PRCTI20241500

Structural Calculations

PREPARED FOR:

Red Dot Corporation
2504 E Main Ave,
Puyallup, WA, 98372

PROJECT:

Red Dot Corporation
Re-Used Mezzanine Evaluation
2220760.20

PREPARED BY:

Dylan M Suddath
Project Engineer

REVIEWED BY:

Drew McEachern PE, SE
Principal

DATE:

August 2024

Structural Calculations

For

Red Dot Mezzanine Evaluation

Puyallup, WA

Project # 2220760.20

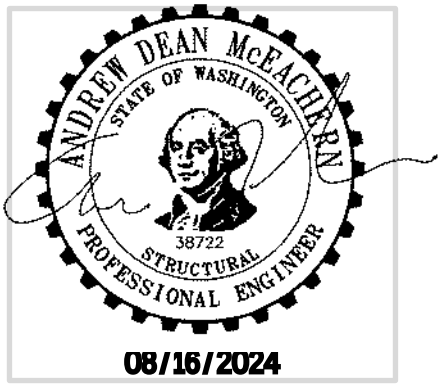
Project Principal Drew McEachern PE SE
Project Engineer Dylan M Suddath

Design Criteria

Design Codes and Standards

Codes and Standards: Structural design and construction shall be in accordance with the applicable sections of the following codes and standards as adopted and amended by the local building authority: International Building Code, 2021 Edition.

Structural Design Criteria:



Live Load Criteria:

Mezzanine 100 psf

Wind Load Criteria:

Wind Load does not apply to this structure as it is indoors. Seismic controls the lateral analysis by inspection.

Seismic Criteria:

Risk Category	II		
Seismic Importance Factor	1.0		
S_s = 1.258		S_1 = 0.433	
S_{ds} = 0.839		S_{d1} = 0.539	
Site Class	= D - Default		
Seismic Design Category	= D		

Response Modification Coeff. (R): 3 ½ (Steel OMF – ASCE 7-16 Table 12.2-1)

2 ½ (Egress Stairway – ASCE 7-16 Table 13.5-1)

Seismic Response Coeff. (C_s): 0.239 (Steel OMF)

Soil Criteria:

Based on Geotechnical Engineering Report by: Terra Associates Inc., dated September 2019.

Allowable Soil Bearing Capacity: 2,500 psf when sitting on 2 feet of structural fill on the previously preloaded side. Allow 33% increase for loads from wind or seismic origin.

Project Description

The project consists of the evaluation of an existing mezzanine that will be relocated to the project site from another building. This mezzanine was designed originally per the IBC 2003, and will be re-evaluated for compliance with IBC 2021 loads and requirements.

The vertical system for this mezzanine consists of 1" bar grating spanning between both hot rolled steel wide flange members and cold formed steel channel members. The beams span between rectangular steel columns. There are a set of stairs that span from the ground up to a small landing, and the landing spans to the platform of the mezzanine. Both the stairs and the landing are supported by two HSS 4x4 columns. The existing interior slab consists of a conventional 6" thick concrete slab on grade.

The lateral system for the mezzanine (not including the stairs and the landing) involves steel ordinary moment frames. The stairs and landing outboard of the mezzanine are laterally supported by the adjacent mezzanine at the top of the stairs and the concrete slab on grade at the base of the stairs.

The original mezzanine was designed for a 150 psf uniform live load. Per the IBC, 25% of the storage live load must be included as seismic weight (see IBC section 12.7.2). Due to the increased seismic load of the 2021 IBC (when compared with the 2003 IBC), we determined that the allowable mezzanine live load could be reduced in order to limit the seismic demand on the mezzanine.

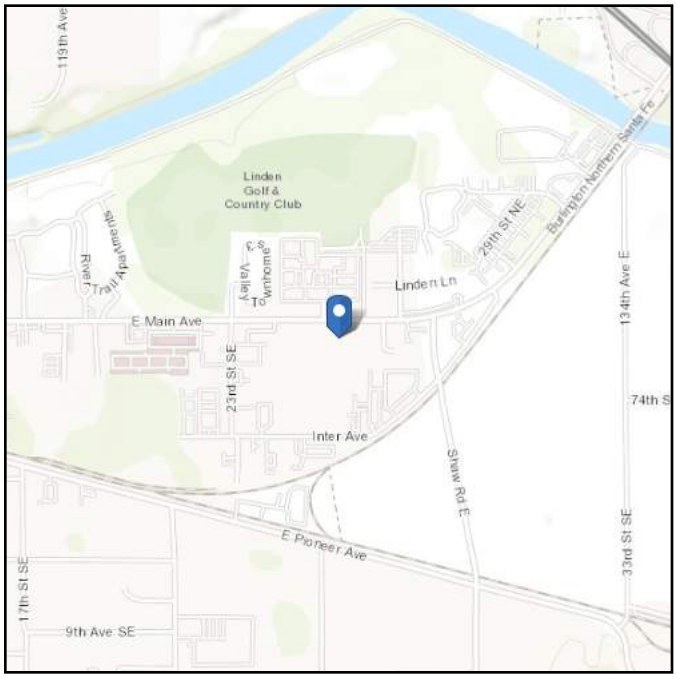
Results:

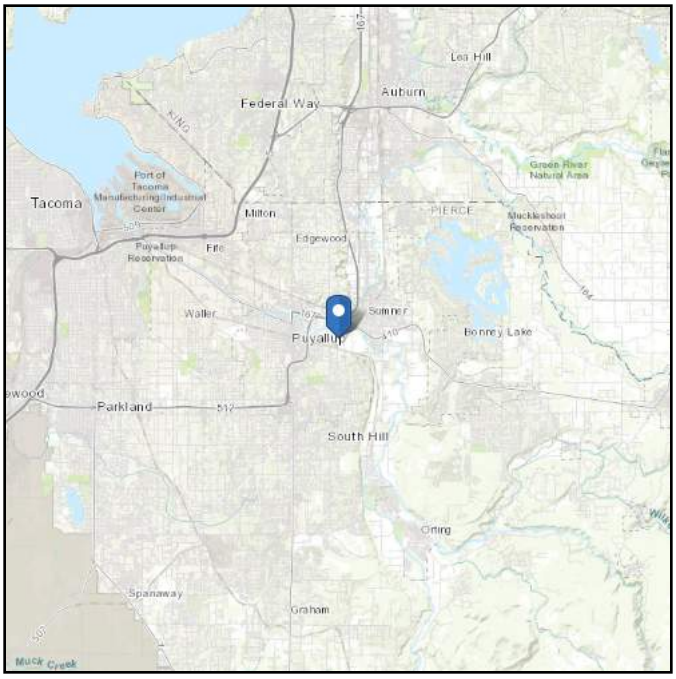
We have evaluated the mezzanine for the vertical and lateral loads as determined by the IBC 2021. Based upon our analysis, the existing mezzanine members are adequate to support a minimum 100psf uniform live load and the corresponding seismic forces. The existing mezzanine may be relocated to the proposed site, and all existing members re-used. We recommend that all fasteners (screws, bolts and expansion anchors) be replaced with new fasteners. All new fasteners should meet or exceed the size and material properties of the existing mezzanine component specifications. The new expansion anchors should have a current ICC approval.

ASCE Hazards Report

Address:
2504 E Main
Puyallup, Washington
98372

Standard:	ASCE/SEI 7-16	**Latitude:**	47.191449
Risk Category:	II	**Longitude:**	-122.261078
Soil Class:	D - Stiff Soil	**Elevation:**	59.039663467353165 ft (NAVD 88)





Seismic

Site Soil Class: D - Stiff Soil

Results:

S_S :	1.258	S_{D1} :	N/A
S_1 :	0.433	T_L :	6
F_a :	1	PGA :	0.5
F_v :	N/A	PGA_M :	0.55
S_{MS} :	1.258	F_{PGA} :	1.1
S_{M1} :	N/A	I_e :	1
S_{DS} :	0.839	C_v :	1.352

Ground motion hazard analysis may be required. See ASCE/SEI 7-16 Section 11.4.8.

Data Accessed: Mon Aug 05 2024

Date Source: USGS Seismic Design Maps

The ASCE Hazard Tool is provided for your convenience, for informational purposes only, and is provided “as is” and without warranties of any kind. The location data included herein has been obtained from information developed, produced, and maintained by third party providers; or has been extrapolated from maps incorporated in the ASCE standard. While ASCE has made every effort to use data obtained from reliable sources or methodologies, ASCE does not make any representations or warranties as to the accuracy, completeness, reliability, currency, or quality of any data provided herein. Any third-party links provided by this Tool should not be construed as an endorsement, affiliation, relationship, or sponsorship of such third-party content by or from ASCE.

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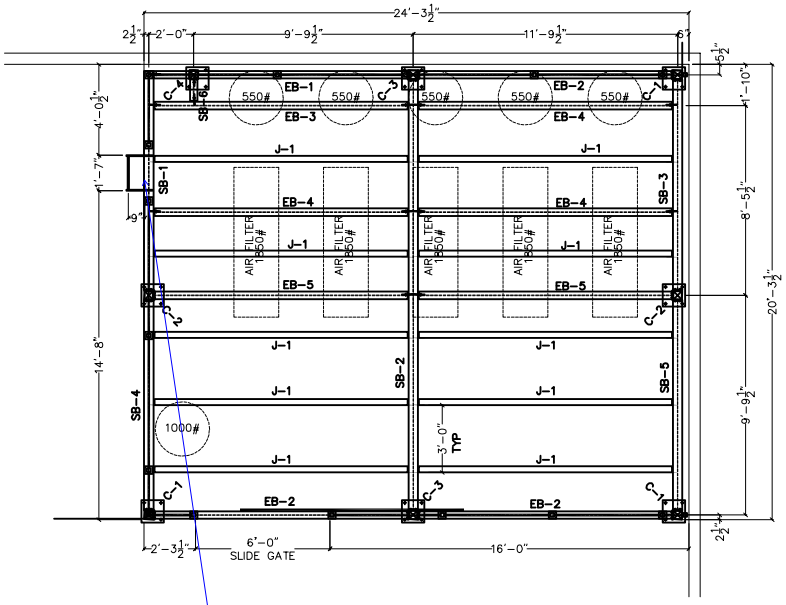
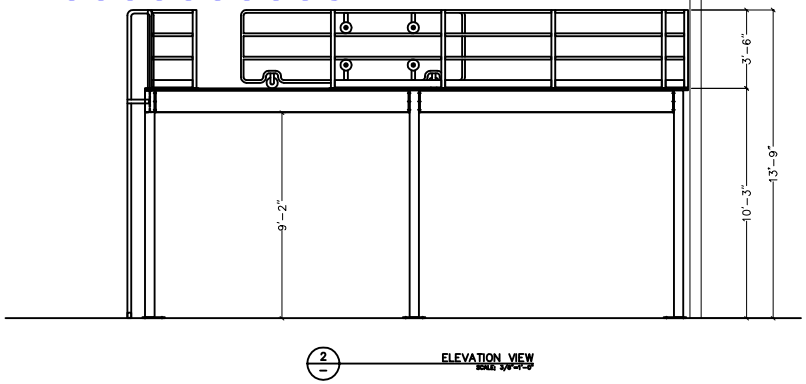
REPLACE ALL ORIGINAL FASTENERS WITH NEW - MATCH ORIGINAL SIZES AND MATERIAL SPECIFICATIONS

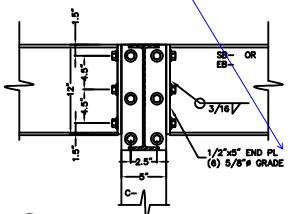


1 FRAMING PLAN
SCALE: 3/8"=1'-0"

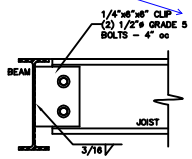
STAIRS ASSUMED TO FRAME INTO THIS LOCATION



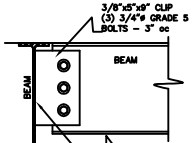
2 ELEVATION VIEW
SCALE: 3/8"=1'-0"



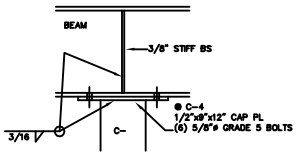
A BEAM/COLUMN CONNECTION



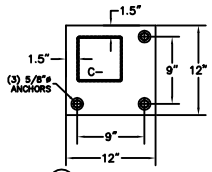
B JOIST/BEAM CONN UNLESS NOTED



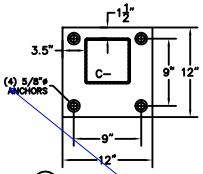
C SB- / EB- CONN



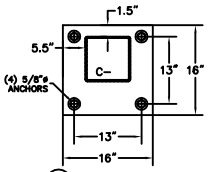
G BEAM/COL CONN
● C-4



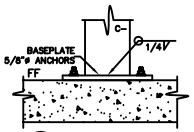
D C-1,4 BASE PLAN
5/8x 12x 12 BASEPLATE



E C-2 BASE PLAN
5/8x 12x 12 BASEPLATE



F C-3 BASE PLAN
3/4x 16x 16 BASEPLATE

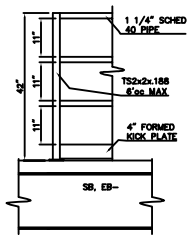


H C- BASE ELEV.

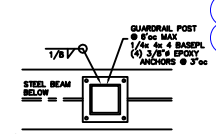
MEMBERS

J-1	JOIST	C10x3.25x 14ga	Fy=55ksi
EB-1,2,3,4,5	EDGE BEAM	W12x 14	
SB-1,3,4,5	SIDE BEAM	W14x 22	
SB-2	SIDE BEAM	W14x 34	
SB-6	SIDE BEAM	W12x 14	
C-1,2,3,4	COLUMN	TS 5x 5x 3/16	

MINIMUM ANCHOR SIZE AND EMBEDMENT SHOWN IN ATTACHED CALCS - OK TO USE 5/8" DIA EXP ANCHORS W/ 4" EMBEDMENT PER ORIGINAL DESIGN - PROVIDE EXPANSION ANCHORS W/ CURRENT ICC REPORT



10 GUARDRAIL DETAIL



K GUARDRAIL POST BASE CONN
PLAN VIEW

UPDATED TO IBC 2021 LOAD CONDITIONS

Ss: 1.258
S1: 0.433
Sds: 0.839
Sd1: 0.539

2500psf ON NEW SITE

REQUIRED INSPECTIONS
1.) ANCHOR BOLTS PER ICC REPORT#1917
2.) PERIODIC ON STEEL FABRICATION & ERECTION
3.) PERIODIC ON STEEL WELDING
4.) 6" SLAB THICKNESS TO BE VERIFIED

NOTES:

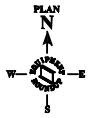
1.) DESIGNED PER 2003 IBC
150 PSF LIVE LOAD or LOADS SHOWN
SEISMIC Ss=134%g S1=46%g Soil Class "D"
Use Grp "I" Design Cat "D"

2.) ASSUMED 6"-3000psi CONCRETE SLAB ON GRADE
ALLOWABLE SOIL BEARING =1500psf

3.) ANCHORS: HILTI KWIK BOLT TZ
4" EMBED PER ICC REPORT#1917
SPECIAL INSPECTION IS REQUIRED

4.) ALL STEEL TO BE A36 UNLESS NOTED
WIDE FLANGE BEAMS & CONN PL's Fy = 50 ksi
COLUMNS Fy = 46 ksi
ALL WELDS TO BE PER AWS w/ E70xx ELECTRODES
ALL BOLTS TO BE GRADE 5 UNLESS NOTED
w/ WASHERS ON BEAM CONNECTIONS

5.) DECK TO BE 1"x3/16" BAR GRATE (KLEMP 19-4-43 or EQUAL)
LAID PERPENDICULAR TO JOISTS
#12 TEKS @ 18"oc TO ALL BEAMS & JOISTS



REV.	DATE	DESCRIPTION	DRAWN	APP'D
1	1-4-07	TOP LT CORNER FRAMING	LK	
2	1-11-07	MOVED COLUMNS 4, 5, & 6 & ADDED HANDRAIL	LK	
3	3-12-07	PER PLAN CHECK	BEN	

EQUIPMENT ROUNDUP AND MANUFACTURING
DISTRIBUTED BY: EQUIPMENT ROUNDUP VANCOUVER, WASHINGTON

DESIGNED BY: S. HAMM	12/14/06	DISTRIBUTED TO: RED DOT CORPORATION
DRAWN BY: L. KOWALSKI	12/14/06	445 AN DO VER PA RK EA ST
CHECKED BY:		SEATTLE, WASHINGTON 98188
APPROVED BY:		TITLE: EQUIPMENT PLATFORM
SCALE: 3/8"=1'-0"	SIZE: D	SHEET: 01 OF
FILE NAME: 06224-01.DWG		JOB No.: EN580A
		DRAWING No.: 1

EQUIPMENT ROUNDUP

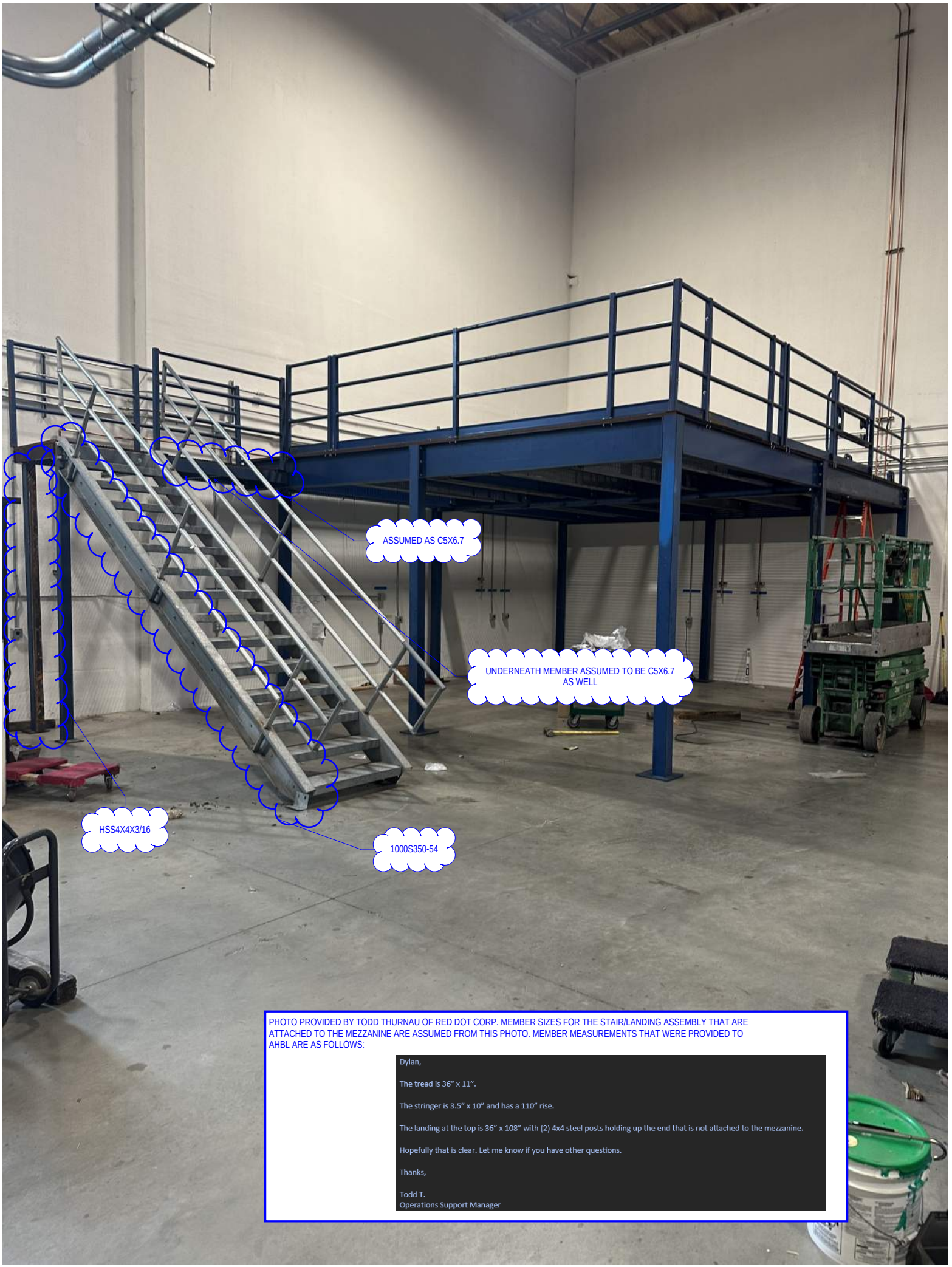


PHOTO PROVIDED BY TODD THURNAU OF RED DOT CORP. MEMBER SIZES FOR THE STAIR/LANDING ASSEMBLY THAT ARE ATTACHED TO THE MEZZANINE ARE ASSUMED FROM THIS PHOTO. MEMBER MEASUREMENTS THAT WERE PROVIDED TO AHBL ARE AS FOLLOWS:

Dylan,

The tread is 36" x 11".

The stringer is 3.5" x 10" and has a 110" rise.

The landing at the top is 36" x 108" with (2) 4x4 steel posts holding up the end that is not attached to the mezzanine.

Hopefully that is clear. Let me know if you have other questions.

Thanks,

Todd T.
Operations Support Manager

Project RED DOT MEZZ | Project No. 2220760.20 | ☐ Page 1 of 6
Subject DES. CRITERIA | Phone | ☒ Calculations
With/To | Fax # | ☐ Fax
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Date | By DMS | ☐ Meeting Minutes
☐ Telephone Memo

AHBL

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Landscape Architects
Community Planners
Land Surveyors

RED DOT MEZZANINE: PUYALLUP FROM TUKWILA

NEW ADDRESS: 2504 E MAIN ST
PUYALLUP, WA, 98372

IBC 2021

DL= ACTUAL CL= 0.25 + GUARDRAIL LOAD
LL= 100 PSF (DOWN FROM 150 PSF STORAGE)

WIND CRITERIA: NOT APPLICABLE BECAUSE INDOORS

SEISMIC CRITERIA:
S_S = 1.258
S_1 = 0.433
S_{DS} = 0.839
S_{D1} = 0.539

GROUP = I DESIGN CATEGORY = D

COLLATERAL DEAD LOAD FROM GRATING:
1"x 3/16" BAR ASSUMED 19-P-4 B/C HEAVIER
→ 8.1 PSF

GUARDRAIL DEAD LOAD:

A) (HSS2x2x3/16) TS2x2x.188 42" TALL @ 6' O.C = 4.32 lb/ft (3½ FT)
B) (PL½"x4"x CONT) 4" FORMED KICK PL CONT (ASSUMED ½") = 4/12 * 20.42 lb/ft²
C) (3) CONT. 1¼" SCHED 40 PIPE = (3) 2.27 lb/ft

A) 4.32 lb/ft (3½ ft) = 15.4 lb/ft / 6ft SPACING = 2.6 lb/ft PERIM
B) 4/12 * 20.42 lb/ft² = 6.9 lb/ft
C) (3) CONT * 2.27 lb/ft = 6.81 lb/ft

∴ PERIM CL = 16.31 lb/ft

CL GRATING = 8.1 PSF AREA OF PLATFORM + 1.0 ALLOWANCE = 9.1 PSF

PER PHONE CALL, HANGING "STUFF" NOT HANGING ANYMORE

Project: LED DOT | Project No.: 22207760.20 | ☐ Page 2 of 6

Subject: SEISMIC LOADING | Phone: | ☐ Calculations

With/To: | Fax #: | ☐ Fax

Address: | # Faxed Pages: | ☐ Memorandum

Date: | By: DMS | ☐ Meeting Minutes | ☐ Telephone Memo

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CHAPTER 12 SEISMIC LOADS: MAIN MEZZANINE

$C_s = \frac{S_{DS}}{(R/I)} = 0.239$

$S_{DS} = 0.839$ $\Omega = 3$

$R = 3\frac{1}{2}$ (STEEL ORDINARY MOMENT FRAME)

$I = 1.0$

$V = C_s W = 5.5^{k}$

$W_p = 22.8^{k}$ (PER RISA) → INCLUDES 25 PSF STORAGE LOAD (PER ASCE 7-16 SEC 12.7.2)

CHAPTER 13 SEISMIC LOADS: ATTACHED STAIRS

$F_p = \frac{0.4 a_p S_{DS} W_p}{(R_p/I_p)} \left(1 + 2\left(\frac{z}{h}\right)\right) =$ { 1.65^{k} FOR MAIN STAIR; 4.127^{k} FOR FASTENERS TO CONC }

$W_p = 4015^{lb}$ (4.1^{k})

$a_p = 1$ (2½ FOR FASTENERS TO CONC) TABLE 13.5-1

$S_{DS} = 0.839$

$R_p = 2\frac{1}{2}$ (TABLE 13.5-1)

$I_p = 1.0$ (SEC 13.1.3)

$\Omega = 2$ (2½ FOR FASTENERS TO CONC.) → TABLE 13.5-1

$z/h = 1.0$

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PER RISA, THE CURRENT CONFIGURATION OF MEZZANINE IS OKAY.

