

Assessing Surface Decay In Structural Timbers

by John Leeke



In a 1760s timber-framed house I recently worked on, the first floor structural framing had a common problem: Nearly all of the first-floor framing members had seriously deteriorated. Surface fungal decay and insect damage were typical on most joists and girders. But while this damage was widespread, the framing members still had substantial strength.

Condition Assessment

The owner wanted us to assess the situation to make sure the deterioration had stopped and that the framing members were still strong enough to carry their loads. He expressed a strong sense of stewardship in caring for this historic building. He wanted to be sure that any action we took now would have a positive effect 100 years or more into the future.

Avoid the extreme. I know of similar cases where a contractor has advised an owner that the only remedy is the complete removal and replacement of damaged members. That would have been extreme in this case, without first assessing the extent of the damage and the strength of the timbers.

The first-floor framing consisted of these members: sills around the perimeter, two main girders connecting the east and west sills and running beneath the central hallway, chimney girts running along chimney foundations from the main girders to the north and south sills, and joists running from the girders to the sills and supporting the floor boards. All of these were exposed to view from the cellar, and most showed serious decay and insect damage.

The usual procedure is to make test probings with a knife or an ice pick and to take boring samples if needed. By probing with an ice pick throughout the cellar, I was able to determine that the damage penetrated the timbers from 1/2 inch to as much as 2 inches in the case of one main girder (see Figure 1). I also found that the top surface of the timbers was not damaged.

Moisture the culprit. The deterioration had been caused by excessive moisture in the cellar. The addition in recent years of ventilation and a concrete floor seemed to have mitigated the moisture buildup to some extent. But while the cellar generally stays dry, it does become wet on occasion. Water marks on the cellar walls gave some indication

of this. And during the last hurricane to hit the New England area, there were 6 to 8 inches of standing water in one area of the basement. Standing water, of course, translates to high humidity throughout the cellar. Clearly the moisture problem would have to be addressed.

While the framing presently retained enough strength to carry its loads, this might not be the case in the future. The main question was whether or not decay in the wood framing would continue. To assess the situation was difficult because the area of deterioration at the intersection of decayed and sound wood was covered with a thick layer of decayed wood.

Because fungal spores are always present in a cellar atmosphere, fungal activity can subside when the humidity is low and resume when moist conditions prevail. As long as the layer of decayed wood remained on the surface of the timbers, it would be impossible to see whether or not the decay had stopped. Considering the structural importance of the first-floor framing, we had to give the owner some way of observing this.

An Unusual Solution

The treatment I decided on was one I had learned about when a colleague and I were doing a condition assessment on a house in Salem, Mass. Eighteen years earlier, someone had scraped and chiseled off the outer layer of deterioration from first-floor timbers affected with surface decay. So when we arrived to do the condition assessment, it was easy to determine the condition of the first-floor timbers. In that case, the decay had been halted and the owners were able to regularly monitor the situation.

The owner agreed to this technique but, because the decay had affected approximately 560 linear feet of framing, we had to come up with a cost estimate. We first chiseled a test section to obtain a unit-cost figure that could be projected to find the cost of the whole project. Based on the estimate, we decided to remove the surface deterioration in several representative areas of the basement (see Figure 2). This treatment would not affect the strength of the timbers because the decayed wood did not contribute to their strength.

Minimal replacement. With the decayed wood removed, we were able to inspect the framing for areas



Figure 1. Dry, powdery surface decay extends 1/2 to 2 inches into the timbers. Half of the 4-inch blade of the ice pick easily penetrates wood softened by insect and fungal decay.



Figure 2. The author chisels decayed wood off the surface of a timber. With sound wood exposed (inset), it will be easy for the owner to monitor future decay activity.

of extensive decay. The project is still ongoing, but at this point it appears that we will only have to replace one section of one of the main girders. The girder is badly decayed in one 3-foot section, with only about one-third of the sound wood remaining. The repair will involve supporting the adjoining floor areas, cutting out about a 6-foot section of the girder, and scarfing and bolting in new wood of the same dimension and species with mortises cut for the floor-joist tenons.

As for the excessive moisture in the cellar, it seems to have been caused primarily by the ground settling into a reverse grade around the perimeter of the house. Landscaping will take care of that problem, which should dry the cellar considerably. As long as the basement remains dry, it is unlikely that the deterioration of the timbers will continue.

We can confidently say, based upon the areas we have examined, that there is presently no insect or fungal activity taking place. However, it will be the responsibility of the future owners of the house to monitor cellar moisture levels and to regularly inspect the test areas. In addition, somewhere down the road, it would be a good idea to scrape some additional timbers to make sure that no further decay is taking place beneath the surface layer of decayed wood where it can't be seen. ■

This is the last Restoration Primer I will be writing on a regular basis. I've enjoyed sharing what I've learned about early buildings over the past three years. If you would like to keep in touch with me, send your address to: John Leeke, Preservation Consultant, RRI, Box 2947, Sanford, ME 04073.