

STATE OF CONNECTICUT
CONNECTICUT SITING COUNCIL

IN RE: :
: :
A PETITION OF CELLCO PARTNERSHIP : PETITION NO. 1546
D/B/A VERIZON WIRELESS FOR A :
DECLARATORY RULING ON THE NEED :
TO OBTAIN A SITING COUNCIL :
CERTIFICATE FOR THE INSTALLATION :
OF A WIRELESS TELECOMMUNICATIONS :
FACILITY AT 300 SUMMIT STREET, :
HARTFORD, CONNECTICUT : DECEMBER 15, 2022

**RESPONSES OF CELLCO PARTNERSHIP D/B/A VERIZON WIRELESS
TO CONNECTICUT SITING COUNCIL INTERROGATORIES**

On November 22, 2022, the Connecticut Siting Council (“Council”) issued Interrogatories to Cellco Partnership d/b/a Verizon Wireless (“Cellco”), relating to Petition No. 1546. Below are Cellco’s responses.

Question No. 1

What is the estimated cost of the proposed project?

Response

Cellco estimates the cost of its cell site radio equipment (\$150,000), Construction Contract and equipment installation (\$220,000), and miscellaneous electrical and fiber installation (\$30,000) at the proposed facility to be approximately \$400,000.

Question No. 2

What are the proposed construction work days/hours?

Response

Construction would occur between 7 a.m. and 7 p.m. Monday through Saturday.

Question No. 3

What is the estimated duration for construction for the proposed facility?

Response

Construction of the proposed facility would be completed in 4 to 6 months.

Question No. 4

Would the proposed facility have a backup power source e.g. battery backup? If yes, provide detail/run time/fuel source.

Response

Backup power to the proposed cell site will be provided by a battery cabinet that Celco will install on its equipment platform. No backup generator is proposed at this location.

Question No. 5

Provide a Structural Analysis and Mount Analysis that reference the 2022 Connecticut State Building Code and which became effective on October 1, 2022.

Response

A (Revised) Structural Analysis Report dated December 12, 2022 is attached.

Question No. 6

Identify the safety standards and/or codes applicable to operation of the equipment, machinery or technology at the proposed facility.

Response

- 2021 International Building Code, as modified by the 2022 Connecticut Supplement.
- National Electric Code (NFPA70).
- 2022 Connecticut State Fire Safety Code.

- TIA-222 Rev. H - “Structural Standards for Steel Antenna Towers and Antenna Supporting Structures”.
- Occupational Safety and Health Administration (OSHA).

Question No. 7

What is Cellco’s existing and predicted coverage footprint from the proposed site (in square miles), at each frequency that would be installed?

Response

The rooftop facility described in Petition No. 1543 is a new facility. The table below includes coverage footprint information for the proposed facility only as there is no existing coverage from this location.

700 MHz coverage in Square Miles		850 MHz coverage in Square Miles		1900 MHz coverage in Square Miles		2100 MHz coverage in Square Miles		3700 MHz coverage in Square Miles	
RSRP -85 dBm	RSRP -95 dBm	RSRP -85 dBm	RSRP -95 dBm	RSRP -85 dBm	RSRP -95 dBm	RSRP -85 dBm	RSRP -95 dBm	RSRP -85 dBm	RSRP -95 dBm
1.53	5.74	0.81	4.3	0.32	1.2	0.19	0.71	0.4	1.12

Question No. 8

Would the proposed site be needed for coverage, capacity, or both? Explain.

Response

The proposed facility is primarily a capacity solution and would help offload wireless traffic from Cellco’s neighboring sites/sectors known as HARTFORD S 2, a rooftop facility at 100 Retreat Avenue; HARTFORD 2, a rooftop facility at 700 Maple Avenue; and HARTFORD

SW, a rooftop facility at 110 Bartholomew Avenue, all of which are currently operating in exhaust.

Question No. 9

Will the proposed facility support text-to-911 service? Is additional equipment required for this purpose?

Response

Yes, Cellco's new facility would support Text-to-911 service without the need for any additional equipment.

Question No. 10

Would Cellco's antennas comply with federal E911 requirements?

Response

Yes.

Question No. 11

Would Cellco's installation comply with the intent of the Warning, Alert and Response Network Act of 2006?

Response

Yes.

(REVISED)
STRUCTURAL ANALYSIS REPORT

For

Verizon Site Name: HARTFORD S 7 CT
TEP Site Number: 350658

300 Summit Street
Hartford, CT 06106

**Antennas Mounted within Proposed Stealth Enclosure;
Equipment within Enclosure on Steel Platform on Roof**



Prepared for:

verizon^v

20 Alexander Drive
Wallingford, CT 06492

Dated: December 12, 2022 (Rev.1)

September 27, 2022

Prepared by:

TEP
NORTHEAST

(TEP OPCO, LLC)
45 Beechwood Drive
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SCOPE OF WORK:

TEP Northeast (TEP NE) has been authorized by Verizon to conduct a structural evaluation of the structure supporting the proposed equipment located in the areas depicted in the latest TEP NE construction drawings.

This report represents this office's findings, conclusions and recommendations pertaining to the support of Verizon's proposed antennas listed below.

This office conducted an on-site visual survey of the above site on February 3, 2022. Attendees included Sergio Anastacio (TEP NE – Project Manager).

The following documents were used for our reference:

- Building Plans prepared by Cesar Pelli & Associates, Inc, dated April 14, 1989.

CONCLUSION SUMMARY:

Based on our evaluation, we have determined that the existing structure **IS CAPABLE** of supporting the proposed equipment loading.

	Member	Controlling Load Case	Stress Ratio	Pass/Fail
Existing Beam	W14x26	Bending	72%	PASS
Existing Column	3-1/2" std.	Axial + Bending	16%	PASS

Based on our evaluation, we have determined that the proposed mounts **ARE CAPABLE** of supporting the proposed equipment loading.

	Member	Controlling Load Case	Stress Ratio	Pass/Fail
Antenna Mount	3	LC13	55%	PASS
Equipment Platform	6	LC12	94%	PASS

Based on our evaluation, we have determined that the proposed connections **ARE CAPABLE** of supporting the proposed equipment loading.

	Member	Stress Ratio	Pass/Fail
Antenna Mount Proposed Connection	5/8" Thru Bolt	10%	PASS
Equipment Platform Proposed Connection	5/8" Thru Bolt	38%	PASS

*Reference documents attached.



APPURTENANCE CONFIGURATION:

Appurtenances	Dimensions	Weight	**Elevation	Mount
(3) NHHS4-65B-R3B Antennas	72.0"x13.8"x8.2"	60 lbs	73'-0"	Steel Frame
(3) NHHSS-65B-R2BT0 Antennas	72.0"x11.9"x7.1"	44 lbs	73'-0"	Steel Frame
(3) MT6407-77A Antennas w/ RRH's	Not to Exceed 35.12"x16.06"x5.51"	Not to Exceed 87.1 lbs	73'-0"	Steel Frame
(3) RF4439d-25A RRH's	15.0"x15.0"x10.0"	98 lbs	-	Steel Frame
(3) RF4440d-13A RRH's	15.0"x15.0"x8.1"	82 lbs	-	Steel Frame
(3) CBRS RT4401-48A RRH's	16.2"x11.4"x5.5"	24 lbs	-	Steel Frame
(2) OVP's	28.9"x15.7"x10.3	32 lbs	-	Steel Frame
(1) CMC74-36B Battery Cabinet	80.8"x36.2"x43.7"	2000 lbs	-	Equipment Platform
(1) CMC74-36E Equipment Cabinet	80.8"x36.2"x43.7"	1500 lbs	-	Equipment Platform
(1) Telco Box	30.0"x30.0"x8.0"	50 lbs	-	Equipment Platform
(1) Hoffman Box	30.0"x30.0"x12.0"	50 lbs	-	Equipment Platform

* Proposed equipment shown in bold.

** Elevation to antenna centerline.



DESIGN CRITERIA:

International Building Code (IBC) 2021 with 2022 Connecticut State Building Code Amendments, and ASCE 7-16 (Minimum Design Loads for Buildings and Other Structures).		
Wind		
Reference Wind Speed:	130 mph	(2022 CSBC Appendix P)
Exposure Category:	B	(ASCE 7-16 Chapter 26)
Risk Category:	III	(ASCE 7-16 Table 1.5-1)
Snow		
Ground Snow, P_g :	30 psf	(2022 CSBC Appendix P)
Importance Factor (I_s):	1.1	(ASCE 7-16 Table 1.5-2)
Exposure Factor (C_e):	0.9	(Fully Exposed, Table 7.3-1)
Thermal Factor (C_t):	1.0	(ASCE 7-16 Table 7.3-2)
Flat Roof Snow Load:	21 psf	(ASCE 7-16 Equation 7.3-1)
Min. Flat Roof Snow Load:	30 psf	
EIA/TIA-222-H Structural Standards for Steel Antenna Towers and Antenna Supporting Structures		
Wind		
City/Town:	Hartford	
County:	Hartford	
Wind Load:	130 mph	(TIA-222-H Figure B-2)
Ice		
Design Ice Thickness (t_i):	1.5 in	(TIA-222-H Figure B-9)
Structure Class:	III	(TIA-222-H Table 2-1)
Importance Factor (I_i):	1.25	(TIA-222-H Table 2-3)
Factored Thickness of Radial Ice (t_{iz}):	2.03 in	(TIA-222-H Sec. 2.6.10)



EXISTING ROOF CONSTRUCTION:

- The existing tower roof construction consists of a roofing membrane over rigid insulation over metal decking supported by a system of steel beams and columns spanning to masonry bearing walls.
- The existing main roof construction consists of loosely laid ballast stone over a roofing membrane over rigid insulation over metal decking supported by a system of steel beams and columns.

ANTENNA/RRH/OVP SUPPORT RECOMMENDATIONS:

The proposed antennas, RRH's, and OVP's are to be mounted on proposed pipe masts installed on a proposed steel frame located on the roof of the penthouse of the existing building. The proposed steel frame is to be enclosed with proposed FRP screen walls and supported by existing steel beams within the roof structure.

EQUIPMENT RECOMMENDATIONS:

The proposed Verizon equipment is to be installed on a proposed steel platform located on the main roof of existing building. The proposed equipment platform is to be enclosed with proposed FRP screen walls and supported by existing steel columns within the roof structure.

Limitations and Assumptions:

1. Reference the latest TEP NE construction drawings for all the equipment locations and details.
2. All detail requirements will be designed and furnished in the construction drawings.
3. All structural members and their connections are assumed to be in good condition and are free from defects with no deterioration to its member capacities.
4. TEP NE is not responsible for any modifications completed prior to and hereafter which TEP NE was not directly involved.
5. All antennas, coax cables and waveguide cables are assumed to be properly installed and supported as per the manufacturer requirements.
6. If field conditions differ from what is assumed in this report, then the engineer of record is to be notified as soon as possible.

FIELD PHOTOS:



Photo 1: Sample photo illustrating the proposed location of the antenna enclosure (view from the South).



Photo 1: Sample photo illustrating the proposed location of the antenna enclosure (view from the East).

FIELD PHOTOS (CONT.):



Photo 3: Sample photo illustrating the proposed location of the equipment platform (view from the West).



Photo 4: Sample photo illustrating the existing roof framing (fireproofed).



Antenna Mount Calculations

Date: 12/12/2022

Project Name: HARTFORD S 7 CT

Designed By: CL Checked By: MSC



Calculate Dead Load of Proposed FRP Enclosure at Penthouse:

<u>Item</u>	<u>Wt. (Lbs.)</u>	<u>Linear ft.</u>	<u>Qty.</u>	<u>Total (Lbs.)</u>
(V) 3x3x1/4 FRP Tube	2.05	10.00	12	246.0
(H) 3x3x1/4 FRP Tube	2.05	3.00	36	221.4
FRP Panel (H = 10'-0")	22.32	10.00	4	892.8
Miscellaneous	250	--	1	250.0

Total, T_{weight} 1610.2 lbs.

Number of Supports: 12

Weight per Supports = 134.18 lbs.

Date: 12/12/2022
 Project Name: HARTFORD S 7 CT
 Designed By: CL Checked By: MSC



Wind Analysis → Antenna Enclosure

Reference Codes:

-2022 Connecticut State Building Code (2018 CTSBC)

-International Building Code 2021 (IBC 2021)

-Minimum Design Loads for Buildings and Other Structures (ASCE 7-16)

Structure Classification	III	(ASCE 7-16 Table 1.5-1)
Basic Wind Speed, V	130 mph	(CT Building Code Appendix P)
Exposure Category	B	(ASCE 7-16 Section 26.7)
Topographic Category	1	(ASCE 7-16 Table 1.5-2)
Height Above Ground Level, z	77 ft	(Top of Enclosure)
Exposure Coefficient, K_z	0.92	(ASCE 7-16 Table 26.10-1)
Topographic Factor, K_{zt}	1.00	(ASCE 7-16 Section 26.8.2)
Wind Directionality Coef., K_d	0.90	(ASCE 7-16 Table 26.6-1)
Ground Elevation Factor, K_e	0.98	(ASCE 7-16 Table 26.9-1)
Velocity Pressure, q_z	$= 0.00256K_zK_{zt}K_dK_eV^2$ $= \mathbf{35.03 \text{ psf}}$	(ASCE 7-16 Equation 26.10-1)
Gust Factor, G	0.85	(ASCE 7-16 Section 26.11)
Net Force Coefficient, C_f	1.29	(ASCE 7-16 Figures 29.4-1 to 29.4-4)
Area Wind Force, F	$= q_zGC_fA_f$ $= \mathbf{38.42 \text{ psf}}$	(ASCE 7-16 Equation 29.4-1)

Date: 12/12/2022
 Project Name: HARTFORD S 7 CT
 Designed By: CL Checked By: MSC



ICE WEIGHT CALCULATIONS

Thickness of ice: 2.03 in.
 Density of ice: 56 pcf

NHHS4-65B-R3B Antenna

Weight of ice based on total radial SF area:
 Height (in): 72.0
 Width (in): 13.8
 Depth (in): 8.2
 Total weight of ice on object: 269 lbs
 Weight of object: 60.0 lbs
Combined weight of ice and object: 329 lbs

NHSS-65B-R2BT0 Antenna

Weight of ice based on total radial SF area:
 Height (in): 72.0
 Width (in): 11.9
 Depth (in): 7.1
 Total weight of ice on object: 236 lbs
 Weight of object: 44.0 lbs
Combined weight of ice and object: 280 lbs

MT6407-77A Antenna

Weight of ice based on total radial SF area:
 Height (in): 35.1
 Width (in): 16.1
 Depth (in): 5.5
 Total weight of ice on object: 138 lbs
 Weight of object: 87.1 lbs
Combined weight of ice and object: 225 lbs

RF4439d-25A RRH

Weight of ice based on total radial SF area:
 Height (in): 15.0
 Width (in): 15.0
 Depth (in): 10.0
 Total weight of ice on object: 62 lbs
 Weight of object: 98.0 lbs
Combined weight of ice and object: 160 lbs

RF4440d-13A RRH

Weight of ice based on total radial SF area:
 Height (in): 15.0
 Width (in): 15.0
 Depth (in): 8.1
 Total weight of ice on object: 59 lbs
 Weight of object: 82.0 lbs
Combined weight of ice and object: 141 lbs

CBRS RT4401-48A RRH

Weight of ice based on total radial SF area:
 Height (in): 16.2
 Width (in): 11.4
 Depth (in): 5.5
 Total weight of ice on object: 49 lbs
 Weight of object: 24.0 lbs
Combined weight of ice and object: 73 lbs

OVP

Weight of ice based on total radial SF area:
 Height (in): 28.9
 Width (in): 15.7
 Depth (in): 10.3
 Total weight of ice on object: 124 lbs
 Weight of object: 32.0 lbs
Combined weight of ice and object: 156 lbs

2" Pipe

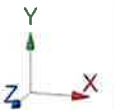
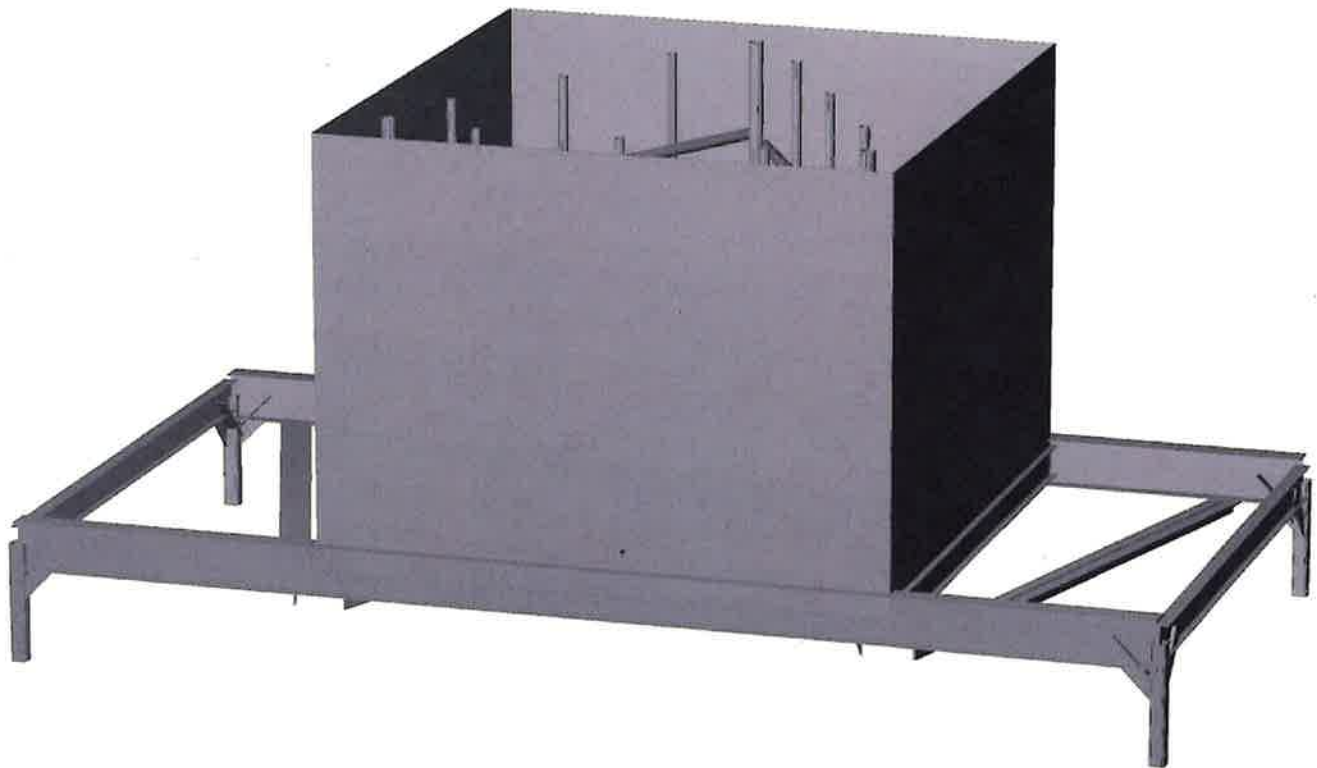
Per foot weight of ice:
 diameter (in): 2.38
Per foot weight of ice on object: 11 plf