SLAB CHECK: 6" SLAB

NON Σ { LRFD VERTICAL LOAD: 21727 lb (LC 9) → NOT CONC W/ LATERAL −1520 UPLIFT
LRFD LATERAL LOAD: 1300 x (LC 17) ⇝ (z = 60 lb) → LC 17 CONTROLS
900 z (LC 22) ⇝ (x = 600 lb) }

Σ { LRFD VERT LOAD: 12350 lb (LC 25) → NOT CONC W LAT + 4318 lb UPLIFT
LRFD LAT LOAD: 3425 lb (LC 29) (203 lb z −2134 UPLIFT)
2827 lb (LC 26) (60 lb x ~~0~~ UPLIFT) }

ASD FOR SLAB AS FTG:

x: 916 lb
y: 14120 lb (−635 lb UPLIFT)
z: 992 lb

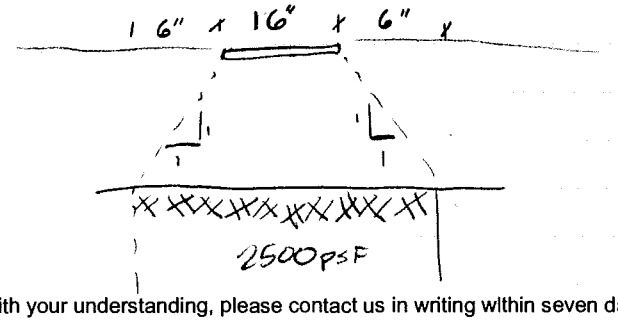
→ DL = 2237 lb
LL = 11879 lb

SLAB AS FTG CHECK

SLAB AS FTG CHECK: ASD NO Σ ONLY NEEDS TO BE CHECKED FOR VERT COMPRESSION.

CONC = 3000psf.

BEARING: 16"x16" BASEPLATE



$\frac{P}{A}$ MUST BE > 2500 PSF

P = 14120 lb
A = 2 1/3 ft x 2 1/3 ft
= 5.44 ft²
14120 lb / 5.44 ft² 2595 psf
3.8% OVER UNITY FOR SOIL OK

SEE ENERCALC FOR ANALYSIS

Project Title: Red Dot Mezzanine
Engineer: DMS
Project ID: 222076.20
Project Descr: Mezzanine Relocation

Point Load on Slab

Project File: Red Dot Mezzanine.ec6

DESCRIPTION: Point Load on Slab Typical Frame

Code References

Calculations per IBC 2021, ASCE 7-16
Load Combinations Used : ASCE 7-16

Analytical Values

d - Slab Thickness	6.0 in	Ks - Soil Modulus of Subgrade Reac	100.0 pci
FS - Req'd Factor of Safety	3.0 : 1	Ec - Concrete Elastic Modulus	3,122.0 ksi
		f'c - Concrete Compressive Strength	3.0 ksi
		μ - Poisson's Ratio	0.150
		Min. Adjacent Load Distance	41.304 in

Analysis Formulas

Pn = 1.72 [(Ks R1 / Ec) 10,000 + 3.6] Fr d′

Ks = Soil modulus of subgrade reaction
R1 = 50% plate average dimension = sqrt(PlWid * PlLer
Ec = Concrete elastic modulus
Fr - Concrete modulus of rupture = 7.5 * sqrt(f'c)
d - Slab Thickness

Min Adjacent Column Distance = 1.5 * ([Ec d^3 / (12 * (1- u^2) Ks] ^ 1

Ec = Concrete elastic modulus
d - Slab Thickness
u - Poisson's ratio
Ks = Soil modulus of subgrade reaction

Load & Capacity Table

Load ID	Plate (in) Wid	Len	R1 (in)	Applied Concentrated Load on Plate - (kip) D	Lr	L	S	W	E	Governing Ld Comb	Pu (kip)	Pn (kip)	Check
Total Load	12.00	12.00	6.00	0.22		11.88				+D+L	12.1	140.5	Pass, FS=11.61 >= 3

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Subject ANCHORAGE | Phone | ☑ Calculations
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ANCHORAGE CHECK:

SL W/ 12x12 W/ 3 ANCHOR WORST CASE

LRFD SL y = +12350/-4318 UPLIFT (NOT CONC W/ LAT)
x = 2492 lb
z = 13 lb

x = 3425 lb
y = -2134 lb } CONCURRENT
z = 203 lb

BOTH CONDITIONS OKAY: SEE SIMPSON
(UPLIFT & LAT)

STAIR ANCHORAGE:

SL LAT LRFD
x: 3890 lb (LC 25 w/ y = 3110 lb comp z = 12 lb)
y: 3110 lb
z: 776 lb (LC 26 w/ x = 500 lb y = 493 lb comp)

SL UPLIFT LRFD
x: -3686 lb
y: -1816 lb (LC 27)
z: 8 lb

ASD BOTTOM STAIRS

$\frac{P}{A}$ > 2500psf

y: FOR SLAB AS FTG: 1629 lb

SLAB AS FTG

BASEPLATE = ASSUMED TO BE AN L4x3x0'-8" LLV

∴ FOOTPRINT = 3"+6"+6" = 15" } A = 2.08 FT²
8"+6"+6" = 20"

OK, NO FURTHER CHECK REQUIRED

If this does not meet with your understanding, please contact us in writing within seven days. THANK YOU.

Model Settings

Number of Reported Sections	5
Number of Internal Sections	100
Member Area Load Mesh Size (in^2)	9
Consider Shear Deformation	Yes
Consider Torsional Warping	Yes
Approximate Mesh Size (in)	24
Transfer Forces Between Intersecting Wood Walls	Yes
Increase Wood Wall Nailing Capacity for Wind Loads	Yes
Include P-Delta for Walls	Yes
Optimize Masonry and Wood Walls	Yes
Maximum Number of Iterations	3
Single	No
Multiple (Optimum)	Yes
Maximum	No

Global Axis corresponding to vertical direction	Y
Convert Existing Data	Yes
Default Global Plane for z-axis	XZ
Plate Local Axis Orientation	Global

Hot Rolled Steel	AISC 15th (360-16): LRFD
Stiffness Adjustment	Yes (Iterative)
Notional Annex	None
Connections	AISC 15th (360-16): LRFD
Cold Formed Steel	AISI S100-20: LRFD
Stiffness Adjustment	Yes (Iterative)
Wood	AWC NDS-18 / SDPWS-21 LRFD
Temperature	< 100F
Concrete	ACI 318-19 (22)
Masonry	TMS 402-16: Strength
Aluminum	AA ADM1-20: LRFD
Structure Type	Building
Stiffness Adjustment	Yes (Iterative)
Stainless	AISC 14th (360-10): LRFD
Stiffness Adjustment	Yes (Iterative)

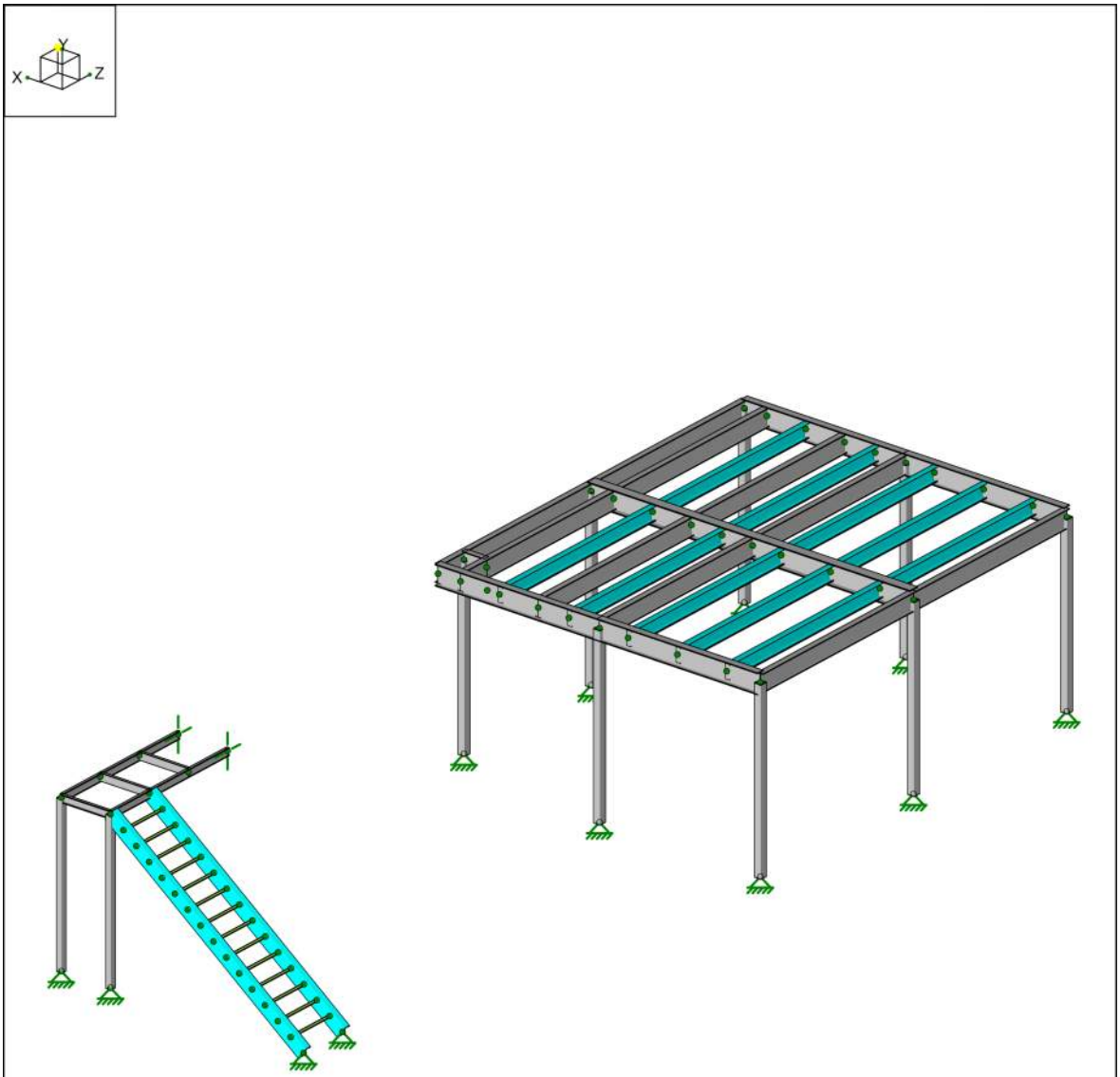
Compression Stress Block	Rectangular Stress Block
Analyze using Cracked Sections	Yes
Leave room for horizontal rebar splices (2*d bar spacing)	No
List forces which were ignored for design in the Detail Report	Yes

Column Min Steel	1
Column Max Steel	8
Rebar Material Spec	ASTM A615
Warn if beam-column framing arrangement is not understood	No
Number of Shear Regions	4
Region 2 & 3 Spacing Increase Increment (in)	4

Code	ASCE 7-16
Risk Category	I or II
Drift Cat	Other

Model Settings (Continued)

Base Elevation (ft)	
Include the weight of the structure in base shear calcs	Yes
S_1 (g)	0.433
SD_1 (g)	0.539
SD_s (g)	0.839
T_L (sec)	5
T Z (sec)	6
T X (sec)	6
C_tZ	0.02
C_tX	0.02
C_tExp. Z	0.75
C_tExp. X	0.75
R Z	3.5
R X	3.5
Ω_0Z	3
Ω_0X	3
C_dZ	3
C_dX	3
ρ Z	1
ρ X	1



RISA	<Licensed Company>	Red Dot Mezzanine	SK-1
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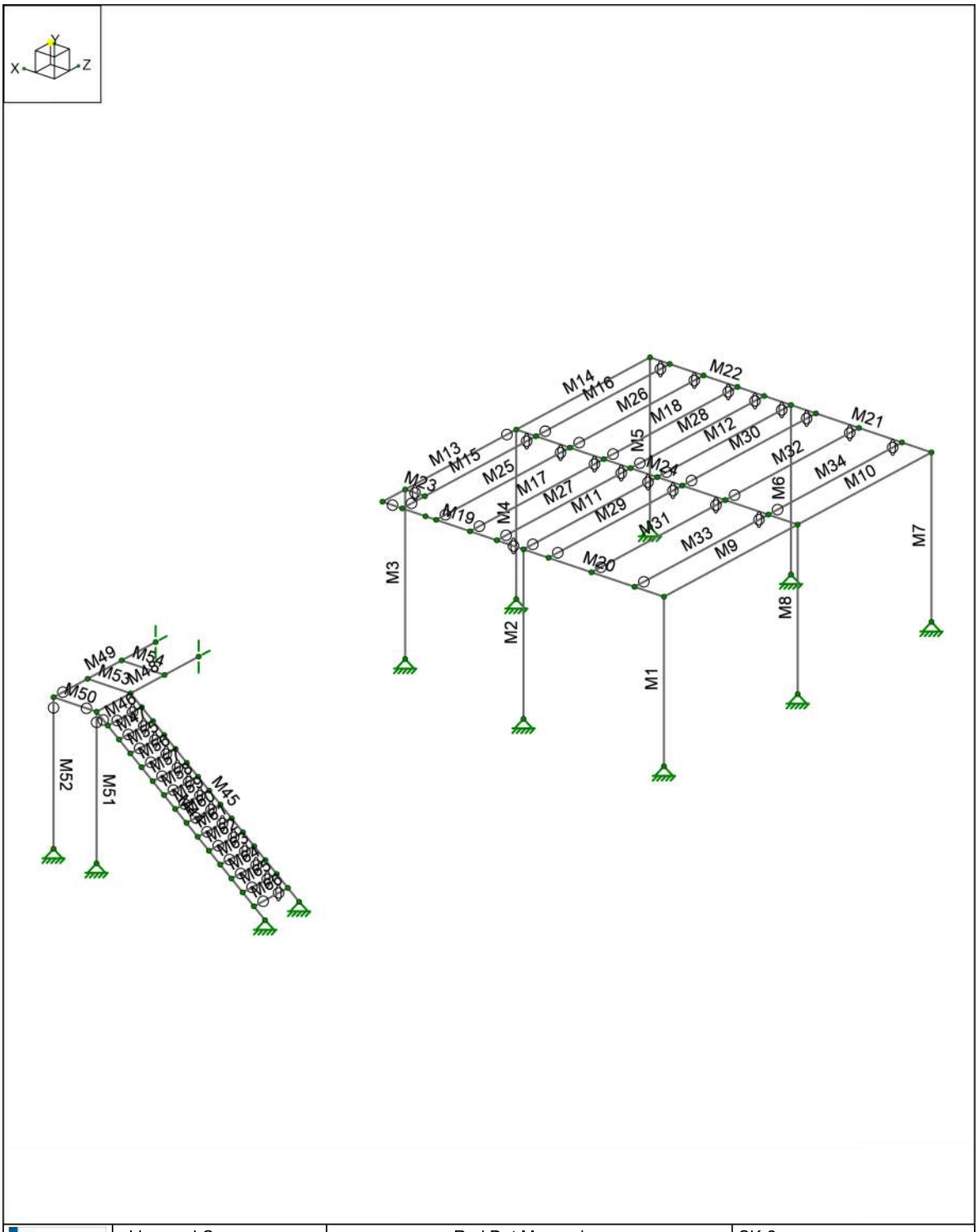

RISA	<Licensed Company>	Red Dot Mezzanine	SK-2
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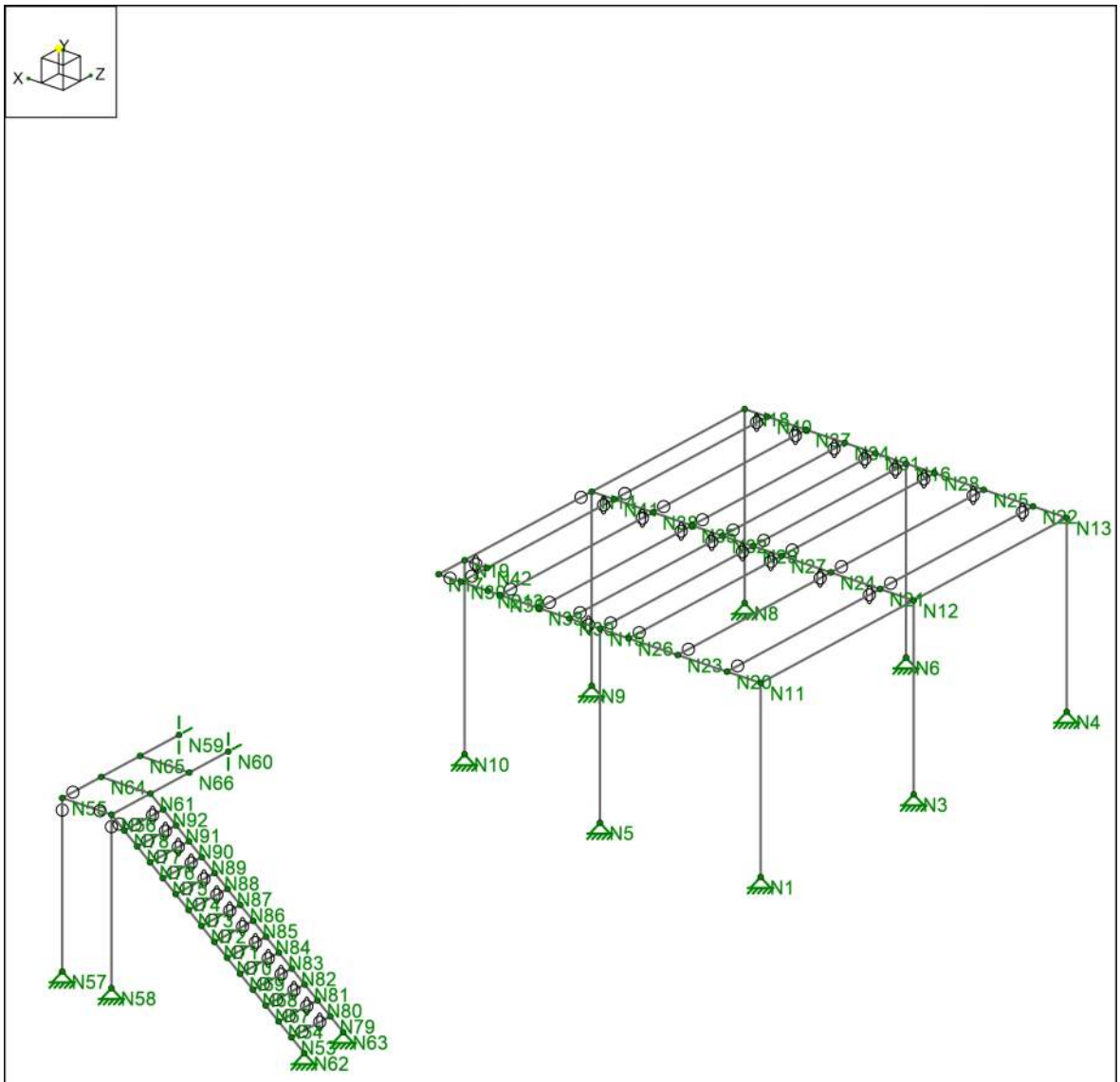

RISA	<Licensed Company>	Red Dot Mezzanine	SK-3
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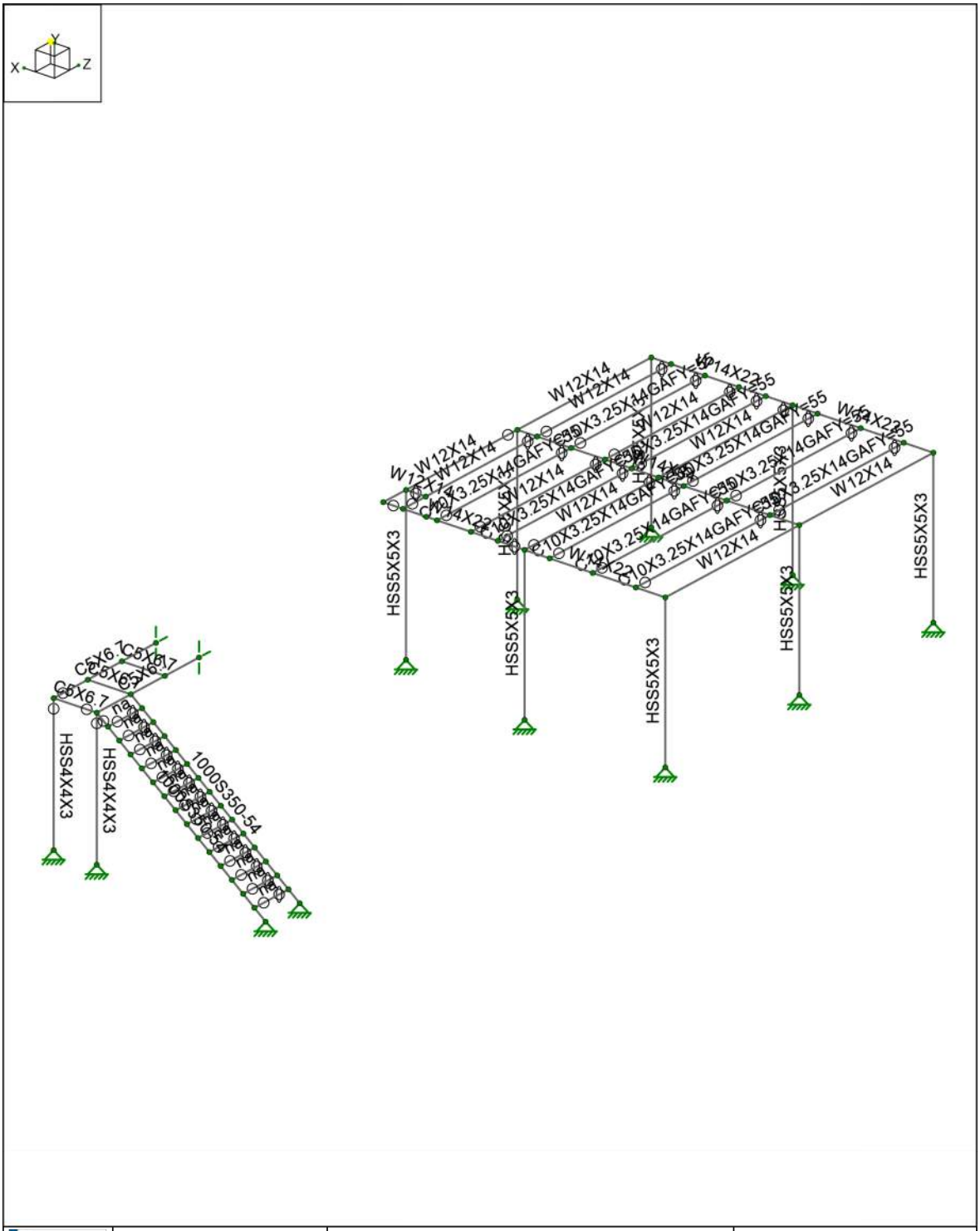

