NB+C Engineering Services

Rooftop Structural Analysis

Prepared for T-Mobile: L700 4x2 Installation

SITE INFORMATION

Address	301 Maple Ave West Vienna, VA 22180 Lat: 38.897942° Long: -77.270294°
T-Mobile Site Number	7WAC050A
T-Mobile Site Name	White Oak Tower
NB+C Project Number	100291
Date	June 15, 2020

TABLE OF CONTENTS

1.0 INTRODUCTION

The existing structure is a 81′-6" tall building located in Vienna, VA.

T-Mobile has proposed to reconfigure the site and install new antennas as shown in the table below. A structural analysis was performed to see if the new loads are safely supported by the roof structure and to verify if the existing structure is in compliance with the applicable codes and standards. Information we have received and used for this analysis includes:

- RFDS provided by T-Mobile dated May 01, 2020
- Site Audit Photos dated September 04, 2019
- Construction Drawings by **NB+C Engineering Services**, dated June 10, 2020

2.0 APPURTENANCES LOADING

As per the information provided to us, the following tables show the final and existing antenna and equipment installation by T-Mobile.

Table 1 – Proposed/Final Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Carrier	Feed Line Size (in)	Note
74’-0” 79’-0”	74’-0” 79’-0”	4	RFS	APXVAAR24_43-U-NA20 (95.9”x24.0”x8.7”, 128.0lbs)	T-Mobile	(4) 6x12 Hybrid (6) 1-1/4” Coax	-
		4	Ericsson	Radio 4449 B71 + B85 (13.4”x16.5”x5.9”, 46.0lbs)			
		2	Ericsson	KRY 112 489/2 (11.0”x6.1”x3.9”, 15.4lbs)			

Table 2 – Existing Antenna and Cable Information

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Carrier	Feed Line Size (in)	Note
74’-0” 79’-0”	74’-0” 79’-0”	4	Ericsson	AIR32DB B66A/B2A	T-Mobile	(4) 6x12 Hybrid[1] (6) 1-1/4” Coax[1] (4) 7/8” Coax[2]	1
		2	Andrew	TMBXX-6516-A2M			
		2	Commscope	SBNHH-1D65C			2
		4	Ericsson	KRY 112 489/2			1
		2	-	Twin Style 1B			

Note:
1. Existing equipment to remain.
2. Existing equipment to be removed, was not considered in this analysis.

3.0 ASSUMPTIONS

This report is based on the theoretical capacity of the existing structural elements and is not an assessment of the overall suitability of the existing Structure or its components for any particular use other than specified here in this report:

- This report makes no warranties, expressed and/or implied, and disclaims any liability arising from material, fabrication and erection of the existing Structure and any other existing or proposed components or appurtenances.
- All proposed and existing antennas, mounts, coaxial cables and appurtenances are assumed to be properly installed and configured according to manufacturer requirements.
- All existing structural elements are assumed to be in place and in good condition, and were previously designed and constructed in accordance with applicable codes and standards.
- Existing anchorage to penthouse wall assumed to be ½" diameter threaded rods with Hilti HY70 adhesive and 3 1/8" min. embedment.
- Contractor to verify existing site condition including the existing structure prior to fabrication and construction. In the event the existing structure conditions are different than the assumptions made in this report, this has to be brought to the structural engineer's attention before proceeding any further with bidding, fabrication and/or erection.

4.0 APPLICABLE CODES AND STANDARDS

The existing structure was analyzed/designed per the provisions of following applicable codes and standards:

- *2015 Virginia Construction Code*
- *ANSI/TIA-222-G – Structural Standards for Antenna Supporting Structures and Antennas*
- *Minimum Design Loads for Buildings and Other Structures ASCE/SEI 7-10*
- *AISC Manual of Steel Construction, 14th Edition – ANSI/AISC 360-10*

5.0 ANALYSIS

Design Loads:

- Ultimate wind speed: 115 mph
- Occupancy Category: II
- Exposure: B

Load Combinations:

- D
- D + L
- D + 0.6W
- 0.6D + 0.6W

6.0 CONCLUSIONS & RECOMMENDATIONS

The proposed appurtenances to are to be supported on the **proposed 2.5SCH40 x 11'-0" LG** mount pipes anchored to the penthouse walls. Refer to construction drawings prepared by **NB+C ES** for the proposed location of the appurtenances, and the supporting mounts.

Based on the performed analysis of this structure for applied gravity and lateral loads, the existing/proposed pipe mounts and anchorage are **adequate** to support the proposed T-Mobile appurtenances. The existing mount pipe was stressed to 6.40% of its capacity, the proposed mount pipe was stressed to 16.40% of its capacity, the existing wall mount angles were stressed to 23.60% of their capacity, and the existing anchorage was stressed to 41.0% of its capacity.

The proposed antenna installation represents an insignificant increase in gravity and lateral loads on the overall structure, therefore the installation is deemed acceptable by engineering judgement.

The conclusions reached by **NB+C ES** in this report are only applicable for the previously mentioned existing structural members supporting the T-Mobile equipment. Further, no structural qualification is made or implied by this report for existing structural members not supporting the T-Mobile equipment.

NB+C ENGINEERING SERVICES, LLC

Prepared by: Yaw O. Bonsu, E.I.T.

Respectfully Submitted by:

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Chief Engineer - Structural
VA PE License # 49792

