32 W 273 Army Trail Road, Suite # 100, Wayne, IL 60184
HUTTER TRANKINA ENGINEERING
CONSULTING STRUCTURAL ENGINEERS
Phone: 630-513-6711
htedesign.com

June 16, 2023
Revised: November 16, 2023

Mr. Dan Szlaga
Terra Consulting Group, Ltd.
600 Busse Highway, 2nd Floor
Park Ridge, IL 60068-2568

Re: VZN: Rand & 53 Relo
Loc. # 766005 / Terra # 333608
Hutter Trankina # 20243B

Dear Mr. Szlaga:

Per your request, we have analyzed the above-referenced site, which is located at 1500 West Shure Drive in Arlington Heights, Illinois. The following paragraphs summarize our findings.

PURPOSE

The purpose of this analysis was to design antenna mounts and verify the structural adequacy of the existing supporting structure for the proposed equipment as specified by Verizon.

DESCRIPTION

The antennas are to be mounted to single pipe mounts on the side of the existing precast wall. Per the landlord's request, new mounts will be installed at the Alpha and Gamma sectors, and the existing mounts will be re-used at the Beta sector. The analysis was based on the Verizon RFDS dated 5/4/2023, a site visit performed by HTE on 3/11/2020, and information provided by your office.

ANALYSIS RESULTS AND CONCLUSION

From our analysis, the following capacity ratings were determined:

Proposed Pipe Mounts:	PASS
Existing Pipe Mounts (Beta):	**FAIL**
Existing Building:	PASS

Based on the performed calculations, the existing mounts at the Beta sector **cannot be verified as structurally acceptable** to resist the wind loads imposed by the proposed equipment. The type and depth of anchorage is unknown per the mapping provided. Please see the attached sketches for the antenna / equipment mounts at the Alpha and Gamma sectors.

Should you have any questions regarding this report or require further analysis, please feel free to contact us.

