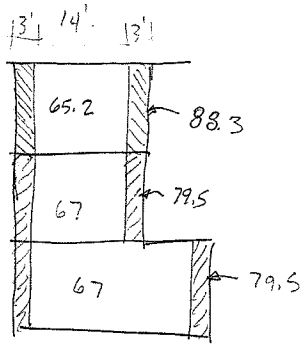
FLORIDA WIND

WIND SPEED = 150 MPH
EXPOSURE C
CATEGORY II

MWFRS = 38.4 + 28.6 = 67 PSF } WALLS
45.2 + 34.3 = 79.5 PSF

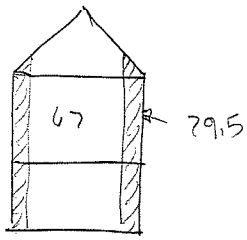
20, -45.2 (INT.) } ROOF
23.4, -64.9 (END.)

COMPONENTS & CLADDING
WALL = 53, -58.2 (INT)
53, -65.5 (END)
ROOF = 51.4, -62.3



65.2 x 14 x 11 = 10040.8 + 88.3 x 6 x 11 = 5828 = 15869#
+
67 x 14 x 9 = 8442 + 79.5 x 6 x 9 = 12735#
+
67 x 24 x 9 + 79.5 x 6 x 9 = 18265#
47369#

BASE SHEAR = 47.4^k



67 x 11 x 20/2 = 7370#
67 x 9 x 14 = 8442 + 79.5 x 6 x 9 = 12735#
x 2
12735#
32840#

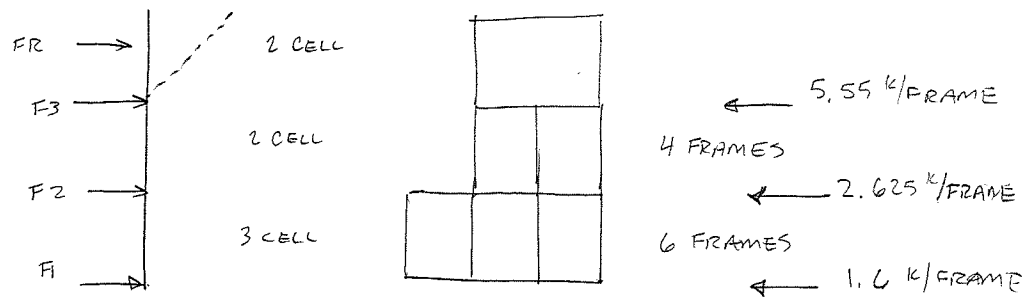
BASE SHEAR = 32.8^k

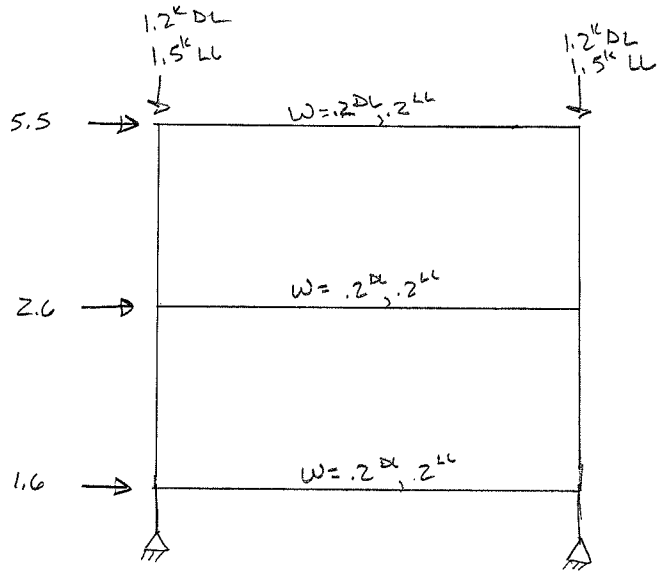
$F_R = \frac{15.869}{2} = 7.93^k$

$F_3 = \frac{15.869}{2} + \frac{12735}{2} = 14.3^k$

$F_2 = \frac{12.735}{2} + \frac{18765}{2} = 15.75^k$

$F_1 = \frac{18765}{2} = 9.4^k$

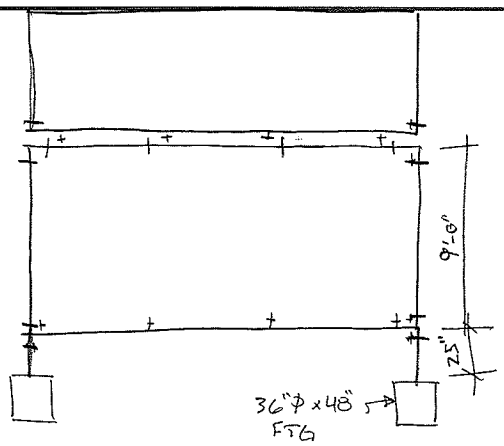




CELL B & E O.K. FOR STRENGTH

$\Delta = 2.96''$ @ LOFT FLOOR.

