

Log Building Preservation Calls for Careful Assessment

Editor's note: This bimonthly column provides technical assistance on management, preservation and conservation matters. We invite you to submit questions of interest to your organization; they will be directed to the appropriate staff member at the Minnesota Historical Society for reply. This month's question is answered by Charles W. Nelson, historical architect.

Q: A 19th-century log building was recently donated to our historical society. It is in a state of disrepair but appears to be basically sound. How should we go about preserving it?

Log buildings — from 19th-century settlers' dwellings to WPA-era, rustic-style cabins — are an important part of Minnesota's



Minnesota Historical Society photos

This hewn-log building in Faribault County has been added to since it was built about 1870.

architectural landscape. Yet they can be costly and time-consuming to restore and preserve.

Whether or not you proceed with plans to preserve your building will depend largely on the condition of the structure. The building's condi-

tion, in turn, will determine what repairs need to be made. Then the real work begins — replacing logs, jacking, notching, scribing, chinking and daubing, to name just some of the tasks that may lie ahead.

A word of caution: Log building restoration is labor intensive! Only the most ambitious do-it-yourselfers should tackle this undertaking themselves.

A two-part series of Tech Talks will present a primer of practical information for those of you up to the challenge, along with advice on when to call in a professional.

Not Meant to Last

Early log buildings were often hastily constructed by settlers needing shelter for themselves or their animals. Such buildings were not intended to be permanent.

Some of those that remain were incorporated into later structures and so were spared exposure to the destructive effects of weather. Those left to battle the elements generally require more extensive



Hewn-log buildings have dovetail corners (left). In rustic-style buildings (right), logs are scribed to interlock.

restoration than most enthusiasts are willing to tackle.

Hardy Survivors

A later generation of log buildings, dating to the era of WPA and CCC programs, are more solidly built. These rustic-style structures are made of notched logs that lock together. Because of their tight construction and because they generally have been better maintained, many of these log buildings are in good condition. Deterioration is usually confined to the roof and corners.

Visual Inspection

The first step in any restoration project is to assess the condition of your property. Do this by conducting a complete visual inspection.

Use a checklist to go over every part of the building from foundation to roof. Examine the condition of the logs, inspect the chinking between them, and note the condition of windows and doors.

Be sure to inspect every log. Pay particular attention to the sill log, the key structural member, which rests on the foundation. It should

be at least eight inches above ground level.

Corner design also will determine how sound the building is. Rustic log buildings, with their notched-log corners, are generally more stable than hewn-log buildings. But they may be more difficult to restore if log replacement is necessary. More on that in the next *Interpreter*.

What to Look For

During an inspection, look first for surface rot, insect infestation, abnormal compression of individual logs or other evidence that the building has settled unevenly.



This log, damaged by both water and insect infestation, needs to be replaced.

Next, look for open cracks in the log faces and note any accumulation of debris in the cracks. If the building is chinked, also look for cracks between the daubing and the logs as well as for loose or missing sections. Finally, inspect the log ends, or crowns, for rot and breakage.

As you conduct your inspection, take plenty of photographs to document the condition of the building. They'll be useful later in developing specifications for the restoration work.

Looking Below the Surface

After the initial inspection, it's time to look for problems that might lie below the surface.

Each log should be sounded and probed to determine its solidity. This step calls for an ice pick, a crowbar and an experienced ear.

Hit each log with the crowbar and listen for hollow areas or a rotted center. A hollow log will sound like a drum. (Use the resonance of a solid log as a basis for comparison.)

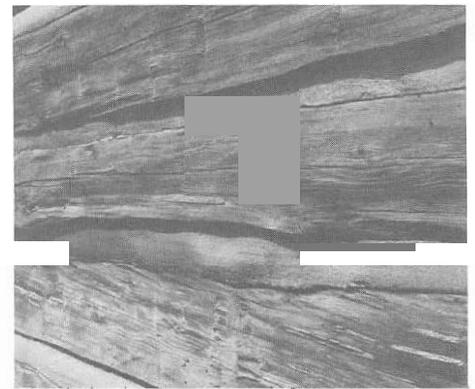
Logs that sound hollow or rotten must be probed to determine the depth of the damage. Be sure to probe all logs near problem areas such as cracks that open upward, missing chinking, and small holes or trails of sawdust that indicate insect infestation.

Some Simple Preservation Measures

If your inspection uncovers only minor deterioration, you may be able to preserve your building without replacing any logs. Here are some simple measures you can take to keep your building in good condition.

- Clear vegetation away from the foundation.
- Be sure that the ground around the sill logs drains properly.
- Use gutters and rain leaders to direct water away from the building.
- Fumigate or spray to rid the structure of insects.
- To protect log surfaces, apply preservatives such as linseed oil or borate solutions, and coat with a water repellent.

CAUTION: The application of fumigants, preservatives and other chemicals may require the services of professionals.



