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COVER OF 11  
JOB NO 2623  
DATE 1/29/18

**STRUCTURAL CALCULATIONS**  
FOR THE  
**YREKA LANDFILL TRANSFER STATION**

<b><u>DESIGN LOADS</u></b>	<b><u>2016 CBC</u></b>
RISK CATEGORY II, WIND SEISMIC	I seismic =1.0 115 MPH, EXP C SDs=0.58, SD1=0.39 SDC D
<b><u>CONTENT</u></b>	<b><u>PAGE</u></b>
LOADING	A1 – A2
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PRELIMINARY FOUNDATION SIZING	F1 – F2



THE FOLLOWING LOADS ARE USED FOR THE PRELIMINARY SIZEING OF THE BUILDING FOUNDATION AS WELL AS THE DESIGN OF NON-BUILDING ELEMENTS

Design loads

Risk Category II

GRAVITY AND OPERATIONAL LOADS - TRANSFER STATION BUILDING

ROOF SNOW LOAD	40.0	PSF, 20% OF SNOW =	8 PSF SHALL BE INLCUDED WITH SEISMIC
ROOF DEAD LOAD	3.0	PSF	
ROOF COLLATERAL	5.0	PSF	

Seismic Parameters: SDs =		0.59	R OMF = 3.5		
OMF:			R OCBF = 3.25	I = 1.00	SITE CLASS: D
Cs =	SDs/(R/I) =	0.169	Q <sub>E</sub> =	0.169 W	
V Service level =	0.7*Cs =	0.118	0.7*Q <sub>E</sub> =	0.118 W	
OCBF:					
Cs =	SDs/(R/I) =	0.182	Q <sub>E</sub> =	0.182 W	
V Service level =	0.7*Cs =	0.127	0.7*Q <sub>E</sub> =	0.127 W	

Ultimate Wind Speed:	115	MPH,	Exposure: C	Kzt = 1.00	PER CBC 1609.6
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NOTE: LEEWARD WALL AND ROOF PRESSURES SHALL BE EVALUATED AT MEAN ROOF HEIGHT

MWFRS: WINDWARD WALL

	qs *	K *	Cnet *	Kzt =	
P15:	33.86	0.85	0.43	1.00	= 12.4 PSF
P20:	33.86	0.9	0.43	1.00	= 13.1 PSF
P25:	33.86	0.94	0.43	1.00	= 13.7 PSF
P30:	33.86	0.98	0.43	1.00	= 14.3 PSF
P40::	33.86	1.04	0.43	1.00	= 15.1 PSF

MWFRS: WINDWARD ROOF (SLOPE = 3 :12)

	qs*kzt *	Cnet cond1		Cnet cond2	
P15:	28.78	-0.91	= -26.2 PSF	-0.165	= -4.7 PSF
P20:	30.47	-0.91	= -27.7 PSF	-0.165	= -5 PSF
P25:	31.82	-0.91	= -29 PSF	-0.165	= -5.3 PSF
P30:	33.18	-0.91	= -30.2 PSF	-0.165	= -5.5 PSF
P40::	35.21	-0.91	= -32 PSF	-0.165	= -5.8 PSF

MWFRS: LEEWARD WALL

	qs *	K *	Cnet *	Kzt =	
P15:	33.86	0.85	-0.51	1.00	= -14.7 PSF
P20:	33.86	0.9	-0.51	1.00	= -15.5 PSF
P25:	33.86	0.94	-0.51	1.00	= -16.2 PSF
P30:	33.86	0.98	-0.51	1.00	= -16.9 PSF
P40::	33.86	1.04	-0.51	1.00	= -18 PSF

MWFRS: LEEWARD ROOF

	qs *	K *	Cnet *	Kzt =	
P15:	33.86	0.85	-0.66	1.00	= -19 PSF
P20:	33.86	0.9	-0.66	1.00	= -20.1 PSF
P25:	33.86	0.94	-0.66	1.00	= -21 PSF
P30:	33.86	0.98	-0.66	1.00	= -21.9 PSF
P40::	33.86	1.04	-0.66	1.00	= -23.2 PSF

COMPONENTS AND CLADDING

WALL ELEMENTS

	qs *Kzt *	K *	Cnet *	
A < 10SF: P15=	33.86	0.85	-1.09	= -31.4 PSF
A < 10SF: P20=	33.86	0.9	-1.09	= -33.2 PSF
A < 10SF: P25=	33.86	0.94	-1.09	= -34.7 PSF
A < 10SF: P30=	33.86	0.98	-1.09	= -36.2 PSF
A < 10SF: P40=	33.86	1.04	-1.09	= -38.4 PSF

	qs *Kzt *	K *	Cnet *	
A = 500SF: P15=	33.86	0.85	-0.83	= -23.9 PSF
A = 500SF: P20=	33.86	0.9	-0.83	= -25.3 PSF
A = 500SF: P25=	33.86	0.94	-0.83	= -26.4 PSF
A = 500SF: P30=	33.86	0.98	-0.83	= -27.5 PSF
A = 500SF: P40=	33.86	1.04	-0.83	= -29.2 PSF

ROOF ELEMENTS

	qs *Kzt *	K *	Cnet *	
A < 10SF: P20=	33.86	0.9	-1.0	= -30.5 PSF
A < 10SF: P25=	33.86	0.94	-1.0	= -31.8 PSF
A < 10SF: P30=	33.86	0.98	-1.0	= -33.2 PSF
A < 10SF: P40=	33.86	1.04	-1.0	= -35.2 PSF

	qs *Kzt *	K *	Cnet *	
A = 100SF: P20=	33.86	0.9	-0.92	= -28 PSF
A = 100SF: P25=	33.86	0.94	-0.92	= -29.3 PSF
A = 100SF: P30=	33.86	0.98	-0.92	= -30.5 PSF
A = 100SF: P40=	33.86	1.04	-0.92	= -32.4 PSF

