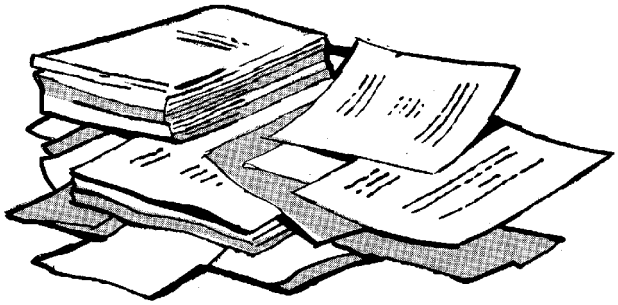
Letters



Lessons Learned From Truss Failure

To the Editor:

I have been a subscriber to *New England Builder* since its inception, and the publication has been more than helpful and informative over the years. In fact, it is through your publication that I learned of Raymond DiPasquale and sought his investigative services when the case study that he describes in your April issue first occurred. It was painful to relive the happening, but the subsequent anguish that leaves me tottering on the verge of bankruptcy now has little to do with the actual collapse of the trusses on that small municipal building in rural New England. I was the general contractor.

The really catastrophic domino effect has come about from the human reactions of the participants. By sharing some of that with you, maybe we can save another small town, a lot of hardworking small businessmen, and even some truss manufacturers a great deal of heartache. Don't I wish that Mr. DiPasquale's last sentence, "No legal action was taken," were true. Because we are in the midst of suits and countersuits, I am not identifying myself or the project—the players won't learn anything new from this letter, but I hope someone can learn a lesson.

The delivery truck that brought the trusses to the job site in the middle of November 1985 was two hours late. The driver backed the truck into the concrete supports in the front of the building, toppling them before he began unloading and erecting. We were using a framing subcontractor on the job, and he had two men on the ground supplying temporary bracing, and two men on the sidewalls, placing and bracing. I had two men on the ground, guiding and attaching crane hooks. I was one day out of the hospital from surgery, and stood outside until half of the trusses had been erected.

It was impossible for any of my men, or me, to see the manufacturing defects in the trusses as they were being erected—they were too high on the truck, and as the crane swung them into position, they were too far away from our line of vision.

It began to get dark around 4 P.M., and there was no lighting on the premises or available nearby. The framing subcontractor got the first course of plywood on, and he and our men felt confident about leaving the project for 15 hours, as it was a cloudless night and dead calm. At 6:05 P.M., residents said they heard a sonic boom. As people headed for a Building Committee meeting at 7 P.M., their headlights told the story: the front two-thirds of the trusses had fallen into the center of the structure, doing sidewall damage as well. The architect spent 10 minutes or so poking through the debris. He then told the newspaper with the second-largest circulation in our state that I had deliberately set out to brace the structure improperly before any competent investigative work had been done (Litigation #1) by the light of day.

The architect had omitted the builder's-risk policy from the bid documents, but had assured me there was a policy in effect as of the day of the bid opening. He forgot to mention that he had named the town as the insured, where it is customary to name the owner and contractor. But that didn't worry me too much, as the actual occurrence was covered by the policy. How naive. When the adjuster arrived on the job site, he said he didn't have to work with me because I was not the named insured. At that point, coming into the worst weather of the year, I supplied the agent and the selectmen with high, low, and average figures to settle—depending on weather, suppliers, and salvageable materials. That was too complicated for the town's volunteers so they made no effort to settle the claim, yet expected me to continue working without being paid.

I wrote to all parties and asked that the manufacturer be given another chance to supply materials—anyone adequately insured is entitled to a mistake. This was three weeks after the collapse and just after I learned from Mr. DiPasquale that manufacturing defects were the prime cause of the accident. At this point, however, the architect decided to do his job—review the truss specifications—and discovered that the fallen trusses were not manufactured in a manner that would support the specified ceiling heating units. Funny enough, when the manufacturer was put on the stand, he said that Page 7 was missing from his set of blueprints (all 10 other copies had it), and that page specified the ceiling heaters.

The town then ordered me to obtain the trusses from another manufacturer. However, the new manufacturer had a different procedure for ordering and certifying materials, and the architect told the town that an order had not been placed. By now it was a month after the collapse and there was no sign of settling the insurance claim. I called the adjuster, who informed me that no one from the town or their agency was working toward a resolution, and he felt that he could go no further without their cooperation. He also advised me not to pay the truss manufacturer until the claim had been concluded. The manufacturer placed a lien on my home and the town (Litigation #2).

