PSE CONSULTING ENGINEERS INC.

STRUCTURAL ENGINEERING CALCULATIONS

PROJECT: Aluminum and glass infill guard rail design

PROJECT LOCATION: Washington State

PSE PROJECT NUMBER: EGlass 217-1

DATE: July 11, 2022

BY: Adel Elfayoumy, Ph.D., P.E.
BY: Nabil Taha, Ph.D., P.E.

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Table of Contents:

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References:

1- Literature:

a. 2018 Washington State Building Code, Based on 2018 International Building Code (IBC)

b. 2018 Washington State Residential Code, Based on 2018 International Residential Code (IRC)

c. 2015 International Building Code with local amendments

d. 2015 International Residential Code with local amendments

e. AISC Design Guide 27: Structural Stainless Steel.

f. National Design Specifications for Wood Construction, 2015 Edition

g. Building Code Requirements for Structural Concrete (ACI318-14)

2- Software:

a. RISA 3D Version 15.0.2
RISA Technologies,
26212 Dimension Dr. Suite 200

Design Criteria:

1- Location:	Washington State	
2- Live Load on Handrail & guards:	a. Uniform Distributed load 50 p/f b. Single Concentrated load 200 lbs c. 50 psf on infill	
3- Wind:	Basic wind speed	110 mph (3 s. gust)
	Exposure	C

**Other criteria assumed as stated in design calculations.

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GUARD RAIL ANALYSIS & DESIGN:

Pages 1,000 - 1,999

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DECK AND FASCIA MOUNT ANALYSIS & DESIGN:

Pages 2,000 - 2,999

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PROJECT NO. Eglass 217-1 SHEET A OF ______

PROJECT NAME ______ DESIGNED BY AF DATE ______

SUBJECT ______ CHECKED BY ______ DATE ______

Conclusion 1/7

→ Glass w/Top & Bottom rail :
Material: Alu. 6061-T6

post : $2\frac{3}{8}$" * $2\frac{3}{8}$" * 0.125" (3' height, 5' apart)

Top rail : 2.375" * 1.5" * 0.125"

Bottom rail : 1.25 * 1.25 * 0.125"

Glass : Fully Tempered, $\frac{1}{4}$" or $\frac{3}{8}$" thick

→ Glass w/Clip

post : $2\frac{3}{8}$" * $2\frac{3}{8}$" * 0.125"

Glass : Fully Tempered, $\frac{3}{8}$" thick (post spacing = 5')

Glass : Fully Tempered, $\frac{1}{4}$" thick for post spacing = 36" max

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PROJECT NO. Eglass 217-1 SHEET 8 OF ______
PROJECT NAME ______ DESIGNED BY AF DATE ______
SUBJECT ______ CHECKED BY ______ DATE ______

Conclusion 2/7

* for square post (square base plate)

Base plate, Alu. Alloy 384 (ADC12), Fy = 24 KSI
4.5"x4.5"x3/8"

Anchors -

- To Concrete

[4 - 3/8" ϕ Red head w/min 4" Embed, 3" edge distance, f'c ≮ 3000 psi]

- To wood

[4 - 3/8" ϕ lag screw w/min 4" Embed]

OR

[4 - 3/8" ϕ thru bolt]

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PROJECT NO: E9l28S 217-1 SHEET C OF

PROJECT NAME DESIGNED BY AF DATE

SUBJECT CHECKED BY DATE

Conclusion 3.7

135° post and base plate

- post: Aluminum 6061-T6, As shown

- base plate = 0.39" thick, as shown

Anchors to Concrete:

[5 - $\frac{3}{8}$" ϕ Red head ITW or LDT
w/min. 4" Embed and 3" edge distance
f'c ≮ 2500 psi]

Anchors to wood:
[5 - $\frac{3}{8}$" ϕ Lag screw w/4" min. Embed]

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PROJECT NO. Eglass 217-1 SHEET D OF ____

PROJECT NAME ____ DESIGNED BY AF DATE ____

SUBJECT ____ CHECKED BY ____ DATE ____

Conclusion 4.7

Fascia mount

→ No bracket

To Concrete

use [2 - 1/2" ϕ red head, 7" apart w/min 4" Embed
post to extend 1.5" below bottom anchor
f'c ≮ 3000 psi,]

To wood

use [2 - 3/8" ϕ lag screw, 7" apart w/min 4" Embed]

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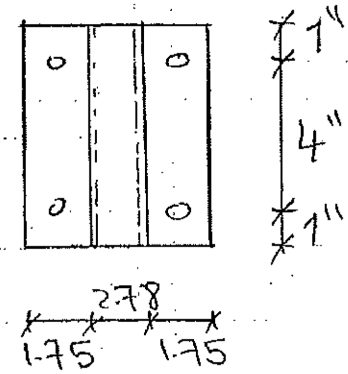
PROJECT NO. Eg1285 217-1 SHEET E OF
PROJECT NAME DESIGNED BY AF DATE
SUBJECT CHECKED BY DATE

Conclusion 5/7

Intermediate post:

use [2-#10 tek screws to hold post in place]



Bracket: As shown
$t = \frac{3}{16}$" thick

Anchor to concrete

use [4-$\frac{3}{8}$"ϕ Red head or LDT
w/min 4" Embed, 3" edge distance
f'c ≮ 2500 psi]

To wood

use [4-$\frac{3}{8}$"ϕ lag screws w/4" min Embed]

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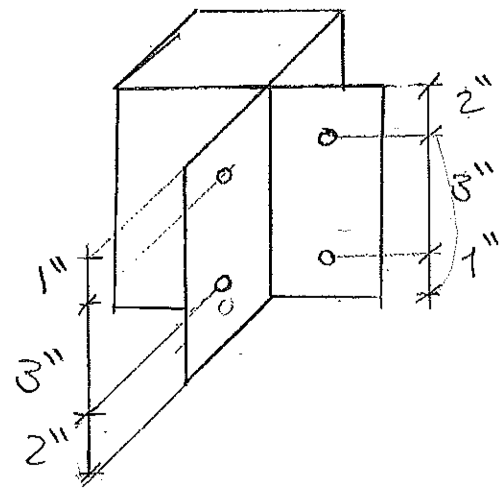
PROJECT NO. ______ SHEET ____ OF ____

PROJECT NAME ______ DESIGNED BY AF DATE 2/11/2018

SUBJECT ______ CHECKED BY ______ DATE ______

Outside Corner fascia bracket



Anchor to Concrete

use [4 - 3/8" φ Red head ITW or LDT w/min 3 1/2" Embed & 1.5" Edge dist. f'c ≮ 2500]

Anchor to wood

use [4 - 1/2" φ lag screw w/Min. 4" Embed]

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PROJECT NO. Eglass 217-1 SHEET G1 OF

PROJECT NAME DESIGNED BY AF DATE

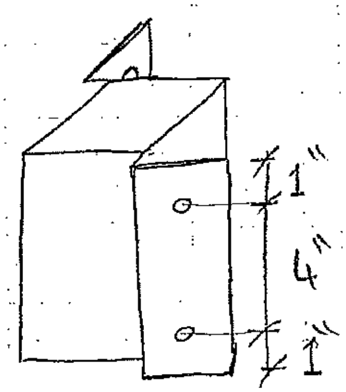
SUBJECT CHECKED BY DATE

Conclusion 7/7

Inside Corner:

post: $t = \frac{3}{16}$", As shown

total length = 6"



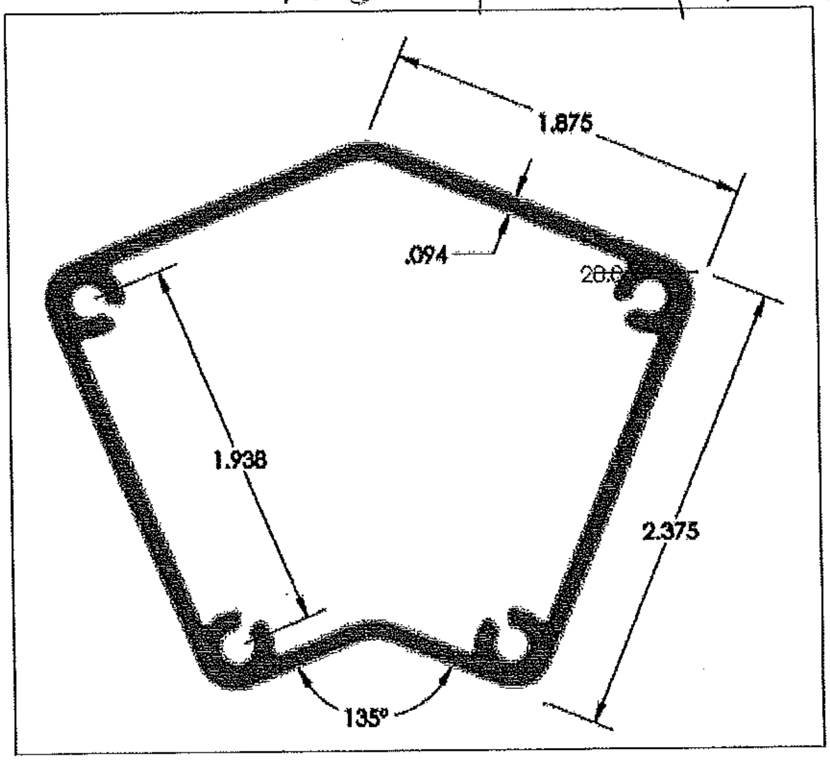
Anchor to Concrete:

Similar to outside Corner

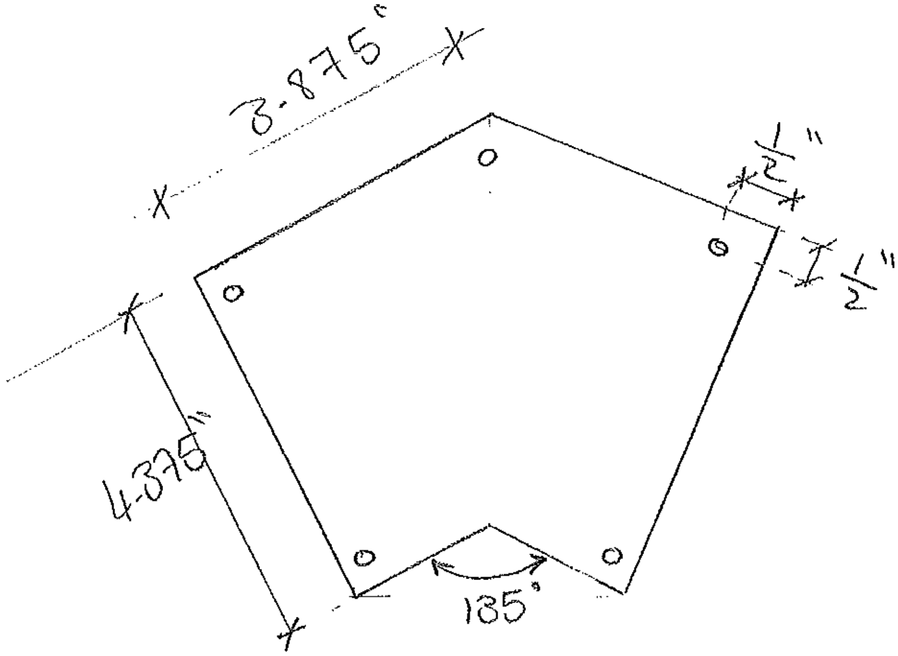
Anchor to wood

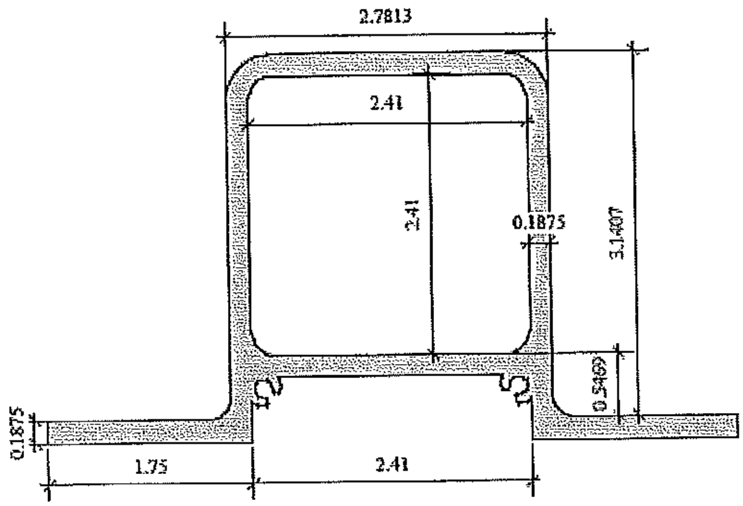
Similar to outside Corner

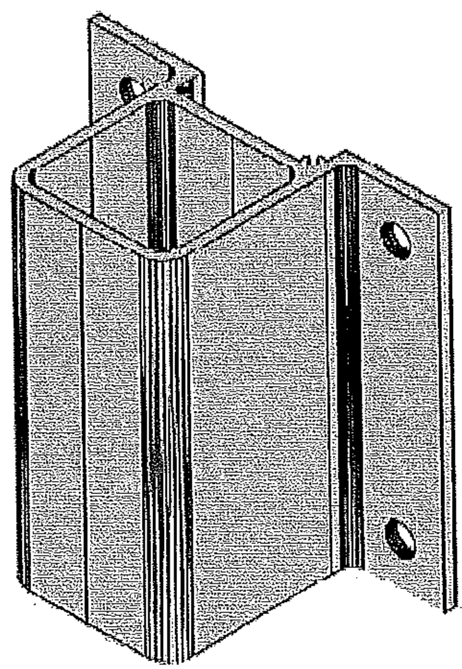
135° Post plan



135° Post baseplate

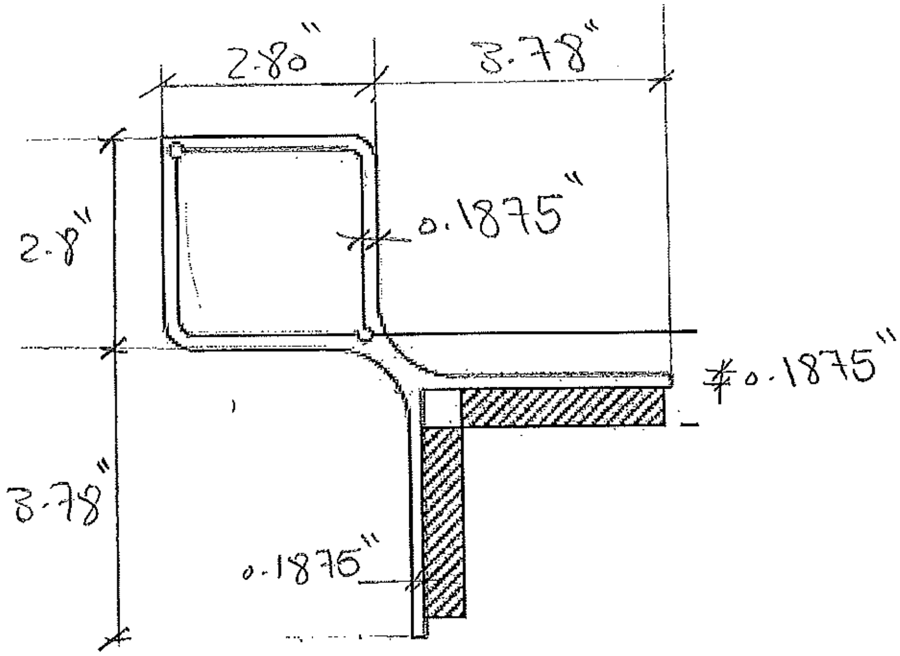






Intermediate post fascia bracket

J



Corner fascia bracket

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PROJECT NO. Eglass 217-1 SHEET 1000 OF ______
PROJECT NAME ______ DESIGNED BY AF DATE ______
SUBJECT ______ CHECKED BY ______ DATE ______

Applied loads

(1) Concentrated load @ post top = 200 lb (IBC)

(2) Distributed load @ Top rail = 50 plf (IBC)

(3) Infill area of guards:
- Horizontal Concentrated load of 50 lb applied to 1 sq f. (IBC, 1607.8.1.1, ASCE 7, 4.5.1)

(4) wind speed (prevailing) @ Washington State = 110 mph (IBC)

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PROJECT NO. Eglass 217-1 SHEET 001 OF ______

PROJECT NAME ______ DESIGNED BY AF DATE ______

SUBJECT ______ CHECKED BY ______ DATE ______

① Glass w/Top & bottom Rail, Deck mount

② Glass w/Top & bottom Rail, fascia mount

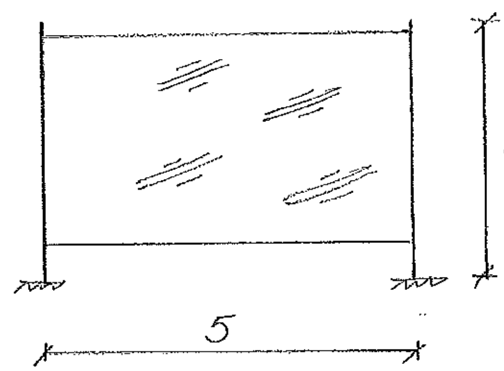
According to RISA output

use, Aluminum 6061-T6

post: $2\frac{3}{8} * 2\frac{3}{8} * 0.125''$

Top rail: $1.0'' * 3.0'' * 0.125''$

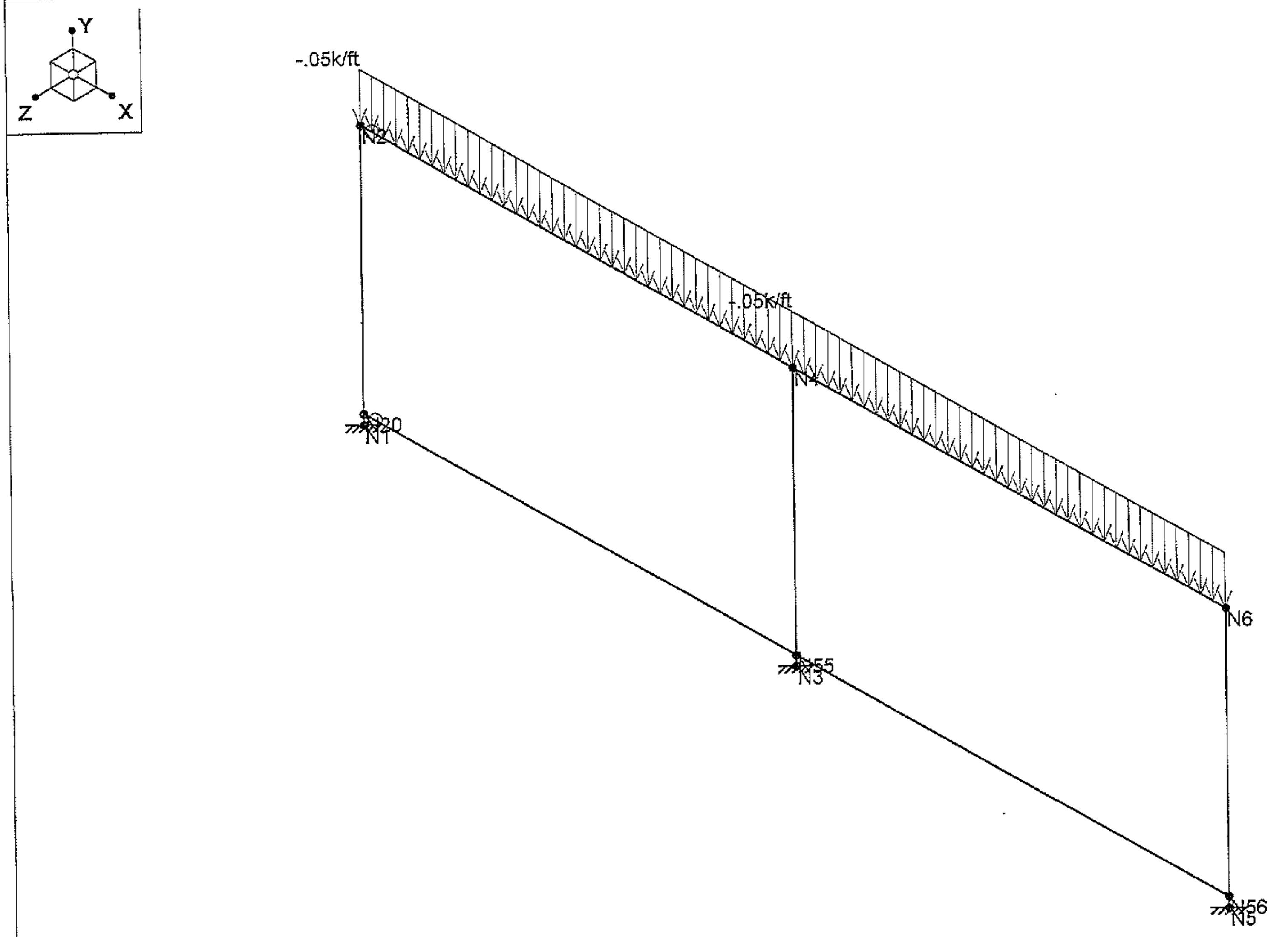
bottom rail: $1'' * 1'' * 0.095''$



use:

