

Finding a Common Ground on Square Footage


"In this increasingly litigious society, appraisers are finding themselves in the crosshairs of disgruntled clients and property owners. One of the major reasons appraisers find themselves in court is square footage calculation," says Scott Austin, author of "Measuring Up: Understanding ANSI Standards" published in *WorkingRE* magazine. If the methodology of calculating the square footage of a home is incorrect, it is likely that an appraisal might misrepresent the property and not parallel the buyer's expectations. For example, one party may suggest that a portion of the house is livable, or included in the square footage of the home, whereas another party may have a different idea. There is a modified American National Standards Institute (ANSI) Z765-2003 that improves this standard measurement and calculation process. It puts everyone on the same page as to the square footage of the home and defines a common language that can be used to describe the process.

The standard describes procedures to be followed in measuring and calculating the square footage of detached and attached single-family dwellings, including townhouses, row houses, and other side-by-side houses in the United States. Originally created in 1996 and updated in 2003, this is the only recognized nationwide standard in existence. It brings common sense to the

process of calculating square footage and in so doing lends credibility to those willing to voluntarily adhere to its careful guidelines.

The standard allows individuals and organizations that use different terminologies based on different points of view to communicate, cooperate, and calculate quantities on a common basis. This standard promotes these goals in the hope that square footage calculation can become an item of agreement rather than a point of contention between groups with different interpretations of square footage.

ANSI Z765-2003 should not be used as a means of measurement for commercial buildings or apartment multifamily buildings; there are other recognized standards that should be employed when appraising these types of properties. The square footage standard is offered for voluntary application. It must be applied as a whole, and is not meant to replace or supersede any legal or otherwise required existing area measurement method.

To purchase the square footage standard, visit www.nahbrc.org/bookstore for an electronic download, or contact the NAHB Research Center at (800) 638-8556 to order a print copy. For more information on the ANSI Z765-2003 modifications, contact Tom Kenney at tkenney@nahbrc.org. 

Field Evaluations (continued from page 1)


reducing the amount of ductwork to one simple trunk line.



Horizontal trench for geothermal loop to heat exchange with the ground

Although the study did not differentiate the home's energy savings from the GHP alone, its numerous energy-efficient technologies and methods resulted in a 93 percent savings on heating costs over the home before the retrofit. For this project, the 2-ton GHP cost only \$3,200 more (including labor, equipment, and ductwork ground piping) than the cost estimate for using a single 3-ton 10 SEER system and 80 AFUE propane furnace. The increase is minimal when considering that GHPs are estimated to save 30 to 70 percent on heating costs.

The cottage on the evaluation site is currently a zero energy home, producing as much energy as it uses. The home is a "residential power plant," said Asdal, explaining that it is currently producing excess energy and selling it back to the grid. "The key is to model and design an integrated system," said Asdal, who added that the GHP "is a very energy efficient system, especially when combined with techniques that reduce consumption."

New results from field evaluations are regularly published on the ToolBase website (www.toolbase.org/fieldval). 

Military Housing Privatization Offers Opportunities for Home Builders


During the mid-1990s, the Department of Defense (DoD) began issuing contracts to private firms for management and maintenance of approximately 200,000 "below standard" housing quarters. According to the Armed Forces Information Service, Congress granted DoD privatization authority so that it could leverage private sector capital to help address domestic military housing problems.

The DoD plans to use private companies to fix 95 percent of its inadequate housing by 2007. Successful early privatization efforts at Fort Carson, Colo., and Lackland Air Force Base, Texas, helped DoD managers realize that this was a method for addressing housing problems quickly and effectively.

In a July 2004 interview with the American Forces Press Service, Joseph K. Sikes, DoD director of housing and competitive sourcing, said, "After 2007, more and more bases will determine it is easier not to take care of the houses yourself ... It's better to have a private developer maintaining it and operating it, and so

I think we'll see even more projects become privatized." He reported that so far 32 projects have been awarded and \$581 million invested in the program.

The NAHB Research Center's military housing division has provided years of support and planning assistance to the U.S. Army and Navy's housing privatization efforts. It specializes in studies comparing military housing programs to those of the private sector and bringing the best of the private sector practices to the services. It has developed both a process for estimating construction costs for all new military housing using a DoD-approved cost model, and the Whole Neighborhood Revitalization program for the Air Force and Army that has become the driving force for reinvestment of several billions of dollars in older military houses.

