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## EC739 Corncrib Construction

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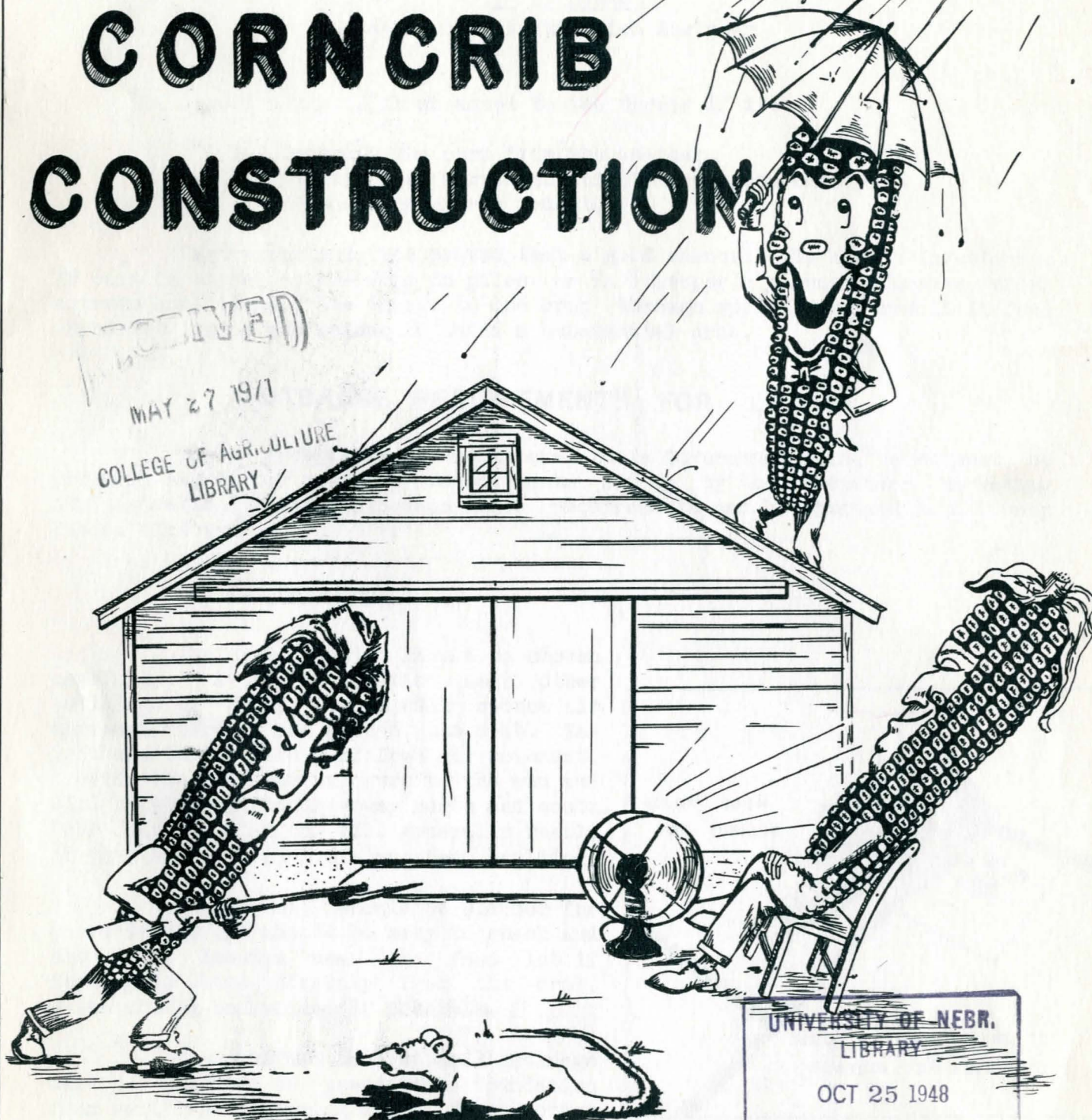
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# CORNCRIB CONSTRUCTION



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COOPERATIVE EXTENSION WORK IN AGRICULTURE AND HOME ECONOMICS  
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DEPARTMENT OF AGRICULTURE COOPERATING, H.G. GOULD, ACTING DIRECTOR  
LINCOLN.



