

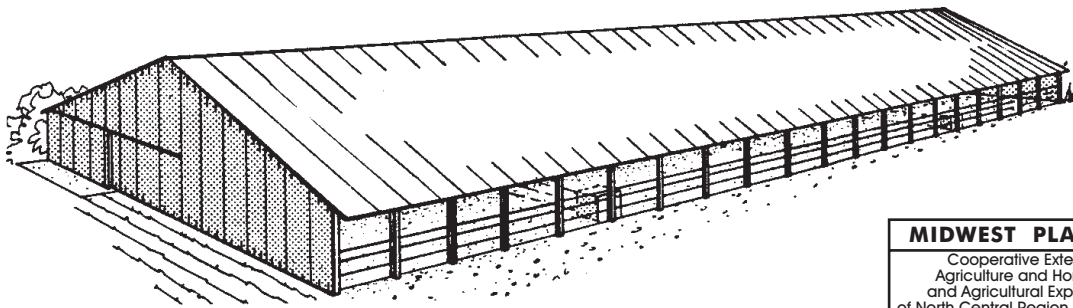
# MWPS-72440

## 48' Confined Beef Barn

An open front pole building for 320 feeders in complete confinement. Covered feed alley with fenceline bunk. Slotted floor with 8' manure pit.

### CAUTION!

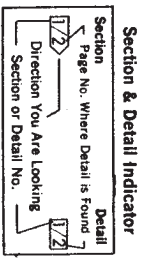
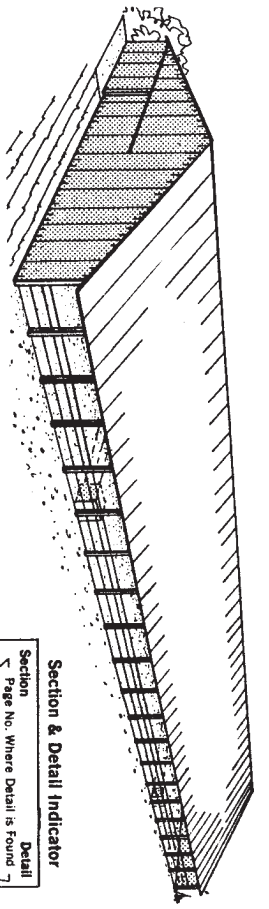
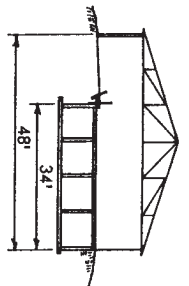
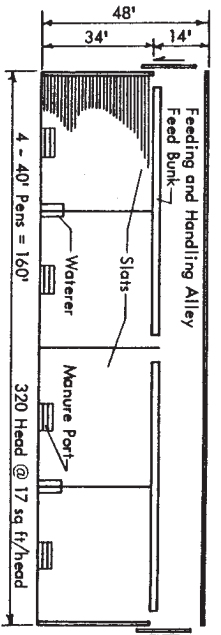
Additional professional services will be required to tailor this plan to your situation, including but not limited to: assurance of compliance with codes and regulations; review of specifications for materials and equipment; supervision of site selection, bid letting and construction; and provision for utilities, waste management, roads or other access. **Furthermore, any deviation from the given specifications may result in structural failure, property damage, and personal injury including loss of life.**



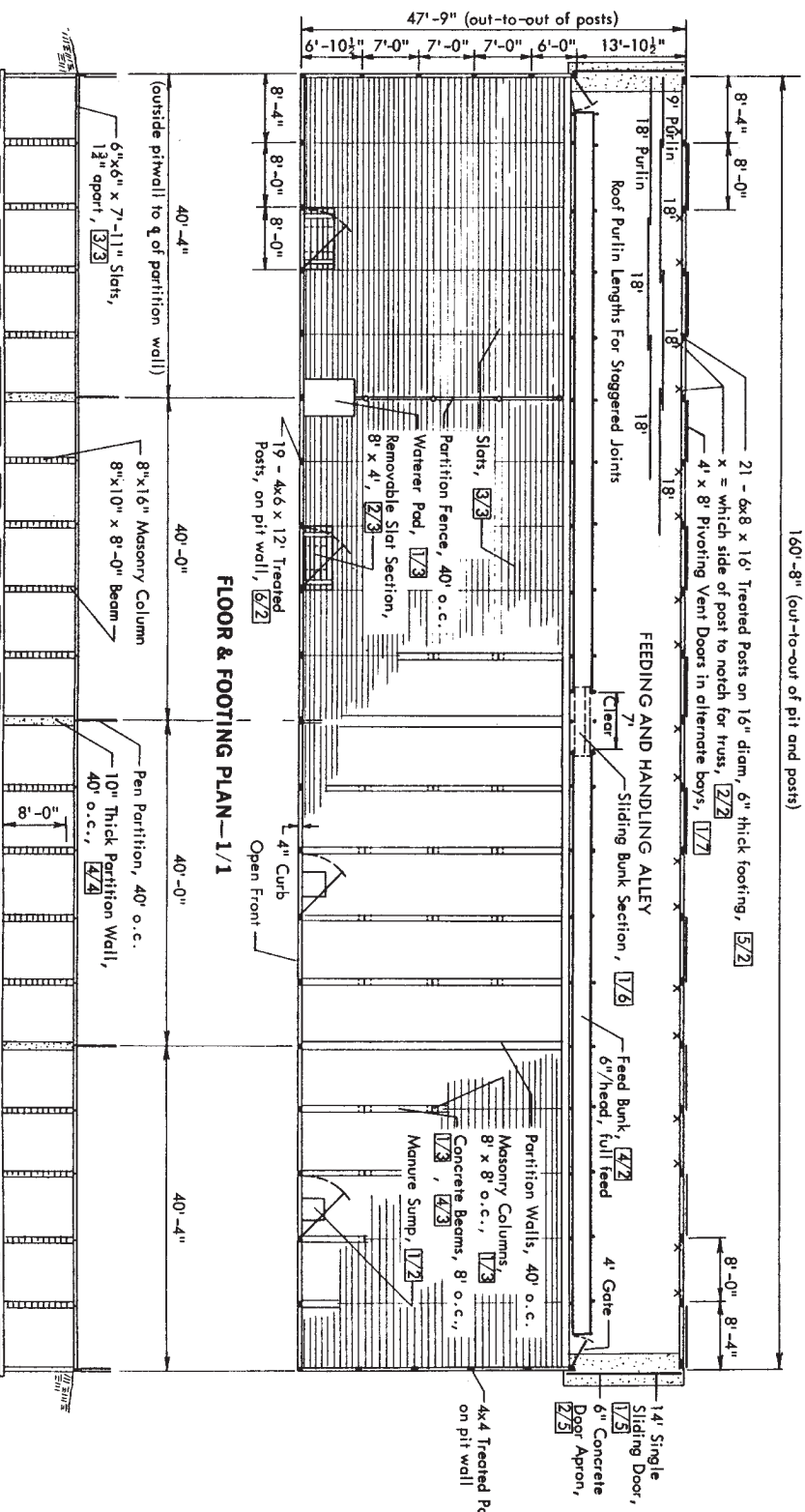
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|--|
| <b>MIDWEST PLAN SERVICE</b><br>Cooperative Extension Work in<br>Agriculture and Home Economics<br>and Agricultural Experiment Stations<br>of North Central Region - USDA Cooperating |
| 48' Confined Beef Shed   |
| Title Page   |
| MIDWEST PLAN NO. 72440   |