For information on military housing privatization contracts and other related opportunities, contact Robert Harris, director of military housing at the NAHB Research Center, at rharris@nahbrc.org. 



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Real-World Data on Innovative Heating Technologies

Innovative heating methods can offer numerous advantages over traditional systems—they can be more efficient, reduce energy bills, improve homeowner comfort, aid design, and promote environmental friendliness. Some recent field evaluations conducted by the NAHB Research Center, the Partnership for Advancing Technology in Housing (PATH), and the U.S. Department of Energy (DOE) through the National Renewable Energy Laboratory (NREL) provide real-life data to help builders understand these emerging technologies and how they can benefit most from them.

From the Floor Up

Researchers are gaining insight into how radiant floor systems, a mature PATH technology, compare with more traditional heating methods. Radiant systems provide heating by running hot water through tubes beneath the floor's surface. Heat radiates up, warming objects near the floor, rather than rising to the ceiling, as with heat from forced air systems.

Radiant floor heating systems can be installed above the sub floor and below the finished floor, by using cross-linked polyethylene tubing (PEX) inserted in grooves of wood panels installed beneath the finished floor, or tubing encased in a concrete fill. Radiant systems can also be installed under the sub floor by attaching PEX tubing to, or suspending it from, the sub floor. This system usually costs less to install, and is ideal for retrofits.

Radiant systems offer numerous benefits, including eliminating dust, draft, and noise problems associated with forced-air systems and improving aesthetics by eliminating heat registers or radiators that obstruct interior designs. In field evaluations, homeowners noticed improved comfort with radiant heating.

To assess the effectiveness of radiant flooring systems, the Research Center and PATH developed two side-by-side evaluations that compare the innovative systems with more traditional forced-air systems.

The first project, a Habitat for Humanity home in Schenectady, N.Y., alternated radiant flooring and forced-air heating in two-week operation periods, while the second project, a 2,642-square foot home in Hailey, Id., alternated heating systems every three weeks.

The evaluations evaluated gas and electric energy consumption, environmental conditions and homeowner comfort. Results from both field evaluations will be published on the ToolBase website as they become available.

From the Ground Up

In Lebanon, N.J., field evaluations conducted as part of the 2003/2004 Systems Engineering for Energy Retrofits (SEER) project investigated the use of numerous technologies that can be combined to reduce heating costs. The SEER initiative, funded by DOE through the NREL, aims to provide research and case studies to remodelers and consumers about opportunities to increase home energy performance.

For the project, which included a 4,000-square foot Victorian home that will be used as a bed and breakfast and a 1,500-square foot cottage, a geothermal or ground-source heat pump (GHP) was chosen as the principle heating device because of its low annual operational costs. GHPs use the natural heat and storage capacity of the earth or ground

water to provide energy-efficient heating, as well as cooling.

The site's large lot allowed for a cost-effective horizontal closed loop GHP configuration. Horizontal loops are generally less expensive than the alternative vertical well system. Closed loops circulate a water and antifreeze solution in a ground loop of pipe to extract heat from the earth, rather than drawing water from a well and returning it to a field or another well.

According to builder Bill Asdal, owner of Asdal Builders in Chester, N.J., the GHP system lent itself to the retrofit. Because GHPs do not produce exhaust gases that must be vented, the furnaces were placed centrally,

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Contractors install PEX tubing for a radiant flooring system prior to installing the finished floor

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ASK AN EXPERT

Radiant Floor Systems Q&A

Radiant floor systems have been around for many years and in the last few years have experienced resurgence due to new or improved technologies such as high efficiency boilers and cross-linked polyethylene (PEX) tubing. The following are Q&As meant to guide builders through the process of designing a radiant floor system.

Q. We are considering installing a radiant floor in the next home we build—where can I get design help?

A. Many areas have local engineers who specialize in HVAC design and who are also well versed in radiant floor design. Some boiler and pipe manufacturers have now recognized the need for design assistance with these systems and many provide training and software through their local dealers.

Q. Is the design process for these systems complicated? What resources are available for those involved with designing a radiant system?

A. This design process is no more complicated than any other HVAC system. There are software products that have special add-ins to help design radiant floor systems. Elite and Wrightsoft are two major HVAC software companies with radiant design modules available. There are also guidelines offered by The Radiant Panel Association (RPA – www.radiant-panelassociation.org) available for under \$10. The RPA also has a national list of certified designers and installers.

