QUANTUM
CONSULTING ENGINEERS

December 27, 2024

PRCTI20242004

City of Puyallup
Development & Permitting Services
ISSUED PERMIT
Building | Planning
Engineering | Public Works
Fire | Traffic

City of Puyallup
Building
REVIEWED
FOR
COMPLIANCE
SKinnear
01/21/2025
11:29:17 AM

STRUCTURAL CALCULATIONS
(Permit Submittal)

CENTERIS DATA CENTER
LEVEL 2 DATA CENTER TI
1023 39th Avenue SE
Puyallup, WA 98374

Calculations required to be provided by the Permittee on site for all Inspections

Quantum Job Number: 23444.01

SCOTT H. TINKER
STATE OF WASHINGTON
36098
STRUCTURAL ENGINEER
PROFESSIONAL ENGINEER

Prepared for:
CENTERIS DATA CENTERS
18300 Cascade Avenue S
Seattle, WA 981188

Prepared by:
QUANTUM CONSULTING ENGINEERS
1511 Third Avenue, Suite 323
Seattle, WA 98101
TEL 206.957.3900
FAX 206.957.3901

Structural Design Criteria

Building Code: 2021 International Building Code
Building Department: City of Puyallup

Seismic Criteria

S_s:	1.26		
S_1:	0.43	Seismic Soil Site Class:	D
S_{ds}:	1.01	Seismic Design Category:	D
S_{d1}:	0.50		

Materials Criteria

Concrete (28 Day Strength):

Foundation/Slab on Grade	F'c= 3,000 PSI
Walls and Columns	F'c= 3,000 PSI

Reinforcing Steel:

Grade 60	Fy= 60,000 PSI

Structural Steel:

Wide-Flange Sections: A-992	Fy= 50,000 PSI
Miscellaneous Sections: A-36	Fy= 36,000 PSI
Tube Sections: A-500	Fy= 46,000 PSI
Pipe Sections: A-53	Fy= 35,000 PSI
Welding	Fy= 70,000 PSI

This is a beta release of the new ATC Hazards by Location website. Please contact us with feedback.

The ATC Hazards by Location website will not be updated to support ASCE 7-22. Find out why.

Hazards by Location

Search Information

Address:	1015 39th Ave SE Puyallup, WA 98374
Coordinates:	47.1590004, -122.2794422
Elevation:	489 ft
Timestamp:	2023-12-01T15:14:56.409Z
Hazard Type:	Seismic
Reference Document:	ASCE7-16
Risk Category:	III
Site Class:	D-default

Basic Parameters

Name	Value	Description
S_S	1.257	MCE_R ground motion (period=0.2s)
S_1	0.433	MCE_R ground motion (period=1.0s)
S_{MS}	1.508	Site-modified spectral acceleration value
S_{M1}	* null	Site-modified spectral acceleration value
S_{DS}	1.005	Numeric seismic design value at 0.2s SA
S_{D1}	* null	Numeric seismic design value at 1.0s SA

* See Section 11.4.8

Additional Information

Name	Value	Description
SDC	* null	Seismic design category
F_a	1.2	Site amplification factor at 0.2s
F_v	* null	Site amplification factor at 1.0s
CR_S	0.914	Coefficient of risk (0.2s)
CR_1	0.898	Coefficient of risk (1.0s)
PGA	0.5	MCE_G peak ground acceleration
F_{PGA}	1.2	Site amplification factor at PGA
PGA_M	0.6	Site modified peak ground acceleration
T_L	6	Long-period transition period (s)
SsRT	1.257	Probabilistic risk-targeted ground motion (0.2s)
SsUH	1.375	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
SsD	1.5	Factored deterministic acceleration value (0.2s)
S1RT	0.433	Probabilistic risk-targeted ground motion (1.0s)
S1UH	0.483	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
S1D	0.6	Factored deterministic acceleration value (1.0s)
PGAd	0.5	Factored deterministic acceleration value (PGA)

* See Section 11.4.8

The results indicated here DO NOT reflect any state or local amendments to the values or any delineation lines made during the building code adoption process. Users should confirm any output obtained from this tool with the local Authority Having Jurisdiction before proceeding with design.

COOLING PIPES SUSPENDED FROM LEVEL 3

- PIPE LOADS

NORTH PIPES: 10" Ø 43 PLF EACH (FULL)
SOUTH PIPES: 8" Ø 30 PLF EACH (FULL)
ADD 20 PLF MISC LOAD FOR FITTINGS ETC

CONTROLLING LINE LOAD IS W = (2) 43 PLF + 20 PLF
W = 106 PLF

ROUND LOAD UP TO 120 PLF
SUPPORTS ARE SPACED @ 8' O.C.

P = 120 PLF (8')
P = 960 lb @ EA. SUPPORT

- UNISTRUT GRAVITY DESIGN

SPAN = 3'-0"
USE P1000 (2) 1 5/8" x 1 5/8" x 12 GA. STACKED.
ALL. LOAD = 1130 lb
V_c = 0.85 ≤ 1.0 OK FOR GRAVITY

- LATERAL DESIGN

S_{DS} = 1.01 a_p = 2.5 R_p = 6.0 I_p = 1.5 z/h = 0.50

$$F_p = \frac{0.4(2.5)(1.01)(960\,lb)}{(6/1.5)}(1+2(0.5)) \quad \text{(ASCE 7-16 EQ 13.3-1)}$$

F_p = 485 lb CONTROLS

F_{pmin} = 0.3 (1.01) (980 lb)
F_{pmin} = 291 lb

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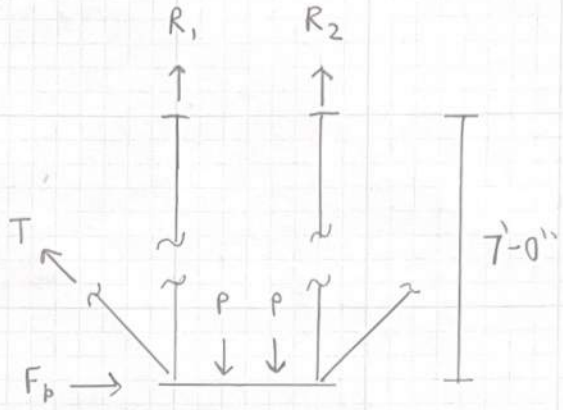
CENTERIS	12/26/24	23444.01	
project	date	project no.	
	TVM		
	designer	sheet	
CENTERIS			
client	checked by		