RISA	<Licensed Company>	Red Dot Mezzanine	SK-4
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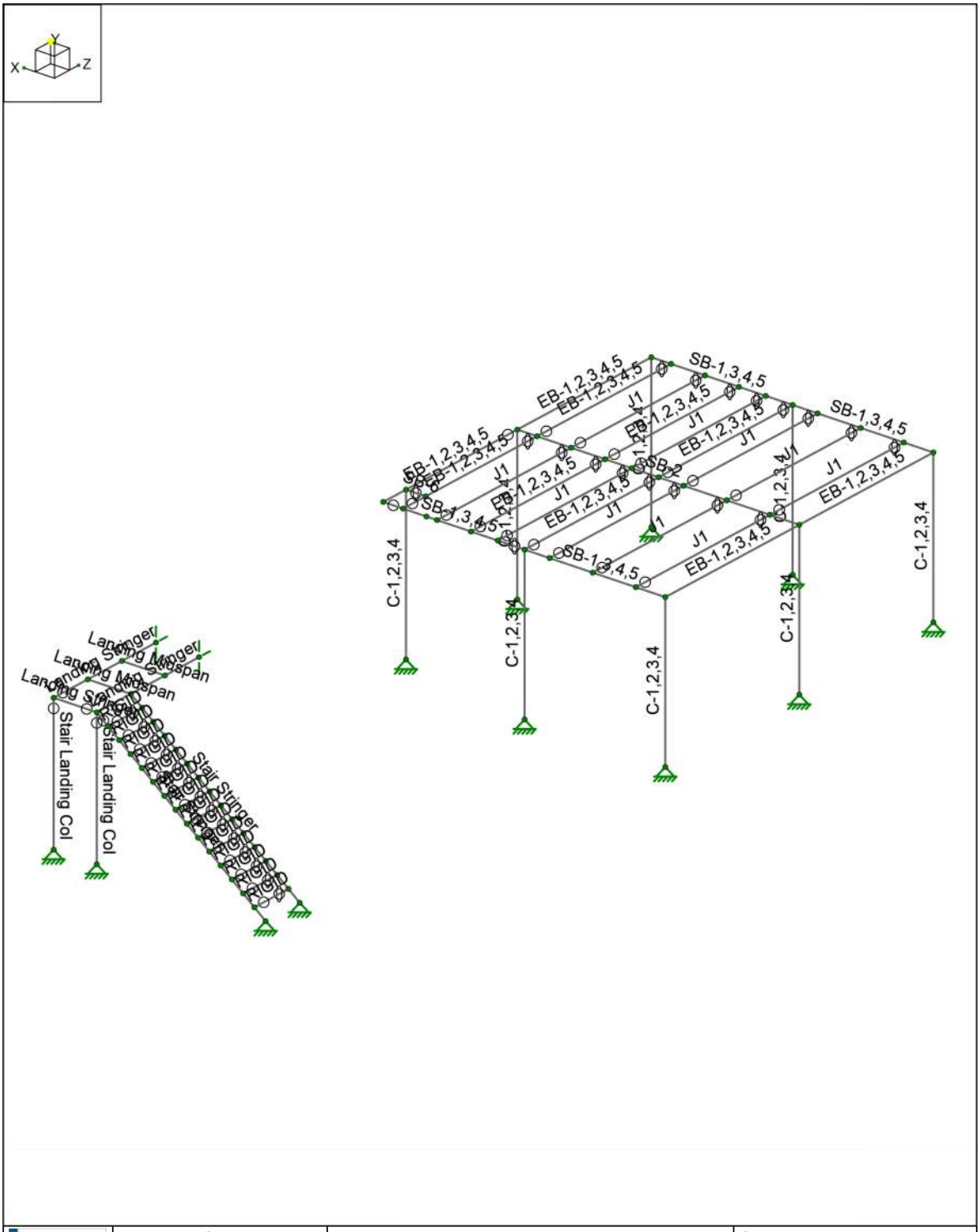

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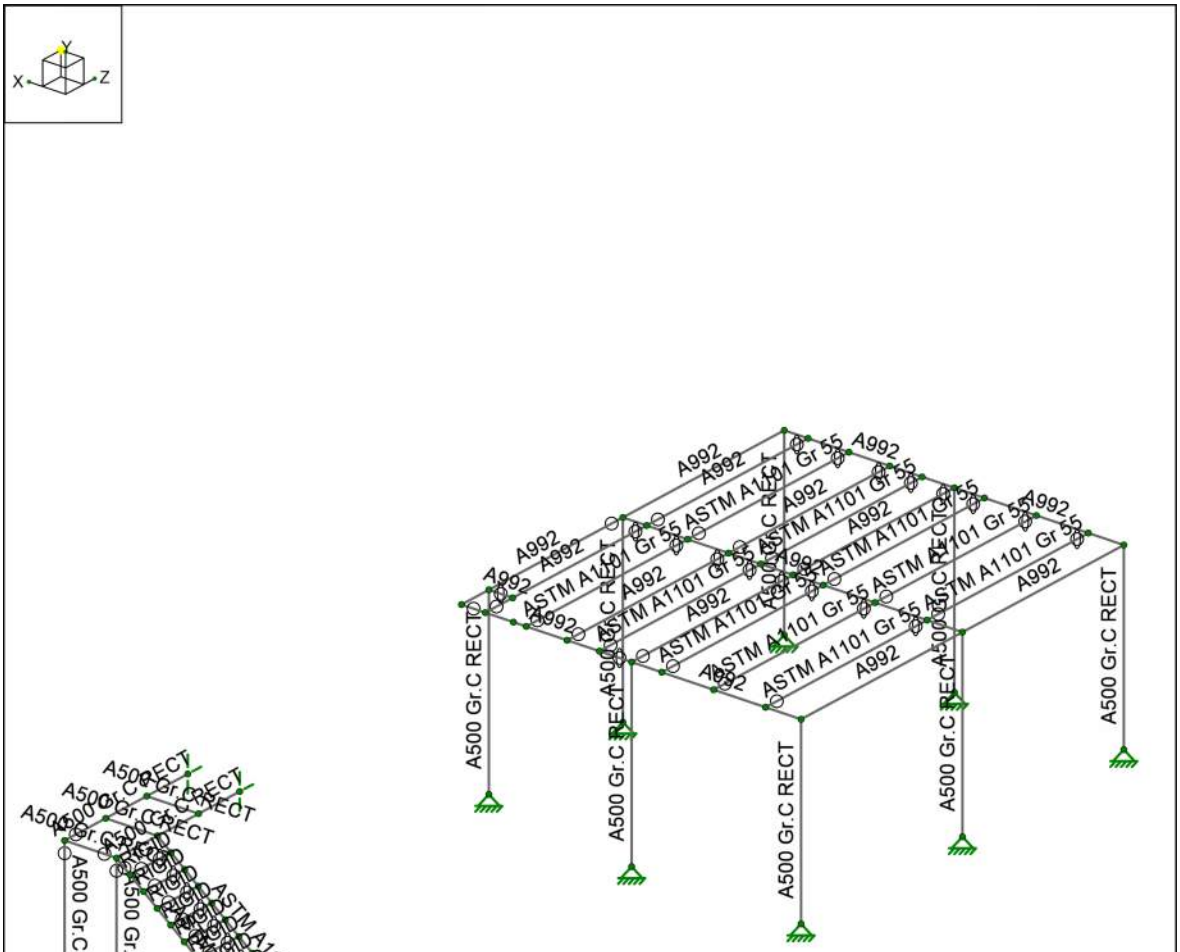

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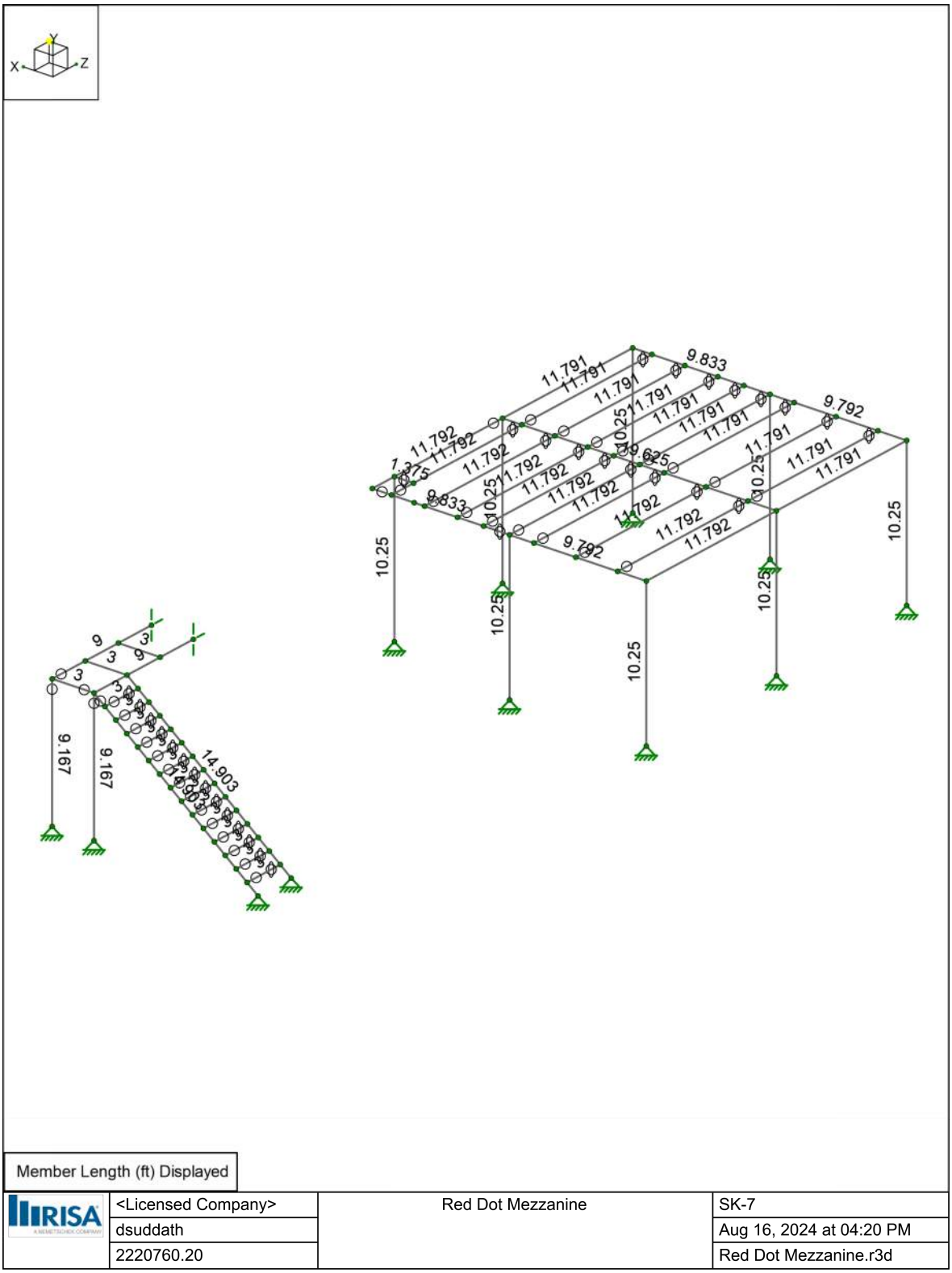

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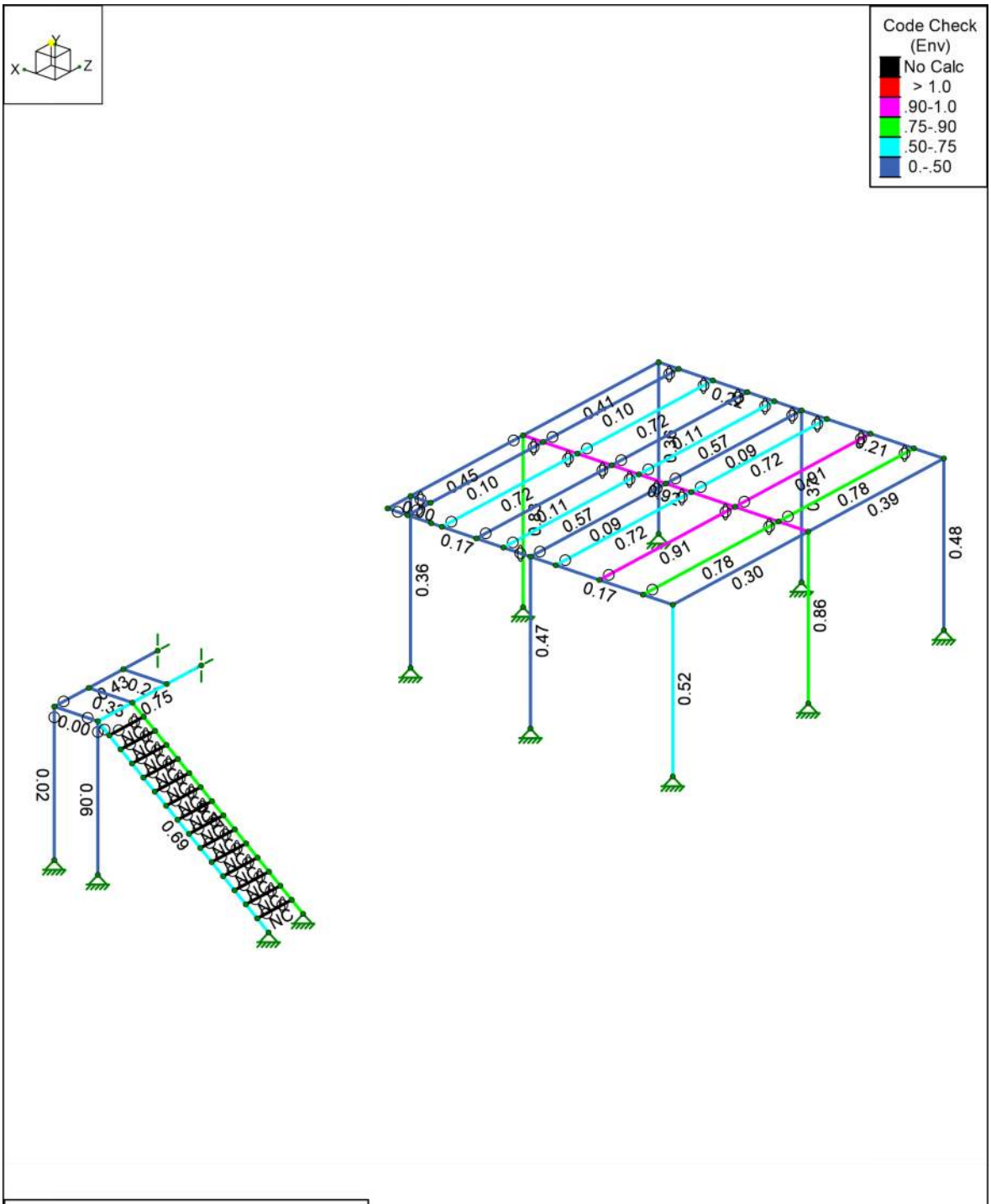
Code Check
(Env)
No Calc
> 1.0
.90-1.0
.75-.90
.50-.75
0.-.50
Member Code Checks Displayed (Enveloped)
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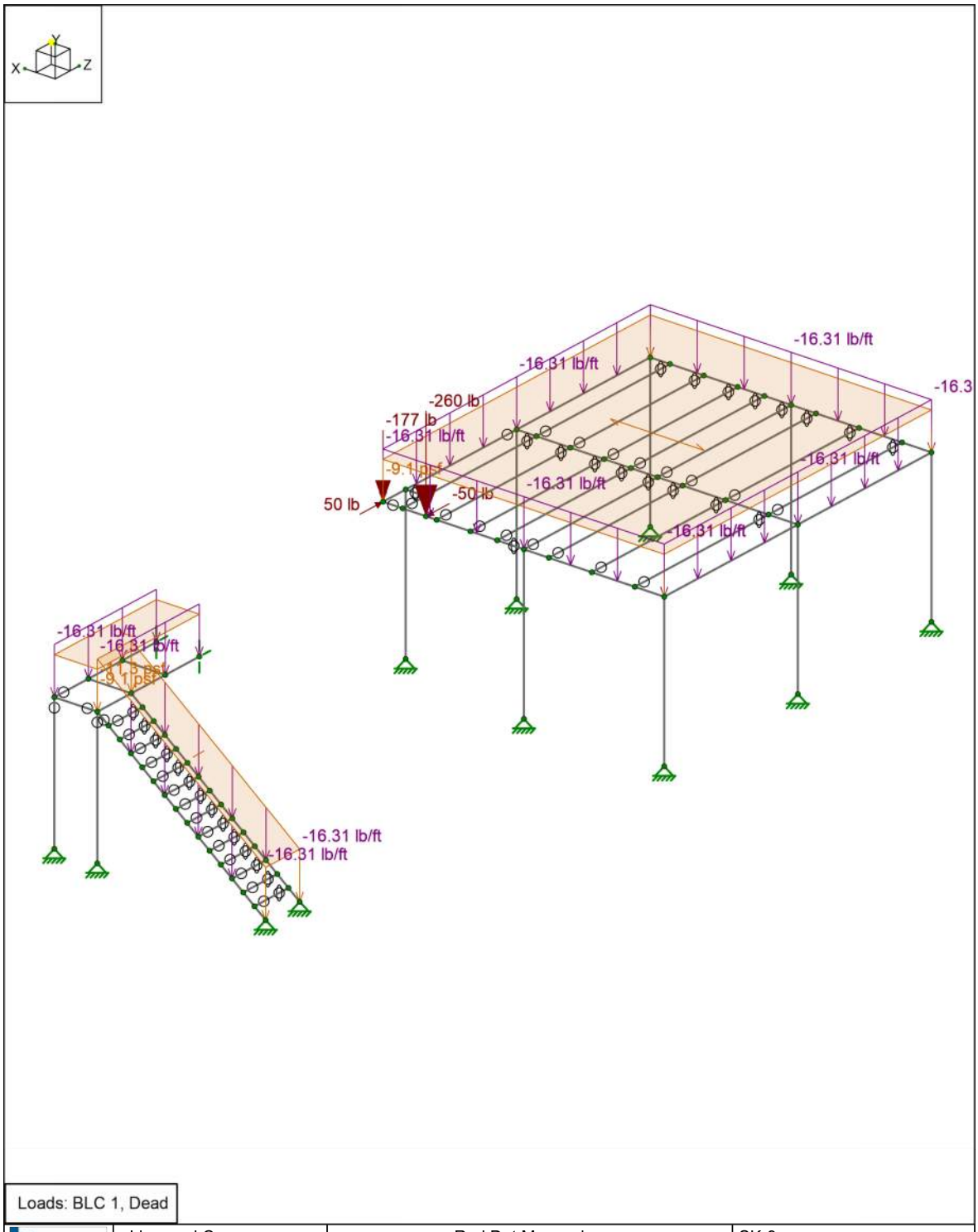
dsuddath
2220760.20
Red Dot Mezzanine
SK-8
Aug 16, 2024 at 04:21 PM
Red Dot Mezzanine.r3d



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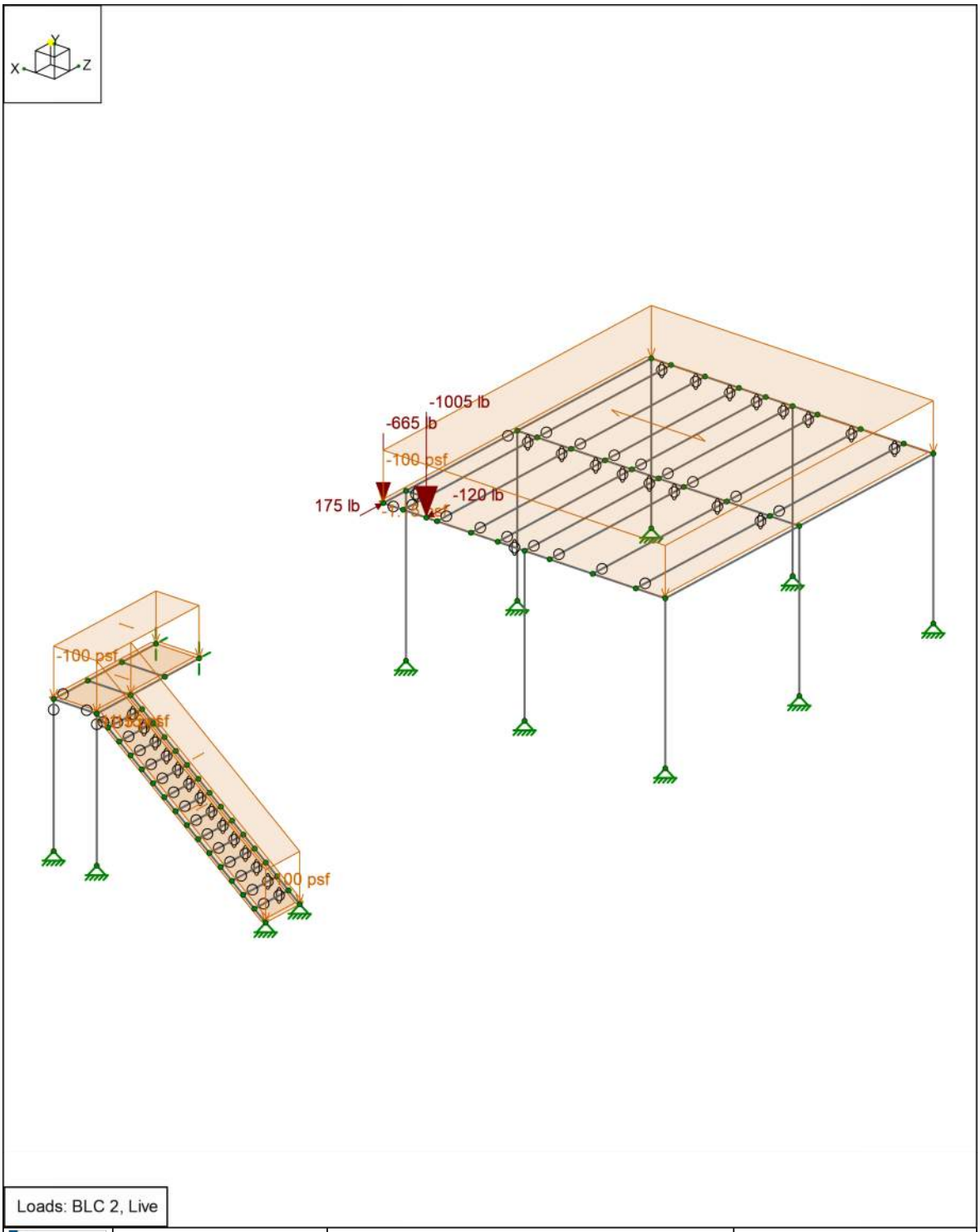

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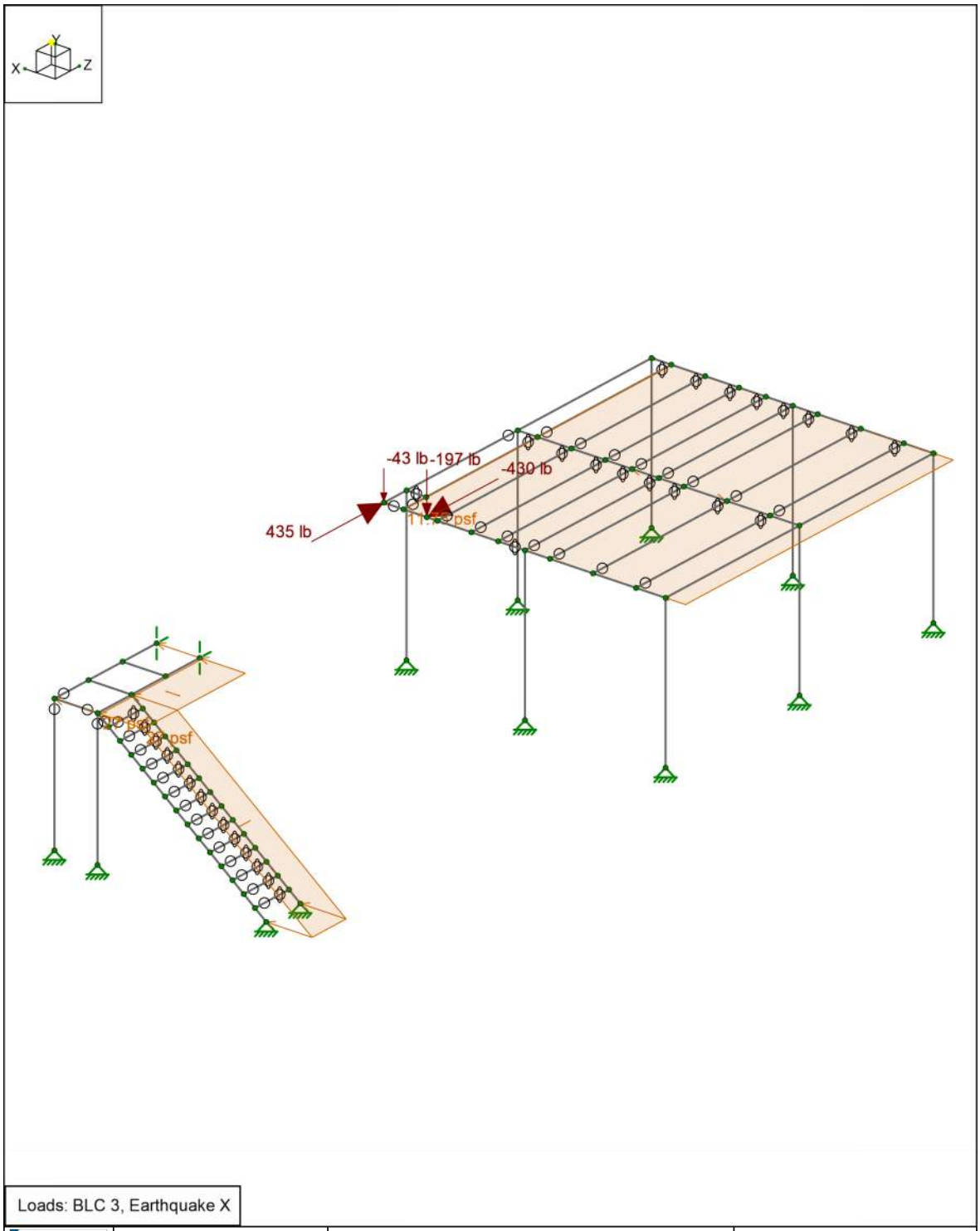
	2220760.20		Red Dot Mezzanine.r3d



