STATE OF CONNECTICUT
CONNECTICUT SITING COUNCIL

IN RE:	:	
	:	
A PETITION OF CELLCO PARTNERSHIP 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 1270 NORTH HIGH STREET, EAST HAVEN, CONNECTICUT	:	PETITION NO. 1379
	:	OCTOBER 1, 2019

RESPONSES OF CELLCO PARTNERSHIP D/B/A VERIZON WIRELESS TO CONNECTICUT SITING COUNCIL INTERROGATORIES, SET ONE

On September 17, 2019, the Connecticut Siting Council ("Council") issued Interrogatories to Cellco Partnership d/b/a Verizon Wireless ("Cellco"), relating to Petition No. 1379, the proposed installation of the East Haven facility. Below are Cellco's responses.

Question No. 1

Is Cellco Partnership d/b/a Verizon Wireless' (Cellco) proposed facility needed for capacity and/or coverage? If yes, for which frequency bands (e.g. 700, 850, 1900 and 2100 MHz)?

Response

The proposed East Haven North Facility is needed for improve wireless "coverage" along portion of Foxon Boulevard, Mill Street, and North High Street, and will improve indoor wireless service at various locations in that area. The East Haven North Facility will improve coverage in all of Celloc's licensed frequency ranges, most importantly for its 700 MHz frequencies. The proposed East Haven North Facility will also provide an estimated capacity offload of 50% to the Gamma sector antennas at Cellco's existing Branford 2 cell site (a tower at

405 Brushy Plain Road in Branford) and 25% to the Alpha sector antennas at Cellco's New Haven NE cell site (a rooftop at 339-363 Eastern Street a.k.a. Bella Vista apartments). Neither of these sites is, however, forecasted to exhaust its capacity in the next 3 years.

Question No. 2

Please provide a structural analysis (signed/stamped by a Professional Engineer duly licensed in Connecticut) taking into account Cellco's proposed loading on the tower and the proposed loading on the building.

Response

See the attached Revised Structural Analysis Report dated July 19, 2019.

Question No. 3

Would the site have battery backup to prevent a reboot condition during the generator start-up delay period? If yes, how long could the battery backup provide power if the generator fails to start?

Response

Yes. The proposed facility will have a battery back up system. This system is designed to keep the cell site operating for up to four (4) hours if the generator fails to start.

Question No. 4

Would the proposed backup generator run periodically for maintenance purposes, e.g. 20 minutes per week during the day?

Response

Yes.

(REVISED)
STRUCTURAL ANALYSIS REPORT

For

EAST HAVEN N CT

1270 North High Street
East Haven, CT 06512

Antennas Mounted on Monopole on Roof; Equipment on Steel Platform on Roof

Prepared for:

verizon

20 Alexander Drive
Wallingford, CT 06492

Dated: July 19, 2019 (Rev.1)
April 15, 2019

Prepared by:

HDG | HUDSON Design Group LLC

45 Beechwood Drive
North Andover, MA 01845
(P) 978.557.5553 (F) 978.336.5586
www.hudsondesigngroupllc.com

HUDSON
Design Group LLC

SCOPE OF WORK:

Hudson Design Group LLC (HDG) 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 HDG 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 April 10, 2019. Attendees included and Jonathan Schallack (HDG – Lead Designer).

The following documents were used for our reference:

- Partial Building Plans prepared by Besier and Gibble, dated September 20, 1976.
- Previous HDG Structural Analysis dated July 14, 2017.

CONCLUSION SUMMARY:

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

Component	Max. Stress Ratio	Elev. of Component (ft)	Pass/Fail	Comments
Pole Section-L1	12.0 %	65.25 – 80.25	PASS	
Pole Section-L2	27.2 %	50.25 – 65.25	PASS	
Pole Section-L3	**44.1 %**	40.25 – 50.25	PASS	**Controlling**

Based on our evaluation, we have determined that the new steel platform **IS CAPABLE** of supporting the proposed equipment loading.

	Member	Controlling Load Case	Stress Ratio	Pass/Fail
Platform Beam	18	LC12	67%	**PASS**

HDG did not perform a condition assessment of the entire roof but did perform an inspection of the existing roof members and structural bearing walls below the area where the equipment is proposed to be located.

*Reference documents attached.

HUDSON
Design Group LLC

APPURTENANCE CONFIGURATION:

Appurtenances	Dimensions	Weight	**Elevation	Mount
(6) JAHH-65B-R3B Antennas	72.0"x13.8"x8.2"	64 lbs	75'	Tower Mount
(3) B2/B66A RRH-BRO49	15.0"x15.0"x10.0"	98 lbs	75'	Tower Mount
(3) B5/B13 RRH-BRO4C	15.0"x15.0"x8.1"	82 lbs	75'	Tower Mount
(3) FDJ85020Q4 Diplexer	6.8"x16.9"x6.3"	24 lbs	75'	Tower Mount
(6) Future Antennas			65'	Tower Mount
(12) Future Antennas			55'	Tower Mount
(2) BBU/Equipment Cabinet		1955 lbs		Platform
(1) Generator		1130 lbs		Platform

* *Proposed equipment shown in bold.*
** *Elevation to antenna centerline.*
*** *Equipment in Italics is future equipment by others.*

DESIGN CRITERIA:

International Building Code (IBC) 2015 with 2018 Connecticut State Building Code, and ASCE 7-10 (Minimum Design Loads for Buildings and Other Structures).		
Wind		
Reference Wind Speed:	130 mph	(CTSBC Appendix N)
Exposure Category:	B	(ASCE 7-10 Chapter 26)
Risk Category:	II	(ASCE 7-10 Table 1.5-1)
Snow		
Ground Snow, P_g:	30	(CTSBC Appendix N)
Importance Factor (I_s):	1.0	(ASCE 7-10 Table 1.5-2)
Exposure Factor (C_e):	1.0	(Partially Exposed, Table 7-2)
Thermal Factor (C_t):	1.0	(ASCE 7-10 Table 7-3)
Flat Roof Snow Load:	21 psf	(ASCE 7-10 Equation 7.3-1)
Min. Flat Roof Snow Load:	30 psf	
EIA/TIA-222-G Structural Standards for Steel Antenna Towers and Antenna Supporting Structures		
Wind		
City/Town:	New Haven	
County:	New Haven	
Wind Load:	115 mph	(TIA-222-G Annex B)
Ice		
Design Ice Thickness (t_i):	0.75 in	(TIA-222-G Annex B)
Structure Class:	II	(TIA-222-G Table 2-1)
Importance Factor (I_i):	1.0	(TIA-222-G Table 2-3)

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Design Group LLC

EXISTING ROOF CONSTRUCTION:

The existing roof construction consists of a roofing membrane over rigid insulation over concrete slabs on bar joists supported steel beams and columns.

ANTENNA/RRH/JUNCTION BOX SUPPORT RECOMMENDATIONS:

The new antennas, RRH's, and junction boxes are proposed to be mounted on new and existing pipe masts installed on the existing monopole structure secured to existing steel platform on the roof.

EQUIPMENT RECOMMENDATIONS:

The Verizon equipment is proposed to be installed on a new steel platform located on the roof of the existing building supported on existing steel beams and columns.

Limitations and Assumptions:

1. Reference the latest HDG construction drawings for all the equipment locations.
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. HDG is not responsible for any modifications completed prior to and hereafter which HDG 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.

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FIELD PHOTOS:

Photo 1: Sample photo illustrating the future equipment location.

Photo 2: Sample photo illustrating the existing roof construction.

FIELD PHOTOS (CONT.):

Photo 3: Sample photo illustrating the existing roof construction.

Photo 4: Sample photo illustrating the existing roof framing.

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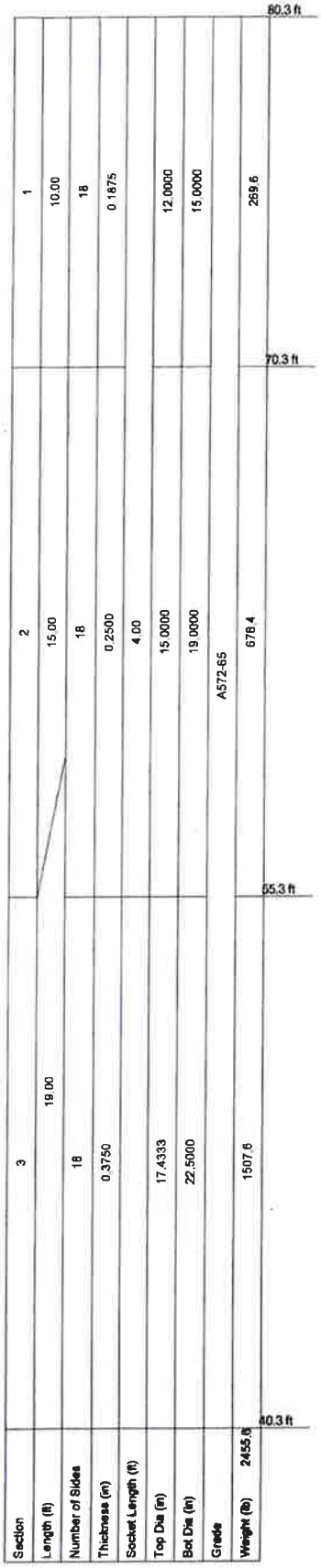
Tower Calculations



Section	1	2	3
Length (ft)	10.00	15.00	19.00
Number of Sides	18	18	18
Thickness (in)	0.1875	0.2500	0.3750
Socket Length (ft)		4.00	
Top Dia (in)	12.0000	15.0000	17.4333
Bot Dia (in)	15.0000	19.0000	22.5000
Grade	A572-65		
Weight (lb)	269.6	678.4	1507.6

Total Weight: 2455.6

DESIGNED APPURTENANCE LOADING

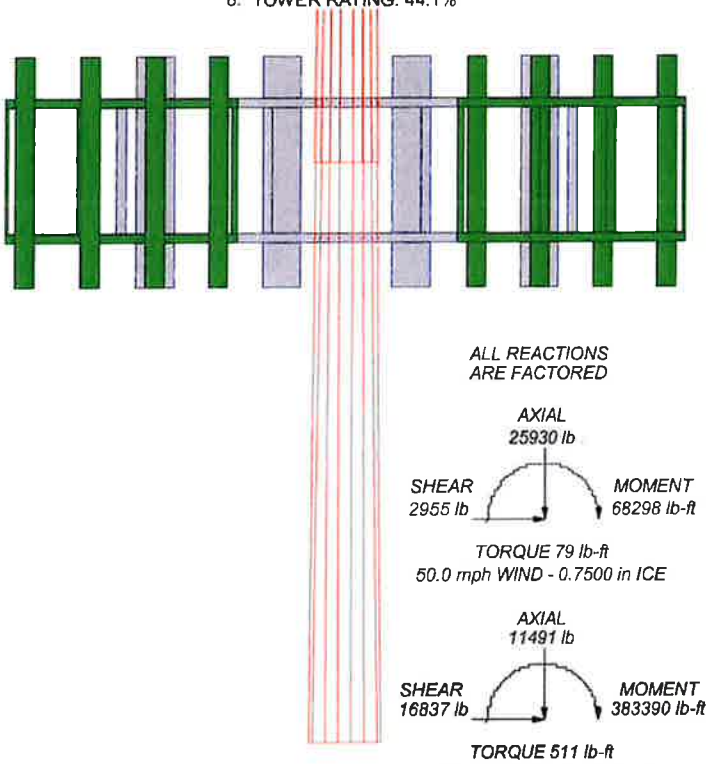
TYPE	ELEVATION	TYPE	ELEVATION
Lightning Rod	80	Diplexer FDJ85020Q4	75
PiROD 13' Low Profile Platform (VERIZON - proposed)	75	Diplexer FDJ85020Q4	75
JAHH-65B-R3B Antenna w/Mounting Pipe	75	B2/B66A RRH-BRO049 RRH	75
JAHH-65B-R3B Antenna w/Mounting Pipe	75	B2/B66A RRH-BRO049 RRH	75
JAHH-65B-R3B Antenna w/Mounting Pipe	75	B2/B66A RRH-BRO049 RRH	75
JAHH-65B-R3B Antenna w/Mounting Pipe	75	B5/B13 RRH-BR04C RRH	75
JAHH-65B-R3B Antenna w/Mounting Pipe	75	B5/B13 RRH-BR04C RRH	75
JAHH-65B-R3B Antenna w/Mounting Pipe	75	B5/B13 RRH-BR04C RRH	75
JAHH-65B-R3B Antenna w/Mounting Pipe	75	PiROD 13' Low Profile Platform	65
JAHH-65B-R3B Antenna w/Mounting Pipe	75	(2) SBNHH-1D65C w/ Mount Pipe	65
JAHH-65B-R3B Antenna w/Mounting Pipe	75	(2) SBNHH-1D65C w/ Mount Pipe	65
JAHH-65B-R3B Antenna w/Mounting Pipe	75	(2) SBNHH-1D65C w/ Mount Pipe	65
Junction Box	75	PIROD 13' Low Profile Platform (VERIZON - proposed)	55
Junction Box	75	(4) SBNHH-1D65C w/ Mount Pipe	55
Diplexer FDJ85020Q4	75	(4) SBNHH-1D65C w/ Mount Pipe	55
		(4) SBNHH-1D65C w/ Mount Pipe	55

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A572-65	65 ksi	80 ksi			

TOWER DESIGN NOTES

1. Tower is located in New Haven County, Connecticut.
2. Tower designed for Exposure B to the TIA-222-G Standard.
3. Tower designed for a 115.0 mph basic wind in accordance with the TIA-222-G Standard.
4. Tower is also designed for a 50.0 mph basic wind with 0.75 in ice. Ice is considered to increase in thickness with height.
5. Deflections are based upon a 60.0 mph wind.
6. Tower Structure Class II.
7. Topographic Category 1 with Crest Height of 0.00 ft
8. TOWER RATING: 44.1%



ALL REACTIONS ARE FACTORED

AXIAL 25930 lb

SHEAR 2955 lb *MOMENT 68298 lb-ft*

TORQUE 79 lb-ft
50.0 mph WIND - 0.7500 in ICE

AXIAL 11491 lb

SHEAR 16837 lb *MOMENT 383390 lb-ft*

TORQUE 511 lb-ft
REACTIONS - 115.0 mph WIND

Hudson Design Group LLC
45 Beechwood Drive
North Andover, MA 01845
Phone: (978) 557-5553
FAX: (978) 336-5586

Job: *EAST HAVEN N CT*		
Project: *55 ft Monopole*		
Client: VERIZON	Drawn by: SO	App'd:
Code: TIA-222-G	Date: 07/18/19	Scale: NTS
Path:		Dwg No. E-1

Tower Input Data

The tower is a monopole.
This tower is designed using the TIA-222-G standard.
The following design criteria apply:

Tower is located in New Haven County, Connecticut.
Basic wind speed of 115.0 mph.
Structure Class II.
Exposure Category B.
Topographic Category 1.
Crest Height 0.00 ft.
Nominal ice thickness of 0.7500 in.
Ice thickness is considered to increase with height.
Ice density of 56.0 pcf.
A wind speed of 50.0 mph is used in combination with ice.
Temperature drop of 50.0 °F.
Deflections calculated using a wind speed of 60.0 mph.
A non-linear (P-delta) analysis was used.
Pressures are calculated at each section.
Stress ratio used in pole design is 1.
Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

Tapered Pole Section Geometry

Section	Elevation ft	Section Length ft	Splice Length ft	Number of Sides	Top Diameter in	Bottom Diameter in	Wall Thickness in	Bend Radius in	Pole Grade
L1	80.25-70.25	10.00	0.00	18	12.0000	15.0000	0.1875	0.7500	A572-65 (65 ksi)
L2	70.25-55.25	15.00	4.00	18	15.0000	19.0000	0.2500	1.0000	A572-65 (65 ksi)
L3	55.25-40.25	19.00		18	17.4333	22.5000	0.3750	1.5000	A572-65 (65 ksi)

Tapered Pole Properties

Section	Tip Dia. in	Area in^2	I in^4	r in	C in	I/C in^3	J in^4	It/Q in^2	w in	w/t
L1	12.1562	7.0299	123.9285	4.1934	6.0960	20.3295	248.0200	3.5156	1.7820	9.504
	15.2025	8.8153	244.3603	5.2584	7.6200	32.0683	489.0422	4.4085	2.3100	12.32
L2	15.1928	11.7041	321.7069	5.2363	7.6200	42.2188	643.8372	5.8532	2.2000	8.8
	19.2545	14.8781	660.8276	6.6563	9.6520	68.4654	1322.5248	7.4405	2.9040	11.616
L3	18.7275	20.3037	746.4237	6.0557	8.8561	84.2833	1493.8296	10.1538	2.4083	6.422
	22.7892	26.3343	1628.6414	7.8544	11.4300	142.4883	3259.4259	13.1696	3.3000	8.8

Tower Elevation ft	Gusset Area (per face) ft²	Gusset Thickness in	Gusset Grade	Adjust. Factor A_f	Adjust. Factor A_r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in	Double Angle Stitch Bolt Spacing Redundants in
L1 80.25-70.25				1	1	1			
L2 70.25-55.25				1	1	1			
L3 55.25-40.25				1	1	1			

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Component Type	Placement ft	Total Number		C_AA_A ft²/ft	Weight plf
1 5/8 Fiber Cable	A	No	No	Inside Pole	74.25 - 40.25	2	No Ice	0.00	1.04
							1/2" Ice	0.00	1.04
							1" Ice	0.00	1.04
**********									
1 5/8	A	No	No	Inside Pole	64.25 - 40.25	12	No Ice	0.00	1.04
							1/2" Ice	0.00	1.04
							1" Ice	0.00	1.04
1 5/8	A	No	No	Inside Pole	54.25 - 40.25	12	No Ice	0.00	1.04
							1/2" Ice	0.00	1.04
							1" Ice	0.00	1.04

Feed Line/Linear Appurtenances Section Areas

Tower Section	Tower Elevation ft	Face	A_R ft²	A_F ft²	C_AA_A In Face ft²	C_AA_A Out Face ft²	Weight lb
L1	80.25-70.25	A	0.000	0.000	0.000	0.000	8.32
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.00
L2	70.25-55.25	A	0.000	0.000	0.000	0.000	143.52
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.00
L3	55.25-40.25	A	0.000	0.000	0.000	0.000	393.12
		B	0.000	0.000	0.000	0.000	0.00
		C	0.000	0.000	0.000	0.000	0.00

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft²	A_F ft²	C_AA_A In Face ft²	C_AA_A Out Face ft²	Weight lb
L1	80.25-70.25	A	1.628	0.000	0.000	0.000	0.000	8.32
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.00
L2	70.25-55.25	A	1.599	0.000	0.000	0.000	0.000	143.52
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.00

Tower Section	Tower Elevation ft	Face or Leg	Ice Thickness in	A_R ft^2	A_F ft^2	C_AA_A In Face ft^2	C_AA_A Out Face ft^2	Weight lb
L3	55.25-40.25	A	1.556	0.000	0.000	0.000	0.000	393.12
		B		0.000	0.000	0.000	0.000	0.00
		C		0.000	0.000	0.000	0.000	0.00

Feed Line Center of Pressure

Section	Elevation ft	CP_X in	CP_Z in	CP_X Ice in	CP_Z Ice in
L1	80.25-70.25	0.0000	0.0000	0.0000	0.0000
L2	70.25-55.25	0.0000	0.0000	0.0000	0.0000
L3	55.25-40.25	0.0000	0.0000	0.0000	0.0000

Note: For pole sections, center of pressure calculations do not consider feed line shielding.