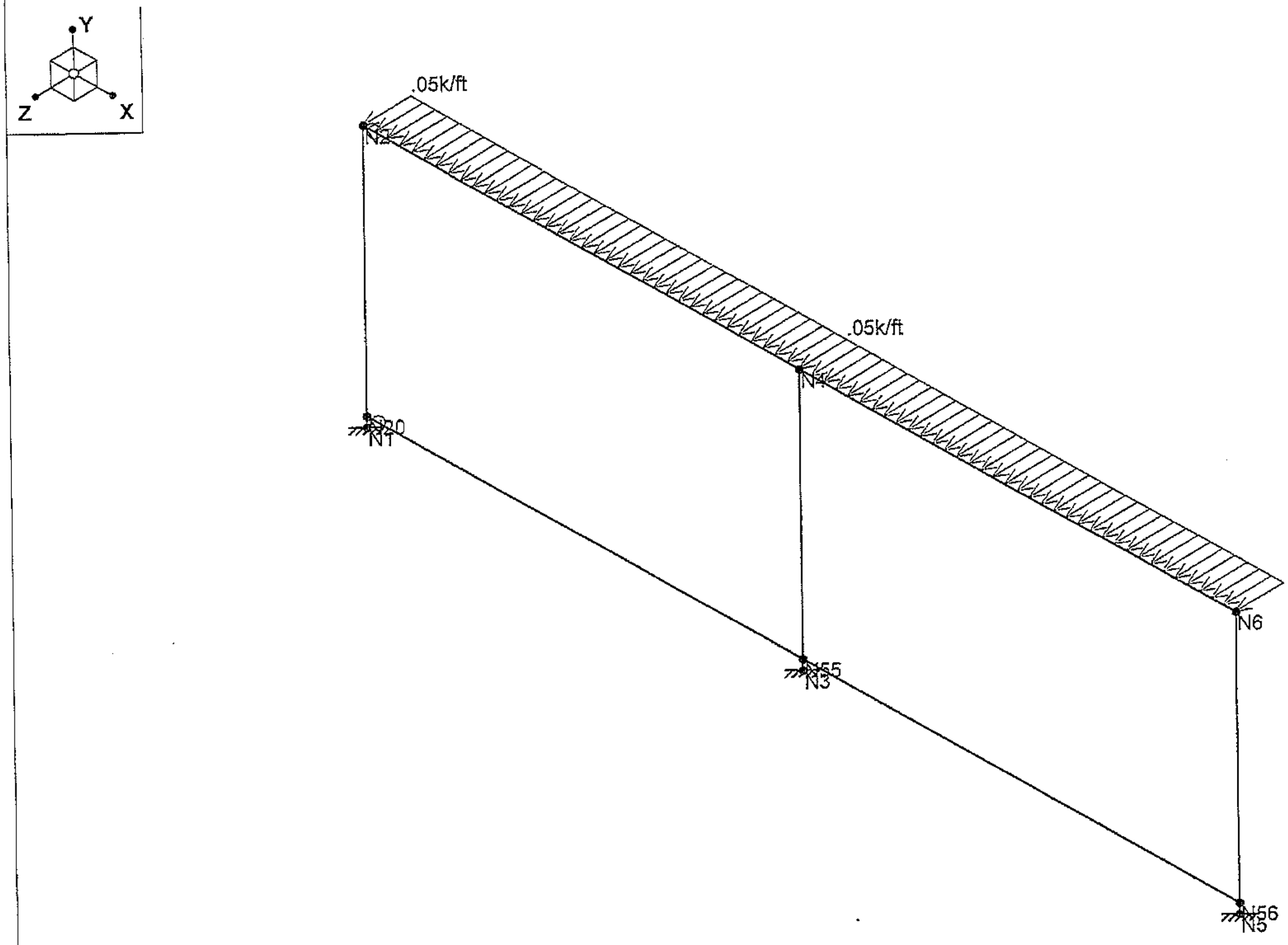
Fully Tempered glass; $\frac{1}{4}''$ thick or $\frac{3}{8}''$ thick

1002



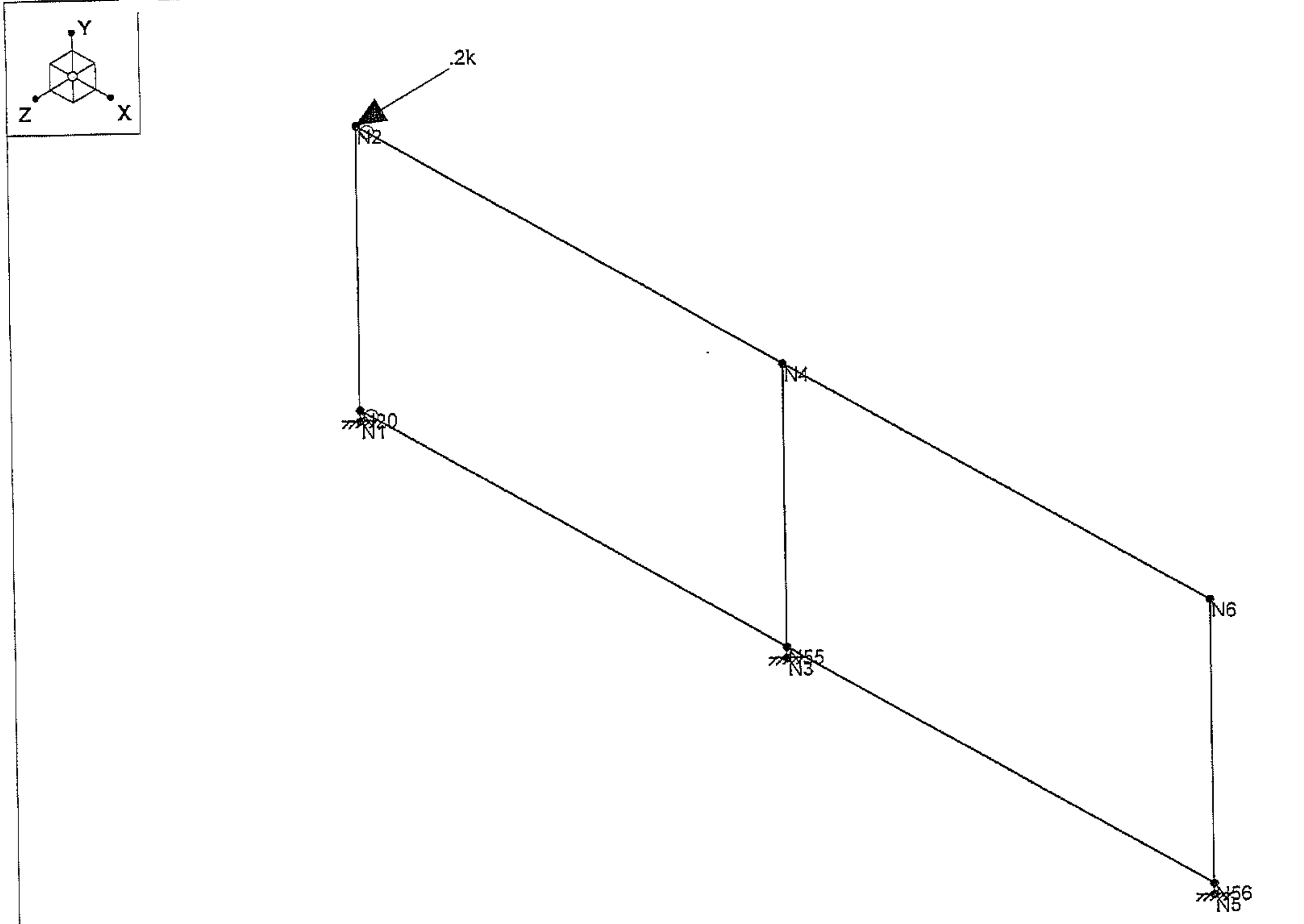
Loads: BLC 1, Distributed load-y at the top of
Envelope Only Solution

PSEI	Glass W/ Top & Bottom Rail	SK - 1
AF		Apr 6, 2017 at 11:31 AM
Eglass 217-1		1- Glass w-top and bottom rail.r3d



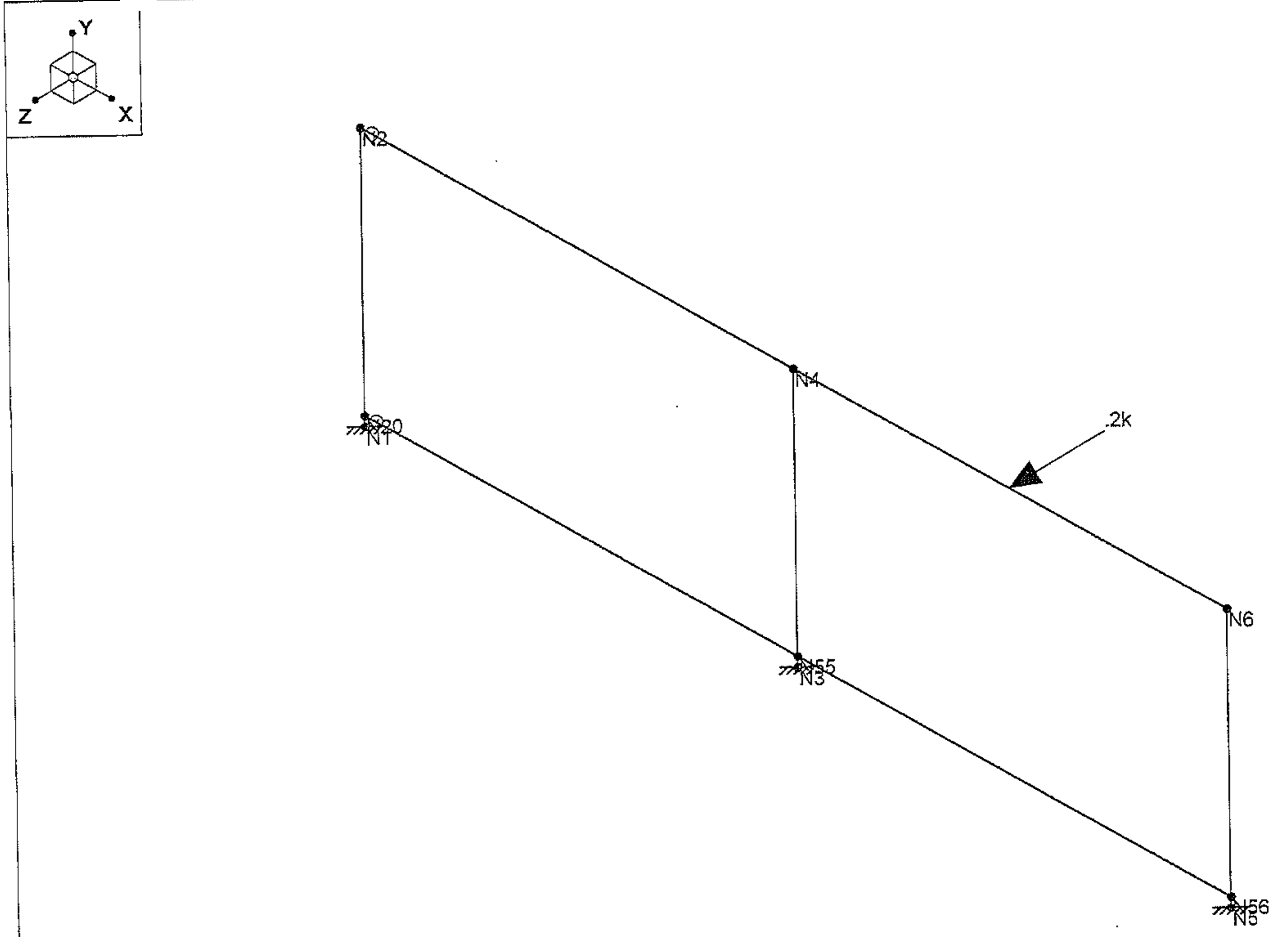
Loads: BLC 2, Distributed load-X at the side o
Envelope Only Solution

PSEI	Glass W/ Top & Bottom Rail	SK - 2
AF		Apr 6, 2017 at 11:31 AM
Eglass 217-1		1- Glass w-top and bottom rail.r3d



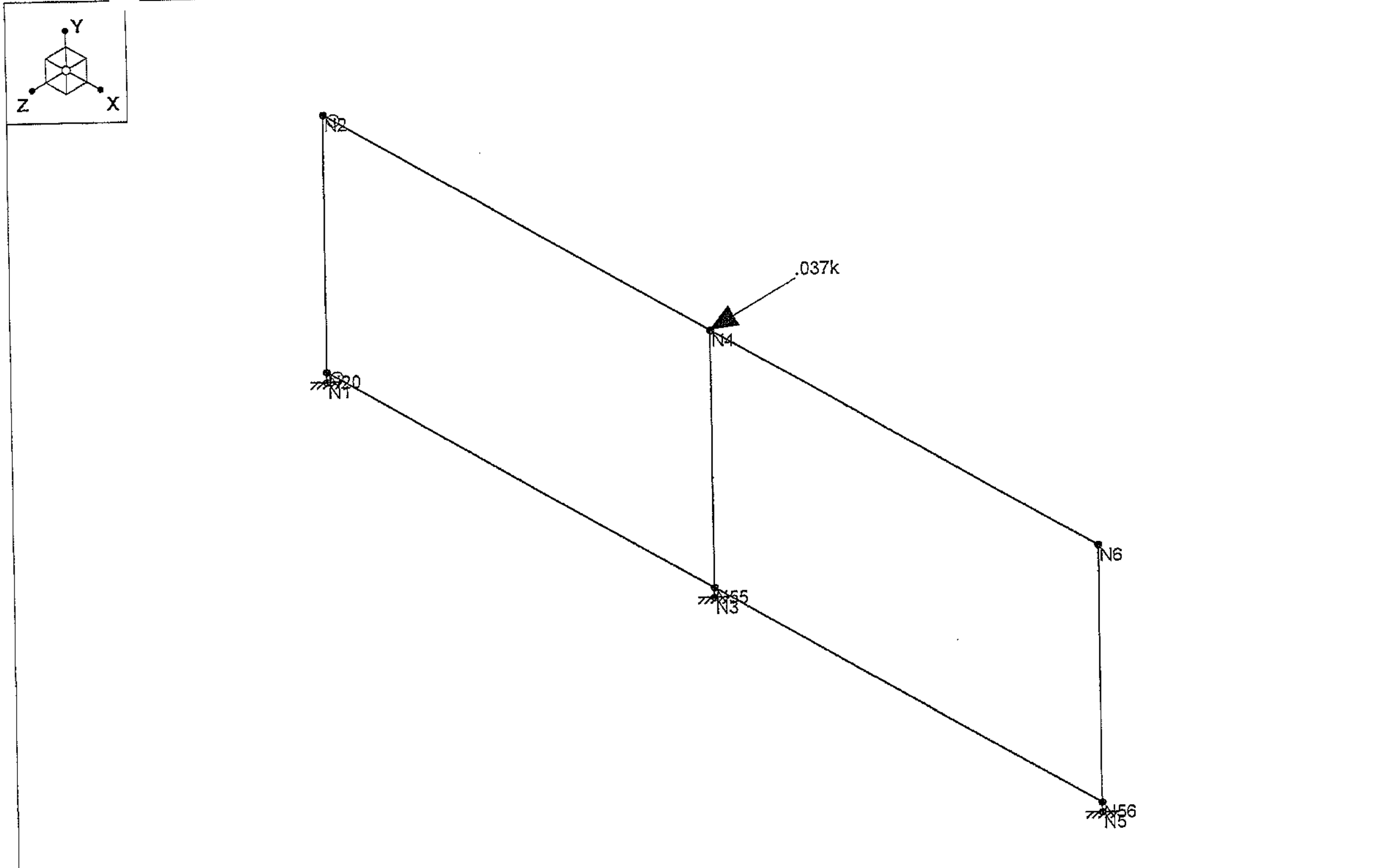
Loads: BLC 3, Point load applied at the corner
Envelope Only Solution

PSEI	Glass W/ Top & Bottom Rail	SK - 3
AF		Apr 6, 2017 at 11:31 AM
Eglass 217-1		1- Glass w-top and bottom rail.r3d



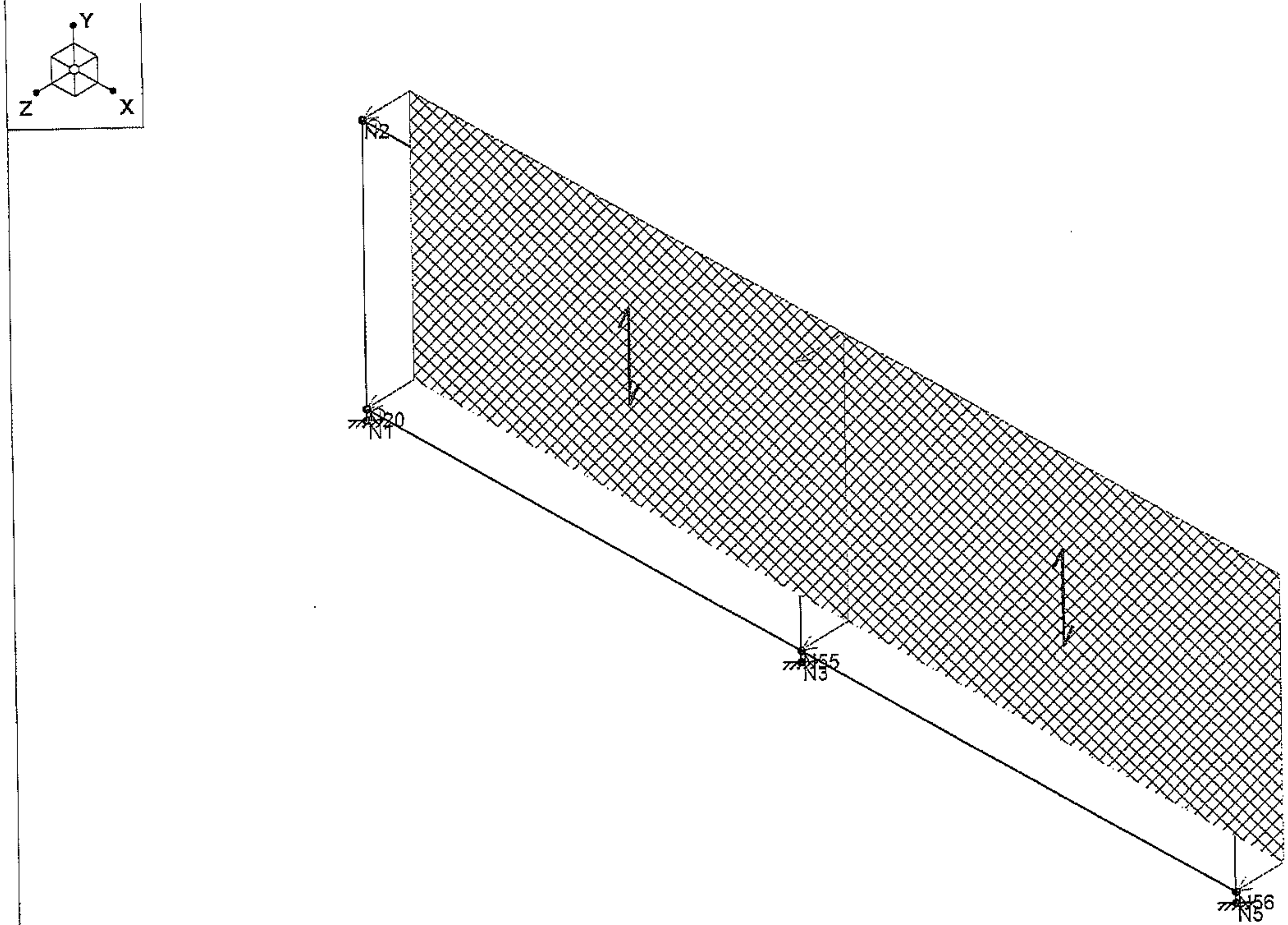
Loads: BLC 4, Point load applied at the middle
Envelope Only Solution

PSEI	Glass W/ Top & Bottom Rail	SK - 4
AF		Apr 6, 2017 at 11:31 AM
Eglass 217-1		1- Glass w-top and bottom rail.r3d



Loads: BLC 5, Infill
Envelope Only Solution

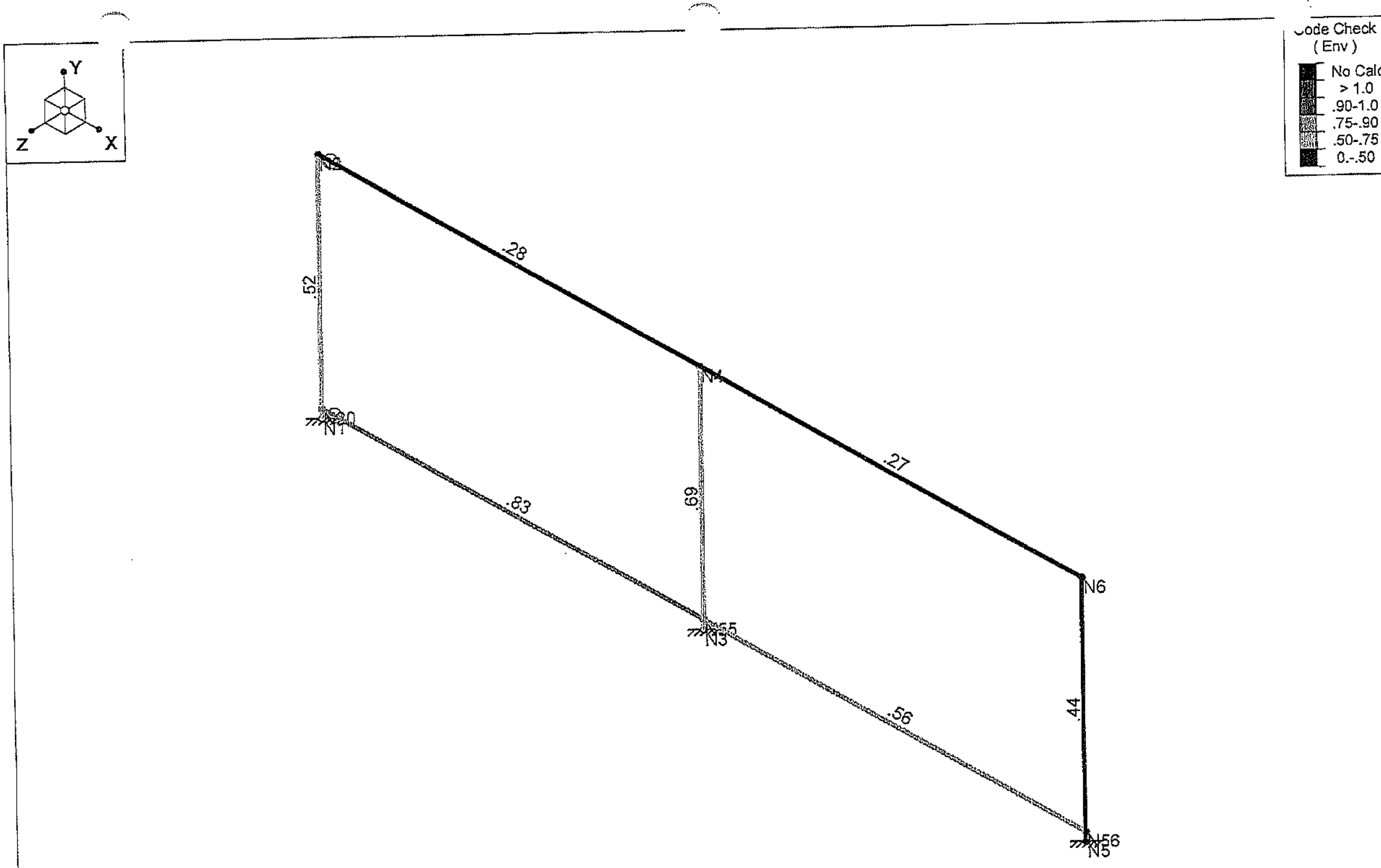
PSEI	Glass W/ Top & Bottom Rail	SK - 5
AF		Apr 6, 2017 at 11:31 AM
Eglass 217-1		1- Glass w-top and bottom rail.r3d