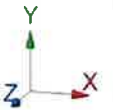
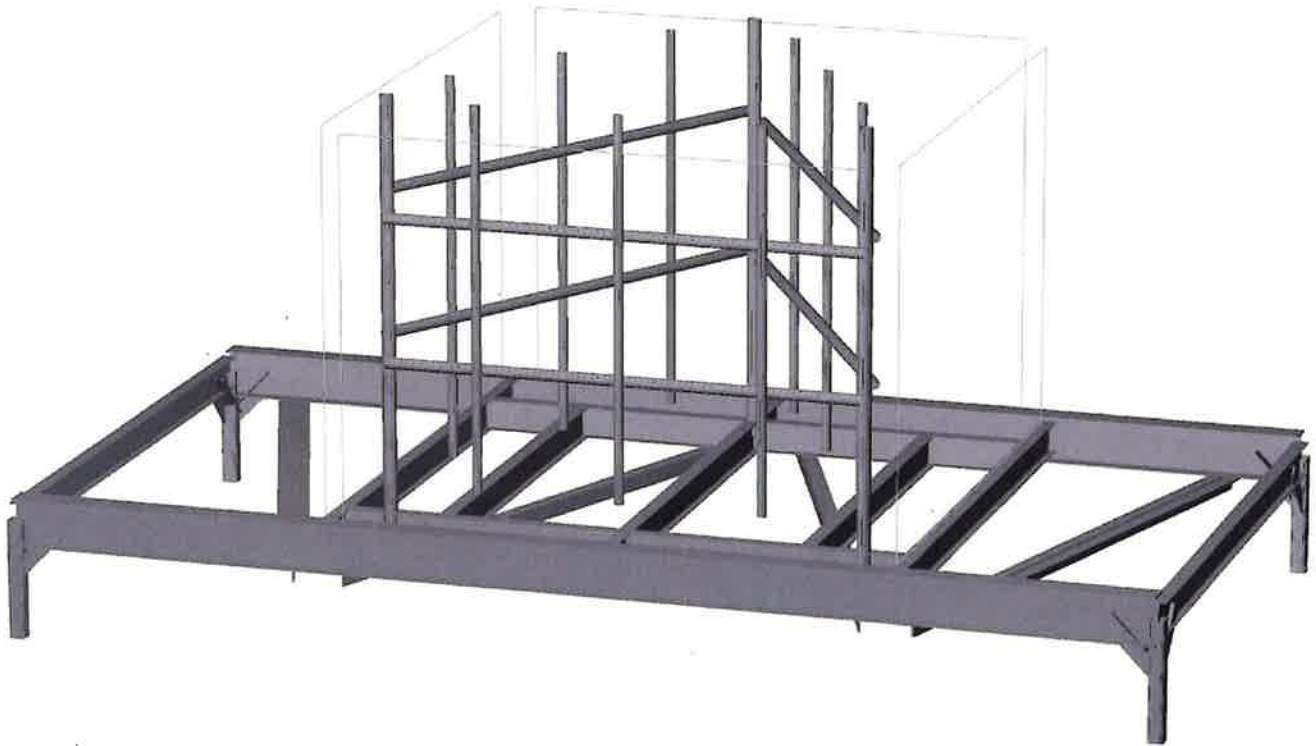
2-1/2" Pipe

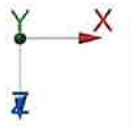
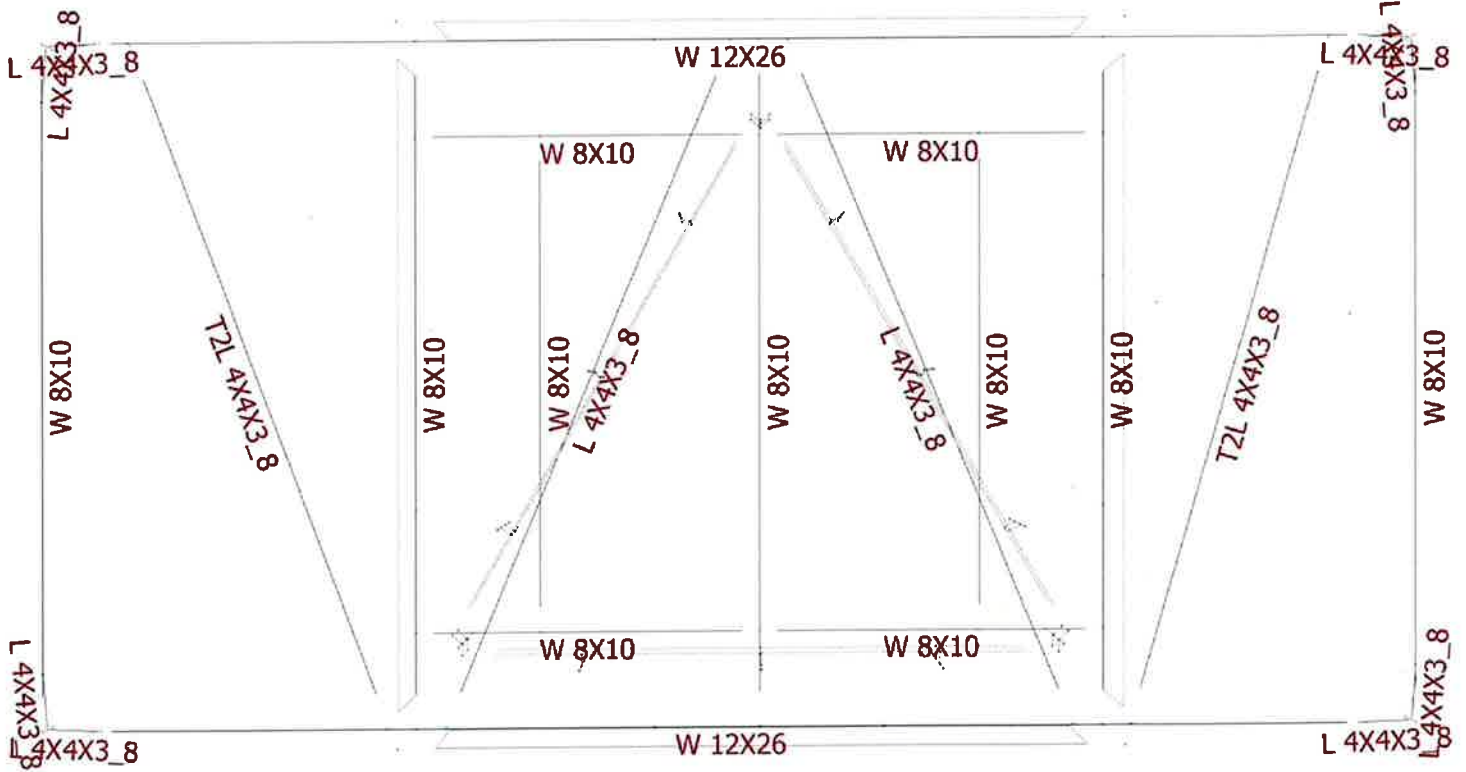
Per foot weight of ice:
 diameter (in): 2.88
Per foot weight of ice on object: 12 plf

3" Pipe

Per foot weight of ice:
 diameter (in): 3.5
Per foot weight of ice on object: 14 plf



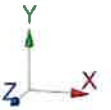
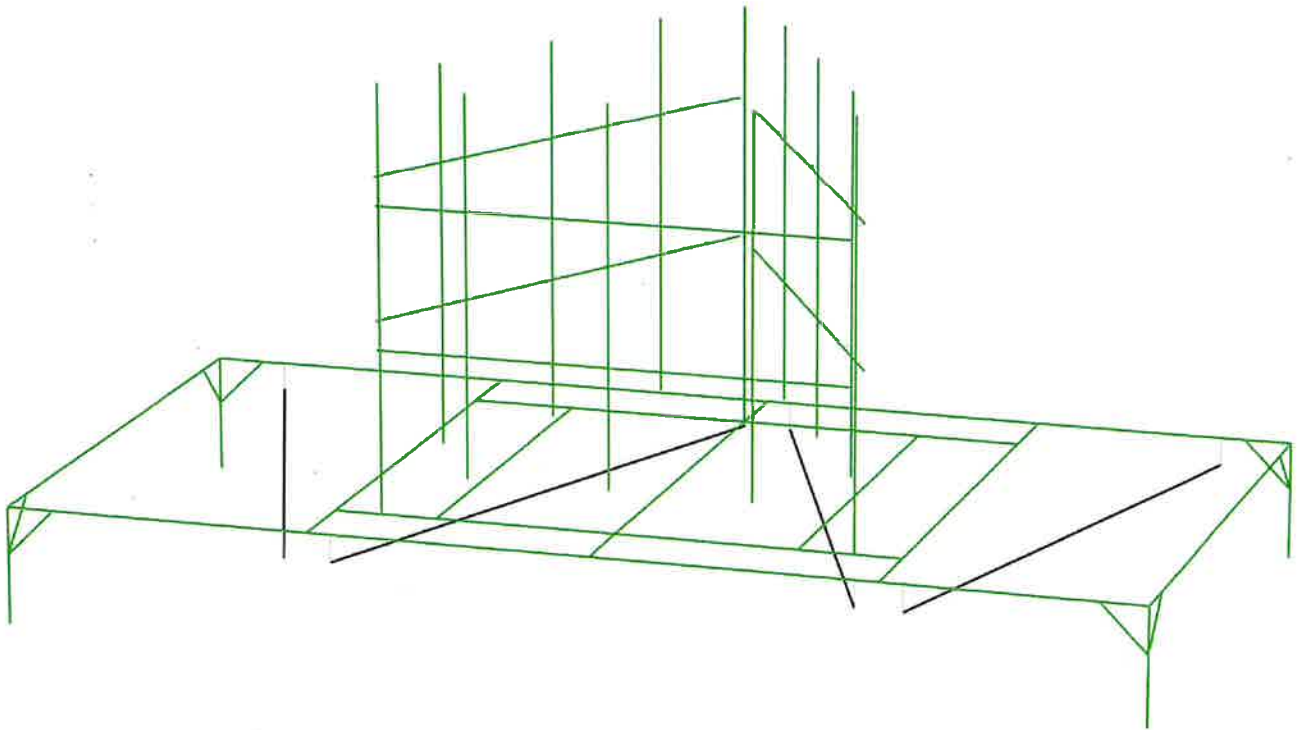


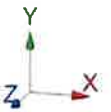
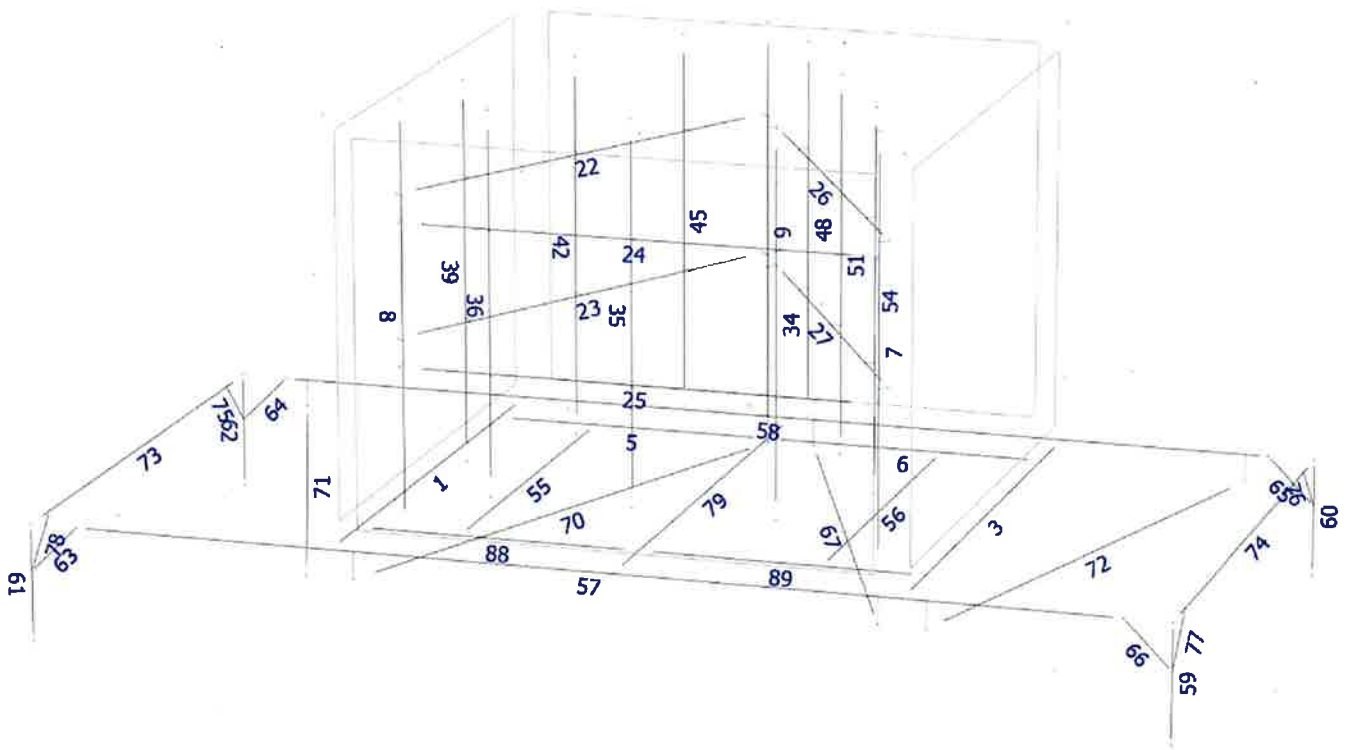


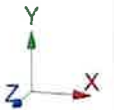
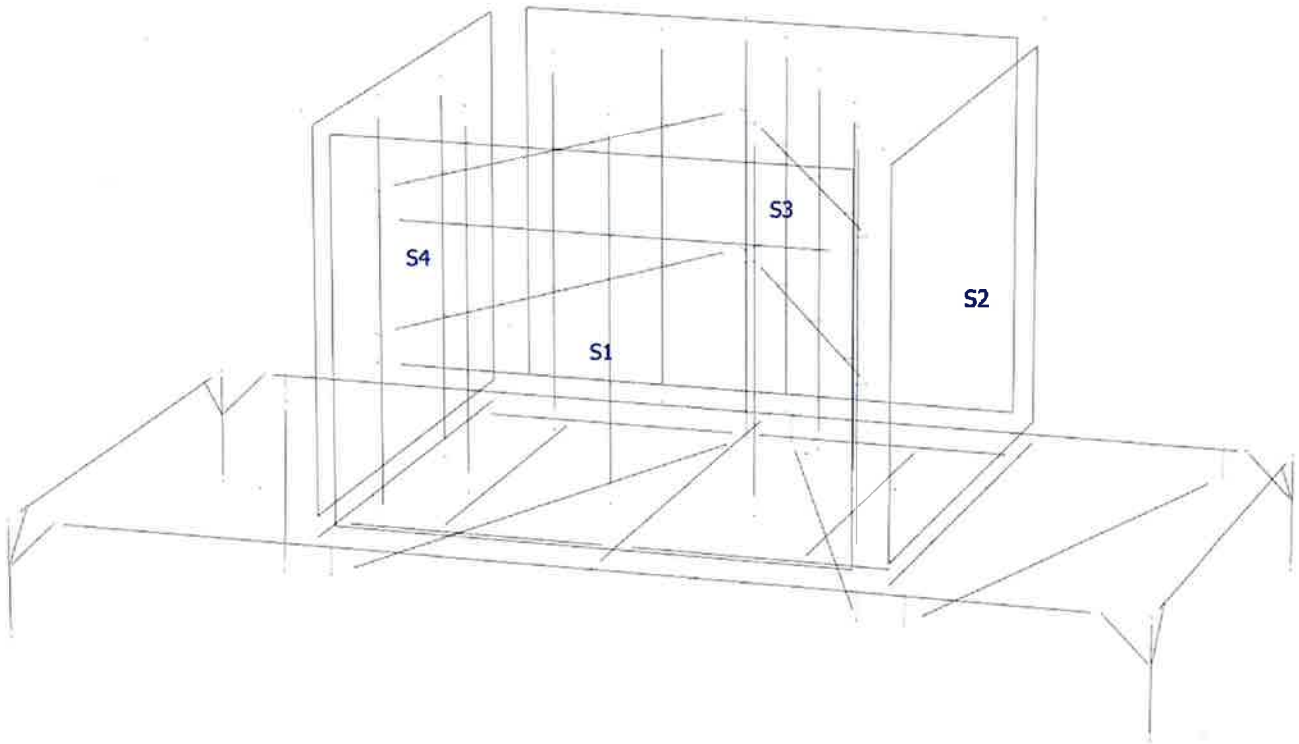


Design status

- Not designed
- Error on design
- Design O.K.
- With warnings







Load data

GLOSSARY

Comb : Indicates if load condition is a load combination

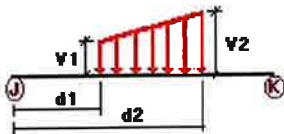
Load Conditions

Condition	Description	Comb.	Category
DL	Dead Load	No	DL
WL1	Wind Load (Side 1)	No	WIND
WL2	Wind Load (Side 2)	No	WIND
WL3	Wind Load (Side 3)	No	WIND
WL4	Wind Load (Side 4)	No	WIND
DI	Dead Ice Load	No	LL

Load on nodes

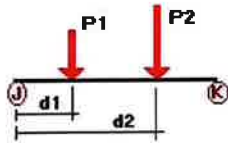
Condition	Node	FX [Kip]	FY [Kip]	FZ [Kip]	MX [Kip*ft]	MY [Kip*ft]	MZ [Kip*ft]
DL	1	0.00	-0.134	0.00	0.00	0.00	0.00
	2	0.00	-0.134	0.00	0.00	0.00	0.00
	3	0.00	-0.134	0.00	0.00	0.00	0.00
	4	0.00	-0.134	0.00	0.00	0.00	0.00
	93	0.00	-0.134	0.00	0.00	0.00	0.00
	94	0.00	-0.134	0.00	0.00	0.00	0.00
	95	0.00	-0.134	0.00	0.00	0.00	0.00
	96	0.00	-0.134	0.00	0.00	0.00	0.00
	97	0.00	-0.134	0.00	0.00	0.00	0.00
	98	0.00	-0.134	0.00	0.00	0.00	0.00
DI	99	0.00	-0.134	0.00	0.00	0.00	0.00
	100	0.00	-0.134	0.00	0.00	0.00	0.00

Distributed force on members



Condition	Member	Dir1	Val1 [Kip/ft]	Val2 [Kip/ft]	Dist1 [ft]	%	Dist2 [ft]	%
DI	7	y	-0.014	-0.014	0.00	No	100.00	Yes
	8	y	-0.014	-0.014	0.00	No	100.00	Yes
	9	y	-0.014	-0.014	0.00	No	100.00	Yes
	22	y	-0.012	-0.012	0.00	No	100.00	Yes
	23	y	-0.012	-0.012	0.00	No	100.00	Yes
	24	y	-0.012	-0.012	0.00	No	100.00	Yes
	25	y	-0.012	-0.012	0.00	No	100.00	Yes
	26	y	-0.012	-0.012	0.00	No	100.00	Yes
	27	y	-0.012	-0.012	0.00	No	100.00	Yes
	34	y	-0.011	-0.011	0.00	No	100.00	Yes
	35	y	-0.011	-0.011	0.00	No	100.00	Yes
	36	y	-0.011	-0.011	0.00	No	100.00	Yes
	39	y	-0.011	-0.011	0.00	No	100.00	Yes
	42	y	-0.011	-0.011	0.00	No	100.00	Yes
	45	y	-0.011	-0.011	0.00	No	100.00	Yes
	48	y	-0.011	-0.011	0.00	No	100.00	Yes
	51	y	-0.011	-0.011	0.00	No	100.00	Yes
54	y	-0.011	-0.011	0.00	No	100.00	Yes	