Shielding Factor Ka

Tower Section	Feed Line Record No.	Description	Feed Line Segment Elev.	K_a No Ice	K_a Ice

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft	Vert ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight lb
Lightning Rod	A	From Face	0.00	0.00	0.0000	80.00	No Ice	0.75	0.75	10.00
			0.00				1/2" Ice	1.25	1.25	40.00
			0.00				1" Ice	1.75	1.75	70.00
**********										
PiROD 13' Low Profile Platform (VERIZON - proposed)	A	None			0.0000	75.00	No Ice	15.70	15.70	1300.00
							1/2" Ice	20.10	20.10	1765.00
							1" Ice	24.50	24.50	2230.00
JAHH-65B-R3B Antenna w/Mounting Pipe	A	From Face	3.50		0.0000	75.00	No Ice	9.11	7.41	85.90
			1.00				1/2" Ice	9.58	8.37	159.87
			0.00				1" Ice	10.05	9.20	241.80
JAHH-65B-R3B Antenna w/Mounting Pipe	A	From Face	3.50		0.0000	75.00	No Ice	9.11	7.41	85.90
			2.50				1/2" Ice	9.58	8.37	159.87
			0.00				1" Ice	10.05	9.20	241.80
JAHH-65B-R3B Antenna w/Mounting Pipe	B	From Face	3.50		0.0000	75.00	No Ice	9.11	7.41	85.90
			1.00				1/2" Ice	9.58	8.37	159.87
			0.00				1" Ice	10.05	9.20	241.80
JAHH-65B-R3B Antenna w/Mounting Pipe	B	From Face	3.50		0.0000	75.00	No Ice	9.11	7.41	85.90
			2.50				1/2" Ice	9.58	8.37	159.87
			0.00				1" Ice	10.05	9.20	241.80

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight lb
JAHH-65B-R3B Antenna w/Mounting Pipe	C	From Face	3.50 1.00 0.00	0.0000	75.00	No Ice 1/2" Ice 1" Ice	9.11 9.58 10.05	7.41 8.37 9.20	85.90 159.87 241.80
JAHH-65B-R3B Antenna w/Mounting Pipe	C	From Face	3.50 2.50 0.00	0.0000	75.00	No Ice 1/2" Ice 1" Ice	9.11 9.58 10.05	7.41 8.37 9.20	85.90 159.87 241.80
Junction Box	A	From Face	2.50 -2.50 0.00	0.0000	75.00	No Ice 1/2" Ice 1" Ice	3.01 3.23 3.45	1.97 2.16 2.36	27.00 53.24 82.85
Junction Box	B	From Face	2.50 -2.50 0.00	0.0000	75.00	No Ice 1/2" Ice 1" Ice	3.01 3.23 3.45	1.97 2.16 2.36	27.00 53.24 82.85
Diplexer FDJ85020Q4	A	From Face	2.50 -1.00 0.00	0.0000	75.00	No Ice 1/2" Ice 1" Ice	0.96 1.09 1.24	0.36 0.43 0.52	24.00 33.57 45.27
Diplexer FDJ85020Q4	B	From Face	2.50 -1.00 0.00	0.0000	75.00	No Ice 1/2" Ice 1" Ice	0.96 1.09 1.24	0.36 0.43 0.52	24.00 33.57 45.27
Diplexer FDJ85020Q4	C	From Face	2.50 -1.00 0.00	0.0000	75.00	No Ice 1/2" Ice 1" Ice	0.96 1.09 1.24	0.36 0.43 0.52	24.00 33.57 45.27
B2/B66A RRH-BRO049 RRH	A	From Face	2.50 -1.00 2.00	0.0000	75.00	No Ice 1/2" Ice 1" Ice	1.88 2.05 2.22	1.25 1.39 1.54	98.00 116.34 137.47
B2/B66A RRH-BRO049 RRH	B	From Face	2.50 -1.00 2.00	0.0000	75.00	No Ice 1/2" Ice 1" Ice	1.88 2.05 2.22	1.25 1.39 1.54	98.00 116.34 137.47
B2/B66A RRH-BRO049 RRH	C	From Face	2.50 -1.00 2.00	0.0000	75.00	No Ice 1/2" Ice 1" Ice	1.88 2.05 2.22	1.25 1.39 1.54	98.00 116.34 137.47
B5/B13 RRH-BR04C RRH	A	From Face	2.50 -1.00 -2.00	0.0000	75.00	No Ice 1/2" Ice 1" Ice	1.88 2.05 2.22	1.01 1.14 1.28	82.00 98.43 117.53
B5/B13 RRH-BR04C RRH	B	From Face	2.50 -1.00 -2.00	0.0000	75.00	No Ice 1/2" Ice 1" Ice	1.88 2.05 2.22	1.01 1.14 1.28	82.00 98.43 117.53
B5/B13 RRH-BR04C RRH	C	From Face	2.50 -1.00 -2.00	0.0000	75.00	No Ice 1/2" Ice 1" Ice	1.88 2.05 2.22	1.01 1.14 1.28	82.00 98.43 117.53
**********									
PiROD 13' Low Profile Platform	A	None		0.0000	65.00	No Ice 1/2" Ice 1" Ice	15.70 20.10 24.50	15.70 20.10 24.50	1300.00 1765.00 2230.00
(2) SBNHH-1D65C w/ Mount Pipe	A	From Face	3.50 0.00 0.00	0.0000	65.00	No Ice 1/2" Ice 1" Ice	11.63 12.35 13.07	9.79 11.31 12.85	82.45 171.76 271.01
(2) SBNHH-1D65C w/ Mount Pipe	B	From Face	3.50 0.00 0.00	0.0000	65.00	No Ice 1/2" Ice 1" Ice	11.63 12.35 13.07	9.79 11.31 12.85	82.45 171.76 271.01
(2) SBNHH-1D65C w/ Mount Pipe	C	From Face	3.50 0.00 0.00	0.0000	65.00	No Ice 1/2" Ice 1" Ice	11.63 12.35 13.07	9.79 11.31 12.85	82.45 171.76 271.01
**********									
PiROD 13' Low Profile Platform (VERIZON - proposed)	A	None		0.0000	55.00	No Ice 1/2" Ice 1" Ice	15.70 20.10 24.50	15.70 20.10 24.50	1300.00 1765.00 2230.00
(4) SBNHH-1D65C w/	A	From Face	3.50	0.0000	55.00	No Ice	11.63	9.79	82.45

Description	Face or Leg	Offset Type	Offsets: Horz Lateral ft / Vert ft / ft	Azimuth Adjustment °	Placement ft		C_AA_A Front ft^2	C_AA_A Side ft^2	Weight lb
Mount Pipe			0.00			1/2" Ice	12.35	11.31	171.76
			0.00			1" Ice	13.07	12.85	271.01
(4) SBNHH-1D65C w/ Mount Pipe	B	From Face	3.50	0.0000	55.00	No Ice	11.63	9.79	82.45
			0.00			1/2" Ice	12.35	11.31	171.76
			0.00			1" Ice	13.07	12.85	271.01
(4) SBNHH-1D65C w/ Mount Pipe	C	From Face	3.50	0.0000	55.00	No Ice	11.63	9.79	82.45
			0.00			1/2" Ice	12.35	11.31	171.76
			0.00			1" Ice	13.07	12.85	271.01

Load Combinations

Comb. No.	Description
1	Dead Only
2	1.2 Dead+1.6 Wind 0 deg - No Ice
3	0.9 Dead+1.6 Wind 0 deg - No Ice
4	1.2 Dead+1.6 Wind 30 deg - No Ice
5	0.9 Dead+1.6 Wind 30 deg - No Ice
6	1.2 Dead+1.6 Wind 60 deg - No Ice
7	0.9 Dead+1.6 Wind 60 deg - No Ice
8	1.2 Dead+1.6 Wind 90 deg - No Ice
9	0.9 Dead+1.6 Wind 90 deg - No Ice
10	1.2 Dead+1.6 Wind 120 deg - No Ice
11	0.9 Dead+1.6 Wind 120 deg - No Ice
12	1.2 Dead+1.6 Wind 150 deg - No Ice
13	0.9 Dead+1.6 Wind 150 deg - No Ice
14	1.2 Dead+1.6 Wind 180 deg - No Ice
15	0.9 Dead+1.6 Wind 180 deg - No Ice
16	1.2 Dead+1.6 Wind 210 deg - No Ice
17	0.9 Dead+1.6 Wind 210 deg - No Ice
18	1.2 Dead+1.6 Wind 240 deg - No Ice
19	0.9 Dead+1.6 Wind 240 deg - No Ice
20	1.2 Dead+1.6 Wind 270 deg - No Ice
21	0.9 Dead+1.6 Wind 270 deg - No Ice
22	1.2 Dead+1.6 Wind 300 deg - No Ice
23	0.9 Dead+1.6 Wind 300 deg - No Ice
24	1.2 Dead+1.6 Wind 330 deg - No Ice
25	0.9 Dead+1.6 Wind 330 deg - No Ice
26	1.2 Dead+1.0 Ice+1.0 Temp
27	1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp
28	1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp
29	1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp
30	1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp
31	1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp
32	1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp
33	1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp
34	1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp
35	1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp
36	1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp
37	1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp
38	1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp

Comb. No.	Description
39	Dead+Wind 0 deg - Service
40	Dead+Wind 30 deg - Service
41	Dead+Wind 60 deg - Service
42	Dead+Wind 90 deg - Service
43	Dead+Wind 120 deg - Service
44	Dead+Wind 150 deg - Service
45	Dead+Wind 180 deg - Service
46	Dead+Wind 210 deg - Service
47	Dead+Wind 240 deg - Service
48	Dead+Wind 270 deg - Service
49	Dead+Wind 300 deg - Service
50	Dead+Wind 330 deg - Service

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical lb	Horizontal, X lb	Horizontal, Z lb
Pole	Max. Vert	37	25929.82	2559.43	1474.24
	Max. H_x	21	8618.49	16836.93	0.00
	Max. H_z	2	11491.32	0.00	16783.60
	Max. M_x	2	381534.92	0.00	16783.60
	Max. M_z	8	383214.85	-16836.93	0.00
	Max. Torsion	5	510.72	-8418.47	14535.03
	Min. Vert	13	8618.49	-8418.47	-14535.03
	Min. H_x	8	11491.32	-16836.93	0.00
	Min. H_z	14	11491.32	0.00	-16783.60
	Min. M_x	14	-381326.92	0.00	-16783.60
	Min. M_z	20	-383390.10	16836.93	0.00
	Min. Torsion	17	-510.78	8418.47	-14535.03

Tower Mast Reaction Summary

Load Combination	Vertical lb	$Shear_x$ lb	$Shear_z$ lb	Overturning Moment, M_x lb-ft	Overturning Moment, M_z lb-ft	Torque lb-ft
Dead Only	9576.10	0.00	0.00	-85.29	71.86	0.00
1.2 Dead+1.6 Wind 0 deg - No Ice	11491.32	-0.00	-16783.60	-381534.92	87.44	-404.21
0.9 Dead+1.6 Wind 0 deg - No Ice	8618.49	-0.00	-16783.60	-380728.68	65.31	-404.28
1.2 Dead+1.6 Wind 30 deg - No Ice	11491.32	8418.47	-14535.03	-330432.65	-191563.99	-510.63
0.9 Dead+1.6 Wind 30 deg - No Ice	8618.49	8418.47	-14535.03	-329730.93	-191193.77	-510.72
1.2 Dead+1.6 Wind 60 deg - No Ice	11491.32	14581.21	-8391.80	-190819.10	-331862.26	-480.24
0.9 Dead+1.6 Wind 60 deg - No Ice	8618.49	14581.21	-8391.80	-190402.86	-331204.84	-480.34
1.2 Dead+1.6 Wind 90 deg - No Ice	11491.32	16836.93	-0.00	-103.87	-383214.85	-321.19
0.9 Dead+1.6 Wind 90 deg - No Ice	8618.49	16836.93	-0.00	-77.57	-382452.32	-321.27
1.2 Dead+1.6 Wind 120 deg - No Ice	11491.32	14581.21	8391.80	190611.29	-331862.15	-76.08

Load Combination	Vertical	$Shear_x$	$Shear_z$	Overturning Moment, M_x	Overturning Moment, M_z	Torque
	lb	lb	lb	lb-ft	lb-ft	lb-ft
0.9 Dead+1.6 Wind 120 deg - No Ice	8618.49	14581.21	8391.80	190247.67	-331204.76	-76.12
1.2 Dead+1.6 Wind 150 deg - No Ice	11491.32	8418.47	14535.03	330224.71	-191563.88	189.43
0.9 Dead+1.6 Wind 150 deg - No Ice	8618.49	8418.47	14535.03	329575.63	-191193.68	189.45
1.2 Dead+1.6 Wind 180 deg - No Ice	11491.32	-0.00	16783.60	381326.92	87.44	404.22
0.9 Dead+1.6 Wind 180 deg - No Ice	8618.49	-0.00	16783.60	380573.34	65.31	404.28
1.2 Dead+1.6 Wind 210 deg - No Ice	11491.32	-8418.47	14535.03	330224.87	191738.85	510.69
0.9 Dead+1.6 Wind 210 deg - No Ice	8618.49	-8418.47	14535.03	329575.75	191324.36	510.78
1.2 Dead+1.6 Wind 240 deg - No Ice	11491.32	-14581.21	8391.80	190611.45	332037.31	480.30
0.9 Dead+1.6 Wind 240 deg - No Ice	8618.49	-14581.21	8391.80	190247.78	331335.57	480.39
1.2 Dead+1.6 Wind 270 deg - No Ice	11491.32	-16836.93	-0.00	-103.87	383390.10	321.19
0.9 Dead+1.6 Wind 270 deg - No Ice	8618.49	-16836.93	-0.00	-77.57	382583.20	321.27
1.2 Dead+1.6 Wind 300 deg - No Ice	11491.32	-14581.21	-8391.80	-190819.26	332037.42	76.03
0.9 Dead+1.6 Wind 300 deg - No Ice	8618.49	-14581.21	-8391.80	-190402.98	331335.65	76.06
1.2 Dead+1.6 Wind 330 deg - No Ice	11491.32	-8418.47	-14535.03	-330432.81	191738.96	-189.49
0.9 Dead+1.6 Wind 330 deg - No Ice	8618.49	-8418.47	-14535.03	-329731.05	191324.44	-189.51
1.2 Dead+1.0 Ice+1.0 Temp	25929.82	-0.00	-0.00	-429.67	367.77	0.00
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp	25929.82	-0.00	-2948.48	-68007.22	377.73	-61.75
1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp	25929.82	1477.69	-2553.46	-58955.10	-33527.95	-79.21
1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp	25929.82	2559.43	-1474.24	-34224.26	-58348.62	-75.44
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp	25929.82	2955.37	-0.00	-441.31	-67433.61	-51.46
1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp	25929.82	2559.43	1474.24	33341.63	-58348.62	-13.69
1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp	25929.82	1477.69	2553.46	58072.47	-33527.94	27.75
1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp	25929.82	-0.00	2948.48	67124.58	377.73	61.76
1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp	25929.82	-1477.69	2553.46	58072.47	34283.40	79.21
1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp	25929.82	-2559.43	1474.24	33341.64	59104.08	75.44
1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp	25929.82	-2955.37	-0.00	-441.31	68189.08	51.46
1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp	25929.82	-2559.43	-1474.24	-34224.27	59104.09	13.69
1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp	25929.82	-1477.69	-2553.46	-58955.11	34283.41	-27.75
Dead+Wind 0 deg - Service	9576.10	0.00	-2554.86	-58074.81	72.87	-61.59
Dead+Wind 30 deg - Service	9576.10	1281.49	-2212.58	-50305.85	-29063.55	-77.80
Dead+Wind 60 deg - Service	9576.10	2219.61	-1277.43	-29080.65	-50392.89	-73.17
Dead+Wind 90 deg - Service	9576.10	2562.98	0.00	-86.49	-58199.97	-48.94
Dead+Wind 120 deg - Service	9576.10	2219.61	1277.43	28907.67	-50392.89	-11.59
Dead+Wind 150 deg - Service	9576.10	1281.49	2212.58	50132.87	-29063.55	28.86

Load Combination	Vertical	$Shear_x$	$Shear_z$	Overturning Moment, M_x	Overturning Moment, M_z	Torque
	lb	lb	lb	lb-ft	lb-ft	lb-ft
Dead+Wind 180 deg - Service	9576.10	0.00	2554.86	57901.83	72.87	61.59
Dead+Wind 210 deg - Service	9576.10	-1281.49	2212.58	50132.87	29209.29	77.80
Dead+Wind 240 deg - Service	9576.10	-2219.61	1277.43	28907.67	50538.63	73.18
Dead+Wind 270 deg - Service	9576.10	-2562.98	0.00	-86.49	58345.71	48.94
Dead+Wind 300 deg - Service	9576.10	-2219.61	-1277.43	-29080.65	50538.63	11.59
Dead+Wind 330 deg - Service	9576.10	-1281.49	-2212.58	-50305.85	29209.29	-28.87

