MWPS-72604

Raised Deck Swine Nurseries

Two 24’ x 22’ and 24’ x 46’ stud-frame swine nursery buildings with year-round mechnical ventilation. Two plans are included. Plan A is an early-wean nursery for 160 pigs from 10-30 lb (3-8 weeks). Plan B is a late-wean nursery for 160 pigs from 15-75 lb (5-12 weeks). A single gravity drain gutter is shown along the back of each row of decks.

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.**

MIDWEST PLAN SERVICE

Cooperative Extension Work in Agriculture and Home Economics and Agricultural Experiment Stations of North Central Region - USDA Cooperating

Raised Deck Swine Nurseries

Title Page

MIDWEST PLAN NO. 72604

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.

Plan mwps-72604
Raised Deck Swine Nurseries

This plan is for two (24'x22' and 24'x46') stud-frame swine nursery buildings with year-round mechanical ventilation. Plan A is an early-wean nursery (prenursery) which houses 160 pigs (20 litters of 8 pigs) from 10 to 30 lb (3 to 8 weeks). The first level pens are on raised platforms with second level decks over them. Plan B is a late-wean nursery (pig nursery) which houses 160 pigs from 15 to 75 lb (5 to 12 weeks) on raised decks.

If more capacity is required, construct a number of rooms with the floor plans shown rather than one room of a larger size. This will improve disease control and management options.

A gravity drain gutter is shown along the back of each row of decks.

Management

These buildings are designed for all-in, all-out management with a cleaning period between groups. This method is highly recommended over continuous occupancy to prevent disease transfer between groups.

When moving pigs into the prenursery, sort them by size and put the smaller pigs in the second level decks.

Utilities

Lighting and wiring: Install two rows of 100 watt incandescent ceiling lights. Space 8' o.c. and center over the pens. Provide electrical receptacles for 250 watt heat lamps over each pen. Space receptacles 4' o.c. in Plan A and 8' o.c. in Plan B.

All wiring devices, boxes, and fittings have to be dust- and watertight, and made of corrosion-resistant materials.

Service entrance panel: Plastic, watertight, dust-tight type.

Fans: Select AMCA-rated fans for the stated capacity at ⅛" static pressure. Obtain fans with inside safety grills that protect workers from the blades. Wire each fan on a separate circuit. Use a fused switch (sized at 125% of fan amperage) on each fan at fan location.

Heat: Desired room temperature is:

Table 1.1. Desired room temperature.

Pig age, wks	Pig weight, lb	Temp, F
3	8	85
4	12	82
5	16	79
6	20	76
7	25	73
8-12	30-75	70

Recommended heater capacity for both plans is 56,000 Btu/hr. Heat lamps or radiant heaters are recommended for at least the first week that the pigs are in the pens. Drafts may be a problem for the smaller pigs in the second level decks. Consider a solid floor overlay, solid partitions, and a hover over the feeder half of the pen. Hovers need not be insulated—try tempered hardboard, sheet metal, or exterior plywood. Heavy clear plastic on a frame allows you to observe the animals.

Both plans are designed to provide winter ventilating air that has been warmed 20-40 F to reduce drafts. Tightly close the ceiling inlets during winter. Warm the winter ventilating air with solar, earth tubes, heat exchangers, or by bringing the cold outside air through a heated storage room or alleyway before it enters the animal room.

Related Midwest Plan Service Publications

- MWPS-8, *Swine Housing and Equipment Handbook.*
- Plan mwps-74303, "Liquid Manure Tanks".
- AED-22, *Tilt-Up Concrete Construction for Agriculture.*

Protect swine from fan failure

Fans or electrical supply systems occasionally fail, leading to swine death by asphyxiation or toxic gases. Consider the following:

- Install a loud automatic warning system to alert anyone at or near the farmstead.
- Have someone baby-sit your animals if you are going to be away for more than a few hours, if there are storm warnings out, or if your herd is in an especially sensitive stage (a number of newborn litters, for example).
- Post instructions on what to do in hot weather, mild weather, cold weather; who to phone for additional advice, etc.
- Prepare walk doors and perhaps summer ventilation panels to be propped open part way or fully.
- Consider an automatic start, standby generator. Run the generator once a month to ensure it will work when needed.
- Consider an automatic telephone to dial selected numbers when power fails.

Materials

Trusses
See truss page.
Roof purlins
Construction grade (Doug fir, southern pine, or hem fir) 2x4 purlins, flat
Maximum spacing:
40 psf snow load, 24" o.c.
45 psf " " , 20" o.c.
60 psf " " , 16" o.c.
Stagger end joints. Fasten purlins at each truss with 2-10d nails.
Studs
Construction grade (Doug fir, southern pine, or hem fir)
Roofing examples
28 ga galvanized steel, 100 nails/100 ft²
0.024" aluminum, 120 nails/100 ft²
1/2" C-C Ext plywood ("Identification Index" = 24/0) + 235 lb asphalt shingles
Siding examples
⅜" C-C Ext plywood, stained
⅜" MDO plywood, painted
0.024 aluminum or 28 ga galvanized steel
Wall liner
⅜" or ½" MDO Plywood
⅜" or ½" FRP Plywood
0.024" aluminum
Ceiling liner
Same as wall liners plus 28 ga galvanized steel
Sills and fascia
Pressure preservative treated (southern yellow pine or equivalent) creosote—8 pcf, penta—0.40 pcf, ACC—0.25 pcf, ACA or CCA (Type A or B)—0.25 pcf.

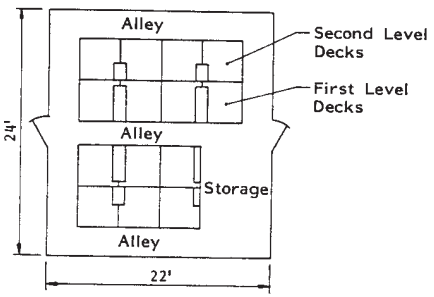
P.T. means lumber pressure preservative treated against insect and fungus attack.

