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TR TECHNICAL RESOURCE

Compiled by Agricultural Engineers of the Midwest Plan Service

GIRDERS & COLUMNS FOR TRUSSED BUILDINGS

TR-2

RECEIVED OCT 18 1972 COLLEGE OF AGRICULTURE

This report is intended primarily for engineers, but may also be useful to others with knowledge of building systems. It was developed to aid in the design of standard plans.

Truss designs may be found in MWPS-9, "Designs for Glued Trusses"; design criteria are in TR-1, Truss Design, published by the Midwest Plan Service. Note that this report presents basic member selection only; additional design is required for the selection of adequate fasteners, wall and roofing systems, anchorage of roof against wind uplift, etc.

Stresses

Allowable stresses, psi, were selected from the November, 1970 Supplement to NDS (5)* for #1 lumber at or below 19%, timbers at above 19%; for poles, from AWPI (4).

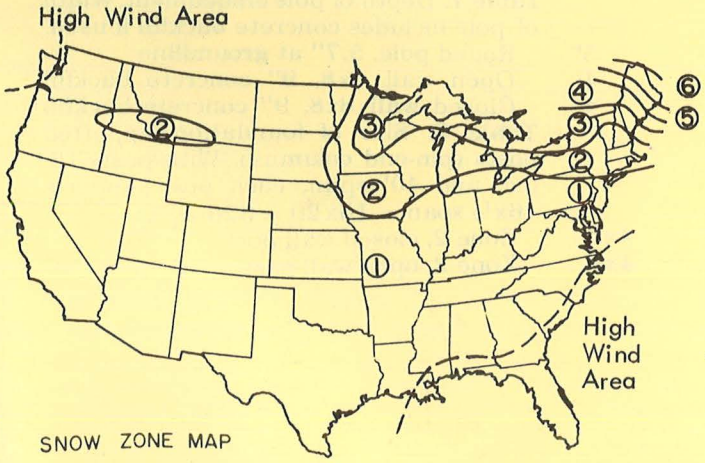
	lumber	timbers	poles
bending	1500	1300	2125
compression	--	925	925

Where appropriate, stresses were increased 15% for snow, 33% for wind.

Loads on Farm Service Buildings

Snow + Dead

The map shows snow load zones from the U.S. Weather Bureau for water equivalent in snow on the ground at major city airports, and are those accumulations expected about once in 25 years (2). Snow accumulation increases with altitude above major city airports. Larger loads can be expected on roofs subjected to drifting.



SNOW ZONE MAP

Uniform Loads for 4/12 Gable Roofs

Zone	Map Load	Snow Load	Snow + Dead
1	up to 20 psf	11.4 psf	19 psf
2	30	17.1	25
3	40	22.8	30
4	50	28.5	36
5	60	34.2	42
6	70	39.5	47

Snow load on a roof = map load x 60% (for roof) x cos 18°30' (for 4/12 slope). Dead load allows for weight of roof, ceiling, and trusses.

Wind

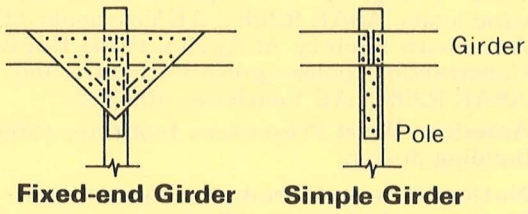
Except for a band along the SE U.S. coast and a small area in the NW, 80 mph winds are the maximum velocities expected on a 25-year occurrence interval. They are used as recommended by ASAE (2).

Comments

An example, page 2, illustrates the use of the tables. The following comments give some additional background.

Table 2. Loads on girders.

The tabulated load is P, not the total load on the girder. Fixed end girders are continuous across the poles or are attached with specially designed stiffened plywood gussets.



Tables 3 and 4. Sawed lumber poles.

The designs are adequate for snow + dead load, 80 mph wind, and 80 mph wind + one-half snow + dead, assuming poles are fixed at the ground-line, with wind load critical in all cases. Table 3 assumes the narrow dimension is not restrained. Table 4 assumes the narrow dimension is longitudinal and is restrained from buckling by girts and/or siding.

Table 5. Round pole sizes.

Round poles were designed on the same basis as the sawed ones, except there is no difference between poles in open and closed walls.

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Table 6. Round pole dimensions.

The 1963 ASA (now ANSI) standard for poles (05.1-1963) (1) lists numbered classes, ASAE lists letter classes (3); classes 7 and 9 (G and H) have the same dimensions—class 9 (H) is more slender, but the difference doesn't show up in shorter lengths.

Pole top dimensions are standard; the data for distances from 8' to 16' down the pole are derived from the top diameter and the assumed taper of 0.075 in./ft (recommended by ASAE) for 8000 psi pole species.

Table 7. Embedment for poles.

The AWPI (4) equation for required depth of set was solved; a 2500 psi soil stress and a 4' minimum depth were arbitrarily set. Post width can be either a pole dimension or, with concrete backfill, the hole dimension.

Table 8. Pin-end columns.

Where columns cannot be assumed fixed at the groundline, the roof area that each column size can support is found in Table 8. The charts are arranged by snow load zone, and whether the column is free to buckle in the narrow dimension (open wall), or restrained against buckling (closed wall).

Post designs in Table 8 are for compression only, and do not allow for lateral wind stability. If either one or both ends of the column is fixed, select the column size as if it were embedded, Tables 3, 4, or 5.

Bibliography

1. American National Standards Institute, 1963. Specifications and dimensions for wood poles. ANSI 0.51.
2. American Society of Agricultural Engineers. 1971. Designing buildings to resist snow and wind loads. ASAE R288.2 AE Yearbook: 321-324.
3. American Society of Agricultural Engineers. Construction poles—preservative-treated wood. ASAE R299.1 AE Yearbook: 309-312.
4. American Wood Preservers Institute. 1969. Pole building design.
5. National Forest Products Association. 1968. National design specification for stress-grade lumber and its fastenings. Supplement, November 1970.
6. U.S. Department of Commerce. 1970. American softwood lumber standard. PS-20-70.