Solution Summary

	Sum of Applied Forces			Sum of Reactions			
Load Comb.	PX lb	PY lb	PZ lb	PX lb	PY lb	PZ lb	% Error
1	0.00	-9576.10	0.00	0.00	9576.10	0.00	0.000%
2	0.00	-11491.32	-16783.60	0.00	11491.32	16783.60	0.000%
3	0.00	-8618.49	-16783.60	0.00	8618.49	16783.60	0.000%
4	8418.47	-11491.32	-14535.03	-8418.47	11491.32	14535.03	0.000%
5	8418.47	-8618.49	-14535.03	-8418.47	8618.49	14535.03	0.000%
6	14581.21	-11491.32	-8391.80	-14581.21	11491.32	8391.80	0.000%
7	14581.21	-8618.49	-8391.80	-14581.21	8618.49	8391.80	0.000%
8	16836.93	-11491.32	0.00	-16836.93	11491.32	0.00	0.000%
9	16836.93	-8618.49	0.00	-16836.93	8618.49	0.00	0.000%
10	14581.21	-11491.32	8391.80	-14581.21	11491.32	-8391.80	0.000%
11	14581.21	-8618.49	8391.80	-14581.21	8618.49	-8391.80	0.000%
12	8418.47	-11491.32	14535.03	-8418.47	11491.32	-14535.03	0.000%
13	8418.47	-8618.49	14535.03	-8418.47	8618.49	-14535.03	0.000%
14	0.00	-11491.32	16783.60	0.00	11491.32	-16783.60	0.000%
15	0.00	-8618.49	16783.60	0.00	8618.49	-16783.60	0.000%
16	-8418.47	-11491.32	14535.03	8418.47	11491.32	-14535.03	0.000%
17	-8418.47	-8618.49	14535.03	8418.47	8618.49	-14535.03	0.000%
18	-14581.21	-11491.32	8391.80	14581.21	11491.32	-8391.80	0.000%
19	-14581.21	-8618.49	8391.80	14581.21	8618.49	-8391.80	0.000%
20	-16836.93	-11491.32	0.00	16836.93	11491.32	0.00	0.000%
21	-16836.93	-8618.49	0.00	16836.93	8618.49	0.00	0.000%
22	-14581.21	-11491.32	-8391.80	14581.21	11491.32	8391.80	0.000%
23	-14581.21	-8618.49	-8391.80	14581.21	8618.49	8391.80	0.000%
24	-8418.47	-11491.32	-14535.03	8418.47	11491.32	14535.03	0.000%
25	-8418.47	-8618.49	-14535.03	8418.47	8618.49	14535.03	0.000%
26	0.00	-25929.82	0.00	0.00	25929.82	0.00	0.000%
27	0.00	-25929.82	-2948.47	0.00	25929.82	2948.48	0.000%
28	1477.69	-25929.82	-2553.45	-1477.69	25929.82	2553.46	0.000%
29	2559.43	-25929.82	-1474.24	-2559.43	25929.82	1474.24	0.000%
30	2955.37	-25929.82	0.00	-2955.37	25929.82	0.00	0.000%
31	2559.43	-25929.82	1474.24	-2559.43	25929.82	-1474.24	0.000%
32	1477.69	-25929.82	2553.45	-1477.69	25929.82	-2553.46	0.000%
33	0.00	-25929.82	2948.47	0.00	25929.82	-2948.48	0.000%
34	-1477.69	-25929.82	2553.45	1477.69	25929.82	-2553.46	0.000%
35	-2559.43	-25929.82	1474.24	2559.43	25929.82	-1474.24	0.000%
36	-2955.37	-25929.82	0.00	2955.37	25929.82	0.00	0.000%
37	-2559.43	-25929.82	-1474.24	2559.43	25929.82	1474.24	0.000%
38	-1477.69	-25929.82	-2553.45	1477.69	25929.82	2553.46	0.000%
39	0.00	-9576.10	-2554.86	0.00	9576.10	2554.86	0.000%
40	1281.49	-9576.10	-2212.58	-1281.49	9576.10	2212.58	0.000%
41	2219.61	-9576.10	-1277.43	-2219.61	9576.10	1277.43	0.000%
42	2562.98	-9576.10	0.00	-2562.98	9576.10	0.00	0.000%
43	2219.61	-9576.10	1277.43	-2219.61	9576.10	-1277.43	0.000%
44	1281.49	-9576.10	2212.58	-1281.49	9576.10	-2212.58	0.000%
45	0.00	-9576.10	2554.86	0.00	9576.10	-2554.86	0.000%
46	-1281.49	-9576.10	2212.58	1281.49	9576.10	-2212.58	0.000%

Load Comb.	Sum of Applied Forces PX lb	PY lb	PZ lb	Sum of Reactions PX lb	PY lb	PZ lb	% Error
47	-2219.61	-9576.10	1277.43	2219.61	9576.10	-1277.43	0.000%
48	-2562.98	-9576.10	0.00	2562.98	9576.10	0.00	0.000%
49	-2219.61	-9576.10	-1277.43	2219.61	9576.10	1277.43	0.000%
50	-1281.49	-9576.10	-2212.58	1281.49	9576.10	2212.58	0.000%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	4	0.00000001	0.00000001
2	Yes	4	0.00000001	0.00001225
3	Yes	4	0.00000001	0.00000001
4	Yes	4	0.00000001	0.00002456
5	Yes	4	0.00000001	0.00001439
6	Yes	4	0.00000001	0.00003685
7	Yes	4	0.00000001	0.00002180
8	Yes	4	0.00000001	0.00000983
9	Yes	4	0.00000001	0.00000001
10	Yes	4	0.00000001	0.00002644
11	Yes	4	0.00000001	0.00001547
12	Yes	4	0.00000001	0.00002525
13	Yes	4	0.00000001	0.00001476
14	Yes	4	0.00000001	0.00001224
15	Yes	4	0.00000001	0.00000001
16	Yes	4	0.00000001	0.00003734
17	Yes	4	0.00000001	0.00002211
18	Yes	4	0.00000001	0.00002433
19	Yes	4	0.00000001	0.00001424
20	Yes	4	0.00000001	0.00000984
21	Yes	4	0.00000001	0.00000001
22	Yes	4	0.00000001	0.00002879
23	Yes	4	0.00000001	0.00001687
24	Yes	4	0.00000001	0.00003067
25	Yes	4	0.00000001	0.00001802
26	Yes	4	0.00000001	0.00000001
27	Yes	4	0.00000001	0.00004423
28	Yes	4	0.00000001	0.00004435
29	Yes	4	0.00000001	0.00004404
30	Yes	4	0.00000001	0.00004317
31	Yes	4	0.00000001	0.00004327
32	Yes	4	0.00000001	0.00004313
33	Yes	4	0.00000001	0.00004288
34	Yes	4	0.00000001	0.00004381
35	Yes	4	0.00000001	0.00004431
36	Yes	4	0.00000001	0.00004433
37	Yes	4	0.00000001	0.00004502
38	Yes	4	0.00000001	0.00004496
39	Yes	4	0.00000001	0.00000001
40	Yes	4	0.00000001	0.00000001
41	Yes	4	0.00000001	0.00000001
42	Yes	4	0.00000001	0.00000001
43	Yes	4	0.00000001	0.00000001
44	Yes	4	0.00000001	0.00000001
45	Yes	4	0.00000001	0.00000001
46	Yes	4	0.00000001	0.00000001
47	Yes	4	0.00000001	0.00000001

48	Yes	4	0.00000001	0.00000001
49	Yes	4	0.00000001	0.00000001
50	Yes	4	0.00000001	0.00000001

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	80.25 - 70.25	1.2126	49	0.2188	0.0019
L2	70.25 - 55.25	0.7595	48	0.2069	0.0012
L3	59.25 - 40.25	0.3410	48	0.1476	0.0004

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
80.00	Lightning Rod	49	1.2011	0.2187	0.0019	44196
75.00	PiROD 13' Low Profile Platform	48	0.9713	0.2161	0.0015	42091
65.00	PiROD 13' Low Profile Platform	48	0.5414	0.1839	0.0008	10035
55.00	PiROD 13' Low Profile Platform	48	0.2292	0.1171	0.0003	8089

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	80.25 - 70.25	7.9557	20	1.4313	0.0123
L2	70.25 - 55.25	4.9874	20	1.3568	0.0078
L3	59.25 - 40.25	2.2401	20	0.9695	0.0029

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
80.00	Lightning Rod	20	7.8800	1.4310	0.0122	6989
75.00	PiROD 13' Low Profile Platform	20	6.3755	1.4159	0.0100	6656
65.00	PiROD 13' Low Profile Platform	20	3.5566	1.2072	0.0053	1542
55.00	PiROD 13' Low Profile Platform	20	1.5061	0.7693	0.0017	1232

Compression Checks

Pole Design Data

Section No.	Elevation ft	Size	L ft	L_u ft	Kl/r	A in^2	P_u lb	ϕP_n lb	Ratio $\frac{P_u}{\phi P_n}$
L1	80.25 - 70.25 (1)	TP15x12x0.1875	10.00	0.00	0.0	8.8153	-3211.47	654932.00	0.005
L2	70.25 - 55.25 (2)	TP19x15x0.25	15.00	0.00	0.0	14.0317	-6022.57	1042490.00	0.006
L3	55.25 - 40.25 (3)	TP22.5x17.4333x0.375	19.00	0.00	0.0	26.3343	-11481.40	1956510.00	0.006

Pole Bending Design Data

Section No.	Elevation ft	Size	M_{ux} lb-ft	ϕM_{nx} lb-ft	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	M_{uy} lb-ft	ϕM_{ny} lb-ft	Ratio $\frac{M_{uy}}{\phi M_{ny}}$
L1	80.25 - 70.25 (1)	TP15x12x0.1875	22745.17	198542.50	0.115	0.00	198542.50	0.000
L2	70.25 - 55.25 (2)	TP19x15x0.25	100111.67	376730.00	0.266	0.00	376730.00	0.000
L3	55.25 - 40.25 (3)	TP22.5x17.4333x0.375	383390.00	882183.33	0.435	0.00	882183.33	0.000

Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V_u lb	ϕV_n lb	Ratio $\frac{V_u}{\phi V_n}$	Actual T_u lb-ft	ϕT_n lb-ft	Ratio $\frac{T_u}{\phi T_n}$
L1	80.25 - 70.25 (1)	TP15x12x0.1875	4712.12	327466.00	0.014	321.33	398327.50	0.001
L2	70.25 - 55.25 (2)	TP19x15x0.25	9181.04	521244.00	0.018	321.28	755982.50	0.000
L3	55.25 - 40.25 (3)	TP22.5x17.4333x0.375	16843.70	978253.00	0.017	321.19	1771000.00	0.000

Pole Interaction Design Data

Section No.	Elevation ft	Ratio $\frac{P_u}{\phi P_n}$	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	Ratio $\frac{M_{uy}}{\phi M_{ny}}$	Ratio $\frac{V_u}{\phi V_n}$	Ratio $\frac{T_u}{\phi T_n}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	80.25 - 70.25 (1)	0.005	0.115	0.000	0.014	0.001	0.120 ✔	1.000	4.8.2 ✔
L2	70.25 - 55.25 (2)	0.006	0.266	0.000	0.018	0.000	0.272 ✔	1.000	4.8.2 ✔

tnxTower	Job: EAST HAVEN N CT	Page: 12 of 12
Hudson Design Group LLC 45 Beechwood Drive North Andover, MA 01845 Phone: (978) 557-5553 FAX: (978) 336-5586	Project: 55 ft Monopole	Date: 14:38:05 07/18/19
	Client: VERIZON	Designed by: SO

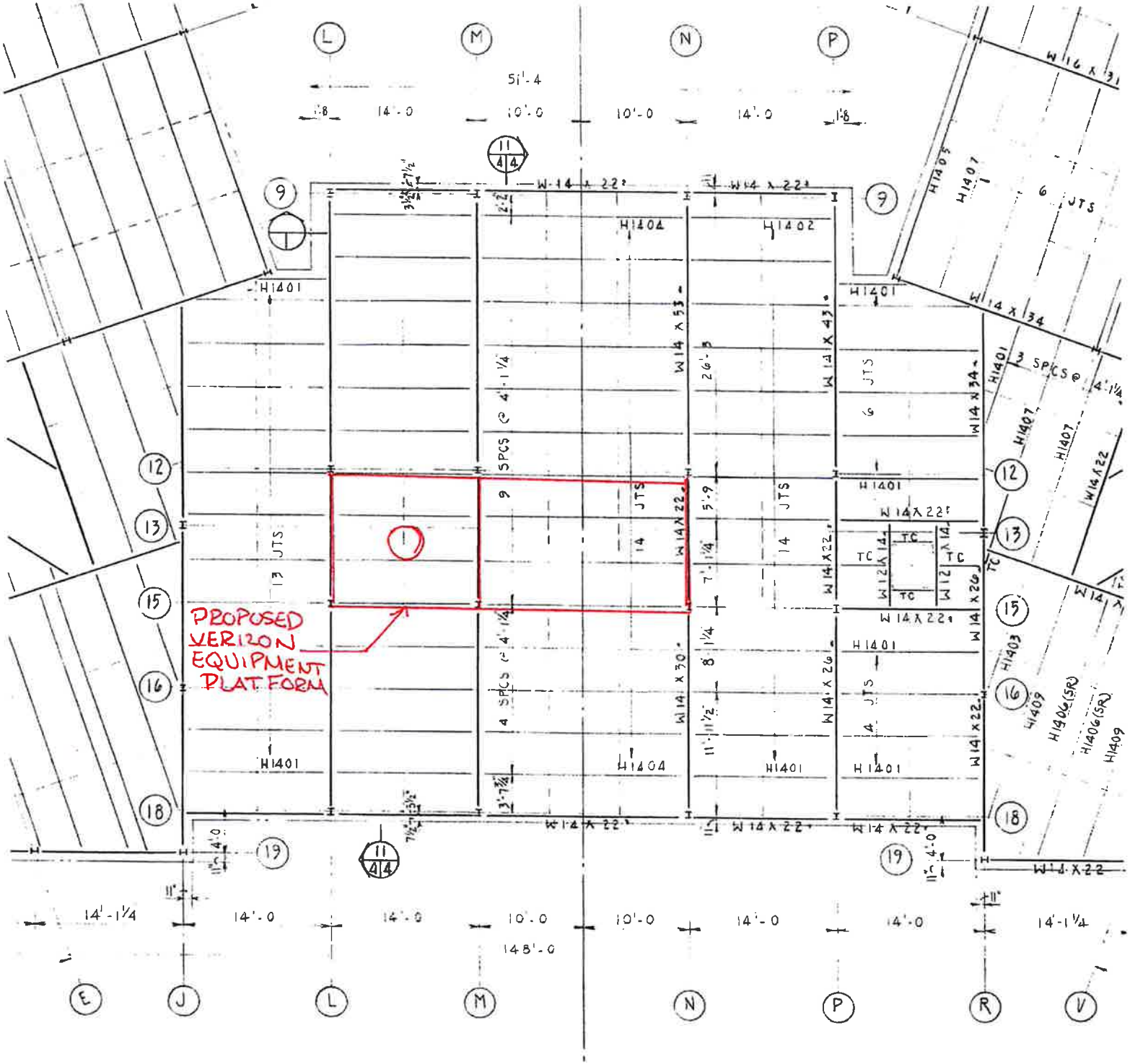
Section No.	Elevation ft	Ratio $\frac{P_u}{\phi P_n}$	Ratio $\frac{M_{ux}}{\phi M_{nx}}$	Ratio $\frac{M_{uy}}{\phi M_{ny}}$	Ratio $\frac{V_u}{\phi V_n}$	Ratio $\frac{T_u}{\phi T_n}$	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L3	55.25 - 40.25 (3)	0.006	0.435	0.000	0.017	0.000	0.441 ✔	1.000	4.8.2 ✔

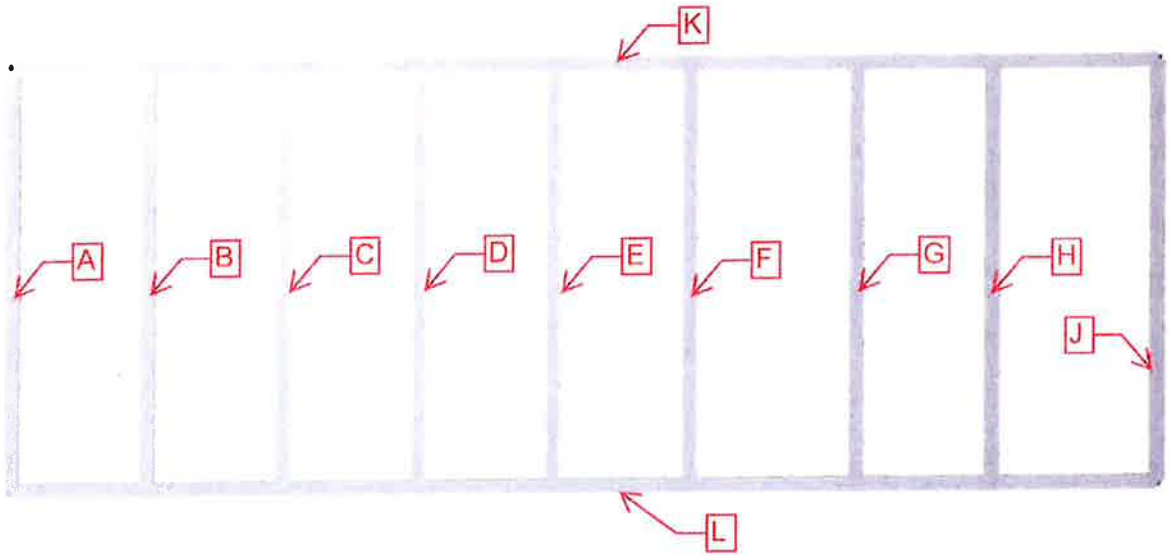
Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P lb	ϕP_{allow} lb	% Capacity	Pass Fail
L1	80.25 - 70.25	Pole	TP15x12x0.1875	1	-3211.47	654932.00	12.0	Pass
L2	70.25 - 55.25	Pole	TP19x15x0.25	2	-6022.57	1042490.00	27.2	Pass
L3	55.25 - 40.25	Pole	TP22.5x17.4333x0.375	3	-11481.40	1956510.00	44.1	Pass
							Summary	
						Pole (L3)	44.1	Pass
						RATING =	**44.1**	**Pass**

HUDSON
Design Group LLC

Equipment Platform
Calculations


PROPOSED
VERIZON
EQUIPMENT
PLATFORM
L
M
N
P
9
12
13
15
16
18
19
E
J
L
M
N
P
R
V
51'-4
14'-0
10'-0
10'-0
14'-0
148'-0
W14 x 22
W14 x 53
W14 x 43
W14 x 34
W14 x 30
W14 x 26
W14 x 22
W16 x 31
W16 x 22
W14 x 34
H1401
H1402
H1404
H1405
H1407
H1403
H1409
H1406(SR)
9 SPCS @ 4'-1¼
4 SPCS @ 4'-1¼
3 SPCS @ 4'-1¼
13 JTS
14 JTS
6 JTS
4 JTS
TC



Y X
Z

Date: 4/16/2019
Project Name: EAST HAVEN N CT
Project No.:
Designed By: SO **Checked By:** MSC

HUDSON Design Group LLC

Load Breakdown:

Live Loads:

Service	25	psf

Dead Loads:

Grating	15	psf
Handrail	10	plf

- **Beam A**

Live Load

→ Service 25 psf x 2.0 ft. (Tributary Width)
= **50.0 plf**

Dead Load

→ Grating 15 psf x 2.0 ft. (Tributary Width)
30.0 plf

→ Handrail 10 plf

- **Beam B, C, D, E**

Live Load

→ Service 25 psf x 4.0 ft. (Tributary Width)
= **100.0 plf**

Dead Load

→ Grating 15 psf x 4.0 ft. (Tributary Width)
60.0 plf

Date: 4/16/2019
Project Name: EAST HAVEN N CT
Project No.:
Designed By: SO Checked By: MSC

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Load Breakdown Cont.