MDO Plywood is C-C exterior with medium density overlay. It is an excellent base for paint. Paint with two coats of good quality oil base enamel. Use vinyl "H" strips and silicone caulk to seal joints between inside wall liners to provent moisture migration through joints.

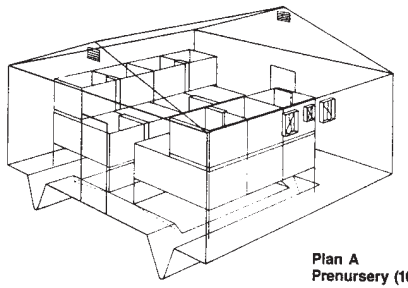
FRP Plywood is a composite material using plywood overlaid with a layer of plastic. It is moisture-resistant and more durable and easier to clean than plywood. Use vinyl "H" strips and silicone caulk at joints as described under MDO Plywood.

Perimeter insulation
At least 2"x24" waterproof expanded, extruded polystyrene insulation. Install a protective liner:
High density fiberglass reinforced plastic or ¼" cement asbestos board preferred. ¼" tempered hardboard or ⅜" foundation grade plywood resist physical damage but are not rodentproof. Install flashing from behind siding to cover top of insulation and its protective material.

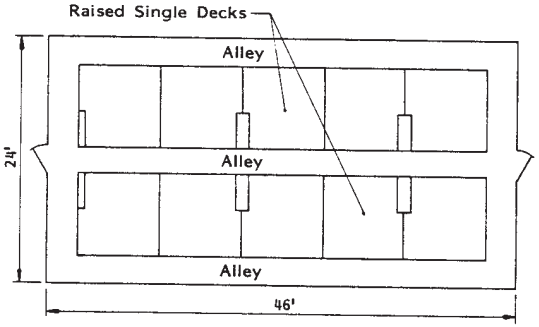
Concrete
Use 3,500 psi concrete with 7% air entrainment. Use steel of at least 40,000 psi yield. Refer to plan mwps-74303, "Liquid Manure Tanks", for more information.



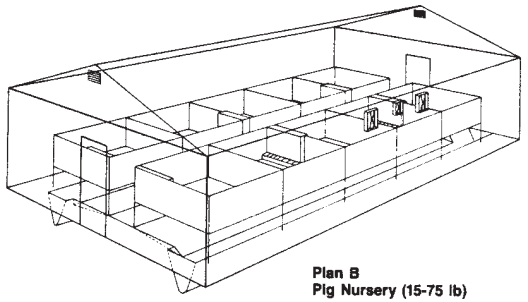
Floor Plan A
Prenursery (10-30 lb)



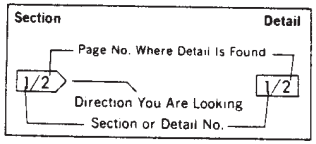
Plan A
Prenursery (10-30 lb)



Floor Plan B
Pig Nursery (15-75 lb)



Plan B
Pig Nursery (15-75 lb)



Section & Detail Indicator

MWPS MIDWEST PLAN SERVICE
Cooperative Extension & Research in Agriculture & Home Economics in the 12 North Central Universities—USDA Cooperating

Raised Deck Swine Nurseries

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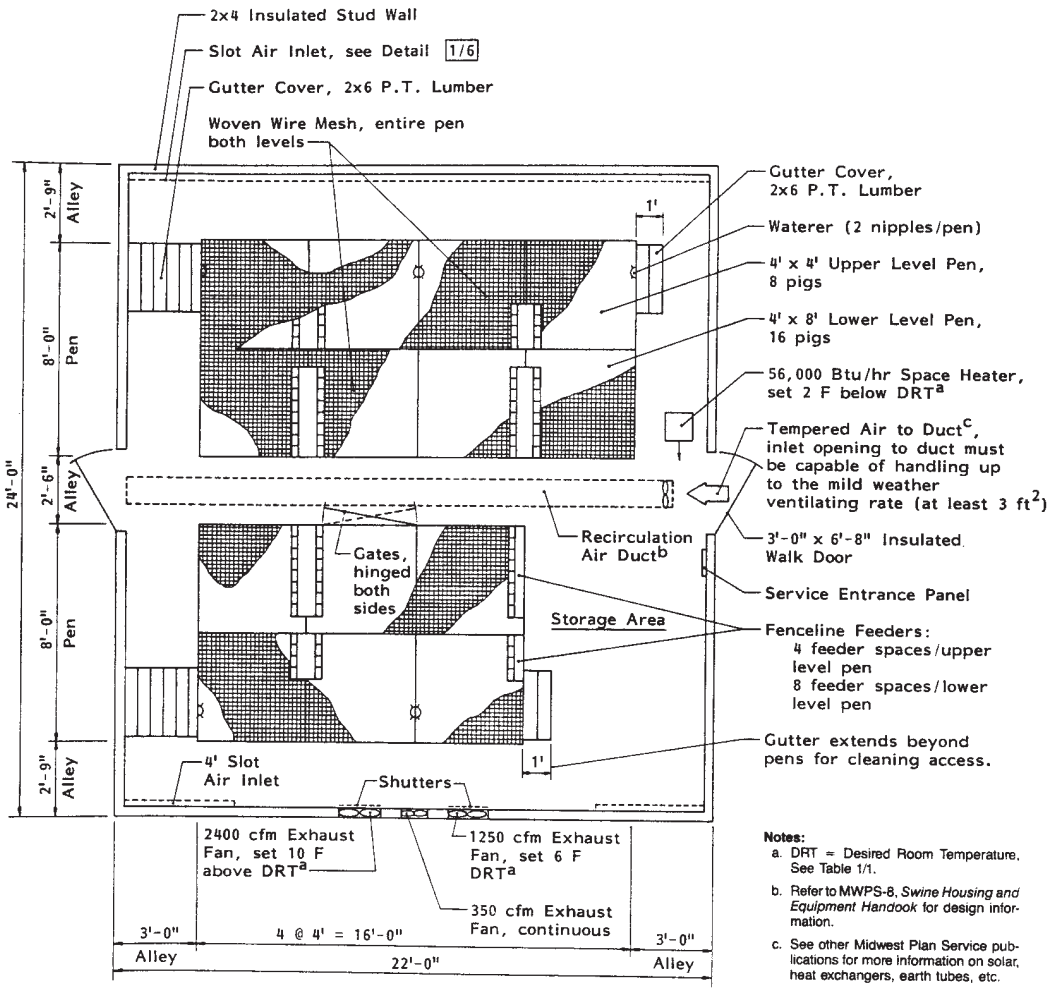


