MWPS-44’Truss

44’ span, 4-web trusses

with plywood gussets.

CAUTION!

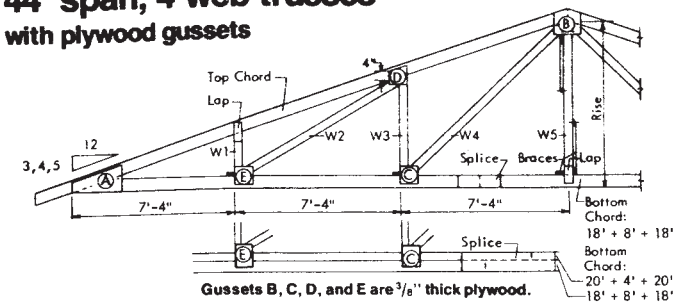
Additional professional services will be required to tailor this plan to your situation, including but not limited to: assurance of compliance with codes and regulations; review of specifications for materials and equipment; supervision of site selection, bid letting and construction; and provision for 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.**

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.

MIDWEST PLAN SERVICE
Cooperative Extension Work in Agriculture and Home Economics and Agricultural Experiment Stations of North Central Region - USDA Cooperating
44’ Truss
Title Page
MIDWEST PLAN NO. 44’ Truss

44' 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	5'-6"	18'+5'	2'	8'	4'	9'+8'	6'
4/12	7'-4"	20'+4'	3'	9'	5'	10'+9'	7'
5/12	9'-2"	20'+4'	3'	10'	6'+5'	12'+11'	9'

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	8' 0	5	8	Web member sizes W1	W2	W3	W4	W5	Gusset Sizes, in. A T H W	B H W	C H W	D H W	E H W
			---Max. snow + roof dead load, psf---																		
3/12 Slope	2x4	2x4	0	17	0	0	0	0	0	0	0	2x4	2x4	2x4	2x4	2x4	3/8x3½x20	8x12	8x8	8x8	8x8
	2x6	2x4	0	22	0	0	0	0	0	0	0	"	"	"	"	"	3/8x4x23	10x12	"	"	"
	2x6	2x6	37	32	29	0	0	0	0	0	0	"	"	"	"	"	3/8x4x32	"	8x10	"	"
	2x8	2x6	39	34	31	0	12	0	0	0	0	2x4	2x4	2x4	2x4	2x4	3/8x4x33	12x12	8x10	8x8	8x8
	2x10	4+4	55	51	48	0	16	0	0	0	0	"	"	"	"	"	½x4x28	14x16	12x10	"	10x8
	2x12	4+6	70	64	61	30	26	18	0	0	0	"	"	"	"	"	½x4x36	16x16	14x10	"	12x8
	2x12	6+6	79	72	69	34	30	27	0	0	0	"	"	"	"	"	½x4x44	18x16	16x12	"	14x8
4/12 Slope	2x4	2x4	22	20	0	0	0	0	0	0	0	2x4	2x4	2x4	2x4	2x4	3/8x3½x17	8x12	8x8	8x8	8x8
	2x6	2x4	34	30	0	0	0	0	0	0	0	"	"	"	"	"	3/8x4x22	10x12	"	"	"
	2x6	2x6	44	42	41	0	16	0	0	0	0	"	"	"	"	"	½x4x18	12x12	8x10	"	"
	2x8	2x6	52	49	47	0	18	0	0	0	0	2x4	2x4	2x4	2x4	2x4	½x4x19	14x12	10x10	8x8	8x8
	2x10	4+4	72	67	61	31	22	0	0	0	0	"	"	"	"	"	½x4x25	14x16	12x10	"	10x10
	2x12	4+6	91	84	84	39	35	26	0	0	0	"	"	2x6	"	"	½x4x31	16x20	14x14	8x10	12x10
	2x12	6+6	100+	94	95	44	41	38	0	17	0	"	"	"	"	"	½x4x36	18x20	18x14	8x12	16x10
5/12 Slope	2x4	2x4	24	23	16	0	0	0	0	0	0	2x4	2x4	2x4	2x4	2x4	3/8x3½x15	8x12	8x8	8x8	8x8
	2x6	2x4	43	38	17	0	0	0	0	0	0	"	"	"	"	"	3/8x4x22	10x12	"	"	"
	2x6	2x6	50	48	47	21	19	0	0	0	0	"	"	"	4&4	"	½x4x16	10x16	10x8	"	"
	2x8	2x6	66	61	58	28	23	0	0	0	0	2x4	2x4	2x6	4&4	2x4	½x4x19	12x16	10x12	8x10	8x8
	2x10	4+4	90	86	75	39	28	0	0	0	0	"	"	2x8	"	"	½x4x26	14x20	14x14	8x12	10x8
	2x12	4+6	100+	100+	100+	49	45	34	0	12	0	"	"	"	"	"	½x4x31	18x16	16x14	8x14	12x10
	2x12	6+6	-	-	-	53	49	47	26	21	0	"	4&4	"	"	"	½x4x31	18x20	18x14	"	14x10

1400f Lumber

	Top chord	Bottom chord	Truss spacing, ft. 2' Ceiling dead load, psf 0	5	8	4' 0	5	8	8' 0	5	8	Web member sizes W1	W2	W3	W4	W5	Gusset Sizes, in. A T H W	B H W	C H W	D H W	E H W
			---Max. snow + roof dead load, psf---																		
3/12 Slope	2x4	2x4	23	21	20	0	0	0	0	0	0	2x4	2x4	2x4	2x4	2x4	3/8x3½x25	8x12	8x8	8x8	8x8
	2x6	2x4	34	31	22	0	0	0	0	0	0	"	"	"	"	"	½x4x17	10x12	"	"	"
	2x6	2x6	46	44	41	0	16	0	0	0	0	"	"	"	"	"	½x4x23	10x16	10x10	"	"
	2x8	2x6	51	47	44	0	17	12	0	0	0	2x4	2x4	2x4	2x4	2x4	½x4x25	12x16	10x10	8x8	8x8
	2x10	4+4	72	67	63	31	26	14	0	0	0	"	"	"	"	"	½x4x32	16x16	12x10	"	10x8
	2x12	4+6	91	84	80	40	35	31	0	12	0	"	"	"	"	"	½x4x39	16x20	14x12	"	12x8
	2x12	6+6	97	89	89	42	37	35	0	16	0	"	"	"	"	"	½x4x44	18x20	18x12	8x10	14x10
4/12 Slope	2x4	2x4	27	25	24	0	0	0	0	0	0	2x4	2x4	2x4	2x4	2x4	3/8x3½x22	8x12	8x8	8x8	8x8
	2x6	2x4	45	42	33	0	0	0	0	0	0	"	"	"	"	"	½x4x17	10x12	8x10	"	"
	2x6	2x6	54	52	50	23	21	17	0	0	0	"	"	"	"	"	½x4x21	12x12	10x10	"	8x10
	2x8	2x6	69	64	61	30	26	18	0	0	0	2x4	2x4	2x4	2x4	2x4	½x4x24	12x16	10x10	8x8	8x10
	2x10	4+4	95	88	88	41	35	23	0	0	0	"	"	"	"	"	½x4x33	14x20	12x12	8x10	10x10
	2x12	4+6	100+	100+	100+	52	48	43	0	17	0	"	"	2x6	"	"	½x4x40	18x20	16x14	8x12	14x10
	2x12	6+6	-	-	-	54	50	47	27	23	16	"	"	"	4&4	"	½x4x39	"	18x14	"	16x10
5/12 Slope	2x4	2x4	30	28	27	0	0	0	0	0	0	2x4	2x4	2x4	2x4	2x4	3/8x3½x19	8x12	8x8	8x8	8x8
	2x6	2x4	57	52	43	0	0	0	0	0	0	"	"	"	"	"	½x4x16	10x16	10x8	"	"
	2x6	2x6	61	58	57	26	24	23	0	0	0	"	"	"	"	"	½x4x19	"	10x10	"	"
	2x8	2x6	86	81	76	37	34	24	0	0	0	2x4	2x4	2x6	2x4	2x4	½x4x24	12x20	12x12	8x10	8x8
	2x10	4+4	100+	100+	100+	51	43	30	0	0	0	"	"	2x8	"	"	2-½x6x18	16x20	14x16	8x14	10x10
	2x12	4+6	-	-	-	64	59	52	32	23	0	"	4&4	"	4&4	"	½x4x35	18x20	16x16	"	12x10
	2x12	6+6	-	-	-	65	60	57	32	28	22	"	"	"	"	"	½x4x37	"	18x16	"	14x10

1600f Lumber

	Top chord	Bottom chord	Truss spacing, ft. 2' Ceiling dead load, psf 0	5	8	4' 0	5	8	8' 0	5	8	Web member sizes W1	W2	W3	W4	W5	Gusset Sizes, in. A T H W	B H W	C H W	D H W	E H W
			---Max. snow + roof dead load, psf---																		
3/12 Slope	2x4	2x4	28	26	25	0	0	0	0	0	0	2x4	2x4	2x4	2x4	2x4	½x3½x17	8x12	8x8	8x8	8x8
	2x6	2x4	40	38	35	0	0	0	0	0	0	"	"	"	"	"	½x4x20	10x16	8x10	"	"
	2x6	2x6	57	53	50	25	20	17	0	0	0	"	"	"	"	"	½x4x28	"	10x10	"	"
	2x8	2x6	61	56	53	26	22	18	0	0	0	2x4	2x4	2x4	2x4	2x4	½x4x29	12x16	10x10	8x8	8x8
	2x10	4+4	87	81	81	37	34	23	0	0	0	"	"	"	"	"	½x4x39	16x20	12x12	8x10	10x10
	2x12	4+6	100+	100+	100+	48	44	41	0	18	0	"	"	"	"	"	½x4x47	18x20	16x12	"	12x10
	2x12	6+6	-	-	-	51	47	45	25	21	17	"	"	"	4&4	"	½x4x48	20x20	18x14	"	14x10
4/12 Slope	2x4	2x4	32	30	29	0	12	0	0	0	0	2x4	2x4	2x4	2x4	2x4	½x3½x14	8x12	8x8	8x8	8x8
	2x6	2x4	54	52	48	0	18	12	0	0	0	"	"	"	"	"	½x4x20	12x12	8x10	"	"
	2x6	2x6	66	63	61	29	26	24	0	0	0	"	"	"	"	"	½x4x25	10x16	10x10	"	8x10
	2x8	2x6	83	79	75	36	33	30	0	14	0	2x4	2x4	2x4	2x4	2x4	½x4x29	12x20	10x10	8x8	8x10
	2x10	4+4	100+	100+	100+	50	47	44	0	20	15	"	"	"	"	"	2-½x6x22	16x20	14x12	8x10	12x10
	2x12	4+6	-	-	-	63	60	57	31	28	25	"	"	"	4&4	"	2-½x6x28	18x20	18x14	"	14x10
	2x12	6+6	-	-	-	66	61	58	33	29	27	"	"	"	"	"	2-½x6x34	18x22	20x14	10x10	16x12
5/12 Slope	2x4	2x4	36	35	34	15	14	0	0	0	0	2x4	2x4	2x4	4&4	2x4	3/8x3½x21	8x12	8x8	8x8	8x8
	2x6	2x4	68	62	54	30	13	0	0	0	0	"	"	"	"	"	½x4x20	10x16	10x10	"	"
	2x6	2x6	74	71	70	32	30	29	0	13	0	"	"	"	"	"	½x4x23	10x20	"	"	"
	2x8	2x6	100+	97	98	45	42	34	0	13	0	2x4	2x4	2x6	4&4	2x4	2-½x6x15	14x16	12x12	8x12	8x10
	2x10	4+4	-	100+	100+	62	53	41	31	14	0	"	"	2x8	"	"	2-½x6x18	16x20	14x16	8x14	10x10
	2x12	4+6	-	-	-	77	72	67	38	31	17	"	"	"	"	"	2-½x6x22	20x24	18x16	10x14	14x10
	2x12	6+6	-	-	-	79	73	70	39	35	32	"	"	"	"	"	2-½x6x28	"	20x18	8x16	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, 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).

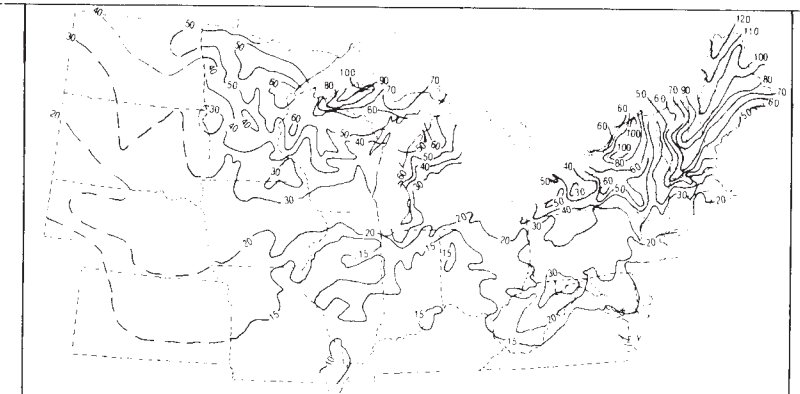
ROOF DEAD LOAD

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		
		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:				
2-6-4-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 3/12 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.

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
7/8" 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

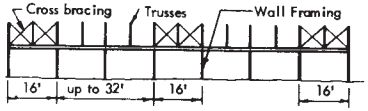
Use exterior, C-C grade 3/8" or 1/2" plywood with outer plies of Group 1 species wood, Identification Indexes, 24/0 and 32/16 respectively.

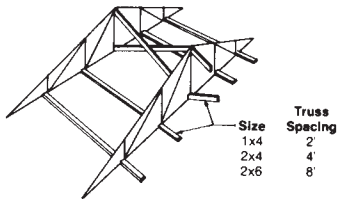
Use 3-ply 3/8" plywood and 5-ply 1/2" plywood or use Structural I, 4-ply, 1/2" plywood.

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

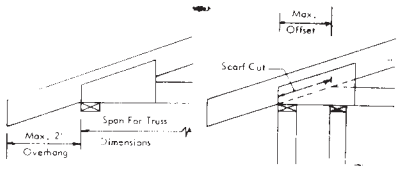
Minimum fasteners for wind anchorage, both ends of each truss.

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

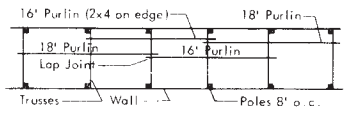
For a 2' to 4' overhang, use the top chord and heel gusset design for a 1/3 larger snow load.



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.



MWPS-48’Truss

48’ 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.**

WARRANTY DISCLAIMER

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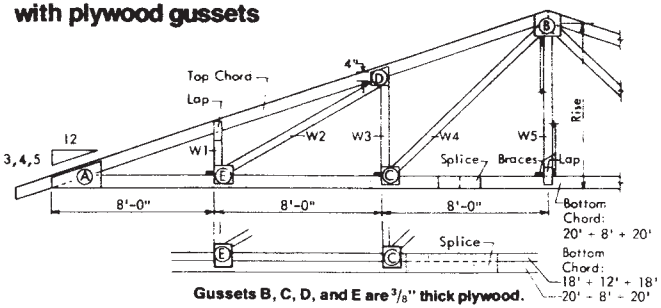
MIDWEST PLAN SERVICE
Cooperative Extension Work in Agriculture and Home Economics and Agricultural Experiment Stations of North Central Region - USDA Cooperating
48’ Truss
Title Page
MIDWEST PLAN NO. 48’ Truss

48' 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'-0"	20'+5'	2'	9'	4'	10'+9'	6'
4/12	8'-0"	20'+6'	3'	10'+9'	5'	11'+10'	8'
5/12	10'-0"	14'+13'	3'	10'+9'	7'+6'	13'+12'	10'

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.

1400f Lumber

	Top chord	Bottom chord	Truss spacing, ft: 2' Ceiling dead load, psf 0	5	8	4' 0	5	8	8' 0	5	8	Web member sizes W1	W2	W3	W4	W5	Gusset Sizes, in: A T H W	B H W	C H W	D H W	E H W
			---Max. snow + roof dead load, psf---																		
3/12 Slope	2x4	2x4	0	17	12	0	0	0	0	0	0	2x4	2x4	2x4	2x4	2x4	3/8x3½x22	8x12	8x8	8x8	8x8
	2x6	2x4	0	28	12	0	0	0	0	0	0	"	"	"	"	"	½x4x17	10x12	"	"	"
	2x6	2x6	41	39	36	0	14	0	0	0	0	"	"	"	"	"	½x4x23	10x16	10x10	"	"
	2x8	2x6	47	43	39	0	15	0	0	0	0	2x4	2x4	2x4	2x4	2x4	½x4x25	12x16	10x10	8x8	8x8
	2x10	4+4	66	61	56	0	22	0	0	0	0	"	"	"	"	"	½x4x32	16x16	12x10	"	10x8
	2x12	4+6	83	77	73	36	32	25	0	0	0	"	"	"	"	"	½x4x40	18x20	14x12	8x10	12x10
	2x12	6+6	88	81	77	38	34	32	0	15	0	"	"	"	"	"	½x4x44	"	18x12	"	14x10
4/12 Slope	2x4	2x4	23	22	21	0	0	0	0	0	0	2x4	2x4	2x4	2x4	2x4	3/8x3½x19	8x12	8x8	8x8	8x8
	2x6	2x4	42	38	19	0	0	0	0	0	0	"	"	"	"	"	½x4x17	10x16	10x10	8x10	"
	2x6	2x6	48	46	44	0	18	12	0	0	0	"	"	"	"	"	½x4x19	"	10x12	"	"
	2x8	2x6	63	59	56	0	23	12	0	0	0	2x4	2x4	2x4	2x4	2x4	½x4x25	12x20	12x14	8x12	8x8
	2x10	4+4	87	80	76	38	29	0	0	0	0	"	"	2x6	"	"	2–½x6x18	16x20	14x12	8x10	10x10
	2x12	4+6	100+	100+	100+	48	44	35	0	13	0	"	"	"	"	"	½x4x36	18x20	16x12	"	12x10
	2x12	6+6	–	–	–	49	45	43	0	21	0	"	"	"	"	"	½x4x38	20x24	20x12	"	14x10
5/12 Slope	2x4	2x4	26	25	23	0	0	0	0	0	0	2x4	2x4	2x4	4&4	2x4	3/8x3½x21	8x12	8x8	8x8	8x8
	2x6	2x4	53	47	26	0	0	0	0	0	0	"	"	2x6	"	"	½x4x17	10x12	8x10	"	"
	2x6	2x6	53	51	50	23	21	17	0	0	0	"	"	"	"	"	½x4x21	12x12	10x10	"	8x10
	2x8	2x6	80	74	73	34	29	17	0	0	0	2x4	2x4	2x8	4&4	2x4	½x4x25	12x16	10x10	8x8	8x10
	2x10	4+4	100+	100+	97	47	36	15	0	0	0	"	"	4&4	"	"	½x4x33	14x20	12x14	8x12	12x10
	2x12	4+6	–	–	100+	59	54	45	0	17	0	"	"	"	"	"	2–½x6x28	18x20	16x14	"	14x10
	2x12	6+6	–	–	–	59	54	52	29	25	15	"	4&4	"	"	"	½x4x39	"	18x14	"	16x10

