

MWPS-50' Truss

50' span, 4-web trusses

with plywood gussets.

CAUTION!

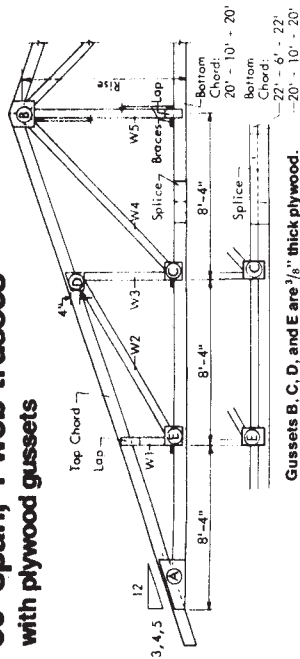
Additional professional services will be required to tailor this plan to your situation, including but not limited to: assurance of compliance with codes and regulations; review of specifications for materials and equipment; supervision of site selection, bid letting and construction; and provision for 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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MIDWEST PLAN SERVICE
Cooperative Extension Work in Agriculture and Home Economics and Agricultural Experiment Stations of North Central Region - USDA Cooperating
50' Truss
Title Page
MIDWEST PLAN NO. 50' Truss

50' span, 4-web trusses with plywood gussets



Gussets B, C, D, and E are 3/8" thick plywood.

Table of lengths

Roof Slope	Rise	Top Chord	W1	W2	W3	W4	W5
3/12	6'-3"	20'+6"	2'	9'	4'	10'	6'
4/12	8'-4"	14'+13"	3'	10'+9"	6'	12'+11"	8'
5/12	10'-5"	14'+14"	4'	11'+10"	7'+6"	13'+12"	11'

4+4+4+6+6+6 indicates stacked lower chord.
4&4, 6&4, indicate double web, a 2x4 is attached to the web member to increase its stiffness.

This sheet is to help you **SELECT** and **ERECT** trusses. **DO NOT** try to **BUILD** trusses from it, because it does not include enough information on gluing, joints, splices, and fabrication. See "Designs for Glued Trusses," MWPS-9. If you buy metal-plate trusses, use their designer's data.

To select a truss:

1. estimate roof dead load
2. determine appropriate snow load
3. roof dead load plus snow load = roof design load, psf
4. select a truss to carry at least the total roof load for the lumber quality, slope, spacing, and ceiling dead load you will use.

For more information see back page and MWPS-9, Designs for Glued Trusses, 4th Edition, 1981.

1400f Lumber

Top chord	Truss spacing, ft								Gusset Sizes, in.						
	0	2	4	5	8	8	5	0	B	C	D	E			
chord	...Max. snow + roof dead load, psf...								H			W			
2x4	0	17	0	0	0	0	0	0	2x4	2x4	2x4	2x4	8x12	8x8	8x8
2x6	2x4	0	26	0	0	0	0	0	"	"	"	"	10x12	8x10	"
2x6	2x6	38	34	0	0	0	0	0	"	"	"	"	10x16	10x10	"
2x8	2x6	45	40	37	0	14	0	0	2x4	2x4	2x4	2x4	12x16	10x10	8x8
2x10	4x4	63	59	53	0	19	0	0	"	"	"	"	16x16	12x12	8x10
2x12	4x6	80	74	70	0	31	22	0	"	"	"	"	18x20	14x12	12x10
2x12	6x6	95	78	74	37	32	0	14	"	"	"	"	20x24	18x12	14x10
2x2	2x4	0	20	14	0	0	0	0	2x4	2x4	2x4	2x4	8x12	8x8	8x8
2x6	2x4	0	36	13	0	0	0	0	"	"	"	"	10x12	8x10	"
2x6	2x6	45	43	42	0	17	0	0	"	"	"	"	12x12	10x10	8x10
2x8	2x6	61	57	54	0	21	0	0	2x4	2x4	2x4	2x4	12x16	10x10	8x10
2x10	4x4	84	80	71	0	27	14	0	"	"	"	"	16x20	14x12	12x10
2x12	4x6	100+	97	98	46	42	32	0	"	"	"	"	18x20	16x12	14x10
2x12	6x6	-	100+	-	47	44	41	20	"	"	"	"	20x24	18x12	16x10
2x4	2x4	24	22	21	0	0	0	0	2x4	2x4	2x4	2x4	8x12	8x8	8x8
2x6	2x4	51	45	19	0	0	0	0	"	"	"	"	10x10	10x10	8x10
2x6	2x6	50	48	47	0	20	14	0	"	"	"	"	10x16	10x12	"
2x8	2x6	77	71	70	0	27	14	0	2x4	2x4	2x4	2x4	12x20	12x16	8x12
2x10	4x4	100+	100	90	45	33	0	0	"	"	"	"	16x20	14x12	10x10
2x12	4x6	-	100+	-	56	52	40	15	"	"	"	"	18x20	16x12	12x10
2x12	6x6	-	-	-	56	52	50	24	12	"	"	"	20x24	20x12	16x10

