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## A Nebraska Log Cabin

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# A Nebraska Log Cabin



*by*

***Marvin Liewer***

## **Preface**

Nebraska pioneers built their homes with materials that were locally available. The prairie often dictated the use of sod. However, logs were generally used when trees were available. Today, logs are used in construction of country homes, vacation cabins, and hunting lodges despite modern construction materials. Log construction is aesthetically pleasing and energy efficient.

In 1994, I began building a log cabin along the Niobrara River near Butte, Nebraska. My goal was to build an attractive, comfortable cabin using local wood products. I used ponderosa pine logs for the walls. Bur oak and green ash lumber was used for window and door trim. Stair and porch railings were constructed from hand-peeled eastern redcedar poles. Redcedar boards were also used for paneling the basement.

The purpose of this report is to describe local wood products and specific constructions techniques used in my successful log cabin project. There are many books available on log home construction. I have tried to avoid duplicating available literature.

## **Log Selection and Specifications**

Ponderosa pine is the dominant tree species in the Pine Ridge area of western Nebraska. The native range of ponderosa pine extends eastward in the Niobrara River Canyons to a point near Springview, Nebraska.

Ponderosa pine trees in Nebraska forests are generally shorter with heavier limbs and more taper than ponderosa pine trees in forests farther west. However, I determined that it would not be difficult to locate suitable logs in Nebraska up to 24 feet in length. Longer lengths, though available, would be much harder to find. Pioneer log cabins I've seen in northern and western Nebraska were almost always 24 feet long or less. My cabin is 16 feet by 24 feet. The combined area of the basement and ground floor is 768 square feet. My logs came from canyons west of Springview, Nebraska, and were purchased from Nebraska Timber, Inc. Log specifications were as follows:

- Minimum length - 18 feet and 26 feet (for finished lengths of 16 and 24 feet)
- Maximum diameter - 11 inches inside bark on the small end
- Minimum diameter - 9 inches inside bark on the small end
- Taper - 4 inches maximum between the small and large end diameters
- Crook or sweep - Variation of 2 inches or less from the center line of the log
- Knots - Maximum diameter on the face of the log of 2 inches and no more than one per linear foot

## **Log Care and Storage**

Ideally the trees would be cut in early winter. Colder weather minimizes insect infestation, mildew and fungal growths that initiate log deterioration. The logs for my cabin were cut in March and April. Ponderosa Pine is not noted for being resistant to rot. Proper care is important to avoid deterioration. The logs were hand peeled in May and June. They were stacked in a criss-cross fashion to allow air to circulate freely through the pile. Moisture evaporates quickly from the cut ends of the logs causing ring separation. I sealed both ends of the log with old paint. This essentially eliminated the problem.

## Construction Technique

I built the cabin with hewed logs. This technique is well described in the book entitled “*A Logbuilders Handbook*” by Drew Langser. I selected this method as it seemed the best procedure for logs with some crook and taper. The resulting walls are plumb on the inside with the curves or crooks being on the top and the bottom of the logs in the finished wall. Most pioneer cabins in Northwest Nebraska were built this way. Hewed logs are also ideally suited for dovetail notches, a self locking notch that seals and weathers well.

I hand hewed the logs with an axe to a 7 inch width. Hand hewing results in random pattern of cuts and nicks in the log that is aesthetically pleasing. Hewing is labor intensive however, and it takes time to learn the skill. This same building technique could also be achieved by running logs through a sawmill to remove slabs on the inside and outside of the logs. A chainsaw with an attachment such as the Haddon Lumber Maker could also be used to rip the slabs from the logs. The sawed surface of the logs could be left as is, smoothed with a power planer, or hand finished with an adz.



I rough hewed the logs in June and July. Late winter would probably be better to reduce the chance of excessive checking. I decked the logs in the shade to reduce the rate of drying. I also painted the logs as they were hewed with a water-soluble wood preservative call “Penetreat.” This prevented mildew and insect infestation and probably slowed the drying rate. I also cut a 2-inch groove with the chain saw on the bottom of the log. This crack widened as the log dried, reducing stress on the lateral faces of the log.

