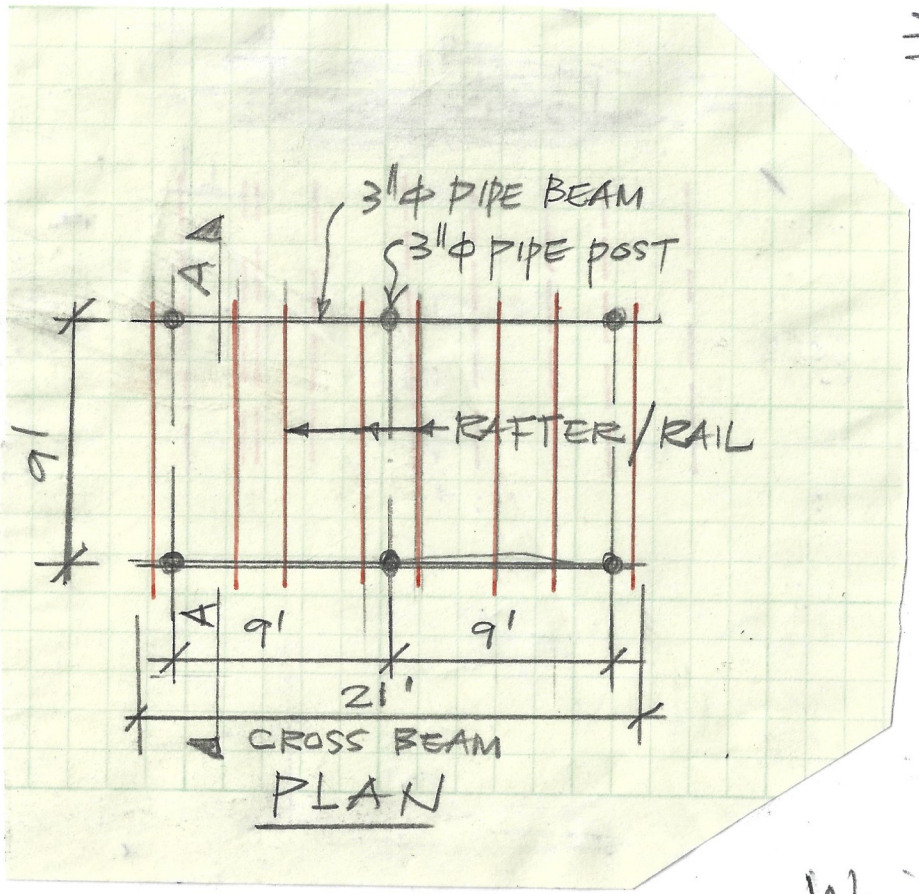
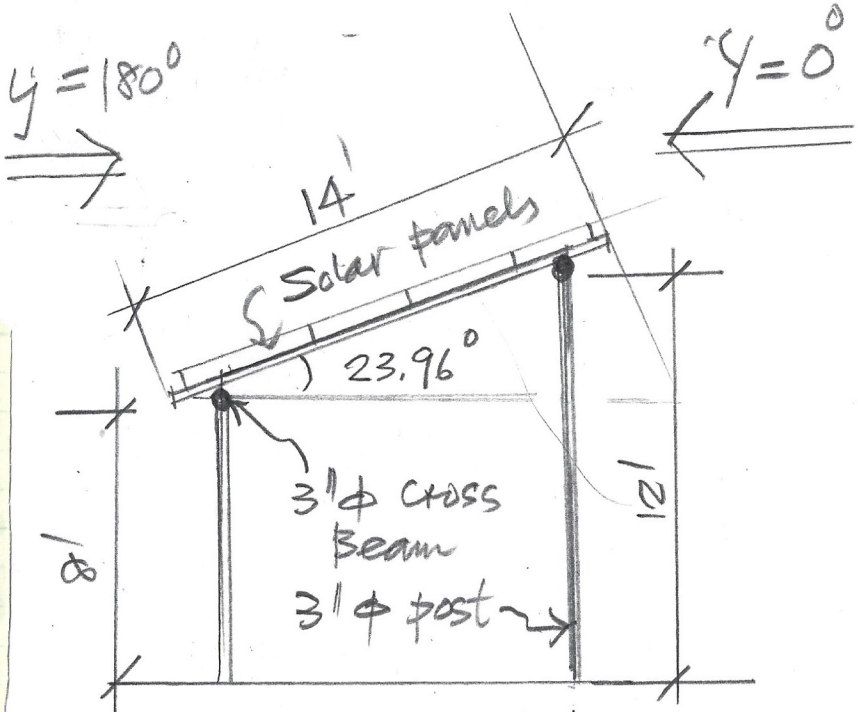
N
E W