Loads: BLC 3, Earthquake X

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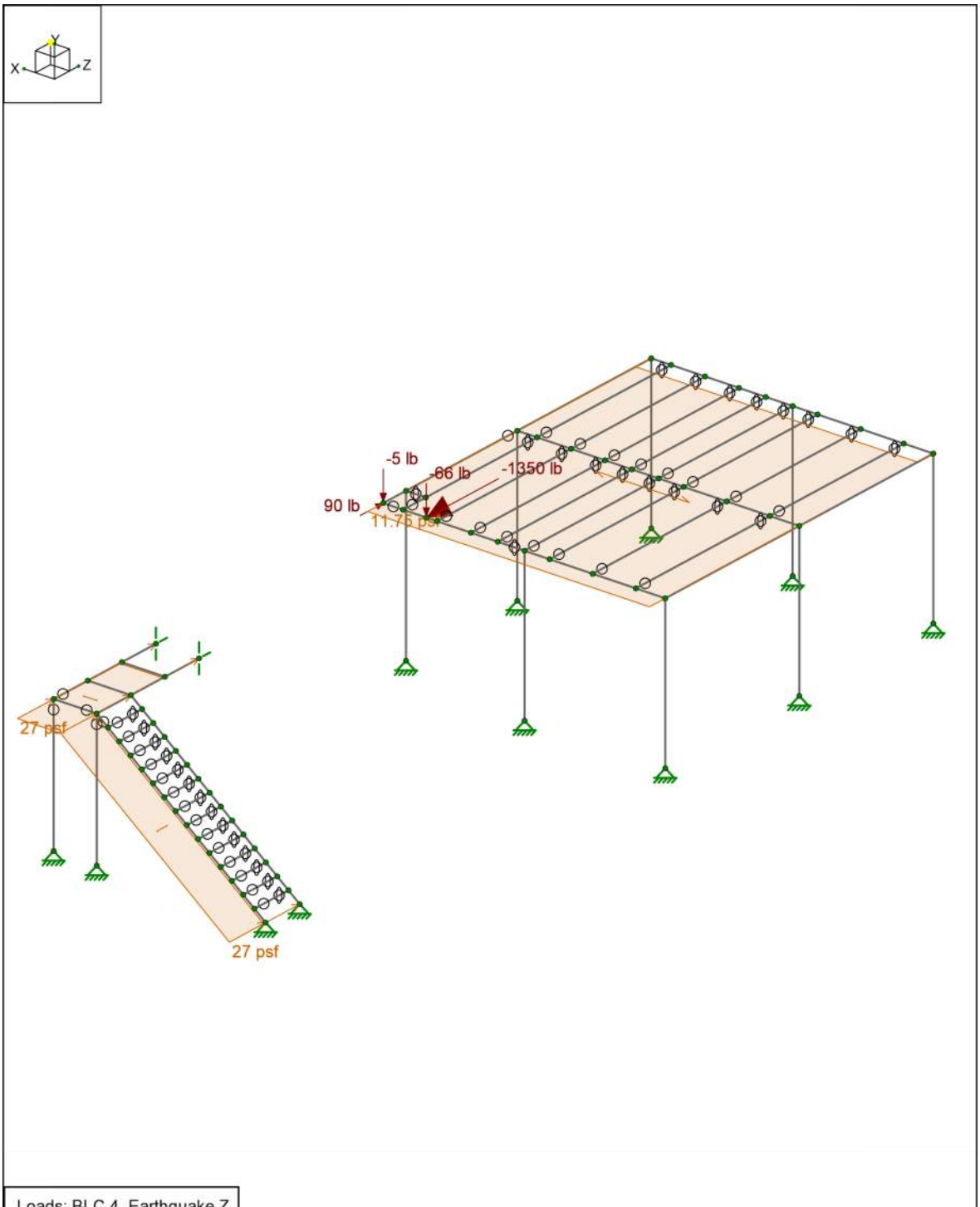

Loads: BLC 4, Earthquake Z

RISA	<Licensed Company>	Red Dot Mezzanine	SK-12
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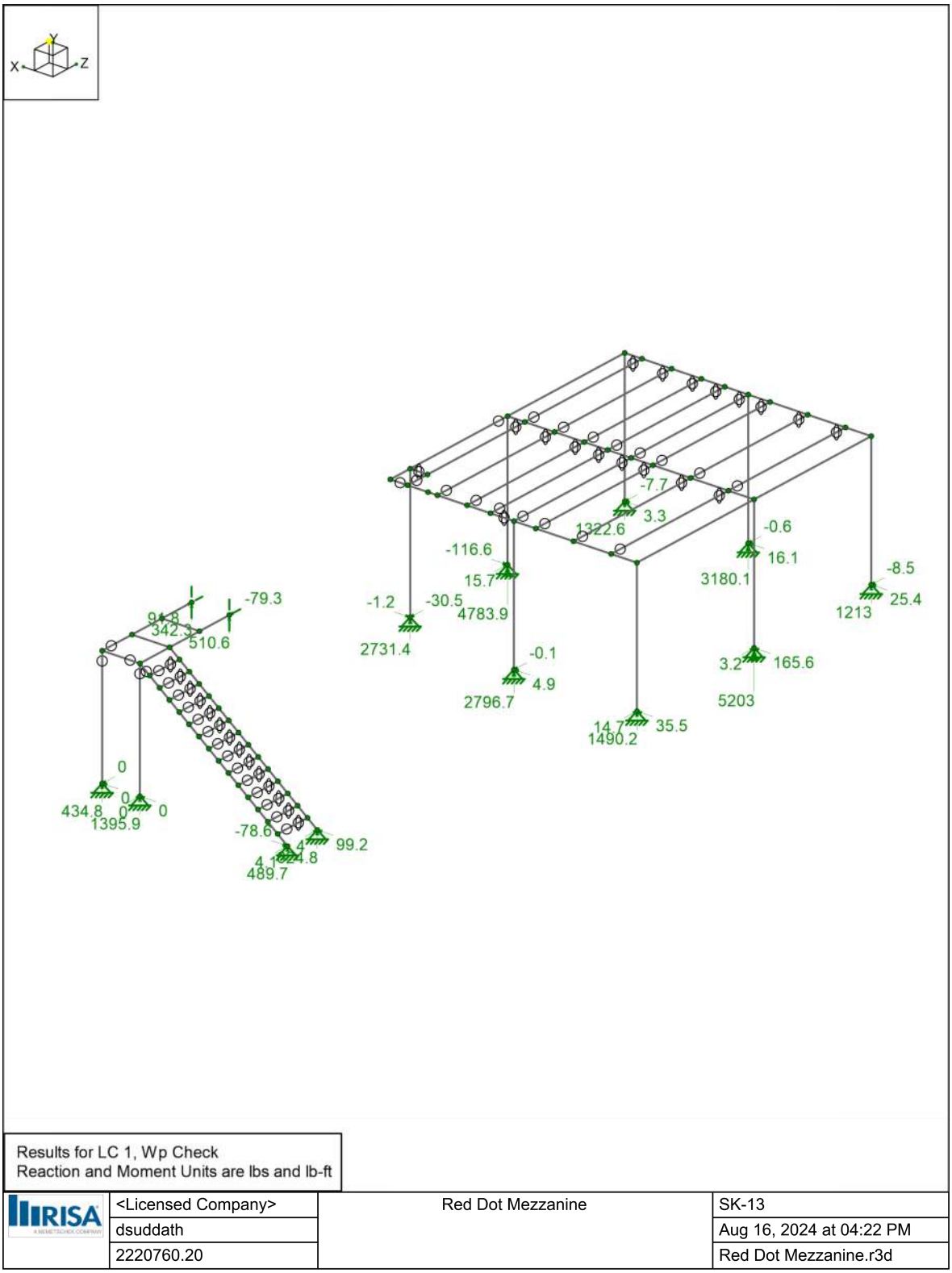

Y
X
Z
-7.7
3.3
1322.6
-116.6
15.7
-0.6
16.1
3180.1
-8.5
25.4
1213
-1.2
-30.5
4783.9
2731.4
-0.1
4.9
2796.7
3.2
165.6
5203
14.7
35.5
1490.2
-79.3
510.6
0
434.8
0
0
1395.9
-78.6
99.2
4
4.8
489.7
Results for LC 1, Wp Check
Reaction and Moment Units are lbs and lb-ft
<Licensed Company>
dsuddath
2220760.20
Red Dot Mezzanine
SK-13
Aug 16, 2024 at 04:22 PM
Red Dot Mezzanine.r3d

Node Coordinates

	Label	X [ft]	Y [ft]	Z [ft]	Detach From Diaphragm
1	N1	0	0	0	
2	N3	0	0	11.792	
3	N4	0	0	23.583	
4	N9	19.625	0	11.792	
5	N5	9.792	0	0	
6	N6	9.792	0	23.583	
7	N8	19.625	0	23.583	
8	N10	19.625	0	2	
9	N11	0	10.25	0	
10	N12	0	10.25	11.792	
11	N13	0	10.25	23.583	
12	N14	19.625	10.25	11.792	
13	N15	9.792	10.25	0	
14	N16	9.792	10.25	23.583	
15	N17	19.625	10.25	0	
16	N18	19.625	10.25	23.583	
17	N19	19.625	10.25	2	
18	N20	2.052	10.25	0	
19	N21	2.052	10.25	11.792	
20	N22	2.052	10.25	23.583	
21	N23	5.052	10.25	0	
22	N24	5.052	10.25	11.792	
23	N25	5.052	10.25	23.583	
24	N26	8.052	10.25	0	
25	N27	8.052	10.25	11.792	
26	N28	8.052	10.25	23.583	
27	N29	9.792	10.25	11.792	
28	N30	11.657	10.25	0	
29	N31	11.657	10.25	23.583	
30	N32	11.656	10.25	11.792	
31	N33	13.521	10.25	0	
32	N34	13.521	10.25	23.583	
33	N35	13.521	10.25	11.792	
34	N36	15.886	10.25	0	
35	N37	15.886	10.25	23.583	
36	N38	15.885	10.25	11.792	
37	N39	18.25	10.25	0	
38	N40	18.25	10.25	23.583	
39	N41	18.25	10.25	11.792	
40	N42	18.25	10.25	2	
41	N55	19.625	9.167	-29	
42	N56	16.625	9.167	-29	
43	N57	19.625	0	-29	
44	N58	16.625	0	-29	
45	N59	19.625	9.167	-20	
46	N60	16.625	9.167	-20	
47	N61	16.625	9.167	-26	
48	N62	4.875	0	-29	
49	N63	4.875	0	-26	
50	N64	19.625	9.167	-26	
51	N65	19.625	9.167	-23	
52	N66	16.625	9.167	-23	
53	N53	5.658333	0.611133	-29	
54	N54	6.441667	1.222267	-29	
55	N67	7.225	1.8334	-29	

Node Coordinates (Continued)

	Label	X [ft]	Y [ft]	Z [ft]	Detach From Diaphragm
56	N68	8.008333	2.444533	-29	
57	N69	8.791667	3.055667	-29	
58	N70	9.575	3.6668	-29	
59	N71	10.358333	4.277933	-29	
60	N72	11.141667	4.889067	-29	
61	N73	11.925	5.5002	-29	
62	N74	12.708333	6.111333	-29	
63	N75	13.491667	6.722467	-29	
64	N76	14.275	7.3336	-29	
65	N77	15.058333	7.944733	-29	
66	N78	15.841667	8.555867	-29	
67	N79	5.658333	0.611133	-26	
68	N80	6.441667	1.222267	-26	
69	N81	7.225	1.8334	-26	
70	N82	8.008333	2.444533	-26	
71	N83	8.791667	3.055667	-26	
72	N84	9.575	3.6668	-26	
73	N85	10.358333	4.277933	-26	
74	N86	11.141667	4.889067	-26	
75	N87	11.925	5.5002	-26	
76	N88	12.708333	6.111333	-26	
77	N89	13.491667	6.722467	-26	
78	N90	14.275	7.3336	-26	
79	N91	15.058333	7.944733	-26	
80	N92	15.841667	8.555867	-26	
81	N213	16.625	10.25	0	

Node Boundary Conditions

	Node Label	X [lb/in]	Y [lb/in]	Z [lb/in]
1	N5	Reaction	Reaction	Reaction
2	N3	Reaction	Reaction	Reaction
3	N9	Reaction	Reaction	Reaction
4	N8	Reaction	Reaction	Reaction
5	N6	Reaction	Reaction	Reaction
6	N4	Reaction	Reaction	Reaction
7	N1	Reaction	Reaction	Reaction
8	N10	Reaction	Reaction	Reaction
9	N57	Reaction	Reaction	Reaction
10	N58	Reaction	Reaction	Reaction
11	N62	Reaction	Reaction	Reaction
12	N63	Reaction	Reaction	Reaction
13	N60		Reaction	Reaction
14	N59		Reaction	Reaction

Hot Rolled Steel Properties

	Label	E [psi]	G [psi]	Nu	Therm. Coeff. [1e^{5}°F^{-1}]	Density [lb/ft^{3}]	Yield [psi]	Ry	Fu [psi]	Rt
1	A992	2.9e+7	1.115e+7	0.3	0.65	490	50000	1.1	65000	1.1
2	A36 Gr.36	2.9e+7	1.115e+7	0.3	0.65	490	36000	1.5	58000	1.2
3	A572 Gr.50	2.9e+7	1.115e+7	0.3	0.65	490	50000	1.1	65000	1.1
4	A500 Gr.B RND	2.9e+7	1.115e+7	0.3	0.65	527	42000	1.4	58000	1.3
5	A500 Gr.B RECT	2.9e+7	1.115e+7	0.3	0.65	527	46000	1.4	58000	1.3
6	A500 Gr.C RND	2.9e+7	1.115e+7	0.3	0.65	527	46000	1.4	62000	1.3
7	A500 Gr.C RECT	2.9e+7	1.115e+7	0.3	0.65	527	50000	1.4	62000	1.3

Hot Rolled Steel Properties (Continued)

	Label	E [psi]	G [psi]	Nu	Therm. Coeff. [1e⁵°F⁻¹]	Density [lb/ft³]	Yield [psi]	Ry	Fu [psi]	Rt
8	A53 Gr.B	2.9e+7	1.115e+7	0.3	0.65	490	35000	1.6	60000	1.2
9	A1085	2.9e+7	1.115e+7	0.3	0.65	490	50000	1.4	65000	1.3
10	A913 Gr.65	2.9e+7	1.115e+7	0.3	0.65	490	65000	1.1	80000	1.1

Cold Formed Steel Properties

	Label	E [psi]	G [psi]	Nu	Therm. Coeff. [1e⁵°F⁻¹]	Density [lb/ft³]	Yield [psi]	Fu [psi]
1	A653 SS Gr33	2.95e+7	1.135e+7	0.3	0.65	490	33000	45000
2	A653 SS Gr50/1	2.95e+7	1.135e+7	0.3	0.65	490	50000	65000
3	ASTM A1101 Gr 55	2.95e+7	1.135e+7	0.3	0.65	491	55000	70000

General Materials Properties

	Label	E [psi]	G [psi]	Nu	Therm. Coeff. [1e⁵°F⁻¹]	Density [lb/ft³]	Plate Methodology
1	gen_Conc3NW	3.155e+6		0.15	0.6	145	Isotropic
2	gen_Conc4NW	3.644e+6		0.15	0.6	145	Isotropic
3	gen_Conc3LW	2.085e+6		0.15	0.6	109.999	Isotropic
4	gen_Conc4LW	2.408e+6		0.15	0.6	109.999	Isotropic
5	gen_Alum	1.01e+7		0.3	1.29	173	Isotropic
6	gen_Steel	2.9e+7		0.3	0.65	490	Isotropic
7	gen_Plywood	1.8e+6	38000	0	0.3	35	Isotropic
8	RIGID	1e+9		0.3	0	0	Isotropic
9	gen_Ortho				0.65	490	Orthotropic

Hot Rolled Steel Section Sets

	Label	Shape	Type	Design List	Material	Design Rule	Area [in²]	Iyy [in⁴]	Izz [in⁴]	J [in⁴]
1	EB-1,2,3,4,5	W12X14	Beam	Wide Flange	A992	Typical	4.16	2.36	88.6	0.07
2	SB-1,3,4,5	W14X22	Beam	Wide Flange	A992	Typical	6.49	7	199	0.208
3	SB-2	W14X34	Beam	Wide Flange	A992	Typical	10	23.3	340	0.569
4	SB-6	W12X14	Beam	Wide Flange	A992	Typical	4.16	2.36	88.6	0.07
5	C-1,2,3,4	HSS5X5X3	Column	Tube	A500 Gr.C RECT	Typical	3.28	12.6	12.6	19.9
6	Stair Landing Col	HSS4X4X3	Column	Tube	A500 Gr.C RECT	Typical	2.58	6.21	6.21	10
7	Landing Stringer	C5X6.7	Beam	Channel	A500 Gr.C RECT	Typical	1.97	0.47	7.48	0.055
8	Landing Midspan	C5X6.7	Beam	Channel	A500 Gr.C RECT	Typical	1.97	0.47	7.48	0.055

Cold Formed Steel Section Sets

	Label	Shape	Type	Design List	Material	Design Rule	Area [in²]	Iyy [in⁴]	Izz [in⁴]	J [in⁴]
1	J1	C10X3.25X14GAFY=55	Beam	CS	ASTM A1101 Gr 55	Typical	1.163	1.439	17.335	0.002
2	Stair Stringer	1000S350-54	Beam	CS	ASTM A1101 Gr 55	Typical	1.052	1.768	16.22	0.001

General Section Sets

	Label	Shape	Type	Material	Area [in²]	Iyy [in⁴]	Izz [in⁴]	J [in⁴]
1	GEN1	RE4X4	Beam	gen_Conc3NW	16	21.333	21.333	31.573
2	RIGID		None	RIGID	1e+6	1e+6	1e+6	1e+6

Member Primary Data

	Label	I Node	J Node	Section/Shape	Type	Design List	Material	Design Rule
1	M1	N1	N11	C-1,2,3,4	Column	Tube	A500 Gr.C RECT	Typical
2	M2	N5	N15	C-1,2,3,4	Column	Tube	A500 Gr.C RECT	Typical

Member Primary Data (Continued)

	Label	I Node	J Node	Section/Shape	Type	Design List	Material	Design Rule
3	M3	N10	N19	C-1,2,3,4	Column	Tube	A500 Gr.C RECT	Typical
4	M4	N9	N14	C-1,2,3,4	Column	Tube	A500 Gr.C RECT	Typical
5	M5	N8	N18	C-1,2,3,4	Column	Tube	A500 Gr.C RECT	Typical
6	M6	N6	N16	C-1,2,3,4	Column	Tube	A500 Gr.C RECT	Typical
7	M7	N4	N13	C-1,2,3,4	Column	Tube	A500 Gr.C RECT	Typical
8	M8	N3	N12	C-1,2,3,4	Column	Tube	A500 Gr.C RECT	Typical
9	M9	N11	N12	EB-1,2,3,4,5	Beam	Wide Flange	A992	Typical
10	M10	N12	N13	EB-1,2,3,4,5	Beam	Wide Flange	A992	Typical
11	M11	N15	N29	EB-1,2,3,4,5	Beam	Wide Flange	A992	Typical
12	M12	N29	N16	EB-1,2,3,4,5	Beam	Wide Flange	A992	Typical
13	M13	N17	N14	EB-1,2,3,4,5	Beam	Wide Flange	A992	Typical
14	M14	N14	N18	EB-1,2,3,4,5	Beam	Wide Flange	A992	Typical
15	M15	N39	N41	EB-1,2,3,4,5	Beam	Wide Flange	A992	Typical
16	M16	N41	N40	EB-1,2,3,4,5	Beam	Wide Flange	A992	Typical
17	M17	N33	N35	EB-1,2,3,4,5	Beam	Wide Flange	A992	Typical
18	M18	N35	N34	EB-1,2,3,4,5	Beam	Wide Flange	A992	Typical
19	M19	N15	N17	SB-1,3,4,5	Beam	Wide Flange	A992	Typical
20	M20	N11	N15	SB-1,3,4,5	Beam	Wide Flange	A992	Typical
21	M21	N13	N16	SB-1,3,4,5	Beam	Wide Flange	A992	Typical
22	M22	N16	N18	SB-1,3,4,5	Beam	Wide Flange	A992	Typical
23	M23	N42	N19	SB-6	Beam	Wide Flange	A992	Typical
24	M24	N12	N14	SB-2	Beam	Wide Flange	A992	Typical
25	M25	N36	N38	J1	Beam	CS	ASTM A1101 Gr 55	Typical
26	M26	N38	N37	J1	Beam	CS	ASTM A1101 Gr 55	Typical
27	M27	N30	N32	J1	Beam	CS	ASTM A1101 Gr 55	Typical
28	M28	N32	N31	J1	Beam	CS	ASTM A1101 Gr 55	Typical
29	M29	N26	N27	J1	Beam	CS	ASTM A1101 Gr 55	Typical
30	M30	N27	N28	J1	Beam	CS	ASTM A1101 Gr 55	Typical
31	M31	N23	N24	J1	Beam	CS	ASTM A1101 Gr 55	Typical
32	M32	N24	N25	J1	Beam	CS	ASTM A1101 Gr 55	Typical
33	M33	N20	N21	J1	Beam	CS	ASTM A1101 Gr 55	Typical
34	M34	N21	N22	J1	Beam	CS	ASTM A1101 Gr 55	Typical
35	M44	N62	N56	Stair Stringer	Beam	CS	ASTM A1101 Gr 55	Typical
36	M45	N63	N61	Stair Stringer	Beam	CS	ASTM A1101 Gr 55	Typical
37	M48	N56	N60	Landing Stringer	Beam	Channel	A500 Gr.C RECT	Typical
38	M49	N55	N59	Landing Stringer	Beam	Channel	A500 Gr.C RECT	Typical
39	M50	N55	N56	Landing Stringer	Beam	Channel	A500 Gr.C RECT	Typical
40	M51	N56	N58	Stair Landing Col	Column	Tube	A500 Gr.C RECT	Typical
41	M52	N55	N57	Stair Landing Col	Column	Tube	A500 Gr.C RECT	Typical
42	M53	N61	N64	Landing Midspan	Beam	Channel	A500 Gr.C RECT	Typical
43	M54	N66	N65	Landing Midspan	Beam	Channel	A500 Gr.C RECT	Typical
44	M46	N78	N92	RIGID	None	None	RIGID	Typical
45	M47	N77	N91	RIGID	None	None	RIGID	Typical
46	M55	N76	N90	RIGID	None	None	RIGID	Typical
47	M56	N75	N89	RIGID	None	None	RIGID	Typical
48	M57	N74	N88	RIGID	None	None	RIGID	Typical
49	M58	N73	N87	RIGID	None	None	RIGID	Typical
50	M59	N72	N86	RIGID	None	None	RIGID	Typical
51	M60	N71	N85	RIGID	None	None	RIGID	Typical
52	M61	N70	N84	RIGID	None	None	RIGID	Typical
53	M62	N69	N83	RIGID	None	None	RIGID	Typical
54	M63	N68	N82	RIGID	None	None	RIGID	Typical
55	M64	N67	N81	RIGID	None	None	RIGID	Typical
56	M65	N54	N80	RIGID	None	None	RIGID	Typical
57	M66	N53	N79	RIGID	None	None	RIGID	Typical

Node Loads and Enforced Displacements (BLC 1 : Dead)

	Node Label	L, D, M	Direction	Magnitude [(lb, lb-ft), (in, rad), (lb*s²/ft, lb*s²*ft)]
1	N17	L	Y	-177
2	N213	L	Y	-260
3	N17	L	Z	50
4	N213	L	Z	-50

Node Loads and Enforced Displacements (BLC 2 : Live)

	Node Label	L, D, M	Direction	Magnitude [(lb, lb-ft), (in, rad), (lb*s²/ft, lb*s²*ft)]
1	N17	L	Y	-665
2	N213	L	Y	-1005
3	N17	L	Z	175
4	N213	L	Z	-120

Node Loads and Enforced Displacements (BLC 3 : Earthquake X)

	Node Label	L, D, M	Direction	Magnitude [(lb, lb-ft), (in, rad), (lb*s²/ft, lb*s²*ft)]
1	N17	L	Y	-43
2	N213	L	Y	-197
3	N17	L	Z	435
4	N213	L	Z	-430

Node Loads and Enforced Displacements (BLC 4 : Earthquake Z)

	Node Label	L, D, M	Direction	Magnitude [(lb, lb-ft), (in, rad), (lb*s²/ft, lb*s²*ft)]
1	N17	L	Y	-5
2	N213	L	Y	-66
3	N17	L	Z	90
4	N213	L	Z	-1350

Member Point Loads

No Data to Print...

