MWPS-36’ Trusses

36’ span, 2-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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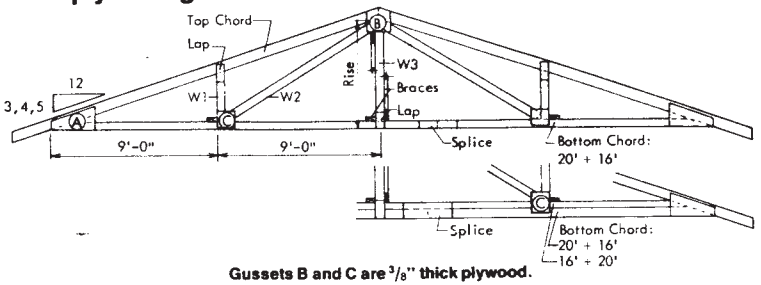
MIDWEST PLAN SERVICE
Cooperative Extension Work in Agriculture and Home Economics and Agricultural Experiment Stations of North Central Region - USDA Cooperating
36’ Truss
Title Page
MIDWEST PLAN NO. 36’

36' 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	4'-6"	19'	2'	10'+9'	5'
4/12	6'-0"	20'	3'	11'+10'	6'
5/12	7'-6"	20'	4'	12'+11'	8'

4+4, 4+6, 6+6 indicate 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, ft. 2' Ceiling dead load, psf 0	5	8	4' 0	5	8	6' 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	17	15	0	0	0	0	0	0	0	2x4	2x4	2x4	3/8x3½x14	8x12	8x8
	2x6	2x4	34	15	0	0	0	0	0	0	0	"	"	"	3/8x4x22	10x12	"
	2x6	2x6	33	30	28	0	0	0	0	0	0	"	"	"	3/8x4x25	10x16	8x10
	2x8	2x6	46	42	38	0	12	0	0	0	0	2x4	2x4	2x4	3/8x4x31	12x16	8x10
	2x10	4+4	68	63	50	29	0	0	0	0	0	"	4&4	"	3/8x4x42	14x16	10x12
	2x12	4+6	87	79	79	38	31	15	0	0	0	"	"	"	½x4x36	16x16	14x10
	2x12	6+6	83	76	72	36	32	29	0	0	0	"	"	"	3/8x4x51	"	16x10
4/12 Slope	2x4	2x4	18	17	0	0	0	0	0	0	0	2x4	2x4	2x4	3/8x3½x12	8x12	8x8
	2x6	2x4	38	21	0	0	0	0	0	0	0	"	"	"	3/8x4x19	10x12	"
	2x6	2x6	38	36	34	16	14	0	0	0	0	"	4&4	"	3/8x4x21	"	8x10
	2x8	2x6	57	53	52	24	18	0	0	0	0	2x4	4&4	2x4	3/8x4x29	12x16	10x10
	2x10	4+4	79	73	65	34	12	0	0	0	0	"	"	"	½x4x22	14x16	12x10
	2x12	4+6	100+	93	93	44	40	22	0	0	0	"	"	"	½x4x28	18x16	14x12
	2x12	6+6	-	90	91	42	38	36	21	14	0	"	"	"	½x4x34	"	16x12
5/12 Slope	2x4	2x4	20	18	0	0	0	0	0	0	0	2x4	2x4	2x4	3/8x3½x10	8x12	8x8
	2x6	2x4	42	28	0	0	0	0	0	0	0	"	"	"	3/8x4x17	10x12	"
	2x6	2x6	41	39	38	18	16	0	0	0	0	"	4&4	"	3/8x4x19	"	"
	2x8	2x6	62	59	57	27	22	0	0	0	0	2x4	4&4	2x4	3/8x4x26	12x16	8x10
	2x10	4+4	87	81	78	38	16	0	0	0	0	"	"	"	½x4x19	14x16	10x10
	2x12	4+6	100+	100+	100+	48	45	31	24	0	0	"	"	"	½x4x24	18x16	12x12
	2x12	6+6	-	-	-	47	44	42	23	19	0	"	"	"	3/8x4x39	"	14x12

