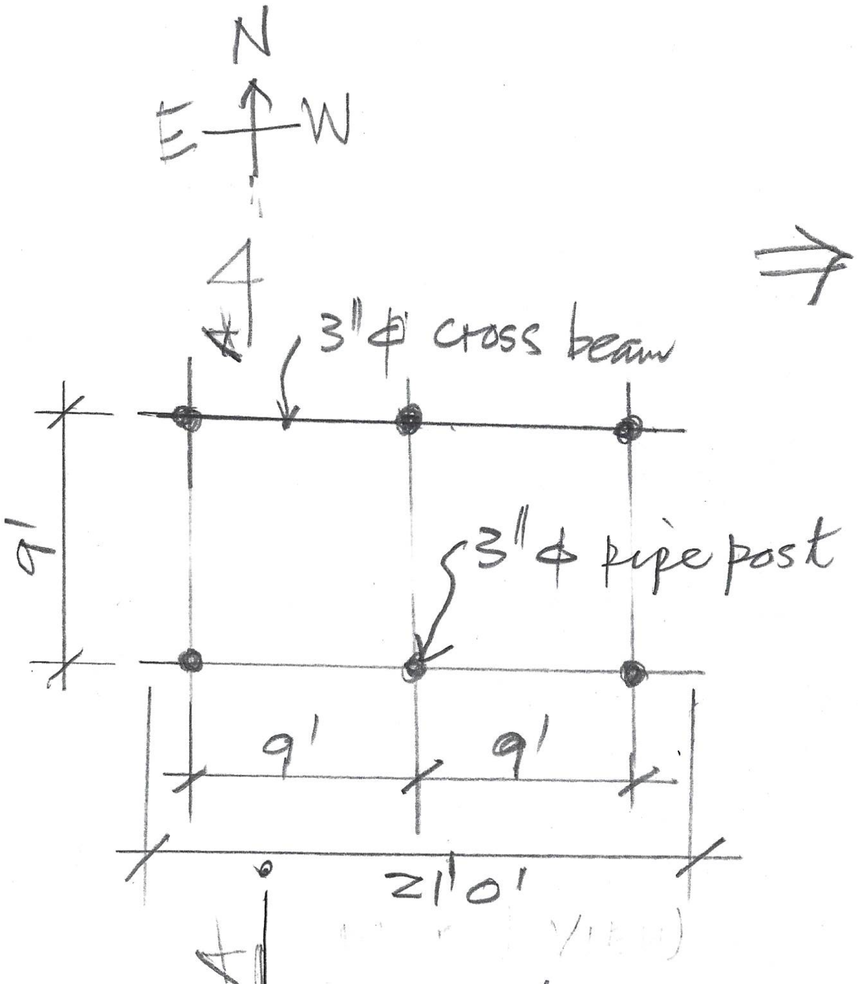
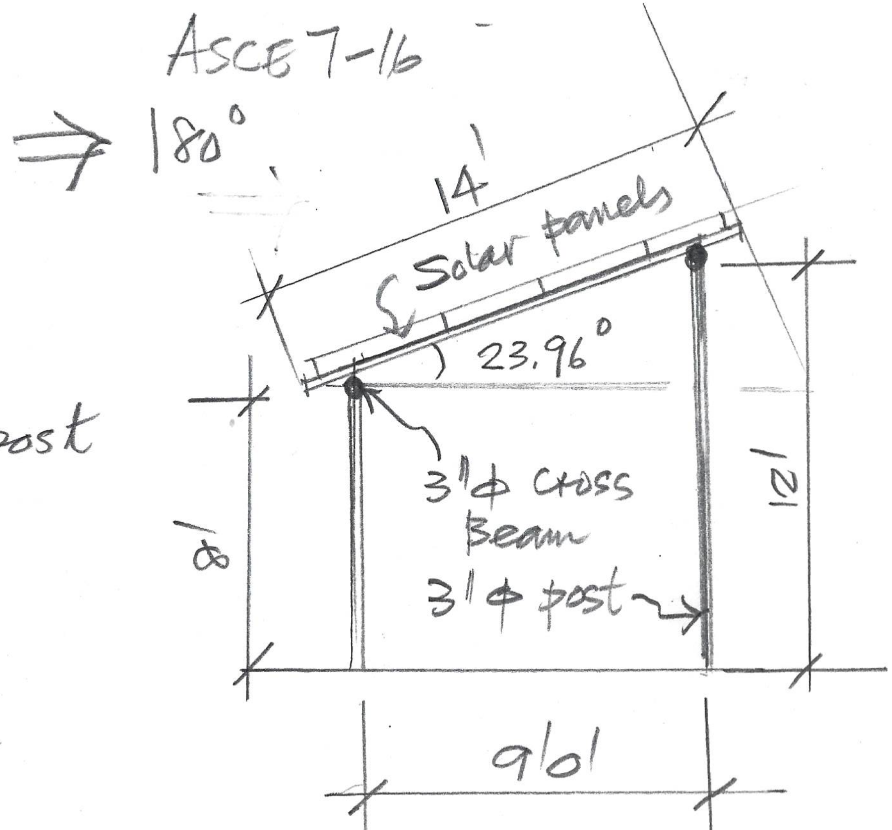