- **Beam F, G and H**

Live Load

→ Service 25 psf x 4.5 ft. (Tributary Width)
= **112.5 plf**

Dead Load

→ Grating 15 psf x 4.5 ft. (Tributary Width)
67.5 plf

- **Beam J**

Live Load

→ Service 25 psf x 2.5 ft. (Tributary Width)
= **62.5 plf**

Dead Load

→ Grating 15 psf x 2.5 ft. (Tributary Width)
37.5 plf

→ Handrail 10 plf

- **Beam K and L**

Dead Load

→ Handrail 10 plf

Date: 4/16/2019
Project Name: EAST HAVEN N CT
Project No.:
Designed By: SO **Checked By:** MSC

HUDSON Design Group LLC

Wind Analysis → Equipment Cabinet

Reference Codes:

-Connecticut State Building Code

-International Building Code 2015 (IBC 2015)

-Minimum Design Loads for Buildings and Other Structures (ASCE 7-10)

Structure Classification	II		(ASCE 7-10 Table 1.5-1)
Basic Wind Speed, V	125	mph	(CT Building Code Appendix N)
Importance Factor, I	1		(ASCE 7-10 Table 1.5-2)
Exposure Category	B		(ASCE 7-10 Section 26.7)
Height Above Ground Level, z	43	ft	(Center of Generator)
Exposure Coeficient, K_z	0.78		(ASCE 7-10 Table 29-3.1)
Wind Directionality Coef., K_d	0.90		(ASCE 7-10 Table 26.6-1)
Topographic Factor, K_{zt}	1.00		(ASCE 7-10 Section 26.8.2)
Velocity Pressure, q_z	$= 0.00256K_zK_{zt}K_dV^2$		(ASCE 7-10 Equation 29.3-1)
	= **28.08** psf		
Gust Factor, G	0.85		(ASCE 7-10 Section 26.9)
Net Force Coeficient, C_f	1.33		(ASCE 7-10 Figure 29.5-1)
Projected Area Normal to Wind, A_f	18	ft^2	(2.5 ft. W x 7 ft. H)
Wind Force, F_1	$= q_zGC_fA_f$		(ASCE 7-10 Equation 29.5-2)
	= **555.53** lbs		

Date: 4/16/2019
Project Name: EAST HAVEN N CT
Project No.:
Designed By: SO Checked By: MSC

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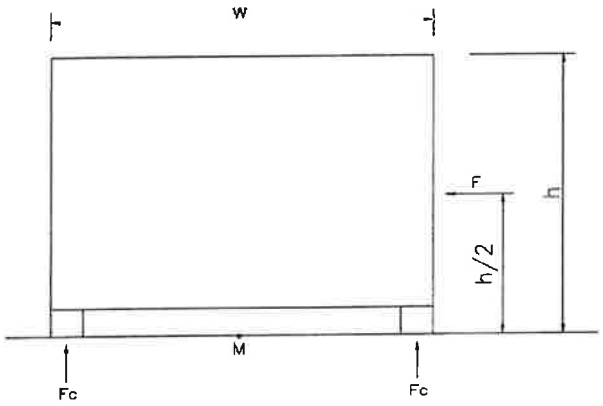
Calculate Overturning Moment of Equipment Cabinet

	Wide, w	Depth, d	Height, h
Dimensions (ft)	2.5	3.25	7



Moment, M = F_1 x h/2
= **1944.35** **lb-ft**

Calculate Force Couple

Force Couple, F_c = M / d
= **598.26** **lbs.**

Number of Supports in Tension: 2

F_c per Support = **299.13** **lbs.**

Date: 4/16/2019
Project Name: EAST HAVEN N CT
Project No.:
Designed By: SO Checked By: MSC

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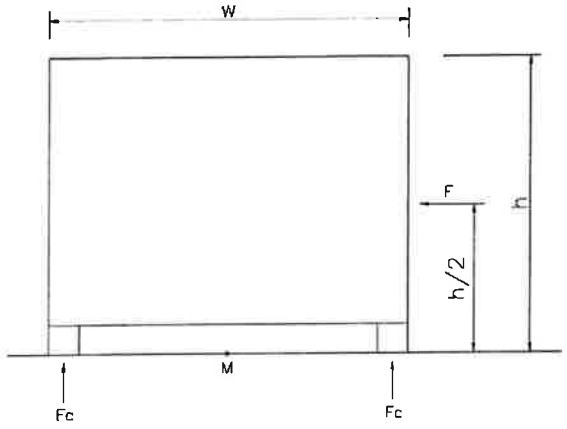
Net Force Coeficient, C_f	1.32		(ASCE 7-10 Figure 29.5-1)
Projected Area Normal to Wind, A_f	23	ft^2	(3.25 ft. W x 7 ft. H)

Wind Force, F_2 = $q_z G C_f A_f$ (ASCE 7-10 Equation 29.5-2)
= **716.76 lbs**

Calculate Overturning Moment of Equipment Cabinet

	Wide, w	Depth, d	Height, h
Dimensions (ft)	3.25	2.5	7



Moment, M = F_2 x h/2
= **2508.65** **lb-ft**

Calculate Force Couple

Force Couple, F_{c2} = M / d
= **1003.46** **lbs.**

Number of Supports in Tension: 2

F_{c2} per Support = **501.73 lbs.**

Date: 4/16/2019
Project Name: EAST HAVEN N CT
Project No.:
Designed By: SO **Checked By:** MSC

HUDSON Design Group LLC

Wind Analysis → Generator

Reference Codes:

-Connecticut State Building Code

-International Building Code 2015 (IBC 2015)

-Minimum Design Loads for Buildings and Other Structures (ASCE 7-10)

Structure Classification	II		(ASCE 7-10 Table 1.5-1)
Basic Wind Speed, V	125	mph	(CT Building Code Appendix N)
Importance Factor, I	1		(ASCE 7-10 Table 1.5-2)
Exposure Category	B		(ASCE 7-10 Section 26.7)
Height Above Ground Level, z	43	ft	(Center of Generator)
Exposure Coeficient, K_z	0.78		(ASCE 7-10 Table 29-3.1)
Wind Directionality Coef., K_d	0.90		(ASCE 7-10 Table 26.6-1)
Topographic Factor, K_{zt}	1.00		(ASCE 7-10 Section 26.8.2)
Velocity Pressure, q_z	$= 0.00256K_zK_{zt}K_dV^2$		(ASCE 7-10 Equation 29.3-1)
	= **28.08** **psf**		
Gust Factor, G	0.85		(ASCE 7-10 Section 26.9)
Net Force Coeficient, C_f	1.30		(ASCE 7-10 Figure 29.5-1)
Projected Area Normal to Wind, A_f	30	ft^2	(7.5 ft. W x 4 ft. H)
Wind Force, F_1	$= q_zGC_fA_f$		(ASCE 7-10 Equation 29.5-2)
	= **930.85** **lbs**		

Date: 4/16/2019
Project Name: EAST HAVEN N CT
Project No.:
Designed By: SO Checked By: MSC

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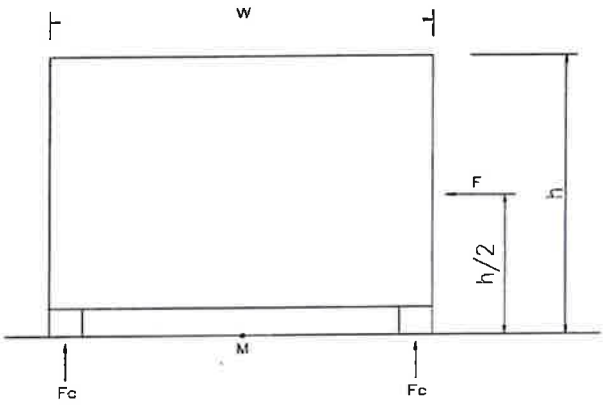
Calculate Overturning Moment of Proposed Generator

	Wide, w	Depth, d	Height, h
Dimensions (ft)	7.5	2.75	4



Moment, M = F_1 x h/2
= **1861.70** **lb-ft**

Calculate Force Couple

Force Couple, F_c = M / d
= **676.98** **lbs.**

Number of Supports In Tension: 2

F_c per Support = **338.49** **lbs.**

Date: 4/16/2019
Project Name: EAST HAVEN N CT
Project No.:
Designed By: SO Checked By: MSC

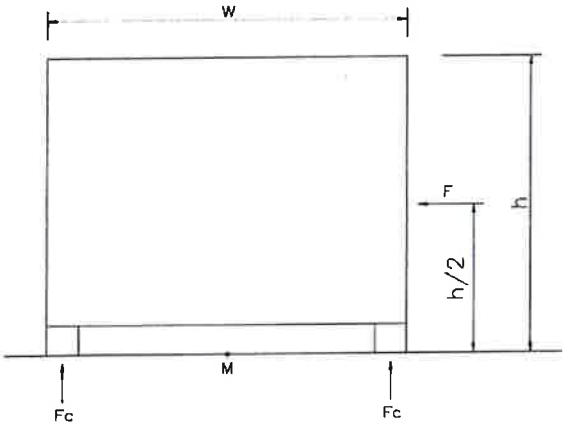
HUDSON Design Group LLC

Net Force Coeficient, C_f	1.30		(ASCE 7-10 Figure 29.5-1)
Projected Area Normal to Wind, A_f	11	ft^2	(2.75 ft. W x 4 ft. H)

Wind Force, F_2 = $q_z G C_f A_f$ (ASCE 7-10 Equation 29.5-2)
= **341.31 lbs**

Calculate Overturning Moment of Proposed Generator

	Wide, w	Depth, d	Height, h
Dimensions (ft)	2.75	7.5	4



Moment, M = F_2 x h/2
= **682.62** **lb-ft**

Calculate Force Couple

Force Couple, F_{c2} = M / d
= **91.02** **lbs.**

Number of Supports in Tension: 2

F_{c2} per Support = **45.51** **lbs.**

Bentley

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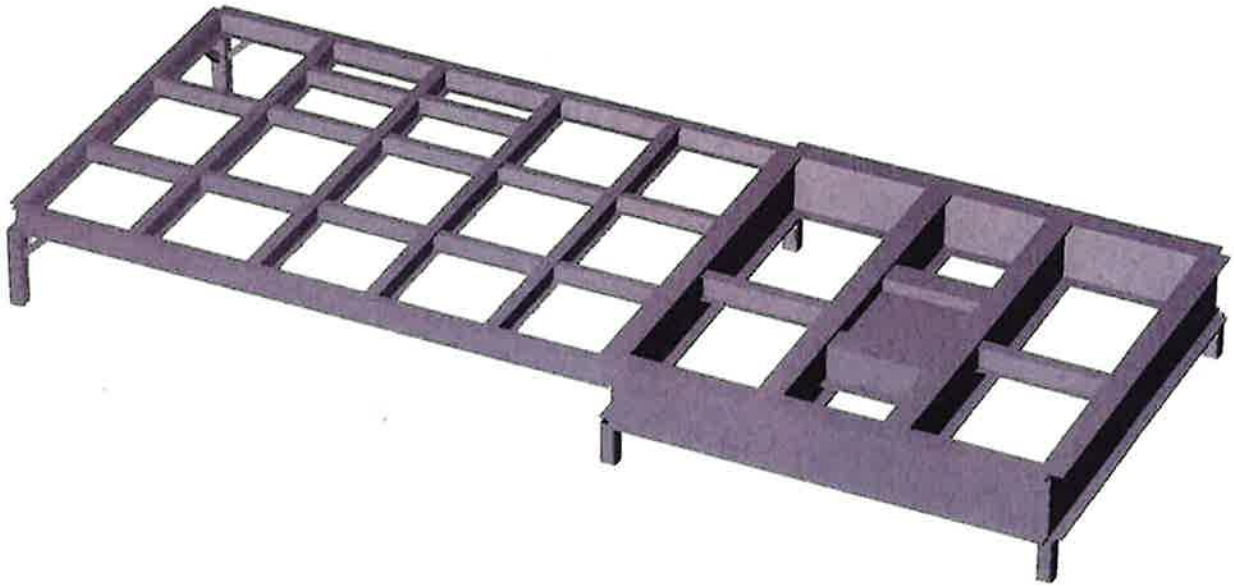

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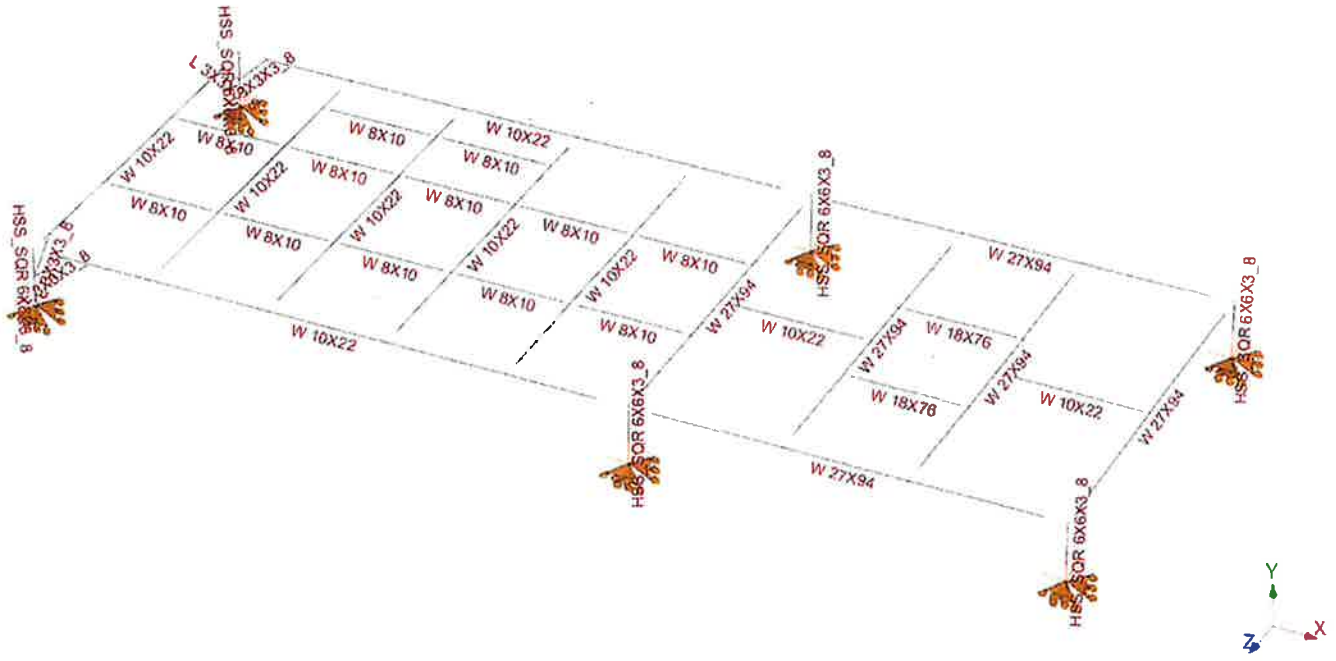

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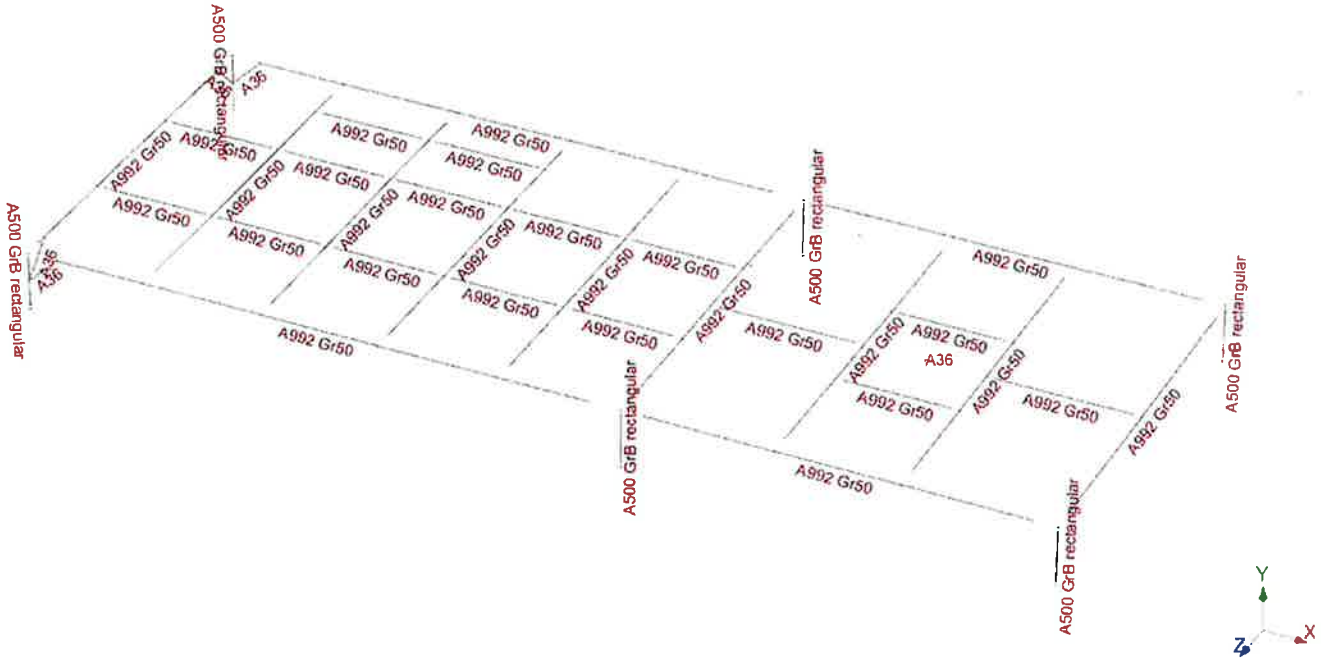