# USGS Design Maps Summary Report

Az

## User-Specified Input

**Report Title** YREKA TRANSFER

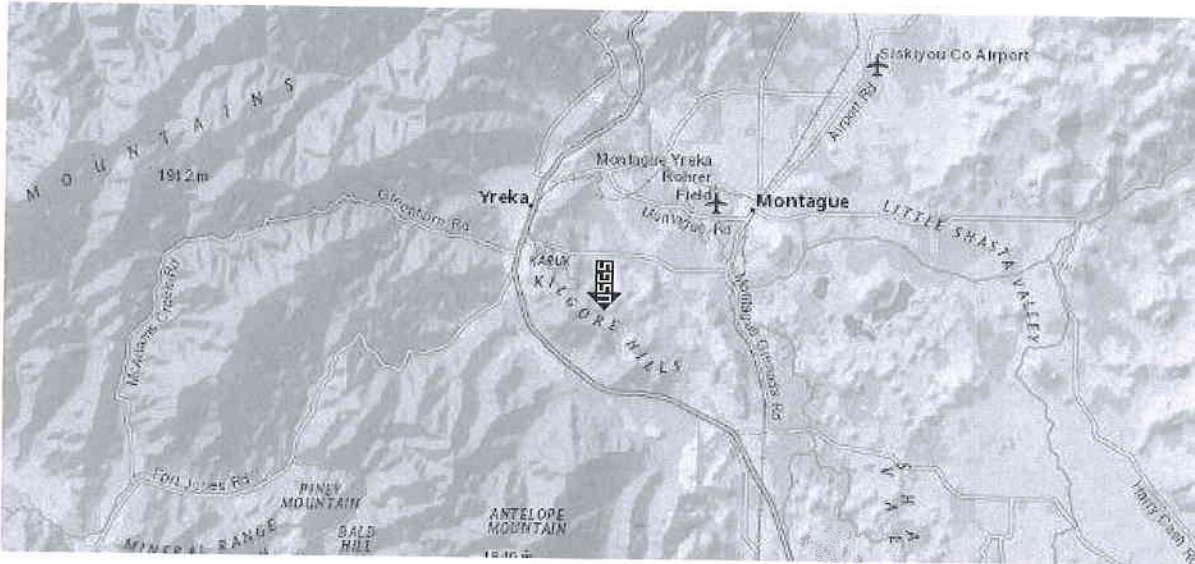
Tue October 3, 2017 18:22:18 UTC

**Building Code Reference Document** 2012/2015 International Building Code  
(which utilizes USGS hazard data available in 2008)

**Site Coordinates** 41.7°N, 122.6°W

**Site Soil Classification** Site Class D - "Stiff Soil"

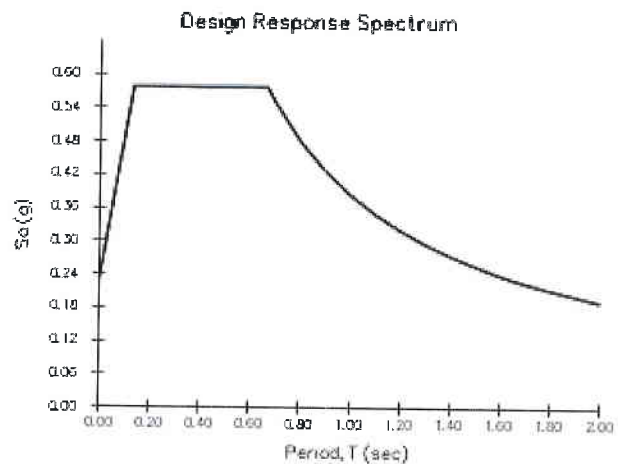
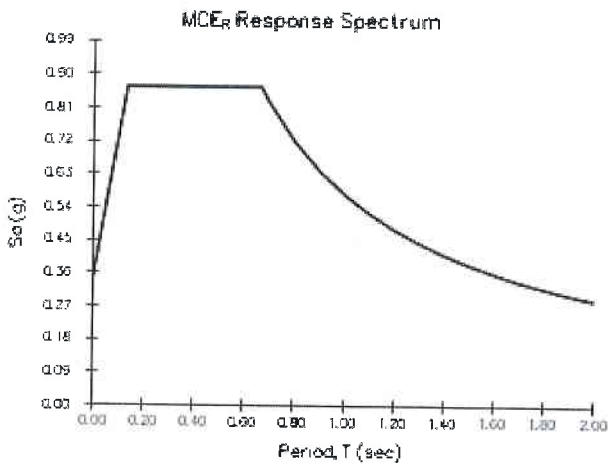
**Risk Category** I/II/III



## USGS-Provided Output

$S_s = 0.698 \text{ g}$	$S_{MS} = 0.867 \text{ g}$	$S_{DS} = 0.578 \text{ g}$
$S_1 = 0.333 \text{ g}$	$S_{M1} = 0.577 \text{ g}$	$S_{D1} = 0.385 \text{ g}$

For information on how the  $S_s$  and  $S_1$  values above have been calculated from probabilistic (risk-targeted) and deterministic ground motions in the direction of maximum horizontal response, please return to the application and select the "2009 NEHRP" building code reference document.