PLAN

ASCE 7-16



Section A-A

Wind Speed = 110 mph

Exposure B

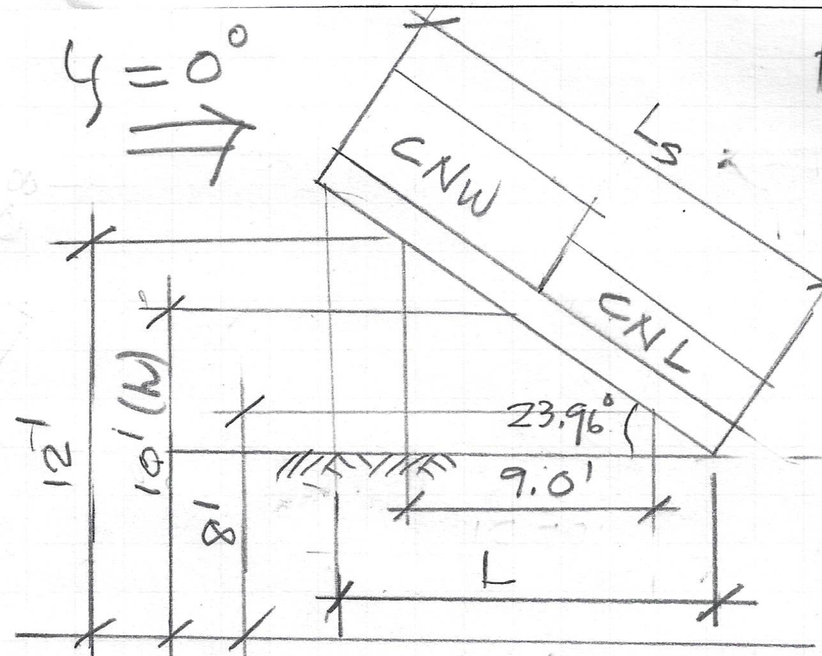
Velocity pressure

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

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

$$q_z = \boxed{15\ psf}$$

$\psi = 0^\circ$



$\tan\theta = \dfrac{4}{9} = 23.96^\circ$

L_s = total Solar Pane[l] length

$= 4 \times 3.3' = 13.2$

$\cos\theta = \dfrac{L}{L_s}$

$L = 13.2 \times \cos 23.96$

$= 12.06'$

The net pressure Coefficient from Fig 27.3-4 is given by $\dfrac{h}{L} = \dfrac{10}{12.06} = 0.829 \Rightarrow (0.25 \le h/L \le 1.0)$

Therefore, from Table of fig. 27.3-4 Clear Wind Flo[w]

