the middle of the frame, which tends to be better protected from rot and subsidence within the understory.

Gallows framing can accomplish the good effect of posting to a ridge (see "The Framing of a Vermont Hill Farm" in *TF* 145) or can act similarly to a purlin plate system—the difference in this case is that gallows posts tenon directly into central pairs of rafters.

Principal rafter, common purlin roofs are probably more resilient in general—vertically oriented roof sheathing boards help to move water from leaky roofs outward. Plates may take it hard in this circumstance, and from a whole systems perspective, segmented and flying plates are better because posts and tie beam ends are more often spared from serious rot.

In the mid-1800s, some gable-front bank barns used central aisle posts that ascend from the first-floor level and tenon directly into principal rafter pairs. Tie beams are interrupted by the central posts, and plates are also segmented, tenoning into tie ends. Principal rafters land on the short tie beam ends, and flying plates are used to frame the eaves. These aisle-type frames, from my own observation, are quite successful and resilient without the use of any particularly long timber.

Another historic, common purlin barn surveyed in Newbury, Vermont (Fulton barn, ca. 1830), is configured in plan like a common threshing barn but with full-length ties that extend over the tops of eaves-wall posts (Fig. 3). The plates are segmented and tenon into the sides of eaves posts like the aisle barn type. This barn, too, has survived well, despite serious neglect.

3 A Newbury, VT, threshing barn probably built for the Fulton family circa 1830. An uncommon, resilient frame design using segmented and flying plates, and common purlin roof framing.

In summary, resilient frames often use redundant framing systems, for example when rafter feet bear upon a plate but are also pegged into a ridge beam at the peak and/or are supported in their middle by a purlin plate. Resilient framing systems usually, in one way or another, move loads toward the central part of the barn which is most protected.

—Silas Treadway

The Barns at Balderdash Cellars

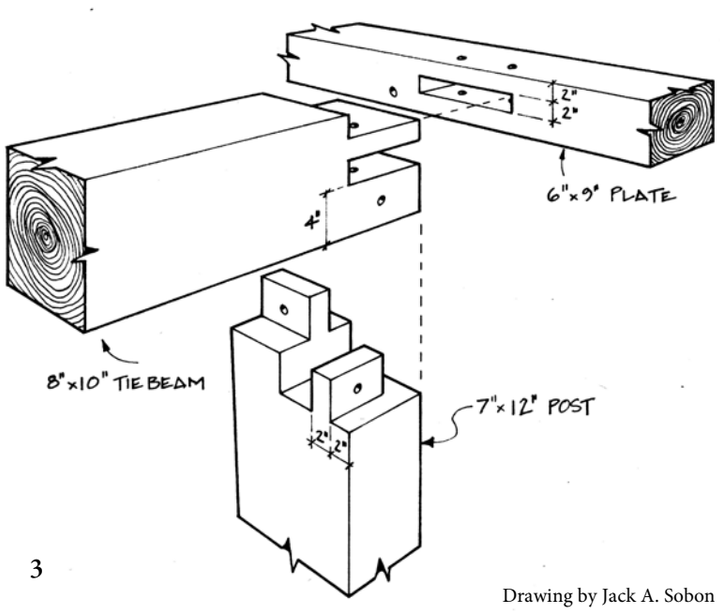
When our local winery, Balderdash Cellars, purchased an old farmstead in Richmond, Massachusetts, for their new home, the property sported an L-shaped barn complex. It was comprised of four distinct structures: two 26x37, three-bay English threshing barns, an 18x30 horse barn purported to have been relocated from the nearby Hancock Shaker Village, and an 18x27 connector at the junction. However, the complex had a mostly nonexistent foundation and many decayed or missing pieces, and would require some heroic measures to save it. Disassembly of the barns was the only effective way to repair the structures. The two connected English barns would be great as a seasonal event space for a winery hosting weddings, concerts, and similar get-togethers. The Shaker barn would go into storage for future use on the property, and the connector, a late-19th-century cobbled mess, would be recycled.

After dismantling, the timbers were repaired or replaced in the workshop of David E. Lanoue in Great Barrington, Massachusetts, using new timber of the same species as the original whenever possible. Some of the oldest barn's timber was black ash (*Fraxinus nigra*), a once very common, slow-growing hardwood fond of wet forests and virtually unavailable locally today. Oak (*Quercus* spp.) was used in its stead for replacements. Conversion methods included riving (the older barn's braces), hewing, and up-and-down sawing. Also, while in the shop, a sampling of each barn's timbers was cored for dating by dendrochronology. The older scribed barn dated to 1794, and the square-ruled one to 1832.