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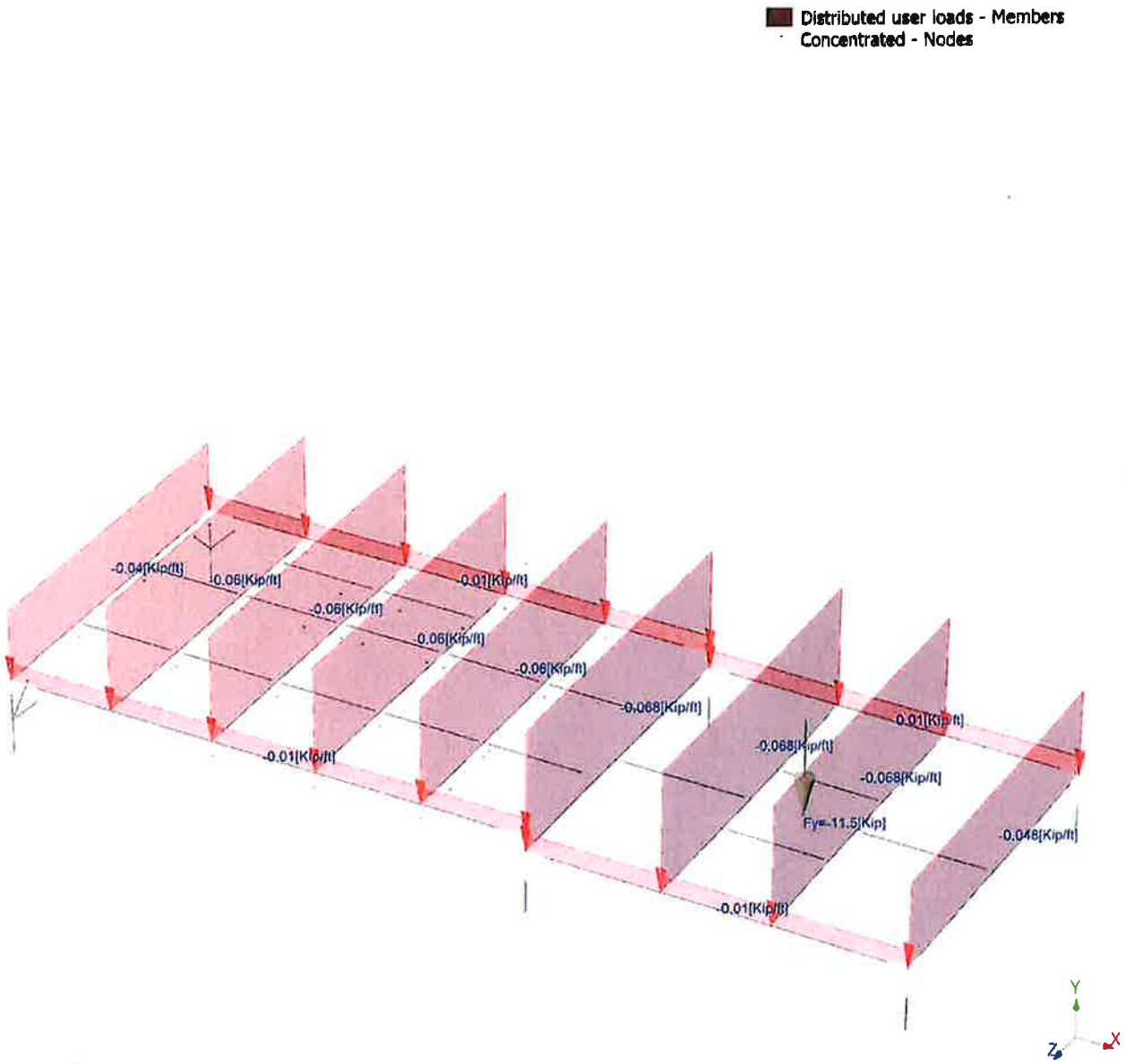
Load condition: DL=Dead Load



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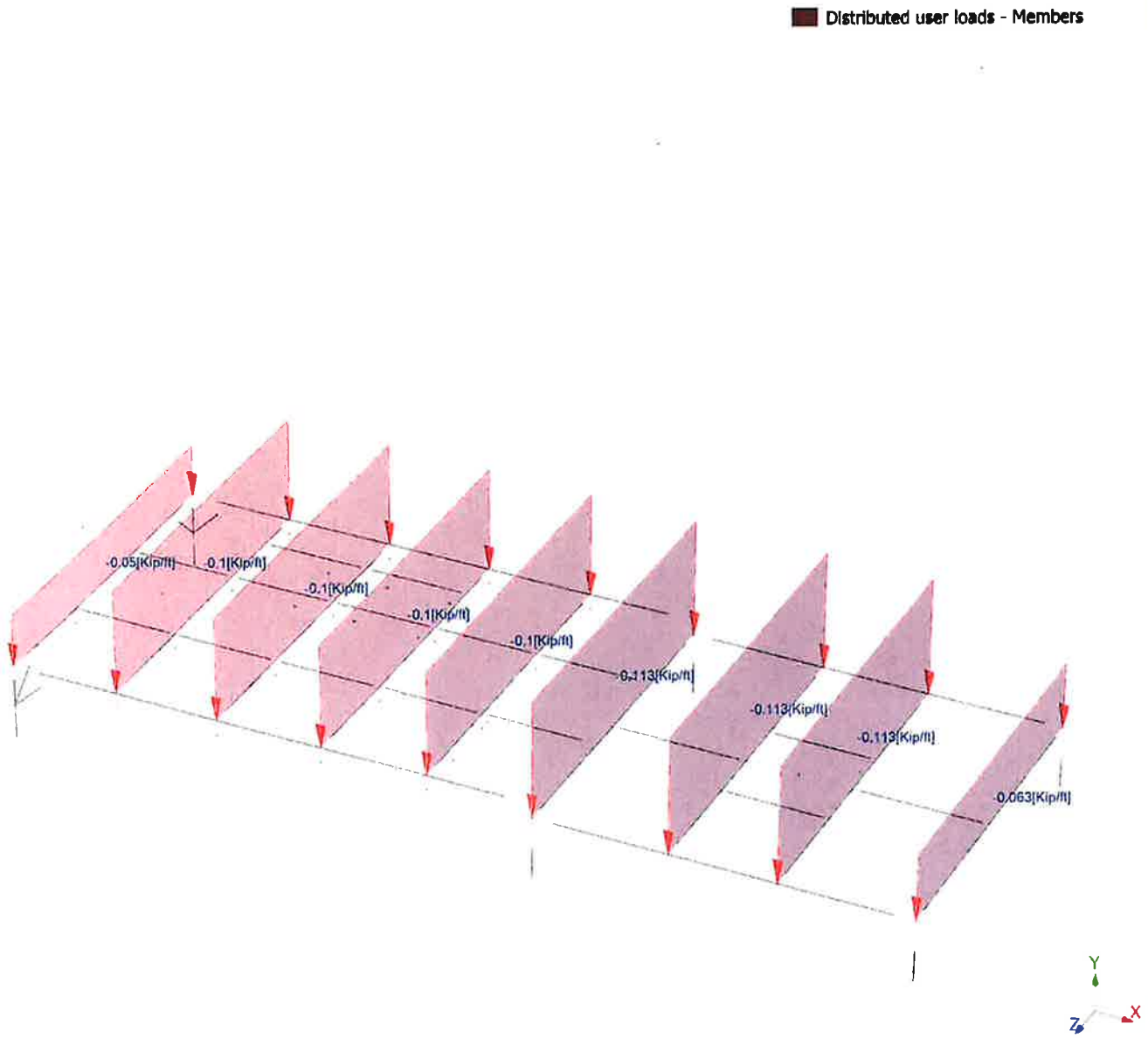
Load condition: LL=Service Load



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Units system: English
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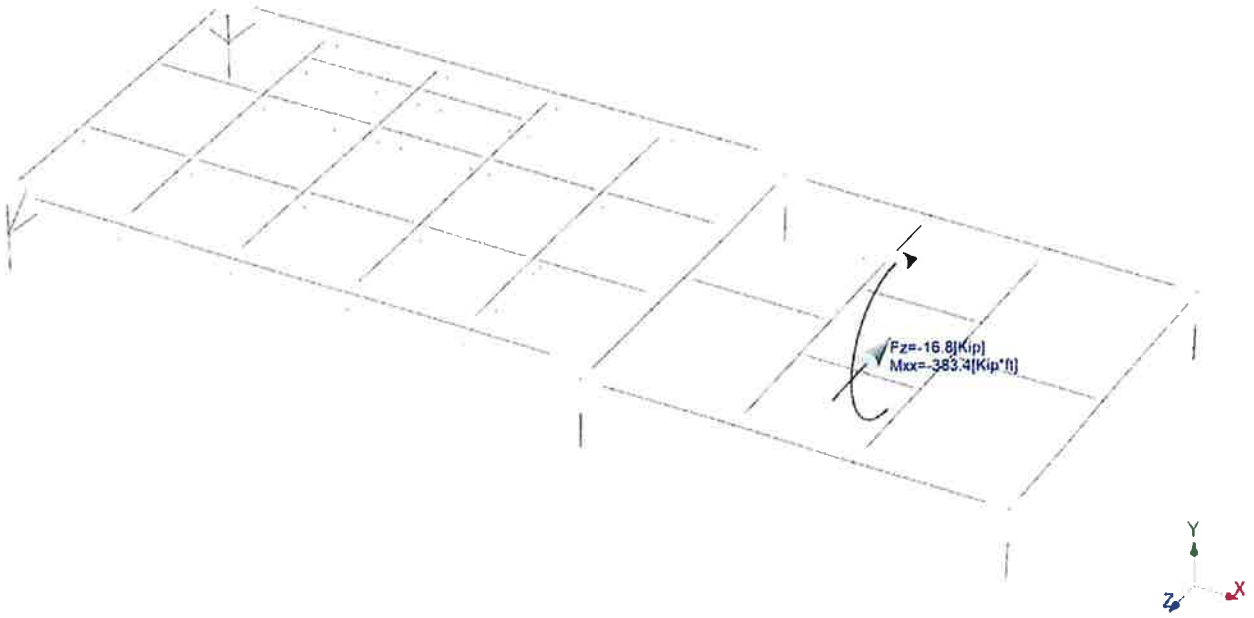
Load condition: WL1=Wind Load 1

Concentrated - Nodes



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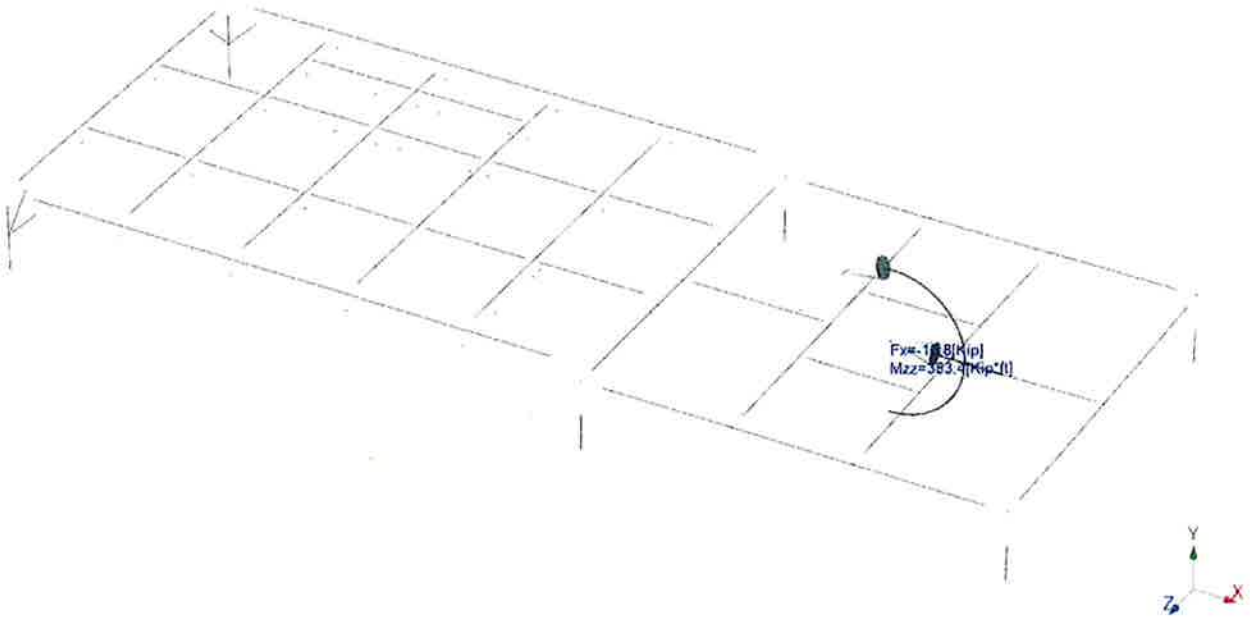
Load condition: WL2=Wind Load 2

Concentrated - Nodes



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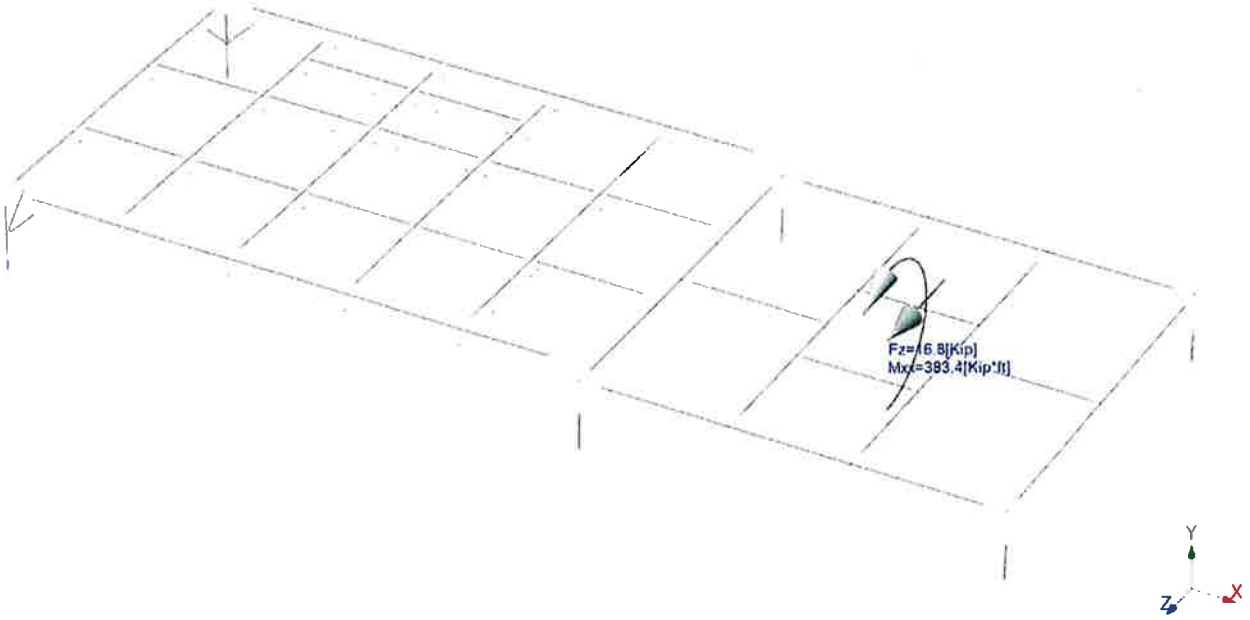
Load condition: WL3=Wind Load 3

Concentrated - Nodes



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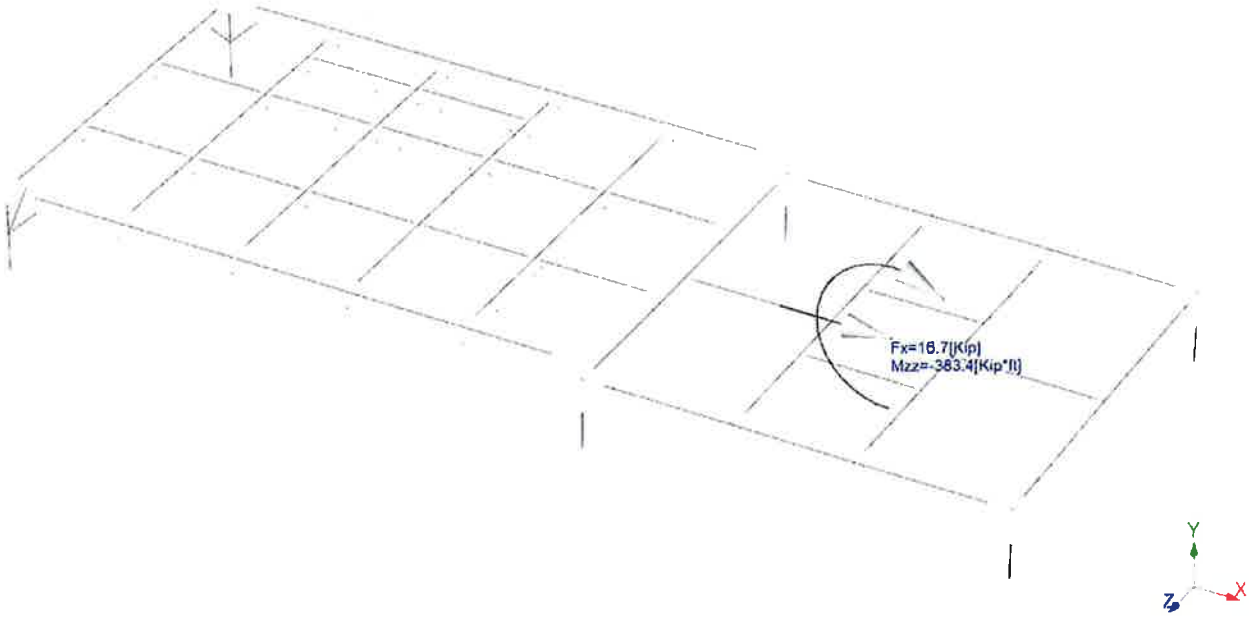
Load condition: WL4=Wind Load 4

