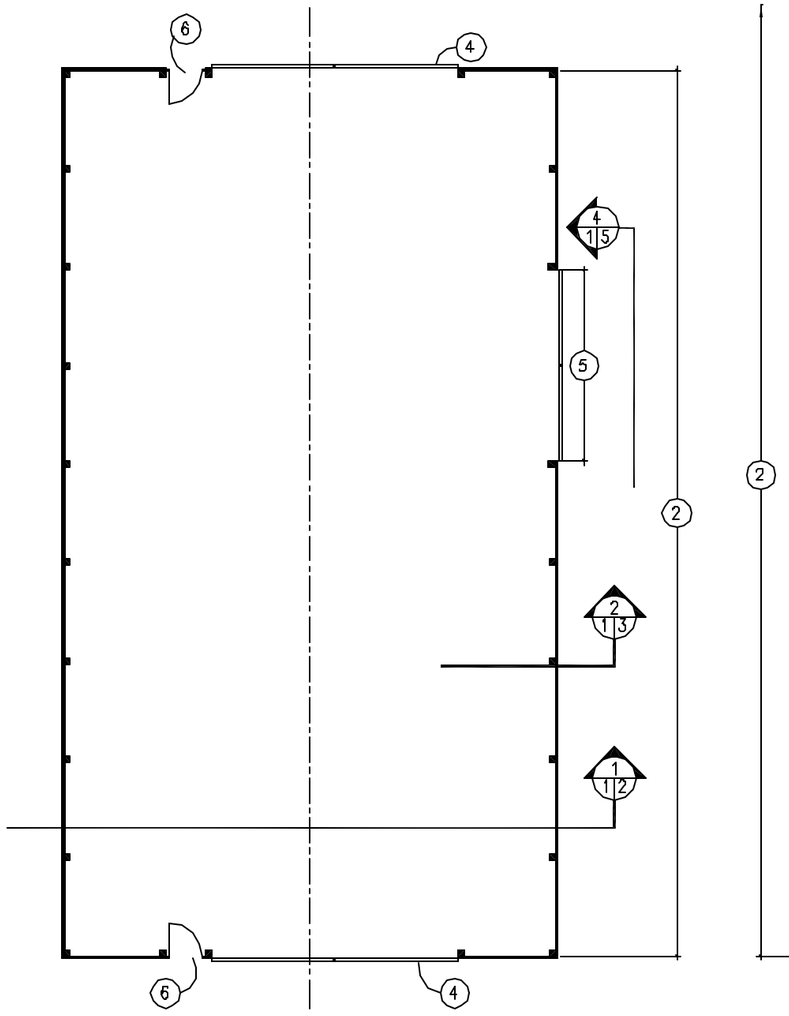

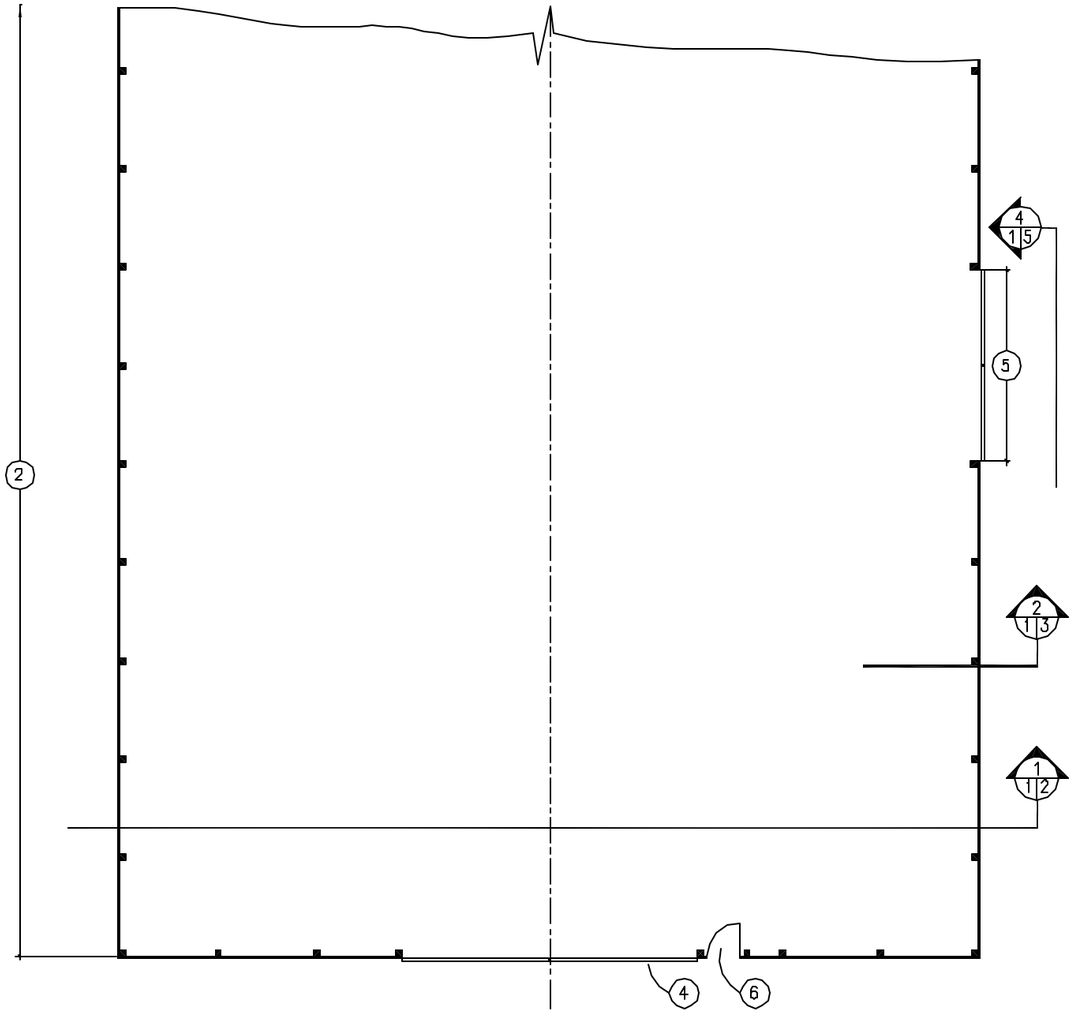

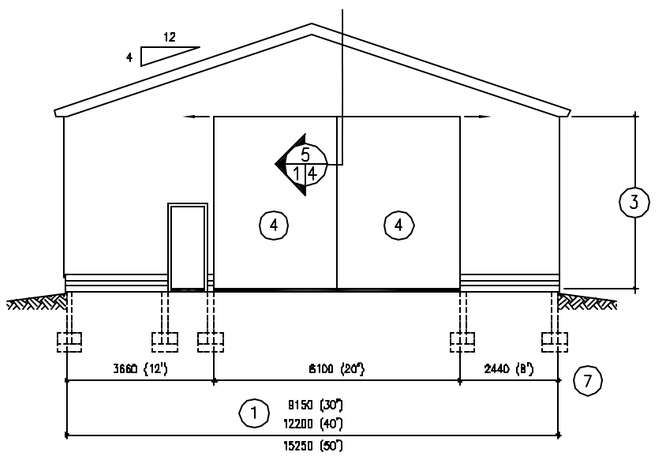

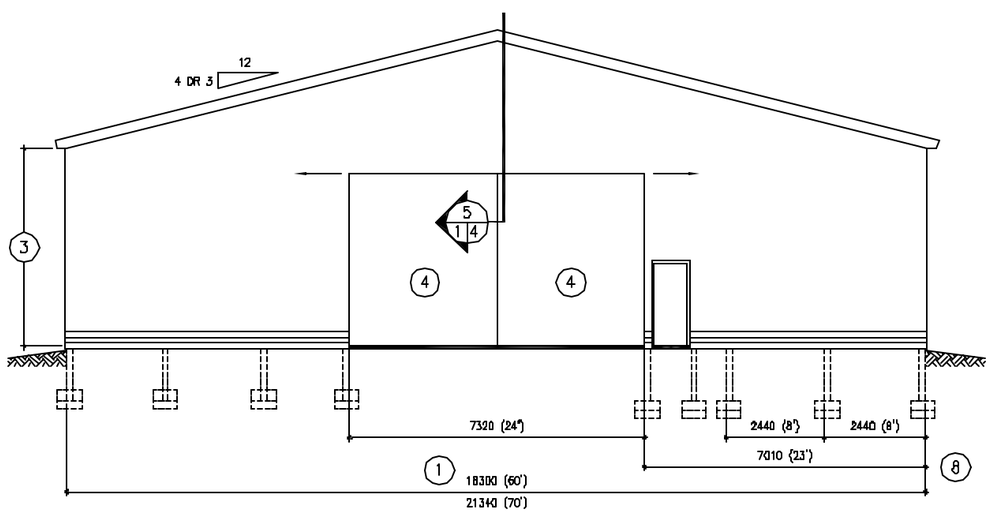

1. Optional roof truss spans 9150 to 21350mm in 3050mm increments (30' to 70' in 10' increments); see truss manufacturer for truss design and spacing to suit local snow + rain + roof dead load (see National Building Code of Canada 1995)
2. Length in 2440mm (8') increments
3. Truss clear height 4270 or 4880mm (14' or 16')
4. Sliding doors, see CPS Plan M9341
5. Optional sidewall doors up to 4880mm (16') nominal width; see special door jamb and steel lintel details, Sheet 5
6. Man door/fire exit 3' 7"
7. Dimensions correspond only to the 12200mm (40') span
8. Dimensions correspond only to the 21340mm (70') span

MATERIALS

Cast-in-place concrete to be min. 25MPa @ 28 days, 6% air entrained.

Reinforcing steel to be min. 400MPa deformed bars; provide 50mm (2") concrete cover over reinforcing steel, and 75mm (3") cover between steel and earth.

All wood indicated 'pressure treated' is CCA pressure-treated to 'ground contact specification', CSA-080 Wood Preservation.

All nails exposed to weather, treated wood, concrete or soil to be hot-dip galvanized.

All framing lumber, except 'pressure-treated' wood, is No.1/No.2 S-P-F species group

Exterior cladding steel to be minimum 0.34mm (29ga.) base metal thickness (ASTM-A-446, grade A, Z275 (G-90)); profiles to be as intended for farm roofing/siding as appropriate

APPLICATION

This plan conforms to the requirements of the National Farm Building Code of Canada 1995. The user of this plan must ensure that the design criteria indicated herein will meet all local design conditions, building regulations and special requirements. The user is responsible to ensure that all required changes are made.

WARNING

DOORS - This structure is designed assuming all doors are closed and remain intact in the event of a severe wind.

TRUSS BRIDGING & BRACING - Install all bridging and bracing as specified by truss manufacturer.

Funding for this project has been provided under the Canada-Ontario Agreement for the Ice Storm Economic Recovery Assistance Program, Annex A, Assistance for the Agricultural Sector and Rural Communities in Eastern Ontario. This program is jointly funded by the Government of Canada and the Government of Ontario.