FRAMES ALONE CANNOT RESIST WIND LOAD MUST RELY ON DIAPHRAGM STRENGTH OF WALLS.



CORNER POST = 4x4x1/4
BASE PL = 18x18x3/4 w/ (4) 4x4x1/2 GUSSET PL
CORNER CONNECTING PIN = 3.5x3.5x1/4
CORNER COLUMNS = 4x4x1/4
TOP & BOTTOM BEAMS = 4x6x3/16

GRADE 5 BOLTS 3/4" Φ
F_y = 92,000 PSI
F_T = 120,000 PSI

GRAVITY LOADS =

FLOOR LOAD = 40 PSF LIVE LOAD
40 PSF DEAD LOAD

ROOF LOAD = 30 PSF LIVE LOAD
24 PSF DEAD LOAD

DECK LOAD = 40 PSF LIVE LOAD
32 PSF DEAD LOAD

5' TRIBUTARY AREA

DIAPHRAGM STRENGTH

WELD ON BOND CAPACITY = $\frac{2400}{4}$ = 600 PSI x 1" = 600 #/IN
x 12
7.2 K/FT

RIVNUT CAPACITY = $\frac{748\#}{4}$ = 187 # (10-32) $\frac{1100\#}{4}$ = 275 # (1/4-20)

FASTENERS @ 2.9' O.C. $\frac{187}{2.9}$ = 64 #/FT $\frac{275}{2.9}$ = 94 #/FT

5/16-18
$\frac{1750}{4}$ = 437.5 / 2.9 = 150 #/FT

FIBERGLASS = $\frac{1500\ PSI}{2}$ = 750 PSI x 12 x 3/16 = 1687 #/FT ✓ MIN THICKNESS

WELD ON APPLIED DIRECTLY TO PANEL & 4x6 TUBE FRAME

1800 $\frac{2,400}{4}$ = ~~600~~ 450 PSI x 1" = ~~600~~ 450 #/IN = 7.2 K/FT.
450 #/IN = 5.4 K/FT ALONG TOP & BOTT

ASSUME MIN 3' VERT/FT = 1.35 K/FT

DRYWALL CAPACITY BASED ON
ADHESIVE CONNECTION = 50 PLF.

ASSUME FIBERGLASS + DRYWALL + INTERMEDIATE
TUBING DIAPHRAGM STRENGTH = 1500 #/FT
CONSERVATIVE

DIAPHRAGM STRESS · ASSUMMING FRAMES TAKE 33% OF LOAD
FRONT & REAR WALLS

BASE SHEAR = $\frac{47.4^k}{2}$ = 23.7^k x .66 = 15.6^k / END

FRONT WALL = 20'-8" - 3'-1" = 17'-7"

$\frac{15.6^k}{17'-7"}$ = 889 #/FT < 1500 O.K.

REAR WALL = 20'-8" - 6'-2" = 14'-6"

$\frac{15.6^k}{14.5'}$ = 1076 #/FT < 1500 O.K.

SIDE WALLS: ASSUME WALLS TAKE ALL LOAD.

BASE SHEAR = $\frac{32.8^k}{2}$ = 16.4^k/SIDE

30'-9"-3" = 20'-9"

$\frac{16.4^k}{20'-9"}$ = 790 #/FT < 1500 O.K.

CONNECTION TO FOUNDATION:

1/2"Ø ANCHOR BOLTS MIN EMBED = 7" OR 1/2"Ø EXP. BOLT
ALLOWABLE SHEAR = 2.4k

$\frac{15.6^k}{2.4}$ = 7 BOLTS / END
≈ 32" O.C.