Plan A. Floor Plan - 1/2

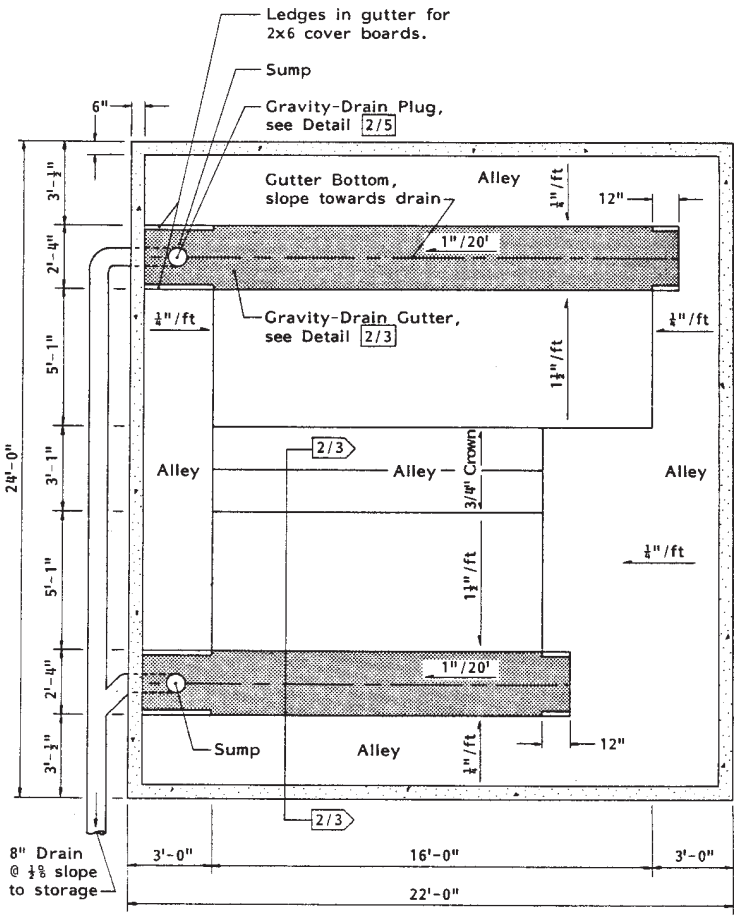
160 Prenursery Pigs (10-30 lb).

Notes:

a. DRT = Desired Room Temperature, See Table 1/1.

b. Refer to MWPS-8, *Swine Housing and Equipment Handook* for design information.

c. See other Midwest Plan Service publications for more information on solar, heat exchangers, earth tubes, etc.