# CORNCRIB CONSTRUCTION

By

E. A. Olson  
Agricultural Extension Engineer

A good corncrib is an asset to the farmer if it:

1. Protects the corn from the weather.
2. Permits free air circulation through stored corn.
3. Protects corn from rodents.

Past experience has proven that a good corncrib is a good investment. If corn is stored on the farm in piles or in improperly planned storages under extreme conditions, the damage to one crop through spoilage may result in feed or market losses sufficient to build a substantial crib.

## STORAGE REQUIREMENTS FOR LOANS

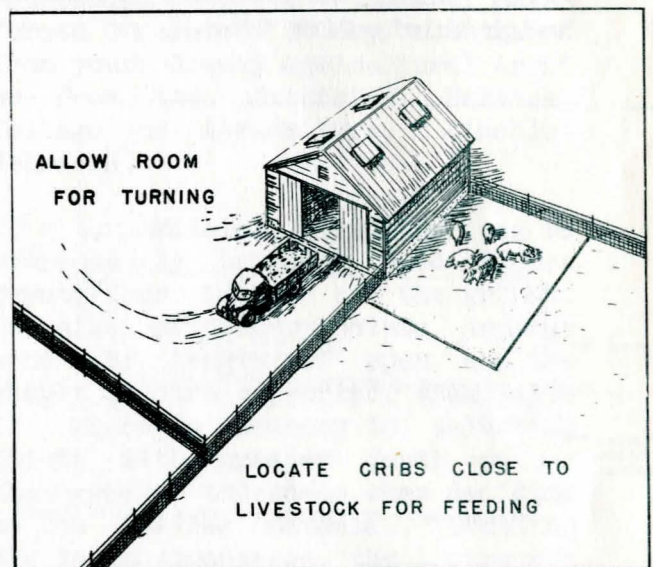
To be acceptable as collateral for a Government loan, corn must be properly stored to meet the requirements set up by the Production Marketing Administration. Information on these requirements can be obtained from County P.M.A. offices.

## LOCATION

The crib location should be chosen carefully. Avoid a location near other buildings or trees, these will reduce air movement through and around the crib. Select a site for plenty of free air movement. Provide the maximum exposure to the sun and wind by placing the driveway north and south. Poor air circulation will generally result if the crib is part of another building.

A good crib should be planned for convenience. It should be easy to reach and should be located near the feed lot if feeding is done directly from the crib. Gates should be avoided if possible.

Good surface and subsoil drainage must be provided to prevent the foundation from settling or heaving due to frost action.





## MATERIALS

The selection of materials for construction, and the manner in which they are assembled are of great importance. Permanent cribs for storing corn may be made of wood, masonry, or metal. No one material should be considered superior for use under all conditions, in as much as satisfactory combinations of wood, metal, and masonry have prevailed for a long time. A well-designed and well-constructed corn storage structure of any of the common materials provides economical storage, is durable, safe against wind and fire damage, and is attractive in appearance.