1100f Lumber

	Top chord	Bottom chord	Truss spacing, ft: 2' Ceiling dead load, psf 0	5	8	4' 0	5	8	8' 0	5	8	Web member sizes W1	W2	W3	W4	W5	Gusset Sizes, in: A T H W	B H W	C H W	D H W	E H W
			---Max. snow + roof dead load, psf---																		
3/12 Slope	2x4	2x4	0	14	0	0	0	0	0	0	0	2x4	2x4	2x4	2x4	2x4	3/8x3½x19	8x12	8x8	8x8	8x8
	2x6	2x4	0	17	0	0	0	0	0	0	0	"	"	"	"	"	3/8x4x22	10x12	"	"	"
	2x6	2x6	33	29	26	0	0	0	0	0	0	"	"	"	"	"	3/8x4x32	"	8x10	"	"
	2x8	2x6	36	31	27	0	0	0	0	0	0	2x4	2x4	2x4	2x4	2x4	3/8x4x34	12x12	8x10	8x8	8x8
	2x10	4+4	50	47	41	0	14	0	0	0	0	"	"	"	"	"	½x4x28	14x16	12x10	"	10x8
	2x12	4+6	64	59	56	0	23	13	0	0	0	"	"	"	"	"	½x4x36	16x16	14x10	"	12x8
	2x12	6+6	73	66	63	31	27	23	0	0	0	"	"	"	4&4	"	½x4x44	18x16	16x12	8x10	14x10
4/12 Slope	2x4	2x4	0	17	0	0	0	0	0	0	0	2x4	2x4	2x4	2x4	2x4	3/8x3½x17	8x12	8x8	8x8	8x8
	2x6	2x4	0	25	0	0	0	0	0	0	0	"	"	"	"	"	3/8x4x22	10x12	"	"	"
	2x6	2x6	39	37	35	0	13	0	0	0	0	"	"	"	"	"	½x4x18	"	8x10	"	"
	2x8	2x6	48	45	42	0	13	0	0	0	0	2x4	2x4	2x4	2x4	2x4	½x4x19	14x12	10x10	8x8	8x8
	2x10	4+4	66	61	52	0	17	0	0	0	0	"	"	2x6	"	"	½x4x25	14x16	12x12	8x10	10x10
	2x12	4+6	84	77	76	36	31	20	0	0	0	"	"	"	4&4	"	½x4x31	16x20	14x14	"	12x10
	2x12	6+6	94	86	83	41	36	32	0	12	0	"	"	"	4&4	"	½x4x36	18x16	18x14	8x12	16x10
5/12 Slope	2x4	2x4	20	19	0	0	0	0	0	0	0	2x4	2x4	2x4	4&4	2x4	3/8x3½x15	8x12	8x8	8x8	8x8
	2x6	2x4	40	32	0	0	0	0	0	0	0	"	"	"	"	"	½x4x13	10x12	"	"	"
	2x6	2x6	43	42	41	0	17	0	0	0	0	"	"	2x6	"	"	½x4x16	10x16	10x10	8x10	"
	2x8	2x6	61	57	52	0	18	0	0	0	0	2x4	2x4	2x6	4&4	2x4	½x4x19	12x16	10x12	8x10	8x8
	2x10	4+4	83	78	64	36	21	0	0	0	0	"	"	2x8	"	"	½x4x26	14x20	14x14	8x12	10x8
	2x12	4+6	100+	95	96	45	39	26	0	0	0	"	"	4&4	"	"	½x4x31	18x20	16x10	8x10	12x10
	2x12	6+6	–	100+	100+	48	44	42	0	16	0	"	"	"	"	"	½x4x35	"	18x12	"	14x10

1600f Lumber

	Top chord	Bottom chord	Truss spacing, ft: 2' Ceiling dead load, psf 0	5	8	4' 0	5	8	8' 0	5	8	Web member sizes W1	W2	W3	W4	W5	Gusset Sizes, in: A T H W	B H W	C H W	D H W	E H W
			---Max. snow + roof dead load, psf---																		
3/12 Slope	2x4	2x4	25	23	21	0	0	0	0	0	0	2x4	2x4	2x4	2x4	2x4	½x3½x16	8x12	8x8	8x8	8x8
	2x6	2x4	37	34	23	0	0	0	0	0	0	"	"	"	"	"	½x4x20	10x16	8x10	"	"
	2x6	2x6	50	48	46	0	18	13	0	0	0	"	"	"	"	"	½x4x28	"	10x10	8x10	"
	2x8	2x6	56	51	48	0	19	13	0	0	0	2x4	2x4	2x4	2x4	2x4	½x4x29	12x16	10x10	8x10	8x8
	2x10	4+4	79	74	73	34	28	14	0	0	0	"	"	"	"	"	½x4x39	16x20	14x12	"	10x10
	2x12	4+6	100	92	93	43	40	35	0	14	0	"	"	"	"	"	½x4x48	18x20	16x12	"	12x10
	2x12	6+6	–	100	100+	47	43	40	0	19	12	"	"	"	"	"	½x4x54	20x20	18x14	10x10	14x12
4/12 Slope	2x4	2x4	28	26	25	0	0	0	0	0	0	2x4	2x4	2x4	4&4	2x4	½x3½x14	8x12	8x8	8x8	8x8
	2x6	2x4	50	47	42	0	16	0	0	0	0	"	"	"	"	"	½x4x20	12x12	10x10	"	"
	2x6	2x6	58	55	53	25	22	21	0	0	0	"	"	"	"	"	½x4x25	10x16	"	"	8x10
	2x8	2x6	77	73	69	33	30	27	0	12	0	2x4	2x4	2x4	4&4	2x4	½x4x30	12x20	10x10	8x10	8x10
	2x10	4+4	100+	99	100	46	43	39	0	18	0	"	"	2x6	"	"	2–½x6x22	16x20	14x14	8x12	12x10
	2x12	4+6	–	–	–	58	54	51	0	25	22	"	"	"	"	"	2–½x6x28	18x20	18x16	"	14x10
	2x12	6+6	–	–	–	61	56	53	30	26	24	"	"	"	"	"	2–½x6x34	18x22	20x16	8x14	16x12
5/12 Slope	2x4	2x4	31	30	29	0	0	0	0	0	0	2x4	2x4	2x4	4&4	2x4	3/8x3½x22	8x12	8x8	8x8	8x8
	2x6	2x4	63	57	46	0	0	0	0	0	0	"	"	2x6	"	"	½x4x20	10x16	10x10	8x10	"
	2x6	2x6	65	62	61	28	26	25	0	0	0	"	"	"	"	"	½x4x22	10x20	"	"	"
	2x8	2x6	96	89	90	41	38	26	0	0	0	2x4	2x4	2x6	4&4	2x4	2–½x6x15	14x20	12x12	8x12	8x10
	2x10	4+4	100+	100+	100+	57	48	31	0	0	0	"	"	2x8	"	"	2–½x6x21	18x24	16x16	10x14	12x10
	2x12	4+6	–	–	–	71	65	55	35	25	0	"	4&4	4&4	"	"	2–½x6x22	20x24	18x12	10x10	14x10
	2x12	6+6	–	–	–	71	66	63	35	32	24	"	"	"	"	"	2–½x6x28	"	20x14	8x12	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, 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).

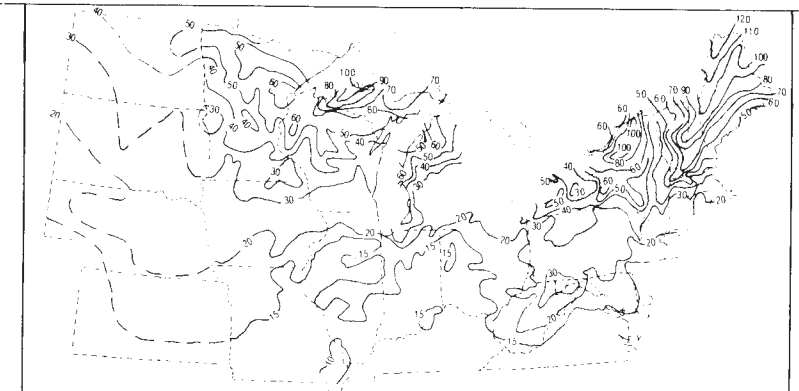
ROOF DEAD LOAD

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

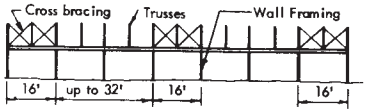
Use exterior, C-C grade 3/8" or 1/2" plywood with outer plies of Group 1 species wood, Identification Indexes, 24/0 and 32/16 respectively.

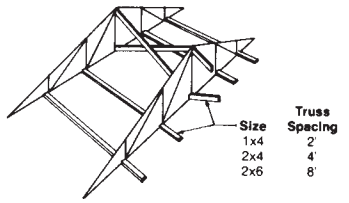
Use 3-ply 3/8" plywood and 5-ply 1/2" plywood or use Structural I, 4-ply, 1/2" plywood.

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

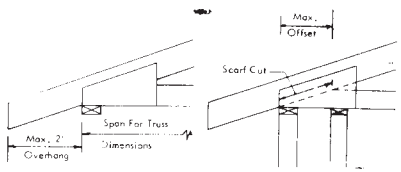
Minimum fasteners for wind anchorage, both ends of each truss.

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

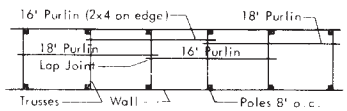
For a 2' to 4' overhang, use the top chord and heel gusset design for a 1/3 larger snow load.



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.



MWPS-50’Truss

50’ span, 4-web trusses

with plywood gussets.

CAUTION!

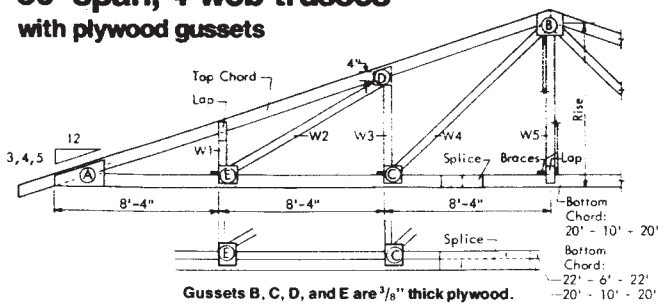
Additional professional services will be required to tailor this plan to your situation, including but not limited to: assurance of compliance with codes and regulations; review of specifications for materials and equipment; supervision of site selection, bid letting and construction; and provision for 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.**

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.

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.

1100f Lumber

	Top chord	Bottom chord	Truss spacing, ft: 2' Ceiling dead load, psf: 0	5	8	4' 0	5	8	8' 0	5	8	Web member sizes: W1	W2	W3	W4	W5	Gusset Sizes, in: A THW	B HW	C HW	D HW	E HW
			---Max. snow + roof dead load, psf---																		
3/12 Slope	2x4	2x4	0	0	0	0	0	0	0	0	0	2x4	2x4	2x4	2x4	2x4	3/8x3½x16	8x12	8x8	8x8	8x8
	2x6	2x4	0	13	0	0	0	0	0	0	0	"	"	"	"	"	3/8x4x22	10x12	"	"	"
	2x6	2x6	0	28	24	0	0	0	0	0	0	"	"	"	"	"	3/8x4x32	"	8x10	"	"
	2x8	2x6	0	29	26	0	0	0	0	0	0	2x4	2x4	2x4	2x4	2x4	3/8x4x34	12x12	8x10	8x8	8x8
	2x10	4+4	48	45	37	0	0	0	0	0	0	"	"	"	"	"	½x4x28	14x16	12x10	"	10x8
	2x12	4+6	61	56	54	0	21	0	0	0	0	"	"	"	"	"	½x4x36	16x16	14x10	"	12x8
	2x12	6+6	70	64	60	0	26	20	0	0	0	"	"	"	"	"	½x4x44	18x16	16x12	8x10	14x10
4/12 Slope	2x4	2x4	0	16	0	0	0	0	0	0	0	2x4	2x4	2x4	2x4	2x4	3/8x3½x17	8x12	8x8	8x8	8x8
	2x6	2x4	0	20	0	0	0	0	0	0	0	"	"	"	"	"	3/8x4x22	10x12	"	"	"
	2x6	2x6	37	35	33	0	0	0	0	0	0	"	"	"	"	"	½x4x18	"	8x10	"	"
	2x8	2x6	47	43	40	0	12	0	0	0	0	2x4	2x4	2x4	2x4	2x4	½x4x19	14x12	10x10	8x8	8x8
	2x10	4+4	64	58	49	0	13	0	0	0	0	"	"	2x6	"	"	½x4x25	14x16	12x12	8x10	10x10
	2x12	4+6	80	74	73	35	28	16	0	0	0	"	"	"	4&4	"	½x4x31	16x20	14x14	"	12x10
	2x12	6+6	90	83	79	39	35	30	0	0	0	"	"	"	"	"	½x4x36	18x20	18x14	8x12	16x10
5/12 Slope	2x4	2x4	19	18	0	0	0	0	0	0	0	2x4	2x4	2x4	2x4	2x4	3/8x3½x15	8x12	8x8	8x8	8x8
	2x6	2x4	38	27	0	0	0	0	0	0	0	"	"	2x6	"	"	½x4x13	10x12	8x10	8x10	"
	2x6	2x6	41	39	38	0	16	0	0	0	0	"	"	"	"	"	½x4x16	10x16	10x10	"	"
	2x8	2x6	59	54	50	0	15	0	0	0	0	2x4	2x4	2x8	2x4	2x4	½x4x19	12x16	10x14	8x12	8x8
	2x10	4+4	80	74	59	34	19	0	0	0	0	"	"	"	4&4	"	½x4x26	14x20	14x10	8x10	10x10
	2x12	4+6	100	91	91	43	36	21	0	0	0	"	"	"	"	"	½x4x32	18x20	16x10	"	12x10
	2x12	6+6	-	98	99	45	42	38	0	14	0	"	"	"	"	"	½x4x35	"	18x12	"	14x10

1400f Lumber

	Top chord	Bottom chord	Truss spacing, ft: 2' Ceiling dead load, psf: 0	5	8	4' 0	5	8	8' 0	5	8	Web member sizes: W1	W2	W3	W4	W5	Gusset Sizes, in: A THW	B HW	C HW	D HW	E HW
			---Max. snow + roof dead load, psf---																		
3/12 Slope	2x4	2x4	0	17	0	0	0	0	0	0	0	2x4	2x4	2x4	2x4	2x4	3/8x3½x20	8x12	8x8	8x8	8x8
	2x6	2x4	0	26	0	0	0	0	0	0	0	"	"	"	"	"	½x4x17	10x12	"	"	"
	2x6	2x6	38	36	34	0	13	0	0	0	0	"	"	"	"	"	½x4x23	10x16	10x10	"	"
	2x8	2x6	45	40	37	0	14	0	0	0	0	2x4	2x4	2x4	2x4	2x4	½x4x25	12x16	10x10	8x8	8x8
	2x10	4+4	63	59	53	0	19	0	0	0	0	"	"	"	"	"	½x4x33	16x16	12x12	8x10	10x8
	2x12	4+6	80	74	70	0	31	22	0	0	0	"	"	"	"	"	½x4x40	18x20	14x12	"	12x10
	2x12	6+6	85	78	74	37	32	30	0	14	0	"	4&4	"	"	"	½x4x44	"	18x12	"	14x10
4/12 Slope	2x2	2x4	0	20	14	0	0	0	0	0	0	2x4	2x4	2x4	2x4	2x4	3/8x3½x20	8x12	8x8	8x8	8x8
	2x6	2x4	0	36	13	0	0	0	0	0	0	"	"	"	"	"	½x4x17	10x12	8x10	"	"
	2x6	2x6	45	43	42	0	17	0	0	0	0	"	"	"	"	"	½x4x21	12x12	10x10	"	8x10
	2x8	2x6	61	57	54	0	21	0	0	0	0	2x4	2x4	2x4	2x4	2x4	½x4x25	12x16	10x10	8x8	8x10
	2x10	4+4	84	80	71	0	27	17	0	0	0	"	"	2x6	"	"	½x4x34	16x16	14x14	8x12	12x10
	2x12	4+6	100+	97	98	46	42	32	0	0	0	"	"	"	4&4	"	2-½x6x28	18x20	16x14	"	14x10
	2x12	6+6	-	100+	-	47	44	41	0	20	0	"	"	"	"	"	½x4x40	"	18x14	"	16x10
5/12 Slope	2x4	2x4	24	22	21	0	0	0	0	0	0	2x4	2x4	2x4	4&4	2x4	3/8x3½x18	8x12	8x8	8x8	8x8
	2x6	2x4	51	45	19	0	0	0	0	0	0	"	"	2x6	"	"	½x4x26	10x16	10x10	8x10	"
	2x6	2x6	50	48	47	0	20	14	0	0	0	"	"	"	"	"	½x4x19	"	10x12	"	"
	2x8	2x6	77	71	70	0	27	14	0	0	0	2x4	2x4	2x8	4&4	2x4	½x4x25	12x20	12x14	8x12	8x8
	2x10	4+4	100+	100	90	45	33	0	0	0	0	"	"	4&4	"	"	2-½x6x18	16x20	14x12	8x10	10x10
	2x12	4+6	-	-	100+	57	52	40	0	15	0	"	"	"	"	"	½x4x36	18x20	16x12	"	12x10
	2x12	6+6	-	-	-	56	52	50	0	24	12	"	"	"	"	"	½x4x38	20x24	20x12	10x10	16x10

1600f Lumber

	Top chord	Bottom chord	Truss spacing, ft: 2' Ceiling dead load, psf: 0	5	8	4' 0	5	8	8' 0	5	8	Web member sizes: W1	W2	W3	W4	W5	Gusset Sizes, in: A THW	B HW	C HW	D HW	E HW
			---Max. snow + roof dead load, psf---																		
3/12 Slope	2x4	2x4	0	21	19	0	0	0	0	0	0	2x4	2x4	2x4	2x4	2x4	3/8x3½x27	8x12	8x8	8x8	8x8
	2x6	2x4	0	33	18	0	0	0	0	0	0	"	"	"	"	"	½x4x20	10x16	8x10	"	"
	2x6	2x6	47	45	44	0	17	0	0	0	0	"	"	"	"	"	½x4x28	"	10x10	8x10	"
	2x8	2x6	54	49	46	0	18	0	0	0	0	2x4	2x4	2x4	2x4	2x4	½x4x29	12x16	10x10	8x10	8x10
	2x10	4+4	76	71	69	0	26	0	0	0	0	"	"	"	"	"	½x4x39	16x20	14x12	"	10x10
	2x12	4+6	96	89	89	42	38	32	0	12	0	"	"	"	"	"	½x4x48	18x20	16x12	"	12x10
	2x12	6+6	100+	96	97	45	41	38	0	18	0	"	"	"	"	"	½x4x54	20x20	18x14	10x10	16x10
4/12 Slope	2x4	2x4	26	25	24	0	0	0	0	0	0	2x4	2x4	2x4	4&4	2x4	½x3½x14	8x12	8x8	8x8	8x8
	2x6	2x4	48	45	40	0	14	0	0	0	0	"	"	"	"	"	½x4x21	12x12	10x10	"	8x10
	2x6	2x6	54	52	50	0	21	20	0	0	0	"	"	"	"	"	½x4x24	10x16	"	"	"
	2x8	2x6	74	70	66	0	29	25	0	0	0	2x4	2x4	2x4	4&4	2x4	½x4x30	12x20	10x10	8x10	8x10
	2x10	4+4	-	94	95	44	40	36	0	17	0	"	"	2x6	"	"	2-½x6x22	16x20	14x14	8x12	12x10
	2x12	4+6	-	-	-	55	52	49	0	24	20	"	"	"	"	"	2-½x6x28	18x22	18x16	8x14	14x12
	2x12	6+6	-	-	-	58	54	51	0	25	22	"	"	"	"	"	2-½x6x34	"	20x16	8x16	16x12
5/12 Slope	2x4	2x4	29	28	27	0	0	0	0	0	0	2x4	2x4	2x4	4&4	2x4	3/8x3½x21	8x12	8x8	8x8	8x8
	2x6	2x4	61	55	36	0	0	0	0	0	0	"	"	2x6	"	"	½x4x20	10x16	10x12	8x10	"
	2x6	2x6	61	58	57	26	24	23	0	0	0	"	"	"	"	"	½x4x22	"	"	"	"
	2x8	2x6	92	86	86	40	36	32	0	0	0	2x4	2x4	2x8	4&4	2x4	2-½x6x15	14x20	12x14	8x14	8x10
	2x10	4+4	100+	100+	100+	55	44	22	0	0	0	"	"	4&4	"	"	2-½x6x21	18x24	16x12	8x12	10x12
	2x12	4+6	-	-	-	68	62	52	34	22	0	"	4&4	"	"	"	2-½x6x22	20x24	18x12	"	12x12
	2x12	6+6	-	-	-	68	63	60	34	30	21	"	"	"	"	"	2-½x6x28	"	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, 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).