## Foundation and Floor

I constructed the cabin over a full basement. The basement has a poured concrete floor and cement block walls. The walls were insulated on the outside with 2

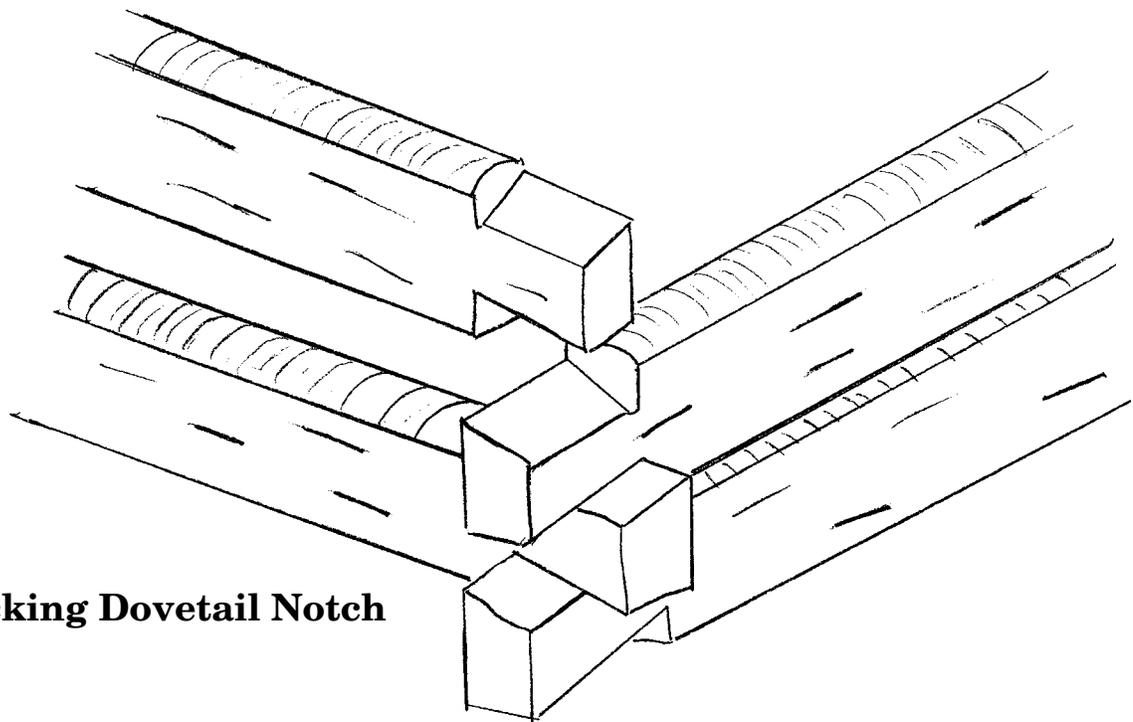
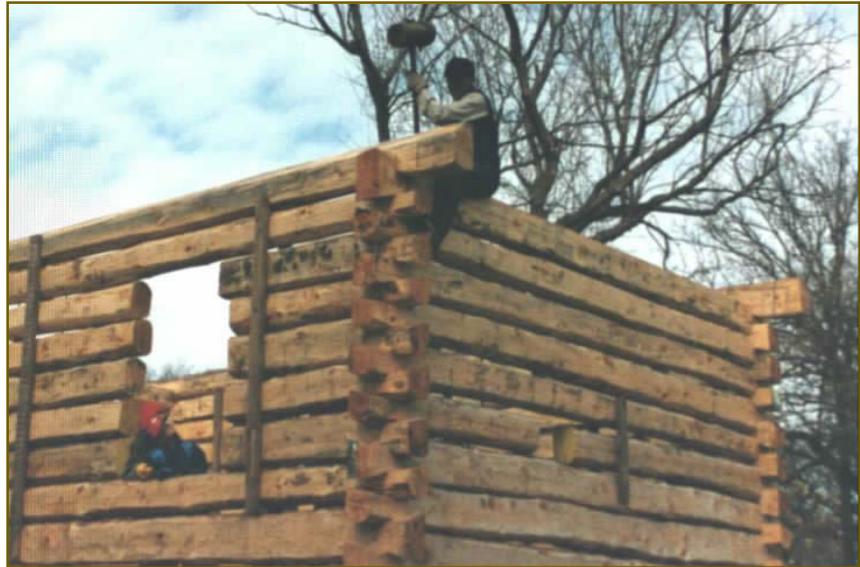


inches of rigid foam insulation. The concrete floor and cement block walls act as a heat sink to moderate temperature fluctuations. This works extremely well with a wood heating stove in the basement. An open stair well allows free movement of air. The basement also keeps the house cooler in the summer.