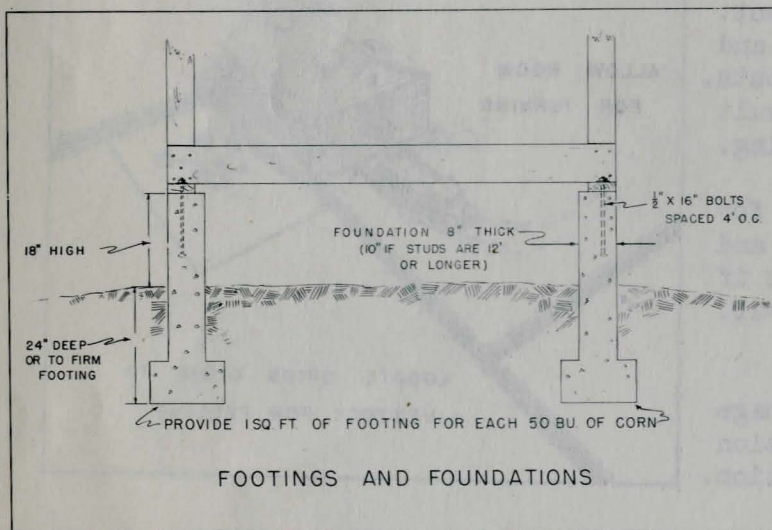
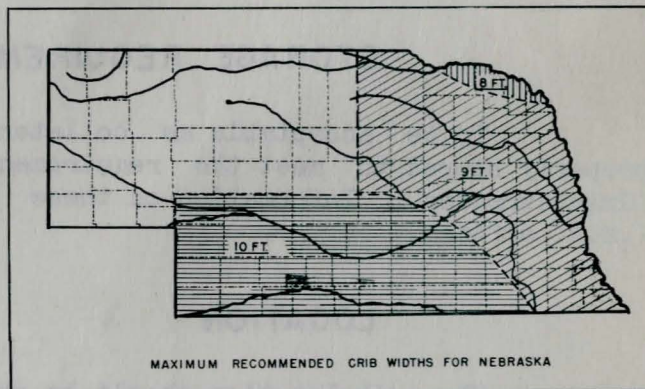
In constructing a cornerib, proper planning of the foundation, floor, walls, bracing, roofing, and rat proofing, will add many years of life to the structure, and afford the greatest protection to stored corn from weather and rodents.

## CRIB WIDTH

Unless you plan to use artificial ventilation, the crib width is the most important dimension, since it determines whether natural drying will occur. The recommended crib width varies for different parts of the state as shown on the map.

## FOUNDATIONS

The foundation and footing must be more sturdy on a cornerib and granary than any other building, due to the weight that it supports. The weight of ear corn in a crib is many times that of the building. For example, a 1,000 bushel crib may weigh about two tons, while the corn that fills it may weigh thirty-five tons.



The illustration at the left shows a typical foundation for a cornerib. Allow one square foot of footing for every fifty bushels of ear corn. Place the footing on firm ground at least twenty-four inches below the surface. This will help prevent heaving and undermining. Two  $\frac{3}{8}$ " reinforcing rods placed in the top and bottom of the foundation will add a lot to its strength.

For a wood floor, the foundation should be at least eighteen inches above the ground level. This allows ventilation and increases the life of the sill, studs, and joists. It also discourages rats from harboring under the floor.

Sills should be anchored to the foundation with  $\frac{1}{2}$ " x 16" bolts set in the foundation at spacings not to exceed four feet.



Gutters and downspouts on a crib will help protect side walls from moisture and will prevent undermining of foundations.

