CAROTHERS AND SON LTD

EUGENE, OREGON

CALCULATIONS

FOR

GANAHL LUMBER COMPANY FOR FILTER SUPPORT STRUCTURE & FOUNDATION

May 31, 2017 Revision 0

REGISTERED PROFESSIONAL ENGINEER
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EXPIRES: 09/30/2018

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Project #3524.0

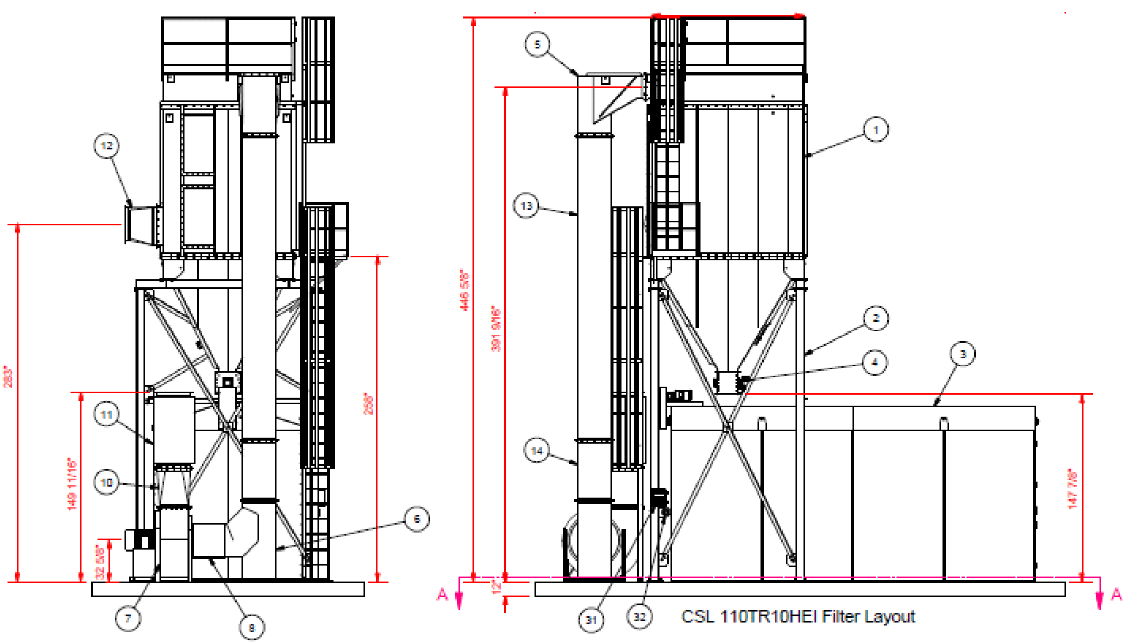
Filter Support and Foundation Design

CSL 110 TR10 HEI Filter-

Design the steel support structure and foundation for the 110 TR10 HEI Filter shown on Carothers project no. 8555 drawings.The equipment will be located at Ganahl Lumber in Costa Mesa, California; therefore use the 2016 California Building Code (CBC 16) as adotped by the state of California, California Building Code, Title 24. The CBC allows the use of the ASCE 7-10.

The Filter is a Category II structure - ASCE 7-10, Table 1.5-1

Dead Load	Taken from CSL Drawings
Snow Load	0 psf - ASCE 7-10 fig. 7-1, Elevation under 1800 ft.
Live Load	60 psf - work platforms
Seismic Loads	Use ASCE 7-10
Wind Loads	110mph, 3-sec gust at 33ft; ASCE 7-10 fig. 26.5-1A



Dimensions of the Structure

$H := 402in = 33.5ft$ — total height to top of plenum

$B := 102in = 8.5ft$ — narrow side of filter

$L := 144in = 12ft$ — wide side of filter

$h_h := 91.16in = 7.597ft$ — height of hopper

<u>Live Load</u>

$Live := B \cdot L \cdot 60psf = 6.12 \cdot kip$ $Snow := B \cdot L \cdot 0psf = 0 \cdot kip$

Dead Load

Weight of filter components, given by CSL. Minor weights will be ignored in determining appropriate CG.:

Calculated dead load will be multiplied by 1.05 to include 5% colladeral for misc unaccounted for weights

Weights for elements given by CSL, heights determined from ACAD drawings by CSL.

plenum:

$h_{pl} := 391.56in = 32.63\,ft$ — height of plenum

$w_{pl} := 2539lbf$ — weight of plenum

housing:

$h_{hsg} := 257in + \frac{120in}{2} = 26.417\,ft$ — height of housing

$w_{hsg} := 3125lbf$ — weight of housing

hopper:

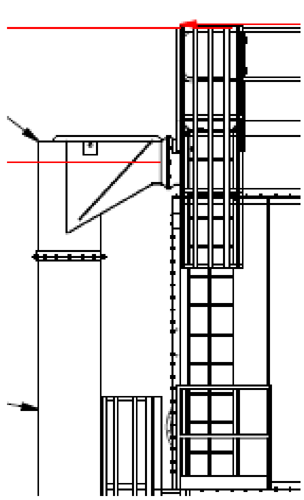
$h_{hop} := 167in + h_h \cdot \frac{2}{3} = 18.98\,ft$ — height of hopper

$w_{hop} := 1480lbf$ — weight of hopper

$w_c := w_{hop} + w_{pl} + w_{hsg} = 7144\,lbf$ — total weight of filter

$h_c := \frac{h_{hop} \cdot w_{hop} + h_{pl} \cdot w_{pl} + h_{hsg} \cdot w_{hsg}}{w_c} = 27.085\,ft$ — center of mass of filter

32" dia. outlet duct assembly:

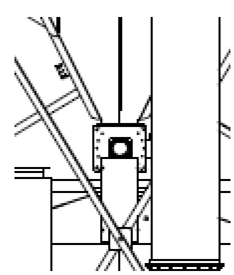


$O_{duct} := 0.301kip$

use half of weight at the top and half at bottom for horizontal force distributions - all weight at the bottom for vertical forces.

$h_{oduct} := 391.56in$

Airlock:



$Alock := .3605kip$

$h_{alock} := 157.13in$

$D_{od} := 26in$ — daimeter of outlet duct

$w_{bt} := .3168kip$ — weight of top bootee

$w_{pc} := .087kip$ — weight of pipe coupler

$w_{bb} := .293kip$ — weight of bottom bootee

$Oduct := O_{duct} + w_{bt} + w_{pc} + w_{bb} = 997.8\,lbf$ — weight of Oduct

Inlet transition and duct:

$Itrans := .105kip$ weight of inlet transition

$h_{itrans} := 283in$ height of inlet transition

Upper ladder, lower ladder, and ladder platform

$ladder_u := .242kip$ weight of upper ladder

$h_{ladu} := 352in$ height of upper ladder

$ladder_l := .403kip$ weight of lower ladder

$h_{ladl} := 149in$ height of lower ladder

$platform := .175kip$ weight of ladder platform

$h_{plat} := 149in$ height of ladder platform

Apply forces at the filter.

Find center of gravity of filter + supported elements:

$$W_{tot} := \begin{pmatrix} w_c \\ Alock \\ \frac{Oduct}{2} \\ Itrans \\ ladder_u \\ ladder_l \\ platform \end{pmatrix} \quad \begin{matrix} \text{collector} \\ \text{air lock} \\ \text{outlet duct} \\ \text{inlet trans} \\ \text{upper ladder} \\ \text{lower ladder} \\ \text{ladder platform} \end{matrix} \quad h := \begin{pmatrix} h_c \\ h_{alock} \\ h_{oduct} \\ h_{itrans} \\ h_{ladu} \\ h_{ladl} \\ h_{plat} \end{pmatrix}$$

$$cg := \frac{\sum_i \left(W_{tot_i} \cdot h_i\right)}{\left(\sum_i W_{tot_i}\right)} = 26.833\,ft$$ Height to cg

$$W_{empty} := \sum_i \left(W_{tot_i} \cdot 1.05\right) = 8.768 \cdot kip$$ Empty weight

$$W_{DL} := W_{empty} = 8.768 \cdot kip$$ Dead load of filter + supported elements

Material weight - $\rho_{dust} := 12pcf$ — dust density - from CSL; filter is typically empty but use 1/2 of bottom filled to be conservative

$$v_{bot} := \frac{1}{2} \cdot \frac{1}{3} \cdot h_h \cdot B \cdot L = 129.1 \cdot ft^3$$

1/2 volume of hopper

$$h' := \left[\frac{6v_{bot} \cdot L}{2 \cdot \left(\frac{L}{h_h}\right)^2 \cdot B}\right]^{\frac{1}{3}} = 6.029\,ft$$

height of dust when hopper is half full

$$W_5 := v_{bot} \cdot \rho_{dust} = 1.55 \cdot kip$$

Operating material weight

$$W_T := W_{empty} + W_5 = 10.318 \cdot kip$$

Total operating weight (excluding support steel. Use for seismic loads)

$$h_5 := 167in + \frac{3 \cdot h'}{4} = 18.439\,ft$$

Height to cg of material with hopper half full of material

$$cg_{op} := \frac{W_{empty} \cdot cg + W_5 \cdot h_5}{W_T} = 25.572\,ft$$

operating center of gravity

Live Load

$$LL := 60psf \cdot B \cdot L = 6.12 \cdot kip$$

live load applied at operating center of gravity in model

Plugged Load

$$PL := v_{bot} \cdot 62.4pcf = 8.059 \cdot kip$$

filter filled with water up to the drain gate (assume half hopper volume below drain gate (conservatvie))

Wind Loading - Use ASCE 7-10 chapter 29

Basic wind speed (3sec gust at 33ft) $v := 110$

Use exposure C $B = 8.5\,ft$

$K_{zt} := 1.0$ no topographic effects - ASCE 7-10 sec. 29.3.2

$G := .85$ gust effect factor - ASCE 7-10 sec. 29.5

$K_d := .9$ wind directionality factor - ASCE 7- sec. 29.3.2

$K_z := 0.94$ velocity pressure coefficient at centroid of Af approx. equal to cg, 25 ft - ASCE 7-10 29.3.1 Tbl-29.3-1

$q_z := .00256psf \cdot K_z \cdot K_{zt} \cdot K_d \cdot v^2$ $q_z = 26.206 \cdot psf$ velocity pressure - ASCE 7-10 sec. 29.3.2

Wind Load on Other Structures - ASCE 7-10 sec. 29.5

$r := \begin{pmatrix} 1 \\ 7 \\ 25 \end{pmatrix}$ $c := \begin{pmatrix} 1.3 \\ 1.4 \\ 2 \end{pmatrix}$ $\frac{H}{B} = 3.941$ $C_f := \mathrm{linterp}\left(r, c, \frac{H}{B}\right)$ $C_f = 1.349$

$f := q_z \cdot G \cdot C_f = 30.049 \cdot psf$ Wind pressure on filter

Find areas and center of applied wind load:

housing + plenum:

$h_{hp} := \frac{h_{hsg} + h_{pl}}{2} = 29.523\,ft$ $A_{hp\_B} := 10ft \cdot B = 85\,ft^2$ $A_{hp\_L} := 10ft \cdot L = 120\,ft^2$

hopper:

$h_{hop} := 167in + h_h \cdot \frac{2}{3} = 18.98\,ft$ $A_{hop\_B} := \frac{1}{2} \cdot h_h \cdot B = 32.286\,ft^2$ $A_{hop\_L} := \frac{1}{2} \cdot h_h \cdot L = 45.58\,ft^2$

Airlock:

$h_a := 167in - 9in = 13.17\,ft$ $A_{a\_B} := 20in \cdot 18in = 2.5\,ft^2$ $A_{a\_L} := 16.25in \cdot 18in = 2.031\,ft^2$

$A_{c\_B} := A_{hp\_B} + A_{hop\_B} + A_{a\_B} = 119.786\,ft^2$ projected area of filter in narrow direction

$A_{c\_L} := A_{hp\_L} + A_{hop\_L} + A_{a\_L} = 167.611\,ft^2$ projected area of filter in wide direction

$F_{c\_L} := f \cdot A_{c\_L} = 5.037 \cdot kip$ total wind load on wide face of filter (x - direction in model)

$F_{c\_B} := f \cdot A_{c\_B} = 3.599 \cdot kip$ total wind load on narrow face of filter (z - direction in model)

Include wind from guardrail, ducting, and ladders - use ASCE wind force task committee recommendations for Cf and area:

Guardrail -

$K_d := .95$ wind directionality factor - ASCE 7- sec. 29.3.2

$q_z := .00256psf\, K_z \cdot K_{zt} \cdot K_d \cdot v^2 = 27.662 \cdot psf$ velocity pressure - ASCE 7-10 sec. 29.3.2

$A_{hr} := 2in \cdot 2 + 6in + \dfrac{42in \cdot 2in \cdot 3}{B} = 1.039\,ft$ area of solid guardrail per square foot

$f_{hrL} := q_z \cdot G \cdot 2.0 \cdot 1\dfrac{ft^2}{ft} \cdot 2L = 1.129 \cdot kip$ wind force on narrow side guardrails

$f_{hrB} := q_z \cdot G \cdot 2 \cdot 1\dfrac{ft^2}{ft} \cdot 2 \cdot B = 0.799 \cdot kip$ wind force on wide side guardrails

$h_{hr} := H + \dfrac{42in}{2} = 35.25\,ft$

Outlet Duct -

$r_{duct} := \begin{pmatrix} 1 \\ 7 \\ 25 \end{pmatrix}$ $c_{duct} := \begin{pmatrix} 0.5 \\ 0.6 \\ 0.7 \end{pmatrix}$ $C_{fduct} := \text{linterp}\left(r_{duct}, c_{duct}, \dfrac{H}{D_{od}}\right) = 0.647$

$f_{oductL} := q_z \cdot G \cdot C_{fduct} \cdot D_{od} \cdot \dfrac{h_{oduct}}{2} = 0.538 \cdot kip$ wind load on Outlet duct

Ladders -

$h_{ladu} := 189in$ height of upper ladder

$h_{ladl} := 295.6in$ height of lower ladder

$f_{ladu} := q_z \cdot G \cdot 2.0 \cdot .75\dfrac{ft^2}{ft} \cdot \dfrac{h_{ladu}}{2} = 0.278 \cdot kip$ wind load on upper ladder

$f_{ladl} := q_z \cdot G \cdot 2.0 \cdot .75\dfrac{ft^2}{ft} \cdot \dfrac{h_{ladl}}{2} = 0.434 \cdot kip$ wind load on lower ladder

$F_{wide} := F_{c\_L} + f_{hrL} + f_{ladu} + f_{ladl} + f_{oductL} = 7.415 \cdot kip$ total wind force on wide face of filter + elements

$F_{narrow} := F_{c\_B} + f_{hrB} + f_{ladu} + f_{ladl} + f_{oductL} = 5.649 \cdot kip$ total wind force on narrow face of filter + elements

$h_{cw} := \dfrac{A_{hp\_L} \cdot h_{hp} + A_{hop\_L} \cdot h_{hop} + A_{a\_L} \cdot h_a}{A_{c\_L}} = 26.458\,ft$ height of center of area for wind applied to filter

$h_w := \dfrac{\left(F_{c\_L} \cdot h_{cw} + f_{hrL} \cdot h_{hr} + f_{ladu} \cdot h_{ladu} + f_{ladl} \cdot h_{ladl}\right)}{F_{wide}} = 25.37\,ft$ height of center of wind applied to filter + supported elements

Wind load applied to steel support frame:

$K_d := .85$ — wind directionality factor - ASCE 7- sec. 29.3.2

$K_z := .94$ — velocity pressre coefficient

$q_z := .00256psf\, K_z \cdot K_{zt} \cdot K_d \cdot v^2 = 24.75 \cdot psf$ — velocity pressure - ASCE 7-10 sec. 29.3.2

$h_{sf} := 239.4in$ — height of steel frame

$W_n := 121.5in = 10.125\,ft$ — width of narrow face of frame

$A_g := W_n \cdot h_{sf} = 201.994\,ft^2$ — maximum gross area of each face of frame

$A_s := 6in \cdot h_{sf} \cdot 2 + 3in \cdot \sqrt{W_n^2 + h_{sf}^2} \cdot 2 = 31.136\,ft^2$ — area of framing on narrow face

$\varepsilon := \dfrac{A_s}{A_g} = 0.154$

$C_f := 4 \cdot \varepsilon^2 - 5.9\varepsilon + 4 = 3.19$ — Force coefficient for truss - ASCE 7-10 Fig. 29.5-3

$F_{wf\_x} := q_z \cdot G \cdot C_f = 67.02 \cdot psf$ — wind force at steel support frame - ASCE 7-10 Eq. 29.5-1

$F_{wf\_x} := \dfrac{F_{wf\_x}}{2} = 33.51 \cdot psf$ — x-direction wind force to be applied to RISA model (RISA applies load to both faces of structure)

$W_w := 12ft = 12\,ft$ — width of wide face of frame

$A_g := W_w \cdot h_{sf} = 239.4\,ft^2$ — maximum gross area of each face of frame

$A_s := 6in \cdot h_{sf} \cdot 2 + 3in \cdot \sqrt{W_w^2 + h_{sf}^2} \cdot 2 = 31.59\,ft^2$ — area of framing on wide face

$\varepsilon := \dfrac{A_s}{A_g} = 0.132$

$C_f := 4 \cdot \varepsilon^2 - 5.9\varepsilon + 4 = 3.29$ — Force coefficient for truss - ASCE 7-10 Fig. 29.5-3

$F_{wf\_z} := q_z \cdot G \cdot C_f = 69.24 \cdot psf$ — z-direction wind force to be applied to RISA model (RISA applies load to both faces of structure)

$F_{wf} := \dfrac{\max(F_{wf\_z}, F_{wf\_x})}{2} = 34.62 \cdot psf$ — wind force at steel support frame - ASCE 7-10 Eq. 29.5-1

$w_{w\_W6} := F_{wf} \cdot 6in = 17.3 \cdot plf$ — wind load to be applied to W6x15 Columns

$w_{w\_L3} := F_{wf} \cdot 3in = 8.7 \cdot plf$ — wind load to be applied to 3" braces

Seismic Load - Nonbuilding Structure; ASCE 7-10 sec. 15.4

Use $R := 2$ $\Omega_0 := 2$ $C_d := 2.5$ ASCE 7-10 Tbl. 15.4-2 - elevated bins hoppers on asymmetrically braced legs

$S_{Ds} := 1.061$ $S_{D1} := .584$ From USGS Seismic Design Parameters

Seismic Design Cat. D (ASCE tbls. 11.6-1 and 2) $I_E := 1.0$

Seismic weight - $W_{eq} := W_T = 10.318 \cdot kip$ Total seismic operating weight of filter + supported elements

Seismic CG -

$CG := cg_{op} = 25.572\,ft$

Estimate Fundamental Period per ASCE 7-10, 15.4.4

$T := .115sec$ Determined using RISA dynamic analysis

$C_{sd} := \dfrac{S_{Ds}}{\dfrac{R}{I_E}}$ $C_{sd} = 0.53$ $C_{smax} := \dfrac{S_{D1}}{\dfrac{T}{s} \cdot \left(\dfrac{R}{I_E}\right)}$ $C_{smax} = 2.539$ ASCE 7-10 sec. 12.8.1.1

$C_{smin} := \max(0.044 \cdot S_{Ds} \cdot I_E, 0.03) = 0.047$ ASCE 7-10 sec.15.4.1

$C_s := \text{if}\left(C_{smax} \le C_{sd}, C_{smax}, \max\left(C_{sd}, C_{smin}\right)\right) = 0.53$

$\rho := 1.0$ redundancy factor

$V_h := \rho \cdot C_s \cdot W_{eq} = 5.474 \cdot kip$

Vertical Load Effects - ASCE 7-10 12.4.2.2

$Q_v := .2 \cdot S_{Ds} = 0.212$

$V_v := .2 \cdot S_{Ds} \cdot W_{eq} = 2.189 \cdot kip$

USGS Design Maps Summary Report

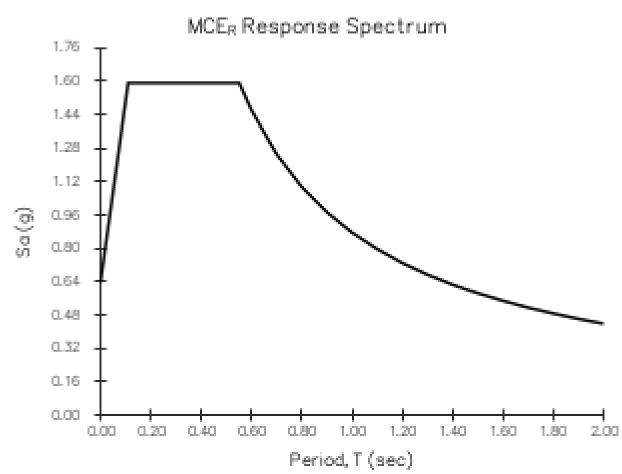
User–Specified Input

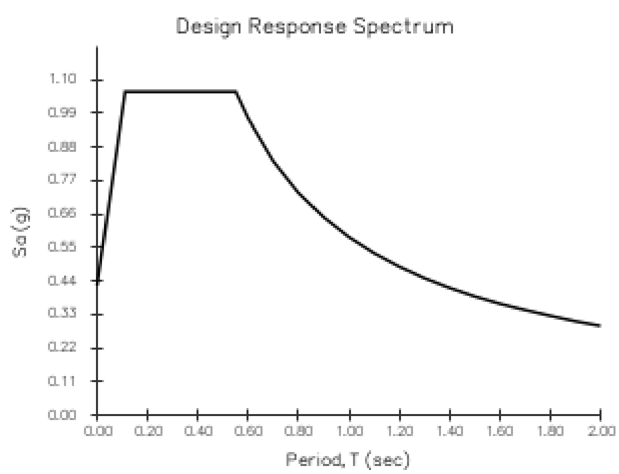
Report Title	Ganahl Lumber Costa Mesa, Ca. Tue May 16, 2017 17:31:23 UTC
Building Code Reference Document	ASCE 7-10 Standard (which utilizes USGS hazard data available in 2008)
Site Coordinates	33.66909°N, 117.88393°W
Site Soil Classification	Site Class D – "Stiff Soil"
Risk Category	I/II/III

USGS–Provided Output

S_S = 1.591 g	S_{MS} = 1.591 g	S_{DS} = 1.061 g
S_1 = 0.584 g	S_{M1} = 0.876 g	S_{D1} = 0.584 g

For information on how the SS and S1 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.





For PGA_M, T_L, C_{RS}, and C_{R1} values, please view the detailed report.

For the RISA model, loads are distributed to the support steel at (4) attachment points on the top horizontal support members. The connection points are attached to the collector. The collector is modeled in RISA as a rigid body represented by rigid members connected to (2) centered points. The points are the calculated centers of gravity for weight and for wind loads calculated previously. The loads imparted on the support steel from the various components for dead, live, seismic and plugged loads are applied to weight center of gravity. Loads imparted on the support steel from the wind loads on various components are applied at the wind center of gravity. The support steel has seismic loading applied for the dead weight of the members, and wind loading applied to each member individually.

Summary of loads for RISA model

Dead Load (operating weight) -

$DL := W_T = 10.318 \cdot kip$

Live Load-

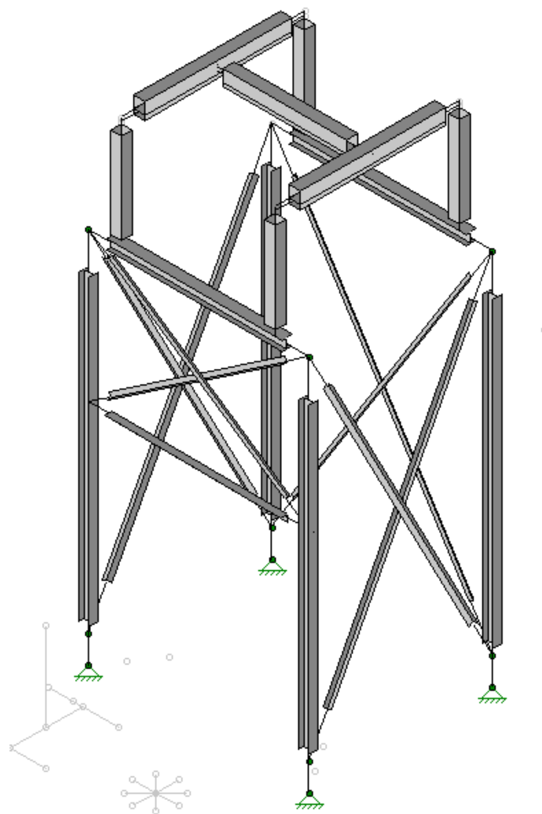
$LL = 6.12 \cdot kip$

Snow Load -

$SL := Snow = 0 \cdot psf$

Plugged Load -

$OL1 := PL = 8.059 \cdot kip$



Seismic Loads -

Seismic force coefficients are shown below as unitless values. These values are multiplied by the member weights in RISA and applied uniformly along the members in x,z, and y directions both positively and negatively.

$ELX_{members} := C_s = 0.53$

$ELY_{members} := Q_v = 0.212$

$ELZ_{members} := C_s = 0.53$

$ELX_{components} := V_h = 5.474 \cdot kip$

$ELY_{components} := V_v = 2.189 \cdot kip$

$ELZ_{components} := V_h = 5.474 \cdot kip$

Wind Loads -

$WLX_{W6} := w_{w\_w6} = 17.309 \cdot plf$

$WLX_{L3} := w_{w\_L3} = 8.655 \cdot plf$

$WLZ_{W6} := w_{w\_w6} = 17.309 \cdot plf$

$WLZ_{L3} := w_{w\_L3} = 8.655 \cdot plf$

$WLX_{components} := F_{wide} = 7.415 \cdot kip$

$WLZ_{components} := F_{narrow} = 5.649 \cdot kip$

For seismic Loads - Check Direction of Loading requirements in accordance with ASCE 7-10 sec. 12.5.4

"... any column or wall that forms part of two or more intersecting seismic force-resisting systems and is subjected to axial load due to seismic forces acting along either principal plan axis equaling or exceeding 20 percent of the axial design strength of the column or wall shall be designed for the most critical load effect due to application of seismic forces in any direction. Either of the procedures of Section 12.5.3 a or B are permitted to be used to satisfy this requirement."

Load combinations used to check axial forces from seismic load alone....

Load Combinations

Combinations | Design

	Description	Solve	PDelta	S.	BLC	Factor	BLC	Factor
76	Seismic Only	☑	Y		ELX	1	ELY	1
77		☑	Y		ELZ	1	ELY	1
78		☑	Y		ELX	-1	ELY	1
79		☑	Y		ELZ	-1	ELY	1

Axial capacity of columns:

Envelope AISC 14th(360-10): LRFD Steel Code Checks

Hot Rolled Steel | Cold Formed Steel | Wood | Concrete Beams | Concrete Columns | Aluminu

	Mem...	Shape	Code ...	Loc[in]	LC	S...	Loc[in]	Dir	L...	phi*Pnc [k]
1	M1	W6x15	.317	140.089	55	.038	0	z	58	37.823

Maximum axial load in columns from seismic loads only: $P_{nc} := 37.823kip$ $P_{EQ} := 15.135kip$ $\frac{P_{EQ}}{P_{nc}} = 0.4$

Envelope Member Section Forces

Sections | Maximums | End Reactions

	Mem...	Sec		Axial[k]	LC
1	M3	1	max	15.135	57
2			min	-14.313	55

Since columns that are part of two intersecting lateral force resisting systems have axial load from seismic forces of more than 20% of their design strength, ASCE 7-10 sec 12.5.4 applies

"Orthogonal Combination Procedure. The structure shall be analyzed using the equivalent lateral force analysis procedure of Section 12.8, the modal response spectrum analysis procedure of Section 12.9, or the linear response history procedure of Section 16.1, as permitted under Section 12.6, with the loading applied independently in any two orthogonal directions and the most critical load effect due to direction of application of seismic forces on the structure is permitted to be assumed to be satisfied if components and their foundations are designed for the following combination of prescribed loads: 100 percent of the forces for one direction plus 30 percent of the forces for the perpendicular direction; the combination requiring the maximum component strength shall be used."

Connection Designs - AISC 13th, Chapter J

L3x3x1/4 angle braces -

These members are modeled as tension only members and are not allowed to take compressive forces. The ends are designed as a pinned condition since they are bolted to the gussets The maximum forces from the RISA model are listed below; for axial loading, negative forces are in tension.

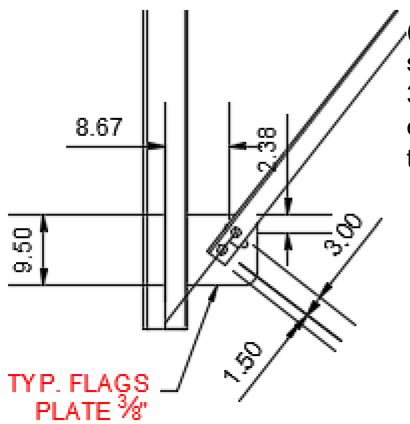
Maximum axial load in braces per RISA analysis:

Envelope Member Section Forces

Sections | Maximums | End Reactions

	Mem...	Sec		Axial[k]	LC
1	M13	1	max	1.516	53
2			min	-14.502	50
3		2	max	1.476	53
4			min	-14.541	50
5		3	max	1.437	53
6			min	-14.58	50
7		4	max	1.398	53
8			min	-14.619	50
9		5	max	1.359	53
10			min	-14.659	50

Typical L3x2 connection



(2) - 3/4" A325-N in bearing at 3" spacing. Bolts are centered in the 3" leg of the L3X3 and 1.5" from the edge of the plate and 1.5" min. from the end of the L3X3.