Plan A. Foundation Plan - 2/2

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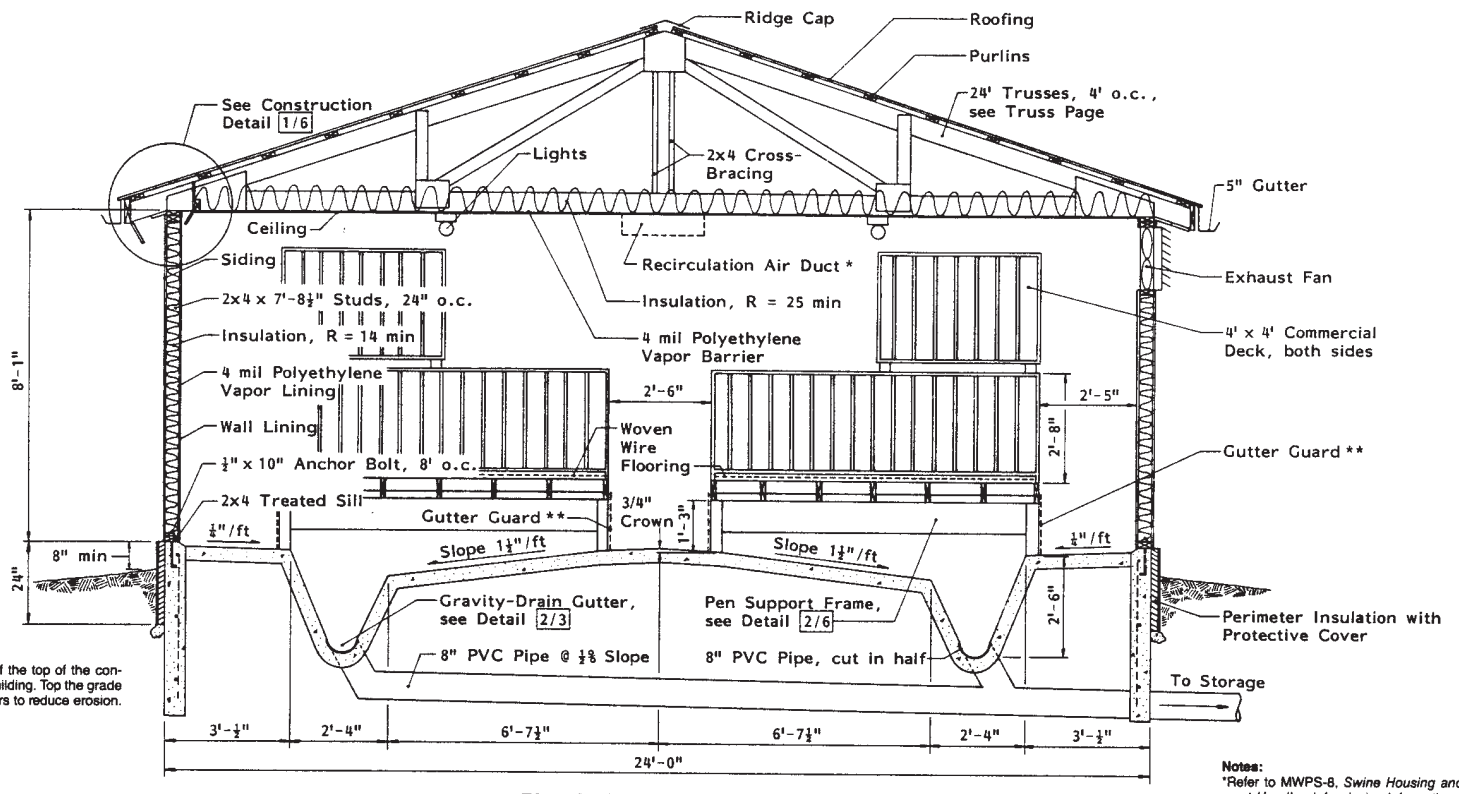
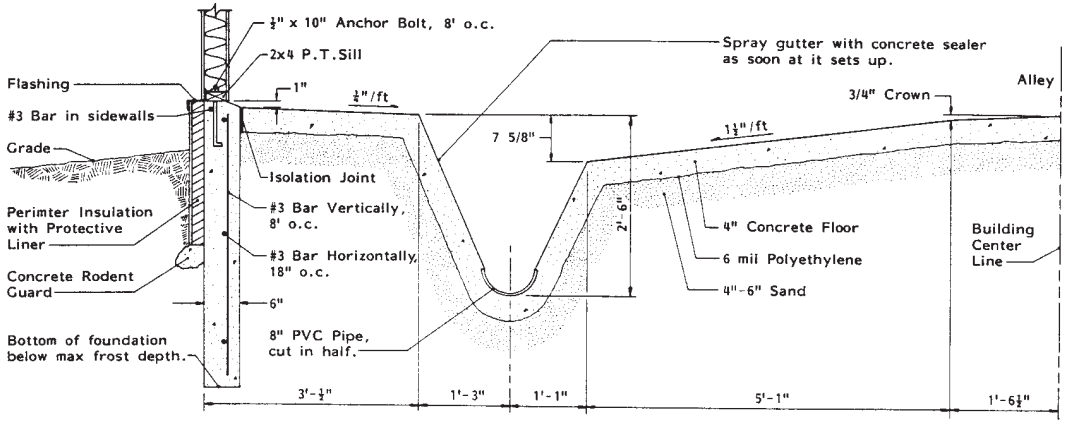


Note: Backfill to within 8" of the top of the concrete. Slope fill away from building. Top the grade with gravel or use rain gutters to reduce erosion.

Plan A. Cross Section - 1/3

Notes:
*Refer to MWPS-8, *Swine Housing and Equipment Handbook* for design information.

**Wire mesh, large screen, etc. to prevent pigs in alleys from getting under pens. Around entire perimeter of pens. Hinge or make removable for easier cleaning.



Sidewall and Gutter Detail - 2/3

An insulated concrete sandwich panel can also be used for the foundation. Refer to AED-22 *Tilt-Up Concrete Construction for Agriculture.* Slope gutter bottom at 1"/20'. Every 3-7 days, wash the manure from the sloping floors into the gutter and pull the drain plug. Agitation is usually not needed before draining.

One method of forming the Y gutter is to build a Y-shaped form which hinges at the bottom of the gutter. Brace the form sides at the top so they are held out in the desired position for placing the concrete. After the concrete sets, the sides pivot at the hinge and swing in towards each other so the form can be lifted out of the gutter.