Concentrated forces on members



Condition	Member	Dir1	Value1 [Kip]	Dist1 [ft]	%
DL	34	y	-0.025	1.50	No
		y	-0.03	1.50	No
		y	-0.022	1.50	No
	35	y	-0.025	6.50	No
		y	-0.03	6.50	No
		y	-0.022	6.50	No
	36	y	-0.024	4.00	No
		y	-0.098	3.50	No
		y	-0.082	5.00	No
	39	y	-0.044	2.00	No
		y	-0.044	5.00	No
		y	-0.032	7.00	No
	42	y	-0.025	1.50	No
		y	-0.03	1.50	No
		y	-0.022	1.50	No
	45	y	-0.025	6.50	No
		y	-0.03	6.50	No
		y	-0.022	6.50	No
	48	y	-0.024	4.00	No
		y	-0.098	3.00	No
		y	-0.082	4.50	No
	51	y	-0.044	2.50	No
		y	-0.044	5.50	No
		y	-0.032	7.00	No
	54	y	-0.025	1.50	No
		y	-0.03	1.50	No
		y	-0.022	1.50	No

		y	-0.025	6.50	No
		y	-0.03	6.50	No
		y	-0.022	6.50	No
		y	-0.024	4.00	No
	51	y	-0.098	3.50	No
		y	-0.082	5.00	No
	54	y	-0.044	2.00	No
		y	-0.044	5.00	No
DI	34	y	-0.135	1.50	No
		y	-0.118	1.50	No
		y	-0.135	6.50	No
		y	-0.118	6.50	No
		y	-0.049	4.00	No
	35	y	-0.062	3.50	No
		y	-0.059	5.00	No
	36	y	-0.069	2.00	No
		y	-0.069	5.00	No
		y	-0.124	7.00	No
	39	y	-0.135	1.50	No
		y	-0.118	1.50	No
		y	-0.135	6.50	No
		y	-0.118	6.50	No
		y	-0.049	4.00	No
	42	y	-0.062	3.50	No
		y	-0.059	5.00	No
	45	y	-0.069	2.00	No
		y	-0.069	5.00	No
		y	-0.124	7.00	No
	48	y	-0.135	1.50	No
		y	-0.118	1.50	No
		y	-0.135	6.50	No
		y	-0.118	6.50	No
		y	-0.049	4.00	No
	51	y	-0.062	3.50	No
		y	-0.059	5.00	No
	54	y	-0.069	2.00	No
		y	-0.069	5.00	No
		y	-0.124	7.00	No

Load on shells

Condition	Shell	Pressure [Kip/ft ²]	Temp. [F]
WL1	1	-0.039	0.00
WL2	2	-0.039	0.00
WL3	3	-0.039	0.00
WL4	4	-0.039	0.00

Self weight multipliers for load conditions

Condition	Description	Self weight multiplier			
		Comb.	MultX	MultY	MultZ
DL	Dead Load	No	0.00	-1.00	0.00
WL1	Wind Load (Side 1)	No	0.00	0.00	0.00
WL2	Wind Load (Side 2)	No	0.00	0.00	0.00
WL3	Wind Load (Side 3)	No	0.00	0.00	0.00
WL4	Wind Load (Side 4)	No	0.00	0.00	0.00
DI	Dead Ice Load	No	0.00	0.00	0.00



Steel Code Check

Report: Summary - Group by member

Load conditions to be included in design :

- LC1=1.4DL
- LC2=1.2DL+1.6DI
- LC3=1.2DL+0.5WL1
- LC4=1.2DL+0.5WL2
- LC5=1.2DL+0.5WL3
- LC6=1.2DL+0.5WL4
- LC7=1.2DL+WL1
- LC8=1.2DL+WL2
- LC9=1.2DL+WL3
- LC10=1.2DL+WL4
- LC11=1.2DL+WL1+DI
- LC12=1.2DL+WL2+DI
- LC13=1.2DL+WL3+DI
- LC14=1.2DL+WL4+DI
- LC15=0.9DL+WL1
- LC16=0.9DL+WL2
- LC17=0.9DL+WL3
- LC18=0.9DL+WL4

Description	Section	Member	Ctrl Eq.	Ratio	Status	Reference
	HSS_SQR 4X4X3_8	59	LC13 at 40.63%	0.26	OK	
		60	LC11 at 40.63%	0.23	OK	
		61	LC13 at 40.63%	0.25	OK	
		62	LC11 at 40.63%	0.22	OK	
	L 4X4X3_8	63	LC12 at 43.75%	0.11	OK	
		64	LC12 at 37.50%	0.09	OK	
		65	LC14 at 43.75%	0.09	OK	
		66	LC14 at 37.50%	0.11	OK	
		67	LC13 at 50.00%	0.07	With warnings	
		70	LC13 at 50.00%	0.07	With warnings	
		75	LC11 at 43.75%	0.04	OK	
		76	LC7 at 37.50%	0.04	OK	
		77	LC9 at 43.75%	0.04	OK	
		78	LC9 at 37.50%	0.03	OK	
	PIPE 2-1_2x0.203	22	LC2 at 18.75%	0.21	OK	
		23	LC2 at 0.00%	0.23	OK	
		24	LC2 at 81.25%	0.21	OK	
		25	LC2 at 100.00%	0.23	OK	
		26	LC2 at 79.69%	0.23	OK	
		27	LC2 at 79.69%	0.23	OK	
	PIPE 2x0.154	34	LC2 at 31.25%	0.27	OK	
		35	LC2 at 66.67%	0.06	OK	
		36	LC2 at 31.25%	0.27	OK	
		39	LC2 at 25.00%	0.33	OK	
		42	LC11 at 25.00%	0.04	OK	
		45	LC2 at 25.00%	0.34	OK	
		48	LC2 at 64.58%	0.31	OK	
		51	LC13 at 29.17%	0.08	OK	
		54	LC2 at 64.58%	0.34	OK	

PIPE 3x0.216

7	LC13 at 38.75%	0.24	OK
8	LC2 at 71.25%	0.20	OK
9	LC13 at 0.00%	0.21	OK

T2L 4X4X3_8

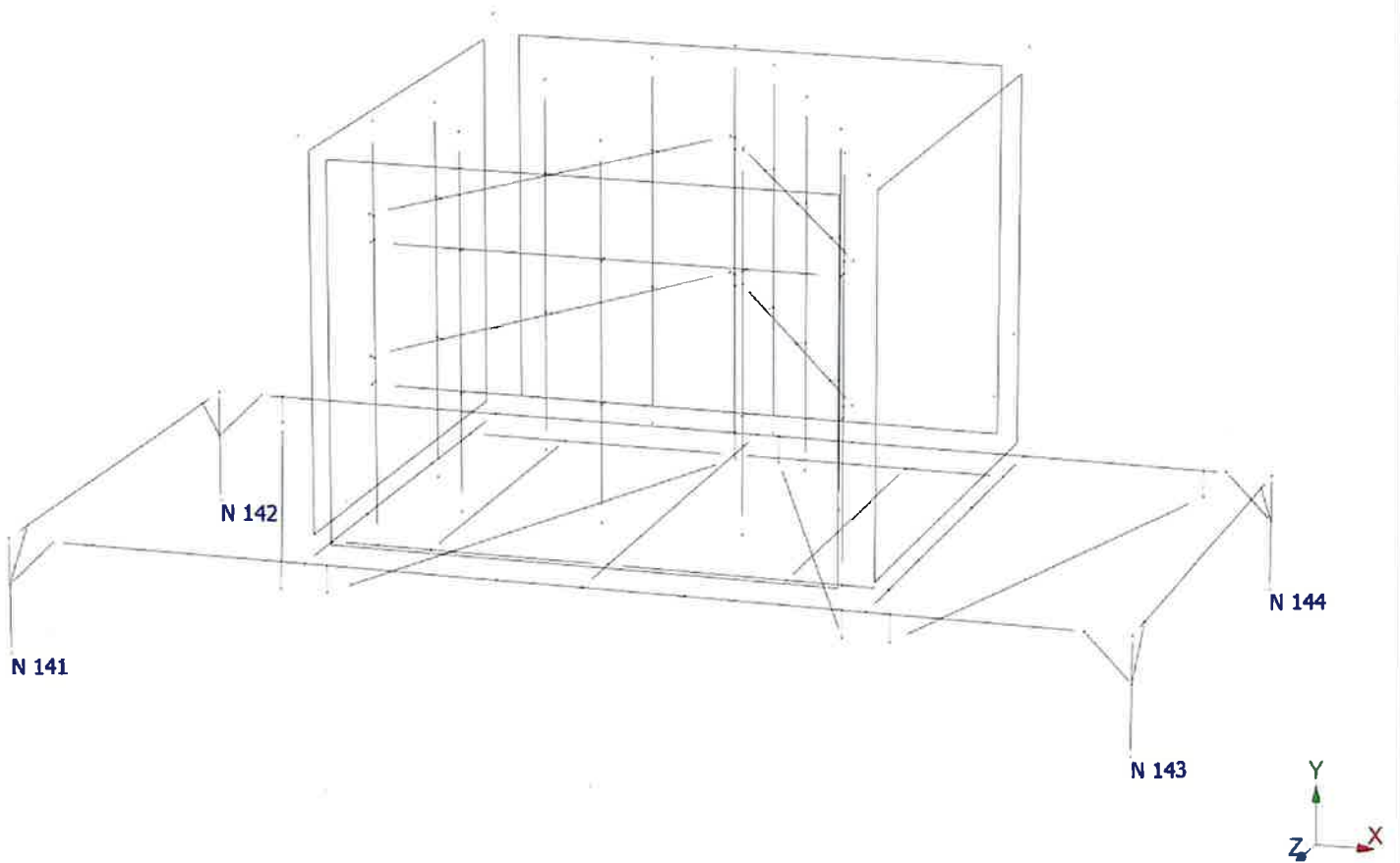
71	LC11 at 50.00%	0.05	With warnings
72	LC11 at 50.00%	0.05	With warnings

W 12X26

57	LC13 at 26.74%	0.37	OK
58	LC11 at 26.74%	0.31	OK

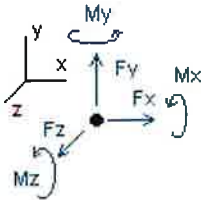
W 8X10

1	LC13 at 0.00%	0.52	OK
3	LC13 at 0.00%	0.55	OK
5	LC11 at 37.50%	0.02	OK
6	LC11 at 65.63%	0.02	OK
55	LC1 at 50.00%	0.01	OK
56	LC1 at 50.00%	0.01	OK
73	LC13 at 91.67%	0.30	OK
74	LC13 at 91.67%	0.32	OK
79	LC2 at 12.50%	0.26	OK
88	LC13 at 14.58%	0.09	OK
89	LC13 at 83.33%	0.11	OK



Analysis result

Reactions



Direction of positive forces and moments

Node	Forces [Kip]			Moments [Kip*ft]		
	FX	FY	FZ	MX	MY	MZ
Condition LC1=1.4DL						
141	1.51793	2.59404	-0.05952	0.00000	0.00000	0.00000
142	1.22109	2.23670	0.05963	0.00000	0.00000	0.00000
143	-1.51813	2.75526	-0.05998	0.00000	0.00000	0.00000
144	-1.22089	2.36136	0.05987	0.00000	0.00000	0.00000
SUM	0.00000	9.94736	0.00000	0.00000	0.00000	0.00000
Condition LC2=1.2DL+1.6DI						
141	2.40087	3.90268	-0.04912	0.00000	0.00000	0.00000
142	1.72685	2.94715	0.05089	0.00000	0.00000	0.00000
143	-2.40409	4.18884	-0.05143	0.00000	0.00000	0.00000
144	-1.72363	3.14202	0.04966	0.00000	0.00000	0.00000
SUM	0.00000	14.18069	0.00000	0.00000	0.00000	0.00000
Condition LC3=1.2DL+0.5WL1						
141	1.03916	1.63567	0.41917	0.00000	0.00000	0.00000
142	1.31477	2.50497	0.58741	0.00000	0.00000	0.00000
143	-1.03431	1.71705	0.47109	0.00000	0.00000	0.00000
144	-1.31962	2.66861	0.62833	0.00000	0.00000	0.00000
SUM	0.00000	8.52631	2.10600	0.00000	0.00000	0.00000
Condition LC4=1.2DL+0.5WL2						
141	1.83190	2.52803	-0.04521	0.00000	0.00000	0.00000
142	1.59832	2.22686	0.05562	0.00000	0.00000	0.00000
143	-0.79988	2.05691	-0.05952	0.00000	0.00000	0.00000
144	-0.52435	1.71451	0.04911	0.00000	0.00000	0.00000
SUM	2.10600	8.52631	0.00000	0.00000	0.00000	0.00000
Condition LC5=1.2DL+0.5WL3						
141	1.55791	2.81045	-0.51225	0.00000	0.00000	0.00000
142	0.77258	1.33025	-0.49187	0.00000	0.00000	0.00000
143	-1.56766	3.00733	-0.56751	0.00000	0.00000	0.00000
144	-0.76284	1.37827	-0.53438	0.00000	0.00000	0.00000
SUM	0.00000	8.52631	-2.10600	0.00000	0.00000	0.00000

Condition **LC6=1.2DL+0.5WL4**

141	0.77857	1.91881	-0.05906	0.00000	0.00000	0.00000
142	0.50630	1.60762	0.04931	0.00000	0.00000	0.00000
143	-1.81188	2.66613	-0.04577	0.00000	0.00000	0.00000
144	-1.57900	2.33375	0.05553	0.00000	0.00000	0.00000
SUM	-2.10600	8.52631	0.00000	0.00000	0.00000	0.00000

Condition **LC7=1.2DL+WL1**

141	0.77810	1.04781	0.89120	0.00000	0.00000	0.00000
142	1.58394	3.09286	1.12193	0.00000	0.00000	0.00000
143	-0.76829	1.07242	0.99556	0.00000	0.00000	0.00000
144	-1.59375	3.31321	1.20331	0.00000	0.00000	0.00000
SUM	0.00000	8.52631	4.21200	0.00000	0.00000	0.00000

Condition **LC8=1.2DL+WL2**

141	2.36253	2.83258	-0.03942	0.00000	0.00000	0.00000
142	2.14974	2.53653	0.06002	0.00000	0.00000	0.00000
143	-0.29831	1.75221	-0.06753	0.00000	0.00000	0.00000
144	-0.00197	1.40499	0.04693	0.00000	0.00000	0.00000
SUM	4.21200	8.52631	0.00000	0.00000	0.00000	0.00000

Condition **LC9=1.2DL+WL3**

141	1.81578	3.39739	-0.97151	0.00000	0.00000	0.00000
142	0.49962	0.74341	-1.03675	0.00000	0.00000	0.00000
143	-1.83510	3.65299	-1.08146	0.00000	0.00000	0.00000
144	-0.48030	0.73251	-1.12228	0.00000	0.00000	0.00000
SUM	0.00000	8.52631	-4.21200	0.00000	0.00000	0.00000

Condition **LC10=1.2DL+WL4**

141	0.25587	1.61416	-0.06700	0.00000	0.00000	0.00000
142	-0.03430	1.29804	0.04751	0.00000	0.00000	0.00000
143	-2.32230	2.97063	-0.04014	0.00000	0.00000	0.00000
144	-2.11127	2.64347	0.05964	0.00000	0.00000	0.00000
SUM	-4.21200	8.52631	0.00000	0.00000	0.00000	0.00000

Condition **LC11=1.2DL+WL1+DI**

141	1.46484	2.09510	0.89151	0.00000	0.00000	0.00000
142	2.00977	3.73876	1.12265	0.00000	0.00000	0.00000
143	-1.45722	2.21211	0.99462	0.00000	0.00000	0.00000
144	-2.01739	4.01433	1.20322	0.00000	0.00000	0.00000
SUM	0.00000	12.06030	4.21200	0.00000	0.00000	0.00000

Condition **LC12=1.2DL+WL2+DI**

141	3.04983	3.88183	-0.03822	0.00000	0.00000	0.00000
142	2.57502	3.18049	0.05983	0.00000	0.00000	0.00000
143	-0.98747	2.89398	-0.06759	0.00000	0.00000	0.00000
144	-0.42538	2.10400	0.04598	0.00000	0.00000	0.00000
SUM	4.21200	12.06030	0.00000	0.00000	0.00000	0.00000

Condition **LC13=1.2DL+WL3+DI**

141	2.50385	4.44943	-0.96934	0.00000	0.00000	0.00000
142	0.92395	1.38472	-1.03792	0.00000	0.00000	0.00000
143	-2.52481	4.79758	-1.08034	0.00000	0.00000	0.00000
144	-0.90299	1.42858	-1.12440	0.00000	0.00000	0.00000
SUM	0.00000	12.06030	-4.21200	0.00000	0.00000	0.00000

Condition **LC14=1.2DL+WL4+DI**

141	0.94296	2.66351	-0.06586	0.00000	0.00000	0.00000
142	0.39097	1.94202	0.04746	0.00000	0.00000	0.00000
143	-3.01140	4.11232	-0.04015	0.00000	0.00000	0.00000
144	-2.53452	3.34244	0.05855	0.00000	0.00000	0.00000
SUM	-4.21200	12.06030	0.00000	0.00000	0.00000	0.00000

Condition **LC15=0.9DL+WL1**

141	0.45292	0.49284	0.90414	0.00000	0.00000	0.00000
142	1.32210	2.61269	1.10897	0.00000	0.00000	0.00000
143	-0.44295	0.48295	1.00861	0.00000	0.00000	0.00000
144	-1.33206	2.80624	1.19027	0.00000	0.00000	0.00000
SUM	0.00000	6.39473	4.21200	0.00000	0.00000	0.00000

Condition **LC16=0.9DL+WL2**

141	2.03719	2.27674	-0.02668	0.00000	0.00000	0.00000
142	1.88807	2.05723	0.04728	0.00000	0.00000	0.00000
143	0.02705	1.16179	-0.05465	0.00000	0.00000	0.00000
144	0.25969	0.89897	0.03405	0.00000	0.00000	0.00000
SUM	4.21200	6.39473	0.00000	0.00000	0.00000	0.00000

Condition **LC17=0.9DL+WL3**

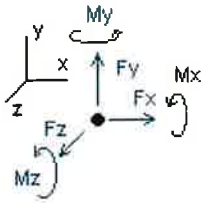
141	1.49027	2.84047	-0.95898	0.00000	0.00000	0.00000
142	0.23818	0.26517	-1.04929	0.00000	0.00000	0.00000
143	-1.50969	3.06144	-1.06887	0.00000	0.00000	0.00000
144	-0.21877	0.22764	-1.13487	0.00000	0.00000	0.00000
SUM	0.00000	6.39473	-4.21200	0.00000	0.00000	0.00000

Condition **LC18=0.9DL+WL4**

141	-0.06939	1.05829	-0.05423	0.00000	0.00000	0.00000
142	-0.29596	0.81874	0.03468	0.00000	0.00000	0.00000
143	-1.99696	2.38024	-0.02730	0.00000	0.00000	0.00000
144	-1.84969	2.13746	0.04684	0.00000	0.00000	0.00000
SUM	-4.21200	6.39473	0.00000	0.00000	0.00000	0.00000

Envelope for nodal reactions

Note.- I_c is the controlling load condition



Direction of positive forces and moments

Envelope of nodal reactions for :

- LC1=1.4DL
- LC2=1.2DL+1.6DI
- LC3=1.2DL+0.5WL1
- LC4=1.2DL+0.5WL2
- LC5=1.2DL+0.5WL3
- LC6=1.2DL+0.5WL4
- LC7=1.2DL+WL1
- LC8=1.2DL+WL2
- LC9=1.2DL+WL3
- LC10=1.2DL+WL4
- LC11=1.2DL+WL1+DI
- LC12=1.2DL+WL2+DI
- LC13=1.2DL+WL3+DI
- LC14=1.2DL+WL4+DI
- LC15=0.9DL+WL1
- LC16=0.9DL+WL2
- LC17=0.9DL+WL3
- LC18=0.9DL+WL4

Node		Forces						Moments					
		Fx [Kip]	I_c	Fy [Kip]	I_c	Fz [Kip]	I_c	Mx [Kip*ft]	I_c	My [Kip*ft]	I_c	Mz [Kip*ft]	I_c
141	Max	3.050	LC12	4.449	LC13	0.904	LC15	0.00000	LC1	0.00000	LC1	0.00000	LC1
	Min	-0.069	LC18	0.493	LC15	-0.972	LC9	0.00000	LC1	0.00000	LC1	0.00000	LC1
142	Max	2.575	LC12	3.739	LC11	1.123	LC11	0.00000	LC1	0.00000	LC1	0.00000	LC1
	Min	-0.296	LC18	0.265	LC17	-1.049	LC17	0.00000	LC1	0.00000	LC1	0.00000	LC1
143	Max	0.027	LC16	4.798	LC13	1.009	LC15	0.00000	LC1	0.00000	LC1	0.00000	LC1
	Min	-3.011	LC14	0.483	LC15	-1.081	LC9	0.00000	LC1	0.00000	LC1	0.00000	LC1
144	Max	0.260	LC16	4.014	LC11	1.203	LC7	0.00000	LC1	0.00000	LC1	0.00000	LC1
	Min	-2.535	LC14	0.228	LC17	-1.135	LC17	0.00000	LC1	0.00000	LC1	0.00000	LC1

Date: 12/12/2022
 Project Name: HARTFORD S 7 CT
 Designed By: CL Checked By: MSC



CHECK CONNECTION CAPACITY (Worst Case) → PROPOSED ANCHORS AT ANTENNA PLATFORM

Reference: AISC Steel Construction Manual 14th Edition (ASD)

Bolt Type = A325 5/8" Threaded Rod

Allowable Tensile Load =

$$F_{Tall} = 13806 \text{ lbs.}$$

Allowable Shear Load =

$$F_{Vall} = 8283 \text{ lbs.}$$

TENSILE FORCES

Reaction $F = 0 \text{ lbs.}$ (Gravity Load Supported by Existing Steel Beam)

SHEAR FORCES

Reactions in X direction: 3011 lbs. (See Bentley Output)

Reactions in Z direction: 1081 lbs. (See Bentley Output)

Resultant: 3199 lbs.