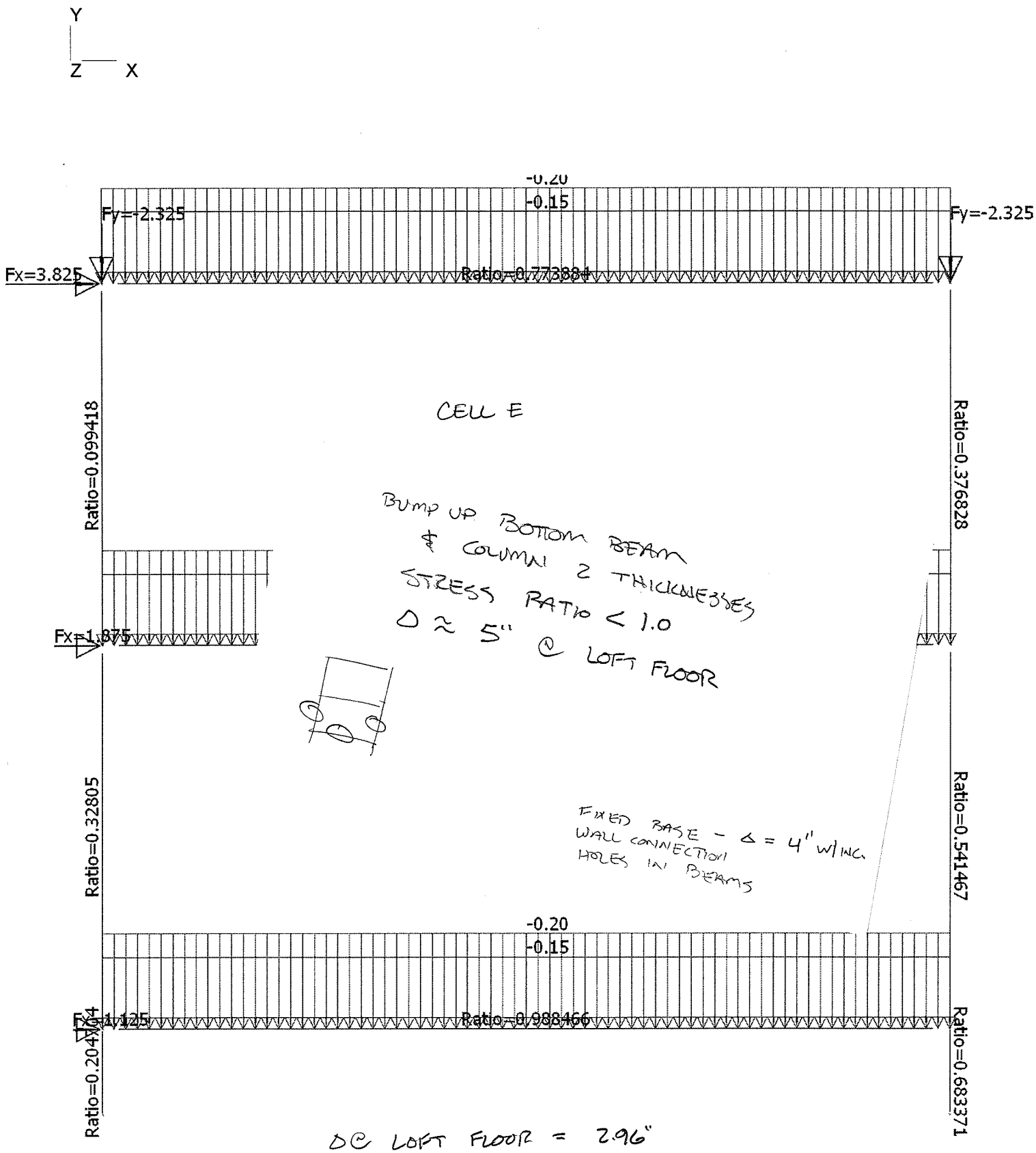
$\frac{16.4}{2.4}$ = 7 BOLTS / SIDE
≈ 4'-0" O.C.

(5) 3/4" @ ENDS - POST CONN. IF USED
(8) 3/4" @ SIDES. - POST CONN. IF USED

RAM Advanse

File : steel house.AVW
Condition: C4=dl+0.75wl+0.75ll

Analysis (1st order)
Date: 6/7/2005 3:37:02 PM



CALIFORNIA SEISMIC.