- TRAPEZE SUPPORT
  ALL BRACES ARE TENSION ONLY

P = 960 lb / 2
P = 480 lb
F_p = 485 lb = EQ

SEE RISA 2D MODEL



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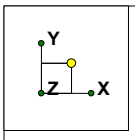
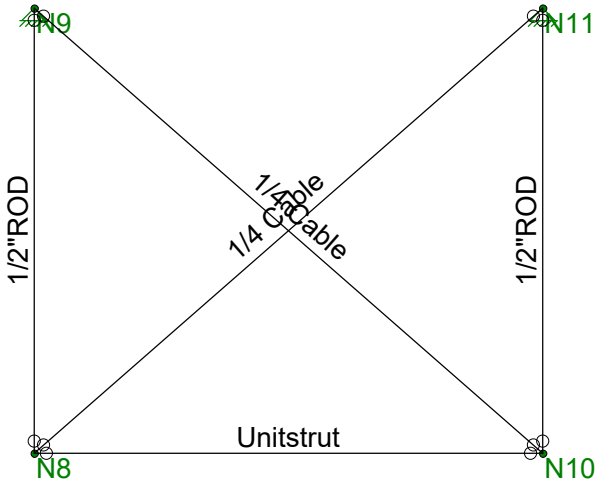
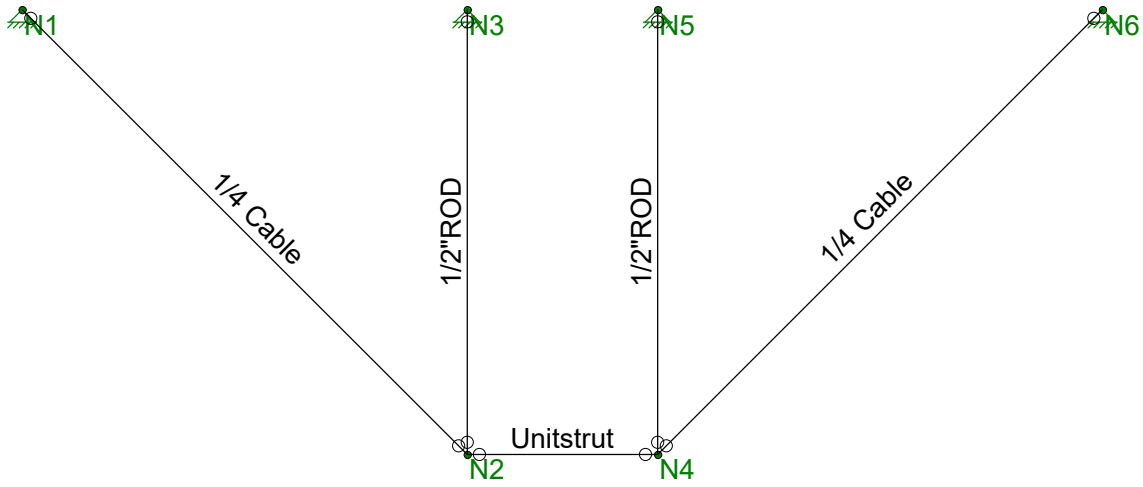
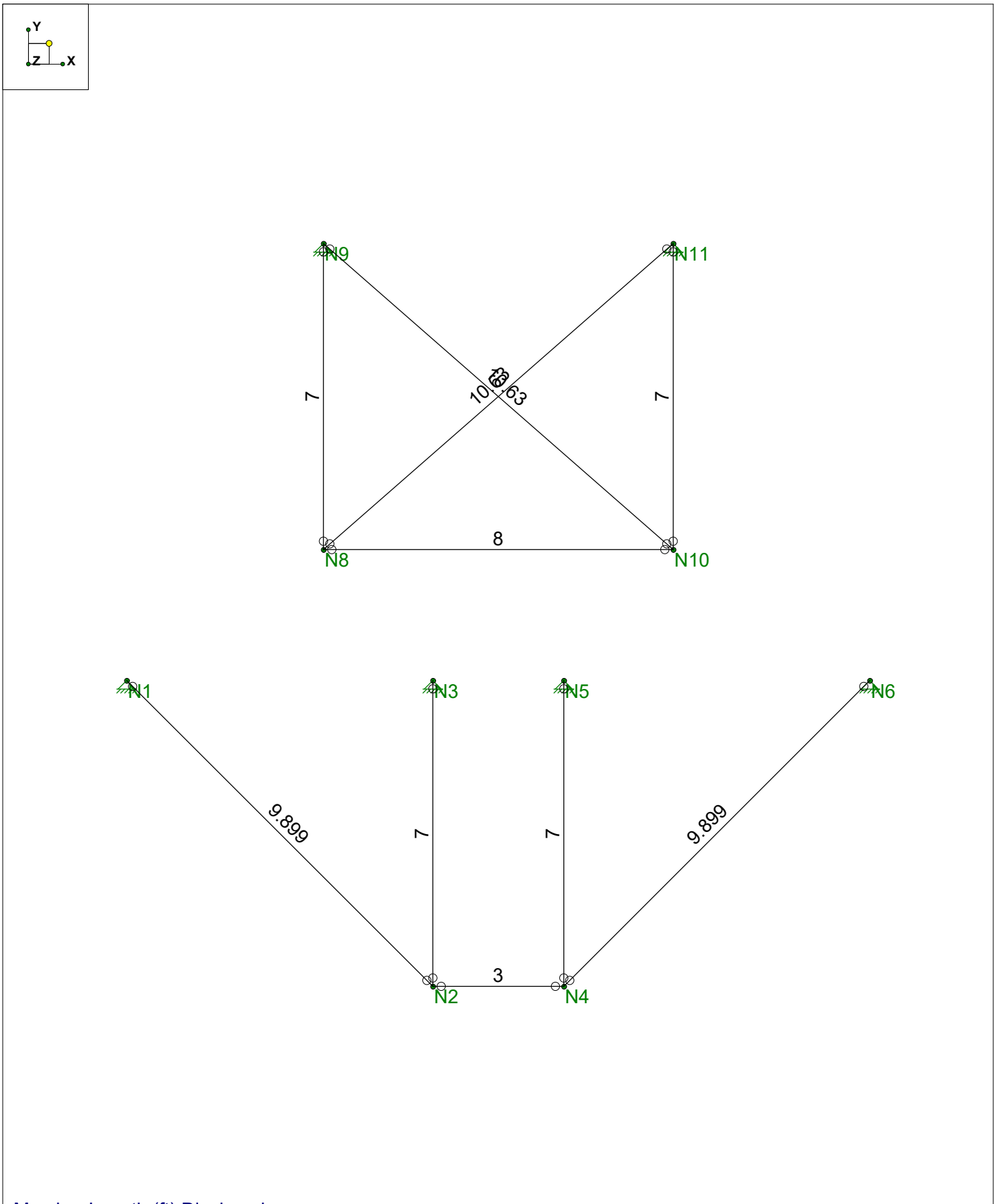






Quantum Consulting Engin...		
Travis Michaud P.E. S.E.		Dec 27, 2024 at 4:52 AM
		Chiller Pipe Unistrut.r2d