No. of Supports = 1

No. of Bolts / Support = 4

Tension Design Load / Bolts =

$$f_t = 0.00 \text{ lbs.} < 13806 \text{ lbs.} \text{ Therefore, OK!}$$

Shear Design Load / Bolts =

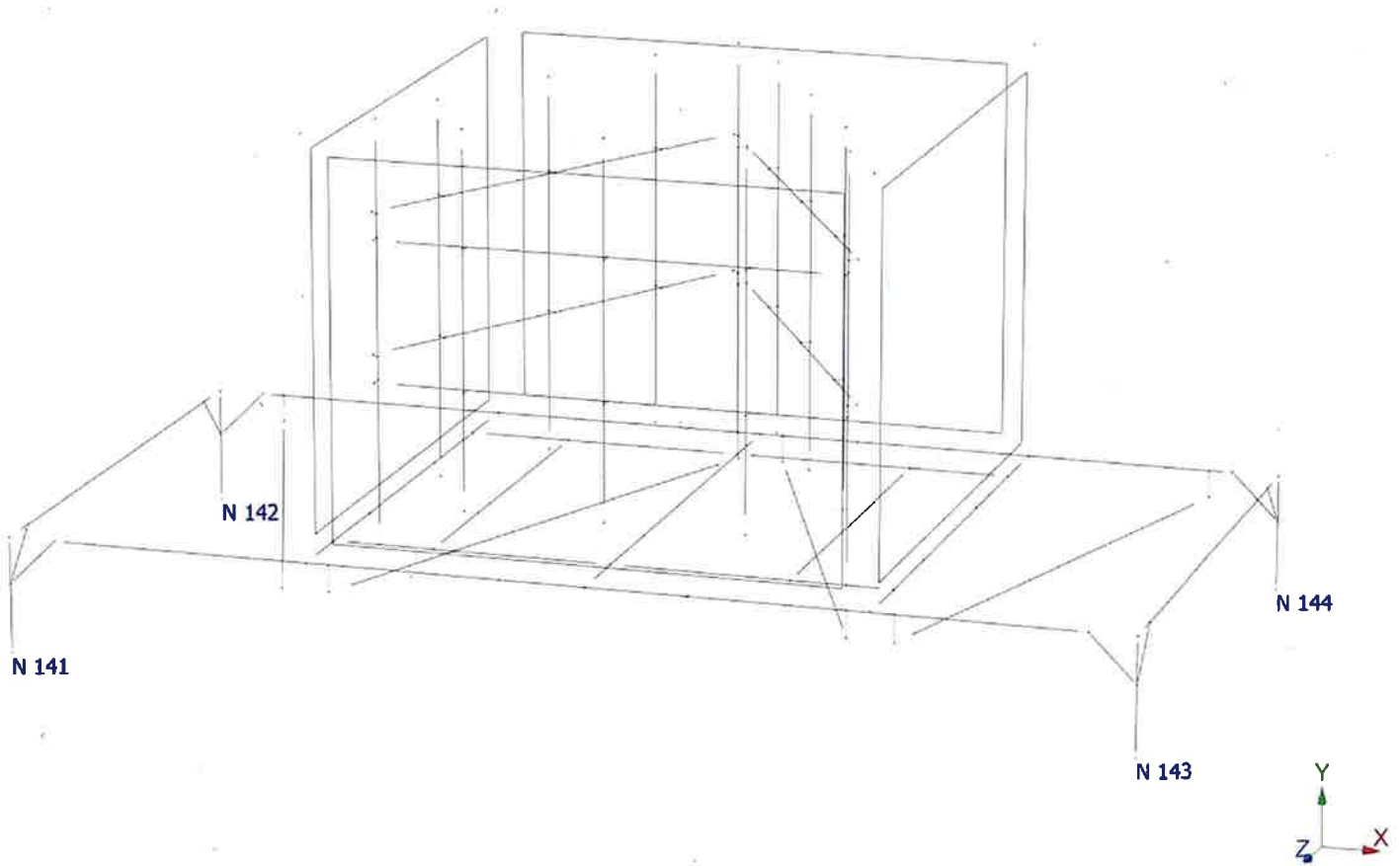
$$f_v = 799.79 \text{ lbs.} < 8283.5 \text{ lbs.} \text{ Therefore, OK!}$$

CHECK COMBINED TENSION AND SHEAR

$$\begin{array}{rclclcl} f_t / F_T & + & f_v / F_V & \leq & 1.0 & \\ 0.000 & + & 0.097 & = & 0.097 & < 1.0 \text{ Therefore, OK!} \end{array}$$



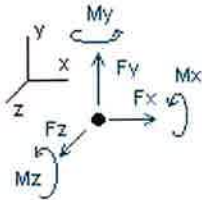
**Penthouse Roof Framing
Calculations**





Analysis result

Reactions



Direction of positive forces and moments

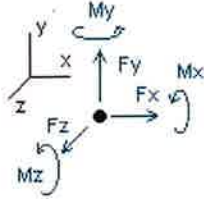
Node	Forces [Kip]			Moments [Kip*ft]		
	FX	FY	FZ	MX	MY	MZ
Condition DL=Dead Load						
141	1.08416	1.85286	-0.04251	0.00000	0.00000	0.00000
142	0.87222	1.59769	0.04259	0.00000	0.00000	0.00000
143	-1.08431	1.96799	-0.04285	0.00000	0.00000	0.00000
144	-0.87207	1.68672	0.04277	0.00000	0.00000	0.00000
SUM	0.00000	7.10526	0.00000	0.00000	0.00000	0.00000
Condition WL1=Wind Load (Side 1)						
141	-0.52241	-1.17200	0.94296	0.00000	0.00000	0.00000
142	0.53654	1.17207	1.07011	0.00000	0.00000	0.00000
143	0.53286	-1.28533	1.04778	0.00000	0.00000	0.00000
144	-0.54699	1.28525	1.15115	0.00000	0.00000	0.00000
SUM	0.00000	0.00000	4.21200	0.00000	0.00000	0.00000
Condition WL2=Wind Load (Side 2)						
141	1.06138	0.60928	0.01154	0.00000	0.00000	0.00000
142	1.10301	0.61920	0.00906	0.00000	0.00000	0.00000
143	1.00293	-0.60932	-0.01603	0.00000	0.00000	0.00000
144	1.04468	-0.61916	-0.00457	0.00000	0.00000	0.00000
SUM	4.21200	0.00000	0.00000	0.00000	0.00000	0.00000
Condition WL3=Wind Load (Side 3)						
141	0.51396	1.16981	-0.92138	0.00000	0.00000	0.00000
142	-0.54614	-1.16970	-1.08691	0.00000	0.00000	0.00000
143	-0.53364	1.28695	-1.03110	0.00000	0.00000	0.00000
144	0.56582	-1.28706	-1.17262	0.00000	0.00000	0.00000
SUM	0.00000	0.00000	-4.21200	0.00000	0.00000	0.00000
Condition WL4=Wind Load (Side 4)						
141	-1.04494	-0.60925	-0.01592	0.00000	0.00000	0.00000
142	-1.08097	-0.61927	-0.00380	0.00000	0.00000	0.00000
143	-1.02117	0.60919	0.01124	0.00000	0.00000	0.00000
144	-1.06492	0.61933	0.00848	0.00000	0.00000	0.00000
SUM	-4.21200	0.00000	0.00000	0.00000	0.00000	0.00000

Condition **DI=Dead Ice Load**

141	0.68676	1.04908	0.00118	0.00000	0.00000	0.00000
142	0.42541	0.64426	-0.00014	0.00000	0.00000	0.00000
143	-0.68877	1.14142	0.00000	0.00000	0.00000	0.00000
144	-0.42341	0.69924	-0.00103	0.00000	0.00000	0.00000
SUM	0.00000	3.53399	0.00000	0.00000	0.00000	0.00000

Envelope for nodal reactions

Note.- **Ic** is the controlling load condition



Direction of positive forces and moments

Envelope of nodal reactions for :

- DL=Dead Load
- WL1=Wind Load (Side 1)
- WL2=Wind Load (Side 2)
- WL3=Wind Load (Side 3)
- WL4=Wind Load (Side 4)
- DI=Dead Ice Load

Node		Forces						Moments					
		Fx	Ic	Fy	Ic	Fz	Ic	Mx	Ic	My	Ic	Mz	Ic
		[Kip]		[Kip]		[Kip]		[Kip*ft]		[Kip*ft]		[Kip*ft]	
141	Max	1.084	DL	1.853	DL	0.943	WL1	0.00000	DL	0.00000	DL	0.00000	DL
	Min	-1.045	WL4	-1.172	WL1	-0.921	WL3	0.00000	DL	0.00000	DL	0.00000	DL
142	Max	1.103	WL2	1.598	DL	1.070	WL1	0.00000	DL	0.00000	DL	0.00000	DL
	Min	-1.081	WL4	-1.170	WL3	-1.087	WL3	0.00000	DL	0.00000	DL	0.00000	DL
143	Max	1.003	WL2	1.968	DL	1.048	WL1	0.00000	DL	0.00000	DL	0.00000	DL
	Min	-1.084	DL	-1.285	WL1	-1.031	WL3	0.00000	DL	0.00000	DL	0.00000	DL
144	Max	1.045	WL2	1.687	DL	1.151	WL1	0.00000	DL	0.00000	DL	0.00000	DL
	Min	-1.065	WL4	-1.287	WL3	-1.173	WL3	0.00000	DL	0.00000	DL	0.00000	DL

Date: 12/12/2022
 Project Name: HARTFORD S 7 CT
 Designed By: CL Checked By: MSC



Summary of Net Loading to be Applied to Roof Framing Members:

Beam #1:

Uniform Roof Load

Dead Load	=	10 psf	(Assumed)
Roof Live Load	=	20 psf	
Snow Load	=	30 psf	
Tributary Width	=	15.00 ft	

Antenna Enclosure Platform Point Load @ 9'-7"± of Span 2

Dead Load	=	1.968 kips	(See Bentley Output, N143)
Dead Ice Load	=	1.141 kips	(See Bentley Output, N143)
Net Dead Load	=	3.109 kips	
Wind Load, Max.	=	1.287 kips	(See Bentley Output, N143)

Antenna Enclosure Platform Point Load @ 21'-7" of Span 2 (located over Column #1)

Dead Load	=	1.687 kips	(See Bentley Output, N144)
Dead Ice Load	=	0.699 kips	(See Bentley Output, N144)
Net Dead Load	=	2.386 kips	
Wind Load, Max.	=	-1.287 kips	(See Bentley Output, N144)

Column #1:

Axial Load at Top of Column (Reactions from Beam #1 Analysis)

Dead Load	=	5.651 kips	(See Enercalc Output)
Roof Live Load	=	3.209 kips	(See Enercalc Output)
Snow Load	=	4.814 kips	(See Enercalc Output)
Wind Load	=	0.716 kips	(See Enercalc Output)

Column #2:

Axial Load at Top of Column (Reactions from Beam #1 Analysis)

Dead Load	=	3.998 kips	(See Enercalc Output)
Roof Live Load	=	3.865 kips	(See Enercalc Output)
Snow Load	=	5.797 kips	(See Enercalc Output)
Wind Load	=	0.716 kips	(See Enercalc Output)

Date: 12/12/2022
Project Name: HARTFORD S 7 CT
Designed By: CL Checked By: MSC



Summary of Net Loading to be Applied to Roof Framing Members: (cont.)

Beam #2:

Point Load @ 2'-11"± (Reactions from Column #1 Analysis)

Dead Load	=	5.697 kips	(See Enercalc Output)
Roof Live Load	=	3.209 kips	(See Enercalc Output)
Snow Load	=	4.814 kips	(See Enercalc Output)
Wind Load	=	0.716 kips	(See Enercalc Output)

Point Load @ 27'-1"± (Reactions from Column #1 Analysis)

Dead Load	=	5.697 kips	(See Enercalc Output)
Roof Live Load	=	3.209 kips	(See Enercalc Output)
Snow Load	=	4.814 kips	(See Enercalc Output)
Wind Load	=	0.716 kips	(See Enercalc Output)

Beam #3:

Point Load @ 3'-0"± (Reactions from Beam #2 Analysis)

Dead Load	=	6.494 kips	(See Enercalc Output)
Roof Live Load	=	3.209 kips	(See Enercalc Output)
Snow Load	=	4.814 kips	(See Enercalc Output)
Wind Load	=	0.716 kips	(See Enercalc Output)



TEP Northeast
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(978) 557-5553

Project Title: HARTFORD S 7 CT
Engineer: CL
Project ID: HARTFORD S 7 CT
Project Descr: Antennas/Equipment Mounted on Rooftop

Steel Beam

Project File: Hartford S 7 CT (Rev.1).ec6

LIC#: KW-06013026, Build:20.22.10.25

Hudson Design Group LLC

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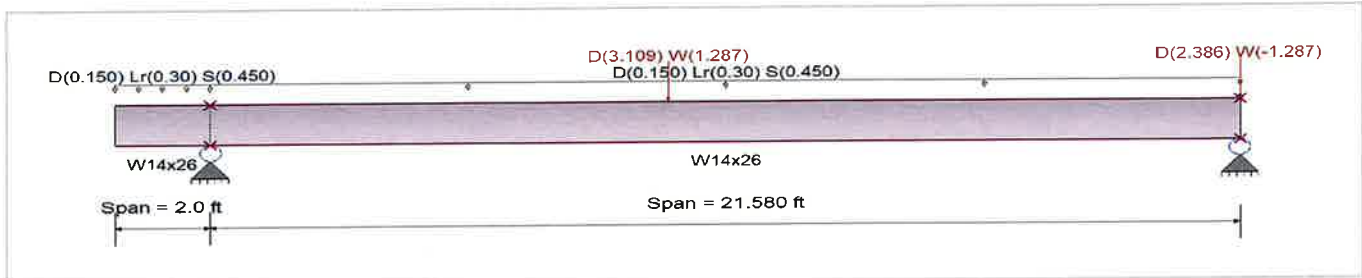
DESCRIPTION: Existing Beam - Beam #1

CODE REFERENCES

Calculations per AISC 360-16, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : ASCE 7-16

Material Properties

Analysis Method : Allowable Strength Design
Beam Bracing : Beam is Fully Braced against lateral-torsional buckling
Bending Axis : Major Axis Bending
Fy : Steel Yield : 36.0 ksi
E : Modulus : 29,000.0 ksi



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loading

Load for Span Number 1

Uniform Load : D = 0.010, Lr = 0.020, S = 0.030 ksf, Tributary Width = 15.0 ft, (Uniform Roof Load)

Load for Span Number 2

Uniform Load : D = 0.010, Lr = 0.020, S = 0.030 ksf, Tributary Width = 15.0 ft, (Uniform Roof Load)

Point Load : D = 3.109, W = 1.287 k @ 9.580 ft, (Antenna Enclosure Platform (N143))

Point Load : D = 2.386, W = -1.287 k @ 21.580 ft, (Antenna Enclosure Platform (N144))

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.718 : 1	Maximum Shear Stress Ratio =	0.205 : 1
Section used for this span	W14x26	Section used for this span	W14x26
Ma : Applied	51.858 k-ft	Va : Applied	10.465 k
Mn / Omega : Allowable	72.216 k-ft	Vn/Omega : Allowable	51.041 k
Load Combination	+D+S	Load Combination	+D+S
Span # where maximum occurs	Span # 2	Location of maximum on span	21.580 ft
Span # where maximum occurs	Span # 2	Span # where maximum occurs	Span # 2
Maximum Deflection			
Max Downward Transient Deflection	0.304 in Ratio = 850	>=360	Span: 2 : S Only
Max Upward Transient Deflection	-0.088 in Ratio = 543	>=360	Span: 2 : S Only
Max Downward Total Deflection	0.580 in Ratio = 446	>=180	Span: 2 : +D+S
Max Upward Total Deflection	-0.168 in Ratio = 286	>=180	Span: 2 : +D+S

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios		Summary of Moment Values						Summary of Shear Values				
			M	V	Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Va Max	Vnx/Vnx/Omega		
D Only															
Dsgn. L =	2.00 ft	1	0.005	0.071			-0.35	0.35	120.60	72.22	1.00	1.00	3.65	76.56	51.04
Dsgn. L =	21.58 ft	2	0.367	0.111	26.49		-0.35	26.49	120.60	72.22	1.00	1.00	5.65	76.56	51.04
+D+Lr															
Dsgn. L =	2.00 ft	1	0.013	0.135			-0.95	0.95	120.60	72.22	1.00	1.00	6.91	76.56	51.04
Dsgn. L =	21.58 ft	2	0.601	0.174	43.40		-0.95	43.40	120.60	72.22	1.00	1.00	8.86	76.56	51.04
+D+S															
Dsgn. L =	2.00 ft	1	0.017	0.167			-1.25	1.25	120.60	72.22	1.00	1.00	8.54	76.56	51.04
Dsgn. L =	21.58 ft	2	0.718	0.205	51.86		-1.25	51.86	120.60	72.22	1.00	1.00	10.46	76.56	51.04
+D+0.750Lr															
Dsgn. L =	2.00 ft	1	0.011	0.119			-0.80	0.80	120.60	72.22	1.00	1.00	6.09	76.56	51.04
Dsgn. L =	21.58 ft	2	0.542	0.158	39.17		-0.80	39.17	120.60	72.22	1.00	1.00	8.06	76.56	51.04



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 Engineer: CL
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 Project Descr: Antennas/Equipment Mounted on Rooftop

Steel Beam

Project File: Hartford S 7 CT (Rev.1).ec6

LIC#: KW-06013026, Build:20.22.10.25

Hudson Design Group LLC

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DESCRIPTION: Existing Beam - Beam #1

