Basement Remodeling

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ONCE AGAIN, The Word invites you to travel into the dark realm of subjects that sometimes are misunderstood by home inspectors. The Word hopes you will find this trip informative and maybe a little entertaining.

This month, we continue our remodeling series with **basement remodeling**. The Word finds this subject interesting because remodeling provides so many of the creative deficiencies that we find during our inspections, and because basement remodeling is a great way to add value to a home.

Remember, when reading all The Word columns, that we're discussing general principles. Something you see in the field isn't always wrong just because it doesn't comply with a general principle. Local building codes and their interpretations, manufacturer's instructions and engineered designs trump general principles.

New standards, old homes – a brief review

Previously, we discussed some general guidelines about when it may be appropriate to apply new standards to old homes. Let's review. One usually does not need to upgrade existing work to current standards if the existing work is legal and safe. Legal work complied with standards and manufacturer's instructions, if any, when the work was done. New work and addition to, extension of, replacement of and major repair of existing work should comply with standards and manufacturer's instructions in effect when the work was performed.

Habitable rooms

Most people remodel basements to create habitable rooms. Habitable rooms are where living, sleeping, eating and cooking occur. Bathrooms, laundry rooms, utility rooms, storage rooms and hallways are not habitable rooms. Habitable rooms, located in basements or anywhere else, require a minimum amount of light, ventilation, heat and ceiling height to make them, well, habitable. Anything less than these minimums is a health and safety issue and a reportable deficiency. We'll get to ceiling height in a moment. Let's discuss the other requirements first.

Light may be provided to a habitable room either by glazing equal to 8% of the floor area or by artificial light. Note that all habitable rooms must have a switch-controlled light regardless of whether the room has glazing. Kitchens should have a light fixture. Other habitable rooms may have a light fixture or a switched receptacle.

Basements should have at least one switch-controlled light regardless of whether or not the basement is habitable. There also should be a light near furnaces/air handlers and electrical panels located in a basement to help people safely work on these components. The light switch should be located near the entrance to the room.

Ventilation provides habitable rooms with air from outside the home. Habitable rooms need ventilation to dilute stuff in the air that could make people sick. Examples of such stuff include volatile organic compounds (off-gassing from building materials like paint and carpet) and the carbon dioxide that we all exhale. Ventilation also may provide combustion air in homes that contain fuel-burning appliances (including fireplaces). Ventilation could be the subject of an entire The Word. For now, let's keep it simple.

The traditional means of providing ventilation is the operable window with an opening at least 4% of the room's area. The traditional alternative is "mechanical ventilation." Most older homes, and even some newer ones, have enough air leaks to allow a forced-air heating system to circulate the leaked air and thus provide adequate ventilation. A forced-air heating system in a leaky home usually satisfies the ventilation requirement.

Another means of providing ventilation is necessary if the home has been built, or has been air-sealed, to the point that leaks don't provide enough outside air. A duct running from an HVAC return boot to the outdoors is a common method in some areas. A whole-house mechanical ventilation system (a heat recovery or energy recovery system) is another method.

Here's a ventilation tip. Watch for evidence of air-sealing (also called weatherization) in older homes, especially in homes that contain fuel-burning equipment. Air-sealing done too well can create air quality problems. A blower door test may be advisable for air-sealed homes that don't have a means to provide outside air.

Cooling isn't required to make a room habitable. Good luck selling that idea in many parts of the country. You may want to point

out the lack of cooling if cooling is expected in your area.

Habitable room ceiling height

It doesn't matter if a habitable room is located in a basement or above grade; the minimum ceiling height is 84 inches (7 feet). Height is measured from the finished floor to the lowest projection from the finished ceiling, ignoring components such as light fixtures and ceiling fans. Hallways, bathrooms and laundry rooms are included along with habitable rooms when determining minimum ceiling height. There are exceptions for rooms with sloped ceilings and for bathrooms, and we've covered these in a previous column.

Basement ceiling height

The Word doesn't worry about ceiling height in unfinished basements in older homes. It is what it is. If the ceiling is too low to allow the basement to be finished, he'll mention that in his report, but that's it for unfinished basement ceiling height in older homes.

In newer homes, the minimum ceiling height is 80 inches in basements without habitable rooms. This minimum is reduced to 76 inches under beams, ducts and similar obstructions.

Escape and rescue openings

Most basements in new homes need at least one escape and rescue opening. Basements less than 200 square feet and used only for storage or for mechanical equipment are exempt from the escape and rescue opening requirement. Note that the reason for this requirement is not only to allow people to escape, but also to allow rescue personnel with protective equipment to enter.