$F_y := 36ksi$ $\quad F_u := 58ksi$

$T_{max} := 8.772kip$

Connection Design - (2) 3/4" A325-N single shear, bearing, L3x2x1/4, standard holes

Shear Check

$N_b := 2$ number of bolts $\quad d := .75in$ nominal bolt diameter $\quad d_h := .8125in$ design hole diameter

$V_{bolt} := 17.9kip$ AISC 14th Table 7-1 3/4" A325-N S (LRFD)

$V_{allb} := N_b \cdot V_{bolt} = 35.8 \cdot kip$

Bearing Check - AISC 14th, Chapter J.3 - hole deformation is a consideration:

$\phi_b := .75 \qquad L_c := 1.5in - d_h \cdot \frac{1}{2} = 1.094 \cdot in$

$t := 0.375in$ material thickness

$R_{nbear} := \min\left(1.2 \cdot L_c \cdot t \cdot F_u, 2.4 \cdot d \cdot t \cdot F_u\right) = 28.547 \cdot kip$

$R_{allbear} := \phi_b \cdot N_b \cdot R_{nbear} = 42.82 \cdot kip$

Tension Check - AISC 14th, Chapter D

$\phi_{ty} := .9$ $\phi_{tv} := .75$

$A_g := 1.2in^2$ area for L3x2x1/4 $A_n := A_g - t \cdot d_h = 0.895 \cdot in^2$ net area

$U := .6$ shear lag factor from table D3.1

$A_e := U \cdot A_g = 0.72 \cdot in^2$

$R_{nty} := F_y \cdot A_g$ $R_{allty} := \phi_{ty} \cdot R_{nty} = 38.88 \cdot kip$

$R_{ntv} := F_u \cdot A_e$ $R_{alltv} := \phi_{tv} \cdot R_{ntv} = 31.32 \cdot kip$

Block Shear Check - AISC 14th, Chapter J.4

$\phi_{bs} := 2.00$ $U_{bs} := 1.00$

$A_{nv} := (4.5in - 1.5 \cdot d_h) \cdot t = 1.23 \cdot in^2$ $A_{nt} := (1.5in - .5 \cdot d_h) \cdot t = 0.41 \cdot in^2$ $A_{gv} := 4.5in \cdot t = 1.688 \cdot in^2$

$R_{nbs} := \min(.6 \cdot F_u \cdot A_{nv} + U_{bs} \cdot F_u \cdot A_{nt}, .6 \cdot F_y \cdot A_{gv} + U_{bs} \cdot F_u \cdot A_{nt})$

$R_{allbs} := \phi_{bs} \cdot R_{nbs} = 120.478 \cdot kip$ $R_{all} := \min(V_{allb}, R_{allbear}, R_{allty}, R_{alltv}, R_{allbs})$

$check\_connection := if(T_{max} \le R_{all}, \text{"OKAY"}, \text{"NO GOOD"}) = \text{"OKAY"}$

Check Gusset weld to post - use AISC 14th Ed., Table 8-4 $\phi_{weld} := .75$

$\theta := 45$ $e_x := 5.5in$ $l_{wd} := 9.5in$ $a := \frac{e_x}{l_{wd}} = 0.579$ $D := 3$ number of sixteenths of weld

From table - $k := 0$ $a' := \begin{pmatrix} .5 \\ .6 \end{pmatrix}$ $C' := \begin{pmatrix} 2.3 \\ 2 \end{pmatrix}$ $C := linterp(a', C', a) \cdot \frac{kip}{in} = 7.966 \times 10^5 \frac{lb}{s^2}$

$\phi R_w := .75 \cdot C \cdot D \cdot l_{wd} = 44.1 \cdot kip$

$checkweld := (if(\phi R_w \ge T_{max}, \text{"OKAY"}, \text{"NO GOOD"})) = \text{"OKAY"}$ Use 1/4" fillet weld

For the brace to column connections, use (2) 3/4" A325-N bolts in bearing. Bolts to be 3" apart and 1.5" min from edges. Gusset to be PL 3/8" and welded to post with 1/4" fillets.

Post to Base plate Design-

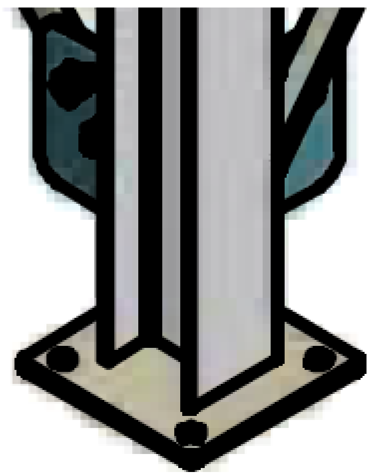
Use the joint reactions to get the loading for the weld design of the post to the base plate. For axial loads, positive loads are in compression and negative loads are in tension.

Joint reactions per RISA analysis:

Envelope Joint Reactions

	Joint		X [k]	LC	Y [k]	LC	Z [k]	LC
1	N1	max	.711	53	23.568	52	.355	74
2		min	-7.503	50	-15.865	54	-4.023	59
3	N2	max	7.503	52	23.568	50	.355	74
4		min	-.711	53	-15.865	56	-4.023	61
5	N3	max	.7	56	15.689	74	3.951	63
6		min	-.7	54	-6.201	71	-.605	60
7	N4	max	.7	56	15.689	74	3.951	65
8		min	-.7	54	-6.201	73	-.605	62

Typical post to base plate connection



$$P_u := 23.568\text{kip}$$

$$V_{ux} := 7.5\text{kip}$$

$$V_{uz} := 4.02\text{kip}$$

$$V_u := \sqrt{P_u^{\,2} + V_{ux}^{\,2} + V_{uz}^{\,2}} = 25.057 \cdot \text{kip}$$

Use 3/16" fillet all around with E70XX rods- $F_{EXX} := 70\text{ksi}$ $\quad \theta := 0\text{deg}$ $\quad \phi_w := .75$

$$A_w := \frac{.1875\text{in}}{\sqrt{2}} \cdot 1\frac{\text{in}}{\text{in}} = 0.133 \cdot \text{in} \qquad F_w := .6 \cdot F_{EXX} \cdot \left(1 + .5 \cdot \sin(\theta)^{1.5}\right) = 42 \cdot \text{ksi}$$

$$\phi R_w := \phi_w \cdot A_w \cdot F_w = 4176.349 \cdot \frac{\text{lbf}}{\text{in}}$$

For post bases, with 3/16 inch fillet welds

$$L_{weld} := \frac{V_u}{\phi R_w} = 6 \cdot \text{in}$$

Note that post base is welded with 3/16" min fillet all around for approx. 36 in of weld - OK.

Use 3/16" fillet weld to attach posts to base plates

Determine weight of 40 cubic yard bin

The bin is enclosed by a metal framed existing building. Bin is to fill with sawdust and is suppored at (4) points, one in each corner

40 yard bin dimensions-

$L_{bin} := 20ft$ length of bin

$W_{bin} := 8ft$ width of bin

$H_{bin} := 8ft$ height of bin

$Capacity := 40yd^3$ capacity of bin

$Weight_e := 12kip$ empty weight of bin (conservative, based on research of 40 cu. yard bins)

$\rho_{dust} := 12pcf$

$Weight_f := \rho_{dust} \cdot Capacity + Weight_e = 24.96 \cdot kip$ weight of full bin

$P_s := \frac{Weight_f}{4} = 6.24 \cdot kip$ point load at each bin support

Determine loads for bin enclosure at foundation.

The bin enclosure is a metal framed existing building. it will be assumed for simplicity and conservatism that the total
weight of the structure bears on the sidewalls.

$L_e := 288in = 24\,ft$ length of enclosure

$W_e := 118in = 9.833\,ft$ width of enclosure

$H_e := 148in$ height of enclosure to center of angled roof.

$Weight_e := 6463lbf = 6.463 \cdot kip$ enclosure weight

$DL := \frac{Weight_e}{2 \cdot L_e} = 134.646 \cdot plf$ dead load on slab for use in RISA foundation.

Determine seismic loading for dust bin enclosure. Project located in Costa Mesa, CA. therefore use the 2016 California Building Code.

Dead Load 6463 lb provided by Carothers
Seismic Loads Use ASCE 7-10

Category II building - ASCE 7-10, Table 1.5-1

$Weight_e := 6.463kip$ Total weight of building

$H_e = 12.333\,ft$ height of enclosure to center of angled roof

Seismic Load - Building Structures; ASCE 7-10 sec. 12.2

$R := 3.5$

$\Omega_0 := 3$ ASCE 7-10 Tbl. 12.2-1, Ordinary moment frames assumed, based on original building engineering.

$C_d := 3$

$S_{D1} = 0.584$ From USGS Seismic Design Parameters

Seismic Design Cat. D (ASCE Tbls. 11.6-1 and 2)

$I_E := 1.0$ ASCE 7-10 Table 1.5-2

$T_a := .02 \cdot \left(\frac{H}{ft}\right)^{.75}$ $T := T_a = 0.278$ ASCE 7-10 12.8.2 eq (12.8-7)

$C_{sd} := \frac{S_{Ds}}{\frac{R}{I_E}} = 0.303$ ASCE 7-10 sec. 12.8.1.1 eq (12.8-2)

$C_{smax} := \frac{S_{D1}}{T \cdot \left(\frac{R}{I_E}\right)} = 0.599$ ASCE 7-10 sec. 12.8.1.1 eq (12.8-3)

$C_{smin} := \max\left(0.01, .044 \cdot S_{Ds} \cdot I_E\right) = 0.047$ ASCE 7-10 sec.12.8.1.1 eq (12.8-5)

$C_s := \mathrm{if}\left(C_{smax} \le C_{sd}, C_{smax}, \max\left(C_{sd}, C_{smin}\right)\right) = 0.303$

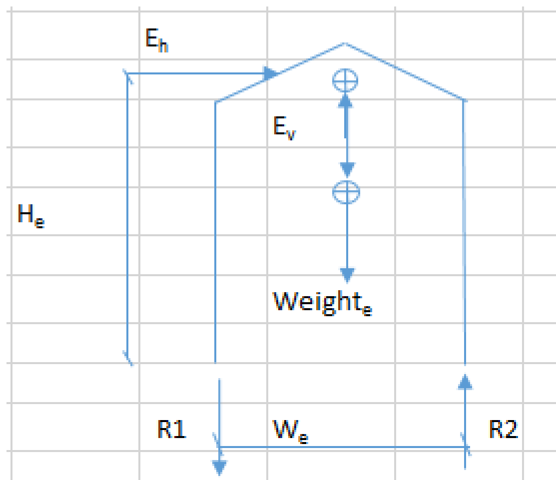
$V := C_s \cdot Weight_e = 1.959 \cdot kip$

$\rho := 1.3$ Redundancy factor (12.3.4)

$E_h := \rho \cdot V = 2.547 \cdot kip$ Horizontal Seismic Force, ASCE 7-10 12.4.2.1

$E_v := .2 \cdot S_{Ds} \cdot Weight_e = 1.371 \cdot kip$ Vertical Seismic Force, ASCE 7-10 12.4.2.2

Calculate seismic loads to use in RISA foundation



$$R_2 := \frac{E_v \cdot H_e + E_h \cdot \frac{W_e}{2} + Weight_e \cdot \frac{W_e}{2}}{W_e} = 6225.11\,lbf$$

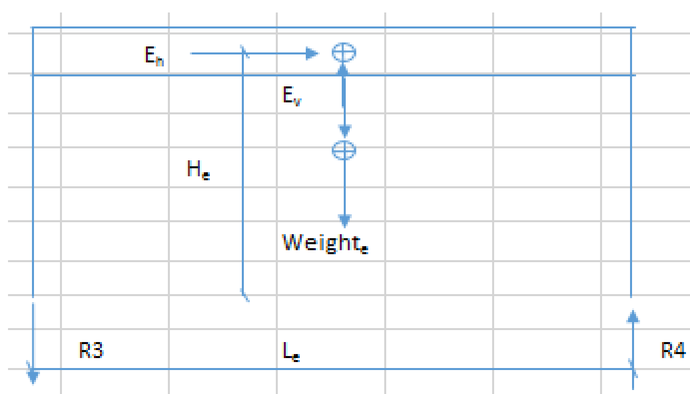
$$R_{2plf} := \frac{R_2}{L_e} = 259.38 \cdot plf$$

max vertical compressive load at foundation

$$R_1 := \frac{E_v \cdot H_e - E_h \cdot \frac{W_e}{2} - Weight_e \cdot \frac{W_e}{2}}{-W_e} = 2784.866\,lbf$$

$$R_{1plf} := \frac{R_1}{L_e} = 116.036 \cdot plf$$

Max vertical tensile load at foundation



$$R_4 := \frac{E_v \cdot H_e + E_h \cdot \frac{L_e}{2} + Weight_e \cdot \frac{L_e}{2}}{2L_e} = 2604.88\,lbf$$

$$R_3 := \frac{-E_v \cdot H_e + E_h \cdot \frac{L_e}{2} - Weight_e \cdot \frac{L_e}{2}}{-2L_e} = 1331.392\,lbf$$

$$R_{4plfmax} := \frac{R_4}{\left(\frac{R_3}{R_3 + R_4}\right) \cdot L_e} = 320.89 \cdot plf$$

max compressive load in plf at foundation

$$R_{3plfmax} := \frac{R_3}{\left(\frac{R_4}{R_3 + R_4}\right) \cdot L_e} = 83.829 \cdot plf$$

max tensile load in plf at foundation

Wind Design: Method 2 - Analytical Procedure, SEI/ASCE 7-10

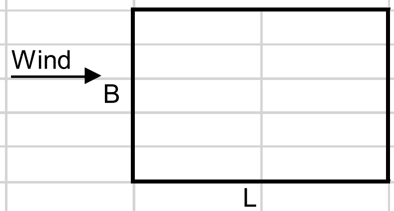
Rigid Building of All Heights (27.4.1)

Exposure:	**B**	Wind load:	**110**	mph
Enclosure:	**Enclosed**	Risk:	**II**	

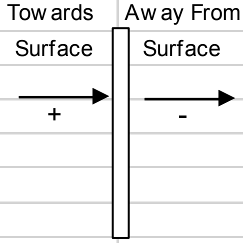
Non-Hurricane Prone Regions

B =	24	ft
L =	9.83	ft
G =	0.85	
Kzt = (6.5.7.2)	1.00	
Kd = (tbl 6-4)	0.85	

Plan View



Sign Convention



qh = .00256 Kz Kzt Kd V^2 = **Kz * 26.33**

External Wall Pressures / **Internal Wall Pressure (Positive Internal Pressure)** / **Total Wind Pressure**

Windward Wall								
Height (ft)	Kz (tbl 6-3)	qh	Cp	qhGCp	qh	GCpi	qhGCpi	p (psf)
12.33	0.57	15.13	0.8	10.29	15.13	0.18	2.72	7.57
Leeward Wall		15.13	-0.50	-6.43	15.13	0.18	2.72	-9.15
Side Wall		15.13	-0.7	-9.00	15.13	0.18	2.72	-11.73

External Wall Pressures / **Internal Wall Pressure (Negative Internal Pressure)** / **Total Wind Pressure**

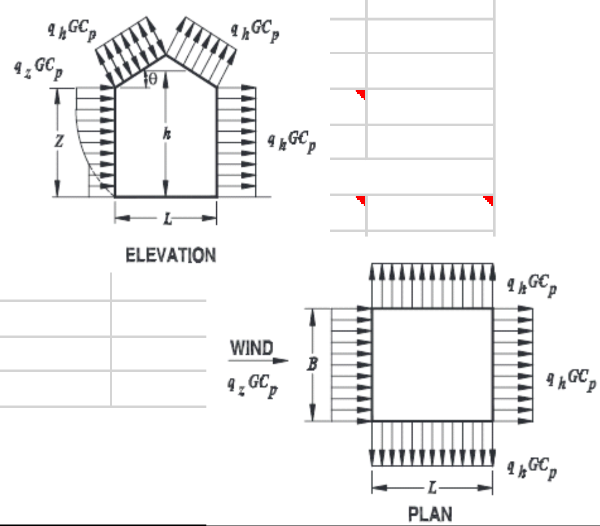
Windward Wall								
Height (ft)	Kz (tbl 6-3)	qh	Cp	qhGCp	qh	GCpi	qhGCpi	p (psf)
12.33	0.57	15.13	0.8	10.29	15.13	-0.18	-2.72	13.01
Leeward Wall		15.13	-0.50	-6.43	15.13	-0.18	-2.72	-3.71
Side Wall		15.13	-0.7	-9.00	15.13	-0.18	-2.72	-6.28

Wind Pressure @ Roof

h =	12.33	ft	h/L =	1.25
Roof Pitch =	4	:12	Θ =	18.43

Uplift Force		Windward Roof			
Height (ft)	qp (psf)	Cp	P = qhGCp	P = qhGCpi	p (psf)
12.33	15.13	-0.7	-9.00	-2.72	11.73
		Leeward Roof			
		Cp	P = qhGCp	P = qhGCpi	p (psf)
		-0.6	-7.72	0.00	7.72
Downward Force		Windward Roof			
Height (ft)	qp (psf)	Cp	P = qhGCp	P = qhGCpi	p (psf)
15	15.13	-0.18	-2.32	-2.72	0.41

Wind Pressure @ Parapet



Determine loads on foundation from worst case wind loading. Loading will be applied to RISA foundation model to
determine foundation imparted soil pressures and slab desing.

$H_{wall} := 10ft$ wall height

$\theta := 18.43deg$ roof angle

$A_{wwide} := L_e \cdot H_{wall} = 240\,ft^2$ area of wide side walls

$A_{rwide} := L_e \cdot \frac{.5W_e}{\cos(\theta)} = 124.379\,ft^2$ area of wide side angled roof

$A_{wnarrow} := W_e \cdot H_{wall} + .5 \cdot W_e \cdot \frac{.5 \cdot W_e}{\sin(\theta)} = 174.797\,ft^2$ area of narrow side

$p_{wall} := 13.08psf + 6.28psf = 19.36 \cdot psf$ max wind load on building side (windward and leeward combined)

$p_{rhwide} := (.41 + 7.72)psf \cdot \sin(\theta) = 2.57 \cdot psf$ max horizontal force at angle roof wide side

$p_{rvwide} := (.41 + 7.72)psf \cdot \cos(\theta) = 7.713 \cdot psf$ max vertical load at angled roof wide side

$P_{ww} := p_{wall} \cdot A_{wwide} = 4.646 \cdot kip$ load at wide wall

$P_{nw} := p_{wall} A_{wnarrow} = 3.384 \cdot kip$ load at narrow wall

$P_{rh} := p_{rhwide} \cdot A_{rwide} = 0.32 \cdot kip$ horizontal roof load

$P_{rv} := p_{rvwide} \cdot A_{rwide} = 0.959 \cdot kip$ vertical roof load

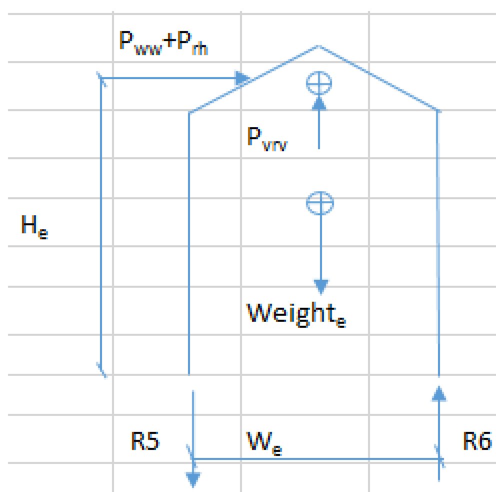
All loads will be applied at mid height of roofing for simplicity, results will be conservative.

$$R_6 := \frac{P_{rv} \cdot H_e + \left(P_{rh} + P_{ww}\right) \cdot \frac{W_e}{2} + Weight_e \cdot \frac{W_e}{2}}{W_e} = 6.918 \cdot kip$$

$R_{6plf} := \frac{R_6}{L_e} = 288.241 \cdot plf$ max vertical compressive load at foundation

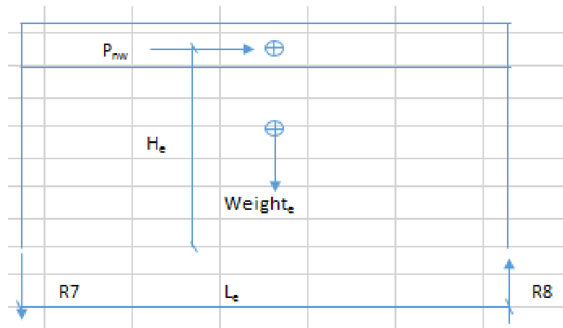
$$R_5 := \frac{P_{rv} \cdot H_e - \left(P_{rh} + P_{ww}\right) \cdot \frac{W_e}{2} - Weight_e \cdot \frac{W_e}{2}}{-W_e} = 4.511 \cdot kip$$

$R_{5plf} := \frac{R_5}{L_e} = 187.971 \cdot plf$ Max vertical tensile load at foundation



$$R_8 := \frac{P_{rv} \cdot H_e + P_{nw} \cdot \frac{L_e}{2} + Weight_e \cdot \frac{L_e}{2}}{2L_e} = 2708.264\,lbf$$

$$R_7 := \frac{-P_{rv} \cdot H_e + P_{nw} \cdot \frac{L_e}{2} - Weight_e \cdot \frac{L_e}{2}}{-2L_e} = 1016.23\,lbf$$



$$R_{8plfmax} := \frac{R_8}{\left(\frac{R_7}{R_7 + R_8}\right) \cdot L_e} = 413.575 \cdot plf$$

max compressive load in plf at foundation

$$R_{7plfmax} := \frac{R_7}{\left(\frac{R_8}{R_7 + R_8}\right) \cdot L_e} = 58.231 \cdot plf$$

max tensile load in plf at foundation

Check Anchorage -

Determine anchorage for existing bin enclosure. check loading for both wind and seismic in Hilti Profis Anchor design software.

$S_b := 24in$ — anchor spacing at bin enclosure base

Seismic loading-

$$V_{sb} := \frac{E_h}{2L_e} \cdot S_b = 0.106 \cdot kip$$

max seismic shear at a given anchor

$$T_{sb} := R_{1plf} \cdot S_b = 0.232 \cdot kip$$

max seismic tension at a given anchor

Wind loading-

$$V_{wb} := \frac{P_{rh} + P_{ww}}{2L_e} \cdot S_b = 0.207 \cdot kip$$

max wind shear at a given anchor

$$T_{wb} := R_{5plf} \cdot S_b = 0.376 \cdot kip$$

max wind tension at a given anchor

Use: HIlti Kwik Bolt TZ-CS with 2 3/4" embed into concrete slab at 2'-0" O.C. for bin enclose anchorage.

Evergreen Engineering Inc.
1740 Willow Creek Circle
Eugene, OR 97402
541-484-4771

Todd Costley, EIT
Checked By: Jennifer Briggs PE
Job #3524.0
5/24/2017

Determine filter support anchorage-

Envelope reactions for standard load combinations -

Envelope Joint Reactions

	Joint		X [k]	LC	Y [k]	LC	Z [k]	LC
1	N2	max	7.503	52	23.568	50	.355	74
2		min	-.711	53	-15.865	56	-4.023	61
3	N1	max	.711	53	23.568	52	.355	74
4		min	-7.503	50	-15.865	54	-4.023	59
5	N4	max	.7	56	15.689	74	3.951	65
6		min	-.7	54	-6.201	73	-.605	62
7	N3	max	.7	56	15.689	74	3.951	63

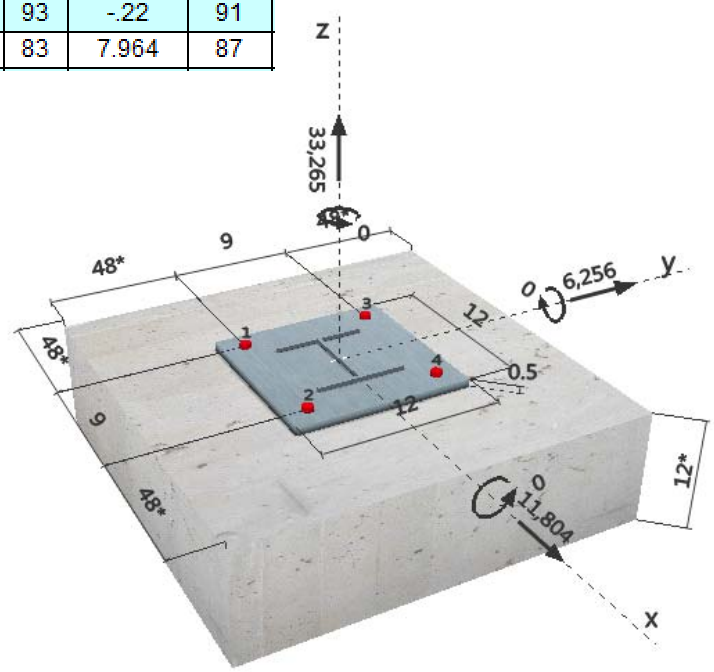
Envelope reactions for Load combinations that include amplified seismic forces:

Envelope Joint Reactions

	Joint		X [k]	LC	Y [k]	LC	Z [k]	LC
1	N2	max	11.904	86	40.781	82	.283	93
2		min	-.219	88	-33.264	94	-8.157	83
3	N1	max	.219	94	40.781	84	.283	95
4		min	-11.904	80	-33.265	88	-8.157	81
5	N3	max	1.017	92	23.68	81	7.964	85
6		min	-1.072	90	-15.352	93	-.22	91
7	N4	max	1.072	92	23.68	83	7.964	87

Seismic forces will control uplift

Anchor layout:



Provide (4) 3/4"ϕ ASTM F1554 GR 36 threaded rods at each leg with 10" embedment into slab

Determine Fan anchorage forces -

$P_{fan} := (1.777 + .427 + .138)kip = 2.342 \cdot kip$ given by CSL

For wind loads, treat fan as a solid rectangular object

Wind loads $K_d := .9$ wind directionality factor - ASCE 7- sec. 29.3.2

$C_f := 1.321$ $q_z := .00256psf\, K_z \cdot K_{zt} \cdot K_d \cdot v^2 = 26.206 \cdot psf$ velocity pressure - ASCE 7-10 sec. 29.3.2

$f_{wfan} := q_z \cdot G \cdot C_f \cdot 63in \cdot 150in = 1.931 \cdot kip$

$$M_{wfan} := \frac{f_{wfan} \cdot (47.69in)}{2} = 3.837 \cdot kip \cdot ft$$

Seismic - use ASCE 7 chapter 13

$R_p := 2.5$ $a_p := 6.0$ $\Omega_o := 2.5$ table 13.6-1; Air side HVAC, fans.....

$$F'_p := max\left[min\left[1.6, \frac{.4 \cdot a_p}{R_p} \cdot (1 + 0)\right], .3\right] \cdot S_{Ds} = 1.019$$ equations 13.3-1 thru 3 $F_p := F'_p \cdot P_{fan} = 2.385 \cdot kip$

$$cg := \left[.427kip \cdot \left(149in - \frac{60in}{2}\right) + 1.777kip \cdot \frac{89in}{2}\right] \cdot \frac{1}{P_{fan}} = 4.622\,ft$$ cg of fan and silencer

$V_{fbase} := F_p = 2.385 \cdot kip$ $f_{wfan} = 1.931 \cdot kip$ shear at fan base due to seismic and wind loading

$M_{sfan} := F_p \cdot cg = 11.025 \cdot ft \cdot kip$ $M_{wfan} = 3.837 \cdot ft \cdot kip$ moment at fan base due to seismic and wind loading

$E_{vert} := .2 \cdot S_{Ds} \cdot P_{fan} = 0.497 \cdot kip$

Find load to be resisted by anchors -

$$ecc := \frac{12.45in \cdot 334.618lbf}{P_{fan}} = 1.779 \cdot in$$ eccentricity of fan load for forces in E/W direction due to offset silencer

$M_{ecc} := P_{fan} \cdot ecc = 0.347 \cdot kip \cdot ft$ moment due to eccentricity

$s_a := 44in$ $s_2 := 45.5in$ minimum anchor spacing

$n_a := 4$ number of anchors (actual number of anchors is 6, but 4 used for simplicity)

$V_u := max(f_{wfan}, \Omega_o \cdot V_{fbase}) \div n_a = 1.491 \cdot kip$ maximum shear at anchor bolts

$T_u := (max(M_{wfan}, \Omega_o \cdot M_{sfan}) + M_{ecc} - .9 \cdot P_{fan} \cdot s_a \cdot .5) \div (s_a \cdot .5n_a) = 3.28 \cdot kip$ tension at anchor bolts

$$T_{u2} := (max(M_{wfan}, \Omega_o \cdot M_{sfan}) + M_{ecc} - .9 \cdot P_{fan} \cdot s_2 \cdot .5) \div (s_2 \cdot .5n_a) + \frac{M_{ecc}}{s_2 \cdot .5n_a} = 3.2 \cdot kip$$ tension due to E/W loading

Anchor to 12" slab with (6) 3/4" Hilti Kwik Bolt TZ, embedded 4 3/4" into concrete.

Outlet duct anchorage forces -

$Oduct = 0.998 \cdot kip$ given by CSL

Recall from calcs above that the downcomer lateral forces are included with the over all collector loads. However, for the sake of checking anchors, let the downcomer be pinned at top and fixed at the bottom and distribute the loads accordingly.

Wind load from calcs above -

$f_{ductL} := q_z \cdot G \cdot C_{fduct} \cdot D_{od} = 31.226 \cdot plf$ $h_o := 310.0625in$

$V_{wbase} := \frac{5 \cdot f_{ductL} \cdot h_o}{8} = 0.504 \cdot kip$ shear at outlet duct base due to wind on duct

$M_{wbase} := \frac{f_{ductL} \cdot h_o^{\ 2}}{8} = 2.606 \cdot kip \cdot ft$ moment at outlet duct base due to wind on duct

Seismic - use ASCE 7 chapter 13

$R_p := 2.5$ table 13.6-1; Ductwork of high deformability materials with joints other than welded

$\Omega_o := 2.5$

$F'_p := max\left[min\left[1.6, \frac{.4 \cdot a_p}{R_p} \cdot \left(1 + \frac{0ft}{42ft}\right)\right], .3\right] \cdot S_{Ds} = 1.019$ equations 13.3-1 thru 3

$F_p := F'_p \cdot Oduct = 1.016 \cdot kip$

$V_{sbase} := \frac{11 \cdot F_p}{16} = 0.699 \cdot kip$ shear at outlet duct base due to seismic forces

$M_{sbase} := \frac{3 \cdot F_p \cdot h_o}{16} = 4.924 \cdot ft \cdot kip$ moment at outlet duct base due to seismic forces

$E_{vert} := .2 \cdot S_{Ds} \cdot Oduct = 0.212 \cdot kip$

Check anchorage -

$n_b := 8$ number of anchor bolts

$D_a := 28.375in$ diameter of anchor circle

$$w_{AB} := \frac{\max(M_{wbase}, \Omega_o \cdot M_{sbase})}{D_a^{\;2}} - \frac{.9 \cdot Oduct}{\pi \cdot D_{od}} = 2069.628 \cdot plf$$ load on bolt circle

$$T_u := w_{AB} \cdot \frac{D_a \cdot \pi}{n_b} + \frac{\max(V_{wbase}, \Omega_o \cdot V_{sbase})}{n_b} = 2.14 \cdot kip$$ maximum tension in anchor bolts

$$T_2 := \frac{\Omega_o \cdot M_{sbase} - .9 \cdot Oduct \cdot \frac{D_a}{2} \cdot .707}{\frac{D_a}{2} \cdot .707 \cdot 2} = 6.914 \cdot kip$$ maximum tension for load rotated 45 degrees

$$V_u := \frac{\max(V_{wbase}, \Omega_o \cdot V_{sbase})}{n_b} = 0.218 \cdot kip$$ maximum shear per anchor

Anchor to 12" slab with (8) 3/8"ϕ Hilti HAS rods with Hilti HIT-HY adhesive with 5" embed into concrete.

Check Foundation -

The equipment will be installed on a new 12" deep concrete slab.
The allowable soil bearing pressure is assumed to be 1500 psi per the CBC.
Provide #5 bars at 12" o.c. in each direction top and bottom
The new slab has been analyzed using RISA Foundation for the loads calculated above

Maximum soil bearing pressure per RISA analysis:

Envelope Soil Pressures (By Combination)

Soil Pressures | Slab Soil Pressures | Footing Soil Pressures | Beam Soil Pressures

	Label	Max UC	Max LC	Soil Pressure[ksf]	Allowable Bearing...
1	N548	.275	20	.413	1.5
2	N547	.275	20	.412	1.5

A 12" thick slab is okay to support the equipment
See RISA Foundation summary for more foundation analysis information

Summary:
The new slab as drawn is okay for the equipment and weights shown on the drawings.