OCCUPANCY CATEGORY 4

$I = 1.0$

SOIL PROFILE TYPE S_D

SEISMIC ZONE = 4

SEISMIC ZONE FACTOR $Z = .40$

SEISMIC SOURCE TYPE = B

SEISMIC NEAR SOURCE FACTOR = $N_a = 1.3$ $N_v = 1.6$

$C_a = .44 N_a = .44(1.3) = .572$

$C_v = .64 N_v = .64(1.6) = 1.024$

$R = 4.5$ (OMRF STEEL)

$T = .035(30)^{3/4} = .45$

$$V = \frac{\cancel{.64}\ 1.024\ \cancel{.44}(1.3)(1.0)}{4.5(.45)} W = \cancel{.28}\ \cancel{.41}\ .51$$

$$< \frac{2.5(.44)(1.0)(1.3)}{4.5} W = \cancel{.24}\ .32$$

$$> (.11)(.44)(1.3)(1.0) W = .06$$

$$> \frac{.8(.4)(1.6)(1)}{4.5} W = .11$$

$V = .32\ W$

$V = .32(72{,}000) = 23.04^k$

W = DEAD LOAD

FLOOR DL = 15811 − 8000 = 7811 / 200 = 40 PSF × 7×10×20 = 56,000#

ROOF DL = 13462 − 8200 = 4762 / 200 = 24 PSF × 2×10×20 = 9600#

DECK DL = 12359 − 6000 = 6359 / 200 = 32 PSF × 1×10×20 = 6400#

72,000#

			wh
W ROOF = 9600 #	h = 10 + 10 + 5.5 = 25.5' + 3'		273600
W 3RD FLR = 40 x 10 x 20 x 2 = 16000#	h = 20' + 3'		368000
W 2ND FLR = 40 x 10 x 20 x 2 + 32 x 10 x 20 = 22400#	h = 10' + 3'		291200
W 1ST FLR = 40 x 10 x 20 x 3 = 24000#	h = 3'		72000
			1004800

$\Sigma wh = 1004800$

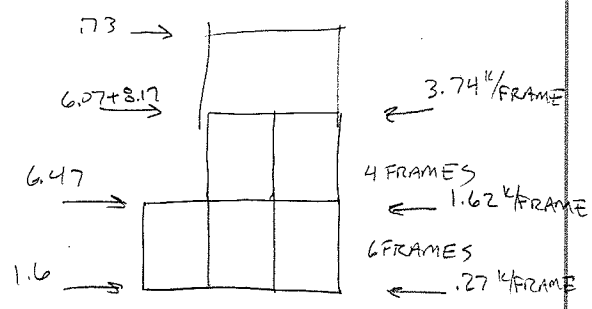
$F_T = .07(.45)(23.04) = .73^k$

$F_R = \frac{(23.04 - .73)(273.6)}{1004.8} = 6.07^k$

$F_3 = \frac{(23.04 - .73)(368)}{1004.8} = 8.17^k$

$F_2 = \frac{(23.04 - .73)(291.2)}{1004.8} = 6.47^k$

$F_1 = \frac{(23.04 - .73)(72)}{1004.8} = 1.6^k$



KORDA

KORDA/NEMETH ENGINEERING

Section OHIO SEISMIC

Job No. 2005-1198 Page 1

By GMF Chk Date 6/1/05

OHIO SEISMIC

CATEGORY I

$I = 1.0$

$S_S = .\cancel{35}$ max .32

$S_1 = .09$ max

SITE CLASS E

$F_a = 2.\cancel{32}$ 2.28

$F_v = 3.5$

$S_{DS} = .\cancel{658}$ .48

$S_{D1} = .21$

SEISMIC DESIGN CATEGORY D

R = 4 (ORDINARY STEEL MOMENT FRAME), 3 (STEEL SYSTEM NOT SPECIFICALLY DETAILED)

$C_d = 3\frac{1}{2}$

$C_t = .035$

	R=3	R=4
C_S =	~~.1696~~	.1272
	~~.1004~~	.0753
	.16	.12

$V = .\cancel{10} \times 72000 = \cancel{7.2}$ K

.16 = 11.5

NICHOLAS CONSTANTINE
1650 WATERMARK DR., STE. 200 COLUMBUS, OH 43215-7010 (614)487-1650
Copyright 2000 by Tondelli Engineering, P.A. Tampa, Florida

