

TIMBER FRAMING

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On the cover, end view and interior detail of newly made barn with guest quarters in Castlemaine, Victoria, Australia. The owner-builder, an artist and self-taught mason and timber framer, chainmilled most of the timber from salvage logs of many species and gathered and laid all the stones in the masonry foundation. Inspired by English design largely from the Welsh Marches, though not exclusively so, the frame was cut by English scribe rule and raised piece by piece using gin pole, shear legs and tackle. Pegs are cleft and shaved. Photos by Mandy Murphy. Story page 22.

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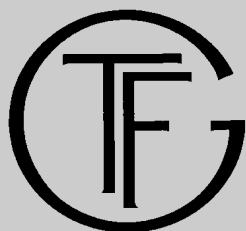
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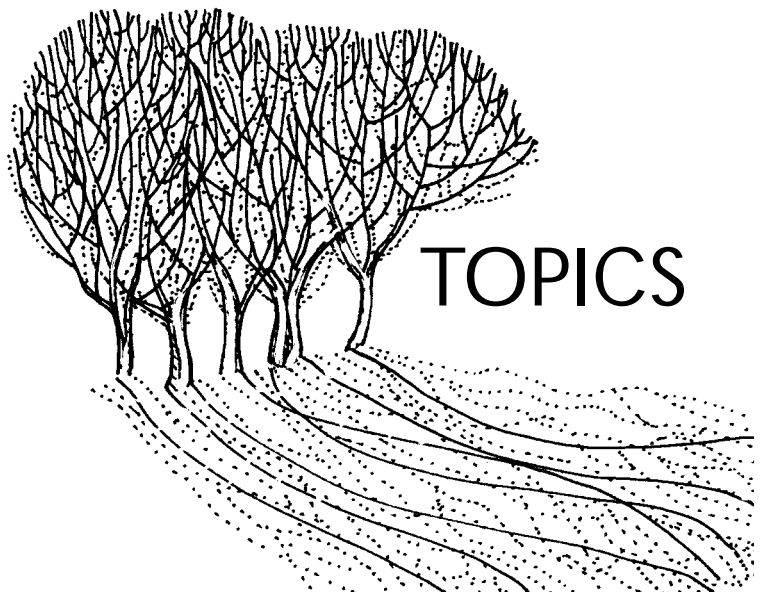
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Respectful Restoration

THE Illinois Yearly Friends Meeting House in McNabb, Ill., was raised in 1874 by English-descended Quakers moving west, and has since withstood tornadoes, termites, lightning and other mortal threats. When the original Quaker settlers moved to central Illinois earlier in the 19th century, they built their small community on some of the most fertile land in North America. Their first meetinghouse rose in 1831. The 1874 structure is the third to stand in the settlement.

The building sits on a limestone foundation, probably quarried from the nearby Illinois River valley, and typical of the period in descending only 20 in. below grade. Despite its shallowness, the 16-in.-broad wall remains in good condition. Settlers in the Midwest built shallow foundations until the early part of the 20th century, surprising in view of the harsh winter season. A lack of stone in easily accessible locations was surely a key factor and, in a new building environment, many settlers were probably unfamiliar with the deep deposits of glacial till concealed beneath the prairie soil. Fortunately for the Meeting House, its surrounding soil is well drained, minimizing frost heaves, and its timber frame construction is capable of absorbing minor shifts without structural degradation.

By the 1860s, there was a wood shortage in Illinois. Almost 15 million acres of prime hardwood forest had been cut. After the Civil War, railways were built, which opened up resources in Wisconsin, Michigan and Minnesota. Houses, barns, churches, bridges and other structures in Illinois were built using white and red pine from states to the north. Many of the pine buildings have deteriorated over time because of poor maintenance or have been lost to tornadoes.

By the end of the 19th century, the lumber barons had moved down to Missouri, logging out all but a few acres of the shortleaf (hard) pine that once grew throughout the Ozarks. The Friends Meeting House is built with shortleaf pine, probably some of the first to be imported into Illinois. Like many buildings in the Midwest built of such pine, it has been able to withstand the elements for the last 130 years with little maintenance. The higher resin content in the hard pine might make the timber resistant to decay, and its greater strength helps withstand high winds and tornadoes, especially important for the Meeting House, which stands in an area of frequent tornadoes.



Iron rods support scarfed tie beam.



Edge-halved scarf in floor girder. Notch carries joist.



Joel McCarty

Quaker meetinghouse was built for two sexes.