Member Length (ft) Displayed

Quantum Consulting Engin...		
Travis Michaud P.E. S.E.		Dec 27, 2024 at 4:53 AM
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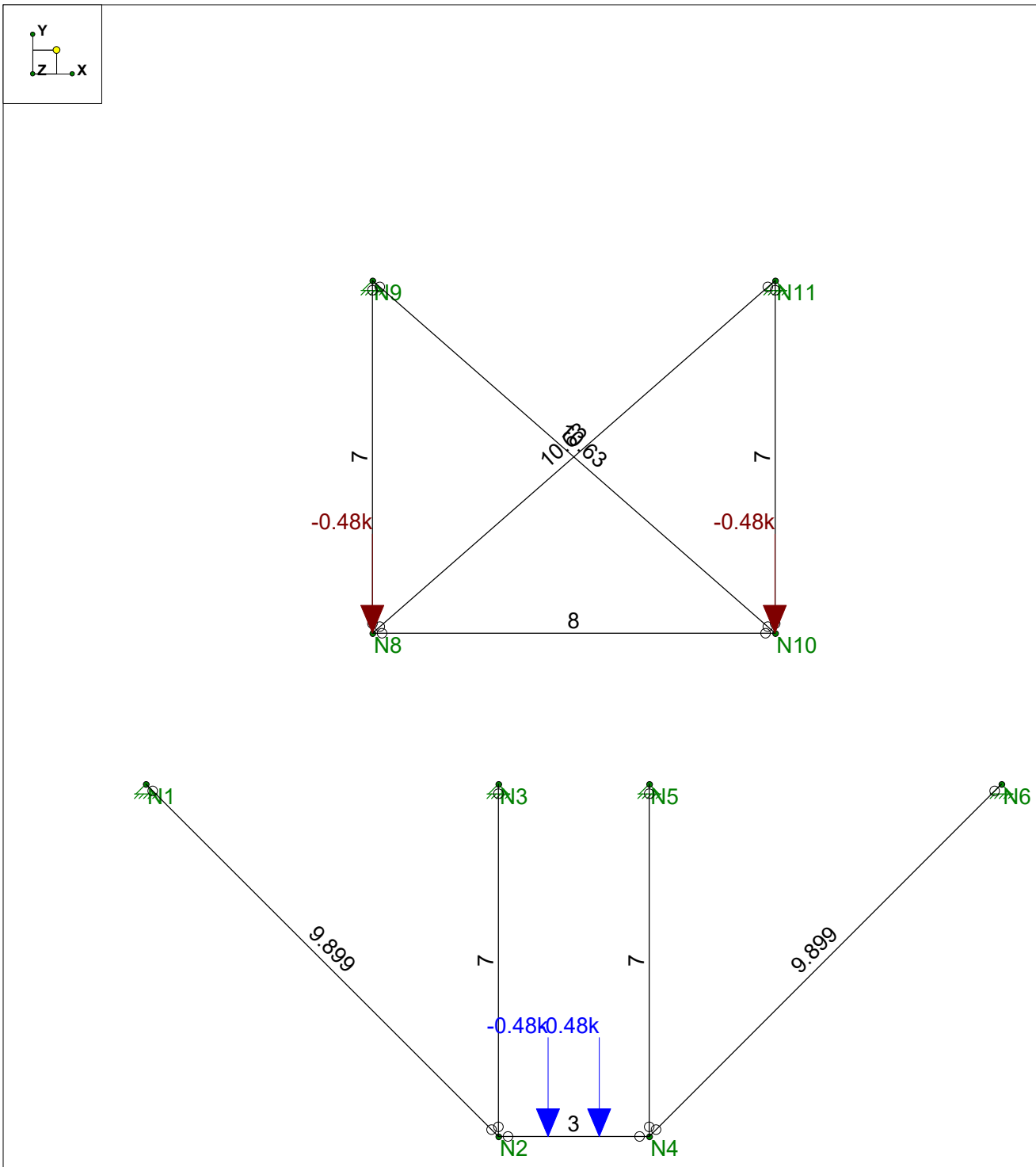
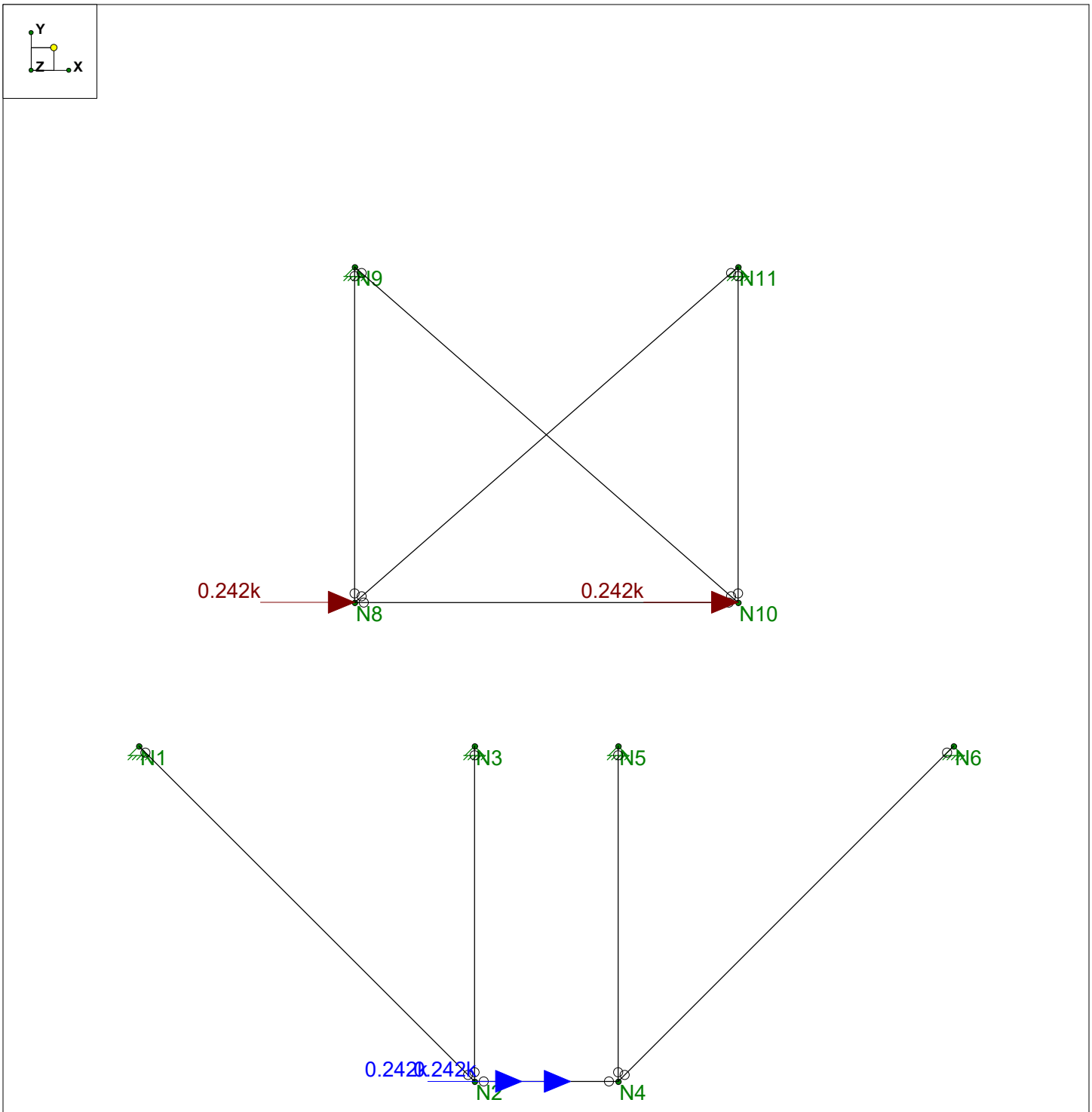