## **WARRANTY DISCLAIMER**

This plan provides conceptual information only. **Neither midwest plan service nor any of the cooperating land-grant universities, or their respective agents or employees, have made, and do not hereby make, any representation, warranty or covenant with respect to the specifications in this plan.** Additional professional services will be required to tailor this plan to your situation, including but not limited to: assurance of compliance with codes and regulations; review of specifications for materials and equipment; supervision of site selection, bid letting and construction; and provision for utilities, waste management, roads or other access.



**\*PREFERRED LUMBER SPECIFICATIONS**  
 Roof Purlins and Wall Girts  
 2x4 Construction Grade (Doug Fir or Southern Yellow Pine)  
 2x6 No. 2 (Doug Fir or Southern Yellow Pine)  
 Trusses and Headers  
 No. 1 or 150F machine rated (Doug Fir or Southern Yellow Pine)  
 Posts and Spasiboards  
 Pressure Treated (Southern Yellow Pine or equivalent) creosote 10 pct. Pils 350 pct. ACh or CCh (Type A or B) - 0.40 pct.  
 \*For alternate member sizes using Hem-Fir and round poles, see page 2 and Truss Page.  
 Use 48' glue-nailed trusses, 8'-0" o.c.



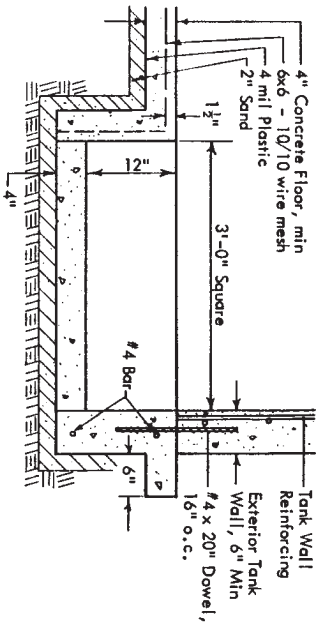
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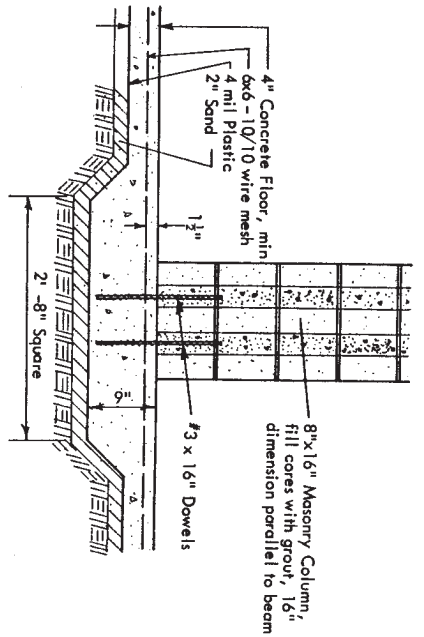
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**48' CONFINED BEEF SHED**  
 slotted floor, open-front, inside bunk

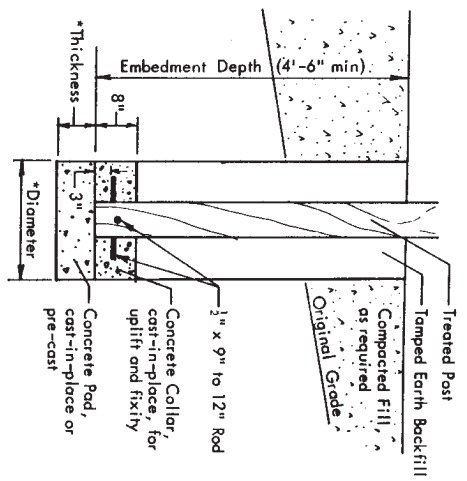
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SUMP DETAIL-1/2