	LOAD CASE	CNW	CNL
22.5°	A	−1.5	−1.6
	B	−2.4	−0.3
30°	A	−1.8	−1.8
	B	−2.5	−0.5

Interpolate

		CNW	CNL
24°	A	−1.56	−1.64
	B	−2.42	−0.34

$A_\Delta \dfrac{(1.8-1.5)}{(30.-22.5)} = \dfrac{0.3}{7.5}$

$\Delta = 0.04$

$\therefore A_1 = -1.5 - (0.04 \times 1.5)$

$= -1.56$ CNW

$A_\Delta \dfrac{(1.8-1.6)}{7.5} = 0.0267$

$A_2 = -1.6 - (0.0267 \times 1.5)$

$= -1.64$ CNL

$B_\Delta \dfrac{(2.5-2.4)}{7.5} = 0.0133$

$B_1 = -2.4 - (0.0133 \times 1.5)$

$= -2.42$ CNL

$B_\Delta = \dfrac{0.5-0.3}{7.5} = 0.0267$

$B_2 = -0.3 - (0.0267 \times 1.5)$

$= -0.34$ CNL

For $\psi = 180^\circ$ Refer to previous Diagram

and $\frac{h}{L} = \frac{10.1}{12.06} = 0.829 \Rightarrow (0.25 \leq h/L \leq 1.0)$

The Clear Wind flow Table of Figure 27.3-4

	Load Case	CNW	CNL
22.5°	A	1.7	1.8
	B	2.2	0.7
30°	A	2.1	2.1
	B	2.6	1.0

Interpolate for

		CNW	CNL
24°	A	1.78	1.86
	B	2.28	0.76

$A_\Delta = \frac{2.1-1.7}{7.5} = 0.0533$

$A_1 = 1.7 + (0.0533 \times 1.5)$
$= 1.58$ CNW

$B_\Delta = \frac{2.6-2.2}{7.5} = 0.0533$

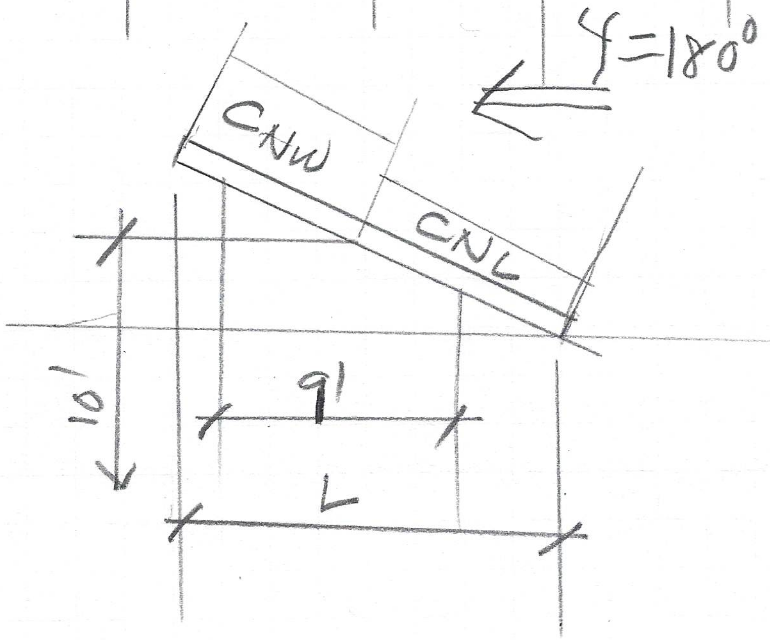
$B_2 = 2.2 + (0.0533 \times 1.5)$
$= 2.28$ CNW

$A_\Delta = \frac{2.1-1.8}{7.5} = 0.04$

$A_2 = 1.8 + (0.04 \times 1.5)$
$= 1.86$ CNL

$B_\Delta = \frac{1.0-0.7}{7.5} = 0.04$

$B_2 = 0.7 + (0.04 \times 1.5)$
$= 0.76$ CNL



For Open Building with Monoslope roof

$p = q_h G C_N$ EQ - 27.3-2

$q_h = q_z$ per Section 26.10.2 Using K_z at mean roof high (h) & less than 30 feet for Category B

Also based on Simplified approach - Structure is rigid (Section 26.11.1) $G = 0.85$

$q_z = 15$ psf Calculated earlier

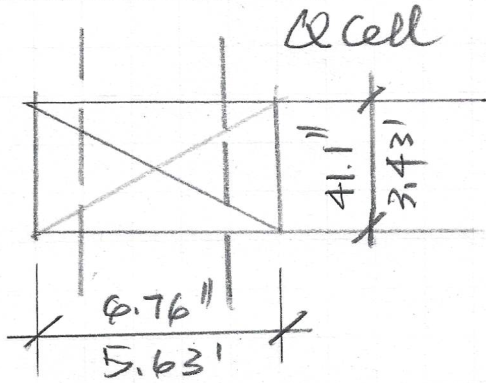
$p = 15 \times 0.85 \times C_N = 12.75\, C_N$

Multiply 12.75 to the Net pressure Coefficient for Load Cases A & B at 24° slope angle The pressure in psf is obtained

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

NOTE SITE LOCATION where Direction 0° is shield by an existing building and its topo is higher. Use $\boxed{29.07 \text{ psf}}$ is more realistic.