1007

Loads: BLC 6, Wind
Envelope Only Solution

PSEI	Glass W/ Top & Bottom Rail	SK - 6
AF		Apr 6, 2017 at 11:31 AM
Eglass 217-1		1- Glass w-top and bottom rail.r3d



Member Code Checks Displayed (Enveloped)
Envelope Only Solution

PSEI	Glass W/ Top & Bottom Rail	SK - 1
AF		May 1, 2017 at 3:16 PM
Eglass 217-1		1- Glass w-top and bottom rail.r3d

Hot Rolled Steel Properties

	Label	E [ksi]	G [ksi]	Nu	Therm (\1...	Density[k/ft^3]	Yield[ksi]	Ry	Fu[ksi]	Rt
1	A36 Gr.36	29000	11154	.3	.65	.49	36	1.5	58	1.2
2	A572 Gr.50	29000	11154	.3	.65	.49	50	1.1	65	1.1
3	A992	29000	11154	.3	.65	.49	50	1.1	65	1.1
4	A500 Gr.42	29000	11154	.3	.65	.49	42	1.4	58	1.3
5	A500 Gr.46	29000	11154	.3	.65	.49	46	1.4	58	1.3
6	316SS	28000	10732	.3	.65	.501	30	1.4	75	1.2

Aluminum Properties

	Label	E [ksi]	G [ksi]	Nu	Therm ...	Density...	Table B.4	kt	Ftu[ksi]	Fty[ksi]	Fcy[ksi]	Fsu[ksi]	Ct
1	3003-H14	10100	3787.5	.33	1.3	.173	Table B.4-1	1	19	16	13	12	141
2	6061-T6	10100	3787.5	.33	1.3	.173	Table B.4-2	1	38	35	35	24	141
3	6063-T5	10100	3787.5	.33	1.3	.173	Table B.4-2	1	22	16	16	13	141
4	6063-T6	10100	3787.5	.33	1.3	.173	Table B.4-2	1	30	25	25	19	141
5	5052-H34	10200	3787.5	.33	1.3	.173	Table B.4-1	1	34	26	24	20	141
6	6061-T6 W	10100	3787.5	.33	1.3	.173	Table B.4-1	1	24	15	15	15	141

Hot Rolled Steel Section Sets

	Label	Shape	Type	Design List	Material	Design...	A [in2]	Iyy [in4]	Izz [in4]	J [in4]
1	CABLE	3/16" Rod	HBrace	None	A36 Gr.36	Typical	.027	6e-5	6e-5	.00012

Aluminum Section Sets

	Label	Shape	Type	Design List	Material	Design Ru...	A [in2]	Iyy [in4]	Izz [in4]	J [in4]
1	POST	RT2X2X0.125	Column	Rectangular Tub...	6061-T6	Typical	.938	.552	.552	.824
2	TOP RAIL	RT1X3X0.125	Beam	Rectangular Tub...	6061-T6	Typical	.938	.153	.95	.422
3	BOTTOM RAIL	RT1X1X0.095	Beam	Rectangular Tub...	6061-T6	Typical	.344	.048	.048	.07

Joint Coordinates and Temperatures

	Label	X [ft]	Y [ft]	Z [ft]	Temp [F]	Detach From Diap...
1	N1	0	0	0	0	
2	N2	0	3	0	0	
3	N3	5	0	0	0	
4	N4	5	3	0	0	
5	N5	10	0	0	0	
6	N6	10	3	0	0	
7	N20	0	0.1125	0	0	
8	N55	5	0.1125	0	0	
9	N56	10	0.1125	0	0	

Joint Boundary Conditions

	Joint Label	X [k/in]	Y [k/in]	Z [k/in]	X Rot.[k-ft/rad]	Y Rot.[k-ft/rad]	Z Rot.[k-ft/rad]
1	N1	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
2	N3	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
3	N5	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction

1010

Hot Rolled Steel Design Parameters

Label	Shape	Length[ft]	Lbyy[ft]	Lbzz[ft]	Lcomp top[ft]	Lcomp bot[ft]	L-torqu...	Kyy	Kzz	Cb	Function
No Data to Print ...											

Aluminum Design Parameters

	Label	Shape	Length[ft]	Lbyy[ft]	Lbzz[ft]	Lcomp top[ft]	Lcomp bot[ft]	L-torqu...	Kyy	Kzz	Cb	Function
1	M1	POST	3			Lbyy						Lateral
2	M2	TOP RAIL	5			Lbyy						Lateral
3	M3	POST	3			Lbyy						Lateral
4	M4	TOP RAIL	5			Lbyy						Lateral
5	M5	POST	3			Lbyy						Lateral
6	M19	BOTTOM R..	5			Lbyy						Lateral
7	M43	BOTTOM R..	5			Lbyy						Lateral

Basic Load Cases

	BLC Description	Category	X Gra...	Y Gra...	Z Grav...	Joint	Point	Distrib...	Area(...	Surface(Plate/W...
1	Distributed load-y at the to...	None		-1				2		
2	Distributed load-X at the si...	None		-1				2		
3	Point load applied at the co..	None		-1		1				
4	Point load applied at the mi..	None		-1			1			
5	Infill	None				1				
6	Wind	None							2	
7	BLC 6 Transient Area Loads	None						4		

Load Combinations

	Description	Solve	PDelta	S...	BLC	Fact...	BLC	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...
1	Distributed load-y a..	Yes	Y		1	1																		
2	Distributed load-X ...	Yes	Y		2	1																		
3	Point load applied ...	Yes	Y		3	1																		
4	Point load applied ...	Yes	Y		4	1																		
5	Infill	Yes	Y		5	1																		
6	Wind	Yes	Y		6	1																		

Load Combination Design

	Description	ASIF	CD	ABIF	Service	Hot Rolled	Cold For...	Wood	Concrete	Masonry	Footings	Aluminum	Connecti...
1	Distributed l...					Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
2	Distributed l...					Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
3	Point load a...					Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
4	Point load a...					Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
5	Infill					Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
6	Wind					Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Joint Loads and Enforced Displacements (BLC 3 : Point load applied at the corner)

	Joint Label	L,D,M	Direction	Magnitude[(k,k-ft), (in,rad), (k...
1	N2	L	Z	.2

Joint Loads and Enforced Displacements (BLC 5 : Infill)

	Joint Label	L,D,M	Direction	Magnitude[(k,k-ft), (in,rad), (k...
1	N4	L	Z	.037

\o\\

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	N1	max	.013	1	.103	1	0	4	0	1	0	1	0	5
2		min	0	5	0	5	-.196	6	-.509	3	0	1	-.043	1
3	N3	max	.005	1	.304	1	0	1	0	1	.033	4	0	5
4		min	0	5	0	5	-.467	6	-.675	2	-.044	6	-.037	1
5	N5	max	0	5	.119	1	.01	3	.015	3	0	1	0	5
6		min	-.018	1	0	5	-.232	6	-.428	2	-.137	6	-.009	1
7	Totals:	max	0	1	.526	1	0	1						
8		min	0	5	0	5	-.895	6						

Envelope Member Section Forces

	Member	Sec		Axial[k]	LC	y Shear[k]	LC	z Shear[k]	LC	Torque[...	LC	y-y Moment[...	LC	z-z Mo...	LC
1	M1	1	max	.103	1	0	5	0	4	0	1	.509	3	0	5
2			min	0	5	-.013	1	-.196	6	0	1	0	1	-.043	1
3		2	max	.101	1	0	5	0	4	0	1	.373	3	0	5
4			min	0	5	-.014	1	-.182	3	0	1	0	1	-.032	1
5		3	max	.1	1	0	5	0	4	0	1	.236	3	0	5
6			min	0	5	-.014	1	-.182	3	0	1	0	1	-.021	1
7		4	max	.099	1	0	5	0	4	0	1	.117	2	0	5
8			min	0	5	-.014	1	-.182	3	0	1	0	1	-.011	1
9		5	max	.098	1	0	5	0	4	0	1	.023	4	0	1
10			min	0	5	-.014	1	-.182	3	0	1	-.037	3	0	1
11	M2	1	max	.014	1	.018	3	0	5	.037	3	0	1	0	1
12			min	0	5	-.125	2	-.098	1	-.023	4	0	1	0	1
13		2	max	.014	1	.018	3	0	5	.037	3	0	5	.117	2
14			min	0	5	-.063	2	-.034	1	-.023	4	-.083	1	-.023	3
15		3	max	.014	1	.018	3	.029	1	.037	3	0	5	.156	2
16			min	0	5	-.005	5	0	5	-.023	4	-.086	1	-.045	3
17		4	max	.014	1	.062	2	.093	1	.037	3	0	5	.117	2
18			min	0	5	-.005	5	0	5	-.023	4	-.009	1	-.068	3
19		5	max	.014	1	.125	2	.157	1	.037	3	.147	1	.027	5
20			min	0	5	-.005	5	0	5	-.023	4	0	5	-.09	3
21	M3	1	max	.298	1	.008	1	0	1	.034	4	.043	2	0	5
22			min	0	5	0	5	-.239	2	-.032	3	-.023	3	-.012	1
23		2	max	.299	1	.008	1	0	1	.034	4	0	1	0	5
24			min	0	5	0	5	-.239	2	-.032	3	-.137	2	-.018	1
25		3	max	.3	1	.008	1	0	1	.034	4	0	1	0	5
26			min	0	5	0	5	-.239	2	-.032	3	-.316	2	-.024	1
27		4	max	.3	1	.008	1	0	1	.034	4	0	1	0	5
28			min	0	5	0	5	-.239	2	-.032	3	-.496	2	-.031	1
29		5	max	.304	1	.005	1	0	1	.033	4	0	1	0	5
30			min	0	5	0	5	-.467	6	-.044	6	-.675	2	-.037	1
31	M4	1	max	.022	1	.007	5	0	5	.02	2	.136	1	.027	5
32			min	0	5	-.114	2	-.141	1	-.003	4	0	5	-.058	3
33		2	max	.022	1	.007	5	0	5	.02	2	0	2	.105	2
34			min	0	5	-.101	4	-.077	1	-.003	4	0	1	-.046	3
35		3	max	.022	1	.099	4	0	5	.02	2	0	5	.218	4
36			min	0	5	-.01	3	-.013	1	-.003	4	-.056	1	-.034	3
37		4	max	.022	1	.099	4	.051	1	.02	2	0	5	.094	4
38			min	0	5	-.01	3	0	5	-.003	4	-.032	1	-.021	3
39		5	max	.022	1	.136	2	.115	1	.02	2	.072	1	0	1
40			min	0	5	-.01	3	0	5	-.003	4	0	5	-.054	2
41	M5	1	max	.115	1	0	5	.01	3	0	1	.003	4	0	5
42			min	0	5	-.022	1	-.136	2	-.054	2	-.02	2	-.072	1
43		2	max	.116	1	0	5	.01	3	0	1	0	1	0	5

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Envelope Member Section Forces (Continued)

	Member	Sec		Axial[k]	LC	y Shear[k]	LC	z Shear[k]	LC	Torque[...	LC	y-y Moment[...	LC	z-z Mo...	LC
44			min	0	5	-.022	1	-.136	2	-.054	2	-.122	2	-.056	1
45		3	max	.117	1	0	5	.01	3	0	1	0	3	0	5
46			min	0	5	-.022	1	-.136	2	-.054	2	-.224	2	-.04	1
47		4	max	.118	1	0	5	.01	3	0	1	.008	3	0	5
48			min	0	5	-.022	1	-.136	2	-.054	2	-.326	2	-.024	1
49		5	max	.119	1	0	5	.01	3	0	1	.015	3	0	5
50			min	0	5	-.018	1	-.232	6	-.137	6	-.428	2	-.009	1
51	M19	1	max	0	2	0	1	0	4	0	3	0	1	0	1
52			min	0	1	0	5	-.084	6	0	2	0	1	0	1
53		2	max	0	2	0	1	0	4	0	3	0	4	0	5
54			min	0	1	0	5	-.028	6	0	2	-.07	6	0	1
55		3	max	0	2	0	5	.028	6	0	3	0	4	0	5
56			min	0	1	0	2	0	3	0	2	-.07	6	0	1
57		4	max	0	2	0	5	.084	6	0	3	0	4	0	5
58			min	0	1	0	2	0	3	0	2	0	6	0	1
59		5	max	0	2	0	5	.14	6	0	3	.139	6	.001	2
60			min	0	1	-.001	2	0	3	0	2	0	3	0	5
61	M43	1	max	0	5	.001	1	0	4	0	2	.094	6	.001	1
62			min	-.004	1	0	5	-.112	6	0	4	0	4	0	5
63		2	max	0	5	0	1	0	4	0	2	0	3	0	1
64			min	-.004	1	0	5	-.057	6	0	4	-.011	6	0	2
65		3	max	0	5	0	1	0	4	0	2	0	3	0	5
66			min	-.004	1	0	5	0	6	0	4	-.047	6	0	2
67		4	max	0	5	0	5	.055	6	0	2	0	1	0	5
68			min	-.004	1	0	2	0	2	0	4	-.013	6	0	1
69		5	max	0	5	0	5	.111	6	0	2	.092	6	0	2
70			min	-.004	1	-.001	2	0	2	0	4	0	2	0	5

Envelope Member Section Deflections

	Member	S...		x [in]	LC	y [in]	LC	z [in]	LC	x Ro...	L...	(n) L/y Ratio	LC	(n) L/z Ratio	LC
1	M1	1	...	0	1	0	1	0	1	0	1	NC	1	NC	1
2			...	0	1	0	1	0	1	0	1	NC	1	NC	1
3		2	...	0	5	.004	1	.051	3	0	1	NC	2	NC	1
4			...	0	1	0	5	0	1	0	1	8268.732	1	699.162	3
5		3	...	0	5	.016	1	.184	3	0	1	NC	2	NC	1
6			...	0	1	0	5	0	1	0	1	2291.512	1	195.459	3
7		4	...	0	5	.032	1	.368	3	0	1	NC	2	NC	1
8			...	0	1	0	5	0	1	0	1	1134.377	1	97.735	3
9		5	...	0	5	.05	1	.574	3	0	1	NC	2	NC	1
10			...	0	1	0	5	0	1	0	1	718.629	1	62.693	3
11	M2	1	...	0	5	.574	3	0	1	2.28...	3	NC	1	NC	1
12			...	-.05	1	0	1	0	5	0	1	137.517	3	NC	1
13		2	...	0	5	.616	2	.214	1	2.29...	2	NC	1	NC	2
14			...	-.05	1	0	1	0	5	0	1	195.219	3	281.651	1
15		3	...	0	5	.714	2	.26	1	2.55...	2	NC	1	NC	2
16			...	-.05	1	0	1	0	5	0	1	321.993	3	231.278	1
17		4	...	0	5	.759	2	.134	1	2.80...	2	NC	1	NC	2
18			...	-.05	1	0	1	0	5	0	1	286.186	4	452.845	1
19		5	...	0	5	.765	2	.001	1	3.06...	2	NC	1	NC	1
20			...	-.05	1	0	1	0	5	0	1	214.398	4	NC	1
21	M3	1	...	.001	1	.05	1	0	1	4.68...	4	NC	2	NC	1
22			...	0	5	0	5	-.765	2	-4.4...	3	717.037	1	47.056	2
23		2	...	.001	1	.03	1	0	1	3.51...	4	NC	2	NC	1
24			...	0	5	0	5	-.49	2	-3.3...	3	1186.505	1	73.479	2
25		3	...	0	1	.014	1	0	1	2.34...	4	NC	2	NC	1

Envelope Member Section Deflections (Continued)

	Member	S...		x [in]	LC	y [in]	LC	z [in]	LC	x Ro...	L...	(n) L/y Ratio	LC	(n) L/z Ratio	LC
26			...	0	5	0	5	-.245	2	-2.2...	3	2494.887	1	147.14	2
27		4	...	0	1	.004	1	0	1	1.17...	4	NC	2	NC	1
28			...	0	5	0	5	-.068	2	-1.1...	3	9339.871	1	526.902	2
29		5	...	0	1	0	1	0	1	0	1	NC	1	NC	1
30			...	0	1	0	1	0	1	0	1	NC	1	NC	1
31	M4	1	...	0	5	.765	2	.001	1	3.06...	2	NC	1	NC	1
32			...	-.05	1	0	1	0	5	0	1	405.699	3	NC	1
33		2	...	0	5	.756	2	.058	1	2.84...	2	NC	1	NC	2
34			...	-.05	1	0	1	0	5	0	1	659.8	3	1062.084	1
35		3	...	0	5	.712	2	.129	1	2.61...	2	NC	1	NC	2
36			...	-.05	1	0	1	0	5	0	1	633	4	470.519	1
37		4	...	0	5	.624	2	.092	1	2.39...	2	NC	1	NC	2
38			...	-.05	1	0	1	0	5	0	1	937.475	4	658.125	1
39		5	...	0	5	.512	2	0	1	2.16...	2	NC	1	NC	1
40			...	-.05	1	-.01	3	0	5	-6.6...	3	NC	1	NC	1
41	M5	1	...	0	1	.05	1	.01	3	0	1	NC	2	NC	1
42			...	0	5	0	5	-.512	2	-7.4...	2	714.578	1	70.309	2
43		2	...	0	1	.023	1	.008	3	0	1	NC	2	NC	1
44			...	0	5	0	5	-.322	2	-5.5...	2	1565.824	1	111.826	2
45		3	...	0	1	.008	1	.005	3	0	1	NC	2	NC	1
46			...	0	5	0	5	-.158	2	-3.7...	2	4607.531	1	227.271	2
47		4	...	0	1	.001	1	.001	3	0	1	NC	1	NC	1
48			...	0	5	0	5	-.044	2	-2.0...	6	NC	1	824.134	2
49		5	...	0	1	0	1	0	1	0	1	NC	1	NC	1
50			...	0	1	0	1	0	1	0	1	NC	1	NC	1
51	M19	1	...	0	5	0	5	.001	3	1.81...	3	NC	1	NC	1
52			...	0	1	0	1	0	1	0	1	NC	1	NC	1
53		2	...	0	5	0	5	.556	6	1.66...	2	NC	2	NC	1
54			...	0	1	-.006	1	0	4	0	1	9936.99	1	108.074	6
55		3	...	0	5	0	5	.66	6	1.91...	2	NC	5	NC	1
56			...	0	1	-.008	1	-.001	4	0	1	7954.01	1	91.089	6
57		4	...	0	5	0	5	.312	6	2.15...	2	NC	1	NC	1
58			...	0	1	-.004	1	-.001	4	0	1	NC	1	193.623	6
59		5	...	0	5	0	5	.002	6	2.40...	2	NC	1	NC	1
60			...	0	1	0	1	0	1	0	1	NC	1	NC	1
61	M43	1	...	0	5	0	5	.002	6	2.40...	2	NC	1	NC	1
62			...	0	1	0	1	0	1	0	1	NC	1	NC	1
63		2	...	0	5	0	5	.186	6	2.18...	2	NC	1	NC	1
64			...	0	1	-.002	2	-.001	3	0	1	NC	1	324.992	6
65		3	...	0	5	0	5	.333	6	1.96...	2	NC	1	NC	1
66			...	0	1	-.003	2	0	3	0	1	NC	1	180.949	6
67		4	...	0	5	0	5	.191	6	1.74...	2	NC	1	NC	1
68			...	0	1	-.002	2	0	3	0	1	NC	1	316.177	6
69		5	...	0	5	0	5	.001	2	1.52...	2	NC	1	NC	1
70			...	0	1	0	1	0	3	-5.3...	3	NC	1	NC	1

Envelope AA ADM1-10: ASD - Building Aluminum Code Checks

	Member	Shape	Code C...	Loc[ft]	LC	Shear ...	Loc[ft]	Dir	LC	Pnc/O...	Pnt/Om...	Mny/O...	Mnz/O...	Vny/O...	Vnz/O...	Cb	Eqn
1	M1	RT2X2X0...	.522	0	3	.038	0	z	6	13.449	18.279	.976	.976	5.17	5.17	1...	H.1-1
2	M2	RT1X3X0...	.277	5	1	.090	5	z	3	2.182	18.279	.532	1.042	8.352	1.989	1	H.1-1
3	M3	RT2X2X0...	.692	3	2	.149	2.906	z	6	13.449	18.279	.976	.976	5.17	5.17	1...	H.1-1
4	M4	RT1X3X0...	.265	0	1	.071	0	z	1	2.182	18.279	.532	1.042	8.352	1.989	1	H.1-1
5	M5	RT2X2X0...	.440	3	2	.226	2.906	z	6	13.449	18.279	.976	.976	5.17	5.17	1...	H.1-1
6	M19	RT1X1X0...	.831	5	6	.084	5	z	6	.678	6.704	.168	.162	1.729	1.729	1	H.1-1
7	M43	RT1X1X0...	.562	0	6	.068	0	z	6	.678	6.704	.168	.162	1.729	1.729	1	H.1-1

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Glass Load Resistance Report --

Wednesday, April 5, 2017

Glazing Information

Edge Supports: 2 Sides
Glazing Angle: 90°
Lite Dimensions:
Unsupported Length: 36.0 in.
Supported Length: 60.0 in.

Project Details

Project Name:
Location:
Comments:

Glass Construction (Rectangular)

Single Glazed Lite

Glass Type: Fully Tempered
Nominal Thickness: 1/4 in.

Short Load Duration, Resistance, and Deflection Data

Load (~ 3 sec.):	31.0 psf
Load Resistance:	68.1 psf
Approximate center of glass deflection:	0.52 in.

Long Load Duration, Resistance, and Deflection Data

Load (~ 30 days):	13.2 psf
Load Resistance:	51.1 psf
Approximate center of glass deflection:	0.22 in.

Conclusion

Based on your design information, the load resistance is greater than or equal to the specified loading.

Statement of Compliance

Procedures followed in determining the resistance of this window glass are in accordance with ASTM E1300-09/12.