The floor is of standard carpentry construction. Floor joists are 2 x 10's with a 16 foot span and are covered with a 3/4 inch tongue and groove plywood. Log walls are heavier than conventional construction and one should insure that the foundation and floor structure is adequate for the weight of the logs. The first course of the logs rests directly on the plywood sub floor.

### Erecting the Walls

After all the logs were rough hewed, I began the process of erecting the walls. Logs were given a final and more precise hewing resulting in a smoother log surface. Notches were cut in the ends at this time and the ends were trimmed to final length. Again a "Penetreat" solution was brushed on the logs with special attention to the fresh cut notches. Fresh-cut ends of the logs were painted with linseed oil rather than old paint. The technique for cutting notches is well described in the Drew Langser book.



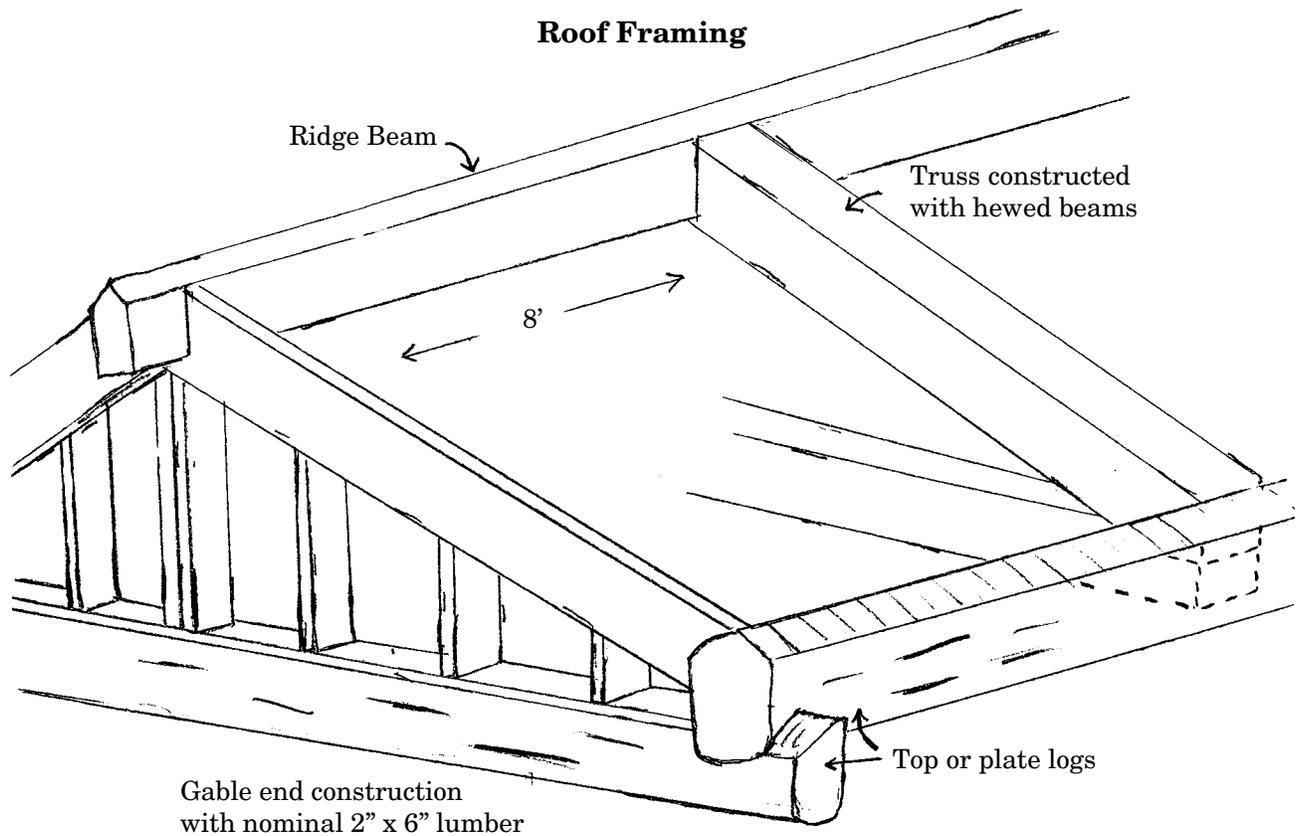
**Self -locking Dovetail Notch**

## Roof Construction

I constructed the triangular gable ends the same as one would for a conventional balloon framed house. Two x six studs were placed on two foot centers and covered with plywood on the outside and sheetrock on the inside. This is a simpler technique than stacking logs to form a triangle.



The roof can be constructed much the same as a conventional house using pre-constructed trusses or rafters and ceiling joists. Plywood sheathing would cover the roof with sheetrock installed for the ceiling. Insulation would be placed above the ceiling.

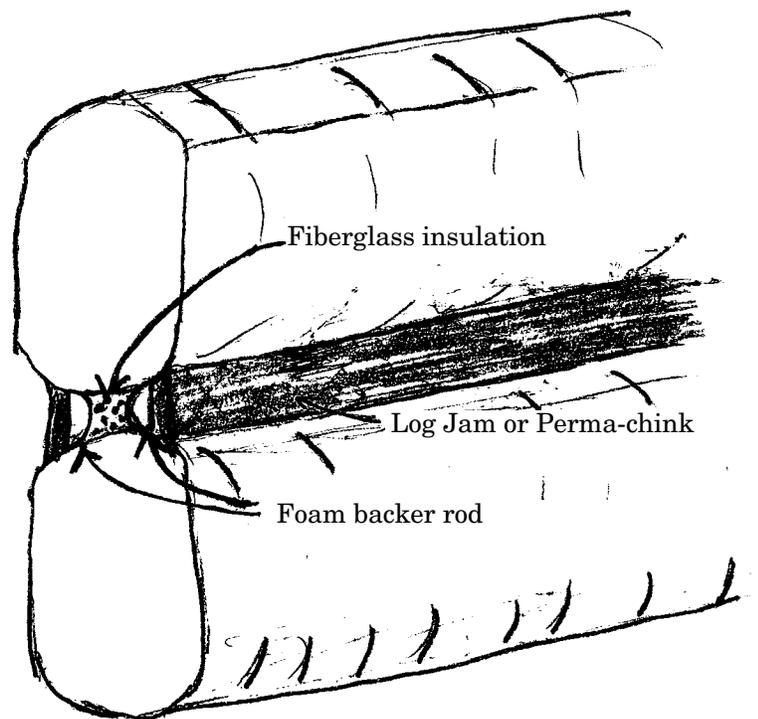