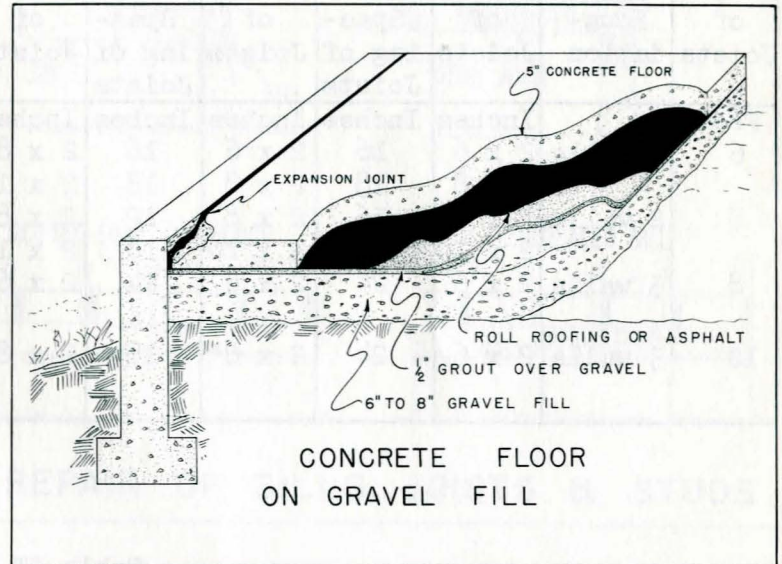
## FLOORS

Concrete is frequently used for corncrib floors. To prevent ground moisture, due to capillary action, from entering the crib, a concrete floor should be placed on a gravel fill, (shown at the right) or suspended above the ground. After the gravel fill has been placed, one half inch of grout or cement is placed over the gravel and allowed to set. Then a moisture barrier of roll roofing (use asphalt to seal joints) or hot asphalt is applied. Next the concrete floor is laid on the barrier.

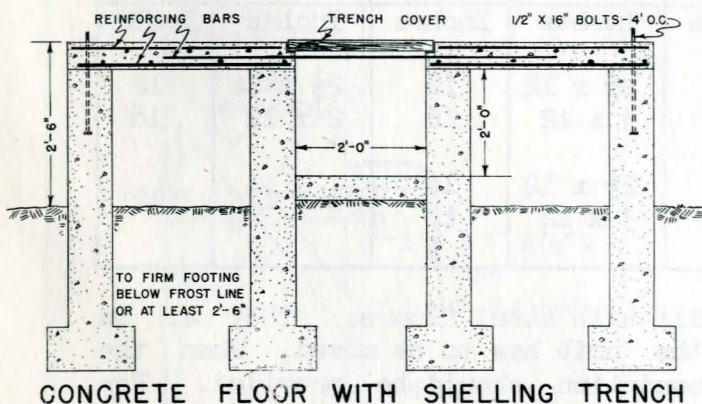
On old concrete floors, two things can be done to reduce dampness:

1. Place a layer of moisture proof paper on the floor and cover it with boards.

2. Paint the concrete floors with two coats of asphalt-aluminum paint.



Suspended concrete floors also help eliminate moisture troubles. This type of floor can be built with or without a shelling trench. Complete information on the construction of this type of floor is available in the Portland Cement Association circular entitled "Suspended Concrete Floors of Reinforced Concrete". It may be obtained from your County Agricultural Agent or from the Extension Service, College of Agriculture, Lincoln, Nebraska.



DETAILS FOR CONSTRUCTION ARE GIVEN IN  
PORTLAND CEMENT ASSOCIATION CIRCULAR  
"SUSPENDED CORN CRIB FLOORS OF  
REINFORCED CONCRETE."

Moisture troubles can be overcome by building wood floors twenty-four inches off the ground. The size of floor joists depends upon the length of span and the weight of corn supported. (See Table I) There is economy in selecting joists with greater depth rather than greater thickness when deciding to use heavier material. Doubling the depth increases the strength four times, while doubling the thickness only doubles the strength. (This principle holds for studs as well as joists.)



Table I

Size of Joists Required for Different Widths and Heights of Cribs

Length of Joists	Type of Foundation	Height of crib									
		8 feet		10 feet		12 feet		14 feet		16 feet	
		Size of Joists	Maximum Spacing of Joists	Size of Joists	Maximum Spacing of Joists	Size of Joists	Maximum Spacing of Joists	Size of Joists	Maximum Spacing of Joists	Size of Joists	Maximum Spacing of Joists
Feet		Inches	Inches	Inches	Inches	Inches	Inches	Inches	Inches	Inches	Inches
6	2 walls	2 x 6	16	2 x 6	16	2 x 8	18	2 x 6	12	2 x 8	18
		2 x 8	18	2 x 8	18	2 x 10	24	2 x 10	24	2 x 10	24
8	2 walls	2 x 8	16	2 x 8	12	2 x 8	12	2 x 10	18	2 x 10	16
		2 x 10	24	2 x 10	18	2 x 10	18		18	2 x 10	18
8	3 walls	2 x 6	24	2 x 6	24	2 x 6	24	2 x 6	18	2 x 6	18
								2 x 8	24	2 x 8	24
								2 x 8	18	2 x 8	18
10	3 walls	2 x 6	24	2 x 6	18	2 x 8	24	2 x 8	18	2 x 8	18
								2 x 10	24	2 x 10	24