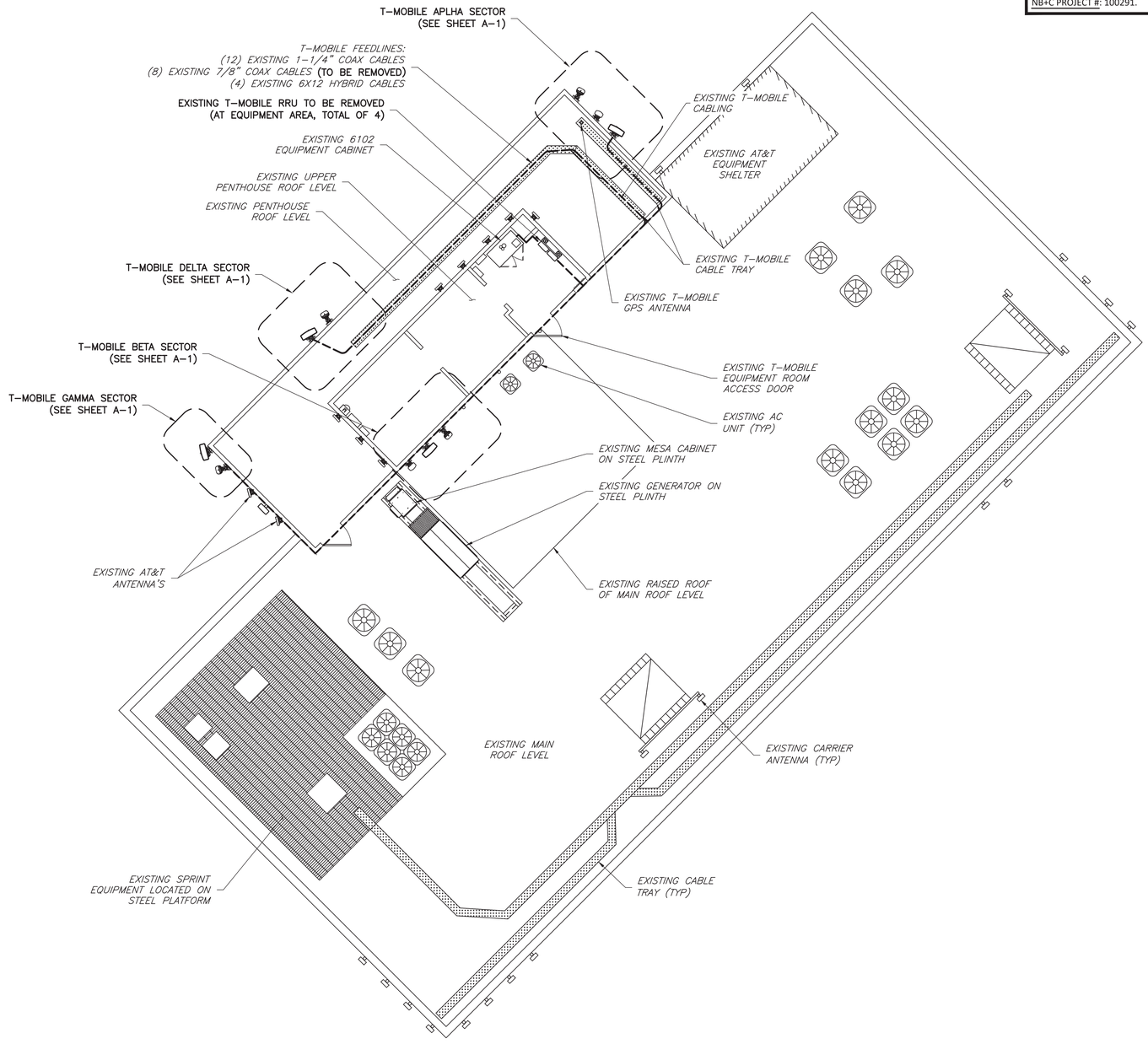
6/15/20

APPENDIX A:
PLAN AND ELEVATION

TRUE NORTH

STRUCTURAL NOTE:
REFER TO THE PASSING STRUCTURAL ANALYSIS OF THE EXISTING BUILDING WITH THE EXISTING AND PROPOSED LOADS PERFORMED BY NB+C.

NB+C PROJECT #: 100291.



1 / C-1 ROOF PLAN
SCALE: 1/8" = 1' (22X34)
SCALE: 1/16" = 1' (11X17)

GRAPHIC SCALE

16 8 0 1 2 4 8 16

1/8 INCH = 1 FOOT (22X34)
1/16 INCH = 1 FOOT (11X17)

APPLICANT

T-Mobile

T-MOBILE NORTHEAST LLC

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BELTSVILLE, MD 20705
OFFICE: (240) 264-8600
FAX: (240) 264-8610

ENGINEER

NB+C TOTALLY COMMITTED.

NB+C ENGINEERING SERVICES, LLC.
6095 MARSHALEE DRIVE, SUITE 300
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SITE INFORMATION

7WAC050A
WHITE OAK TOWER
301 MAPLE AVENUE WEST
VIENNA, VA 22180
TOWN OF VIENNA

DESIGN RECORD

REVISIONS

REV	DATE	DESCRIPTION	BY
0	06/10/20	FINAL CD's	CAR

PROFESSIONAL STAMP

COMMONWEALTH OF VIRGINIA
TRENT TRAVIS SNARR
Lic. No. 049978
06/10/20
PROFESSIONAL ENGINEER

ENGINEER

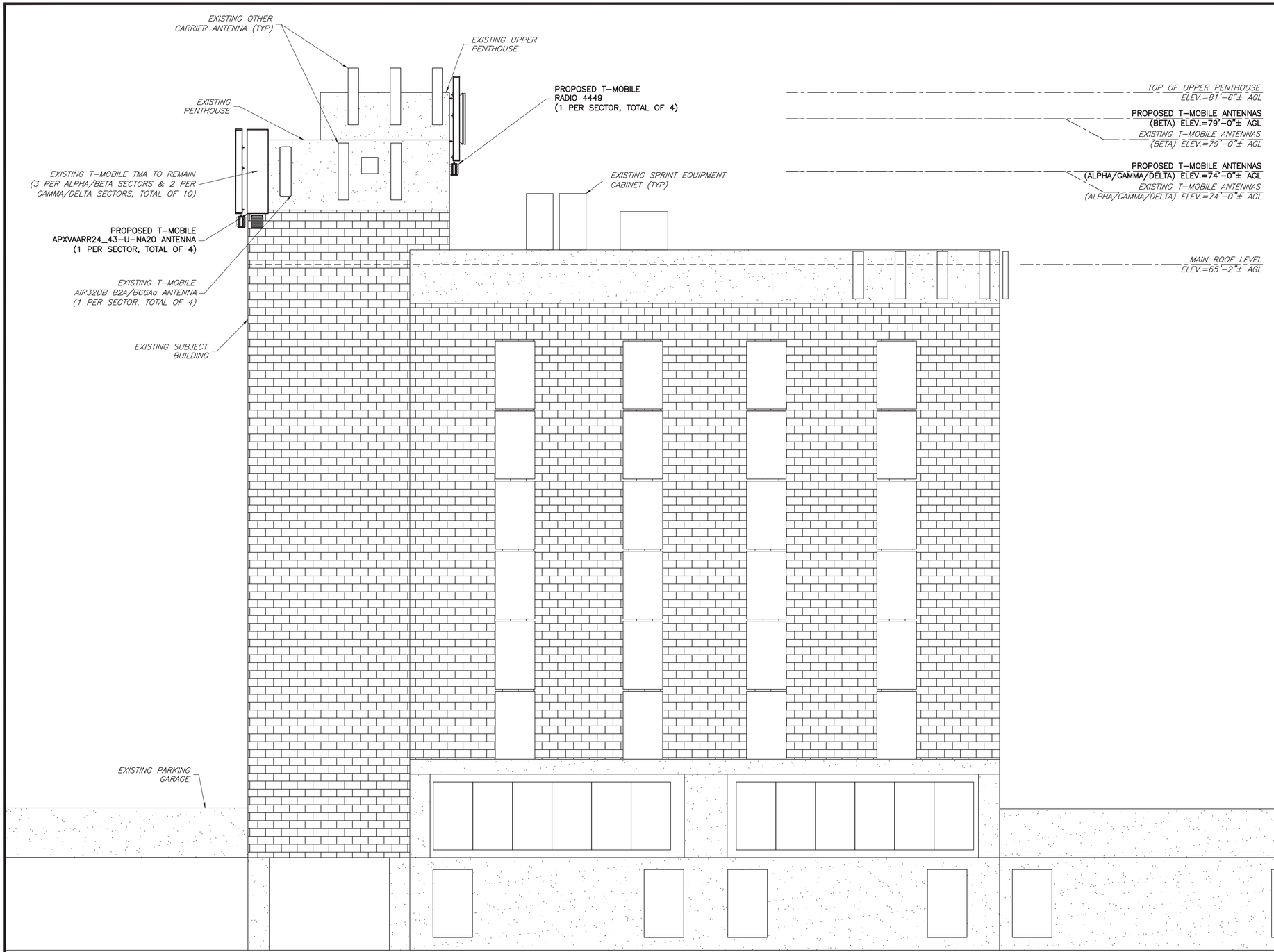
TRENT TRAVIS SNARR, P.E.
VIRGINIA PROFESSIONAL ENGINEER
LICENSE #049978

SHEET TITLE

ROOFTOP PLAN

SHEET NUMBER

C-1



1 / C-2 ELEVATION
SCALE: 1" = 10' (22X34)
SCALE: 1" = 20' (11X17)

GRAPHIC SCALE
10 0 5 10 20 40
1 INCH = 10 FEET (22X34)
1 INCH = 20 FEET (11X17)

STRUCTURAL NOTE:
REFER TO THE PASSING STRUCTURAL ANALYSIS OF THE EXISTING BUILDING WITH THE EXISTING AND PROPOSED LOADS PERFORMED BY NB+C.