How to Use Tables

Example

	Decide on the problem to be solved.
40'	Building span (width)
8'	Truss spacing
	Snow load zone (map, page 1)
Zone 2	Central Iowa
16'	Pole or post spacing along walls
12'	Wall height
4000 lb	**Table 1.** Find the load (P) in pounds that each truss imposes on the girder.
	Table 2. With trusses 8' on centers (o.c.) and poles 16' o.c., there will be one truss over each pole, and one midway between each pair of poles.
2-2x12	If girder is to be fixed-end
	If girder is to be a simple beam
4-2x12	(3-2x12 + 1-2x12 = 3411 + 1137)

Main Wall Members

Round POLES or sawed lumber POLES (fixed-end columns) are preservative-treated members designed to be set in the ground for lateral support.

Sawed lumber POSTS (pin-end columns) extend from the girder to a foundation at or near the groundline.

If POLES (fixed-end) to be set in ground

If sawed wood: because columns tend to bend in the slender direction, open-wall poles may be larger than closed-wall poles that are supported by girts and siding.

8x8	**Table 3.** Poles at 16', 12' wall, 40' span. Select poles for open wall.
8x8 or 6x10	**Table 4.** Select poles for closed wall. (note—6x10 may be cheaper)
D	**Table 5,** if round poles
	Table 6. Pole size "D" is 6.7" top, 7.5" groundline, diameters.
	Table 7. Depth of pole embedment. Width of pole includes concrete backfill if used.
5'	Round pole, 5.7" at groundline
4'	Open wall 8x8, 9" concrete backfill
4'	Closed wall 8x8, 9" concrete backfill
	Table 8. Size of foundation-supported posts (pin-end columns). With posts 16' o.c. and 40' span, each post supports 16x½ span = 16x20 = 320 sq ft.
4x6	Zone 2, closed wall post
4x8	Zone 2, open wall post

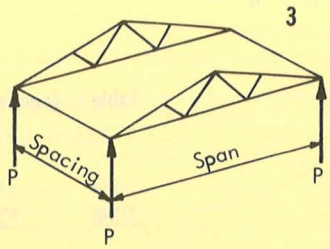


Table 1. Truss Reactions, P pounds, snow + dead

LOAD ZONE	SPAN FT.	TRUSS SPACING, FEET 2'	4'	6'	8'	10'	12'	14'	16'
1	20	380	760	1140	1520	1900	2280	2660	3040
(19 psf)	22	418	836	1254	1672	2090	2508	2926	3344
Snow & Dead	24	456	912	1368	1824	2280	2736	3192	3648
	26	494	988	1482	1976	2470	2964	3458	3952
	28	532	1064	1596	2128	2660	3192	3724	4256
	30	570	1140	1710	2280	2850	3420	3990	4560
	32	608	1216	1824	2432	3040	3648	4256	4864
	34	646	1292	1938	2584	3230	3876	4522	5168
	36	684	1368	2052	2736	3420	4104	4788	5472
	38	722	1444	2166	2888	3610	4332	5054	5776
	40	760	1520	2280	3040	3800	4560	5320	6080
	42	798	1596	2394	3192	3990	4788	5586	6384
	44	836	1672	2508	3344	4180	5016	5852	6688
	46	874	1748	2622	3496	4370	5244	6118	6992
	48	912	1824	2736	3648	4560	5472	6384	7296
	50	950	1900	2850	3800	4750	5700	6650	7600
	52	988	1976	2964	3952	4940	5928	6916	7904
	54	1026	2052	3078	4104	5130	6156	7182	8208
	56	1064	2128	3192	4256	5320	6384	7448	8512
	58	1102	2204	3306	4408	5510	6612	7714	8816
	60	1140	2280	3420	4560	5700	6840	7980	9120
2	20	500	1000	1500	2000	2500	3000	3500	4000
(25 psf)	22	550	1100	1650	2200	2750	3300	3850	4400
	24	600	1200	1800	2400	3000	3600	4200	4800
	26	650	1300	1950	2600	3250	3900	4550	5200
	28	700	1400	2100	2800	3500	4200	4900	5600
	30	750	1500	2250	3000	3750	4500	5250	6000
	32	800	1600	2400	3200	4000	4800	5600	6400
	34	850	1700	2550	3400	4250	5100	5950	6800
	36	900	1800	2700	3600	4500	5400	6300	7200
	38	950	1900	2850	3800	4750	5700	6650	7600
	40	1000	2000	3000	4000	5000	6000	7000	8000
	42	1050	2100	3150	4200	5250	6300	7350	8400
	44	1100	2200	3300	4400	5500	6600	7700	8800
	46	1150	2300	3450	4600	5750	6900	8050	9200
	48	1200	2400	3600	4800	6000	7200	8400	9600
	50	1250	2500	3750	5000	6250	7500	8750	10000
	52	1300	2600	3900	5200	6500	7800	8100	10400
	54	1350	2700	4050	5400	6750	8100	9450	10800
	56	1400	2800	4200	5600	7000	8400	9800	11200
	58	1450	2900	4350	5800	7250	8700	10150	11600
	60	1500	3000	4500	6000	7500	9000	10500	12000
3	20	600	1200	1800	2400	3000	3600	4200	4800
(30 psf)	22	660	1320	1980	2640	3300	3960	4620	5280
	24	720	1440	2160	2880	3600	4320	5040	5760
	26	780	1560	2340	3120	3900	4680	5460	6240
	28	840	1680	2520	3360	4200	5040	5880	6720
	30	900	1800	2700	3600	4500	5400	6300	7200
	32	960	1920	2880	3840	4800	5760	6720	7680
	34	1020	2040	3060	4080	5100	6120	7140	8160
	36	1080	2160	3240	4320	5400	6480	7560	8640
	38	1140	2280	3420	4560	5700	6840	7980	9120
	40	1200	2400	3600	4800	6000	7200	8400	9600
	42	1260	2520	3780	5040	6300	7560	8820	10080
	44	1320	2640	3960	5280	6600	7920	9240	10560
	46	1380	2760	4140	5520	6900	8280	9660	11040
	48	1440	2880	4320	5760	7200	8640	10080	11520
	50	1500	3000	4500	6000	7500	9000	10500	12000
	52	1560	3120	4680	6240	7800	9360	10920	12480
	54	1620	3240	4860	6480	8100	9720	11340	12960
	56	1680	3360	5040	6720	8400	10080	11760	13440
	58	1740	3480	5220	6960	8700	10440	12180	13920
	60	1800	3600	5400	7200	9000	10800	12600	14400