Table II

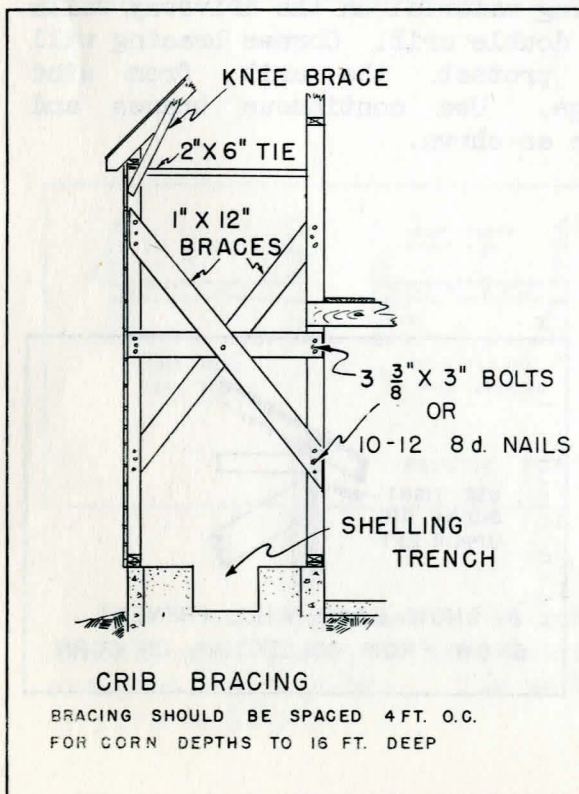
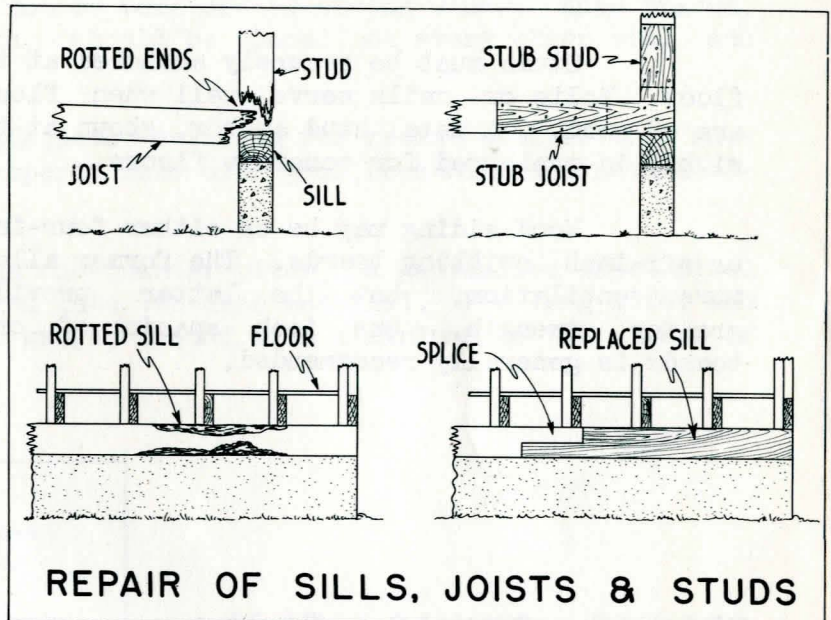
Size and Spacing of Joists for Overhead Bins