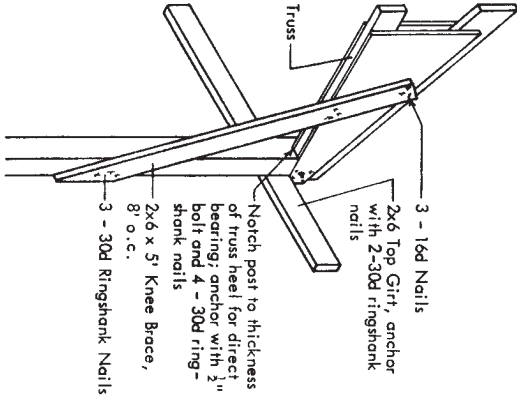
MASONRY COLUMN FOOTING DETAIL-3/2



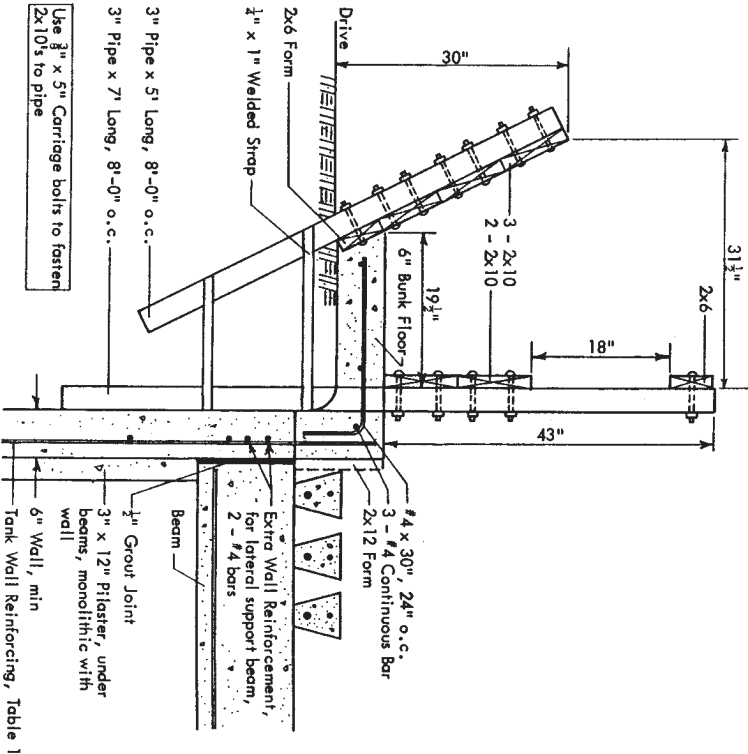
FOOTING DETAIL-5/2

\*Footing Size  
16" Dia x 6" Thick @ Sidewall Posts

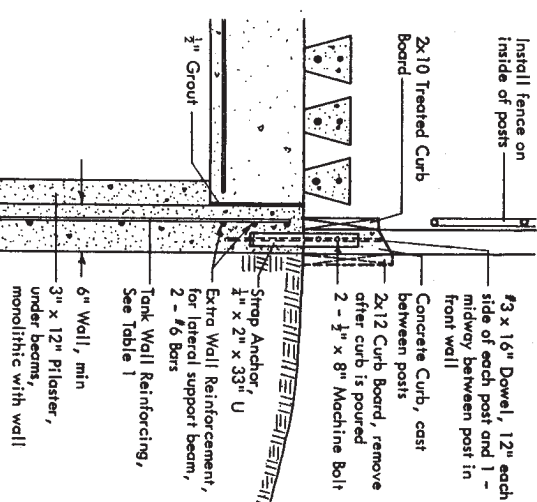
Extend embedment depth as required to place footing on undisturbed soil. For large diameter footings, use smaller diameter auger and flare the bottom of the hole with Lineman's spoon.



KNEE BRACE DETAIL-2/2

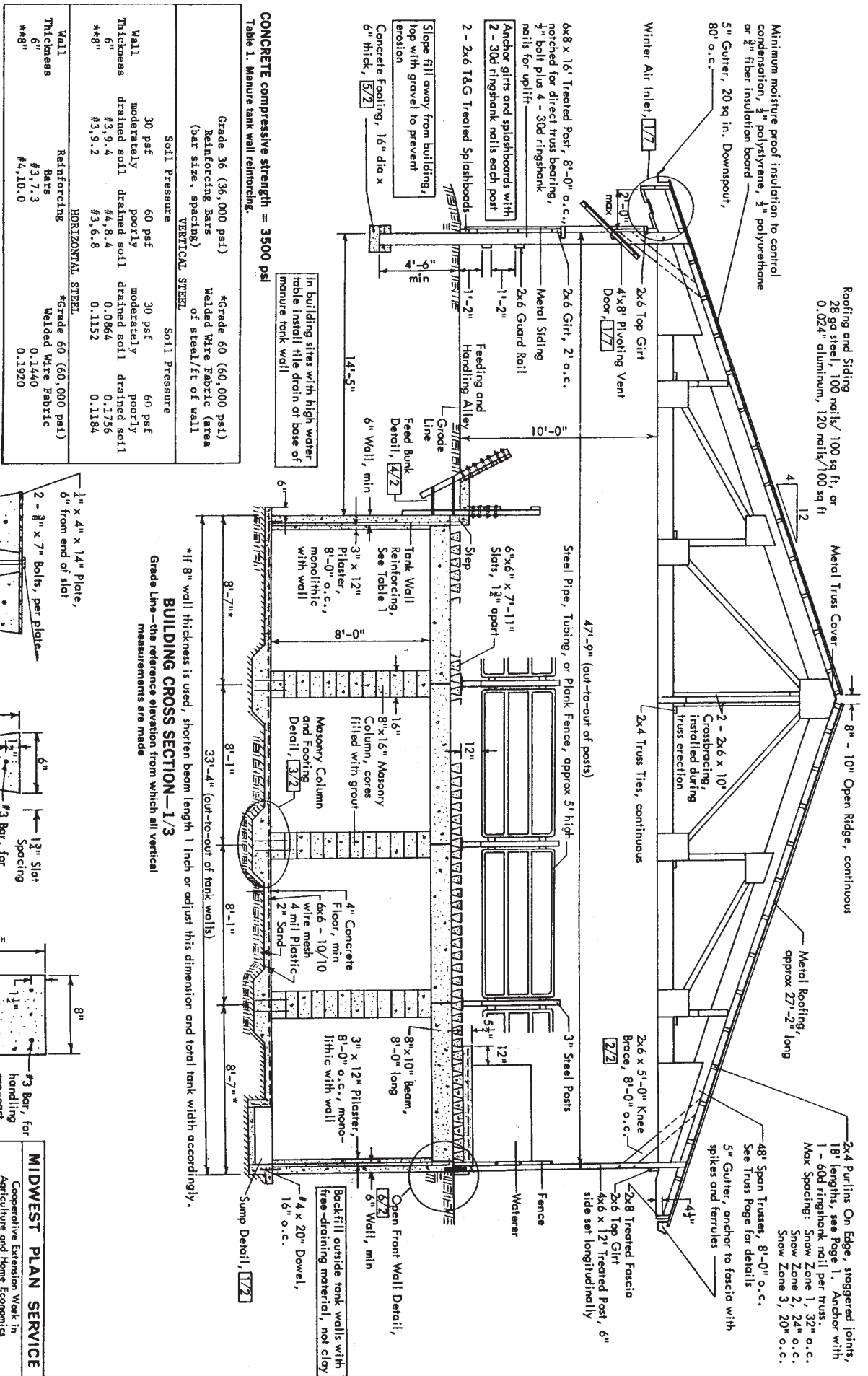


FEED BUNK DETAIL-4/2



OPEN FRONT WALL DETAIL-6/2

|   |
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CONCRETE compressive strength = 3500 psi  
 Table 1. Manure tank wall reinforcing.

