

In Good Standing

AN OUNCE OF PREVENTION IS WORTH POUNDS OF CORRECTION

Magazines were perused, books paged through and plans meticulously reviewed, all in search of the perfect log home. Home shows were attended, weekend drives dictated by log raisings or open houses, sales pitches listened to, and the brochures piled up. The years-long process seems like a perpetual quest for the pot of gold at rainbow's end. At long last, however, a log-home manufacturer has been selected, blueprints drawn, a price established and, most important, financing approved.

Time to start building. Or is it?

How do you know your home will stand up? States and counties vary on their building approval and permit process. Some jurisdictions require licensed general contractors or even licensed subcontractors. Some counties require an architect or engineer to draw the plans; others allow high-school educated CAD (computer-aided design) gurus to do the honors. Until recently, no building code regulated the design of log homes, and, unless mandated by the state or county where the home is being built, having a professional engineer review the blueprints is typically not included. "We've been doing this for 30 years, we know what we're doing. There's no need to pay an engineer to review the plans." Ever hear that?

Professional engineers are like to dentists and attorneys. No one enjoys going to them. They cause pain and cost money. Yes, but all have the ability to prevent even more pain and expense. Who wants to pay someone to tell them their dream house can be built only with skyscraper-size steel beams and 4-foot-diameter, old-growth Douglas fir trees? In many areas, there is no law requiring such a service; go ahead and build the house. Many people do just that, without having an engineer or architect review the plans.

As the owner of an engineering firm, I can attest that our services are typically called upon as a prophylactic measure by the local building jurisdiction, which requires that a structural engineer review all residential structures



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above a certain size prior to a building permit being issued. Increasingly, though, our services are being called upon in areas where engineering is not required to avoid a stop-work order by a building inspector who says, "I'm not approving this house without an engineer signing off on it first."

The scary part is that typically by this point most of the house has been erected. Just like the dentist and attorney, it's now even more painful and expensive.

"Doc, my tooth hurts bad." Didn't want to deal with the gruesome six-month cleaning. "Attorney, how do I get out of this contract?" Didn't want to pay to review the contract prior to signing it. Now it's, "Engineer, what do I have to do to prevent my house from falling down?" Didn't want to hire an expert to review the plans prior to building.

Log homes are becoming more complex as customers demand more from the centuries-old building material. No longer are they 1,200-square-foot rectangles with a wood stove and front porch. They are now three stories tall with multiple fireplaces, complex roof ridge lines, heated floors, elevators and party-sized hot tubs on decks overlooking the mountains within arm's reach of winter's supply of firewood—also on the deck. Stick-frame roof trusses from the local lumberyard may work, but custom-shaped, full-log structural trusses sell the house. Garages

free of interior posts make opening doors on sport utility vehicles a breeze. And who wants to have to shovel snow off a 40-degree pitched roof during winter?

Until log cabins are built in space, the Earth gets the honor of resisting any force placed upon the structure. Whether it be snow, wind, earthquakes, hot tubs, firewood stacks, stone fireplaces or even 30 of your closest friends jumping up and down at a New Year's Eve bash, the loads placed on the roof, floors, walls, etc. are all held up by the soil underneath the foundation. If the soil capacity is underestimated, the whole house is doomed. Just like the children's song about the shin bone connected to the knee bone connected to the thigh bone, the soil supports the foundation, which supports the first floor and walls, which support the second floor and walls, which support the roof, which supports the snow that piles up on the roof.

The point is that when the building inspector says a footing under a post in the basement appears too small, the engineering analysis is anything but simple. The post is likely carrying loads all the way up the roof that all have to be meticulously calculated, often on a home that was built differently from how the plans initially indicated.

Typically, the variances seem small, such as moving an interior wall to make a room bigger, moving columns aside to allow for a better view or replacing steel beams with wood because a crane was unavailable to drop the steel beam in place. The contractor said it would be fine, but in order for an engineer to actually verify the footing, all the changes need to be conveyed and discussed, something that takes time, maybe even a site visit. And time equals money—your money.

If the footing is really too small, replacing it can be a monumental task. Whatever is bearing on the footing has to be temporarily braced while the old footing is jackhammered apart and replaced with a bigger, proper-size pad. Worse, if the improperly sized footing is never noticed, the ramifications of its failure could extend all the way to the roof. The roof might sag, floors may droop, windows may crack, doors may not close, and the slate floor may crumble.

Will the house fall down? Probably not. Is it a house you want to live in? Definitely not.

Emergency engineering is part of the engineering business, but it doesn't have to be part of your house budget. Chances are, if an engineer is being contacted after the house is built, so is a lawyer—maybe even a dentist, if you've been grinding your teeth worrying about the prob-

lem. The fix is neither cheap nor a no-win situation. The log manufacturer clams up, fearing that anything it says can and will be used against it in the court of law. The builder unexpectedly moves to Mexico. Meanwhile, the owner has to wait until a judge decides who's at fault and who is capable of fixing the situation.

Mistakes will inevitably be made in the building process. After all, you don't have to be perfect in school to get an A, just close to perfect. In building your log home, however, you hope the difference between perfect and close to perfect does not involve key structural elements. It is one thing if the sink leaks, something entirely different if the foundation cracks. Having an engineer competent with

log structures review the plans for structural integrity severely diminishes the chances of a structural failure, which may be as minor as a hairline crack in a travertine floor.

Obviously, every case differs, but a typical 3,000-square-foot home can generally be engineered for somewhere around \$2,500. That

figure could vary significantly, depending on the design of the house, its foundation, location, etc. It is entirely possible that the engineer could save that much money or more by slightly redesigning the house to accommodate typical log-strength capacities or lumber sizes, thereby eliminating special-order materials. It is almost guaranteed that emergency engineering will cost at least that much to solve one major problem, and that doesn't include reviewing the house for anything else that might be wrong.

Perhaps the log-home manufacturer or builder said your idea was not an option, probably because of its comfort level with the design or availability of stock materials. An engineer, however, can open doors as to what is possible, such as great rooms without interior posts, structural log trusses, large gabled walls with floor-to-ceiling windows, garage parking with usable basement space below, walk-in safes, stone fireplaces, even on the second floor, and, yes, floors that won't rattle the china when the New Year's Eve crowd starts jumping.

Even if the state or county where you intend to build doesn't require it, talk to a structural engineer or architect about drawing or reviewing the plans prior to construction or bidding. It's your house, the same house your family will call home. Why not ensure its integrity? **LHI**

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