SYM	REVISIONS	CHECKED	DATE	APPROVED

Argue & Associates Consulting Engineers
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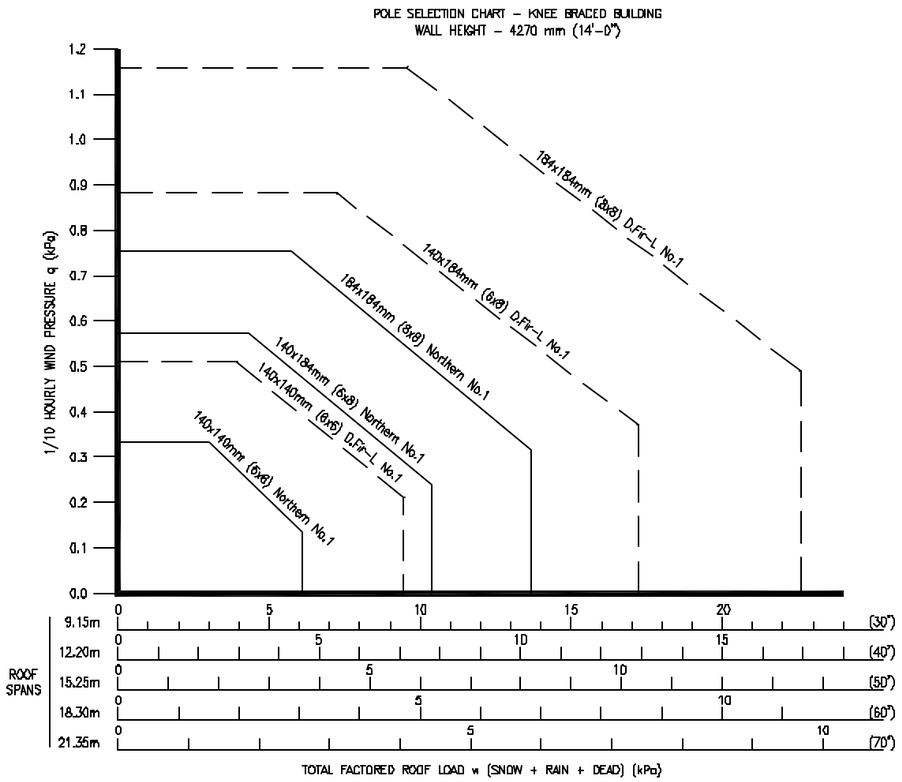
CANADA PLAN SERVICE

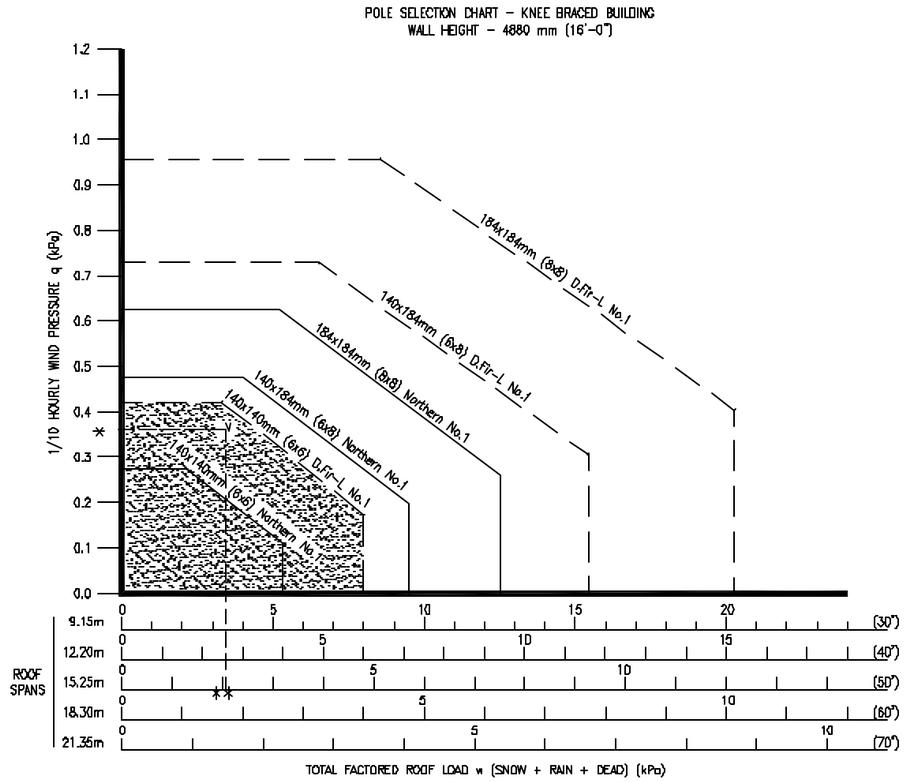
Pole Frame Machinery Storage
Knee Braced For Wind