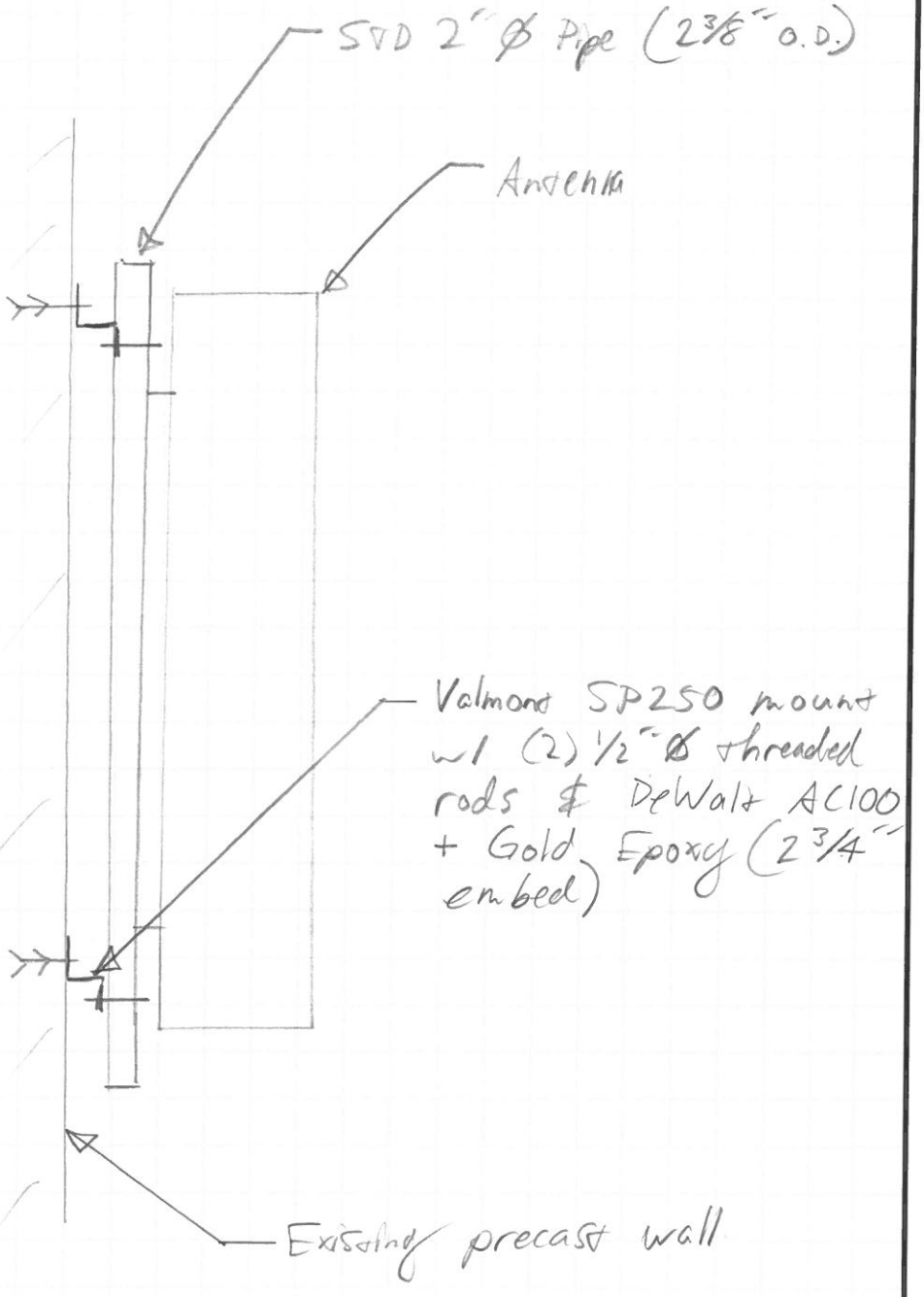
Sincerely,

Josh D. Rak
Project Engineer

John L. Trankina
President

Attachment: Alpha/Gamma Mount Design

* All new steel shall be galvanized



(1) Antenna Mount – Proposed @ Alpha/Gamma
N.T.S.

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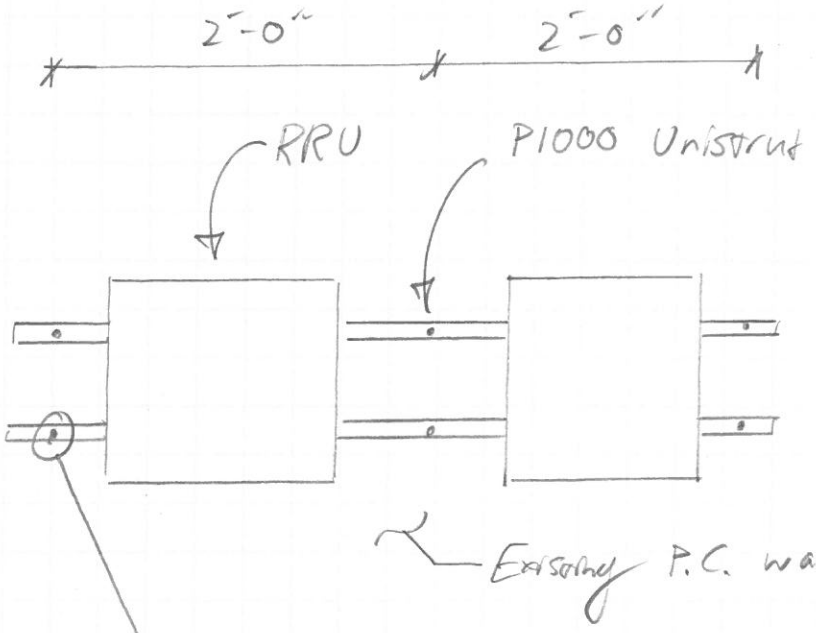

(2) RRU Wall mount
N.T.S

* All new steel shall be galvanized

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Structural Calculations

For

Verizon Loc. # 766005

Rand & 53 Relo

1500 West Shure Drive
Arlington Heights, Illinois

June 16, 2023
Revised: November 16, 2023

PREPARED BY:
HUTTER TRANKINA ENGINEERING
32 W 273 Army Trail Road, Suite 100, Wayne, IL 60184

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Project # 20243B

PURPOSE: DESIGN WALL MOUNTS FOR ANTENNAS AND ASSOCIATED EQUIPMENT

CODES, SPEC'S, REF: EIA-TIA-222-H

EQUIPMENT: PER VERIZON RFDS DATED 11/8/2023

ITEM	NO.			
Commscope NHH-65C-R2B	6			
KRE105281	3			
AIR6449	3			
Ericsson 8843	3			
Ericsson 4449	3			
Raycap 3315	3			

RESULTS:

PROPOSED MOUNTS: PASS
EXISTING MOUNTS: **FAIL**
EXISTING BUILDING: PASS

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JOB:	20243B		
CALC BY:	JDR	DATE:	
CHECK BY:		DATE:	
SHEET NO:	1	OF	CRITERIA
DESCRIPTION:	TELECOM PROJECT CRITERIA		