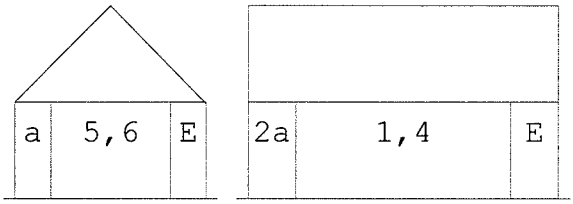
CUSTOMER :
JOB NUMBER : DATE : 6/1/2005
DESCRIPTION :

***** DESIGN WIND LOADS - ASCE 7-98 *****
*** MAIN WIND FORCE RESISTING SYSTEMS ***

WIND VELOCITY = 150 MPH
EXPOSURE CATEGORY = C
BUILDING CATEGORY = 2
IMPORTANCE FACTOR = 1.00
Kzt = 1.00

BUILDING DIMENSION NORMAL TO WIND DIRECTION = 30.0 FT
BUILDING DIMENSION PARALLEL TO WIND DIRECTION = 20.0 FT
MEAN ROOF HEIGHT = 20.0 FT Kh = 0.902 qh = 51.9 PSF
DISTANCE, Z = 20.0 FT Kz = 0.902 qz = 51.9 PSF
ROOF SLOPE = 12.00 : 12 (45.00 DEG)

WALL WIND LOADS								
CASE A, WIND PERPENDICULAR TO RIDGE								
	INTERIOR ZONE				END ZONE			
	1		4		1		4	
GCp	0.56		-0.37		0.69		-0.48	
PRESSURE(psf)	38.4		-28.6		45.2		-34.3	
CASE B, WIND PARALLEL TO RIDGE								
	1	4	5	6	1	4	5	6
GCp	-0.45	-0.45	0.40	-0.29	-0.48	-0.48	0.61	-0.43
PRESSURE(psf)	-32.7	-32.7	30.1	-24.4	-34.3	-34.3	41.0	-31.7



P = qh(GCp - GCpi)
GCpi = ± 0.18
CORNER DISTANCE, a = 3.00 FT

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CUSTOMER :
JOB NUMBER : DATE : 6/1/2005
DESCRIPTION :

***** DESIGN WIND LOADS - ASCE 7-98 *****
*** MAIN WIND FORCE RESISTING SYSTEMS ***

WIND VELOCITY = 150 MPH
EXPOSURE CATEGORY = C
BUILDING CATEGORY = 2
IMPORTANCE FACTOR = 1.00
Kzt = 1.00

BUILDING DIMENSION NORMAL TO WIND DIRECTION = 30.0 FT
BUILDING DIMENSION PARALLEL TO WIND DIRECTION = 20.0 FT
MEAN ROOF HEIGHT = 20.0 FT Kh = 0.902 qh = 51.9 PSF
DISTANCE, Z = 20.0 FT Kz = 0.902 qz = 51.9 PSF
ROOF SLOPE = 12.00 : 12 (45.00 DEG)

ROOF WIND LOADS				
CASE A, WIND PERPENDICULAR TO RIDGE				
	INTERIOR ZONE		END ZONE	
	2	3	2	3
GCp	0.21	-0.43	0.27	-0.53
PRESSURE (psf)	20.3	-31.7	23.4	-36.9
CASE B, WIND PARALLEL TO RIDGE				
GCp	-0.69	-0.37	-1.07	-0.53
PRESSURE (psf)	-45.2	-28.6	-64.9	-36.9

2E	3E
2	3
2a	2a

P = qh(GCp - GCpi)
GCpi = ± 0.18
CORNER DISTANCE, a = 3.00 FT

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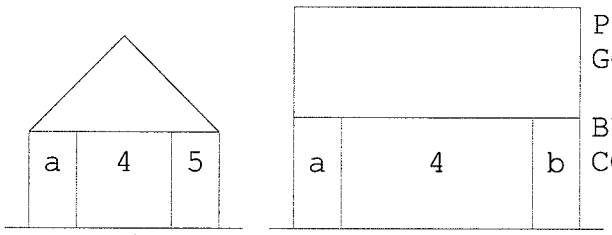
CUSTOMER :
JOB NUMBER : DATE : 6/1/2005
DESCRIPTION :