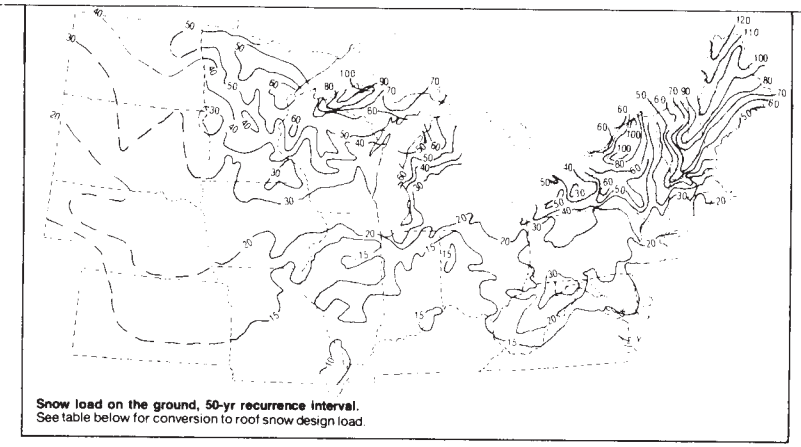
ROOF DEAD LOAD

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	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:				
2-6&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 7/12 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.

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
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

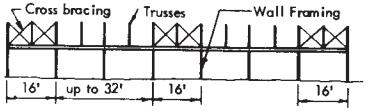
Use exterior, C-C grade 3/8" or 1/2" plywood with outer plies of Group 1 species wood, Identification Indexes, 24/0 and 32/16 respectively.

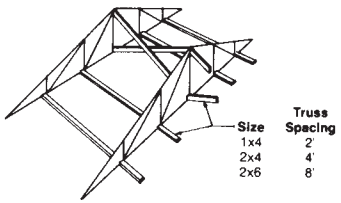
Use 3-ply 3/8" plywood and 5-ply 1/2" plywood or use Structural I, 4-ply, 1/2" plywood.

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

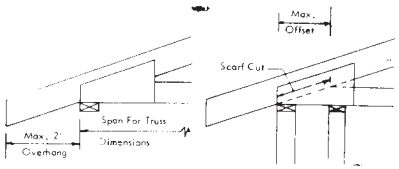
Minimum fasteners for wind anchorage, both ends of each truss.

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

Overhang

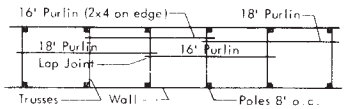
For a 2' to 4' overhang, use the top chord and heel gusset design for a 1/3 larger snow load.



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.



MWPS-60’ Truss

60’ span, 6-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.**

WARRANTY DISCLAIMER

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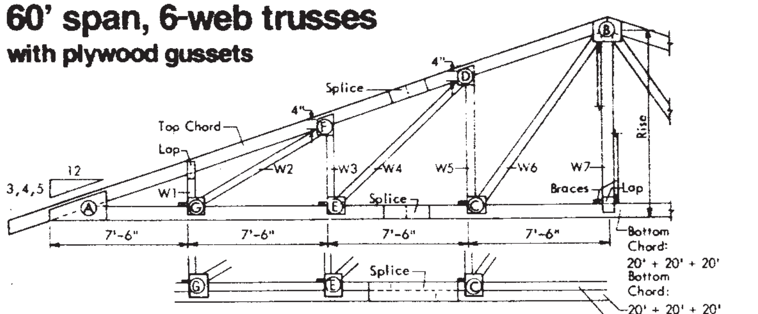
MIDWEST PLAN SERVICE
Cooperative Extension Work in Agriculture and Home Economics and Agricultural Experiment Stations of North Central Region - USDA Cooperating
60’ Truss
Title Page
MIDWEST PLAN NO. 60’ Truss

60' span, 6-web trusses
with plywood gussets



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

Table of lengths

Roof Slope	Rise	Top Chord	W1	W2	W3	W4	W5	W6	W7
3/12	7'-6"	20'+12'	2'	8'	4'	9'	6'	11'	8'
4/12	10'-0"	20'+12'	3'	9'+8'	5'	11'+10'	8'+7'	12'+11'	10'
5/12	12'-6"	20'+13'	3'	10'+9'	6'+5'	12'+11'	10'+9'	14'+13'	13'+12'

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.

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.

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.

1100f Lumber

Truss spacing, ft. (2', 4', 8'); Ceiling dead load, psf (0, 5, 8); —Max. snow + roof dead load, psf—

Slope	Top chord	Bottom chord	2' 0	2' 5	2' 8	4' 0	4' 5	4' 8	8' 0	8' 5	8' 8	W1	W2	W3	W4	W5	W6	W7	A T H W	B H W	C H W	D H W	E H W	F H W	G H W
3/12 Slope	2x4	2x4	0	12	0	0	0	0	0	0	0	2x4	2x4	2x4	2x4	2x4	2x4	2x4	3/8x3½x21	8x12	8x8	8x8	8x8	8x8	8x8
	2x6	2x4	0	13	0	0	0	0	0	0	0	"	"	"	"	"	"	"	3/8x4x22	10x12	"	"	"	"	"
	2x6	2x6	0	22	19	0	0	0	0	0	0	"	"	"	"	"	"	"	3/8x4x33	"	"	"	"	"	"
	2x8	2x6	0	23	20	0	0	0	0	0	0	2x4	2x4	2x4	2x4	2x4	2x4	2x4	3/8x4x34	12x12	8x8	8x8	8x8	8x8	8x8
	2x10	4+4	38	35	33	0	0	0	0	0	0	"	"	"	"	"	"	"	½x4x28	14x16	12x10	"	10x10	"	10x8
	2x12	6+4	49	46	44	0	18	14	0	0	0	"	"	"	"	2x6	"	"	½x4x36	16x16	14x12	8x12	12x10	"	12x8
	2x12	6+6	56	52	50	0	21	18	0	0	0	"	"	"	"	"	"	"	½x4x44	16x20	16x12	8x12	16x10	"	14x8
4/12 Slope	2x4	2x4	0	14	0	0	0	0	0	0	0	2x4	2x4	2x4	2x4	2x4	4&4	2x4	3/8x3½x19	8x12	8x8	8x8	8x8	8x8	8x8
	2x6	2x4	0	18	0	0	0	0	0	0	0	"	"	"	"	"	"	"	3/8x4x22	10x12	"	"	"	"	"
	2x6	2x6	35	31	29	0	0	0	0	0	0	"	"	"	"	2x6	"	"	½x4x19	"	10x10	8x10	"	"	"
	2x8	2x6	37	33	31	0	12	0	0	0	0	2x4	2x4	2x4	2x4	2x6	4&4	2x4	½x4x20	12x16	10x10	8x10	8x8	8x8	8x8
	2x10	4+4	50	48	46	0	15	0	0	0	0	"	"	"	"	2x8	"	"	½x4x26	14x16	12x14	8x12	10x10	"	10x8
	2x12	6+4	64	61	58	0	25	17	0	0	0	"	"	"	"	4&4	"	"	½x4x32	16x16	14x10	8x10	14x10	"	12x8
	2x12	6+6	75	70	66	32	29	26	0	12	0	"	"	"	4&4	"	"	"	½x4x37	18x16	18x12	8x12	16x10	"	14x8
5/12 Slope	2x4	2x4	0	17	0	0	0	0	0	0	0	2x4	2x4	2x4	2x4	2x6	4&4	2x4	3/8x3½x17	8x12	8x10	8x10	8x8	8x8	8x8
	2x6	2x4	29	23	0	0	0	0	0	0	0	"	"	"	"	2x8	"	"	3/8x4x22	10x12	8x12	8x12	"	"	"
	2x6	2x6	39	36	34	0	14	0	0	0	0	"	"	"	"	4&4	"	"	½x4x18	10x16	10x8	8x8	"	"	"
	2x8	2x6	46	43	42	0	16	0	0	0	0	2x4	2x4	2x4	2x4	4&4	4&4	2x4	½x4x20	12x16	10x8	8x8	8x8	8x8	8x8
	2x10	4+4	63	60	55	0	19	0	0	0	0	"	"	2x6	"	"	"	"	½x4x26	14x20	12x10	8x8	12x10	8x10	10x8
	2x12	6+4	80	76	73	34	32	23	0	0	0	"	"	2x8	4&4	6&4	"	"	½x4x32	18x16	16x12	8x12	14x14	8x12	12x8
	2x12	6+6	93	86	82	40	36	34	0	15	0	"	"	"	"	"	"	"	½x4x37	18x20	18x12	8x14	18x14	"	14x8

1400f Lumber

Truss spacing, ft. (2', 4', 8'); Ceiling dead load, psf (0, 5, 8); —Max. snow + roof dead load, psf—

Slope	Top chord	Bottom chord	2' 0	2' 5	2' 8	4' 0	4' 5	4' 8	8' 0	8' 5	8' 8	W1	W2	W3	W4	W5	W6	W7	A T H W	B H W	C H W	D H W	E H W	F H W	G H W
3/12 Slope	2x4	2x4	0	15	13	0	0	0	0	0	0	2x4	2x4	2x4	2x4	2x4	2x4	2x4	3/8x3½x27	8x12	8x8	8x8	8x8	8x8	8x8
	2x6	2x4	0	19	12	0	0	0	0	0	0	"	"	"	"	"	"	"	½x4x16	10x12	"	"	"	"	"
	2x6	2x6	34	30	28	0	0	0	0	0	0	"	"	"	"	"	"	"	½x4x24	10x16	10x10	"	"	"	"
	2x8	2x6	35	32	29	0	0	0	0	0	0	2x4	2x4	2x4	2x4	2x4	2x4	2x4	½x4x25	12x16	10x10	8x8	8x8	8x8	8x8
	2x10	4+4	50	47	45	0	18	0	0	0	0	"	"	"	"	"	"	"	½x4x34	14x20	12x10	8x10	12x10	"	10x8
	2x12	6+4	64	60	58	0	24	22	0	0	0	"	"	"	"	2x6	"	"	½x4x40	16x20	14x14	8x12	14x10	"	12x8
	2x12	6+6	71	65	62	31	26	23	0	0	0	"	"	"	"	"	4&4	"	½x4x45	18x16	18x14	10x12	16x10	"	14x8
4/12 Slope	2x4	2x4	0	19	17	0	0	0	0	0	0	2x4	2x4	2x4	2x4	2x4	2x4	2x4	3/8x3½x24	8x12	8x8	8x8	8x8	8x8	8x8
	2x6	2x4	0	26	21	0	0	0	0	0	0	"	"	"	"	2x6	"	"	½x4x16	10x12	8x10	8x10	"	"	"
	2x6	2x6	42	39	37	0	15	12	0	0	0	"	"	"	"	"	"	"	½x4x23	10x16	10x12	"	"	"	"
	2x8	2x6	48	45	43	0	18	12	0	0	0	2x4	2x4	2x4	2x4	2x8	2x4	2x4	½x4x25	12x16	10x14	8x12	8x10	8x8	8x8
	2x10	4+4	66	63	60	0	25	12	0	0	0	"	"	"	"	4&4	"	"	½x4x33	16x16	14x12	8x10	12x10	"	10x8
	2x12	6+4	84	80	77	36	34	31	0	12	0	"	"	"	"	"	4&4	"	2-½x6x28	18x16	16x12	8x12	14x10	"	12x8
	2x12	6+6	93	85	81	40	36	33	0	15	0	"	.	"	"	"	"	"	½x4x46	18x20	20x12	10x10	18x12	"	14x10
5/12 Slope	2x4	2x4	24	22	20	0	0	0	0	0	0	2x4	2x4	2x4	2x4	4&4	4&4	2x4	3/8x3½x22	8x12	8x8	8x8	8x8	8x8	8x8
	2x6	2x4	39	33	28	0	0	0	0	0	0	"	"	"	"	"	"	"	½x4x16	10x12	"	"	"	"	"
	2x6	2x6	48	45	43	0	18	16	0	0	0	"	"	"	"	"	"	"	½x4x22	10x16	10x8	"	10x8	"	"
	2x8	2x6	60	57	55	0	23	16	0	0	0	2x4	2x4	2x6	2x4	4&4	4&4	2x4	½x4x25	12x20	10x10	8x8	10x10	8x10	8x8
	2x10	4+4	83	79	78	36	32	18	0	0	0	"	"	"	4&4	6&4	"	"	2-½x6x18	16x16	14x12	8x12	14x12	"	10x8
	2x12	6+4	100+	100	100	45	43	40	0	16	0	"	"	2x8	"	"	"	"	2-½x6x22	18x20	18x14	10x12	16x14	8x12	12x8
	2x12	6+6	-	-	-	49	45	43	0	22	15	"	"	"	"	"	"	"	2-½x6x28	"	20x14	8x14	18x14	8x14	14x10

1600f Lumber

Truss spacing, ft. (2', 4', 8'); Ceiling dead load, psf (0, 5, 8); —Max. snow + roof dead load, psf—

Slope	Top chord	Bottom chord	2' 0	2' 5	2' 8	4' 0	4' 5	4' 8	8' 0	8' 5	8' 8	W1	W2	W3	W4	W5	W6	W7	A T H W	B H W	C H W	D H W	E H W	F H W	G H W
3/12 Slope	2x4	2x4	0	20	18	0	0	0	0	0	0	2x4	2x4	2x4	2x4	2x4	2x4	2x4	½x3½x18	8x12	8x8	8x8	8x8	8x8	8x8
	2x6	2x4	0	25	21	0	0	0	0	0	0	"	"	"	"	"	"	"	½x4x20	10x12	8x10	"	"	"	"
	2x6	2x6	41	37	34	0	13	0	0	0	0	"	"	"	"	"	"	"	½x4x29	10x16	10x10	"	8x10	"	"
	2x8	2x6	43	40	36	0	14	0	0	0	0	2x4	2x4	2x4	2x4	2x4	2x4	2x4	½x4x30	12x16	10x10	8x10	8x10	8x8	8x8
	2x10	4+4	60	57	55	0	23	14	0	0	0	"	"	"	"	"	"	"	½x4x39	14x20	12x10	"	12x10	"	10x8
	2x12	6+4	77	72	69	33	30	28	0	13	0	"	"	"	"	2x6	"	"	½x4x47	18x20	16x14	10x12	14x12	"	12x8
	2x12	6+6	87	80	76	38	33	31	0	14	0	"	"	"	"	"	"	"	½x4x56	"	18x14	10x14	18x12	"	14x8
4/12 Slope	2x4	2x4	27	24	22	0	0	0	0	0	0	2x4	2x4	2x4	2x4	2x4	2x4	2x4	½x3½x16	8x12	8x8	8x8	8x8	8x8	8x8
	2x6	2x4	37	33	28	0	0	0	0	0	0	"	"	"	"	"	4&4	"	½x4x19	10x12	10x8	"	"	"	"
	2x6	2x6	52	49	47	0	19	17	0	0	0	"	"	"	"	2x6	"	"	½x4x28	10x16	10x12	8x10	8x10	"	"
	2x8	2x6	58	54	52	0	22	19	0	0	0	2x4	2x4	2x4	2x4	2x6	4&4	2x4	½x4x30	12x16	10x12	8x12	10x10	8x8	8x8
	2x10	4+4	80	76	73	34	32	23	0	0	0	"	"	"	"	2x8	"	"	2-½x6x22	16x16	14x16	8x16	12x10	"	10x10
	2x12	6+4	100+	96	92	44	41	39	0	18	0	"	"	"	"	4&4	"	"	2-½x6x28	18x20	18x12	10x12	16x12	"	12x10
	2x12	6+6	-	100+	100+	50	46	43	0	20	17	"	"	"	"	"	"	"	2-½x6x34	20x20	20x12	"	18x12	8x10	16x10
5/12 Slope	2x4	2x4	29	27	25	0	0	0	0	0	0	2x4	2x4	2x4	2x4	4&4	4&4	2x4	½x3½x14	8x12	8x8	8x8	8x8	8x8	8x8
	2x6	2x4	47	41	36	0	0	0	0	0	0	"	"	"	"	"	"	"	½x4x19	10x16	10x8	"	"	"	"
	2x6	2x6	58	55	53	25	22	21	0	0	0	"	"	"	"	"	"	"	½x4x26	10x20	10x10	"	10x8	"	"
	2x8	2x6	72	69	67	31	29	25	0	0	0	2x4	2x4	2x4	2x4	4&4	4&4	2x4	2-½x6x15	14x16	12x10	8x10	10x10	8x8	8x8
	2x10	4+4	99	95	96	43	41	29	0	0	0	"	"	2x6	"	"	"	"	2-½x6x21	16x20	16x12	8x12	14x12	8x10	10x8
	2x12	6+4	-	100+	100+	54	52	50	0	23	0	"	"	2x8	4&4	6&4	"	"	2-½x6x26	20x20	18x14	10x14	16x16	8x14	12x10
	2x12	6+6	-	-	-	60	56	53	30	26	23	"	4&4	"	"	"	"	"	2-½x6x28	"	20x14	"	18x16	"	14x10

Gusset Sizes, in.

60' Trusses

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).

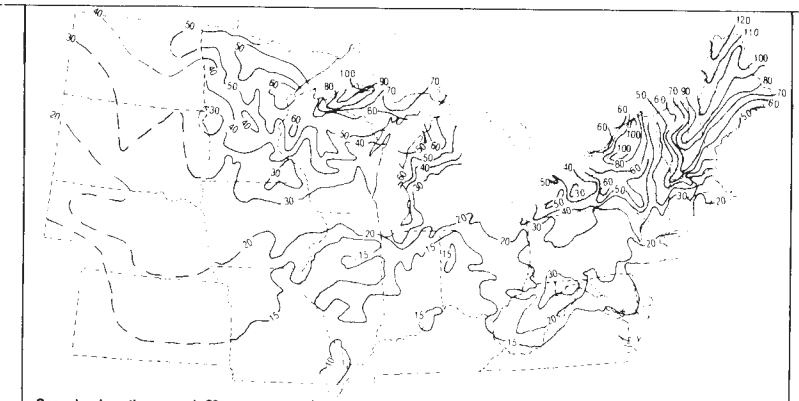
ROOF DEAD LOAD

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	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:				
2-6&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 ½ 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
⅜" plywood	1.1
½" 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

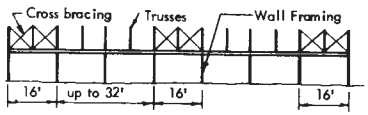
Use exterior, C-C grade ⅜" or ½" plywood with outer plies of Group 1 species wood, Identification Indexes, 24/0 and 32/16 respectively.