Concentrated - Nodes



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Not designed
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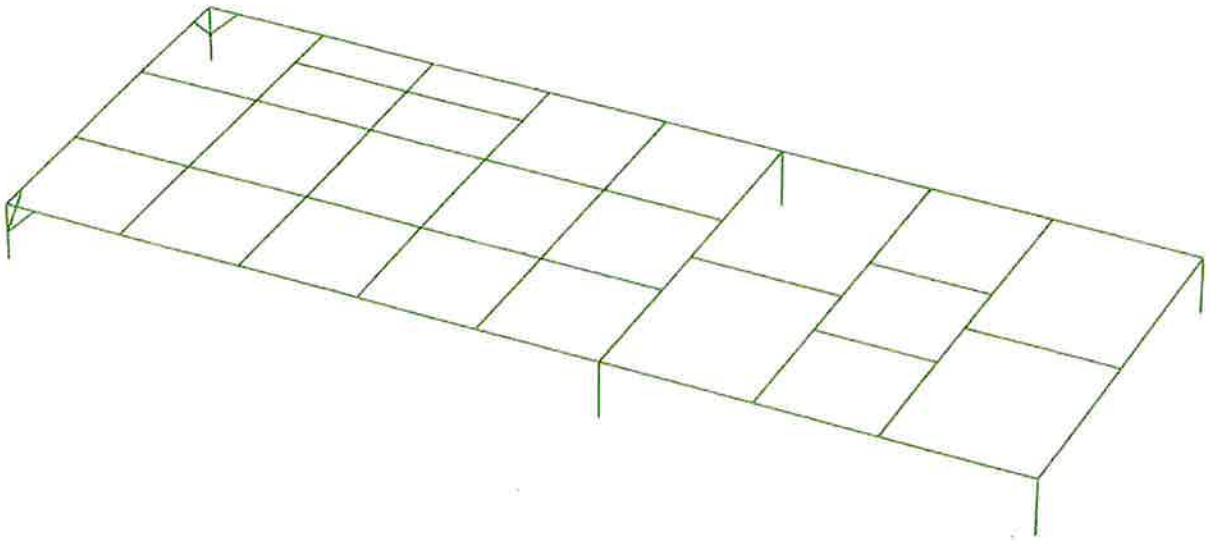
Design O.K.
With warnings



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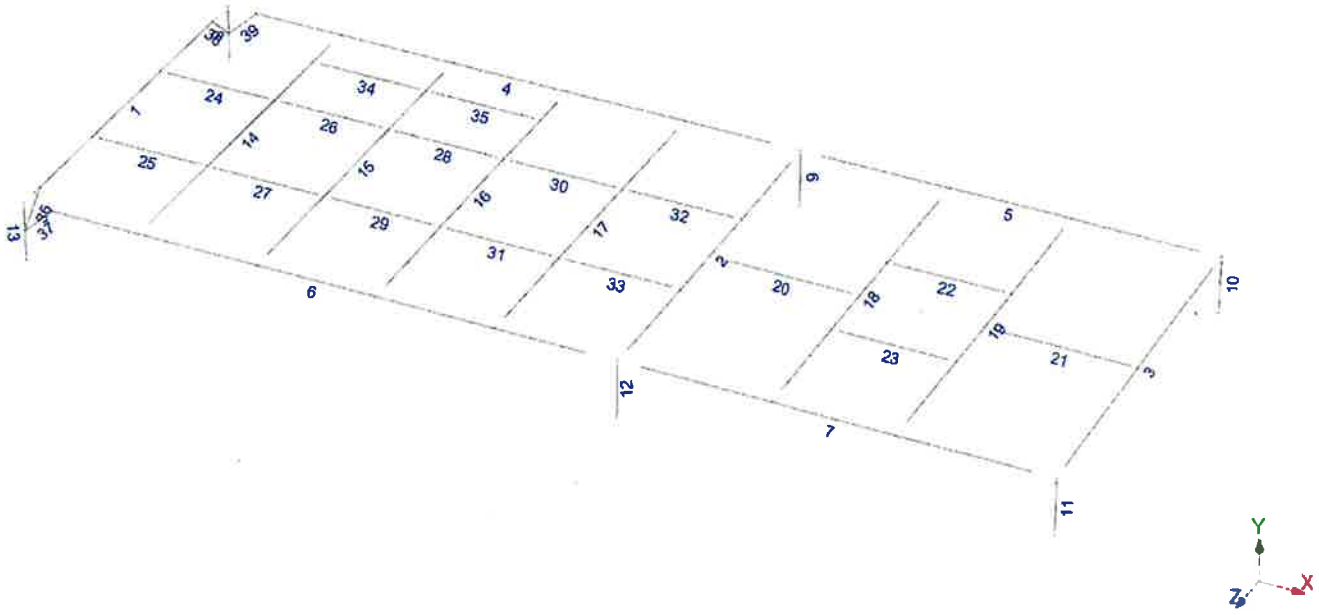

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Steel Code Check

Report: Summary - Group by member

Load conditions to be included in design :

D1=1.4DL
D2=1.2DL+1.6LL
D3=1.2DL+0.5WL1
D4=1.2DL+0.5WL2
D5=1.2DL+0.5WL3
D6=1.2DL+0.5WL4
D7=1.2DL+WL1
D8=1.2DL+WL2
D9=1.2DL+WL3
D10=1.2DL+WL4
D11=1.2DL+WL1+LL
D12=1.2DL+WL2+LL
D13=1.2DL+WL3+LL
D14=1.2DL+WL4+LL
D15=0.9DL+WL1
D16=0.9DL+WL2
D17=0.9DL+WL3
D18=0.9DL+WL4

Description	Section	Member	Ctrl Eq.	Ratio	Status	Reference
	HSS_SQR 6X6X3_8	**8**	D2 at 43.75%	0.37	OK	Eq. H1-1b
		9	D11 at 100.00%	**0.59**	**OK**	Eq. H1-1b
		10	D11 at 100.00%	0.59	OK	Eq. H1-1b
		11	D13 at 100.00%	0.53	OK	Eq. H1-1b
		12	D13 at 100.00%	0.52	OK	Eq. H1-1b
		13	D2 at 43.75%	0.28	OK	Eq. H1-1b
	L 3X3X3_8	**36**	D2 at 0.00%	0.04	OK	Sec. E1
		37	D2 at 0.00%	0.45	OK	Sec. E1
		38	D2 at 0.00%	0.04	OK	Sec. E1
		39	D2 at 0.00%	**0.61**	**OK**	Sec. E1
	W 10X22	**1**	D12 at 51.25%	0.04	OK	Eq. H1-1b
		4	D2 at 59.38%	**0.67**	**OK**	Eq. H1-1b
		6	D2 at 60.42%	0.53	OK	Eq. H1-1b
		14	D12 at 65.63%	0.17	OK	Eq. H1-1b
		15	D2 at 65.63%	0.16	OK	Eq. H1-1b
		16	D14 at 65.63%	0.15	OK	Eq. H1-1b
		17	D2 at 45.00%	0.12	OK	Eq. H1-1b
		20	D12 at 0.00%	0.02	OK	Sec. E1
		21	D14 at 0.00%	0.02	OK	Sec. E1
	W 18X76	**22**	D11 at 50.00%	0.27	OK	Sec. G2.1(a)
		23	D13 at 0.00%	**0.27**	**OK**	Sec. G2.1(a)
	W 27X94	**2**	D12 at 48.75%	0.10	OK	Eq. H1-1b
		3	D14 at 50.00%	0.09	OK	Eq. H1-1b
		5	D11 at 37.50%	0.38	OK	Eq. H1-1b
		7	D13 at 64.06%	0.38	OK	Eq. H1-1b
		18	D12 at 51.04%	**0.55**	**OK**	Eq. H1-1b

	19	D14 at 52.08%	0.54	OK	Eq. H1-1b
W 8X10	**24**	D12 at 0.00%	0.00	OK	Sec. E1
	25	D12 at 0.00%	0.00	OK	Sec. E1
	26	D14 at 62.50%	**0.05**	**OK**	Eq. H1-1b
	27	D12 at 0.00%	0.00	OK	Sec. E1
	28	D14 at 83.33%	0.03	OK	Sec. G2.1(a)
	29	D12 at 0.00%	0.00	OK	Sec. E1
	30	D12 at 0.00%	0.00	OK	Sec. E1
	31	D12 at 0.00%	0.00	OK	Sec. E1
	32	D12 at 0.00%	0.01	OK	Sec. E1
	33	D12 at 0.00%	0.01	OK	Sec. E1
	34	D14 at 62.50%	0.05	OK	Eq. H1-1b
	35	D14 at 83.33%	0.03	OK	Sec. G2.1(a)

Bentley

Current Date: 7/18/2019 11:58 AM
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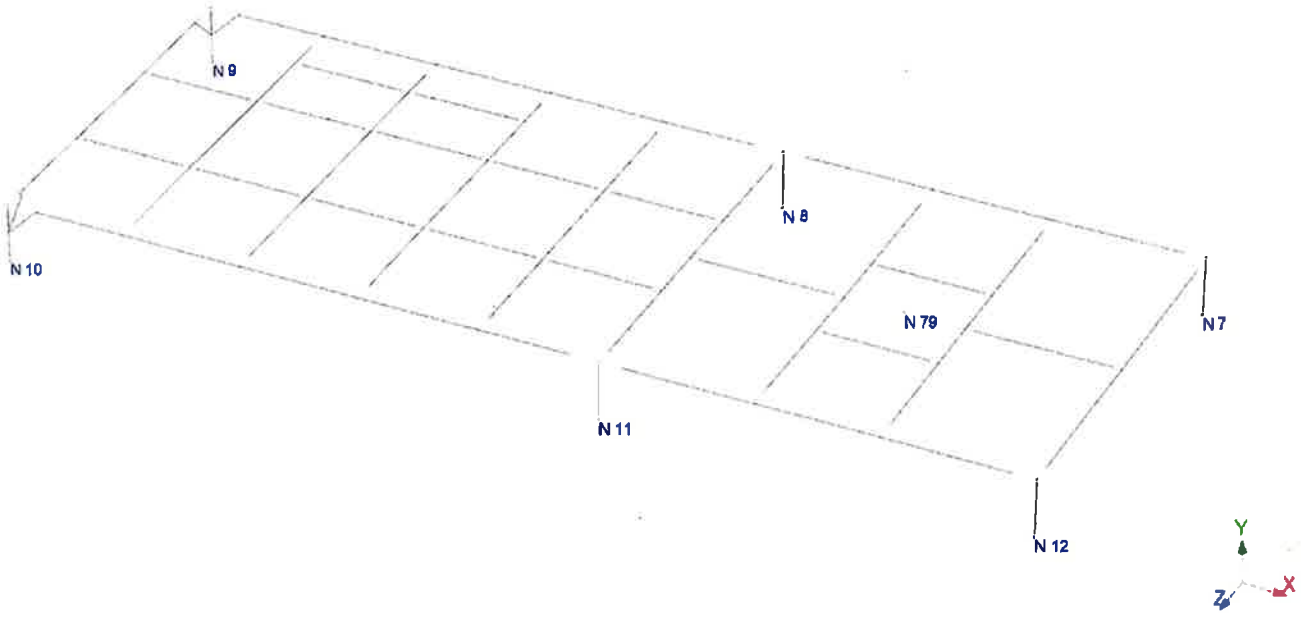
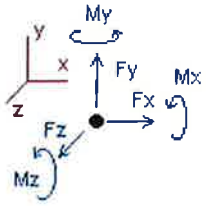


Bentley

Current Date: 7/18/2019 2:42 PM
Units system: English
File name: W:\STRUCTURAL DEPARTMENT\ANALYSIS SOFTWARE\RAM Elements\RAM Projects\VERIZON\CT\East Haven N CT\Rev.1\East Haven CT (Equipment Platform) Rev1.retx\

Analysis result

Reactions



Direction of positive forces and moments

Node	Forces [Kip] FX	FY	FZ	Moments [Kip*ft] MX	MY	MZ
Condition **D1=1.4DL**						
7	-2.93676	5.06127	-0.07572	-0.15037	0.00000	5.86482
8	-1.62673	7.55718	0.07573	0.15035	0.00000	6.00243
9	4.72883	4.98890	0.28624	0.08010	0.00219	3.89291
10	2.69908	2.97653	-0.28624	-0.05833	-0.00117	2.42274
11	-1.05793	7.42097	0.07571	0.15036	0.00000	3.69984
12	-1.80649	5.26832	-0.07572	-0.15038	0.00000	3.62168
SUM	0.00000	33.27318	0.00000	0.02174	0.00102	25.50442
Condition **D2=1.2DL+1.6LL**						
7	-4.21497	6.14470	-0.06503	-0.12915	0.00000	8.42248
8	-2.35520	10.39361	0.06506	0.12913	0.00000	8.61768
9	6.71217	7.29864	0.66918	0.17115	0.00305	5.59677
10	4.97153	5.57371	-0.66918	-0.15248	-0.00217	4.33796
11	-1.86762	10.27690	0.06501	0.12914	0.00000	6.64347
12	-3.24591	6.32217	-0.06504	-0.12916	0.00000	6.49929
SUM	0.00000	46.00973	0.00000	0.01864	0.00087	40.11763
Condition **D3=1.2DL+0.5WL1**						
7	-2.57714	11.80901	2.02711	4.05525	0.00000	5.14589
8	-1.42445	14.06529	2.17289	4.34409	0.00000	5.26685
9	4.16075	4.37305	0.24535	0.06995	0.00181	3.41467
10	2.20613	2.45448	-0.24534	-0.04870	-0.00108	1.99870
11	-0.87672	-1.05738	2.17289	4.34413	0.00000	3.04952
12	-1.48857	-2.95508	2.02710	4.05523	0.00000	2.98552
SUM	0.00000	28.68937	8.40000	16.81996	0.00072	21.86114
Condition **D4=1.2DL+0.5WL2**						
7	-1.27872	-2.33192	-0.03524	-0.06998	0.00000	2.54929
8	0.18210	12.99312	0.03525	0.06997	0.00000	2.69845
9	5.26536	4.43449	0.24198	0.06730	0.00249	1.41444
10	3.65515	2.65833	-0.24198	-0.04972	-0.00160	0.01392
11	0.79588	13.29585	0.03504	0.06960	0.00000	0.54921
12	-0.21978	-2.50700	-0.03505	-0.06961	0.00000	0.44771

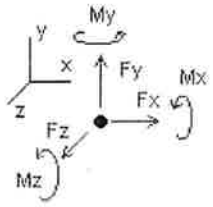
SUM	8.40000	28.54287	0.00000	0.01757	0.00089	7.67303
Condition **D5=1.2DL+0.5WL3**						
7	-2.45731	-3.13255	-2.15692	-4.31304	0.00000	4.90809
8	-1.36423	-1.11012	-2.04306	-4.08634	0.00000	5.02303
9	3.94581	4.17936	0.24534	0.06737	0.00196	3.25890
10	2.42086	2.64815	-0.24535	-0.05129	-0.00093	2.15458
11	-0.93687	13.77905	-2.04309	-4.08637	0.00000	3.29306
12	-1.60827	11.98648	-2.15691	-4.31302	0.00000	3.22308
SUM	0.00000	28.35037	-8.40000	-16.78269	0.00103	21.86073
Condition **D6=1.2DL+0.5WL4**						
7	-3.74842	11.00839	-0.09440	-0.18747	0.00000	7.49006
8	-2.96143	-0.03832	0.09441	0.18744	0.00000	7.57698
9	2.84852	4.11829	0.24869	0.07001	0.00128	5.24775
10	0.97977	2.44471	-0.24869	-0.05026	-0.00041	4.12704
11	-2.59933	-0.57460	0.09458	0.18782	0.00000	5.77771
12	-2.86912	11.53841	-0.09459	-0.18784	0.00000	5.74502
SUM	-8.35000	28.49687	0.00000	0.01970	0.00086	35.96456
Condition **D7=1.2DL+WL1**						
7	-2.63705	19.27979	4.11913	8.23940	0.00000	5.26480
8	-1.45457	21.65299	4.28086	8.55931	0.00000	5.38875
9	4.26822	4.46989	0.24535	0.07125	0.00173	3.49255
10	2.09877	2.35765	-0.24533	-0.04740	-0.00116	1.92075
11	-0.84665	-8.47559	4.28088	8.55938	0.00000	2.92775
12	-1.42872	-10.42585	4.11911	8.23935	0.00000	2.86674
SUM	0.00000	28.85887	16.80000	33.62128	0.00057	21.86134
Condition **D8=1.2DL+WL2**						
7	-0.04022	-9.00208	-0.00557	-0.01106	0.00000	0.07159
8	1.75854	19.50865	0.00558	0.01106	0.00000	0.25197
9	6.47744	4.59278	0.23862	0.06595	0.00310	-0.50789
10	4.99681	2.76534	-0.23862	-0.04945	-0.00220	-2.04880
11	2.49856	20.23087	0.00519	0.01032	0.00000	-2.07287
12	1.10886	-9.52970	-0.00520	-0.01032	0.00000	-2.20888
SUM	16.80000	28.56587	0.00000	0.01650	0.00090	-6.51488
Condition **D9=1.2DL+WL3**						
7	-2.39740	-10.60333	-4.24894	-8.49718	0.00000	4.78918
8	-1.33412	-8.69782	-4.15103	-8.30156	0.00000	4.90112
9	3.83835	4.08252	0.24534	0.06607	0.00203	3.18101
10	2.52823	2.74498	-0.24536	-0.05259	-0.00085	2.23252
11	-0.96694	21.19726	-4.15108	-8.30162	0.00000	3.41483
12	-1.66812	19.45726	-4.24892	-8.49714	0.00000	3.34185
SUM	0.00000	28.18087	-16.80000	-33.58402	0.00118	21.86052
Condition **D10=1.2DL+WL4**						
7	-4.97961	17.67854	-0.12390	-0.24604	0.00000	9.95313
8	-4.52852	-6.55424	0.12390	0.24601	0.00000	10.00903
9	1.64376	3.96038	0.25203	0.07136	0.00067	7.15873
10	-0.35395	2.33810	-0.25203	-0.05053	0.00018	6.17744
11	-4.29186	-7.51002	0.12427	0.24675	0.00000	8.38412
12	-4.18983	18.56111	-0.12427	-0.24679	0.00000	8.38574