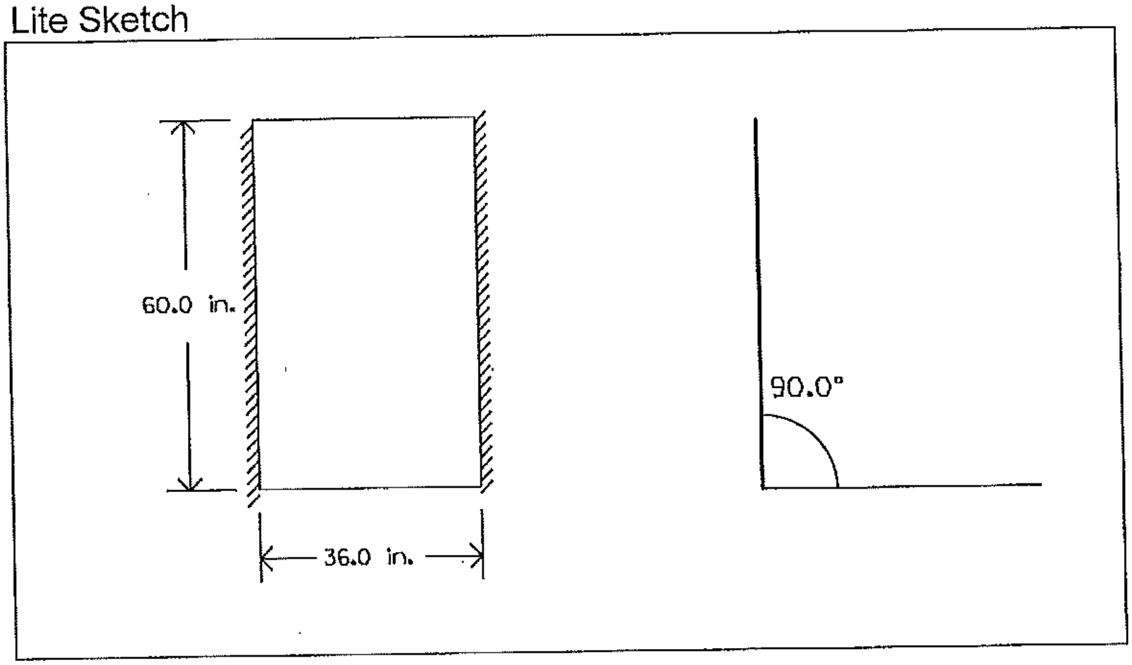
Disclaimer:
This software can be used to determine the load resistance of specified glass types exposed to uniform lateral loads of short or long duration subject to the following conditions:
- The glass is free of edge and surface damage and has been properly glazed in the opening in conformance with the manufacturer's recommendations.
- Procedures exist to determine load resistance for rectangular glass assemblies that are:
  a. Continuously supported along all four edges,
  b. Continuously supported along three edges,
  c. Continuously supported along two parallel edges, and
  d. Continuously supported along one edge.
- The software user has the responsibility of selecting the correct procedures for the required application from the software.
- The stiffness of members supporting any glass edge shall be sufficient that under design load, edge deflections shall not exceed L/175, where L denotes that length of the supported edge.
- The manufacturer states that the Safety Plus II 0.090 Polyurethane Large Missile Resistant interlayer is comparable to the PVB interlayer.

For other limiting conditions that may apply, refer to Section 5 of ASTM E1300 and local building codes.

Prepared by: ______________________ on 4/5/2017

Details Report --

Lite Sketch



Precision Structural Engineering, Inc.
250 Main Street, Suite A • Klamath Falls, OR 97601
Tel (541) 850-6300 • FAX (541) 850-6233
Medford Office
836 Mason Way (off Sage Road) • Medford, OR 97501
Tel (541) 858-8500
www.structure1.com • Email: info@structure1.com

PROJECT NO. Eglass 217-1 SHEET 6 of 6 OF

PROJECT NAME DESIGNED BY AF DATE

SUBJECT CHECKED BY NT DATE 4-18-17

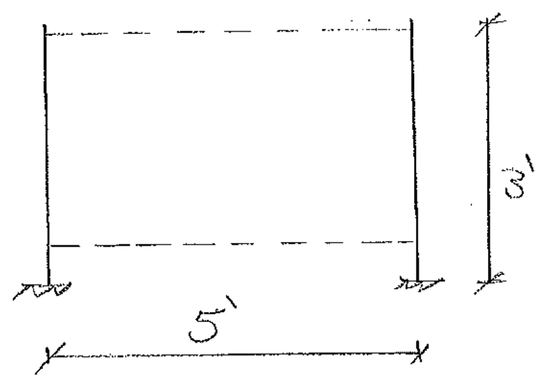
(3) Glass w/Clip, Deck mount

(4) Glass w/Clip, fascia mount

According To RISA output.

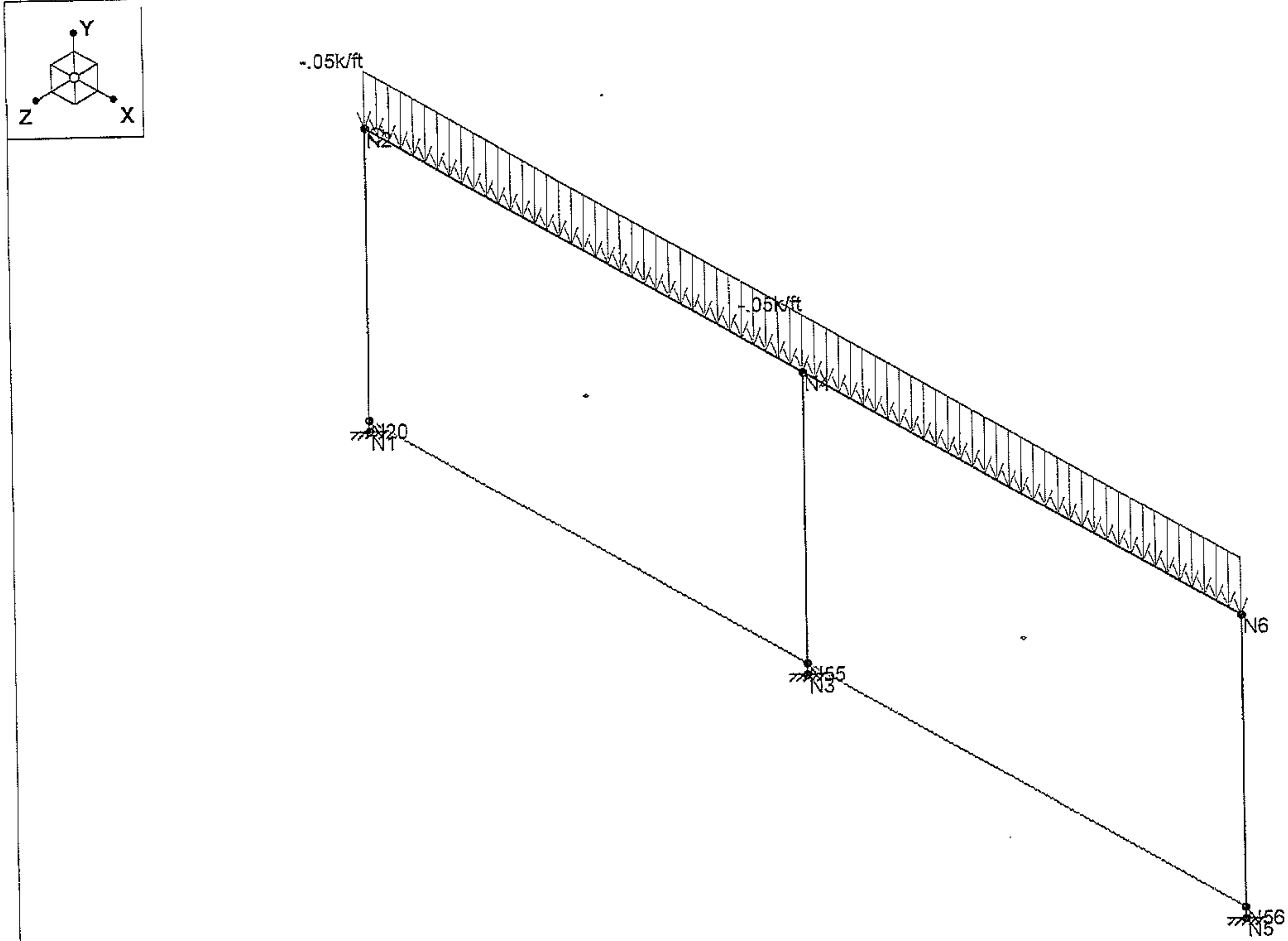
use, Aluminum 6061-T6

post: 2"*2"*0.125"



use:

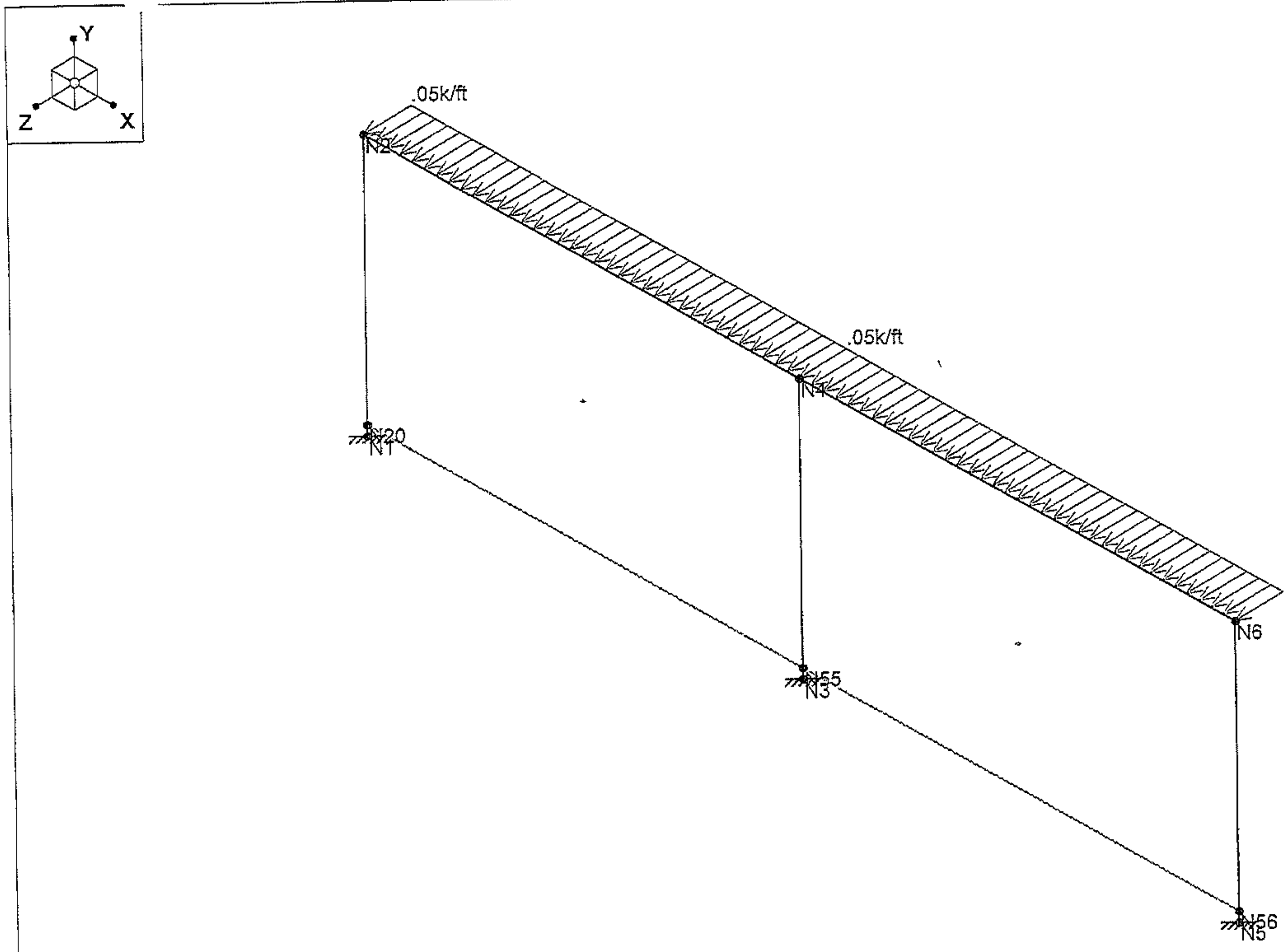
Fully Tempered glass, 3/8" thick
supported on two sides.



Loads: BLC 1, Distributed load-y at the top of
Envelope Only Solution

PSEI	Glass W/ Clips	SK - 8
AF		Apr 6, 2017 at 12:08 PM
Eglass 217-1		3- Glass w-clip.r3d

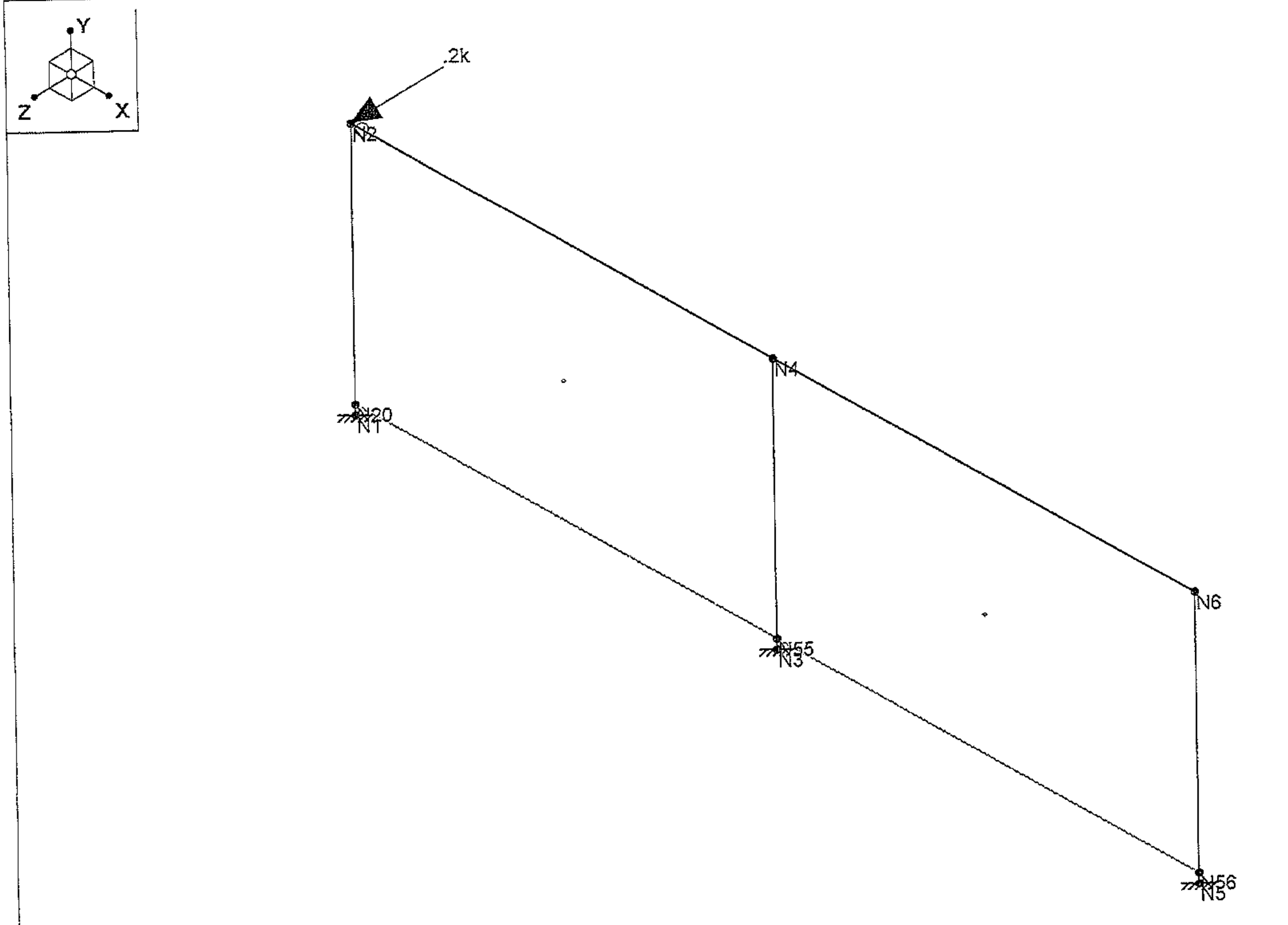
1 of 7



1of8

Loads: BLC 2, Distributed load-X at the side o
Envelope Only Solution

PSEI	Glass W/ Clips	SK - 9
AF		Apr 6, 2017 at 12:08 PM
Eglass 217-1		3- Glass w-clip.r3d



Loads: BLC 3, Point load applied at the corner
Envelope Only Solution

PSEI	Glass W/ Clips	SK - 10
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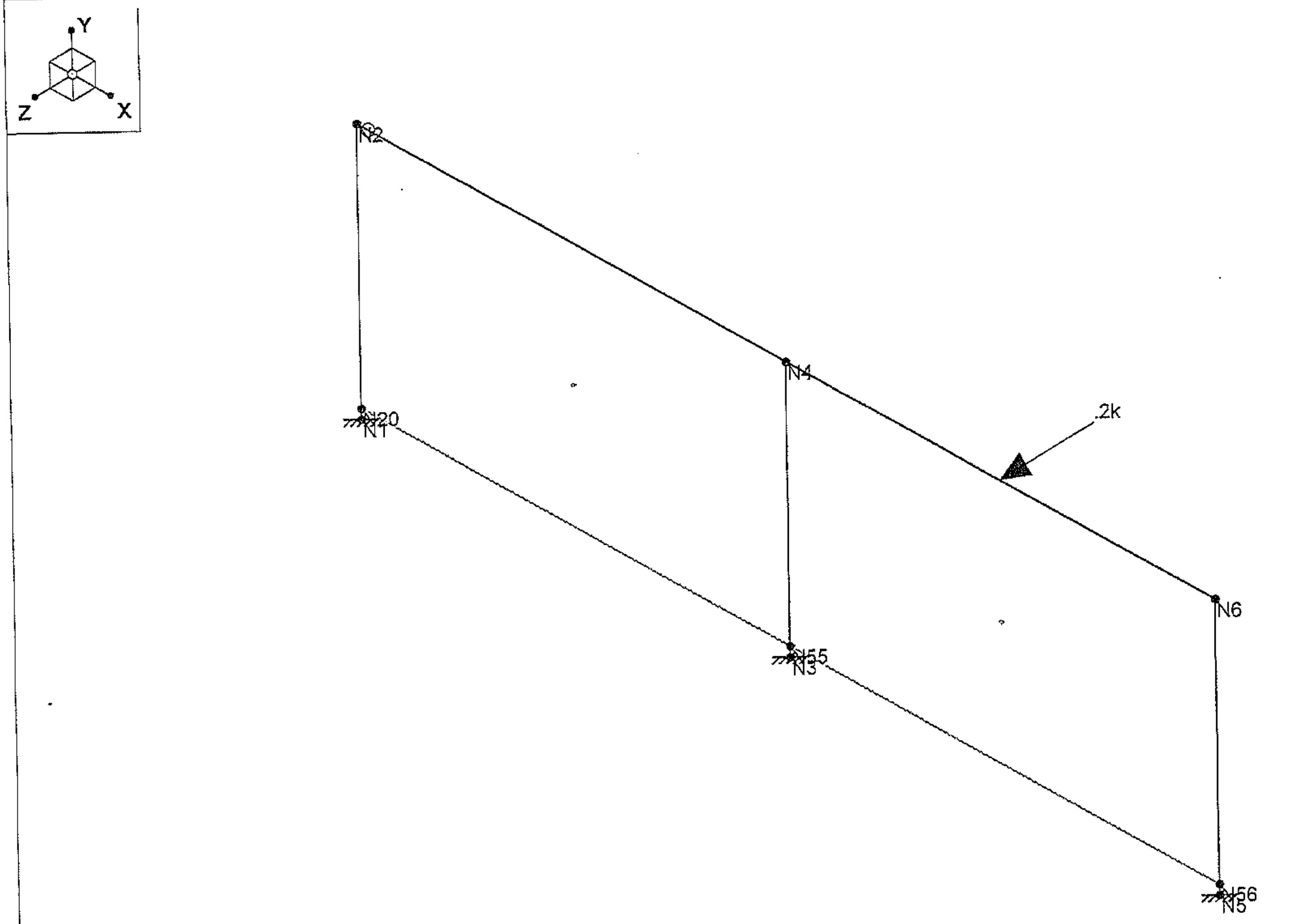
Eglass 217-1		3- Glass w-clip.r3d

