

# BUILDING PERFORMANCE



## Rescuing an Old Barn

Long past its prime, a wreck is reborn as a restaurant

BY TED CUSHMAN

Rural New England is full of old, broken-down barns. Many of them are destined to be torn down and burned. But every once in a while, one of those decrepit barns gets a second chance at life. This is one of those stories.

Jesper Kruse and the crew of Maine Passive House recently took on an old barn in Oxford, Maine, whose owner wanted to repurpose the aging structure as a restaurant and tasting room for a craft brewery. The budget was tight. But with help from Portland, Maine, architect Leslie Benson, Kruse was able to suggest envelope upgrades that brought the old building into the 21st century. Says Kruse: "It ended up being a project we could be proud of."

"The clients thought the barn would be simpler than it was," says

architect Benson. "We had to tell them it was far more complicated than they imagined. But it's going to be such a cool space in the end that it's worth it."

### A NEW FOUNDATION

When the owners first suggested using the old structure, says Kruse, "I took a look underneath it and said, 'Did you know you had a lake down there?'" The existing foundation "was just a few big rocks," says Kruse. Water pooling under the barn had exposed the floor and the bases of the barn posts to moist conditions, causing significant deterioration. As it sat, the area beneath the barn

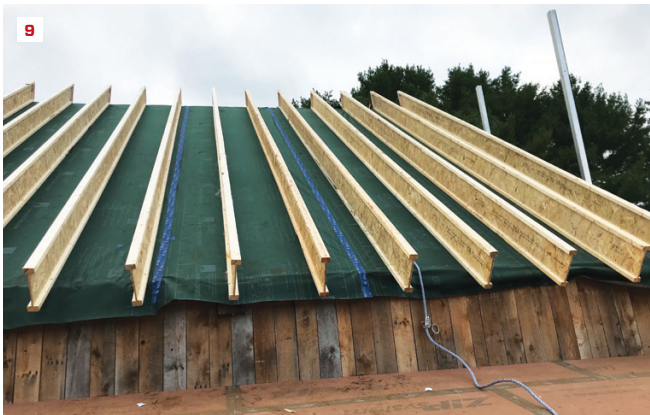
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Photos by Jesper Kruse

## RESCUING AN OLD BARN



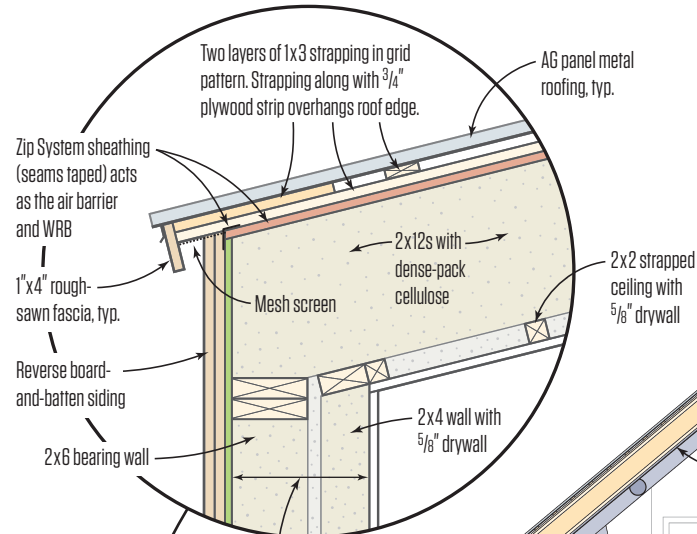
The barn's original frame and board siding had more charm than integrity (1). To expose the foundation, the barn was jacked up and moved back off its location (2, 3). Thick concrete pads were placed to support the interior post ends (4), and a concrete perimeter foundation was placed (5) to elevate and support the walls. Inside the building, posts needed to be spliced for length, as well as to replace the deteriorated post ends with sound material (6).