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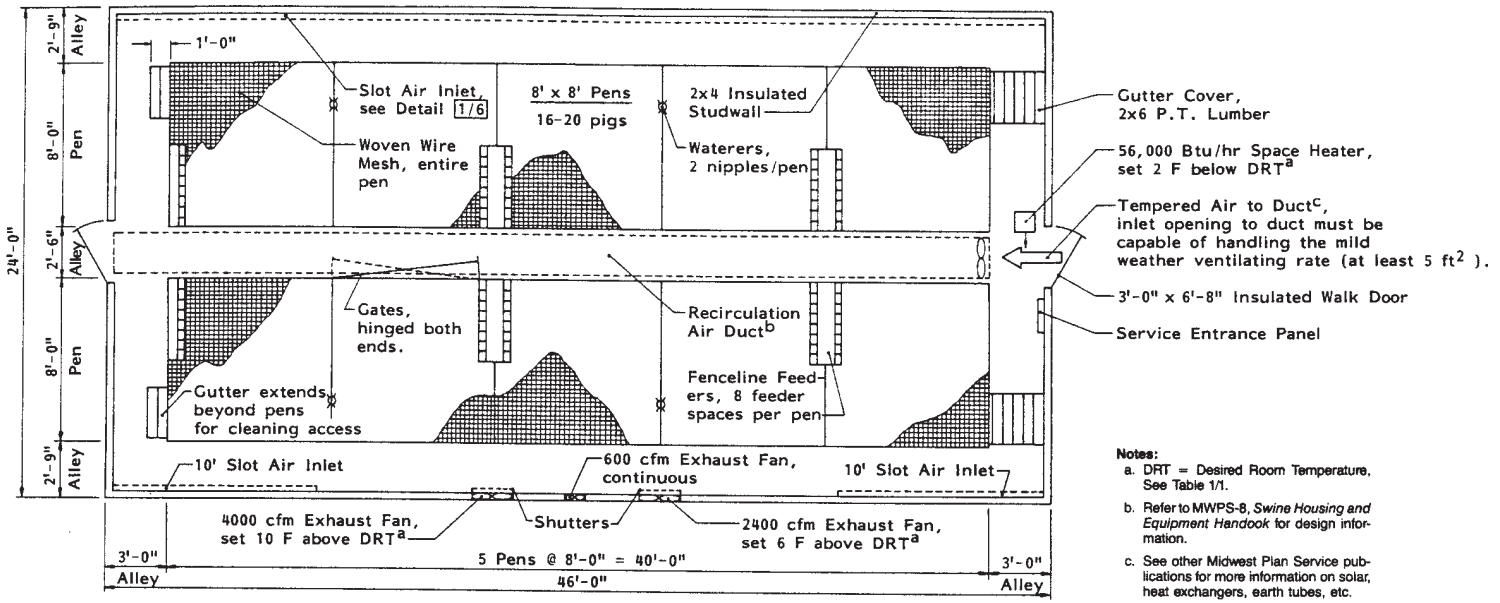


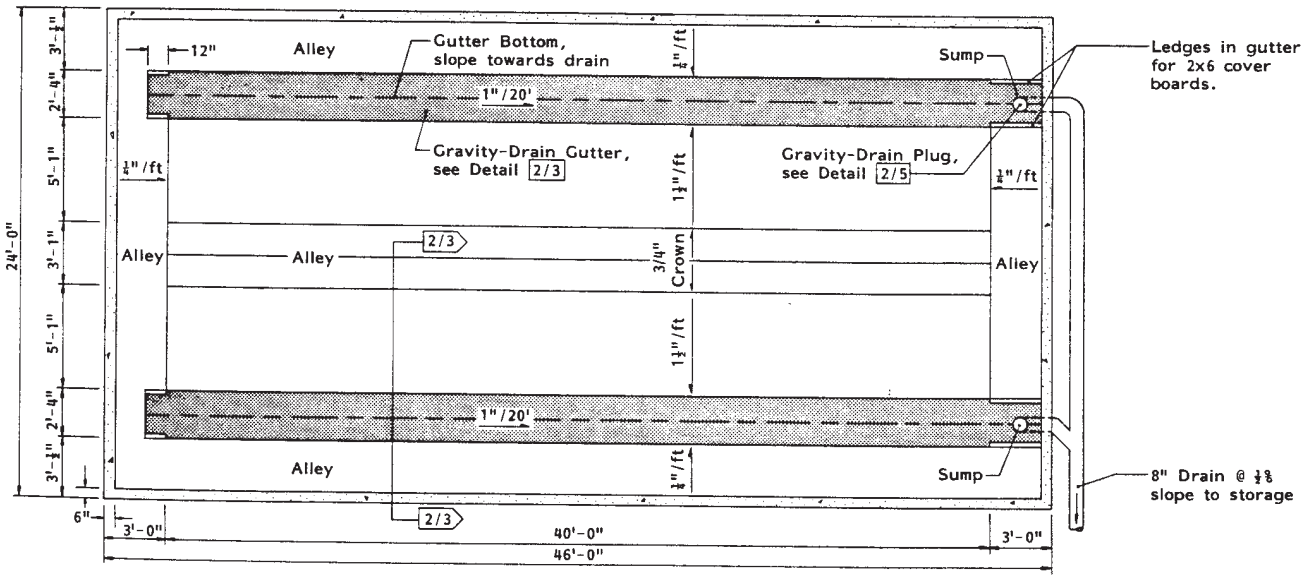
Notes:

a. DRT = Desired Room Temperature, See Table 1/1.

b. Refer to MWPS-8, *Swine Housing and Equipment Handook* for design information.

c. See other Midwest Plan Service publications for more information on solar, heat exchangers, earth tubes, etc.

Plan B. Floor Plan - 1/4
160-200 Pigs (15-75 lb)