Most basements in older homes do not comply with the recent escape and rescue opening requirements, and The Word doesn't worry about it, with two exceptions. A basement with a habitable room and without an escape and rescue opening gets a warning in the report about the possible (but unlikely) fire safety issue. A basement with a bedroom without an escape and rescue opening gets a deficiency call in the report. A bedroom without an escape and rescue opening may reasonably be considered unsafe wherever it's located. The recommendation in this situation is simply not to use the room as a bedroom; problem solved.

When you're looking at a room, you might wonder if it's a bedroom for purposes of the escape and rescue opening requirements. There is no generally accepted definition of what constitutes a bedroom (or sleeping room). Ask a real estate agent and she'll probably say a room with a closet and a door. That's an American-centric definition. In many parts of the world, clothing is stored in furniture, so a closet isn't necessary to make a room a bedroom. You may want to define a room that could be used as a bedroom as a bedroom for purposes of escape and rescue opening requirements and make your recommendation accordingly.

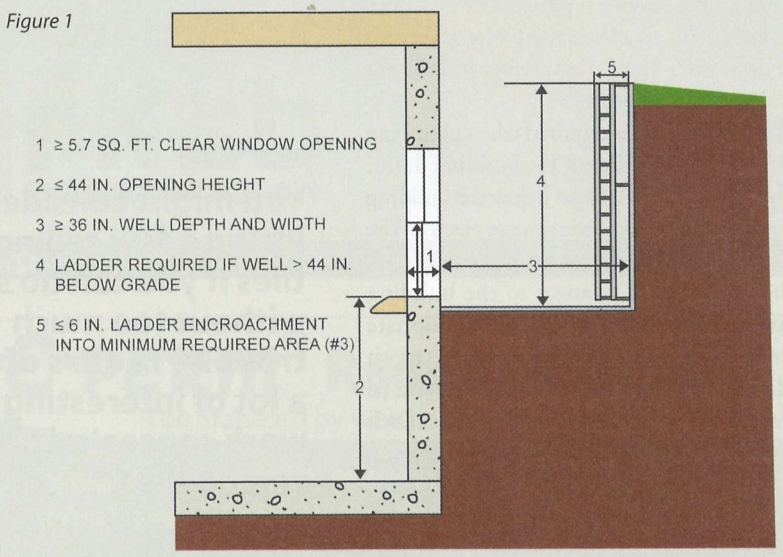
A basement escape and rescue opening should have a clear opening area of at least 5.7 square feet. If the opening is at grade level (as might occur in a walk-out basement), then the clear opening area should be at least 5.0 square feet. Grade level means the bottom of the opening is not more than 44 inches above or below exterior finished grade. The minimum opening width is 20 inches and the minimum opening height is 24 inches. Clearly, one or both of these dimensions must be larger than the minimum to achieve the minimum clear opening area.

Clear opening dimensions usually are not an issue for most hung windows and most doors. Openings such as casement windows may present a problem if the sash obstructs the opening when the sash is open. So, don't just look at the frame when evaluating the clear opening dimensions; look at the sash or door as well.

People should be able to get through the escape and rescue opening without needing a ladder or similar device on the inside of the building. From the finished floor to where the clear opening begins should be not more than 44 inches.

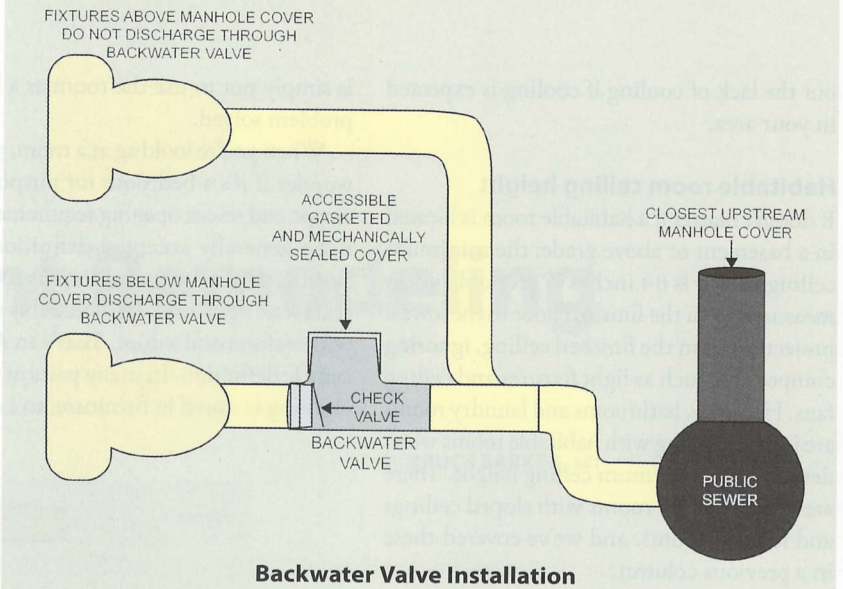
Many basement escape and rescue opening windows will need a window well. The well floor must have an area of at least 9 square feet and a minimum dimension of 3 feet. A securely attached ladder is required if finished grade is more than 44 inches above the well. The ladder rungs must be at least 12 inches wide with vertical spacing less than 18 inches, project at least 3 inches from the well wall and project not more than 6 inches into the minimum well dimensions. *See Figure 1.* Any security cover over the well must be operable from inside the well. Don't forget to check for a means to drain water that may enter the well. ▸▸

Figure 1



Window Well Side View

Figure 2



Backwater Valve Installation

Basement plumbing

Two components are common to many basements that have plumbing fixtures: the sewage ejector pump and the backwater valve.

