

September 23, 2009

MEC File No. 2570.02b

CLIENT: WATERSHED ARCHITECTS  
1520 West Main Street, Suite 102  
Richmond, VA 23220

RE: General Wind Load Structural Analysis – ReadyShelter 3 Bedroom Dwelling

CRITERIA: Wind Load: 140 MPH, Exposure C

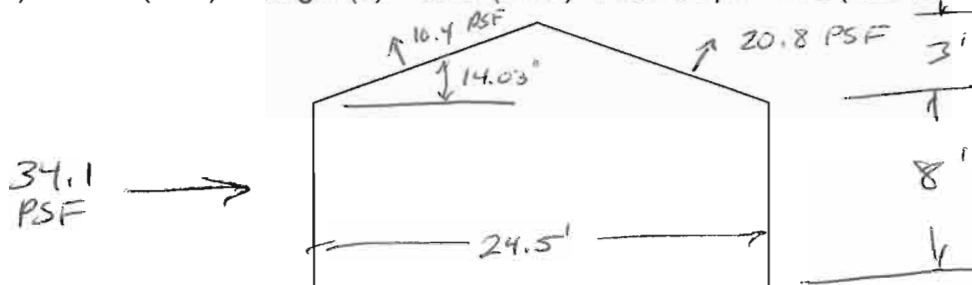
PLANS: Project 2436-3 ReadyShelter FEMA 1BR Unit, Revised 14 August 2008

APPLICABLE CODE: 2006 IBC & ASCE 7

WINDSPEED: 140MPH (3 Second Gust), EXPOSURE C

$$P=(0.00256)K_EK_DV^2= 0.00256(1.21)(.85)(1)(140)^2 = 51.6 \text{ Pounds per Square-Foot (psf)}$$

Width (W) = 24.5' (20.5)' Length (L) = 36.5' (24.5)' Roof Slope: 4:12 (25% or 14.03°)

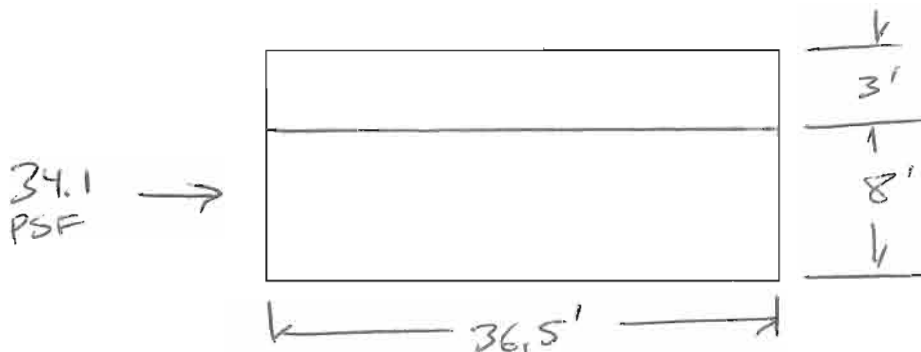


TRANSVERSE LOADING:

$$\text{Total Horizontal Shear} = (34.1\text{psf})(8')(36.5') + (7.74\text{psf}^*)(3')(36.5') = 10,805 \text{ lbs}$$

$$\text{Shear Load Applied to Each End Wall} = 10,805 \text{ lbs}/2 = \underline{5,402 \text{ lbs}}$$

\*- Denotes Average Pressure



LONGITUDINAL LOADING:

$$\text{Total Longitudinal Shear} = (34.1\text{psf})((8'+11')/2)(24.5') = 7,937 \text{ lbs}$$

$$\text{Shear Load Applied to Each Side Wall} = 7,937/2 = \underline{3,968 \text{ lbs}}$$

CHECK 2" WALL PANELS: (Per Provided Dura Building Systems Test Results)

Maximum Transverse Load to Panel: 35.1 psf allowable – Spans Horz to Wall Studs, 8' Tall Panel & Stud. (Note: 2-way Panels also span vertically to floor and Ceiling – no info provided).

Therefore: 35.1psf allowable > 34.1 psf applied wind pressure – OK

Lateral Load to studs = 34.1psf (4') = 136.4 lbs/ft

Studs Span 8' vertically so  $V_{max}$  (@ flr & roof connections) 136.4 lbs/ft (8')/2 = 545.6 lbs (Check)

Stud Moment: 545.6 lbs (4')/2 = 1091.2 ft-lbs. < 1497 ft-lbs stud capacity – OK (Verify)

Therefore  $M_{capacity} = 8'(35.1psf) = 281$  ft-lbs/ft

CHECK DIAGONAL STRAPS: (Worst Case – Front Elevation End Wall)

End Wall Shear Applied = 5,402 lbs

Shear Capacity of Each 4'-wide Panel = 1718 lbs ultimate, with 2:1 SF = 859 lbs.

End Wall Total Shear Capacity w/o Straps = (5 min intact panels)(859 lbs/panel) = 4295 lbs

Therefore 5,402 lbs – 4,295 lbs = 1107 lbs (Horz) remaining for one Diagonal Strap (In Tension)

@ ~45° Angle, Strap Tension ~  $((1107^2)(2))^{-2} = 1566$  lbs < 2256 lbs Strap Cap. - OK (VERIFY)

CHECK FOUNDATION PIERS:

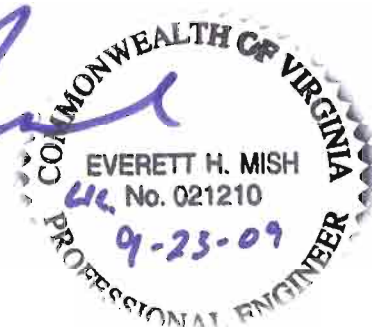
Maximum Uplift / Pier (Average) = 21.2psf x 36'x24' / 12 Piers = 1526 lbs/pier.

Rough Est. of Dead Loads = (36'x24'x10 lbs/ft)+(600 lbs/2'x2'x1'ftg & pier(12 piers)) = 15,840 lbs

Therefore: 15,840 lbs/12 piers = 1340 lbs/per < 1526 lbs uplift/pier. Not Acceptable – Will require additional anchorages tied to perimeter and center girder. (Figures do not include soil adhesion and backfill weight).

MISH ENGINEERING CONCEPTS, P.L.C.

Everett H. Mish, P.E., Principal  
Virginia Professional Engineer Registration Number: 21210



cc: file