Plan B. Foundation Plan - 2/4

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Raised Deck
Swine Nurseries

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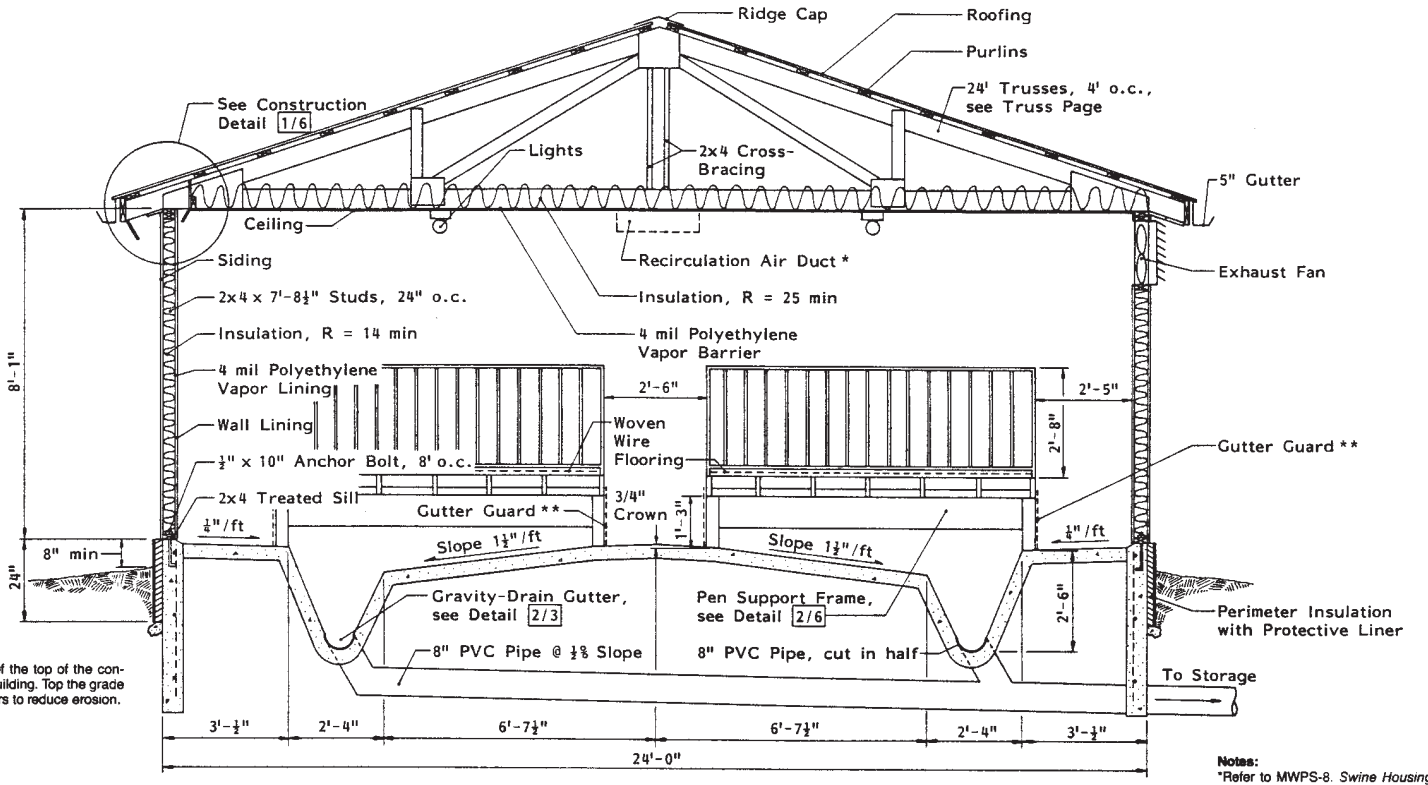
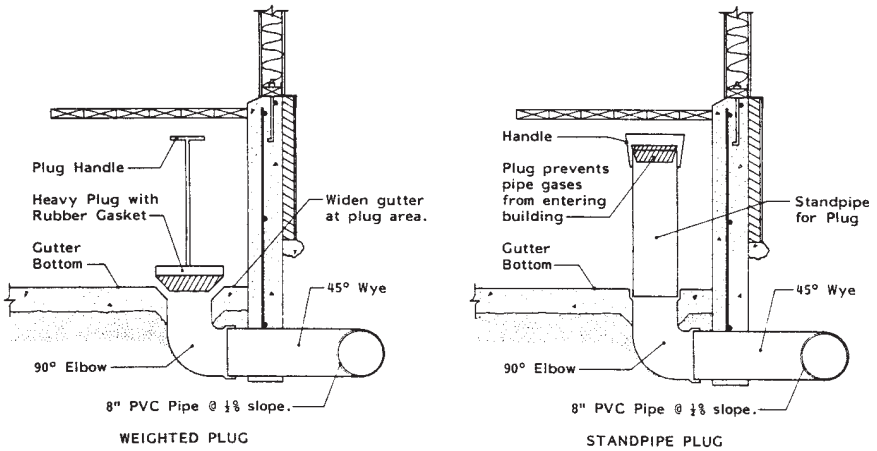


Note: Backfill to within 8" of the top of the concrete. Slope fill away from building. Top the grade with gravel or use rain gutters to reduce erosion.

Plan B. Cross Section - 1/5

Notes:
*Refer to MWPS-8, *Swine Housing and Equipment Handbook* for design information.

**Wire mesh, large screen, etc. to prevent pigs in alleys from getting under pens. Around entire perimeter of pens. Hinge or make removable for easier cleaning.



Cross Section of Gutter End - 2/5
(Gravity Drain Plug)
Make sure plug seals well, air leaks let manure gases back into the room and reduce ventilation efficiency. A slow water leak may lead to ice build-up.

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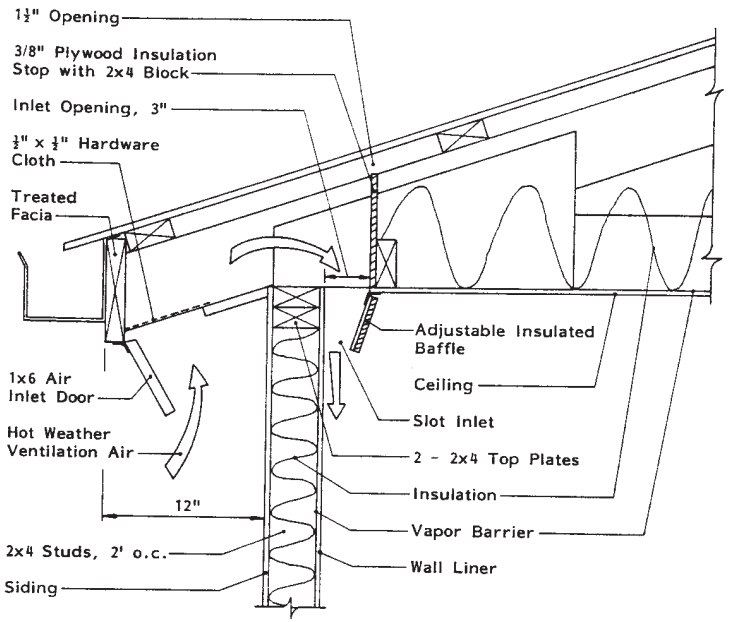


