MWPS-Truss 28’

Truss 28’

28’ 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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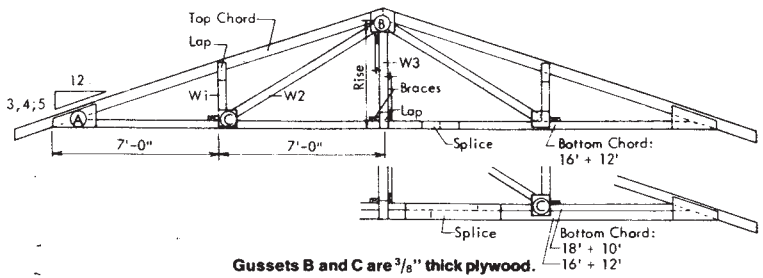
MIDWEST PLAN SERVICE
Cooperative Extension Work in Agriculture and Home Economics and Agricultural Experiment Stations of North Central Region - USDA Cooperating
28’ Truss
Title Page
MIDWEST PLAN NO. 28’ Truss

28' span, 2-web trusses

with plywood gussets



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

Table of lengths

Roof Slope	Rise	Top Chord	W1	W2	W3
3/12	3'-6"	15'	2'	8'	4'
4/12	4'-8"	16'	2'	8'	5'
5/12	5'-10"	16'	3'	9'	6'

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.

1100f Lumber

	Top chord	Bottom chord	Truss spacing 2' Ceiling dead load, psf 0	5	8	4' 0	5	8	8' 0	5	8	Web member sizes W1	W2	W3	Gusset Sizes, in. A T H W	B H W	C H W
			---Max. snow + roof dead load, psf---														
3/12 Slope	2x4	2x4	25	22	21	0	0	0	0	0	0	2x4	2x4	2x4	3/8x3½x15	8x12	8x8
	2x6	2x4	48	44	21	21	0	0	0	0	0	"	"	"	3/8x4x24	10x12	"
	2x6	2x6	47	44	42	20	17	15	0	0	0	"	"	"	3/8x4x26	10x16	8x10
	2x8	2x6	63	57	54	27	22	18	13	0	0	2x4	4&4	2x4	3/8x4x31	12x16	8x10
	2x10	4+4	98	88	87	42	35	0	21	0	0	"	"	"	½x4x28	14x16	10x10
	2x12	4+6	-	100+	100+	54	47	43	27	18	0	"	"	"	½x4x36	16x16	12x12
	2x12	6+6	-	-	-	52	48	45	26	21	14	"	"	"	3/8x4x49	"	14x12
4/12 Slope	2x4	2x4	28	26	25	12	0	0	0	0	0	2x4	2x4	2x4	3/8x3½x13	8x12	8x8
	2x6	2x4	56	53	30	24	0	0	0	0	0	"	"	"	3/8x4x22	10x12	8x10
	2x6	2x6	55	52	50	24	21	19	12	0	0	"	4&4	"	3/8x4x22	"	"
	2x8	2x6	82	76	73	35	32	25	17	0	0	2x4	4&4	2x4	3/8x4x30	14x12	10x10
	2x10	4+4	100+	100+	100+	49	45	18	24	0	0	"	"	"	½x4x22	14x16	12x10
	2x12	4+6	-	-	-	63	58	52	31	24	0	"	"	"	½x4x28	16x16	14x10
	2x12	6+6	-	-	-	60	55	53	30	26	21	"	"	"	3/8x4x45	18x16	16x12
5/12 Slope	2x4	2x4	30	28	27	13	0	0	0	0	0	2x4	2x4	2x4	3/8x3½x12	8x12	8x8
	2x6	2x4	62	59	42	27	0	0	13	0	0	"	4&4	"	3/8x4x19	10x12	"
	2x6	2x6	60	57	55	26	23	22	13	0	0	"	"	"	3/8x4x20	"	"
	2x8	2x6	90	85	82	39	36	31	19	0	0	2x4	4&4	2x4	½x4x15	12x16	8x10
	2x10	4+4	100+	100+	100+	54	50	24	27	0	0	"	"	"	½x4x20	14x16	10x10
	2x12	4+6	-	-	-	69	64	62	34	28	0	"	"	"	½x4x22	16x16	12x10
	2x12	6+6	-	-	-	67	62	59	33	29	26	"	"	"	½x4x28	18x16	14x12