ASCET-16



PLAN



Section A-A

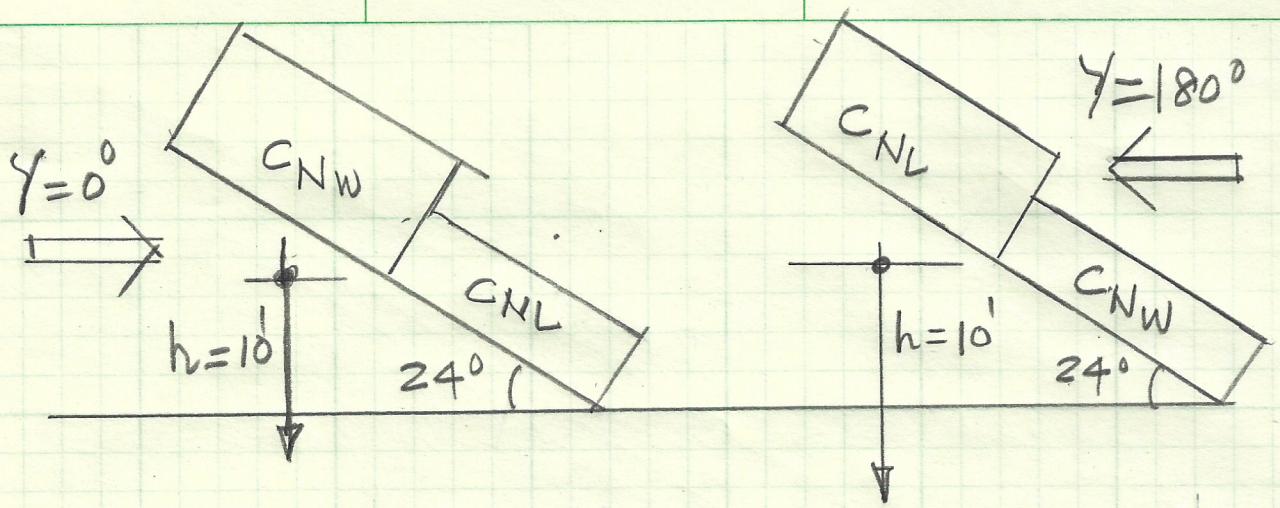
Wind Speed = 110 mph
Exposure B

Velocity Pressure

$q_z = 0.00256\, K_z\, K_{zt}\, K_d\, K_e\, V^2$

$= 0.00256 \times 0.57 \times 1.0 \times 0.85 \times 1.0 \times 110^2$

$q_z =$ **15 psf**



SUMMARY

LOAD CASE	PRESSURE psf			
	DIRECTION 0°		DIRECTION 180°	
	C_{NW}	C_{NL}	C_{NW}	C_{NL}
A	-19.89	-20.91	22.75	23.72
B	-30.86	-4.34	29.07	9.69

LOAD COMBINATION
for rafter analysis

Uplift = ?

Downward = ?

Which data to use ?

Uplift → Direction 0° ? C_{NW} C_{NL}

use Load case B -30.86 & -4.34

OR MIX Load Case A & B -30.86 & -20.91

Downward → Direction 180° ?

