

MWPS-Truss 24'

Truss 24'

24' span, 2-web trusses

CAUTION!

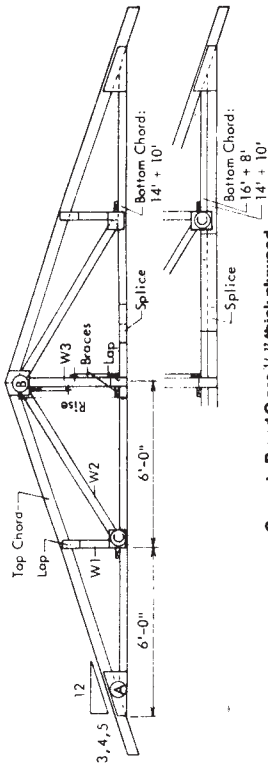
Additional professional services will be required to tailor this plan to your situation, including but not limited to: assurance of compliance with codes and regulations; review of specifications for materials and equipment; supervision of site selection, bid letting and construction; and provision for 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
24' Truss
Title Page
MIDWEST PLAN NO. 24' TRUSS

24'-span, 2-web trusses with plywood gussets



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

Table of lengths

Slope	Rise	Top Chord	W1	W2	W3
3/12	3'-0"	13'	2'	7'	3'
4/12	4'-0"	13'	2'	7'	4'
5/12	5'-0"	14'	3'	8'	5'

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.

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.

To select a truss:

1. estimate roof dead load
2. determine appropriate snow load = roof design load, psf
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	Bottom chord	Truss spacing, ft.								Web member sizes			Gusset Sizes, in.					
		0	5	8	10	12	15	18	20	W1	W2	W3	A	T	H	B	H	C
2x4	2x4	37	34	17	14	0	0	0	0	2x4	2x4	2x4	3/8x3x19	8x12	8x8			
2x6	2x4	74	70	33	22	14	16	0	0	"	"	"	3/8x4x17	10x16	8x10			
2x6	2x6	72	67	64	31	28	26	15	12	"	"	"	3/8x4x31	10x16	8x10			
2x8	2x6	100	90	91	43	38	35	21	16	2x4	2x4	2x4	3/8x4x23	12x16	8x10			
2x10	4x4	100+	100+	100+	66	60	54	33	22	"	"	"	3/8x4x32	14x16	10x12			
2x12	4x6	-	-	-	86	76	75	43	37	"	"	"	3/8x4x36	16x16	12x12			
2x12	6x6	-	-	-	82	74	70	41	35	"	"	"	3/8x4x44	16x16	16x12			
2x4	2x4	44	42	41	19	17	0	0	0	2x4	2x4	2x4	3/8x3x17	8x12	8x8			
2x6	2x4	87	82	81	38	30	0	19	0	"	"	"	3/8x4x16	12x12	8x10			
2x6	2x6	85	79	76	37	33	31	18	15	"	"	"	3/8x4x28	10x16	10x10			
2x8	2x6	100+	100+	100+	55	51	49	27	23	2x4	2x4	2x4	3/8x4x22	12x16	10x10			
2x10	4x4	-	-	-	69	68	67	37	32	"	"	"	3/8x4x25	14x16	12x10			
2x12	4x6	-	-	-	98	90	90	49	43	"	"	"	3/8x4x32	16x16	14x12			
2x12	6x6	-	-	-	94	86	86	47	43	"	"	"	3/8x4x34	16x20	16x12			
2x4	2x4	48	46	45	21	19	0	0	0	2x4	2x4	2x4	3/8x3x14	8x12	8x8			
2x6	2x4	96	91	91	42	39	0	21	0	"	"	"	3/8x4x16	10x16	8x10			
2x6	2x6	94	88	86	41	38	36	20	17	"	"	"	3/8x4x25	10x16	10x10			
2x8	2x6	100+	100+	100+	61	56	54	30	27	2x4	2x4	2x4	3/8x4x20	12x16	8x10			
2x10	4x4	-	-	-	83	77	76	41	37	"	"	"	3/8x4x23	16x16	12x12			
2x12	4x6	-	-	-	100+	98	100	53	49	"	"	"	3/8x4x29	16x20	12x12			
2x12	6x6	-	-	-	95	96	96	52	47	"	"	"	3/8x4x29	16x20	14x12			