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VIRGINIA PROFESSIONAL ENGINEER
LICENSE #049978

SHEET TITLE

ELEVATION

SHEET NUMBER

C-2

APPENDIX B:
CALCULATIONS

PURPOSE

The purpose of these calculations is to structurally qualify the existing/proposed antenna mounts for support of the proposed T-Mobile apurtenances.

Site Information:

Site Number: 7WAC050A

Address: 301 Maple Avenue West, Vienna, VA 22180

1) Antenna Mount Analysis:

Wind Loads:

		ASCE/SEI 7-10 Reference
Occupancy Category:	II	Table 1.5-1, pg. 2
Exposure:	$Exp := "B"$	Section 26.7.3, pg. 251
Topographic Factor:	$K_{zt} := 1.0$	Section 26.8.2, pg. 254
Wind Directional Factor:	$K_d := 0.85$	Table 26.6-1, pg. 250
Gust Effect Factor:	$G := 0.85$	Section 26.9.1, pg. 254
Basic Wind Speed (mph):	$V := 115$	Figure 26.5-1 A-C, pgs. 247-249
Equipment Mid Height AGL (ft):	$h_1 := 79$	
Velocity Pressure Coefficient:	$z_g := \begin{cases} 1200 & \text{if } Exp = "B" \\ 900 & \text{if } Exp = "C" \\ 700 & \text{if } Exp = "D" \end{cases} = 1200$	Table 26.9-1, pg. 256
	$\alpha := \begin{cases} 7 & \text{if } Exp = "B" \\ 9.5 & \text{if } Exp = "C" \\ 11.5 & \text{if } Exp = "D" \end{cases} = 7$	
	$K_z := 2.01 \cdot \left(\frac{h_1}{z_g}\right)^{\frac{2}{\alpha}} = 0.924$	Table 29.3-1, pg. 310
Velocity Pressure (psf):	$q_{1z} := 0.00256 \cdot K_z \cdot K_{zt} \cdot K_d \cdot V^2 \, psf$	Equation 29.3-1, pg. 307
	$q_{1z} = 26.59 \cdot psf$	

Antenna Dimensions:

	Antenna 1: APXVAARR24_43	TMBXX 6516	RRU 1: 4449 B71+B85
Antenna Height	$h_1 := 95.9in$	$h_2 := 59.8in$	$h_5 := 14.9in$
Antenna Width	$w_1 := 24in$	$w_2 := 12.0in$	$w_5 := 13.2in$
Antenna Depth	$d_1 := 8.7in$	$d_2 := 6.5in$	$d_5 := 10.4in$
Antenna Weight	$m_{ant1} := 128lbf$	$m_{ant2} := 34.6lbf$	$m_{rru1} := 74lbf$
Wind Area Front	$A_{1f} := h_1 \cdot w_1$	$A_{2f} := h_2 \cdot w_2$	$A_{5f} := h_5 \cdot w_5$
Wind Area Side	$A_{1s} := h_1 \cdot d_1$	$A_{2s} := h_2 \cdot d_2$	$A_{5s} := h_5 \cdot d_5$
Aspect Ratio	$Aspect_{1f} := \frac{h_1}{w_1} = 4$	$Aspect_{2f} := \frac{h_2}{w_2} = 5$	$Aspect_{5f} := \frac{h_5}{w_5} = 1.1$
	$Aspect_{1s} := \frac{h_1}{d_1} = 11$	$Aspect_{2s} := \frac{h_2}{d_2} = 9.2$	$Aspect_{5s} := \frac{h_5}{d_5} = 1.4$

	RRU 2: KRY 112 489/2
Antenna Height	$h_6 := 11.0in$
Antenna Width	$w_6 := 6.1in$
Antenna Depth	$d_6 := 3.9in$
Antenna Weight	$m_{rru2} := 15.4lbf$
Wind Area Front	$A_{6f} := h_6 \cdot w_6$
Wind Area Side	$A_{6s} := h_6 \cdot d_6$
Aspect Ratio	$Aspect_{6f} := \frac{h_6}{w_6} = 1.8$
	$Aspect_{6s} := \frac{h_6}{d_6} = 2.8$

Force Coeff front	$C_{f1f} = 1.35$	$C_{f2f} = 1.37$	$C_{f3f} = 1.37$	$C_{f5f} = 1.3$
Force Coeff side	$C_{f1s} = 1.53$	$C_{f2s} = 1.47$	$C_{f3s} = 1.47$	$C_{f5s} = 1.31$
	$C_{f6f} = 1.31$			
	$C_{f6s} = 1.33$			

Figure 29.5-1, pg. 312

Wind Loads on Antennas:

Equation 29.5-1, pg. 308

Antenna 1:
APXVAARR24_43

$W_{f1} := q_{1z} \cdot G \cdot C_{f1f} \cdot A_{1f}$

$W_{f1} = 487.6 \cdot lbf$

$W_{s1} := q_{1z} \cdot G \cdot C_{f1s} \cdot A_{1s}$

$W_{s1} = 200.9 \cdot lbf$

Antenna 2:
TMBXX 6516 A2M

$W_{f2} := q_{1z} \cdot G \cdot C_{f2f} \cdot A_{2f}$

$W_{f2} = 153.9 \cdot lbf$

$W_{s2} := q_{1z} \cdot G \cdot C_{f2s} \cdot A_{2s}$

$W_{s2} = 89.9 \cdot lbf$

RRU 1:
4449 B71+B85

$W_{f5} := q_{1z} \cdot G \cdot C_{f5f} \cdot A_{5f}$

$W_{f5} = 40.2 \cdot lbf$

$W_{s5} := q_{1z} \cdot G \cdot C_{f5s} \cdot A_{5s}$

$W_{s5} = 31.8 \cdot lbf$

RRU 2:
KRY 112 489/2

$W_{f6} := q_{1z} \cdot G \cdot C_{f6f} \cdot A_{6f}$

$W_{f6} = 13.8 \cdot lbf$

$W_{s6} := q_{1z} \cdot G \cdot C_{f6s} \cdot A_{6s}$

$W_{s6} = 9 \cdot lbf$

Wind Loads Mount Members:

Equation 29.5-1, pg. 308

Member:	2.0" STD Pipe	2.5" STD Pipe
Width:	$w_{p2} := 2.375in$	$w_{p25} := 2.875in$
Force Coeff.	$C_{fp2} := 1.2$	$C_{fp25} := 1.2$
Wind Load:	$F_{p2} := q_{1z} \cdot G \cdot C_{fp2} \cdot w_{p2}$	$F_{p25} := q_{1z} \cdot G \cdot C_{fp25} \cdot w_{p25}$
	$F_{p2} = 5.4 \cdot plf$	$F_{p25} = 6.5 \cdot plf$

Antenna Mount Frame Analyzes:

Refer to attached RISA 3D output.