Table 1. (continued) Truss Reactions, P pounds, snow + dead

LOAD ZONE	SPAN FT.	TRUSS SPACING, FEET 2'	4'	6'	8'	10'	12'	14'	16'
4	20	720	1440	2160	2880	3600	4320	5040	5760
(36 psf)	22	792	1584	2376	3168	3960	4752	5544	6336
	24	864	1728	2592	3456	4320	5184	6048	6912
	26	936	1872	2808	3744	4680	5616	6552	7488
	28	1008	2016	3024	4032	5040	6048	7056	8064
	30	1080	2160	3240	4320	5400	6480	7560	8640
	32	1152	2304	3456	4608	5760	6912	8064	9216
	34	1224	2448	3672	4896	6120	7344	8568	9792
	36	1296	2592	3888	5184	6480	7776	9072	10368
	38	1368	2736	4104	5472	6840	8208	9576	10944
	40	1440	2880	4320	5760	7200	8640	10080	11520
	42	1512	3024	4536	6048	7560	9072	10584	12096
	44	1584	3168	4752	6336	7920	9504	11088	12672
	46	1656	3312	4968	6624	8280	9936	11592	13248
	48	1728	3456	5184	6912	8640	10368	12096	13824
	50	1800	3600	5400	7200	9000	10800	12600	14400
	52	1872	3744	5616	7488	9360	11232	13104	14976
	54	1944	3888	5832	7776	9720	11664	13608	15552
	56	2016	4032	6048	8064	10080	12096	14112	16128
	58	2088	4176	6264	8352	10440	12528	14616	16704
	60	2160	4320	6480	8640	10800	12960	15120	17280
5	20	840	1680	2520	3360	4200	5040	5880	6720
(42 psf)	22	924	1848	2772	3696	4620	5544	6468	7392
	24	1008	2016	3024	4032	5040	6048	7056	8064
	26	1092	2184	3276	4368	5460	6552	7644	8736
	28	1176	2352	3528	4704	5880	7056	8232	9408
	30	1260	2520	3780	5040	6300	7560	8820	10080
	32	1344	2688	4032	5376	6720	8064	9408	10752
	34	1428	2856	4284	5712	7140	8568	9996	11424
	36	1512	3024	4536	6048	7560	9072	10584	12096
	38	1596	3192	4788	6384	7980	9576	11172	12768
	40	1680	3360	5040	6720	8400	10080	11760	13440
	42	1764	3528	5292	7056	8820	10584	12348	14112
	44	1848	3696	5544	7392	9240	11088	12936	14784
	46	1932	3864	5796	7728	9660	11592	13524	15456
	48	2016	4032	6048	8064	10080	12096	14112	16128
	50	2100	4200	6300	8400	10500	12600	14700	16800
	52	2184	4368	6552	8736	10920	13104	15288	17472
	54	2268	4536	6804	9072	11340	13608	15876	18144
	56	2352	4704	7056	9408	11760	14112	16464	18816
	58	2436	4872	7308	9744	12180	14616	17052	19488
	60	2520	5040	7560	10080	12600	15120	17640	20160
6	20	940	1880	2820	3760	4700	5640	6580	7520
(47 psf)	22	1034	2068	3102	4136	5170	6204	7238	8272
	24	1128	2256	3384	4512	5640	6768	7896	9024
	26	1222	2444	3666	4888	6110	7332	8554	9776
	28	1316	2632	3948	5264	6580	7896	9212	10528
	30	1410	2820	4230	5640	7050	8460	9870	11280
	32	1504	3008	4512	6016	7520	9024	10528	12032
	34	1598	3196	4794	6392	7990	9588	11186	12784
	36	1692	3384	5076	6768	8460	10152	11844	13536
	38	1786	3572	5358	7144	8930	10716	12502	14288
	40	1880	3760	5640	7520	9400	11280	13160	15040
	42	1974	3948	5922	7896	9870	11844	13818	15792
	44	2068	4136	6204	8272	10340	12408	14476	16544
	46	2162	4324	6486	8648	10810	12972	15134	17296
	48	2256	4512	6768	9024	11280	13536	15792	18048
	50	2350	4700	7050	9400	11750	14100	16450	18800
	52	2444	4888	7332	9776	12220	14664	17108	19552
	54	2538	5076	7614	10152	12690	15228	17766	20304
	56	2632	5264	7896	10528	13160	15792	18424	21056
	58	2726	5452	8178	10904	13630	16356	19082	21808
	60	2820	5640	8460	11280	14100	16920	19740	22560

Table 2. Allowable Loads on Girders, P pounds

The tabulated load is P, not the total load on the girder, and is the maximum load in bending. Shear and deflection not checked.
PS20-70 lumber sizes, stress = 1.15(1500) = 1725 psi

If basic stress is, psi:	1000	1200	1400	1500	1600	1800
Multiply tabulated load by:	0.67	0.80	0.93	1.00	1.07	1.20