1619



Loads: BLC 4, Point load applied at the middle
Envelope Only Solution

PSEI	Glass W/ Clips	SK - 11
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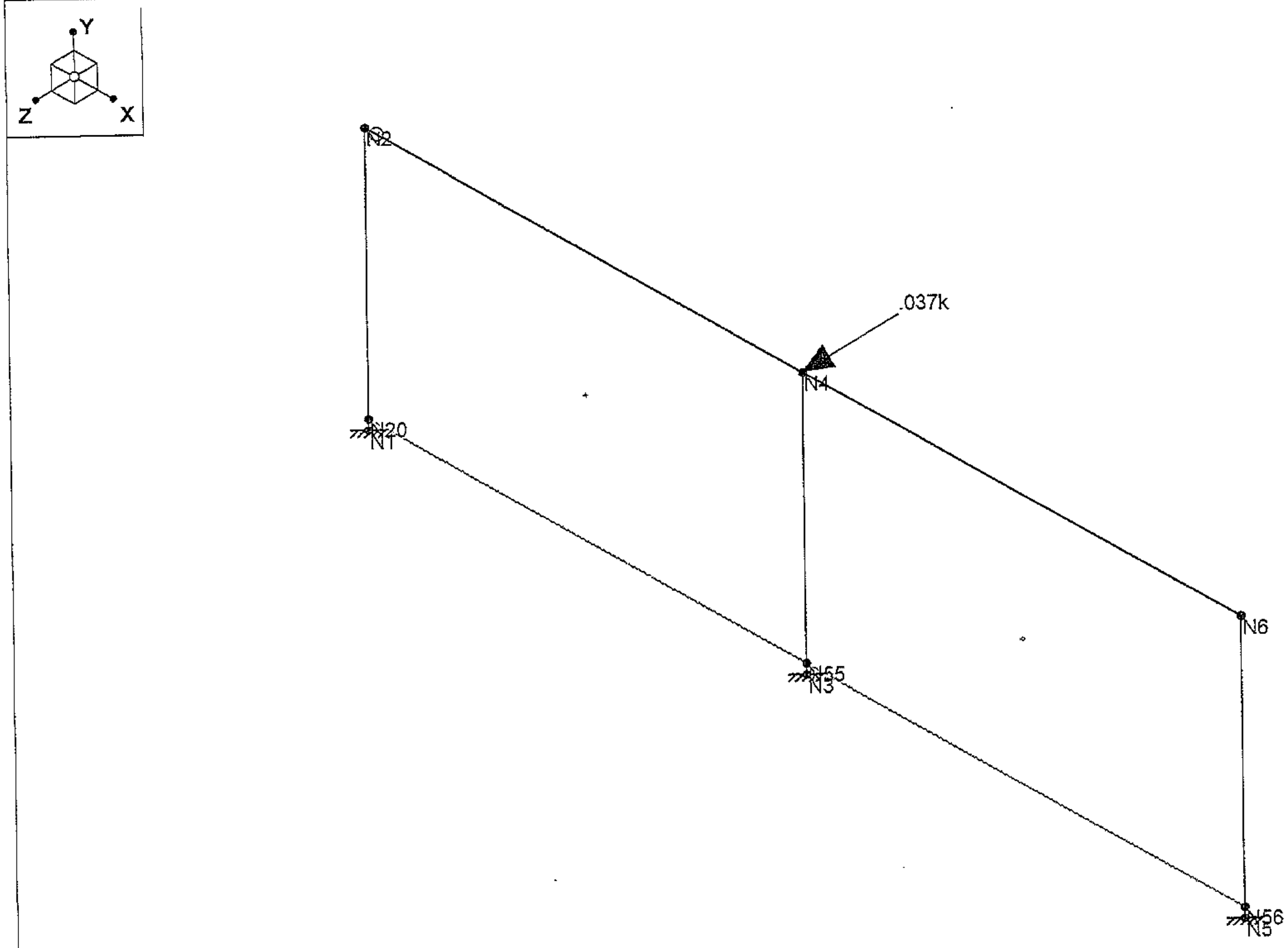
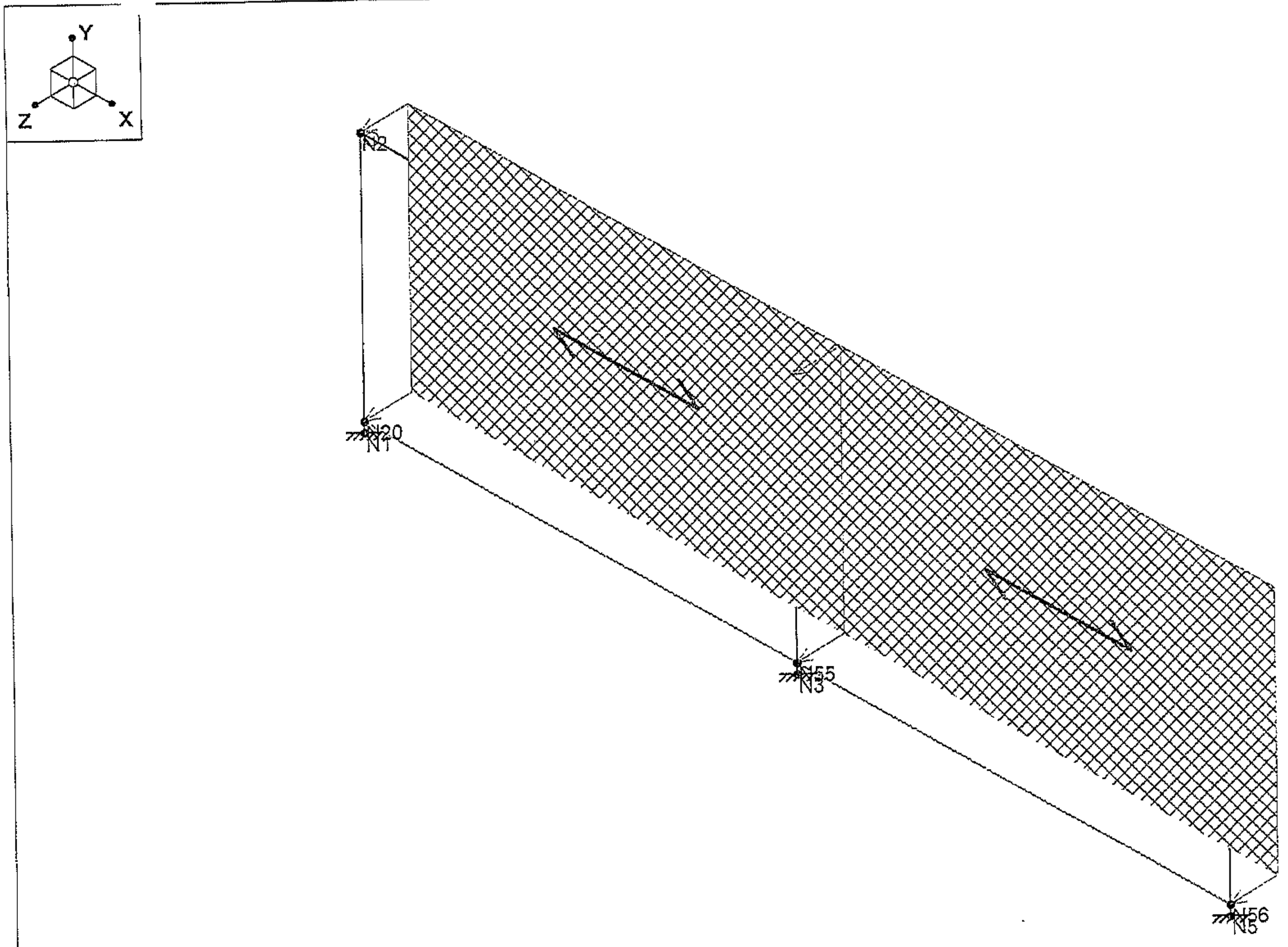
Eglass 217-1		3- Glass w-clip.r3d



Loads: BLC 5, Infill
Envelope Only Solution

PSEI	Glass W/ Clips	SK - 12
AF		Apr 6, 2017 at 12:09 PM
Eglass 217-1		3- Glass w-clip.r3d

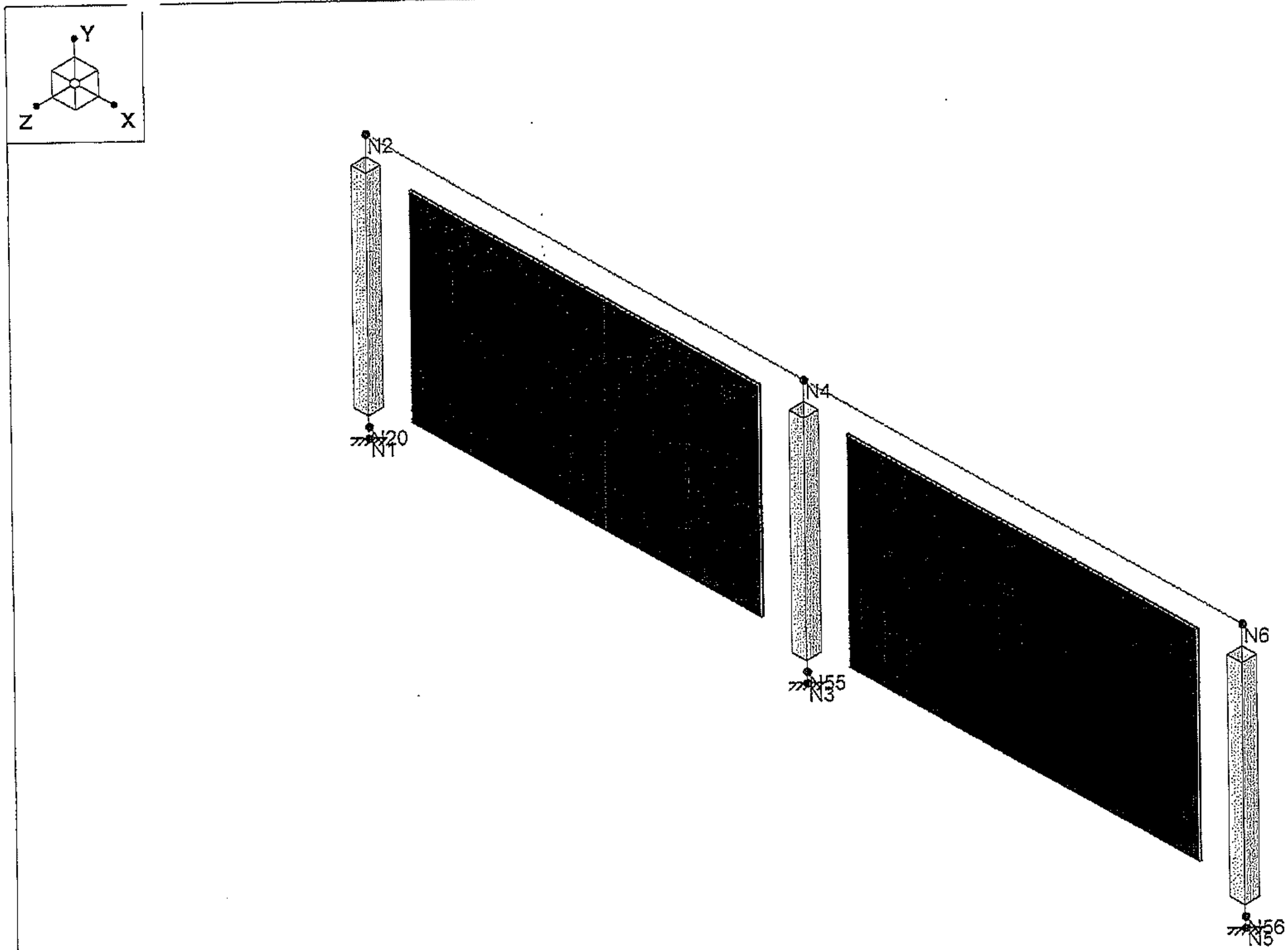
1021



Loads: BLC 6, Wind
Envelope Only Solution

PSEI	Glass W/ Clips	SK - 13
AF		Apr 6, 2017 at 12:09 PM
Eglass 217-1		3- Glass w-clip.r3d

1022



Envelope Only Solution

PSEI	Glass W/ Clips	SK - 14
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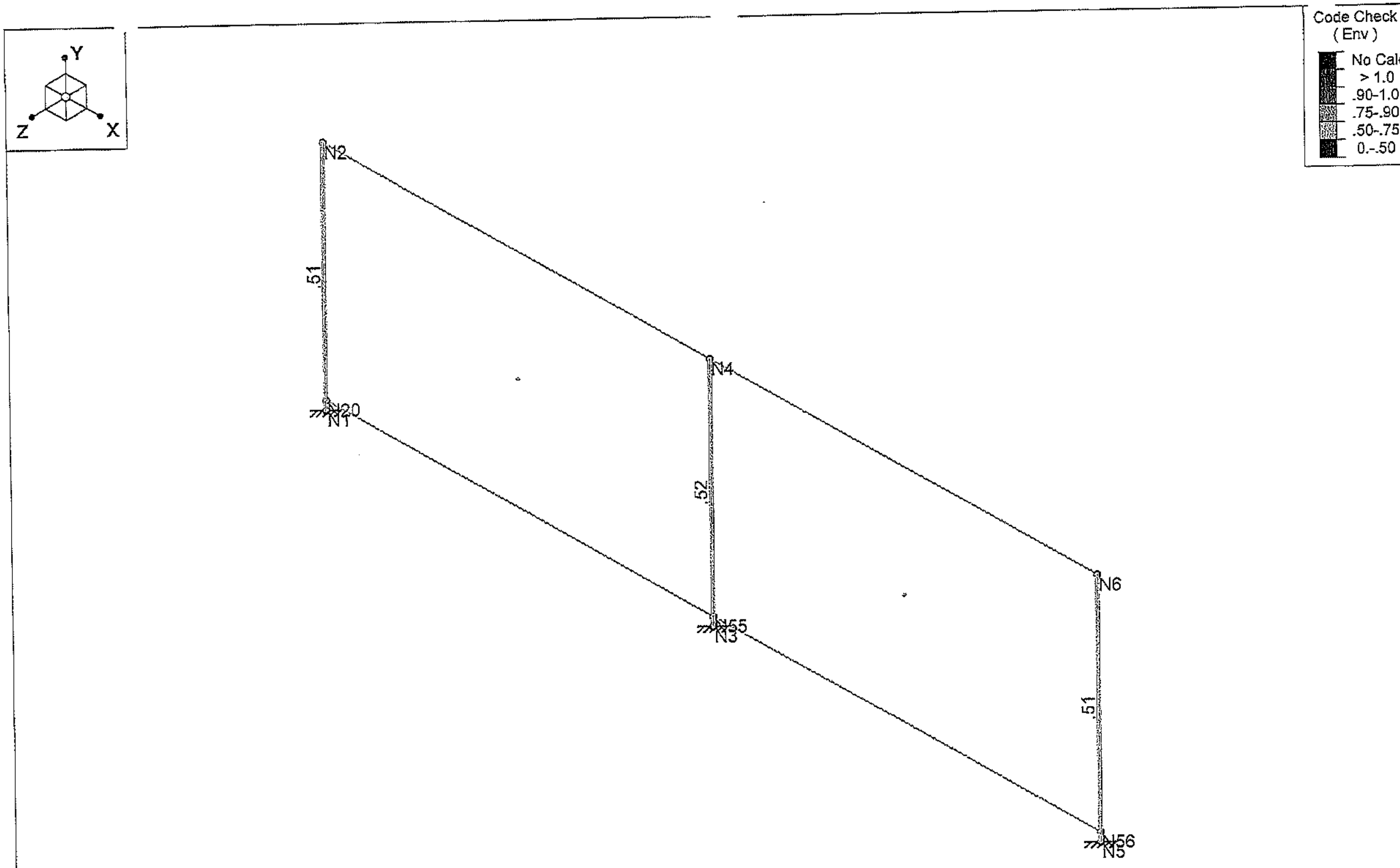
Eglass 217-1		3- Glass w-clip.r3d

1623



Member Code Checks Displayed (Enveloped)
Envelope Only Solution

PSEI	Glass W/ Clips	SK - 15
AF		Apr 6, 2017 at 12:09 PM
Eglass 217-1		3- Glass w-clip.r3d

1024

Hot Rolled Steel Properties

	Label	E [ksi]	G [ksi]	Nu	Therm (\1...	Density[k/ft^3]	Yield[ksi]	Ry	Fu[ksi]	Rt
1	A36 Gr.36	29000	11154	.3	.65	.49	36	1.5	58	1.2
2	A572 Gr.50	29000	11154	.3	.65	.49	50	1.1	65	1.1
3	A992	29000	11154	.3	.65	.49	50	1.1	65	1.1
4	A500 Gr.42	29000	11154	.3	.65	.49	42	1.4	58	1.3
5	A500 Gr.46	29000	11154	.3	.65	.49	46	1.4	58	1.3
6	316SS	28000	10732	.3	.65	.501	30	1.4	75	1.2

Aluminum Properties

	Label	E [ksi]	G [ksi]	Nu	Therm ...	Density...	Table B.4	kt	Ftu[ksi]	Fty[ksi]	Fcy[ksi]	Fsu[ksi]	Ct
1	3003-H14	10100	3787.5	.33	1.3	.173	Table B.4-1	1	19	16	13	12	141
2	6061-T6	10100	3787.5	.33	1.3	.173	Table B.4-2	1	38	35	35	24	141
3	6063-T5	10100	3787.5	.33	1.3	.173	Table B.4-2	1	22	16	16	13	141
4	6063-T6	10100	3787.5	.33	1.3	.173	Table B.4-2	1	30	25	25	19	141
5	5052-H34	10200	3787.5	.33	1.3	.173	Table B.4-1	1	34	26	24	20	141
6	6061-T6 W	10100	3787.5	.33	1.3	.173	Table B.4-1	1	24	15	15	15	141

Hot Rolled Steel Section Sets

	Label	Shape	Type	Design List	Material	Design...	A [in2]	Iyy [in4]	Izz [in4]	J [in4]
1	CABLE	3/16" Rod	HBrace	None	A36 Gr.36	Typical	.027	6e-5	6e-5	.00012

Aluminum Section Sets

	Label	Shape	Type	Design List	Material	Design Ru...	A [in2]	Iyy [in4]	Izz [in4]	J [in4]
1	POST	RT2X2X0.125	Column	Rectangular Tub...	6061-T6	Typical	.938	.552	.552	.824
2	TOP RAIL	RT1X1X0.095	Beam	Rectangular Tub...	6061-T6	Typical	.344	.048	.048	.07
3	BOTTOM RAIL	RT1X1X0.095	Beam	Rectangular Tub...	6061-T6	Typical	.344	.048	.048	.07

Joint Coordinates and Temperatures

	Label	X [ft]	Y [ft]	Z [ft]	Temp [F]	Detach From Diap...
1	N1	0	0	0	0	
2	N2	0	3	0	0	
3	N3	5	0	0	0	
4	N4	5	3	0	0	
5	N5	10	0	0	0	
6	N6	10	3	0	0	
7	N20	0	0.1125	0	0	
8	N55	5	0.1125	0	0	
9	N56	10	0.1125	0	0	

Joint Boundary Conditions

	Joint Label	X [k/in]	Y [k/in]	Z [k/in]	X Rot.[k-ft/rad]	Y Rot.[k-ft/rad]	Z Rot.[k-ft/rad]
1	N1	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
2	N3	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction
3	N5	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction

Hot Rolled Steel Design Parameters

Label	Shape	Length[ft]	Lbyy[ft]	Lbzz[ft]	Lcomp top[ft]	Lcomp bot[ft]	L-torqu...	Kyy	Kzz	Cb	Function
No Data to Print ...											

Aluminum Design Parameters

	Label	Shape	Length[ft]	Lbyy[ft]	Lbzz[ft]	Lcomp top[ft]	Lcomp bot[ft]	L-torqu...	Kyy	Kzz	Cb	Function
1	M1	POST	3			Lbyy						Lateral
2	M3	POST	3			Lbyy						Lateral
3	M5	POST	3			Lbyy						Lateral

Basic Load Cases

	BLC Description	Category	X Gra...	Y Gra...	Z Grav...	Joint	Point	Distrib...	Area(...	Surface(Plate/W...
1	Distributed load-y at the to...	None		-1				2		
2	Distributed load-X at the si...	None		-1				2		
3	Point load applied at the co...	None		-1		1				
4	Point load applied at the mi...	None		-1			1			
5	Infill	None				1				
6	Wind	None							2	
7	BLC 6 Transient Area Loads	None						4		

Load Combinations

	Description	Solve	PDelta	S...	BLC	Fact...	BLC	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...
1	Distributed load-y a...	Yes	Y		1	1																		
2	Distributed load-X ...	Yes	Y		2	1																		
3	Point load applied ...	Yes	Y		3	1																		
4	Point load applied ...	Yes	Y		4	1																		
5	Infill	Yes	Y		5	1																		
6	Wind	Yes	Y		6	1																		

Load Combination Design

	Description	ASIF	CD	ABIF	Service	Hot Rolled	Cold For...	Wood	Concrete	Masonry	Footings	Aluminum	Connecti...
1	Distributed l...					Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
2	Distributed l...					Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
3	Point load a...					Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
4	Point load a...					Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
5	Infill					Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
6	Wind					Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Joint Loads and Enforced Displacements (BLC 3 : Point load applied at the corner)

	Joint Label	L,D,M	Direction	Magnitude[(k,k-ft), (in,rad), (k...
1	N2	L	Z	.2

Joint Loads and Enforced Displacements (BLC 5 : Infill)

	Joint Label	L,D,M	Direction	Magnitude[(k,k-ft), (in,rad), (k...
1	N4	L	Z	.037

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	N1	max	.011	1	.144	1	0	1	0	1	0	1	0	5
2		min	0	5	0	5	-.263	6	-.5	2	0	1	-.001	1
3	N3	max	0	1	.233	1	0	1	0	1	.005	4	0	5
4		min	0	5	0	5	-.37	6	-.503	6	-.01	3	0	1
5	N5	max	0	5	.144	1	.031	3	0	1	.005	4	.001	1
6		min	-.011	1	0	5	-.263	6	-.5	2	-.01	3	0	5
7	Totals:	max	0	5	.522	1	0	1						
8		min	0	1	0	5	-.895	6						

Envelope Member Section Forces

	Member	Sec		Axial[k]	LC	y Shear[k]	LC	z Shear[k]	LC	Torque[...	LC	y-y Moment[...	LC	z-z Mo...	LC
1	M1	1	max	.144	1	0	5	0	1	0	1	.5	2	0	5
2			min	0	5	-.011	1	-.263	6	0	1	0	1	-.001	1
3		2	max	.01	1	0	1	0	1	0	1	.375	2	0	1
4			min	0	5	0	5	-.213	6	0	1	0	1	0	5
5		3	max	.009	1	0	1	0	1	0	1	.25	2	0	1
6			min	0	5	0	5	-.167	2	0	1	0	1	0	5
7		4	max	.008	1	0	1	0	1	0	1	.125	2	0	1
8			min	0	2	0	5	-.167	2	0	1	-.021	3	0	5
9		5	max	.008	1	0	1	0	1	0	1	.071	4	0	2
10			min	-.001	2	0	5	-.167	2	0	1	-.143	3	0	1
11	M2	1	max	0	5	.035	3	0	2	.143	3	0	1	0	1
12			min	-.02	1	-.167	2	-.139	1	-.071	4	0	1	0	1
13		2	max	0	5	.035	3	0	2	.143	3	0	2	.169	2
14			min	-.02	1	-.104	2	-.076	1	-.071	4	-.135	1	-.044	3
15		3	max	0	5	.035	3	0	2	.143	3	0	2	.26	2
16			min	-.02	1	-.042	2	-.014	1	-.071	4	-.191	1	-.088	3
17		4	max	0	5	.035	3	.049	1	.143	3	0	2	.273	2
18			min	-.02	1	-.039	6	0	5	-.071	4	-.169	1	-.133	3
19		5	max	0	5	.083	2	.111	1	.143	3	0	2	.208	2
20			min	-.02	1	-.039	6	0	5	-.071	4	-.069	1	-.177	3
21	M3	1	max	.004	1	0	2	.077	6	.005	4	0	1	0	2
22			min	-.002	2	0	1	-.167	2	-.01	3	-.039	6	0	1
23		2	max	.005	1	0	2	0	1	.005	4	0	1	0	2
24			min	0	2	0	1	-.167	2	-.01	3	-.125	2	0	1
25		3	max	.006	1	0	2	0	1	.005	4	0	1	0	1
26			min	0	5	0	1	-.167	2	-.01	3	-.25	2	0	2
27		4	max	.007	1	0	2	0	1	.005	4	0	1	0	1
28			min	0	5	0	1	-.271	6	-.01	3	-.375	2	0	2
29		5	max	.233	1	0	1	0	1	.005	4	0	1	0	5
30			min	0	5	0	5	-.37	6	-.01	3	-.503	6	0	1
31	M4	1	max	0	5	.039	6	0	5	.143	3	0	2	.208	2
32			min	-.02	1	-.084	4	-.111	1	-.071	4	-.069	1	-.167	3
33		2	max	0	5	.039	6	0	5	.143	3	0	2	.273	2
34			min	-.02	1	-.084	4	-.049	1	-.071	4	-.169	1	-.128	3
35		3	max	0	5	.116	4	.014	1	.143	3	0	2	.294	4
36			min	-.02	1	-.031	3	0	2	-.071	4	-.191	1	-.088	3
37		4	max	0	5	.116	4	.076	1	.143	3	0	2	.169	2
38			min	-.02	1	-.031	3	0	2	-.071	4	-.135	1	-.049	3
39		5	max	0	5	.167	2	.139	1	.143	3	0	5	.005	4
40			min	-.02	1	-.031	3	0	2	-.071	4	0	1	-.01	3
41	M5	1	max	.008	1	0	1	.028	3	.005	4	.071	4	0	1
42			min	-.001	2	0	5	-.167	2	-.01	3	-.143	3	0	5
43		2	max	.008	1	0	1	.028	3	.005	4	0	1	0	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[k]	LC	y Shear[k]	LC	z Shear[k]	LC	Torque[...	LC	y-y Moment[...	LC	z-z Mo...	LC
44			min	0	2	0	5	-.167	2	-.01	3	-.125	2	0	5
45		3	max	.009	1	0	1	.028	3	.005	4	0	1	0	5
46			min	0	5	0	5	-.167	2	-.01	3	-.25	2	0	1
47		4	max	.01	1	0	1	.028	3	.005	4	0	1	0	5
48			min	0	5	0	5	-.213	6	-.01	3	-.375	2	0	1
49		5	max	.144	1	0	5	.031	3	.005	4	0	1	.001	1
50			min	0	5	-.011	1	-.263	6	-.01	3	-.5	2	0	5