Check Connections

The existing connections are composed of 1/2" threaded rods in Hilti HY-70 adhesive (3 1/8" embed.), assumed per site photos.

Hilti HY-70 Techinical Guide:

Spacing: $s_b := 8in$

Max Tension Strength: $N_n := 905lbf$

Max Shear Strength: $V_n := 1685lbf$

Total Tension Strength: $T := N_n = 0.91 \cdot kip$

Total Shear Strength: $V := V_n = 1.69 \cdot kip$

Max Reactions From RISA 3D:

Envelope Joint Reactions

	Joint		X [k]	L...	Y [k]	LC	Z [k]	L...
1	N9	max	.035	4	.48	3	.053	
2		min	-.035	2	-.367	9	-.072	
3	N7	max	.035	4	.48	3	.053	
4		min	-.035	2	-.367	9	-.072	
5	N10	max	.057	8	.484	5	.113	
6		min	-.057	6	-.364	7	-.095	
7	N8	max	.057	8	.484	5	.113	
8		min	-.057	6	-.364	7	-.095	
9	N17	max	.027	4	.095	3	.028	
10		min	-.027	2	-.049	9	-.035	
11	N18	max	.021	8	.095	5	.033	
12		min	-.021	6	-.049	7	-.026	
13	N19	max	.027	4	.095	3	.028	
14		min	-.027	2	-.049	9	-.035	
15	N20	max	.021	8	.095	5	.033	
16		min	-.021	6	-.049	7	-.026	

$$F_{V1} := 57\text{lbf} \qquad F_{V2} := 484\text{lbf} \qquad F_T := 113\text{lbf} \qquad F_V := \sqrt{F_{V1}^2 + F_{V2}^2} = 487.3\cdot\text{lbf}$$

$$\text{Interaction} := \left(\frac{F_T}{T}\right) + \left(\frac{F_V}{V}\right) = 0.41$$

<1.0 ; **Thus OK**

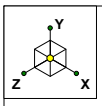
Hence the existing connections are adequate.

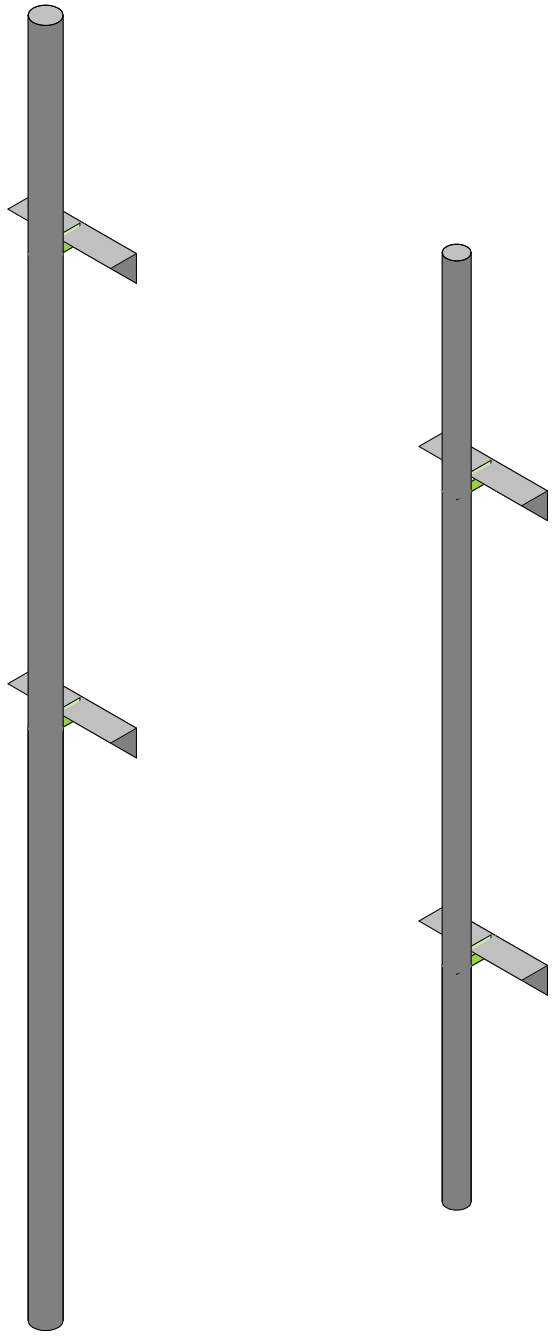
Adhesive Anchoring Systems

3.2.6 HIT-HY 70 Hybrid for Masonry Construction

Table 10 - HIT-HY 70 allowable adhesive bond loads for threaded rods in the face of hollow brick[1, 2, 3, 4, 5, 10]

Nominal anchor diameter	Effective embedment in.	(mm)[6]	Tension lb	(kN)[7, 8]	Minimum edge distance c_{min} in.	(mm)[9]	Load reduction factor @ c_{min}	Shear lb	(kN)[7, 8]	Edge distance[6] Critical c_{cr} in.	(mm)	Minimum c_{min} in.	(mm)	Load reduction factor @ c_{min}
1/4	3-1/8	(79)	530	(2.4)	8	(203)	1.00	370	(1.6)	12	(304.8)	8	(203)	1.00
5/16			735	(3.3)				595	(2.6)					1.00
3/8			905	(4.0)				1,045	(4.7)					0.76
1/2			905	(4.0)				1,685	(7.5)					0.52