REV H - DETERMINATION OF WIND LOADS FOR MOUNT ANALYSIS

z = h =	**95.00 ft**	Z_g =	900
Exp =	**C**	α =	9.5
Risk Category=	**2**	$K_{z\,min}$ =	0.85
K_e=	**1.00** (ground elevation factor)	$K_Z = 2.01(z/z_g)^{2/a}$ =	**1.25**
V =	**107 mph**	$q_Z = 0.00256K_zK_{zt}K_dK_eK_sV^2$ =	**34.9 psf**
G_H =	**1.00** See section 2.6.9 - 3rd paragraph	$G_H\,q_z$ =	**34.9 psf**
K_{zt} =	**1.0** (topographic factor)		
K_d =	**0.95** (directionality factor)	$K_{iz} = (z/33)^{0.10} < 1.4$ =	**1.11**
K_s=	**1.00** (rooftop speed-up factor)	$t_{iz} = t_i I_{ice\_t} K_{iz}(K_{zt})^{0.35}$ =	**1.67 in**
V_{ice} =	**40 mph**	$q_{Zice} = 0.00256K_zK_{zt}K_dK_eK_sV^2$ =	**4.9 psf**
t_i =	**1.50 in**	$G_H\,q_{zice}$ =	**4.9 psf**

Manufacturer	Antenna	L (in)	W (in)	D (in)	Wt (lbs)	L/W	Ca	Front CaAa	L/D	Ca	Side CaAa	CaAa (ice)	CaAa (ice)	1.67 Ice Wt.
Andrew	NHH-65C-R2B	96	11.9	7.1	52	8.07	1.44	11.39	13.52	1.62	7.66	14.48	10.61	249
Ericsson	AIR 6449 VZE01-Sub6	30.4	15.9	8.1	82	1.91	1.20	4.03	3.75	1.26	2.15	5.41	3.31	114
Ericsson	KRE 10528 / 4408	8.4	7.9	4.9	11	1.06	1.20	0.55	1.71	1.20	0.34	1.10	0.81	25
Ericsson	8843 or 4449	18	13.2	10.9	72	1.36	1.20	1.98	1.65	1.20	1.64	2.94	2.53	79
Raycap	RCMDC-3315-PF-48	19.18	15.73	10.25	32	1.22	1.20	2.51	1.87	1.20	1.64	3.58	2.55	89
Misc	2" DIA X 8' PIPE	96	2.38	2.38	29	40.34	1.20	1.90	40.34	1.20	1.90	4.73	4.73	69

	Qty	Front Area Exp. Factor	Front CaAa	Side CaAa	Wt.	Front CaAa (ice)	Side CaAa (ice)	1.67 Ice Wt.
Antenna 1								
NHH-65C-R2B	1	1.00	11.39	7.66	52.0	14.48	10.61	249
Σ =			**11.39**	**7.66**	**52.0 lbs**	**14.48**	**10.61**	**249 lbs**
Wind =			35 psf	35 psf		4.9 psf	4.9 psf	
F =			**397 lbs**	**267 lbs**		**71 lbs**	**52 lbs**	
F (30) =			**364 lbs**			**66 lbs**		
F(60) =			**299 lbs**			**56 lbs**		

	Qty	Front Area Exposure Factor	Front CaAa	Side CaAa	Wt.	Front CaAa (ice)	Side CaAa (ice)	1.67 Ice Wt.
Antenna 2								
AIR 6449 VZE01-Sub6	1	1.00	4.03	2.15	82.0	5.41	3.31	114
KRE 10528 / 4408	1	1.00	0.55	0.34	11.0	1.10	0.81	25
Σ =			**4.58**	**2.49**	**93.0 lbs**	**6.51**	**4.11**	**138 lbs**
Wind =			35 psf	35 psf		4.9 psf	4.9 psf	
F =			**160 lbs**	**87 lbs**		**32 lbs**	**20 lbs**	
F (30) =			**141 lbs**			**29 lbs**		
F(60) =			**105 lbs**			**23 lbs**		