Cathedral ceilings and partial lofts are popular in log homes. I have a cathedral ceiling . I framed the roof with a full-length ridge beam of laminated veneer lumber supported by the gable walls at each end and two 8" x 8" hewed beam trusses on eight foot centers. Preconstructed

panels consisting of 7 ½ inches of rigid foam insulation bonded to ½ inch oriented strand board (OSB) were placed on the roof framing. These panels were four feet wide and thirteen feet long and spanned the distance from the ridge beam to the eave. Structural support for the panels which spanned the distance for the ridge beam to the top log was built into the panel. The panels resulted in a good solid roof with an insulation value of R-30.

## Chinking

Chinking the logs properly is an important step to insure that the walls are tight and draft free. Pioneer log homes were often chinked with a mixture of clay and straw. Mortar was also used. Many walls were later covered with plaster on the interior and boards on the exterior.



Today synthetic compounds that flex as the logs shrink and swell with changing weather are commonly used. A foam backing is used behind the chinking material which, in effect, results in a double seal on both the inside and the outside wall. Fiberglass insulation is placed in the space between the foam backing materials. Two readily available chinking products are “Perma-chink” and “Log Jam.” They are used in almost all commercially built log homes and are available in five gallon buckets. Instructions for applying of these products is supplied with the products. I used Log Jam and had very good results.