Member Distributed Loads (BLC 1 : Dead)

	Member Label	Direction	Start Magnitude [lb/ft, F, psf, lb-ft/ft]	End Magnitude [lb/ft, F, psf, lb-ft/ft]	Start Location [(ft, %)]	End Location [(ft, %)]
1	M20	Y	-16.31	-16.31	0	%100
2	M19	Y	-16.31	-16.31	0	%100
3	M13	Y	-16.31	-16.31	0	%100
4	M14	Y	-16.31	-16.31	0	%100
5	M22	Y	-16.31	-16.31	0	%100
6	M21	Y	-16.31	-16.31	0	%100
7	M10	Y	-16.31	-16.31	0	%100
8	M9	Y	-16.31	-16.31	0	%100
9	M48	Y	-16.31	-16.31	0	%100
10	M49	Y	-16.31	-16.31	0	%100
11	M44	Y	-16.31	-16.31	0	%100
12	M45	Y	-16.31	-16.31	0	%100

Member Distributed Loads (BLC 5 : BLC 1 Transient Area Loads)

	Member Label	Direction	Start Magnitude [lb/ft, F, psf, lb-ft/ft]	End Magnitude [lb/ft, F, psf, lb-ft/ft]	Start Location [(ft, %)]	End Location [(ft, %)]
1	M9	Y	-9.337	-9.337	1.832e-15	11.792
2	M10	Y	-9.337	-9.337	4.816e-15	11.791
3	M11	Y	-16.4	-16.4	6.398e-15	11.792
4	M12	Y	-16.4	-16.4	1.676e-14	11.791
5	M13	Y	-6.258	-6.258	0.003	11.792
6	M14	Y	-6.256	-6.256	1.893e-14	11.791
7	M15	Y	-16.546	-16.546	0	0.513
8	M15	Y	-16.546	-16.539	0.513	1.025
9	M15	Y	-16.539	-16.513	1.025	1.538
10	M15	Y	-16.513	-16.396	1.538	2.051
11	M15	Y	-16.396	-16.288	2.051	2.563
12	M15	Y	-16.288	-17.811	2.563	3.076
13	M15	Y	-17.811	-20.322	3.076	3.589
14	M15	Y	-20.322	-18.778	3.589	4.102
15	M15	Y	-18.778	-16.257	4.102	4.614
16	M15	Y	-16.257	-16.257	4.614	5.127
17	M15	Y	-16.257	-16.257	5.127	5.64
18	M15	Y	-16.257	-16.257	5.64	6.152
19	M15	Y	-16.257	-16.258	6.152	6.665
20	M15	Y	-16.258	-16.258	6.665	7.178
21	M15	Y	-16.258	-16.258	7.178	7.69
22	M15	Y	-16.258	-16.258	7.69	8.203
23	M15	Y	-16.258	-20.323	8.203	8.716
24	M15	Y	-20.323	-20.323	8.716	9.229
25	M15	Y	-20.323	-16.259	9.229	9.741
26	M15	Y	-16.259	-16.259	9.741	10.254
27	M15	Y	-16.259	-16.259	10.254	10.767
28	M15	Y	-16.259	-16.259	10.767	11.279
29	M15	Y	-16.259	-16.26	11.279	11.792
30	M16	Y	-17.015	-17.015	1.293e-14	11.791
31	M17	Y	-19.242	-19.242	7.036e-15	11.792
32	M18	Y	-19.242	-19.242	2.125e-14	11.791
33	M25	Y	-20.666	-20.666	0	0.513
34	M25	Y	-20.666	-20.662	0.513	1.025
35	M25	Y	-20.662	-20.648	1.025	1.538
36	M25	Y	-20.648	-20.633	1.538	2.051
37	M25	Y	-20.633	-20.629	2.051	2.563
38	M25	Y	-20.629	-25.773	2.563	3.076
39	M25	Y	-25.773	-25.765	3.076	3.589
40	M25	Y	-25.765	-20.611	3.589	4.102
41	M25	Y	-20.611	-20.611	4.102	4.614
42	M25	Y	-20.611	-20.611	4.614	5.127
43	M25	Y	-20.611	-20.611	5.127	5.64
44	M25	Y	-20.611	-20.611	5.64	6.152
45	M25	Y	-20.611	-20.611	6.152	6.665
46	M25	Y	-20.611	-20.611	6.665	7.178
47	M25	Y	-20.611	-20.611	7.178	7.69
48	M25	Y	-20.611	-20.611	7.69	8.203
49	M25	Y	-20.611	-25.764	8.203	8.716
50	M25	Y	-25.764	-25.764	8.716	9.229
51	M25	Y	-25.764	-20.611	9.229	9.741
52	M25	Y	-20.611	-20.611	9.741	10.254
53	M25	Y	-20.611	-20.611	10.254	10.767
54	M25	Y	-20.611	-20.611	10.767	11.279
55	M25	Y	-20.611	-20.611	11.279	11.792

Member Distributed Loads (BLC 5 : BLC 1 Transient Area Loads) (Continued)

	Member Label	Direction	Start Magnitude [lb/ft, F, psf, lb-ft/ft]	End Magnitude [lb/ft, F, psf, lb-ft/ft]	Start Location [(ft, %)]	End Location [(ft, %)]
56	M26	Y	-21.517	-21.517	2.846e-14	11.791
57	M27	Y	-16.967	-16.967	5.482e-15	11.792
58	M28	Y	-16.967	-16.967	1.471e-14	11.791
59	M29	Y	-21.567	-21.567	4.219e-15	11.792
60	M30	Y	-21.567	-21.567	9.104e-15	11.791
61	M31	Y	-27.3	-27.3	4.219e-15	11.792
62	M32	Y	-27.3	-27.3	4.663e-15	11.791
63	M33	Y	-22.987	-22.987	4.122e-15	11.792
64	M34	Y	-22.987	-22.987	8.271e-15	11.791
65	M44	Y	-16.95	-16.95	3.526e-13	14.903
66	M45	Y	-16.95	-16.95	3.338e-13	14.903
67	M48	Y	-13.65	-13.65	9.853e-16	9
68	M49	Y	-13.65	-13.65	1.082e-15	9

Member Distributed Loads (BLC 6 : BLC 2 Transient Area Loads)

	Member Label	Direction	Start Magnitude [lb/ft, F, psf, lb-ft/ft]	End Magnitude [lb/ft, F, psf, lb-ft/ft]	Start Location [(ft, %)]	End Location [(ft, %)]
1	M9	Y	-102.6	-102.6	1.832e-15	11.792
2	M10	Y	-102.6	-102.6	4.816e-15	11.791
3	M11	Y	-180.225	-180.225	6.398e-15	11.792
4	M12	Y	-180.225	-180.225	1.676e-14	11.791
5	M13	Y	-68.765	-68.765	0.003	11.792
6	M14	Y	-68.75	-68.75	1.893e-14	11.791
7	M15	Y	-181.821	-181.823	0	0.513
8	M15	Y	-181.823	-181.751	0.513	1.025
9	M15	Y	-181.751	-181.46	1.025	1.538
10	M15	Y	-181.46	-180.175	1.538	2.051
11	M15	Y	-180.175	-178.985	2.051	2.563
12	M15	Y	-178.985	-195.727	2.563	3.076
13	M15	Y	-195.727	-223.324	3.076	3.589
14	M15	Y	-223.324	-206.351	3.589	4.102
15	M15	Y	-206.351	-178.647	4.102	4.614
16	M15	Y	-178.647	-178.649	4.614	5.127
17	M15	Y	-178.649	-178.651	5.127	5.64
18	M15	Y	-178.651	-178.653	5.64	6.152
19	M15	Y	-178.653	-178.655	6.152	6.665
20	M15	Y	-178.655	-178.657	6.665	7.178
21	M15	Y	-178.657	-178.659	7.178	7.69
22	M15	Y	-178.659	-178.661	7.69	8.203
23	M15	Y	-178.661	-223.33	8.203	8.716
24	M15	Y	-223.33	-223.332	8.716	9.229
25	M15	Y	-223.332	-178.668	9.229	9.741
26	M15	Y	-178.668	-178.67	9.741	10.254
27	M15	Y	-178.67	-178.672	10.254	10.767
28	M15	Y	-178.672	-178.674	10.767	11.279
29	M15	Y	-178.674	-178.676	11.279	11.792
30	M16	Y	-186.975	-186.975	1.293e-14	11.791
31	M17	Y	-211.45	-211.45	7.036e-15	11.792
32	M18	Y	-211.45	-211.45	2.125e-14	11.791
33	M25	Y	-227.097	-227.097	0	0.513
34	M25	Y	-227.097	-227.06	0.513	1.025
35	M25	Y	-227.06	-226.898	1.025	1.538
36	M25	Y	-226.898	-226.735	1.538	2.051
37	M25	Y	-226.735	-226.688	2.051	2.563
38	M25	Y	-226.688	-283.223	2.563	3.076
39	M25	Y	-283.223	-283.133	3.076	3.589

Member Distributed Loads (BLC 6 : BLC 2 Transient Area Loads) (Continued)

	Member Label	Direction	Start Magnitude [lb/ft, F, psf, lb-ft/ft]	End Magnitude [lb/ft, F, psf, lb-ft/ft]	Start Location [(ft, %)]	End Location [(ft, %)]
40	M25	Y	-283.133	-226.498	3.589	4.102
41	M25	Y	-226.498	-226.498	4.102	4.614
42	M25	Y	-226.498	-226.498	4.614	5.127
43	M25	Y	-226.498	-226.498	5.127	5.64
44	M25	Y	-226.498	-226.498	5.64	6.152
45	M25	Y	-226.498	-226.498	6.152	6.665
46	M25	Y	-226.498	-226.498	6.665	7.178
47	M25	Y	-226.498	-226.498	7.178	7.69
48	M25	Y	-226.498	-226.498	7.69	8.203
49	M25	Y	-226.498	-283.123	8.203	8.716
50	M25	Y	-283.123	-283.123	8.716	9.229
51	M25	Y	-283.123	-226.498	9.229	9.741
52	M25	Y	-226.498	-226.498	9.741	10.254
53	M25	Y	-226.498	-226.498	10.254	10.767
54	M25	Y	-226.498	-226.498	10.767	11.279
55	M25	Y	-226.498	-226.498	11.279	11.792
56	M26	Y	-236.45	-236.45	2.846e-14	11.791
57	M27	Y	-186.45	-186.45	5.482e-15	11.792
58	M28	Y	-186.45	-186.45	1.471e-14	11.791
59	M29	Y	-237	-237	4.219e-15	11.792
60	M30	Y	-237	-237	9.104e-15	11.791
61	M31	Y	-300	-300	4.219e-15	11.792
62	M32	Y	-300	-300	4.663e-15	11.791
63	M33	Y	-252.6	-252.6	4.122e-15	11.792
64	M34	Y	-252.6	-252.6	8.271e-15	11.791
65	M44	Y	-150	-150	3.25e-13	14.903
66	M45	Y	-150	-150	3.231e-13	14.903
67	M48	Y	-150	-150	1.082e-15	9
68	M49	Y	-150	-150	9.853e-16	9
69	M44	X	-1.725	-1.725	3.526e-13	14.903
70	M45	X	-1.725	-1.725	3.338e-13	14.903
71	M48	X	-1.725	-1.725	9.853e-16	9
72	M49	X	-1.725	-1.725	1.082e-15	9
73	M9	X	-1.18	-1.18	1.832e-15	11.792
74	M10	X	-1.18	-1.18	4.816e-15	11.791
75	M11	X	-2.073	-2.073	6.398e-15	11.792
76	M12	X	-2.073	-2.073	1.676e-14	11.791
77	M13	X	-0.791	-0.791	0.003	11.792
78	M14	X	-0.791	-0.791	1.893e-14	11.791
79	M15	X	-2.091	-2.091	0	0.513
80	M15	X	-2.091	-2.09	0.513	1.025
81	M15	X	-2.09	-2.087	1.025	1.538
82	M15	X	-2.087	-2.072	1.538	2.051
83	M15	X	-2.072	-2.058	2.051	2.563
84	M15	X	-2.058	-2.251	2.563	3.076
85	M15	X	-2.251	-2.568	3.076	3.589
86	M15	X	-2.568	-2.373	3.589	4.102
87	M15	X	-2.373	-2.054	4.102	4.614
88	M15	X	-2.054	-2.054	4.614	5.127
89	M15	X	-2.054	-2.054	5.127	5.64
90	M15	X	-2.054	-2.055	5.64	6.152
91	M15	X	-2.055	-2.055	6.152	6.665
92	M15	X	-2.055	-2.055	6.665	7.178
93	M15	X	-2.055	-2.055	7.178	7.69
94	M15	X	-2.055	-2.055	7.69	8.203

Member Distributed Loads (BLC 6 : BLC 2 Transient Area Loads) (Continued)

	Member Label	Direction	Start Magnitude [lb/ft, F, psf, lb-ft/ft]	End Magnitude [lb/ft, F, psf, lb-ft/ft]	Start Location [(ft, %)]	End Location [(ft, %)]
95	M15	X	-2.055	-2.568	8.203	8.716
96	M15	X	-2.568	-2.568	8.716	9.229
97	M15	X	-2.568	-2.055	9.229	9.741
98	M15	X	-2.055	-2.055	9.741	10.254
99	M15	X	-2.055	-2.055	10.254	10.767
100	M15	X	-2.055	-2.055	10.767	11.279
101	M15	X	-2.055	-2.055	11.279	11.792
102	M16	X	-2.15	-2.15	1.293e-14	11.791
103	M17	X	-2.432	-2.432	7.036e-15	11.792
104	M18	X	-2.432	-2.432	2.125e-14	11.791
105	M25	X	-2.612	-2.612	0	0.513
106	M25	X	-2.612	-2.611	0.513	1.025
107	M25	X	-2.611	-2.609	1.025	1.538
108	M25	X	-2.609	-2.607	1.538	2.051
109	M25	X	-2.607	-2.607	2.051	2.563
110	M25	X	-2.607	-3.257	2.563	3.076
111	M25	X	-3.257	-3.256	3.076	3.589
112	M25	X	-3.256	-2.605	3.589	4.102
113	M25	X	-2.605	-2.605	4.102	4.614
114	M25	X	-2.605	-2.605	4.614	5.127
115	M25	X	-2.605	-2.605	5.127	5.64
116	M25	X	-2.605	-2.605	5.64	6.152
117	M25	X	-2.605	-2.605	6.152	6.665
118	M25	X	-2.605	-2.605	6.665	7.178
119	M25	X	-2.605	-2.605	7.178	7.69
120	M25	X	-2.605	-2.605	7.69	8.203
121	M25	X	-2.605	-3.256	8.203	8.716
122	M25	X	-3.256	-3.256	8.716	9.229
123	M25	X	-3.256	-2.605	9.229	9.741
124	M25	X	-2.605	-2.605	9.741	10.254
125	M25	X	-2.605	-2.605	10.254	10.767
126	M25	X	-2.605	-2.605	10.767	11.279
127	M25	X	-2.605	-2.605	11.279	11.792
128	M26	X	-2.719	-2.719	2.846e-14	11.791
129	M27	X	-2.144	-2.144	5.482e-15	11.792
130	M28	X	-2.144	-2.144	1.471e-14	11.791
131	M29	X	-2.726	-2.726	4.219e-15	11.792
132	M30	X	-2.726	-2.726	9.104e-15	11.791
133	M31	X	-3.45	-3.45	4.219e-15	11.792
134	M32	X	-3.45	-3.45	4.663e-15	11.791
135	M33	X	-2.905	-2.905	4.122e-15	11.792
136	M34	X	-2.905	-2.905	8.271e-15	11.791
137	M44	Z	-1.725	-1.725	3.526e-13	14.903
138	M45	Z	-1.725	-1.725	3.338e-13	14.903
139	M48	Z	-1.725	-1.725	9.853e-16	9
140	M49	Z	-1.725	-1.725	1.082e-15	9

Member Distributed Loads (BLC 7 : BLC 3 Transient Area Loads)

	Member Label	Direction	Start Magnitude [lb/ft, F, psf, lb-ft/ft]	End Magnitude [lb/ft, F, psf, lb-ft/ft]	Start Location [(ft, %)]	End Location [(ft, %)]
1	M25	X	26.614	26.614	11.279	11.792
2	M26	X	27.783	27.783	2.846e-14	11.791
3	M27	X	21.908	21.908	5.482e-15	11.792
4	M28	X	21.908	21.908	1.471e-14	11.791
5	M29	X	27.847	27.847	4.219e-15	11.792
6	M30	X	27.848	27.848	9.104e-15	11.791

Member Distributed Loads (BLC 7 : BLC 3 Transient Area Loads) (Continued)

	Member Label	Direction	Start Magnitude [lb/ft, F, psf, lb-ft/ft]	End Magnitude [lb/ft, F, psf, lb-ft/ft]	Start Location [(ft, %)]	End Location [(ft, %)]
7	M31	X	35.25	35.25	4.219e-15	11.792
8	M32	X	35.25	35.25	4.663e-15	11.791
9	M33	X	29.681	29.681	4.122e-15	11.792
10	M34	X	29.681	29.681	8.271e-15	11.791
11	M48	X	40.5	40.5	1.082e-15	9
12	M49	X	40.5	40.5	9.853e-16	9
13	M44	X	40.5	40.5	3.526e-13	14.903
14	M45	X	40.5	40.5	3.338e-13	14.903
15	M9	X	12.056	12.056	1.832e-15	11.792
16	M10	X	12.056	12.056	4.816e-15	11.791
17	M11	X	21.176	21.176	6.398e-15	11.792
18	M12	X	21.176	21.176	1.676e-14	11.791
19	M13	X	8.08	8.08	0.003	11.792
20	M14	X	8.078	8.078	1.893e-14	11.791
21	M15	X	21.364	21.364	0	0.513
22	M15	X	21.364	21.356	0.513	1.025
23	M15	X	21.356	21.322	1.025	1.538
24	M15	X	21.322	21.171	1.538	2.051
25	M15	X	21.171	21.031	2.051	2.563
26	M15	X	21.031	22.998	2.563	3.076
27	M15	X	22.998	26.241	3.076	3.589
28	M15	X	26.241	24.246	3.589	4.102
29	M15	X	24.246	20.991	4.102	4.614
30	M15	X	20.991	20.991	4.614	5.127
31	M15	X	20.991	20.992	5.127	5.64
32	M15	X	20.992	20.992	5.64	6.152
33	M15	X	20.992	20.992	6.152	6.665
34	M15	X	20.992	20.992	6.665	7.178
35	M15	X	20.992	20.992	7.178	7.69
36	M15	X	20.992	20.993	7.69	8.203
37	M15	X	20.993	26.241	8.203	8.716
38	M15	X	26.241	26.242	8.716	9.229
39	M15	X	26.242	20.994	9.229	9.741
40	M15	X	20.994	20.994	9.741	10.254
41	M15	X	20.994	20.994	10.254	10.767
42	M15	X	20.994	20.994	10.767	11.279
43	M15	X	20.994	20.994	11.279	11.792
44	M16	X	21.97	21.97	1.293e-14	11.791
45	M17	X	24.845	24.845	7.036e-15	11.792
46	M18	X	24.845	24.845	2.125e-14	11.791
47	M25	X	26.684	26.684	0	0.513
48	M25	X	26.684	26.68	0.513	1.025
49	M25	X	26.68	26.66	1.025	1.538
50	M25	X	26.66	26.641	1.538	2.051
51	M25	X	26.641	26.636	2.051	2.563
52	M25	X	26.636	33.279	2.563	3.076
53	M25	X	33.279	33.268	3.076	3.589
54	M25	X	33.268	26.614	3.589	4.102
55	M25	X	26.614	26.614	4.102	4.614
56	M25	X	26.614	26.614	4.614	5.127
57	M25	X	26.614	26.614	5.127	5.64
58	M25	X	26.614	26.614	5.64	6.152
59	M25	X	26.614	26.614	6.152	6.665
60	M25	X	26.614	26.614	6.665	7.178
61	M25	X	26.614	26.614	7.178	7.69

Member Distributed Loads (BLC 7 : BLC 3 Transient Area Loads) (Continued)

	Member Label	Direction	Start Magnitude [lb/ft, F, psf, lb-ft/ft]	End Magnitude [lb/ft, F, psf, lb-ft/ft]	Start Location [(ft, %)]	End Location [(ft, %)]
62	M25	X	26.614	26.614	7.69	8.203
63	M25	X	26.614	33.267	8.203	8.716
64	M25	X	33.267	33.267	8.716	9.229
65	M25	X	33.267	26.614	9.229	9.741
66	M25	X	26.614	26.614	9.741	10.254
67	M25	X	26.614	26.614	10.254	10.767
68	M25	X	26.614	26.614	10.767	11.279

Member Distributed Loads (BLC 8 : BLC 4 Transient Area Loads)

	Member Label	Direction	Start Magnitude [lb/ft, F, psf, lb-ft/ft]	End Magnitude [lb/ft, F, psf, lb-ft/ft]	Start Location [(ft, %)]	End Location [(ft, %)]
1	M44	Z	40.5	40.5	3.25e-13	14.903
2	M45	Z	40.5	40.5	3.231e-13	14.903
3	M48	Z	40.5	40.5	1.082e-15	9
4	M49	Z	40.5	40.5	9.853e-16	9
5	M9	Z	12.056	12.056	1.832e-15	11.792
6	M10	Z	12.056	12.056	4.816e-15	11.791
7	M11	Z	21.176	21.176	6.398e-15	11.792
8	M12	Z	21.176	21.176	1.676e-14	11.791
9	M13	Z	8.08	8.08	0.003	11.792
10	M14	Z	8.078	8.078	1.893e-14	11.791
11	M15	Z	21.364	21.364	0	0.513
12	M15	Z	21.364	21.356	0.513	1.025
13	M15	Z	21.356	21.322	1.025	1.538
14	M15	Z	21.322	21.171	1.538	2.051
15	M15	Z	21.171	21.031	2.051	2.563
16	M15	Z	21.031	22.998	2.563	3.076
17	M15	Z	22.998	26.241	3.076	3.589
18	M15	Z	26.241	24.246	3.589	4.102
19	M15	Z	24.246	20.991	4.102	4.614
20	M15	Z	20.991	20.991	4.614	5.127
21	M15	Z	20.991	20.992	5.127	5.64
22	M15	Z	20.992	20.992	5.64	6.152
23	M15	Z	20.992	20.992	6.152	6.665
24	M15	Z	20.992	20.992	6.665	7.178
25	M15	Z	20.992	20.992	7.178	7.69
26	M15	Z	20.992	20.993	7.69	8.203
27	M15	Z	20.993	26.241	8.203	8.716
28	M15	Z	26.241	26.242	8.716	9.229
29	M15	Z	26.242	20.994	9.229	9.741
30	M15	Z	20.994	20.994	9.741	10.254
31	M15	Z	20.994	20.994	10.254	10.767
32	M15	Z	20.994	20.994	10.767	11.279
33	M15	Z	20.994	20.994	11.279	11.792
34	M16	Z	21.97	21.97	1.293e-14	11.791
35	M17	Z	24.845	24.845	7.036e-15	11.792
36	M18	Z	24.845	24.845	2.125e-14	11.791
37	M25	Z	26.684	26.684	0	0.513
38	M25	Z	26.684	26.68	0.513	1.025
39	M25	Z	26.68	26.66	1.025	1.538
40	M25	Z	26.66	26.641	1.538	2.051
41	M25	Z	26.641	26.636	2.051	2.563
42	M25	Z	26.636	33.279	2.563	3.076
43	M25	Z	33.279	33.268	3.076	3.589
44	M25	Z	33.268	26.614	3.589	4.102
45	M25	Z	26.614	26.614	4.102	4.614