Member Length (ft) Displayed
Loads: BLC 1, Dead

Quantum Consulting Engin...		
Travis Michaud P.E. S.E.		Dec 27, 2024 at 4:53 AM
		Chiller Pipe Unistrut.r2d



Loads: BLC 2, Seismic
Envelope Only Solution

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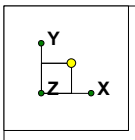
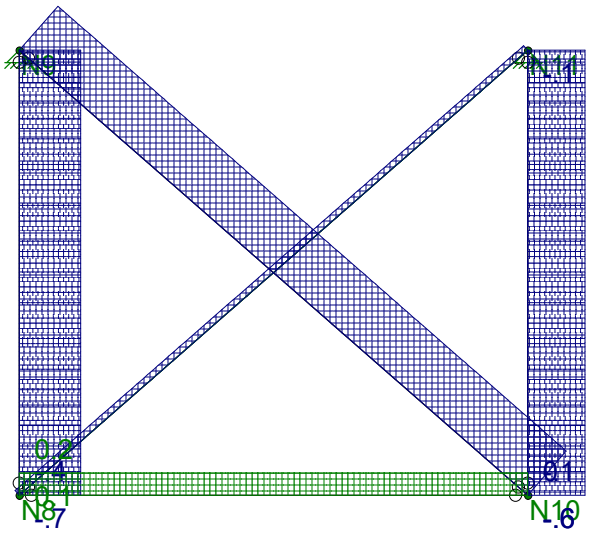
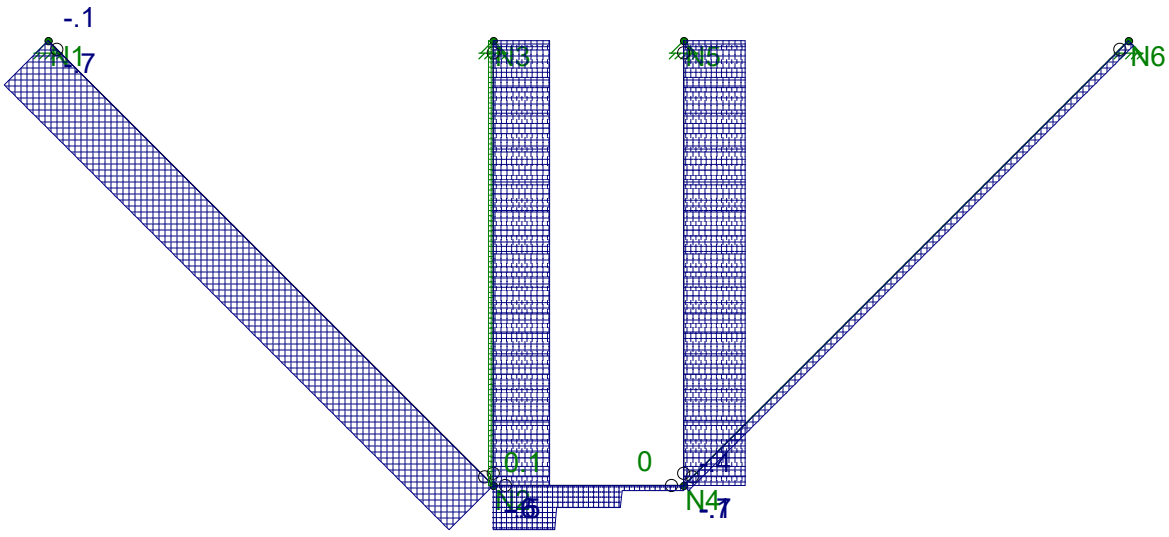
Travis Michaud P.E. S.E.		Dec 27, 2024 at 9:12 AM
		Chiller Pipe Unistrut.r2d

Load Combinations

	Description	S...	P...	S...	BLC	Fa...	BLC	Fa...	BLC	Fa...	BLC	Factor	BLC	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...
1	ASCE Strength 1	Y...	Y		DL	1.4																		
2	ASCE Strength 6	Y...	Y		DL	1.4	EL	1																
3	ASCE Strength 7	Y...	Y		DL	0.9	EL	1																
4	ASCE Strength 6 w/ Omega		Y		DL	1.4	EL	2																
5	ASCE Strength 7 w/ Omega		Y		DL	0.9	EL	2																







MAX CABLE TENSION IS 700 LB. 1/4" CABLE IS OK.
MAX ROD TENSION IS 700 LB. 1/2" ROD IS OK.
MAX ROD COMPRESSION IS 50 LBS,
KL/r = 672
Fe = 0.63 KSI
Pu/Ω = 74 LB > 50 LB EULER BUCKLING OK.
Envelope Only Solution
Member Axial Forces (k) (Enveloped)