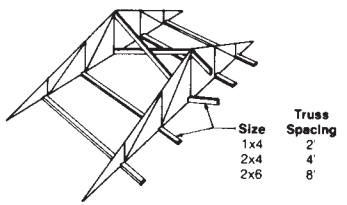
Use 3-ply ⅜" plywood and 5-ply ½" plywood or use Structural I, 4-ply, ½" plywood.

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

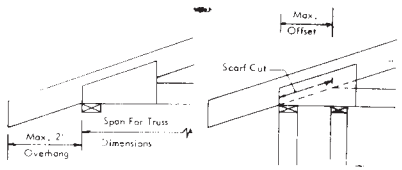
Minimum fasteners for wind anchorage, both ends of each truss.

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 = ½" bolt
4-30d ring-shank nails = ½" bolt

Overhang

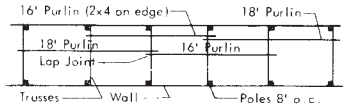
For a 2' to 4' overhang, use the top chord and heel gusset design for a ½ larger snow load.



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.



MWPS-Truss 24’

Truss 24’

24’ span, 2-web trusses

CAUTION!

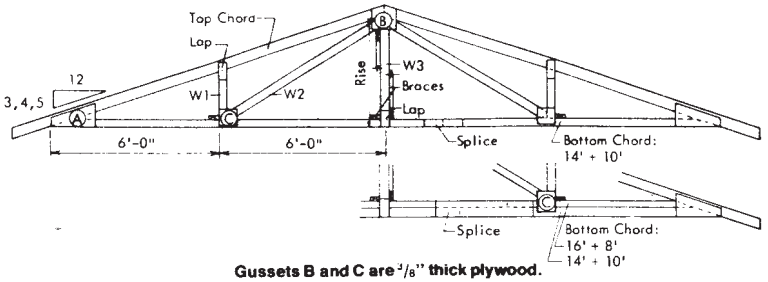
Additional professional services will be required to tailor this plan to your situation, including but not limited to: assurance of compliance with codes and regulations; review of specifications for materials and equipment; supervision of site selection, bid letting and construction; and provision for 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.**

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.

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

Roof 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'

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, ft. 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	29	27	13	0	0	0	0	0	2x4	2x4	2x4	3/8x3½x16	8x12	8x8
	2x6	2x4	56	53	46	24	0	0	12	0	0	"	"	"	3/8x4x23	10x12	"
	2x6	2x6	59	55	52	25	22	19	12	0	0	"	"	"	3/8x4x26	"	"
	2x8	2x6	76	69	65	33	28	25	16	0	0	2x4	2x4	2x4	3/8x4x31	12x12	8x8
	2x10	4+4	100+	100+	100+	52	46	34	26	0	0	"	"	"	½x4x28	14x16	10x10
	2x12	4+6	-	-	-	66	58	54	33	27	16	"	"	"	3/8x4x47	16x16	12x10
	2x12	6+6	-	-	-	67	61	57	33	28	24	"	"	"	3/8x4x51	"	14x12
4/12 Slope	2x4	2x4	36	33	32	15	13	0	0	0	0	2x4	2x4	2x4	3/8x3½x14	8x12	8x8
	2x6	2x4	71	67	54	31	13	0	15	0	0	"	"	"	3/8x4x22	10x12	8x10
	2x6	2x6	68	64	62	30	26	25	15	0	0	"	"	"	3/8x4x23	"	"
	2x8	2x6	100+	95	91	44	41	38	22	17	0	2x4	2x4	2x4	½x4x18	14x12	8x10
	2x10	4+4	-	100+	100+	61	56	46	30	19	0	"	"	"	½x4x23	14x16	12x10
	2x12	4+6	-	-	-	80	73	72	40	35	23	"	"	"	½x4x28	16x16	14x10
	2x12	6+6	-	-	-	76	70	66	38	33	31	"	"	"	½x4x34	"	16x10
5/12 Slope	2x4	2x4	39	37	35	17	15	0	0	0	0	2x4	2x4	2x4	3/8x3½x12	8x12	8x8
	2x6	2x4	78	74	71	34	17	0	17	0	0	"	"	"	3/8x4x20	10x12	"
	2x6	2x6	76	72	69	33	30	28	16	13	0	"	"	"	3/8x4x20	"	"
	2x8	2x6	100+	100+	100+	49	46	44	24	20	0	2x4	2x4	2x4	½x4x16	12x16	8x10
	2x10	4+4	-	-	-	68	62	53	34	18	0	"	"	"	½x4x18	14x16	10x10
	2x12	4+6	-	-	-	87	80	79	43	39	27	"	"	"	½x4x23	16x16	12x10
	2x12	6+6	-	-	-	84	77	73	42	37	35	"	"	"	½x4x28	18x16	16x10

1400f Lumber

	Top chord	Bottom chord	Truss spacing, ft. 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	39	37	34	17	14	0	0	0	0	2x4	2x4	2x4	3/8x3½x19	8x12	8x8
	2x6	2x4	74	70	68	32	22	14	16	0	0	"	"	"	½x4x17	10x16	8x10
	2x6	2x6	72	67	64	31	28	26	15	12	0	"	"	"	3/8x4x31	"	"
	2x8	2x6	100	90	91	43	38	35	21	16	0	2x4	2x4	2x4	½x4x23	12x16	8x10
	2x10	4+4	-	100+	100+	66	60	54	33	22	0	"	"	"	½x4x32	14x16	10x12
	2x12	4+6	-	-	-	86	76	75	43	37	31	"	"	"	½x4x36	16x16	12x12
	2x12	6+6	-	-	-	82	74	70	41	35	32	"	"	"	½x4x44	"	16x10
4/12 Slope	2x4	2x4	44	42	41	19	17	0	0	0	0	2x4	2x4	2x4	3/8x3½x17	8x12	8x8
	2x6	2x4	87	82	81	38	30	0	19	0	0	"	"	"	½x4x16	12x12	8x10
	2x6	2x6	85	79	76	37	33	31	18	15	13	"	"	"	3/8x4x28	10x16	10x10
	2x8	2x6	100+	100+	100+	55	51	49	27	23	16	2x4	2x4	2x4	½x4x22	12x16	10x10
	2x10	4+4	-	-	-	75	69	68	37	32	0	"	"	"	½x4x25	14x16	12x10
	2x12	4+6	-	-	-	98	90	90	49	45	41	"	"	"	½x4x32	18x16	14x12
	2x12	6+6	-	-	-	94	86	86	47	43	39	"	"	"	½x4x34	16x20	16x12
5/12 Slope	2x4	2x4	48	46	45	21	19	0	0	0	0	2x4	2x4	2x4	3/8x3½x14	8x12	8x8
	2x6	2x4	96	91	91	42	39	0	21	0	0	"	"	"	½x4x14	10x16	8x10
	2x6	2x6	94	88	86	41	38	36	20	17	15	"	"	"	3/8x4x25	"	"
	2x8	2x6	100+	100+	100+	61	56	54	30	27	19	2x4	2x4	2x4	½x4x20	12x16	8x10
	2x10	4+4	-	-	-	83	77	76	41	37	0	"	"	"	½x4x23	16x16	12x10
	2x12	4+6	-	-	-	100+	98	100	53	49	47	"	"	"	½x4x29	16x20	12x12
	2x12	6+6	-	-	-	-	95	96	52	47	45	"	"	"	½x4x29	"	14x12

1600f Lumber

	Top chord	Bottom chord	Truss spacing, ft. 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	47	44	43	20	17	0	0	0	0	2x4	2x4	2x4	3/8x3½x22	8x12	8x8
	2x6	2x4	88	84	83	38	33	0	19	0	0	"	"	"	½x4x20	10x16	8x10
	2x6	2x6	87	81	78	38	34	32	19	15	13	"	"	"	3/8x4x36	"	10x10
	2x8	2x6	100+	100+	100+	52	47	44	26	21	16	2x4	2x4	2x4	½x4x27	12x16	10x10
	2x10	4+4	-	-	-	80	73	71	40	34	0	"	"	"	½x4x33	14x20	12x10
	2x12	4+6	-	-	-	100+	96	92	51	45	41	"	"	"	½x4x41	16x20	14x12
	2x12	6+6	-	-	-	-	90	91	50	45	41	"	"	"	½x4x44	"	16x12
4/12 Slope	2x4	2x4	53	50	49	23	21	14	0	0	0	2x4	2x4	2x4	3/8x3½x19	8x12	8x10
	2x6	2x4	100+	99	99	45	43	14	22	0	0	"	"	"	½x4x18	10x16	10x10
	2x6	2x6	-	95	92	44	41	39	22	19	17	"	"	"	½x4x18	"	"
	2x8	2x6	-	100+	100+	66	61	59	33	29	26	2x4	2x4	2x4	½x4x26	14x16	10x12
	2x10	4+4	-	-	-	91	84	83	45	42	18	"	"	"	½x4x31	14x20	12x12
	2x12	4+6	-	-	-	100+	100+	100+	59	54	51	"	"	"	½x4x38	16x20	16x12
	2x12	6+6	-	-	-	-	-	-	56	51	49	"	"	"	½x4x38	18x20	18x14
5/12 Slope	2x4	2x4	57	55	54	25	23	21	12	0	0	2x4	2x4	2x4	3/8x3½x17	8x12	8x8
	2x6	2x4	100+	100+	100+	50	47	21	25	0	0	"	"	"	½x4x17	10x16	8x10
	2x6	2x6	-	-	-	49	46	44	24	21	20	"	"	"	½x4x17	"	"
	2x8	2x6	-	-	-	73	68	65	36	33	31	2x4	2x4	2x4	½x4x22	14x16	8x12
	2x10	4+4	-	-	-	100	92	93	50	46	22	"	"	"	½x4x28	14x20	10x12
	2x12	4+6	-	-	-	-	100+	100+	64	59	56	"	"	"	½x4x34	18x20	14x12
	2x12	6+6	-	-	-	-	-	-	62	57	54	"	"	"	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).

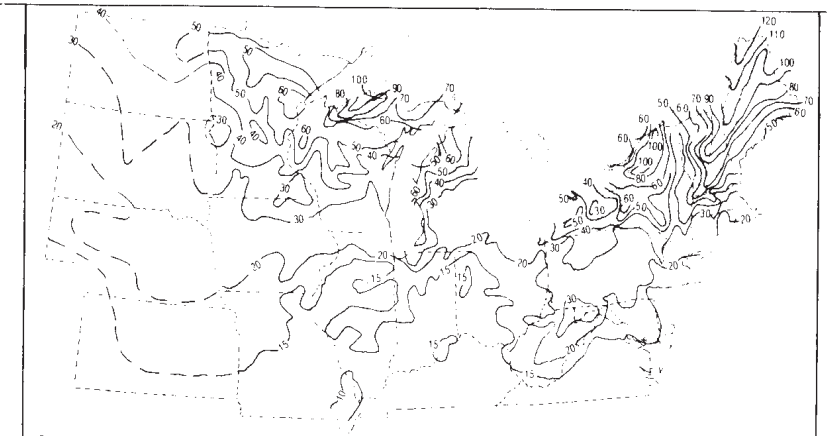
ROOF DEAD LOAD

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	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:				
2-6-4-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 3/12 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.

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

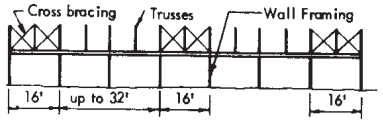
Use exterior, C-C grade 3/8" or 1/2" plywood with outer plies of Group 1 species wood. Identification Indexes, 24/0 and 32/16 respectively.

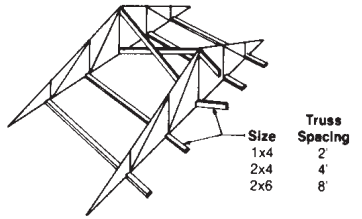
Use 3-ply 3/8" plywood and 5-ply 1/2" plywood or use Structural I, 4-ply, 1/2" plywood.

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

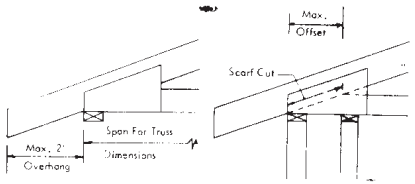
Minimum fasteners for wind anchorage, both ends of each truss.

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

Overhang

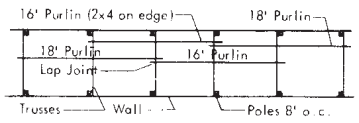
For a 2' to 4' overhang, use the top chord and heel gusset design for a 1/3 larger snow load.



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.



MWPS-Truss 28’

Truss 28’

28’ span, 2-web trusses

CAUTION!

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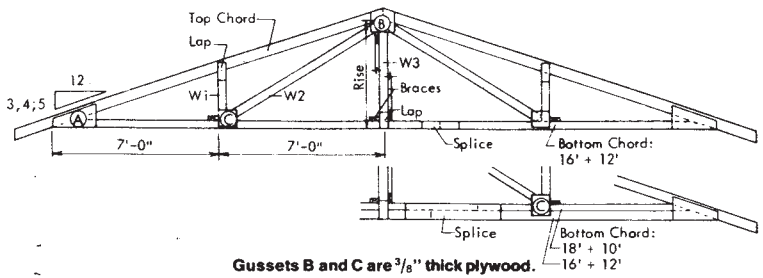
MIDWEST PLAN SERVICE
Cooperative Extension Work in Agriculture and Home Economics and Agricultural Experiment Stations of North Central Region - USDA Cooperating
28’ Truss
Title Page
MIDWEST PLAN NO. 28’ Truss

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, ft. 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, ft. 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, ft. 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

28' Trusses

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).

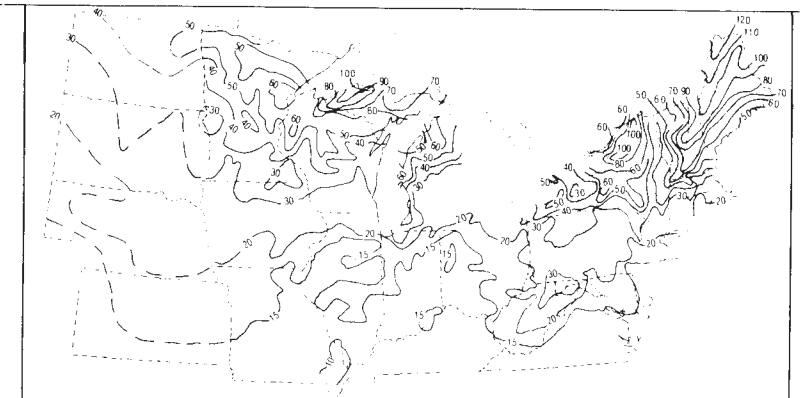
ROOF DEAD LOAD

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

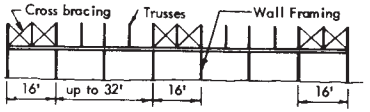
Use exterior, C-C grade 3/8" or 1/2" plywood with outer plies of Group 1 species wood, Identification Indexes, 24/0 and 32/16 respectively.

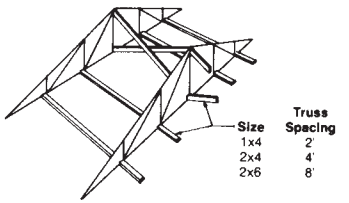
Use 3-ply 3/8" plywood and 5-ply 1/2" plywood or use Structural I, 4-ply, 1/2" plywood.

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

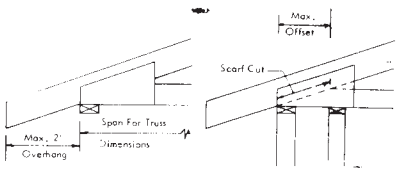
Minimum fasteners for wind anchorage, both ends of each truss.

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

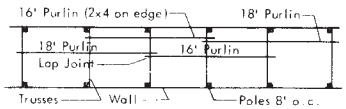
For a 2' to 4' overhang, use the top chord and heel gusset design for a 1/3 larger snow load.



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.



MWPS-30’ Truss

30’ span, 2-web trusses

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30' span, 2-web trusses
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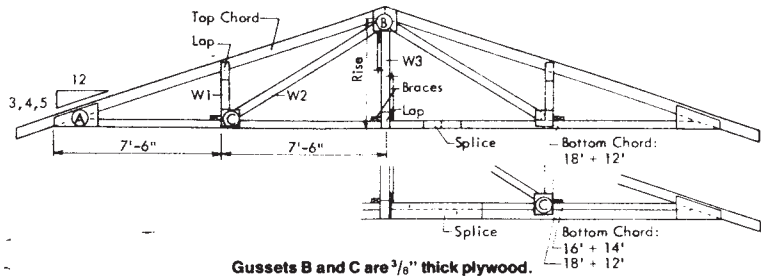

Gussets B and C are 3/8" thick plywood.

Table of lengths

Roof Slope	Rise	Top Chord	W1	W2	W3
3/12	3'-9"	16'	2'	8'	4'
4/12	5'-0"	17'	3'	9'	5'
5/12	6'-3"	17'	3'	10'	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.