***** DESIGN WIND LOADS - ASCE 7-98 *****
*** COMPONENTS AND CLADDING ***

WIND VELOCITY = 150 MPH
EXPOSURE CATEGORY = C
BUILDING CATEGORY = 2
IMPORTANCE FACTOR = 1.00
Kzt = 1.00

ROOF SLOPE = 12.00 : 12 (45.00 DEG)
TRIBUTARY AREA = 80.0 FT2
MEAN ROOF HEIGHT = 20.0 FT Kh = 0.902 qh = 51.9 PSF
DISTANCE, Z = 20.0 FT Kz = 0.902 qz = 51.9 PSF

WIND LOADS		
	WALL AREA	
	4	5
GCp (+)	0.841	0.841
GCp (-)	-0.941	-1.081
PRESSURE (psf)	53.0	53.0
SUCTION (psf)	-58.2	-65.5



P = qh[(GCp) - (GCpi)]
GCpi = ± 0.18

BUILDING WIDTH = 30.0 FT
CORNER DISTANCE, a = 3.0 FT

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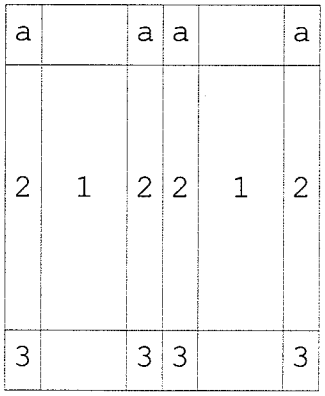
CUSTOMER :
JOB NUMBER : DATE : 6/1/2005
DESCRIPTION :

***** DESIGN WIND LOADS - ASCE 7-98 *****
*** COMPONENTS AND CLADDING ***

WIND VELOCITY = 150 MPH
EXPOSURE CATEGORY = C
BUILDING CATEGORY = 2
IMPORTANCE FACTOR = 1.00
Kzt = 1.00

ROOF SLOPE = 12.00 : 12 (45.00 DEG)
TRIBUTARY AREA = 80.0 FT2
MEAN ROOF HEIGHT = 20.0 FT Kh = 0.902 qh = 51.9 PSF
DISTANCE, Z = 20.0 FT Kz = 0.902 qz = 51.9 PSF

GABLE/HIP ROOF WIND LOADS			
	ROOF AREA		
	1	2	3
GCp (+)	0.810	0.810	0.810
GCp (-)	-0.819	-1.019	-1.019
PRESSURE(psf) VERT. COMP. HORIZ. COMP.	51.4 36.4 36.4	51.4 36.4 36.4	51.4 36.4 36.4
SUCTION(psf) VERT. COMP. HORIZ. COMP.	-51.9 -36.7 -36.7	-62.3 -44.1 -44.1	-62.3 -44.1 -44.1



P = qh[(GCp) - (GCpi)]
GCpi = ± 0.18

BUILDING WIDTH = 30.0 FT
CORNER DISTANCE, a = 3.0 FT

UPLIFT

LOAD PER COLUMN = 2.2^k UPLIFT MAX
× 2 (INT. PAD)
4.4^k × 1.5 = 6.6^k

WT OF CONCRETE REQ'D

$\frac{6600\#}{150\ PCF} = \frac{44\ ft^3}{4'\ DEEP} = 11\ SF$ 4'ϕ = 12.56 SF O.K.

2.2 × 1.5 = 3.3^k

$\frac{3300\#}{150\ PCF} = \frac{22\ ft^3}{4} = 5.5\ SF$ 3'ϕ = 7.0 SF O.K.

BEARING

LOAD PER COLUMN = 17.7^k MAX
× 2
35.4^k

ALLOWABLE BEARING PRESSURE = 1500 PSF × 1.33 (WIND INCREASE)

INTERMEDIATE = $\frac{35.4}{1.5 \times 1.33} = 17.74\ SF$ INCREASE DIAMETER TO 5'-0" @ 1500 PSF
= 2000 PSF × 1.33

$\frac{35.4}{2 \times 1.33} = 13.3\ SF$ INCREASE DIAMETER TO 4'-6" @ 2000 PSF

CORNER COLUMN = $\frac{17.7}{1.5 \times 1.33} = 8.87\ SF$ $\frac{17.7}{2 \times 1.33} = 6.65\ SF$
SIZE OK. FOR 2000#/SF

LATERAL

CORNER 150 PSF/FT × 4' = 600 × 3' = 1800# × 4/2 = 3.6^k × 1.33 = 4.8^k
MAX LATERAL LOAD = 6.8^k
USE MINIMUM 5'-0" DEPTH IN SOIL. = 7.5^k CAPACITY