Although this information is a product of the U.S. Geological Survey, we provide no warranty, expressed or implied, as to the accuracy of the data contained therein. This tool is not a substitute for technical subject-matter knowledge.

KZAE # 2023  
10/3/17

YREKA TRANSFER  
A3

## PRELIMINARY PEMB LOADING FOR BUILDING REACTIONS

NOTE: FOUNDATION SIZING IN THIS DOCUMENT IS FOR BID PURPOSES. THE FOUNDATION ENGINEERING WILL NEED TO BE REVISED BASED ON THE FINAL BUILDING ENGINEERING

GRAVITY LOADS: DL = 3PSF  
CL = 9PSF  
SL = 40PSF

### WIND FOR OPEN STRUCTURE:

$$\text{ASCE 7-10 (27.3-1)} \quad q = 0.00256 (1.04) (1.0) (0.85) (115^2) = 30 \text{ PSF}$$

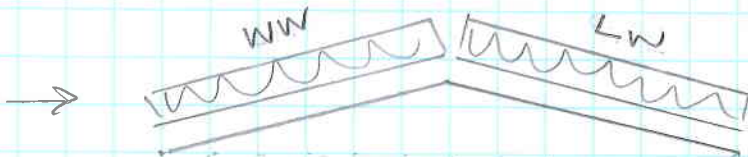
$$(27.4-3) \quad P = q G C_N = 30 (0.85) C_N = 25.5 C_N$$

WIND || TO RIDGE:  $C_N = -0.8$

$$P = 25.5 \times -0.8 = -20.4 \text{ PSF OUTWARD ON ROOF}$$

$$P = 30 (0.85) (1.5) = 38.3 \text{ PSF ON VERTICAL SURFACES}$$

### WIND $\perp$ TO RIDGE:



CASE A:  $C_{NW} = 1.1$ ,  $C_{NL} = -0.4$

$$P_{WW} = 25.5 (1.1) = 28 \text{ PSF}$$

$$P_{LW} = 25.5 (-0.4) = -10 \text{ PSF}$$

CASE B:

$$P_{WW} = 25.5 (0.1) = 3 \text{ PSF}$$

$$P_{LW} = 25.5 (-1.1) = -28 \text{ PSF}$$

SEIS:  $DL + 0.25SL = 3^d + 0.2 \times 40^d + 5^d = 16 \text{ PSF}$

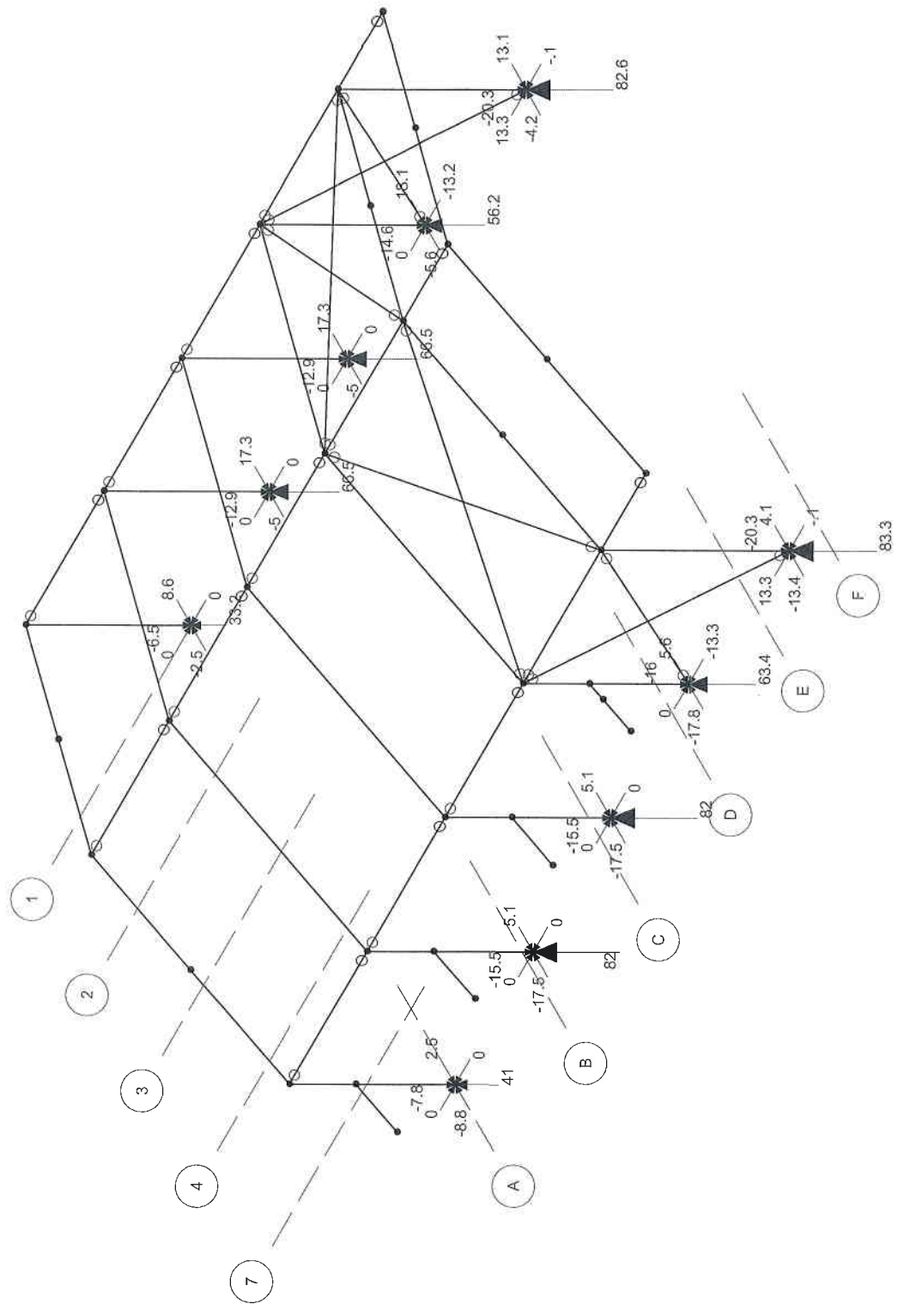
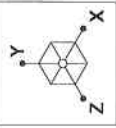
$$CS = 0.182 \text{ MAX}$$