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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 2' Ceiling dead load, psf 0	5	8	Truss spacing 4' Ceiling dead load, psf 0	5	8	Truss spacing 8' Ceiling dead load, psf 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	28	25	24	12	0	0	0	0	0	2x4	2x4	2x4	3/8x3½x18	8x12	8x8
	2x6	2x4	55	52	34	24	0	0	0	0	0	"	"	"	½x4x16	10x16	8x10
	2x6	2x6	53	49	47	23	20	17	0	0	0	"	"	"	3/8x4x30	"	"
	2x8	2x6	76	68	65	33	28	25	0	0	0	2x4	2x4	2x4	½x4x22	12x16	8x12
	2x10	4+4	100+	100+	100+	47	43	22	23	0	0	"	4&4	"	½x4x30	14x16	12x10
	2x12	4+6	-	-	-	61	55	53	30	25	0	"	"	"	½x4x36	16x20	14x10
	2x12	6+6	-	-	-	58	53	50	29	24	21	"	"	"	3/8x4x58	"	16x12
4/12 Slope	2x4	2x4	31	29	28	13	0	0	0	0	0	2x4	2x4	2x4	3/8x3½x16	8x12	8x8
	2x6	2x4	63	59	49	27	0	0	0	0	0	"	"	"	½x4x15	10x12	8x10
	2x6	2x6	61	58	56	26	24	22	13	0	0	"	4&4	"	3/8x4x27	12x12	10x10
	2x8	2x6	91	85	82	40	36	34	20	13	0	2x4	4&4	2x4	½x4x20	12x16	10x10
	2x10	4+4	100+	100+	100+	54	50	32	27	0	0	"	"	"	½x4x27	16x16	12x12
	2x12	4+6	-	-	-	70	64	61	35	30	13	"	"	"	½x4x30	16x20	14x12
	2x12	6+6	-	-	-	67	62	59	33	29	27	"	"	"	½x4x34	"	18x12
5/12 Slope	2x4	2x4	33	32	31	14	0	0	0	0	0	2x4	2x4	2x4	3/8x3½x14	8x12	8x8
	2x6	2x4	69	66	53	30	0	0	0	0	0	"	"	"	½x4x13	10x12	"
	2x6	2x6	67	64	62	29	27	25	14	12	0	"	4&4	"	3/8x4x24	10x16	8x10
	2x8	2x6	100+	95	92	44	41	39	22	15	0	2x4	4&4	2x4	½x4x18	12x16	8x10
	2x10	4+4	-	100+	100+	61	56	54	30	-	-	"	"	"	½x4x25	16x16	10x12
	2x12	4+6	-	-	-	77	71	68	38	34	18	"	"	"	½x4x27	16x20	12x12
	2x12	6+6	-	-	-	75	69	66	37	33	31	"	"	"	½x4x28	"	16x12

1100f Lumber

	Top chord	Bottom chord	Truss spacing 2' Ceiling dead load, psf 0	5	8	Truss spacing 4' Ceiling dead load, psf 0	5	8	Truss spacing 8' Ceiling dead load, psf 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	22	20	0	0	0	0	0	0	0	2x4	2x4	2x4	3/8x3½x14	8x12	8x8
	2x6	2x4	44	37	0	19	0	0	0	0	0	"	"	"	3/8x4x23	10x12	"
	2x6	2x6	43	40	37	18	15	12	0	0	0	"	"	"	3/8x4x25	10x16	8x10
	2x8	2x6	58	52	49	25	20	12	0	0	0	2x4	2x4	2x4	3/8x4x31	12x16	8x10
	2x10	4+4	88	81	78	38	28	0	19	0	0	"	4&4	"	½x4x28	14x16	10x10
	2x12	4+6	100+	100+	100+	50	43	36	25	13	0	"	"	"	½x4x36	16x16	12x12
	2x12	6+6	-	-	-	47	43	39	23	18	0	"	"	"	3/8x4x48	"	14x12
4/12 Slope	2x4	2x4	25	23	17	0	0	0	0	0	0	2x4	2x4	2x4	3/8x3½x13	8x12	8x8
	2x6	2x4	51	48	17	22	0	0	0	0	0	"	"	"	3/8x4x21	10x12	8x10
	2x6	2x6	49	47	45	21	19	17	0	0	0	"	"	"	3/8x4x22	"	"
	2x8	2x6	74	69	67	32	29	19	0	0	0	2x4	2x4	2x4	3/8x4x29	14x12	10x10
	2x10	4+4	100+	94	94	44	38	0	22	0	0	"	4&4	"	½x4x22	14x16	12x10
	2x12	4+6	-	100+	100+	57	52	46	28	18	0	"	"	"	½x4x28	18x16	14x12
	2x12	6+6	-	-	-	55	50	48	27	23	14	"	"	"	3/8x4x44	"	16x12
5/12 Slope	2x4	2x4	27	25	24	0	0	0	0	0	0	2x4	2x4	2x4	3/8x3½x11	8x12	8x8
	2x6	2x4	55	53	24	24	0	0	0	0	0	"	"	"	3/8x4x19	10x12	"
	2x6	2x6	54	52	50	23	21	20	0	0	0	"	"	"	3/8x4x20	"	"
	2x8	2x6	82	77	74	35	32	23	17	0	0	2x4	4&4	2x4	3/8x4x26	12x16	8x10
	2x10	4+4	100+	100+	100+	49	46	0	24	0	0	"	"	"	½x4x20	14x16	10x10
	2x12	4+6	-	-	-	63	58	52	31	22	0	"	"	"	½x4x22	18x16	12x12
	2x12	6+6	-	-	-	61	56	54	30	26	17	"	"	"	3/8x4x40	"	16x10

1600f Lumber

	Top chord	Bottom chord	Truss spacing 2' Ceiling dead load, psf 0	5	8	Truss spacing 4' Ceiling dead load, psf 0	5	8	Truss spacing 8' Ceiling dead load, psf 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	33	31	29	14	0	0	0	0	0	2x4	2x4	2x4	3/8x3½x21	8x12	8x8
	2x6	2x4	66	62	51	28	0	0	0	0	0	"	"	"	½x4x19	10x16	8x10
	2x6	2x6	63	59	57	27	24	23	13	0	0	"	"	"	3/8x4x36	"	8x12
	2x8	2x6	90	82	82	39	34	31	19	14	0	2x4	2x4	2x4	½x4x27	12x20	10x10
	2x10	4+4	101+	101+	101+	57	52	40	28	0	0	"	"	"	½x4x36	14x20	12x12
	2x12	4+6	-	-	-	74	67	63	37	32	17	"	"	"	½x4x40	16x20	14x12
	2x12	6+6	-	-	-	70	64	60	35	30	28	"	"	"	½x4x44	18x24	16x14
4/12 Slope	2x4	2x4	37	35	34	16	14	0	0	0	0	2x4	2x4	2x4	3/8x3½x18	8x12	8x10
	2x6	2x4	75	71	66	32	14	0	0	0	0	"	"	"	½x4x17	10x16	10x10
	2x6	2x6	73	69	67	32	29	27	16	13	0	"	"	"	½x4x18	"	"
	2x8	2x6	101+	101+	99	47	44	43	23	20	0	2x4	2x4	2x4	½x4x24	14x16	10x12
	2x10	4+4	-	-	-	66	61	50	33	14	0	"	"	"	½x4x28	14x20	12x12
	2x12	4+6	-	-	-	84	77	73	42	37	26	"	"	"	½x4x36	18x20	16x14
	2x12	6+6	-	-	-	81	74	71	40	36	34	"	"	"	½x4x36	"	18x14
5/12 Slope	2x4	2x4	39	38	38	17	15	0	0	0	0	2x4	2x4	2x4	3/8x3½x16	8x12	8x8
	2x6	2x4	87	78	78	35	25	0	17	0	0	"	"	"	½x4x16	10x16	8x10
	2x6	2x6	80	76	74	35	32	31	17	15	0	"	"	"	½x4x15	"	"
	2x8	2x6	101+	101+	101+	52	49	48	26	23	0	2x4	2x4	2x4	½x4x21	14x16	10x10
	2x10	4+4	-	-	-	73	68	59	36	19	0	"	"	"	½x4x25	14x20	10x12
	2x12	4+6	-	-	-	93	86	86	46	43	31	"	"	"	½x4x33	18x20	14x12
	2x12	6+6	-	-	-	90	83	80	45	41	38	"	"	"	½x4x33	"	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).

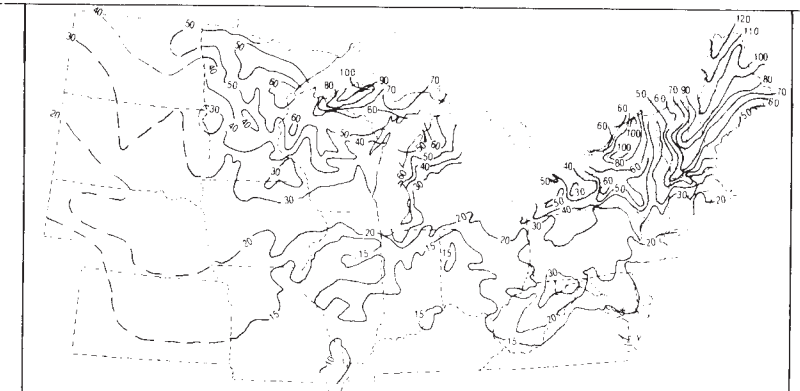
ROOF DEAD LOAD

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 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-by-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
3/4" 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

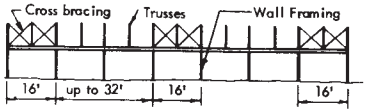
Use exterior, C-C grade 3/8" or 1/2" plywood with outer plies of Group 1 species wood, Identification Indexes, 24/0 and 32/16 respectively.

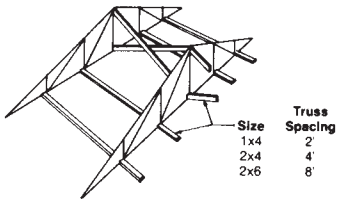
Use 3-ply 3/8" plywood and 5-ply 1/2" plywood or use Structural I, 4-ply, 1/2" plywood.

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

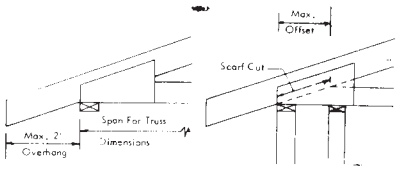
Minimum fasteners for wind anchorage, both ends of each truss.

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

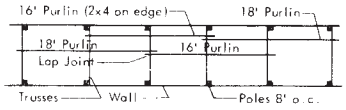
For a 2' to 4' overhang, use the top chord and heel gusset design for a 1/3 larger snow load.



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.



MWPS-32’

32’ 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.**

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.

MIDWEST PLAN SERVICE

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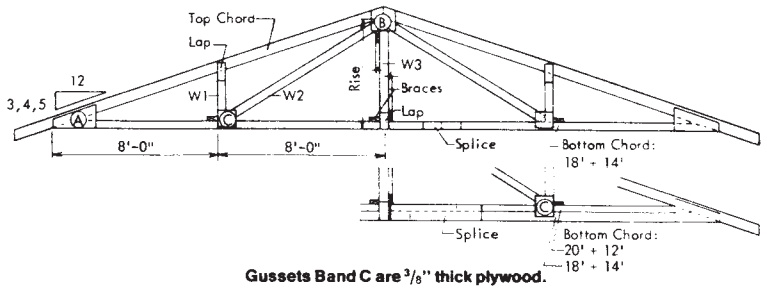
32’ Truss

Title Page

32' span, 2-web trusses
with plywood gussets



Gussets Band C are 3/8" thick plywood.

Table of lengths

Roof Slope	Rise	Top Chord	W1	W2	W3
3/12	4'-0"	17'	2'	9'+8'	4'
4/12	5'-4"	18'	3'	10'+9'	5'
5/12	6'-8"	18'	3'	10'+9'	7'

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	Bottom chord	Truss spacing, ft. 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	23	21	0	0	0	0	0	0	2x4	2x4	2x4	3/8x3½x18	8x12	8x8
	2x6	2x4	50	47	22	0	0	0	0	0	0	"	"	"	½x4x16	10x16	8x10
	2x6	2x6	48	45	43	21	18	16	0	0	0	"	"	"	3/8x4x30	"	"
	2x8	2x6	70	63	60	30	25	19	0	0	0	2x4	2x4	2x4	½x4x22	12x16	8x12
	2x10	4+4	99	91	91	43	38	13	0	0	0	"	"	"	½x4x29	14x20	12x10
	2x12	4+6	–	100+	100+	55	50	48	27	20	0	"	4&4	"	½x4x36	16x20	14x12
	2x12	6+6	–	–	–	52	48	45	26	22	17	"	"	"	3/8x4x58	"	16x12
4/12 Slope	2x4	2x4	28	26	25	12	0	0	0	0	0	2x4	2x4	2x4	3/8x3½x15	8x12	8x8
	2x6	2x4	57	54	34	25	11	0	0	0	0	"	"	"	½x4x14	10x12	8x10
	2x6	2x6	56	53	51	24	21	20	0	0	0	"	"	"	3/8x4x26	12x12	10x10
	2x8	2x6	83	78	75	36	33	27	0	0	0	2x4	2x4	2x4	½x4x20	12x16	10x10
	2x10	4+4	100+	100+	100+	50	46	18	25	0	0	"	4&4	"	½x4x27	16x16	12x12
	2x12	4+6	–	–	–	64	58	56	32	26	0	"	"	"	½x4x29	16x20	14x12
	2x12	6+6	–	–	–	62	56	54	31	26	23	"	"	"	½x4x34	"	18x12
5/12 Slope	2x4	2x4	30	28	28	13	0	0	0	0	0	2x4	2x4	2x4	3/8x3½x13	8x12	8x8
	2x6	2x4	62	60	45	27	0	0	0	0	0	"	"	"	½x4x13	10x12	"
	2x6	2x6	61	58	57	26	24	23	13	0	0	"	4&4	"	3/8x4x23	10x16	8x10
	2x8	2x6	92	87	84	40	38	34	20	0	0	2x4	4&4	2x4	½x4x18	12x16	8x10
	2x10	4+4	100+	100+	100+	55	52	26	27	0	0	"	"	"	½x4x24	16x16	10x12
	2x12	4+6	–	–	–	71	65	61	35	31	0	"	"	"	½x4x27	16x20	12x12
	2x12	6+6	–	–	–	69	64	61	34	30	28	"	"	"	½x4x28	18x20	16x12

1100f Lumber

	Top chord	Bottom chord	Truss spacing, ft. 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	20	18	0	0	0	0	0	0	0	2x4	2x4	2x4	3/8x3½x14	8x12	8x8
	2x6	2x4	40	30	0	0	0	0	0	0	0	"	"	"	3/8x4x23	10x12	8x8
	2x6	2x6	39	36	34	17	14	0	0	0	0	"	"	"	3/8x4x25	10x16	8x10
	2x8	2x6	53	48	46	23	18	0	0	0	0	2x4	2x4	2x4	3/8x4x31	12x16	8x10
	2x10	4+4	80	74	68	35	20	0	0	0	0	"	"	"	½x4x28	14x16	10x10
	2x12	4+6	100+	98	93	45	39	30	22	0	0	"	4&4	"	½x4x36	16x16	12x12
	2x12	6+6	–	–	90	43	38	35	21	16	0	"	"	"	3/8x4x53	"	16x10
4/12 Slope	2x4	2x4	22	21	0	0	0	0	0	0	0	2x4	2x4	2x4	3/8x3½x12	8x12	8x8
	2x6	2x4	46	40	0	20	0	0	0	0	0	"	"	"	3/8x4x20	10x12	8x10
	2x6	2x6	45	42	41	19	17	0	0	0	0	"	"	"	3/8x4x22	"	"
	2x8	2x6	67	63	61	29	26	0	0	0	0	2x4	2x4	2x4	3/8x4x29	14x12	10x10
	2x10	4+4	93	86	82	40	30	0	20	0	0	"	4&4	"	½x4x22	14x16	12x10
	2x12	4+6	100+	100+	100+	52	47	38	26	13	0	"	"	"	½x4x28	18x16	14x12
	2x12	6+6	–	–	–	50	46	44	25	21	0	"	"	"	3/8x4x44	"	16x12
5/12 Slope	2x4	2x4	24	22	0	0	0	0	0	0	0	2x4	2x4	2x4	3/8x3½x10	8x12	8x8
	2x6	2x4	50	48	0	22	0	0	0	0	0	"	"	"	3/8x4x19	10x12	"
	2x6	2x6	49	47	46	21	19	15	0	0	0	"	"	"	3/8x4x19	"	"
	2x8	2x6	74	70	68	32	29	15	0	0	0	2x4	2x4	2x4	3/8x4x26	12x16	8x10
	2x10	4+4	100+	96	95	45	38	0	22	0	0	"	4&4	"	½x4x19	14x16	10x10
	2x12	4+6	–	100+	100+	57	53	46	28	16	0	"	"	"	½x4x24	18x16	14x10
	2x12	6+6	–	–	–	56	51	49	28	24	0	"	"	"	3/8x4x40	"	16x10

1600f Lumber

	Top chord	Bottom chord	Truss spacing, ft. 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	30	28	26	13	0	0	0	0	0	2x4	2x4	2x4	3/8x3½x21	8x12	8x8
	2x6	2x4	60	57	42	26	0	0	0	0	0	"	"	"	½x4x19	10x16	8x10
	2x6	2x6	58	54	52	25	22	20	0	0	0	"	"	"	3/8x4x35	"	8x12
	2x8	2x6	84	76	72	36	31	29	0	0	0	2x4	2x4	2x4	½x4x26	12x16	10x10
	2x10	4+4	100+	100+	100+	52	48	26	26	0	0	"	4&4	"	½x4x35	14x20	12x12
	2x12	4+6	–	–	–	67	61	58	33	29	0	"	"	"	½x4x39	16x20	14x12
	2x12	6+6	–	–	–	63	58	55	32	27	24	"	"	"	½x4x44	18x24	16x14
4/12 Slope	2x4	2x4	33	32	30	14	0	0	0	0	0	2x4	2x4	2x4	3/8x3½x18	8x12	8x10
	2x6	2x4	68	65	51	29	17	0	0	0	0	"	"	"	½x4x17	10x16	10x10
	2x6	2x6	66	63	61	29	26	25	14	0	0	"	4&4	"	½x4x18	"	"
	2x8	2x6	100	94	90	43	41	38	21	15	0	2x4	4&4	2x4	½x4x23	14x16	10x12
	2x10	4+4	–	100+	100+	60	55	41	30	0	0	"	"	"	½x4x32	14x20	14x12
	2x12	4+6	–	–	–	76	70	66	38	34	15	"	"	"	½x4x35	18x20	16x14
	2x12	6+6	–	–	–	74	68	65	37	33	30	"	"	"	½x4x36	18x24	18x14
5/12 Slope	2x4	2x4	35	34	34	15	0	0	0	0	0	2x4	2x4	2x4	3/8x3½x16	8x12	8x8
	2x6	2x4	74	71	63	32	0	0	0	0	0	"	"	"	½x4x15	10x16	8x10
	2x6	2x6	73	69	68	31	29	28	15	13	0	"	4&4	"	½x4x15	"	"
	2x8	2x6	100+	100+	100	48	45	43	29	18	0	2x4	4&4	2x4	½x4x21	14x16	10x10
	2x10	4+4	–	–	–	66	62	49	33	0	0	"	"	"	½x4x25	14x20	10x12
	2x12	4+6	–	–	–	85	78	78	42	38	23	"	"	"	½x4x32	18x20	14x12
	2x12	6+6	–	–	–	83	76	73	41	37	35	"	"	"	½x4x33	"	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).

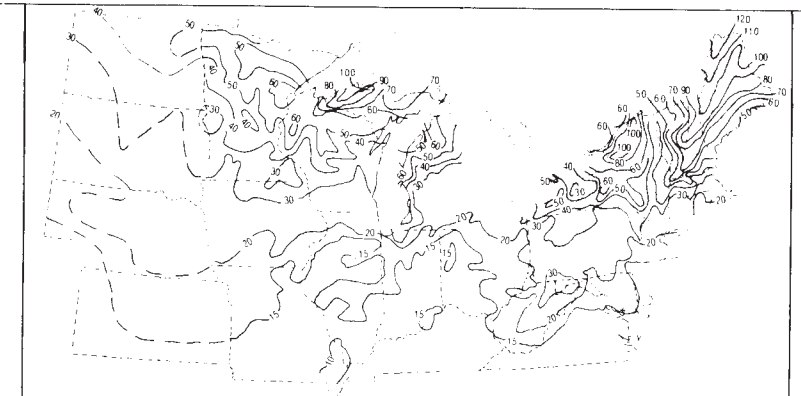
ROOF DEAD LOAD

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: Top	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:				
2-6-4-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 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
3/4" 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

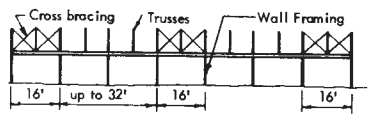
Use exterior, C-C grade 3/8" or 1/2" plywood with outer plies of Group 1 species wood, Identification Indexes, 24/0 and 32/16 respectively.