Envelope Member Section Deflections

	Member	S...		x [in]	LC	y [in]	LC	z [in]	LC	x Ro...	L...	(n) L/y Ratio	LC	(n) L/z Ratio	LC
1	M1	1	...	0	1	0	1	0	1	0	1	NC	1	NC	1
2			...	0	1	0	1	0	1	0	1	NC	1	NC	1
3		2	...	0	5	0	1	.051	2	0	1	NC	1	NC	1
4			...	0	1	0	5	0	1	0	1	NC	1	708.068	2
5		3	...	0	5	0	1	.183	2	0	1	NC	1	NC	1
6			...	0	1	0	5	0	1	0	1	NC	1	196.297	2
7		4	...	0	5	0	1	.37	2	0	1	NC	1	NC	1
8			...	0	1	0	5	0	1	0	1	NC	1	97.183	2
9		5	...	0	5	0	1	.585	2	0	1	NC	1	NC	1
10			...	0	1	0	1	0	1	0	1	NC	1	61.568	2
11	M2	1	...	0	1	.585	2	0	1	2.42...	2	NC	1	NC	1
12			...	0	1	0	1	0	5	0	1	NC	1	NC	1
13		2	...	0	1	.585	2	0	1	2.42...	2	NC	1	NC	1
14			...	0	1	0	1	0	5	0	1	NC	1	NC	1
15		3	...	0	1	.585	2	0	1	2.42...	2	NC	1	NC	1
16			...	0	1	0	1	0	5	0	1	NC	1	NC	1
17		4	...	0	1	.585	2	0	1	2.42...	2	NC	1	NC	1
18			...	0	1	0	1	0	5	0	1	NC	1	NC	1
19		5	...	0	1	.585	2	0	1	2.42...	2	NC	1	NC	1
20			...	0	1	0	1	0	5	0	1	NC	1	NC	1
21	M3	1	...	0	1	0	1	0	1	7.08...	4	NC	1	NC	1
22			...	0	5	0	1	-.585	2	-1.4...	3	NC	1	61.568	2
23		2	...	0	1	0	1	0	1	5.31...	4	NC	1	NC	1
24			...	0	5	0	1	-.37	2	-1.0...	3	NC	1	97.183	2
25		3	...	0	1	0	1	0	1	3.54...	4	NC	1	NC	1
26			...	0	5	0	1	-.183	2	-7.0...	3	NC	1	196.297	2
27		4	...	0	1	0	1	0	1	1.77...	4	NC	1	NC	1
28			...	0	5	0	1	-.051	2	-3.5...	3	NC	1	708.068	2
29		5	...	0	1	0	1	0	1	0	1	NC	1	NC	1
30			...	0	1	0	1	0	1	0	1	NC	1	NC	1
31	M4	1	...	0	1	.585	2	0	1	2.42...	2	NC	1	NC	1
32			...	0	1	0	1	0	5	0	1	NC	1	NC	1
33		2	...	0	1	.585	2	0	1	2.42...	2	NC	1	NC	1
34			...	0	1	0	1	0	5	0	1	NC	1	NC	1
35		3	...	0	1	.585	2	0	1	2.42...	2	NC	1	NC	1
36			...	0	1	0	1	0	5	0	1	NC	1	NC	1
37		4	...	0	1	.585	2	0	1	2.42...	2	NC	1	NC	1
38			...	0	1	0	1	0	5	0	1	NC	1	NC	1
39		5	...	0	1	.585	2	0	1	2.42...	2	NC	1	NC	1
40			...	0	1	0	1	0	5	0	1	NC	1	NC	1
41	M5	1	...	0	1	0	1	0	1	7.08...	4	NC	1	NC	1
42			...	0	5	0	1	-.585	2	-1.4...	3	NC	1	61.568	2
43		2	...	0	1	0	5	0	1	5.31...	4	NC	1	NC	1
44			...	0	5	0	1	-.37	2	-1.0...	3	NC	1	97.183	2
45		3	...	0	1	0	5	0	1	3.54...	4	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	S...		x [in]	LC	y [in]	LC	z [in]	LC	x Ro...	L...	(n) L/y Ratio	LC	(n) L/z Ratio	LC
46			...	0	5	0	1	-.183	2	-7.0...	3	NC	1	196.297	2
47		4	...	0	1	0	5	0	1	1.77...	4	NC	1	NC	1
48			...	0	5	0	1	-.051	2	-3.5...	3	NC	1	708.068	2
49		5	...	0	1	0	1	0	1	0	1	NC	1	NC	1
50			...	0	1	0	1	0	1	0	1	NC	1	NC	1

Envelope AA ADM1-10: ASD - Building Aluminum Code Checks

	Member	Shape	Code C...	Loc[ft]	LC	Shear ...	Loc[ft]	Dir	LC	Pnc/O...	Pnt/Om...	Mny/O...	Mnz/O...	Vny/O...	Vnz/O...	Cb	Eqn
1	M1	RT2X2X0..	.512	0	2	.051	0	z	6	13.449	18.279	.976	.976	5.17	5.17	1	H.1-1
2	M3	RT2X2X0..	.515	3	6	.072	2.906	z	6	13.449	18.279	.976	.976	5.17	5.17	1	H.1-1
3	M5	RT2X2X0..	.512	3	2	.051	2.906	z	6	13.449	18.279	.976	.976	5.17	5.17	1	H.1-1

Glass Load Resistance Report -- 6030

Wednesday, April 5, 2017

Glazing Information

Edge Supports: 2 Sides
Glazing Angle: 90°
Lite Dimensions:
Unsupported Length: 60.0 in.
Supported Length: 36.0 in.

Project Details

Project Name:
Location:
Comments:

Glass Construction (Rectangular)

Single Glazed Lite

Glass Type: Fully Tempered
Nominal Thickness: 5/16 in.

Short Load Duration, Resistance, and Deflection Data

Load (~ 3 sec.):	31.0 psf
Load Resistance:	43.7 psf
Approximate center of glass deflection:	1.68 in.

Long Load Duration, Resistance, and Deflection Data

Load (~ 30 days):	13.2 psf
Load Resistance:	32.8 psf
Approximate center of glass deflection:	0.72 in.

Conclusion

Based on your design information, the load resistance is greater than or equal to the specified loading.

Statement of Compliance

Procedures followed in determining the resistance of this window glass are in accordance with ASTM E1300-09/12.

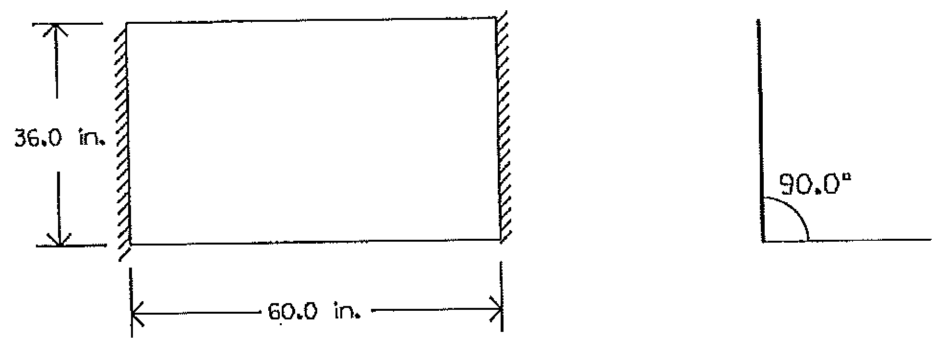
Disclaimer:
This software can be used to determine the load resistance of specified glass types exposed to uniform lateral loads of short or long duration subject to the following conditions:
- The glass is free of edge and surface damage and has been properly glazed in the opening in conformance with the manufacturer's recommendations.
- Procedures exist to determine load resistance for rectangular glass assemblies that are:
  a. Continuously supported along all four edges,
  b. Continuously supported along three edges,
  c. Continuously supported along two parallel edges, and
  d. Continuously supported along one edge.
- The software user has the responsibility of selecting the correct procedures for the required application from the software.
- The stiffness of members supporting any glass edge shall be sufficient that under design load, edge deflections shall not exceed L/175, where L denotes that length of the supported edge.
- The manufacturer states that the Safety Plus II 0.090 Polyurethane Large Missile Resistant Interlayer is comparable to the PVB interlayer.

For other limiting conditions that may apply, refer to Section 5 of ASTM E1300 and local building codes.

Prepared by: ______________________ on 4/5/2017

Details Report --

Lite Sketch



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Tel (541) 858-8500

www.structure1.com • Email: info@structure1.com

PROJECT NO. Eglass 219-1 SHEET 1032 OF ______

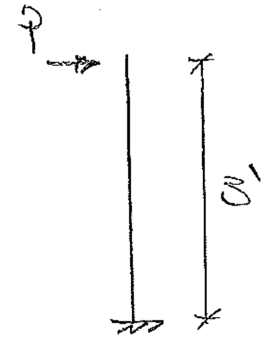
PROJECT NAME ______ DESIGNED BY YAS DATE ______

SUBJECT ______ CHECKED BY ______ DATE ______

Max load @ the Top of post is due to the 50 lb/ft distributed load

$P = 50(lb/ft) * \text{post spacing}$

$= 50 * 5 = 250 \text{ lb}$



Max moment @ support $= 250^{lb} * 3(ft)$

$= 750 \text{ lb.ft}$

Max shear @ support $= 250^{lb}$

PSE Consulting Engineers, Inc.
250 Main St. Suite A
Klamath Falls, OR 97601
P: 541-850-6300 F:541-850-6233
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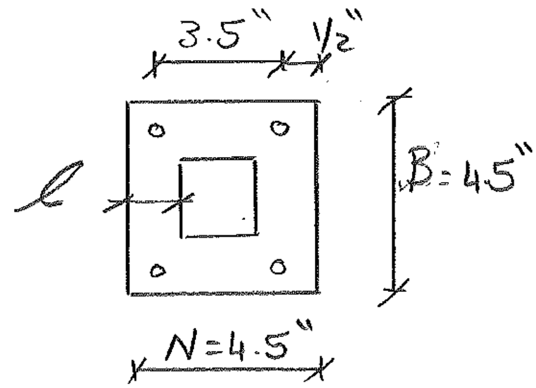
2nd office Location
836 Mason Way
Medford, OR 97501
P:541-858-8500 F: 541-776-463
Email: info@structure1.com

Project No: Eglass 217-1
Project Name:
Subject:

SHEET # ______ OF ______
DESIGNED BY AF DATE ______
CHECKED BY ______ DATE ______

① Deck mount

Base plate Design



Moment @ base = 250 lb * 3'

= 750 lb.ft

Base plate thickness = t

$$t \geq \ell \sqrt{\frac{3.33P}{BNf_y}}$$, P = Axial load

P = 0.304 lb (page 1011)

$$t \geq 1.0625" \sqrt{\frac{304 * 10^{-3} * 3.33}{4.5 * 4.5 * 24}} = 0.045"$$

use Aluminum Alloy 384, (ADC12, f_y = 24 Ksi)

use $[4\frac{1}{2}" * 4\frac{1}{2}" * \frac{3}{8}"]$

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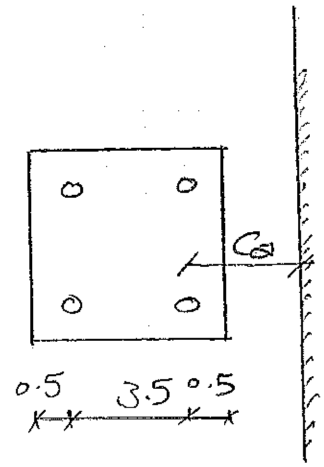
PROJECT NO. Eglass 717-1 SHEET 2001 OF ______

PROJECT NAME ______ DESIGNED BY AF DATE ______

SUBJECT ______ CHECKED BY ______ DATE ______

Base plate to Concrete

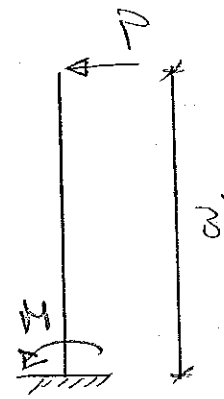
use ITW Redhead trubolt wedge
Anchor strength based on ESR-2427



$f'_c = 3000\ psi$
bolt spacing = 3"
bolt size = 3/8" , hef = 4"
Edge distance = 3" = Ca

$P = 50(lb/ft) * 5 = 250\ lb$

$M = 250(lb) * 3 = 750\ lb\text{-}ft$



$Tension/2\ bolts = \frac{750^{lb\cdot ft} * 12}{4.0} = 2{,}250^{lb}/2\ bolts$

$shear/2\ bolts = 250\ lb$

$T/bolt = \frac{2250}{2} = 1{,}125^{lb}$

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PROJECT NO. Egless 217-1 SHEET 2002 OF

PROJECT NAME DESIGNED BY AF DATE

SUBJECT CHECKED BY DATE

Check Concrete breakout strength

$$N_{cbg} = \frac{A_{NC}}{A_{NCo}} \psi_{ecN} \cdot \psi_{edN} \cdot \psi_{cN} \cdot \psi_{cpN} \cdot N_b$$

$$A_{NC} = (3 + 3.5 + 1.5*4)^2 = 156.25 \text{ in}^2$$

$$A_{NCo} = 9 h_{ef}^2 = 9*4^2 = 144 \text{ in}^2$$

$$\psi_{ecN} = \frac{1}{1 + \frac{2*1.5}{3*4}} = 0.8$$

$$\psi_{edN} = 0.7 + 0.3 * \frac{3}{1.5*4} = 0.85$$

$$\psi_{cN} = 1.4$$

$$\psi_{cp,N} = 1$$

$$N_b = 17 * 1 \sqrt{3000} * 4^{1.5} = 7449 \text{ lb}$$

$$N_{cbg} = \frac{156.25}{144} * 0.8 * 0.85 * 1.4 * 7449 = 7{,}695 \text{ lb}$$

2-3/8" φ shear capacity = 2*4200 = 8400 lb

∴ Concrete breakout controls (7695 < 8400)

Allowable Tension load = 0.65 * 7695 / 1.6 = 3126 lb

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PROJECT NO. Egless 217-1 SHEET 2003 OF ______

PROJECT NAME ______ DESIGNED BY A.F DATE ______

SUBJECT ______ CHECKED BY ______ DATE ______

Check shear strength of Concrete

$$V_{cbg} = \frac{A_{vc}}{A_{vco}} \psi_{ec} \cdot \psi_{ed} \cdot \psi_c \cdot \psi_h \cdot V_b$$

$$A_{vco} = 4.5(3)^2 = 40.5 \text{ in}^2$$

$$A_{vc} = (2*1.5*3+3.5)*4 = 50 \text{ in}^2$$

$$\psi_{ec} = \frac{1}{1+\frac{2*1.5}{3*3}} = 0.75$$

$$\psi_{ed} = 0.7+0.3*\frac{3}{1.5*3} = 0.9$$

$$\psi_{cv} = 1.0$$

$$\psi_h = \sqrt{\frac{1.5*3}{4}} = 1.06$$

$$V_b = 8*\left(\frac{4}{3/8}\right)^{0.2}\sqrt{3/8} *1*\sqrt{3000}*3^{1.5} = 2238 \text{ lb}$$

$$V_{cb} = \frac{50}{40.5}*0.75*0.9*1.06*2238 = 1{,}978 \text{ lb}$$

$2-\frac{3}{8}"\phi$ shear capacity $= 2*1830 = 3660$ lb

ESR-2427 Table 4

Allowable shear strength $= 0.7*1978/1.6 = 865$ lb

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PROJECT NO. Eglass 217-1 SHEET 2004 OF ______

PROJECT NAME ______ DESIGNED BY AF DATE ______

SUBJECT ______ CHECKED BY ______ DATE ______

- Tension utility = $\frac{2571}{3126}$ = 0.89

- shear utility = $\frac{250}{865}$ = 0.29 > 0.2

Tension shear interaction

0.89 + 0.3 = 1.19 < 1.2 (ok)

use [4 - $\frac{3}{8}$" ϕ Red head ITW or LDT
w/min. 4" Embed, 3" edge dist.
fc' ≮ 3000]

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PROJECT NO. Eg1285 217-1 SHEET 2004A OF ______

PROJECT NAME ______ DESIGNED BY VAF DATE ______

SUBJECT ______ CHECKED BY ______ DATE ______

Base plate to wood

wood specific weight = 0.5

Tension: $\frac{M}{d} = \frac{50 \text{ lb/ft} * 5' * 36''}{4.0''} = 2,250 \text{ lb}$

Adjustment for wood bearing

$C_b = (4.5'' + 0.375)/4.5'' = 1.083$

$a = \frac{2,250}{1.083 * 625 \text{ psi} * 4.5''} = 0.738$

Tension $= T = \frac{50 \text{ lb/ft} * 5' * 36''}{(4 - \frac{0.738}{2})} = 2479 \text{ lb}$

$\frac{3}{8}''$ ⌀ lag screw w/ 4" min Embed tension

Capacity $= 305^{lb} * 4'' = 1220^{lb} * 1.6 = 1952^{lb}$

C_d factor ↑

2-lag screws capacity $= 2 * 1952 = 3904 \text{ lb} > 2479 \text{ lb}$

use [4 - $\frac{3}{8}''$ lag screws w/ 4" min Embed]

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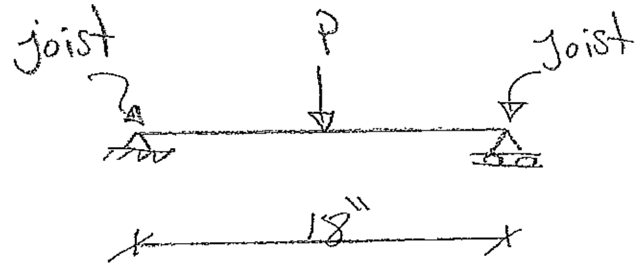
PROJECT NO. Eglass 217-1 SHEET 2004B OF ______

PROJECT NAME ______ DESIGNED BY AF DATE ______

SUBJECT ______ CHECKED BY ______ DATE ______

Base plate to wood

P = 2479 lb



use blocking [2 - 2*8 w/ 4 - $\frac{3}{8}$" ϕ - Lag screws]

WoodWorks® SOFTWARE FOR WOOD DESIGN	COMPANY May 14, 2020 12:24	PROJECT Stainless cable & Railing 217-1 AF 2020-05-14 wood block.wwb

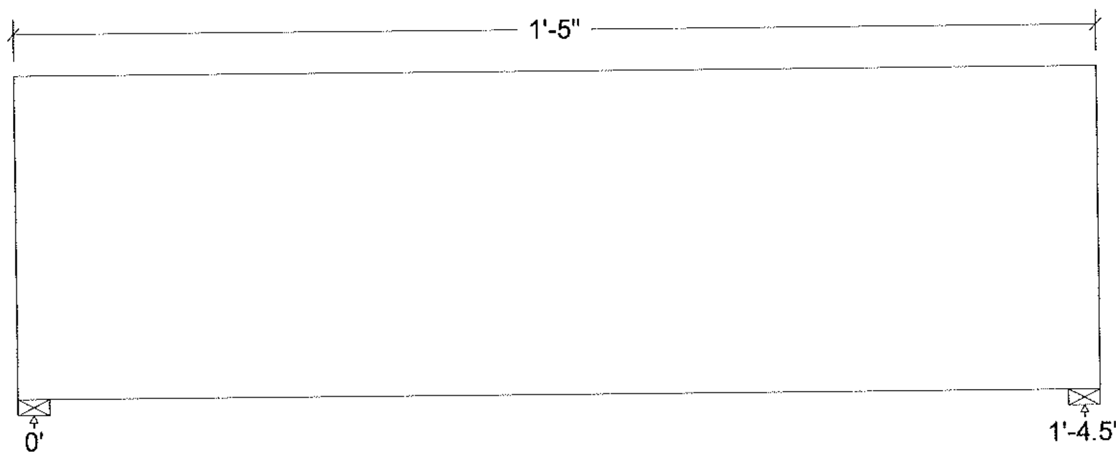
Design Check Calculation Sheet

WoodWorks Sizer 11.1

Loads:

Load	Type	Distribution	Pat-tern	Location [ft] Start	End	Magnitude Start	End	Unit
Load1	Dead	Point		0.83		-2479		lbs
Self-weight	Dead	Full UDL				7.7		plf

Maximum Reactions (lbs), Bearing Capacities (lbs) and Bearing Lengths (in) :



Unfactored:			
Dead	5		5
Factored:			
Uplift	-1009		-1460
Total	5		5
Bearing:			
Capacity			
Beam	2266		2266
Support	2266		2266
Des ratio			
Beam	0.00		0.00
Support	0.00		0.00
Load comb	#1		#1
Length	0.50*		0.50*
Min req'd	0.50*		0.50*
Cb	1.00		1.00
Cb min	1.00		1.00
Cb support	1.00		1.00
Fcp sup	625		625

*Minimum bearing length setting used: 1/2" for end supports

Lumber n-ply, D.Fir-L, No.2, 2x8, 3-ply (4-1/2"x7-1/4")

Supports: All - Timber-soft Beam, D.Fir-L No.2

Total length: 1'-5.0"; Clear span: 1'-4.0"; volume = 0.3 cu.ft.