Envelope Only Solution

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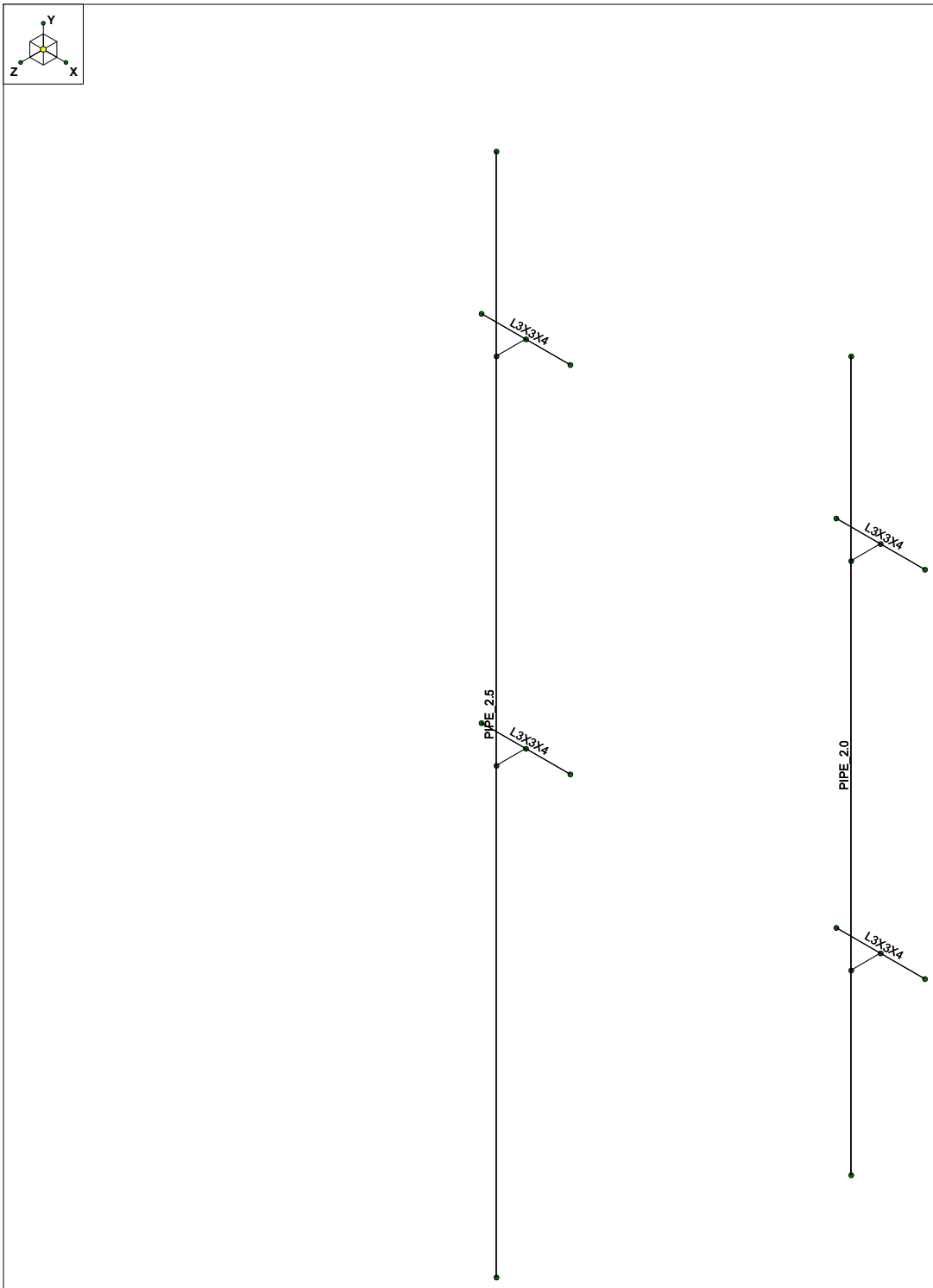

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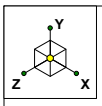

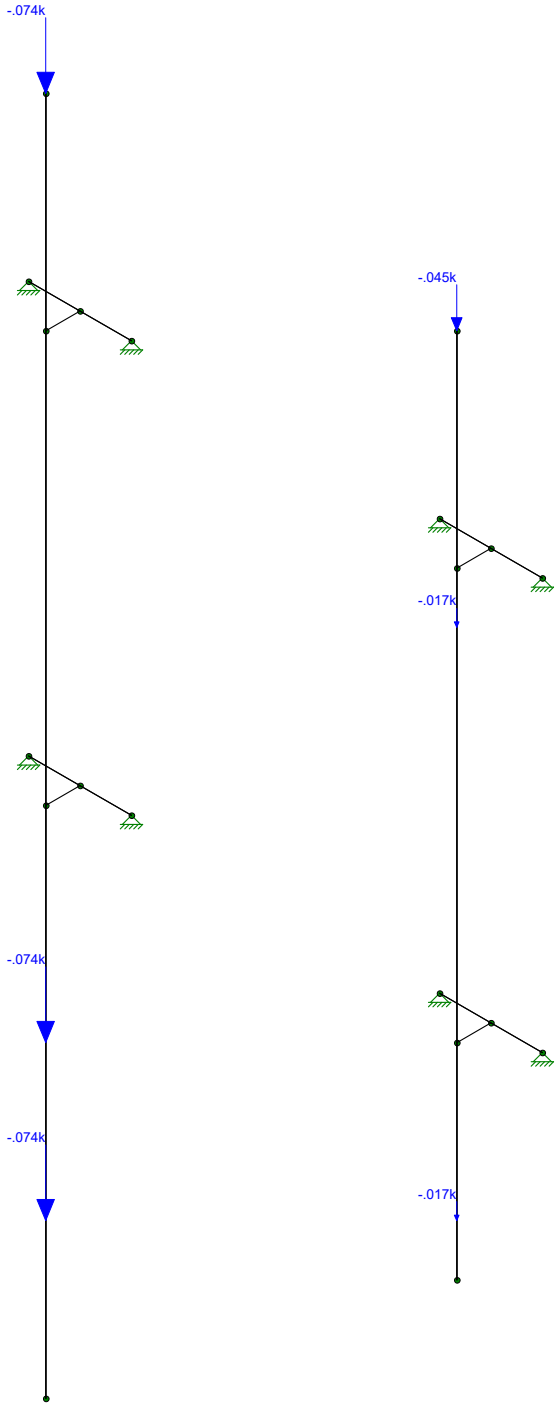

Loads: BLC 1, DEAD
Envelope Only Solution

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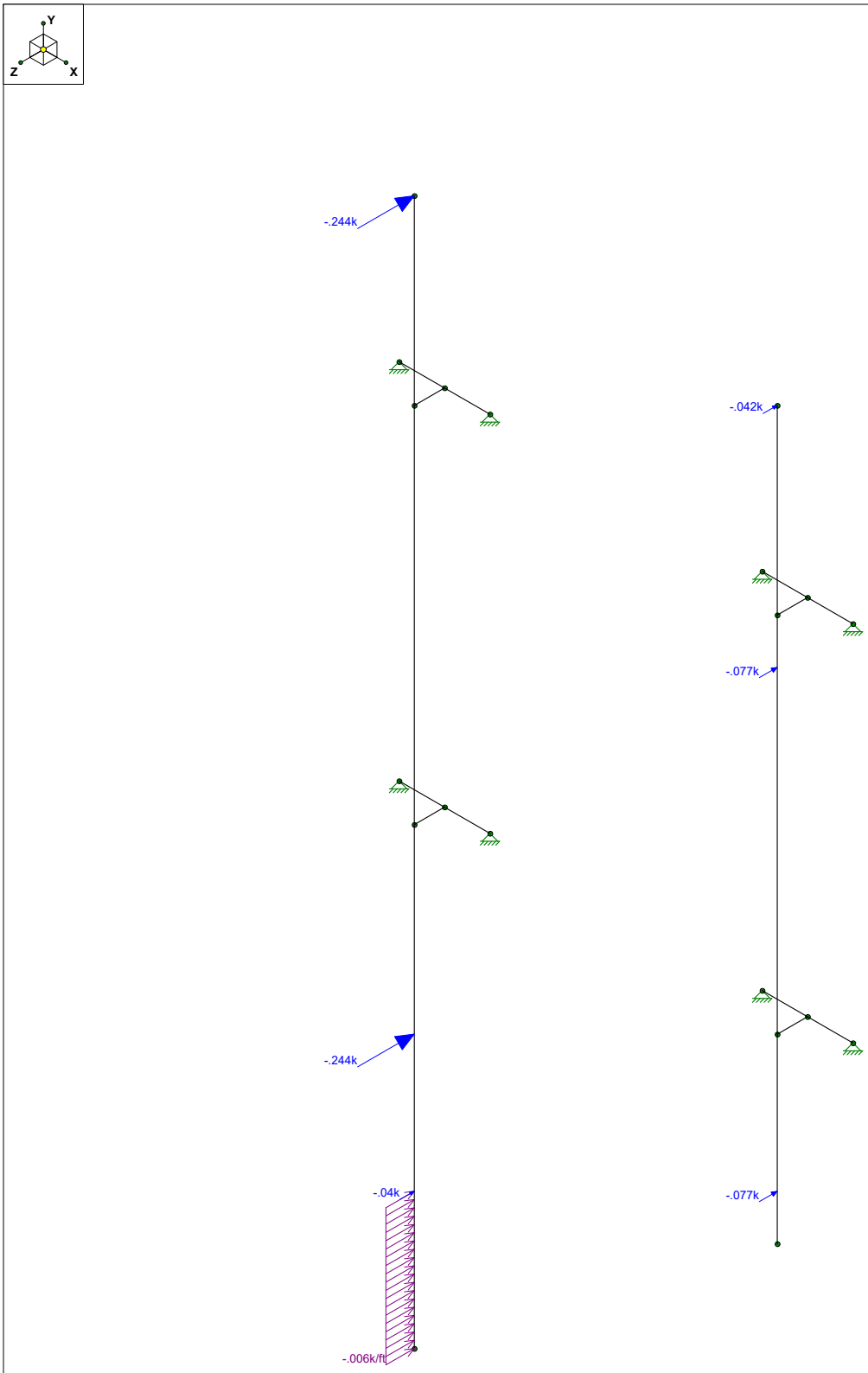