## Staining

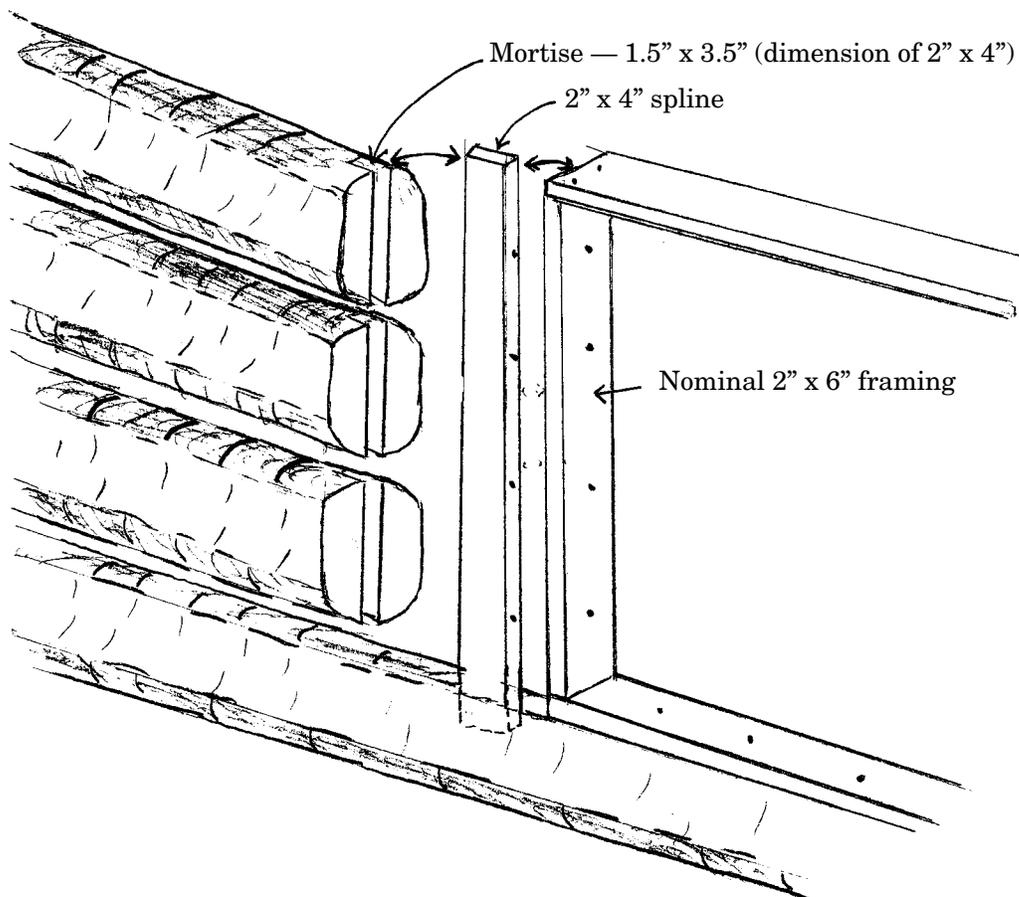
Many different kinds of stains are available for finishing the inside and outside of the logs. It is important to make sure the log stain used is compatible with the chinking material. The chinking may not bond with some of the stains available.

## Windows and Doors

Green logs shrink as they dry and consequently the log walls will settle with time. Most of the settling occurs within the first year, but minor settling will occur for 3 or 4 years. The log walls of my cabin settled 2.5 inches the first year and approximately  $\frac{1}{2}$  inch since then. One must allow for this settling above the window/door frames. Glass windows and doors do not shrink with the walls.

The easiest way to frame door and window openings in log structures is to nail appropriate sized dimensional lumber, i.e. 2 x 6's for 6" walls, directly to the ends of the logs to create a box. The drawback is that as the logs season and shrink in diameter, the walls settle at the corners, but since the logs are nailed to a rigid frame at the windows, they can't settle at that junction. The logs will tend to pull away from the windows and create gaps allowing drats into an otherwise tight structure. To compensate for this settling, one can delay installing windows until the logs have dried. I recommend two years or more.