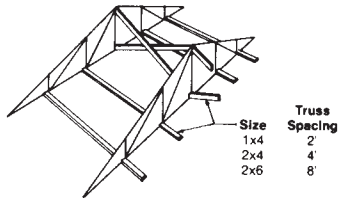
Use 3-ply 3/8" plywood and 5-ply 1/2" plywood or use Structural I, 4-ply, 1/2" plywood.

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

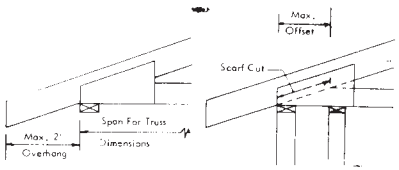
Minimum fasteners for wind anchorage, both ends of each truss.

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

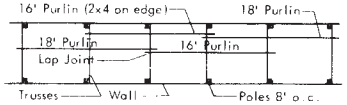
For a 2' to 4' overhang, use the top chord and heel gusset design for a 1/3 larger snow load.



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.



MWPS-34’Truss

34’ span, 2-web trusses

with plywood gussets

CAUTION!

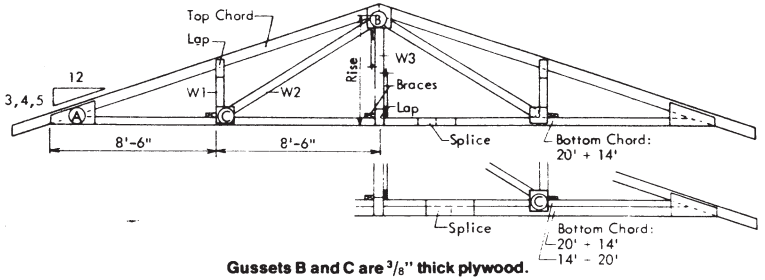
Additional professional services will be required to tailor this plan to your situation, including but not limited to: assurance of compliance with codes and regulations; review of specifications for materials and equipment; supervision of site selection, bid letting and construction; and provision for 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.**

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.

MIDWEST PLAN SERVICE
Cooperative Extension Work in Agriculture and Home Economics and Agricultural Experiment Stations of North Central Region - USDA Cooperating
34’ Truss
Title Page
MIDWEST PLAN NO. 34’ Truss

34' 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'-3"	18'	2'	9'+8'	4'
4/12	5'-8"	19'	3'	10'+9'	6'
5/12	7'-1"	19'	4'	11'+10'	7'

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, ft. 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	18	16	0	0	0	0	0	0	0	2x4	2x4	2x4	3/8x3½x14	8x12	8x8
	2x6	2x4	37	22	0	0	0	0	0	0	0	"	"	"	3/8x4x22	10x12	"
	2x6	2x6	36	33	31	0	12	0	0	0	0	"	"	"	3/8x4x25	10x16	8x10
	2x8	2x6	49	45	42	0	16	0	0	0	0	2x4	2x4	2x4	3/8x4x31	12x16	8x10
	2x10	4+4	74	68	58	32	14	0	0	0	0	"	"	"	3/8x4x42	14x16	10x12
	2x12	4+6	94	86	86	41	36	23	0	0	0	"	"	"	½x4x36	16x16	14x10
	2x12	6+6	90	82	78	39	34	32	0	14	0	"	"	"	3/8x4x52	"	16x10
4/12 Slope	2x4	2x4	20	19	0	0	0	0	0	0	0	2x4	2x4	2x4	3/8x3½x12	8x12	8x8
	2x6	2x4	42	29	0	0	0	0	0	0	0	"	"	"	3/8x4x19	10x12	"
	2x6	2x6	41	39	37	18	15	0	0	0	0	"	"	"	3/8x4x22	"	8x10
	2x8	2x6	62	58	56	27	22	0	0	0	0	2x4	2x4	2x4	3/8x4x29	14x12	10x10
	2x10	4+4	85	79	76	37	20	0	0	0	0	"	"	"	½x4x22	14x16	12x10
	2x12	4+6	100+	100	100+	47	43	30	23	0	0	"	4&4	"	½x4x28	18x16	14x12
	2x12	6+6	-	-	-	46	42	39	23	19	0	"	"	"	3/8x4x44	"	16x12
5/12 Slope	2x4	2x4	22	20	0	0	0	0	0	0	0	2x4	2x4	2x4	3/8x3½x10	8x12	8x8
	2x6	2x4	46	40	0	0	0	0	0	0	0	"	"	"	3/8x4x17	10x12	"
	2x6	2x6	45	43	42	19	17	0	0	0	0	"	"	"	3/8x4x19	"	"
	2x8	2x6	68	64	62	29	27	0	0	0	0	2x4	2x4	2x4	3/8x4x26	12x16	8x10
	2x10	4+4	95	88	89	41	31	0	20	0	0	"	4&4	"	½x4x20	14x16	10x10
	2x12	4+6	100+	100+	100+	52	48	38	26	12	0	"	"	"	½x4x24	18x16	12x12
	2x12	6+6	-	-	-	51	47	45	25	22	14	"	"	"	3/8x4x40	"	14x12

1400f Lumber

	Top chord	Bottom chord	Truss spacing, ft. 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	23	21	13	0	0	0	0	0	0	2x4	2x4	2x4	3/8x3½x17	8x12	8x8
	2x6	2x4	46	43	13	0	0	0	0	0	0	"	"	"	½x4x16	10x16	8x10
	2x6	2x6	44	41	39	19	16	14	0	0	0	"	"	"	3/8x4x30	"	"
	2x8	2x6	65	59	56	28	23	14	0	0	0	2x4	2x4	2x4	½x4x22	12x16	8x12
	2x10	4+4	90	83	83	39	33	0	0	0	0	"	"	"	½x4x29	14x20	12x10
	2x12	4+6	100+	100+	100+	50	46	42	0	16	0	"	"	"	½x4x36	16x20	14x12
	2x12	6+6	-	-	-	48	44	41	24	20	0	"	4&4	"	3/8x4x58	"	16x12
4/12 Slope	2x4	2x4	25	24	20	0	0	0	0	0	0	2x4	2x4	2x4	3/8x3½x15	8x12	8x8
	2x6	2x4	52	50	20	0	0	0	0	0	0	"	"	"	½x4x14	10x12	8x10
	2x6	2x6	51	48	47	22	19	18	0	0	0	"	"	"	3/8x4x26	10x16	10x10
	2x8	2x6	76	72	69	33	30	22	0	0	0	2x4	2x4	2x4	½x4x20	12x16	10x10
	2x10	4+4	100+	98	98	46	42	0	0	0	0	"	"	"	½x4x26	16x16	12x12
	2x12	4+6	-	-	-	58	54	51	29	20	0	"	4&4	"	½x4x29	16x20	14x12
	2x12	6+6	-	-	-	57	52	50	28	24	16	"	"	"	½x4x34	"	18x12
5/12 Slope	2x4	2x4	27	26	25	12	0	0	0	0	0	2x4	2x4	2x4	3/8x3½x13	8x12	8x8
	2x6	2x4	57	54	26	24	0	0	0	0	0	"	"	"	3/8x4x22	10x12	"
	2x6	2x6	56	53	52	24	22	20	0	0	0	"	"	"	3/8x4x23	10x16	8x10
	2x8	2x6	84	80	77	36	34	26	0	0	0	2x4	2x4	2x4	½x4x18	12x16	8x10
	2x10	4+4	100+	100+	100+	51	47	12	25	0	0	"	4&4	"	½x4x24	16x16	10x12
	2x12	4+6	-	-	-	65	60	56	32	26	0	"	"	"	½x4x26	16x20	12x12
	2x12	6+6	-	-	-	63	59	56	31	28	21	"	"	"	½x4x28	"	16x12

1600f Lumber

	Top chord	Bottom chord	Truss spacing, ft. 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	27	25	24	0	0	0	0	0	0	2x4	2x4	2x4	3/8x3½x21	8x12	8x8
	2x6	2x4	55	52	28	0	0	0	0	0	0	"	"	"	½x4x19	10x16	8x10
	2x6	2x6	53	50	48	23	20	18	0	0	0	"	"	"	3/8x4x35	"	8x12
	2x8	2x6	77	70	67	33	29	24	0	0	0	2x4	2x4	2x4	½x4x26	12x20	10x10
	2x10	4+4	100+	100+	100+	47	44	18	0	0	0	"	"	"	½x4x35	14x20	12x12
	2x12	4+6	-	-	-	61	56	53	30	24	0	"	4&4	"	½x4x38	16x20	14x12
	2x12	6+6	-	-	-	58	53	50	29	24	20	"	"	"	½x4x44	18x24	16x14
4/12 Slope	2x4	2x4	30	28	27	13	0	0	0	0	0	2x4	2x4	2x4	3/8x3½x17	8x12	8x10
	2x6	2x4	62	59	43	27	0	0	0	0	0	"	"	"	½x4x17	10x16	10x10
	2x6	2x6	61	58	56	26	24	22	13	0	0	"	4&4	"	3/8x4x30	"	"
	2x8	2x6	91	86	83	40	37	33	20	0	0	2x4	4&4	2x4	½x4x23	14x16	10x12
	2x10	4+4	100+	100+	100+	55	51	23	27	0	0	"	"	"	½x4x31	14x20	14x12
	2x12	4+6	-	-	-	70	65	60	35	30	0	"	"	"	½x4x34	18x20	16x14
	2x12	6+6	-	-	-	68	63	60	34	30	27	"	"	"	½x4x36	18x24	18x14
5/12 Slope	2x4	2x4	32	31	30	14	0	0	0	0	0	2x4	2x4	2x4	3/8x3½x15	8x12	8x8
	2x6	2x4	67	65	50	29	0	0	0	0	0	"	"	"	½x4x15	10x16	8x10
	2x6	2x6	66	63	62	29	26	25	14	12	0	"	4&4	"	½x4x15	"	"
	2x8	2x6	100+	95	92	44	41	39	22	12	0	2x4	4&4	2x4	½x4x21	14x16	10x10
	2x10	4+4	-	100+	100+	61	57	39	30	0	0	"	"	"	½x4x28	14x20	12x12
	2x12	4+6	-	-	-	78	72	71	39	35	0	"	"	"	½x4x32	18x20	14x12
	2x12	6+6	-	-	-	76	70	67	38	34	32	"	"	"	½x4x33	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).

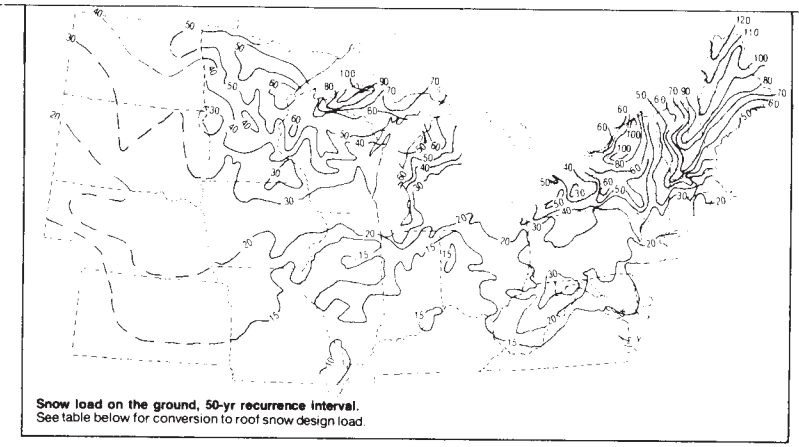
ROOF DEAD LOAD

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 Top	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 ½ 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
⅜" plywood	1.1
½" 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

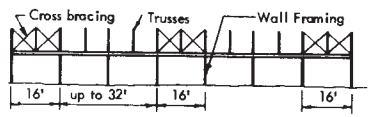
Use exterior, C-C grade ⅜" or ½" plywood with outer plies of Group 1 species wood, Identification Indexes, 24/0 and 32/16 respectively.

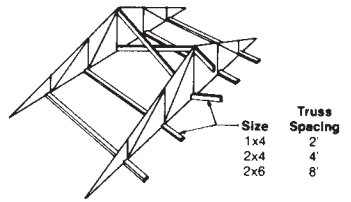
Use 3-ply ⅜" plywood and 5-ply ½" plywood or use Structural I, 4-ply, ½" plywood.

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

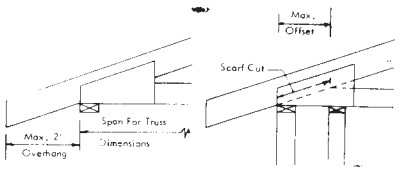
Minimum fasteners for wind anchorage, both ends of each truss.

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 = ½" bolt
B = ½" bolt

Overhang

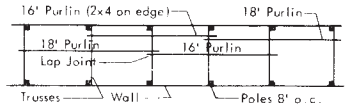
For a 2' to 4' overhang, use the top chord and heel gusset design for a ⅓ larger snow load.



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.



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.**

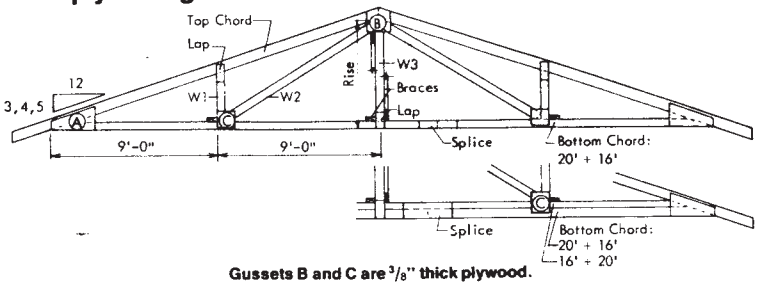
WARRANTY DISCLAIMER

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.

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).

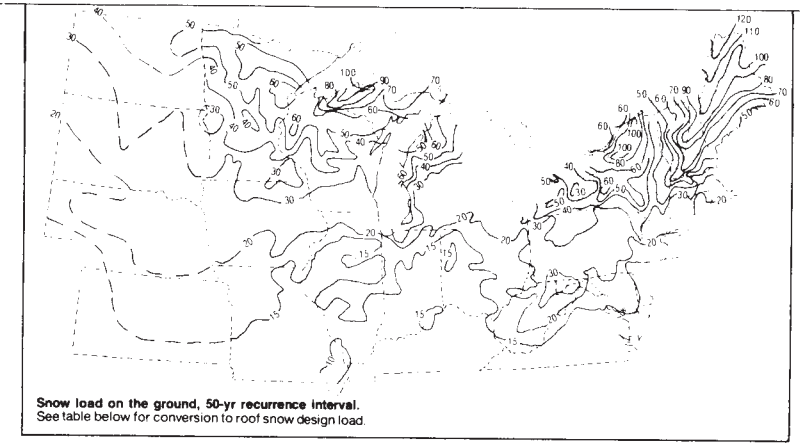
ROOF DEAD LOAD

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:				
2-64-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	Roof snow load, 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

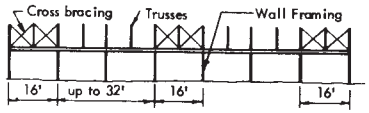
Use exterior, C-C grade 3/8" or 1/2" plywood with outer plies of Group 1 species wood, Identification Indexes, 24/0 and 32/16 respectively.

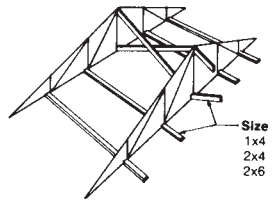
Use 3-ply 3/8" plywood and 5-ply 1/2" plywood or use Structural I, 4-ply, 1/2" plywood.

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

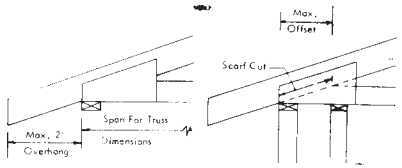
Minimum fasteners for wind anchorage, both ends of each truss.

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

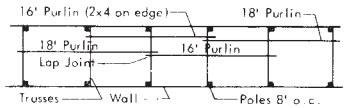
For a 2' to 4' overhang, use the top chord and heel gusset design for a 1/3 larger snow load.



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.



MWPS-38’Truss

38’ 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.**

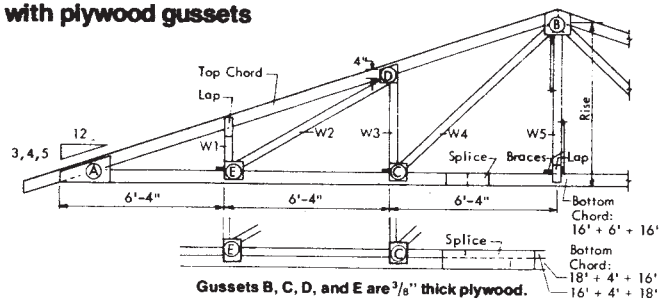
WARRANTY DISCLAIMER

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.