1600f Lumber

Top chord	Bottom chord	Truss spacing, ft.								Web member sizes			Gusset Sizes, in.					
		0	5	8	10	12	15	18	20	W1	W2	W3	A	T	H	B	H	C
2x4	2x4	47	44	43	20	17	0	0	0	2x4	2x4	2x4	3/8x3x22	8x12	8x8			
2x6	2x4	88	84	83	38	33	0	19	0	"	"	"	3/8x4x20	10x16	8x10			
2x6	2x6	87	81	78	38	34	32	19	15	"	"	"	3/8x4x36	10x16	10x10			
2x8	2x6	100+	100+	100+	52	47	44	26	21	2x4	2x4	2x4	3/8x4x27	12x16	10x10			
2x10	4x4	-	-	-	80	73	71	40	34	"	"	"	3/8x4x33	16x20	12x10			
2x12	4x6	-	-	-	100+	96	92	51	45	"	"	"	3/8x4x41	16x20	14x12			
2x12	6x6	-	-	-	90	91	91	50	45	"	"	"	3/8x4x44	16x20	16x12			
2x4	2x4	53	50	49	23	21	14	0	0	2x4	2x4	2x4	3/8x3x19	8x12	8x10			
2x6	2x4	100+	99	99	45	43	14	22	0	"	"	"	3/8x4x18	10x16	10x10			
2x6	2x6	95	92	94	41	39	22	19	17	"	"	"	3/8x4x26	10x16	10x10			
2x8	2x6	100+	100+	100+	66	61	59	35	29	2x4	2x4	2x4	3/8x4x26	14x16	10x12			
2x10	4x4	-	-	-	91	84	83	45	42	"	"	"	3/8x4x31	16x20	12x12			
2x12	4x6	-	-	-	100+	100+	100+	59	54	"	"	"	3/8x4x38	16x20	16x12			
2x12	6x6	-	-	-	86	87	87	51	49	"	"	"	3/8x4x34	18x20	18x14			
2x4	2x4	57	55	54	25	23	21	12	0	2x4	2x4	2x4	3/8x3x17	8x12	8x8			
2x6	2x4	100+	100+	100+	50	47	21	25	0	"	"	"	3/8x4x17	10x16	8x10			
2x6	2x6	-	-	-	49	46	44	24	21	"	"	"	3/8x4x17	10x16	8x10			
2x8	2x6	-	-	-	73	68	65	36	33	2x4	2x4	2x4	3/8x4x22	14x16	8x12			
2x10	4x4	-	-	-	100	92	93	46	42	"	"	"	3/8x4x28	16x20	10x12			
2x12	4x6	-	-	-	100+	100+	100+	64	59	"	"	"	3/8x4x34	16x20	14x12			
2x12	6x6	-	-	-	82	81	81	52	51	"	"	"	3/8x4x34	18x20	16x12			

This page is a summary of the information in "Designs for Cold 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

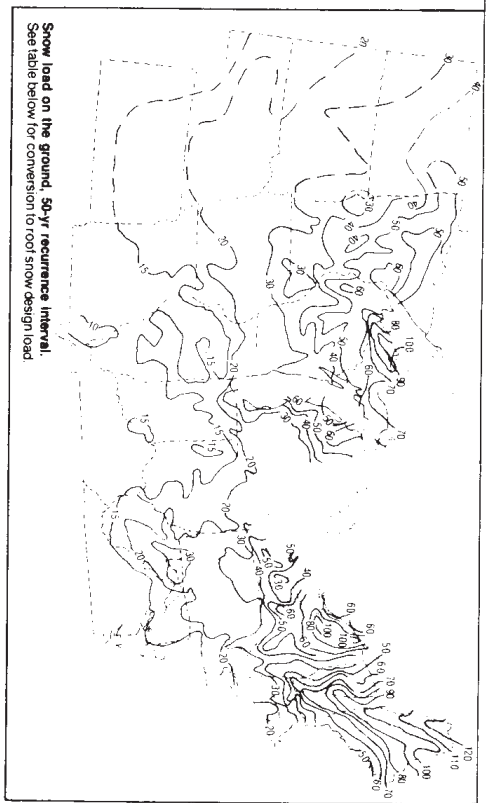
Add the weights of the truss, purlins or decking, roofing, and roof insulation to get the dead load on the top chord.

Approximate weights of trusses, psf.
 Example: a 4-web truss for 4' spacing with 2x8 top chord and 2x6 bottom chord weighs about $13 + 0.7 = 20$ psf.
 Dashed lines in table indicate example.