$$L.O.E./FRAME = 0.182 (16^d) (28') (100^d) = 8.2^k \text{ PER FRAME}$$

$$L.O.E./SIDEWALL = 0.182 (16^d) (128') (100^d/2) = 18.6^k \text{ PER SIDEWALL}$$

**Envelope Joint Reactions**

	Joint		X [k]	LC	Y [k]	LC	Z [k]	LC	MX [k-ft]	LC	MY [k-ft]	LC	MZ [k-ft]	LC
1	N7	max	.006	24	40.987	2	2.543	20	0	1	0	1	0	1
2		min	-.005	21	-7.775	15	-8.772	11	0	1	0	1	0	1
3	N8	max	.006	24	81.974	2	5.085	20	0	1	0	1	0	1
4		min	-.005	21	-15.549	15	-17.545	11	0	1	0	1	0	1
5	N10	max	.006	24	63.353	2	5.569	20	0	1	0	1	0	1
6		min	-13.316	21	-16.014	15	-17.827	11	0	1	0	1	0	1
7	N11	max	13.27	24	83.251	2	4.09	20	0	1	0	1	0	1
8		min	-.075	23	-20.27	16	-13.426	11	0	1	0	1	0	1
9	N1	max	.006	24	33.234	2	8.643	12	0	1	0	1	0	1
10		min	-.005	21	-6.459	15	-2.516	19	0	1	0	1	0	1
11	N2	max	.006	24	66.469	2	17.285	12	0	1	0	1	0	1
12		min	-.005	21	-12.918	15	-5.032	19	0	1	0	1	0	1
13	N3	max	.006	24	66.469	2	17.285	12	0	1	0	1	0	1
14		min	-.005	21	-12.918	15	-5.032	19	0	1	0	1	0	1
15	N4	max	.006	24	56.186	2	18.058	12	0	1	0	1	0	1
16		min	-13.229	21	-14.642	15	-5.552	19	0	1	0	1	0	1
17	N9	max	.006	24	81.974	2	5.085	20	0	1	0	1	0	1
18		min	-.005	21	-15.549	15	-17.545	11	0	1	0	1	0	1
19	N5	max	13.319	22	82.632	2	13.128	12	0	1	0	1	0	1
20		min	-.075	23	-20.331	16	-4.165	19	0	1	0	1	0	1
21	Totals:	max	26.6	22	656.529	2	41.789	18						
22		min	-26.6	23	-125.951	16	-39.521	5						

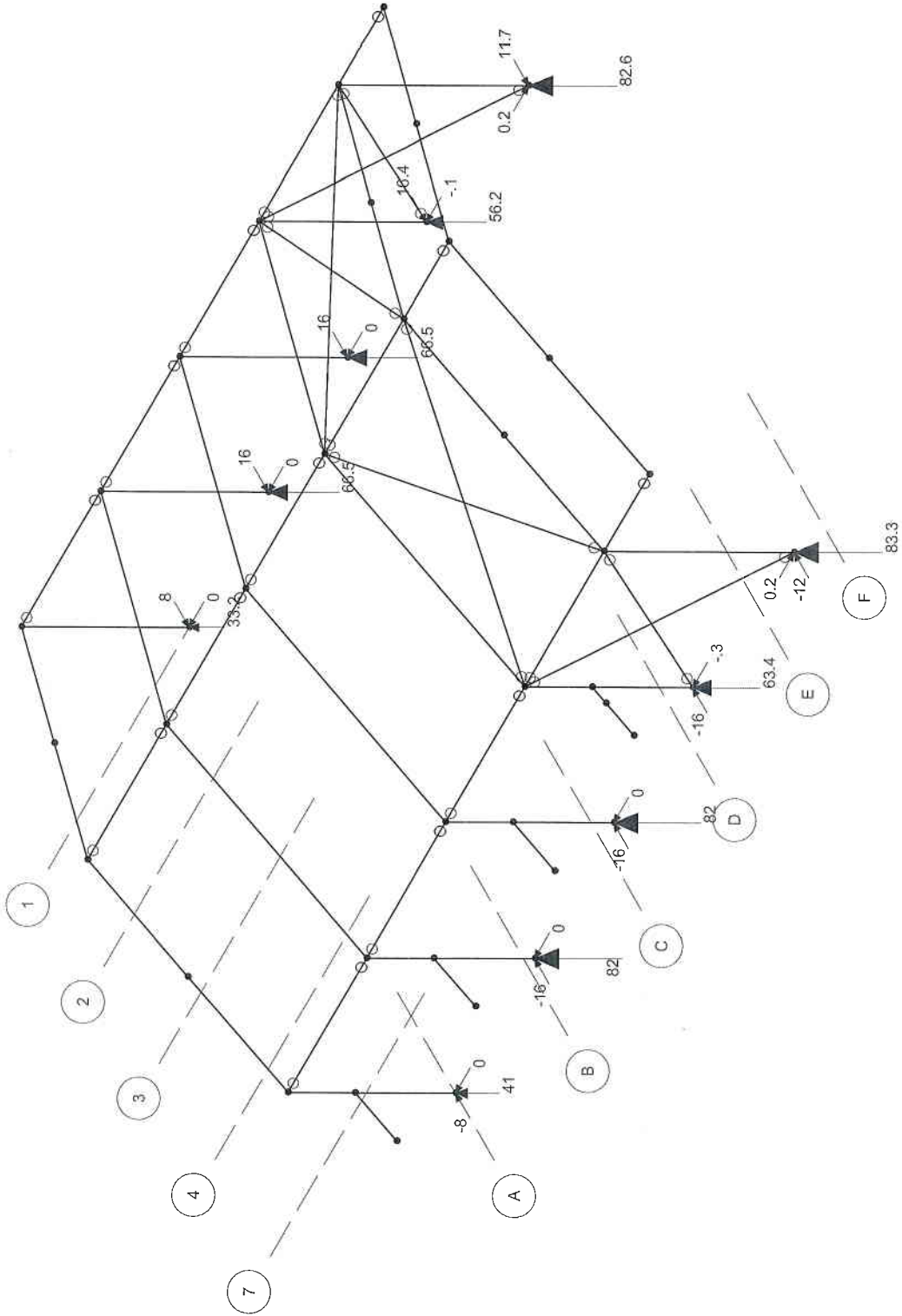
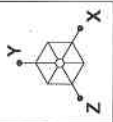