I elected to frame the openings in such a manner that the logs are allowed to settle. First, I placed nominal 2 x 4 inch splines on each side of the window and door openings. The splines (or wooden uprights) were mortised into the ends of the logs. Then nominal 2 x 6's were fastened to the splines, rather than the ends of the logs, thus framing the left and right side of the window/door openings. Next, 2 x 6's were placed across the top of the window/door opening leaving a gap of 3 inches between the frame and the log above. This gap was later filled in after the logs had settled. The 2 x 6 at the bottom of the frame can be nailed directly to the log at the bottom of the window opening. Conventional windows were installed in the 2x6 inch framed openings.



## Maintenance

One of the most important aspects of constructing a log home is to minimize the exposure of logs to prolonged wetness. Common points of failure of wood structures is where water drips from the roof and becomes trapped on the wood below, and where water splashes from the ground onto lower logs. The bottom log should be at least 12 inches above the ground. The roof at both the eaves and gable ends should be long enough that rain does not hit the log walls except in wind-blown storms. My gable ends extend 2 feet from the log walls. The eaves extend 36 inches horizontally beyond the log walls.

General rules to insure that the log structure performs well:

1. Store logs out of direct sunlight and in a manner that allows full air circulation prior to construction.
2. Apply a preservative treatment such as “Penetreat” as soon as logs are peeled. Apply again if logs are milled or hewed.
3. Construct on a foundation at least 12 inches above ground and construct the roof with long eaves and gable ends.
4. Allow for settling above the window and door frames or delay installation for one to two years.
5. Follow the manufacturers directions for chinking and make sure the chinking is compatible with the log stain if the logs were stained prior to chinking.
6. Finish the logs with stain designed for log homes.

## Reflections

My cabin has been my primary home since 1998. The logs do not have large cracks or checks and none of them have warped or twisted out of place. The chinking has held up well and the walls are tight enough that I have to open the door a crack to get a good draft when starting a fire in the wood stove.

Comfort in both winter and summer have exceeded my expectations. The cabin is aesthetically pleasing. Light reflecting off the hand-crafted walls gives an ambiance that brings peace and contentment.

My log cabin is the culmination of many years of dreaming, planning, and hard labor. Building this cabin was a physical and emotional journey. To take axe and saw and translate my ideas into a comfortable home was a very satisfying experience. It reflects my ideas of responsible living. It has a personal value that cannot be purchased by any amount of money.



“Most men appear never to have considered what a house is, and are actually, though needlessly, poor all their lives because they think they must have such a one as their neighbors have.”

*Henry David Thoreau - Walden*

### ***About the Author***

*Marvin Liewer lives five miles southwest of Butte, Nebraska near the Niobrara River. He majored in Forest Management at Colorado State University and worked for the USDA Forest Service for 30 years before retiring in 1994. Upon retirement he fulfilled a lifelong dream of building with logs. This cabin is now his primary residence. For further information, he can be reached at 47903 901<sup>st</sup> Road, Butte, NE 68722, telephone 402-775-2253.*

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## Sources of Log Building Information:

*A Logbuilders Handbook*, by Drew Langser.

An excellent book on building with hewed logs and dovetail notches.

*The Mother News*. July/August, 1985.

Very good article titled "Building the Traditional Hewn-Log Home" by David Peterson and Peter Gott.

*Building and Restoring the Hewn-Log House*, by Charles McRaven.

A good book if you are restoring and existing log house.

*Building the Alaska Log House*, by Tom Walker.

This book is a good manual fo building with round logs and saddle notches.

## Sources for Materials and Tools:

Schroeder Log Home Supply, Inc.

1107 SE 7<sup>th</sup> Ave.

Grand Rapids, MN 55744

1-800-359-6614

[www.loghelp.com](http://www.loghelp.com)

Perma-chink System, Inc.

1605 Prosser Rd.

Knoxville, TN 37914

1-877-244-6548

[www.permachink.com](http://www.permachink.com)

Premier Building Systems

Mid-America

RR!, Box 101

Mead, NE 68041

1-800-228-4412