The selectmen called in the town counsel. Unfortunately, he had had a heart attack the preceding week and assigned the case to a junior associate who had no town counsel experience. But he did have ambition; he

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Clearing the Air On Stressed-Skin Panels

To the Editor:

In reference to the recent article on stressed-skin panels by Alex Wilson [NEB, 2/87] and T. Wayne Kondor's response, I hope, first, to clarify the testing our company has carried out and, second, to clear the air a little of the contention surrounding EPS and urethane foam cores.

Most of the tests conducted by Winter Panel Corp. last year on EPS- and urethane-core stressed-skin panels were indeed "official" ASTM tests. PFS Corp., an independent testing laboratory in Madison, Wisc., supervised and witnessed fire testing of panels at the Gold Bond Research Facility in Buffalo, N.Y. Both wall- and roof-section tests were conducted on EPS and urethane panels in accordance with ASTM E-119 standards.

The other tests that were conducted—the non-ASTM tests that Mr. Kondor referred to—were designed by us to simulate a real-life situation. Our company was thinking about offering an EPS panel and we wanted to see how it would perform. When we test a product, we perform the standard ASTM tests, as well as tests that simulate the worst-case scenario that could be encountered in the field. It is important to be aware of any liability and safety problems that might exist. Thus, in this particular test, the blocking around windows was omitted (a poor, but commonly practiced, technique in the field). The windows were carefully foamed and completely trimmed on the inside.

I don't want to go over the results anymore; anyone who is interested is welcome to visit our facility and examine the results. Rather, I want to emphasize how important it is that the stressed-skin-panel industry work together to develop safety standards, proper installation practices, and a high level of quality control in manufacturing. That was my hope in conducting these tests in the first place. I had hoped that our test results would be welcomed by the industry as an important step in learning how to safely design and install stressed-skin panels. I am sorry that the issue degraded into an emotional fray between the EPS- and urethane-panel factions.

The stressed-skin-panel industry is still in its infancy. There is plenty of room in it for both EPS and urethane panels. But all the panels and the

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Use Oil Primer on Redwood & Cedar

To the Editor:

In the April issue, Henry Spies answered a question regarding the proper use of oil- and latex-base paints. In his reply he neglected one important area. When painting redwood or cedar siding and trim, it is important to use an oil- or alkyd-resin-base primer in order to prevent the natural extractives in these woods from bleeding through. Acrylic-latex top coats can then be applied. Even on Douglas fir plywood it is best to use a stain-blocking latex primer to prevent staining and acrylic-latex top coats to reduce checking. All of this information is available in California Redwood Association (CRA) and American Plywood Association (APA) literature.

CRA address: 591 Redwood Hgwy., Suite 3100, Mill Valley, CA 94941. APA address: P.O. Box 11700, Tacoma, WA 98411.

Keith Kersell
Manager, Technical Services
The Pacific Lumber Company
Mill Valley, Calif.

CORRECTION

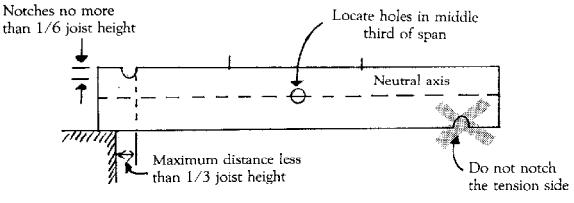
Where to Cut Holes in Joists

The article "Defeating Deflection" [NEB, 4/87] said to "never locate holes or notches in the middle third of the span" of a floor joist. This was correct for notches—but wrong for holes.

In fact, if you must cut holes, always make them in the middle third of a span. In a 2x10 joist, for example, a two-inch hole made in the middle third of the span (at mid-height) has almost no effect on the bending capacity of the joist. And since the shearing stress at mid-span is nearly zero, the loss of shear strength caused by the hole is not significant either.

How about notches? If small notches must be cut in the top of a joist, they are best located at the support, but not beyond one-third of the joist height from the face of support. And, as the article said, don't notch the bottom of a joist.

We'd like to thank Walter H. Weidner Jr., P.E., a consulting engineer from Arlington, Mass., for bringing this error to our attention.—Editor



Basking in the Sun

To the Editor:

I like the idea of putting a bathtub on a south wall, where the bather has the opportunity to bask in the sun. Henri de Marne has mentioned the problems involved in putting a tub on an exterior wall. Do you have any details showing ways to circumvent these problems? If not, could you review these problems and their causes?

Thank you.