Reaction and Moment Units are k and k-ft (Enveloped)

SK - 11

Oct 19, 2017 at 4:18 PM

2623 open building reactions.r3d



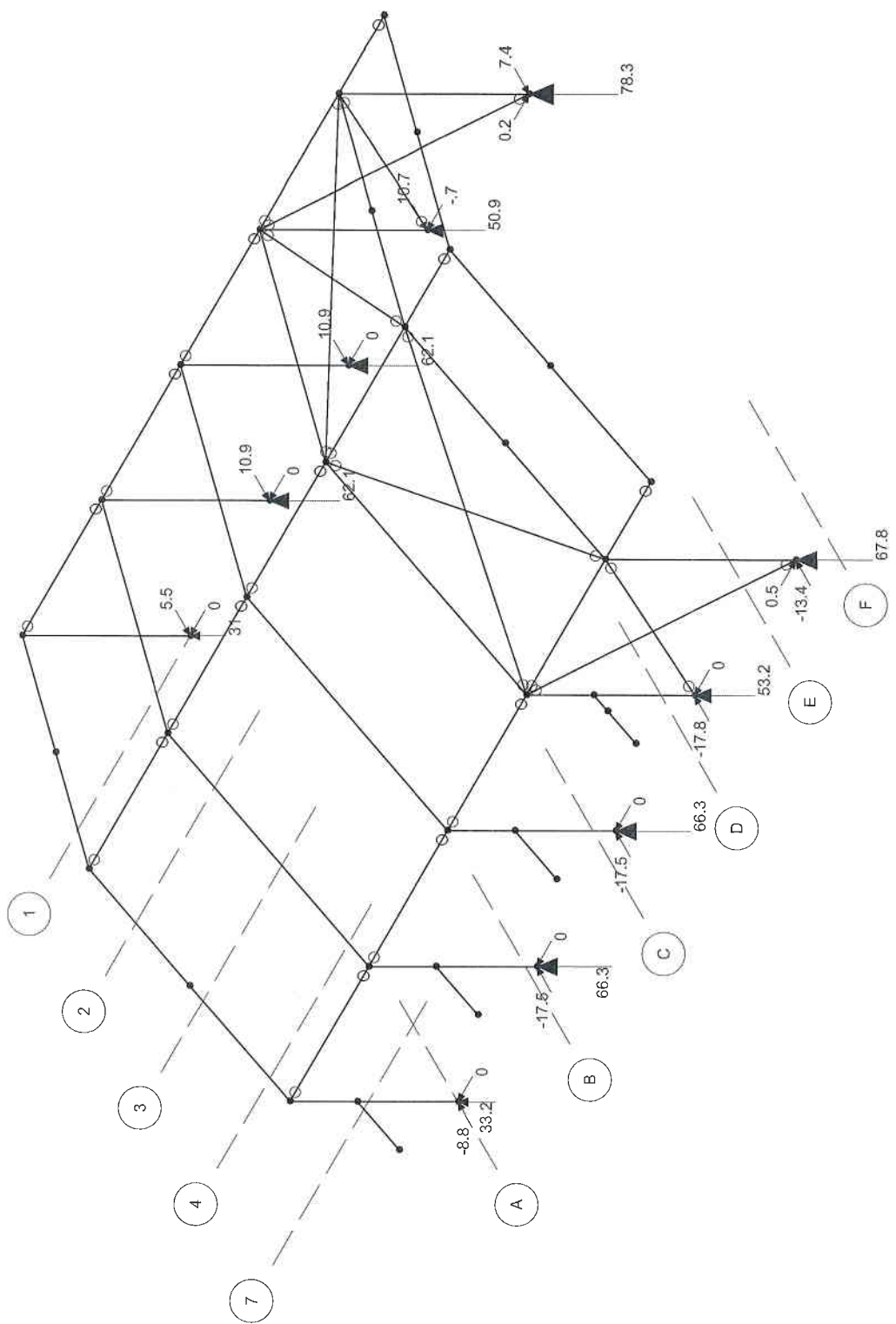
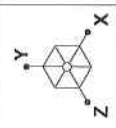
Results for LC 2, IBC 16-10 (a) *Ductility*  
Reaction and Moment Units are k and k-ft