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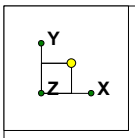
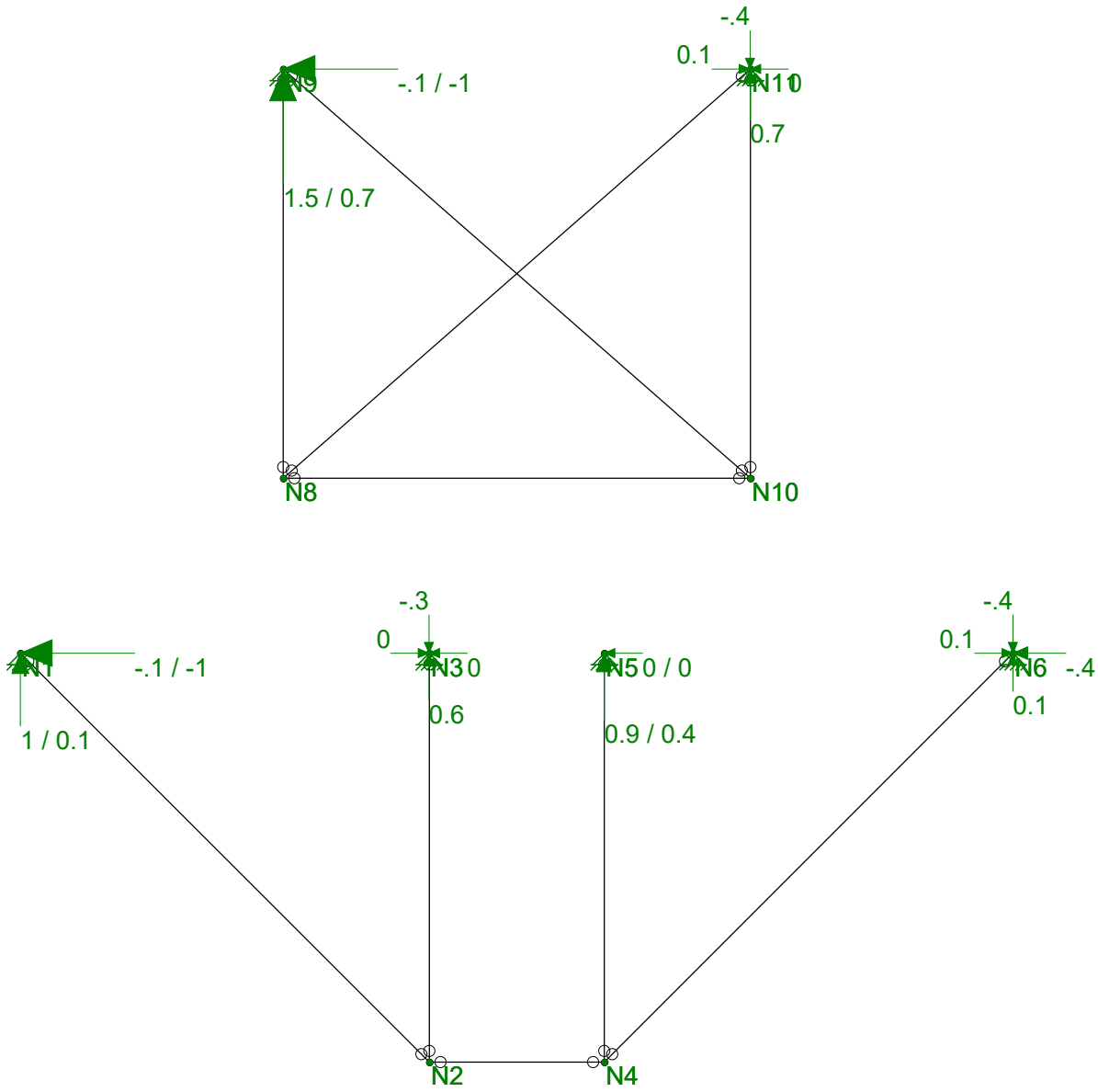
Travis Michaud P.E. S.E.		Dec 27, 2024 at 9:14 AM
		Chiller Pipe Unistrut.r2d





ENVELOPED REACTIONS IN OMEGA COMBINATION
Envelope Only Solution
Y-direction Reaction Units are k and k-ft (Enveloped)

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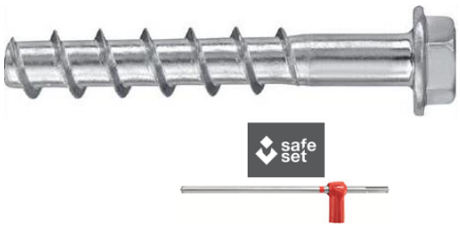
Travis Michaud P.E. S.E.		Dec 27, 2024 at 9:18 AM
		Chiller Pipe Unistrut.r2d

Company:	Quantum Consulting Engineers	Page:	1
Address:	1511 Third Ave, Suite 323	Specifier:	Travis Michaud
Phone I Fax:	2069573900 |	E-Mail:	tmichaud@quantumce.com
Design:	Metal deck - Dec 27, 2024	Date:	12/27/2024
Fastening point:			

Specifier's comments:

1 Input data



Metal deck:	Verco W3 Formlok 3"
Metal deck type:	W1
Anchor installation:	In the lower flute of concrete-filled metal deck
Anchor type and diameter:	**KWIK HUS-EZ (KH-EZ) (Carbon Steel) 1/2 (4 1/4)**
Item number:	418075 KH-EZ 1/2"x4 1/2"
Specification text:	Hilti ∅ 1/2 in KWIK HUS-EZ (KH-EZ) (Carbon Steel) with 4.25 in nominal embedment depth per ICC-ES ESR-3027 , SAFEset - automatic cleaning installation per MPII
Effective embedment depth:	$h_{ef,act}$ = 3.220 in., h_{nom} = 4.250 in.
Material:	Carbon Steel
Evaluation Service Report:	ESR-3027
Issued I Valid:	12/1/2023 | 12/1/2025
Proof:	Design Method ACI 318-19 / Mech in concrete over metal deck installation
Stand-off installation:	
Profile:	
Base material:	cracked concrete, 3000, f_c' = 3,000 psi; h = 3.500 in.
Installation:	**automatic cleaned drilled hole, Installation condition: Dry**
Seismic loads (cat. C, D, E, or F)	Tension load: yes (17.10.5.3 (d))
	Shear load: yes (17.10.6.3 (c))

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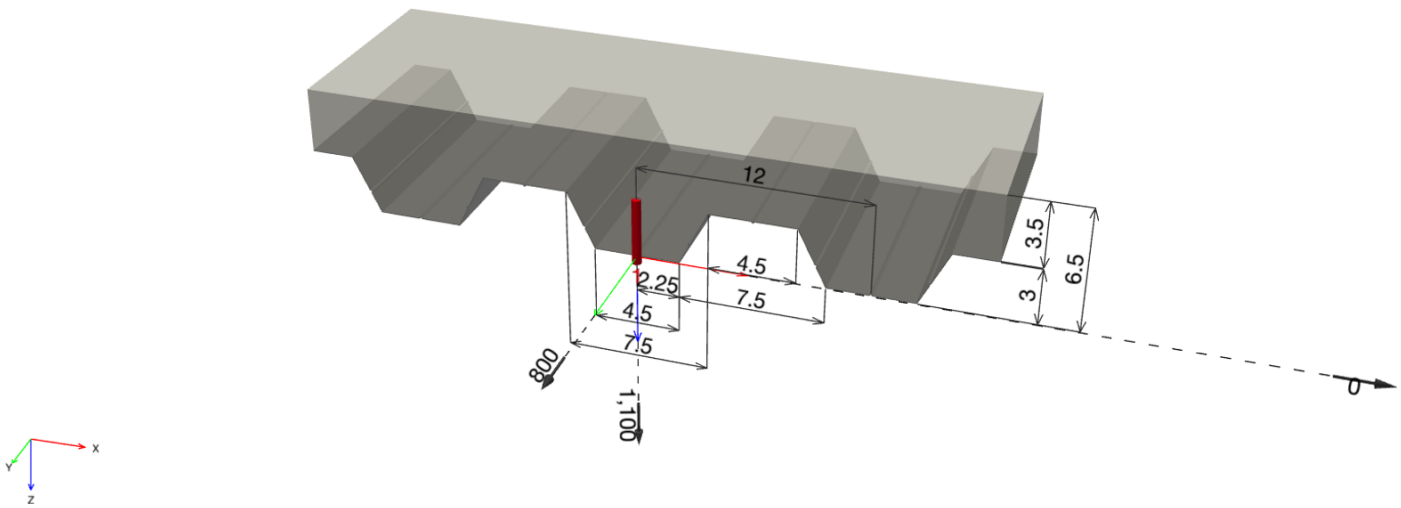
Fastening point:			