Richard Devens III, AIA
Center Sandwich, N.H.

Henri de Marne replies:

The problems involved in putting bathtubs on the outside walls in areas where freezing temperatures are common are as follows:

1. Insulation is often omitted or poorly done behind the tub, and drywall is not carried to the floor and properly sealed. This is particularly true where new, single-piece fiberglass units are used. The result can be frozen pipes and moisture migration causing paint peeling on the outside and potentially worse.

Great care in installation could alleviate these problems, but the plumber usually sets the tub in before the insulation and the drywall people show up, and these areas get forgotten.

2. Band-joist insulation is too often forgotten between first and second floors, resulting in cold areas that can cause water and waste pipes to freeze—even if insulation and drywall were properly applied behind the tub first. Moving the tub farther in reduces the chance of freeze-ups.

3. In tiled situations, caulking and grouting do eventually open up and permit leaks to develop. This is a more serious problem in exterior walls than interior walls because: they take longer to detect; insulation can become soaked and conceal the problem; carpenter ants can set up residence; and rot is harder to repair since the wall is less accessible and more likely to be structural.

4. Windows above tubs are a source of constant problems when the shower is used, e.g., mildew, rot, paint peeling, unless a second shower curtain is applied over them, in which case condensation still occurs on them behind the curtains. Why create additional maintenance problems?

5. Windows above tubs create downdrafts that are very uncomfortable to the bather. Even triple or quadruple glazing has a colder surface than an insulated or interior wall. Condensation is also likely to occur and air circulation is very poor in those areas.

I have designed situations where the bather can take advantage of the great outdoors without having to put up with any of the potential problems. If the tub is on an inside wall, windows can be detailed to permit as good a view of the outdoors as if the window were just above the tub and with none of the negative aspects. And if the bathroom walls happen to have a southern exposure, then fall, winter, and spring solar penetration still permit the bather to bask in the sun.

Foundation Observations

To the Editor:

With respect to Harris Hyman's experience with ultrathin slabs [NEB, 3/87], I would like to raise a few cautions, after first complimenting him on the use of fiber-reinforced concrete for thin slabs by saying "I wish I'd thought of that."

The cautions stem from my experience in the late 1970s with fiber-reinforced concrete. At that time I built approximately 30 homes with an exterior skin of polymer-modified, fiber-reinforced concrete installed directly over expanded-polystyrene insulation. The fiber reinforcing was in some cases chopped glass fibers, and in others a woven glass cloth. The learning curve was steep with respect to what surface finishes would work with the glass-fiber reinforcing, but the ultimate results were superb.

The cautions arise from the type of fiber reinforcing used. Glass fibers are the most common but, unfortunately, can be fraught with the most problems. Glass degrades when exposed to the high-alkaline environment of concrete. Any glass-fiber reinforcing must be treated to resist such a hostile environment. This can be quite expensive, and its effectiveness has been challenged by many. It is common to treat woven glass mats, but not common to treat chopped glass fibers. Specially formulated glass can be used, but this is not common either.

Another approach is to modify the environment the glass "sees" through polymer modification. This can dramatically reduce the alkalinity effects on any glass-fiber reinforcing. In my buildings I relied on both strategies, and I'm still not sure.

For these reasons, the trend has been away from glass-fiber reinforcing to using steel or plastic fibers. Plastic fibers have problems as a result of plastic's modulus of elasticity. For the future, my money is on steel fibers.

In the same issue, I noticed Paul Hanke's distress over the "allegation that poly vapor barriers below a slab can increase the chance of cracking." It's true. The polyethylene tends to increase the water/cement ratio by preventing the seepage into the soil or granular pad of the usually excessive mix water found in residential concrete. This also serves to increase surface bleed water, resulting in poor surface finishes (again due to a now much higher surface-water/cement ratio). The higher water/cement ratio results in weaker as well as more permeable concrete, and concrete more prone to shrinkage cracks. Concrete contractors often don't realize it, but they do the right thing when they punch holes in the poly when no one is looking in order to drain excessive mix water.

Fortunately, holes, rips, and tears in the poly do not significantly reduce its effectiveness as a vapor-diffusion retarder, since they reduce the total surface area of the poly by only 1 or 2 percent. Who cares if my vapor-diffusion retarder's effectiveness is reduced by 1 or 2 percent?

What about air leakage? The concrete slab itself can be made to act as an air barrier if it is sealed at the edges.