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios		Summary of Moment Values						Summary of Shear Values			
			M	V	Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Va Max	VnxVnx/Omega	
+D+0.750S														
Dsgn. L = 2.00 ft	2.00 ft	1	0.014	0.143		-1.03	1.03	120.60	72.22	1.00	1.00	7.32	76.56	51.04
Dsgn. L = 21.58 ft	21.58 ft	2	0.630	0.181	45.52	-1.03	45.52	120.60	72.22	1.00	1.00	9.26	76.56	51.04
+D+0.60W														
Dsgn. L = 2.00 ft	2.00 ft	1	0.005	0.080		-0.35	0.35	120.60	72.22	1.00	1.00	4.08	76.56	51.04
Dsgn. L = 21.58 ft	21.58 ft	2	0.424	0.102	30.60	-0.35	30.60	120.60	72.22	1.00	1.00	5.22	76.56	51.04
+D+0.750Lr+0.450W														
Dsgn. L = 2.00 ft	2.00 ft	1	0.011	0.126		-0.80	0.80	120.60	72.22	1.00	1.00	6.42	76.56	51.04
Dsgn. L = 21.58 ft	21.58 ft	2	0.585	0.152	42.26	-0.80	42.26	120.60	72.22	1.00	1.00	7.74	76.56	51.04
+D+0.750S+0.450W														
Dsgn. L = 2.00 ft	2.00 ft	1	0.014	0.150		-1.03	1.03	120.60	72.22	1.00	1.00	7.64	76.56	51.04
Dsgn. L = 21.58 ft	21.58 ft	2	0.673	0.175	48.60	-1.03	48.60	120.60	72.22	1.00	1.00	8.94	76.56	51.04
+0.60D+0.60W														
Dsgn. L = 2.00 ft	2.00 ft	1	0.003	0.051		-0.21	0.21	120.60	72.22	1.00	1.00	2.62	76.56	51.04
Dsgn. L = 21.58 ft	21.58 ft	2	0.277	0.058	20.01	-0.21	20.01	120.60	72.22	1.00	1.00	2.96	76.56	51.04
+0.60D														
Dsgn. L = 2.00 ft	2.00 ft	1	0.003	0.043		-0.21	0.21	120.60	72.22	1.00	1.00	2.19	76.56	51.04
Dsgn. L = 21.58 ft	21.58 ft	2	0.220	0.066	15.89	-0.21	15.89	120.60	72.22	1.00	1.00	3.39	76.56	51.04

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
	1	0.0000	0.000	+D+S	-0.1679	0.000
+D+S	2	0.5803	10.704		0.0000	0.000

Vertical Reactions

Support notation : Far left is #

Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Max Upward from all Load Conditions		9.796	10.465
Max Upward from Load Combinations		9.796	10.465
Max Upward from Load Cases		5.797	5.651
Max Downward from all Load Conditions (Resis			-0.716
Max Downward from Load Cases (Resisting Up			-0.716
D Only	3.998	5.651	
+D+Lr	7.863	8.860	
+D+S	9.796	10.465	
+D+0.750Lr	6.897	8.058	
+D+0.750S	8.346	9.261	
+D+0.60W	4.428	5.221	
+D+0.750Lr+0.450W	7.219	7.736	
+D+0.750S+0.450W	8.668	8.939	
+0.60D+0.60W	2.828	2.961	
+0.60D	2.399	3.390	
Lr Only	3.865	3.209	
S Only	5.797	4.814	
W Only	0.716	-0.716	



TEP Northeast
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 Engineer: CL
 Project ID: HARTFORD S 7 CT
 Project Descr: Antennas/Equipment Mounted on Rooftop

Steel Beam

Project File: Hartford S 7 CT (Rev.1).ec6

LIC#: KW-06013026, Build:20.22.10.25

Hudson Design Group LLC

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DESCRIPTION: Existing Beam - Beam #2

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios		Summary of Moment Values					Summary of Shear Values				
			M	V	Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Va Max	VnxVnx/Omega	
Dsgn. L =	30.00 ft	1	0.129	0.065	13.57		13.57	175.38	105.02	1.03	1.00	3.90	90.17	60.11

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S	1	0.5594	15.086		0.0000	0.000

Vertical Reactions

Load Combination	Support notation : Far left is #			Values in KIPS
	Support 1	Support 2		
Max Upward from all Load Conditions	11.308	11.308	-0.716	
Max Upward from Load Combinations	11.308	11.308	-0.716	
Max Upward from Load Cases	6.494	6.494	-0.716	
Max Downward from all Load Conditions (Resis			-0.716	
Max Downward from Load Combinations (Resi			-0.716	
Max Downward from Load Cases (Resisting Up			-0.716	
D Only	6.494	6.494	-0.716	
+D+Lr	9.703	9.703	-0.716	
+D+S	11.308	11.308	-0.716	
+D+0.750Lr	8.900	8.900	-0.716	
+D+0.750S	10.104	10.104	-0.716	
+D+0.60W	6.923	6.923	-0.716	
+D+0.750Lr+0.450W	9.222	9.222	-0.716	
+D+0.750S+0.450W	10.426	10.426	-0.716	
+0.60D+0.60W	4.326	4.326	-0.716	
+0.60D	3.896	3.896	-0.716	
Lr Only	3.209	3.209	-0.716	
S Only	4.814	4.814	-0.716	
W Only	0.716	0.716	-0.716	



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Steel Column Project File: Hartford S 7 CT (Rev.1).ec6

LIC#: KW-06013026, Build:20.22.10.25 Hudson Design Group LLC (c) ENERCALC INC 1983-2022

DESCRIPTION: Existing Column - Column #1

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	Axial Reaction	X-X Axis Reaction		k	Y-Y Axis Reaction		Mx - End Moments		My - End Moments	
	@ Base	@ Base	@ Top		@ Base	@ Top	@ Base	@ Top	@ Base	@ Top
+D+0.60W	6.126									
+D+0.750Lr+0.450W	8.426									
+D+0.750S+0.450W	9.630									
+0.60D+0.60W	3.848									
+0.60D	3.418									
Lr Only	3.209									
S Only	4.814									
W Only	0.716									

Extreme Reactions

Item	Extreme Value	Axial Reaction	X-X Axis Reaction		k	Y-Y Axis Reaction		Mx - End Moments		My - End Moments	
		@ Base	@ Base	@ Top		@ Base	@ Top	@ Base	@ Top	@ Base	@ Top
Axial @ Base	Maximum	10.511									
"	Minimum	0.716									
Reaction, X-X Axis Base	Maximum	5.697									
"	Minimum	5.697									
Reaction, Y-Y Axis Base	Maximum	5.697									
"	Minimum	5.697									
Reaction, X-X Axis Top	Maximum	5.697									
"	Minimum	5.697									
Reaction, Y-Y Axis Top	Maximum	5.697									
"	Minimum	5.697									
Moment, X-X Axis Base	Maximum	5.697									
"	Minimum	5.697									
Moment, Y-Y Axis Base	Maximum	5.697									
"	Minimum	5.697									
Moment, X-X Axis Top	Maximum	5.697									
"	Minimum	5.697									
Moment, Y-Y Axis Top	Maximum	5.697									
"	Minimum	5.697									

Maximum Deflections for Load Combinations

Load Combination	Max. X-X Deflection	Distance	Max. Y-Y Deflection	Distance
D Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+Lr	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+S	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+0.750Lr	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+0.750S	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+0.60W	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+0.750Lr+0.450W	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+0.750S+0.450W	0.0000 in	0.000 ft	0.000 in	0.000 ft
+0.60D+0.60W	0.0000 in	0.000 ft	0.000 in	0.000 ft
+0.60D	0.0000 in	0.000 ft	0.000 in	0.000 ft
Lr Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
S Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
W Only	0.0000 in	0.000 ft	0.000 in	0.000 ft

Steel Section Properties : Pipe3-1/2 Std

Steel Section Properties : Pipe3-1/2 Std



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Steel Column

Project File: Hartford S 7 CT (Rev.1).ec6

LIC# : KW-06013026, Build:20.22.10.25

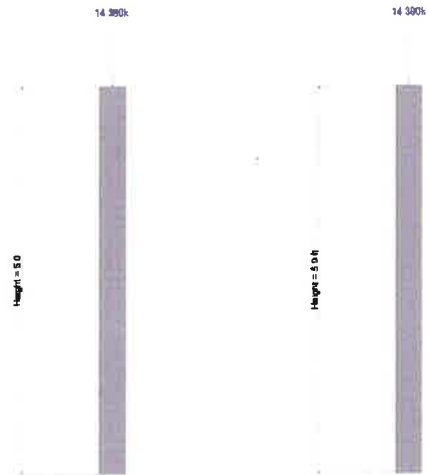
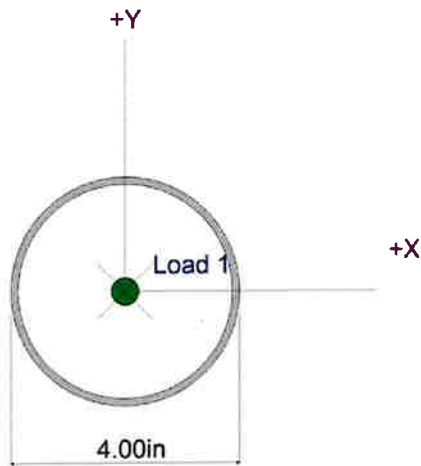
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DESCRIPTION: Existing Column - Column #1

Depth	=	4.000 in	I xx	=	4.52 in^4	J	=	9.040 in^4
			S xx	=	2.26 in^3			
Diameter	=	4.000 in	R xx	=	1.340 in			
Wall Thick	=	0.227 in	Zx	=	3.030 in^3			
Area	=	2.510 in^2	I yy	=	4.520 in^4			
Weight	=	9.176 plf	S yy	=	2.260 in^3			
			R yy	=	1.340 in			
Ycg	=	0.000 in						

Sketches





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DESCRIPTION: Existing Column - Column #2

Maximum Reactions

Note: Only non-zero reactions are listed.

Load Combination	Axial Reaction	X-X Axis Reaction		k	Y-Y Axis Reaction		Mx - End Moments		k-ft	My - End Moments	
	@ Base	@ Base	@ Top		@ Base	@ Top	@ Base	@ Top		@ Base	@ Top
+D+0.60W	4.473										
+D+0.750Lr+0.450W	7.265										
+D+0.750S+0.450W	8.714										
+0.60D+0.60W	2.856										
+0.60D	2.426										
Lr Only	3.865										
S Only	5.797										
W Only	0.716										

Extreme Reactions

Item	Extreme Value	Axial Reaction	X-X Axis Reaction		k	Y-Y Axis Reaction		Mx - End Moments		k-ft	My - End Moments	
		@ Base	@ Base	@ Top		@ Base	@ Top	@ Base	@ Top		@ Base	@ Top
Axial @ Base	Maximum	9.841										
"	Minimum	0.716										
Reaction, X-X Axis Base	Maximum	4.044										
"	Minimum	4.044										
Reaction, Y-Y Axis Base	Maximum	4.044										
"	Minimum	4.044										
Reaction, X-X Axis Top	Maximum	4.044										
"	Minimum	4.044										
Reaction, Y-Y Axis Top	Maximum	4.044										
"	Minimum	4.044										
Moment, X-X Axis Base	Maximum	4.044										
"	Minimum	4.044										
Moment, Y-Y Axis Base	Maximum	4.044										
"	Minimum	4.044										
Moment, X-X Axis Top	Maximum	4.044										
"	Minimum	4.044										
Moment, Y-Y Axis Top	Maximum	4.044										
"	Minimum	4.044										

Maximum Deflections for Load Combinations

Load Combination	Max. X-X Deflection	Distance	Max. Y-Y Deflection	Distance
D Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+Lr	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+S	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+0.750Lr	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+0.750S	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+0.60W	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+0.750Lr+0.450W	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+0.750S+0.450W	0.0000 in	0.000 ft	0.000 in	0.000 ft
+0.60D+0.60W	0.0000 in	0.000 ft	0.000 in	0.000 ft
+0.60D	0.0000 in	0.000 ft	0.000 in	0.000 ft
Lr Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
S Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
W Only	0.0000 in	0.000 ft	0.000 in	0.000 ft

Steel Section Properties : Pipe3-1/2 Std

Steel Section Properties : Pipe3-1/2 Std



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Steel Column

Project File: Hartford S 7 CT (Rev.1).ec6

LIC#: KW-06013026, Build:20.22.10.25

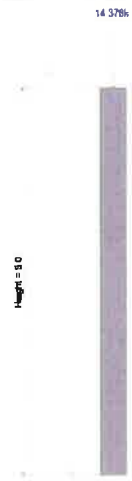
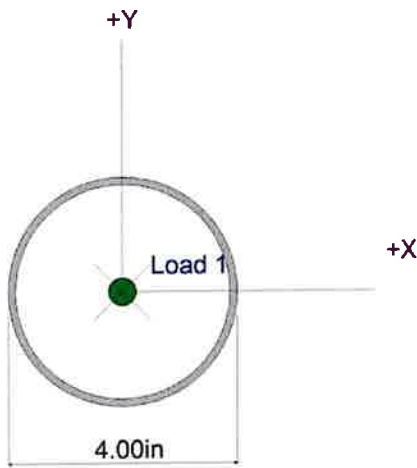
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DESCRIPTION: Existing Column - Column #2

Depth	=	4.000 in	I xx	=	4.52 in ⁴	J	=	9.040 in ⁴
			S xx	=	2.26 in ³			
Diameter	=	4.000 in	R xx	=	1.340 in			
Wall Thick	=	0.227 in	Zx	=	3.030 in ³			
Area	=	2.510 in ²	I yy	=	4.520 in ⁴			
Weight	=	9.176 plf	S yy	=	2.260 in ³			
			R yy	=	1.340 in			
Ycg	=	0.000 in						

Sketches





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Project Title: HARTFORD S 7 CT
Engineer: CL
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Steel Beam

Project File: Hartford S 7 CT (Rev.1).ec6

LIC#: KW-06013026, Build:20.22.10.25

Hudson Design Group LLC

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DESCRIPTION: Existing Beam - Beam #3

CODE REFERENCES

Calculations per AISC 360-16, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : ASCE 7-16

Material Properties

Analysis Method : Allowable Strength Design
Beam Bracing : Completely Unbraced
Bending Axis : Major Axis Bending

Fy : Steel Yield : 36.0 ksi
E : Modulus : 29,000.0 ksi



Applied Loads

Service loads entered. Load Factors will be applied for calculations.

Beam self weight calculated and added to loading

Load(s) for Span Number 1

Point Load : D = 6.494, Lr = 3.209, S = 4.814, W = 0.7160 k @ 3.0 ft, (Beam #2 Reaction)

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	0.221 : 1	Maximum Shear Stress Ratio =	0.125 : 1
Section used for this span	W12x30	Section used for this span	W12x30
Ma : Applied	17.097 k-ft	Va : Applied	5.744 k
Mn / Omega : Allowable	77.425 k-ft	Vn/Omega : Allowable	46.051 k
Load Combination	+D+S	Load Combination	+D+S
Span # where maximum occurs	Span # 1	Location of maximum on span	0.000 ft
		Span # where maximum occurs	Span # 1
Maximum Deflection			
Max Downward Transient Deflection	0.005 in Ratio = 13,218	>=360	
Max Upward Transient Deflection	0.000 in Ratio = 0	<360	Span: 1 : S Only
Max Downward Total Deflection	0.013 in Ratio = 5572	>=180	Span: 1 : +D+S
Max Upward Total Deflection	0.000 in Ratio = 0	<180	

Maximum Forces & Stresses for Load Combinations

Load Combination	Segment Length	Span #	Max Stress Ratios		Summary of Moment Values						Summary of Shear Values			
			M	V	Mmax +	Mmax -	Ma Max	Mnx	Mnx/Omega	Cb	Rm	Va Max	Vnx/Vnx/Omega	
D Only														
Dsgn. L =	6.00 ft	1	0.128	0.072	9.88		9.88	129.30	77.43	1.31	1.00	3.34	69.08	46.05
+D+Lr														
Dsgn. L =	6.00 ft	1	0.190	0.107	14.69		14.69	129.30	77.43	1.31	1.00	4.94	69.08	46.05
+D+S														
Dsgn. L =	6.00 ft	1	0.221	0.125	17.10		17.10	129.30	77.43	1.31	1.00	5.74	69.08	46.05
+D+0.750Lr														
Dsgn. L =	6.00 ft	1	0.174	0.099	13.49		13.49	129.30	77.43	1.31	1.00	4.54	69.08	46.05
+D+0.750S														
Dsgn. L =	6.00 ft	1	0.197	0.112	15.29		15.29	129.30	77.43	1.31	1.00	5.14	69.08	46.05
+D+0.60W														
Dsgn. L =	6.00 ft	1	0.136	0.077	10.52		10.52	129.30	77.43	1.31	1.00	3.55	69.08	46.05
+D+0.750Lr+0.450W														
Dsgn. L =	6.00 ft	1	0.180	0.102	13.97		13.97	129.30	77.43	1.31	1.00	4.70	69.08	46.05
+D+0.750S+0.450W														
Dsgn. L =	6.00 ft	1	0.204	0.115	15.77		15.77	129.30	77.43	1.31	1.00	5.30	69.08	46.05
+0.60D+0.60W														
Dsgn. L =	6.00 ft	1	0.085	0.048	6.57		6.57	129.30	77.43	1.31	1.00	2.22	69.08	46.05
+0.60D														
Dsgn. L =	6.00 ft	1	0.077	0.043	5.93		5.93	129.30	77.43	1.31	1.00	2.00	69.08	46.05



TEP Northeast
 45 Beechwood Drive
 North Andover, MA 01845
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Project Title: HARTFORD S 7 CT
 Engineer: CL
 Project ID: HARTFORD S 7 CT
 Project Descr: Antennas/Equipment Mounted on Rooftop

Steel Beam

Project File: Hartford S 7 CT (Rev.1).ec6

LIC#: KW-06013026, Build:20.22.10.25

Hudson Design Group LLC

(c) ENERCALC INC 1983-2022

DESCRIPTION: Existing Beam - Beam #3

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl	Location in Span	Load Combination	Max. "+" Defl	Location in Span
+D+S	1	0.0129	3.017		0.0000	0.000

Vertical Reactions

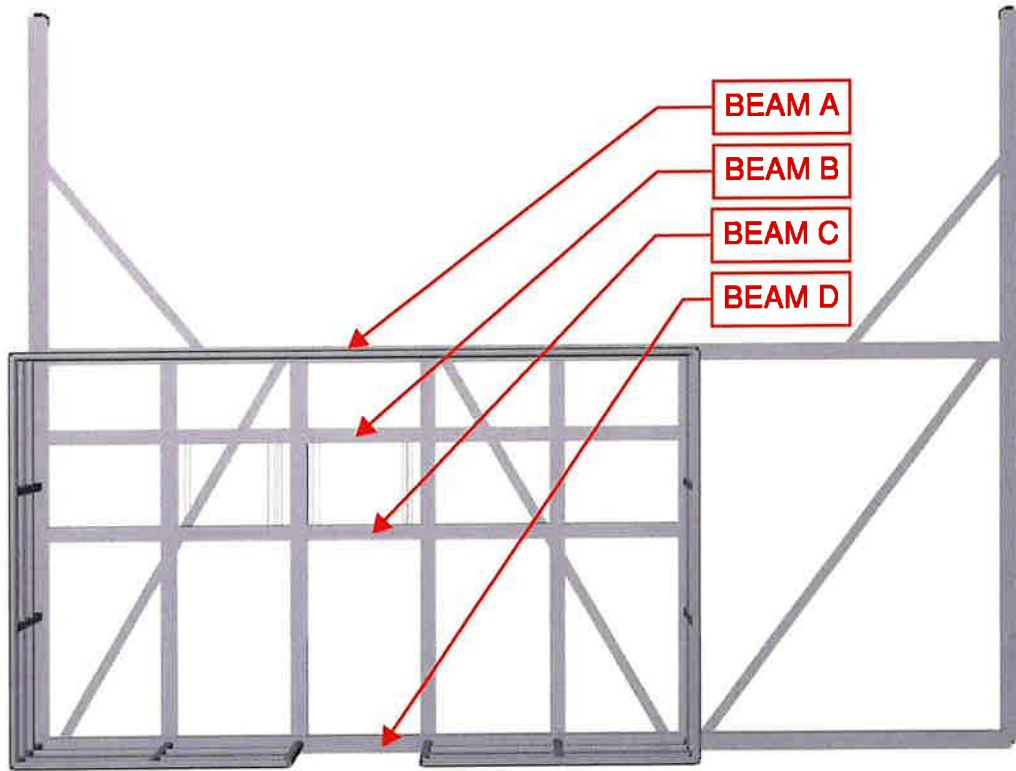
Support notation : Far left is #

Values in KIPS

Load Combination	Support 1	Support 2	
Max Upward from all Load Conditions	5.744	5.744	-0.716
Max Upward from Load Combinations	5.744	5.744	-0.716
Max Upward from Load Cases	3.337	3.337	-0.716
Max Downward from all Load Conditions (Resi:			-0.716
Max Downward from Load Combinations (Resi:			-0.716
Max Downward from Load Cases (Resisting Up			-0.716
D Only	3.337	3.337	-0.716
+D+Lr	4.941	4.941	-0.716
+D+S	5.744	5.744	-0.716
+D+0.750Lr	4.540	4.540	-0.716
+D+0.750S	5.142	5.142	-0.716
+D+0.60W	3.552	3.552	-0.716
+D+0.750Lr+0.450W	4.701	4.701	-0.716
+D+0.750S+0.450W	5.303	5.303	-0.716
+0.60D+0.60W	2.217	2.217	-0.716
+0.60D	2.002	2.002	-0.716
Lr Only	1.605	1.605	-0.716
S Only	2.407	2.407	-0.716
W Only	0.358	0.358	-0.716