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



Company:	Quantum Consulting Engineers	Page:	3
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Phone I Fax:	2069573900 |	E-Mail:	tmichaud@quantumce.com
Design:	Metal deck - Dec 27, 2024	Date:	12/27/2024
Fastening point:			

1.1 Design results

Case	Description	Forces [lb] / Moments [in.lb]	Seismic	Max. Util. Anchor [%]
1	Combination 1	N = 1,100; V_x = 0; V_y = 800; M_x = 0; M_y = 0; M_z = 0;	yes	97

2 Load case/Resulting anchor forces

Anchor reactions [lb]

Tension force: (+Tension, -Compression)

Anchor	Tension force	Shear force	Shear force x	Shear force y
1	1,100	800	0	800

3 Tension load

	Load N_{ua} [lb]	Capacity ϕ N_n [lb]	Utilization $\beta_N = N_{ua}/\phi$ N_n	Status
Steel Strength*	N/A	N/A	N/A	N/A
Pullout Strength*	1,100	1,645	67	OK
Concrete Breakout Failure**	N/A	N/A	N/A	N/A

* highest loaded anchor **anchor group (anchors in tension)

3.1 Pullout Strength

$N_{p,Deck}$ [lb]	$(f_c'/3000)^{\alpha}$	α	λ_a	ϕ	$\phi_{seismic}$	$\phi_{nonductile}$	ϕ $N_{pn,Deck,f'c}$ [lb]
3,375	1.000	0.500	1.000	0.650	0.750	1.000	1,645

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Fastening point:			

4 Shear load

	Load V_{ua} [lb]	Capacity ϕ V_n [lb]	Utilization $\beta_V = V_{ua}/\phi$ V_n	Status
Steel Strength*	800	1,293	62	OK
Steel failure (with lever arm)*	N/A	N/A	N/A	N/A
Pryout Strength*	N/A	N/A	N/A	N/A
Concrete edge failure in direction **	N/A	N/A	N/A	N/A

* highest loaded anchor **anchor group (relevant anchors)
When the input edge distance is set to "infinity", edge breakout verification is not performed in that direction

4.1 Steel Strength

$V_{sa,Deck}$ [lb]	$\alpha_{V,seis}$	ϕ	ϕ $V_{sa,Deck}$ [lb]	V_{ua} [lb]
2,155	0.600	0.600	1,293	800

5 Combined tension and shear loads, per ACI 318-19 section 17.8

β_N	β_V	ζ	Utilization $\beta_{N,V}$ [%]	Status
0.669	0.619	5/3	97	OK

$\beta_{NV} = \beta_N^{\zeta} + \beta_V^{\zeta} <= 1$

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Design:	Metal deck - Dec 27, 2024	Date:	12/27/2024
Fastening point:			

6 Warnings

- The anchor design methods in PROFIS Engineering require rigid anchor plates per current regulations (AS 5216:2021, ETAG 001/Annex C, EOTA TR029 etc.). This means load re-distribution on the anchors due to elastic deformations of the anchor plate are not considered - the anchor plate is assumed to be sufficiently stiff, in order not to be deformed when subjected to the design loading. PROFIS Engineering calculates the minimum required anchor plate thickness with CBFEM to limit the stress of the anchor plate based on the assumptions explained above. The proof if the rigid anchor plate assumption is valid is not carried out by PROFIS Engineering. Input data and results must be checked for agreement with the existing conditions and for plausibility!
- The equations presented in this report are based on imperial units. When inputs are displayed in metric units, the user should be aware that the equations remain in their imperial format.
- Condition A applies where the potential concrete failure surfaces are crossed by supplementary reinforcement proportioned to tie the potential concrete failure prism into the structural member. Condition B applies where such supplementary reinforcement is not provided, or where pullout or pryout strength governs.
- Refer to the manufacturer's product literature for cleaning and installation instructions.
- For additional information about ACI 318 strength design provisions, please go to https://submittals.us.hilti.com/PROFISAnchorDesignGuide/
- "An anchor design approach for structures assigned to Seismic Design Category C, D, E or F is given in ACI 318-19, Chapter 17, Section 17.10.5.3 (a) that requires the governing design strength of an anchor or group of anchors be limited by ductile steel failure. If this is NOT the case, the connection design (tension) shall satisfy the provisions of Section 17.10.5.3 (b), Section 17.10.5.3 (c), or Section 17.10.5.3 (d). The connection design (shear) shall satisfy the provisions of Section 17.10.6.3 (a), Section 17.10.6.3 (b), or Section 17.10.6.3 (c)."
- Section 17.10.5.3 (b) / Section 17.10.6.3 (a) require the attachment the anchors are connecting to the structure be designed to undergo ductile yielding at a load level corresponding to anchor forces no greater than the controlling design strength. Section 17.10.5.3 (c) / Section 17.10.6.3 (b) waive the ductility requirements and require the anchors to be designed for the maximum tension / shear that can be transmitted to the anchors by a non-yielding attachment. Section 17.10.5.3 (d) / Section 17.10.6.3 (c) waive the ductility requirements and require the design strength of the anchors to equal or exceed the maximum tension / shear obtained from design load combinations that include E, with E increased by ω_0.
- Hilti post-installed anchors shall be installed in accordance with the Hilti Manufacturer's Printed Installation Instructions (MPII). Reference ACI 318-19, Section 26.7.

Fastening meets the design criteria!

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Phone I Fax:	2069573900 |	E-Mail:	tmichaud@quantumce.com
Design:	Metal deck - Dec 27, 2024	Date:	12/27/2024
Fastening point:			

7 Installation data

Anchor type and diameter: KWIK HUS-EZ (KH-EZ) (Carbon Steel) 1/2 (4 1/4)

Profile: -

Item number: 418075 KH-EZ 1/2"x4 1/2"

Hole diameter in the fixture: -

Maximum installation torque: 540 in.lb

Plate thickness (input): -

Hole diameter in the base material: 0.500 in.

Hole depth in the base material: 4.625 in.

Drilling method: SafeSet - automatic cleaning

Minimum thickness of the base material: 3.250 in.