Loads: BLC 3, WIND Z
Envelope Only Solution

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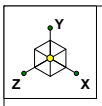

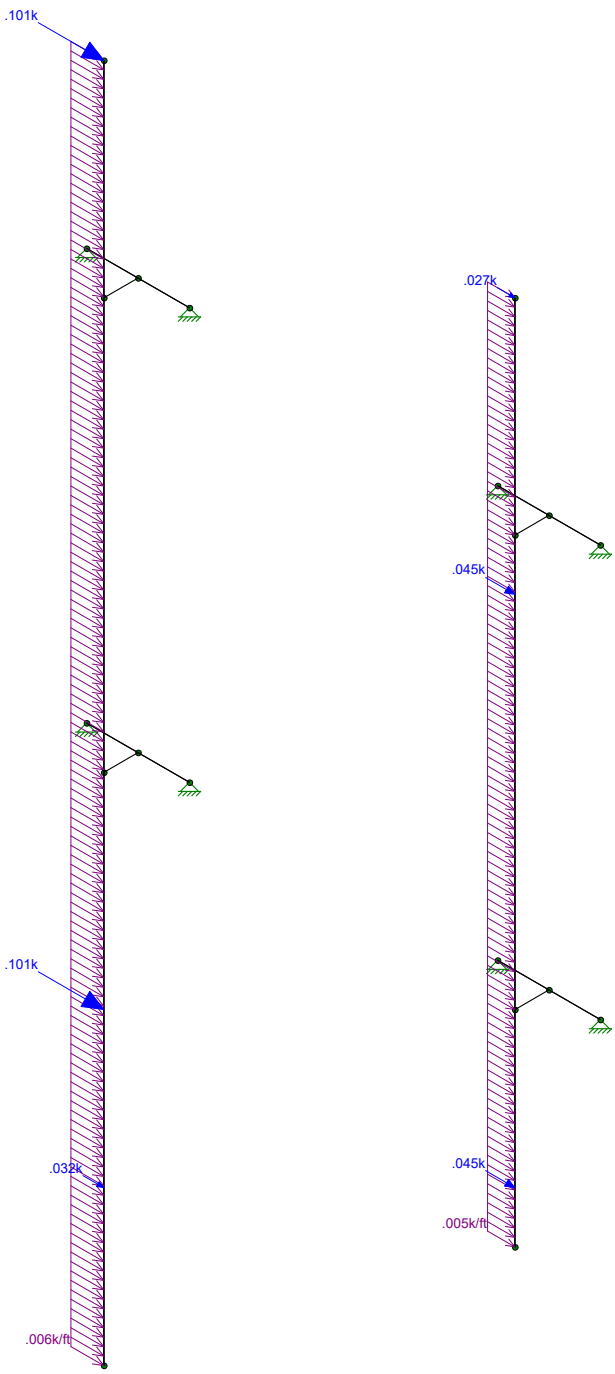

Loads: BLC 2, WIND X
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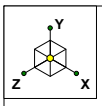

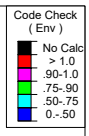

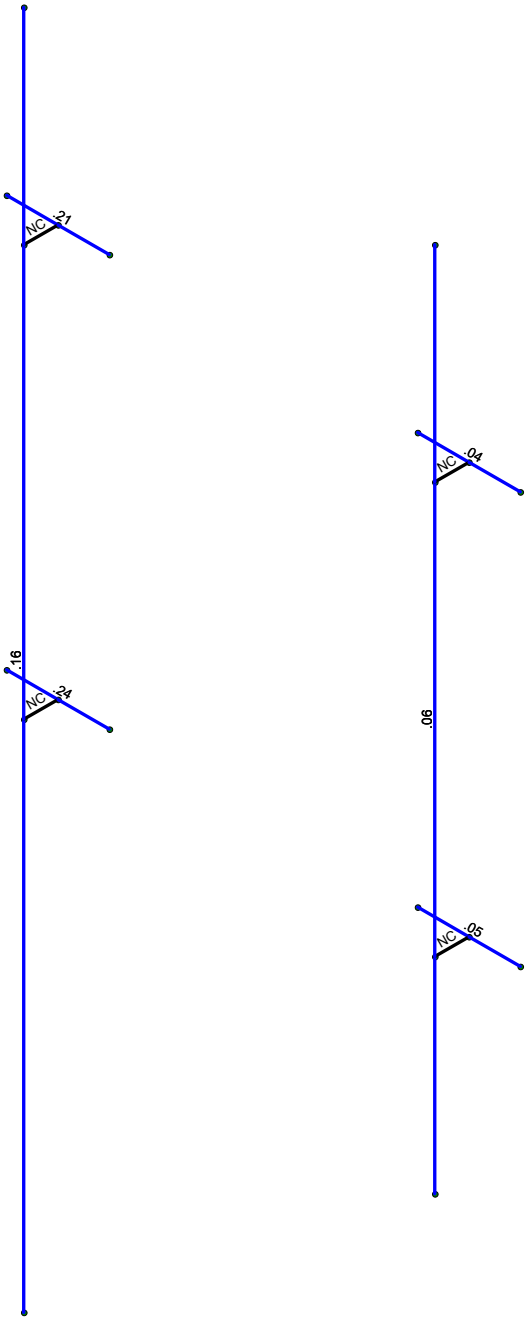

Member Code Checks Displayed (Enveloped)
Envelope Only Solution

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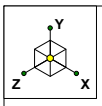