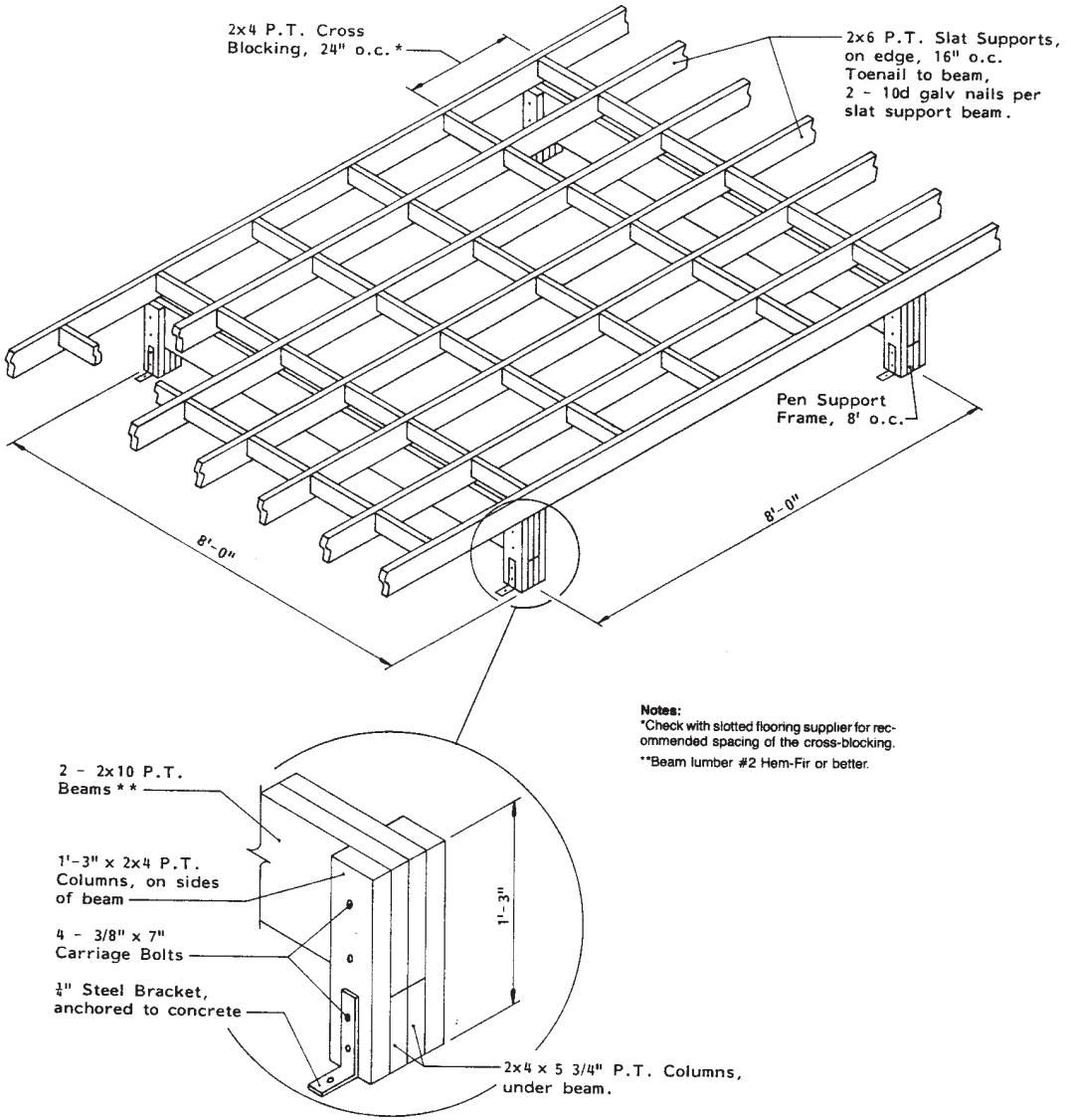
Construction Detail - 1/6

Install eave inlet and slot inlet along both walls. Install fans in the long wall opposite winter prevailing winds. Do not install slot inlet at fans or within 8' of fans.

Cold and mild weather: tightly close all upwind soffit doors and adjustable slot inlet baffles so all the air is drawn through the recirculation duct. It is recommended that the fresh air to the duct be warmed 20-40 F. See other Midwest Plan Service publications for more information on solar, heat exchangers, earth tubes, etc. Position the supplemental heater so it blows into the intake of the recirculation duct. Make the fresh air inlet opening to the recirculation duct capable of handling the mild weather ventilation rate.

Hot weather: open all soffit doors. Open slot inlet baffles to 2¾" for Plan A; 2¼" for Plan B. Shut off the recirculation duct system.

Other ventilation systems are shown in MWPS-8, *Swine Housing and Equipment Handbook*.



Notes:
*Check with slotted flooring supplier for recommended spacing of the cross-blocking.
**Beam lumber #2 Hem-Fir or better.

Pen Support Frame Detail - 2/6

Decks and deck supports are also available commercially.