Member Distributed Loads (BLC 8 : BLC 4 Transient Area Loads) (Continued)

	Member Label	Direction	Start Magnitude [lb/ft, F, psf, lb-ft/ft]	End Magnitude [lb/ft, F, psf, lb-ft/ft]	Start Location [(ft, %)]	End Location [(ft, %)]
46	M25	Z	26.614	26.614	4.614	5.127
47	M25	Z	26.614	26.614	5.127	5.64
48	M25	Z	26.614	26.614	5.64	6.152
49	M25	Z	26.614	26.614	6.152	6.665
50	M25	Z	26.614	26.614	6.665	7.178
51	M25	Z	26.614	26.614	7.178	7.69
52	M25	Z	26.614	26.614	7.69	8.203
53	M25	Z	26.614	33.267	8.203	8.716
54	M25	Z	33.267	33.267	8.716	9.229
55	M25	Z	33.267	26.614	9.229	9.741
56	M25	Z	26.614	26.614	9.741	10.254
57	M25	Z	26.614	26.614	10.254	10.767
58	M25	Z	26.614	26.614	10.767	11.279
59	M25	Z	26.614	26.614	11.279	11.792
60	M26	Z	27.783	27.783	2.846e-14	11.791
61	M27	Z	21.908	21.908	5.482e-15	11.792
62	M28	Z	21.908	21.908	1.471e-14	11.791
63	M29	Z	27.847	27.847	4.219e-15	11.792
64	M30	Z	27.848	27.848	9.104e-15	11.791
65	M31	Z	35.25	35.25	4.219e-15	11.792
66	M32	Z	35.25	35.25	4.663e-15	11.791
67	M33	Z	29.681	29.681	4.122e-15	11.792
68	M34	Z	29.681	29.681	8.271e-15	11.791

Member Area Loads (BLC 1 : Dead)

	Node A	Node B	Node C	Node D	Direction	Load Direction	A Magnitude [psf]	B Magnitude [psf]	C Magnitude [psf]	D Magnitude [psf]	Exclude Braces
1	N17	N11	N13	N18	Y	A-B	-9.1	-9.1	-9.1	-9.1	Yes
2	N56	N61	N63	N62	Y	A-B	-11.3	-11.3	-11.3	-11.3	Yes
3	N56	N55	N59	N60	Y	A-B	-9.1	-9.1	-9.1	-9.1	Yes

Member Area Loads (BLC 2 : Live)

	Node A	Node B	Node C	Node D	Direction	Load Direction	A Magnitude [psf]	B Magnitude [psf]	C Magnitude [psf]	D Magnitude [psf]	Exclude Braces
1	N17	N11	N13	N18	Y	A-B	-100	-100	-100	-100	Yes
2	N62	N63	N61	N56	Y	A-B	-100	-100	-100	-100	Yes
3	N55	N56	N60	N59	Y	A-B	-100	-100	-100	-100	Yes
4	N56	N61	N63	N62	X	A-B	-1.15	-1.15	-1.15	-1.15	Yes
5	N56	N55	N59	N60	X	A-B	-1.15	-1.15	-1.15	-1.15	Yes
6	N17	N11	N13	N18	X	A-B	-1.15	-1.15	-1.15	-1.15	Yes
7	N56	N61	N63	N62	Z	A-B	-1.15	-1.15	-1.15	-1.15	Yes
8	N56	N55	N59	N60	Z	A-B	-1.15	-1.15	-1.15	-1.15	Yes

Member Area Loads (BLC 3 : Earthquake X)

	Node A	Node B	Node C	Node D	Direction	Load Direction	A Magnitude [psf]	B Magnitude [psf]	C Magnitude [psf]	D Magnitude [psf]	Exclude Braces
1	N17	N11	N13	N18	X	A-B	11.75	11.75	11.75	11.75	Yes
2	N55	N56	N60	N59	X	A-B	27	27	27	27	Yes
3	N56	N61	N63	N62	X	A-B	27	27	27	27	Yes

Member Area Loads (BLC 4 : Earthquake Z)

	Node A	Node B	Node C	Node D	Direction	Load Direction	A Magnitude [psf]	B Magnitude [psf]	C Magnitude [psf]	D Magnitude [psf]	Exclude Braces
1	N62	N63	N61	N56	Z	A-B	27	27	27	27	Yes
2	N55	N56	N60	N59	Z	A-B	27	27	27	27	Yes
3	N17	N11	N13	N18	Z	A-B	11.75	11.75	11.75	11.75	Yes

Basic Load Cases

	BLC Description	Category	Y Gravity	Nodal	Distributed	Area(Member)
1	Dead	DL	-1	4	12	3
2	Live	LL		4		8
3	Earthquake X	ELX		4		3
4	Earthquake Z	ELZ		4		3
5	BLC 1 Transient Area Loads	None			68	
6	BLC 2 Transient Area Loads	None			140	
7	BLC 3 Transient Area Loads	None			68	
8	BLC 4 Transient Area Loads	None			68	

Load Combinations

	Description	Solve	P-Delta	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor
1	Wp Check	Yes	Y	DL	1	LL	0.25								
2															
3	LRFD Gravity Loads														
4															
5	Deflection 1	Yes	Y	DL	1										
6	Deflection 2	Yes	Y	LL	1										
7	Deflection 3	Yes	Y	DL	1	LL	1								
8	IBC 21/ASCE Strength 1	Yes	Y	DL	1.4										
9	IBC 21/ASCE Strength 2 (a)	Yes	Y	DL	1.2	LL	1.6	LLS	1.6						
10	ELX - GR	Yes	Y	ELX	1										
11	ELZ - GR	Yes	Y	ELZ	1										
12															
13	LRFD Lateral Loads														
14															
15	IBC 21/ASCE Strength 6 (a)	Yes	Y	DL	1.2	Sds*DL	0.2	ELX	1	LL	0.5	LLS	1	LL	0.042
16	IBC 21/ASCE Strength 6 (b)	Yes	Y	DL	1.2	Sds*DL	0.2	ELZ	1	LL	0.5	LLS	1	LL	0.042
17	IBC 21/ASCE Strength 6 (c)	Yes	Y	DL	1.2	Sds*DL	0.2	ELX	-1	LL	0.5	LLS	1	LL	-0.042
18	IBC 21/ASCE Strength 6 (d)	Yes	Y	DL	1.2	Sds*DL	0.2	ELZ	-1	LL	0.5	LLS	1	LL	-0.042
19	IBC 21/ASCE Strength 7 (a)	Yes	Y	DL	0.9	Sds*DL	-0.2	ELX	1					LL	0.042
20	IBC 21/ASCE Strength 7 (b)	Yes	Y	DL	0.9	Sds*DL	-0.2	ELZ	1					LL	0.042
21	IBC 21/ASCE Strength 7 (c)	Yes	Y	DL	0.9	Sds*DL	-0.2	ELX	-1					LL	-0.042
22	IBC 21/ASCE Strength 7 (d)	Yes	Y	DL	0.9	Sds*DL	-0.2	ELZ	-1					LL	-0.042
23	IBC 21/ASCE Strength 6 (os-a)	Yes	Y	DL	1.2	Sds*DL	0.2	Om*ELX	1	LL	0.5	LLS	1	LL	0.042
24	IBC 21/ASCE Strength 6 (os-b)	Yes	Y	DL	1.2	Sds*DL	0.2	Om*ELZ	1	LL	0.5	LLS	1	LL	0.042
25	IBC 21/ASCE Strength 6 (os-c)	Yes	Y	DL	1.2	Sds*DL	0.2	Om*ELX	-1	LL	0.5	LLS	1	LL	-0.042
26	IBC 21/ASCE Strength 6 (os-d)	Yes	Y	DL	1.2	Sds*DL	0.2	Om*ELZ	-1	LL	0.5	LLS	1	LL	-0.042
27	IBC 21/ASCE Strength 7 (os-a)	Yes	Y	DL	0.9	Sds*DL	-0.2	Om*ELX	1					LL	0.042
28	IBC 21/ASCE Strength 7 (os-b)	Yes	Y	DL	0.9	Sds*DL	-0.2	Om*ELZ	1					LL	0.042
29	IBC 21/ASCE Strength 7 (os-c)	Yes	Y	DL	0.9	Sds*DL	-0.2	Om*ELX	-1					LL	-0.042
30	IBC 21/ASCE Strength 7 (os-d)	Yes	Y	DL	0.9	Sds*DL	-0.2	Om*ELZ	-1					LL	-0.042
31															
32	ASD Vertical Loadings														
33															
34															
35	IBC 21/ASCE ASD 8 (a)	Yes	Y	DL	1	ELX	0.7								

Load Combinations (Continued)

	Description	Solve	P-Delta	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor	BLC	Factor
36	IBC 21/ASCE ASD 8 (b)	Yes	Y	DL	1	ELZ	0.7								
37	IBC 21/ASCE ASD 8 (c)	Yes	Y	DL	1	ELX	-0.7								
38	IBC 21/ASCE ASD 8 (d)	Yes	Y	DL	1	ELZ	-0.7								
39	IBC 21/ASCE ASD 9 (a)	Yes	Y	DL	1	ELX	0.525	LL	0.75	LLS	0.75				
40	IBC 21/ASCE ASD 9 (b)	Yes	Y	DL	1	ELZ	0.525	LL	0.75	LLS	0.75				
41	IBC 21/ASCE ASD 9 (c)	Yes	Y	DL	1	ELX	-0.525	LL	0.75	LLS	0.75				
42	IBC 21/ASCE ASD 9 (d)	Yes	Y	DL	1	ELZ	-0.525	LL	0.75	LLS	0.75				
43	IBC 21/ASCE ASD 10 (a)	Yes	Y	DL	0.6	ELX	0.7								
44	IBC 21/ASCE ASD 10 (b)	Yes	Y	DL	0.6	ELZ	0.7								
45	IBC 21/ASCE ASD 10 (c)	Yes	Y	DL	0.6	ELX	-0.7								
46	IBC 21/ASCE ASD 10 (d)	Yes	Y	DL	0.6	ELZ	-0.7								
47	IBC 21/ASCE ASD 8 (os-a)	Yes	Y	DL	1	Om*ELX	0.7								
48	IBC 21/ASCE ASD 8 (os-b)	Yes	Y	DL	1	Om*ELZ	0.7								
49	IBC 21/ASCE ASD 8 (os-c)	Yes	Y	DL	1	Om*ELX	-0.7								
50	IBC 21/ASCE ASD 8 (os-d)	Yes	Y	DL	1	Om*ELZ	-0.7								
51	IBC 21/ASCE ASD 9 (os-a)	Yes	Y	DL	1	Om*ELX	0.525	LL	0.75	LLS	0.75				
52	IBC 21/ASCE ASD 9 (os-b)	Yes	Y	DL	1	Om*ELZ	0.525	LL	0.75	LLS	0.75				
53	IBC 21/ASCE ASD 9 (os-c)	Yes	Y	DL	1	Om*ELX	-0.525	LL	0.75	LLS	0.75				
54	IBC 21/ASCE ASD 9 (os-d)	Yes	Y	DL	1	Om*ELZ	-0.525	LL	0.75	LLS	0.75				
55	IBC 21/ASCE ASD 10 (os-a)	Yes	Y	DL	0.6	Om*ELX	0.7								
56	IBC 21/ASCE ASD 10 (os-b)	Yes	Y	DL	0.6	Om*ELZ	0.7								
57	IBC 21/ASCE ASD 10 (os-c)	Yes	Y	DL	0.6	Om*ELX	-0.7								
58	IBC 21/ASCE ASD 10 (os-d)	Yes	Y	DL	0.6	Om*ELZ	-0.7								
59															
60	Deflection 1	Yes	Y	DL	1										
61	Deflection 2	Yes	Y	LL	1										
62	Deflection 3	Yes	Y	DL	1	LL	1								
63	IBC 21/ASCE ASD 1	Yes	Y	DL	1										
64	IBC 21/ASCE ASD 2	Yes	Y	DL	1	LL	1	LLS	1						

Envelope Node Reactions

	Node Label		X [lb]	LC	Y [lb]	LC	Z [lb]	LC	MX [lb-ft]	LC	MY [lb-ft]	LC	MZ [lb-ft]	LC
1	N5	max	830.558	17	10979.528	9	88.499	16	0	64	0	64	0	64
2		min	-751.325	15	-969.063	21	-73.561	18	0	1	0	1	0	1
3	N3	max	1293.122	17	21727.731	9	898.917	22	0	64	0	64	0	64
4		min	-1112.703	10	-1139.399	10	-897.511	11	0	1	0	1	0	1
5	N9	max	1078.469	21	19558.891	9	563.195	18	0	64	0	64	0	64
6		min	-1240.388	15	-499.717	11	-557.134	11	0	1	0	1	0	1
7	N8	max	621.096	17	4440.543	9	614.834	18	0	64	0	64	0	64
8		min	-579.329	15	-559.287	21	-619.638	16	0	1	0	1	0	1
9	N6	max	620.228	17	12798.62	9	87.052	16	0	64	0	64	0	64
10		min	-593.11	10	4.087	10	-75.435	18	0	1	0	1	0	1
11	N4	max	632.942	17	4511.621	9	884.445	18	0	64	0	64	0	64
12		min	-579.94	19	-986.095	10	-880.705	16	0	1	0	1	0	1
13	N1	max	857.059	17	5721.157	9	867.493	18	0	64	0	64	0	64
14		min	-791.748	19	-1520.483	10	-876.737	16	0	1	0	1	0	1
15	N10	max	78.145	15	9864.168	9	517.987	22	0	64	0	64	0	64
16		min	-72.628	17	-491.079	11	-627.255	16	0	1	0	1	0	1
17	N57	max	0.125	9	1371.002	9	0.001	17	0	64	0	64	0	64
18		min	-0.003	37	-8.871	11	-0.006	9	0	1	0	1	0	1
19	N58	max	0.467	9	5038.504	9	0.039	16	0	64	0	64	0	64
20		min	-0.008	17	-244.236	21	-0.027	18	0	1	0	1	0	1
21	N62	max	668.481	21	1874.919	9	259.688	18	0	64	0	64	0	64
22		min	-829.884	15	-305.718	10	-249.059	11	0	1	0	1	0	1
23	N63	max	1404.677	17	2400.803	9	251.613	18	0	64	0	64	0	64

Envelope Node Reactions (Continued)

	Node Label		X [lb]	LC	Y [lb]	LC	Z [lb]	LC	MX [lb-ft]	LC	MY [lb-ft]	LC	MZ [lb-ft]	LC
24		min	-1242.315	10	-700.544	10	-252.67	11	0	1	0	1	0	1
25	N60	max	0	64	1919.145	9	1313.369	22	0	64	0	64	0	64
26		min	0	1	-65.265	11	-1483	16	0	1	0	1	0	1
27	N59	max	0	64	1275.387	9	595.083	15	0	64	0	64	0	64
28		min	0	1	-4.79	11	-407.156	21	0	1	0	1	0	1
29	Totals:	max	7655.762	17	103482.018	9	6126.83	18						
30		min	-7374.227	10	71	11	-6114.25	11						

Envelope Node Reactions - Overstrength or Capacity Limit

	Node Label		X [lb]	LC	Y [lb]	LC	Z [lb]	LC	MX [lb-ft]	LC	MY [lb-ft]	LC	MZ [lb-ft]	LC
1	N5	max	2625.872	25*	10686.93	23*	280.721	24*	0	58*	0	58*	0	58*
2		min	-2116.329	23*	-4317.518	29*	-203.685	26*	0	23*	0	23*	0	23*
3	N3	max	3153.233	25*	13248.564	53*	2699.07	30*	0	58*	0	58*	0	58*
4		min	-3397.364	27*	-1384.156	27*	-2663.279	28*	0	23*	0	23*	0	23*
5	N9	max	3424.017	29*	12300.535	23*	1613.082	30*	0	58*	0	58*	0	58*
6		min	-3138.237	23*	-2133.826	29*	-1699.967	28*	0	23*	0	23*	0	23*
7	N8	max	1920.827	25*	5722.086	24*	1945.886	26*	0	58*	0	58*	0	58*
8		min	-1684.094	23*	-2599.926	29*	-1752.691	24*	0	23*	0	23*	0	23*
9	N6	max	1803.41	25*	6691.31	52*	268.749	24*	0	58*	0	58*	0	58*
10		min	-1775.128	27*	682.921	30*	-219.811	26*	0	23*	0	23*	0	23*
11	N4	max	1734.463	25*	5766.865	24*	2806.975	26*	0	58*	0	58*	0	58*
12		min	-1873.683	23*	-2872.124	30*	-2481.744	24*	0	23*	0	23*	0	23*
13	N1	max	2281.08	25*	7423.674	25*	2411.75	26*	0	58*	0	58*	0	58*
14		min	-2675.076	23*	-4052.444	27*	-2826.934	24*	0	23*	0	23*	0	23*
15	N10	max	257.893	23*	6215.743	54*	1564.854	26*	0	58*	0	58*	0	58*
16		min	-195.753	25*	-251.722	28*	-1817.044	24*	0	23*	0	23*	0	23*
17	N57	max	0.169	23*	987.389	23*	0.004	25*	0	58*	0	58*	0	58*
18		min	-0.035	25*	-74.144	29*	-0.014	23*	0	23*	0	23*	0	23*
19	N58	max	0.795	23*	4458.653	23*	0.117	24*	0	58*	0	58*	0	58*
20		min	-0.035	53*	-1624.868	29*	-0.08	26*	0	23*	0	23*	0	23*
21	N62	max	2055.887	29*	1702.103	25*	775.609	26*	0	58*	0	58*	0	58*
22		min	-2216.736	23*	-697.333	27*	-735.15	28*	0	23*	0	23*	0	23*
23	N63	max	3890.17	25*	3110.882	25*	734.008	30*	0	58*	0	58*	0	58*
24		min	-3686.9	27*	-1815.529	27*	-764.458	28*	0	23*	0	23*	0	23*
25	N60	max	0	58*	1473.496	23*	3999.548	30*	0	58*	0	58*	0	58*
26		min	0	23*	-450.283	29*	-4186.322	24*	0	23*	0	23*	0	23*
27	N59	max	0	58*	744.759	51*	1465.084	23*	0	58*	0	58*	0	58*
28		min	0	23*	-21.916	29*	-1282.376	29*	0	23*	0	23*	0	23*
29	Totals:	max	22404.216	25*	54458.219	51*	18355.331	26*						
30		min	-22096.864	27*	6291.866	29*	-18341.597	28*						

Material Take-Off

	Material	Size	Pieces	Length[ft]	Weight[LB]
1	General Members				
2	RIGID		14	42	0
3	Total General		14	42	0
4					
5	Hot Rolled Steel				
6	A500 Gr.C RECT	C5X6.7	5	27	194.661
7	A500 Gr.C RECT	HSS4X4X3	2	18.3	173.111
8	A500 Gr.C RECT	HSS5X5X3	8	82	984.319
9	A992	W12X14	11	119.3	1688.617
10	A992	W14X22	4	39.3	866.799

Material Take-Off (Continued)

	Material	Size	Pieces	Length[ft]	Weight[LB]
11	A992	W14X34	1	19.6	667.796
12	Total HR Steel		31	305.5	4575.303
13					
14	Cold Formed Steel				
15	ASTM A1101 Gr 55	1000S350-54	2	29.8	106.914
16	ASTM A1101 Gr 55	C10X3.25X14GAFY=55	10	117.9	467.427
17	Total CF Steel		12	147.7	574.341

Warning Log

No Data to Print...

Company:		Date:	8/16/2024
Engineer:	DMS	Page:	1/5
Project:			
Address:			
Phone:			
E-mail:			

1.Project information

Customer company:
Customer contact name:
Customer e-mail:
Comment:

Project description: Stair anchorage lateral load case
Location:
Fastening description:

2. Input Data & Anchor Parameters

General
Design method:ACI 318-19
Units: Imperial units

Anchor Information:
Anchor type: Torque controlled expansion anchor
Material: Carbon Steel
Diameter (inch): 0.500
Nominal Embedment depth (inch): 3.875
Effective Embedment depth, h_{ef} (inch): 3.375
Code report: ICC-ES ESR-3037
Anchor category: 1
Anchor ductility: Yes
h_{min} (inch): 6.00
c_{ac} (inch): 7.50
C_{min} (inch): 12.00
S_{min} (inch): 2.75

Base Material
Concrete: Normal-weight
Concrete thickness, h (inch): 12.00
State: Cracked
Compressive strength, f'_c (psi): 3000
$\Psi_{c,V}$: 1.0
Reinforcement condition: Supplementary reinforcement not present
Supplemental edge reinforcement: Not applicable
Reinforcement provided at corners: No
Ignore concrete breakout in tension: No
Ignore concrete breakout in shear: No
Ignore 6do requirement: Not applicable
Build-up grout pad: No

Base Plate
Length x Width x Thickness (inch): 8.00 x 3.00 x 0.25

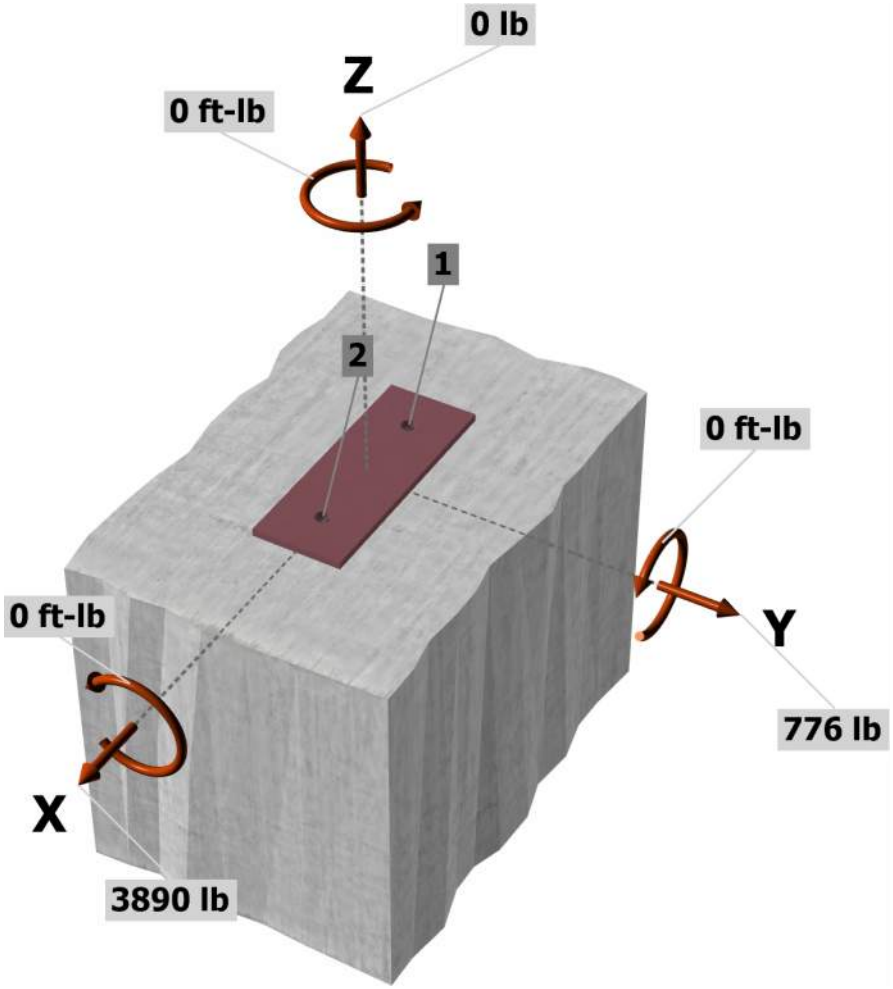
Recommended Anchor
Anchor Name: Strong-Bolt® 2 - 1/2"Ø CS Strong-Bolt 2, hnom:3.875" (98mm)
Code Report: ICC-ES ESR-3037