Width of Driveway	Depth of Grain							
	4 feet		6 feet		8 feet		10 feet	
	Size of Joists	Maximum Spacing of Joists	Size of Joists	Maximum Spacing of Joists	Size of Joists	Maximum Spacing of Joists	Size of Joists	Maximum Spacing of Joists
	Inches	Inches	Inches	Inches	Inches	Inches	Inches	Inches
10 feet	2 x 8	12	2 x 12	12	2½ x 12	12	2½ x 12	12
	2 x 10	16	2½ x 12	18	3 x 12	16	2 x 12	18
11 feet	2 x 10	12	2 x 12	12	2½ x 12	16	3 x 12	12
	2 x 12	18	2½ x 12	16	3 x 12	12		

Many metal or steel cribs are built with steel floors. They can be set on a platform of boards or planks if the crib has to be moved. When the location is permanent a sturdy concrete foundation should be provided. For temporary support these cribs can be supported on a six inch gravel fill held in place by masonry blocks. When the metal crib is placed on a fill, the underside of the floor should be covered with asphalt roofing paint for protection against rust.



Sills, joists, and studs are often "rotted out" due to exposure. The studs and joists can be repaired with stubs fastened securely to the old members. Adequate nailing or bolting is necessary. Some means to support the building when repairing these members must be provided. Remove the rotted portions of the sill and replace with creosoted material.



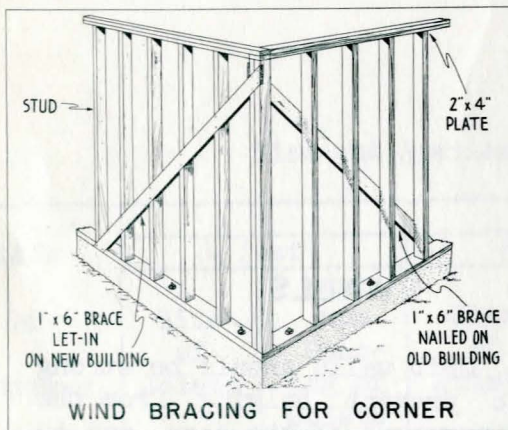
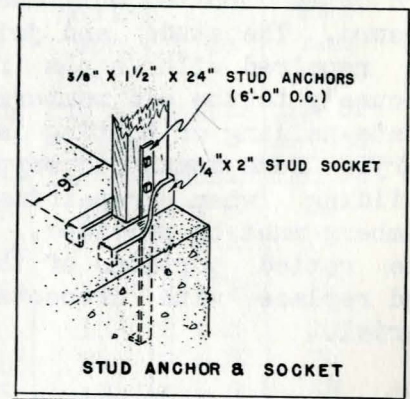
## WALLS

Crib walls should be strong enough to prevent bulging from the outward pressure of the corn, and to prevent the crib from racking from strong winds when empty. Good practice calls for the use of 2 x 6 studs placed two feet on center, tied together with braces and cross ties at four foot intervals as shown at the left. This type of bracing is adequate for depths up to sixteen feet. If studs are eighteen to twenty-four feet 2 x 8 studs should be used.



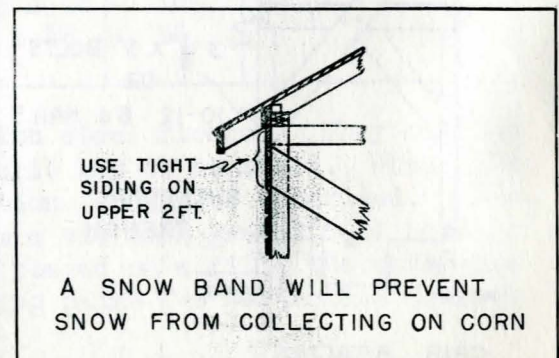
Studs must be securely anchored at the floor. Bolts or nails serve well when floors are of wood. A metal stud anchor, shown at the right, is preferred for concrete floors.