Equipment Platform Calculations



Date: 12/12/2022
Project Name: HARTFORD S 7 CT
Designed By: CL Checked By: MSC



Load Breakdown at Proposed Equipment Platform

Live Loads:

Service = 25 psf

Dead Loads:

Grating = 15 psf

• **Beam A**

Live Load

→ Service 25 psf x 1.3 ft. (Tributary Width)
= 31.3 plf

Dead Load

→ Grating 15 psf x 1.3 ft. (Tributary Width)
= 18.8 plf

• **Beam B**

Live Load

→ Service 25 psf x 2.8 ft. (Tributary Width)
= 68.8 plf

Dead Load

→ Grating 15 psf x 2.8 ft. (Tributary Width)
= 41.3 plf

• **Beam C**

Live Load

→ Service 25 psf x 4.8 ft. (Tributary Width)
= 118.8 plf

Dead Load

→ Grating 15 psf x 4.8 ft. (Tributary Width)
= 71.3 plf

• **Beam D**

Live Load

→ Service 25 psf x 3.3 ft. (Tributary Width)
= 81.3 plf

Dead Load

→ Grating 15 psf x 3.3 ft. (Tributary Width)
= 48.8 plf

Date: 12/12/2022
 Project Name: HARTFORD S 7 CT
 Designed By: CL Checked By: MSC



Wind Analysis → Platform Enclosure

Reference Codes:

-2022 Connecticut State Building Code (2018 CTSBC)

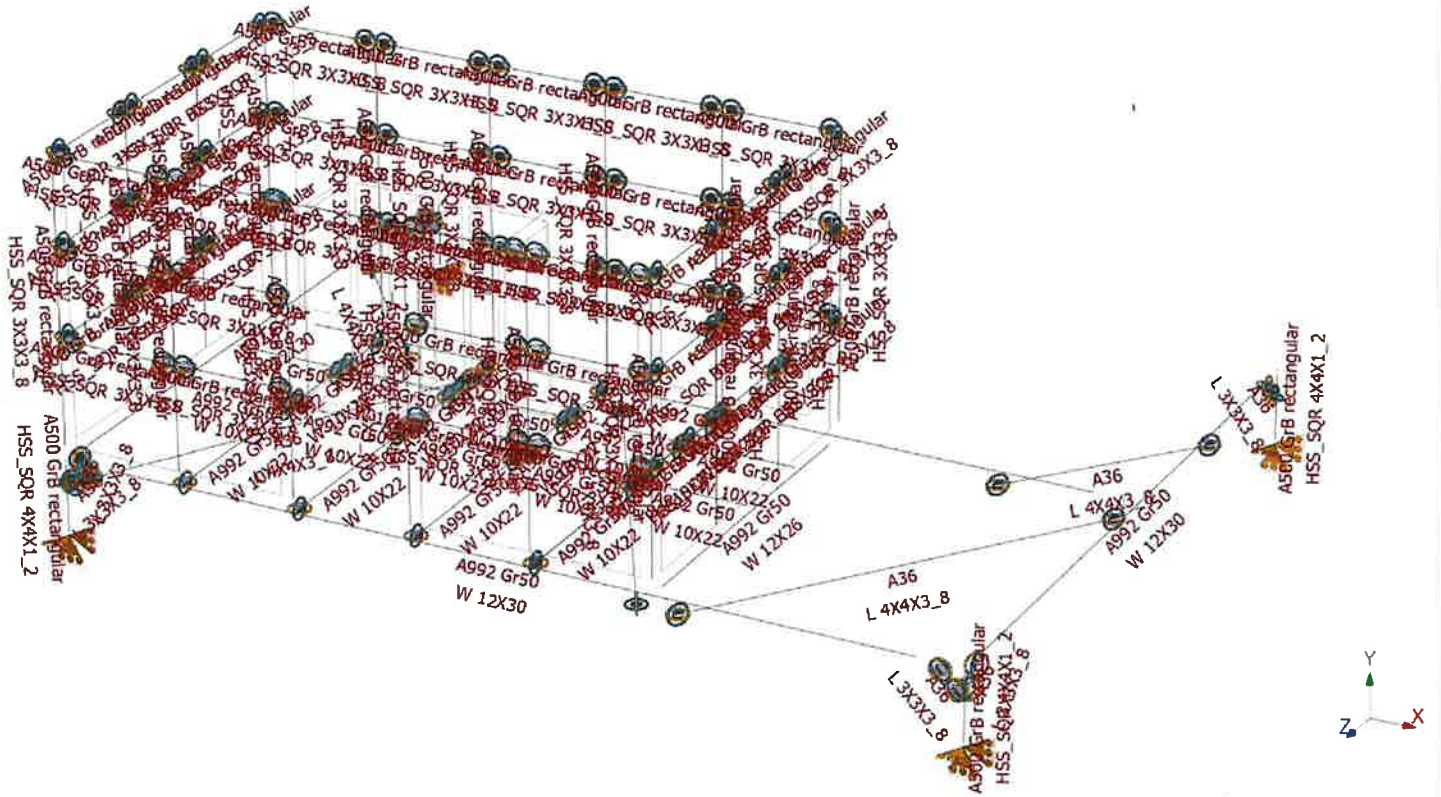
-International Building Code 2021 (IBC 2021)

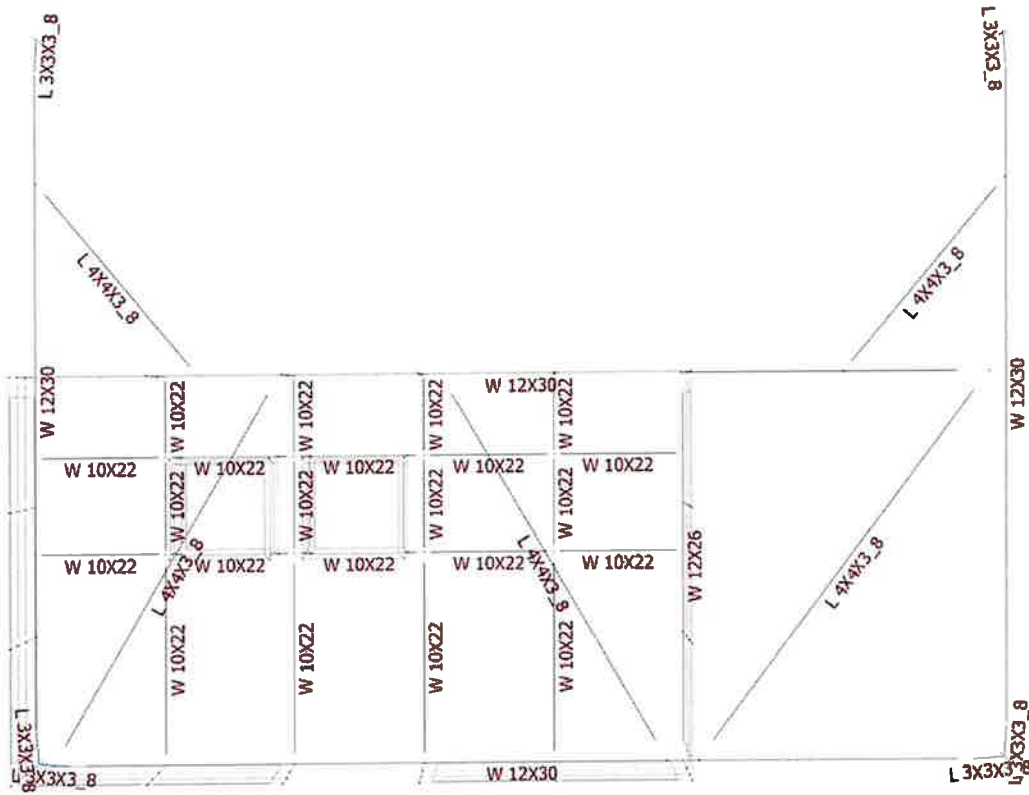
-Minimum Design Loads for Buildings and Other Structures (ASCE 7-16)

Structure Classification	III	(ASCE 7-16 Table 1.5-1)
Basic Wind Speed, V	130 mph	(CT Building Code Appendix P)
Exposure Category	B	(ASCE 7-16 Section 26.7)
Topographic Category	1	(ASCE 7-16 Table 1.5-2)
Height Above Ground Level, z	58 ft	(Top of Enclosure)
Exposure Coefficient, K_z	0.84	(ASCE 7-16 Table 26.10-1)
Topographic Factor, K_{zt}	1.00	(ASCE 7-16 Section 26.8.2)
Wind Directionality Coef., K_d	0.90	(ASCE 7-16 Table 26.6-1)
Ground Elevation Factor, K_e	0.98	(ASCE 7-16 Table 26.9-1)
Velocity Pressure, q_z	$= 0.00256K_zK_{zt}K_dK_eV^2$ $= \underline{\underline{32.13 \text{ psf}}}$	(ASCE 7-16 Equation 26.10-1)
Gust Factor, G	0.85	(ASCE 7-16 Section 26.11)
Net Force Coefficient, C_f	1.29	(ASCE 7-16 Figures 29.4-1 to 29.4-4)
Area Wind Force, F	$= q_zGC_fA_f$ $= \underline{\underline{35.24 \text{ psf}}}$	(ASCE 7-16 Equation 29.4-1)





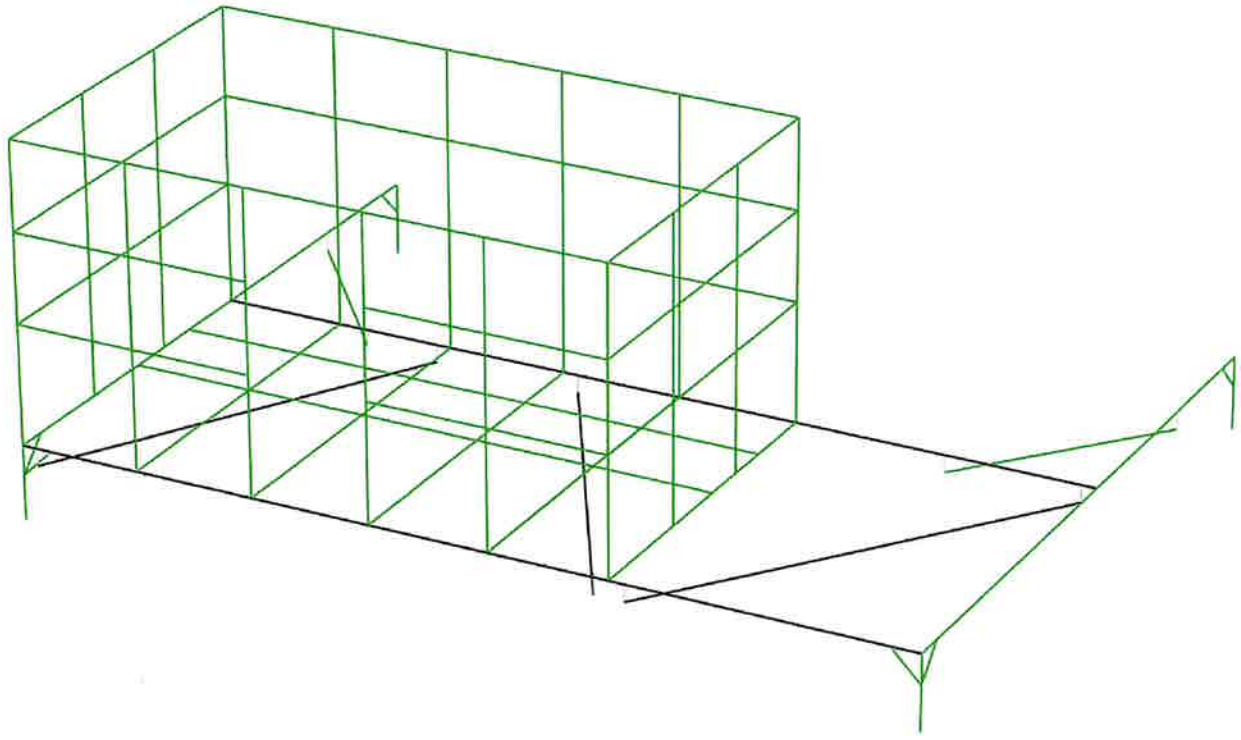


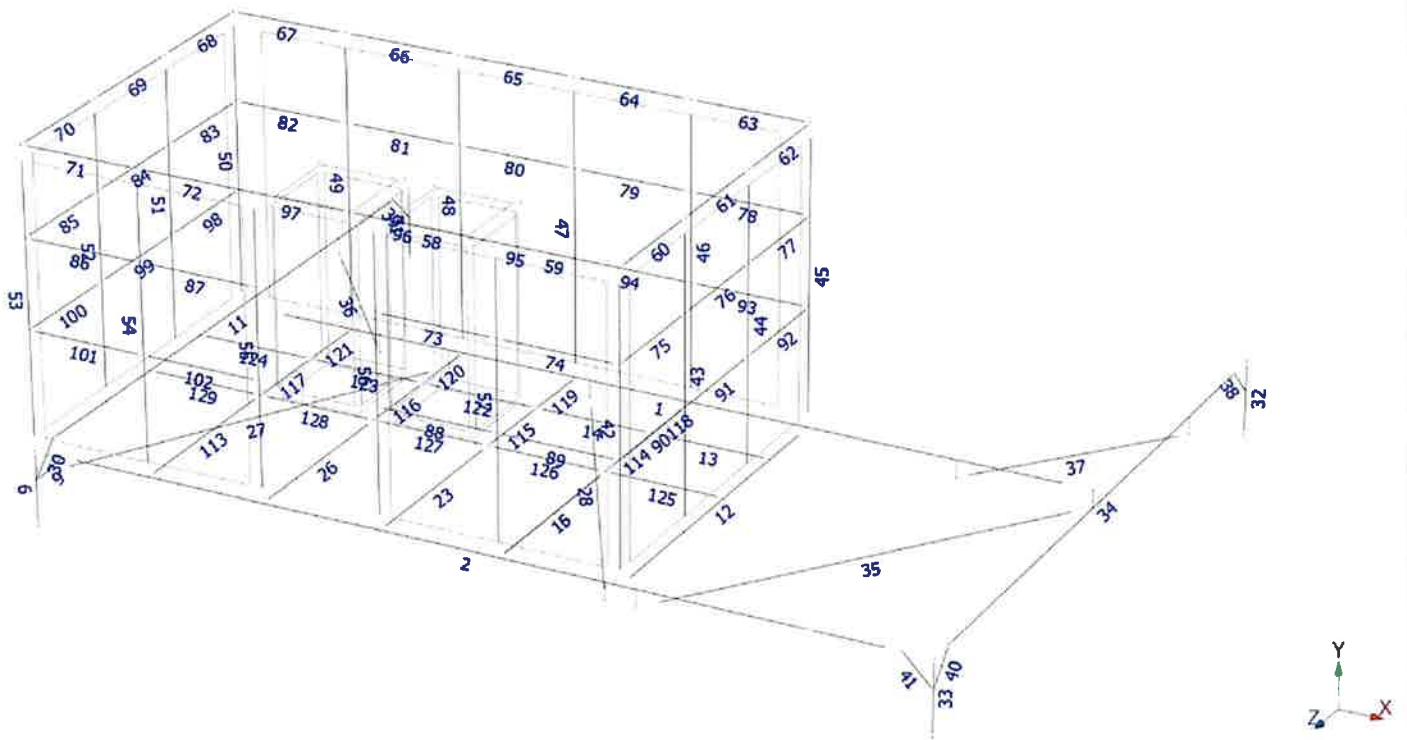


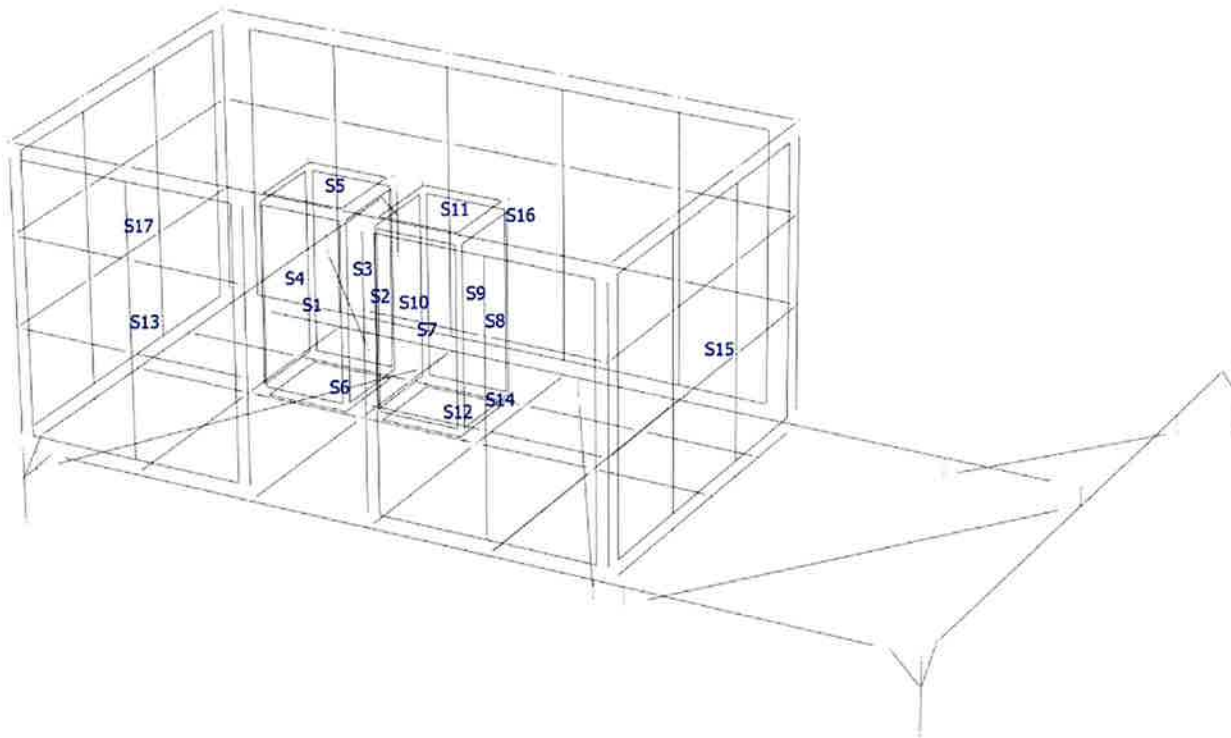


Design status

- Not designed
- Error on design
- Design O.K.
- With warnings







Load data

GLOSSARY

Comb : Indicates if load condition is a load combination

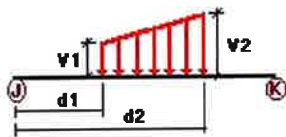
Load Conditions

Condition	Description	Comb.	Category
DL	Dead Load	No	DL
WL1	Wind Load (Side 1)	No	WIND
WL2	Wind Load (Side 2)	No	WIND
WL3	Wind Load (Side 3)	No	WIND
WL4	Wind Load (Side 4)	No	WIND
LL	Live Load	No	LL