Load and Geometry
Load factor source: ACI 318 Section 5.3
Load combination: not set
Seismic design: Yes
Anchors subjected to sustained tension: Not applicable
Ductility section for tension: 17.10.5.2 not applicable
Ductility section for shear: 17.10.6.2 not applicable
Ω_0 factor: not set
Apply entire shear load at front row: No
Anchors only resisting wind and/or seismic loads: No

Strength level loads:

N_{ua} [lb]: 0
V_{uax} [lb]: 3890
V_{uay} [lb]: 776
M_{ux} [ft-lb]: 0
M_{uy} [ft-lb]: 0
M_{uz} [ft-lb]: 0

<Figure 1>



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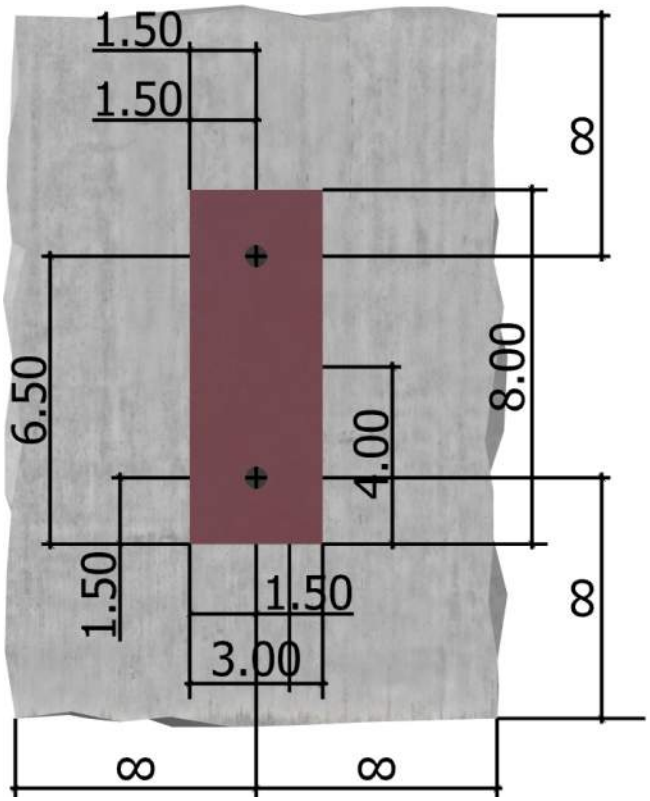
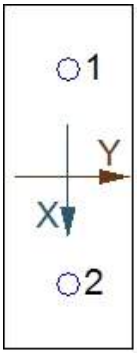


3. Resulting Anchor Forces

Anchor	Tension load, N_{ua} (lb)	Shear load x, V_{uax} (lb)	Shear load y, V_{uay} (lb)	Shear load combined, $\sqrt{(V_{uax})^2+(V_{uay})^2}$ (lb)
1	0.0	1945.0	388.0	1983.3
2	0.0	1945.0	388.0	1983.3
Sum	0.0	3890.0	776.0	3966.6

Maximum concrete compression strain (‰): 0.00
Maximum concrete compression stress (psi): 0
Resultant tension force (lb): 0
Resultant compression force (lb): 0
Eccentricity of resultant tension forces in x-axis, e'_{Nx} (inch): 0.00
Eccentricity of resultant tension forces in y-axis, e'_{Ny} (inch): 0.00
Eccentricity of resultant shear forces in x-axis, e'_{Vx} (inch): 0.00
Eccentricity of resultant shear forces in y-axis, e'_{Vy} (inch): 0.00

<Figure 3>



8. Steel Strength of Anchor in Shear (Sec. 17.7.1)

V_{sa} (lb)	ϕ_{grout}	ϕ	$\phi_{grout}\phi V_{sa}$ (lb)
6510	1.0	0.65	4232

10. Concrete Pryout Strength of Anchor in Shear (Sec. 17.7.3)

$\phi V_{cpg} = \phi k_{cp} N_{cbg} = \phi k_{cp}(A_{Nc} / A_{Nco})\, \Psi_{ec,N}\, \Psi_{ed,N}\, \Psi_{c,N}\, \Psi_{cp,N} N_b$ (Sec. 17.5.1.2 & Eq. 17.7.3.1b)

k_{cp}	A_{Nc} (in^2)	A_{Nco} (in^2)	$\Psi_{ec,N}$	$\Psi_{ed,N}$	$\Psi_{c,N}$	$\Psi_{cp,N}$	N_b (lb)	ϕ	ϕV_{cpg} (lb)
2.0	153.14	102.52	1.000	1.000	1.000	1.000	5773	0.70	12074

11. Results

Interaction of Tensile and Shear Forces (Sec. 17.8)

Shear	Factored Load, V_{ua} (lb)	Design Strength, ϕV_n (lb)	Ratio	Status
Steel	**1983**	**4232**	**0.47**	**Pass (Governs)**
Pryout	3967	12074	0.33	Pass

1/2"Ø CS Strong-Bolt 2, hnom:3.875" (98mm) meets the selected design criteria.

12. Warnings

- Per designer input, the tensile component of the strength-level earthquake force applied to anchors does not exceed 20 percent of the total factored anchor tensile force associated with the same load combination. Therefore the ductility requirements of ACI 318 17.10.5.2 for tension need not be satisfied – designer to verify.

- Per designer input, the shear component of the strength-level earthquake force applied to anchors does not exceed 20 percent of the total factored anchor shear force associated with the same load combination. Therefore the ductility requirements of ACI 318 17.10.6.2 for shear need not be satisfied – designer to verify.

- Designer must exercise own judgement to determine if this design is suitable.

- Refer to manufacturer's product literature for hole cleaning and installation instructions.

Company:		Date:	8/16/2024
Engineer:	DMS	Page:	1/5
Project:	Red Dot Mezzanine		
Address:			
Phone:			
E-mail:			

1.Project information

Customer company:
Customer contact name:
Customer e-mail:
Comment:

Project description: Stair Anchorage Uplift Case
Location:
Fastening description:

2. Input Data & Anchor Parameters

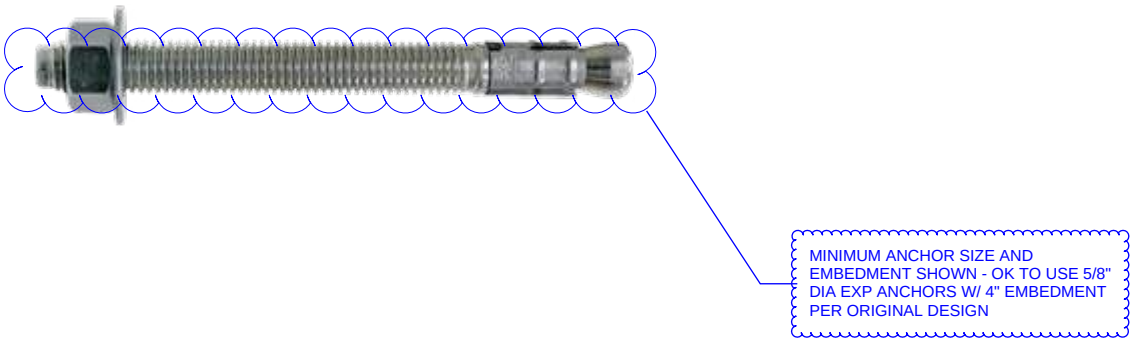
General
Design method:ACI 318-19
Units: Imperial units

Anchor Information:
Anchor type: Torque controlled expansion anchor
Material: Carbon Steel
Diameter (inch): 0.500
Nominal Embedment depth (inch): 3.875
Effective Embedment depth, h_{ef} (inch): 3.375
Code report: ICC-ES ESR-3037
Anchor category: 1
Anchor ductility: Yes
h_{min} (inch): 6.00
c_{ac} (inch): 7.50
C_{min} (inch): 12.00
S_{min} (inch): 2.75

Base Material
Concrete: Normal-weight
Concrete thickness, h (inch): 12.00
State: Cracked
Compressive strength, f'_c (psi): 3000
$\Psi_{c,V}$: 1.0
Reinforcement condition: Supplementary reinforcement not present
Supplemental edge reinforcement: Not applicable
Reinforcement provided at corners: No
Ignore concrete breakout in tension: No
Ignore concrete breakout in shear: No
Ignore 6do requirement: Not applicable
Build-up grout pad: No

Base Plate
Length x Width x Thickness (inch): 8.00 x 3.00 x 0.25

Recommended Anchor
Anchor Name: Strong-Bolt® 2 - 1/2"Ø CS Strong-Bolt 2, hnom:3.875" (98mm)
Code Report: ICC-ES ESR-3037

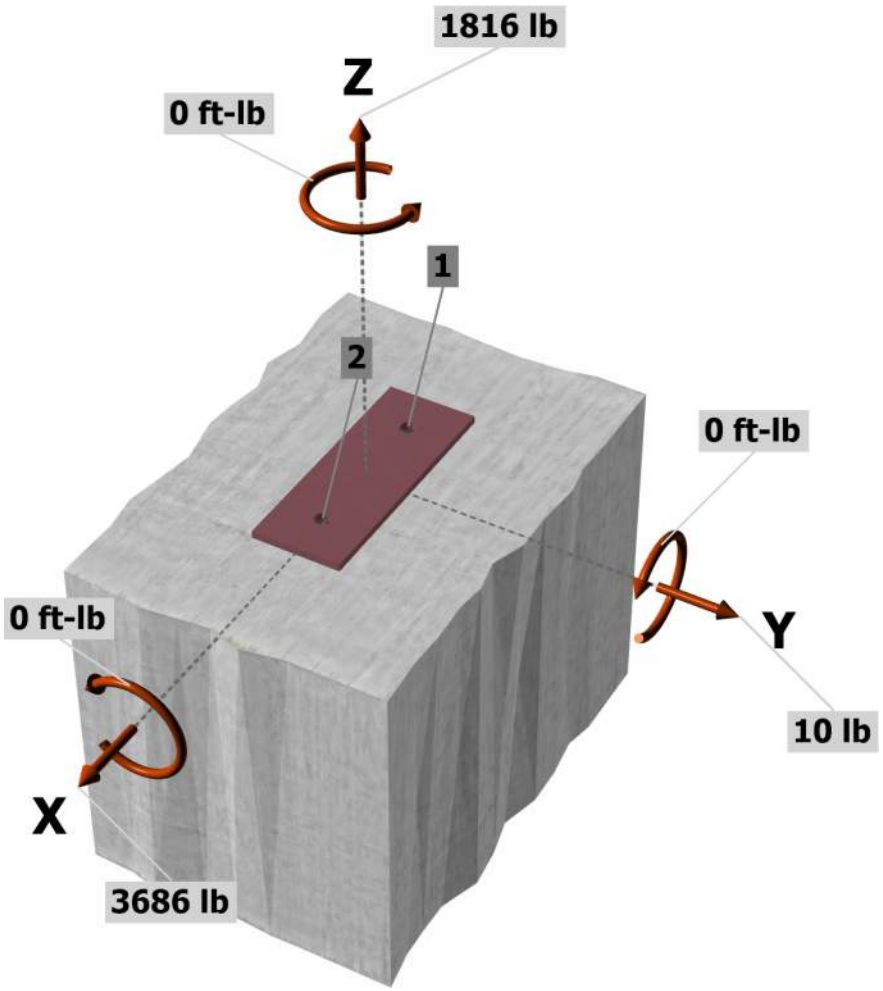


Load and Geometry
Load factor source: ACI 318 Section 5.3
Load combination: not set
Seismic design: Yes
Anchors subjected to sustained tension: Not applicable
Ductility section for tension: 17.10.5.2 not applicable
Ductility section for shear: 17.10.6.2 not applicable
Ω_0 factor: not set
Apply entire shear load at front row: No
Anchors only resisting wind and/or seismic loads: No

Strength level loads:

N_{ua} [lb]: 1816
V_{uax} [lb]: 3686
V_{uay} [lb]: 10
M_{ux} [ft-lb]: 0
M_{uy} [ft-lb]: 0
M_{uz} [ft-lb]: 0

<Figure 1>



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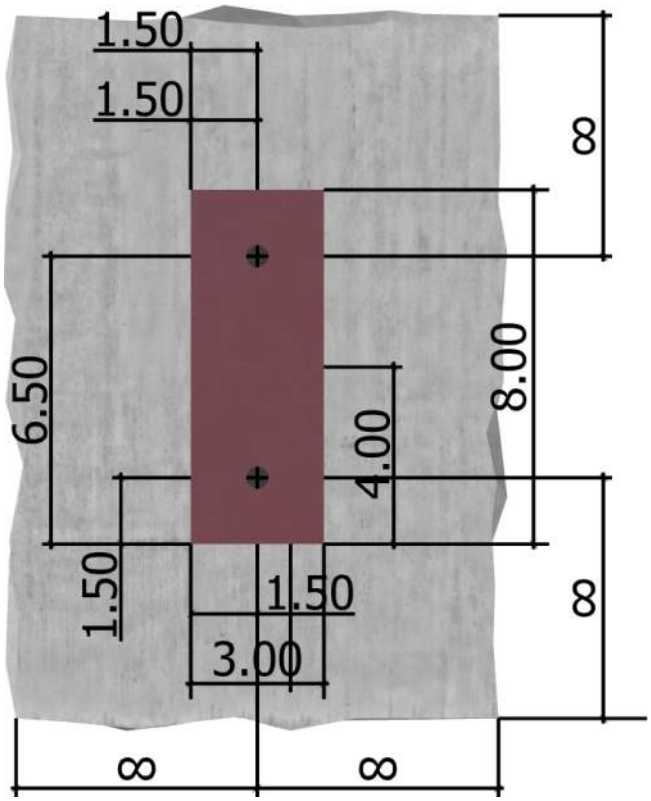
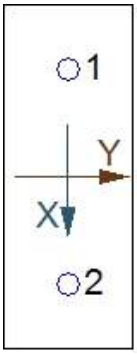


3. Resulting Anchor Forces

Anchor	Tension load, N_{ua} (lb)	Shear load x, V_{uax} (lb)	Shear load y, V_{uay} (lb)	Shear load combined, $\sqrt{(V_{uax})^2+(V_{uay})^2}$ (lb)
1	908.0	1843.0	5.0	1843.0
2	908.0	1843.0	5.0	1843.0
Sum	1816.0	3686.0	10.0	3686.0

Maximum concrete compression strain (‰): 0.00
Maximum concrete compression stress (psi): 0
Resultant tension force (lb): 1816
Resultant compression force (lb): 0
Eccentricity of resultant tension forces in x-axis, e'_{Nx} (inch): 0.00
Eccentricity of resultant tension forces in y-axis, e'_{Ny} (inch): 0.00
Eccentricity of resultant shear forces in x-axis, e'_{Vx} (inch): 0.00
Eccentricity of resultant shear forces in y-axis, e'_{Vy} (inch): 0.00

<Figure 3>



4. Steel Strength of Anchor in Tension (Sec. 17.6.1)

N_{sa} (lb)	ϕ	ϕN_{sa} (lb)
12100	0.75	9075

5. Concrete Breakout Strength of Anchor in Tension (Sec. 17.6.2)

$N_b = k_c \lambda_a \sqrt{f'_c} h_{ef}^{1.5}$ (Eq. 17.6.2.2.1)

k_c	λ_a	f'_c (psi)	h_{ef} (in)	N_b (lb)
17.0	1.00	3000	3.375	5773

$0.75\phi N_{cbg} = 0.75\phi \, (A_{Nc} / A_{Nco}) \Psi_{ec,N} \Psi_{ed,N} \Psi_{c,N} \Psi_{cp,N} N_b$ (Sec. 17.5.1.2 & Eq. 17.6.2.1a)

A_{Nc} (in²)	A_{Nco} (in²)	$c_{a,min}$ (in)	$\Psi_{ec,N}$	$\Psi_{ed,N}$	$\Psi_{c,N}$	$\Psi_{cp,N}$	N_b (lb)	ϕ	$0.75\phi N_{cbg}$ (lb)
153.14	102.52	-	1.000	1.000	1.00	1.000	5773	0.65	4204

6. Pullout Strength of Anchor in Tension (Sec. 17.6.3)

$0.75\phi N_{pn} = 0.75\phi \Psi_{c,P} \lambda_a N_p (f'_c / 2{,}500)^n$ (Sec. 17.5.1.2, Eq. 17.6.3.1 & Code Report)

$\Psi_{c,P}$	λ_a	N_p (lb)	f'_c (psi)	n	ϕ	$0.75\phi N_{pn}$ (lb)
1.0	1.00	4985	3000	0.50	0.65	2662

8. Steel Strength of Anchor in Shear (Sec. 17.7.1)

V_{sa} (lb)	ϕ_{grout}	ϕ	$\phi_{grout}\phi V_{sa}$ (lb)
6510	1.0	0.65	4232

10. Concrete Pryout Strength of Anchor in Shear (Sec. 17.7.3)

$\phi V_{cpg} = \phi k_{cp} N_{cbg} = \phi k_{cp} (A_{Nc} / A_{Nco}) \Psi_{ec,N} \Psi_{ed,N} \Psi_{c,N} \Psi_{cp,N} N_b$ (Sec. 17.5.1.2 & Eq. 17.7.3.1b)

k_{cp}	A_{Nc} (in^2)	A_{Nco} (in^2)	$\Psi_{ec,N}$	$\Psi_{ed,N}$	$\Psi_{c,N}$	$\Psi_{cp,N}$	N_b (lb)	ϕ	ϕV_{cpg} (lb)
2.0	153.14	102.52	1.000	1.000	1.000	1.000	5773	0.70	12074

11. Results

Interaction of Tensile and Shear Forces (Sec. R17.8)

Tension	Factored Load, N_{ua} (lb)	Design Strength, øN_n (lb)	Ratio	Status
Steel	908	9075	0.10	Pass
Concrete breakout	**1816**	**4204**	**0.43**	**Pass (Governs)**
Pullout	908	2662	0.34	Pass

Shear	Factored Load, V_{ua} (lb)	Design Strength, øV_n (lb)	Ratio	Status
Steel	**1843**	**4232**	**0.44**	**Pass (Governs)**
Pryout	3686	12074	0.31	Pass

Interaction check	$(N_{ua}/\phi N_{ua})^{5/3}$	$(V_{ua}/\phi V_{ua})^{5/3}$	Combined Ratio	Permissible	Status
Sec. R17.8	0.25	0.25	49.7%	1.0	Pass

1/2"Ø CS Strong-Bolt 2, hnom:3.875" (98mm) meets the selected design criteria.

12. Warnings

- Per designer input, the tensile component of the strength-level earthquake force applied to anchors does not exceed 20 percent of the total factored anchor tensile force associated with the same load combination. Therefore the ductility requirements of ACI 318 17.10.5.2 for tension need not be satisfied – designer to verify.

- Per designer input, the shear component of the strength-level earthquake force applied to anchors does not exceed 20 percent of the total factored anchor shear force associated with the same load combination. Therefore the ductility requirements of ACI 318 17.10.6.2 for shear need not be satisfied – designer to verify.

- Designer must exercise own judgement to determine if this design is suitable.

- Refer to manufacturer's product literature for hole cleaning and installation instructions.

Company:		Date:	8/16/2024
Engineer:	DMS	Page:	1/5
Project:	Red Dot Mezzanine		
Address:			
Phone:			
E-mail:			

1.Project information

Customer company:
Customer contact name:
Customer e-mail:
Comment:

Project description: Worst Case Scenario Loading with Worst Case Base plate (12x12 W/ 3 anchors not concentrically loaded)
Location:
Fastening description:

2. Input Data & Anchor Parameters

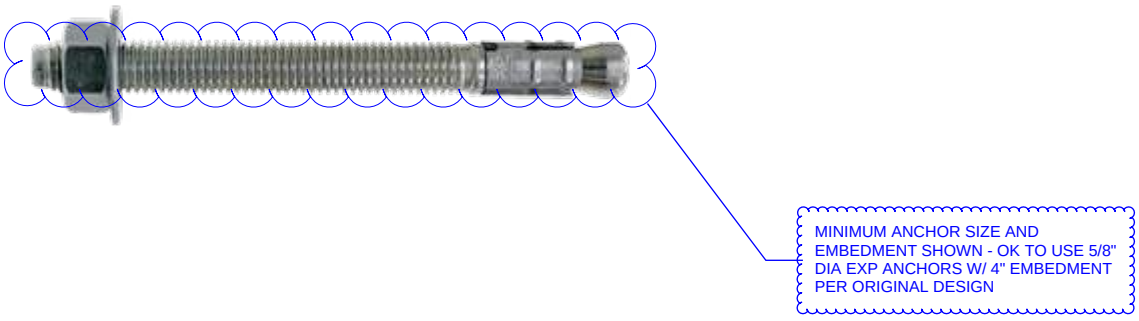
General
Design method:ACI 318-19
Units: Imperial units

Anchor Information:
Anchor type: Torque controlled expansion anchor
Material: Carbon Steel
Diameter (inch): 0.500
Nominal Embedment depth (inch): 3.875
Effective Embedment depth, h_{ef} (inch): 3.375
Code report: ICC-ES ESR-3037
Anchor category: 1
Anchor ductility: Yes
h_{min} (inch): 6.00
c_{ac} (inch): 7.50
C_{min} (inch): 12.00
S_{min} (inch): 2.75

Base Material
Concrete: Normal-weight
Concrete thickness, h (inch): 6.00
State: Cracked
Compressive strength, f'_c (psi): 3000
$\Psi_{c,V}$: 1.0
Reinforcement condition: Supplementary reinforcement not present
Supplemental edge reinforcement: Not applicable
Reinforcement provided at corners: No
Ignore concrete breakout in tension: No
Ignore concrete breakout in shear: No
Ignore 6do requirement: Not applicable
Build-up grout pad: No

Base Plate
Length x Width x Thickness (inch): 12.00 x 12.00 x 0.25

Recommended Anchor
Anchor Name: Strong-Bolt® 2 - 1/2"Ø CS Strong-Bolt 2, hnom:3.875" (98mm)
Code Report: ICC-ES ESR-3037

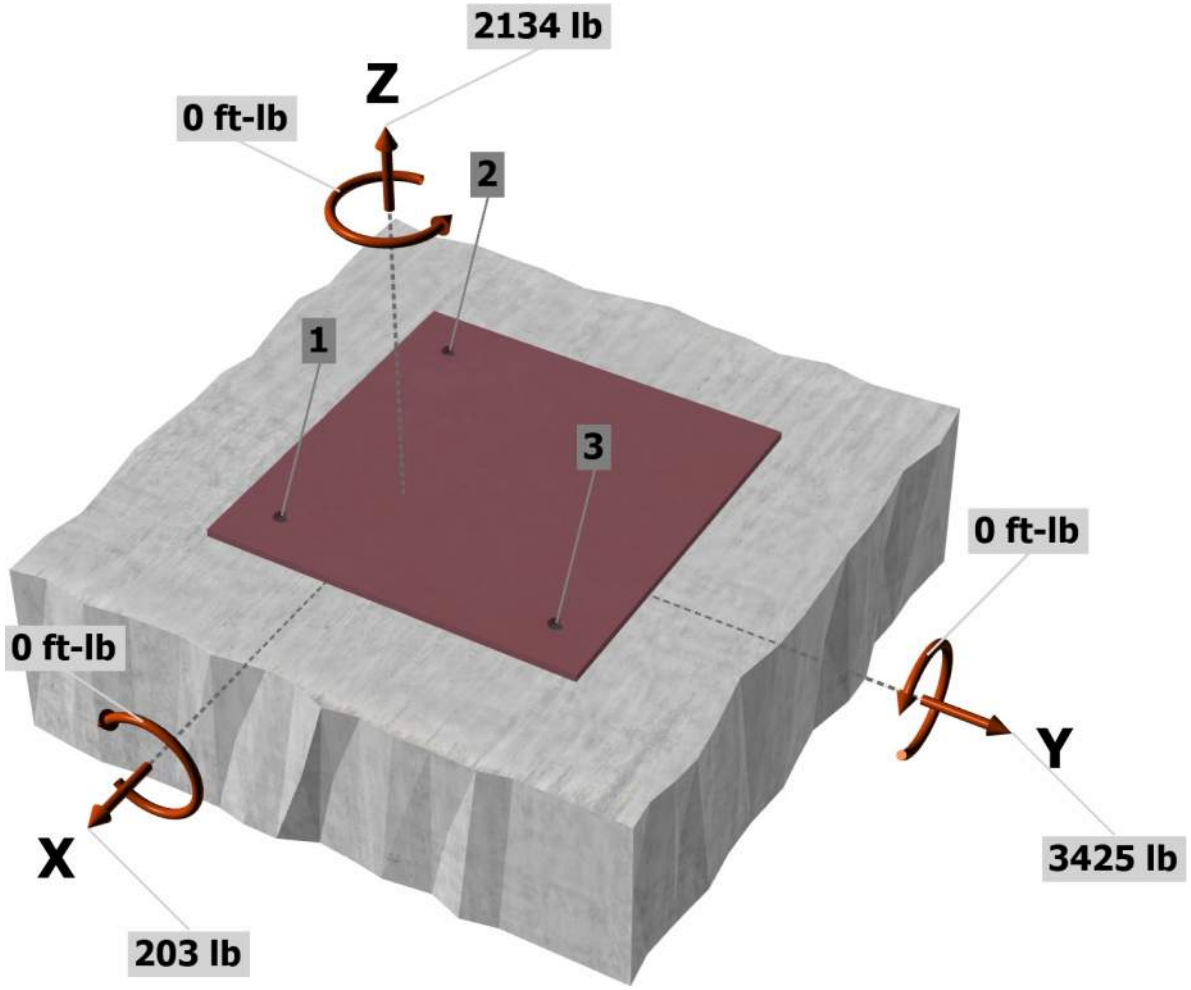


Load and Geometry
Load factor source: ACI 318 Section 5.3
Load combination: not set
Seismic design: Yes
Anchors subjected to sustained tension: Not applicable
Ductility section for tension: 17.10.5.2 not applicable
Ductility section for shear: 17.10.6.2 not applicable
Ω_0 factor: not set
Apply entire shear load at front row: No
Anchors only resisting wind and/or seismic loads: No