A backwater valve is a one-way check valve that lets water flow toward the sewer, but doesn't let gross stuff from a clogged sewer into the home. A backwater valve is required when a plumbing fixture flood-rim level is below the level of the nearest upstream sewer manhole cover. While backwater valves are most common in basements, one could be needed if any floor of the home is below street level. Figure 2 shows a typical backwater valve installation. It's easy to miss calling the absence of a backwater valve. Remember to look for one when one is needed.

A sewage ejector is required when plumbing fixtures are located below the building drain. Only those fixtures located below the building drain should flow into the sewage ejector. The discharge pipe for most sewage ejectors is 2 inches and should connect to the building drain (or branch drain) with an appropriate drainage fitting like a wye or a tee-wye. As with all drainage fittings, the connection should be above the center line of the building or branch drain so stuff doesn't backflow into the fitting and clog the system.

Inspecting a sewage ejector begins with making sure that the sump pit has a cover that is water-tight and gas-tight. There should be a check valve and a full-open valve on the sewage ejector discharge pipe to prevent backflow into the ejector and to allow for service and replacement of the ejector. See Photo 1 (but note that the gate valve should be above the check valve to allow easier replacement of the check valve). The sewage ejector should have either a 1 ½-inch or a 2-inch vent, depending on the ejector's pump capacity. The Word likes to run water in fixtures that drain into the ejector to make sure that the pump activates.

Suspended ceilings

Suspended ceilings are a favorite way to finish a basement ceiling. The area above a suspended ceiling is concealed space according to most Standards of Practice, so lifting ceiling tiles isn't required. Lifting a few ceiling tiles is one inspection technique where Mike Holmes may have a good point. You might consider lifting a few ceiling tiles if you can do so without too much trouble. There's often a lot of interesting work concealed above ceiling tiles.

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Basement moisture issues

Basement and moisture are so closely related that they are almost synonyms. Finished basements are scary because it's so easy to get the moisture-related details wrong and because you can't usually see any of these details. The only really effective way to prevent basement moisture problems is on the outside, so we'll deal with that briefly.

Almost all basements should have a properly installed and functioning foundation drain, and especially finished basements. Many basements, especially in older homes, don't have a foundation drain and you should warn your client about this absence. You also might warn your clients that foundation drains frequently are improperly installed, not functioning properly, or both.

Basement walls should either be waterproofed or dampproofed on the outside wall below grade. Waterproofing is better at retarding both liquid water and water vapor and, if done properly, should last for the life of the home. It is more expensive, so it is much less common. Dampproofing is okay at retarding water vapor

Photo 1: Sewage ejector with gate valve, check valve and a vent.

and a little liquid water. Dampproofing is far more common. Unfortunately, dampproofing may break down over time (30-40 years) and lose its effectiveness.

Grading, drainage and gutters always are important around basements and especially around finished basements. It's important to check for these and make sure they are better than the required minimums if the basement is finished.

HVAC undersized?

It's reasonable to believe that the HVAC system wasn't sized to accommodate a finished basement. An improperly sized system could cause comfort and functional problems in the basement and in the stories above. Determining HVAC system size is way out of scope, but most experienced inspectors have a good feel for what works in their area. You do a great service for your client by pointing out a possible HVAC capacity problem and recommending a Manual J and Manual S analysis by a qualified contractor.

The bottom line

Basements are inexpensive square footage, so finishing them is a great way to increase the value of a home, if done well. Basement finishing often is done poorly, creating problems for clients and liability for us. Be sure to take extra time and care when inspecting finished basements.

Memo to the gods of remodeling: The Word does not reside on Mt. Olympus (just at its base) and welcomes other viewpoints. Send your lightning bolts or emails to Bruce@DreamHomeConsultants.com. The thoughts contained herein are those of The Word. They are not ASHI standards or policies. ■

Bruce Barker operates Dream Home Consultants. He has been building and inspecting homes since 1987. He is the author of "Everybody's Building Code" and currently serves as chair of the ASHI Standards Committee. Bruce will be presenting a session called "Code Quiz" at InspectionWorld Las Vegas, in which the audience will be encouraged to actively participate and have some fun. To read more of Barker's articles, go to ***www.dreamhomeconsultants.com****.*