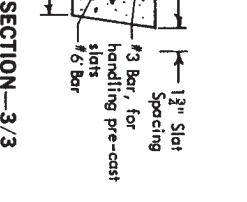
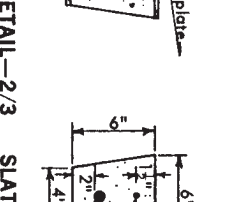
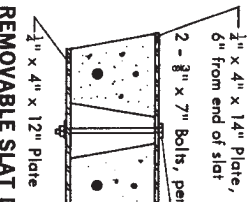
| Wall Thickness | Grade 36 (36,000 psi) Reinforcing Bars (bar size, spacing) |                            | Grade 60 (60,000 psi) Welded Wire Fabric (area of steel/ft of wall) |                            |
|----------------|--|----------------------------|---|----------------------------|
|                | VERTICAL STEEL   | SOIL PRESSURE              | VERTICAL STEEL  | SOIL PRESSURE              |
| 6"             | 30 pcf moderately drained soil                             | 60 pcf poorly drained soil | 30 pcf moderately drained soil                                      | 60 pcf poorly drained soil |
| **6"           | #3, 9.4  | #4, 8.4                    | 0.0864  | 0.1756                     |
| **8"           | #3, 9.2  | #3, 6.8                    | 0.1152  | 0.1184                     |

| Wall Thickness | Grade 60 (60,000 psi) Reinforcing Bars |                                | Grade 60 (60,000 psi) Welded Wire Fabric |               |
|----------------|--|--------------------------------|--|---------------|
|                | VERTICAL STEEL                         | SOIL PRESSURE                  | VERTICAL STEEL                           | SOIL PRESSURE |
| 6"             | #3, 7.3                                | 60 pcf moderately drained soil | 0.1140                                   | 0.1140        |
| **8"           | #4, 10.0                               | 60 pcf poorly drained soil     | 0.1920                                   | 0.1920        |

\*NOTE: Flat sheets of welded wire fabric should be used, not rolls. Two layers may be used to provide required steel area. Reinforcing bars (Grade 60, #3, #4, or #5) may be attached to welded fabric to increase steel area.)  
 \*\*NOTE: For 8" wall, beams may be supported in 3"x8"x10" notch in tank wall.

\*If 8" wall thickness is used, shorten beam length 1 inch or adjust this dimension and total tank width accordingly.  
 BUILDING CROSS SECTION—1/3  
 Grade Line—the reference elevation from which all vertical measurements are made

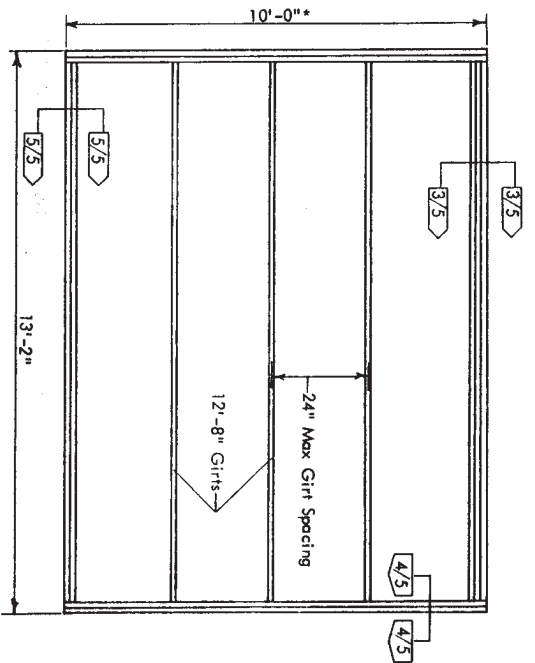


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**481 CONFINED BEEF SHED**  
 slotted floor, open-front, inside bunk

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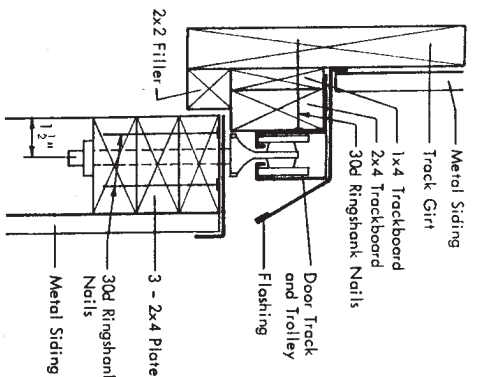


**SINGLE SLIDING DOOR FRAME—1/5**

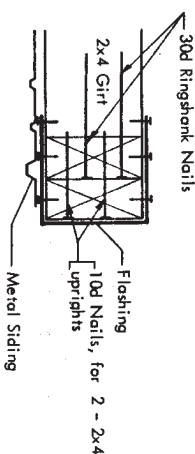
\*If sliding door apron, 2/5, is not installed, reduce door panel height by 2".

**ESTIMATING LIST**

| Manure Tanks                    |       |
|---------------------------------|-------|
| Floor                           | 68    |
| Concrete, cubic yards           | 1200  |
| Welded wire fabric, lbs         | 95    |
| Walls (6 in., 30 lb/sq ft load) | 6600  |
| Concrete, cubic yards           | 432   |
| Steel, Grade 36, lbs            | 36    |
| Columns                         | 1000  |
| Masonry block, 8" x 16"         | 19    |
| Beams, 6" x 6" x 8'             | 2     |
| Slats, 6" x 6" x 7' - 11"       | 380   |
| Trusses                         | 230   |
| 3/4 ft trusses                  | 120   |
| End wall trusses                | 6250  |
| Posts (pressure-treated)        | 1600  |
| 4x6, feet                       | 860   |
| 4x4, feet                       | 11500 |
| Purlins (Zone 3) and Truss Ties | 10    |
| 2x4's, feet                     | 2     |
| Wall Girts, Braces Guard Rails  | 152   |
| 2x6's, feet                     | 260   |
| Splashboards (pressure-treated) |       |
| 2x6's, feet                     |       |
| Roofing and Siding, sq ft       |       |
| Pivoting Vent Doors (4' x 8')   |       |
| Sliding Doors (10' x 14')       |       |
| Feed Bunk, feet                 |       |
| Fencing, feet                   |       |