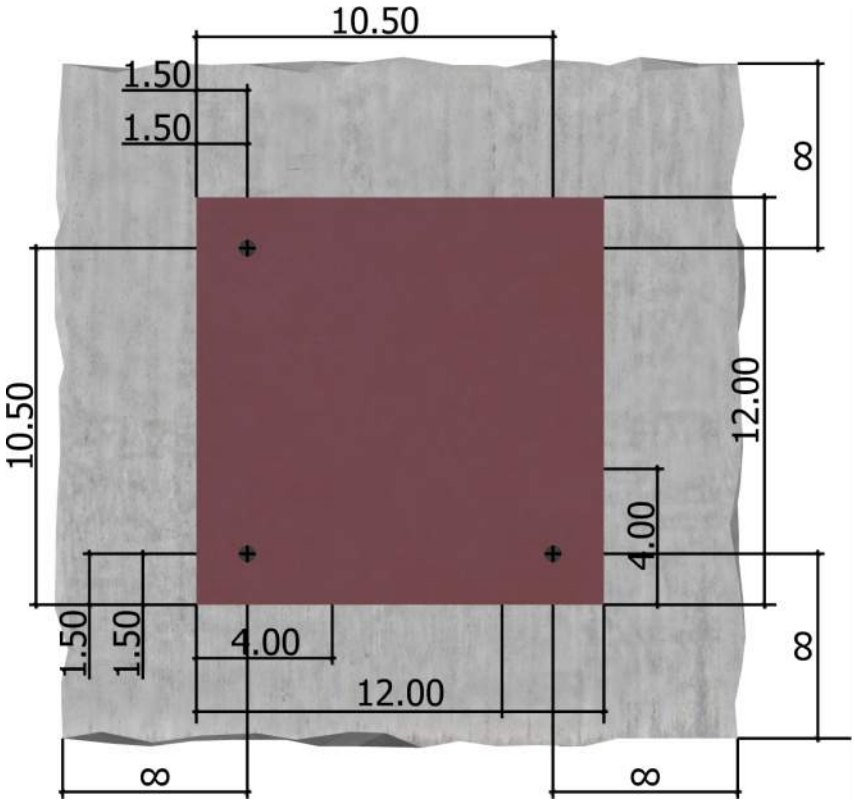
Strength level loads:

N_{ua} [lb]: 2134
V_{uax} [lb]: 203
V_{uay} [lb]: 3425
M_{ux} [ft-lb]: 0
M_{uy} [ft-lb]: 0
M_{uz} [ft-lb]: 0

<Figure 1>



<Figure 2>

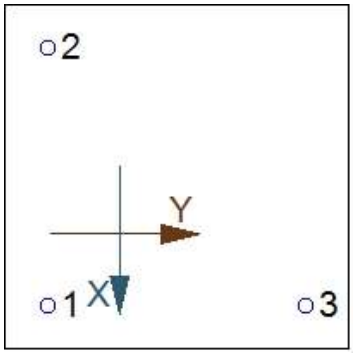


3. Resulting Anchor Forces

Anchor	Tension load, N_{ua} (lb)	Shear load x, V_{uax} (lb)	Shear load y, V_{uay} (lb)	Shear load combined, $\sqrt{(V_{uax})^2+(V_{uay})^2}$ (lb)
1	946.6	118.1	1192.1	1197.9
2	593.7	118.1	1040.9	1047.6
3	593.7	-33.1	1192.1	1192.5
Sum	2134.0	203.0	3425.0	3438.0

Maximum concrete compression strain (‰): 0.00
Maximum concrete compression stress (psi): 0
Resultant tension force (lb): 2134
Resultant compression force (lb): 0
Eccentricity of resultant tension forces in x-axis, e'_{Nx} (inch): 0.50
Eccentricity of resultant tension forces in y-axis, e'_{Ny} (inch): 0.50
Eccentricity of resultant shear forces in x-axis, e'_{Vx} (inch): 0.00
Eccentricity of resultant shear forces in y-axis, e'_{Vy} (inch): 0.00

<Figure 3>



4. Steel Strength of Anchor in Tension (Sec. 17.6.1)

N_{sa} (lb)	ϕ	ϕN_{sa} (lb)
12100	0.75	9075

5. Concrete Breakout Strength of Anchor in Tension (Sec. 17.6.2)

$N_b = k_c \lambda_a \sqrt{f'_c} h_{ef}^{1.5}$ (Eq. 17.6.2.2.1)

k_c	λ_a	f'_c (psi)	h_{ef} (in)	N_b (lb)
17.0	1.00	3000	3.375	5773

$0.75\phi N_{cbg} = 0.75\phi (A_{Nc} / A_{Nco}) \Psi_{ec,N} \Psi_{ed,N} \Psi_{c,N} \Psi_{cp,N} N_b$ (Sec. 17.5.1.2 & Eq. 17.6.2.1a)

A_{Nc} (in^2)	A_{Nco} (in^2)	$c_{a,min}$ (in)	$\Psi_{ec,N}$	$\Psi_{ed,N}$	$\Psi_{c,N}$	$\Psi_{cp,N}$	N_b (lb)	ϕ	$0.75\phi N_{cbg}$ (lb)
284.77	102.52	-	0.829	1.000	1.00	1.000	5773	0.65	6485

6. Pullout Strength of Anchor in Tension (Sec. 17.6.3)

$0.75\phi N_{pn} = 0.75\phi \Psi_{c,P} \lambda_a N_p (f'_c / 2{,}500)^n$ (Sec. 17.5.1.2, Eq. 17.6.3.1 & Code Report)

$\Psi_{c,P}$	λ_a	N_p (lb)	f'_c (psi)	n	ϕ	$0.75\phi N_{pn}$ (lb)
1.0	1.00	4985	3000	0.50	0.65	2662

8. Steel Strength of Anchor in Shear (Sec. 17.7.1)

V_{sa} (lb)	ϕ_{grout}	ϕ	$\phi_{grout}\phi V_{sa}$ (lb)
6510	1.0	0.65	4232

10. Concrete Pryout Strength of Anchor in Shear (Sec. 17.7.3)

$\phi V_{cp} = \phi k_{cp} N_{cb} = \phi k_{cp}(A_{Nc} / A_{Nco})\, \Psi_{ed,N}\, \Psi_{c,N}\, \Psi_{cp,N} N_b$ (Sec. 17.5.1.2 & Eq. 17.7.3.1a)

k_{cp}	A_{Nc} (in^2)	A_{Nco} (in^2)	$\Psi_{ed,N}$	$\Psi_{c,N}$	$\Psi_{cp,N}$	N_b (lb)	ϕ	ϕV_{cp} (lb)
2.0	91.55	102.52	1.000	1.000	1.000	5773	0.70	7218

11. Results

Interaction of Tensile and Shear Forces (Sec. 17.8)

Tension	Factored Load, N_{ua} (lb)	Design Strength, øN_n (lb)	Ratio	Status
Steel	947	9075	0.10	Pass
Concrete breakout	2134	6485	0.33	Pass
Pullout	**947**	**2662**	**0.36**	**Pass (Governs)**

Shear	Factored Load, V_{ua} (lb)	Design Strength, øV_n (lb)	Ratio	Status
Steel	**1198**	**4232**	**0.28**	**Pass (Governs)**
Pryout	1198	7218	0.17	Pass

Interaction check	$N_{ua}/\phi N_n$	$V_{ua}/\phi V_n$	Combined Ratio	Permissible	Status
Sec. 17.8.1	0.36	0.00	35.6%	1.0	Pass

1/2"Ø CS Strong-Bolt 2, hnom:3.875" (98mm) meets the selected design criteria.

12. Warnings

- For irregular anchor patterns, the designer must consider sizing of base plate holes to ensure shear loads are distributed to anchors as designed.

- Per designer input, the tensile component of the strength-level earthquake force applied to anchors does not exceed 20 percent of the total factored anchor tensile force associated with the same load combination. Therefore the ductility requirements of ACI 318 17.10.5.2 for tension need not be satisfied – designer to verify.

- Per designer input, the shear component of the strength-level earthquake force applied to anchors does not exceed 20 percent of the total factored anchor shear force associated with the same load combination. Therefore the ductility requirements of ACI 318 17.10.6.2 for shear need not be satisfied – designer to verify.

- Designer must exercise own judgement to determine if this design is suitable.

- Refer to manufacturer's product literature for hole cleaning and installation instructions.

Company:		Date:	8/16/2024
Engineer:	DMS	Page:	1/5
Project:	Red Dot Mezzanine		
Address:			
Phone:			
E-mail:			

1.Project information

Customer company:
Customer contact name:
Customer e-mail:
Comment:

Project description: Worst Case Scenario Loading with Worst Case Base plate (12x12 W/ 3 anchors not concentrically loaded)
Location:
Fastening description:

2. Input Data & Anchor Parameters

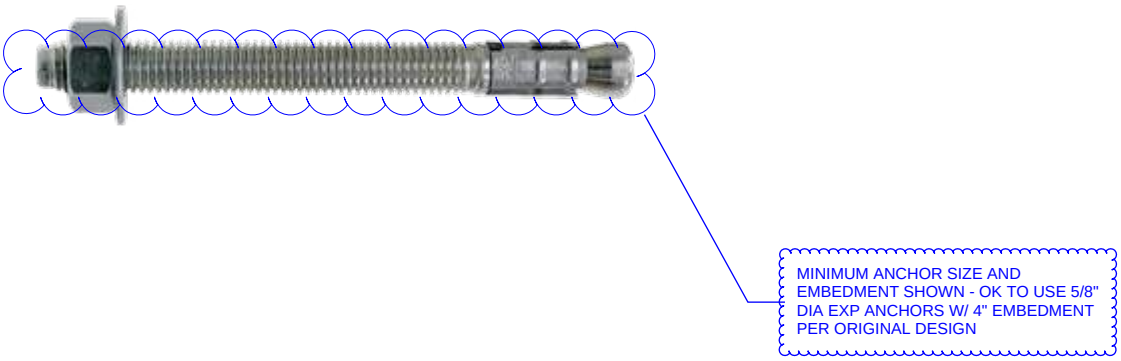
General
Design method:ACI 318-19
Units: Imperial units

Anchor Information:
Anchor type: Torque controlled expansion anchor
Material: Carbon Steel
Diameter (inch): 0.500
Nominal Embedment depth (inch): 3.875
Effective Embedment depth, h_{ef} (inch): 3.375
Code report: ICC-ES ESR-3037
Anchor category: 1
Anchor ductility: Yes
h_{min} (inch): 6.00
c_{ac} (inch): 7.50
C_{min} (inch): 12.00
S_{min} (inch): 2.75

Base Material
Concrete: Normal-weight
Concrete thickness, h (inch): 6.00
State: Cracked
Compressive strength, f'_c (psi): 3000
$\Psi_{c,V}$: 1.0
Reinforcement condition: Supplementary reinforcement not present
Supplemental edge reinforcement: Not applicable
Reinforcement provided at corners: No
Ignore concrete breakout in tension: No
Ignore concrete breakout in shear: No
Ignore 6do requirement: Not applicable
Build-up grout pad: No

Base Plate
Length x Width x Thickness (inch): 12.00 x 12.00 x 0.63

Recommended Anchor
Anchor Name: Strong-Bolt® 2 - 1/2"Ø CS Strong-Bolt 2, hnom:3.875" (98mm)
Code Report: ICC-ES ESR-3037

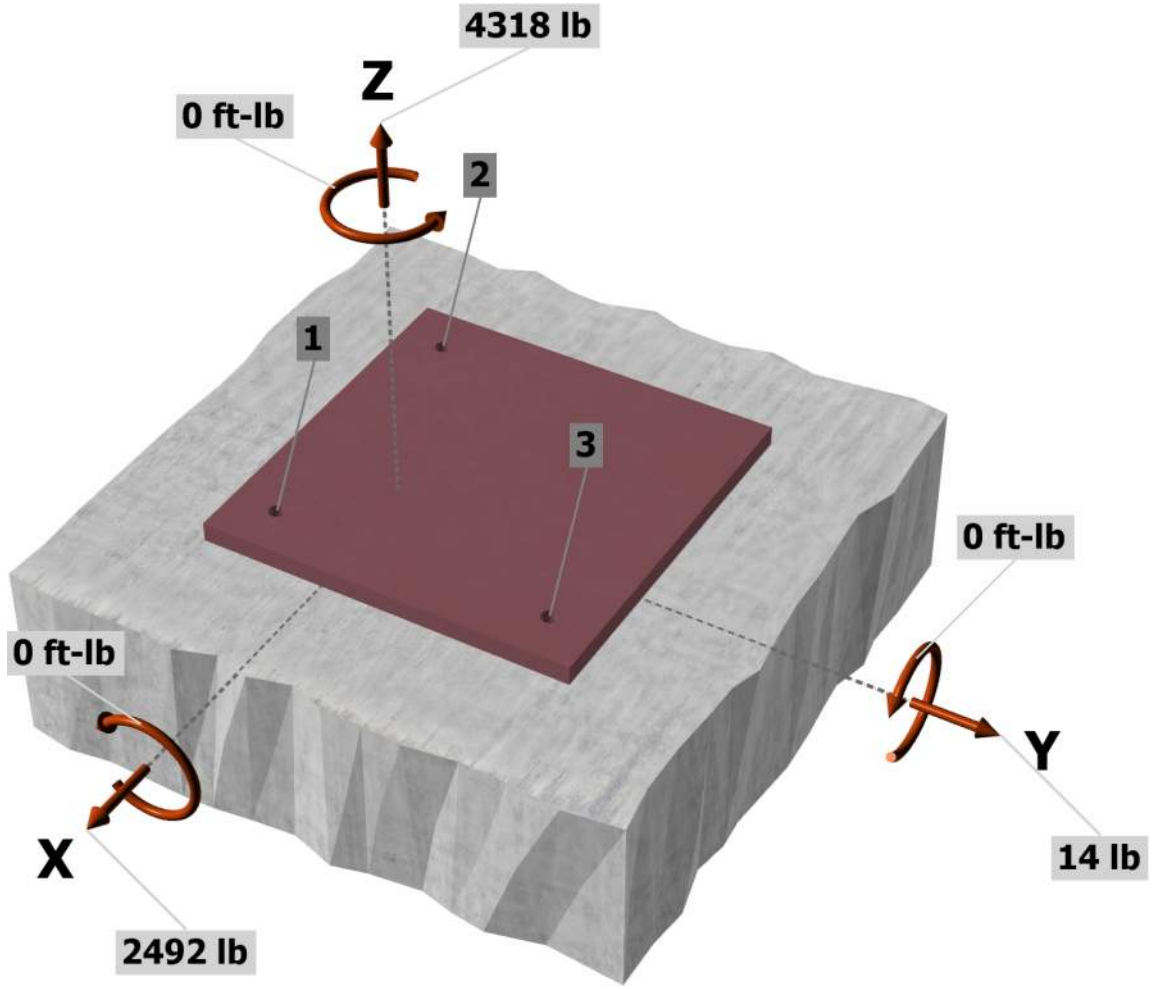


Load and Geometry
Load factor source: ACI 318 Section 5.3
Load combination: not set
Seismic design: Yes
Anchors subjected to sustained tension: Not applicable
Ductility section for tension: 17.10.5.2 not applicable
Ductility section for shear: 17.10.6.2 not applicable
Ω_0 factor: not set
Apply entire shear load at front row: No
Anchors only resisting wind and/or seismic loads: No

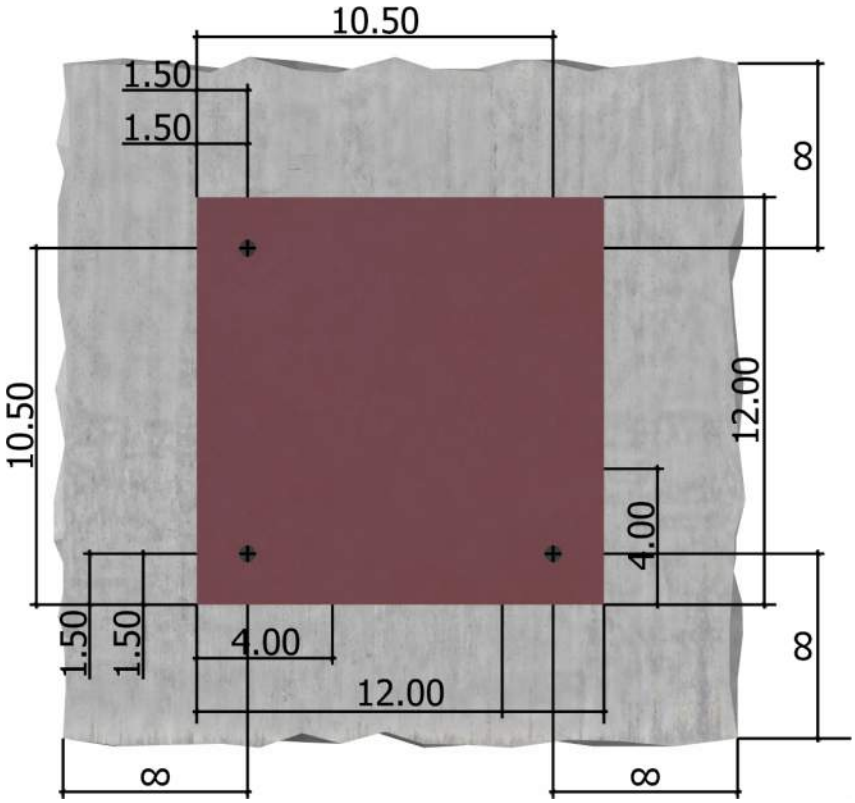
Strength level loads:

N_{ua} [lb]: 4318
V_{uax} [lb]: 2492
V_{uay} [lb]: 14
M_{ux} [ft-lb]: 0
M_{uy} [ft-lb]: 0
M_{uz} [ft-lb]: 0

<Figure 1>



<Figure 2>

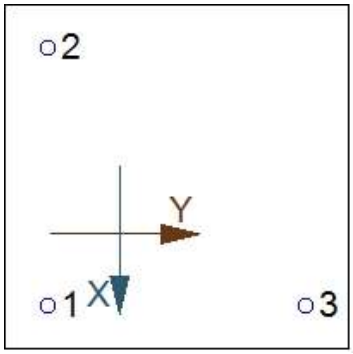


3. Resulting Anchor Forces

Anchor	Tension load, N_{ua} (lb)	Shear load x, V_{uax} (lb)	Shear load y, V_{uay} (lb)	Shear load combined, $\sqrt{(V_{uax})^2+(V_{uay})^2}$ (lb)
1	1917.3	865.5	39.5	866.4
2	1200.4	865.5	-64.9	867.9
3	1200.4	761.1	39.5	762.1
Sum	4318.0	2492.0	14.0	2496.4

Maximum concrete compression strain (‰): 0.00
Maximum concrete compression stress (psi): 0
Resultant tension force (lb): 4318
Resultant compression force (lb): 0
Eccentricity of resultant tension forces in x-axis, e'_{Nx} (inch): 0.50
Eccentricity of resultant tension forces in y-axis, e'_{Ny} (inch): 0.50
Eccentricity of resultant shear forces in x-axis, e'_{Vx} (inch): 0.00
Eccentricity of resultant shear forces in y-axis, e'_{Vy} (inch): 0.00

<Figure 3>



4. Steel Strength of Anchor in Tension (Sec. 17.6.1)

N_{sa} (lb)	ϕ	ϕN_{sa} (lb)
12100	0.75	9075

5. Concrete Breakout Strength of Anchor in Tension (Sec. 17.6.2)

$N_b = k_c \lambda_a \sqrt{f'_c} h_{ef}^{1.5}$ (Eq. 17.6.2.2.1)

k_c	λ_a	f'_c (psi)	h_{ef} (in)	N_b (lb)
17.0	1.00	3000	3.375	5773

$0.75\phi N_{cbg} = 0.75\phi (A_{Nc} / A_{Nco}) \Psi_{ec,N} \Psi_{ed,N} \Psi_{c,N} \Psi_{cp,N} N_b$ (Sec. 17.5.1.2 & Eq. 17.6.2.1a)

A_{Nc} (in^2)	A_{Nco} (in^2)	$c_{a,min}$ (in)	$\Psi_{ec,N}$	$\Psi_{ed,N}$	$\Psi_{c,N}$	$\Psi_{cp,N}$	N_b (lb)	ϕ	$0.75\phi N_{cbg}$ (lb)
284.77	102.52	-	0.829	1.000	1.00	1.000	5773	0.65	6480

6. Pullout Strength of Anchor in Tension (Sec. 17.6.3)

$0.75\phi N_{pn} = 0.75\phi \Psi_{c,P} \lambda_a N_p (f'_c / 2{,}500)^n$ (Sec. 17.5.1.2, Eq. 17.6.3.1 & Code Report)

$\Psi_{c,P}$	λ_a	N_p (lb)	f'_c (psi)	n	ϕ	$0.75\phi N_{pn}$ (lb)
1.0	1.00	4985	3000	0.50	0.65	2662

8. Steel Strength of Anchor in Shear (Sec. 17.7.1)

V_{sa} (lb)	ϕ_{grout}	ϕ	$\phi_{grout}\phi V_{sa}$ (lb)
6510	1.0	0.65	4232

10. Concrete Pryout Strength of Anchor in Shear (Sec. 17.7.3)

$\phi V_{cp} = \phi k_{cp} N_{cb} = \phi k_{cp}(A_{Nc} / A_{Nco})\, \Psi_{ed,N}\, \Psi_{c,N}\, \Psi_{cp,N} N_b$ (Sec. 17.5.1.2 & Eq. 17.7.3.1a)

k_{cp}	A_{Nc} (in^2)	A_{Nco} (in^2)	$\Psi_{ed,N}$	$\Psi_{c,N}$	$\Psi_{cp,N}$	N_b (lb)	ϕ	ϕV_{cp} (lb)
2.0	91.55	102.52	1.000	1.000	1.000	5773	0.70	7218

11. Results

Interaction of Tensile and Shear Forces (Sec. 17.8)

Tension	Factored Load, N_{ua} (lb)	Design Strength, øN_n (lb)	Ratio	Status
Steel	1917	9075	0.21	Pass
Concrete breakout	4318	6480	0.67	Pass
Pullout	**1917**	**2662**	**0.72**	**Pass (Governs)**

Shear	Factored Load, V_{ua} (lb)	Design Strength, øV_n (lb)	Ratio	Status
Steel	**868**	**4232**	**0.21**	**Pass (Governs)**
Pryout	866	7218	0.12	Pass

Interaction check	$N_{ua}/\phi N_n$	$V_{ua}/\phi V_n$	Combined Ratio	Permissible	Status
Sec. 17.8.1	0.72	0.00	72.0%	1.0	Pass

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12. Warnings

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- Designer must exercise own judgement to determine if this design is suitable.

- Refer to manufacturer's product literature for hole cleaning and installation instructions.