SUM	-16.70000	28.47387	0.00000	0.02076	0.00085	50.06819
Condition	**D11=1.2DL+WL1+LL**					
7	-3.69814	20.40883	4.11905	8.23924	0.00000	7.38698
8	-2.05511	24.10050	4.28095	8.55947	0.00000	7.55922
9	5.93002	6.35891	0.51025	0.13531	0.00246	4.90504
10	3.76004	4.24665	-0.51022	-0.11146	-0.00189	3.33408
11	-1.44717	-6.02805	4.28095	8.55954	0.00000	5.09786
12	-2.48965	-9.29681	4.11903	8.23919	0.00000	4.98861
SUM	0.00000	39.79003	16.80000	33.62128	0.00057	33.27178
Condition	**D12=1.2DL+WL2+LL**					
7	-1.10131	-7.87304	-0.00565	-0.01122	0.00000	2.19377
8	1.15800	21.95617	0.00567	0.01122	0.00000	2.42243
9	8.13925	6.48181	0.50351	0.13001	0.00383	0.90460
10	6.65808	4.65434	-0.50351	-0.11351	-0.00293	-0.63547
11	1.89805	22.67841	0.00526	0.01048	0.00000	0.09724
12	0.04793	-8.40066	-0.00528	-0.01048	0.00000	-0.08701
SUM	16.80000	39.49703	0.00000	0.01650	0.00090	4.89556
Condition	**D13=1.2DL+WL3+LL**					
7	-3.45849	-9.47429	-4.24902	-8.49734	0.00000	6.91136
8	-1.93465	-6.25030	-4.15094	-8.30140	0.00000	7.07159
9	5.50015	5.97154	0.51023	0.13013	0.00276	4.59350
10	4.18950	4.63398	-0.51026	-0.11664	-0.00158	3.64585
11	-1.56746	23.64480	-4.15101	-8.30146	0.00000	5.58494
12	-2.72905	20.58630	-4.24900	-8.49731	0.00000	5.46372
SUM	0.00000	39.11203	-16.80000	-33.58401	0.00118	33.27096
Condition	**D14=1.2DL+WL4+LL**					
7	-6.04070	18.80758	-0.12398	-0.24620	0.00000	12.07531
8	-5.12906	-4.10672	0.12399	0.24617	0.00000	12.17949
9	3.30557	5.84940	0.51693	0.13541	0.00140	8.57122
10	1.30732	4.22710	-0.51693	-0.11458	-0.00055	7.59077
11	-4.89238	-5.06248	0.12434	0.24692	0.00000	10.55423
12	-5.25076	19.69015	-0.12435	-0.24695	0.00000	10.50761
SUM	-16.70000	39.40503	0.00000	0.02076	0.00085	61.47863
Condition	**D15=0.9DL+WL1**					
7	-2.00774	18.19523	4.13536	8.27162	0.00000	4.00805
8	-1.10598	20.03359	4.26463	8.52709	0.00000	4.10252
9	3.25490	3.40084	0.18402	0.05408	0.00126	2.65835
10	1.52039	1.71982	-0.18399	-0.03490	-0.00091	1.40159
11	-0.61995	-10.06580	4.26465	8.52716	0.00000	2.13493
12	-1.04161	-11.55478	4.13533	8.27158	0.00000	2.09066
SUM	0.00000	21.72890	16.80000	33.61662	0.00036	16.39611
Condition	**D16=0.9DL+WL2**					
7	0.58908	-10.08664	0.01066	0.02116	0.00000	-1.18515
8	2.10713	17.88926	-0.01065	-0.02116	0.00000	-1.03426
9	5.46412	3.52373	0.17728	0.04878	0.00263	-1.34209
10	4.41843	2.12751	-0.17728	-0.03695	-0.00195	-2.56796
11	2.72526	18.64066	-0.01104	-0.02190	0.00000	-2.86569
12	1.49597	-10.65863	0.01103	0.02190	0.00000	-2.98495

SUM	16.80000	21.43590	0.00000	0.01184	0.00068	-11.98011
Condition	**D17=0.9DL+WL3**					
7	-1.76809	-11.68788	-4.23271	-8.46496	0.00000	3.53243
8	-0.98553	-10.31721	-4.16726	-8.33378	0.00000	3.61489
9	2.82503	3.01347	0.18400	0.04891	0.00156	2.34682
10	1.94985	2.10715	-0.18403	-0.04009	-0.00060	1.71336
11	-0.74024	19.60705	-4.16731	-8.33384	0.00000	2.62201
12	-1.28101	18.32834	-4.23269	-8.46492	0.00000	2.56578
SUM	0.00000	21.05090	-16.80000	-33.58867	0.00096	16.39529
Condition	**D18=0.9DL+WL4**					
7	-4.35030	16.59398	-0.10767	-0.21382	0.00000	8.69638
8	-4.17993	-8.17363	0.10767	0.21379	0.00000	8.72279
9	0.63044	2.89133	0.19069	0.05419	0.00020	6.32453
10	-0.93232	1.70027	-0.19069	-0.03803	0.00043	5.65829
11	-4.06516	-9.10023	0.10804	0.21453	0.00000	7.59130
12	-3.80272	17.43218	-0.10805	-0.21456	0.00000	7.60966
SUM	-16.70000	21.34390	0.00000	0.01610	0.00063	44.60296

Envelope for nodal reactions

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



Direction of positive forces and moments

Envelope of nodal reactions for :

D1=1.4DL
D2=1.2DL+1.6LL
D3=1.2DL+0.5WL1
D4=1.2DL+0.5WL2
D5=1.2DL+0.5WL3
D6=1.2DL+0.5WL4
D7=1.2DL+WL1
D8=1.2DL+WL2
D9=1.2DL+WL3
D10=1.2DL+WL4
D11=1.2DL+WL1+LL
D12=1.2DL+WL2+LL
D13=1.2DL+WL3+LL
D14=1.2DL+WL4+LL
D15=0.9DL+WL1
D16=0.9DL+WL2
D17=0.9DL+WL3
D18=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
7	Max	0.589	D16	20.409	D11	4.135	D15	8.27162	D15	0.00000	D1	12.07531	D14
	Min	-6.041	D14	-11.688	D17	-4.249	D13	-8.49734	D13	0.00000	D1	-1.18515	D16
8	Max	2.107	D16	24.101	D11	4.281	D11	8.55947	D11	0.00000	D1	12.17949	D14
	Min	-5.129	D14	-10.317	D17	-4.167	D17	-8.33378	D17	0.00000	D1	-1.03426	D16
9	Max	8.139	D12	7.299	D2	0.669	D2	0.17115	D2	0.00383	D12	8.57122	D14
	Min	0.630	D18	2.891	D18	0.177	D16	0.04878	D16	0.00020	D18	-1.34209	D16
10	Max	6.658	D12	5.574	D2	-0.177	D16	-0.03490	D15	0.00043	D18	7.59077	D14
	Min	-0.932	D18	1.700	D18	-0.669	D2	-0.15248	D2	-0.00293	D12	-2.56796	D16
11	Max	2.725	D16	23.645	D13	4.281	D11	8.55954	D11	0.00000	D11	10.55423	D14
	Min	-4.892	D14	-10.066	D15	-4.167	D17	-8.33384	D17	0.00000	D17	-2.86569	D16
12	Max	1.496	D16	20.586	D13	4.135	D15	8.27158	D15	0.00000	D1	10.50761	D14
	Min	-5.251	D14	-11.555	D15	-4.249	D13	-8.49731	D13	0.00000	D1	-2.98495	D16

Date: 7/18/2019
Project Name: EAST HAVEN N CT
Project No.:
Designed By: SO **Checked By:** MSC

HUDSON Design Group LLC

Check Building Columns Worse Case:

Existing W10x33 Columns (Assumed)

Load Breakdown:

Tributary Area (Column M15): (12.83/2)+(21/2) x (14/2)+(20/2)
288 ft^2

Roof

→ Snow 30 psf x 288 ft^2
= **8627 lbs.**

→ Dead 55 psf x 288 ft^2
= **15815.53 lbs.**

Fourth, Third and Main Level

→ Live Load 40 psf x 288 ft^2 x3
= **34507 lbs.**

→ Dead 55 psf x 288 ft^2 x3
= **47446.58 lbs.**

Loading From Platform

= **24101 lbs.** (See Bentely Results)

Total Loading

= (D + 0.75W + 0.75L + 0.75S)
= **119.7 kips**

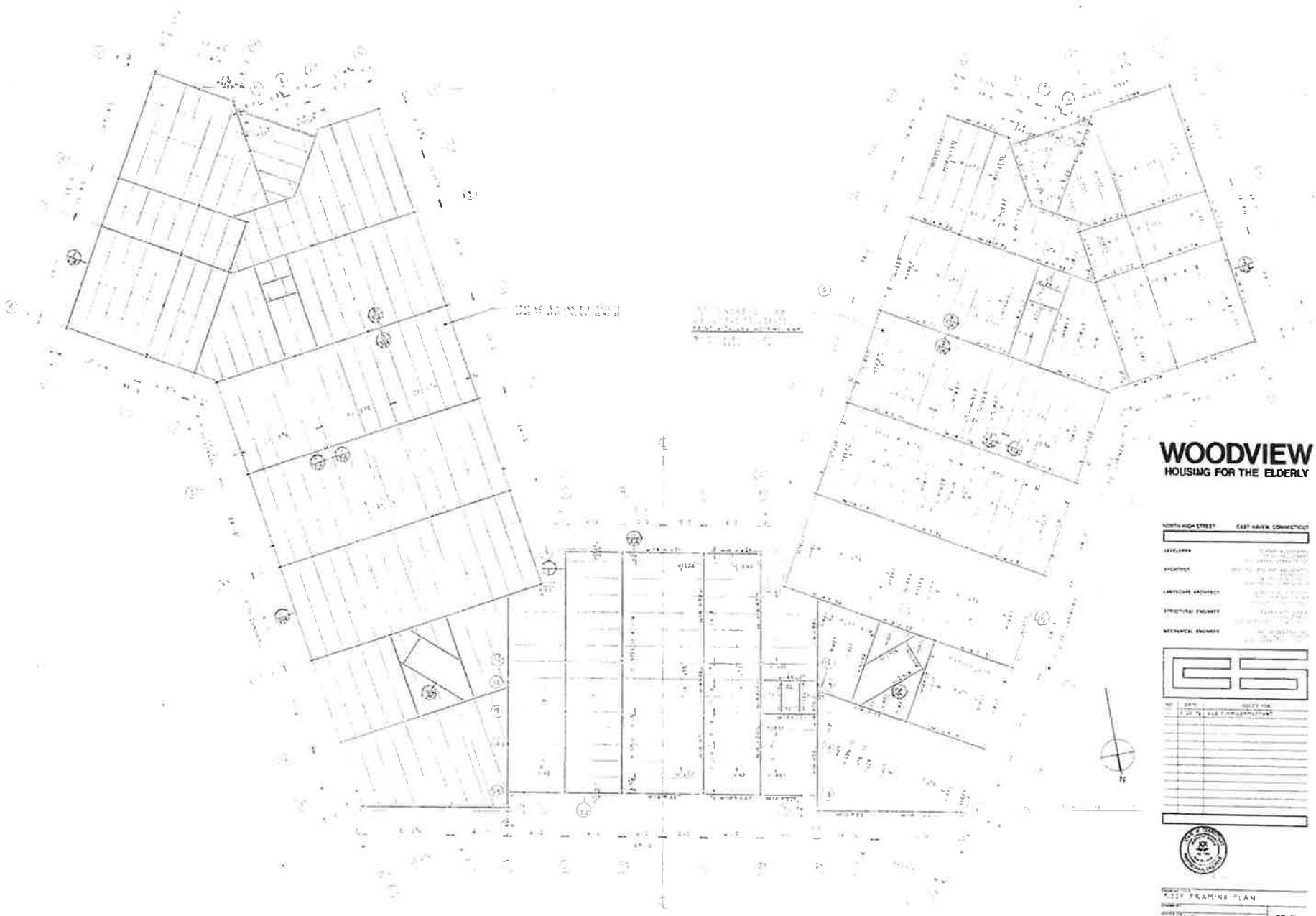
Allowable Compression for W10x33 Column

= **220 kips**

119.7 kip < 220 kips O.K.