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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:

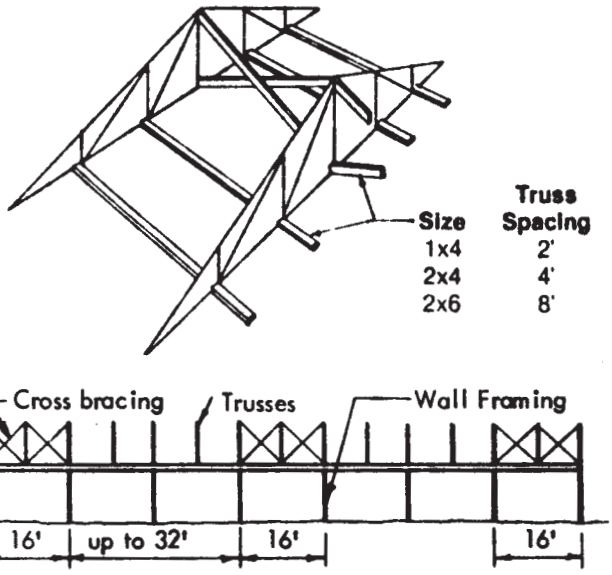
Get a copy of MWPS-9 and follow its recommendations.

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.

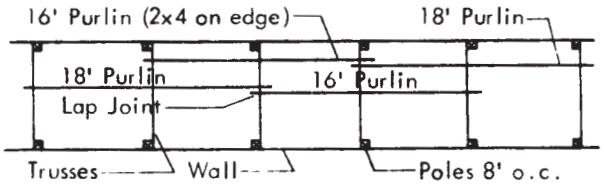
Truss span	Truss spacing 2'	4'	8'
20'-24'	1A or 1B	1A or 1B	2A or 1B
26'-30'	1A or 1B	1A or 1B	2A or 2B
32'-46'	1A or 1B	2A or 1B	3A or 2B
48'-50'	1A or 1B	2A or 1B	4A or 2B
52'-60'	1A or 1B	2A or 2B	4A or 3B

A – metal framing anchor
4-30d ring-shank nails – ½" bolt
B – ½" bolt

Roof Purlins

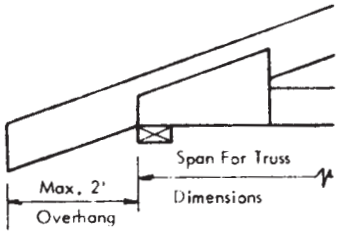
Stagger purlin joints for continuity across the trusses. Purlins may be laid flat with 2' and 4' truss spacings and butt joints used.

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 ⅓ 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		Truss spacing		
		2′	4′	8′
Top	Bottom	Truss dead weight, psf		
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	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.

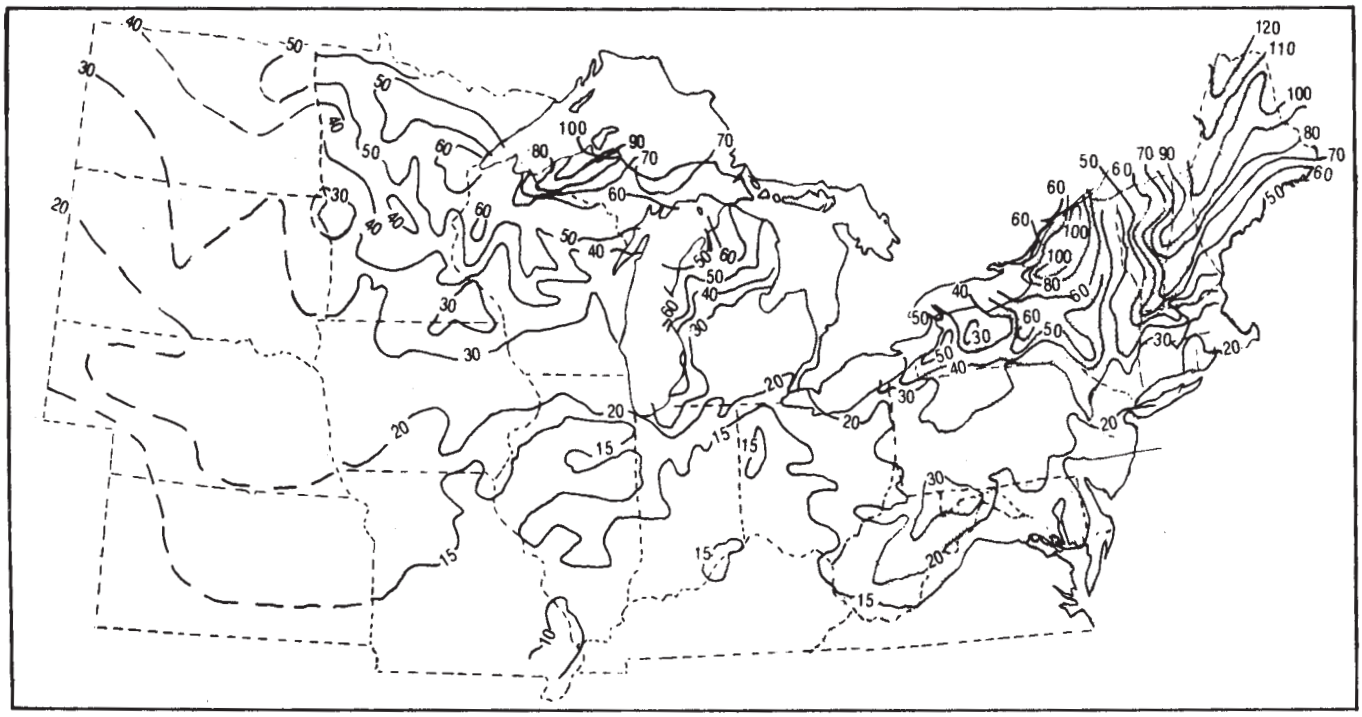
Map load	Roof snow load	
	Farm	Other
	- - - - psf - - - -	
15	12.0	12
20	14.4	16
30	21.6	24
40	28.8	32
50	36.0	40
60	43.2	48
70	50.4	56
80	57.6	64
90	64.8	72
100	72.0	80
110	79.2	88
120	86.4	96

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