GIRDER SPAN	MEMBER SIZE*	FIXED END BEAM PPP (3)	FIXED END BEAM P P (2)	FIXED END BEAM P (1)	SIMPLE BEAM PPP (3)	SIMPLE BEAM P P (2)	SIMPLE BEAM P (1)
4'	6	869	1223	2173	543	815	1087
	8	1511	2125	3778	944	1417	1889
	66	1739	2445	4347	1087	1630	2173
	68	2380	3348	5951	1488	2232	2976
	10	2460	3459	6150	1537	2306	3075
	88	3022	4250	7555	1889	2833	3778
	12	3639	5117	9096	2274	3411	4548
	810	3971	5584	9927	2482	3723	4964
	1010	4920	6918	12299	3075	4612	6150
	1012	6098	8576	15246	3812	5717	7623
	1212	7277	10234	18193	4548	6822	9096
	101010	7380	10377	18449	4612	6918	9224
	121212	10916	15350	27289	6822	10234	13645
8'	6	435	611	1087	272	408	543
	8	756	1062	1889	472	708	944
	66	869	1223	2173	543	815	1087
	68	1190	1674	2976	744	1116	1488
	10	1230	1730	3075	769	1153	1537
	88	1511	2125	3778	944	1417	1889
	12	1819	2558	4548	1137	1706	2274
	810	1985	2792	4964	1241	1861	2482
	1010	2460	3459	6150	1537	2306	3075
	1012	3049	4288	7623	1906	2859	3812
	1212	3639	5117	9096	2274	3411	4548
	101010	3690	5189	9224	2306	3459	4612
	121212	5458	7675	13645	3411	5117	6822
12'	6	290	408	724	181	272	362
	8	504	708	1259	315	472	630
	66	580	815	1449	362	543	724
	68	793	1116	1984	496	744	992
	10	820	1153	2050	512	769	1025
	88	1007	1417	2518	630	944	1259
	12	1213	1706	3032	758	1137	1516
	810	1324	1861	3309	827	1241	1655
	1010	1640	2306	4100	1025	1537	2050
	1012	2033	2859	5082	1271	1906	2541
	1212	2426	3411	6064	1516	2274	3032
	101010	2460	3459	6150	1537	2306	3075
	121212	3639	5117	9096	2274	3411	4548
16'	6	217	306	543	136	204	272
	8	378	531	944	236	354	472
	66	435	611	1087	272	408	543
	68	595	837	1488	372	558	744
	10	615	865	1537	384	577	769
	88	756	1062	1889	472	708	944
	12	910	1279	2274	569	853	1137
	810	993	1396	2482	620	931	1241
	1010	1230	1730	3075	769	1153	1537
	1012	1525	2144	3812	953	1429	1906
	1212	1819	2558	4548	1137	1706	2274
	101010	1845	2594	4612	1153	1730	2306
	121212	2729	3838	6822	1706	2558	3411
Moment = P x L x 12/J; J =		**3.2**	**4.5**	**8.0**	**2.0**	**3.0**	**4.0**

***6 = 2"x6", 66 = 2 - 2"x6", etc**

Table 3. Sawed Lumber Poles in Open Walls

All Snow Zones

Pole Spacing	Spans	Wall Height 8'	10'	12'	14'
4'	up to 40'	4x 4	3x 6	4x 6	6x 6
	42' - 54'	3x 6	"	"	"
	56' - 60'	4x 6	4x 6	6x 6	"
8'	up to 28'	3x 6	6x 6	4x 8	4x10
	30' - 36'	4x 6	"	"	"
	38' - 56'	"	"	4x10	6x 8
	58' - 60'	"	"	6x 8	"
12'	up to 20'	4x 6	4x 8	4x10	8x 8
	22' - 30'	6x 6	"	"	"
	32' - 44'	"	4x10	"	"
	46' - 52'	"	"	6x 8	6x10
	54' - 60'	"	6x 8	8x 8	"
16'	up to 36'	6x 6	4x10	8x 8	8x10
	38' - 48'	4x 8	"	"	"
	50' - 54'	4x10	"	"	"
	56' - 60'	"	6x 8	6x10	"
20'	up to 24'	4x 8	4x10	6x10	8x10
	26' - 32'	4x10	"	"	"
	34' - 44'	"	8x 8	"	"
	44' - 50'	"	"	8x10	"
	52' - 58'	6x 8	"	"	6x12
	60'	"	"	"	10x10

Selecting Sawed Lumber Poles
80 mph Wind, Fixed at Groundline, 1500f Lumber

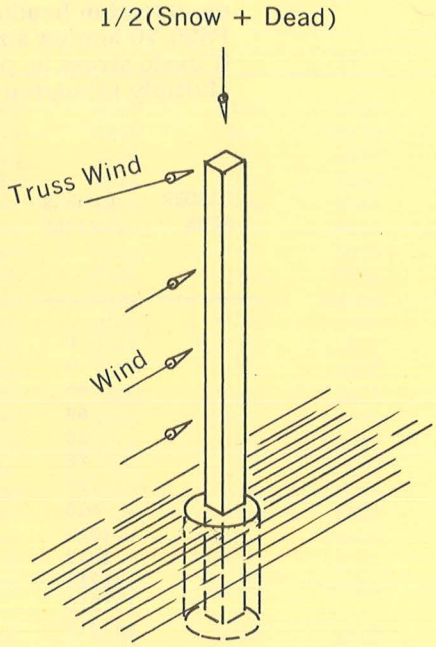
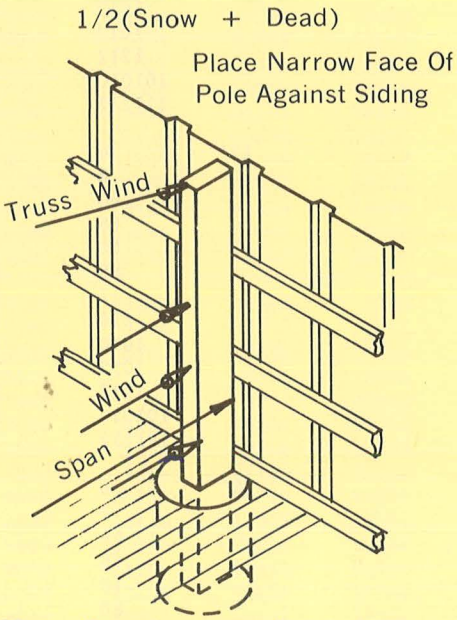