Cleaning: Automatically performed while drilling

Hilti ∅ 1/2 in KWIK HUS-EZ (KH-EZ) (Carbon Steel) with 4.25 in nominal embedment depth per ICC-ES ESR-3027 , SAFEset - automatic cleaning installation per MPII

7.1 Recommended accessories

Drilling	Cleaning	Setting
• Suitable Rotary Hammer • Vacuum cleaner	• No accessory required	• Torque wrench

Coordinates Anchor in.

Anchor	x	y	c_{-x}	c_{+x}	c_{-y}	c_{+y}
1	0.000	0.000	-	-	-	-

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Fastening point:			

8 Remarks; Your Cooperation Duties

- Any and all information and data contained in the Software concern solely the use of Hilti products and are based on the principles, formulas and security regulations in accordance with Hilti's technical directions and operating, mounting and assembly instructions, etc., that must be strictly complied with by the user. All figures contained therein are average figures, and therefore use-specific tests are to be conducted prior to using the relevant Hilti product. The results of the calculations carried out by means of the Software are based essentially on the data you put in. Therefore, you bear the sole responsibility for the absence of errors, the completeness and the relevance of the data to be put in by you. Moreover, you bear sole responsibility for having the results of the calculation checked and cleared by an expert, particularly with regard to compliance with applicable norms and permits, prior to using them for your specific facility. The Software serves only as an aid to interpret norms and permits without any guarantee as to the absence of errors, the correctness and the relevance of the results or suitability for a specific application.
- You must take all necessary and reasonable steps to prevent or limit damage caused by the Software. In particular, you must arrange for the regular backup of programs and data and, if applicable, carry out the updates of the Software offered by Hilti on a regular basis. If you do not use the AutoUpdate function of the Software, you must ensure that you are using the current and thus up-to-date version of the Software in each case by carrying out manual updates via the Hilti Website. Hilti will not be liable for consequences, such as the recovery of lost or damaged data or programs, arising from a culpable breach of duty by you.

P1000 - Beam Loading

Span In	Max. Allowable Uniform Load Lbs	Defl. at Uniform Load In	Uniform Loading at Deflection Span/180 Lbs	Span/240 Lbs	Span/360 Lbs
24	1,690	0.06	1,690	1,690	1,690
36	1,130	0.13	1,130	1,130	900
48	850	0.22	850	760	500
60	680	0.35	650	480	320
72	560	0.50	450	340	220
84	480	0.68	330	250	160
96	420	0.89	250	190	130
108	380	1.14	200	150	100
120	340	1.40	160	120	80
144	280	2.00	110	80	60
168	240	2.72	80	60	40
192	210	3.55	60	50	NR
216	190	4.58	50	40	NR
240	170	5.62	40	NR	NR

P1001 - Beam Loading

Span In	Max. Allowable Uniform Load Lbs	Defl. at Uniform Load In	Uniform Loading at Deflection Span/180 Lbs	Span/240 Lbs	Span/360 Lbs
24	3,500*	0.02	3,500*	3,500*	3,500*
36	3,190	0.07	3,190	3,190	3,190
48	2,390	0.13	2,390	2,390	2,390
60	1,910	0.20	1,910	1,910	1,620
72	1,600	0.28	1,600	1,600	1,130
84	1,370	0.39	1,370	1,240	830
96	1,200	0.51	1,200	950	630
108	1,060	0.64	1,000	750	500
120	960	0.79	810	610	410
144	800	1.14	560	420	280
168	680	1.53	410	310	210
192	600	2.02	320	240	160
216	530	2.54	250	190	130
240	480	3.16	200	150	100

P1000 - Column Loading

Unbraced Height In	Max. Allowable Load at Slot Face Lbs	Maximum Column Load Applied at C.G. K = 0.65 Lbs	K = 0.80 Lbs	K =1.0 Lbs	K = 1.2 Lbs
24	3,550	10,740	9,890	8,770	7,740
36	3,190	8,910	7,740	6,390	5,310
48	2,770	7,260	6,010	4,690	3,800
60	2,380	5,910	4,690	3,630	2,960
72	2,080	4,840	3,800	2,960	2,400
84	1,860	4,040	3,200	2,480	1,980
96	1,670	3,480	2,750	2,110	1,660
108	1,510	3,050	2,400	1,810	**
120	1,380	2,700	2,110	**	**
144	1,150	2,180	1,660	**	**

P1001 - Column Loading

Unbraced Height In	Max. Allowable Load at Slot Face Lbs	Maximum Column Load Applied at C.G. K = 0.65 Lbs	K = 0.80 Lbs	K =1.0 Lbs	K = 1.2 Lbs
24	6,430	24,280	23,610	22,700	21,820
36	6,290	22,810	21,820	20,650	19,670
48	6,160	21,410	20,300	18,670	16,160
60	6,000	20,210	18,670	15,520	12,390
72	5,620	18,970	16,160	12,390	8,950
84	5,170	16,950	13,630	9,470	6,580
96	4,690	14,890	11,190	7,250	5,040
108	4,170	12,850	8,950	5,730	3,980
120	3,690	10,900	7,250	4,640	**
144	2,930	7,630	5,040	**	**

P1000/P1001 - Elements of Section

Parameter	P1000		P1001	
Area of Section	0.555	In^2	1.111	In^2
Axis 1-1				
Moment of Inertia (I)	0.185	In^4	0.928	In^4
Section Modulus (S)	0.202	In^3	0.571	In^3
Radius of Gyration (r)	0.577	In	0.914	In
Axis 2-2				
Moment of Inertia (I)	0.236	In^4	0.471	In^4
Section Modulus (S)	0.290	In^3	0.580	In^3
Radius of Gyration (r)	0.651	In	0.651	In

Notes:

* Load limited by spot weld shear.

** KL/r > 200

NR = Not Recommended.

1. Beam loads are given in *total* uniform load (W Lbs) not uniform load (w lbs/ft or w lbs/in).
2. Beam loads are based on a simple span and assumed to be adequately laterally braced. Unbraced spans can reduce beam load carrying capacity. Refer to Page 62 for reduction factors for unbraced lengths.
3. For pierced channel, multiply beam loads by the following factor:

"KO" Series.....95% **"T" Series 85%**
"HS" Series .....90% **"SL" Series.....85%**
"H3" Series.....90% **"DS" Series.....70%**
"WT" Series.....85%

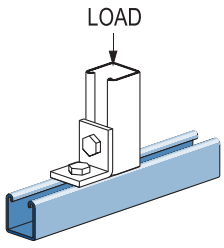
4. Deduct channel weight from the beam loads.
5. For concentrated midspan point loads, multiply beam loads by 50% and the corresponding deflection by 80%. For other load conditions refer to page 18.
6. All beam loads are for bending about Axis 1-1.