MIDWEST PLAN SERVICE
Cooperative Extension Work in Agriculture and Home Economics and Agricultural Experiment Stations of North Central Region - USDA Cooperating
38’ Truss
Title Page
MIDWEST PLAN NO. 38’ Truss

38' 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	4'-9"	20'	2'	7'	3'	8'	5'
4/12	6'-4"	16'+5'	2'	8'	4'	9'	6'
5/12	7'-11"	16'+5'	3'	8'	5'	10'+9'	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,
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. 2' Ceiling dead load, psf 0	5	8	4' 0	5	8	6' 0	5	8	Web member sizes W1	W2	W3	W4	W5	Gusset Sizes, in. A T H W	B H W	C H W	D H W	E H W
			---Max. snow + roof dead load, psf---																		
3/12 Slope	2x4	2x4	29	27	25	0	0	0	0	0	0	2x4	2x4	2x4	2x4	2x4	3/8x3½x25	8x12	8x8	8x8	8x8
	2x6	2x4	39	36	34	0	0	0	0	0	0	"	"	"	"	"	½x4x16	10x12	"	"	"
	2x6	2x6	56	51	48	24	19	16	0	0	0	"	"	"	"	"	½x4x23	10x16	10x10	"	"
	2x8	2x6	58	54	51	25	21	18	0	0	0	2x4	2x4	2x4	2x4	2x4	½x4x23	12x16	10x10	8x8	8x8
	2x10	4+4	84	78	75	36	33	26	0	0	0	"	"	"	"	"	½x4x31	14x16	12x10	"	10x8
	2x12	4+6	100+	99	100	46	43	40	23	19	0	"	"	"	"	"	½x4x39	16x20	14x12	"	12x8
	2x12	6+6	-	-	-	49	45	42	24	20	17	"	"	"	"	"	½x4x44	18x20	18x12	"	14x8
4/12 Slope	2x4	2x4	34	32	31	14	13	0	0	0	0	2x4	2x4	2x4	2x4	2x4	3/8x3½x22	8x12	8x8	8x8	8x8
	2x6	2x4	52	49	46	22	13	0	0	0	0	"	"	"	"	"	½x4x16	10x12	8x10	"	"
	2x6	2x6	68	64	63	29	27	24	0	0	0	"	"	"	"	"	½x4x22	10x16	10x10	"	8x10
	2x8	2x6	79	74	70	34	31	28	0	0	0	2x4	2x4	2x4	2x4	2x4	½x4x23	12x16	10x10	8x8	8x8
	2x10	4+4	100+	100+	100+	48	45	35	24	13	0	"	"	"	4&4	"	½x4x32	14x20	12x12	"	10x10
	2x12	4+6	-	-	-	60	56	53	30	25	15	"	"	"	"	"	½x4x35	18x20	16x12	"	12x10
	2x12	6+6	-	-	-	63	58	55	31	27	25	"	"	"	"	"	½x4x39	18x20	18x12	8x10	14x10
5/12 Slope	2x4	2x4	37	36	35	16	14	0	0	0	0	2x4	2x4	2x4	2x4	2x4	3/8x3½x20	8x12	8x8	8x8	8x8
	2x6	2x4	65	60	55	28	17	0	0	0	0	"	"	"	"	"	½x4x16	10x16	10x8	"	"
	2x6	2x6	76	73	71	33	31	29	16	14	0	"	"	"	4&4	"	½x4x20	"	10x10	"	"
	2x8	2x6	99	92	88	43	40	35	21	14	0	2x4	2x4	2x4	4&4	2x4	½x4x24	12x20	10x10	8x8	8x8
	2x10	4+4	-	100+	100+	59	54	44	29	17	0	"	"	2x6	"	"	2-½x6x18	16x20	14x14	8x12	10x10
	2x12	4+6	-	-	-	74	69	67	37	32	20	"	"	"	"	"	½x4x35	18x20	16x14	"	12x10
	2x12	6+6	-	-	-	75	69	66	37	33	31	"	"	"	"	"	½x4x37	"	18x14	"	14x10

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	W4	W5	Gusset Sizes, in. A T H W	B H W	C H W	D H W	E H W
			---Max. snow + roof dead load, psf---																		
3/12 Slope	2x4	2x4	24	22	19	0	0	0	0	0	0	2x4	2x4	2x4	2x4	2x4	3/8x3½x21	8x12	8x8	8x8	8x8
	2x6	2x4	30	27	20	0	0	0	0	0	0	"	"	"	"	"	3/8x4x22	10x12	"	"	"
	2x6	2x6	42	38	35	18	13	0	0	0	0	"	"	"	"	"	3/8x4x32	"	8x10	"	"
	2x8	2x6	44	41	38	19	15	0	0	0	0	2x4	2x4	2x4	2x4	2x4	3/8x4x32	12x12	8x10	8x8	8x8
	2x10	4+4	64	59	57	28	23	14	0	0	0	"	"	"	"	"	½x4x28	14x16	12x10	"	10x8
	2x12	4+6	82	75	72	35	31	28	0	0	0	"	"	"	"	"	½x4x36	16x16	14x10	"	12x8
	2x12	6+6	92	84	80	40	35	33	20	15	0	"	"	"	4&4	"	½x4x44	18x16	16x10	"	14x8
4/12 Slope	2x4	2x4	27	26	25	0	0	0	0	0	0	2x4	2x4	2x4	2x4	2x4	3/8x3½x19	8x12	8x8	8x8	8x8
	2x6	2x4	40	37	31	0	0	0	0	0	0	"	"	"	"	"	3/8x4x22	10x12	"	"	"
	2x6	2x6	56	53	50	24	20	15	0	0	0	"	"	"	"	"	½x4x18	12x12	8x10	"	"
	2x8	2x6	61	56	54	26	22	15	0	0	0	2x4	2x4	2x4	2x4	2x4	½x4x18	14x12	8x10	8x8	8x8
	2x10	4+4	84	78	78	36	31	20	0	0	0	"	"	"	"	"	½x4x25	14x16	12x10	"	10x8
	2x12	4+6	100+	98	99	46	42	39	23	15	0	"	"	"	4&4	"	½x4x30	16x20	14x10	"	12x10
	2x12	6+6	-	100+	100+	51	47	45	26	22	14	"	"	"	"	"	½x4x35	18x16	18x12	"	14x10
5/12 Slope	2x4	2x4	30	29	28	13	0	0	0	0	0	2x4	2x4	2x4	2x4	2x4	3/8x3½x17	8x12	8x8	8x8	8x8
	2x6	2x4	49	46	38	21	0	0	0	0	0	"	"	"	"	"	3/8x4x22	10x12	"	"	"
	2x6	2x6	63	60	58	27	25	21	0	0	0	"	"	"	"	"	½x4x17	10x16	10x8	"	"
	2x8	2x6	75	70	67	33	29	21	0	0	0	2x4	2x4	2x4	2x4	2x4	½x4x18	12x16	10x8	8x8	8x8
	2x10	4+4	100+	100+	96	45	39	26	22	0	0	"	"	2x6	4&4	"	½x4x25	14x20	14x12	8x10	10x8
	2x12	4+6	-	-	100+	57	52	48	28	20	0	"	"	"	"	"	½x4x31	18x16	16x12	"	12x8
	2x12	6+6	-	-	-	62	57	54	31	27	19	"	"	"	"	"	½x4x31	"	18x12	8x12	14x10

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	W4	W5	Gusset Sizes, in. A T H W	B H W	C H W	D H W	E H W
			---Max. snow + roof dead load, psf---																		
3/12 Slope	2x4	2x4	35	34	32	15	13	0	0	0	0	2x4	2x4	2x4	2x4	2x4	½x3½x17	8x12	8x8	8x8	8x8
	2x6	2x4	47	44	42	20	15	0	0	0	0	"	"	"	"	"	½x4x20	10x16	8x10	"	"
	2x6	2x6	67	61	58	29	24	21	0	0	0	"	"	"	"	"	½x4x27	"	10x10	"	"
	2x8	2x6	70	64	61	30	26	23	0	0	0	2x4	2x4	2x4	2x4	2x4	½x4x28	12x16	10x10	8x8	8x8
	2x10	4+4	100+	94	90	44	41	35	22	14	0	"	"	"	"	"	½x4x37	14x20	12x12	"	10x8
	2x12	4+6	-	100+	100+	56	51	49	28	24	16	"	"	"	"	"	½x4x46	18x20	16x12	"	12x8
	2x12	6+6	-	-	-	60	55	52	30	25	23	"	"	"	"	"	½x4x46	"	18x12	8x10	14x8
4/12 Slope	2x4	2x4	41	39	37	17	15	14	0	0	0	2x4	2x4	2x4	2x4	2x4	½x3½x15	8x12	8x8	8x8	8x8
	2x6	2x4	62	60	56	27	23	18	0	0	0	"	"	"	"	"	½x4x20	12x12	8x10	8x8	8x8
	2x6	2x6	83	78	76	36	33	31	18	15	0	"	"	"	"	"	½x4x26	10x16	10x10	"	8x10
	2x8	2x6	96	90	87	41	39	36	20	17	14	2x4	2x4	2x4	2x4	2x4	½x4x28	12x20	10x10	8x8	8x10
	2x10	4+4	100+	100+	100+	58	55	52	29	25	22	"	"	"	"	"	2-½x6x22	16x20	14x12	8x10	12x10
	2x12	4+6	-	-	-	73	69	66	36	33	31	"	"	"	"	"	2-½x6x28	18x20	16x12	"	14x10
	2x12	6+6	-	-	-	77	71	67	38	34	32	"	"	"	"	"	2-½x6x34	"	20x14	"	16x10
5/12 Slope	2x4	2x4	45	44	43	19	18	0	0	0	0	2x4	2x4	2x4	2x4	2x4	½x3½x13	8x12	8x8	8x8	8x8
	2x6	2x4	78	72	70	34	27	0	0	0	0	"	"	"	"	"	½x4x19	10x16	10x10	"	"
	2x6	2x6	93	89	87	40	39	37	20	18	0	"	"	"	"	"	½x4x24	10x20	12x10	"	"
	2x8	2x6	100+	100+	100+	51	48	46	25	20	0	2x4	2x4	2x4	2x4	2x4	2-½x6x15	14x16	12x10	8x10	8x10
	2x10	4+4	-	-	-	71	68	54	35	24	0	"	"	2x6	"	"	2-½x6x18	16x20	14x14	8x12	10x10
	2x12	4+6	-	-	-	89	83	82	44	41	30	"	"	"	"	"	2-½x6x22	20x24	18x14	"	12x10
	2x12	6+6	-	-	-	92	85	81	46	42	39	"	"	"	"	"	2-½x6x28	"	20x16	10x12	16x10

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).

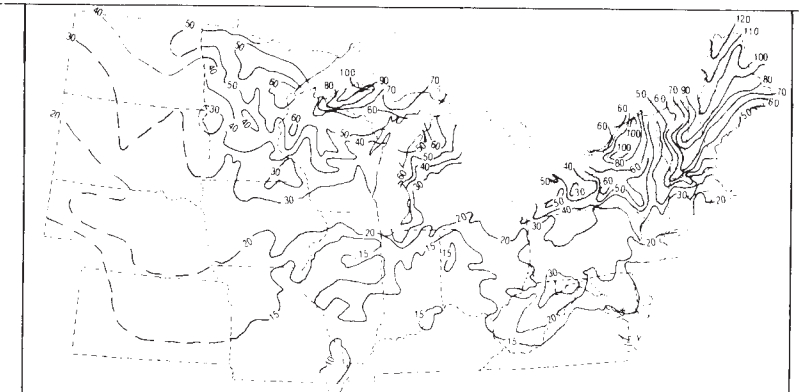
ROOF DEAD LOAD

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	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:				
2-6&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 3/12 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.

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

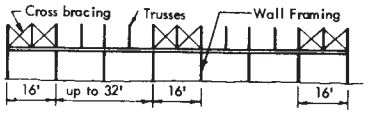
Use exterior, C-C grade 3/8" or 1/2" plywood with outer plies of Group 1 species wood, Identification Indexes, 24/0 and 32/16 respectively.

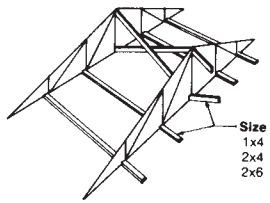
Use 3-ply 3/8" plywood and 5-ply 1/2" plywood or use Structural I, 4-ply, 1/2" plywood.

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.





Size	Truss Spacing
1x4	2'
2x4	4'
2x6	8'

Wind Anchorage

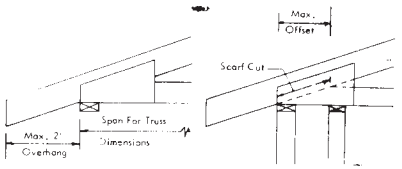
Minimum fasteners for wind anchorage, both ends of each truss.

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

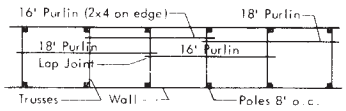
For a 2' to 4' overhang, use the top chord and heel gusset design for a 1/3 larger snow load.



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.



MWPS-40’ Truss

40’ span, 4-web trusses

with plywood gussets

CAUTION!

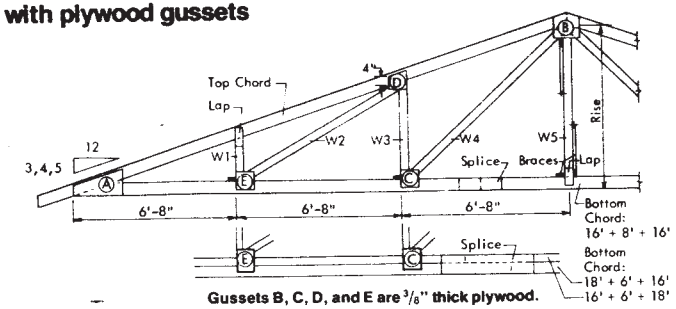
Additional professional services will be required to tailor this plan to your situation, including but not limited to: assurance of compliance with codes and regulations; review of specifications for materials and equipment; supervision of site selection, bid letting and construction; and provision for 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.**

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.

MIDWEST PLAN SERVICE
Cooperative Extension Work in Agriculture and Home Economics and Agricultural Experiment Stations of North Central Region - USDA Cooperating
40’ Truss
Title Page
MIDWEST PLAN NO. 40’ Truss

40' 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	5'-0"	16'+5'	2'	7'	3'	8'	5'
4/12	6'-8"	18'+4'	2'	8'	5'	9'+8'	7'
5/12	8'-4"	18'+4'	3'	9'	6'	11'+10'	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	8' 0	5	8	Web member sizes W1	W2	W3	W4	W5	Gusset Sizes, in. A T H W	B H W	C H W	D H W	E H W
			---Max. snow + roof dead load, psf---																		
3/12 Slope	2x4	2x4	22	20	16	0	0	0	0	0	0	2x4	2x4	2x4	2x4	2x4	3/8x3½x21	8x12	8x8	8x8	8x8
	2x6	2x4	28	25	15	0	0	0	0	0	0	"	"	"	"	"	3/8x4x22	10x12	"	"	"
	2x6	2x6	41	36	33	0	13	0	0	0	0	"	"	"	"	"	3/8x4x32	"	8x10	"	"
	2x8	2x6	42	38	35	0	14	0	0	0	0	2x4	2x4	2x4	2x4	2x4	3/8x4x33	12x12	8x10	8x8	8x8
	2x10	4+4	61	56	54	26	20	0	0	0	0	"	"	"	"	"	½x4x28	14x16	12x10	"	10x8
	2x12	4+6	77	71	68	33	29	25	0	0	0	"	"	"	"	"	½x4x36	16x16	14x10	"	12x8
	2x12	6+6	87	80	76	38	33	31	0	14	0	"	"	"	"	"	½x4x44	18x16	16x10	"	14x8
4/12 Slope	2x4	2x4	25	24	23	0	0	0	0	0	0	2x4	2x4	2x4	2x4	2x4	3/8x3½x19	8x12	8x8	8x8	8x8
	2x6	2x4	38	34	23	0	0	0	0	0	0	"	"	"	"	"	3/8x4x22	10x12	"	"	"
	2x6	2x6	51	49	47	22	18	12	0	0	0	"	"	"	"	"	½x4x18	12x12	8x10	"	"
	2x8	2x6	58	53	51	25	21	13	0	0	0	2x4	2x4	2x4	2x4	2x4	½x4x19	14x12	8x10	8x8	8x8
	2x10	4+4	80	74	72	34	28	14	0	0	0	"	"	"	"	"	½x4x25	14x16	12x10	"	10x8
	2x12	4+6	100+	93	94	44	40	34	0	13	0	"	"	"	"	"	½x4x31	16x20	14x12	"	12x10
	2x12	6+6	-	100+	100+	49	45	43	24	20	0	"	"	"	4&4	"	½x4x35	18x16	18x12	8x10	14x10
5/12 Slope	2x4	2x4	28	26	26	0	0	0	0	0	0	2x4	2x4	2x4	2x4	2x4	3/8x3½x17	8x12	8x8	8x8	8x8
	2x6	2x4	47	42	33	0	0	0	0	0	0	"	"	"	"	"	3/8x4x22	10x12	"	"	"
	2x6	2x6	58	55	54	25	23	17	0	0	0	"	"	"	"	"	½x4x17	10x16	8x10	"	"
	2x8	2x6	72	67	64	31	27	17	0	0	0	2x4	2x4	2x4	2x4	2x4	½x4x18	12x16	10x10	8x8	8x8
	2x10	4+4	99	96	88	43	35	21	0	0	0	"	"	2x6	"	"	½x4x25	14x20	14x12	8x10	10x8
	2x12	4+6	-	100+	100+	54	50	43	27	17	0	"	"	2x8	4&4	"	½x4x31	18x16	16x14	8x14	12x10
	2x12	6+6	-	-	-	58	54	52	29	25	16	"	"	"	"	"	½x4x31	18x20	18x14	"	14x10

1400f Lumber

	Top chord	Bottom chord	Truss spacing, ft. 2' Ceiling dead load, psf 0	5	8	4' 0	5	8	8' 0	5	8	Web member sizes W1	W2	W3	W4	W5	Gusset Sizes, in. A T H W	B H W	C H W	D H W	E H W
			---Max. snow + roof dead load, psf---																		
3/12 Slope	2x4	2x4	27	25	23	0	0	0	0	0	0	2x4	2x4	2x4	2x4	2x4	3/8x3½x25	8x12	8x8	8x8	8x8
	2x6	2x4	37	34	32	0	0	0	0	0	0	"	"	"	"	"	½x4x16	10x12	"	"	"
	2x6	2x6	53	49	46	23	18	15	0	0	0	"	"	"	"	"	½x4x23	10x16	10x10	"	"
	2x8	2x6	55	51	49	24	19	16	0	0	0	2x4	2x4	2x4	2x4	2x4	½x4x24	12x16	10x10	8x8	8x8
	2x10	4+4	80	74	71	34	31	22	0	0	0	"	"	"	"	"	½x4x31	14x16	12x10	"	10x8
	2x12	4+6	100+	93	94	44	40	37	0	17	0	"	"	"	"	"	½x4x39	16x20	14x12	"	12x8
	2x12	6+6	-	98	99	46	42	39	23	19	16	"	"	"	4&4	"	½x4x44	18x20	18x12	8x10	14x8
4/12 Slope	2x4	2x4	31	29	28	0	0	0	0	0	0	2x4	2x4	2x4	2x4	2x4	3/8x3½x22	8x12	8x8	8x8	8x8
	2x6	2x4	49	47	43	0	0	0	0	0	0	"	"	"	"	"	½x4x17	10x12	8x10	"	"
	2x6	2x6	63	60	58	27	25	23	0	0	0	"	"	"	"	"	½x4x22	10x16	10x10	"	8x10
	2x8	2x6	75	70	67	33	29	25	0	0	0	2x4	2x4	2x4	2x4	2x4	½x4x23	12x16	10x10	8x8	8x8
	2x10	4+4	100+	98	98	45	41	31	0	0	0	"	"	"	"	"	½x4x33	14x20	12x12	"	10x10
	2x12	4+6	-	-	-	57	53	50	28	23	12	"	"	"	4&4	"	½x4x40	18x20	16x12	8x10	14x10
	2x12	6+6	-	-	-	60	55	52	30	25	23	"	"	"	"	"	½x4x38	18x20	18x12	"	16x10
5/12 Slope	2x4	2x4	34	33	32	15	13	0	0	0	0	2x4	2x4	2x4	2x4	2x4	3/8x3½x20	8x12	8x8	8x8	8x8
	2x6	2x4	62	57	52	27	13	0	0	0	0	"	"	"	"	"	½x4x16	10x16	10x8	"	"
	2x6	2x6	71	68	66	31	28	27	0	0	0	"	"	"	"	"	½x4x20	"	10x10	"	"
	2x8	2x6	94	88	84	41	37	32	0	12	0	2x4	2x4	2x6	2x4	2x4	½x4x24	12x20	10x12	8x10	8x8
	2x10	4+4	100+	100+	100+	56	51	39	28	14	0	"	"	"	4&4	"	2-½x6x18	16x20	14x14	8x12	10x10
	2x12	4+6	-	-	-	70	65	63	35	29	16	"	"	"	"	"	½x4x35	18x20	16x14	"	12x10
	2x12	6+6	-	-	-	73	66	63	35	31	29	"	"	"	"	"	½x4x38	20x24	20x14	"	14x10