Table 4. Sawed Lumber Poles in Closed Walls

All Snow Zones

Pole Spacing	Spans	Wall Height 8'	10'	12'	14'
4'	up to 40'	4x 4	3x 6	4x 6	6x 6
	42' - 54'	3x 6	"	"	"
	56' - 58'	"	"	6x 6	"
	60'	"	4x 6	"	"
8'	up to 28'	3x 6	6x 6	4x 8	4x10
	30' - 36'	4x 6	"	"	"
	38' - 60'	"	"	4x10	"
12'	up to 20'	4x 6	4x 8	4x10	8x 8
	22' - 30'	6x 6	"	"	"
	32' - 44'	"	4x10	"	"
	46' - 50'	"	"	6x 8	"
	52'	"	"	8x 8	6x10
16'	up to 34'	6x 6	4x10	8x 8	6x10
	36' - 48'	4x 8	"	"	8x10
	50' - 54'	4x10	"	"	"
	56' - 60'	"	6x 8	6x10	"
20'	up to 24'	4x 8	4x10	6x10	8x10
	26' - 30'	4x10	"	"	"
	32' - 44'	"	8x 8	"	"
	46' - 50'	"	"	8x10	"
	52' - 58'	"	"	"	6x12
	60'	"	"	"	10x10



Note: Some substitutions are possible, and may be more economical, than the tabulated size in Table 4.

Table	6x6	8x8	8x10	10x10
Substitute	4x8	6x10	6x12	8x12

6x10 may replace 8x8: 8x8 may not replace 6x10

Table 5. Classes of Round Wood Poles

Pole Spacing	Spans	Wall Height 8'	10'	12'	14'
4'	up to 48'	J	J	J	G
	50' - 60'	"	"	G	"
8'	up to 32'	J	G	G	F
	34' - 36'	"	"	F	"
	38' - 44'	G	"	"	"
	46' - 60'	"	"	"	E
12'	up to 56'	G	F	E	D
	58'	"	E	"	"
	60'	F	"	D	"
16'	up to 20'	G	F	D	C
	22' - 26'	"	E	"	"
	28' - 54'	F	"	"	"
	56' - 58'	"	"	C	B
	60'	"	D	"	"
20'	up to 30'	F	E	C	B
	32' - 36'	"	D	"	"
	38' - 50'	E	"	"	"
	52' - 58'	"	"	"	A
	60'	"	"	B	"

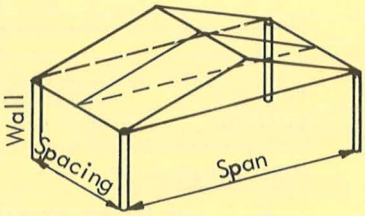


Table 6. Dimensions of Wood Poles

Circum = circumference, in.
Diam = diameter, in.

Area = cross section area, in^2
Sect Mod = section modulus, l/c, in^3

Wall Height	Class ASA / ASAE / Groundline Property	10 / J	9 / H	7 / G	6 / F	5 / E	4 / D	3 / C	2 / B	1 / A
	Top Circum	12.0	15.0	15.0	17.0	19.0	21.0	23.0	25.0	27.0
	Top Diam	3.8	4.8	4.8	5.4	6.0	6.7	7.3	8.0	8.6
8'	Circum	13.9	16.9	16.9	18.9	20.9	22.9	24.9	26.9	28.9
	Diam	4.4	5.4	5.4	6.0	6.6	7.3	7.9	8.6	9.2
	Area	15.3	22.7	22.7	28.4	34.7	41.7	49.3	57.5	66.4
	Sect Mod	8.5	15.2	15.2	21.3	28.8	37.9	48.8	61.5	76.3
10'	Circum	14.4	17.4	17.4	19.4	21.4	23.4	25.4	27.4	29.4
	Diam	4.6	5.5	5.5	6.2	6.8	7.4	8.1	8.7	9.3
	Area	16.4	24.0	24.0	29.8	36.3	43.4	51.2	59.6	68.6
	Sect Mod	9.4	16.6	16.6	23.0	30.8	40.3	51.6	64.8	80.1
12'	Circum	14.8	17.8	17.8	19.8	21.8	23.8	25.8	27.8	29.8
	Diam	4.7	5.7	5.7	6.3	6.9	7.6	8.2	8.9	9.5
	Area	17.5	25.3	25.3	31.3	37.9	45.2	53.1	61.6	70.8
	Sect Mod	10.3	17.9	17.9	24.7	32.9	42.8	54.5	68.2	84.0
14'	Circum	15.3	18.3	18.3	20.3	22.3	24.3	26.3	28.3	30.3
	Diam	4.9	5.8	5.8	6.5	7.1	7.7	8.4	9.0	9.6
	Area	18.6	26.6	26.6	32.8	39.6	47.0	55.0	63.7	73.1
	Sect Mod	11.3	19.4	19.4	26.5	35.1	45.4	57.6	71.8	88.1
16'	Circum	15.8	18.8	18.8	20.8	22.8	24.8	26.8	28.8	30.8
	Diam	5.0	6.0	6.0	6.6	7.2	7.9	8.5	9.2	9.8
	Area	19.8	28.0	28.0	34.3	41.3	48.8	57.0	65.9	75.3
	Sect Mod	12.4	20.9	20.9	28.4	37.4	48.1	60.7	75.4	92.2