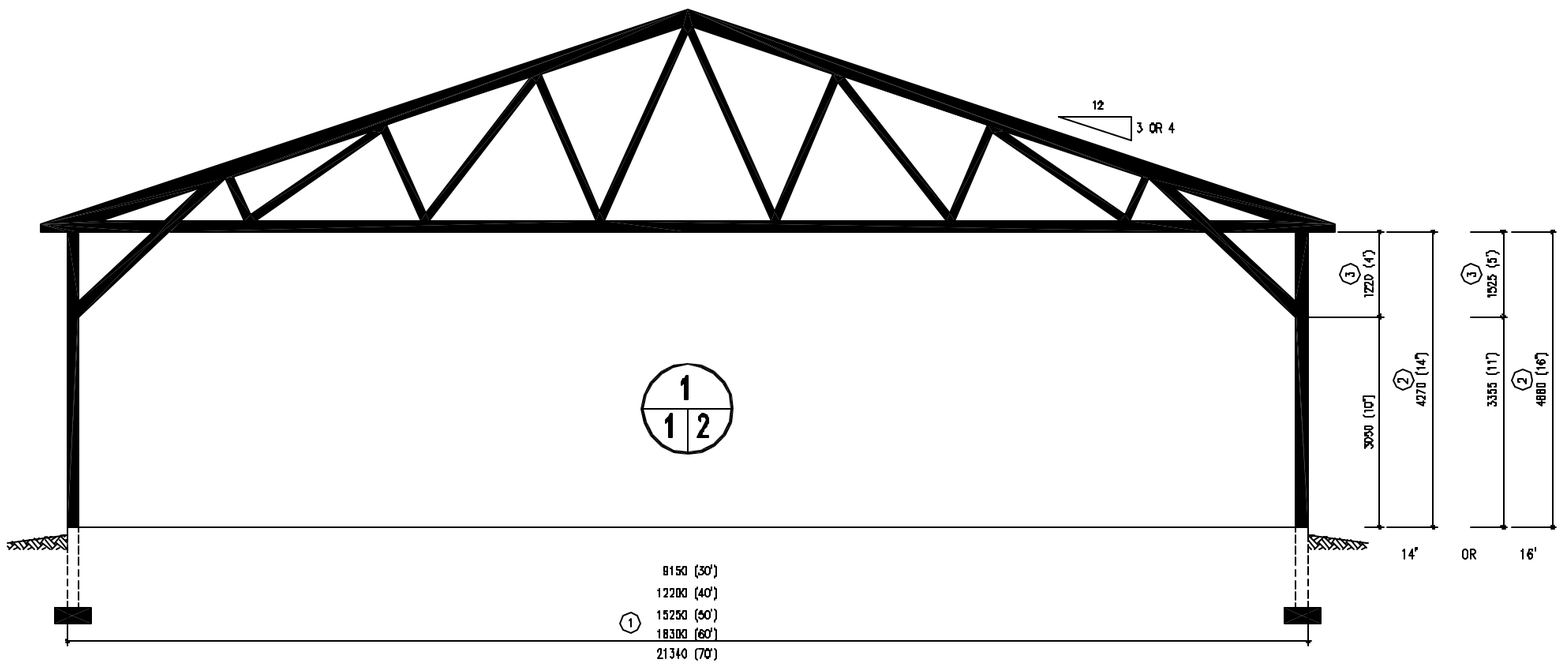
DESIGNED	JET	DATE	DEC. 1998
DRAWN	JBA	REVISED	
SCALE	NO SCALE	DETAIL NUMBER ORIGINATES ON SHEET DRAWN ON SHEET	A B C
CHECKED	BEM		

PLAN **8311**

SHEET 1 OF 5







1. Optional roof truss spans; see truss manufacturer for truss design and spacing to suit local snow + rain + roof dead load (see National Building Code of Canada 1995)
2. Optional wall heights
3. Corresponding knee brace-to-truss heights

EXAMPLE:

To select sawn poles for a knee-braced pole frame storage building at London, Ontario.

Given – roof truss span 15.25m (50')
- roof slopes 18.4° (4/12)
- building wall height 4.88m (16')
- building will be 'wind sheltered' by a row of spruce trees that will soon grow higher than the roof
- from the National Building Code of Canada 1995,
  ground snow S_S = 1.7 kPa
  1-day rain S_R = 0.4 kPa
  1/10 hourly wind q = 0.36 kPa

STEP 1:

Calculate the "total factored roof load"; from Table 3, Sheet 4 the appropriate formula is

$$w = 0.75\ S_S + 1.2\ S_R + 0.3$$
$$= 0.75\ (1.7) + 1.2\ (0.4) + 0.3$$
$$= 1.27 + 0.48 + 0.3$$
$$w = 2.05\ \text{kPa}$$

STEP 2:

Go to the Pole Selection Chart, building height 4880mm (16').
On the horizontal scale for roof span 15.25m (50'), locate
** 2.05 kPa 'total factored roof load'. From the **, draw a vertical line up into this chart.

STEP 3:

On the vertical scale for 1/10 hourly wind pressure, locate
* 0.36 kPa, then draw a horizontal line across into the chart until it intersects with the vertical line from Step 2 (see V on chart).

STEP 4:

Select the poles. Because the V is beyond the line for '140x140mm (6x6) Northern No.1', this pole is not strong enough; therefore choose the '140x140mm (6x6) D.Fir-L No.1'. If you want to use the 'Northern' species, go to the next size, that is '140x184mm (6x8) Northern No.1'.

