start, I try to determine how my work will affect existing utilities, if at all. Since we often use electric resistance heat when remodeling a basement, I also check the electrical panel to see if it can handle the extra circuits and load.

Mitigating Moisture

I've dealt with many wet basements, and my experience has been that roof runoff is responsible for most moisture problems. Clogged gutters, disconnected downspouts and leaders, and improper grading all contribute to the roof runoff being directed to the basement area. Two inches of rain falling on a 2,000-square-foot house can produce more than 2,600 gallons of runoff water. We repair any damaged or missing portions of the guttering system so that it's easy to monitor and maintain.

Basement leaks can also be caused by malfunctioning (or nonexistent) footing drains. Whatever the cause, a chronic water problem has to be fixed before proceeding with a basement remodel. You may have to wait a few months (or seasons) to make sure you've really solved the moisture problem.

If there is reason to believe that the surrounding seasonal water table is higher than the proposed finished basement floor, you may want to abandon the project. If you will be held responsible for any future moisture problems, the risk is probably not worth the reward.

under floor coverings, signs of rot where the stairs rest on the floor, or lally columns with rusty bases. Any efflorescence on the masonry walls is a sure sign of past and possibly current moisture problems.

On the exterior, I look for disconnected downspouts and grading that directs water towards rather than away from the house.

If the signs of moisture are severe enough, I'll explain to my customer the potential costs and uncertainties of attempting to eliminate the problem.

Obstructions. There are generally two ways of dealing with obstructions: Move them or mask them. In some cases, the building code will dictate the choice (see "Bringing the Basement Up to Code," page 41), but typically the customer's aesthetic preferences and pocketbook will govern the decision.

Pipes and ductwork tend to be the most common obstructions. Domestic supply lines and hot-water heating lines can almost always be rerouted, but drain lines and steam lines often present more expensive, and sometimes impossible, challenges. Threaded pipe is almost always a problem, and for estimating purposes, I plan on replacing the entire run of any threaded pipe we will disturb.

Ductwork that cannot be boxed out and covered must be moved, so I try to find an alternate path and calculate the associated moving costs. Because rerouting ductwork can affect system performance, be careful about making promises to a customer before checking in with your sub.

Finally, if any beams or posts are candidates for relocation, I consider the load paths and try to predict how involved the relocation process will be.

A lot of obstructions may break the budget, so I explain to the customer the cost of relocating the items and discuss alternative methods of dealing with the problems. A recent customer opted to paint the existing steam-heating pipes rather than pay to have the heating system upgraded.



Relocating drain lines under the basement slab can free up room overhead.

Bringing the Basement Up to Code

Like any living space, finished basements are subject to code requirements. Here are some of the regs in my area of Massachusetts that apply to basement remodels. Requirements vary depending on your location, so be sure to familiarize yourself with your local code before you finalize your estimate.

Minimum ceiling height. For recreation rooms, the minimum height is 7 feet. Bedrooms and offices

insulation value must be at least R-10. Foundation walls containing a heated or mechanically cooled space must be insulated to a value of at least R-12.5. Some codes may require higher levels of insulation when electrical resistance heat is used.

Windows. The total window area for a habitable room should be at least 8% of the floor area. If the habitable room happens to be a bedroom, then half the required

Stairs. Raising the finished floor height could reduce the height of the first riser on a set of stairs. Since most codes permit little variance in riser heights, you should check with your inspector before changing floor heights.