Table 7. Depth of Embedment for Poles, Feet (4′ min)
80 mph Winds, 2500 psi Soil

Post Spacing	Spans	Wall Height 8'	10'	12'	14'
POST WIDTH = 3"					
4'	up to 44'	4'	4'	4'	4'
	48' - 60'	"	"	"	4½'
8'	up to 30'	4'	4'	5'	6'
	32' - 42'	"	4½'	"	"
	44'	"	"	5½'	6½'
12'	up to 26'	4'	5'	6½'	7½'
	28' - 42'	4½'	5½'	"	"
	44' - 60'	"	"	7'	8'
16'	up to 30'	5'	6'	7½'	-
	32' - 42'	"	6½'	8'	-
	42' - 52'	5½'	"	"	-
	52' - 60'	"	7'	"	-
20'	up to 32'	5½'	7'	-	-
	34' - 54'	6'	7½'	-	-
	56' - 60'	6½'	8'	-	-
POST WIDTH = 6"					
4'	up to 60'	4'	4'	4'	4'
8'	up to 48'	4'	4'	4'	4'
	50' - 60'	"	"	"	4½'
12'	up to 42'	4'	4'	4½'	5'
	42' - 60'	"	"	"	5½'
16'	up to 30'	4'	4'	5'	6'
	32' - 44'	"	4½'	"	"
	46' - 60'	"	"	5½'	6½'
20'	up to 30'	4'	4½'	5½'	7'
	32' - 52'	"	5'	6'	"
	54' - 60'	"	"	6½'	7½'
POST WIDTH = 9"					
4', 8'	up to 60'	4'	4'	4'	4'
12'	up to 46'	4'	4'	4'	4'
	48' - 60'	"	"	"	4½'
16'	up to 42'	4'	4'	4'	5'
	44' - 60'	"	"	4½'	"
20'	up to 42'	4'	4'	4½'	5½'
	44' - 50'	"	"	5'	"
	52' - 60'	"	"	"	6'
POST WIDTH = 12"					
to 12'	up to 60'	4'	4'	4'	4'
16'	up to 46'	4'	4'	4'	4'
	48' - 60'	"	"	"	4½'
20'	up to 42'	4'	4'	4'	4½'
	44' - 60'	"	"	"	5'

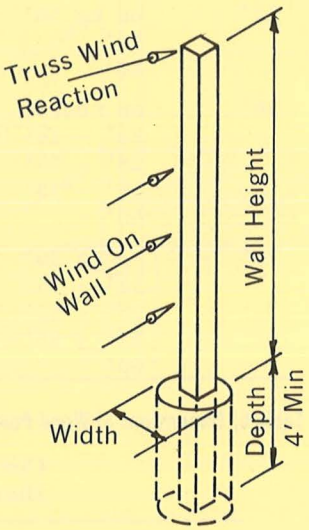
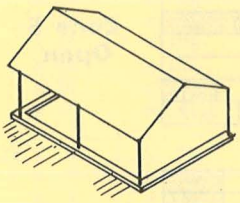


Table 8. Allowable Roof Area Supported by Pin-End Columns
Roof Area = 1/2 Span x Post Spacing