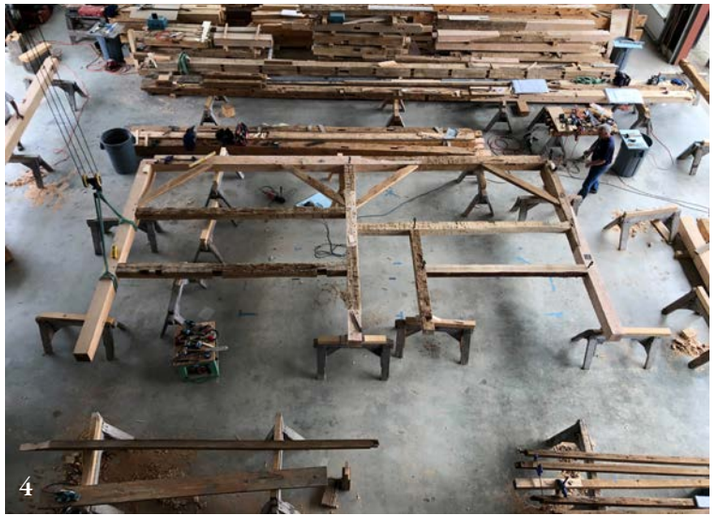
Photographs by Jack A. Sobon, unless otherwise noted

1 The west gable of the 1794 barn illustrates the condition of the barn as found. It was definitely in need of some help. The wider, lower braces were riven, the upper braces up-and-down sawn.

Photograph by David E. Lanoue, Inc.

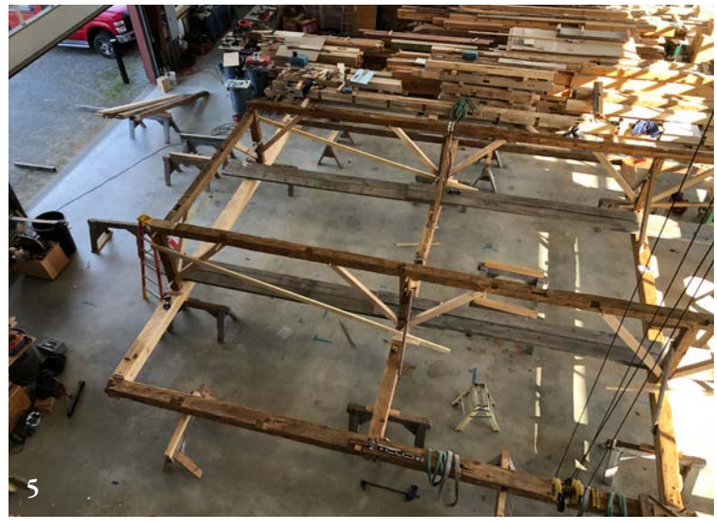


Drawing by Jack A. Sobon



Photograph by David E. Lanoue, Inc.

With public structures, there are often code compliance issues when converting an old barn. The repaired frame was set up on a new foundation with a walk-out basement and a conventionally framed deck designed for a 100-lb.-per-sq.-ft. live load capacity (A-2, Assembly under Use and Occupancy classification), so floor loading was not an issue. In the International Building Code, there are five types of construction, with subclassifications of A and B. Many people think that timber-framed buildings would fall under type IV (Heavy Timber), but not so. Heavy timber is more akin to 19th-century mill construction where exterior walls are noncombustible (brick or stone), the plank floors are 4 in. thick without concealed spaces, and joists measure a minimum of 6 in. x 10 in. Old timber-framed buildings typically fall under type VB, the least fire resistive and the same as common residential construction. In the eyes of the building code, timber-framed buildings offer no fire-resistive advantages. Public spaces must also comply with the Americans with Disabilities Act. So,



Photograph by David E. Lanoue, Inc.

2 Looking at the south wall where the two English barns abut, one can see the 1794 scribed barn on the right with its tapered post and triple bypass joint. Much of the east end-wall framing had been removed long ago. The 1832 square-ruled barn with its dropped tie beam is on the left.

3 The barn features eight triple bypass joints in its construction. A tapered post, wide end up, is placed flatwise against the longitudinal wall and has a tenon for both the plate and tie beam. The tie beam engages the plate with a tenon as well. For more on this joint, see my *Historic American Timber Joinery* (2014), p. 19, or *TF* 56, p. 16.

4 To effectively repair a scribed frame, the sections should be laid out level as they were originally scribed and the new components similarly scribed in place. Here is the western gable frame of the 1794 barn with an original gable-wall door (unusual in English barns) set up in the shop.

5 The frame, from the plates up, was assembled in the shop. The new gable tie beam can be seen at left. The purlin plate in the foreground is a reused plate from an earlier English barn with the standard English tying joint. Note the half dovetail on its top. Originally, only the end posts had purlin plate braces but I deemed the additional support necessary for the undersized purlin plates.

there are now three accessible egress doors, all in original animal and service door locations. The four large threshing bay doorways are not considered accessible but still can be opened for egress, light, and air during festivities. The big door opening over the walkout required a rail with balusters to be added for safety. There was a headroom issue at the egress doors, so the posts, already needing new bottoms, were made a few inches longer, lifting the whole building slightly.

Barns seem to be a very popular venue for wedding receptions in these times and probably were so historically, too. The project was finished last summer, but the barn space was booked a year in advance of its completion!

—Jack A. Sobon

6

7

6 Two of the 1794 barn's oak rafters, sawn from the same log, showed charring on their waney edges. When land was being cleared for settlement, fires were often utilized to ready the land for planting. This charring may have occurred in a standing tree or a log on the ground.

7 The repairs are clearly seen in this nearly completed interior view. No effort was made to disguise them. The new, wider rafters support the two cupolas. Mow rails have been omitted to allow for tables, as well as dancing, to be continuous along the barn's length. The old barn boards were cleaned and reapplied as the interior layer of sheathing.

8 The restored barn, with landscaping yet to be finished, stands proud once again. The outer layer of boarding is new pine, stained to match the original color.

8