1600f Lumber

Top chord	Truss spacing, ft								Gusset Sizes, in.						
	0	2	4	5	8	8	5	0	B	C	D	E			
chord	...Max. snow + roof dead load, psf...								H			W			
2x4	2x4	0	21	19	0	0	0	0	2x4	2x4	2x4	2x4	8x12	8x8	8x8
2x6	2x4	0	33	18	0	0	0	0	"	"	"	"	10x10	8x10	"
2x6	2x6	47	45	44	0	17	0	0	"	"	"	"	10x16	10x10	8x10
2x8	2x6	54	49	46	0	18	0	0	2x4	2x4	2x4	2x4	12x16	10x10	8x10
2x10	4x4	76	71	69	0	26	0	0	"	"	"	"	16x20	14x12	10x10
2x12	4x6	96	89	89	42	38	32	12	"	"	"	"	18x20	16x12	12x10
2x12	6x6	100+	96	97	45	41	38	18	"	"	"	"	20x24	18x12	16x10
2x4	2x4	26	25	24	0	0	0	0	2x4	2x4	2x4	2x4	8x12	8x8	8x8
2x6	2x4	48	45	40	0	14	0	0	"	"	"	"	10x10	10x10	8x10
2x6	2x6	54	52	50	0	21	20	0	"	"	"	"	10x16	10x16	"
2x8	2x6	74	70	66	0	29	25	0	2x4	2x4	2x4	2x4	12x20	10x10	8x10
2x10	4x4	94	95	44	40	36	0	17	"	"	"	"	16x20	14x12	12x10
2x12	4x6	-	-	-	55	52	49	24	"	"	"	"	18x20	18x12	15x12
2x12	6x6	-	-	-	58	54	51	25	"	"	"	"	20x24	20x12	16x12
2x4	2x4	29	28	27	0	0	0	0	2x4	2x4	2x4	2x4	8x12	8x8	8x8
2x6	2x4	61	55	36	0	0	0	0	"	"	"	"	10x10	10x12	8x10
2x6	2x6	61	58	57	26	23	0	0	"	"	"	"	10x16	10x12	"
2x8	2x6	92	86	86	40	36	22	0	2x4	2x4	2x4	2x4	14x20	12x14	8x10
2x10	4x4	100+	100+	100+	55	44	22	0	"	"	"	"	16x20	14x12	10x10
2x12	4x6	-	-	-	68	62	52	34	"	"	"	"	18x24	18x12	12x12
2x12	6x6	-	-	-	68	63	60	34	21	"	"	"	20x24	20x14	14x12

This page is a summary of the information in "Designs for Glued Trusses," MWPS-9. Refer to this publication before building trusses.

ROOF SLOPE (Inches of rise/inches of run)

Roof slope significantly affects the forces in the truss members. A steeper roof allows higher roof loads. 3/12 slope—used in low snow load areas or for short spans and narrow spacings. 4/12 slope—most common for farm buildings. 5/12 slope—used in high snow load areas or for long spans and wide spacings.

TRUSS SPACING

Roof and ceiling materials and wall framing influence truss spacing selection. In pole buildings it is desirable to support each truss on a pole. 2' spacing uses more material and labor. It is common for buildings with ceilings and plywood roof decks. 4' spacing is common in insulated livestock buildings with ceilings and metal roofs, and in some storage buildings. 8 spacing uses least material and labor for buildings without ceilings such as machinery storages, un-insulated livestock buildings, etc. Total cost may be greater if a ceiling is needed.

CEILING DEAD LOAD

Three ceiling dead load cases are included in the tables. • 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.