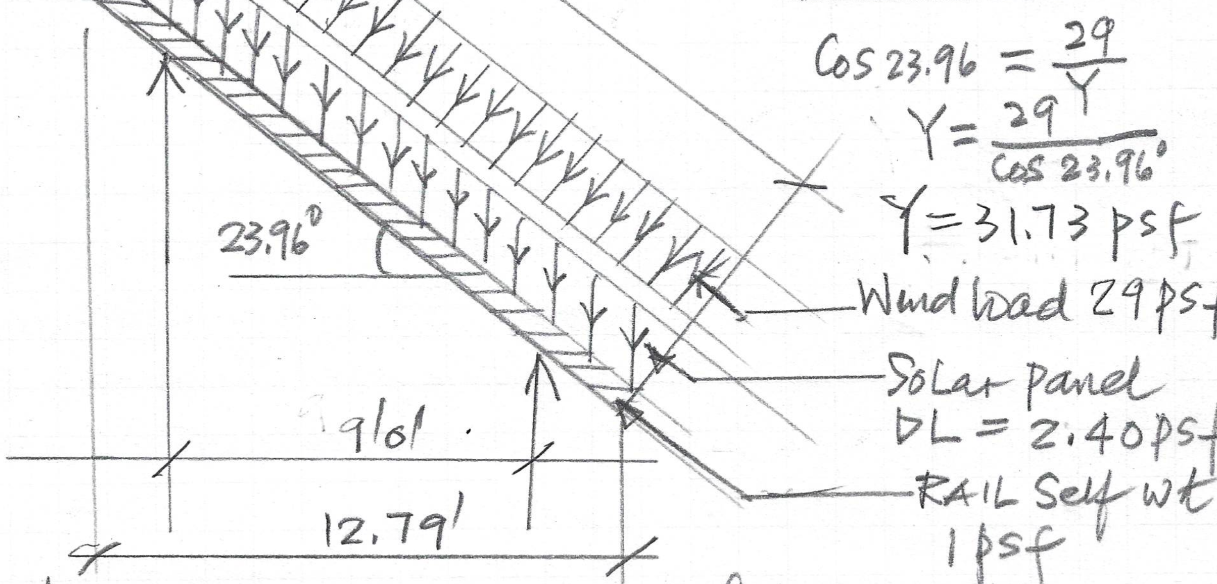
QCell Solar panel placement: landscape

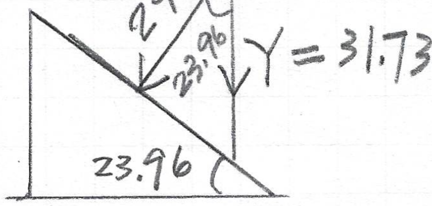


Each S. panel supported by 2 rail along the S. panel width. Each rail would support 1/2 of 5.63' or 2.82' of load on the panel per foot

Weight of panel = 46.3 lb or $\frac{46.3 \text{ lb}}{(5.63 \times 3.43)\text{ ft}^2} = 2.40 \text{ lb/ft}^2$

Estimated Wind Load = 29 lb/ft²





$\cos 23.96 = \frac{29}{Y}$

$Y = \frac{29}{\cos 23.96°}$

$Y = 31.73$ psf

Dead load on rail/rafter = $1 + (2.40 \times 2.82)$

$= 7.77$ lb/ft

Wind load on rail/rafter = 31.73×2.82

$= 89.48$ lb/ft

Design load = $0.9 D_L + W_L$

$= (7.77 \times 0.9) + 89.48 = \boxed{96.47 \text{ lb/ft}}$