Chord Size, Top Bottom	Truss spacing	Truss dead weight, psf
2x4	2'	6.1
2x4	4'	8.1
2x6	2'	0.8
2x6	4'	0.4
2x6	2x4	2.0
2x6	2x6	1.0
2x6	2x8	1.2
2x6	2x10	0.6
2x6	2x12	2.7
2x6	2x14	1.3
2x6	2x16	0.7
2x10	2x4+2x4	3.3
2x10	2x4+2x6	1.6
2x10	2x6+2x6	4.0
2x10	2x8+2x6	2.0
2x12	2x6+2x6	1.0
2x12	2x8+2x6	2.2
2x12	2x10	1.1

Add the following for:

2x4-web Truss	1.4	0.7	0.4
6 web Truss	2.1	1.2	0.6



SNOW LOAD

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

Recommended snow loads.
 Recommended by the MWPS and NILES Committees for roofs up to about 100 ft slope for buildings outside the jurisdiction of a building code.
 Farm buildings: 30-yr map load x 0.9 for 25-yr x 0.8 for snow on roof.
 Other buildings: 30-yr map load x 0.8 to convert from snow on ground to snow on roof.
 Minimum recommended load is 2 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	Farm	Other
15	12.0	12
20	14.4	16
30	21.6	24
40	28.8	32

Weights of roofing and ceiling materials.

Roof framing	2x4 purlins 2 o.c	0.7 psf
	2x6 purlins 2 o.c	1.1
Ceiling framing	1x3 rurring 16 o.c	0.4 psf
	1x4 rurring 2 o.c	0.7
Sheathing, etc.	1 lumber solid	2.2 psf
	1/2 plywood	1.1
	3/4 plywood	1.4
	1 1/2 plywood	2.6
	1 1/2 OSB minimum	0.4
	28 ga steel	0.9
	Asphalt shingles	2.6
	Insulation per inch of thickness	0.1-0.4

Wind Loads
 Trusses are designed to withstand winds of 80 mph on a building less than 30' high.

LUMBER

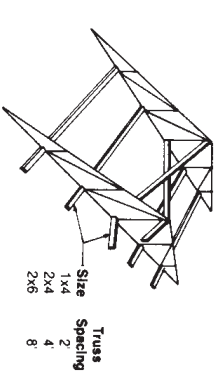
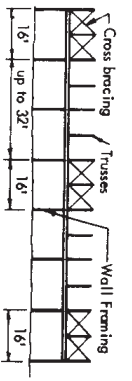
Three lumber groups are indicated in the tables. Example of species in each group are listed below.
 2x6 + = 2x6 2x8 2x10 2x12
 SS = Select structural
 (15%) = moisture content at time of milling

Species	Grade	Size
Douglas Fir—Larch	No. 1	2x4
	SS	2x6
Douglas Fir—Larch (North)	No. 1	2x4
	SS	2x6
Southern Pine (15%)	No. 2 dense	2x4
	No. 1	2x6
Southern Pine (19%)	No. 1	2x4
	No. 2 dense	2x6
Southern Pine (19%)	No. 1	2x4
	No. 2	2x6
1400 Group	No. 2	2x4
Douglas Fir—Larch	No. 1	2x6
Douglas Fir—Larch (North)	No. 2	2x4
	No. 1	2x6
Hem—Fir	No. 1	2x4
	SS	2x6
Southern Pine (15%)	No. 2	2x4
Southern Pine (19%)	No. 2	2x4
Southern Pine (19%)	No. 1	2x6
Southern Pine (19%)	No. 1	2x4
Southern Pine (19%)	SS	2x6
Spruce—Pine—Fir	SS	2x4
1100 Group	No. 2	2x6
Douglas Fir—Larch	No. 2	2x4
Douglas Fir (North)	No. 2	2x6
Douglas Fir (South)	No. 2	2x4
Douglas Fir (South)	No. 2	2x6
Hem—Fir	No. 2	2x4
	No. 1	2x6
Hem—Fir (North)	No. 1	2x4
Hem—Fir (North)	SS	2x6
Hem—Fir (North)	No. 1	2x4
Southern Pine (15%)	No. 1	2x6
Southern Pine (19%)	No. 2	2x6
Southern Pine (19%)	No. 1	2x4
Spruce Pine Fir	No. 1	2x6
	SS	2x4

Use exterior, C-C grade 1/2" or 3/4" plywood with outer piles of Group 1 species wood. Identification indexes: 2x10 and 3x16 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.

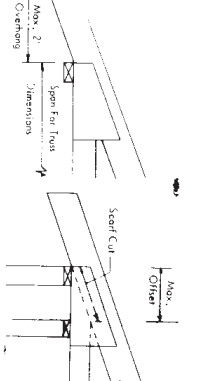


Wind Anchorage
 Minimum fasteners for wind anchorage, both ends of each truss:

Truss Span	Truss Spacing	Truss Size	Spacing
20'-24'	2'	1A or 1B	8
25'-30'	4'	1A or 1B	8
31'-36'	4'	1A or 1B	8
37'-42'	4'	1A or 1B	8
43'-48'	4'	1A or 1B	8
49'-54'	4'	1A or 1B	8
55'-60'	4'	1A or 1B	8

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.