SK - 10

Oct 19, 2017 at 4:18 PM

2623 open building reactions.r3d

RD



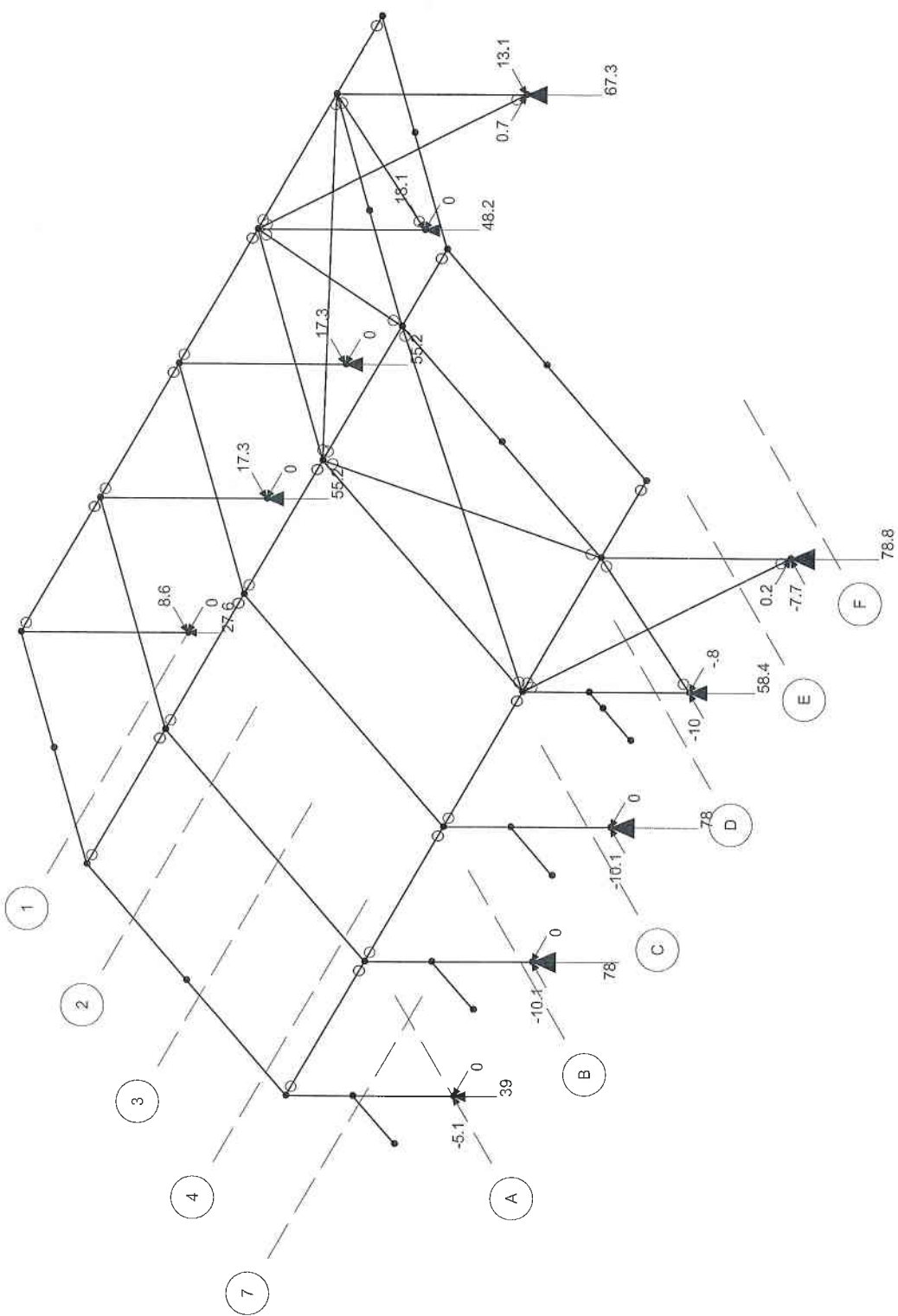
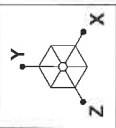
Results for LC 11, IBC 16-13 (a) (b)  $DL + CL + 0.75SL + 0.45WL$   
 Reaction and Moment Units are k and k-ft

