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Construction Concerns: Modifying Wood Trusses

Article and photos by Gregory Havel
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Wood trusses have been common components of residential and light commercial buildings since the 1970s. They are designed, assembled, and bundled at factories; shipped by truck to the construction job site; unloaded; and set in place, usually with an extended-reach, all-terrain forklift or a crane.

Sometimes, these trusses are damaged in shipment and need repairs before they can be used, or the owner or architect makes a building design change that requires modifying several trusses. In either case, the model building codes and truss manufacturer's information require that the proposed repairs or modifications be designed or approved by the truss manufacturer's engineer or architect to ensure that the trusses will still meet or exceed the strength requirements of the design. A tag attached to every bundle of one manufacturer's trusses reads:

> **"If a truss is damaged, altered, or improperly installed, report it to the Manufacturer immediately. Do NOT attempt repairs or modifications without a Repair Detail from the Manufacturer, Engineer, or Architect. Repairs or modifications shall be made with the truss laying flat, or shored up to relieve any load. Repair the truss by following the information on the Repair Detail exactly. Use only the materials specified. Seek professional assistance if anything is unclear. Always follow the Repair Detail prepared for your exact situation. Keep the Repair Detail for review by the Building Inspector, Architect, or Owner."**

Photo 1 shows a set of trusses for the top half-story of a large house under construction. The owner decided to add a separate HVAC system (furnace and air conditioner) for this level. The architect placed it inside the truss void space, behind a knee-wall. This required modifying several trusses (removing web members, strengthening bottom chords), adding a floor and another knee-wall, and enclosing the new space with gypsum board and insulation. A truss of the original design is visible in the background, behind the new stud wall framing and the new knee-wall.

Photo 2 (below) shows the detail of the attachment of the studs for the new knee-wall. The truss manufacturer's engineer designed this arrangement, with the knee-wall studs becoming part of the truss web. The load calculations included the change in the weight of the truss itself; the dead loads (weight of the floor, gypsum board, furnace, ducts, and pipe); and live loads (weight of a serviceperson and tools).

The engineer specified the dimensions and thickness of the plywood gusset plates, the minimum number of nails to be used to attach each gusset plate to the chord and to the stud, and the type of construction adhesive to be used between the plywood gusset plates and the lumber truss members.

Reputable building contractors keep copies of the engineer's approval for truss repairs and modifications at the job site, because the building inspector often asks to see them. Once the occupancy permit is signed, these approvals will be more difficult to locate. Owners usually do not have copies, and even contractors and building inspectors don't keep their paperwork forever.

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If an owner or occupant repairs or modified a wood truss after the building is complete, it may be with or without the manufacturer's approval or architect's design. In either case, it is likely to be done with plywood gusset plates and nails. It will be difficult to judge the quality of workmanship, or the absence of approvals, unless the structure is visibly deformed or collapsing.

For detailed information on installing, modifying, and repairing wood trusses, visit http://www.sbcindustry.com/bcsi.php. BCSI 2008, a Web site of Wood Truss Council of America (WTCA) and the Truss Plate Institute (TPI), representing the structural building components industry. The publishers state that this information meets industry standards and model building code minimum requirements, and that design or local code requirements must be followed if they are more strict.

The publication *Building Component Safety Information,* 2008 edition, is referenced on the truss tags and paperwork from many manufacturers. It is a free download at http://www.sbcindustry.com/docs/06_BCSI_booklet_FINAL.pdf (115 pages, 19.2 MB) Some wood truss manufacturers supply an abridged copy of this information, or similar information from another source, with each shipment.

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