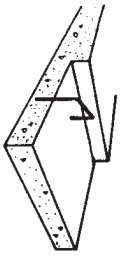


**DOOR TRACK ASSEMBLY—3/5**



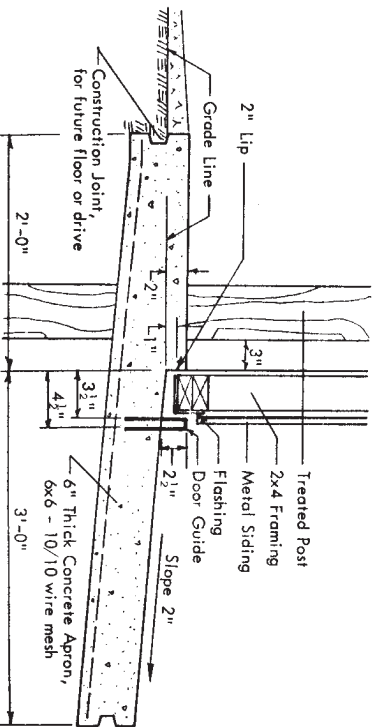
**UPRIGHT SECTION—4/5**

Extend flashing around uprights and nail to girts and uprights.



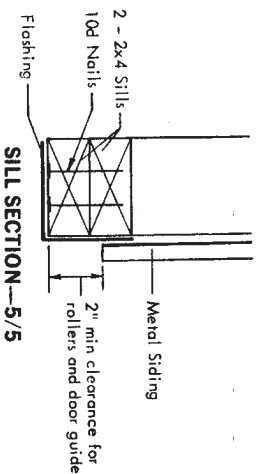
**"U"-Shaped Door Guide**

Locate 1/2" dia x 20" "U"-shaped door guide at closing jamb of door to force closing door against apron lip. Taper from 4 1/2" to 3 1/2" clearance.



**SLIDING DOOR APRON—2/5**

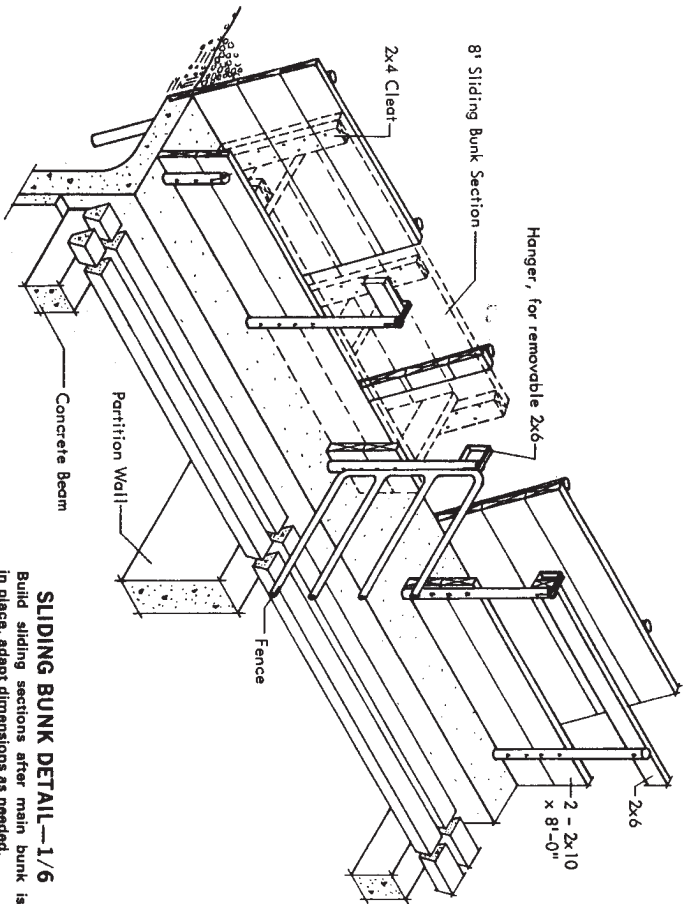
Set adjustable roller guides in the concrete apron at door jamb. Use door stops as required.



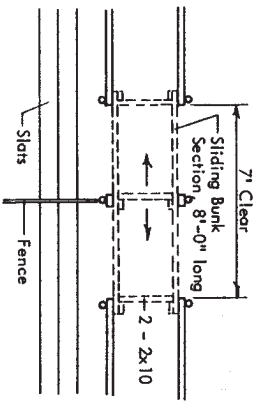
**SILL SECTION—5/5**

|   |  |
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| 48' CONFINED BEEF SHED<br>sloped floor, open-front, inside bunk   |  |
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**SLIDING BUNK DETAIL—1/6**  
Build sliding sections after main bunk is in place, adapt dimensions as needed.

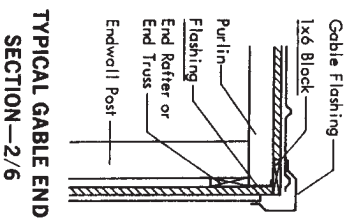


Alternate Lumber Specifications, Spacing and Sizes

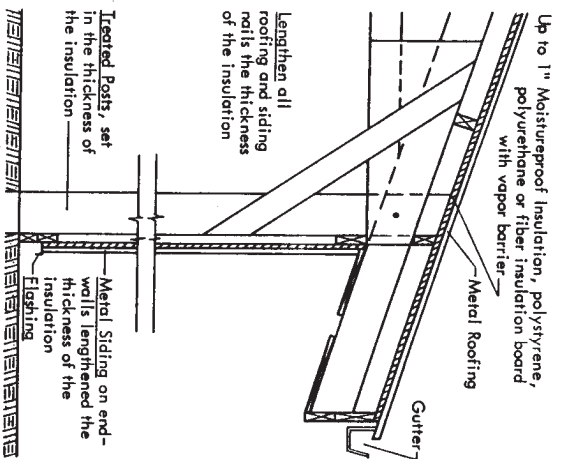
2x4 Roof Purlins (Construction Grade Hem-Fir)  
Max Spacing  
Snow Zone 1: 28" o.c.  
Snow Zone 2: 24" o.c.  
Snow Zone 3: 18" o.c.