1400f Lumber

	Top chord	Bottom chord	Truss spacing, ft. 2' Ceiling dead load, psf 0	5	8	4' 0	5	8	6' 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	21	19	0	0	0	0	0	0	0	2x4	2x4	2x4	3/8x3½x17	8x12	8x8
	2x6	2x4	42	36	0	0	0	0	0	0	0	"	"	"	3/8x4x27	10x16	8x10
	2x6	2x6	41	38	36	17	15	0	0	0	0	"	"	"	3/8x4x29	"	"
	2x8	2x6	62	55	52	26	21	0	0	0	0	2x4	2x4	2x4	½x4x22	12x16	8x12
	2x10	4+4	83	77	76	36	24	14	0	0	0	"	"	"	½x4x29	14x20	12x12
	2x12	4+6	100+	98	99	46	42	36	0	0	0	"	"	"	½x4x36	16x20	14x12
	2x12	6+6	-	-	-	44	40	37	22	17	0	"	4&4	"	3/8x4x57	"	16x12
4/12 Slope	2x4	2x4	23	21	0	0	0	0	0	0	0	2x4	2x4	2x4	3/8x3½x14	8x12	8x8
	2x6	2x4	48	45	0	0	0	0	0	0	0	"	"	"	½x4x14	10x12	8x10
	2x6	2x6	47	44	43	20	18	12	0	0	0	"	"	"	3/8x4x26	12x12	10x10
	2x8	2x6	70	66	64	30	27	13	0	0	0	2x4	2x4	2x4	½x4x19	12x16	10x10
	2x10	4+4	97	91	90	42	36	13	0	0	0	"	"	"	½x4x26	16x16	12x12
	2x12	4+6	100+	100+	100+	54	50	45	27	16	0	"	4&4	"	½x4x32	16x20	16x12
	2x12	6+6	-	-	-	52	48	46	26	22	12	"	"	"	½x4x34	"	18x12
5/12 Slope	2x4	2x4	25	23	12	0	0	0	0	0	0	2x4	2x4	2x4	3/8x3½x12	8x12	8x8
	2x6	2x4	52	50	12	22	0	0	0	0	0	"	4&4	"	3/8x4x22	10x12	"
	2x6	2x6	51	49	48	22	20	18	0	0	0	"	"	"	3/8x4x23	10x16	8x10
	2x8	2x6	78	73	71	34	31	18	0	0	0	2x4	4&4	2x4	½x4x17	12x16	8x10
	2x10	4+4	100+	100+	100+	47	44	0	23	0	0	"	"	"	½x4x24	16x16	10x12
	2x12	4+6	-	-	-	60	55	51	30	19	0	"	"	"	½x4x26	16x20	12x12
	2x12	6+6	-	-	-	59	54	52	29	25	19	"	"	"	½x4x28	"	16x12