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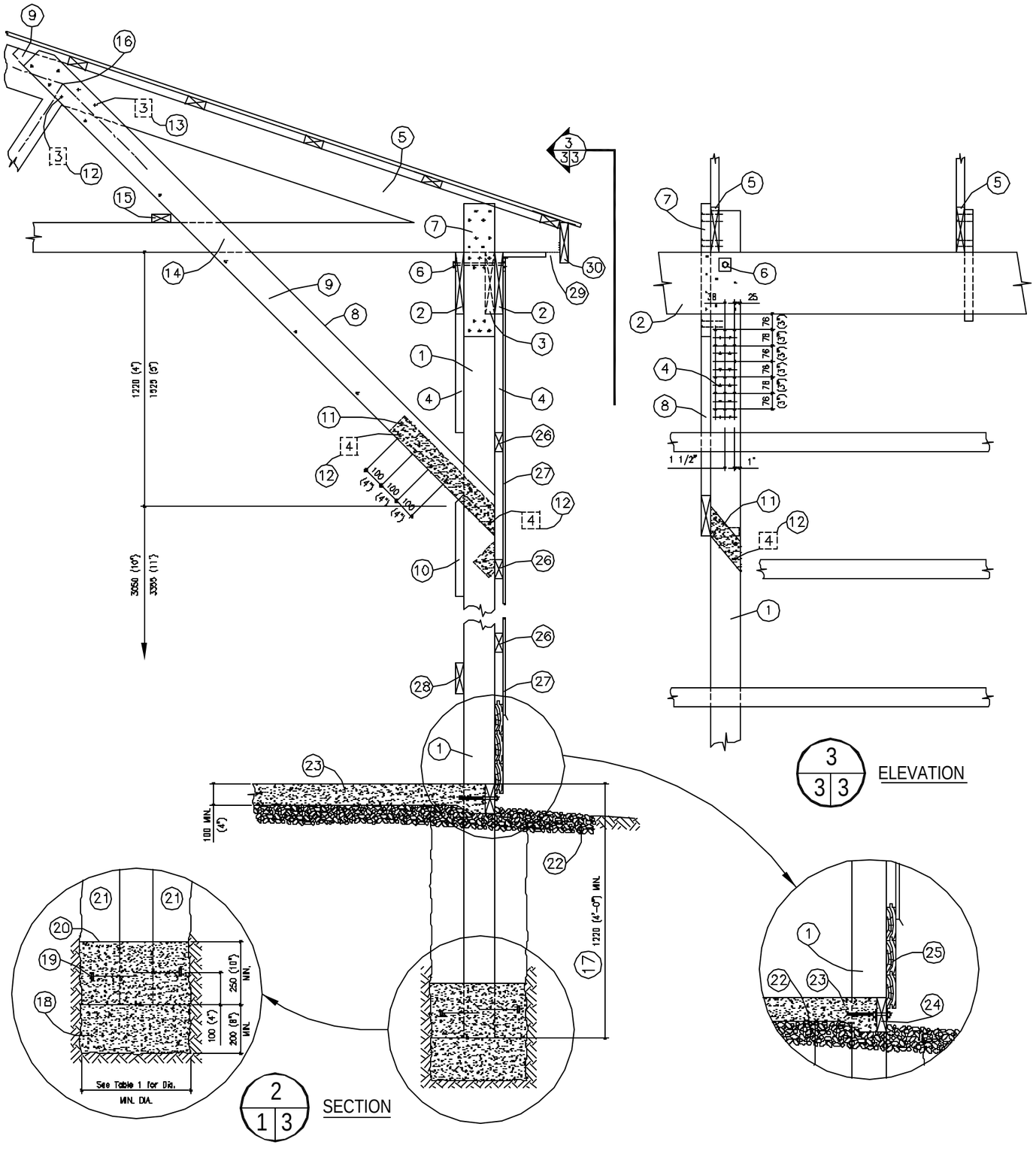
CANADA PLAN SERVICE

Section
Pole Selection Charts

DESIGNED	JET	DATE	DEC. 1999
DRAWN	JBA	REVISED	
SCALE	NO SCALE	DETAIL NUMBER ORIGINATES ON SHEET B DRAWN ON SHEET C	
CHECKED	BEM		

PLAN **8311**



1. Pressure treated sawn poles 2440mm (8') c/c; see Pole Selection Chart (sheet 2) for size
2. Double (or triple) plate beam, lengths 4880mm (16'), ends staggered 2440mm (8') at poles; see Plate Beam Selection Table 4, Sheet 4 for size
3. Where third plate beam is required, notch pole to fit flush
4. 38x140mm (2x6) scabs to pole, tight fit under (2); see Plate Beam Nailing Schedule Table 2, Sheet 4 for number of 102mm (4") spiral nails to pole; typical min. nail spacings as shown
5. Manufactured wood roof trusses, spaced 1220, 813 or 610mm (48", 32" or 24") c/c; notch pole 38mm (1 1/2") in way of truss
6. 1/2" bolt, plate beam to pole; oversized washers 76x76x6mm (3"x3"x1/4") or equivalent
7. 38x610mm (2"x24") scab to pole and truss, fit tight between plates (2); 102mm (4") spiral nails to truss and pole
8. 38x140 (2x6) knee brace 2440mm (8') c/c at poles (1)
9. 38x140mm (2x6) knee brace stiffener, notched 38mm (1 1/2") in way of truss upper and lower chords; end bears on (9)
10. 38x140mm (2x6) butt block, top end cut to fit (8)
11. 100x914x1.21mm (4"x36"x18ga.) galv. steel strap sandwiched between stiffener (8) and knee brace (11), hammer-bend and nail tight around pole
12. 102mm (4") spiral common nails, predrill 4mm (5/32") dia. through steel strap (10); No. of nails at each location shown thus [ ]
13. Nails not penetrating the third member to be clinched
14. Do not nail knee bracing to lower chord of truss
15. 38x89mm (2x4) truss lower chord stiffener; see manufacturer's drawing for location and add stiffener at knee brace if none is shown
16. Centrelines of truss members and knee brace (8) to coincide here
17. Or to below frost
18. Concrete footing placed in dense, undisturbed soil; for soft soils and/or truss spans greater than 1220mm (40"), increase diameter of post hole to 610mm (2"); see Table 1 for diameter
    NOTE: if top of all footings can be precisely levelled when placing concrete footings, poles can be more easily notched and top-cut BEFORE erecting
19. Hot-dip galvanized spikes 204x8.23mm (8"x1/0ga.) driven 76-100mm (3-4") into butt of poles 4 sides; for areas of high winds, increase to 8 spikes each pole
20. Concrete anchor to resist wind uplift
21. Soil or crushed stone backfill, well compacted
22. Crushed stone under (23), extend to beyond drainage from roof
23. Optional concrete floor
24. 38x140mm (2x6) pressure treated form plank fitted between poles to slide vertically if floor heaves; 3-3/8"x8" bolts each plank to (23)
25. 3-38x140mm (2x6) T&G pressure treated planking, ends staggered 2440mm (8') at poles; 2-125mm (5") galv. spiral nails each plank to pole
26. 38x89mm (2x4) wall girts not greater than 610mm (24") c/c; nail to each pole with 2-102mm (4") spiral nails
27. Vertical steel siding
28. Optional 38x140mm (2x6) guard plank midway between (25) and (26)
29. 50mm (2") continuous eave vent; screen with 12x12mm (1/2"x1/2") galvanized hardware cloth pre-bent to L-shape before installing (30)
30. 38x190mm (2x8) or wider face board