HUDSON
Design Group LLC

Reference Documents



WOODVIEW
HOUSING FOR THE ELDERLY

NORTH HIGH STREET EAST HAVEN, CONNECTICUT

DEVELOPER

ARCHITECT

LANDSCAPE ARCHITECT

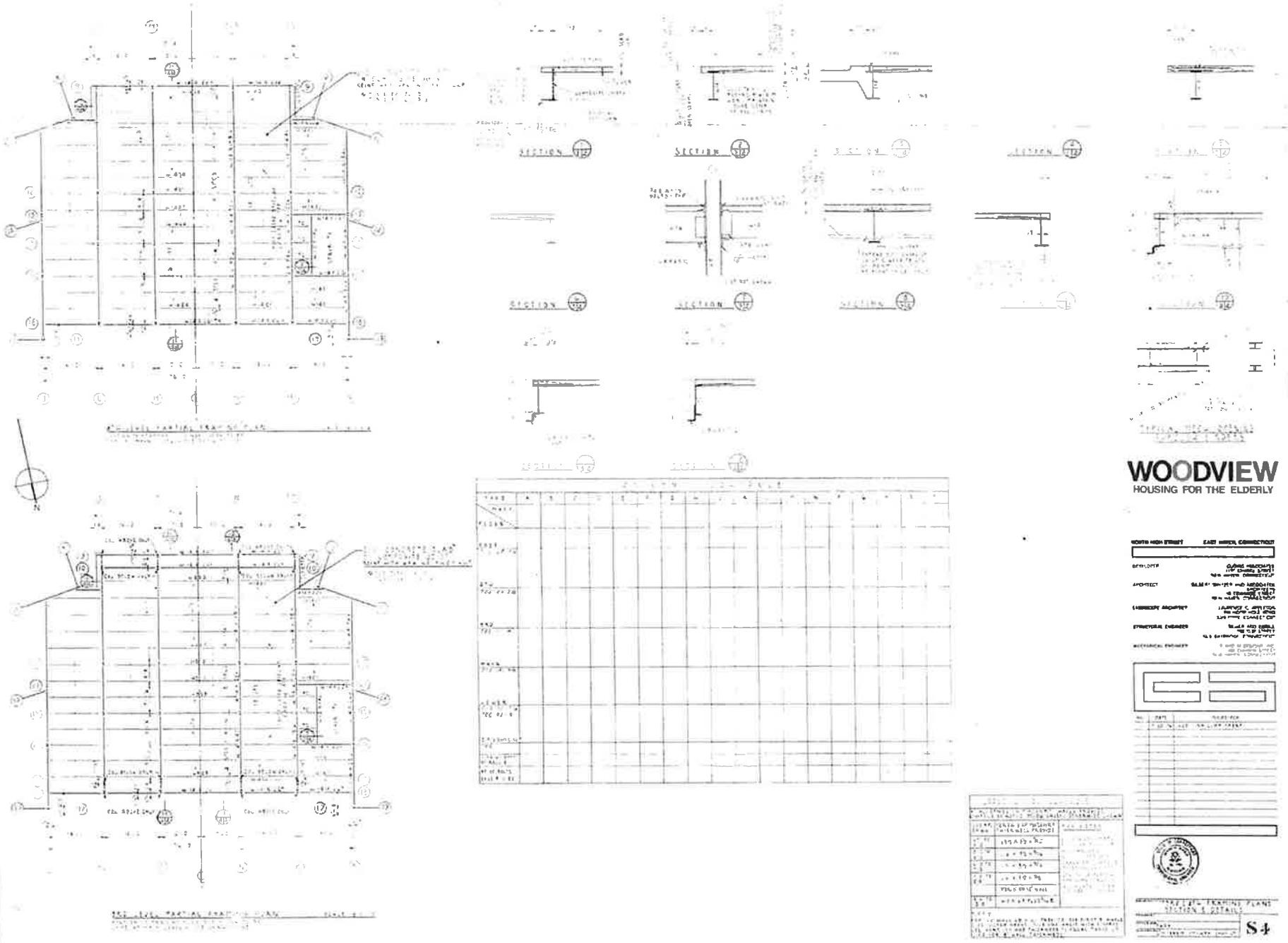
STRUCTURAL ENGINEER

MECHANICAL ENGINEER

NO.	DATE	ISSUED FOR

ROOF FRAMING PLAN

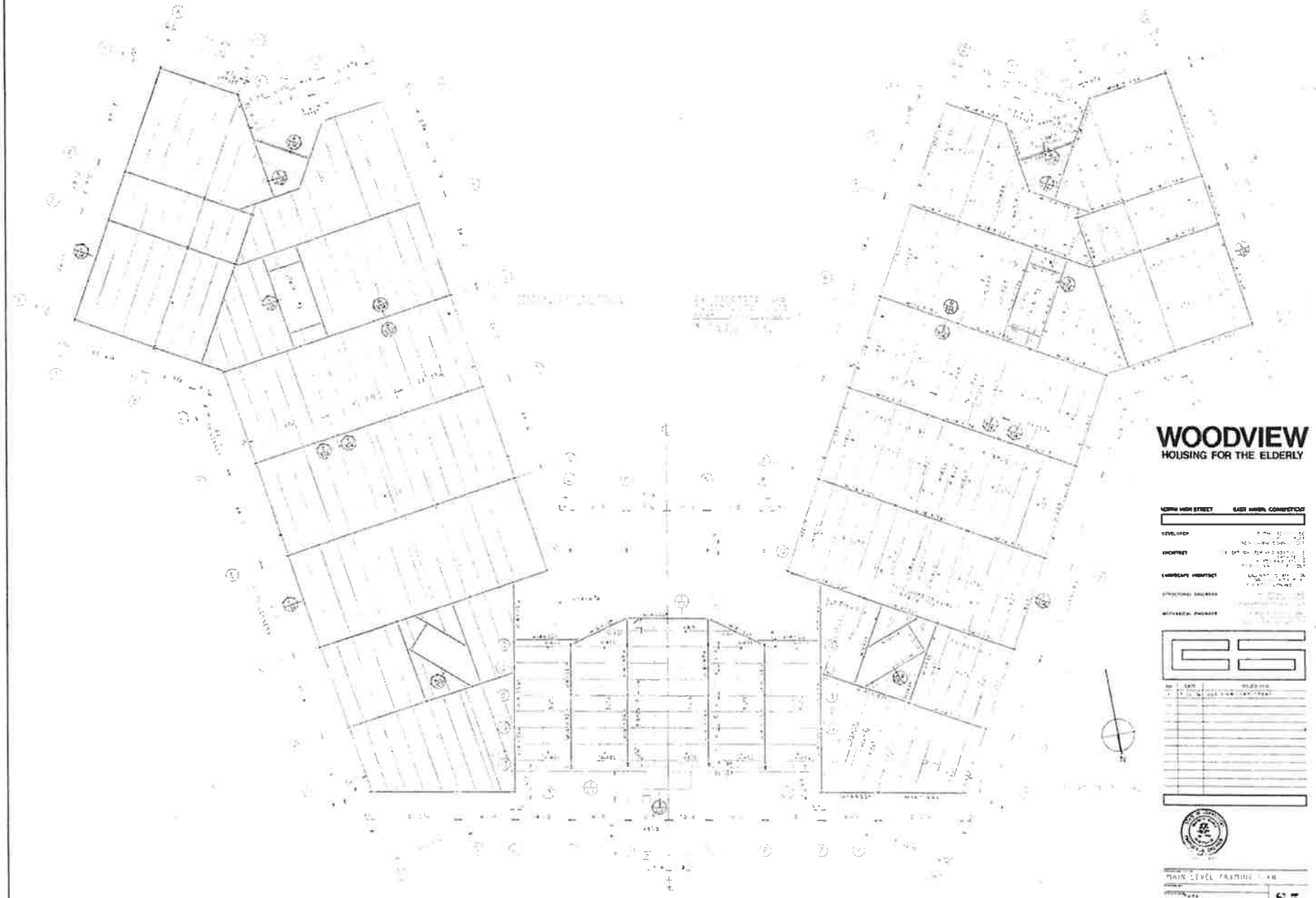
S5



WOODVIEW

HOUSING FOR THE ELDERLY

S4

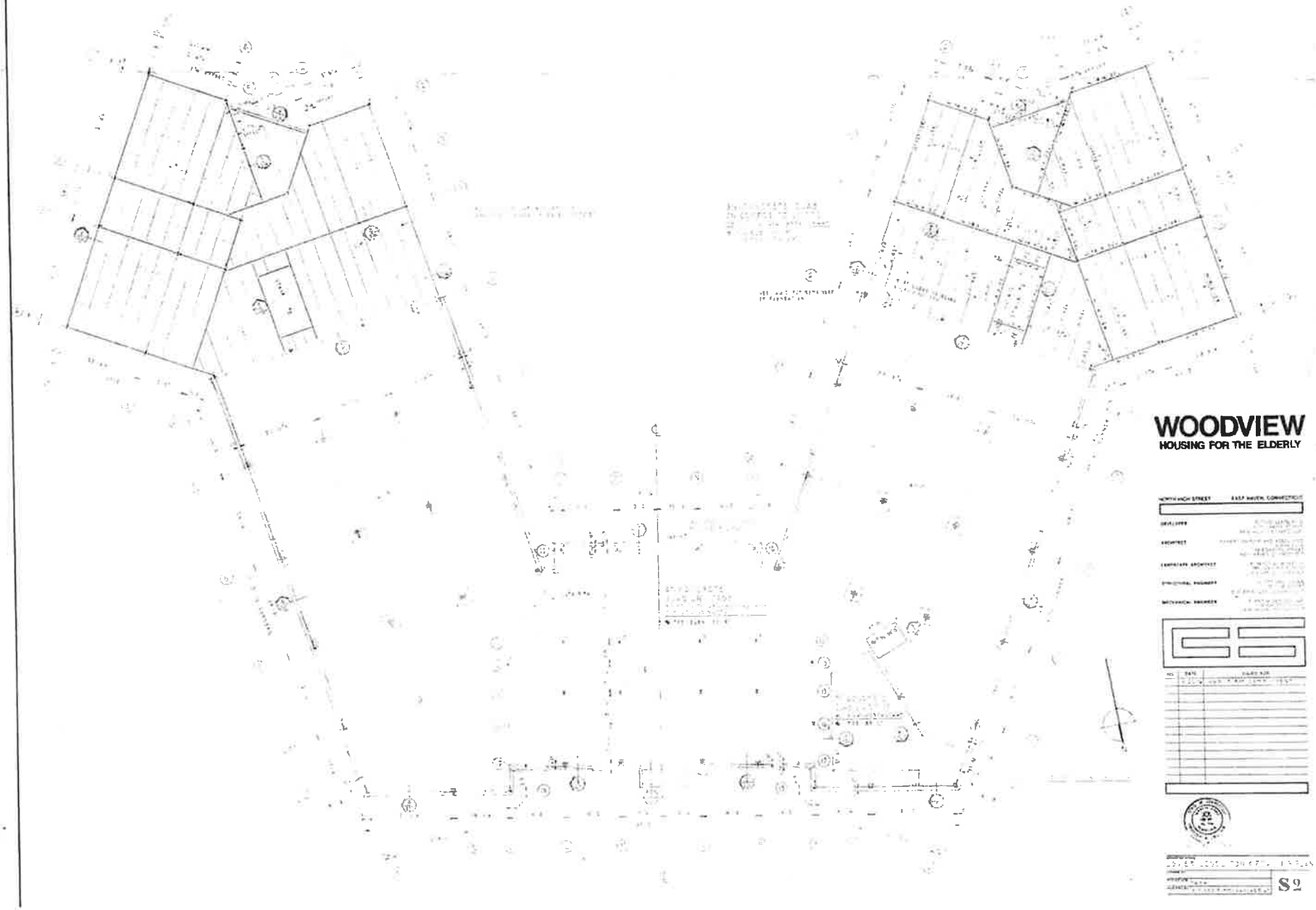


WOODVIEW

HOUSING FOR THE ELDERLY

MAIN LEVEL FRAMING PLAN

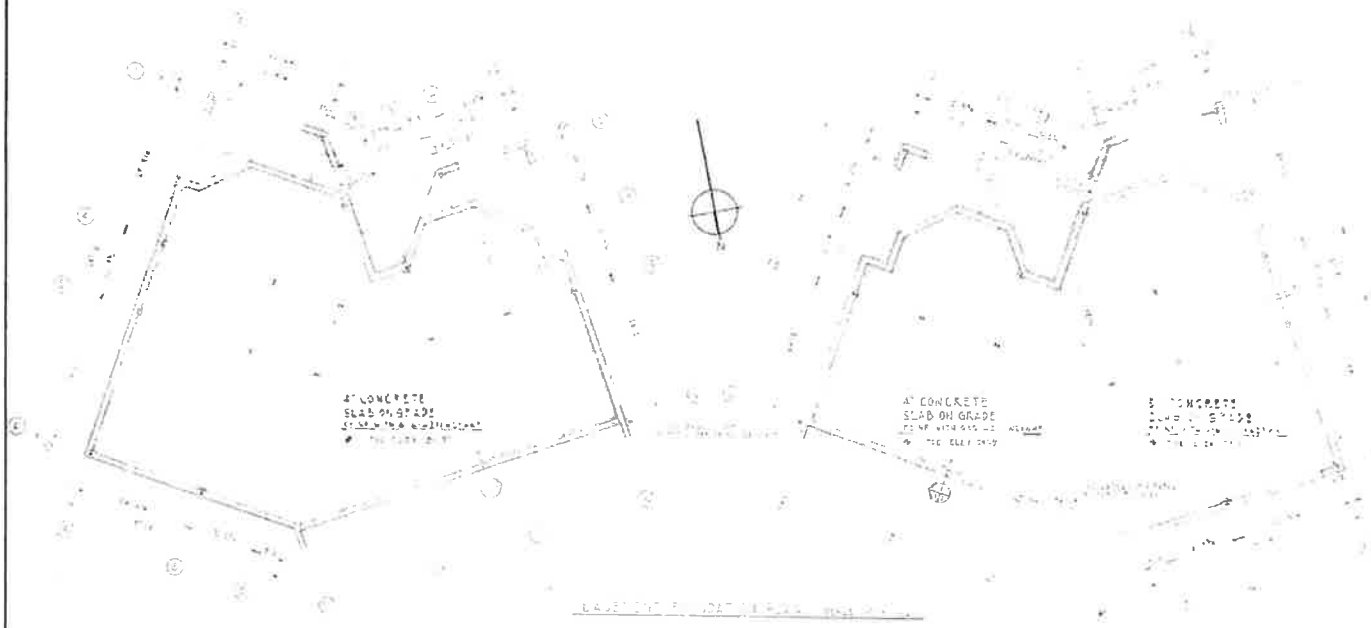
S5

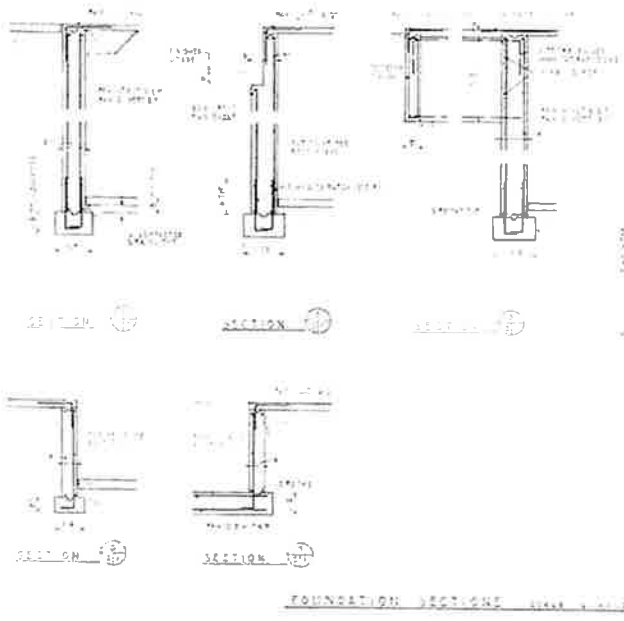


WOODVIEW

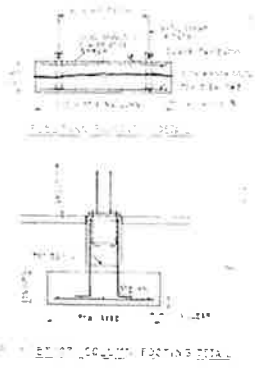
HOUSING FOR THE ELDERLY

S2

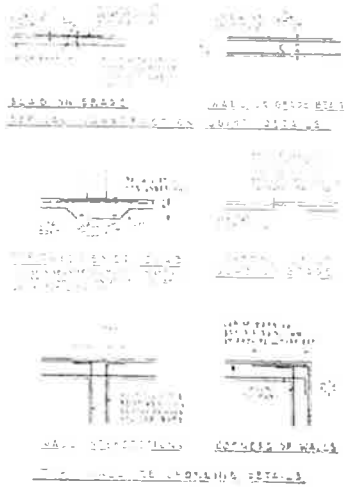




FOUNDATION SECTIONS



TYP. STEPPED FOOTING DETAIL

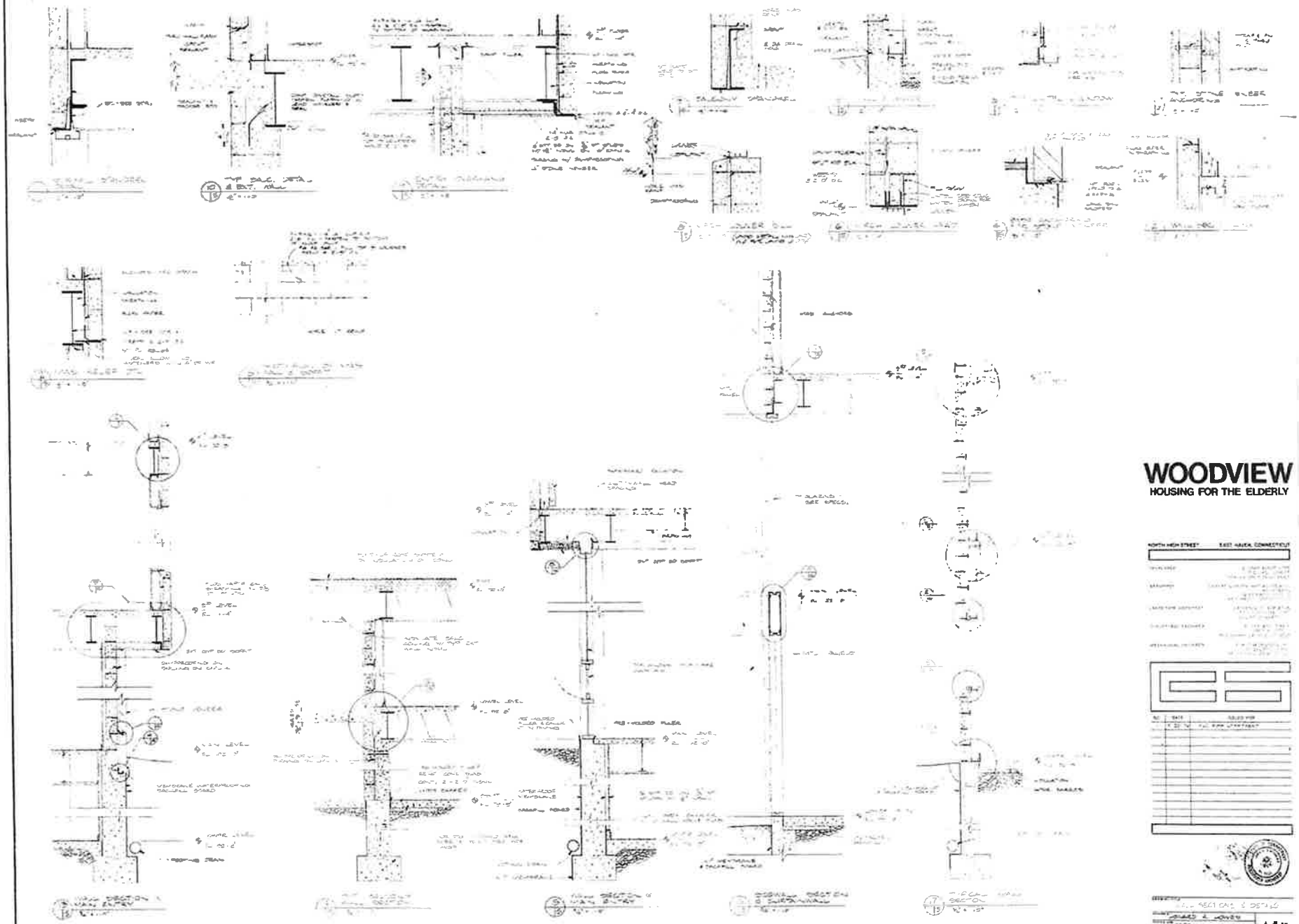


WALL CONSTRUCTION

CORNERS OF WALLS

WOODVIEW
HOUSING FOR THE ELDERLY

S1

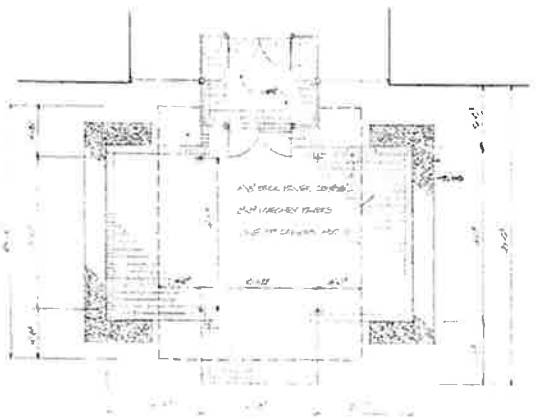


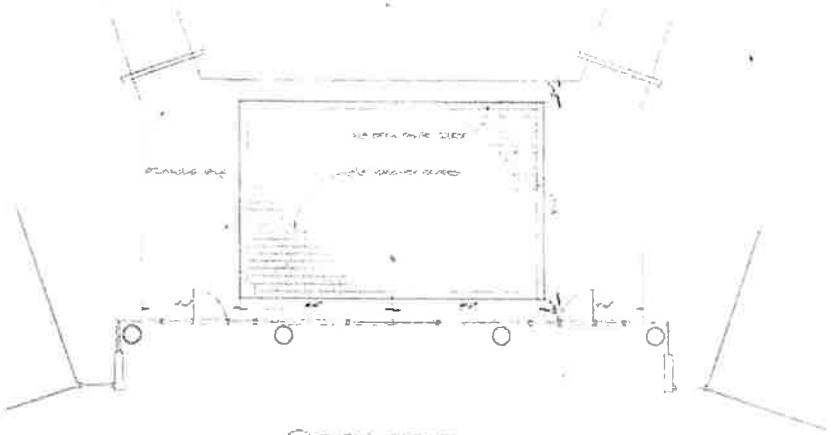
WOODVIEW

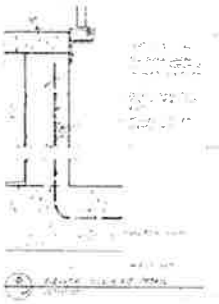
HOUSING FOR THE ELDERLY

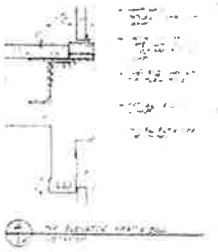
NORTH HIGH STREET EAST HAVEN, CONNECTICUT

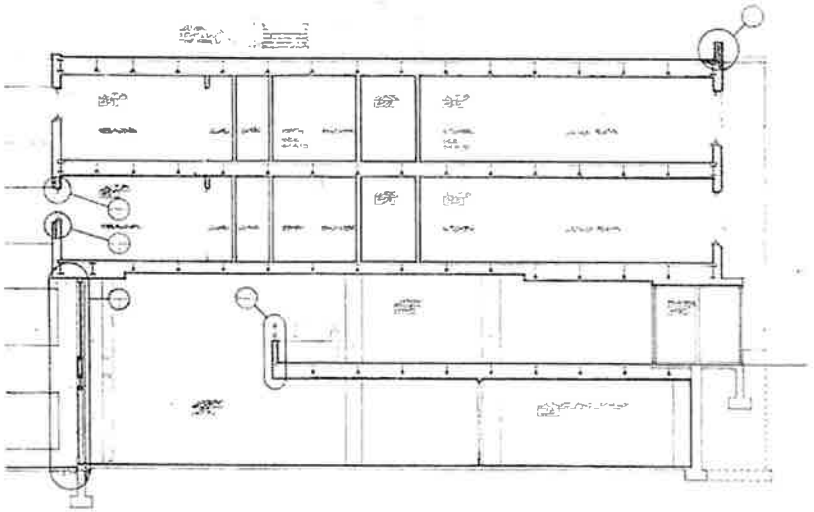
A1.5

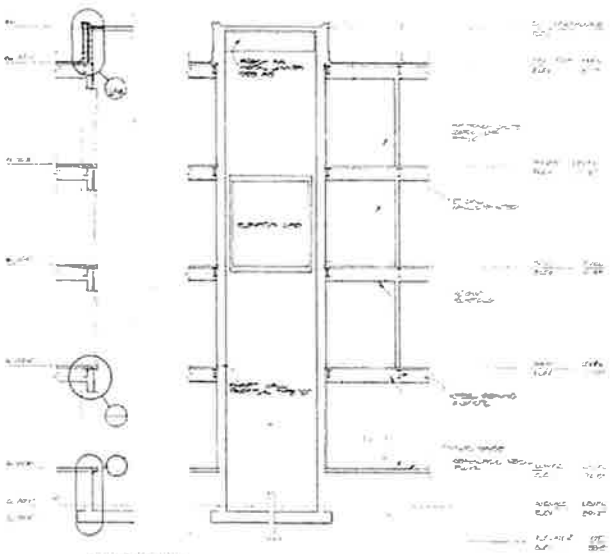






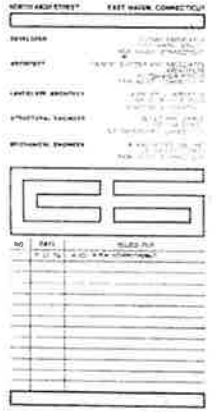






WOODVIEW

HOUSING FOR THE ELDERLY



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