Lateral support: top= at supports, bottom= at supports; Oblique angle: 90.0 deg; Repetitive factor: applied where permitted (refer to online help);

Analysis vs. Allowable Stress and Deflection using NDS 2015 :

Criterion		Analysis Value	Design Value	Unit	Analysis/Design
Shear	x-x	fv = 0	Fv' = 162	psi	fv/Fv' = 0.00
	y-y	fv = 67	Fv' = 162	psi	fv/Fv' = 0.42
Bending(-)	x-x	fb = 0	Fb' = 1118	kip-ft	fb/Fb' = 0.00
	y-y	fb = 1210	Fb' = 1285	kip-ft	fb/Fb' = 0.94
Live Defl'n		negligible			
Total Defl'n		-0.03 = L/486	0.07 = L/240	in	0.49

Additional Data:

FACTORS:	F/E(psi)	CD	CM	Ct	CL	CF	Cfu	Cr	Cfrt	Ci	Cn	LC#
Fvy'	180	0.90	1.00	1.00	-	-	-	-	1.00	1.00	-	1
Fby'-	900	0.90	1.00	1.00	1.000	1.200	1.15	1.15	1.00	1.00	-	1
Fcp'	625	-	1.00	1.00	-	-	-	-	1.00	1.00	-	-
E'	1.6 million		1.00	1.00	-	-	-	-	1.00	1.00	-	1
Emin'	0.58 million		1.00	1.00	-	-	-	-	1.00	1.00	-	1

CRITICAL LOAD COMBINATIONS:

```
Shear     : LC #1  = D only, V max =   1464, V design =   1464 lbs
Bending(-): LC #1  = D only, M =    822 lbs-ft
Deflection: LC #1  = D only  (total)
D=dead L=live S=snow W=wind I=impact Lr=roof live Lc=concentrated E=earthquake
All LC's are listed in the Analysis output
Load combinations: ASCE 7-10 / IBC 2015
```

CALCULATIONS:

```
Deflection: EIy =   9.79e06 lb-in2
"Live" deflection = Deflection from all non-dead loads (live, wind, snow…)
Total Deflection = 1.50(Dead Load Deflection) + Live Load Deflection.
Lateral stability(-):   b = full member width
```

Design Notes:

1. WoodWorks analysis and design are in accordance with the ICC International Building Code (IBC 2015), the National Design Specification (NDS 2015), and NDS Design Supplement.
2. Please verify that the default deflection limits are appropriate for your application.
3. Sawn lumber bending members shall be laterally supported according to the provisions of NDS Clause 4.4.1.
4. BUILT-UP BEAMS: it is assumed that each ply is a single continuous member (that is, no butt joints are present) fastened together securely at intervals not exceeding 4 times the depth and that each ply is equally top-loaded. Where beams are side-loaded, special fastening details may be required.
5. FIRE RATING: Joists, wall studs, and multi-ply members are not rated for fire endurance.

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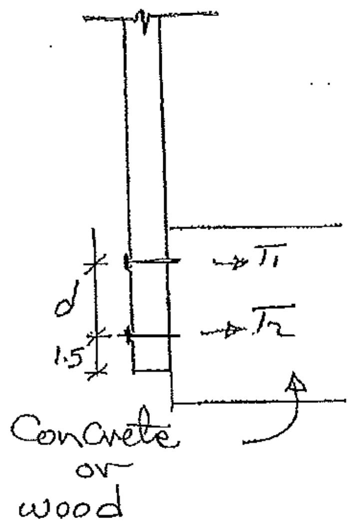
PROJECT NO. Egless 217-1 SHEET 2004 E OF
PROJECT NAME DESIGNED BY HF DATE
SUBJECT Fascia mount CHECKED BY DATE

post is directly attached with no bracket



* with Concrete

$\frac{3}{8}$ ϕ red head ITW

Allowable Tension load/bolt =

$0.65 * \frac{4200}{1.6}$ lb

= 1706 lb

Applied Tension = $\frac{M}{d}$

# of bolts to resist = 1.0

$\frac{M}{d} \ngtr 1706$ lb

$\frac{750\,(lb/ft) * 12}{d} = 1706$ lb

d = 5.27"

∴ spacing between anchors is 7"

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PROJECT NAME DESIGNED BY AF DATE

SUBJECT Fascia Mount CHECKED BY DATE

∴ use [2 - 1/2" redhead ITW or LDT
7" apart w/min 4" Embed.
post to extend 1.5" below bottom anchor
f'c ≮ 2500 psi, Concrete member
thickness ≮ 3"]

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PROJECT NO. Eglass 217-1 SHEET 2004G OF ______

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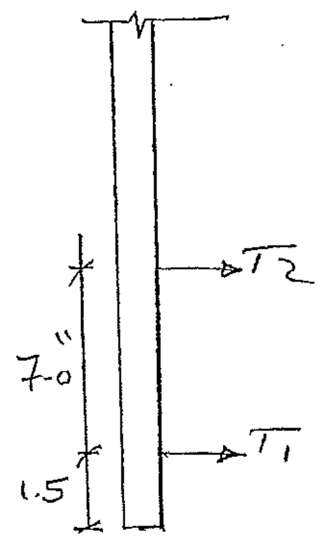
SUBJECT Fascia Mount CHECKED BY ______ DATE ______

* with wood

d = 7" (spacing between lag screws)



M @ bottom of post = 875 lb. ft

Resisting moment = $T_1 * 1.5 + T_2 * 8.5$

$T_1 = T_2 * \frac{1.5}{8.5}$

∴ Resisting moment = $1.5 * \frac{1.5}{8.5} * T_2 + 8.5 T_2$

$= 8.76\, T_2$ (in. load)

for equilibrium = M = resisting moment

750 (lb-ft) * 12 = $8.76 T_2$

∴ T_2 = 1027 lb

∴ Embed. length = $\frac{T}{\text{withdrawl capacity}}$

$= \frac{1027}{305 * 1.6} = 2.1$

Capacity of 3/8" screw

∴ use [2 - 3/8" φ lag screws, 7" apart w/min 4" Emb.]

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DECK AND FASCIA MOUNT ANALYSIS & DESIGN:

Pages 2,000 - 2,999

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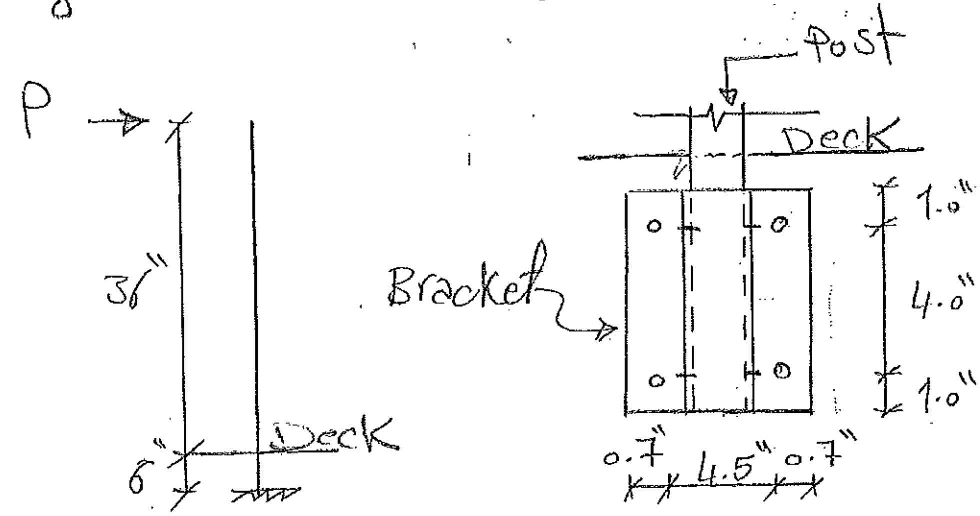
PROJECT NO: Eglass 217-1 SHEET 2005 OF ______
PROJECT NAME ______ DESIGNED BY AF DATE ______
SUBJECT ______ CHECKED BY ______ DATE ______

Fascia mount bracket.

Post $2\frac{3}{8}" * 2\frac{3}{8}" * 0.125$ (3' height, 5' apart)



$P = 50\,(lb/ft) * 5 = 250\ lb$

$M = 250\ lb * \frac{42"}{12} = 875\ lb.ft$

Max Tension $= \frac{875}{\frac{(4+1)}{12}} = 2100\ lb$

Shear on bolts = 304 lb

use [2- #10 Tek screws to hold post inplace]

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PROJECT NAME DESIGNED BY AF DATE
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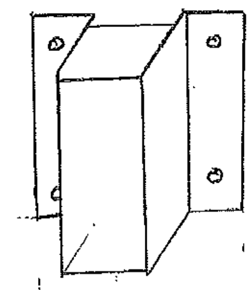
Bracket Design

Material: Aluminum 606

thickness: 3/16"

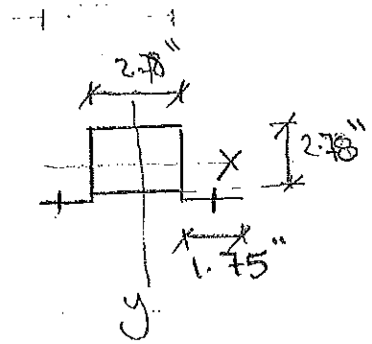


Section properties:

$A = 2.78\ in^2$

$I_{xx} = 3.913\ in^4$ $S_{xx} = 1.981\ in^3$

$I_{yy} = 5.453\ in^4$ $S_{yy} = 1.846\ in^3$



$F_t = 15\ Ksi$ (ADM, Table 2-24)

Bracket Bending Capacity $= F_t * S$

$= 15\ Ksi * 1.981\ in^3$

$= 29.7$ in. Kip

$= 2.475$ Kip.ft

∴ Allowable moment on bracket $= 2.475$ Kip.ft

> 875 lb.ft

(OK)

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SUBJECT ______ CHECKED BY ______ DATE ______

* check Anchors = wood deck

Tension on 2 lag screws = 2100 lb

withdrawl capacity of 3/8" lag screws = 243 lb/in
(NDS table 12.2.A)

C_d = 1.6 (Adjustments)

withdraw capacity = 243 (lb/in) * 1.6 = 388.8 lb/in

Embed length = $\frac{2100}{2 * 388.8}$ (lb/2 bolts) = 2.7 in

use [4 - $\frac{3}{8}$" ⌀ lag screws, w/ 4" min Embed]

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PROJECT NO. Eglass 217-1 SHEET 2008 OF ____
PROJECT NAME ____ DESIGNED BY AF DATE ____
SUBJECT ____ CHECKED BY ____ DATE ____

* Check Anchors - Concrete deck

Tension / 2 bolts = 2100 lb

∴ Tension / bolt = $\frac{2100}{2}$ = 1050 lb

Shear / 4 bolts = 304 lb (RISA output, Page 1011)

Shear / bolt = $\frac{304}{4}$ = 76 lb (Negligible)

* Concrete breakout strength ACI 318-14

$N_{cbg} = \frac{A_{NC}}{A_{NCo}} \psi_{ec,N} \cdot \psi_{ed,N} \cdot \psi_{c,N} \cdot \psi_{cp,N} \cdot N_b$ (17.4.2.1-b)

$A_{NC} = (C_{a1} + S_1 + 1.5h_{ef}) * 2 * 1.5h_{ef}$

$= (2.5 + 4.5 + 1.5*3) * 2 * 1.5 * 3 = 103.5 \text{ in}^2$

$A_{NCo} = 9h_{ef}^2 = 9 * 3^2 = 81 \text{ in}^2$

$\psi_{ec,N} = \frac{1}{\left(1 + \frac{2e'_N}{3h_{ef}}\right)} = \frac{1}{1 + \frac{2*4.5/2}{3*3}} = 0.66$

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PROJECT NO. Egl288 217-1 SHEET 2009 OF ______
PROJECT NAME ______ DESIGNED BY AF DATE ______
SUBJECT ______ CHECKED BY ______ DATE ______

$$\psi_{ed,N} = 0.7 + 0.3 \frac{C_a}{1.5 h_{ef}}$$

$$= 0.7 + 0.3 * \frac{2.5}{1.5*3} = 0.866$$

$$\psi_{c,N} = 1.4$$

$$\psi_{cp,N} = 1.0$$

$$N_b = K_c \lambda_a \sqrt{f_c'} \cdot h_{ef}^{1.5}$$

$$= 17 * \sqrt{2500} * 4^{1.5} = 6800 \text{ lb}$$

$$N_{cbg} = \frac{108.5}{81} * 0.66 * 0.866 * 1.4 * 1 * 6800 = 6952 \text{ lb}$$

$\frac{3}{8}$" ϕ bolt tension capacity = 4200 lb
(ESR-2427, table 3)

Tensile strength of 2 bolts = 2*4200 = 8400 lb > 6952 lb

∴ Concrete breakout strength = 6952 lb

$$\text{Allowable Tension load} = 0.65 * \frac{6952}{1.6} = 3012 \text{ lb} > 2100 \text{ lb}$$

(OK)

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PROJECT NO. Eylers 212.1 SHEET 2010 OF ______

PROJECT NAME ______ DESIGNED BY AF DATE ______

SUBJECT ______ CHECKED BY ______ DATE ______

∴ use :

[4 - 3/8" φ Red head ITW or LDT
w/min 4" Embed , & 3" Edge distance
f'c ≮ 2500 psi]

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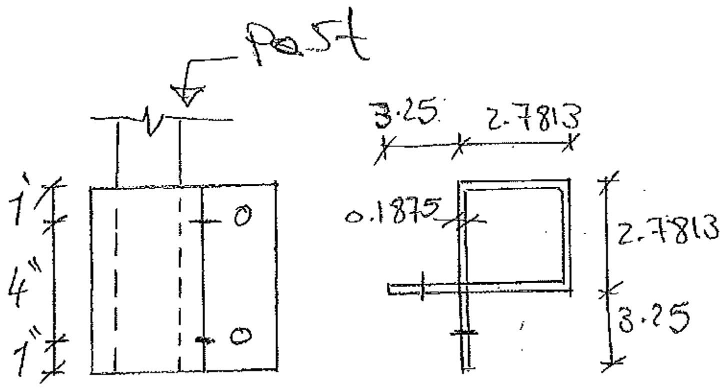
PROJECT NO: Eglass 217-1 SHEET 2071 OF ______

PROJECT NAME ______ DESIGNED BY AF DATE ______

SUBJECT ______ CHECKED BY ______ DATE ______

Corner fascia bracket



Shape properties:

Area = 3.28 in^2

$I_x = I_y = 8.584$

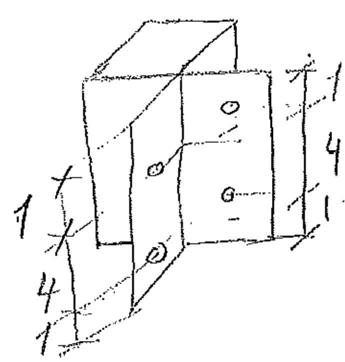
$S_x = S_y = 2.067$ in^3

$F_t = 15$ Ksi

Bracket bending capacity = $F_t * S$
= 15 Ksi * 2.067
= 31.0 in.Kip
= 2.5 Kip.ft

Max applied moment = 200 lb * 42"/12 = 700 lb.ft

Bracket bending capacity = 2.5 kip.ft > 0.7 Kip.ft



2012

Company :
Designer :
Job Number :

Jun 30, 2017
13:29 PM
Checked By:______

Section Properties: Section1_1.dxf

Section Information:

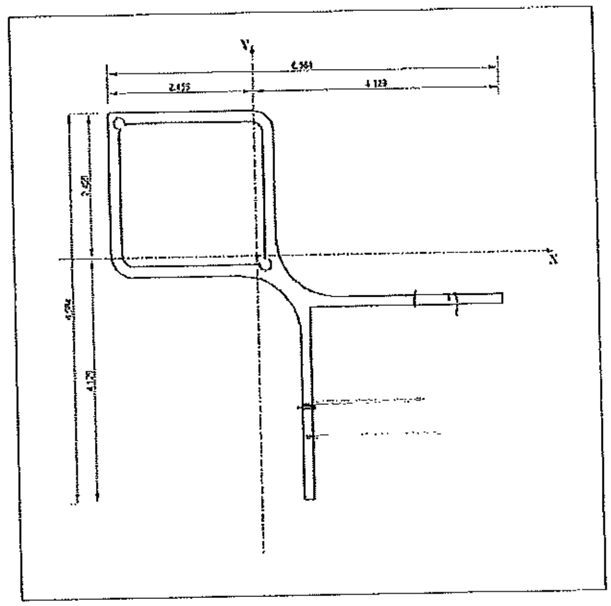
Material Type	=	General	
Shape Type	=	Arbitrary	
Number of Shapes	=	1	

Basic Properties:

Total Width	=	6.584	in
Total Height	=	6.584	in
Centroid, Xo	=	1.599	in
Centroid, Yo	=	-2.033	in
X-Bar (Right)	=	4.129	in
X-Bar (Left)	=	2.455	in
Y-Bar (Top)	=	2.455	in
Y-Bar (Bot)	=	4.129	in
Max Thick	=	6.584	in

Equivalent Properties:

Area, Ax	=	3.283	in^2
Inertia, Ixx	=	8.534	in^4
Inertia, Iyy	=	8.534	in^4
Inertia, Ixy	=	-4.405	in^4
Sx (Top)	=	3.476	in^3
Sx (Bot)	=	2.067	in^3
Sy (Left)	=	3.476	in^3
Sy (Right)	=	2.067	in^3
rx	=	1.612	in
ry	=	1.612	in
Plastic Zx	=	4.101	in^3
Plastic Zy	=	4.098	in^3
Torsional J	=	3.341	in^4
As-xx Def	=	1.000	
As-yy Def	=	1.000	
As-xx Stress	=	1.000	
As-yy Stress	=	1.000	



Section Diagram

2013

Company :	Jun 30, 2017
Designer :	13:29 PM
Job Number :	Checked By:______

Summary of Section Properties

Section Information:

Sn.No.	1
Section	Section1_1...

Basic Properties:

Total Width (in)	6.584
Total Height (in)	6.584
Centroid, Xo (in)	1.599
Centroid, Yo (in)	-2.033
X-Bar (Right) (in)	4.129
X-Bar (Left) (in)	2.455
Y-Bar (Top) (in)	2.455
Y-Bar (Bot) (in)	4.129

Equivalent Properties:

Area, Ax (in^2)	3.283
Inertia, Ixx (in^4)	8.534
Inertia, Iyy (in^4)	8.534
Inertia, Ixy (in^4)	-4.405
Sx (Top) (in^3)	3.476
Sx (Bot) (in^3)	2.067
Sy (Left) (in^3)	3.476
Sy (Right) (in^3)	2.067
rx (in)	1.612
ry (in)	1.612
Plastic Zx (in^3)	4.101
Plastic Zy (in^3)	4.098
Torsional J (in^4)	3.341

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Email: info@structure1.com

Project No: Eglass 217-1
Project Name:
Subject:

SHEET #______ OF ______
DESIGNED BY AF DATE ______
CHECKED BY ______ DATE ______

check anchor - wood deck

Max moment = $200^{lb} * 3.5' = 700$ lb.ft

50% of the load will be taken care off by Tension on one side &

50% Shear on other side

check for Tension

Moment = $T_1 + 4T_2$ & $T_1 = \frac{1}{4} T_2$

$\frac{1}{2} * 700 * \frac{12 (in)}{1 (ft)} = \frac{1}{4} T_2 + 4 T_2$

$T_2 = 989$ lb

$\frac{3}{8}$" ϕ lag screw withdraw capacity = 305^{lb}

Embed length = $\frac{989^{lb}}{305 * 1.6 \times ..} = 2.1"$

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Project Name:
Subject:

SHEET # ____ OF ____
DESIGNED BY AF DATE ____
CHECKED BY ____ DATE ____

- check for shear

$\frac{1}{2}$" ϕ lag screw shear capacity = 520 lb ($Z_{\parallel}$)

Shear in screws = S_1 and S_2

$\frac{1}{2}$ Moment = $S * 3$"

$\frac{1}{2} * 700 * 12" = 3S$

$S = 1400$ lb

$\# \text{ screws} = \frac{1400}{520 * 1.6} = 1.68$

C_d factor ↗

use [4 - $\frac{1}{2}$" ϕ lag screws w/4" min embed
2 each side]

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PROJECT NO. Eglass 217-1 SHEET 2015 OF

PROJECT NAME DESIGNED BY AF DATE

SUBJECT CHECKED BY DATE

Check anchors - Concrete deck

Single bolt in tension, Max tension = 1750 lb

$N_{cb} = \frac{A_{Nc}}{A_{Nco}} \psi_{ed,N} \cdot \psi_{c,N} \cdot \psi_{cp,N} \cdot N_b$

half of load will be shear on the other 2 bolts

∴ Tension = $\frac{1750}{2}$ = 875 lb

$A_{Nc} = (C_{a1} + 1.5 h_{ef}) * 2 * 1.5 h_{ef}$
$= (7.5 + 1.5 * 3) * 2 * 1.5 * 3 = 54 \text{ in}^2$

$A_{Nco} = 9 h_{ef}^2 = 9 * 3^2 = 81 \text{ in}^2$

$N_b = 17 \sqrt{2500} * 3^{1.5} = 4416 \text{ lb}$

$\psi_{ed,N} = 0.7 + 0.3 * \frac{1.5}{1.5*3} = 0.8$

$\psi_{c,N} = 1.4$

$\psi_{cp,N} = 1.0$

$\frac{5}{8}$" φ bolt tensile strength

$N_{cb} = \frac{54}{81} * 0.80 * 1.4 * 1 * 4416 = 3297 \text{ lb} < 4{,}200 \text{ lb}$

∴ Allowable Tensile strength = $0.65 * \frac{3297}{1.6} = 1339 \text{ lb}$

$> 875 \text{ lb}$

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PROJECT NO: Eg12 85 217-1 SHEET 2016 OF ______

PROJECT NAME ______ DESIGNED BY AF DATE ______

SUBJECT ______ CHECKED BY ______ DATE ______

use:

4- $\frac{3}{8}$" ϕ Red head ITW or LDT
w/ min 3" Embed, 1.50" Edg distance
f'c ≮ 2,500

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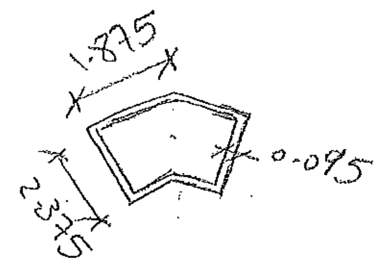
PROJECT NO: 9/28/ 217.1 SHEET 2017 OF ____
PROJECT NAME ____ DESIGNED BY HYF DATE ____
SUBJECT ____ CHECKED BY ____ DATE ____

135° post

Section properties:



$A = 0.931\ in^2$

$I_x = 0.851\ in^4$

$I_y = 1.033\ in^4$

$S_x = 0.579\ in^3$

$S_y = 0.596\ in^3$

Post bending capacity $= F_b \cdot S$

$= 15\ Ksi * 0.596 = 8.94\ in.K$

$= 0.745\ Kip.ft > 0.7\ Kip.ft$

max applied Bending

(OK)

Section Properties: Section1_1.dxf

Section Information:

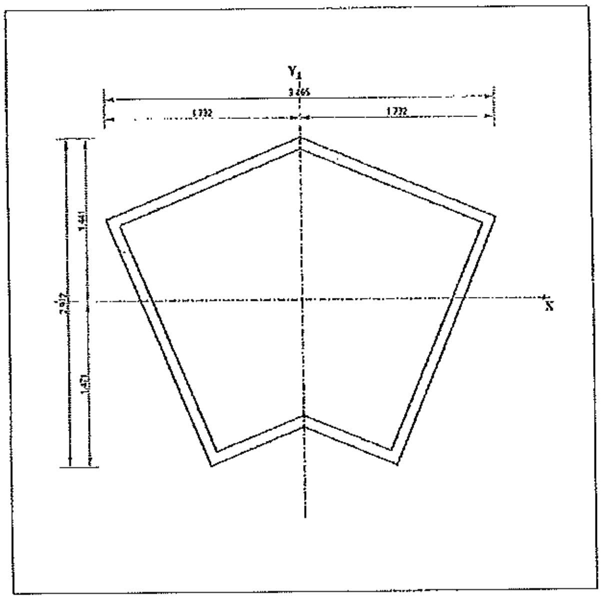
Material Type	=	Hot Rolled Steel	
Shape Type	=	Pipe	
Number of Shapes	=	1	

Basic Properties:

Total Width	=	3.465	in
Total Height	=	2.912	in
Centroid, Xo	=	0.000	in
Centroid, Yo	=	-0.034	in
Shear Center, Xs	=	0.000	in
Shear Center, Ys	=	0.000	in
X-Bar (Right)	=	1.732	in
X-Bar (Left)	=	1.732	in
Y-Bar (Top)	=	1.441	in
Y-Bar (Bot)	=	1.471	in
Thickness	=	0.102	in

Equivalent Properties:

Area, Ax	=	0.931	in^2
Inertia, Ixx	=	0.851	in^4
Inertia, Iyy	=	1.033	in^4
Inertia, Ixy	=	0.000	in^4
Sx (Top)	=	0.591	in^3
Sx (Bot)	=	0.579	in^3
Sy (Left)	=	0.596	in^3
Sy (Right)	=	0.596	in^3
rx	=	0.956	in
ry	=	1.053	in
Plastic Zx	=	0.808	in^3
Plastic Zy	=	0.879	in^3
Torsional J	=	1.442	in^4



Section Diagram

Summary of Section Properties

Section Information:

Sn.No.	1
Section	Section1_1...