Low Foundation Wall On Ground

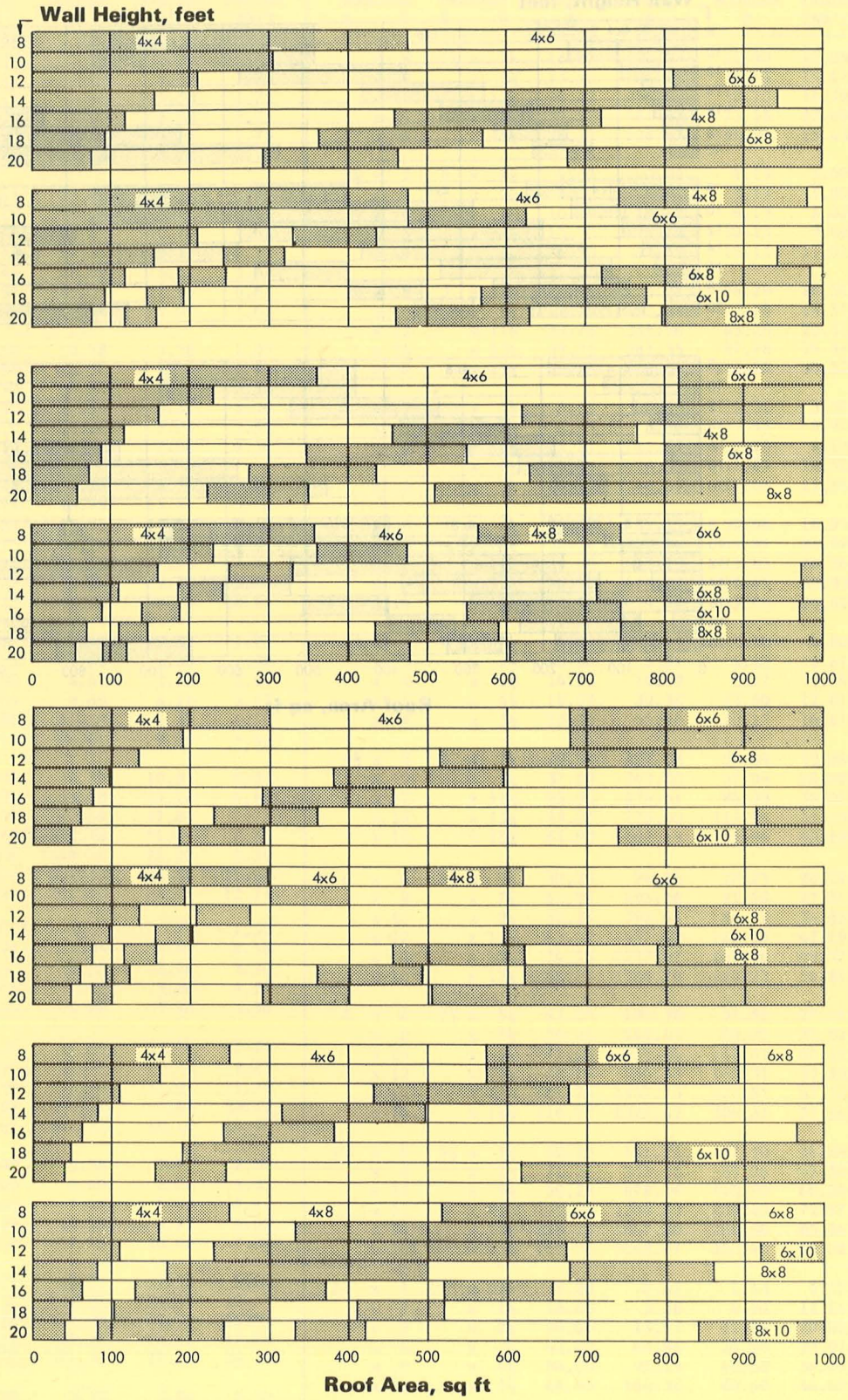


Table 8. (continued) Allowable Roof Area Supported by Pin-End Columns

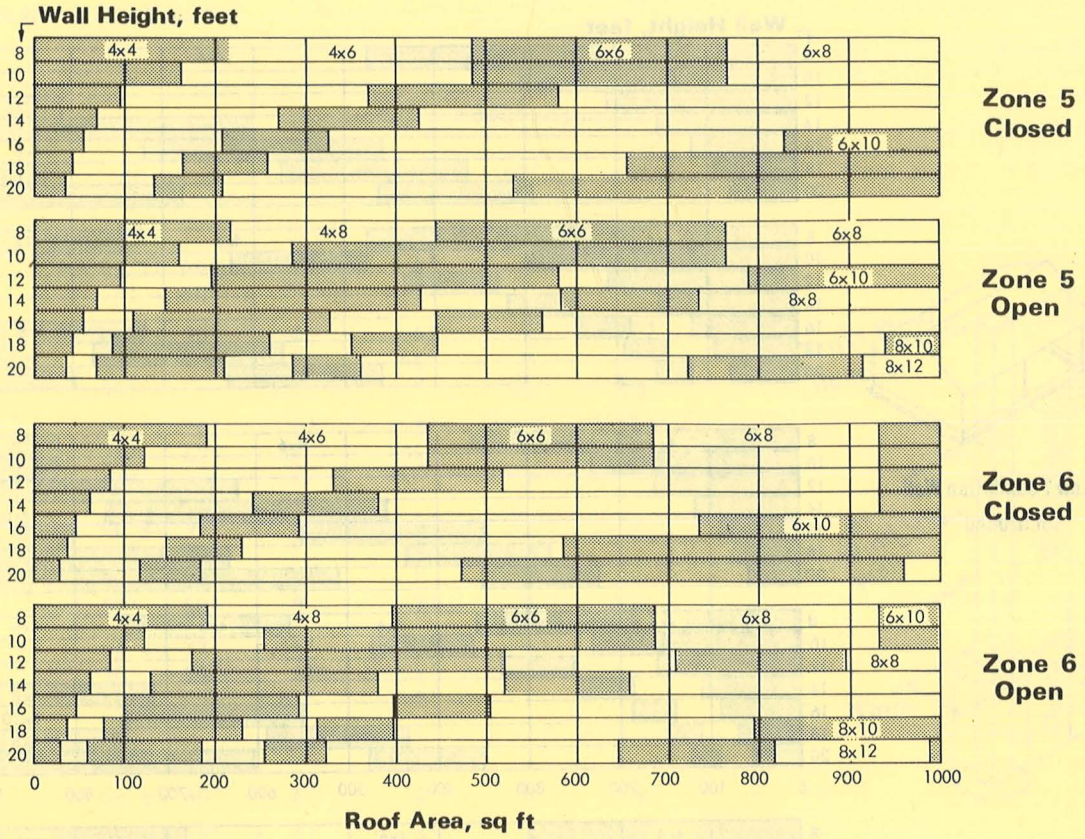


Table 9. Lumber Section Properties, PS 20-70 Lumber Sizes

NOMINAL B	NOMINAL D	DRESSED B	DRESSED D	AREA A	INERTIA MOMENT I	SECTION MODULUS Z	SHEAR FACTOR 2BD/3
1	2	3/4	1½	1.13	0.21	0.28	0.75
	3		2½	1.88	0.98	0.78	1.25
	4		3½	2.63	2.68	1.53	1.75
	5		4½	3.38	5.70	2.53	2.25
	6		5½	4.13	10.40	3.78	2.75
	7		6½	4.88	17.16	5.28	3.25
1	8	3/4	7¼	5.44	23.82	6.57	3.63
	9		8¼	6.19	35.09	8.51	4.13
	10		9¼	6.94	49.47	10.70	4.63
	11		10¼	7.69	67.31	13.13	5.13
	12		11¼	8.44	88.99	15.82	5.63
	14		13¼	9.94	145.39	21.95	6.63
	16		15¼	11.44	221.66	29.07	7.63
1¼	2	1	1½	1.50	0.28	0.38	1.00
	3		2½	2.50	1.30	1.04	1.67
	4		3½	3.50	3.57	2.04	2.33
	5		4½	4.50	7.59	3.38	3.00
	6		5½	5.50	13.86	5.04	3.67
	7		6½	6.50	22.89	7.04	4.34
1¼	8	1	7¼	7.25	31.76	8.76	4.84
	9		8¼	8.25	46.79	11.34	5.50
	10		9¼	9.25	65.95	14.26	6.17
	11		10¼	10.25	89.74	17.51	6.84
	12		11¼	11.25	118.65	21.09	7.50
	14		13¼	13.25	193.85	29.26	8.84
	16		15¼	15.25	295.55	38.76	10.17
1½	2	1¼	1½	1.88	0.35	0.47	1.25
	3		2½	3.13	1.63	1.30	2.08
	4		3½	4.38	4.47	2.55	2.92
	5		4½	5.63	9.49	4.22	3.75
	6		5½	6.88	17.33	6.30	4.59
	7		6½	8.13	28.61	8.80	5.42
1½	8	1¼	7¼	9.06	39.70	10.95	6.04
	9		8¼	10.31	58.49	14.18	6.88
	10		9¼	11.56	82.44	17.83	7.71
	11		10¼	12.81	112.18	21.89	8.55
	12		11¼	14.06	148.32	26.37	9.38
	14		13¼	16.56	242.31	36.58	11.05
	16		15¼	19.06	369.44	48.45	12.71
2	2	1½	1½	2.25	0.42	0.56	1.50
	3		2½	3.75	1.95	1.56	2.50
	4		3½	5.25	5.36	3.06	3.50
	5		4½	6.75	11.39	5.06	4.50
	6		5½	8.25	20.80	7.56	5.50
2	8	1½	7¼	10.88	47.63	13.14	7.25
	10		9¼	13.88	98.93	21.39	9.25
	12		11¼	16.88	177.98	31.64	11.26
	14		13¼	19.88	290.78	43.89	13.26
	16		15¼	22.88	443.32	58.14	15.26
2¼	2	2	1½	3.00	0.56	0.75	2.00
	3		2½	5.00	2.60	2.08	3.33
	4		3½	7.00	7.15	4.08	4.67
	5		4½	9.00	15.19	6.75	6.00
	6		5½	11.00	27.73	10.08	7.34
2½	8	2	7¼	14.50	63.51	17.52	9.67
	10		9¼	18.50	131.91	28.52	12.34
	12		11¼	22.50	237.30	42.19	15.01
	14		13¼	26.50	387.70	58.52	17.68
	16		15¼	30.50	591.10	77.52	20.34