Use Load case B ? +29.07 & 9.67

OR A & B Mixed: +29.07 & 23.72

Means Slope

span that is taken as the horizontal projection of the rafter. Both methods are illustrated, and the maximum values of shear and moment are compared.

Sloping beam method
(left rafter illustrated)

Horizontal plane method
(right rafter illustrated)

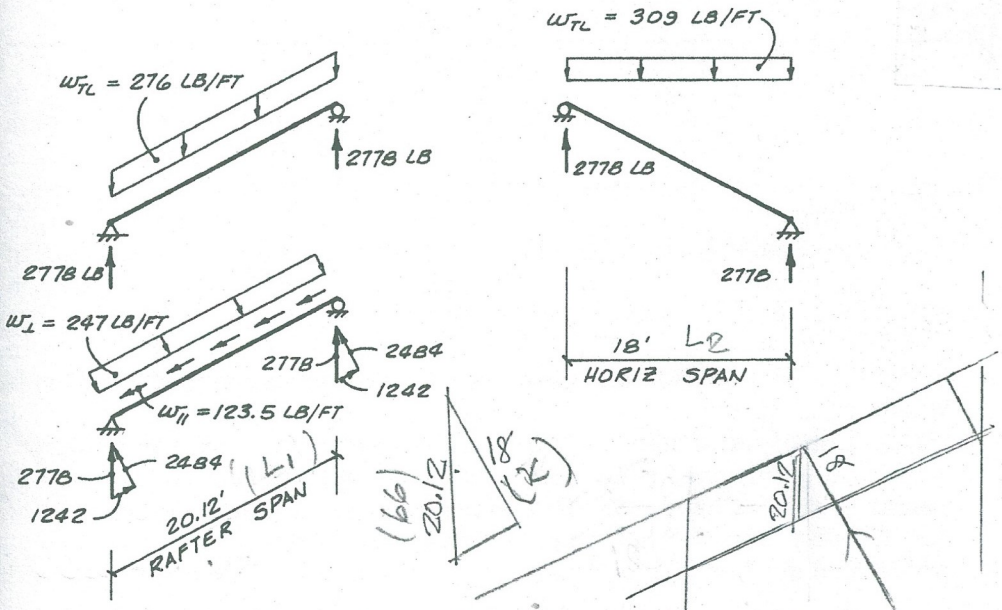


Figure 2.5b Comparison of *sloping beam method* and *horizontal plane method* for determining shears and moments in an inclined beam.

Slope — SLOPE — SNOW LOAD

$$TL = DL + SL$$

$$= 10 + 66\left(\frac{18}{20.12}\right)\frac{L2}{L1}$$

Total Load

$$= 69 \text{ psf}$$

$$w = 69 \text{ psf} \times 4 \text{ ft}$$

$$= 276 \text{ lb/ft}$$

Use load normal to roof and rafter span parallel to roof.

$$V = \frac{wL}{2} = \frac{0.247(20.12)}{2}$$

$$= 2.48 \text{ k}$$

$$M = \frac{wL^2}{8} = \frac{0.247(20.12)^2}{8}$$

$$= 12.5 \text{ ft-k}$$

HORIZONTAL — SNOW LOAD

$$TL = DL + SL$$

Similar Δs $= 10\left(\frac{20.12}{18}\right) + 66$

$$= 77.2 \text{ psf}$$

$$w = 77.2 \text{ psf} \times 4 \text{ ft}$$

$$\approx 309 \text{ lb/ft}$$

$\frac{66}{20.12} = \frac{x}{18}$

Use total vertical load and projected horizontal span.

$$V = \frac{wL}{2} = \frac{0.309(18)}{2}$$

$$= 2.78 \text{ k} \quad \text{(conservative)}$$

$$M = \frac{wL^2}{8} = \frac{0.309(18)^2}{8}$$

$$= 12.5 \text{ ft-k} \quad \text{(same)}$$