INTERMEDIATE: 4'-0" ϕ × 5'-0" DEPTH = 9.75^k CAPACITY
~~INTER~~ MAX LATERAL = 6.8 × 2 = 13.6
USE 6'-0" DEPTH = 14.3^k CAPACITY

KORDA

KORDA/NEMETH ENGINEERING

Section FOUNDATIONS

Job No. 2005-1198 Page

By GME Chk Date 8/16/05

CORNER PIER 4x4 SQ - 5' DEEP 24" PIER

16x1.5 = 24 K BRG > 17.7 K

150 PSF/FT x 5' x 2' = 1500 # x 5/2 x 1.33 = 5 K < 6.8

OK FOR BRG. NO GOOD FOR LATERAL

UPLIFT = 3.3 K = 22 FT³ O.K.

INTERMEDIATE PIER - SAME SIZE

24 K < 35.4 K

5 K < 13.6 K

NO GOOD FOR BEARING OR LATERAL.

UPLIFT = 6.6 K = 44 FT³ 16 x 5 = 80 SF SOIL & CONC. O.K.

CONTINUOUS FOUNDATION

CORNER AREA = 3.5 SF + 7.5 = 11 SF x 1.5 = 16.5 K

11 x 2 = 22 K

STRIP AREA = 2' x 1.5 K/SF = 3 K/FT x 10' = 30 K

2 x 2 = 4 K/FT x 10' = 40 K

WT OF FTG = 2' x 10/12 + 6/12 x 50/12 = 3.75 SF x .15 = 563 #/FT

563 x 10' = 5.63 K + WT OF SOIL O.K.

BELL FOOT

CORNER - NOT WIDE ENOUGH FOR LATERAL LOADS

INTERMEDIATE - NOT ENOUGH AREA FOR BEARING OR LATERAL

CONTINUOUS

- NEEDS TO BE SLIGHTLY WIDER FOR BEARING LOADS ≈ 28" WIDE. (OK FOR 2000 PSF SOIL)
- 4' DEEP O.K.
- NEED MORE BOLTS FOR TUBE TO FOUNDATION CONNECTION.
- NEED 2 CONT. BARS IN BOTTOM OF FOOTING.

KORDA

KORDA/NEMETH ENGINEERING

Section FOUNDATIONS

Job No. 2005.1198 Page

By GME Chk Date 8/16/05

INTERMEDIATE

P = DL OF HOUSE = 10,400 #
+ WT OF PIER = 4000 #
+ WT OF SOIL 4300 #
18,700 #

M_O = 6.6 × 5 = 33 ft-k × 1.5 = 49.5 ft-k.

M_r = 18,700 × 2 = 37.4 ft-k

+ 150 × 4' × 2' × 4/2 × 4/3 = 3.2 ft-k
40.6 ft.k

NEED LARGER AREA.

BRG NEED $\frac{35.4}{1.5}$ = 23.6 SF TRY 5×5 25SF

WT OF PIER = 4900 #
WT OF SOIL = 7500 #
12.46 K + 10.4 K = 22.8 K × 2.5' = 57.2 ft-k

USE 5'×5' FOOTING @ INTERMEDIATE

CORNER M_O = 3.3 × 5 × 1.5 = 24.75 ft-k
M_r = (5.2 + 4 + 4.3) × 2 = 27 ft-k
+ 3.2
30.2

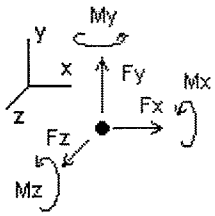
4'×4' O.K. @ CORNER

RAM Advanse

File : C:\RamAdvanse\Data\steel house 2 cell A-D.AVW
Units system : English
Date : 6/20/2005 3:37:22 PM