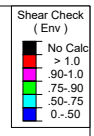

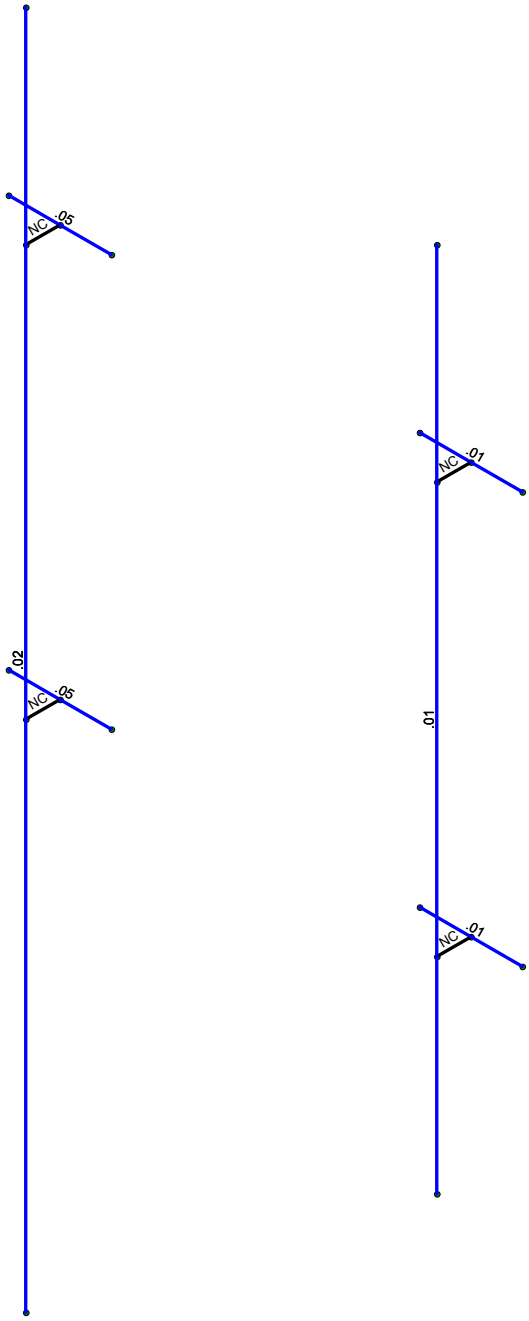

Member Shear Checks Displayed (Enveloped)
Envelope Only Solution

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Hot Rolled Steel Properties

	Label	E [ksi]	G [ksi]	Nu	Therm (/1E...	Density[k/ft...	Yield[ksi]	Ry	Fu[ksi]	Rt
1	A992	29000	11154	.3	.65	.49	50	1.1	65	1.1
2	A36 Gr.36	29000	11154	.3	.65	.49	36	1.5	58	1.2
3	A572 Gr.50	29000	11154	.3	.65	.49	50	1.1	65	1.1
4	A500 Gr.B RND	29000	11154	.3	.65	.527	42	1.4	58	1.3
5	A500 Gr.B Rect	29000	11154	.3	.65	.527	46	1.4	58	1.3
6	A53 Gr.B	29000	11154	.3	.65	.49	35	1.6	60	1.2
7	A1085	29000	11154	.3	.65	.49	50	1.4	65	1.3

Hot Rolled Steel Section Sets

	Label	Shape	Type	Design List	Material	Design Rules	A [in2]	Iyy [in4]	Izz [in4]	J [in4]
1	MP	PIPE_2.5	Beam	Pipe	A53 Gr.B	Typical	1.61	1.45	1.45	2.89
2	WM	L3X3X4	Beam	Single Angle	A36 Gr.36	Typical	1.44	1.23	1.23	.031
3	MP 2	PIPE_2.0	Beam	Pipe	A53 Gr.B	Typical	1.02	.627	.627	1.25

Joint Coordinates and Temperatures

	Label	X [ft]	Y [ft]	Z [ft]	Temp [F]	Detach From Diap...
1	N1	0	0	0	0	
2	N2	0	11	0	0	
3	N3	0	9	0	0	
4	N4	0	5	0	0	
5	N5	0	9	-.333	0	
6	N6	0	5	-.333	0	
7	N7	.5	9	-.333	0	
8	N8	.5	5	-.333	0	
9	N9	-.5	9	-.333	0	
10	N10	-.5	5	-.333	0	
11	N11	4	3	0	0	
12	N12	4	11	0	0	
13	N13	4	9	0	0	
14	N14	4	5	0	0	
15	N15	4	9	-.333	0	
16	N16	4	5	-.333	0	
17	N17	4.5	9	-.333	0	
18	N18	4.5	5	-.333	0	
19	N19	3.5	9	-.333	0	
20	N20	3.5	5	-.333	0	

Basic Load Cases

	BLC Description	Category	X Gravity	Y Gravity	Z Gravity	Joint	Point	Distributed	Area(Me...	Surface(P...
1	DEAD	DL		-1			6			
2	WIND X	WLX					6	2		
3	WIND Z	WLZ					6	1		

Member Point Loads (BLC 1 : DEAD)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M1	Y	-.074	11
2	M1	Y	-.074	3
3	M1	Y	-.074	1.5
4	M6	Y	-.017	.5
5	M6	Y	-.017	5.5
6	M6	Y	-.045	8

Member Point Loads (BLC 2 : WIND X)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M1	X	.101	11
2	M1	X	.101	3
3	M1	X	.032	1.5
4	M6	X	.045	.5
5	M6	X	.045	5.5
6	M6	X	.027	8

Member Point Loads (BLC 3 : WIND Z)

	Member Label	Direction	Magnitude[k,k-ft]	Location[ft,%]
1	M1	Z	-.244	11
2	M1	Z	-.244	3
3	M1	Z	-.04	1.5
4	M6	Z	-.077	.5
5	M6	Z	-.077	5.5
6	M6	Z	-.042	8

Member Distributed Loads (BLC 2 : WIND X)

	Member Label	Direction	Start Magnitude[k/ft,...	End Magnitude[k/ft,F...	Start Location[ft,%]	End Location[ft,%]
1	M1	X	.006	.006	0	0
2	M6	X	.005	.005	0	0

Member Distributed Loads (BLC 3 : WIND Z)

	Member Label	Direction	Start Magnitude[k/ft,...	End Magnitude[k/ft,F...	Start Location[ft,%]	End Location[ft,%]
1	M1	Z	-.006	-.006	0	1.5

Load Combinations

	Description	So..	P...	S...	BLC	Fac..	BLC	Fac..	BLC	Fac..	BLC	Fac..	BLC	Fac..	BLC	Fac..	BLC	Fac..	BLC	Fac..	BLC	Fac..	BLC	Fac..	BLC	Fac...
1	ASCE ASD 1	Yes	Y		DL	1																				
2	ASCE ASD 5 (a) (a)	Yes	Y		DL	1	W...	.6																		
3	ASCE ASD 5 (a) (b)	Yes	Y		DL	1	W...	.6																		
4	ASCE ASD 5 (a) (c)	Yes	Y		DL	1	W...	-.6																		
5	ASCE ASD 5 (a) (d)	Yes	Y		DL	1	W...	-.6																		
6	ASCE ASD 7 (a)	Yes	Y		DL	.6	W...	.6																		
7	ASCE ASD 7 (b)	Yes	Y		DL	.6	W...	.6																		
8	ASCE ASD 7 (c)	Yes	Y		DL	.6	W...	-.6																		
9	ASCE ASD 7 (d)	Yes	Y		DL	.6	W...	-.6																		