Q. Are there any technical publications for background information on radiant floor systems?

A. The book *Modern Hydronic Heating for Residential and Light Commercial Buildings* by John Siegenthaler, P.E., offers a thorough background from design to final installation.

If you have other questions on these or other heating systems, contact the ToolBase Ask an Expert Service.

www.toolbase.org/ask

Withstanding Natural Disasters

As builders and homeowners begin rebuilding in the wake of recent hurricanes, the impact of, and need for, disaster-resistant construction materials and methods are evident.

In one example, three homes constructed with panelized roof and wall systems in the Port Charlotte, Fla., area survived Hurricane Charley virtually unscathed while surrounding homes suffered extensive damage. The impact-resistant homes, built by Home Front Inc., withstood over 110-mph wind gusts, leaving two of the homes completely intact and causing only minor damage to the third.

Panelized wall systems, which can be designed to resist earthquakes, high winds and debris impact, are one of many PATH technologies that offer innovative approaches to disaster mitigation.

Walls constructed of reinforced concrete, insulating concrete form (ICF), and concrete masonry unit (CMU) systems also performed well during the recent hurricanes.


Damage caused by Hurricane Andrew in 1992 prompted significant improvements in residential building codes. Both the Florida State Building Code and the International Residential Code improved requirements for roof-to-wall connections, window windborne debris resistance, foundation anchorages, and attachment of various roofing products. Homes constructed to these new code provisions were also more likely to withstand damage.

For manufactured homes, disaster-resistant pier systems are a cost-effective option that can reduce structural

movement and save lives and property. The systems, which feature stout members rigidly connecting its chassis to a slab, grade beam, or array of pads, are often called "earthquake resistant bracing" (ERB) systems, but many also resist high winds, frost heave, and floods. Permanent foundations that comply with building codes also provide excellent wind uplift resistance.

High wind- and impact-resistant asphalt shingles are designed to stay attached to sheathing and to resist breakage during severe weather, mitigating damage costs. Although materials cost about 50 percent more than conventional shingles, they are generally warranted to resist winds between 100 and 150 mph.

Impact-resistant windows contain laminated glass that prevents the penetration of the building envelope and consequential structural and water damage. When struck with flying debris, the glass cracks or shatters, but the laminate holds the window pane together, and glass fragments adhere to the plastic interlayer. Several impact-resistant windows have passed Southern Florida's "large missile impact" test, resisting a 2x4 stud fired at the window at 80 miles per hour. Additionally, several storm shutter systems and reinforced garage doors have been tested to resist windborne debris forces and successfully protected windows and garage doors in many Florida homes subjected to high winds from Hurricanes Charley and Frances.

More information on these disaster-mitigating technologies is available in the PATH Technology Inventory (www.toolbase.org/techinventory). 

Low-E vs. Standard Storm Windows

Research by the Lawrence Berkeley National Laboratory has demonstrated that low-e (low-emissivity) storm windows can provide thermal performance comparable to a brand new double-pane replacement window, at a fraction of the cost. With windows 15 to 20 years old, air flows more freely, creating hot and cold currents throughout the household. Low-e replacement storm windows allow more natural light into homes, while controlling radiated heat, providing maximum energy efficiency, and reducing heat loads in areas where cooling costs are high.

Low-e windows are common, and use either high solar heat gain or low solar heat gain coatings. Low-e coatings are usually applied to glass in double-pane assemblies to control thermal radiation, with the type and placement of the coatings varying according to the regional climate. However, low-e storm windows are new, and have not been field tested to date.

The NAHB Research Center is working with the U.S. Department of Housing and Urban Development (HUD), Arkema (formerly Atofina), and the Department of Energy (DOE) under the Partnership for Advancing Technology in Housing (PATH) program to identify homes that can use low-e storm windows.

The Research Center will identify about 50 homes (half with low-e storm windows and the remainder with new standard storm windows) that have a need for cost-effective storm windows. Research Center staff will install sensors and data loggers in four "ideal homes" (two with low-e and two with standard storm windows), and monitor and gather cost and energy information to better understand their performance.

For more information on the Low-E Storm Windows Research Plan, contact Shawn Martin, director of applied technology, at smartin@nahbrc.org, or visit www.toolbase.org. 