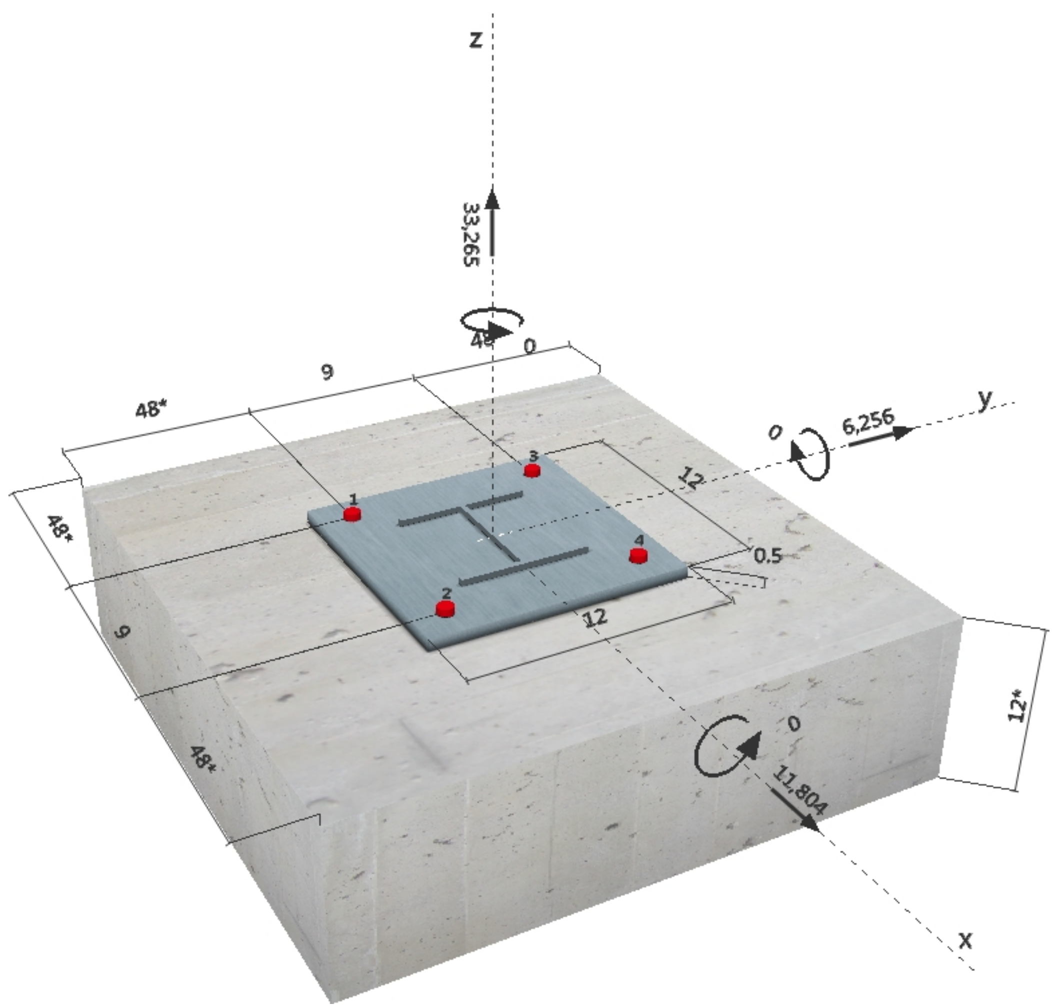
Company:	Evergreen Engineering	Page:	1
Specifier:	Todd Costley EIT	Project:	CSL-Ganahl Lumber
Address:	1740 Willow Creek Circle	Sub-Project I Pos. No.:	Filter Anchorage
Phone I Fax:	541-484-4771 |	Date:	5/22/2017
E-Mail:	tcostley@eeeug.com`		

Specifier's comments:

1 Input data

Anchor type and diameter:	**Hex Head ASTM F 1554 GR. 36 3/4**
Effective embedment depth:	h_{ef} = 10.000 in.
Material:	ASTM F 1554
Proof:	Design method ACI 318-14 / CIP
Stand-off installation:	e_b = 0.000 in. (no stand-off); t = 0.500 in.
Anchor plate:	l_x x l_y x t = 12.000 in. x 12.000 in. x 0.500 in.; (Recommended plate thickness: not calculated
Profile:	W shape (AISC); (L x W x T x FT) = 5.990 in. x 5.990 in. x 0.230 in. x 0.260 in.
Base material:	cracked concrete, 4000, f_c' = 4000 psi; h = 12.000 in.
Reinforcement:	tension: condition B, shear: condition B;
	edge reinforcement: none or < No. 4 bar
Seismic loads (cat. C, D, E, or F)	Tension load: yes (17.2.3.4.3 (d))
	Shear load: yes (17.2.3.5.3 (c))

Geometry [in.] & Loading [lb, in.lb]



Company:	Evergreen Engineering	Page:	2
Specifier:	Todd Costley EIT	Project:	CSL-Ganahl Lumber
Address:	1740 Willow Creek Circle	Sub-Project I Pos. No.:	Filter Anchorage
Phone I Fax:	541-484-4771 |	Date:	5/22/2017
E-Mail:	tcostley@eeeug.com`		

2 Proof I Utilization (Governing Cases)

		Design values [lb]		Utilization	
Loading	**Proof**	**Load**	**Capacity**	β_N / β_V [%]	**Status**
Tension	Concrete Breakout Strength	33265	42588	79 / -	OK
Shear	Steel Strength	3340	7555	- / 45	OK

Loading	β_N	β_V	ζ	**Utilization** $\beta_{N,V}$ **[%]**	**Status**
Combined tension and shear loads	0.781	0.442	5/3	92	OK

3 Warnings

- Please consider all details and hints/warnings given in the detailed report!

Fastening meets the design criteria!

4 Remarks; Your Cooperation Duties

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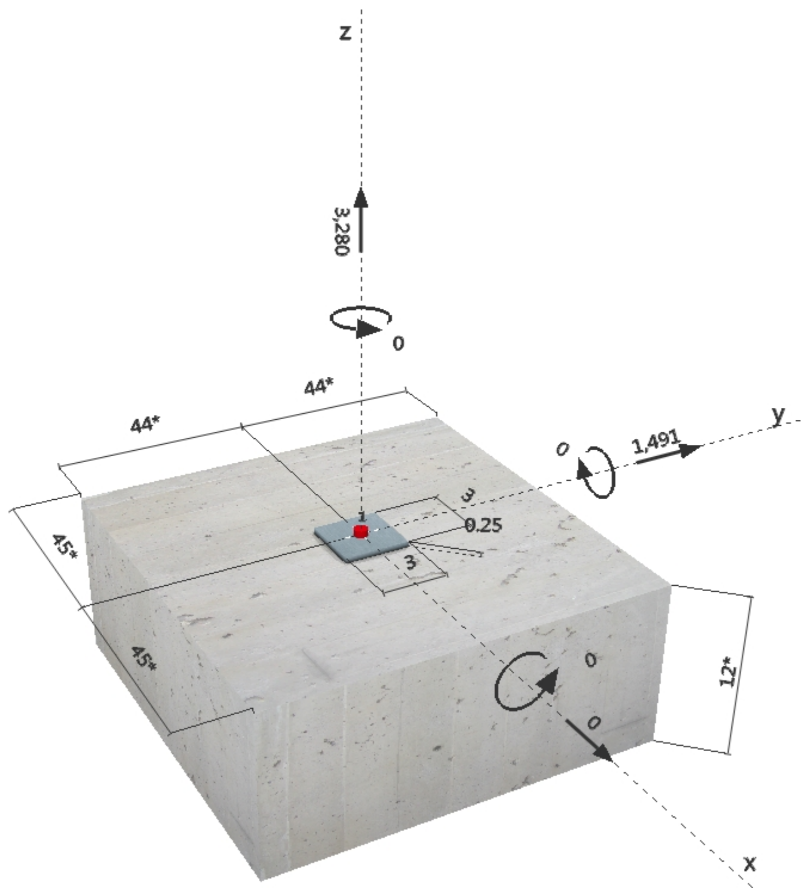
Company: Evergreen Engineering
Specifier: Todd Costley EIT
Address: 1740 Willow Creek Circle
Phone I Fax: 541-484-4771 |
E-Mail: tcostley@eeeug.com`

Specifier's comments:

1 Input data

Anchor type and diameter:	**Kwik Bolt TZ - CS 5/8 (4)**
Effective embedment depth:	$h_{ef,act}$ = 4.000 in., h_{nom} = 4.438 in.
Material:	Carbon Steel
Evaluation Service Report:	ESR-1917
Issued I Valid:	6/1/2016 | 5/1/2017
Proof:	Design method ACI 318-14 / Mech.
Stand-off installation:	e_b = 0.000 in. (no stand-off); t = 0.250 in.
Anchor plate:	l_x x l_y x t = 3.000 in. x 3.000 in. x 0.250 in.; (Recommended plate thickness: not calculated
Profile:	no profile
Base material:	cracked concrete, 4000, f_c' = 4000 psi; h = 12.000 in.
Installation:	**hammer drilled hole, Installation condition: Dry**
Reinforcement:	tension: condition B, shear: condition B; no supplemental splitting reinforcement present edge reinforcement: none or < No. 4 bar
Seismic loads (cat. C, D, E, or F)	Tension load: yes (17.2.3.4.3 (d)) Shear load: yes (17.2.3.5.3 (c))

Geometry [in.] & Loading [lb, in.lb]



Company:	Evergreen Engineering	Page:	2
Specifier:	Todd Costley EIT	Project:	CSL-Ganahl Lumber
Address:	1740 Willow Creek Circle	Sub-Project I Pos. No.:	Fan Anchorage
Phone I Fax:	541-484-4771 |	Date:	5/22/2017
E-Mail:	tcostley@eeeug.com`		

2 Proof I Utilization (Governing Cases)

		Design values [lb]		Utilization	
Loading	**Proof**	**Load**	**Capacity**	β_N / β_V [%]	**Status**
Tension	Concrete Breakout Strength	3280	4193	79 / -	OK
Shear	Steel Strength	1491	4940	- / 31	OK

Loading	β_N	β_V	ζ	**Utilization** $\beta_{N,V}$ **[%]**	**Status**
Combined tension and shear loads	0.782	0.302	5/3	80	OK

3 Warnings

- Please consider all details and hints/warnings given in the detailed report!

Fastening meets the design criteria!

4 Remarks; Your Cooperation Duties

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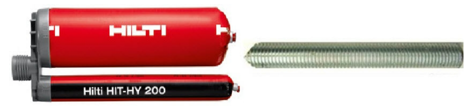
Company:	Evergreen Engineering	Page:	1
Specifier:	Todd Costley EIT	Project:	Ganahl Lumber Filter
Address:	1740 Willow Creek Circle	Sub-Project I Pos. No.:	
Phone I Fax:	541-484-4771 |	Date:	5/22/2017
E-Mail:	tcostley@eeeug.com`		

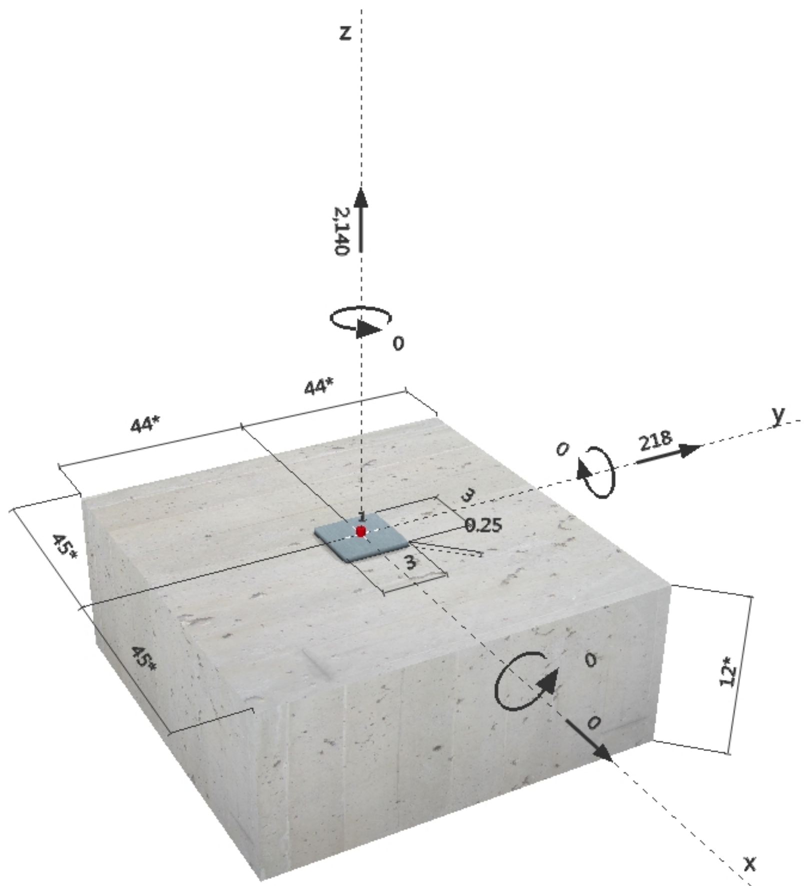
Specifier's comments:

1 Input data



Anchor type and diameter:	**HIT-HY 200 + HAS 3/8**
Effective embedment depth:	$h_{ef,act}$ = 5.000 in. ($h_{ef,limit}$ = - in.)
Material:	5.8
Evaluation Service Report:	ESR-3187
Issued I Valid:	11/1/2016 | 3/1/2018
Proof:	Design method ACI 318-14 / Chem
Stand-off installation:	e_b = 0.000 in. (no stand-off); t = 0.250 in.
Anchor plate:	l_x x l_y x t = 3.000 in. x 3.000 in. x 0.250 in.; (Recommended plate thickness: not calculated
Profile:	no profile
Base material:	cracked concrete, 4000, f_c' = 4000 psi; h = 12.000 in., Temp. short/long: 32/32 °F
Installation:	**hammer drilled hole, Installation condition: Dry**
Reinforcement:	tension: condition B, shear: condition B; no supplemental splitting reinforcement present edge reinforcement: none or < No. 4 bar
Seismic loads (cat. C, D, E, or F)	Tension load: yes (17.2.3.4.3 (d)) Shear load: yes (17.2.3.5.3 (c))

Geometry [in.] & Loading [lb, in.lb]



Company:	Evergreen Engineering	Page:	2
Specifier:	Todd Costley EIT	Project:	Ganahl Lumber Filter
Address:	1740 Willow Creek Circle	Sub-Project I Pos. No.:	
Phone I Fax:	541-484-4771 |	Date:	5/22/2017
E-Mail:	tcostley@eeeug.com`		

2 Proof I Utilization (Governing Cases)

		Design values [lb]		Utilization	
Loading	**Proof**	**Load**	**Capacity**	**β_N / β_V [%]**	**Status**
Tension	Bond Strength	2140	2359	91 / -	OK
Shear	Steel Strength	218	1415	- / 16	OK

Loading	**β_N**	**β_V**	**ζ**	**Utilization $\beta_{N,V}$ [%]**	**Status**
Combined tension and shear loads	0.907	0.154	1.0	89	OK

3 Warnings

- Please consider all details and hints/warnings given in the detailed report!

Fastening meets the design criteria!

4 Remarks; Your Cooperation Duties

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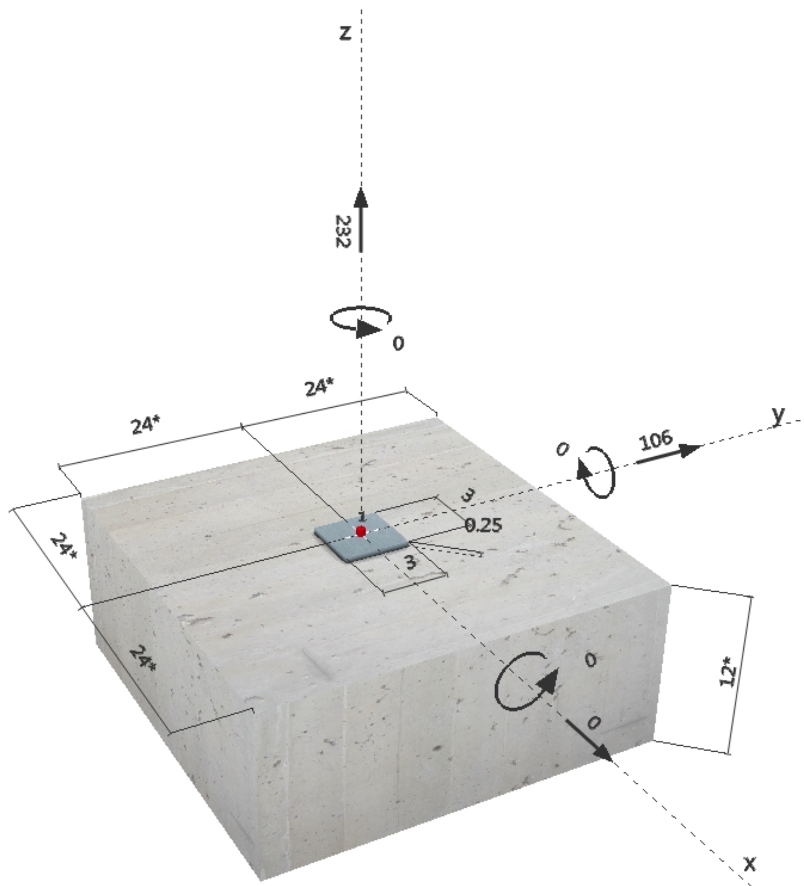
Company:	Evergreen Engineering	Page:	1
Specifier:	Todd Costley EIT	Project:	CSL-Ganahl Lumber
Address:	1740 Willow Creek Circle	Sub-Project I Pos. No.:	Bin Enclosure Seismic
Phone I Fax:	541-484-4771 |	Date:	5/22/2017
E-Mail:	tcostley@eeeug.com`		

Specifier's comments:

1 Input data

Anchor type and diameter:	**Kwik Bolt TZ - CS 3/8 (2 3/4)**
Effective embedment depth:	$h_{ef,act}$ = 2.750 in., h_{nom} = 3.063 in.
Material:	Carbon Steel
Evaluation Service Report:	ESR-1917
Issued I Valid:	6/1/2016 | 5/1/2017
Proof:	Design method ACI 318-14 / Mech.
Stand-off installation:	e_b = 0.000 in. (no stand-off); t = 0.250 in.
Anchor plate:	l_x x l_y x t = 3.000 in. x 3.000 in. x 0.250 in.; (Recommended plate thickness: not calculated
Profile:	no profile
Base material:	cracked concrete, 4000, f_c' = 4000 psi; h = 12.000 in.
Installation:	**hammer drilled hole, Installation condition: Dry**
Reinforcement:	tension: condition B, shear: condition B; no supplemental splitting reinforcement present
	edge reinforcement: none or < No. 4 bar
Seismic loads (cat. C, D, E, or F)	Tension load: yes (17.2.3.4.3 (d))
	Shear load: yes (17.2.3.5.3 (c))

Geometry [in.] & Loading [lb, in.lb]



Company:	Evergreen Engineering	Page:	2
Specifier:	Todd Costley EIT	Project:	CSL-Ganahl Lumber
Address:	1740 Willow Creek Circle	Sub-Project I Pos. No.:	Bin Enclosure Seismic
Phone I Fax:	541-484-4771 |	Date:	5/22/2017
E-Mail:	tcostley@eeeug.com`		

2 Proof I Utilization (Governing Cases)

		Design values [lb]		Utilization	
Loading	**Proof**	**Load**	**Capacity**	**β_N / β_V [%]**	**Status**
Tension	Pullout Strength	232	1946	12 / -	OK
Shear	Steel Strength	106	1466	- / 8	OK

Loading	β_N	β_V	ζ	Utilization $\beta_{N,V}$ [%]	Status
Combined tension and shear loads	0.119	0.072	5/3	5	OK

3 Warnings

- Please consider all details and hints/warnings given in the detailed report!

Fastening meets the design criteria!

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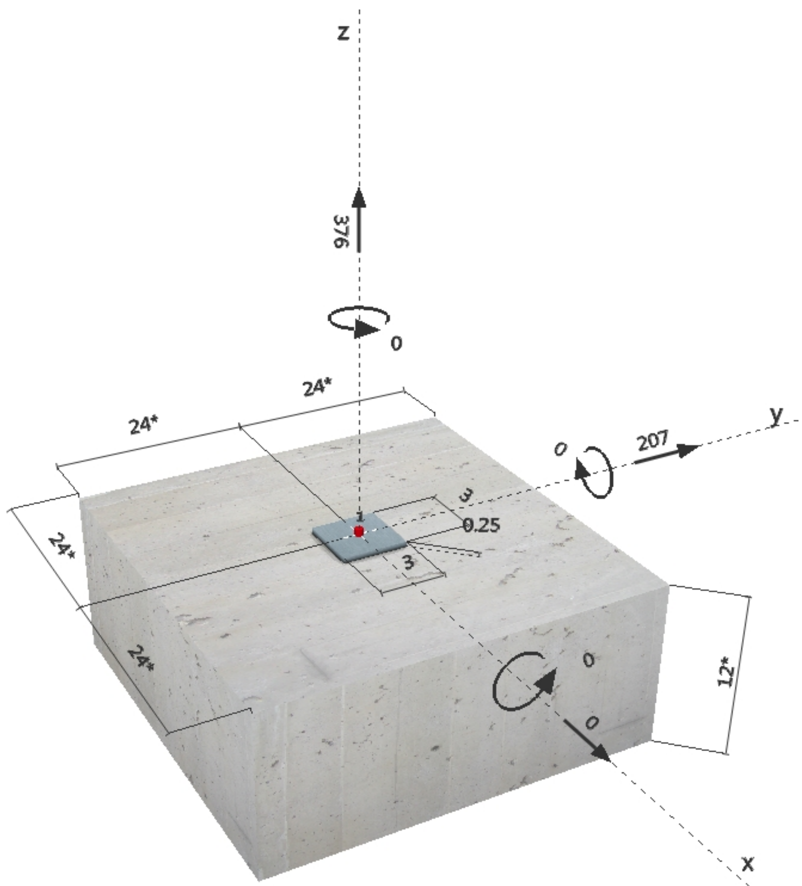
Company:	Evergreen Engineering	Page:	1
Specifier:	Todd Costley EIT	Project:	CSL-Ganahl Lumber
Address:	1740 Willow Creek Circle	Sub-Project I Pos. No.:	Bin Enclosure Wind
Phone I Fax:	541-484-4771 |	Date:	5/22/2017
E-Mail:	tcostley@eeeug.com`		

Specifier's comments:

1 Input data

Anchor type and diameter:	**Kwik Bolt TZ - CS 3/8 (2 3/4)**
Effective embedment depth:	$h_{ef,act}$ = 2.750 in., h_{nom} = 3.063 in.
Material:	Carbon Steel
Evaluation Service Report:	ESR-1917
Issued I Valid:	6/1/2016 | 5/1/2017
Proof:	Design method ACI 318-14 / Mech.
Stand-off installation:	e_b = 0.000 in. (no stand-off); t = 0.250 in.
Anchor plate:	l_x x l_y x t = 3.000 in. x 3.000 in. x 0.250 in.; (Recommended plate thickness: not calculated
Profile:	no profile
Base material:	cracked concrete, 4000, f_c' = 4000 psi; h = 12.000 in.
Installation:	**hammer drilled hole, Installation condition: Dry**
Reinforcement:	tension: condition B, shear: condition B; no supplemental splitting reinforcement present
	edge reinforcement: none or < No. 4 bar
Seismic loads (cat. C, D, E, or F)	Tension load: yes (17.2.3.4.3 (d))
	Shear load: yes (17.2.3.5.3 (c))

Geometry [in.] & Loading [lb, in.lb]



Company:	Evergreen Engineering	Page:	2
Specifier:	Todd Costley EIT	Project:	CSL-Ganahl Lumber
Address:	1740 Willow Creek Circle	Sub-Project I Pos. No.:	Bin Enclosure Wind
Phone I Fax:	541-484-4771 |	Date:	5/22/2017
E-Mail:	tcostley@eeeug.com`		

2 Proof I Utilization (Governing Cases)

		Design values [lb]		Utilization	
Loading	**Proof**	**Load**	**Capacity**	**β_N / β_V [%]**	**Status**
Tension	Pullout Strength	376	1946	20 / -	OK
Shear	Steel Strength	207	1466	- / 15	OK

Loading	β_N	β_V	ζ	Utilization $\beta_{N,V}$ [%]	Status
Combined tension and shear loads	0.193	0.141	5/3	11	OK

3 Warnings

- Please consider all details and hints/warnings given in the detailed report!

Fastening meets the design criteria!

4 Remarks; Your Cooperation Duties

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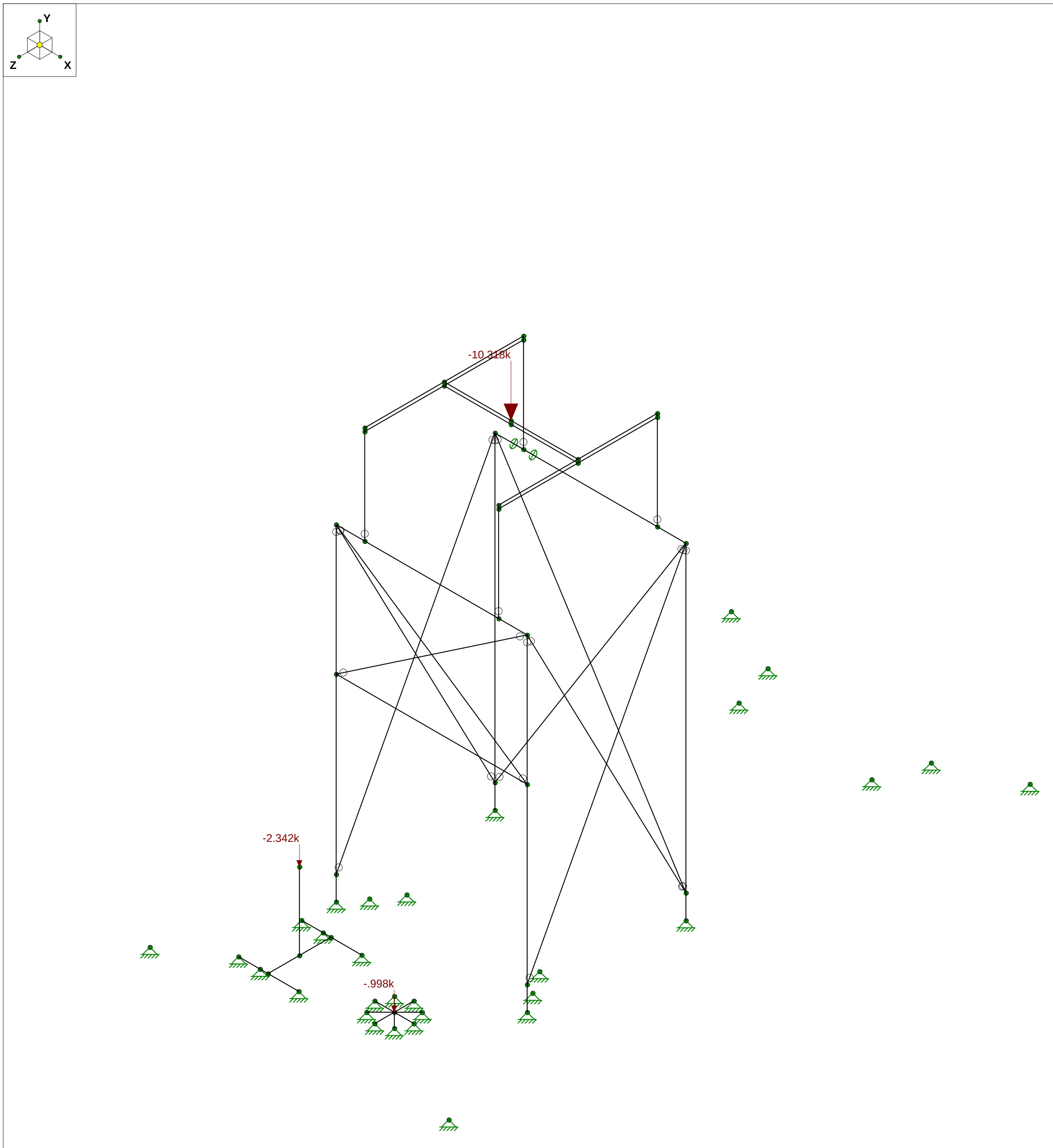
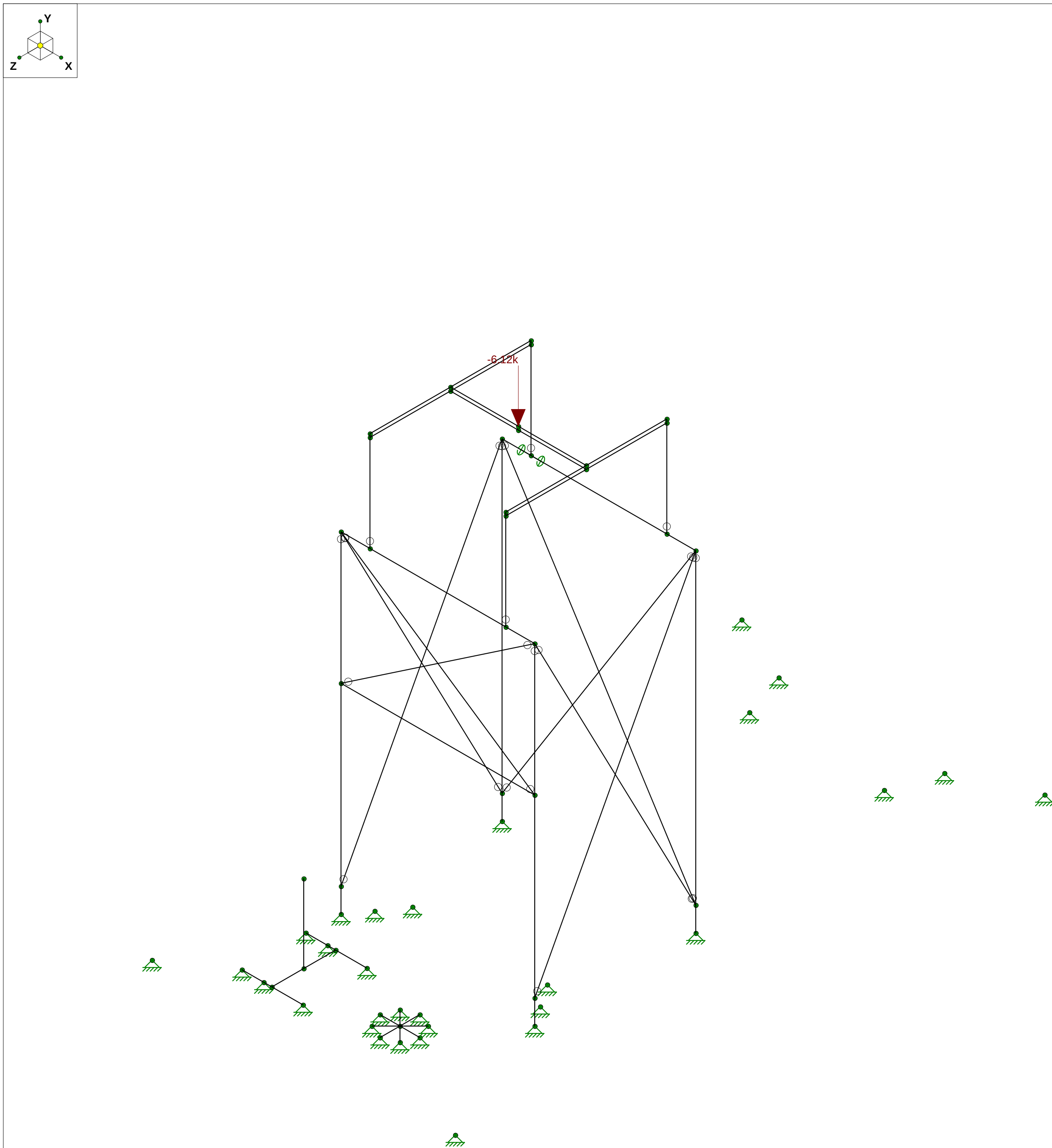