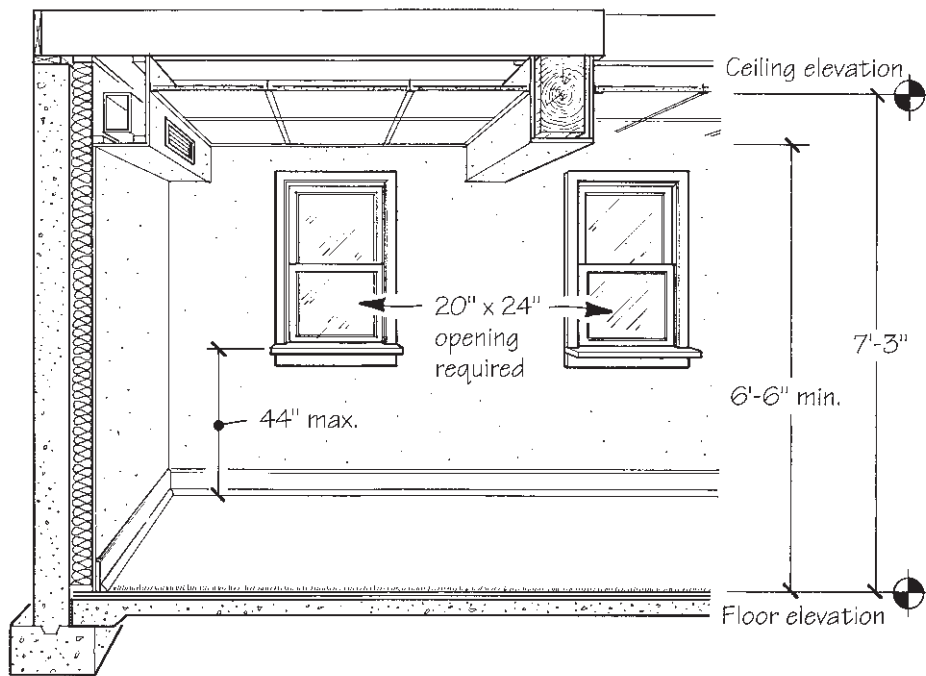
Adjoining garages. When a garage is located in the basement area, a 20-minute fire-rated door must be used to separate the finished portion of the basement from the garage area, and the finished portion's floor must be at least 4 inches higher than the garage floor. Any area considered a "sleeping room" cannot share a wall with the garage.

Consider a variance. Many contractors think that applying for a code variance is an exercise in futility, but I've found just the opposite to be true. The good news is that there's a good chance your variance will be granted. The bad news is that it will take time. My experience has been that obtaining a variance will add two to three months to the permitting process, so if you're considering applying, be sure to allow enough time.

It also pays to get the inspector involved before submitting the request. Find out what items will not meet code, and make sure to include them all in a single

application. I've observed that reapplying for additional variances increases the chances of being shot down. It's important to note that a variance, to be approved, can't involve issues of clear personal safety. A ceiling height or window size variance might qualify, but seriously nonconforming steps probably wouldn't. —P.E.

Basement Bedroom Minimums



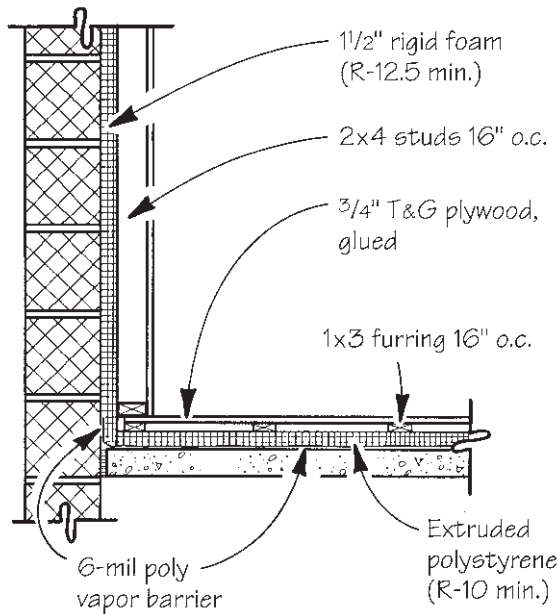
Under the author's local code, a basement bedroom must have a ceiling height of at least 7 feet 3 inches, although beams and soffits spaced more than 4 feet apart can be another 9 inches lower. There must also be a code-approved egress window: an operable window with a clear opening at least 20x24 inches with a sill no higher than 44 inches.

require 7 feet 3 inches, so label your plan carefully. Beams spaced more than 4 feet apart can drop down as much as 9 inches, provided they extend no lower than 6 feet 6 inches above the finished floor. Be sure to allow for the floor system thickness when calculating clearances.