Rappahannock House Aims to be Example of Sustainability, Inside and Out

Rappahannock County, Va., is a community known for taking a modern approach to preserving its deliberately rural character. The county boasts numerous organizations dedicated to resisting sprawl and overdevelopment, and prides itself on being a model for sustainability of developing rural areas nationwide.

So it is not surprising that Rappahannock County is the future site for what may become "one of the greenest homes in the nation," according to designer John Spears, of Sustainable Design in Gaithersburg, Md.

The innovative home will be constructed with local natural resources and operated as a "zero energy home," producing as much energy as it uses. The owners have already begun creating compressed earth bricks for the walls by using a "Green Machine," manufactured by TerraBuilt Corporation, in Middleburg, Va. The bricks, which consist of a mixture of sand, clay, and concrete, have a tongue-in-groove design and will be dry stacked without mortar and covered with stucco. Other green materials will be used for roofing, insulation, kitchen cabinets, and counters.

To achieve the "zero energy" status, Spears has designed the home to use

numerous energy-efficient technologies, including an active solar water heating system that will provide hot water for both domestic uses and the radiant flooring system, a geothermal heat pump with fan coil for cooling (which can also be used to supplement radiant floor heating), an energy recovery ventilator, low-e windows, and efficient appliances.

Currently, the best options for the home's final design are under review. Once construction is completed, the house will be monitored by the Department of Energy and the NAHB Research Center for its efficiency. The Florida Solar Energy Center will be monitoring its solar technologies. Results will be published on ToolBase.org as they become available.

Filmmaker Michael Vaughn will document the entire process of the Rappahannock House from its development through construction and operation for an upcoming PBS documentary. The one-hour documentary will showcase the home's innovative technologies as well as the design philosophy behind the house. Vaughn is proposing to expand the film project into a series about building and rebuilding green.

"The series will explore the huge variety of new technologies which reduce energy dependence and pollution," said Vaughn. "The list is long and new ideas keep emerging."

To learn more about compressed earth bricks and the Green Machine, visit the TerraBuilt website (www.terrabuilt.com). More information on the home's other innovative technologies is available in the PATH Technology Inventory (www.toolbase.org/techinventory). **TB**

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QUALITY MATTERS

National Housing Quality Program Certifies First Two Home Builders

This summer, the NAHB Research Center's National Housing Quality (NHQ) Program certified the first two NHQ pilot Certified Builders—Grayson Homes of Ellicott City, Md., and KB Home Las Vegas. Participation in the NHQ Certified Builder program is designed to increase efficiency and consistency in building practices. The Certified Builder program provides a complete review of business practices, and ensures that all elements of the company's quality assurance system are incorporated to provide greater customer satisfaction. Certification candidates participate in field and office training to implement their quality program, work more efficiently with their trade contractors, and begin the continuous improvement efforts required by all NHQ Programs.

NAHB Research Center president Michael Luzier said, "I am excited about how the NHQ Certified Builder program is developing and am confident that its implementation on a national scale will bring about greater efficiencies for participating builders and even higher rates of customer satisfaction.

I'd like to thank the participants in this ongoing pilot program—they are industry leaders whose partnership continues to be a vital part of program development and the evolution of quality assurance in home building."



CERTIFIED BUILDER

Even before participating in the pilot Certified Builder program, Grayson Homes had a visible dedication to quality assurance and customer satisfaction. In 2002, Grayson's trade contractors began training with the NHQ Certified Trade Contractor program. Grayson also won the 2005 NHQ Gold Award. The NHQ Award is patterned after the Malcolm Baldrige National Quality Award and represents the highest recognition by the housing industry for quality achievement.

KB Home Las Vegas has been a pioneer in quality assurance in the home building industry. In November 2003, after the Las Vegas division successfully implemented the NHQ Certified Trade Contractor program, KB Home Chairman and Chief Executive Officer Bruce Karatz announced that the company would become the first large builder in the country to implement the NHQ Certified Trade Contractor program nationwide.

During the 2005 International Builders' Show in Orlando, the NAHB Research Center will officially launch the national roll-out of the NHQ Certified Builder Program. The Research Center expects that several other builders will have achieved certification by this time.

For more information, visit www.nahbrc.org/quality or email quality@nahbrc.org.