Analysis Results

Reactions



Direction of positive forces and moments

Node	Forces [Kip] FX	FY	FZ	Moments [Kip*ft] MX	MY	MZ
Condition **C1=0.6dl+wl**						
5	-3.36983	-2.17750	0.00000	0.00000	0.00000	0.00000
6	-5.73017	10.81750	0.00000	0.00000	0.00000	0.00000
SUM	-9.10000	8.64000	0.00000	0.00000	0.00000	0.00000
Condition **C2=0.6dl-wl**						
5	5.75244	10.81750	0.00000	0.00000	0.00000	0.00000
6	3.34756	-2.17750	0.00000	0.00000	0.00000	0.00000
SUM	9.10000	8.64000	0.00000	0.00000	0.00000	0.00000
Condition **C3=dl**						
5	1.98550	7.20000	0.00000	0.00000	0.00000	0.00000
6.	-1.98550	7.20000	0.00000	0.00000	0.00000	0.00000
SUM	0.00000	14.40000	0.00000	0.00000	0.00000	0.00000
Condition **C4=dl+0.75wl+0.75ll**						
5	0.05378	7.95188	0.00000	0.00000	0.00000	0.00000
6	-6.87878	17.69813	0.00000	0.00000	0.00000	0.00000
SUM	-6.82500	25.65000	0.00000	0.00000	0.00000	0.00000
Condition **C5=dl+ll**						
5	3.97101	14.70000	0.00000	0.00000	0.00000	0.00000
6	-3.97101	14.70000	0.00000	0.00000	0.00000	0.00000
SUM	0.00000	29.40000	0.00000	0.00000	0.00000	0.00000
Condition **C6=dl+wl**						
5	-2.57563	0.70250	0.00000	0.00000	0.00000	0.00000
6	-6.52437	13.69750	0.00000	0.00000	0.00000	0.00000
SUM	-9.10000	14.40000	0.00000	0.00000	0.00000	0.00000

Condition **C7=dl-0.75wl+0.75ll**

5	6.89549	17.69813	0.00000	0.00000	0.00000	0.00000
6	-0.07049	7.95188	0.00000	0.00000	0.00000	0.00000
SUM	6.82500	25.65000	0.00000	0.00000	0.00000	0.00000

Condition **C8=dl-wl**

5	6.54664	13.69750	0.00000	0.00000	0.00000	0.00000
6	2.55336	0.70250	0.00000	0.00000	0.00000	0.00000
SUM	9.10000	14.40000	0.00000	0.00000	0.00000	0.00000

LOAD = 40 PSF LIVE LOAD
40 PSF DEAD LOAD (SEE S9)
80 PSF TOTAL

JOIST = 1/4" x 6" PL WELDED TO FLOOR PL @ TOP.

$S_x = \frac{.25(6^2)}{6} = 1.5 \text{ in}^3 \times 24{,}000 \#/\text{in}^2 = 3 \text{ ft-k}$

$M = \frac{80 \times 1.33 \times 10^2}{8} = 1.33 \text{ ft-k}$

$\Delta = \frac{5 \times \frac{40}{12} \times 1.33 \times (10 \times 12)^4}{384(E)\left(\frac{.25 \times 6^3}{12}\right)} = .09 \text{ in} < \frac{10 \times 12}{360} = .33 \text{ in}$

CONNECTION = 1/4" FILLET CONT. = .928 x 4 x 6" = 22 k O.K.

RAFTERS

1/8" x 2" x 5" TUBE, SPAN = 10'-0"
LOAD = 30 PSF LIVE LOAD
38 PSF DEAD LOAD
OK BY INSPECTION

KICKOUT @ BOTTOM = $\frac{.068 \times 1.33 \times 20^2}{8} = \frac{4.52 \text{ ft-k}}{11'} = 400\#$

3/4" ϕ BOLT ACCEPTABLE.

WIND LOAD = 67 PSF MWFRS
58.2 PSF COMP & CLADDING

MEMBERS = (2) 2x4x.0625 TUBE
$S_x = .791 \text{ in}^3$ $I_x = 1.586 \text{ in}^4$ M CAP = 1.66 ft-k
$S_x = .606 \text{ in}^3$ $I_y = .607 \text{ in}^4$ = 1.27 ft-k

MAX TRIBUTARY AREA = $\frac{1.27 \times 8}{10^2} = \frac{.101 \text{ k}}{.058} = 2'$

$\frac{1.66 \times 8}{10^2} = \frac{.133 \text{ k}}{.058} = 2.3'$

$\frac{1.27 \times 8}{8^2} = \frac{.159}{.058} = 2.73'$

$\frac{1.66 \times 8}{8^2} = \frac{.2075}{.058} = 3.58'$

WALL STUDS O.K. FOR STRENGTH

$\Delta \quad \frac{5 \frac{.2075}{12} \times (8 \times 12)^4}{384 \times 29000000 (1.586)} = .415 \text{ in} \qquad \frac{8 \times 12}{360} = .266 \text{ in}$

ASSUMING FIXED ENDS $\Delta = .08''$