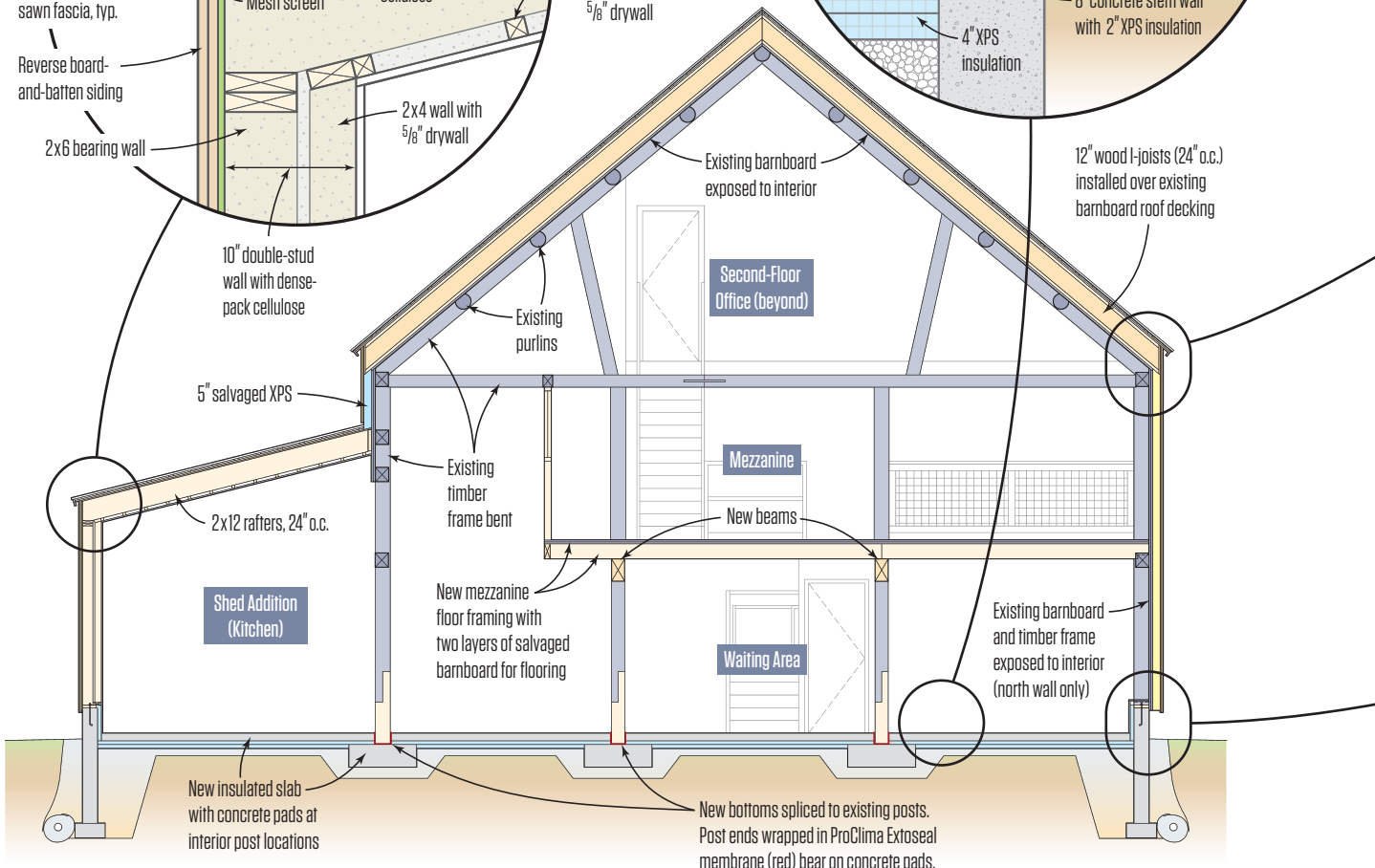
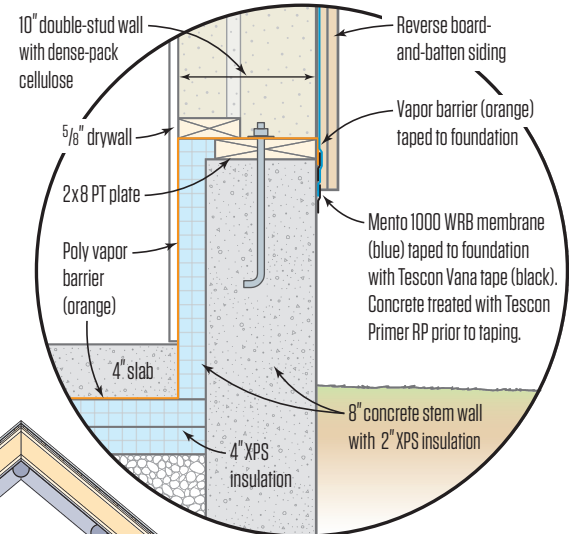
A shed addition (7) adds to the building's volume with modern insulated construction. Working from the new shed roof, the crew stripped off old metal roofing and built up a wood I-joist roof on top of the existing barnboards (8, 9), starting with a layer of felt paper to prevent the green Pro Clima DA air barrier membrane from telegraphing through the gaps between boards. A cross-hatch of strapping ventilates the new roof buildup from above (10). Wall membranes taped to the roof membrane and to the addition's Zip sheathing (11, 12) create an airtight envelope around the entire volume.