1600f Lumber

	Top chord	Bottom chord	Truss spacing, ft. 2' Ceiling dead load, psf 0	5	8	4' 0	5	8	8' 0	5	8	Web member sizes W1	W2	W3	W4	W5	Gusset Sizes, in. A T H W	B H W	C H W	D H W	E H W
			---Max. snow + roof dead load, psf---																		
3/12 Slope	2x4	2x4	33	31	29	0	12	0	0	0	0	2x4	2x4	2x4	2x4	2x4	½x3½x17	8x12	8x8	8x8	8x8
	2x6	2x4	44	42	39	0	0	0	0	0	0	"	"	"	"	"	½x4x19	10x16	8x10	"	"
	2x6	2x6	64	58	55	27	23	20	0	0	0	"	"	"	"	"	½x4x27	"	10x10	"	"
	2x8	2x6	67	61	58	29	25	21	0	0	0	2x4	2x4	2x4	2x4	2x4	½x4x28	12x16	10x10	8x8	8x8
	2x10	4+4	96	89	89	41	39	31	0	12	0	"	"	"	"	"	½x4x38	16x20	12x12	8x10	10x8
	2x12	4+6	100+	100+	100+	53	48	46	26	22	13	"	"	"	"	"	½x4x46	18x20	16x12	"	12x8
	2x12	6+6	-	-	-	55	52	49	28	24	21	"	"	"	"	"	½x4x47	"	18x12	"	14x10
4/12 Slope	2x4	2x4	38	36	34	16	14	12	0	0	0	2x4	2x4	2x4	2x4	2x4	½x3½x15	8x12	8x8	8x8	8x8
	2x6	2x4	59	57	53	26	21	16	0	0	0	"	"	"	"	"	½x4x20	12x12	8x10	"	"
	2x6	2x6	77	72	70	33	30	29	0	13	0	"	"	"	"	"	½x4x26	10x16	10x10	"	8x10
	2x8	2x6	91	86	83	39	37	34	0	16	13	2x4	2x4	2x4	2x4	2x4	½x4x28	12x20	10x10	8x8	8x10
	2x10	4+4	100+	100+	100+	55	52	49	27	24	20	"	"	"	"	"	2-½x6x22	16x20	14x12	8x10	12x10
	2x12	4+6	-	-	-	69	66	63	34	31	29	"	"	"	"	"	2-½x6x28	18x20	16x12	"	14x10
	2x12	6+6	-	-	-	73	67	64	36	32	30	"	"	"	"	"	2-½x6x34	18x20	20x14	"	16x10
5/12 Slope	2x4	2x4	41	40	40	18	16	0	0	0	0	2x4	2x4	2x4	2x4	2x4	½x3½x13	8x12	8x8	8x8	8x8
	2x6	2x4	75	69	65	32	24	0	0	0	0	"	"	"	"	"	½x4x19	10x16	10x10	"	"
	2x6	2x6	86	82	80	37	36	34	18	16	0	"	"	"	4&4	"	½x4x23	10x20	12x10	"	"
	2x8	2x6	100+	100+	100+	49	46	43	24	16	0	2x4	2x4	2x6	4&4	2x4	½x6x15	14x16	12x12	8x12	8x10
	2x10	4+4	-	-	-	68	64	51	34	21	0	"	"	"	"	"	2-½x6x18	16x20	14x14	"	10x10
	2x12	4+6	-	-	-	85	79	78	42	38	27	"	"	"	"	"	2-½x6x22	20x24	18x14	"	12x10
	2x12	6+6	-	-	-	87	81	77	43	40	31	"	"	"	"	"	2-½x6x28	"	20x16	8x14	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, 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).

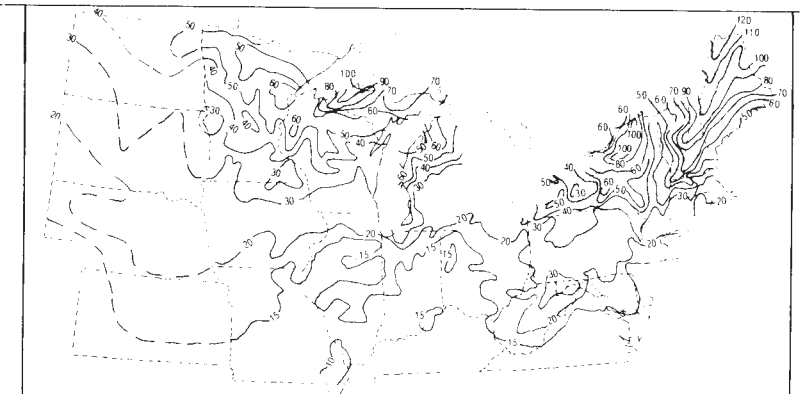
ROOF DEAD LOAD

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	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:				
2-64-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 ½ 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
⅜" plywood	1.1
½" 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

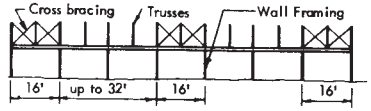
Use exterior, C-C grade ⅜" or ½" plywood with outer plies of Group 1 species wood. Identification Indexes, 24/0 and 32/16 respectively.

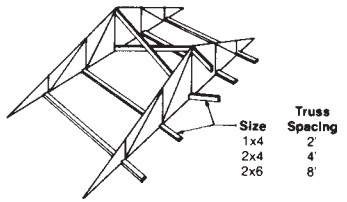
Use 3-ply ⅜" plywood and 5-ply ½" plywood or use Structural I, 4-ply, ½" plywood.

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

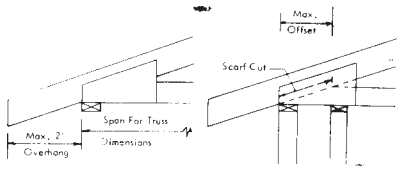
Minimum fasteners for wind anchorage, both ends of each truss.

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 = ½" bolt
4-30d ring-shank nails = ½" bolt

Overhang

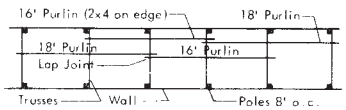
For a 2' to 4' overhang, use the top chord and heel gusset design for a ⅓ larger snow load.



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.



MWPS-42’Truss

42’ 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.**

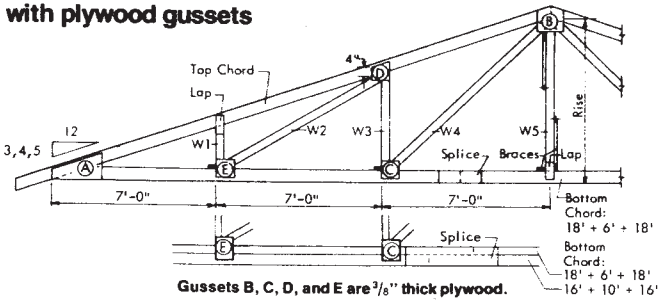
WARRANTY DISCLAIMER

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.

MIDWEST PLAN SERVICE
Cooperative Extension Work in Agriculture and Home Economics and Agricultural Experiment Stations of North Central Region - USDA Cooperating
42’ Truss
Title Page
MIDWEST PLAN NO. 42’

42' 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	5'-3"	18'+4'	2'	8'	4'	9'+8'	5'
4/12	7'-0"	18'+5'	2'	8'	5'	10'+9'	7'
5/12	8'-9"	18'+5'	3'	9'	6'	11'	9'

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	8' 0	5	8	Web member sizes W1	W2	W3	W4	W5	Gusset Sizes, in: A THW	B HW	C HW	D HW	E HW
			---Max. snow + roof dead load, psf---																		
3/12 Slope	2x4	2x4	20	18	0	0	0	0	0	0	0	2x4	2x4	2x4	2x4	2x4	3/8x3½x20	8x12	8x8	8x8	8x8
	2x6	2x4	27	24	0	0	0	0	0	0	0	"	"	"	"	"	3/8x4x23	10x12	"	"	"
	2x6	2x6	39	34	31	0	12	0	0	0	0	"	"	"	"	"	3/8x4x32	"	8x10	"	"
	2x8	2x6	40	36	33	0	13	0	0	0	0	2x4	2x4	2x4	2x4	2x4	3/8x4x33	12x12	8x10	8x8	8x8
	2x10	4+4	58	54	51	25	18	0	0	0	0	"	"	"	"	"	⅝x4x28	14x16	12x10	"	10x8
	2x12	4+6	73	67	64	32	28	22	0	0	0	"	"	"	"	"	⅝x4x36	16x16	14x10	"	12x8
	2x12	6+6	83	76	72	36	31	29	0	13	0	"	"	"	"	"	⅝x4x44	18x16	16x12	"	14x8
4/12 Slope	2x4	2x4	23	22	19	0	0	0	0	0	0	2x4	2x4	2x4	2x4	2x4	3/8x3½x18	8x12	8x8	8x8	8x8
	2x6	2x4	36	32	17	0	0	0	0	0	0	"	"	"	"	"	3/8x4x22	10x12	"	"	"
	2x6	2x6	48	46	44	21	17	0	0	0	0	"	"	"	"	"	½x4x18	12x12	8x10	"	"
	2x8	2x6	55	51	49	24	19	0	0	0	0	2x4	2x4	2x4	2x4	2x4	⅝x4x19	14x12	8x10	8x8	8x8
	2x10	4+4	76	71	67	33	25	0	0	0	0	"	"	"	"	"	⅝x4x25	14x16	12x10	"	10x10
	2x12	4+6	96	89	89	41	37	31	0	0	0	"	"	"	"	"	⅝x4x30	16x20	14x12	"	12x10
	2x12	6+6	100+	99	100	46	43	40	23	18	0	"	4&4	"	4&4	"	⅝x4x35	18x20	18x12	8x10	16x10
5/12 Slope	2x4	2x4	26	24	24	0	0	0	0	0	0	2x4	2x4	2x4	2x4	2x4	3/8x3½x16	8x12	8x8	8x8	8x8
	2x6	2x4	45	40	23	0	0	0	0	0	0	"	"	"	"	"	3/8x4x22	10x12	"	"	"
	2x6	2x6	54	51	50	23	21	14	0	0	0	"	"	"	"	"	½x4x16	10x16	10x8	"	"
	2x8	2x6	69	64	61	30	25	14	0	0	0	"	"	2x6	"	"	⅝x4x19	12x16	10x12	8x10	8x8
	2x10	4+4	94	91	81	41	31	13	0	0	0	"	"	"	"	"	⅝x4x25	14x20	14x12	"	10x8
	2x12	4+6	100+	100+	100+	51	47	38	25	15	0	"	4&4	2x8	4&4	"	⅝x4x31	18x16	16x14	8x14	12x10
	2x12	6+6	-	-	-	56	51	49	28	24	12	"	"	"	"	"	⅝x4x31	18x20	18x14	"	14x10

1400f Lumber

	Top chord	Bottom chord	Truss spacing, ft: 2' Ceiling dead load, psf: 0	5	8	4' 0	5	8	8' 0	5	8	Web member sizes W1	W2	W3	W4	W5	Gusset Sizes, in: A THW	B HW	C HW	D HW	E HW
			---Max. snow + roof dead load, psf---																		
3/12 Slope	2x4	2x4	25	23	22	0	0	0	0	0	0	2x4	2x4	2x4	2x4	2x4	3/8x3½x25	8x12	8x8	8x8	8x8
	2x6	2x4	35	32	28	0	0	0	0	0	0	"	"	"	"	"	½x4x16	10x12	"	"	"
	2x6	2x6	50	47	44	0	17	14	0	0	0	"	"	"	"	"	½x4x24	10x16	10x10	"	"
	2x8	2x6	53	49	46	0	18	14	0	0	0	2x4	2x4	2x4	2x4	2x4	½x4x24	12x16	10x10	8x8	8x8
	2x10	4+4	76	70	67	33	29	19	0	0	0	"	"	"	"	"	½x4x32	16x16	12x10	"	10x8
	2x12	4+6	96	88	89	42	37	35	0	14	0	"	"	"	"	"	½x4x39	16x20	14x12	"	12x8
	2x12	6+6	100+	93	94	44	40	37	0	17	13	"	"	"	"	"	½x4x44	18x20	18x12	8x10	14x10
4/12 Slope	2x4	2x4	29	27	26	0	0	0	0	0	0	2x4	2x4	2x4	2x4	2x4	3/8x3½x22	8x12	8x8	8x8	8x8
	2x6	2x4	47	45	39	0	0	0	0	0	0	"	"	"	"	"	½x4x17	10x12	8x10	"	"
	2x6	2x6	58	56	54	25	23	21	0	0	0	"	"	"	"	"	½x4x22	10x16	10x10	"	8x10
	2x8	2x6	72	67	64	31	27	21	0	0	0	2x4	2x4	2x4	2x4	2x4	½x4x24	12x16	10x10	8x8	8x10
	2x10	4+4	100	93	93	43	38	26	0	0	0	"	"	"	"	"	½x4x33	14x20	12x12	8x10	10x10
	2x12	4+6	-	100+	100+	54	50	48	27	20	0	"	"	"	4&4	"	½x4x40	18x20	16x12	"	14x10
	2x12	6+6	-	-	-	57	52	50	28	24	19	"	"	"	"	"	½x4x38	"	18x12	"	16x10
5/12 Slope	2x4	2x4	32	31	29	14	0	0	0	0	0	2x4	2x4	2x4	2x4	2x4	3/8x3½x19	8x12	8x8	8x8	8x8
	2x6	2x4	59	54	48	26	0	0	0	0	0	"	"	"	"	"	½x4x16	10x16	10x8	"	"
	2x6	2x6	66	63	61	28	26	25	0	0	0	"	"	"	"	"	½x4x19	"	10x10	"	"
	2x8	2x6	90	84	80	39	35	28	0	0	0	2x4	2x4	2x6	2x4	2x4	½x4x24	12x20	12x12	8x10	8x8
	2x10	4+4	100+	100+	100+	54	48	34	0	0	0	"	"	2x8	"	"	2-½x6x18	16x20	14x16	8x14	10x10
	2x12	4+6	-	-	-	67	62	55	33	26	13	"	"	"	4&4	"	½x4x35	18x20	16x16	"	12x10
	2x12	6+6	-	-	-	68	62	60	34	30	26	"	"	"	"	"	½x4x37	"	18x16	"	14x10

1600f Lumber

	Top chord	Bottom chord	Truss spacing, ft: 2' Ceiling dead load, psf: 0	5	8	4' 0	5	8	8' 0	5	8	Web member sizes W1	W2	W3	W4	W5	Gusset Sizes, in: A THW	B HW	C HW	D HW	E HW
			---Max. snow + roof dead load, psf---																		
3/12 Slope	2x4	2x4	30	28	27	0	0	0	0	0	0	2x4	2x4	2x4	2x4	2x4	½x3½x17	8x12	8x8	8x8	8x8
	2x6	2x4	42	40	37	0	0	0	0	0	0	"	"	"	"	"	½x4x20	10x16	8x10	"	"
	2x6	2x6	61	56	53	26	22	18	0	0	0	"	"	"	"	"	½x4x28	"	10x10	"	"
	2x8	2x6	64	59	56	27	23	20	0	0	0	2x4	2x4	2x4	2x4	2x4	½x4x28	12x16	10x10	8x8	8x8
	2x10	4+4	91	85	85	39	36	28	0	0	0	"	"	"	"	"	½x4x39	16x20	12x12	8x10	10x10
	2x12	4+6	100+	100+	100+	50	46	44	0	20	0	"	"	"	"	"	½x4x47	18x20	16x12	"	12x10
	2x12	6+6	-	-	-	54	49	47	27	23	20	"	"	"	"	"	½x4x47	20x20	18x14	"	14x10
4/12 Slope	2x4	2x4	35	33	31	15	13	0	0	0	0	2x4	2x4	2x4	2x4	2x4	½x3½x14	8x12	8x8	8x8	8x8
	2x6	2x4	57	54	50	24	19	14	0	0	0	"	"	"	"	"	½x4x20	12x12	8x10	"	"
	2x6	2x6	71	67	65	31	28	26	0	12	0	"	"	"	"	"	½x4x25	10x16	10x10	"	8x10
	2x8	2x6	87	82	79	38	35	32	0	15	0	2x4	2x4	2x4	2x4	2x4	½x4x29	12x20	10x10	8x8	8x10
	2x10	4+4	100+	100+	100+	52	49	47	26	22	18	"	"	"	4&4	"	2-½x6x22	16x20	14x12	8x10	12x10
	2x12	4+6	-	-	-	66	62	60	33	30	26	"	"	"	"	"	2-½x6x28	18x20	16x12	"	14x10
	2x12	6+6	-	-	-	69	64	61	34	30	28	"	"	"	"	"	2-½x6x34	18x22	20x14	"	16x10
5/12 Slope	2x4	2x4	38	37	37	16	15	0	0	0	0	2x4	2x4	2x4	4&4	2x4	½x3½x13	8x12	8x8	8x8	8x8
	2x6	2x4	71	65	61	31	17	0	0	0	0	"	"	"	"	"	½x4x19	10x16	10x10	"	"
	2x6	2x6	80	77	75	34	33	31	17	15	0	"	"	"	"	"	½x4x23	10x20	12x10	"	"
	2x8	2x6	100+	100+	100+	47	44	38	23	15	0	2x4	2x4	2x6	4&4	2x4	2-½x6x15	14x16	12x12	8x12	8x10
	2x10	4+4	-	-	-	65	57	47	32	18	0	"	"	"	"	"	2-½x6x18	16x20	14x14	"	10x10
	2x12	4+6	-	-	-	81	75	73	40	34	21	"	"	2x8	"	"	2-½x6x22	20x24	18x16	10x14	14x10
	2x12	6+6	-	-	-	83	77	73	41	37	35	"	"	"	"	"	2-½x6x28	"	20x18	8x16	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, 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).

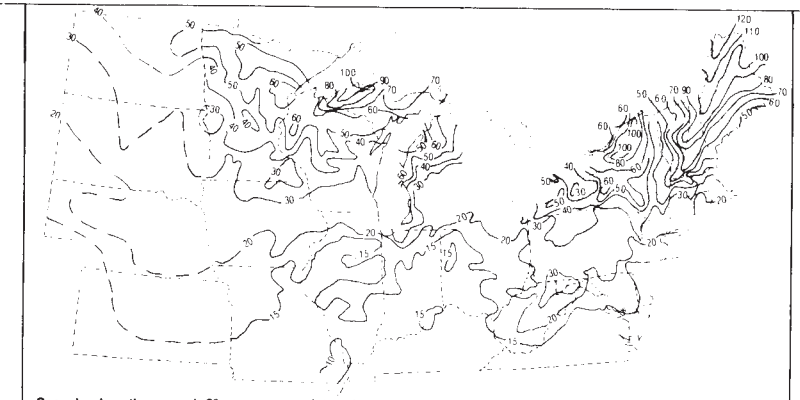
ROOF DEAD LOAD

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	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
1/2" plywood	1.1
3/4" 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

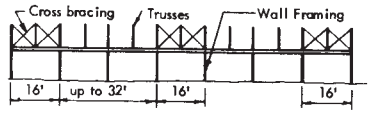
Use exterior, C-C grade 3/8" or 1/2" plywood with outer plies of Group 1 species wood, Identification Indexes, 24/0 and 32/16 respectively.

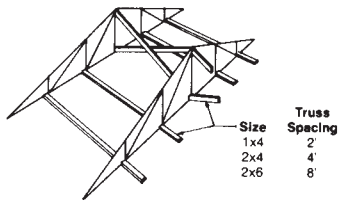
Use 3-ply 3/8" plywood and 5-ply 1/2" plywood or use Structural I, 4-ply, 1/2" plywood.

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

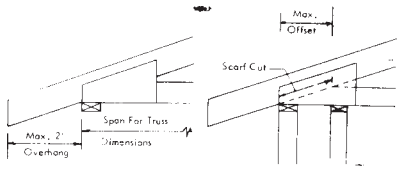
Minimum fasteners for wind anchorage, both ends of each truss.

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.