SK - 12

Oct 19, 2017 at 4:18 PM

2623 open building reactions.r3d



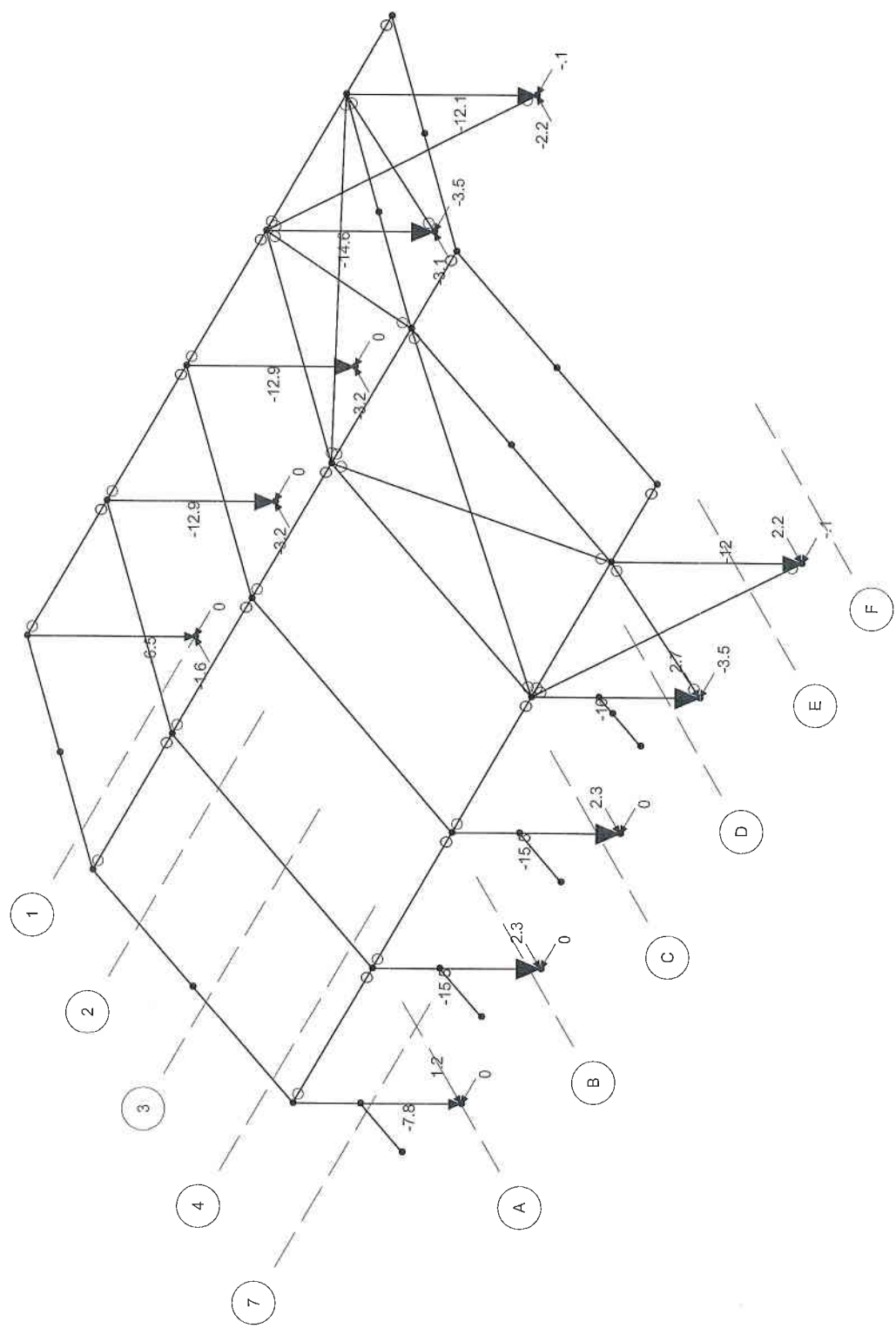
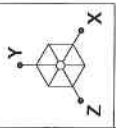


Results for LC 12,  $DL + CL + 0.75 SL - 0.45 WL \pm E$   
 Reaction and Moment Units are k and k-ft

SK - 13

Oct 19, 2017 at 4:18 PM

2623 open building reactions.r3d

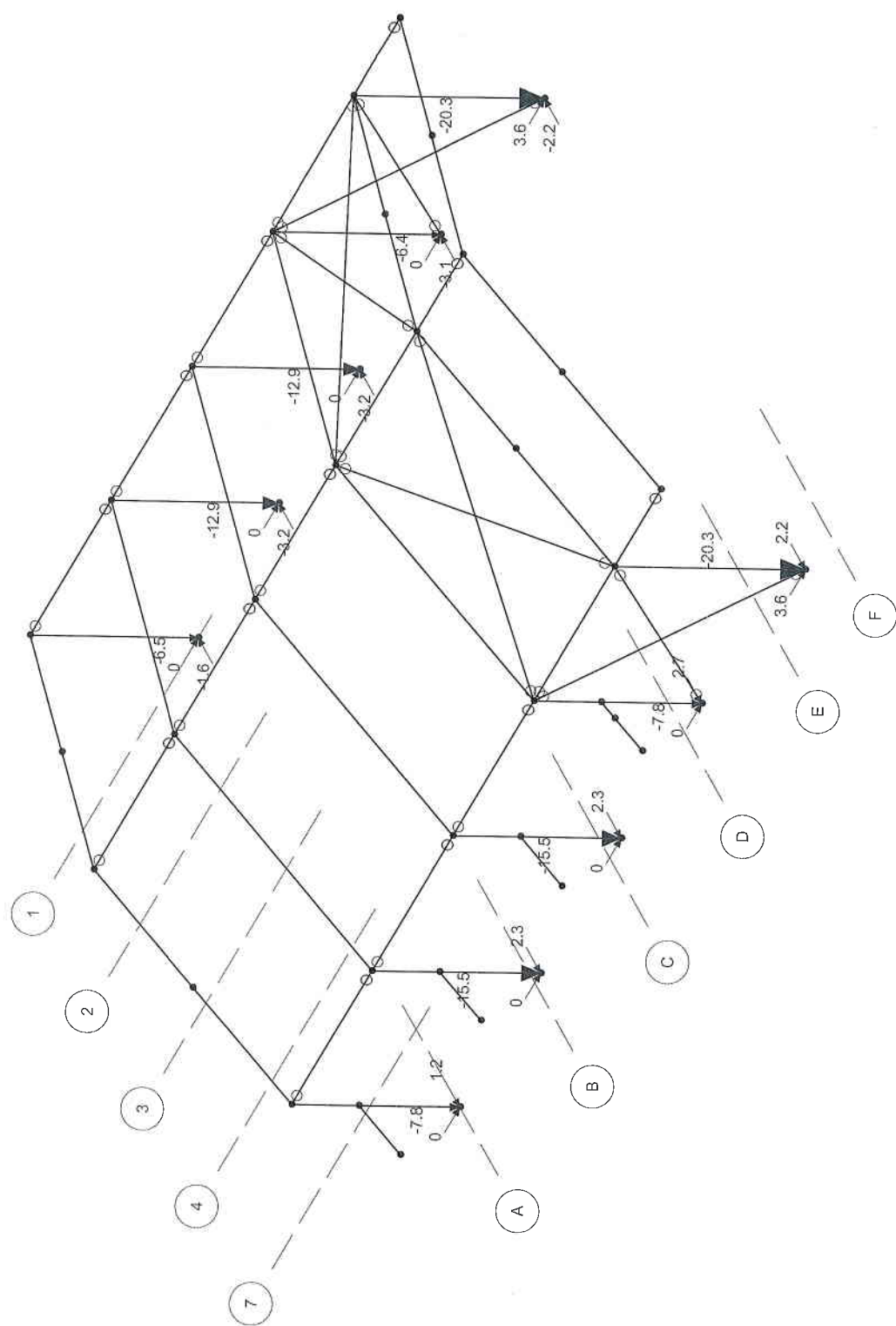
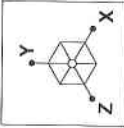