1600f Lumber

	Top chord	Bottom chord	Truss spacing, ft. 2' Ceiling dead load, psf 0	5	8	4' 0	5	8	6' 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	23	17	0	0	0	0	0	0	2x4	2x4	2x4	3/8x3½x20	8x12	8x8
	2x6	2x4	50	48	17	0	0	0	0	0	0	"	"	"	½x4x19	10x16	8x10
	2x6	2x6	49	46	44	21	18	16	0	0	0	"	"	"	3/8x4x34	"	8x12
	2x8	2x6	72	65	62	31	26	18	0	0	0	2x4	2x4	2x4	½x4x26	12x20	10x10
	2x10	4+4	100+	93	93	44	39	0	0	0	0	"	"	"	½x4x34	14x20	12x12
	2x12	4+6	-	100+	100+	56	51	49	28	19	0	"	"	"	½x4x36	18x24	16x14
	2x12	6+6	-	-	-	54	49	47	27	22	15	"	"	"	½x4x44	"	16x14
4/12 Slope	2x4	2x4	27	26	25	12	0	0	0	0	0	2x4	2x4	2x4	3/8x3½x17	8x12	8x10
	2x6	2x4	57	54	26	24	0	0	0	0	0	"	"	"	½x4x16	10x16	10x10
	2x6	2x6	56	53	52	24	22	20	0	0	0	"	"	"	3/8x4x30	"	"
	2x8	2x6	84	79	77	36	33	26	0	0	0	2x4	2x4	2x4	½x4x23	14x16	10x12
	2x10	4+4	100+	100+	100+	51	47	0	25	0	0	"	4&4	"	½x4x31	14x20	14x12
	2x12	4+6	-	-	-	65	60	55	32	25	0	"	"	"	½x4x33	18x20	16x14
	2x12	6+6	-	-	-	63	58	55	31	27	20	"	"	"	½x4x35	18x24	18x14
5/12 Slope	2x4	2x4	29	28	27	12	0	0	0	0	0	2x4	2x4	2x4	3/8x3½x15	8x12	8x8
	2x6	2x4	62	59	33	27	0	0	0	0	0	"	"	"	½x4x14	10x16	8x10
	2x6	2x6	61	58	57	26	24	23	13	0	0	"	4&4	"	3/8x4x26	"	"
	2x8	2x6	92	88	85	40	38	33	20	0	0	2x4	4&4	2x4	½x4x20	14x16	10x10
	2x10	4+4	100+	100+	100+	56	53	16	28	0	0	"	"	"	½x4x28	16x20	12x12
	2x12	4+6	-	-	-	72	66	65	36	30	0	"	"	"	½x4x31	18x20	14x12
	2x12	6+6	-	-	-	70	65	62	35	31	26	"	"	"	½x4x32	18x24	18x12

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).

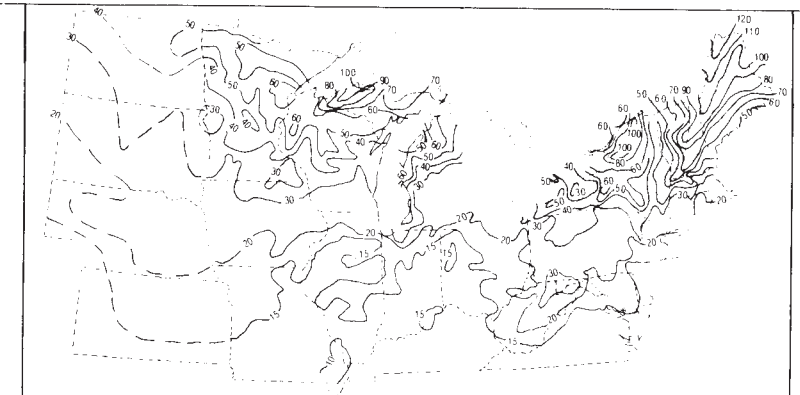
ROOF DEAD LOAD

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		Truss spacing		
Top	Bottom	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:				
2-6&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
1/2" plywood	1.1
5/8" 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

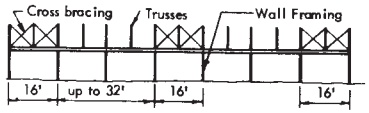
Use exterior, C-C grade 3/8" or 1/2" plywood with outer plies of Group 1 species wood, Identification Indexes, 24/0 and 32/16 respectively.

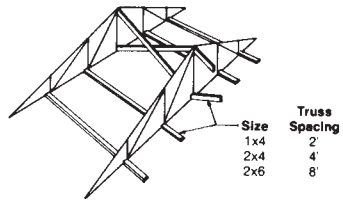
Use 3-ply 3/8" plywood and 5-ply 1/2" plywood or use Structural I, 4-ply, 1/2" plywood.

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

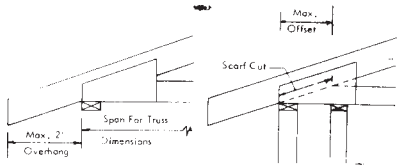
Minimum fasteners for wind anchorage, both ends of each truss.

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