Envelope Joint Reactions

	Joint		X [k]	LC	Y [k]	LC	Z [k]	LC	MX [k-ft]	LC	MY [k-ft]	LC	MZ [k-ft]	LC
1	N8	max	.057	8	.484	5	.113	3	0	9	0	9	0	9
2		min	-.057	6	-.364	7	-.095	9	0	1	0	1	0	1
3	N10	max	.057	8	.484	5	.113	3	0	9	0	9	0	9
4		min	-.057	6	-.364	7	-.095	9	0	1	0	1	0	1
5	N7	max	.035	4	.48	3	.053	7	0	9	0	9	0	9
6		min	-.035	2	-.367	9	-.072	5	0	1	0	1	0	1
7	N9	max	.035	4	.48	3	.053	7	0	9	0	9	0	9
8		min	-.035	2	-.367	9	-.072	5	0	1	0	1	0	1
9	N17	max	.027	4	.095	3	.028	7	0	9	0	9	0	9
10		min	-.027	2	-.049	9	-.035	5	0	1	0	1	0	1
11	N19	max	.027	4	.095	3	.028	7	0	9	0	9	0	9
12		min	-.027	2	-.049	9	-.035	5	0	1	0	1	0	1
13	N18	max	.021	8	.095	5	.033	3	0	9	0	9	0	9
14		min	-.021	6	-.049	7	-.026	9	0	1	0	1	0	1
15	N20	max	.021	8	.095	5	.033	3	0	9	0	9	0	9
16		min	-.021	6	-.049	7	-.026	9	0	1	0	1	0	1
17	Totals:	max	.279	8	.409	5	.44	7						
18		min	-.279	2	.245	6	-.44	5						

Envelope AISC 14th(360-10): ASD Steel Code Checks

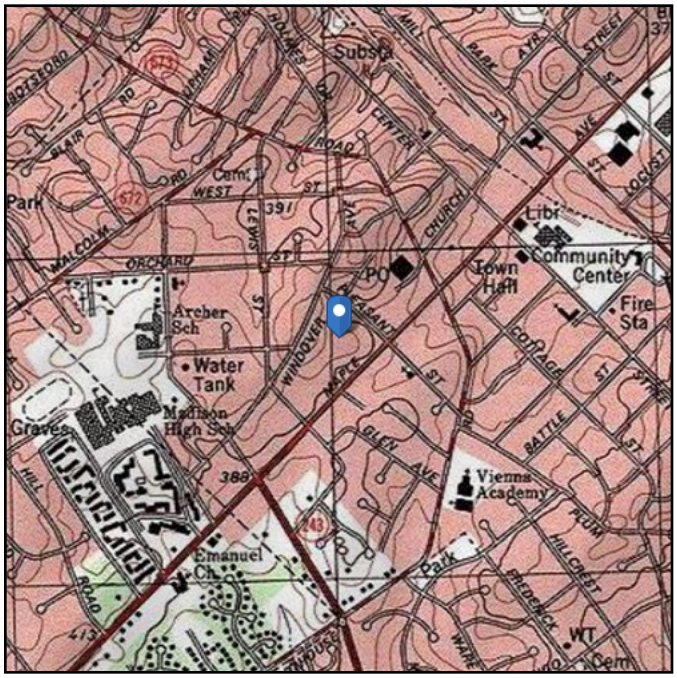
	Member	Shape	Code Check	Loc[ft]	LC	Shear ...	Loc[ft]	Dir	LC	Pnc/om ...	Pnt/om [...	Mnyy/o...	Mnzz/o...	Cb	Eqn
1	M3	L3X3X4	.236	.5	5	.050	0	z	5	30.362	31.042	1.123	2.499	1...	H2-1
2	M2	L3X3X4	.210	.5	3	.049	0	z	3	30.362	31.042	1.123	2.499	1...	H2-1
3	M1	PIPE_2.5	.164	4.927	5	.017	3.094		9	12.508	33.743	2.393	2.393	1	H1-1b
4	M6	PIPE_2.0	.064	2	5	.007	.5		9	9.924	21.377	1.245	1.245	1	H1-1b
5	M8	L3X3X4	.047	.5	5	.010	0	z	5	30.362	31.042	1.123	2.499	1...	H2-1
6	M7	L3X3X4	.039	.5	3	.010	0	z	3	30.362	31.042	1.123	2.499	1...	H2-1

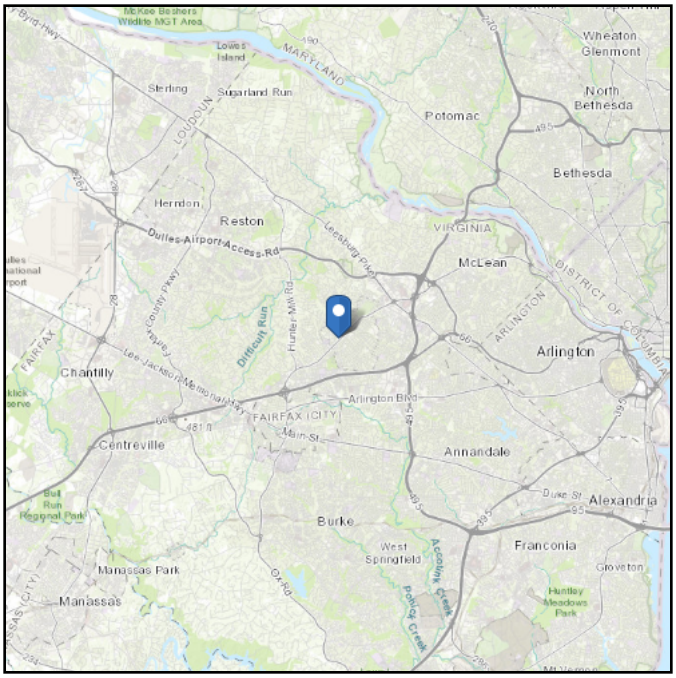
ASCE 7 Hazards Report

Address:
301 Maple Ave W
Vienna, Virginia
22180

Standard: ASCE/SEI 7-10
Risk Category: II
Soil Class: D - Stiff Soil

Elevation: 412.42 ft (NAVD 88)
Latitude: 38.89827
Longitude: -77.270958





Wind

Results:

Wind Speed:	115 Vmph
10-year MRI	76 Vmph
25-year MRI	84 Vmph
50-year MRI	90 Vmph
100-year MRI	96 Vmph

Data Source: ASCE/SEI 7-10, Fig. 26.5-1A and Figs. CC-1–CC-4, incorporating errata of March 12, 2014

Date Accessed: Wed May 27 2020

Value provided is 3-second gust wind speeds at 33 ft above ground for Exposure C Category, based on linear interpolation between contours. Wind speeds are interpolated in accordance with the 7-10 Standard. Wind speeds correspond to approximately a 7% probability of exceedance in 50 years (annual exceedance probability = 0.00143, MRI = 700 years).

Site is not in a hurricane-prone region as defined in ASCE/SEI 7-10 Section 26.2.

Mountainous terrain, gorges, ocean promontories, and special wind regions should be examined for unusual wind conditions.

Ice

Results:

Ice Thickness:	0.75 in.
Concurrent Temperature:	15 F
Gust Speed:	30 mph
Data Source:	Standard ASCE/SEI 7-10, Figs. 10-2 through 10-8
Date Accessed:	Wed May 27 2020

Ice thicknesses on structures in exposed locations at elevations higher than the surrounding terrain and in valleys and gorges may exceed the mapped values.

Values provided are equivalent radial ice thicknesses due to freezing rain with concurrent 3-second gust speeds, for a 50-year mean recurrence interval, and temperatures concurrent with ice thicknesses due to freezing rain. Thicknesses for ice accretions caused by other sources shall be obtained from local meteorological studies. Ice thicknesses in exposed locations at elevations higher than the surrounding terrain and in valleys and gorges may exceed the mapped values.