2x6 Wall Girts (No. 2 Hem-Fir)  
Max Spacing: 20" o.c.  
Trusses (No. 1 Hem-Fir)  
See Truss Page

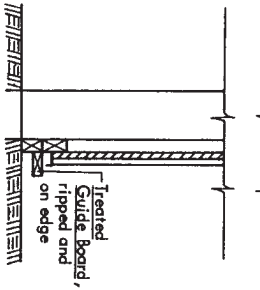
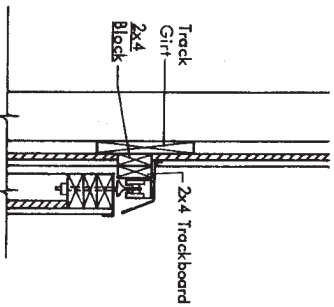
Posts (Round vs Sawm)  
6x8 = ASA or ASAE Class 5, 6.0" Top Diameter  
4x6 = ASA or ASAE Class 7, 4.8" Top Diameter  
4x4 = ASA or ASAE Class 10, 3.8" Top Diameter



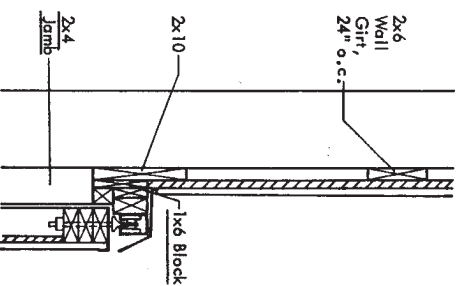
**TYPICAL GABLE END SECTION—2/6**



**WALL SECTION—4/6**



**ENDWALL SECTION—3/6**  
With Sliding Door



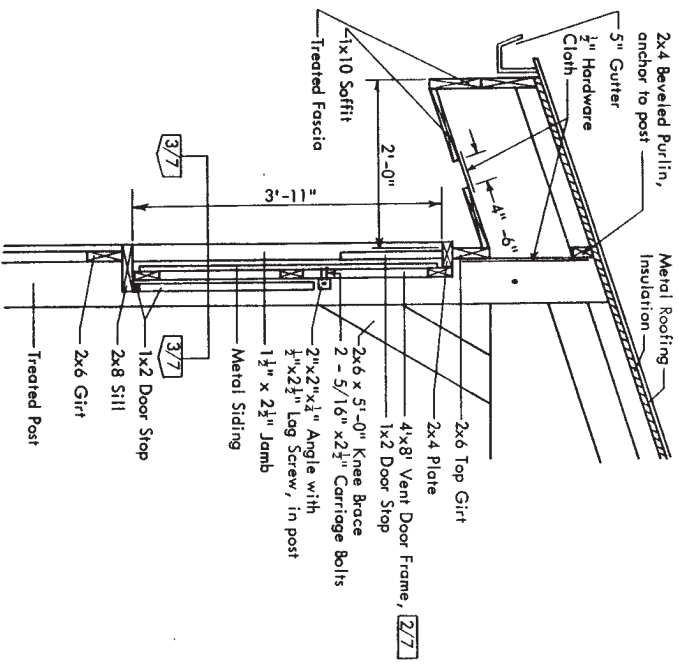
**TRACK GIRTS SECTION—5/6**

**INSULATION DETAILS**

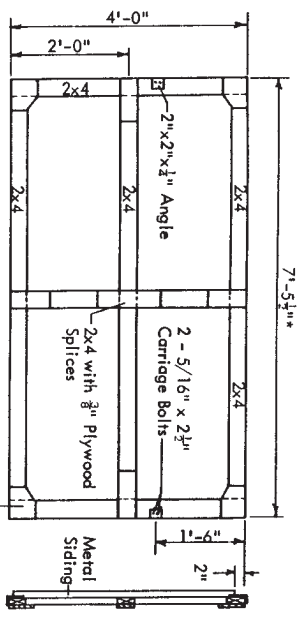
Underlines show materials that change when insulation is added.

|   |
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| <b>48' CONFINED BEEF SHED</b><br>slotted floor, open-front, inside bunk   |
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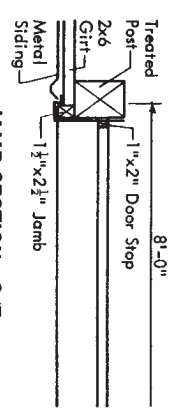