1400f Lumber

	Top chord	Bottom chord	Truss spacing 2' Ceiling dead load, psf 0	5	8	4' 0	5	8	8' 0	5	8	Web member sizes W1	W2	W3	Gusset Sizes, in. A T H W	B H W	C H W
			---Max. snow + roof dead load, psf---														
3/12 Slope	2x4	2x4	31	28	27	13	0	0	0	0	0	2x4	2x4	2x4	3/8x3½x18	8x12	8x8
	2x6	2x4	61	57	48	26	0	0	0	0	0	"	"	"	½x4x17	10x16	8x10
	2x6	2x6	58	54	52	25	22	20	12	0	0	"	"	"	3/8x4x30	"	"
	2x8	2x6	82	74	70	36	31	28	18	12	0	2x4	2x4	2x4	½x4x22	12x16	8x12
	2x10	4+4	100+	100+	100+	52	48	33	26	0	0	"	"	"	½x4x30	14x16	12x10
	2x12	4+6	-	-	-	68	62	58	34	29	14	"	"	"	½x4x36	16x16	14x10
	2x12	6+6	-	-	-	64	58	55	32	27	24	"	"	"	½x4x44	16x20	16x12
4/12 Slope	2x4	2x4	35	33	31	15	12	0	0	0	0	2x4	2x4	2x4	3/8x3½x16	8x12	8x8
	2x6	2x4	70	66	58	30	12	0	15	0	0	"	"	"	½x4x15	10x12	8x10
	2x6	2x6	68	64	62	29	26	25	14	0	0	"	"	"	3/8x4x27	12x12	10x10
	2x8	2x6	100+	94	90	44	41	38	22	18	0	2x4	2x4	2x4	½x4x20	12x16	10x10
	2x10	4+4	-	100+	100+	60	55	48	30	13	0	"	"	"	½x4x27	16x16	12x12
	2x12	4+6	-	-	-	77	71	67	38	34	21	"	"	"	½x4x30	16x20	14x12
	2x12	6+6	-	-	-	74	68	65	37	33	30	"	"	"	½x4x34	"	18x12
5/12 Slope	2x4	2x4	37	36	35	16	14	0	0	0	0	2x4	2x4	2x4	3/8x3½x14	8x12	8x8
	2x6	2x4	76	73	72	33	16	0	16	0	0	"	"	"	½x4x14	10x16	8x10
	2x6	2x6	75	71	69	32	30	28	16	13	0	"	"	"	3/8x4x24	"	"
	2x8	2x6	100+	100+	100+	48	45	44	24	21	0	2x4	2x4	2x4	½x4x18	12x16	8x10
	2x10	4+4	-	-	-	67	62	53	33	14	0	"	"	"	½x4x22	14x16	12x10
	2x12	4+6	-	-	-	85	79	75	42	38	27	"	"	"	½x4x28	16x20	12x12
	2x12	6+6	-	-	-	83	76	73	41	37	35	"	"	"	½x4x28	"	16x12

1600f Lumber

	Top chord	Bottom chord	Truss spacing 2' Ceiling dead load, psf 0	5	8	4' 0	5	8	8' 0	5	8	Web member sizes W1	W2	W3	Gusset Sizes, in. A T H W	B H W	C H W
			---Max. snow + roof dead load, psf---														
3/12 Slope	2x4	2x4	37	35	33	16	14	0	0	0	0	2x4	2x4	2x4	3/8x3½x21	8x12	8x8
	2x6	2x4	73	69	61	32	16	0	16	0	0	"	"	"	½x4x20	10x16	8x10
	2x6	2x6	70	65	63	30	27	25	15	12	0	"	"	"	3/8x4x36	"	8x12
	2x8	2x6	99	89	90	43	38	35	21	16	0	2x4	2x4	2x4	½x4x27	12x16	10x10
	2x10	4+4	-	100+	100+	63	58	50	31	16	0	"	"	"	½x4x37	14x20	12x12
	2x12	4+6	-	-	-	82	74	73	41	35	27	"	"	"	½x4x40	16x20	14x12
	2x12	6+6	-	-	-	78	71	67	39	34	31	"	"	"	½x4x44	18x24	16x12
4/12 Slope	2x4	2x4	41	40	39	18	16	0	0	0	0	2x4	2x4	2x4	3/8x3½x19	8x12	8x10
	2x6	2x4	83	79	75	36	23	0	18	0	0	"	"	"	½x4x17	10x16	10x10
	2x6	2x6	81	76	74	35	32	30	17	15	0	"	"	"	½x4x18	"	"
	2x8	2x6	100+	100+	100+	53	49	47	26	23	0	2x4	2x4	2x4	½x4x25	14x16	10x12
	2x10	4+4	-	-	-	72	67	61	36	23	0	"	"	"	½x4x29	14x20	12x12
	2x12	4+6	-	-	-	93	85	81	46	42	35	"	"	"	½x4x37	16x20	16x12
	2x12	6+6	-	-	-	90	82	78	45	41	38	"	"	"	½x4x37	18x20	18x14
5/12 Slope	2x4	2x4	44	43	42	19	17	0	0	0	0	2x4	2x4	2x4	3/8x3½x16	8x12	8x8
	2x6	2x4	91	87	86	39	28	0	19	0	0	"	"	"	½x4x16	10x16	8x10
	2x6	2x6	89	85	82	39	37	34	19	17	14	"	"	"	½x4x16	"	"
	2x8	2x6	100+	100+	100+	58	54	52	29	26	0	2x4	2x4	2x4	½x4x22	14x16	10x10
	2x10	4+4	-	-	-	80	74	71	40	30	0	"	"	"	½x4x26	14x20	10x12
	2x12	4+6	-	-	-	100+	94	95	51	47	42	"	"	"	½x4x33	18x20	14x12
	2x12	6+6	-	-	-	-	92	92	50	46	44	"	"	"	½x4x34	"	16x12