The Meeting House roof is supported by well-executed 48-ft. clearspan trusses with a 9:12 roof pitch. Each truss comprises 6x8 rafters 27 ft. long, 6x6 raking struts, scarfed 8x10 bottom chord members (27 ft. each) and a 7x12 oak kingpost. Iron fastenings are all hand forged; 1-in.-dia. tension rods flank the kingpost to help support the two-piece lower chord, and 1-in. bolts fasten the rafter tails to the lower chord. Another 1-in. bolt clamps the lower chord to the kingpost, passing up through the connection to a buried nut in the kingpost. The bottom chord extends out over the walls to carry soffit and fascia.

The interior is sheathed with solid tongue-and-groove boarding covered with horsehair plaster. Bents are 12 ft. on center; 2x6 framing on 16-in. centers fills in between the posts. The walls are 20 ft. tall. Except for descending curtain partitions to separate the building when desired into men's and women's sides, the interior is open. The exterior is simple, but the trim is well placed and the walls are sided with 6-in. clear quartersawn pine bevel siding applied directly to the studs. The windows, appropriately for the wall height, are 10 ft. tall, with double-hung 6-over-4-light sashes.

Early in 2002, a committee from the Meeting House asked us to do an inspection and assess whether the building could be restored. We determined initially that termites had infested the northern third of the building, and the bridled scarf joints in the bottom chords of the attic trusses had separated $\frac{3}{4}$ in. to $1\frac{1}{4}$ in. as well. The building had also begun to settle in the northeast corner because of drainage problems with a downspout. We presented the committee with a bid and began discussing in detail how the restoration would be performed. After consultation with an architectural firm and an engineering firm, a plan was developed to restore the building. Two years passed while these details were hammered out and the Illinois Yearly Meeting raised the necessary funds from its membership.

The members of the Meeting were concerned about sustainability of resources and the local economy. For that reason we chose local white oak to replace the existing hard pine. Architects and historical committees are often concerned that replacement material match that of the original building. The IYM members believed (and I agreed) that this requirement can sometimes occlude the point of a restoration. We ought to take a national look at the impact of harvesting and shipping from distant locations. In many places throughout our country, we should reduce our consumption of outside resources and stimulate the local economy. The use of local resources should be paramount when a restoration is considered.

When we restore buildings, our firm's intent is to preserve and promote the original intent of the builders of the day. This intent may be subject to the taste of a client, who may pick a different

stylistic period to represent. After all, there are plenty of simulated historic buildings that rely on illusory façades. In this case, the members of the Meeting chose to keep the building as nearly like the original as possible. As a restoration company that specializes in the structural components, we aimed to repeat the original methods and joinery used to produce the building.

Our scope of work, after two years of meetings and negotiations, was to lift the building and install new sills under the 72-ft. north eaves wall, to repair the separating tie beams, to replace floor joists and to rebuild the foundation. Termites had had their way with the sills and girders. Some settling had occurred as well in the floating foundation, in part because of infrequently maintained downspouts.

We dealt first with the attic-truss bottom-chord separations, by rigging with cables and turnbuckles to prevent further spreading. After several weeks of tightening the rigging we were able to draw the building together about $\frac{3}{8}$ in. We felt this would be enough to stabilize matters, and that any further action would damage the large plaster ceiling below. The most recent plaster job had certainly been completed after the bulk of the spreading had occurred in the bottom chord members.

We removed the flooring by slicing the existing subfloor and finish floor into sections that could later be relaid, using epoxy to seal the cut seams. The original men's side of the building had fir flooring installed over an original single floor of hard pine. The women's side had linoleum over the original hard pine. The flooring came up well and quickly in sections approximately 32 in. wide and 12 ft. long, cut along existing joints in the boards.

To remove and replace the sill beam on the north wall, we lifted the entire building at once. The old sill was removed, the new one installed and the masons went to work on the limestone foundation. New girders, cut at the shop using the same joinery as the original, slid into place. We dropped in the joists and closed the floor back up. Since the building had a history of termites, we installed both an EPDM (petroleum rubber) membrane and $\frac{1}{8}$ -in. high-density plastic under all sills and girders and extending a minimum of 4 in. past the foundation wall. All new timbers and all accessible old timbers we sprayed with Timbor borate treatment.

The original structure was so rigid and well put together that all was accomplished without a crack in the plaster walls and ceilings. Our intent was to get the building ready for the next 100 years. We feel we accomplished that goal. Barring natural disaster, the Illinois Yearly Meeting House could continue to serve its Meeting for centuries to come.

—RICK COLLINS
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