**WALL SECTION—1/7**  
Hold vent door open with a light metal chain from the vent door frame to an eye hook in the sill.



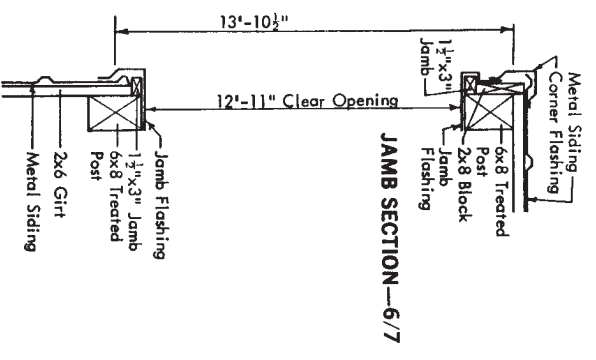
**4' x 8' VENT DOOR FRAME—2/7**

3/8\"/>



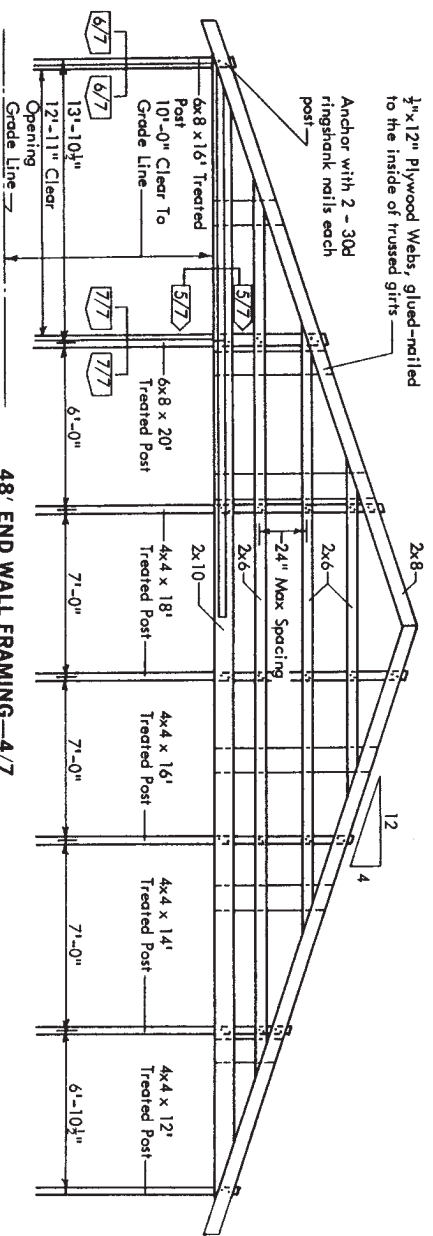
**JAMB SECTION—3/7**

**VENT DOOR DETAILS**

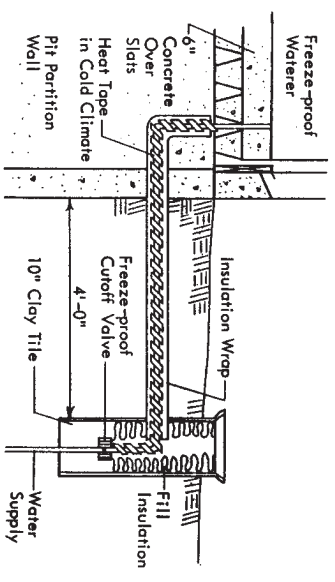


**JAMB SECTION—6/7**

**JAMB SECTION—7/7**

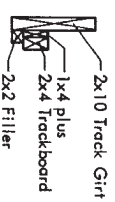


**48' END WALL FRAMING—4/7**  
6x8 treated posts set in ground.  
4x4 treated posts set on pit wall.



**WATERER DETAIL—8/7**

Bring water line into building next to pit partition wall.



**TRACK GIRT SECTION—5/7**

|  |                        |
|--|------------------------|
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| slotted floor, open-front, inside bunk   |                        |
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# TRUSSES

July, 1984

## Dear Customer:

When this plan was released, the last sheet had details for glue-nailed truss selection. Most buildings are erected with purchased trusses. The truss sheet did not have space enough to present all that was needed to build glue-nailed trusses.

Therefore, the sheet has been dropped. The plan has not yet been revised to include the following notes:

## TRUSS NOTES

If you buy trusses:

Specify the span, slope, and spacing shown on the plan. Specify the roof and ceiling types. Require strength adequate for the wind and snow loads for your locality.

Require installation details specifying anchorage, bracing, and roofing and ceiling framing and attachment. If you buy glue-nailed trusses:

Have them built and installed to the recommendations in MWPS-9, *Designs for Glued Trusses*, Fourth Edition.

If you build your own trusses:

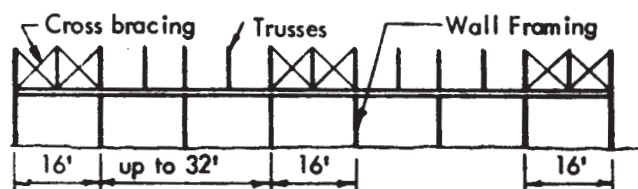
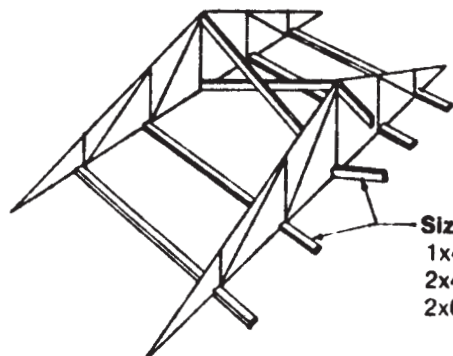
Get a copy of MWPS-9 and follow its recommendations.

Send \$5.00 for *Designs for Glued Trusses*, MWPS-9 to:

Midwest Plan Service, 122 Davidson Hall, Iowa State University, Ames, IA 50011

## Windbracing

Brace and anchor the trusses as they are placed. Bottom chord stiffeners are required at panel points unless a rigid ceiling is to be installed. Use king post crossbracing in all buildings.



## Wind Anchorage

Minimum fasteners for wind anchorage, both ends of each truss.

| Truss span | Truss spacing |          |          |
|------------|---------------|----------|----------|
|            | 2'            | 4'       | 8'       |
| 20'-24'    | 1A or 1B      | 1A or 1B | 2A or 1B |
| 26'-30'    | 1A or 1B      | 1A or 1B | 2A or 2B |
| 32'-46'    | 1A or 1B      | 2A or 1B | 3A or 2B |
| 48'-50'    | 1A or 1B      | 2A or 1B | 4A or 2B |
| 52'-60'    | 1A or 1B      | 2A or 2B | 4A or 3B |

A - metal framing anchor

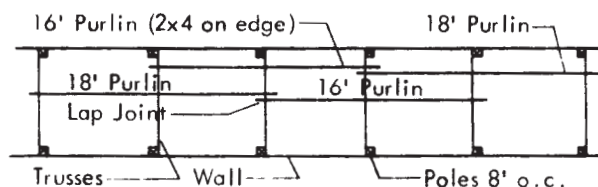
4-30d ring-shank nails -- 1/2" bolt

B - 1/2" bolt

## Roof Purlins

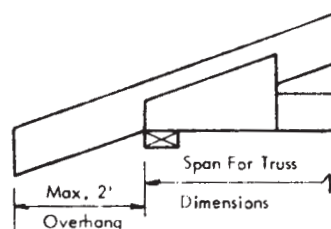
Stagger purlin joints for continuity across the trusses. Purlins may be laid flat with 2' and 4' truss spacings and butt joints used.

Alternating purlin lengths may be used in pole buildings where the poles are spaced evenly and the trusses are not. For poles 8' o.c. they may be of alternating 16' and 18' lengths with staggered and lapped end joints if pairs of trusses are mounted on alternate sides of the poles.



## Overhang

For a 2' to 4' overhang, use the top chord and heel gusset design for a 1/3 larger snow load.



**Loads**

Install trusses to withstand the loads.

- Required by any applicable building code.
- Recommended by an engineer familiar with farm buildings in your area.
- Or, if necessary, estimated from the material below.

**Ceiling Dead Load**

- 0 psf allows for no materials in addition to the truss, bracing, and stiffeners.
- 5 psf ceiling dead load allows for a metal or plywood ceiling with insulation (warm livestock buildings).
- 8 psf ceiling dead load allows for a gypsum board ceiling with insulation (residential or light commercial buildings).

**Roof Dead Load**

Add the weights of the truss, purlins or decking, roofing, and roof insulation to get the dead load on the top chord.