Deteriorated chinking allows water to seep in between the logs.

For More Information

For a list of products that may be used on log buildings, write or call Schroeder Log Home Supply, 4301 W. Highway 2, Grand Rapids, MN 55744, 1-800-359-6614.

See also *Preservation Briefs, No. 26: The Preservation and Repair of Historic Log Buildings*, published by the Preservation Assistance Division, National Park Service, U.S. Department of the Interior.

A limited supply of *Preservation Briefs* is available from the State Historic Preservation Office, (612) 296-5434. The free publication also can be obtained from the Preservation Assistance Division, National Park Service, P.O. Box 37127, U.S. Department of the Interior, Washington, D.C. 20013.

Send Us Your Questions

Need advice on a conservation or preservation matter? We'll pass your question along to an MHS staff person with the expertise to help you solve your problem. Send inquiries to *Interpreter* Editor, Minnesota Historical Society, 345 Kellogg Blvd. W., St. Paul, 55102-1906.

Log Building Restoration: Log Replacement, Chinking, Daubing

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Q: Several logs on our historic log building have rotted. How should we go about replacing them?

The March 1996 issue of the *Interpreter* offered guidelines for assessing the condition of log buildings. This month we'll discuss methods of repairing log buildings to make them weather-tight.

Making Spot Repairs

Not all damaged logs need replacing. If a log is basically sound, it may need only surface repairs or a new end. Such jobs



Epoxy can be used to spot-repair damaged areas on a log.

call for epoxy and fiberglass rods, modern-day materials that have

become popular in log building restoration.

To repair a weak spot on a log, cut out the deteriorated portion and fill the cavity with a mixture of epoxy and sawdust (of the same species as the log).

This technique leaves a distinct patch, which may be made less obvious with sanding and staining or, where historically appropriate, with whitewashing. Patching should not be considered for highly visible areas where a patch would detract from the appearance of the building.

To repair larger areas of surface damage, you may need to put a new "face" on the log. This procedure requires careful fitting. Fashion a half-log face to match the profile of the original log and secure it in place with fiberglass rods and epoxy.

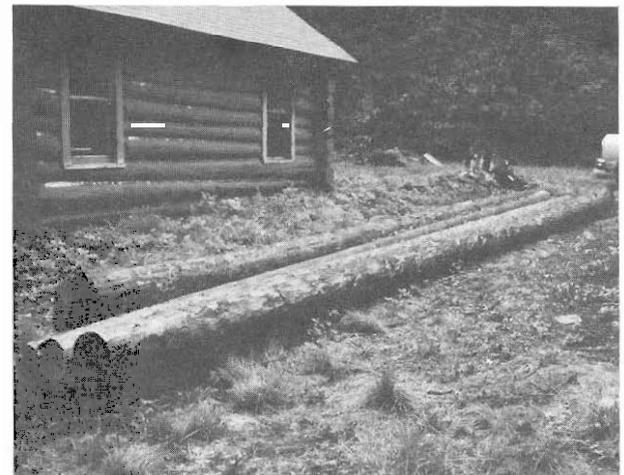
The same operation can be applied to replace rotted crowns, or log ends. Remove the damaged crown, make a new one that duplicates it and splice it to the log with fiberglass rods and epoxy. Do not use metal rods; inert fiberglass is preferable because it will not corrode when embedded in wood.



Fiberglass rods secure a replacement crown.

Preparing for Log Replacement

Replacing a log in the wall of a log building is a relatively straightforward operation. You jack up the logs above to lift the weight of the wall off the log needing replacement. You then remove the rotten log and fit a new one in its place.



Replacing a 32-foot sill log at the Joyce Estate in Itasca County required careful planning and technical know-how.

This operation is not without risks. To minimize the danger of collapse, you must be attentive to the structural position of the log and the construction of the wall.



Vertical supports called cribs stabilize the wall before it is lifted to make way for the replacement log.

It is the corners of a log building that lock it together and transmit the weight of the structure to the foundation. To lift a log wall, you must support its weight without causing undue stress on the corner joints. Thus, it is critical, when positioning jacks, to place them as near the corners as possible.

There are two ways to lift a log wall. The first involves passing steel plates through the wall, from outside to inside, just above the log to be replaced. The building is then lifted by positioning a jack under each end of the plate, inside and outside the building. The drawback to this method is that the log cannot simply be rolled out of the way; it must be removed by pulling it out from one end.

The second method of lifting a log wall is cribbing — sandwiching the wall between a series of vertical

lumber supports, or cribs, that are secured through the wall with threaded rods, washers and nuts and then “snugged” to hold the logs tight. Jacks are placed under the cribs and the wall section is lifted until the rotten log is freed and rolled out of position.

Fitting the New Log

When choosing your replacement log, be sure it is the same species used in the original construction. And the surface treatment should have similar texture and finish (for example, hewn or scribed). This will ensure that, when left to weather naturally, the replacement log will

gradually assume the appearance of the original logs.