TABLE 1
Concrete Footing Diameter Under Each Pole
Based on Soil Bearing Capacity 120 kPa (2500 psf)

Truss Span mm (ft)	* Total Roof Load, w, kPa (psf) 1.5 (31)	2.0 (42)	2.5 (52)	3.0 (63)	3.5 (73)	4.0 (84)
	Footing Diameter, mm (in)					
9150(30)	450(18)	520(20)	570(22)	620(24)	670(26)	710(28)
12200(40)	510(20)	590(23)	650(26)	710(28)	760(30)	810(32)
15250(50)	570(22)	650(26)	720(28)	790(31)	850(33)	910(36)
10300(60)	620(24)	710(28)	790(31)	860(34)	930(37)	990(39)
21350(70)	670(26)	760(30)	850(33)	930(37)	1000(39)	1060(42)

* See Example Step 1 and Table 3 (Sheet 4) to calculate "total factored roof load, w"

NOTE: Footing diameters may be reduced where soil investigation reveals higher bearing capacity.

For Design Tables And Example, See Sheet 4

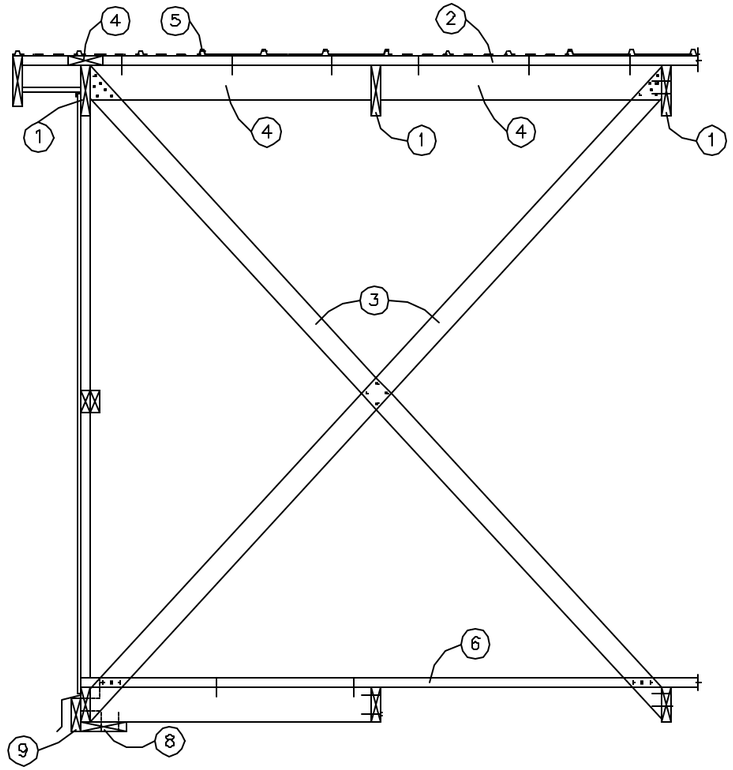
SYM	REVISIONS	CHECKED	DATE	APPROVED

Argue & Associates Consulting Engineers Guelph - Canada

CANADA PLAN SERVICE

Structural Details

DESIGNED	JET	DATE	DEC. 1998	PLAN 8311
DRAWN	JBA	REVISED		
SCALE	NO SCALE	DETAIL NUMBER ___ A B C ORIGINATES ON SHEET___ DRAWN ON SHEET___		SHEET 3 OF 5
CHECKED	BEM			



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1 | 4

Notes to Tables 3 and 4

1. Ground snow (S_S) and rain (S_R) are tabled in the National Building Code of Canada, 1995.
2. For 4/12 roof slope, a slippery metal roof without obstructions to snow sliding is assumed; for roof areas above roof valleys, ice guards or other obstructions to snow sliding, use only the 3/12 (14.0°) adjustment formulas.
3. Add one more matching plate beam member to end spans of plate beam.

TABLE 2
Plate Beam Nailing Schedule

Plate Beam Nominal Size	Total No. of 4" spiral nails at (2) & (4) Sheet 3
38 x 140mm (2x6)	11
38 x 184mm (2x8)	17
38 x 235mm (2x10)	28
38 x 286mm (2x12)	35

TABLE 3
Total Factored Roof Load, w = snow + rain + dead (kPa)

Gable Roof Slope	Wind – Sheltered	Wind – Exposed
4/12 (18.4°)	$w = 0.75S_S + 1.2S_R + 0.3$	$w = 0.56S_S + 1.2S_R + 0.3$
3/12 (14.0°)	$w = 0.96S_S + 1.2S_R + 0.3$	$w = 0.71S_S + 1.2S_R + 0.3$

TABLE 4
Plate Beam Selection for Total Factored Roof Load, w (kPa)