**Approximate weights of trusses, psf**

Example: a 4-web truss for 4' spacing with 2x8 top chord and 2x6 bottom chord weighs about 1.3 + 0.7 = 2.0 psf. Dashed lines in table indicate example.

| Chord size<br>Top | Bottom    | Truss spacing |     |     |
|-------------------|-----------|---------------|-----|-----|
|                   |           | 2'            | 4'  | 8'  |
| 2x4               | 2x4       | 1.6           | 0.8 | 0.4 |
| 2x6               | 2x4       | 2.0           | 1.0 | 0.5 |
| 2x6               | 2x6       | 2.4           | 1.2 | 0.6 |
| 2x8               | 2x6       | 2.7           | 1.3 | 0.7 |
| 2x10              | 2x4 + 2x4 | 3.3           | 1.6 | 0.8 |
| 2x12              | 2x4 + 2x6 | 4.0           | 2.0 | 1.0 |
| 2x12              | 2x6 + 2x6 | 4.4           | 2.2 | 1.1 |

| Add the following for: |     |     |     |  |
|------------------------|-----|-----|-----|--|
| 2-&4-Web Truss         |     |     |     |  |
| Truss                  | 1.4 | 0.7 | 0.4 |  |
| 6 Web Truss            | 2.1 | 1.2 | 0.6 |  |

**Recommended snow loads**

For roofs up to about 5/12 slope for buildings outside the jurisdiction of a building code. Farm buildings:

50-yr map load x 0.9 for 25-yr x 0.8 for snow on roof.  
Other buildings: 50-yr map load x 0.8 to convert from snow on ground to snow on roof.

Minimum recommended load is 12 psf. In areas where all of the maximum snow load results from a single storm without significant wind, the maximum roof load may equal the ground snow load.

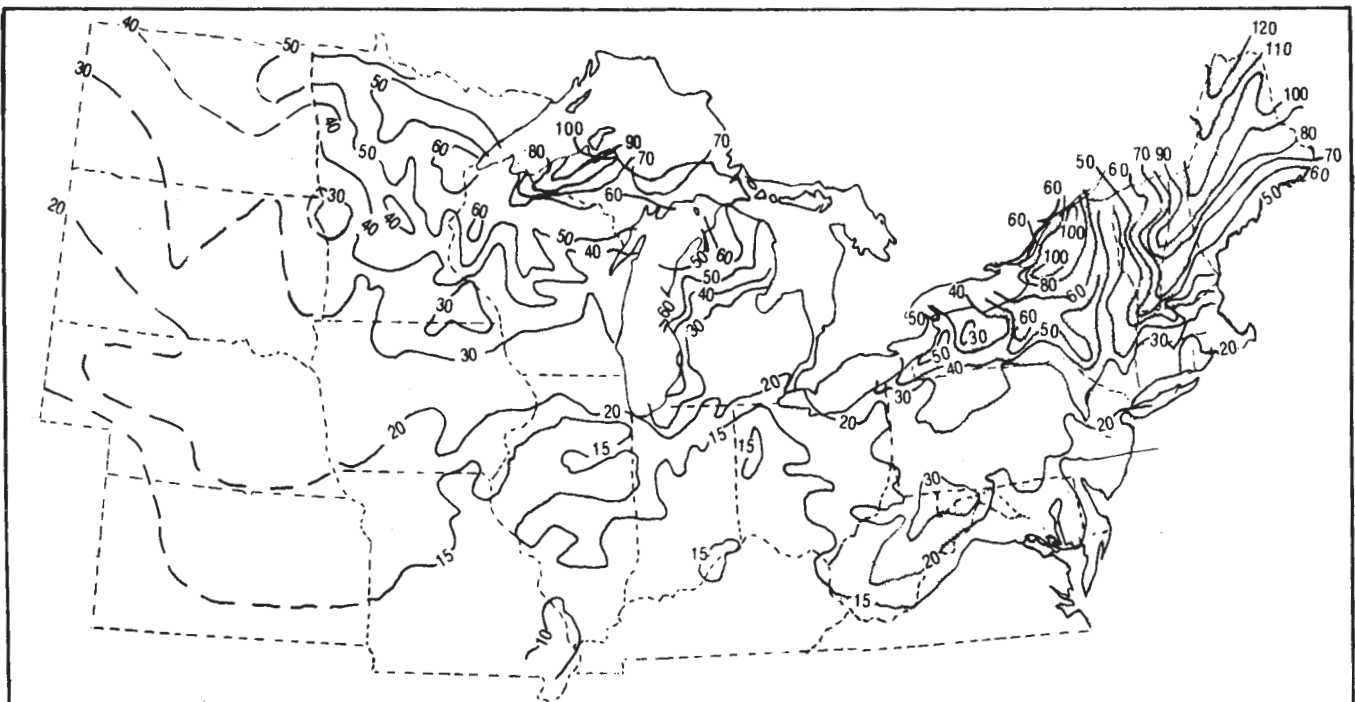
| Map load | Roof snow load |     | Other |
|----------|----------------|-----|-------|
|          | Farm           | psf |       |
| 15       | 12.0           |     | 12    |
| 20       | 14.4           |     | 16    |
| 30       | 21.6           |     | 24    |
| 40       | 28.8           |     | 32    |
| 50       | 36.0           |     | 40    |
| 60       | 43.2           |     | 48    |
| 70       | 50.4           |     | 56    |
| 80       | 57.6           |     | 64    |
| 90       | 64.8           |     | 72    |
| 100      | 72.0           |     | 80    |
| 110      | 79.2           |     | 88    |
| 120      | 86.4           |     | 96    |

**Weights of roofing and ceiling materials**

|                                   |         |
|-----------------------------------|---------|
| 2x4s, 2' o.c.                     | 0.7 psf |
| 2x6s, 2' o.c.                     | 1.1     |
| 1" lumber, solid                  | 2.2 psf |
| 1x3s, 16" o.c.                    | 0.4     |
| 3/8" plywood                      | 1.1     |
| 1/2" plywood                      | 1.4     |
| 0.024" aluminum                   | 0.4     |
| 28 ga steel                       | 0.9     |
| Asphalt shingles                  | 2.6     |
| Insulation, per inch of thickness | 0.1-0.4 |

**Wind Loads**

For most areas of the U.S., trusses are designed to withstand winds of 80 mph on a building less than 30' high.



Snow load on the ground, 50-yr recurrence interval