Basic Properties:

Total Width (in)	3.465
Total Height (in)	2.912
Centroid, Xo (in)	0.000
Centroid, Yo (in)	-0.034
X-Bar (Right) (in)	1.732
X-Bar (Left) (in)	1.732
Y-Bar (Top) (in)	1.441
Y-Bar (Bot) (in)	1.471

Equivalent Properties:

Area, Ax (in^2)	0.931
Inertia, Ixx (in^4)	0.851
Inertia, Iyy (in^4)	1.033
Inertia, Ixy (in^4)	0.000
Sx (Top) (in^3)	0.591
Sx (Bot) (in^3)	0.579
Sy (Left) (in^3)	0.596
Sy (Right) (in^3)	0.596
rx (in)	0.956
ry (in)	1.053
Plastic Zx (in^3)	0.808
Plastic Zy (in^3)	0.879
Torsional J (in^4)	1.442

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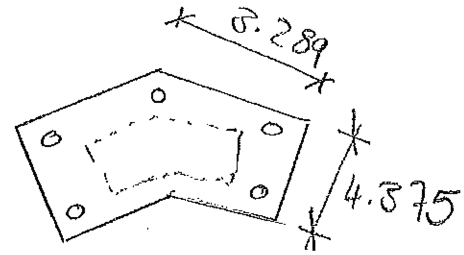
PROJECT NO Eglass 217-1 SHEET 2020 OF

PROJECT NAME DESIGNED BY AF DATE

SUBJECT CHECKED BY DATE

135° post base plate



Assume $t = 0.39$ in

$$t \geq \ell \sqrt{\frac{2P_u}{0.9 A F_y}}$$

ℓ: distance from post edge to base plate edge = 1"

A: base plate area = 20.85 in²

F_y = 38 Ksi (Aluminum 6061-T6)

P_u = 300 (lb) * 1.5 = 450 lb

$$t \geq \sqrt{\frac{2 * 450 / (1000)}{0.9 * 20.85 * 38}} = 0.035 \text{ in}$$

use [0.39" * shape as shown, Aluminum]

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PROJECT NO E91285 217-1 SHEET 2021 OF ______

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SUBJECT ______ CHECKED BY ______ DATE ______

Anchors

Tension on one Anchore = $\frac{M}{d}$

d = distance between anchore & base plate farther edge = 4.20"

M = Applied bending moment = 875 lb.ft

$M = 4.2 * T + 3.77 * \frac{3.77}{4.2} T + 0.65 * \frac{0.65}{4.2} T$

$= 7.7T$

$M = 50^{plf} * 5 * \frac{36"}{12} = 750$ lb.ft

$T = \frac{750 * 12}{7.7} = 1,153$ lb

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PROJECT NO. Eglass 217-1 SHEET 2022 OF

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Anchors with Concrete

$N_{cb} = \frac{A_{NC}}{A_{NCo}} \psi_{ed,N} \cdot \psi_{c,N} \cdot \psi_{cp,N} \cdot N_b$

$A_{NC} = (3 + 1.5 * 3) * (2 * 1.5 * 3) = 67.5 \text{ in}^2$

$A_{NCo} = 9 * \overline{3}^{2} = 81 \text{ in}^2$

$N_b = 17 \sqrt{2500} * \overline{3}^{1.5} = 4,416 \text{ lb}$

$\psi_{ed} = 0.7 + 0.3 \frac{*3}{1.5*3} = 0.9$

$\psi_{c,N} = 1.4$

$\psi_{cp,N} = 1.0$

$N_{cb} = \frac{67.5}{81} * 0.9 * 1.4 * 1 * 4416 = 4686 \text{ lb}$

$\frac{3}{8}$" ϕ bolt tension capacity = 4200 lb < 4686 lb

∴ bolt capacity controls

Allowable Ten. load = $0.65 * \frac{4200}{1.6} = 1575$ lb

$\frac{\text{Applied Tension}}{\text{allowable Tension}} = \frac{1153}{1575} = 0.73$

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PROJECT NO: E9/285 217-1 SHEET 2023 OF ______

PROJECT NAME ______ DESIGNED BY AF DATE ______

SUBJECT ______ CHECKED BY ______ DATE ______

* check for shear

$$V_{cb} = \frac{A_{VC}}{A_{VCO}} \cdot \psi_{ed,V} \cdot \psi_{C,V} \cdot \psi_{h,V} \cdot V_b$$

$$A_{VC} = 1.5 * 3 * (1.5 * 3 + 3) = 33.75 \text{ in}^2$$

$$A_{VCO} = 4.5 * 3^2 = 40.5 \text{ in}^2$$

$$V_b = 7 * \left(\left(\frac{3}{3/8}\right)^{0.2} \sqrt{3/8}\right) * \sqrt{2500} * 3^{1.5} = 1688 \text{ lb}$$

$$\psi_{ed,V} = 1.0$$

$$\psi_{C,V} = 1.4$$

$$\psi_{h,V} = \sqrt{\frac{1.5 * 3}{3}} = 1.22$$

$$V_{cb} = \frac{33.75}{40.5} * 1 * 1.4 * 1.22 * 1688 = 2402 \text{ lb}$$

$\frac{3}{8}$" ϕ bolt shear capacity = 1880 lb (controls)

$$\text{Allowable shear} = 0.7 * \frac{1880}{1.6} = 800 \text{ lb}$$

$$\text{shear/bolt} = \frac{50^{\text{lb/ft}} * 5^{(\text{ft})}}{5} = 50 \text{ lb}$$

$$\frac{\text{Applied shear}}{\text{Allowable shear}} = \frac{50}{800} = 0.06 < 0.2$$

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PROJECT NO. Eg1a88 217-1 SHEET 2624 OF ______

PROJECT NAME ______ DESIGNED BY AF DATE ______

SUBJECT ______ CHECKED BY ______ DATE ______

∴ Interaction of shear & Tension won't reduce allowable Tension load

∴

use: [5- 3/8" φ Red head ITW or LDT
w/min 4" Embed & 8" edge distance
f'c ≮ 2500 psi]

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PROJECT NO. Eglass 217-1 SHEET 2025 OF

PROJECT NAME DESIGNED BY AF DATE

SUBJECT CHECKED BY DATE

Anchors with wood

$\frac{3}{8}$" ϕ lag screw withdrawl capacity = 243 lb

Embed length = $\frac{1153^{lb}}{243 * 1.6}$ = 2.96 in

use = [5 - $\frac{3}{8}$" ϕ lag screw w/4" min Embed]

Table 2.3.2 Frequently Used Load Duration Factors, C_D[1]

Load Duration	C_D	Typical Design Loads
Permanent	0.9	Dead Load
Ten years	1.0	Occupancy Live Load
Two months	1.15	Snow Load
Seven days	1.25	Construction Load
Ten minutes	1.6	Wind/Earthquake Load
Impact[2]	2.0	Impact Load

1. Load duration factors shall not apply to reference modulus of elasticity, E, reference modulus of elasticity for beam and column stability, E_{min}, nor to reference compression perpendicular to grain design values, $F_{c\perp}$, based on a deformation limit.
2. Load duration factors greater than 1.6 shall not apply to structural members pressure-treated with water-borne preservatives (see Reference 30), or fire retardant chemicals. The impact load duration factor shall not apply to connections.

2.3.3 Temperature Factor, C_t

Reference design values shall be multiplied by the temperature factors, C_t, in Table 2.3.3 for structural members that will experience sustained exposure to elevated temperatures up to 150°F (see Appendix C).

2.3.4 Fire Retardant Treatment

The effects of fire retardant chemical treatment on strength shall be accounted for in the design. Adjusted design values, including adjusted connection design values, for lumber and structural glued laminated timber pressure-treated with fire retardant chemicals shall be obtained from the company providing the treatment and redrying service. Load duration factors greater than 1.6 shall not apply to structural members pressure-treated with fire retardant chemicals (see Table 2.3.2).

2.3.5 Format Conversion Factor, K_F (LRFD Only)

For LRFD, reference design values shall be multiplied by the format conversion factor, K_F, specified in Table 2.3.5. The format conversion factor, K_F, shall not apply for designs in accordance with ASD methods specified herein.

2.3.6 Resistance Factor, ϕ (LRFD Only)

For LRFD, reference design values shall be multiplied by the resistance factor, ϕ, specified in Table 2.3.6. The resistance factor, ϕ, shall not apply for designs in accordance with ASD methods specified herein.

2.3.7 Time Effect Factor, λ (LRFD Only)

For LRFD, reference design values shall be multiplied by the time effect factor, λ, specified in Appendix N.3.3. The time effect factor, λ, shall not apply for designs in accordance with ASD methods specified herein.

Table 2.3.3 Temperature Factor, C_t

Reference Design Values	In-Service Moisture Conditions[1]	C_t		
		T≤100°F	100°F<T≤125°F	125°F<T≤150°F
F_t, E, E_{min}	Wet or Dry	1.0	0.9	0.9
F_b, F_v, F_c, and $F_{c\perp}$	Dry	1.0	0.8	0.7
	Wet	1.0	0.7	0.5

1. Wet and dry service conditions for sawn lumber, structural glued laminated timber, prefabricated wood I-joists, structural composite lumber, wood structural panels and cross-laminated timber are specified in 4.1.4, 5.1.4, 7.1.4, 8.1.4, 9.3.3, and 10.1.5 respectively.

2 DESIGN VALUES FOR STRUCTURAL MEMBERS

Table 12.2A Lag Screw Reference Withdrawal Design Values, W[1]

Tabulated withdrawal design values (W) are in pounds per inch of thread penetration into side grain of wood member. Length of thread penetration in main member shall not include the length of the tapered tip (see 12.2.1.1).

Specific Gravity, G[2]	Lag Screw Diameter, D										
	1/4"	5/16"	3/8"	7/16"	1/2"	5/8"	3/4"	7/8"	1"	1-1/8"	1-1/4"
0.73	397	469	538	604	668	789	905	1016	1123	1226	1327
0.71	381	450	516	579	640	757	868	974	1077	1176	1273
0.68	357	422	484	543	600	709	813	913	1009	1103	1193
0.67	349	413	473	531	587	694	796	893	987	1078	1167
0.58	281	332	381	428	473	559	641	719	795	869	940
0.55	260	307	352	395	437	516	592	664	734	802	868
0.51	232	274	314	353	390	461	528	593	656	716	775
0.50	225	266	305	342	378	447	513	576	636	695	752
0.49	218	258	296	332	367	434	498	559	617	674	730
0.47	205	242	278	312	345	408	467	525	580	634	686
0.46	199	235	269	302	334	395	453	508	562	613	664
0.44	186	220	252	283	312	369	423	475	525	574	621
0.43	179	212	243	273	302	357	409	459	508	554	600
0.42	173	205	235	264	291	344	395	443	490	535	579
0.41	167	198	226	254	281	332	381	428	473	516	559
0.40	161	190	218	245	271	320	367	412	455	497	538
0.39	155	183	210	236	261	308	353	397	438	479	518
0.38	149	176	202	227	251	296	340	381	422	461	498
0.37	143	169	194	218	241	285	326	367	405	443	479
0.36	137	163	186	209	231	273	313	352	389	425	460
0.35	132	156	179	200	222	262	300	337	373	407	441
0.31	110	130	149	167	185	218	250	281	311	339	367

1. Tabulated withdrawal design values, W, for lag screw connections shall be multiplied by all applicable adjustment factors (see Table 11.3.1).
2. Specific gravity, G, shall be determined in accordance with Table 12.3.3A.

12.2.3.2 For calculation of the fastener reference withdrawal design value in pounds, the unit reference withdrawal design value in lbs/in. of fastener penetration from 12.2.3.1 shall be multiplied by the length of fastener penetration, p_t, into the wood member.

12.2.3.3 The reference withdrawal design value, in lbs/in. of penetration, for a single post-frame ring shank nail driven in the side grain of the main member, with the nail axis perpendicular to the wood fibers, shall be determined from Table 12.2D or Equation 12.2-4, within the range of specific gravities and nail diameters given in Table 12.2D. Reference withdrawal design values, W, shall be multiplied by all applicable adjustment factors (see Table 11.3.1) to obtain adjusted withdrawal design values, W'.

$$W = 1800\ G^2 D \qquad (12.2\text{-}4)$$

12.2.3.4 For calculation of the fastener reference withdrawal design value in pounds, the unit reference withdrawal design value in lbs/in. of ring shank penetration from 12.2.3.3 shall be multiplied by the length of ring shank penetration, p_t, into the wood member.

12.2.3.5 Nails and spikes shall not be loaded in withdrawal from end grain of wood (C_{eg}=0.0).

12.2.3.6 Nails, and spikes shall not be loaded in withdrawal from end-grain of laminations in cross-laminated timber (C_{eg}=0.0).

12.2.4 Drift Bolts and Drift Pins

Reference withdrawal design values, W, for connections using drift bolt and drift pin connections shall be determined in accordance with 11.1.1.3.

LAG SCREWS

Table 12K LAG SCREWS: Reference Lateral Design Values, Z, for Single Shear (two member) Connections[1,2,3,4]

for sawn lumber or SCL with ASTM A653, Grade 33 steel side plate (for t_s<1/4") or ASTM A 36 steel side plate (for t_s=1/4")
(tabulated lateral design values are calculated based on an assumed length of lag screw penetration, p, into the main member equal to 8D)

Side Member Thickness	Lag Screw Diameter	G=0.67 Red Oak		G=0.55 Mixed Maple Southern Pine		G=0.5 Douglas Fir-Larch		G=0.49 Douglas Fir-Larch (N)		G=0.46 Douglas Fir(S) Hem-Fir(N)		G=0.43 Hem-Fir		G=0.42 Spruce-Pine-Fir		G=0.37 Redwood (open grain)		G=0.36 Eastern Softwoods Spruce-Pine-Fir(S) Western Cedars Western Woods		G=0.35 Northern Species	
t_s in.	D in.	$Z_{\parallel}$ lbs.	$Z_{\perp}$ lbs.	$Z_{\parallel}$ lbs.	$Z_{\perp}$ lbs.	$Z_{\parallel}$ lbs.	$Z_{\perp}$ lbs.	$Z_{\parallel}$ lbs.	$Z_{\perp}$ lbs.	$Z_{\parallel}$ lbs.	$Z_{\perp}$ lbs.	$Z_{\parallel}$ lbs.	$Z_{\perp}$ lbs.	$Z_{\parallel}$ lbs.	$Z_{\perp}$ lbs.	$Z_{\parallel}$ lbs.	$Z_{\perp}$ lbs.	$Z_{\parallel}$ lbs.	$Z_{\perp}$ lbs.	$Z_{\parallel}$ lbs.	$Z_{\perp}$ lbs.
0.075 (14 gage)	1/4	170	130	160	120	150	110	150	110	150	100	140	100	140	100	130	90	130	90	130	90
	5/16	220	160	200	140	190	130	190	130	190	130	180	120	180	120	170	110	170	110	160	100
	3/8	220	160	200	140	200	130	190	130	190	120	180	120	180	120	170	110	170	100	170	100
0.105 (12 gage)	1/4	180	140	170	130	160	120	160	120	160	110	150	110	150	110	140	100	140	100	140	90
	5/16	230	170	210	150	200	140	200	140	190	130	190	130	190	120	180	110	170	110	170	110
	3/8	230	160	210	140	200	140	200	130	200	130	190	120	190	120	180	110	180	110	170	110
0.120 (11 gage)	1/4	190	150	180	130	170	120	170	120	160	120	160	110	160	110	150	100	150	100	140	100
	5/16	230	170	210	150	210	140	200	140	200	140	190	130	190	130	180	120	180	120	180	110
	3/8	240	170	220	150	210	140	210	140	200	130	200	130	190	120	180	110	180	110	180	110
0.134 (10 gage)	1/4	200	150	180	140	180	130	170	130	170	120	160	120	160	110	150	110	150	100	150	100
	5/16	240	180	220	160	210	150	210	140	200	140	200	130	200	130	190	120	180	120	180	120
	3/8	240	170	220	150	220	140	210	140	210	140	200	130	200	130	190	120	190	120	180	110
0.179 (7 gage)	1/4	220	170	210	150	200	150	200	140	190	140	190	130	190	130	180	120	170	120	170	120
	5/16	260	190	240	170	230	160	230	160	230	150	220	150	220	150	210	130	200	130	200	130
	3/8	270	190	250	170	240	160	240	160	230	150	220	140	220	140	210	130	210	130	200	130
0.239 (3 gage)	1/4	240	180	220	160	210	150	210	150	200	140	190	140	190	130	180	120	180	120	180	120
	5/16	300	220	280	190	270	180	260	180	260	170	250	160	250	160	230	150	230	150	230	140
	3/8	310	220	280	190	270	180	270	180	260	170	250	160	250	160	240	140	230	140	230	140
	7/16	420	290	390	260	380	240	370	240	360	230	350	220	350	220	330	200	330	200	320	190
	1/2	510	340	470	300	460	290	450	280	440	270	430	260	420	260	400	240	400	230	390	230
	5/8	770	490	710	430	680	400	680	400	660	380	640	370	630	360	600	330	590	330	580	320
	3/4	1110	670	1020	590	980	560	970	550	950	530	920	500	910	500	860	450	850	450	840	440
	7/8	1510	880	1390	780	1330	730	1320	710	1280	690	1250	650	1230	650	1170	590	1160	590	1140	570
	1	1940	1100	1780	960	1710	910	1700	890	1650	860	1600	820	1590	810	1500	740	1480	730	1460	710
1/4	1/4	240	180	220	160	210	150	210	150	200	140	200	140	190	130	180	120	180	120	180	120
	5/16	310	220	280	200	270	180	270	180	260	170	250	170	250	160	230	150	230	150	230	140
	3/8	320	220	290	190	280	180	270	180	270	170	260	160	250	160	240	150	240	140	230	140
	7/16	480	320	440	280	420	270	420	260	410	250	390	240	390	230	370	220	360	210	360	210
	1/2	580	390	540	340	520	320	510	320	500	310	480	290	480	290	460	270	450	260	440	260
	5/8	850	530	780	470	750	440	740	440	720	420	700	400	690	400	660	370	650	360	640	350
	3/4	1200	730	1100	640	1060	600	1050	590	1020	570	990	540	980	530	930	490	920	480	900	470
	7/8	1600	930	1470	820	1410	770	1400	750	1360	720	1320	690	1310	680	1240	630	1220	620	1200	600
	1	2040	1150	1870	1000	1800	950	1780	930	1730	900	1680	850	1660	840	1570	770	1550	760	1530	740

1. Tabulated lateral design values, Z, shall be multiplied by all applicable adjustment factors (see Table 11.3.1).
2. Tabulated lateral design values, Z, are for "reduced body diameter" lag screws (see Appendix Table L2) inserted in side grain with screw axis perpendicular to wood fibers; screw penetration, p, into the main member equal to 8D; dowel bearing strengths, F_e, of 61,850 psi for ASTM A653, Grade 33 steel and 87,000 psi for ASTM A36 steel and screw bending yield strengths, F_{yb}, of 70,000 psi for D = 1/4", 60,000 psi for D = 5/16", and 45,000 psi for D ≥3/8".
3. Where the lag screw penetration, p, is less than 8D but not less than 4D, tabulated lateral design values, Z, shall be multiplied by p/8D or lateral design values shall be calculated using the provisions of 12.3 for the reduced penetration.
4. The length of lag screw penetration, p, not including the length of the tapered tip, E (see Appendix Table L2), of the lag screw into the main member shall not be less than 4D. See 12.1.4.6 for minimum length of penetration, p_{min}.