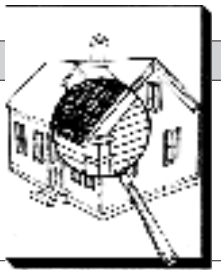
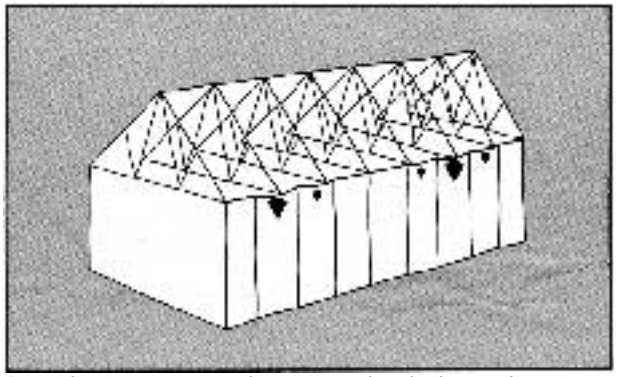


Framing & Truss Troubles

by Michael Lennon

The caller was insistent. He wanted me to come and check the home being built for him, and he wanted me to come right away. When he kept insisting that things were wrong with his house, I thought he was just an overwrought buyer. After all, the house was not yet roughed in. I was sure he was a nut case when he alleged that the county building inspector who had approved the framing was on the take. Against my better judgement, I agreed to meet him at the site and check the framing. I wasn't expecting problems because the house was built by one of the nation's largest home builders.



On some jobs we've seen trusses set 24 inches on-center on single top plates between studs – causing a sag.

The house was large, about 3,000 square feet of living space. It was western box framed with solid-web trusses (plywood I-beams) used for floor framing, and open-web trusses used for roof framing. One portion of the house had a two-story cathedral ceiling with webbed trusses.

> The carpenter had taken it upon themselves to do engineering, using the materials available.

It didn't take long to pick out some problems, and they were only the tip of the iceberg.

When I looked up at the underside of the first floor sheathing from the basement I saw something unusual. Some of the plywood pieces were installed with their grain running parallel to the trusses and some other pieces were installed with their grain perpendicular to the trusses. Everyone knew, I thought, that the plywood should run across the trusses.

The roof framing and sheathing was equally curious, because one roof system was built over the top of another. Open-web trusses with plywood sheathing formed an internal roof system. Above this, rafters wee nailed to the plywood, and these framed a higher roof system. The rafters bore on the plywood and the trusses at various points along the top chord of the webbed trusses.

A cathedral ceiling in another part of the house bore not on an exterior wall, but onto a single plywood-web truss that was used as a header across an opening retrofitted for a bay window.

The floor system had some problems as well. The hearth area for a very wide main fireplace had eight plywood I-beams strap-hangered to another that was used as a header. That "header" was in turn strap-hangered to single plywood I-beams on each side of the hearth. So really, those two trusses were carrying the load of all ten. The single solid-web trusses used as beams and headers were sagging under their dead loads.

Elsewhere, partitions with single top plates bore the ends of trusses set at 24 inches on-center. The top plate was sagging under the weight wherever the load was not applied directly over a stud.

This house had been "field-modified." The carpenters had taken it upon themselves to do the engineering work, and they used the materials available to them on the job. Certainly, this is an exceptional case, but it made me think once again that trusses are not always understood by framing carpenters.

I've noticed lots of truss problems in the many home inspections I've done. I have nightmares of web cuts through the ends of solid-web trusses, and dimension lumber joists sistered alongside "too-short" floor trusses, or loads misapplied on chords. Let me give a few observations and suggestions about some common errors I see in my work.

I see many ceramic tile problems on floors built with open-web trusses. Too often the tile job will crack up soon after application due to too much deflection in the floor. The problems continue unless the floor is stiffened with plywood panels glued and screwed to the sides of the flat trusses.

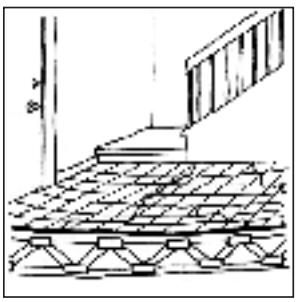
Another problem with open-web trusses is that they tend to yield uneven floors. While slight waviness can go undetected in carpeted rooms, it shows up readily with high-sheen sheet-vinyl kitchen floors.

Errors in judgement in framing are hardly limited to truss systems. For instance, it is very common to find excessively bouncy floors when joist spans are stretched to near maximum. Occasionally, I even find joists installed crown down.

Designers and framing carpenters sometimes forget about wood shrinkage. For instance, consider how unequal depths of wood support at opposite ends of joists or beams can cause differential settlement due to unequal shrinkage. Masonry buildings sometimes have structural members supported on masonry at one end and by built-up lumber at the other. It is not uncommon to find masonry buildings supported by wood in the center whose floors sag in the middle. This sagging can get progressively worse on upper levels.

A two-story brick-veneer house I saw had a portion of an exterior wall supported by a steel "I" beam that was in turn supported by masonry on one end and a built-up wood beam on the other. When the wood shrank, the brick veneer above would have cracked. Fortunately, this mistake was discovered during a "pre close-in" inspection and corrections were made before the failure occurred.

On another project, the end wall of a cathedral-ceiling rec room had a standard 8-foot-high 2x4 bearing partition with the upper-level partition nailed over it, plate to plate. The wall moved two inches in and out when lightly pushed near the middle. Continuous studs would have worked a lot better.



Open-web trusses sometimes allow too much deflection for ceramic tile. One solution is to stiffen them with plywood panels nailed alongside the truss.

Inspection is not always the answer. Lots of framing and design errors can be found in "completed" and inspected buildings. Plumbers with reciprocating saws seem to be particularly disrespectful of structurally significant wood members.

Years of checking over framing systems have left me with one strong thought worth passing along. Don't take things for granted, take a long studied look. ■

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