# MWPS-34’Truss

# 34’ span, 2-web trusses

with plywood gussets

## CAUTION!

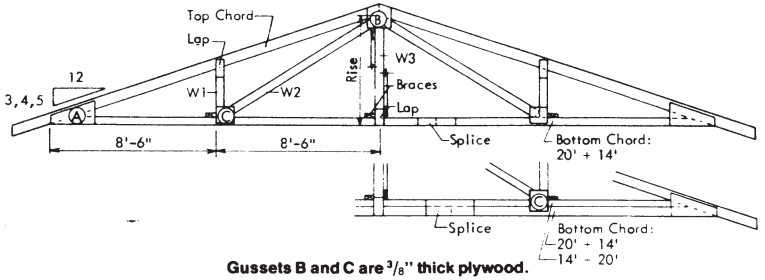
Additional professional services will be required to tailor this plan to your situation, including but not limited to: assurance of compliance with codes and regulations; review of specifications for materials and equipment; supervision of site selection, bid letting and construction; and provision for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

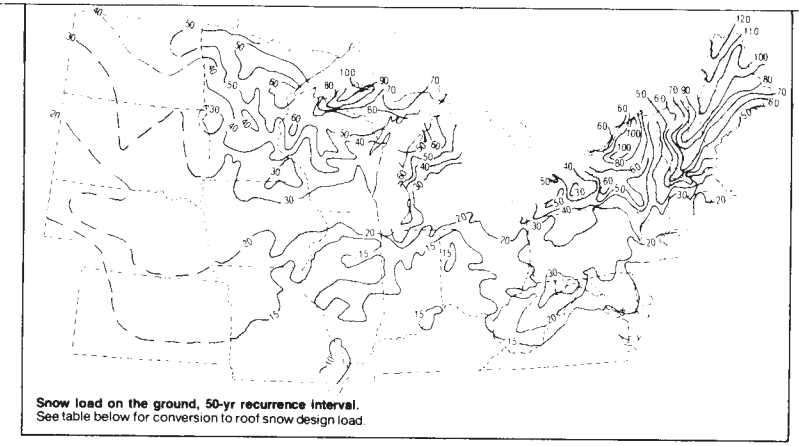
### ROOF DEAD LOAD

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

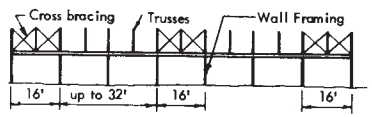
Use exterior, C-C grade ⅜" or ½" plywood with outer plies of Group 1 species wood, Identification Indexes, 24/0 and 32/16 respectively.

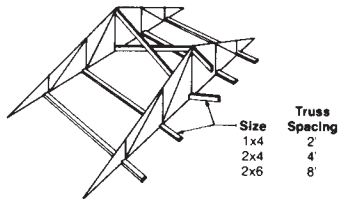
Use 3-ply ⅜" plywood and 5-ply ½" plywood or use Structural I, 4-ply, ½" plywood.

## 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

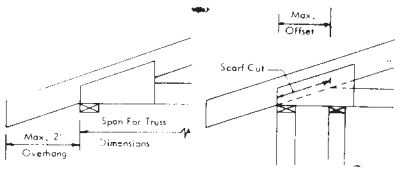
Minimum fasteners for wind anchorage, both ends of each truss.

| 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.