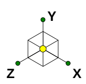
Loads: BLC 1, DL

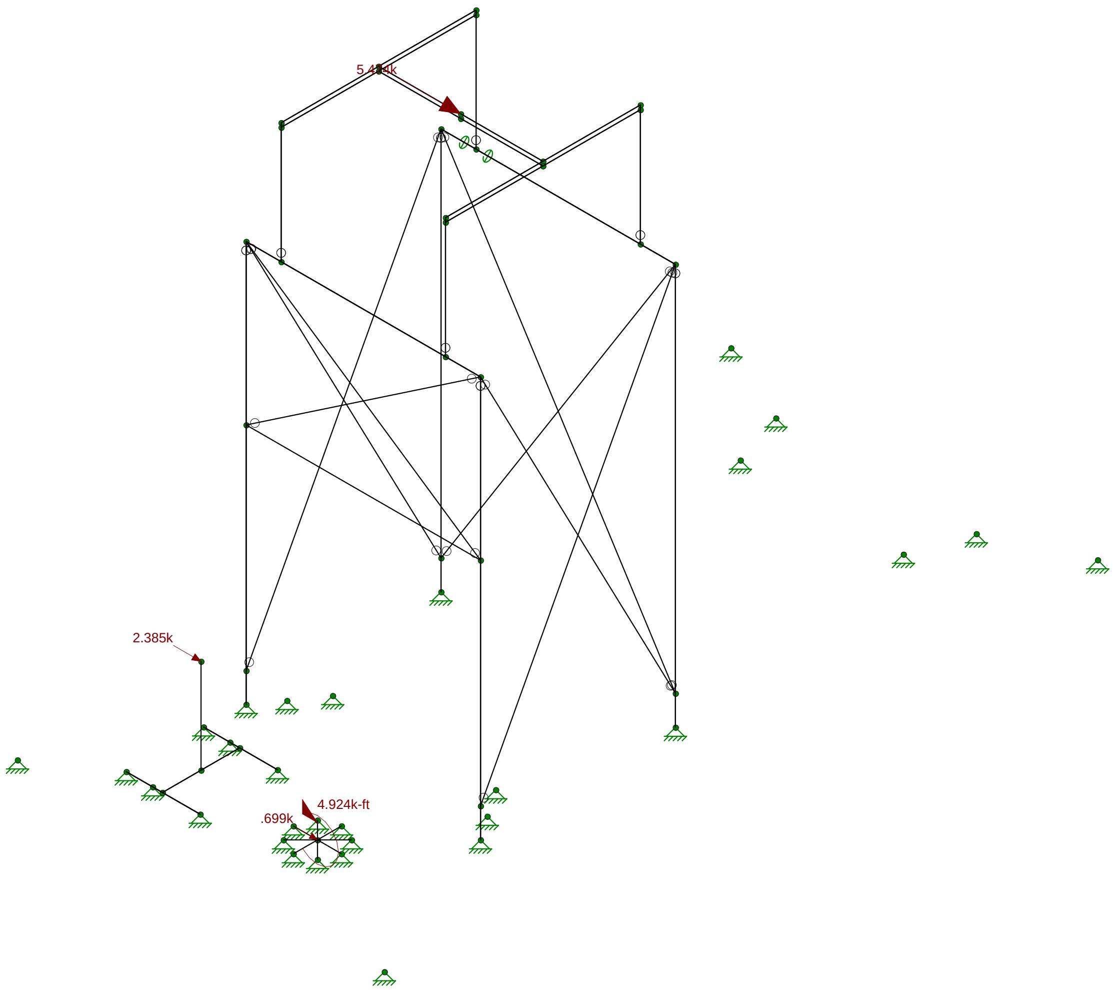
Evergreen Engineering	CSL 110TR10HEI, Ganahl Lumber - Costa Mesa, CA	SK - 12
Todd Costley E.I.T.		May 22, 2017 at 10:19 AM
3524.0	Dead Load	CSL_Ganahl Lumber_Costa Mesa...



Loads: BLC 2, LL

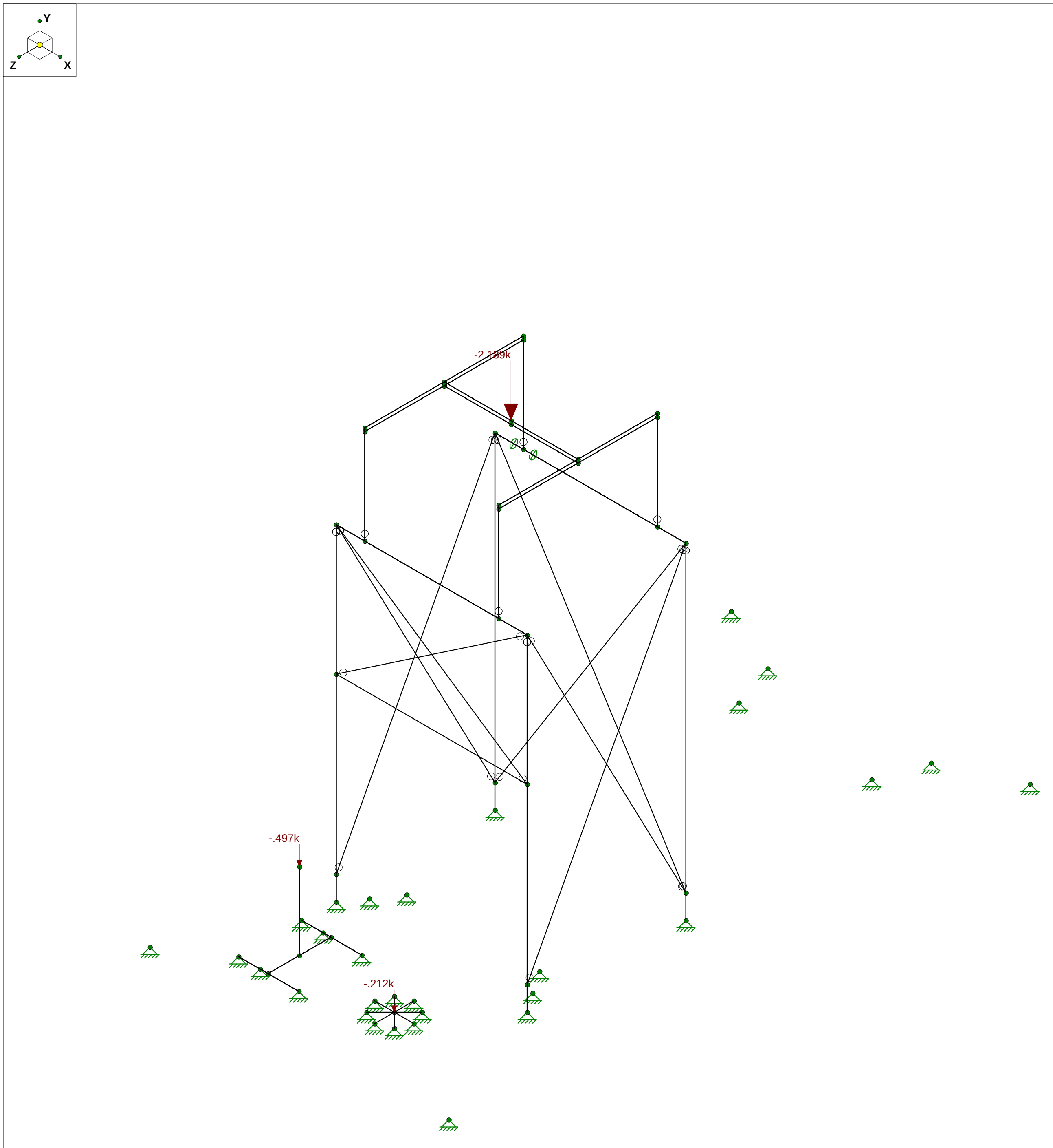
Evergreen Engineering	CSL 110TR10HEI, Ganahl Lumber - Costa Mesa, CA Live Load	SK - 13
Todd Costley E.I.T.		May 22, 2017 at 10:20 AM
3524.0		CSL_Ganahl Lumber_Costa Mesa...





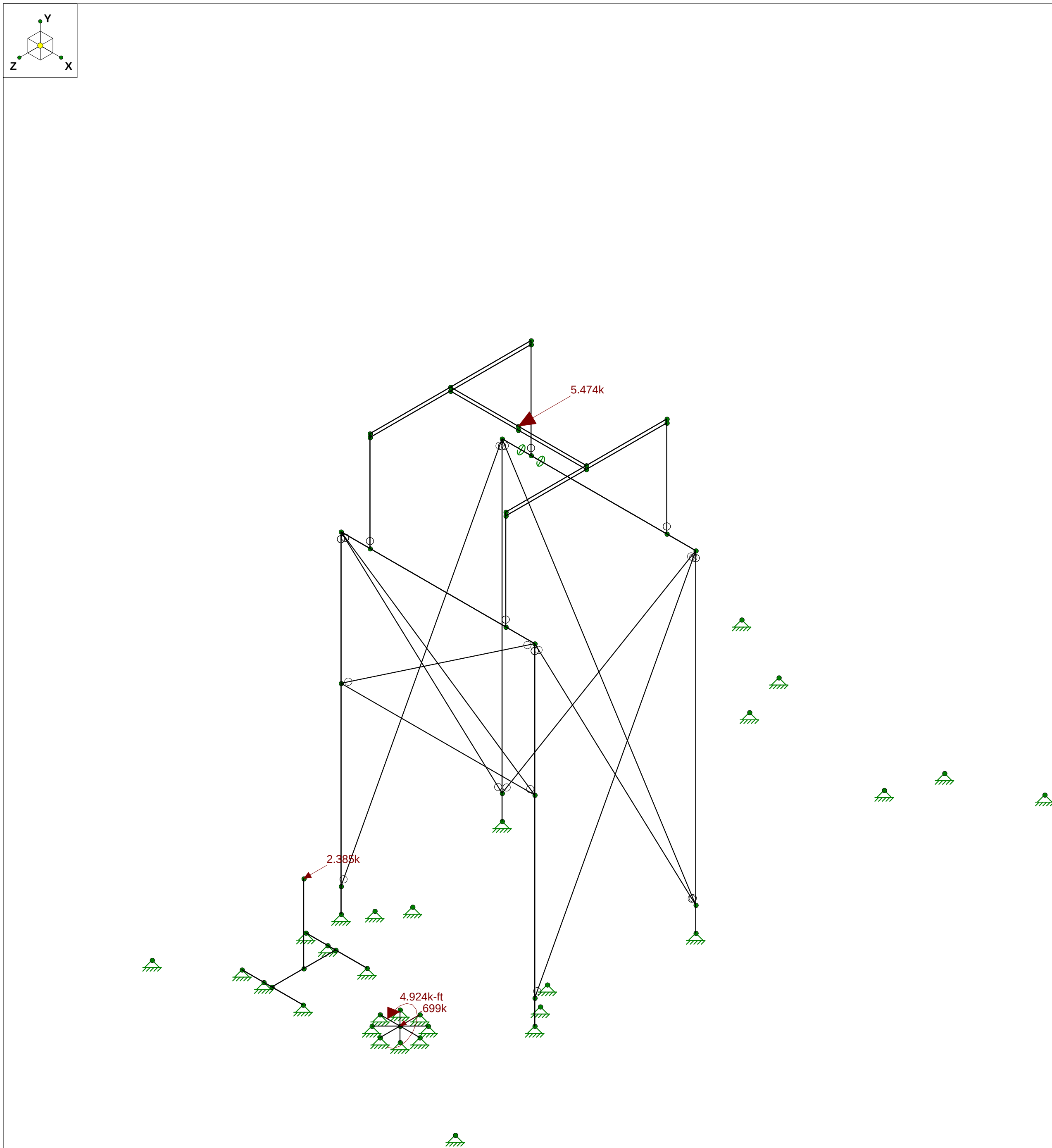
Loads: BLC 3, ELX
Envelope Only Solution

Evergreen Engineering		SK - 1
Todd Costley E.I.T.	CSL 110TR10HEI, Ganahl Lumber - Costa Mesa, CA	May 24, 2017 at 10:54 AM
3524.0	Seismic X - Direction Loading	CSL_Ganahl Lumber_Costa Mesa....



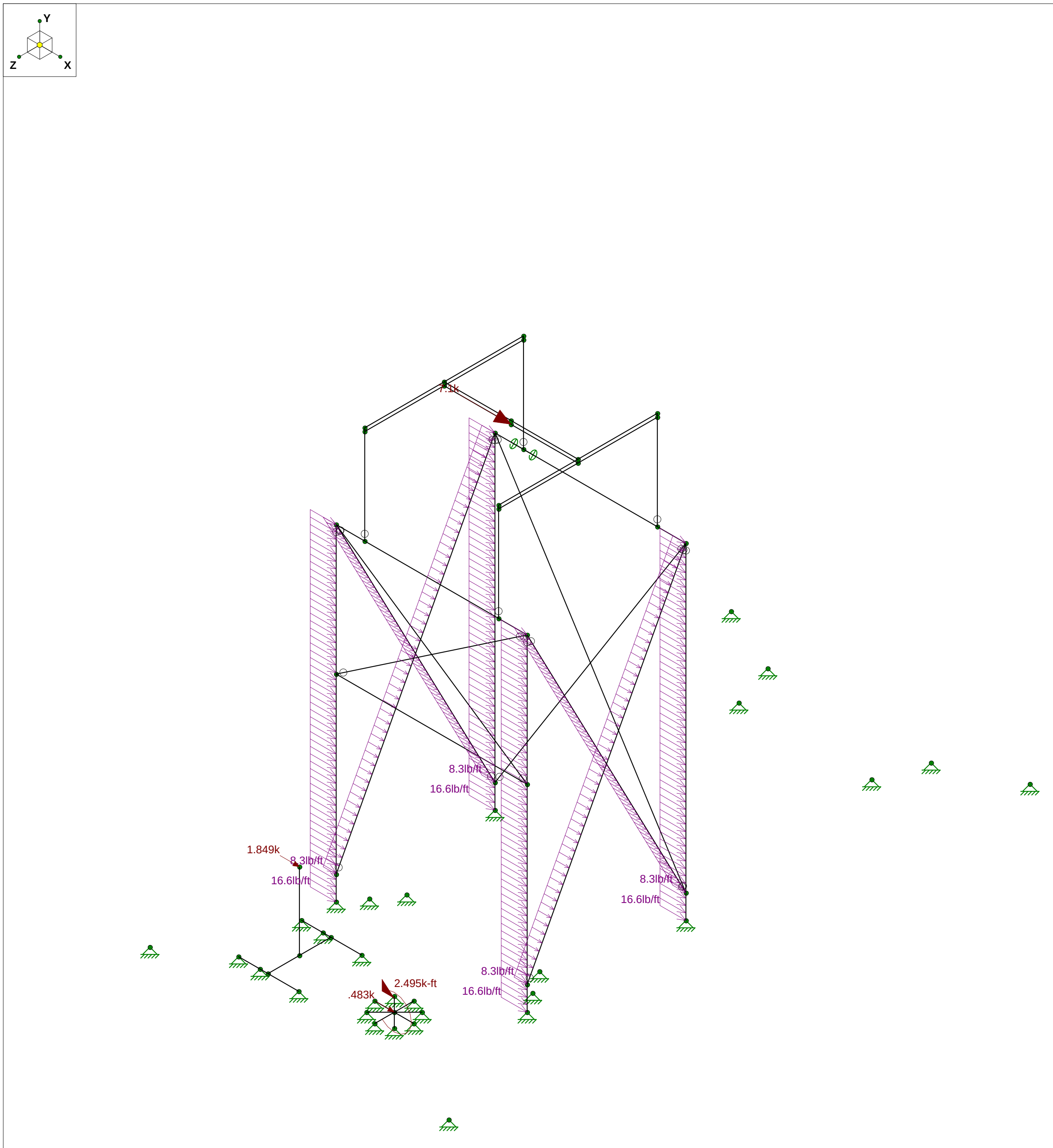
Loads: BLC 4, ELY
Envelope Only Solution

Evergreen Engineering		SK - 2
Todd Costley E.I.T.	CSL 110TR10HEI, Ganahl Lumber - Costa Mesa, CA	May 24, 2017 at 10:54 AM
3524.0	Seismic Y - Direction Loading	CSL_Ganahl Lumber_Costa Mesa....



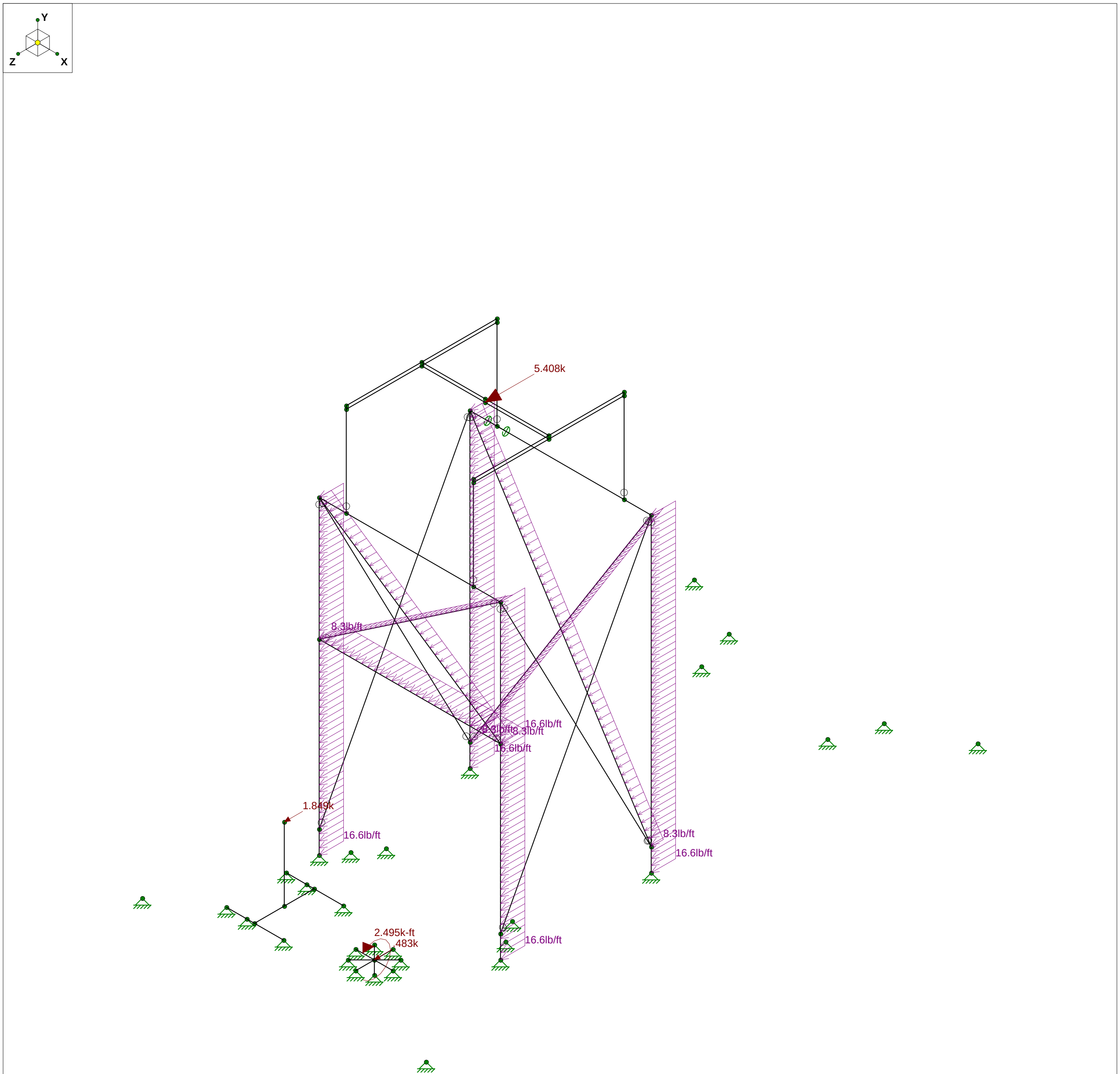
Loads: BLC 5, ELZ
Envelope Only Solution

Evergreen Engineering		SK - 4
Todd Costley E.I.T.	CSL 110TR10HEI, Ganahl Lumber - Costa Mesa, CA	May 24, 2017 at 10:55 AM
3524.0	Seismic Z - Direction Loading	CSL_Ganahl Lumber_Costa Mesa....



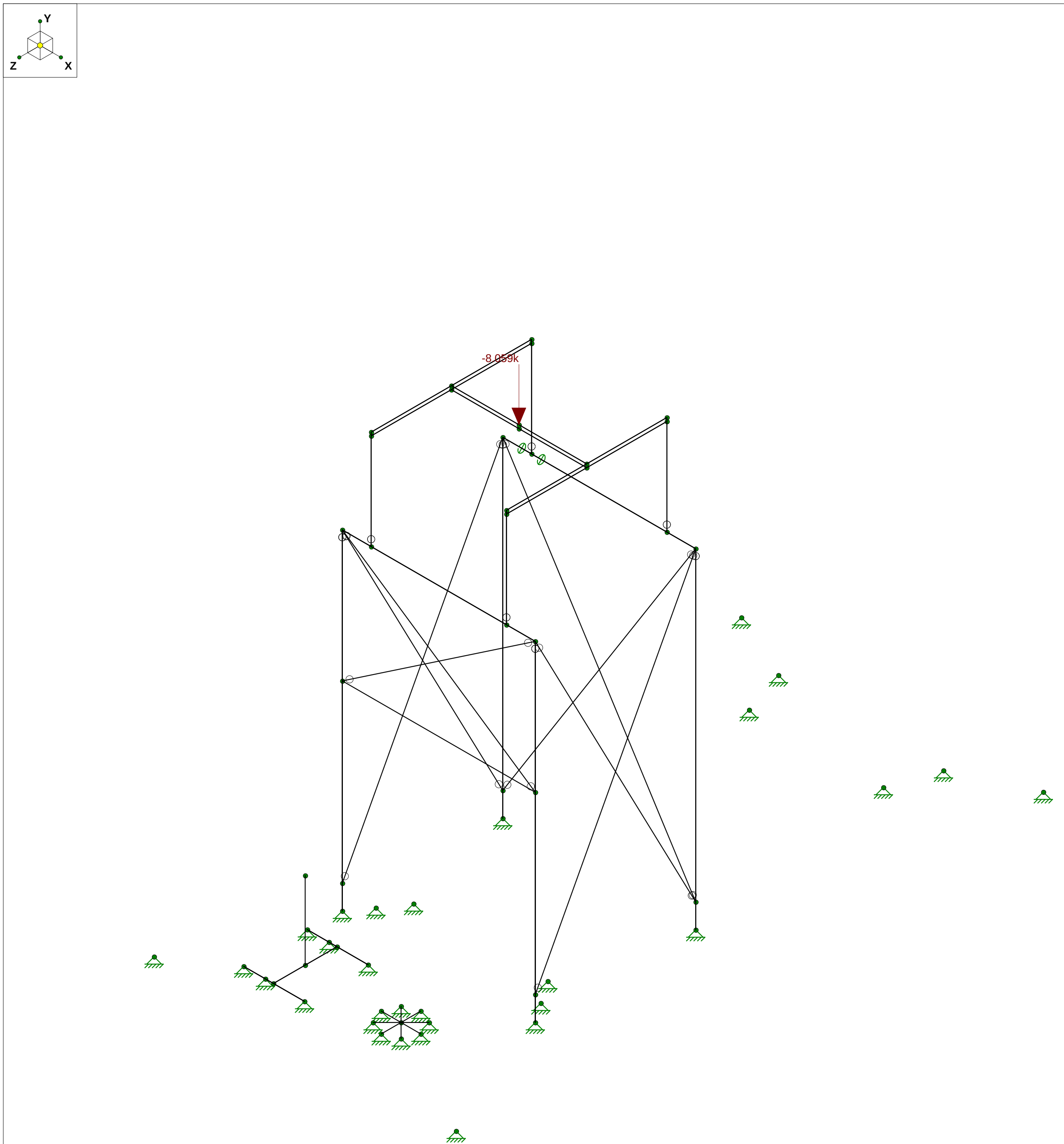
Loads: BLC 6, WLX

Evergreen Engineering	CSL 110TR10HEI, Ganahl Lumber - Costa Mesa, CA Wind X - Direction Loading	SK - 17
Todd Costley E.I.T.		May 22, 2017 at 10:22 AM
3524.0		CSL_Ganahl Lumber_Costa Mesa...



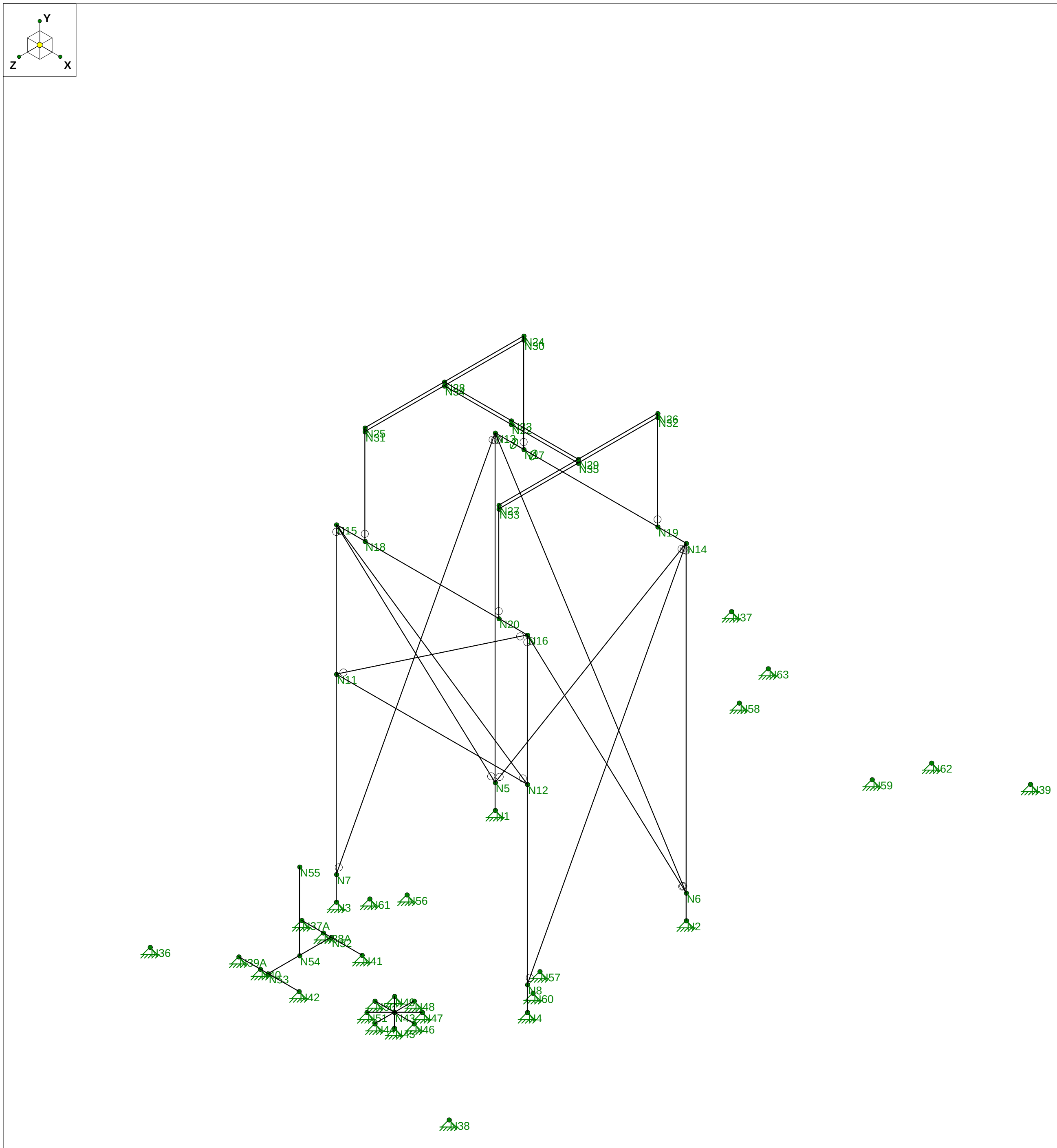
Loads: BLC 7, WLZ

Evergreen Engineering		SK - 18
Todd Costley E.I.T.	CSL 110TR10HEI, Ganahl Lumber - Costa Mesa, CA	May 22, 2017 at 10:22 AM
3524.0	Wind Z - Direction Loading	CSL_Ganahl Lumber_Costa Mesa...