3	2	2½	1½	3.75	0.70	0.94	2.50
	3		2½	6.25	3.26	2.60	4.17
	4		3½	8.75	8.93	5.10	5.84
	5		4½	11.25	18.98	8.44	7.50
	6		5½	13.75	34.66	12.60	9.17
3	8	2½	7¼	18.13	79.39	21.90	12.09
	10		9¼	23.13	164.89	35.65	15.42
	12		11¼	28.13	296.63	52.73	18.76
	14		13¼	33.13	484.63	73.15	22.09
	16		15¼	38.13	738.87	96.90	25.43
3½	2	3	1½	4.50	0.84	1.13	3.00
	3		2½	7.50	3.91	3.13	5.00
	4		3½	10.50	10.72	6.13	7.00
	5		4½	13.50	22.78	10.13	9.00
	6		5½	16.50	41.59	15.13	11.01
3½	8	3	7¼	21.75	95.27	26.28	14.51
	10		9¼	27.75	197.86	42.78	18.51
	12		11¼	33.75	355.96	63.28	22.51
	14		13¼	39.75	581.55	87.78	26.51
	16		15¼	45.75	886.64	116.28	30.52
4	2	3½	1½	5.25	0.98	1.31	3.50
	3		2½	8.75	4.56	3.65	5.84
	4		3½	12.25	12.51	7.15	8.17
	5		4½	15.75	26.58	11.81	10.51
	6		5½	19.25	48.53	17.65	12.84
4	8	3½	7¼	25.38	111.15	30.66	16.93
	10		9¼	32.38	230.84	49.91	21.59
	12		11¼	39.38	415.28	73.83	26.26
	14		13¼	46.38	678.48	102.41	30.93
	16		15¼	53.38	1034.42	135.66	35.60
4½	2	4	1½	6.00	1.13	1.50	4.00
	3		2½	10.00	5.21	4.17	6.67
	4		3½	14.00	14.29	8.17	9.34
	5		4½	18.00	30.38	13.50	12.01
	6		5½	22.00	55.46	20.17	14.67
4½	8	4	7¼	29.00	127.03	35.04	19.34
	10		9¼	37.00	263.82	57.04	24.68
	12		11¼	45.00	474.61	84.38	30.01
	14		13¼	53.00	775.40	117.04	35.35
	16		15¼	61.00	1182.19	155.04	40.69
6	6	5½	5½	30.25	76.26	27.73	20.18
	8		7½	41.25	193.36	51.56	27.51
	10		9½	52.25	392.96	82.73	34.85
	12		11½	63.25	697.07	121.23	42.19
	14		13½	74.25	1127.67	167.06	49.52
	16		15½	85.25	1706.78	220.23	56.86
8	6	7½	5½	41.25	103.98	37.81	27.51
	8		7½	56.25	263.67	70.31	37.52
	10		9½	71.25	535.86	112.81	47.52
	12		11½	86.25	950.55	165.31	57.53
	14		13½	101.25	1537.73	227.81	67.53
	16		15½	116.25	2327.42	300.31	77.54
10	6	9½	5½	52.25	131.71	47.90	34.85
	8		7½	71.25	333.98	89.06	47.52
	10		9½	90.25	678.76	142.90	60.20
	12		11½	109.25	1204.03	209.40	72.87
	14		13½	128.25	1947.80	288.56	85.54
	16		15½	147.25	2948.07	380.40	98.22
12	1	12*	3/4	9.00	0.42	1.13	6.00
	2		1½	18.00	3.38	4.50	12.01
	3		2½	30.00	15.63	12.50	20.01
	4		3½	42.00	42.88	24.50	28.01
	5		4½	54.00	91.13	40.50	36.02
	6		5½	66.00	166.38	60.50	44.02

*Full 12" wide.