Plate Beam Size	Roof Span, mm (ft) 9150 (30 ft)	12200 (40 ft)	15250 (50 ft)	18300 (60 ft)	21350 (70 ft)
	Trusses Spaced @ 1220mm (48") c/c				
2–38x140 (2–2x6)	1.59	1.19	---	---	---
2–38x184 (2–2x8)	2.35	1.77	1.41	1.18	---
3–38x184 (3–2x8)	3.53	2.65	2.12	1.77	---
2–38x235 (2–2x10)	3.52	2.64	2.11	1.76	1.51
3–38x235 (3–2x10)	5.28	3.96	3.17	2.64	2.26
2–38x286 (2–2x12)	---	3.55	2.84	2.37	2.03
3–38x286 (3–2x12)	---	---	4.26	3.55	3.05
	Trusses Spaced @ 813mm (32") c/c				
2–38x184 (2–2x8)	2.56	1.92	1.53	1.28	---
3–38x184 (3–2x8)	3.84	2.88	2.30	1.92	1.64
2–38x235 (2–2x10)	3.82	2.87	2.29	1.91	1.64
3–38x235 (3–2x10)	5.73	4.30	3.44	2.87	2.46
2–38x286 (2–2x12)	---	3.86	3.09	2.57	2.21
3–38x286 (3–2x12)	---	5.79	4.63	3.86	3.31
	Trusses Spaced @ 610mm (24") c/c				
2–38x184 (2–2x8)	1.88	1.41	1.13	---	---
3–38x184 (3–2x8)	2.82	2.12	1.69	1.41	1.21
2–38x235 (2–2x10)	2.81	2.11	1.69	1.41	1.21
3–38x235 (3–2x10)	4.22	3.17	2.53	2.11	1.81
2–38x286 (2–2x12)	3.79	2.84	2.27	1.89	1.62
3–38x286 (3–2x12)	5.68	4.26	3.41	2.84	2.44

1. Truss upper chord
2. 38x89mm (2x4) roof purlins, 4880mm (16'–0") lengths, end joints staggered 2440mm (8'–0") at trusses; nail each purlin to each truss with 2–102mm (4") spiral nails
3. 38x89mm (2x4) permanent X–bracing at each truss stiffener (6) but not more than 2440mm (8'–0") c/c
4. 38x140mm (2x6) blocking between trusses at (2); nail with 102mm (4") spiral nails @ 300mm (12") c/c
5. Steel roofing is galvanized sheet, minimum thickness 0.34mm (29ga), screw–fastened; typical Canadian farm roofing profiles
6. 38x89mm (2x4) truss lower chord stiffener, spaced as per truss manufacturer but in no case greater than 2440mm (8'–0") c/c
7. 38x140mm (2x6) blocking between trusses at each X–brace (3)
8. 38x184mm (2x8) door head jamb
9. Track board and galvanized steel flashing to suit endwall door and hardware

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EXAMPLE – Use Tables 3 and 4 to select a plate beam combination for a pole frame building at London, Ontario

Given:
- truss span 15250mm (50'–0")
- truss slope 4/12 (18.4°)
- sidewall pole spacing 2440mm (8'–0")
- truss spacing 1220mm (48")
- building is fully exposed to wind (no taller building or trees nearby)
- from National Building Code of Canada 1995:
  - ground snow S_S = 1.7 kPa
  - 1–day rain S_R = 0.4 kPa

Step 1:
- calculate total snow + rain + dead roof load
- from Table 3 the appropriate formula is $w = 0.56S_S + 1.2S_R + 0.3$
- then w = 0.56 (1.7) + 1.2 (0.4) + 0.3
- and w = 1.73 kPa (40 lb/ft²)

Step 2:
- go to Table 4, trusses @ 1220mm (48") c/c and roof span 15250mm (50'–0")
- note that either 2–2x10 or 3–2x8 plate beam will support 2.11 or 2.12 kPa respectively, both safely greater than 1.73 kPa (from Step 1).

SYM	REVISIONS	CHECKED	DATE	APPROVED

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CANADA PLAN SERVICE

Structural Details
Plate Beam

DESIGNED	JET	DATE	DEC. 1999
DRAWN	JBA	REVISED	
SCALE	NO SCALE	DETAIL NUMBER ORIGINATES ON SHEET B DRAWN ON SHEET C	
CHECKED	BEM		