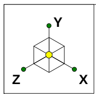


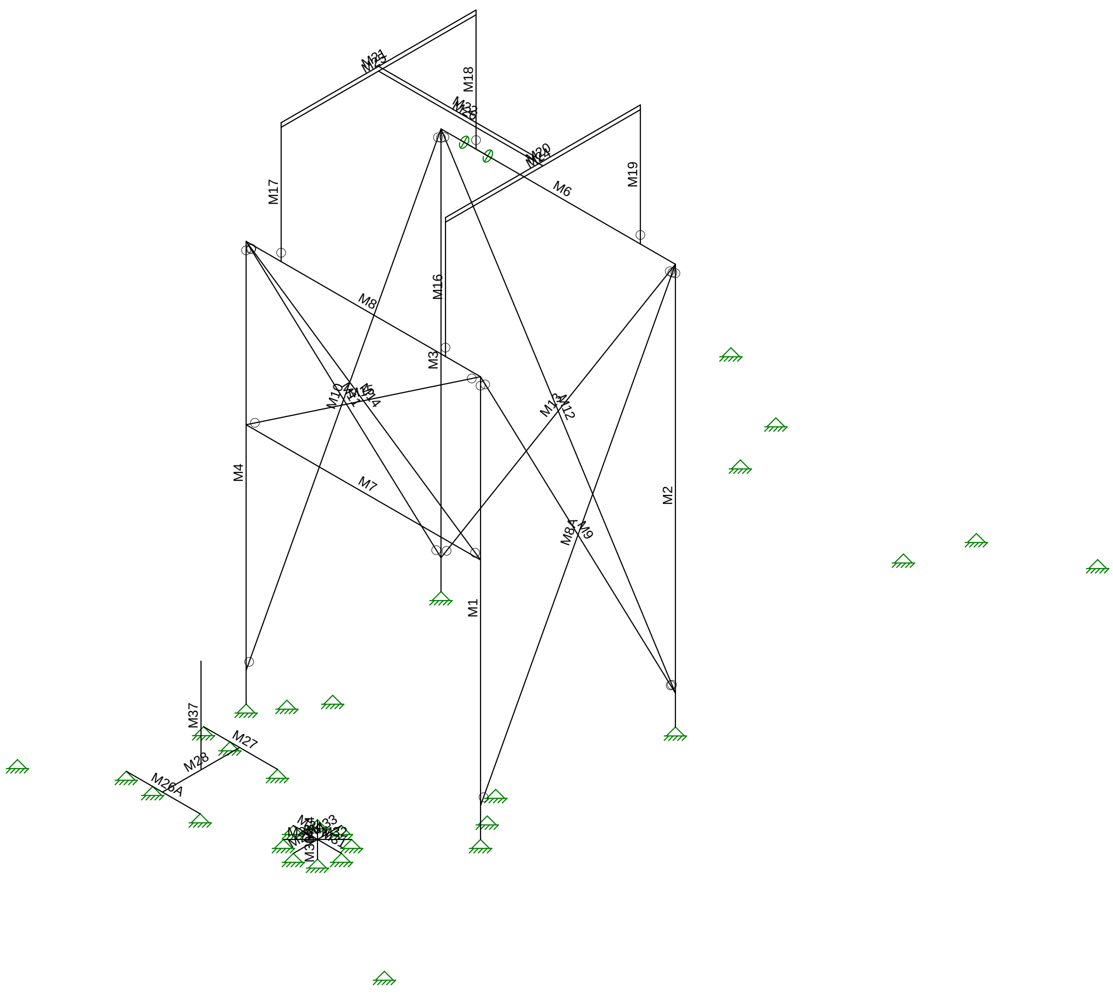
Loads: BLC 8, Plugged Load
Envelope Only Solution

Evergreen Engineering	CSL 110TR10HEI, Ganahl Lumber - Costa Mesa, CA Plugged Load	SK - 5
Todd Costley E.I.T.		May 24, 2017 at 10:56 AM
3524.0		CSL_Ganahl Lumber_Costa Mesa....

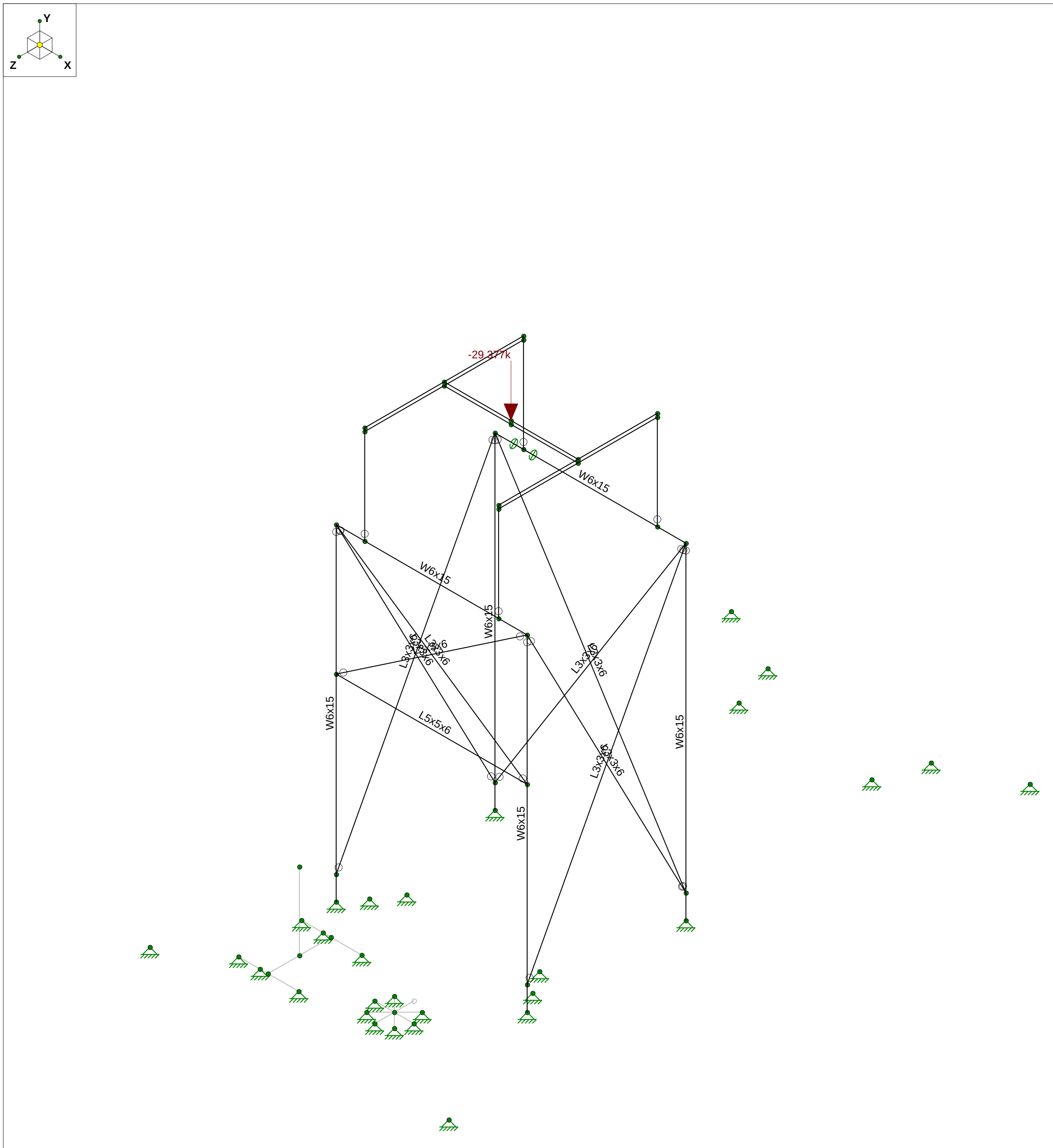


Evergreen Engineering	CSL 110TR10HEI, Ganahl Lumber - Costa Mesa, CA	SK - 10
Todd Costley E.I.T.		May 22, 2017 at 10:18 AM
3524.0	Node Key	CSL_Ganahl Lumber_Costa Mesa...



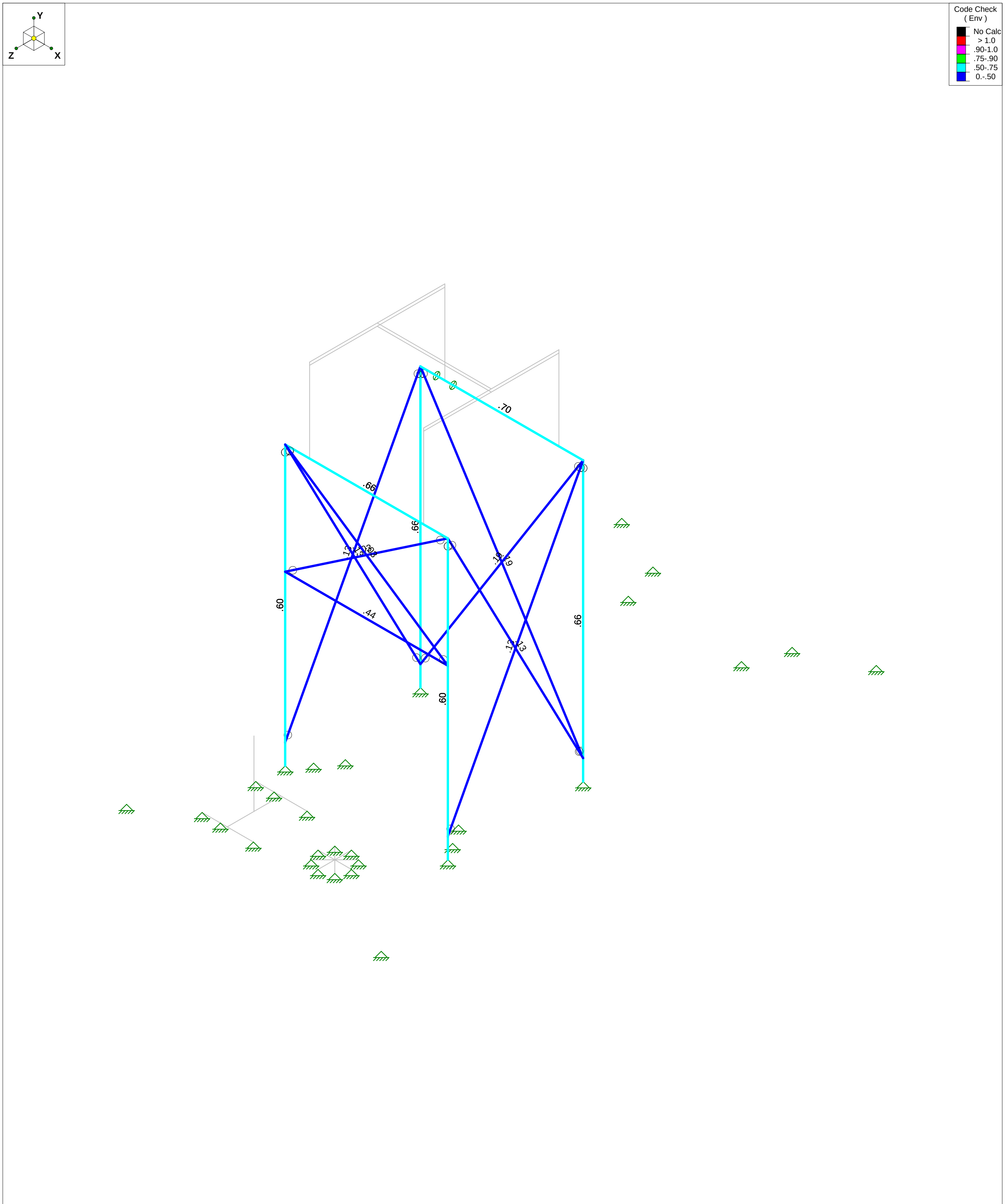


Evergreen Engineering		SK - 11
Todd Costley E.I.T.	CSL 110TR10HEI, Ganahl Lumber - Costa Mesa, CA	May 22, 2017 at 10:19 AM
3524.0	Member Key	CSL_Ganahl Lumber_Costa Mesa...



Loads: BLC 8, Plugged Load
Envelope Only Solution

Evergreen Engineering		SK - 21
Todd Costley E.I.T.	CSL 110TR10HEI, Ganahl Lumber - Costa Mesa, CA	May 22, 2017 at 10:25 AM
3524.0	Member Shapes (Filter Support)	CSL_Ganahl Lumber_Costa Mesa...



Member Code Checks Displayed (Enveloped)
Envelope Only Solution

Evergreen Engineering		SK - 7
Todd Costley E.I.T.	CSL 110TR10HEI, Ganahl Lumber - Costa Mesa, CA	May 24, 2017 at 11:03 AM
3524.0	Code Bending Checks	CSL_Ganahl Lumber_Costa Mesa....

Hot Rolled Steel Properties

	Label	E [ksi]	G [ksi]	Nu	Therm (\1E5 F)	Density[lb/in^3]	Yield[ksi]	Ry	Fu[ksi]	Rt
1	A36 Gr.36	29000	11154	.3	.65	.284	36	1.5	58	1.2
2	A572 Gr.50	29000	11154	.3	.65	.284	50	1.1	65	1.1
3	A992	29000	11154	.3	.65	.284	50	1.1	65	1.1
4	A500 Gr.B RND	29000	11154	.3	.65	.284	42	1.4	58	1.3
5	A500 Gr.B Rect	29000	11154	.3	.65	.284	46	1.4	58	1.3
6	A53 Gr.B	29000	11154	.3	.65	.284	35	1.6	60	1.2
7	Massless	29000	11154	.3	.65	0	36	1.5	58	1.2

Hot Rolled Steel Section Sets

	Label	Shape	Type	Design List	Material	Design R...	A [in2]	Iyy [in4]	Izz [in4]	J [in4]
1	W6x15	W6x15	Column	Wide Flange	A992	Typical	4.43	9.32	29.1	.101
2	L3x3x6	L3x3x6	HBrace	Single Angle	A36 Gr.36	Typical	2.11	1.75	1.75	.101
3	L5x5x3	L5x5x6	HBrace	Single Angle	A36 Gr.36	Typical	3.65	8.76	8.76	.183
4	Dummy	L5x5x8	None	None	Massless	Typical	4.79	11.3	11.3	.417
5	Dummy 2	HSS7x7x4	None	None	Massless	Typical	6.17	46.5	46.5	73.5

Hot Rolled Steel Design Parameters

	Label	Shape	Length[in]	Lbyy[in]	Lbzz[in]	Lcomp top[in]	Lcomp bot[in]	L-torqu...	Kyy	Kzz	Cb	Function
1	M1	W6x15	235.94									Lateral
2	M2	W6x15	235.94									Lateral
3	M3	W6x15	235.94									Lateral
4	M4	W6x15	235.94									Lateral
5	M6	W6x15	138	96.75		Lbyy						Lateral
6	M8	W6x15	138	96.75		Lbyy						Lateral
7	M7	L5x5x3	138									Lateral
8	M8A	L3x3x6	246.967									Lateral
9	M9	L3x3x6	246.967									Lateral
10	M10	L3x3x6	246.967									Lateral
11	M11	L3x3x6	246.967									Lateral
12	M12	L3x3x6	258.591									Lateral
13	M13	L3x3x6	258.591									Lateral
14	M14	L3x3x6	166.658									Lateral
15	M15	L3x3x6	166.658									Lateral
16	M16	Dummy 2	70.9									Lateral
17	M17	Dummy 2	70.9									Lateral
18	M18	Dummy 2	70.9									Lateral
19	M19	Dummy 2	70.9									Lateral
20	M20	Dummy 2	114.75									Lateral
21	M21	Dummy 2	114.75									Lateral
22	M22	Dummy 2	96.75									Lateral
23	M24	Dummy 2	114.75									Lateral
24	M25	Dummy 2	114.75									Lateral
25	M26	Dummy 2	96.75									Lateral
26	M26A	Dummy	43.5									Lateral
27	M27	Dummy	43.5									Lateral
28	M28	Dummy	45.5									Lateral
29	M29	Dummy	14.188									Lateral
30	M30	Dummy	14.188									Lateral

Hot Rolled Steel Design Parameters (Continued)

	Label	Shape	Length[in]	Lbyy[in]	Lbzz[in]	Lcomp top[in]	Lcomp bot[in]	L-torqu...	Kyy	Kzz	Cb	Function
31	M31	Dummy	14.188									Lateral
32	M32	Dummy	14.188									Lateral
33	M33	Dummy	14.188									Lateral
34	M34	Dummy	14.188									Lateral
35	M35	Dummy	14.188									Lateral
36	M36	Dummy	14.188									Lateral

Joint Loads and Enforced Displacements (BLC 1 : DL)

	Joint Label	L,D,M	Direction	Magnitude[(k,k-ft), (in,rad), (k*s^2/in, k*s^2*in)]
1	N23	L	Y	-10.318
2	N55	L	Y	-2.342
3	N43	L	Y	-.998

Joint Loads and Enforced Displacements (BLC 2 : LL)

	Joint Label	L,D,M	Direction	Magnitude[(k,k-ft), (in,rad), (k*s^2/in, k*s^2*in)]
1	N23	L	Y	-6.12

Joint Loads and Enforced Displacements (BLC 3 : ELX)

	Joint Label	L,D,M	Direction	Magnitude[(k,k-ft), (in,rad), (k*s^2/in, k*s^2*in)]
1	N23	L	X	5.474
2	N55	L	X	2.385
3	N43	L	X	.699
4	N43	L	Mz	4.924

Joint Loads and Enforced Displacements (BLC 4 : ELY)

	Joint Label	L,D,M	Direction	Magnitude[(k,k-ft), (in,rad), (k*s^2/in, k*s^2*in)]
1	N23	L	Y	-2.189
2	N55	L	Y	-.497
3	N43	L	Y	-.212

Joint Loads and Enforced Displacements (BLC 5 : ELZ)

	Joint Label	L,D,M	Direction	Magnitude[(k,k-ft), (in,rad), (k*s^2/in, k*s^2*in)]
1	N23	L	Z	5.474
2	N55	L	Z	2.385
3	N43	L	Z	.699
4	N43	L	Mx	4.924

Joint Loads and Enforced Displacements (BLC 6 : WLX)

	Joint Label	L,D,M	Direction	Magnitude[(k,k-ft), (in,rad), (k*s^2/in, k*s^2*in)]
1	N22	L	X	7.1
2	N55	L	X	1.849
3	N43	L	X	.483
4	N43	L	Mz	2.495

Joint Loads and Enforced Displacements (BLC 7 : WLZ)

	Joint Label	L,D,M	Direction	Magnitude[(k,k-ft), (in,rad), (k*s^2/in, k*s^2*in)]
1	N22	L	Z	5.408

Joint Loads and Enforced Displacements (BLC 7 : WLZ) (Continued)

	Joint Label	L,D,M	Direction	Magnitude[(k,k-ft), (in,rad), (k*s^2/in, k*s^2*in)]
2	N55	L	Z	1.849
3	N43	L	Mx	2.495
4	N43	L	Z	.483

Joint Loads and Enforced Displacements (BLC 8 : Plugged Load)

	Joint Label	L,D,M	Direction	Magnitude[(k,k-ft), (in,rad), (k*s^2/in, k*s^2*in)]
1	N23	L	Y	-8.059

Member Distributed Loads (BLC 6 : WLX)

	Member Label	Direction	Start Magnitude[lb/ft,F,ksf]	End Magnitude[lb/f...	Start Location[in,%]	End Location[in,%]
1	M4	X	16.6	16.6	0	0
2	M3	X	16.6	16.6	0	0
3	M2	X	16.6	16.6	0	0
4	M1	X	16.6	16.6	0	0
5	M10	X	8.3	8.3	0	0
6	M11	X	8.3	8.3	0	0
7	M9	X	8.3	8.3	0	0
8	M8A	X	8.3	8.3	0	0

Member Distributed Loads (BLC 7 : WLZ)

	Member Label	Direction	Start Magnitude[lb/ft,F,ksf]	End Magnitude[lb/f...	Start Location[in,%]	End Location[in,%]
1	M15	Z	8.3	8.3	0	0
2	M14	Z	8.3	8.3	0	0
3	M12	Z	8.3	8.3	0	0
4	M13	Z	8.3	8.3	0	0
5	M7	Z	16.6	16.6	0	0
6	M4	Z	16.6	16.6	0	0
7	M1	Z	16.6	16.6	0	0
8	M3	Z	16.6	16.6	0	0
9	M2	Z	16.6	16.6	0	0

Load Combinations

	Description	Sol...	PDe...	...	BLC	Fac...	BLC	Fact...	BLC	Fac...	BLC	Fac...	BLC	Fac...	BLC	Fac...	BLC	Fac...	BLC	Fac...	BLC	Fac...	BLC	Fac...
1	ASCE ASD 1		Y		DL	1																		
2	ASCE ASD 2		Y		DL	1	LL	1																
3	ASCE ASD 3...		Y		DL	1																		
4	ASCE ASD 5...		Y		DL	1	WLX	.6																
5	ASCE ASD 5...		Y		DL	1	WLZ	.6																
6	ASCE ASD 5...		Y		DL	1	WLX	-.6																
7	ASCE ASD 5...		Y		DL	1	WLZ	-.6																
8	ASCE ASD 6...		Y		DL	1	WLX	.45	LL	.75														
9	ASCE ASD 6...		Y		DL	1	WLZ	.45	LL	.75														
10	ASCE ASD 6...		Y		DL	1	WLX	-.45	LL	.75														
11	ASCE ASD 6...		Y		DL	1	WLZ	-.45	LL	.75														
12	ASCE ASD 7...		Y		DL	.6	WLX	.6																
13	ASCE ASD 7...		Y		DL	.6	WLZ	.6																
14	ASCE ASD 7...		Y		DL	.6	WLX	-.6																
15	ASCE ASD 7...		Y		DL	.6	WLZ	-.6																

Load Combinations (Continued)

	Description	Sol...	PDe.....		BLC	Fac...	BLC	Fact...	BLC	Fac...	BLC	Fac...	BLC	Fac...	BLC	Fac...	BLC	Fac...	BLC	Fac...	BLC	Fac...	BLC	Fac...
16	ASCE ASD 5...		Y		DL	1	ELY	.7	ELX	.7	ELZ	.21												
17	ASCE ASD 5...		Y		DL	1	ELY	.7	ELZ	.7	ELX	.21												
18	ASCE ASD 5...		Y		DL	1	ELY	.7	ELX	.7	ELZ	-.21												
19	ASCE ASD 5...		Y		DL	1	ELY	.7	ELZ	.7	ELX	-.21												
20	ASCE ASD 5...		Y		DL	1	ELY	.7	ELX	-.7	ELZ	-.21												
21	ASCE ASD 5...		Y		DL	1	ELY	.7	ELZ	-.7	ELX	-.21												
22	ASCE ASD 5...		Y		DL	1	ELY	.7	ELX	-.7	ELZ	.21												
23	ASCE ASD 5...		Y		DL	1	ELY	.7	ELZ	-.7	ELX	.21												
24	ASCE ASD 6...		Y		DL	1	ELY	.525	ELX	.525	ELZ	.158	LL	.75										
25	ASCE ASD 6...		Y		DL	1	ELY	.525	ELZ	.525	ELX	.158	LL	.75										
26	ASCE ASD 6...		Y		DL	1	ELY	.525	ELX	.525	ELZ	-.158	LL	.75										
27	ASCE ASD 6...		Y		DL	1	ELY	.525	ELZ	.525	ELX	-.158	LL	.75										
28	ASCE ASD 6...		Y		DL	1	ELY	.525	ELX	-.525	ELZ	-.158	LL	.75										
29	ASCE ASD 6...		Y		DL	1	ELY	.525	ELZ	-.525	ELX	-.158	LL	.75										
30	ASCE ASD 6...		Y		DL	1	ELY	.525	ELX	-.525	ELZ	.158	LL	.75										
31	ASCE ASD 6...		Y		DL	1	ELY	.525	ELZ	-.525	ELX	.158	LL	.75										
32	ASCE ASD 8...		Y		DL	.6	ELY	-.7	ELX	.7	ELZ	.21												
33	ASCE ASD 8...		Y		DL	.6	ELY	-.7	ELZ	.7	ELX	.21												
34	ASCE ASD 8...		Y		DL	.6	ELY	-.7	ELX	.7	ELZ	-.21												
35	ASCE ASD 8...		Y		DL	.6	ELY	-.7	ELZ	.7	ELX	-.21												
36	ASCE ASD 8...		Y		DL	.6	ELY	-.7	ELX	-.7	ELZ	-.21												
37	ASCE ASD 8...		Y		DL	.6	ELY	-.7	ELZ	-.7	ELX	-.21												
38	ASCE ASD 8...		Y		DL	.6	ELY	-.7	ELX	-.7	ELZ	.21												
39	ASCE ASD 8...		Y		DL	.6	ELY	-.7	ELZ	-.7	ELX	.21												
40																								
41	Plugged Load		Y		DL	1	OL1	1																
42																								
43																								
44	ASCE Streng...	Yes	Y		DL	1.4																		
45	ASCE Streng...	Yes	Y		DL	1.2	LL	1.6																
46	ASCE Streng...	Yes	Y		DL	1.2	WLX	.5																
47	ASCE Streng...	Yes	Y		DL	1.2	WLZ	.5																
48	ASCE Streng...	Yes	Y		DL	1.2	WLX	-.5																
49	ASCE Streng...	Yes	Y		DL	1.2	WLZ	-.5																
50	ASCE Streng...	Yes	Y		DL	1.2	WLX	1	LL	.5														
51	ASCE Streng...	Yes	Y		DL	1.2	WLZ	1	LL	.5														
52	ASCE Streng...	Yes	Y		DL	1.2	WLX	-1	LL	.5														
53	ASCE Streng...	Yes	Y		DL	1.2	WLZ	-1	LL	.5														
54	ASCE Streng...	Yes	Y		DL	.9	WLX	1																
55	ASCE Streng...	Yes	Y		DL	.9	WLZ	1																
56	ASCE Streng...	Yes	Y		DL	.9	WLX	-1																
57	ASCE Streng...	Yes	Y		DL	.9	WLZ	-1																
58	ASCE Streng...	Yes	Y		DL	1.2	ELY	1	ELX	1	ELZ	.3	LL	.5										
59	ASCE Streng...	Yes	Y		DL	1.2	ELY	1	ELZ	1	ELX	.3	LL	.5										
60	ASCE Streng...	Yes	Y		DL	1.2	ELY	1	ELX	1	ELZ	-.3	LL	.5										
61	ASCE Streng...	Yes	Y		DL	1.2	ELY	1	ELZ	1	ELX	-.3	LL	.5										
62	ASCE Streng...	Yes	Y		DL	1.2	ELY	1	ELX	-1	ELZ	-.3	LL	.5										
63	ASCE Streng...	Yes	Y		DL	1.2	ELY	1	ELZ	-1	ELX	-.3	LL	.5										
64	ASCE Streng...	Yes	Y		DL	1.2	ELY	1	ELX	-1	ELZ	.3	LL	.5										
65	ASCE Streng...	Yes	Y		DL	1.2	ELY	1	ELZ	-1	ELX	.3	LL	.5										
66	ASCE Streng...	Yes	Y		DL	.9	ELY	-1	ELX	1	ELZ	.3												
67	ASCE Streng...	Yes	Y		DL	.9	ELY	-1	ELZ	1	ELX	.3												

Load Combinations (Continued)

	Description	Sol...	PDe.....		BLC	Fac...	BLC	Fact...	BLC	Fac...	BLC	Fac...	BLC	Fac...	BLC	Fac...	BLC	Fac...	BLC	Fac...	BLC	Fac...	BLC	Fac...
68	ASCE Streng...	Yes	Y		DL	.9	ELY	-1	ELX	1	ELZ	-.3												
69	ASCE Streng...	Yes	Y		DL	.9	ELY	-1	ELZ	1	ELX	-.3												
70	ASCE Streng...	Yes	Y		DL	.9	ELY	-1	ELX	-1	ELZ	-.3												
71	ASCE Streng...	Yes	Y		DL	.9	ELY	-1	ELZ	-1	ELX	-.3												
72	ASCE Streng...	Yes	Y		DL	.9	ELY	-1	ELX	-1	ELZ	.3												
73	ASCE Streng...	Yes	Y		DL	.9	ELY	-1	ELZ	-1	ELX	.3												
74	Plugged	Yes	Y		DL	1.2	OL1	1.6																
75																								
76	Seismic Only		Y		ELX	1	ELY	1																
77			Y		ELZ	1	ELY	1																
78			Y		ELX	-1	ELY	1																
79			Y		ELZ	-1	ELY	1																
80	Seismic Over...		Y		DL	1.2	ELY	2	ELX	2	ELZ	.6	LL	.5										
81	Seismic Over...		Y		DL	1.2	ELY	2	ELZ	2	ELX	.6	LL	.5										
82	Seismic Over...		Y		DL	1.2	ELY	2	ELX	2	ELZ	-.6	LL	.5										
83	Seismic Over...		Y		DL	1.2	ELY	2	ELZ	2	ELX	-.6	LL	.5										
84	Seismic Over...		Y		DL	1.2	ELY	2	ELX	-2	ELZ	-.6	LL	.5										
85	Seismic Over...		Y		DL	1.2	ELY	2	ELZ	-2	ELX	-.6	LL	.5										
86	Seismic Over...		Y		DL	1.2	ELY	2	ELX	-2	ELZ	.6	LL	.5										
87	Seismic Over...		Y		DL	1.2	ELY	2	ELZ	-2	ELX	.6	LL	.5										
88	Seismic Over...		Y		DL	.9	ELY	-2	ELX	2	ELZ	.6												
89	Seismic Over...		Y		DL	.9	ELY	-2	ELZ	2	ELX	.6												
90	Seismic Over...		Y		DL	.9	ELY	-2	ELX	2	ELZ	-.6												
91	Seismic Over...		Y		DL	.9	ELY	-2	ELZ	2	ELX	-.6												
92	Seismic Over...		Y		DL	.9	ELY	-2	ELX	-2	ELZ	-.6												
93	Seismic Over...		Y		DL	.9	ELY	-2	ELZ	-2	ELX	-.6												
94	Seismic Over...		Y		DL	.9	ELY	-2	ELX	-2	ELZ	.6												
95	Seismic Over...		Y		DL	.9	ELY	-2	ELZ	-2	ELX	.6												

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	N4	max	1.071	56	13.826	59	3.797	65	0	44	0	44	0	44
2		min	-1.051	54	-6.164	71	-.607	47	0	44	0	44	0	44
3	N3	max	1.051	56	13.826	61	3.797	63	0	44	0	44	0	44
4		min	-1.071	54	-6.164	73	-.607	47	0	44	0	44	0	44
5	N1	max	.699	53	22.638	52	.684	49	0	44	0	44	0	44
6		min	-6.828	50	-14.783	54	-3.833	59	0	44	0	44	0	44
7	N2	max	6.828	52	22.638	50	.684	49	0	44	0	44	0	44
8		min	-.699	53	-14.783	56	-3.833	61	0	44	0	44	0	44
9	N36	max	0	44	0	44	0	44	0	44	0	44	0	44
10		min	0	44	0	44	0	44	0	44	0	44	0	44
11	N37	max	0	44	0	44	0	44	0	44	0	44	0	44
12		min	0	44	0	44	0	44	0	44	0	44	0	44
13	N38	max	0	44	0	44	0	44	0	44	0	44	0	44
14		min	0	44	0	44	0	44	0	44	0	44	0	44
15	N39	max	0	44	0	44	0	44	0	44	0	44	0	44
16		min	0	44	0	44	0	44	0	44	0	44	0	44
17	N37A	max	0	64	2.154	64	.594	64	0	44	0	44	0	44
18		min	0	60	-2.686	60	-.756	60	0	44	0	44	0	44
19	N38A	max	1.776	64	4.945	63	1.903	71	0	44	0	44	0	44

Envelope Joint Reactions (Continued)