Insulation. For a slab-on-grade beneath a "conditioned space," the

glazing must be operable and an opening of at least 20x24 inches must be provided with a sill height no higher than 44 inches above the finished floor. This maximum sill height should be kept in mind when adding bedrooms to deeply set basements: A large well may be required to accommodate a window that meets code.

Retrofit Insulation



This floating floor system provides a dry base for the finish floor. Two-by-four walls over 1 1/2-inch rigid foam provide space for plumbing and wiring.

Head-Banger Beams

A common obstruction we encounter is the basement girder that supports the first-floor joists. Boxing the girder is the easiest solution, but when the headroom clearance is too low, we consider recessing the girder into the floor-joist system and creating a flush beam. This may sound like a lot of work, but two good carpenters can recess a 12-foot beam in a short day. We support the joists on both sides of the beam, remove the beam and carefully cut the joists, then tuck the beam back into the resulting opening, using joist hangers to reattach the floor joists.

If there are bearing walls located directly above the beam, or any other unusual loading conditions, be sure to check with an engineer before you break out the crowbars and reciprocating saws.

Mechanical Work

Makeup air for a furnace is seldom an issue in an unfinished older basement. But when a furnace is walled off from the finished portion of the basement, provisions for adequate makeup air are essential, as well as code-required. One option is to use a louvered door in the furnace room, but this does nothing to mask the sound. We use an In-Forcer intake fan (Tjernlund Products, 1601 Ninth St., White Bear Lake, MN 55110; 800/255-4208) that is ducted to the outside and wired to provide combustion air when the furnace is firing. The unit mounts in a joist bay and draws air through a PVC duct. This enables us to effectively seal off the furnace noise from the finished portion of the basement.

Drain lines. It's a rare basement remodel that doesn't involve moving drain lines. We often reroute the interfering lines and conceal them in the walls, being careful not to block access to existing cleanouts. When the house sewer exit is below the basement floor level, we'll often drop a drain line under the slab. This may seem like a costly approach, but most of the work can be done by an unskilled laborer, including patching the concrete (it will be hidden under the finish floor). We provide access panels to any underslab cleanouts, keeping them flush with the finish floor, and seal out moisture and soil gases with weatherstripping.

Occasionally we discover a trap for a kitchen or bathroom sink in the floor-joist bays, and we're careful to provide access panels to these spots as well.

Electrical. Electrical work is seldom a problem. Whenever possible, we feed electrical devices from new circuits that originate at the service panel.

Floating Subfloor System

We've had excellent results using a floating subfloor system that controls moisture, insulates, and provides a substrate for many types of finished flooring (see illustration, at left). We start by covering the existing slab with 6-mil polyethylene (turning up the edges 6 inches at the walls), followed by a layer of 1-inch extruded foam insulation. Using construction adhesive, we glue 1x3 furring to the foam at 16-inch centers, then glue and screw 3/4-inch T&G plywood to the furring strips, running a generous bead of adhesive in the T&G joint. This method avoids the costly and time-consuming mechanical fasteners that would otherwise be needed if the flooring system were attached to the concrete floor. To allow for expansion, the floor system is held back 1/2 inch from the foundation walls.

The plywood is a suitable substrate for just about any finished flooring material, including ceramic tile.

Retrofit Wall System

We apply 1 1/2-inch rigid foam to the basement walls using construction adhesive, and foil-tape all the joints. With the foam in place, we frame 2x4 walls. The 2x4s provide ample room for wiring and piping, and they're easier to install than furring that is fastened through the foam into the foundation wall. When we're faced with a stone foundation, we spray the walls with Icynene foam insulation (Icynene, 376 Watline Ave., Missauga, ON L4Z 1X2, Canada; 800/758-7325). It adheres to the irregular wall surface and provides the code-required R-value.

More often than not, a basement can be remodeled into a comfortable living space at a reasonable cost. The projects we've completed have averaged between \$25 and \$50 per square foot, and have proved to be a profitable market niche for our company. ■

Paul Eldrenkamp owns and operates Byggmeister, Inc., a residential remodeling company in Newton, Mass.