Load on nodes

Condition	Node	FX [Kip]	FY [Kip]	FZ [Kip]	MX [Kip*ft]	MY [Kip*ft]	MZ [Kip*ft]
DL	47	0.00	-0.05	0.00	0.00	0.00	0.00
	48	0.00	-0.05	0.00	0.00	0.00	0.00

Distributed force on members



Condition	Member	Dir1	Val1 [Kip/ft]	Val2 [Kip/ft]	Dist1 [ft]	%	Dist2 [ft]	%
DL	1	y	-0.019	-0.019	33.00	Yes	100.00	Yes
	2	y	-0.049	-0.049	33.00	Yes	100.00	Yes
	13	y	-0.042	-0.042	0.00	Yes	100.00	Yes
	14	y	-0.042	-0.042	0.00	Yes	100.00	Yes
	122	y	-0.042	-0.042	0.00	Yes	100.00	Yes
	123	y	-0.042	-0.042	0.00	Yes	100.00	Yes
	124	y	-0.042	-0.042	0.00	Yes	100.00	Yes
	125	y	-0.071	-0.071	0.00	Yes	100.00	Yes
	126	y	-0.071	-0.071	0.00	Yes	100.00	Yes
	127	y	-0.071	-0.071	0.00	Yes	100.00	Yes
	128	y	-0.071	-0.071	0.00	Yes	100.00	Yes
	129	y	-0.071	-0.071	0.00	Yes	100.00	Yes
LL	1	y	-0.031	-0.031	33.00	Yes	100.00	Yes

2	y	-0.081	-0.081	33.00	Yes	100.00	Yes
13	y	-0.069	-0.069	0.00	Yes	100.00	Yes
14	y	-0.069	-0.069	0.00	Yes	100.00	Yes
122	y	-0.069	-0.069	0.00	Yes	100.00	Yes
123	y	-0.069	-0.069	0.00	Yes	100.00	Yes
124	y	-0.069	-0.069	0.00	Yes	100.00	Yes
125	y	-0.119	-0.119	0.00	Yes	100.00	Yes
126	y	-0.119	-0.119	0.00	Yes	100.00	Yes
127	y	-0.119	-0.119	0.00	Yes	100.00	Yes
128	y	-0.119	-0.119	0.00	Yes	100.00	Yes
129	y	-0.119	-0.119	0.00	Yes	100.00	Yes

Load on shells

Condition	Shell	Pressure [Kip/ft2]	Temp. [F]
DL	6	-0.167	0.00
	12	-0.222	0.00
WL1	1	-0.039	0.00
	7	-0.039	0.00
	13	-0.036	0.00
	14	-0.036	0.00
	16	0.036	0.00
WL2	15	-0.036	0.00
	17	0.036	0.00
WL3	13	0.036	0.00
	14	0.036	0.00
	16	-0.036	0.00
WL4	15	0.036	0.00
	17	-0.036	0.00

Self weight multipliers for load conditions

Condition	Description	Self weight multiplier			
		Comb.	MultX	MultY	MultZ
DL	Dead Load	No	0.00	-1.00	0.00
WL1	Wind Load (Side 1)	No	0.00	0.00	0.00
WL2	Wind Load (Side 2)	No	0.00	0.00	0.00
WL3	Wind Load (Side 3)	No	0.00	0.00	0.00
WL4	Wind Load (Side 4)	No	0.00	0.00	0.00
LL	Live Load	No	0.00	0.00	0.00



Current Date: 12/12/2022 12:12 PM

Units system: English

Steel Code Check

Report: Summary - Group by member

Load conditions to be included in design :

- LC1=1.4DL
- LC2=1.2DL+1.6LL
- LC3=1.2DL+0.5WL1
- LC4=1.2DL+0.5WL2
- LC5=1.2DL+0.5WL3
- LC6=1.2DL+0.5WL4
- LC7=1.2DL+WL1
- LC8=1.2DL+WL2
- LC9=1.2DL+WL3
- LC10=1.2DL+WL4
- LC11=1.2DL+WL1+LL
- LC12=1.2DL+WL2+LL
- LC13=1.2DL+WL3+LL
- LC14=1.2DL+WL4+LL
- LC15=0.9DL+WL1
- LC16=0.9DL+WL2
- LC17=0.9DL+WL3
- LC18=0.9DL+WL4

Description	Section	Member	Ctrl Eq.	Ratio	Status	Reference
	HSS_SQR 3X3X3_8	42	LC13 at 0.00%	0.26	OK	
		43	LC12 at 39.58%	0.34	OK	
		44	LC12 at 39.58%	0.30	OK	
		45	LC11 at 0.00%	0.53	OK	
		46	LC17 at 39.58%	0.33	OK	
		47	LC11 at 39.58%	0.37	OK	
		48	LC11 at 39.58%	0.31	OK	
		49	LC17 at 39.58%	0.32	OK	
		50	LC11 at 0.00%	0.53	OK	
		51	LC14 at 39.58%	0.28	OK	
		52	LC14 at 39.58%	0.34	OK	
		53	LC13 at 100.00%	0.17	OK	
		54	LC17 at 39.58%	0.34	OK	
		55	LC11 at 39.58%	0.22	OK	
		56	LC13 at 39.58%	0.37	OK	
		57	LC15 at 39.58%	0.34	OK	
		58	LC13 at 50.00%	0.02	OK	
		59	LC12 at 50.00%	0.02	OK	
		60	LC13 at 46.88%	0.03	OK	
		61	LC12 at 50.00%	0.01	OK	
		62	LC13 at 50.00%	0.03	OK	
		63	LC11 at 50.00%	0.02	OK	
		64	LC11 at 50.00%	0.03	OK	
		65	LC11 at 0.00%	0.03	OK	
		66	LC11 at 0.00%	0.02	OK	
		67	LC14 at 50.00%	0.01	OK	
		68	LC13 at 46.88%	0.03	OK	
		69	LC11 at 0.00%	0.02	OK	
		70	LC11 at 50.00%	0.03	OK	
		71	LC12 at 46.88%	0.01	OK	
		72	LC11 at 50.00%	0.01	OK	
		73	LC13 at 50.00%	0.02	OK	

	74	LC13 at 46.88%	0.02	OK
	75	LC13 at 46.88%	0.02	OK
	76	LC14 at 50.00%	0.02	OK
	77	LC7 at 50.00%	0.02	OK
	78	LC11 at 50.00%	0.02	OK
	79	LC11 at 50.00%	0.02	OK
	80	LC11 at 50.00%	0.02	OK
	81	LC11 at 46.88%	0.02	OK
	82	LC11 at 46.88%	0.02	OK
	83	LC13 at 46.88%	0.02	OK
	84	LC12 at 50.00%	0.02	OK
	85	LC11 at 50.00%	0.02	OK
	86	LC11 at 50.00%	0.02	OK
	87	LC9 at 50.00%	0.02	OK
	88	LC13 at 50.00%	0.03	OK
	89	LC13 at 46.88%	0.02	OK
	90	LC13 at 46.88%	0.03	OK
	91	LC14 at 50.00%	0.02	OK
	92	LC17 at 50.00%	0.03	OK
	93	LC11 at 50.00%	0.03	OK
	94	LC11 at 50.00%	0.02	OK
	95	LC11 at 50.00%	0.02	OK
	96	LC11 at 50.00%	0.02	OK
	97	LC11 at 46.88%	0.02	OK
	98	LC13 at 46.88%	0.03	OK
	99	LC12 at 50.00%	0.02	OK
	100	LC11 at 50.00%	0.03	OK
	101	LC12 at 46.88%	0.02	OK
	102	LC13 at 50.00%	0.02	OK
<hr/>				
HSS_SQR 4X4X1_2	6	LC12 at 59.38%	0.94	OK
	31	LC11 at 40.63%	0.66	OK
	32	LC11 at 59.38%	0.40	OK
	33	LC14 at 59.38%	0.86	OK
<hr/>				
L 3X3X3_8	9	LC12 at 46.88%	0.64	OK
	30	LC13 at 43.75%	0.39	OK
	38	LC11 at 43.75%	0.31	OK
	39	LC11 at 50.00%	0.51	OK
	40	LC14 at 50.00%	0.20	OK
	41	LC14 at 43.75%	0.46	OK
<hr/>				
L 4X4X3_8	27	LC11 at 50.00%	0.17	With warnings
	28	LC7 at 50.00%	0.15	With warnings
	35	LC7 at 50.00%	0.37	With warnings
	36	LC9 at 50.00%	0.03	OK
	37	LC7 at 50.00%	0.03	OK
<hr/>				
W 10X22	13	LC11 at 0.00%	0.33	OK
	14	LC11 at 100.00%	0.30	OK
	15	LC11 at 0.00%	0.01	OK
	16	LC11 at 0.00%	0.01	OK
	23	LC13 at 0.00%	0.01	OK
	26	LC11 at 0.00%	0.02	OK
	113	LC13 at 0.00%	0.01	OK
	114	LC14 at 0.00%	0.01	OK
	115	LC11 at 0.00%	0.00	OK
	116	LC11 at 0.00%	0.00	OK
	117	LC14 at 0.00%	0.01	OK
	118	LC15 at 0.00%	0.00	OK
	119	LC12 at 0.00%	0.01	OK
	120	LC11 at 0.00%	0.02	OK
	121	LC11 at 0.00%	0.01	OK
	122	LC11 at 10.94%	0.32	OK

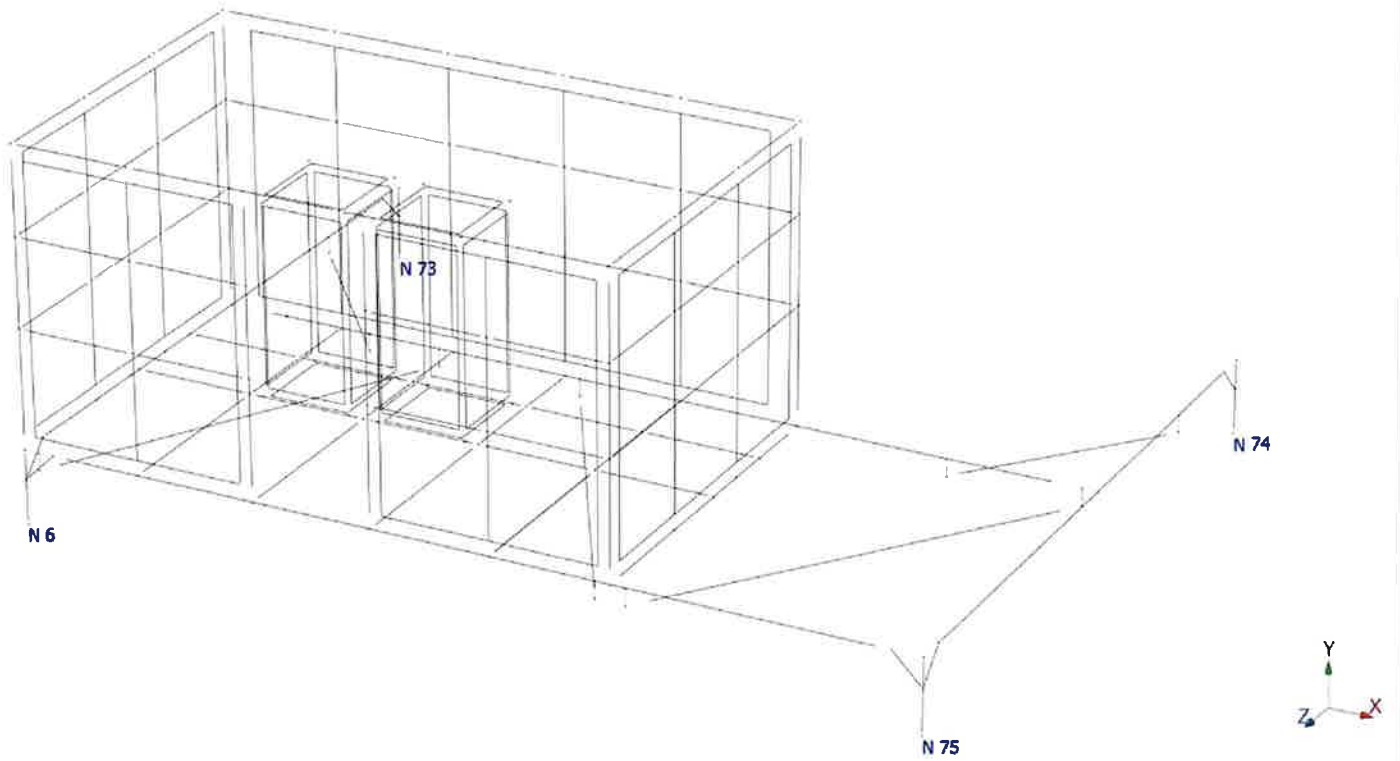
123	LC11 at 87.50%	0.41	OK
124	LC11 at 0.00%	0.27	OK
125	LC11 at 0.00%	0.29	OK
126	LC11 at 100.00%	0.31	OK
127	LC11 at 10.94%	0.32	OK
128	LC13 at 87.50%	0.36	OK
129	LC13 at 0.00%	0.25	OK

W 12X26

12	LC11 at 54.37%	0.30	OK
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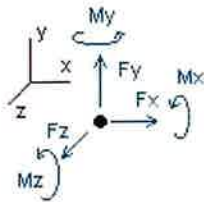
W 12X30

1	LC11 at 33.04%	0.78	With warnings
2	LC14 at 32.99%	0.70	With warnings
11	LC11 at 53.31%	0.76	OK
34	LC11 at 52.50%	0.51	OK



Analysis result

Reactions



Direction of positive forces and moments

Node	Forces [Kip]			Moments [Kip*ft]		
	FX	FY	FZ	MX	MY	MZ
Condition LC1=1.4DL						
6	4.90188	11.57195	-4.76675	0.00000	0.00000	0.00000
73	-0.00401	5.20995	4.75755	0.00000	0.00000	0.00000
74	-0.00774	3.05542	3.21833	0.00000	0.00000	0.00000
75	-4.89013	6.53676	-3.20913	0.00000	0.00000	0.00000
SUM	0.00000	26.37408	0.00000	0.00000	0.00000	0.00000
Condition LC2=1.2DL+1.6LL						
6	6.45299	14.63307	-5.73372	0.00000	0.00000	0.00000
73	-0.00491	6.15828	5.72205	0.00000	0.00000	0.00000
74	-0.00996	3.49213	3.75655	0.00000	0.00000	0.00000
75	-6.43812	7.94080	-3.74488	0.00000	0.00000	0.00000
SUM	0.00000	32.22428	0.00000	0.00000	0.00000	0.00000
Condition LC3=1.2DL+0.5WL1						
6	3.25544	8.28334	-2.35214	0.00000	0.00000	0.00000
73	-0.04064	6.10045	7.22326	0.00000	0.00000	0.00000
74	-0.01965	3.32126	4.51414	0.00000	0.00000	0.00000
75	-3.19514	4.90130	-2.11785	0.00000	0.00000	0.00000
SUM	0.00000	22.60636	7.26741	0.00000	0.00000	0.00000
Condition LC4=1.2DL+0.5WL2						
6	6.16282	10.87927	-4.79912	0.00000	0.00000	0.00000
73	-0.01621	4.57557	3.91515	0.00000	0.00000	0.00000
74	-0.01401	2.50809	2.98536	0.00000	0.00000	0.00000
75	-1.81260	4.64343	-2.10140	0.00000	0.00000	0.00000
SUM	4.32000	22.60636	0.00000	0.00000	0.00000	0.00000
Condition LC5=1.2DL+0.5WL3						
6	5.12836	11.39185	-5.57768	0.00000	0.00000	0.00000
73	0.02209	2.99324	1.26425	0.00000	0.00000	0.00000
74	0.00914	1.94322	1.11641	0.00000	0.00000	0.00000
75	-5.15959	6.27805	-3.28299	0.00000	0.00000	0.00000
SUM	0.00000	22.60636	-6.48000	0.00000	0.00000	0.00000

Condition **LC6=1.2DL+0.5WL4**

6	2.23330	8.95852	-3.36962	0.00000	0.00000	0.00000
73	0.00778	4.35551	4.23884	0.00000	0.00000	0.00000
74	0.00330	2.72931	2.52935	0.00000	0.00000	0.00000
75	-6.56439	6.56302	-3.39857	0.00000	0.00000	0.00000
SUM	-4.32000	22.60636	0.00000	0.00000	0.00000	0.00000

Condition **LC7=1.2DL+WL1**

6	2.33285	6.65368	-0.61378	0.00000	0.00000	0.00000
73	-0.09200	7.72891	10.35887	0.00000	0.00000	0.00000
74	-0.02917	4.01701	6.26400	0.00000	0.00000	0.00000
75	-2.21168	4.20675	-1.47427	0.00000	0.00000	0.00000
SUM	0.00000	22.60636	14.53482	0.00000	0.00000	0.00000

Condition **LC8=1.2DL+WL2**

6	8.12152	11.83953	-5.51379	0.00000	0.00000	0.00000
73	-0.03143	4.68572	3.75336	0.00000	0.00000	0.00000
74	-0.01963	2.39801	3.21374	0.00000	0.00000	0.00000
75	0.56954	3.68309	-1.45331	0.00000	0.00000	0.00000
SUM	8.64000	22.60636	0.00000	0.00000	0.00000	0.00000

Condition **LC9=1.2DL+WL3**

6	6.07797	12.87176	-7.06356	0.00000	0.00000	0.00000
73	0.03894	1.51424	-1.55768	0.00000	0.00000	0.00000
74	0.02814	1.25887	-0.53474	0.00000	0.00000	0.00000
75	-6.14505	6.96148	-3.80402	0.00000	0.00000	0.00000
SUM	0.00000	22.60636	-12.96000	0.00000	0.00000	0.00000

Condition **LC10=1.2DL+WL4**

6	0.26233	7.99801	-2.65467	0.00000	0.00000	0.00000
73	0.01664	4.24560	4.40082	0.00000	0.00000	0.00000
74	0.01516	2.84044	2.30160	0.00000	0.00000	0.00000
75	-8.93413	7.52230	-4.04775	0.00000	0.00000	0.00000
SUM	-8.64000	22.60636	0.00000	0.00000	0.00000	0.00000

Condition **LC11=1.2DL+WL1+LL**

6	3.76007	9.60391	-1.64232	0.00000	0.00000	0.00000
73	-0.10485	8.78345	11.39152	0.00000	0.00000	0.00000
74	-0.02624	4.55292	6.87694	0.00000	0.00000	0.00000
75	-3.62898	5.67728	-2.09133	0.00000	0.00000	0.00000
SUM	0.00000	28.61756	14.53482	0.00000	0.00000	0.00000

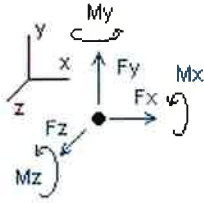
Condition **LC12=1.2DL+WL2+LL**

6	9.54096	14.78346	-6.55055	0.00000	0.00000	0.00000
73	-0.05067	5.73818	4.76918	0.00000	0.00000	0.00000
74	-0.03056	2.94911	3.85153	0.00000	0.00000	0.00000
75	-0.81974	5.14681	-2.07016	0.00000	0.00000	0.00000
SUM	8.64000	28.61756	0.00000	0.00000	0.00000	0.00000