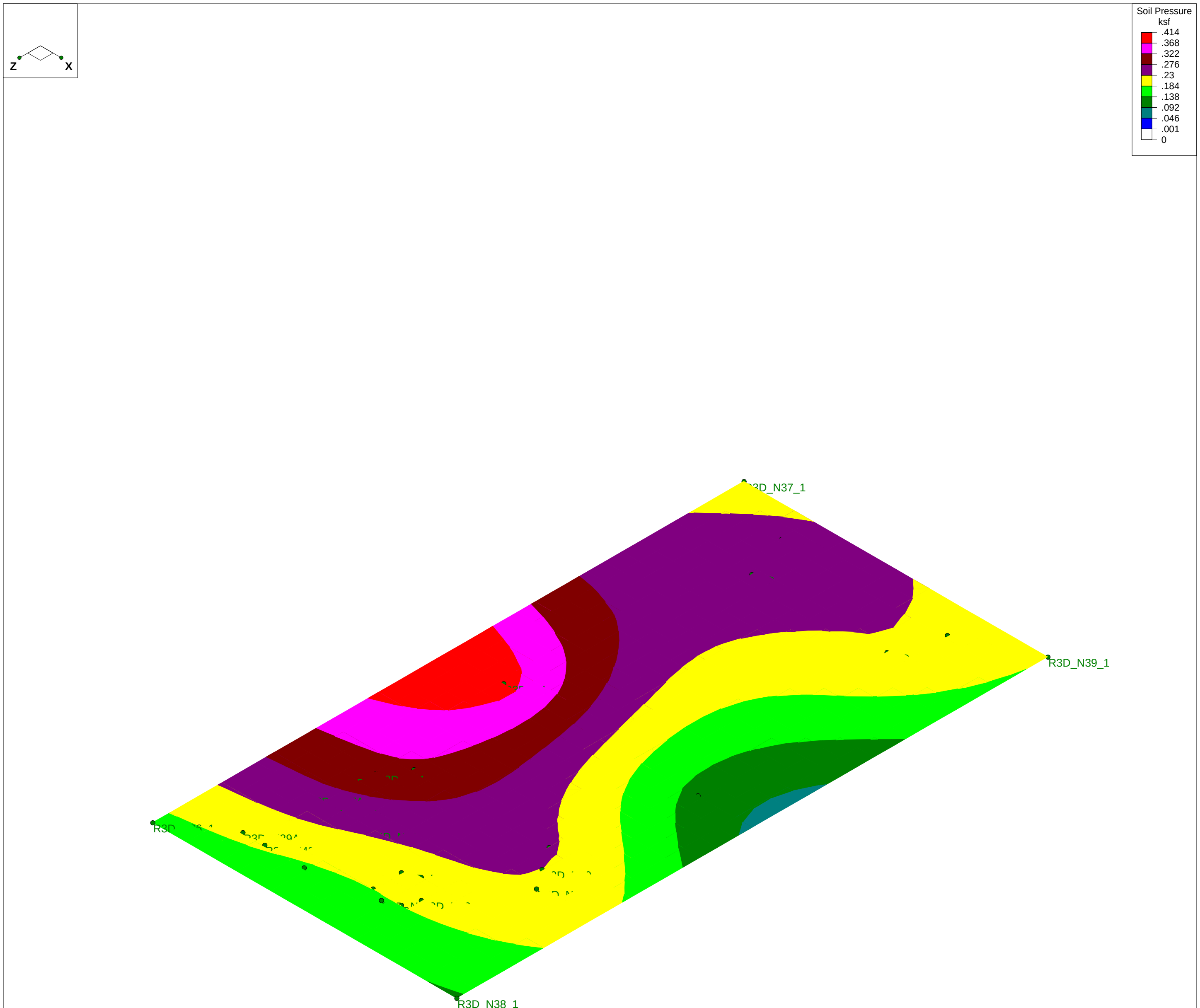
	Joint		X [k]	LC	Y [k]	LC	Z [k]	LC	MX [k-ft]	LC	MY [k-ft]	LC	MZ [k-ft]	LC
20		min	-1.858	60	-2.306	67	-3.204	59	0	44	0	44	0	44
21	N39A	max	0	70	2.155	62	.494	64	0	44	0	44	0	44
22		min	0	66	-2.649	58	-.368	60	0	44	0	44	0	44
23	N40	max	.555	70	4.951	61	1.839	60	0	44	0	44	0	44
24		min	-.515	66	-2.351	73	-.659	72	0	44	0	44	0	44
25	N41	max	.459	64	3.317	60	1.089	60	0	44	0	44	0	44
26		min	-.48	60	-2.932	64	-.692	64	0	44	0	44	0	44
27	N42	max	.143	70	3.328	58	.298	60	0	44	0	44	0	44
28		min	-.133	66	-2.932	62	-.546	64	0	44	0	44	0	44
29	N45	max	.642	70	1.133	64	.642	63	0	44	0	44	0	44
30		min	-.642	58	-.871	68	-.642	67	0	44	0	44	0	44
31	N44	max	.531	61	1.217	61	.581	62	0	44	0	44	0	44
32		min	-.531	73	-.955	73	-.581	58	0	44	0	44	0	44
33	N51	max	.468	66	1.133	59	.468	67	0	44	0	44	0	44
34		min	-.468	62	-.871	71	-.468	63	0	44	0	44	0	44
35	N50	max	.581	63	1.217	58	.531	60	0	44	0	44	0	44
36		min	-.581	59	-.955	70	-.531	72	0	44	0	44	0	44
37	N49	max	.642	62	1.133	60	.642	71	0	44	0	44	0	44
38		min	-.642	66	-.871	72	-.642	59	0	44	0	44	0	44
39	N48	max	.531	69	1.217	65	.581	62	0	44	0	44	0	44
40		min	-.531	65	-.955	69	-.581	58	0	44	0	44	0	44
41	N47	max	.468	58	1.133	63	.468	59	0	44	0	44	0	44
42		min	-.468	70	-.871	67	-.468	71	0	44	0	44	0	44
43	N46	max	.581	63	1.217	62	.531	68	0	44	0	44	0	44
44		min	-.581	59	-.955	66	-.531	64	0	44	0	44	0	44
45	N56	max	0	44	0	44	0	44	0	44	0	44	0	44
46		min	0	44	0	44	0	44	0	44	0	44	0	44
47	N57	max	0	44	0	44	0	44	0	44	0	44	0	44
48		min	0	44	0	44	0	44	0	44	0	44	0	44
49	N58	max	0	44	0	44	0	44	0	44	0	44	0	44
50		min	0	44	0	44	0	44	0	44	0	44	0	44
51	N59	max	0	44	0	44	0	44	0	44	0	44	0	44
52		min	0	44	0	44	0	44	0	44	0	44	0	44
53	N60	max	0	44	0	44	0	44	0	44	0	44	0	44
54		min	0	44	0	44	0	44	0	44	0	44	0	44
55	N61	max	0	44	0	44	0	44	0	44	0	44	0	44
56		min	0	44	0	44	0	44	0	44	0	44	0	44
57	N62	max	0	44	0	44	0	44	0	44	0	44	0	44
58		min	0	44	0	44	0	44	0	44	0	44	0	44
59	N63	max	0	44	0	44	0	44	0	44	0	44	0	44
60		min	0	44	0	44	0	44	0	44	0	44	0	44
61	Totals:	max	11.421	52	32.614	74	10.029	65						
62		min	-11.421	54	11.303	66	-10.029	61						

Envelope AISC 14th(360-10): LRFD Steel Code Checks

	Member	Shape	Code Check	Loc[in]	LC	Shea...	Loc[i...	Dir	LC	phi*Pnc [k]	phi*Pn...	phi*M...	phi*Mn z-z [...	Cb	Eqn
1	M1	W6x15	.605	140....	60	.044	0	z	65	37.823	199.35	16.283	29.337	1.449	H1-1a
2	M2	W6x15	.656	17.204	50	.160	0	y	52	37.823	199.35	16.283	22.767	1.124	H1-1a
3	M3	W6x15	.656	17.204	52	.160	0	y	50	37.823	199.35	16.283	22.767	1.124	H1-1a
4	M4	W6x15	.605	140....	62	.044	0	z	63	37.823	199.35	16.283	29.337	1.449	H1-1a

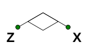
Envelope AISC 14th(360-10): LRFD Steel Code Checks (Continued)

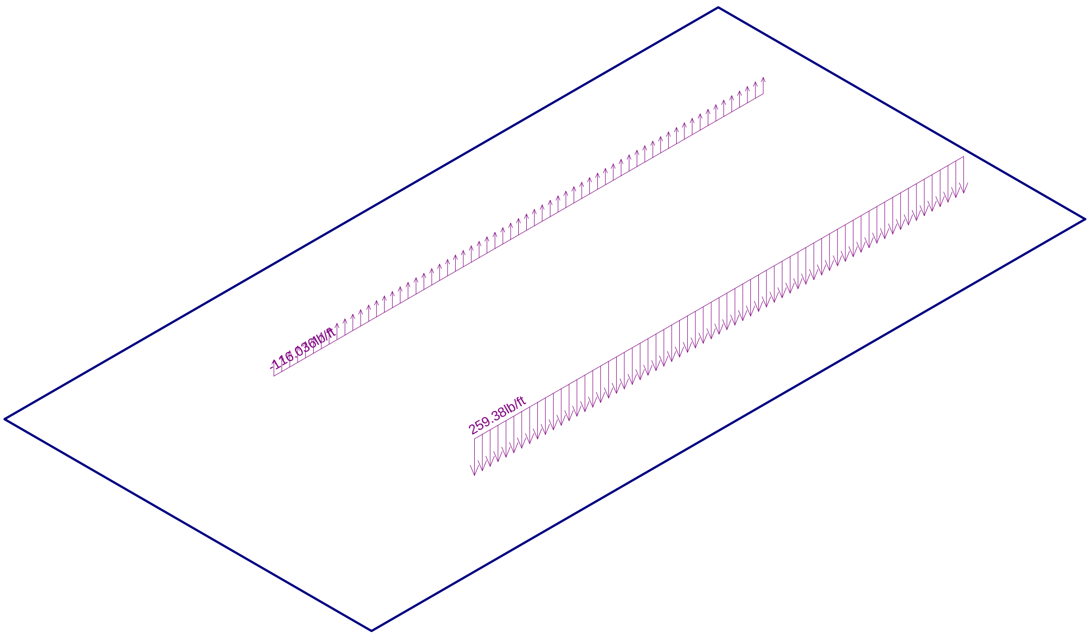
	Member	Shape	Code Check	Loc[in]	LC	Shea...	Loc[i...	Dir	LC	phi*Pnc [k]	phi*Pn...	phi*M...	phi*Mn z-z [...	Cb	Eqn
5	M6	W6x15	.705	117....	63	.171	138	y	62	143.99	199.35	16.283	36.613	1	H1-1b
6	M8	W6x15	.658	117....	61	.157	0	y	61	143.99	199.35	16.283	36.613	1	H1-1b
7	M7	L5x5x6	.436	0	50	.018	138	y	52	42.095	118.26	7.418	15.146	2.288	H2-1
8	M8A	L3x3x6	.125	246....	65	.012	0	y	65	2.638	68.364	2.307	3.573	1.136	H2-1*
9	M9	L3x3x6	.126	246....	61	.008	246....	y	59	2.638	68.364	2.307	3.573	1.136	H2-1*
10	M10	L3x3x6	.125	246....	63	.012	246....	y	63	2.638	68.364	2.307	3.573	1.136	H2-1*
11	M11	L3x3x6	.126	246....	59	.008	0	y	61	2.638	68.364	2.307	3.573	1.136	H2-1*
12	M12	L3x3x6	.194	258....	52	.009	258....	z	55	2.406	68.364	2.307	3.498	1.136	H2-1*
13	M13	L3x3x6	.194	258....	50	.009	258....	z	55	2.406	68.364	2.307	3.498	1.136	H2-1*
14	M14	L3x3x6	.026	166....	56	.004	166....	y	64	5.793	68.364	2.307	4.151	1.136	H2-1*
15	M15	L3x3x6	.026	166....	54	.004	166....	y	58	5.793	68.364	2.307	4.151	1.136	H2-1*
16	M16	HSS7x7x4	.610	67.946	61	.204	0	z	61	193.01	199.908	41.85	41.85	1.658	H1-1b
17	M17	HSS7x7x4	.610	67.946	59	.204	0	z	59	193.01	199.908	41.85	41.85	1.658	H1-1b
18	M18	HSS7x7x4	.784	67.946	62	.202	68.6...	z	62	193.01	199.908	41.85	41.85	1.62	H1-1b
19	M19	HSS7x7x4	.784	67.946	60	.202	68.6...	z	60	193.01	199.908	41.85	41.85	1.62	H1-1b
20	M20	HSS7x7x4	.836	57.375	58	.451	57.3...	y	50	182.341	199.908	41.85	41.85	1.53	H3-6
21	M21	HSS7x7x4	.836	57.375	64	.451	57.3...	y	52	182.341	199.908	41.85	41.85	1.53	H3-6
22	M22	HSS7x7x4	.950	48.375	74	.221	48.3...	y	74	187.255	199.908	41.85	41.85	1.446	H1-1b
23	M24	HSS7x7x4	.552	57.375	50	.308	57.3...	z	52	182.341	199.908	41.85	41.85	1.236	H3-6
24	M25	HSS7x7x4	.552	57.375	52	.308	57.3...	z	50	182.341	199.908	41.85	41.85	1.236	H3-6
25	M26	HSS7x7x4	.372	96.75	50	.049	0	y	52	187.255	199.908	41.85	41.85	2.248	H1-1b
26	M26A	L5x5x8	.672	22.203	58	.108	22.6...	y	64	139.905	155.196	9.278	20.619	1.373	H2-1
27	M27	L5x5x8	.597	22.203	60	.108	22.6...	y	62	139.905	155.196	9.278	20.619	1.383	H2-1
28	M28	L5x5x8	.959	22.75	59	6.220	0	y	60	138.547	155.196	9.278	20.619	1.483	H2-1
29	M29	L5x5x8	.135	0	59	.025	0	y	61	153.493	155.196	9.278	20.619	1.667	H2-1
30	M30	L5x5x8	.126	0	61	.023	0	y	64	153.493	155.196	9.278	20.619	1.667	H2-1
31	M31	L5x5x8	.135	0	62	.025	0	y	64	153.493	155.196	9.278	20.619	1.667	H2-1
32	M32	L5x5x8	.125	0	62	.023	0	y	62	153.493	155.196	9.278	20.619	1.667	H2-1
33	M33	L5x5x8	.135	0	63	.025	0	y	63	153.493	155.196	9.278	20.619	1.667	H2-1
34	M34	L5x5x8	.126	0	65	.023	0	y	65	153.493	155.196	9.278	20.619	1.667	H2-1
35	M35	L5x5x8	.135	0	58	.025	0	y	60	153.493	155.196	9.278	20.619	1.667	H2-1
36	M36	L5x5x8	.125	0	58	.023	0	y	59	153.493	155.196	9.278	20.619	1.667	H2-1



Results for LC 20, ASCE ASD 5 (b) (e)

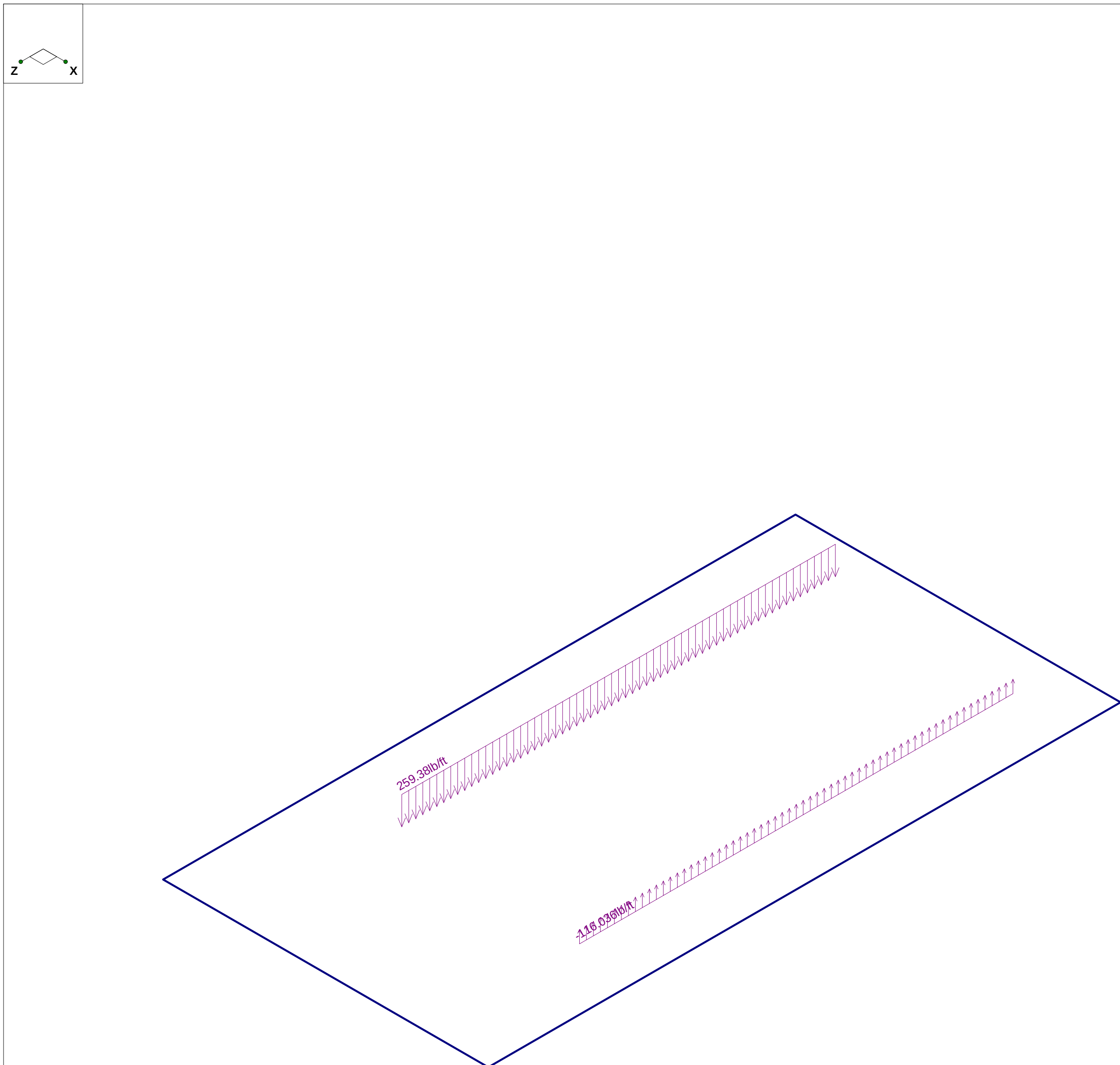
Evergreen Engineering	CSL 110TR10HEI, Ganahl Lumber - Costa Mesa, CA	SK - 6
Todd Costley E.I.T.		May 24, 2017 at 11:00 AM
3524.0	Worst Case Soil Pressures	CSL_Ganahl Lumber_Costa Mesa....





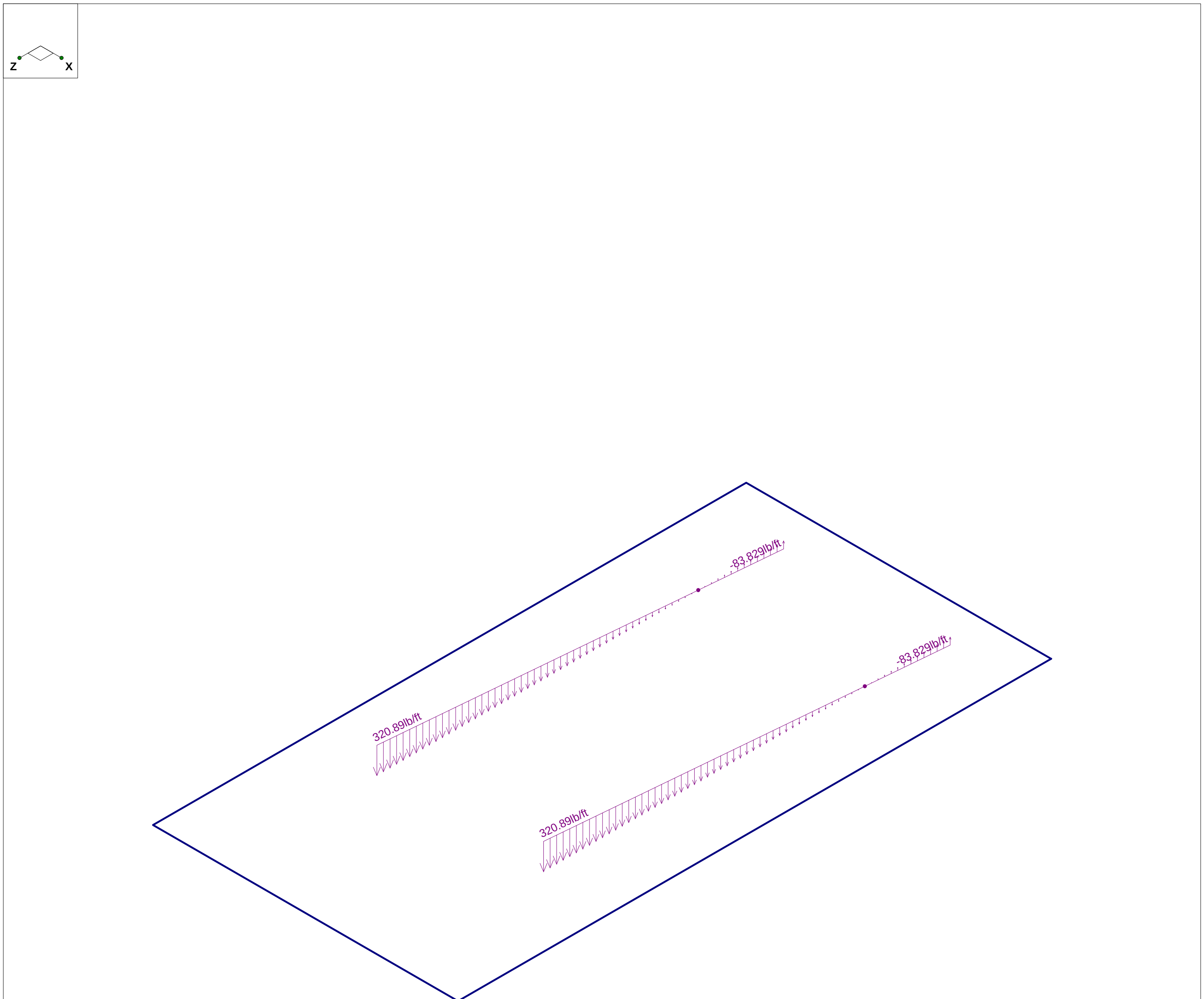
Loads: OL2 - Other Load 2
Results for LC 20, ASCE ASD 5 (b) (e)

Evergreen Engineering		SK - 2
Todd Costley E.I.T.	CSL 110TR10HEI, Ganahl Lumber - Costa Mesa, CA	May 22, 2017 at 9:56 AM
3524.0	Bin Enclosure Seismic Positive X - Direction Loading	CSL_Ganahl Lumber_Costa Mesa...



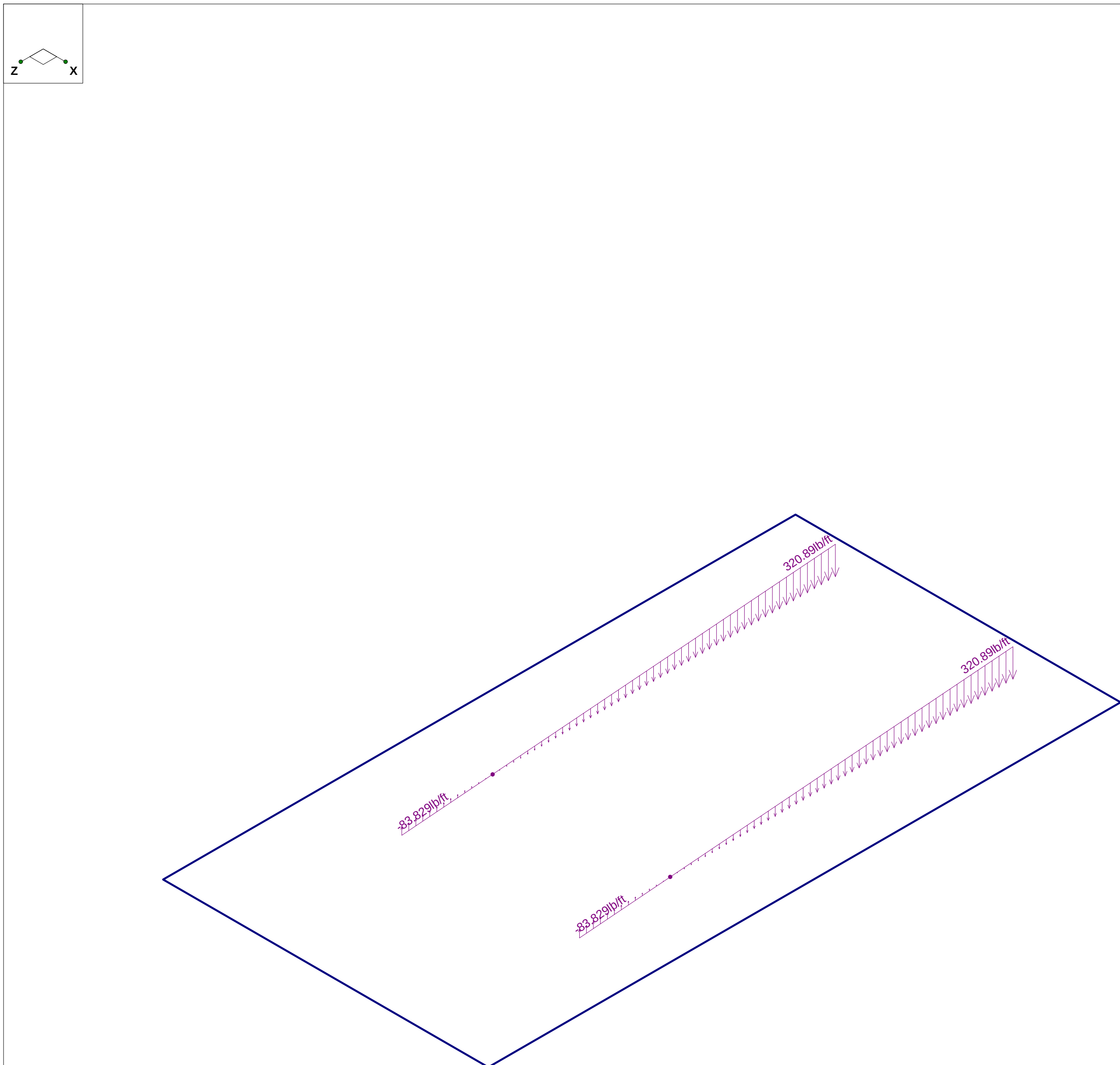
Loads: OL3 - Other Load 3
Results for LC 20, ASCE ASD 5 (b) (e)

Evergreen Engineering		SK - 3
Todd Costley E.I.T.	CSL 110TR10HEI, Ganahl Lumber - Costa Mesa, CA	May 22, 2017 at 9:56 AM
3524.0	Bin Enclosure Seismic Negative X - Direction Loading	CSL_Ganahl Lumber_Costa Mesa...



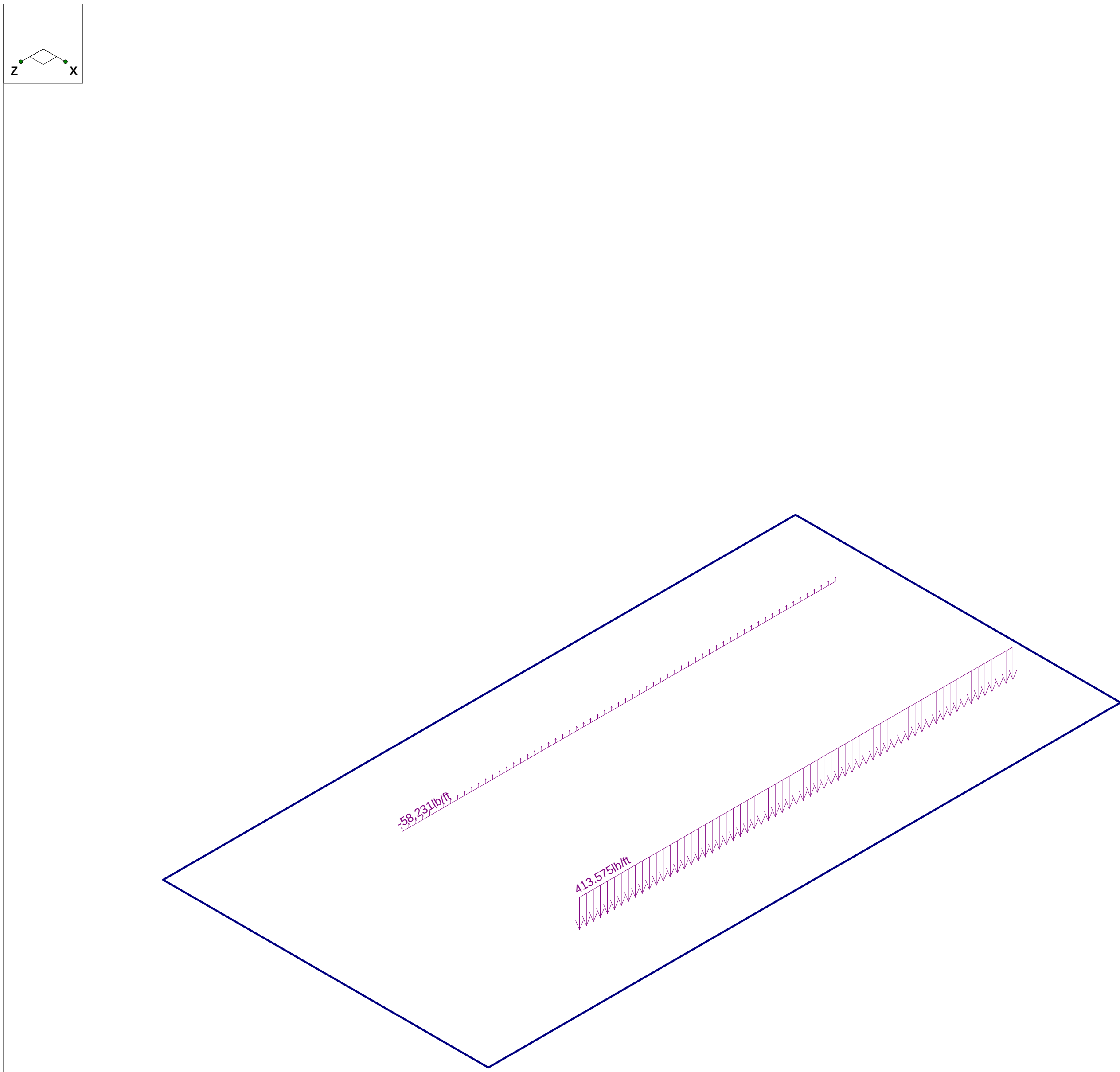
Loads: OL4 - Other Load 4
Results for LC 20, ASCE ASD 5 (b) (e)

Evergreen Engineering		SK - 4
Todd Costley E.I.T.	CSL 110TR10HEI, Ganahl Lumber - Costa Mesa, CA	May 22, 2017 at 9:57 AM
3524.0	Bin Enclosure Seismic Positive Z - Direction Loading	CSL_Ganahl Lumber_Costa Mesa...