Now, if putting holes in the poly upsets you, you can resort to the following:

Use a low water/cement-ratio concrete with a superplasticizer;

Cover the poly with several inches of sand, which will serve to absorb the excessive mix water and, over time, promote an effective concrete cure;

Pre-crack the floor slab with control joints. If the concrete is going to crack anyway, why not have it crack in straight lines? Clients get upset with random cracks, but straight-line cracks look as if they belong;

Install a preserved-wood floor slab, and to heck with the concrete.

Joseph W. Lstiburek, P.E.
Building Engineering Corp.
Toronto, Ontario

Paul Hanke responds:

I received a reply to my inquiry to the ACI on the subject, the gist of which is as follows:

1. Poly vapor barriers below the slab aggravate plastic and shrinkage cracking (and curling) before curing begins, because the bottom of the slab loses no moisture, while the top dries rapidly. This causes differential shrinkage.

2. Assuming the poly is otherwise desirable (to prevent capillary draw and vapor migration from the soil), a layer of sand above the poly and below the slab will help, as Joe points out.

On a related question:

3. A layer of wet burlap covered by a poly sheet on top of the slab would provide good curing conditions without recourse to flooding, sprinkling, etc., and would probably eliminate discoloring caused by use of poly alone. I've never tried this, though, and I suppose the burlap might disfigure the concrete in some ways. Does anyone out there have any experience in this regard?

TRUSS FAILURE

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appointed himself de facto clerk of the works. He'd fix the problem—just get rid of the general contractor (with no regard to the AIA contract still in effect, or the town's obligations under the bond). So with no prior certification of cause by the architect, no allegation of defective *workmanship*, and no other legal cause for termination, I was notified (again by the newspaper) that my contract was canceled. The balance of the job was awarded—before the cancellation date—to a local builder with no bond, on the basis of time and materials (Litigation #3—breach of contract).

Not knowing the outcome of the breach-of-contract action, we have also filed suit (Litigation #4) against the manufacturer for product liability, who has reacted by filing suit against the lumber supplier for defective product. The supplier will probably sue God for defective trees.

We are entering a new building season and I can't do bonded work, because the bonding company says the termination was illegal and until that issue is resolved they are still on the hook. All I want is to be back where I was before this whole thing happened—solvent and with a good reputation. Fortunately, my work is well thought of closer to my home, and I am still building. But garages, porches, and family rooms can't carry the overhead I had built up to support the large, bonded work, and if I make major cutbacks in those areas I may never recover.

What have I learned? A lot. (1) Never take a municipal job that is being supervised without a clerk of the works—a committee of volunteers cannot communicate effectively, let alone put up a building. (2) Make sure the builder's-risk policy has the contractor as a named insured. (3) Go to the manufacturer's facility and make your own quality-control check before accepting the trusses on site. (4) And avoid lawyers at all costs; as soon as they come into the project you can kiss expediency, justice, and common sense goodbye.

Name withheld on request
(due to pending litigation)

STRESSED-SKIN

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panel installations must be durable, strong, and safe. That is our interest. Through our testing program, we are making sure our panels meet these requirements, and we hope that other manufacturers are working toward the same goals.

Though T. Wayne Kondor certainly didn't demonstrate it in his letter, he did suggest that future articles should be more positive and based on fact. The article in our newsletter and subsequent articles that referred to it were based on fact. If we had made a greater effort to share the tests and results with the panel industry instead of allowing them to be published, perhaps they would have produced a more constructive effect. Maybe we could have published a very positive article showing the problems and the industry's solutions.

The next time I have similar information, I am going to share it with the industry first. That could evolve into a reciprocal sharing of information, which would benefit the entire stressed-skin-panel industry. Our industry is young. We need to work together in properly addressing issues of safety, durability, quality control, and proper installation practices. Through such efforts, we can achieve the high level of professionalism our customers deserve.

Amos G. Winter, IV
Winter Panel Corp.
Brattleboro, Vt.

How do we decide which products to use and which to avoid? Standards, codes, test results, magazine articles, marketing hype, and instinct all play a role. One recurring problem with all this is that too often we are comparing apples to oranges and have no way to evaluate competing claim. The institution of standards is an attempt—albeit imperfect—to give us a way to compare apples to apples, to give us a common language and common tests for comparing products.

For practical insights into how standards and codes are developed, and what they have to say about foam plastics, we suggest you read the article "Cracking Clapboards" of this month's issue. The next time you hear "our product has a 15-minute fire rating," you can ask whether that's a finish rating, assembly rating, corner rating—or something entirely different.—Editor