Wood siding may be of either four-inch or six-inch cribbing boards. The former allows more ventilation, but the latter provides greater strength. One inch spacing of crib boards is generally recommended.



Diagonal siding offers the advantage of sturdy bracing, but tends to decay at lower ends due to water running down the boards. Advantage may be taken of diagonal siding as bracing material on the driveway walls of a double crib. Corner bracing will help protect the crib from wind damage. Use continuous braces and place as shown.

A snow band made by placing tight siding about two feet below the eaves will improve a crib materially by preventing snow from collecting on top of the corn.



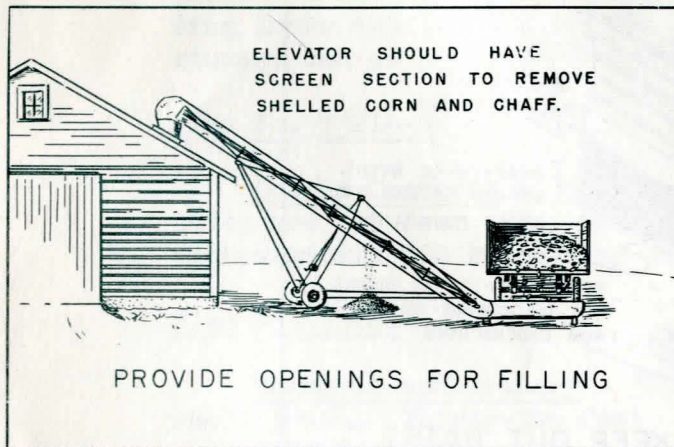


## ROOFS

The crib roof should be constructed of substantial material and well-fastened and anchored so it will not be torn off by strong winds. Knee braces, as shown in a previous illustration, should be placed on every other stud and rafter.

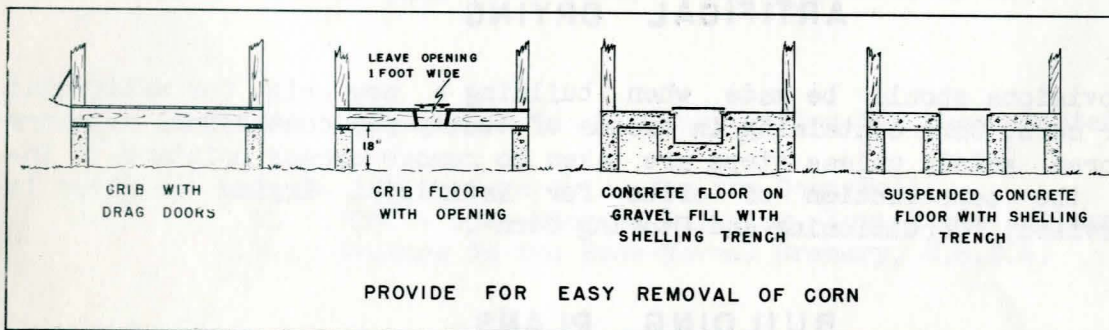
Wood shingles make an adequate covering for roofs steeper than one-quarter pitch. They should be properly laid over good sheathing and nailed securely with rust resistant nails.

For roofs with less than one-quarter pitch, a galvanized sheet steel roof is satisfactory if well nailed into two-inch material. For long life, use sheet steel no lighter than No. 28 gauge, coated with a minimum of two ounces of zinc per square foot.



## LABOR SAVING DEVICES

In addition to providing safe storage, cribs should be built so they can easily be filled or emptied. When an outside elevator is used, roof hatches should be provided for filling. (The elevator should be equipped with a screen or rod section to aid in removal of shelled corn and chaff, since they restrict air movement through the ear corn).



Corn can easily be removed from the crib for shelling if a shelling trench, open floor, or drag doors are provided as shown above. These devices are good labor savers. The method selected will depend partially upon the type of floor built.