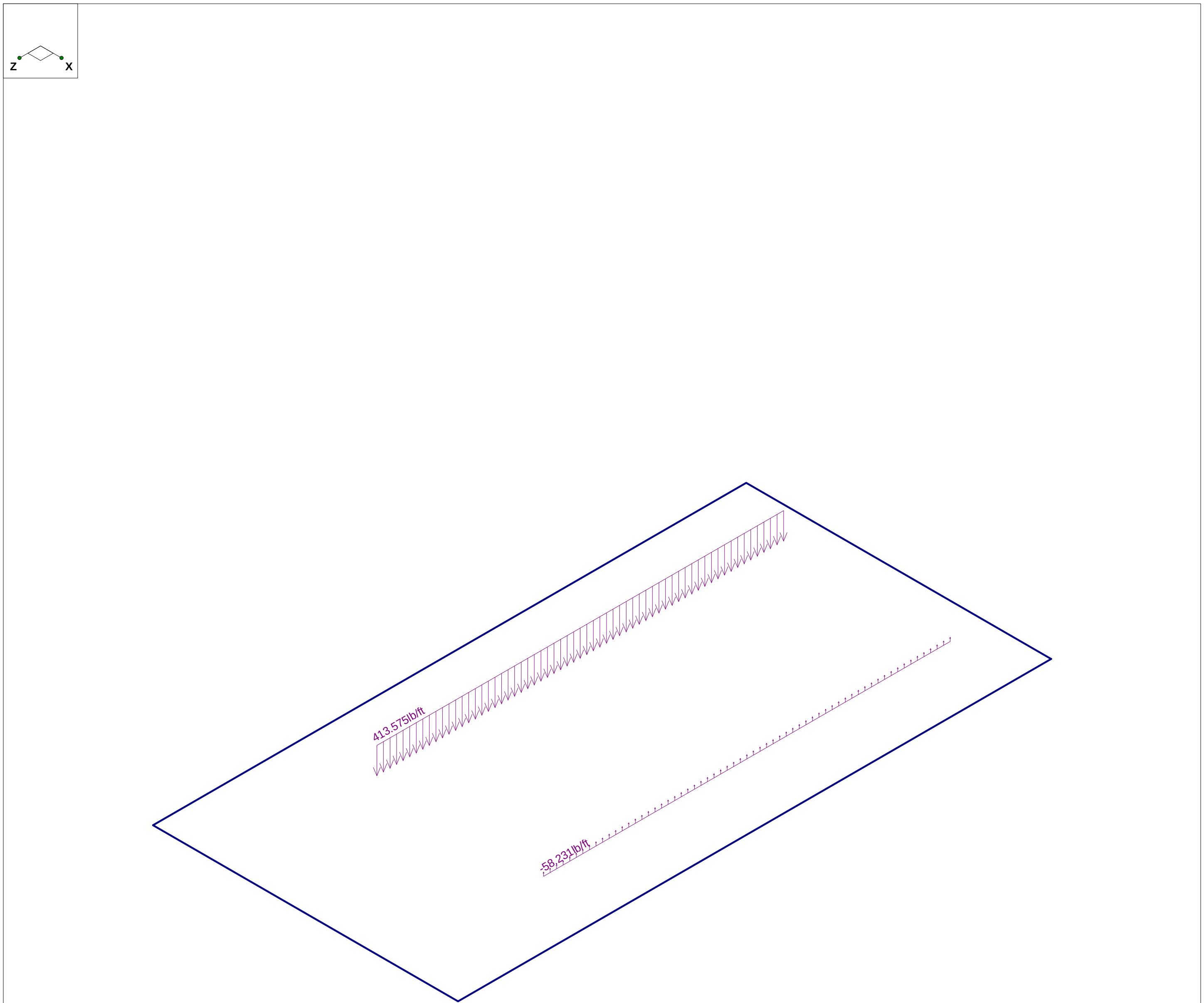
Loads: OL5 - Other Load 5
Results for LC 20, ASCE ASD 5 (b) (e)

Evergreen Engineering		SK - 5
Todd Costley E.I.T.	CSL 110TR10HEI, Ganahl Lumber - Costa Mesa, CA	May 22, 2017 at 9:57 AM
3524.0	Bin Enclosure Seismic Negative Z - Direction Loading	CSL_Ganahl Lumber_Costa Mesa...



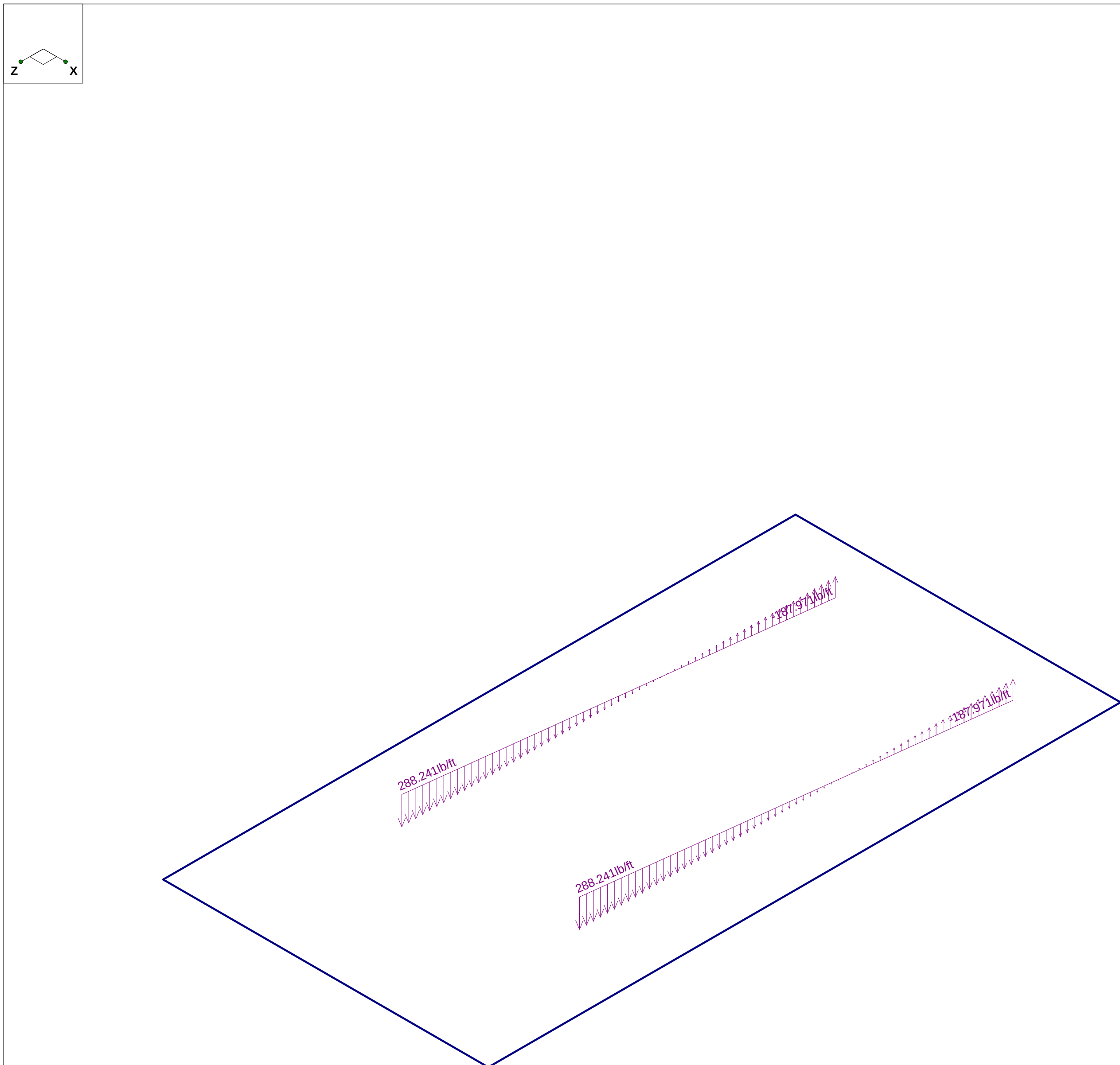
Loads: OL6 - Other Load 6
Results for LC 20, ASCE ASD 5 (b) (e)

Evergreen Engineering		SK - 6
Todd Costley E.I.T.	CSL 110TR10HEI, Ganahl Lumber - Costa Mesa, CA	May 22, 2017 at 9:59 AM
3524.0	Bin Enclosure Wind Positive X - Direction Loading	CSL_Ganahl Lumber_Costa Mesa...



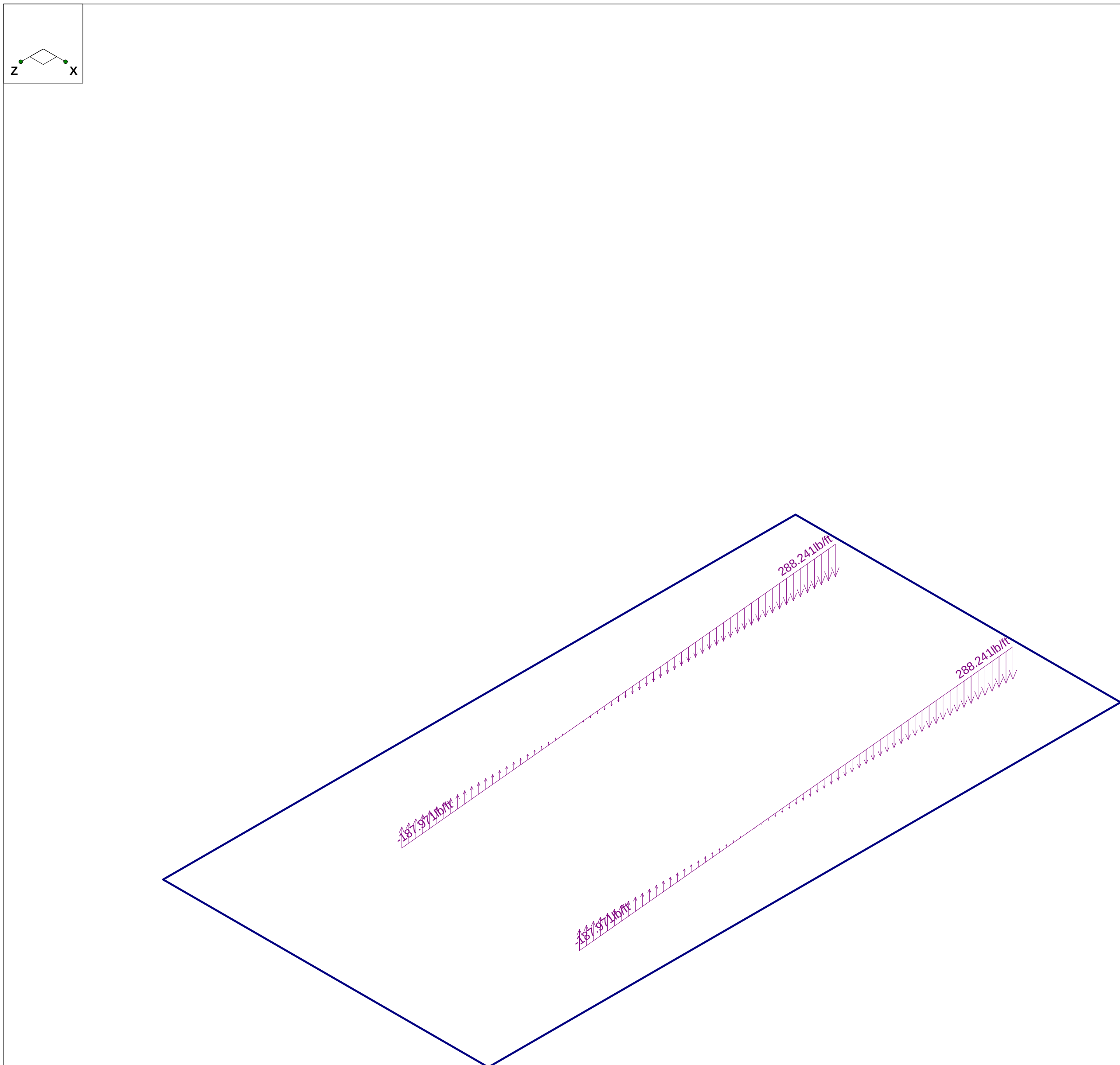
Loads: OL7 - Other Load 7
Results for LC 20, ASCE ASD 5 (b) (e)

Evergreen Engineering		SK - 7
Todd Costley E.I.T.	CSL 110TR10HEI, Ganahl Lumber - Costa Mesa, CA	May 22, 2017 at 9:59 AM
3524.0	Bin Enclosure Wind Negative X - Direction Loading	CSL_Ganahl Lumber_Costa Mesa...



Loads: OL8 - Other Load 8
Results for LC 20, ASCE ASD 5 (b) (e)

Evergreen Engineering		SK - 8
Todd Costley E.I.T.	CSL 110TR10HEI, Ganahl Lumber - Costa Mesa, CA	May 22, 2017 at 10:00 AM
3524.0	Bin Enclosure Wind Positive Z - Direction Loading	CSL_Ganahl Lumber_Costa Mesa...



Loads: OL9 - Other Load 9
Results for LC 20, ASCE ASD 5 (b) (e)

Evergreen Engineering		SK - 9
Todd Costley E.I.T.	CSL 110TR10HEI, Ganahl Lumber - Costa Mesa, CA	May 22, 2017 at 10:00 AM
3524.0	Bin Enclosure Wind Negative Z - Direction Loading	CSL_Ganahl Lumber_Costa Mesa...

General Design Parameters

	Label	Max Bending Chk	Max Shear Chk	Top Cover[in]	Bottom Cover[in]
1	Typical	1	1	2	3

Slab Rebar Parameters

	Label	Top Bar	Bottom Bar	Max Top Bar ...	Min Top Bar...	Max Bot Bar ...	Min Bot Bar S...	Spacing Incremen...	Rebar Options
1	Typical	#5	#5	12	12	12	12	1	Force Top and Bottom

Point Loads and Moments (Cat 1 : DL)

	Label	Direction	Magnitude[k,k-ft]
1	R3D_N59	Y	6.24
2	R3D_N58	Y	6.24
3	R3D_N57	Y	6.24
4	R3D_N56	Y	6.24
5	R3D_N1	X	-.189
6	R3D_N1	Y	3.265
7	R3D_N1	Z	.228
8	R3D_N2	X	.189
9	R3D_N2	Y	3.265
10	R3D_N2	Z	.228
11	R3D_N3	X	-.004
12	R3D_N3	Y	3.281
13	R3D_N3	Z	-.228
14	R3D_N4	X	.004
15	R3D_N4	Y	3.281
16	R3D_N4	Z	-.228
17	R3D_N37A	Y	-.188
18	R3D_N37A	Z	.057
19	R3D_N38A	X	.029
20	R3D_N38A	Y	1.223
21	R3D_N38A	Z	.616
22	R3D_N39A	Y	-.176
23	R3D_N39A	Z	-.045
24	R3D_N40	X	-.029
25	R3D_N40	Y	1.205
26	R3D_N40	Z	-.575
27	R3D_N41	X	.008
28	R3D_N41	Y	.137
29	R3D_N41	Z	-.141
30	R3D_N42	X	-.008
31	R3D_N42	Y	.143
32	R3D_N42	Z	.088
33	R3D_N44	Y	.125
34	R3D_N45	Y	.125
35	R3D_N46	Y	.125
36	R3D_N47	Y	.125
37	R3D_N48	Y	.125
38	R3D_N49	Y	.125
39	R3D_N50	Y	.125
40	R3D_N51	Y	.125

Point Loads and Moments (Cat 2 : LL)

	Label	Direction	Magnitude[k,k-ft]

Point Loads and Moments (Cat 2 : LL) (Continued)

	Label	Direction	Magnitude[k,k-ft]
1	R3D_N1	X	-.1
2	R3D_N1	Y	1.53
3	R3D_N1	Z	.138
4	R3D_N2	X	.1
5	R3D_N2	Y	1.53
6	R3D_N2	Z	.138
7	R3D_N3	Y	1.53
8	R3D_N3	Z	-.138
9	R3D_N4	Y	1.53
10	R3D_N4	Z	-.138

Point Loads and Moments (Cat 16 : OL1)

	Label	Direction	Magnitude[k,k-ft]
1	R3D_N1	X	-.132
2	R3D_N1	Y	2.015
3	R3D_N1	Z	.181
4	R3D_N2	X	.132
5	R3D_N2	Y	2.015
6	R3D_N2	Z	.181
7	R3D_N3	Y	2.015
8	R3D_N3	Z	-.181
9	R3D_N4	Y	2.015
10	R3D_N4	Z	-.181

Point Loads and Moments (Cat 26 : ELX)

	Label	Direction	Magnitude[k,k-ft]
1	R3D_N1	X	2.801
2	R3D_N1	Y	-14.727
3	R3D_N1	Z	.705
4	R3D_N2	X	2.801
5	R3D_N2	Y	14.727
6	R3D_N2	Z	-.705
7	R3D_N3	X	.671
8	R3D_N3	Y	1.043
9	R3D_N3	Z	1.073
10	R3D_N4	X	.671
11	R3D_N4	Y	-1.043
12	R3D_N4	Z	-1.073
13	R3D_N37A	Y	-1.266
14	R3D_N37A	Z	.326
15	R3D_N38A	X	1.362
16	R3D_N38A	Y	-.395
17	R3D_N38A	Z	1.076
18	R3D_N39A	Y	-1.245
19	R3D_N39A	Z	.151
20	R3D_N40	X	.533
21	R3D_N40	Y	-.426
22	R3D_N40	Z	-.97
23	R3D_N41	X	.352
24	R3D_N41	Y	1.661
25	R3D_N41	Z	-.488

Point Loads and Moments (Cat 26 : ELX) (Continued)

	Label	Direction	Magnitude[k,k-ft]
26	R3D_N42	X	.138
27	R3D_N42	Y	1.671
28	R3D_N42	Z	-.095
29	R3D_N44	X	.004
30	R3D_N44	Z	.53
31	R3D_N45	X	.617
32	R3D_N45	Y	-.736
33	R3D_N45	Z	.083
34	R3D_N46	X	.17
35	R3D_N46	Y	-1.041
36	R3D_N46	Z	-.53
37	R3D_N47	X	-.443
38	R3D_N47	Y	-.736
39	R3D_N47	Z	-.083
40	R3D_N48	X	.004
41	R3D_N48	Z	.53
42	R3D_N49	X	.617
43	R3D_N49	Y	.736
44	R3D_N49	Z	.083
45	R3D_N50	X	.17
46	R3D_N50	Y	1.041
47	R3D_N50	Z	-.53
48	R3D_N51	X	-.443
49	R3D_N51	Y	.736
50	R3D_N51	Z	-.083

Point Loads and Moments (Cat 27 : ELY)

	Label	Direction	Magnitude[k,k-ft]
1	R3D_N1	X	-.04
2	R3D_N1	Y	.693
3	R3D_N1	Z	.048
4	R3D_N2	X	.04
5	R3D_N2	Y	.693
6	R3D_N2	Z	.048
7	R3D_N3	Y	.696
8	R3D_N3	Z	-.048
9	R3D_N4	Y	.696
10	R3D_N4	Z	-.048
11	R3D_N37A	Y	-.04
12	R3D_N37A	Z	.012
13	R3D_N38A	X	.006
14	R3D_N38A	Y	.26
15	R3D_N38A	Z	.131
16	R3D_N39A	Y	-.037
17	R3D_N39A	Z	-.009
18	R3D_N40	X	-.006
19	R3D_N40	Y	.256
20	R3D_N40	Z	-.122
21	R3D_N41	X	.002
22	R3D_N41	Y	.029
23	R3D_N41	Z	-.03

Point Loads and Moments (Cat 27 : ELY) (Continued)

	Label	Direction	Magnitude[k,k-ft]
24	R3D_N42	X	-.002
25	R3D_N42	Y	.03
26	R3D_N42	Z	.019
27	R3D_N44	Y	.027
28	R3D_N45	Y	.026
29	R3D_N46	Y	.027
30	R3D_N47	Y	.026
31	R3D_N48	Y	.027
32	R3D_N49	Y	.026
33	R3D_N50	Y	.027
34	R3D_N51	Y	.026

Point Loads and Moments (Cat 28 : ELZ)

	Label	Direction	Magnitude[k,k-ft]
1	R3D_N1	X	.274
2	R3D_N1	Y	-8.228
3	R3D_N1	Z	1.762
4	R3D_N2	X	-.274
5	R3D_N2	Y	-8.228
6	R3D_N2	Z	1.762
7	R3D_N3	X	-.001
8	R3D_N3	Y	8.228
9	R3D_N3	Z	1.711
10	R3D_N4	X	.001
11	R3D_N4	Y	8.228
12	R3D_N4	Z	1.711
13	R3D_N37A	Y	.437
14	R3D_N37A	Z	-.514
15	R3D_N38A	X	-.391
16	R3D_N38A	Y	-2.99
17	R3D_N38A	Z	1.998
18	R3D_N39A	Y	-.452
19	R3D_N39A	Z	-.282
20	R3D_N40	X	.391
21	R3D_N40	Y	3.013
22	R3D_N40	Z	.333
23	R3D_N41	X	-.101
24	R3D_N41	Y	-.354
25	R3D_N41	Z	.55
26	R3D_N42	X	.101
27	R3D_N42	Y	.345
28	R3D_N42	Z	.299
29	R3D_N44	X	-.53
30	R3D_N44	Y	1.041
31	R3D_N44	Z	.17
32	R3D_N45	X	.083
33	R3D_N45	Y	.736
34	R3D_N45	Z	.617
35	R3D_N46	X	.53
36	R3D_N46	Z	.004
37	R3D_N47	X	-.083

Point Loads and Moments (Cat 28 : ELZ) (Continued)

	Label	Direction	Magnitude[k,k-ft]
38	R3D_N47	Y	-.736
39	R3D_N47	Z	-.443
40	R3D_N48	X	-.53
41	R3D_N48	Y	-1.041
42	R3D_N48	Z	.17
43	R3D_N49	X	.083
44	R3D_N49	Y	-.736
45	R3D_N49	Z	.617
46	R3D_N50	X	.53
47	R3D_N50	Z	.004
48	R3D_N51	X	-.083
49	R3D_N51	Y	.736
50	R3D_N51	Z	-.443

Point Loads and Moments (Cat 29 : WLX)

	Label	Direction	Magnitude[k,k-ft]
1	R3D_N1	X	3.628
2	R3D_N1	Y	-18.747
3	R3D_N1	Z	.891
4	R3D_N2	X	3.628
5	R3D_N2	Y	18.747
6	R3D_N2	Z	-.891
7	R3D_N3	X	.916
8	R3D_N3	Y	1.341
9	R3D_N3	Z	1.364
10	R3D_N4	X	.916
11	R3D_N4	Y	-1.341
12	R3D_N4	Z	-1.364
13	R3D_N37A	Y	-.981
14	R3D_N37A	Z	.253
15	R3D_N38A	X	1.056
16	R3D_N38A	Y	-.306
17	R3D_N38A	Z	.834
18	R3D_N39A	Y	-.965
19	R3D_N39A	Z	.117
20	R3D_N40	X	.414
21	R3D_N40	Y	-.33
22	R3D_N40	Z	-.752
23	R3D_N41	X	.273
24	R3D_N41	Y	1.288
25	R3D_N41	Z	-.378
26	R3D_N42	X	.107
27	R3D_N42	Y	1.296
28	R3D_N42	Z	-.073
29	R3D_N44	X	.003
30	R3D_N44	Z	.269
31	R3D_N45	X	.329
32	R3D_N45	Y	-.373
33	R3D_N45	Z	.057
34	R3D_N46	X	.118
35	R3D_N46	Y	-.528

Point Loads and Moments (Cat 29 : WLX) (Continued)

	Label	Direction	Magnitude[k,k-ft]
36	R3D_N46	Z	-.269
37	R3D_N47	X	-.208
38	R3D_N47	Y	-.373
39	R3D_N47	Z	-.057
40	R3D_N48	X	.003
41	R3D_N48	Z	.269
42	R3D_N49	X	.329
43	R3D_N49	Y	.373
44	R3D_N49	Z	.057
45	R3D_N50	X	.118
46	R3D_N50	Y	.528
47	R3D_N50	Z	-.269
48	R3D_N51	X	-.208
49	R3D_N51	Y	.373
50	R3D_N51	Z	-.057

Point Loads and Moments (Cat 31 : WLZ)

	Label	Direction	Magnitude[k,k-ft]
1	R3D_N1	X	.272
2	R3D_N1	Y	-8.351
3	R3D_N1	Z	1.934
4	R3D_N2	X	-.272
5	R3D_N2	Y	-8.351
6	R3D_N2	Z	1.934
7	R3D_N3	X	-.004
8	R3D_N3	Y	8.351
9	R3D_N3	Z	1.812
10	R3D_N4	X	.004
11	R3D_N4	Y	8.351
12	R3D_N4	Z	1.812
13	R3D_N37A	Y	.339
14	R3D_N37A	Z	-.398
15	R3D_N38A	X	-.303
16	R3D_N38A	Y	-2.318
17	R3D_N38A	Z	1.549
18	R3D_N39A	Y	-.35
19	R3D_N39A	Z	-.218
20	R3D_N40	X	.303
21	R3D_N40	Y	2.336
22	R3D_N40	Z	.258
23	R3D_N41	X	-.078
24	R3D_N41	Y	-.274
25	R3D_N41	Z	.427
26	R3D_N42	X	.078
27	R3D_N42	Y	.268
28	R3D_N42	Z	.232
29	R3D_N44	X	-.269
30	R3D_N44	Y	.528
31	R3D_N44	Z	.118
32	R3D_N45	X	.057
33	R3D_N45	Y	.373

Point Loads and Moments (Cat 31 : WLZ) (Continued)

	Label	Direction	Magnitude[k,k-ft]
34	R3D_N45	Z	.329
35	R3D_N46	X	.269
36	R3D_N46	Z	.003
37	R3D_N47	X	-.057
38	R3D_N47	Y	-.373
39	R3D_N47	Z	-.208
40	R3D_N48	X	-.269
41	R3D_N48	Y	-.528
42	R3D_N48	Z	.118
43	R3D_N49	X	.057
44	R3D_N49	Y	-.373
45	R3D_N49	Z	.329
46	R3D_N50	X	.269
47	R3D_N50	Z	.003
48	R3D_N51	X	-.057
49	R3D_N51	Y	.373
50	R3D_N51	Z	-.208

Line Loads and Moments (Cat 1 : DL)

	Start Point	End Point	Direction	Start Magnitude[lb/ft,k-ft/in]	End Magnitude[lb/ft,k-ft/in]
1	R3D_N63	R3D_N61	Y	134.6	134.6
2	R3D_N62	R3D_N60	Y	134.6	134.6

Line Loads and Moments (Cat 17 : OL2)

	Start Point	End Point	Direction	Start Magnitude[lb/ft,k-ft/in]	End Magnitude[lb/ft,k-ft/in]
1	R3D_N60	R3D_N62	Y	259.38	259.38
2	R3D_N61	R3D_N63	Y	-116.036	-116.036

Line Loads and Moments (Cat 18 : OL3)

	Start Point	End Point	Direction	Start Magnitude[lb/ft,k-ft/in]	End Magnitude[lb/ft,k-ft/in]
1	R3D_N60	R3D_N62	Y	-116.036	-116.036
2	R3D_N61	R3D_N63	Y	259.38	259.38

Line Loads and Moments (Cat 19 : OL4)

	Start Point	End Point	Direction	Start Magnitude[lb/ft,k-ft/in]	End Magnitude[lb/ft,k-ft/in]
1	R3D_N61	R3D_N63	Y	320.89	-83.829
2	R3D_N60	R3D_N62	Y	320.89	-83.829

Line Loads and Moments (Cat 20 : OL5)

	Start Point	End Point	Direction	Start Magnitude[lb/ft,k-ft/in]	End Magnitude[lb/ft,k-ft/in]
1	R3D_N61	R3D_N63	Y	-83.829	320.89
2	R3D_N60	R3D_N62	Y	-83.829	320.89

Line Loads and Moments (Cat 21 : OL6)

	Start Point	End Point	Direction	Start Magnitude[lb/ft,k-ft/in]	End Magnitude[lb/ft,k-ft/in]
1	R3D_N60	R3D_N62	Y	413.575	413.575
2	R3D_N61	R3D_N63	Y	-58.231	-58.231

Line Loads and Moments (Cat 22 : OL7)

	Start Point	End Point	Direction	Start Magnitude[lb/ft,k-ft/in]	End Magnitude[lb/ft,k-ft/in]
1	R3D_N60	R3D_N62	Y	-58.231	-58.231
2	R3D_N61	R3D_N63	Y	413.575	413.575

Line Loads and Moments (Cat 23 : OL8)

	Start Point	End Point	Direction	Start Magnitude[lb/ft,k-ft/in]	End Magnitude[lb/ft,k-ft/in]
1	R3D_N61	R3D_N63	Y	288.241	-187.971
2	R3D_N60	R3D_N62	Y	288.241	-187.971

Line Loads and Moments (Cat 24 : OL9)

	Start Point	End Point	Direction	Start Magnitude[lb/ft,k-ft/in]	End Magnitude[lb/ft,k-ft/in]
1	R3D_N63	R3D_N61	Y	288.241	-187.971
2	R3D_N62	R3D_N60	Y	288.241	-187.971

Slabs

	Label	Thickness [in]	Material	Local Axis Angle [deg]	Analysis Offset [in]
1	S1	12	Conc4000NW	0	0

Load Categories

	Category	Point Loads	Line Loads	Area Loads
1	DL	40	2	
2	LL	10		
3	OL1	10		
4	OL2		2	
5	OL3		2	
6	OL4		2	
7	OL5		2	
8	OL6		2	
9	OL7		2	
10	OL8		2	
11	OL9		2	
12	ELX	50		
13	ELY	34		
14	ELZ	50		
15	WLX	50		
16	WLZ	50		

Strip Reinforcing

	Label	UC Top	LC	Top Bars	Governing ...	UC Bot	LC	Bot B...	Gover...	UC Shear	LC	Governing ...
1	DS1	.356	56	#5@12in	DS1-X10	.498	50	#5@1...	DS1-...	.39	50	DS1-X10
2	DS2	.324	54	#5@12in	DS2-X5	.444	52	#5@1...	DS2-...	.309	52	DS2-X5
3	DS3	.157	56	#5@12in	DS3-X43	.277	50	#5@1...	DS3-...	.379	52	DS3-X4
4	DS4	.055	61	#5@12in	DS4-X24	.15	61	#5@1...	DS4-...	.206	61	DS4-X46
5	DS5	.026	60	#5@12in	DS5-X50	.118	44	#5@1...	DS5-...	.093	44	DS5-X25
6	DS6	.017	65	#5@12in	DS6-X23	.107	44	#5@1...	DS6-...	.128	44	DS6-X41
7	DS7	.041	64	#5@12in	DS7-X21	.06	60	#5@1...	DS7-...	.058	59	DS7-X7
8	DS8	.071	71	#5@12in	DS8-X21	.25	59	#5@1...	DS8-...	.134	59	DS8-X29