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, uninsulated 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).

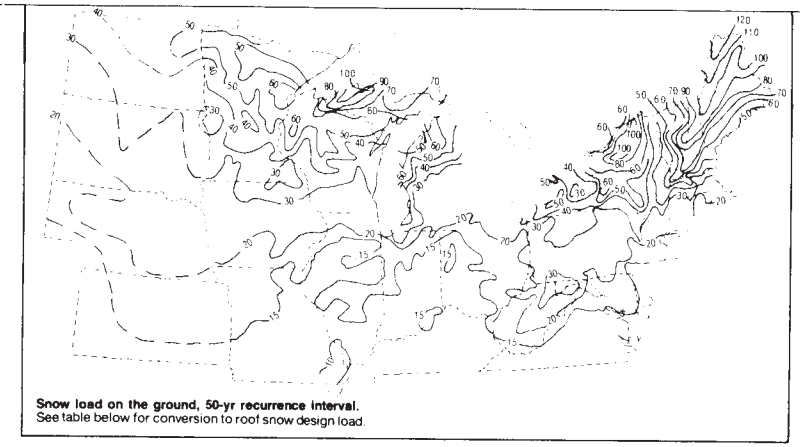
ROOF DEAD LOAD

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 1.3 + 0.7 = 2.0 psf. Dashed lines in table indicate example.

Chord Size Top	Chord Size Bottom	Truss spacing 2'	4'	8'
		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



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.

Recommended by the MWPS and NRAES Committees for roofs up to about 1/2 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.

Roof framing	
2x4 purlins, 2' o.c.	0.7 psf
2x6 purlins, 2' o.c.	1.1
Ceiling framing	
1x3 furring, 16" o.c.	0.4 psf
2x4 furring, 2' o.c.	0.7
Sheathing, etc.	
1" lumber, solid	2.2 psf
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

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
1600 Group		
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
1400 Group		
Douglas Fir—Larch	No. 2	2x4
	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
	No. 1	2x6
Spruce—Pine—Fir	SS	2x4
1100 Group		
Douglas Fir—Larch	No. 2	2x6
Douglas Fir (North)	No. 2	2x4
	No. 2	2x6
Douglas Fir (South)	No. 2	2x4
	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	2x6
Southern Pine (15%)	No. 2	2x6
Southern Pine (19%)	No. 2	2x6
Spruce Pine Fir	No. 1	2x4
	SS	2x6

Plywood

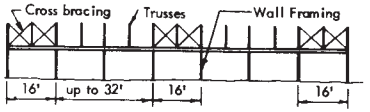
Use exterior, C-C grade 3/8" or 1/2" plywood with outer plies of Group 1 species wood, Identification Indexes, 24/0 and 32/16 respectively.

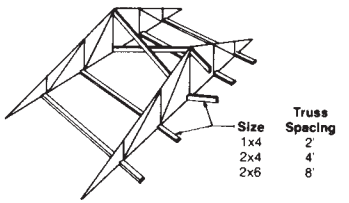
Use 3-ply 3/8" plywood and 5-ply 1/2" plywood or use Structural I, 4-ply, 1/2" plywood.

BUILDING CONSTRUCTION

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

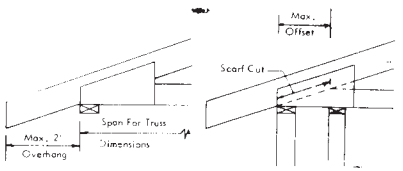
Minimum fasteners for wind anchorage, both ends of each truss.

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

Overhang

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