PLAN 8311

SHEET 4 OF 5

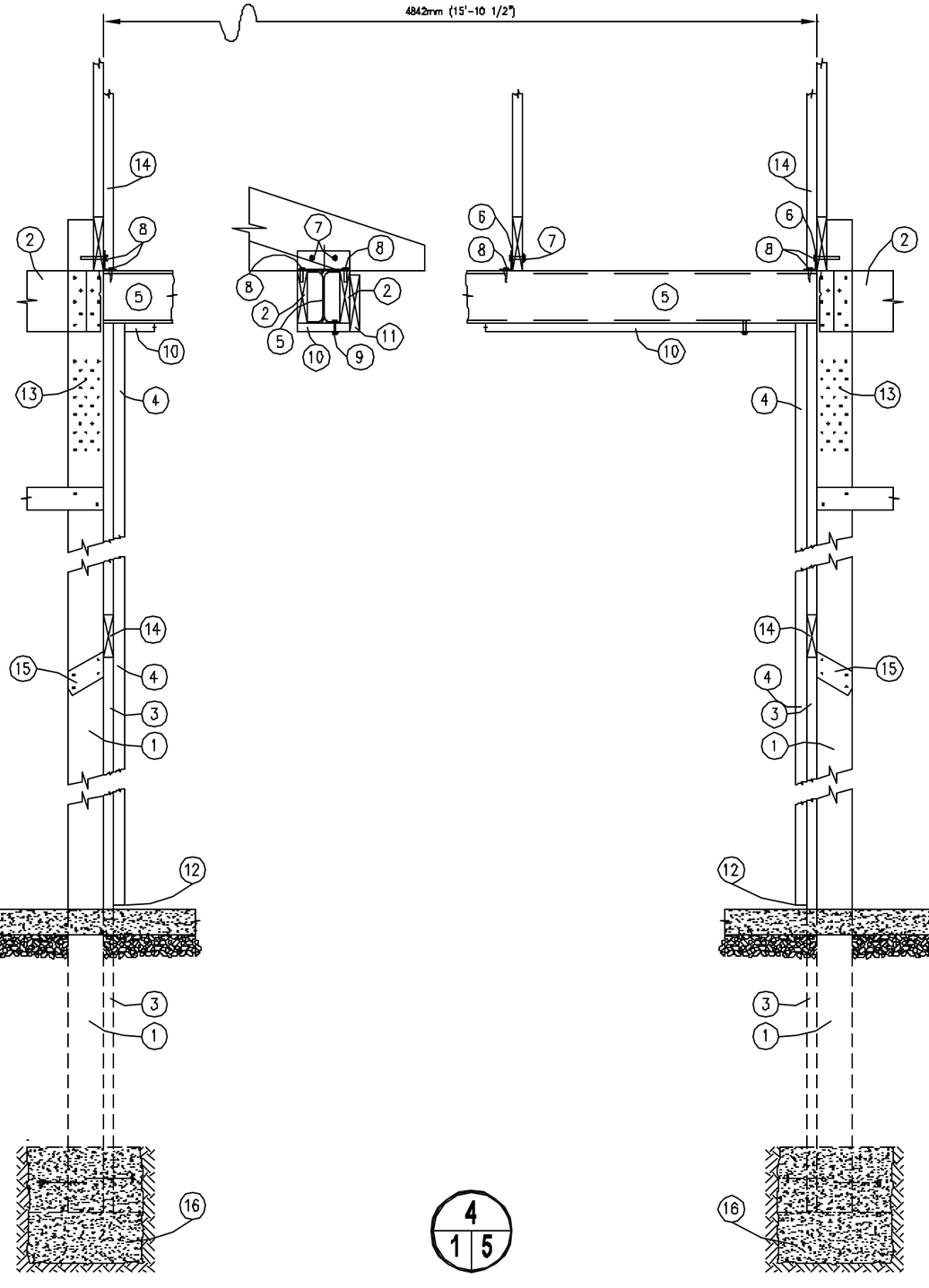

TABLE 5
Steel Beam Total Factored Roof Loads, w (kPa), Door Span 4880mm (16')

Steel Beam Size - metric (Imperial)	Roof Span, mm (ft)				
	9150 (30 ft)	12200 (40 ft)	15250 (50 ft)	18300 (60 ft)	21350 (70 ft)
*W250x39 (W10x26)	---	---	6.13	5.10	4.37
W200x42 (W8x28)	---	---	5.29	4.40	3.78
W250x33 (W10x22)	---	6.28	5.03	4.18	3.59
W200x36 (W8x24)	---	5.68	4.54	3.78	3.24
W200x31 (W8x21)	6.64	4.98	3.99	3.32	2.84
W200x27 (W8x18)	5.53	4.15	3.32	2.76	2.37
W250x24 (W10x16)	5.39	4.05	3.24	2.70	2.31
W200x21 (W8x14)	3.82	2.87	2.29	1.91	1.64

*means 'Wide Flange', 250mm deep by 39 kg/m of length (10" deep by 26 lb/ft of length)

EXAMPLE - To select a steel beam lintel for a 4880mm (16') sidewall doorway at London, Ontario.

Given:
- truss span 15250mm (50'-0")
- truss slope 4/12 (18.4°)
- building is close to a row of spruce trees that will soon grow to be higher than the new building, therefore the roof must be considered 'wind-sheltered'.
- from the National Building Code of Canada 1995:
  - ground snow S_s = 1.7 kPa
  - maximum one-day rain S_R = 0.4 kPa

Step 1:
- calculate 'total factored roof load'
- from Table 3, Sheet 4 the appropriate formula is $w = 0.75S_s + 1.2S_R + 0.3$
- then w = 0.75 (1.7) + 1.2 (0.4) + 0.3
- and w = 2.06 kPa (43 lb/ft²)

Step 2:
- go to Table 5 and column under roof span 15250mm (50 ft), then down to w = 2.29 kPa. This corresponds to a steel beam lintel size W200x21 (W8x14) which is safe for London, Ontario.

1. Pressure treated sawn pole; see Pole Selection Chart (Sheet 2)
2. 38mm (1 1/2") plate beam, see (2/13)
3. Reinforce door jamb poles with 38mm (1 1/2") pressure treated plank 50mm (2") wider than pole; extends from knee brace (14) to concrete footing; outside edge flush with (2)
4. 38mm (1 1/2") side door jamb, 100mm (4") wider than pole (1) notch in way of (2), outside edge flush with (11); (3) and (4) combine to give 76mm (3") end-grain bearing under beam (5)
5. Steel beam 4842mm (15'-10 1/2") long, see Table 5 for size; beam ends each to bear on 76mm (3") of end grain at side jambs
6. Weld truss anchor clips 50x75x6mm (2x3x1/4") steel angle to (5) drill clips for 3/8" bolts and/or lag screws as shown
7. 3/8" bolts, truss to (6)
8. 3/8" x 4" lag screws to truss/pole and to plate beams (2)
9. 3/8" x 2 1/2" carriage bolts, head jamb (10) to beam @ 600mm (24") c/c; alternate left/right of beam centerline
10. 38mm (1 1/2") door head jamb, width to fit (2)
11. 38mm (1 1/2") track board (optional for sliding door hardware)
12. 12mm (1/2") gap from (4) to concrete floor
13. Increase scab nailing 1.5 times for extra roof load as compared with Table 2, Sheet 4
14. Knee brace 38x140mm (2x6), stiffened with 38x89mm (2x4) same as in (2/13), except left pole is reversed
15. Knee brace steel strap anchor at pole, same as in (2/13)
16. Increase effective area of concrete pads at door jambs by 150% as compared with pads for poles at 8'-0" centres

SYM	REVISIONS	CHECKED	DATE	APPROVED

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CANADA PLAN SERVICE

Details of Optional Sidewall Door Frame

DESIGNED	JET	DATE	DEC. 1998
DRAWN	JBA	REVISED	
SCALE	NO SCALE		
CHECKED	BEM		

DETAIL NUMBER ____ A
ORIGINATES ON SHEET ____ B
DRAWN ON SHEET ____ C

PLAN 8311

SHEET 5 OF 5

4/15