Results for LC 15, IBC 16-15 (a) 0, bDL to bWLX  
 Reaction and Moment Units are k and k-ft

SK - 14

Oct 19, 2017 at 4:19 PM

2623 open building reactions.r3d



Results for LC 16, 0.6DL - 0.6WLX  
 Reaction and Moment Units are k and k-ft

SK - 15

Oct 19, 2017 at 4:19 PM

2623 open building reactions.r3d

K2AE# 2623  
1/26/18

YJS  
FJ

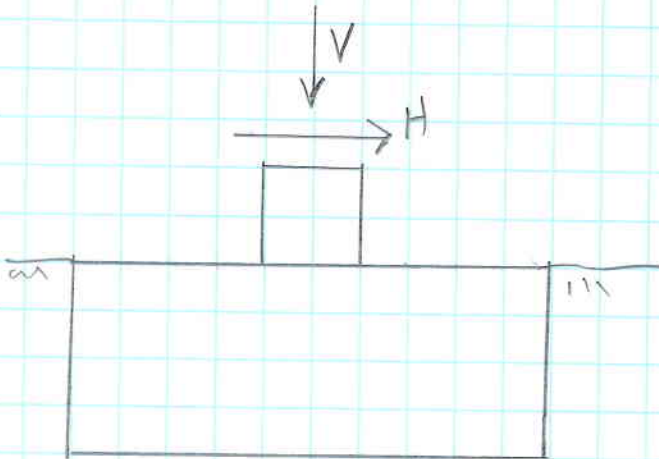
TYP. SPREAD FTG

$F_A = 3000 \text{ PSF NET}$   
 $\mu = 0.4$

$V_{MIN} \uparrow = 20.3^k @ \textcircled{F}$   
 $19.6^k \text{ ELSEWHERE}$

$V_{MAX} \downarrow = 83.3^k$

$H_{MAX} = 17.8^k \text{ W/} \downarrow = 53.2^k$



• SIZE FOR BEARING:  
 $(83.3^k / 2100 \text{ PSF})^{1/2} = 5.3'$

USE 6'-0" SQ. FTG, MIN. CAM LOCATIONS  
SEE BELOW FOR UPLIFT

GRID ① & ② FTG

SIZE FOR UPLIFT =  $20.3^k$ :

$\text{VOL REQD} = (20.3^k - 2.8^k) / (0.6 \times 0.15) = 194 \text{ CF}$

18" x 18" GRADE AM BTWN ① & ②

$(0.6 \times 0.15 \times 1.5 \times 1.5 \times 28/2)$

6'-0" SQ. FTG:  $194 / 6^2 = 3.0'$  [ 6'-0" x 3'-0" OP FTG ]

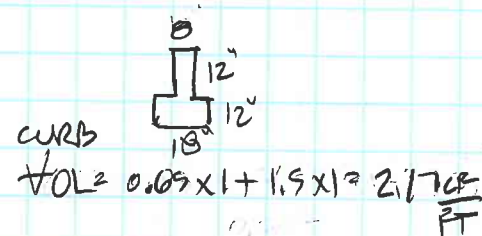
GRID 2 @ A, B & C:

SIZE FOR UPLIFT =  $15.6^k$

$\text{VOL REQD} = 15.6^k / (0.6 \times 0.15) = 174 \text{ CF}$

20 FT OF CURB =  $2.17 \times 20 = 43.4 \text{ CF}$

6'-0" SQ. =  $(174 - 43.4) / 6^2 = 2.1' \Rightarrow 2 \text{ L4 DEEP}$



SLIDING  $\xrightarrow{17.8^k} \downarrow 53.2^k$   $F_{UC} = 0.4 (53.2^k + 0.15 (6^2 \times 6)) = 27.3^k$

$27.3 / 17.8 = 1.54 \text{ FOS OK}$

KZAB #2023  
1/26/18

YTS  
KZ

GRID 1 FTG @ A, B & C

SIZE FOR UPLIFT: 15.0K

VOL REQ'D = 174 CF

$$174 / 8^2 = 2.7' - \left[ \text{0'-0" SQ. X 2'-0" DP} \right]$$