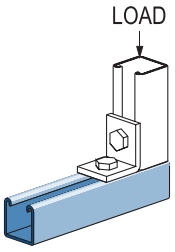
Lateral Bracing Load Reduction Charts

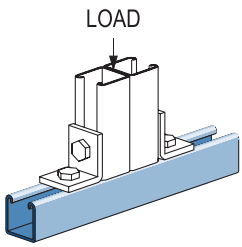
Span		Single Channel											Double Channel										
Ft. *(m)*	In. *(cm)*	P1000	P1100	P2000	P3000	P3300	P4000	P4100	P4400	P4520	P5000	P5500	P1001	P1101	P2001	P3001	P3301	P4001	P4101	P4401	P4521	P5001	P5501
2 *(0.61)*	24 *(61)*	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.98	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
3 *(0.91)*	36 *(91)*	0.94	0.89	0.88	0.96	1.00	0.94	0.98	1.00	1.00	0.85	0.89	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
4 *(1.22)*	48 *(122)*	0.88	0.78	0.75	0.91	1.00	0.88	0.94	0.98	1.00	0.70	0.77	1.00	0.98	0.98	1.00	1.00	0.98	1.00	1.00	1.00	0.97	0.98
5 *(1.52)*	60 *(152)*	0.82	0.68	0.61	0.88	0.98	0.83	0.91	0.96	1.00	0.55	0.67	0.97	0.93	0.92	0.98	1.00	0.93	0.96	1.00	1.00	0.90	0.93
6 *(1.83)*	72 *(183)*	0.78	0.59	0.48	0.84	0.97	0.79	0.89	0.94	0.98	0.44	0.58	0.93	0.87	0.85	0.95	0.97	0.88	0.92	0.97	0.97	0.83	0.87
7 *(2.13)*	84 *(213)*	0.75	0.52	0.41	0.82	0.96	0.75	0.86	0.92	0.97	0.38	0.51	0.89	0.82	0.78	0.92	0.95	0.83	0.89	0.95	0.95	0.76	0.81
8 *(2.44)*	96 *(244)*	0.71	0.47	0.35	0.79	0.94	0.72	0.84	0.91	0.96	0.33	0.46	0.85	0.76	0.71	0.88	0.92	0.79	0.85	0.92	0.92	0.68	0.76
9 *(2.74)*	108 *(274)*	0.69	0.43	0.32	0.77	0.93	0.69	0.82	0.89	0.95	0.30	0.42	0.81	0.70	0.64	0.85	0.90	0.74	0.81	0.90	0.90	0.61	0.70
10 *(3.05)*	120 *(305)*	0.66	0.40	0.29	0.75	0.92	0.66	0.80	0.87	0.94	0.28	0.40	0.78	0.65	0.57	0.82	0.87	0.69	0.78	0.87	0.87	0.54	0.64
12 *(3.66)*	144 *(366)*	0.61	0.36	0.25	0.70	0.89	0.60	0.76	0.84	0.91	0.24	0.36	0.70	0.54	0.45	0.76	0.82	0.60	0.71	0.82	0.83	0.43	0.53
14 *(4.27)*	168 *(427)*	0.55	0.32	0.23	0.66	0.86	0.55	0.73	0.81	0.89	0.22	0.32	0.63	0.45	0.38	0.70	0.78	0.51	0.64	0.77	0.78	0.35	0.45
16 *(4.88)*	192 *(488)*	0.51	0.30	0.21	0.62	0.84	0.50	0.69	0.78	0.87	0.21	0.30	0.56	0.39	0.32	0.64	0.73	0.44	0.57	0.72	0.73	0.30	0.39
18 *(5.49)*	216 *(549)*	0.47	0.28	0.19	0.58	0.81	0.47	0.65	0.75	0.84	0.19	0.28	0.49	0.34	0.28	0.58	0.68	0.39	0.50	0.67	0.68	0.27	0.34
20 *(6.10)*	240 *(610)*	0.44	0.26	0.18	0.54	0.78	0.43	0.61	0.72	0.82	0.18	0.26	0.44	0.31	0.25	0.52	0.63	0.35	0.45	0.62	0.63	0.24	0.30

Bearing Loads on Unistrut Channel

Loads are calculated based on 2007 Specification For The Design Of Cold Formed Steel Structural Members published by AISI







Channel	Bearing Length 1⅝" (41 mm) Maximum Allowable Loads Lbs *(kN)*	Bearing Length 1⅝" (41 mm) Maximum Allowable Loads Lbs *(kN)*	Bearing Length 3¼" (82 mm) Maximum Allowable Loads Lbs *(kN)*
P1000	6,700 *29.80*	3,100 *13.79*	7,700 *34.25*
P1100	3,500 *15.57*	1,700 *7.56*	4,000 *17.79*
P2000	2,500 *11.12*	1,200 *5.34*	3,000 *13.34*
P3000	6,700 *29.80*	3,200 *14.23*	7,700 *34.25*
P3300	6,800 *30.25*	3,200 *14.23*	7,800 *34.70*
P4000	2,600 *11.57*	1,200 *5.34*	3,000 *13.34*
P4100	3,500 *15.57*	1,800 *8.01*	4,100 *18.24*
P4400	7,300 *32.47*	3,400 *15.12*	8,400 *37.37*
P4520	7,300 *32.47*	3,400 *15.12*	8,400 *37.37*
P5000	6,500 *28.91*	3,000 *13.34*	7,500 *33.36*
P5500	6,600 *29.36*	3,100 *13.79*	7,600 *33.81*

Server Unistrut Support Framing

IBC 2021, ASCE 7-16

1.) Seismic Parameters

Sds	1.01		*Seismic Force Per ASCE 7-16 Chap 13*		
h/z	0.33		ap =	1	
Server Weight (W)	7000	lb	Rp =	2.5	
Serve Length	83	in	Ip =	1	
Server Width	36	in	Fp_Min = 0.3 Sds W		**2121 lb**
Center of Mass	58	in	Fp_Max = 1.6 Sds W		11312 lb
Min. Servers Per Group	3		Fp = 0.4 Sds (ap W / Rp Ip) (1+2*h/z)		
Minimum OT Width	83	in	Fp =		1508 lb

Overturning Moment	366922	lb-in	
Resisting Moment	871500	lb-in	
Factor of Safety	2.38	≥ 1.5	OK
ASD Point Load At Unitstrut	1032	lb	

2.) P1000 Unistrut Beams

Number of Supports	4		
Unistrut Span	24	in	
DL At Support	1167	lb	
DL+0.7 EQ At Support	1854	lb	
P1000 Capacity	1690	lb	
Uc EQ =	1.10	≤ 1.33	OK per engineering judgement
Uc DL =	0.69	≤ 1.00	OK

3.) Double P1001 Unistrut Beams

DL+0.7 EQ At Support	4532	lb	(Assuming server support aligns over girder)
Unistrut Span	48	in	
(2) P1001 Capacity	4780	lb	
Uc EQ =	0.95	≤ 1.0	OK