Condition LC13=1.2DL+WL3+LL						
6	7.47224	15.81579	-8.09789	0.00000	0.00000	0.00000
73	0.04481	2.57437	-0.53627	0.00000	0.00000	0.00000
74	0.02133	1.81326	0.10078	0.00000	0.00000	0.00000
75	-7.53838	8.41413	-4.42662	0.00000	0.00000	0.00000
SUM	0.00000	28.61756	-12.96000	0.00000	0.00000	0.00000
Condition LC14=1.2DL+WL4+LL						
6	1.65750	10.94674	-3.67916	0.00000	0.00000	0.00000
73	0.03315	5.30911	5.44093	0.00000	0.00000	0.00000
74	0.02204	3.38122	2.91253	0.00000	0.00000	0.00000
75	-10.35270	8.98048	-4.67430	0.00000	0.00000	0.00000
SUM	-8.64000	28.61756	0.00000	0.00000	0.00000	0.00000
Condition LC15=0.9DL+WL1						
6	1.26447	4.17257	0.40888	0.00000	0.00000	0.00000
73	-0.07934	6.61383	9.33312	0.00000	0.00000	0.00000
74	-0.03334	3.37004	5.58211	0.00000	0.00000	0.00000
75	-1.15178	2.79833	-0.78929	0.00000	0.00000	0.00000
SUM	0.00000	16.95477	14.53482	0.00000	0.00000	0.00000
Condition LC16=0.9DL+WL2						
6	7.05733	9.35979	-4.48334	0.00000	0.00000	0.00000
73	-0.01247	3.57375	2.74455	0.00000	0.00000	0.00000
74	-0.00793	1.73865	2.51018	0.00000	0.00000	0.00000
75	1.60307	2.28257	-0.77140	0.00000	0.00000	0.00000
SUM	8.64000	16.95477	0.00000	0.00000	0.00000	0.00000
Condition LC17=0.9DL+WL3						
6	5.03772	10.39254	-6.03937	0.00000	0.00000	0.00000
73	0.03301	0.39698	-2.57124	0.00000	0.00000	0.00000
74	0.03528	0.59676	-1.23442	0.00000	0.00000	0.00000
75	-5.10601	5.56848	-3.11497	0.00000	0.00000	0.00000
SUM	0.00000	16.95477	-12.96000	0.00000	0.00000	0.00000
Condition LC18=0.9DL+WL4						
6	-0.77680	5.51848	-1.63978	0.00000	0.00000	0.00000
73	0.00046	3.12439	3.36904	0.00000	0.00000	0.00000
74	0.00676	2.18968	1.62363	0.00000	0.00000	0.00000
75	-7.87042	6.12221	-3.35289	0.00000	0.00000	0.00000
SUM	-8.64000	16.95477	0.00000	0.00000	0.00000	0.00000

Envelope for nodal reactions

Note.- **lc** is the controlling load condition



Direction of positive forces and moments

Envelope of nodal reactions for :

- LC1=1.4DL
- LC2=1.2DL+1.6LL
- LC3=1.2DL+0.5WL1
- LC4=1.2DL+0.5WL2
- LC5=1.2DL+0.5WL3
- LC6=1.2DL+0.5WL4
- LC7=1.2DL+WL1
- LC8=1.2DL+WL2
- LC9=1.2DL+WL3
- LC10=1.2DL+WL4
- LC11=1.2DL+WL1+LL
- LC12=1.2DL+WL2+LL
- LC13=1.2DL+WL3+LL
- LC14=1.2DL+WL4+LL
- LC15=0.9DL+WL1
- LC16=0.9DL+WL2
- LC17=0.9DL+WL3
- LC18=0.9DL+WL4

Node		Forces						Moments					
		Fx [Kip]	lc	Fy [Kip]	lc	Fz [Kip]	lc	Mx [Kip*ft]	lc	My [Kip*ft]	lc	Mz [Kip*ft]	lc
6	Max	9.541	LC12	15.816	LC13	0.409	LC15	0.00000	LC1	0.00000	LC1	0.00000	LC1
	Min	-0.777	LC18	4.173	LC15	-8.098	LC13	0.00000	LC1	0.00000	LC1	0.00000	LC1
73	Max	0.045	LC13	8.783	LC11	11.392	LC11	0.00000	LC1	0.00000	LC1	0.00000	LC1
	Min	-0.105	LC11	0.397	LC17	-2.571	LC17	0.00000	LC1	0.00000	LC1	0.00000	LC1
74	Max	0.035	LC17	4.553	LC11	6.877	LC11	0.00000	LC1	0.00000	LC1	0.00000	LC1
	Min	-0.033	LC15	0.597	LC17	-1.234	LC17	0.00000	LC1	0.00000	LC1	0.00000	LC1
75	Max	1.603	LC16	8.980	LC14	-0.771	LC16	0.00000	LC1	0.00000	LC1	0.00000	LC1
	Min	-10.353	LC14	2.283	LC16	-4.674	LC14	0.00000	LC1	0.00000	LC1	0.00000	LC1

Date: 12/12/2022
 Project Name: HARTFORD S 7 CT
 Designed By: CL Checked By: MSC



CHECK CONNECTION CAPACITY (Worst Case) → PROPOSED ANCHORS AT EQUIPMENT PLATFORM

Reference: AISC Steel Construction Manual 14th Edition (ASD)

Bolt Type = A325 5/8" Threaded Rod

Allowable Tensile Load =

$F_{Tall} = 13806$ lbs.

Allowable Shear Load =

$F_{vall} = 8283$ lbs.

TENSILE FORCES

Reaction $F = 0$ lbs. (Gravity Load Supported by Existing Steel Beam)

SHEAR FORCES

Reactions in X direction: 9541 lbs. (See Bentley Output)

Reactions in Z direction: 8098 lbs. (See Bentley Output)

Resultant: 12514 lbs.

No. of Supports = 1

No. of Bolts / Support = 4

Tension Design Load /Bolts =

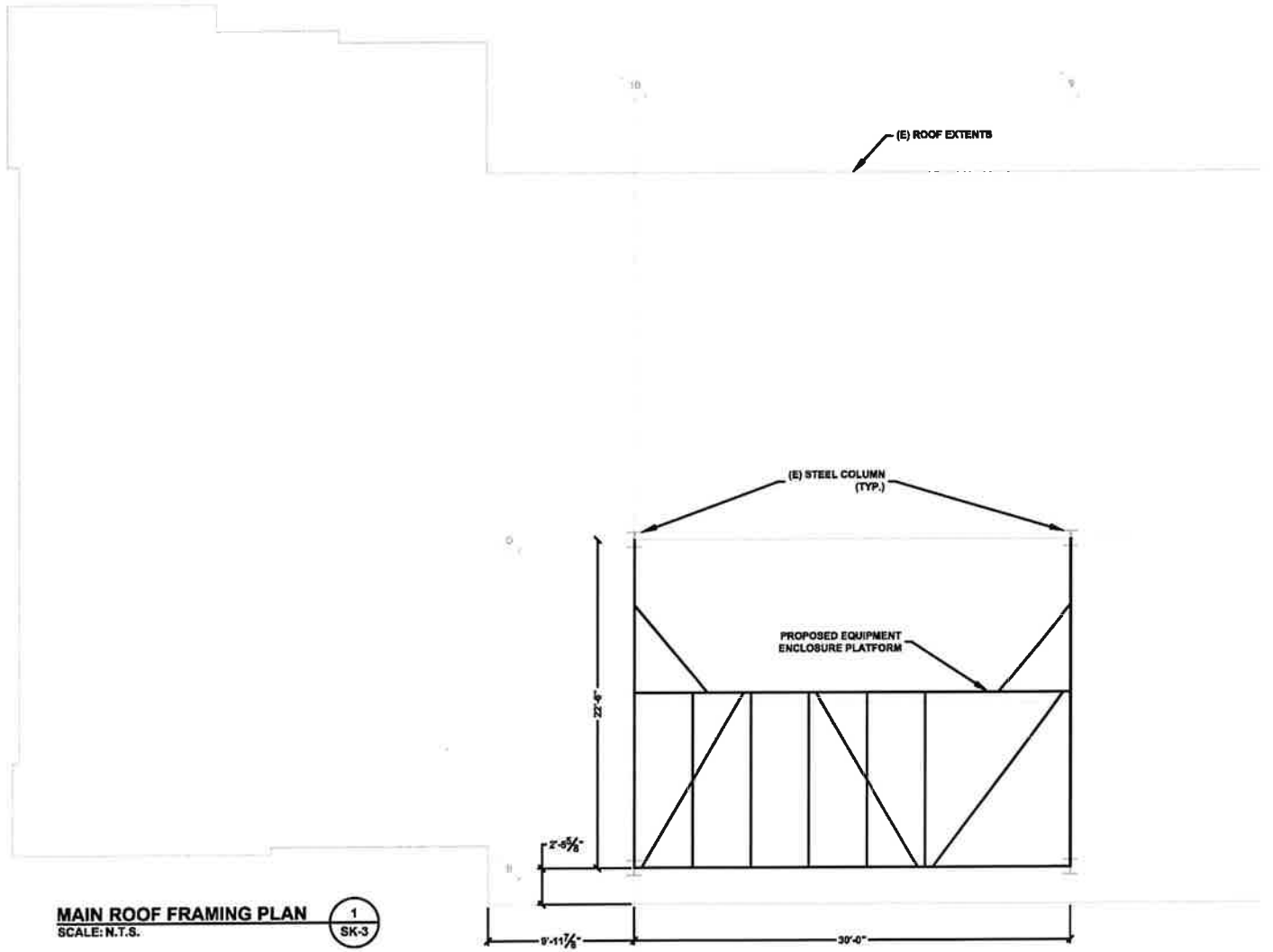
$f_t = 0.00$ lbs. < 13806 lbs. **Therefore, OK !**

Shear Design Load / Bolts=

$f_v = 3128.58$ lbs. < 8283.5 lbs. **Therefore, OK !**

CHECK COMBINED TENSION AND SHEAR

$f_t / F_T + f_v / F_v \leq 1.0$
 0.000 + 0.378 = 0.378 < 1.0 **Therefore, OK !**



MAIN ROOF FRAMING PLAN
 SCALE: N.T.S.

1
 SK-3

Reference Documents



TRINITY COLLEGE
HARTFORD, CONNECTICUT

Clear Fell & Associates, Inc.
Architects
1004 Chapel Street
New Haven, Connecticut 06510

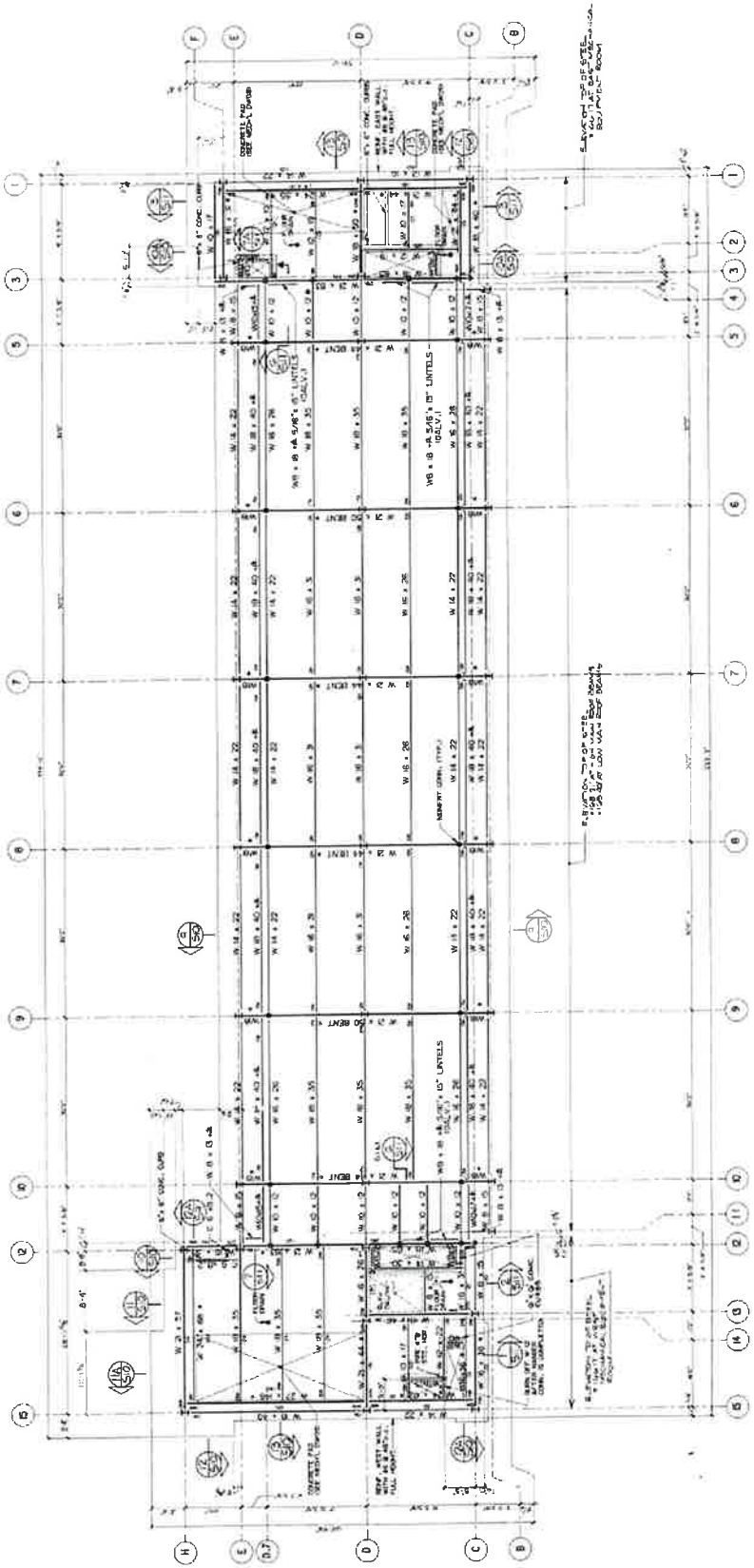
Shaw & Zimbrick, Inc.
Structural Engineers
1004 Chapel Street
New Haven, Connecticut 06510

Swagart Engineering, Inc.
Consulting Engineers
277 Main Street
Hartford, Connecticut 06103

Date	Description
11-11-81	1. PRELIMINARY
1-11-82	2. REVISED
3-11-82	3. REVISED

ROOF FRAMING PLAN

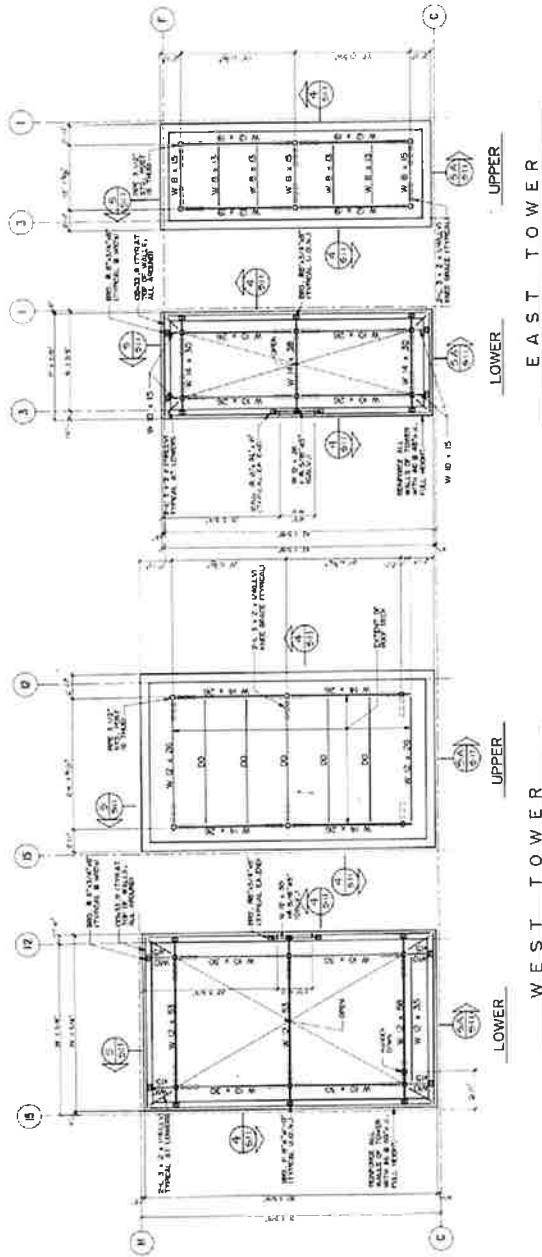
Project No. 81-010
 Date: APRIL 11, 1981
 Job No. B13C
 Title: AS NOTED BY S & Z
 Drawing No. 8-5





Drawn	Date	Description
1	10/1/68	PRELIMINARY
2	10/1/68	REVISED
3	10/1/68	REVISED

TO BE USED IN CONNECTION WITH THE FOLLOWING DRAWINGS:
 ARCHITECTURAL: 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353, 354, 355, 356, 357, 358, 359, 360, 361, 362, 363, 364, 365, 366, 367, 368, 369, 370, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 383, 384, 385, 386, 387, 388, 389, 390, 391, 392, 393, 394, 395, 396, 397, 398, 399, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450, 451, 452, 453, 454, 455, 456, 457, 458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490, 491, 492, 493, 494, 495, 496, 497, 498, 499, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 514, 515, 516, 517, 518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 531, 532, 533, 534, 535, 536, 537, 538, 539, 540, 541, 542, 543, 544, 545, 546, 547, 548, 549, 550, 551, 552, 553, 554, 555, 556, 557, 558, 559, 560, 561, 562, 563, 564, 565, 566, 567, 568, 569, 570, 571, 572, 573, 574, 575, 576, 577, 578, 579, 580, 581, 582, 583, 584, 585, 586, 587, 588, 589, 590, 591, 592, 593, 594, 595, 596, 597, 598, 599, 600, 601, 602, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 614, 615, 616, 617, 618, 619, 620, 621, 622, 623, 624, 625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 637, 638, 639, 640, 641, 642, 643, 644, 645, 646, 647, 648, 649, 650, 651, 652, 653, 654, 655, 656, 657, 658, 659, 660, 661, 662, 663, 664, 665, 666, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688, 689, 690, 691, 692, 693, 694, 695, 696, 697, 698, 699, 700, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 733, 734, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, 753, 754, 755, 756, 757, 758, 759, 760, 761, 762, 763, 764, 765, 766, 767, 768, 769, 770, 771, 772, 773, 774, 775, 776, 777, 778, 779, 780, 781, 782, 783, 784, 785, 786, 787, 788, 789, 790, 791, 792, 793, 794, 795, 796, 797, 798, 799, 800, 801, 802, 803, 804, 805, 806, 807, 808, 809, 810, 811, 812, 813, 814, 815, 816, 817, 818, 819, 820, 821, 822, 823, 824, 825, 826, 827, 828, 829, 830, 831, 832, 833, 834, 835, 836, 837, 838, 839, 840, 841, 842, 843, 844, 845, 846, 847, 848, 849, 850, 851, 852, 853, 854, 855, 856, 857, 858, 859, 860, 861, 862, 863, 864, 865, 866, 867, 868, 869, 870, 871, 872, 873, 874, 875, 876, 877, 878, 879, 880, 881, 882, 883, 884, 885, 886, 887, 888, 889, 890, 891, 892, 893, 894, 895, 896, 897, 898, 899, 900, 901, 902, 903, 904, 905, 906, 907, 908, 909, 910, 911, 912, 913, 914, 915, 916, 917, 918, 919, 920, 921, 922, 923, 924, 925, 926, 927, 928, 929, 930, 931, 932, 933, 934, 935, 936, 937, 938, 939, 940, 941, 942, 943, 944, 945, 946, 947, 948, 949, 950, 951, 952, 953, 954, 955, 956, 957, 958, 959, 960, 961, 962, 963, 964, 965, 966, 967, 968, 969, 970, 971, 972, 973, 974, 975, 976, 977, 978, 979, 980, 981, 982, 983, 984, 985, 986, 987, 988, 989, 990, 991, 992, 993, 994, 995, 996, 997, 998, 999, 1000.



TOWER ROOF FRAMING PLANS

- SCALE: 1/8" = 1'-0"
1. FOR ALL DIMENSIONS NOTED
 2. ELEVATIONS TOP OF STRUCTURAL STEEL UNLESS OTHERWISE NOTED:
 - A) WEST TOWER, LOWER ROOF = 67'-0"
 - B) WEST TOWER, UPPER ROOF = 67'-0"
 - C) EAST TOWER, LOWER ROOF = 67'-0"
 - D) EAST TOWER, UPPER ROOF = 67'-0"