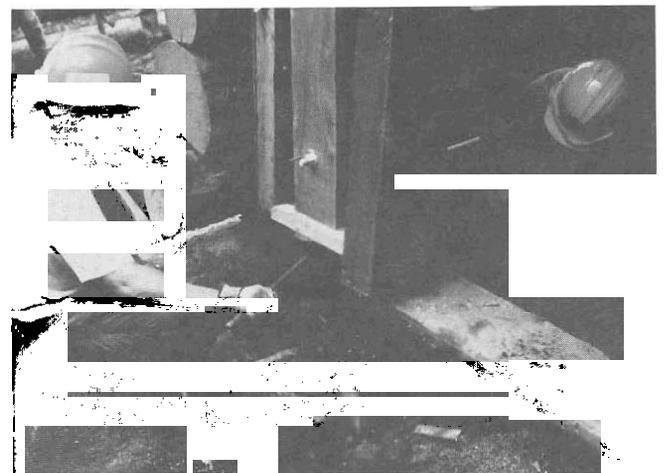
The replacement log also must be DRY. Ideally, you will find a log that has been left to air dry for up to three years. Never use green wood in log replacement work.

Before you maneuver the new log into position, be sure that its profile matches exactly the log to be replaced. A correct fit often requires a bit of fine-tuning. It is not uncommon to raise and lower a wall section several times, or even to remove the replacement log for adjustment and reinstallation.

If several logs need replacing, repeat the process above for each log. If many logs require replacement, it might be worth the time and effort to disassemble and reassemble the entire building. This approach allows for careful analysis of each log. But it may have the adverse effect of destroying significant details of construction, such as interior finishes.

Filling the Gaps

With new logs in place, you’re ready for chinking and daubing to make your building weather-tight. Chinking is material that fills the gaps between logs. Daubing is the mortar that covers the chinking. The amount of chinking and daubing you’ll need to do depends on the quality of your building’s craftsmanship. In tightly constructed buildings, daubing alone may serve to seal the seams between logs.



Workers lift the structure by placing a jack under each crib

Historically, spaces between logs were filled with a variety of materials, from saplings packed with straw and mud to lime-and-sand

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Log Building Restoration

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mortar. Modern chinking materials include rigid foam or stainless steel wire lath. Daubing is then applied directly to the chinking, sealing it from exposure to weather and concealing it from view.

To prepare your own historically appropriate daubing mixture, you'll need sand, hydrated lime and water. I recommend the following mixture:

6 parts sand

4 parts lime

1 part mason's cement

Note: Mortars with a high portland cement content are taboo! However, a small amount of cement will give your mortar added strength.

market today that are more durable than historic mixes. These commercially available mixes are generally more elastic and provide a strong, crack-resistant bond that keeps water out. But these mixes, available only in a limited range of colors, should not be used when a historically accurate appearance is paramount.

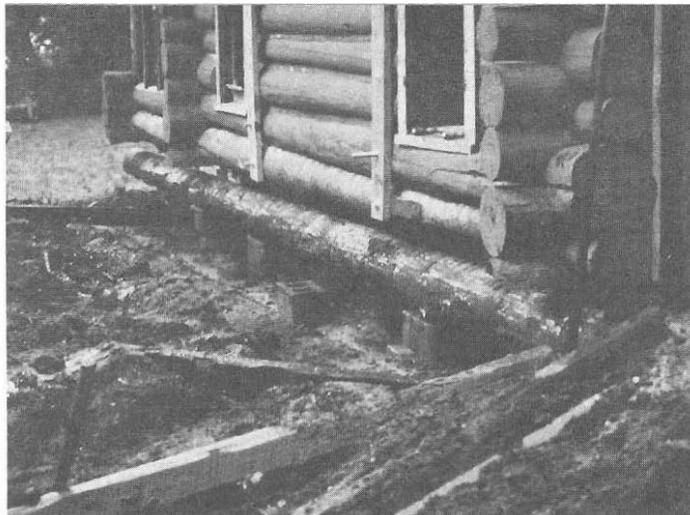


Mortar applied with a trowel seals the seams between logs.

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With the new sill log in position, workers will make sure its curves exactly match those of the overlying log.

Blend the mortar into a stiff, paste-like consistency, then trowel it into the seams. Be sure to contour it to aid rainwater runoff. After it has begun to set, trowel the mortar again to smooth it and seal any hairline cracks. Large areas of chinking should be re-daubed at a later time to fill cracks that appear as the mixture cures.

There are many products on the

Keeping Up Appearances

When your restoration work is done, make a maintenance plan for your log building. It should include yearly inspection of logs, roof and windows as well as the surrounding site. Also schedule periodic repairs of the chinking

and daubing. If you used historically appropriate mortar, you may need to re-daub every five to 10 years.

Such measures will help extend the life of your log building well into the future.

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