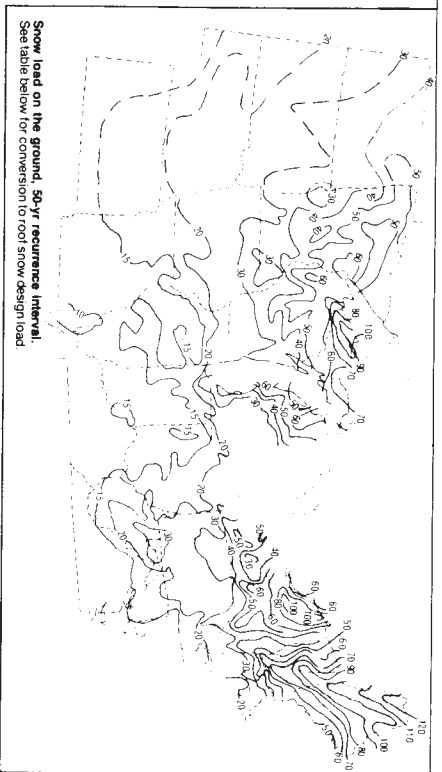
Approximate weights of trusses, psf

Example: a 4-web truss for 4' spacing with 2x8 top chord and 2x6 bottom chord weighs about (3+0.7) = 20 psf. Dashed lines in table indicate example.

Gird size, top battens	Truss spacing		
	2'	4'	8'
2x4	1.6	0.8	0.4
2x6	2.0	1.0	0.5
2x6	2.4	1.2	0.6
2x8	2.7	1.3	0.7
2x10	3.3	1.6	0.8
2x12	4.0	2.0	1.0
2x12	4.4	2.2	1.1

Add the following for:

2x4x8x8 Truss	1.4	0.7	0.4
6 web Truss	2.1	1.2	0.6



Snow load on the ground, 50-yr recurrence interval. See table below for conversion to roof snow design load.

SNOW LOAD

Use the map above and the table below for determining snow load for your building.

Recommended snow loads.

Use the map above and the table below for determining snow load for your building. Minimum recommended load is 12 psf in areas where all of the maximum snow load results from a single storm event. In other areas, the maximum snow load may equal the ground snow load.

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

Weights of roofing and ceiling materials.

Material	Weight (psf)
Roof framing	
2x4 purlins, 2 o.c.	3.7
2x6 purlins, 2 o.c.	1.1
2x4 purlins, 16 o.c.	0.4
2x4 framing, 2 o.c.	0.7
Sheathing, etc.	
1 lumber solid	2.2
2 plywood	1.1
3 plywood	1.4
0.024 aluminum	1.4
28 ga steel	0.4
Asph/Flt shingles	2.6
Insulation, per inch of thickness	0.1-0.4

Wind Loads

Trusses are designed to withstand winds of 30 mph on a building less than 30' high.

LUMBER

Three lumber groups are indicated in the tables. Example of species in each group are listed below. SS = Selected structural species (15%) = moisture content at time of milling.

Species	Grade	Size
Douglas Fir—Larch	No. 1	2x4
Douglas Fir—Larch (North)	No. 1	2x6
Southern Pine (15%)	No. 2 dense	2x4
Southern Pine (15%)	No. 1	2x6
Southern Pine (15%)	No. 2 dense	2x4
Southern Pine (15%)	No. 1	2x6
Southern Pine (15%)	No. 2 dense	2x4
Southern Pine (15%)	No. 1	2x6

Species	Grade	Size
Douglas Fir—Larch	No. 2	2x4
Douglas Fir—Larch	No. 1	2x6
Douglas Fir—Larch (North)	No. 1	2x4
Hem—Fir	No. 1	2x6
Hem—Fir	SS	2x4
Southern Pine (15%)	No. 2	2x4
Southern Pine (15%)	No. 2	2x4
Southern Pine (15%)	No. 1	2x6
Southern Pine (15%)	SS	2x4
Southern Pine (15%)	SS	2x6
Spruce—Pine—Fir	No. 2	2x4
Spruce—Pine—Fir	No. 2	2x6
Douglas Fir (North)	No. 2	2x4
Douglas Fir (North)	No. 2	2x6
Douglas Fir (South)	No. 2	2x4
Douglas Fir (South)	No. 2	2x6
Hem—Fir	No. 1	2x4
Hem—Fir (North)	No. 1	2x6
Hem—Fir (North)	SS	2x4
Hem—Fir (North)	SS	2x6
Southern Pine (15%)	No. 2	2x4
Southern Pine (15%)	No. 2	2x6
Southern Pine (15%)	No. 1	2x4
Southern Pine (15%)	No. 1	2x6
Southern Pine (15%)	SS	2x4
Southern Pine (15%)	SS	2x6