Envelope Upgrade for an Old Barn

Addition (Double-Stud Infill Wall System)



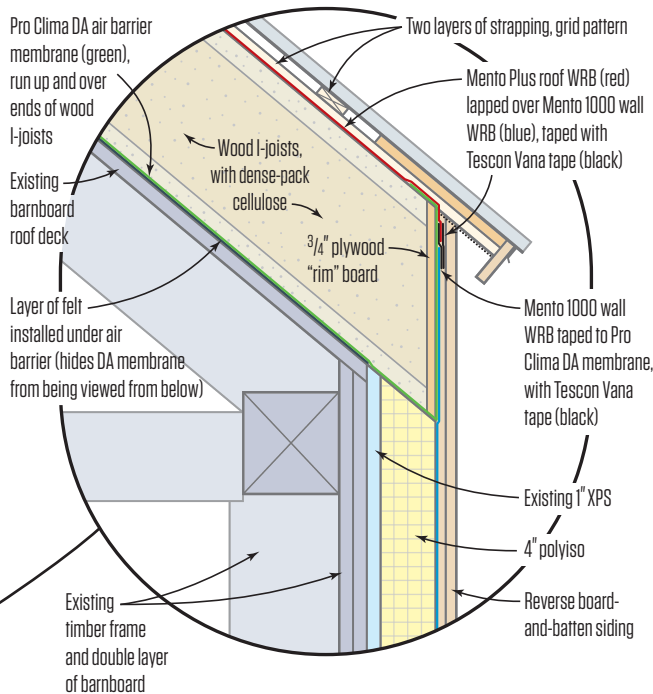
Barn Gable-End Walls (Double-Stud Infill Wall System)



In order to accomplish a well-insulated airtight envelope on a tight budget, Maine Passive House relied on a combination of advanced membranes and recycled existing materials. Existing barnboard was left exposed on the roof underside and on one wall. The built-up I-joint roof system above the existing timbers is completely enclosed in vapor management membranes.

(continued from page 39)

### Barn North Wall (Rigid Foam Buildout)



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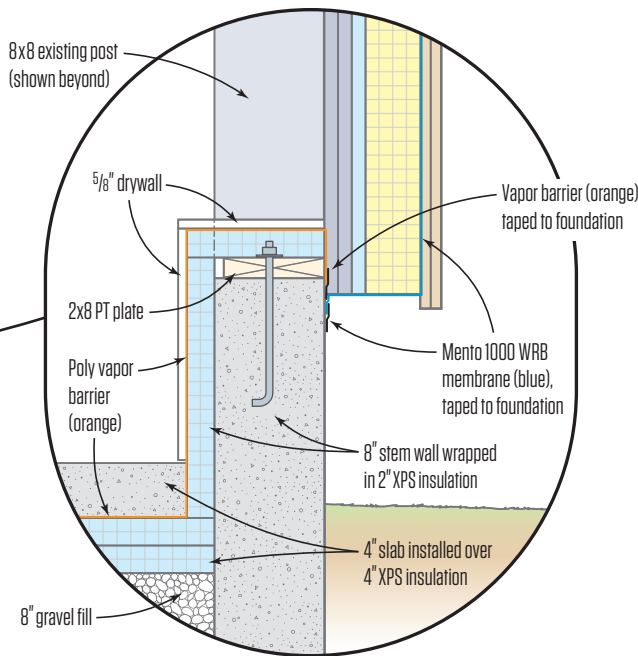


Illustration: Tim Healey

couldn't be made dry, so the decision was made to lift the barn up and move it back, excavate for a new insulated slab foundation, and move the barn back into place.

"The whole barn frame got raised up about 16 inches from its original elevation, onto a new concrete stem wall, because there were some headroom issues with the original barn," explains Benson. "Some of the tie beams were so low that they didn't even have code clearance for walking under them, so we had to address that." Post bottoms had to be spliced for two reasons: to replace unsound wood, and to raise the elevation of the lower portion of the barn. The new post ends were wrapped in Pro Clima Extoseal membrane and set on pads; a new 4-inch slab over 8 inches of gravel and 4 inches of XPS insulation locked the post ends in place.

### AN ENVELOPE UPGRADE

Then there was the envelope to consider. Kruse's crew added a wood I-joint buildup to the barn roof, a double-stud infill wall system to three of the building's sides, and a rigid foam buildout to the barn's back wall (leaving original barnboard exposed on the interior side of that one foam-clad wall). A shed addition, which would hold a new wood-fired pizza oven, was framed with double studs and a wood I-joint roof. Crucially for building performance, all the building's exterior planes were covered with an airtight, vapor-open membrane skin and vented rainscreen cladding.

The owners had to be talked into the envelope upgrade, Benson and Kruse note. "Originally, it wasn't going to be a double stud wall system," says Benson. "It was just going to be working with what was there. They were trying to not add any insulation to the building at all. It was going to be 2x4 walls infilled around the exterior on three sides. But eventually, the client came around and agreed to the double-stud cavity."

"One of the eaves walls is left with the exposed barnboards to the inside," says Benson. "That already had an inch of rigid foam on the exterior, and then they're adding 4 inches of rigid foam to the exterior there, to get it to be a little more equivalent to the other walls. But the reason the client was so enamored of keeping this old barn is that they just loved the patina of the weathered old wood."

"The cool thing about preserving this one wall with those barn boards is that you get to see all the framing and the bracing, and it's a nice rhythm," says Benson. "It's like a truth window—it's a way to see the bones of how this barn worked before."

Ted Cushman is a senior editor at JLC.