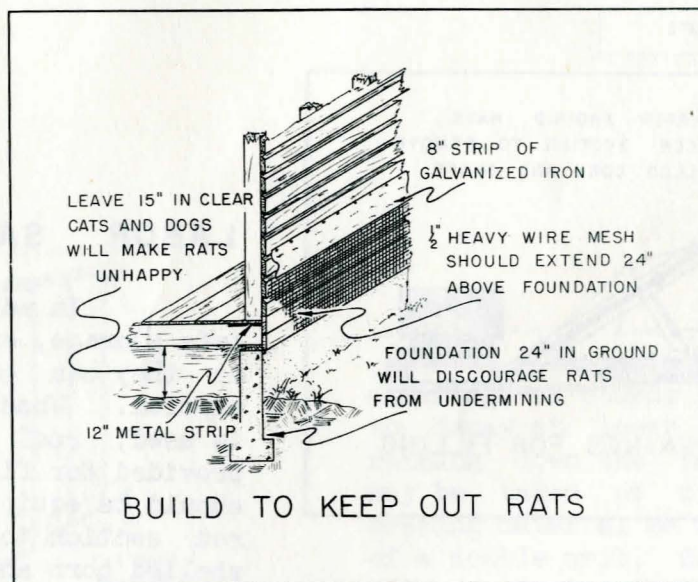


## RATPROOFING

Concrete foundations, walls, and floors are most effective in excluding rats. Rats and mice may cause not only the loss of considerable corn, but also much damage to the building.

One rat will eat fifty pounds of corn and destroy or spoil another fifty to one-hundred pounds in one year. The cost of excluding rats is less than feeding and harboring them.

One method of rat-proofing a building is shown below. The wire mesh and galvanized strip should be continuous around the building and along the crib walls on the driveway.



## ARTIFICIAL DRYING

Provisions should be made when building a new crib for artificial drying of ear corn. Corn containing in excess of twenty per cent kernel moisture cannot be stored safely unless steps are taken to remove excess moisture. Information on the construction of cribs for artificial drying is given in E. C. 738, Revised, "Conditioning and Storing Corn".

## BUILDING PLANS

It is unwise to attempt to erect any substantial building, particularly large grain storage structures without carefully prepared plans. Lack of knowledge of the strength of material, their proper selection and placing, and the relationships of the various members in the structures have caused many failure of corncribs.



The plans listed below should be of help in planning and erecting suitable corncribs. They are available for a small charge from the College of Agriculture at Lincoln, Nebraska. Additional information on these plans will be found on plan sheets which may be seen at the County Extension Office or obtained from the Extension Service, College of Agriculture at Lincoln.

Plan No. 10.732-15

Single Crib - 900 bushel - 8 feet wide by 32 feet long, equipped with drag doors.

Plan No. 5535

Corncrib and Granary - 1000 bushel ear corn and 2000 bushel small grain. Twenty-seven feet wide by thirty-two long - 8 foot crib with drag doors and 11 foot driveway. If cribs are provided on both sides, storage can be provided for total of 2000 bushels of ear corn.

Plan No. 73214-A

Double Corncrib - 2500 bushels - 31 feet wide by 32 feet long, cribs are 10 feet wide with shelling trench. Overhead storage for approximately 500 bushels of small grain is provided.

Plan No. 73221

Corncrib and Granary - 3600 bushels ear corn and 2800 bushels of small grain. Thirty-two feet wide by twenty-seven feet long, cribs are eight feet wide and are shown with shelling trench. Gable roof is shown with cupola for housing inside elevator.

Plan No. 73222

Same as plan 73221 except roof is gambrel or hip.

Information contained in this publication has been adapted from:

F. B. 1701 - Corn Cribs for the Corn Belt  
E. C. 262 - Corn Storage Building, Iowa State College  
Corn Storage in the Ever-Normal Granary, U.S.D.A.