1100 Group
 Douglas Fir—Larch
 Douglas Fir (North)
 Douglas Fir (South)
 Hem—Fir
 Hem—Fir (North)
 Hem—Fir (North)
 Hem—Fir (North)
 Hem—Fir (North)
 Southern Pine (15%)
 Southern Pine (15%)
 Southern Pine (15%)
 Spruce Pine Fir
 Spruce Pine Fir
 SS

1200 Group
 Douglas Fir—Larch
 Douglas Fir (North)
 Douglas Fir (South)
 Hem—Fir
 Hem—Fir (North)
 Hem—Fir (North)
 Hem—Fir (North)
 Southern Pine (15%)
 Southern Pine (15%)
 Southern Pine (15%)
 Spruce Pine Fir
 Spruce Pine Fir
 SS

1300 Group
 Douglas Fir—Larch
 Douglas Fir (North)
 Douglas Fir (South)
 Hem—Fir
 Hem—Fir (North)
 Hem—Fir (North)
 Hem—Fir (North)
 Southern Pine (15%)
 Southern Pine (15%)
 Southern Pine (15%)
 Spruce Pine Fir
 Spruce Pine Fir
 SS

1400 Group
 Douglas Fir—Larch
 Douglas Fir (North)
 Douglas Fir (South)
 Hem—Fir
 Hem—Fir (North)
 Hem—Fir (North)
 Hem—Fir (North)
 Southern Pine (15%)
 Southern Pine (15%)
 Southern Pine (15%)
 Spruce Pine Fir
 Spruce Pine Fir
 SS

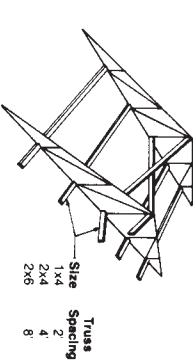
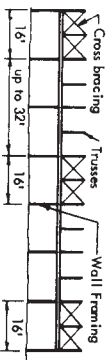
1500 Group
 Douglas Fir—Larch
 Douglas Fir (North)
 Douglas Fir (South)
 Hem—Fir
 Hem—Fir (North)
 Hem—Fir (North)
 Hem—Fir (North)
 Southern Pine (15%)
 Southern Pine (15%)
 Southern Pine (15%)
 Spruce Pine Fir
 Spruce Pine Fir
 SS

1600 Group
 Douglas Fir—Larch
 Douglas Fir (North)
 Douglas Fir (South)
 Hem—Fir
 Hem—Fir (North)
 Hem—Fir (North)
 Hem—Fir (North)
 Southern Pine (15%)
 Southern Pine (15%)
 Southern Pine (15%)
 Spruce Pine Fir
 Spruce Pine Fir
 SS

Use exterior C-C grade $1/2''$ or $1/2''$ plywood with water plies of Group 1 species wood. Identification indexes, 24/0 and 32/16 respectively. Use 3-ply $1/2''$ plywood and 5-ply $1/2''$ plywood or use Structural I, 4-ply, $1/2''$ plywood.

BUILDING CONSTRUCTION

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.



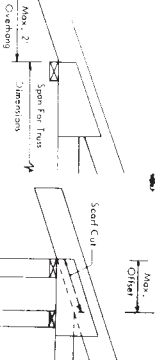
Wind Anchorage

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

Truss Span	Truss Spacing	Truss Size
20-24	4	8
26-30	1A or 1B	2A or 1B
32-36	1A or 1B	2A or 2B
38-42	1A or 1B	2A or 2B
44-48	1A or 1B	3A or 2B
50-54	1A or 1B	3A or 2B
56-60	1A or 1B	4A or 3B
62-66	1A or 1B	4A or 3B

A = metal framing anchor
 4-30d ring-shank nails = 1/2" bolt
 B = 1/2" bolt

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



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.