Envelope Soil Pressures

	Label	Max UC	Max LC	Soil Pressure[ksf]	Allowable Bearing[ksf]
1	N548	.27	20	.406	1.5
2	N547	.269	20	.404	1.5
3	N677	.267	20	.4	1.5
4	N116	.267	20	.4	1.5
5	N115	.266	20	.398	1.5
6	N546	.263	20	.395	1.5
7	N117	.263	20	.394	1.5
8	N441	.263	20	.394	1.5
9	N118	.262	20	.394	1.5
10	N600	.26	20	.39	1.5
11	N370	.259	20	.389	1.5
12	N364	.259	20	.389	1.5
13	N226	.258	20	.387	1.5
14	N225	.256	20	.385	1.5
15	N442	.256	20	.384	1.5
16	N366	.255	20	.383	1.5
17	N661	.253	20	.379	1.5
18	R3D_N1	.253	20	.379	1.5
19	N601	.251	20	.377	1.5
20	N224	.251	20	.377	1.5
21	N435	.251	20	.376	1.5
22	N365	.249	20	.374	1.5
23	N369	.248	20	.373	1.5
24	N214	.247	20	.371	1.5
25	N550	.246	20	.368	1.5
26	N551	.245	20	.368	1.5
27	N434	.245	20	.367	1.5
28	N125	.243	20	.365	1.5
29	N216	.243	20	.365	1.5
30	N602	.241	20	.362	1.5
31	N606	.241	20	.362	1.5
32	N543	.24	20	.36	1.5
33	N433	.238	6	.357	1.5
34	N549	.238	20	.357	1.5
35	N433	.238	20	.357	1.5
36	N123	.236	20	.354	1.5
37	N588	.236	20	.354	1.5
38	N106	.235	20	.352	1.5
39	N212	.235	20	.352	1.5
40	N106	.233	6	.349	1.5
41	N211	.233	6	.349	1.5
42	N431	.232	6	.348	1.5
43	N589	.231	6	.347	1.5
44	N120	.23	20	.344	1.5
45	N431	.229	20	.343	1.5
46	N439	.228	20	.342	1.5
47	N119	.228	20	.342	1.5
48	N120	.226	6	.34	1.5
49	N552	.226	20	.339	1.5
50	N542	.225	20	.338	1.5
51	N590	.225	20	.338	1.5
52	N440	.225	20	.337	1.5

Envelope Soil Pressures (Continued)

	Label	Max UC	Max LC	Soil Pressure[ksf]	Allowable Bearing[ksf]
53	N440	.224	6	.335	1.5
54	N432	.223	6	.335	1.5
55	N552	.223	6	.334	1.5
56	N599	.223	6	.334	1.5
57	N425	.222	6	.332	1.5
58	N195	.221	6	.332	1.5
59	N124	.221	6	.331	1.5
60	N105	.22	6	.33	1.5
61	N424	.22	6	.33	1.5
62	N196	.219	6	.328	1.5
63	N351	.218	6	.327	1.5
64	N506	.217	6	.326	1.5
65	N429	.217	6	.325	1.5
66	N108	.215	6	.323	1.5
67	N592	.215	6	.322	1.5
68	N199	.214	6	.321	1.5
69	N439	.213	22	.32	1.5
70	N430	.213	6	.319	1.5
71	N541	.212	6	.318	1.5
72	R3D_N56	.212	6	.318	1.5
73	N423	.212	6	.317	1.5
74	N545	.212	6	.317	1.5
75	N422	.21	6	.315	1.5
76	N223	.21	6	.315	1.5
77	N198	.209	6	.314	1.5
78	N350	.209	6	.314	1.5
79	N507	.209	6	.314	1.5
80	N358	.209	6	.313	1.5
81	N121	.209	6	.313	1.5
82	N197	.209	6	.313	1.5
83	N321	.208	6	.312	1.5
84	N209	.207	6	.311	1.5
85	R3D_N61	.206	6	.309	1.5
86	N122	.206	6	.308	1.5
87	N593	.205	6	.307	1.5
88	N35	.204	6	.306	1.5
89	N200	.204	6	.306	1.5
90	N322	.204	6	.306	1.5
91	N316	.203	6	.305	1.5
92	N201	.203	6	.305	1.5
93	N306	.202	6	.303	1.5
94	N229	.202	25	.302	1.5
95	N500	.201	25	.302	1.5
96	N206	.201	25	.302	1.5
97	N432	.201	25	.301	1.5
98	R3D_N38A	.2	25	.301	1.5
99	N209	.2	25	.3	1.5
100	N414	.2	25	.3	1.5
101	N228	.2	25	.299	1.5
102	N498	.199	25	.299	1.5
103	N262	.199	25	.299	1.5
104	N639	.199	27	.298	1.5

Envelope Soil Pressures (Continued)

	Label	Max UC	Max LC	Soil Pressure[ksf]	Allowable Bearing[ksf]
105	N197	.199	27	.298	1.5
106	N467	.198	25	.298	1.5
107	N193	.198	25	.298	1.5
108	N627	.198	25	.297	1.5
109	N674	.198	25	.297	1.5
110	N584	.198	25	.297	1.5
111	N261	.198	25	.297	1.5
112	N609	.198	25	.297	1.5
113	N207	.198	25	.296	1.5
114	N468	.197	25	.295	1.5
115	N591	.197	25	.295	1.5
116	N473	.196	25	.295	1.5
117	N502	.196	25	.294	1.5
118	N426	.196	25	.294	1.5
119	N427	.196	25	.294	1.5
120	N486	.195	25	.293	1.5
121	N650	.195	25	.293	1.5
122	N213	.195	25	.292	1.5
123	R3D_N41	.195	25	.292	1.5
124	N475	.195	25	.292	1.5
125	N674	.195	27	.292	1.5
126	N208	.194	27	.292	1.5
127	N473	.194	27	.291	1.5
128	N308	.194	27	.291	1.5
129	N214	.194	27	.291	1.5
130	N607	.194	27	.291	1.5
131	N263	.193	25	.29	1.5
132	N239	.193	25	.289	1.5
133	N230	.193	27	.289	1.5
134	N195	.193	27	.289	1.5
135	N415	.192	25	.288	1.5
136	N417	.192	25	.288	1.5
137	N264	.192	25	.288	1.5
138	N451	.192	25	.287	1.5
139	N471	.191	25	.287	1.5
140	N310	.191	25	.287	1.5
141	N431	.191	25	.286	1.5
142	N587	.191	25	.286	1.5
143	N639	.19	25	.285	1.5
144	N196	.19	25	.285	1.5
145	N678	.19	25	.285	1.5
146	N197	.189	25	.284	1.5
147	N590	.189	25	.284	1.5
148	N194	.189	25	.283	1.5
149	N604	.189	25	.283	1.5
150	N208	.188	25	.283	1.5
151	N501	.188	25	.283	1.5
152	N598	.188	25	.282	1.5
153	N616	.187	27	.281	1.5
154	N192	.187	27	.281	1.5
155	N587	.187	27	.28	1.5
156	N647	.186	27	.28	1.5

Envelope Soil Pressures (Continued)

	Label	Max UC	Max LC	Soil Pressure[ksf]	Allowable Bearing[ksf]
157	N501	.186	27	.279	1.5
158	N434	.186	27	.279	1.5
159	N435	.186	27	.278	1.5
160	N420	.185	27	.278	1.5
161	N608	.185	27	.277	1.5
162	N238	.185	27	.277	1.5
163	N588	.185	27	.277	1.5
164	N442	.185	27	.277	1.5
165	N469	.184	25	.276	1.5
166	N309	.184	25	.276	1.5
167	N600	.184	27	.276	1.5
168	N268	.184	27	.275	1.5
169	N267	.183	25	.275	1.5
170	N452	.183	25	.274	1.5
171	N470	.183	25	.274	1.5
172	N265	.183	25	.274	1.5
173	N212	.183	25	.274	1.5
174	N418	.182	25	.273	1.5
175	N218	.182	25	.273	1.5
176	N288	.182	25	.273	1.5
177	N252	.182	25	.273	1.5
178	N474	.182	25	.273	1.5
179	N610	.182	25	.272	1.5
180	R3D_N48	.18	25	.271	1.5
181	N640	.18	25	.27	1.5
182	R3D_N49	.18	25	.27	1.5
183	N681	.18	25	.27	1.5
184	N217	.179	25	.269	1.5
185	N251	.179	25	.269	1.5
186	N419	.179	25	.269	1.5
187	N215	.179	25	.268	1.5
188	R3D_N47	.179	25	.268	1.5
189	N603	.178	25	.267	1.5
190	N420	.178	25	.266	1.5
191	N198	.177	25	.266	1.5
192	N620	.177	25	.266	1.5
193	N195	.177	25	.265	1.5
194	N494	.177	27	.265	1.5
195	N299	.177	27	.265	1.5
196	N194	.176	27	.264	1.5
197	N690	.176	27	.264	1.5
198	N417	.176	27	.264	1.5
199	N441	.176	27	.264	1.5
200	N606	.176	27	.263	1.5
201	N646	.176	27	.263	1.5
202	N421	.175	27	.263	1.5
203	N677	.175	27	.262	1.5
204	N615	.174	27	.262	1.5
205	N620	.174	27	.261	1.5
206	N609	.174	27	.26	1.5
207	N460	.173	27	.26	1.5
208	N439	.173	27	.26	1.5

Envelope Soil Pressures (Continued)

	Label	Max UC	Max LC	Soil Pressure[ksf]	Allowable Bearing[ksf]
209	N266	.173	25	.259	1.5
210	N301	.173	25	.259	1.5
211	N219	.172	25	.258	1.5
212	N253	.172	25	.258	1.5
213	N256	.172	25	.258	1.5
214	N255	.172	25	.258	1.5
215	N623	.171	25	.257	1.5
216	R3D_N50	.171	25	.256	1.5
217	N494	.171	25	.256	1.5
218	N269	.171	25	.256	1.5
219	N250	.17	25	.255	1.5
220	R3D_N46	.17	25	.255	1.5
221	N236	.17	25	.255	1.5
222	N220	.17	25	.254	1.5
223	N216	.169	25	.254	1.5
224	N270	.169	25	.254	1.5
225	N690	.169	25	.254	1.5
226	N583	.168	24	.252	1.5
227	R3D_N48	.168	24	.252	1.5
228	N580	.168	24	.252	1.5
229	R3D_N49	.168	24	.252	1.5
230	N268	.168	24	.252	1.5
231	N339	.168	24	.252	1.5
232	N197	.168	24	.252	1.5
233	N335	.168	24	.251	1.5
234	N128	.167	24	.251	1.5
235	N486	.167	24	.251	1.5
236	N371	.167	24	.25	1.5
237	N581	.167	24	.25	1.5
238	N186	.167	24	.25	1.5
239	N271	.166	24	.25	1.5
240	N408	.166	24	.25	1.5
241	N74	.166	24	.249	1.5
242	N129	.166	24	.249	1.5
243	N412	.166	31	.249	1.5
244	N408	.166	31	.249	1.5
245	N143	.166	31	.249	1.5
246	N597	.166	31	.249	1.5
247	N409	.166	31	.249	1.5
248	N583	.166	31	.249	1.5
249	N326	.166	31	.249	1.5
250	N313	.166	31	.249	1.5
251	N93	.166	31	.249	1.5
252	N129	.166	31	.248	1.5
253	N241	.166	31	.248	1.5
254	R3D_N58	.166	31	.248	1.5
255	N125	.165	31	.248	1.5
256	N142	.165	31	.248	1.5
257	N580	.165	31	.248	1.5
258	N371	.165	31	.248	1.5
259	N189	.165	31	.248	1.5
260	N133	.165	31	.248	1.5

Envelope Soil Pressures (Continued)

	Label	Max UC	Max LC	Soil Pressure[ksf]	Allowable Bearing[ksf]
261	N553	.165	31	.247	1.5
262	N141	.165	31	.247	1.5
263	N126	.165	31	.247	1.5
264	N546	.165	31	.247	1.5
265	N662	.165	31	.247	1.5
266	N561	.165	31	.247	1.5
267	N654	.165	31	.247	1.5
268	N246	.164	31	.247	1.5
269	N31	.164	31	.247	1.5
270	N374	.164	31	.247	1.5
271	N413	.164	31	.247	1.5
272	N581	.164	31	.247	1.5
273	N202	.164	31	.247	1.5
274	N567	.164	31	.247	1.5
275	N130	.164	31	.246	1.5
276	N535	.164	31	.246	1.5
277	N432	.164	31	.246	1.5
278	N381	.164	31	.246	1.5
279	N152	.164	31	.246	1.5
280	N380	.164	31	.246	1.5
281	N188	.164	31	.246	1.5
282	N566	.164	31	.246	1.5
283	N151	.164	31	.245	1.5
284	N407	.164	31	.245	1.5
285	N319	.163	31	.245	1.5
286	N675	.163	31	.245	1.5
287	N556	.163	31	.245	1.5
288	N180	.163	31	.245	1.5
289	N306	.163	31	.245	1.5
290	N332	.163	31	.245	1.5
291	N139	.163	31	.245	1.5
292	N505	.163	31	.244	1.5
293	N318	.163	31	.244	1.5
294	N369	.163	31	.244	1.5
295	N579	.163	31	.244	1.5
296	N339	.163	31	.244	1.5
297	N562	.163	31	.244	1.5
298	N384	.163	31	.244	1.5
299	N582	.163	31	.244	1.5
300	N312	.163	31	.244	1.5
301	N140	.162	31	.244	1.5
302	N373	.162	31	.244	1.5
303	N404	.162	31	.244	1.5
304	N536	.162	31	.243	1.5
305	N382	.162	31	.243	1.5
306	N545	.162	31	.243	1.5
307	N34	.162	31	.243	1.5
308	N375	.162	31	.243	1.5
309	N113	.162	31	.243	1.5
310	N178	.162	31	.243	1.5
311	N376	.162	31	.243	1.5
312	N153	.162	31	.243	1.5

Envelope Soil Pressures (Continued)

	Label	Max UC	Max LC	Soil Pressure[ksf]	Allowable Bearing[ksf]
313	N32	.162	31	.243	1.5
314	N392	.162	31	.243	1.5
315	N328	.162	31	.243	1.5
316	N154	.162	31	.243	1.5
317	R3D_N3	.162	31	.243	1.5
318	N56	.162	31	.243	1.5
319	N95	.162	31	.243	1.5
320	N304	.162	31	.243	1.5
321	N586	.162	31	.243	1.5
322	N94	.162	31	.242	1.5
323	N555	.162	31	.242	1.5
324	N124	.161	31	.242	1.5
325	N519	.161	31	.242	1.5
326	N518	.161	31	.242	1.5
327	N372	.161	31	.242	1.5
328	N397	.161	31	.242	1.5
329	N302	.161	31	.242	1.5
330	N496	.161	31	.242	1.5
331	N57	.161	31	.242	1.5
332	N55	.161	31	.242	1.5
333	N394	.161	31	.242	1.5
334	N398	.161	31	.242	1.5
335	N138	.161	31	.241	1.5
336	N456	.161	31	.241	1.5
337	N338	.161	31	.241	1.5
338	N176	.161	31	.241	1.5
339	N327	.161	31	.241	1.5
340	N331	.161	31	.241	1.5
341	N33	.16	31	.241	1.5
342	N509	.16	31	.24	1.5
343	N181	.16	31	.24	1.5
344	N262	.16	31	.24	1.5
345	N137	.16	31	.24	1.5
346	N58	.16	31	.24	1.5
347	N179	.16	31	.24	1.5
348	N317	.16	31	.24	1.5
349	N180	.16	29	.24	1.5
350	N182	.16	31	.24	1.5
351	N661	.16	31	.24	1.5
352	N311	.16	31	.24	1.5
353	N560	.16	31	.24	1.5
354	N333	.16	31	.24	1.5
355	N199	.16	31	.24	1.5
356	N591	.16	31	.24	1.5
357	N107	.16	31	.24	1.5
358	N155	.159	31	.239	1.5
359	N391	.159	31	.239	1.5
360	N390	.159	31	.239	1.5
361	N664	.159	31	.239	1.5
362	N403	.159	31	.239	1.5
363	N649	.159	31	.239	1.5
364	N261	.159	31	.239	1.5

Envelope Soil Pressures (Continued)

	Label	Max UC	Max LC	Soil Pressure[ksf]	Allowable Bearing[ksf]
365	N39	.159	31	.239	1.5
366	N576	.159	31	.239	1.5
367	N158	.159	31	.239	1.5
368	N77	.159	31	.239	1.5
369	N528	.159	31	.238	1.5
370	N655	.159	31	.238	1.5
371	N526	.159	31	.238	1.5
372	N174	.159	31	.238	1.5
373	N201	.159	31	.238	1.5
374	N329	.159	31	.238	1.5
375	R3D_N62	.159	31	.238	1.5
376	N330	.159	31	.238	1.5
377	N244	.159	31	.238	1.5
378	N554	.159	31	.238	1.5
379	N175	.158	31	.238	1.5
380	R3D_N63	.158	31	.238	1.5
381	N627	.158	31	.237	1.5
382	N145	.158	31	.237	1.5
383	N362	.158	31	.237	1.5
384	N112	.158	31	.237	1.5
385	N523	.158	31	.237	1.5
386	N114	.158	31	.237	1.5
387	N393	.158	31	.237	1.5
388	N144	.158	31	.237	1.5
389	N520	.158	31	.237	1.5
390	N62	.158	31	.236	1.5
391	N544	.158	31	.236	1.5
392	N171	.158	31	.236	1.5
393	N76	.158	31	.236	1.5
394	N679	.157	31	.236	1.5
395	N524	.157	31	.236	1.5
396	N69	.157	31	.236	1.5
397	N106	.157	31	.236	1.5
398	N510	.157	31	.236	1.5
399	N110	.157	31	.236	1.5
400	N414	.157	31	.236	1.5
401	N183	.157	31	.236	1.5
402	N74	.157	31	.235	1.5
403	N399	.157	31	.235	1.5
404	N387	.157	31	.235	1.5
405	N68	.157	31	.235	1.5
406	N41	.157	31	.235	1.5
407	N568	.157	31	.235	1.5
408	N666	.157	31	.235	1.5
409	N156	.157	31	.235	1.5
410	N166	.157	31	.235	1.5
411	N665	.156	31	.235	1.5
412	N358	.156	31	.235	1.5
413	N61	.156	31	.234	1.5
414	N66	.156	31	.234	1.5
415	N671	.156	31	.234	1.5
416	N378	.156	31	.234	1.5

Envelope Soil Pressures (Continued)

	Label	Max UC	Max LC	Soil Pressure[ksf]	Allowable Bearing[ksf]
417	R3D_N4	.156	31	.234	1.5
418	N157	.156	31	.234	1.5
419	N40	.156	31	.234	1.5
420	N59	.156	31	.234	1.5
421	N305	.156	31	.234	1.5
422	N190	.156	31	.234	1.5
423	N165	.156	31	.233	1.5
424	N67	.155	31	.233	1.5
425	N525	.155	31	.233	1.5
426	N363	.155	31	.233	1.5
427	N173	.155	31	.233	1.5
428	N569	.155	31	.233	1.5
429	N401	.155	31	.233	1.5
430	N592	.155	31	.233	1.5
431	N577	.155	31	.233	1.5
432	N355	.155	31	.233	1.5
433	N245	.155	31	.232	1.5
434	N109	.155	31	.232	1.5
435	N354	.155	31	.232	1.5
436	N75	.155	31	.232	1.5
437	N60	.155	31	.232	1.5
438	N667	.155	31	.232	1.5
439	N529	.155	31	.232	1.5
440	N108	.155	31	.232	1.5
441	N543	.155	31	.232	1.5
442	N388	.155	31	.232	1.5
443	N111	.155	31	.232	1.5
444	N521	.154	31	.232	1.5
445	N511	.154	31	.231	1.5
446	N200	.154	31	.231	1.5
447	N512	.154	31	.231	1.5
448	N97	.154	31	.231	1.5
449	N172	.154	31	.231	1.5
450	N187	.154	31	.231	1.5
451	N98	.154	31	.231	1.5
452	N360	.154	31	.231	1.5
453	N377	.154	31	.231	1.5
454	N100	.154	31	.23	1.5
455	N410	.154	31	.23	1.5
456	N177	.153	31	.23	1.5
457	N498	.153	31	.23	1.5
458	N99	.153	31	.23	1.5
459	N502	.153	31	.23	1.5
460	N353	.153	31	.23	1.5
461	N497	.153	31	.23	1.5
462	N411	.153	31	.229	1.5
463	N361	.153	31	.229	1.5
464	N359	.153	31	.229	1.5
465	N146	.152	31	.229	1.5
466	N570	.152	31	.229	1.5
467	N487	.152	29	.228	1.5
468	N147	.152	31	.228	1.5

Envelope Soil Pressures (Continued)

	Label	Max UC	Max LC	Soil Pressure[ksf]	Allowable Bearing[ksf]
469	N105	.152	31	.228	1.5
470	N513	.152	31	.228	1.5
471	N263	.152	31	.228	1.5
472	N163	.152	31	.228	1.5
473	N530	.152	31	.228	1.5
474	N159	.152	31	.228	1.5
475	N400	.152	31	.228	1.5
476	N307	.152	31	.228	1.5
477	N150	.152	31	.227	1.5
478	N578	.152	31	.227	1.5
479	N514	.151	31	.227	1.5
480	N102	.151	31	.227	1.5
481	N585	.151	31	.227	1.5
482	N259	.151	31	.227	1.5
483	N379	.151	31	.227	1.5
484	N648	.151	31	.227	1.5
485	N264	.151	31	.226	1.5
486	N402	.151	31	.226	1.5
487	N322	.151	31	.226	1.5
488	N164	.15	31	.226	1.5
489	N43	.15	31	.225	1.5
490	R3D_N41	.15	31	.225	1.5
491	N673	.15	31	.225	1.5
492	N101	.15	31	.225	1.5
493	N593	.15	31	.225	1.5
494	N471	.15	31	.225	1.5
495	N389	.15	31	.225	1.5
496	N542	.149	31	.224	1.5
497	N136	.149	31	.224	1.5
498	N44	.149	31	.224	1.5
499	N160	.149	31	.224	1.5
500	N245	.149	29	.223	1.5
501	N405	.148	31	.223	1.5
502	R3D_N38A	.148	31	.223	1.5
503	N466	.148	31	.223	1.5
504	N670	.148	31	.222	1.5
505	N415	.148	31	.222	1.5
506	N321	.148	31	.222	1.5
507	N46	.148	31	.222	1.5
508	N337	.148	29	.222	1.5
509	N76	.148	29	.222	1.5
510	N170	.148	31	.221	1.5
511	N499	.147	31	.221	1.5
512	N487	.147	31	.221	1.5
513	N162	.147	31	.221	1.5
514	N572	.147	31	.221	1.5
515	N471	.147	29	.22	1.5
516	N385	.147	31	.22	1.5
517	N104	.147	31	.22	1.5
518	N45	.147	31	.22	1.5
519	N416	.146	31	.219	1.5
520	N411	.146	29	.219	1.5

Envelope Soil Pressures (Continued)

	Label	Max UC	Max LC	Soil Pressure[ksf]	Allowable Bearing[ksf]
521	N386	.146	31	.219	1.5
522	N406	.146	31	.219	1.5
523	R3D_N37A	.146	31	.218	1.5
524	N573	.146	31	.218	1.5
525	N541	.145	31	.218	1.5
526	N320	.145	31	.218	1.5
527	N260	.145	31	.217	1.5
528	N410	.145	29	.217	1.5
529	N134	.145	31	.217	1.5
530	N406	.145	29	.217	1.5
531	N169	.144	31	.216	1.5
532	N259	.144	29	.216	1.5
533	N473	.144	31	.216	1.5
534	N75	.144	29	.216	1.5
535	N308	.144	29	.216	1.5
536	N488	.144	31	.215	1.5
537	N672	.144	31	.215	1.5
538	N357	.144	31	.215	1.5
539	N691	.143	31	.215	1.5
540	N308	.143	31	.215	1.5
541	N356	.143	31	.215	1.5
542	N680	.143	31	.214	1.5
543	N167	.143	31	.214	1.5
544	N395	.142	31	.214	1.5
545	N652	.142	31	.213	1.5
546	N469	.142	31	.213	1.5
547	N473	.142	29	.212	1.5
548	N565	.141	31	.212	1.5
549	N258	.141	31	.212	1.5
550	N650	.141	31	.212	1.5
551	N584	.141	31	.212	1.5
552	N574	.141	31	.212	1.5
553	N557	.141	31	.211	1.5
554	N564	.141	31	.211	1.5
555	N470	.141	31	.211	1.5
556	N668	.14	31	.21	1.5
557	N558	.14	31	.21	1.5
558	N651	.14	31	.21	1.5
559	N168	.14	31	.21	1.5
560	N500	.14	31	.21	1.5
561	N559	.139	31	.209	1.5
562	N529	.139	29	.209	1.5
563	N563	.139	31	.209	1.5
564	N265	.139	31	.208	1.5
565	N287	.138	29	.207	1.5
566	N575	.138	31	.207	1.5
567	N467	.138	31	.207	1.5
568	N625	.138	31	.207	1.5
569	N669	.137	31	.206	1.5
570	R3D_N49	.137	31	.206	1.5
571	R3D_N48	.137	31	.205	1.5
572	N101	.137	41	.205	1.5

Envelope Soil Pressures (Continued)

	Label	Max UC	Max LC	Soil Pressure[ksf]	Allowable Bearing[ksf]
573	R3D_N42	.136	41	.204	1.5
574	N51	.136	41	.204	1.5
575	N43	.136	41	.204	1.5
576	N643	.136	41	.204	1.5
577	N254	.136	41	.204	1.5
578	N411	.136	41	.204	1.5
579	N168	.136	41	.204	1.5
580	N386	.136	41	.204	1.5
581	N76	.136	41	.204	1.5
582	N668	.136	41	.204	1.5
583	N461	.136	41	.204	1.5
584	N103	.136	41	.204	1.5
585	N339	.136	41	.204	1.5
586	N44	.136	41	.203	1.5
587	N490	.136	41	.203	1.5
588	N321	.135	41	.203	1.5
589	N337	.135	41	.203	1.5
590	N491	.135	41	.202	1.5
591	N622	.135	41	.202	1.5
592	N54	.135	41	.202	1.5
593	N46	.135	41	.202	1.5
594	N462	.135	41	.202	1.5
595	R3D_N44	.135	41	.202	1.5
596	N77	.134	41	.201	1.5
597	N104	.134	41	.201	1.5
598	N410	.134	41	.201	1.5
599	N134	.134	41	.201	1.5
600	N495	.134	41	.201	1.5
601	N328	.134	41	.201	1.5
602	N45	.134	41	.201	1.5
603	N672	.134	41	.2	1.5
604	N564	.133	41	.2	1.5
605	N573	.133	41	.2	1.5
606	N541	.133	41	.2	1.5
607	N565	.133	41	.2	1.5
608	N653	.133	41	.2	1.5
609	N476	.133	41	.2	1.5
610	N574	.133	41	.2	1.5
611	N493	.133	41	.2	1.5
612	N563	.133	41	.2	1.5
613	N572	.133	41	.199	1.5
614	N641	.133	41	.199	1.5
615	N326	.133	41	.199	1.5
616	N320	.133	41	.199	1.5
617	N663	.133	41	.199	1.5
618	N75	.132	41	.199	1.5
619	N135	.132	41	.199	1.5
620	N575	.132	41	.198	1.5
621	N669	.132	41	.198	1.5
622	N274	.132	41	.198	1.5
623	N571	.132	41	.197	1.5
624	N557	.131	41	.197	1.5

Envelope Soil Pressures (Continued)

	Label	Max UC	Max LC	Soil Pressure[ksf]	Allowable Bearing[ksf]
625	N277	.131	41	.197	1.5
626	N74	.131	41	.197	1.5
627	N327	.131	41	.197	1.5
628	N356	.131	41	.197	1.5
629	N357	.131	41	.197	1.5
630	R3D_N39_1	.131	41	.197	1.5
631	R3D_N37_1	.131	41	.197	1.5
632	N654	.13	41	.196	1.5
633	N652	.13	41	.196	1.5
634	N673	.13	41	.195	1.5
635	N558	.13	41	.195	1.5
636	N272	.13	41	.195	1.5
637	N278	.13	41	.195	1.5
638	N530	.129	41	.193	1.5
639	N559	.129	41	.193	1.5
640	N528	.129	41	.193	1.5
641	N651	.129	41	.193	1.5
642	N481	.128	41	.193	1.5
643	N529	.128	41	.193	1.5
644	N660	.128	41	.192	1.5
645	N631	.128	41	.192	1.5
646	N464	.127	41	.191	1.5
647	N465	.126	41	.189	1.5
648	N644	.125	41	.187	1.5
649	N295	.124	41	.187	1.5
650	N489	.124	41	.187	1.5
651	N483	.124	41	.186	1.5
652	N294	.124	41	.185	1.5
653	N298	.123	41	.185	1.5
654	N621	.123	41	.184	1.5
655	N291	.123	41	.184	1.5
656	N492	.122	41	.183	1.5
657	N642	.122	41	.182	1.5
658	N477	.121	41	.182	1.5
659	N682	.12	41	.181	1.5
660	N478	.12	41	.179	1.5
661	N479	.119	41	.178	1.5
662	N485	.118	41	.177	1.5
663	N322	.118	9	.176	1.5
664	N280	.117	9	.176	1.5
665	N327	.117	9	.176	1.5
666	N357	.117	9	.176	1.5
667	N529	.116	9	.175	1.5
668	N660	.116	9	.174	1.5
669	N336	.116	9	.174	1.5
670	N533	.116	9	.174	1.5
671	N105	.116	9	.174	1.5
672	N543	.116	9	.174	1.5
673	N326	.116	9	.173	1.5
674	N320	.115	9	.173	1.5
675	N281	.115	9	.173	1.5
676	N337	.115	9	.173	1.5

Envelope Soil Pressures (Continued)

	Label	Max UC	Max LC	Soil Pressure[ksf]	Allowable Bearing[ksf]
677	N321	.115	9	.173	1.5
678	N528	.114	9	.171	1.5
679	N651	.114	9	.171	1.5
680	N656	.114	9	.17	1.5
681	N542	.113	9	.17	1.5
682	N685	.113	9	.17	1.5
683	N654	.113	9	.169	1.5
684	N652	.113	9	.169	1.5
685	N653	.112	9	.169	1.5
686	N541	.112	9	.169	1.5
687	N637	.111	9	.167	1.5
688	N284	.11	9	.165	1.5
689	N285	.108	9	.162	1.5
690	N686	.106	9	.16	1.5
691	R3D_N38_1	.105	9	.157	1.5