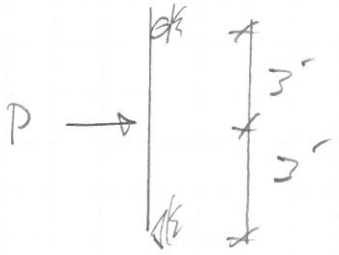
	Qty	Front Area Exposure Factor	Front CaAa	Side CaAa	Wt.	Front CaAa (ice)	Side CaAa (ice)	1.67 Ice Wt.
Antenna - 3								
8843 or 4449	1	1.00	1.98	1.64	72.0	2.94	2.53	79
Σ =			**1.98**	**1.64**	**72.0 lbs**	**2.94**	**2.53**	**79 lbs**
Wind =			35 psf	35 psf		4.9 psf	4.9 psf	
F =			**69 lbs**	**57 lbs**		**14 lbs**	**12 lbs**	
F (30) =			**66 lbs**			**14 lbs**		
F(60) =			**60 lbs**			**13 lbs**		

Wall Mount

$P = 397(0.6) = 238\#$

↑ Ant 1 ASD controls

$M = \frac{Pl}{4} = 358'-\#$



Use 2" SCD Pipe
$M_{cap} = 1{,}230'-\#$ ✓

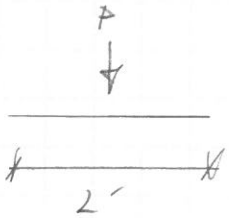
Use Valmont SP250 mount w/ (2) 1/2" Ø threaded rods & DeWalt AC100+ Gold epoxy (2 3/4" embed) ✓

RRU Mount

$P_w = 69\#$

$P_d = 72$

$M = 40'-\#$



$M_{cap} = \frac{F_y S_x}{\Omega} = \frac{(40)(0.262)/12}{1.67} = 471'-\#$ ✓

Use P1000 Unistrut w/ same anchors ↗

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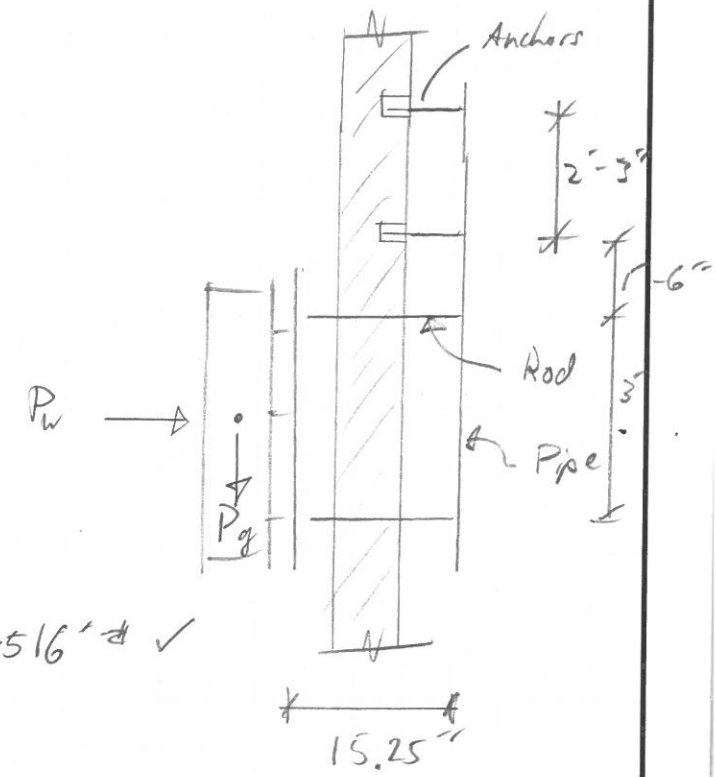
(E) Wall Mount (Beta Sector)



Wind - no ice

$P_w = 397 \times 0.6 = 238^{\#}$

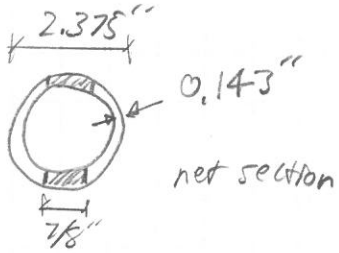
$P_g = 52^{\#}$

• Rod: 3/4"Ø (36 ksi assumed)

$M = P_g \, 15.25/12 = 66'\text{-}\#$

$\frac{M_n}{\Omega} = \frac{F_y Z}{\Omega} = \frac{(36^{ksi})(0.75")^3/6}{1.67} = 1{,}516'\text{-}\# \checkmark$

• Pipe – 2" STD pipe assumed (2 3/8" O.D.) ← Approx, not mapped



net section $M = P_w \times 1.5' + P_g \times 2'$

$M = 461'\text{-}\#$

$M_n/\Omega = 1{,}250'\text{-}\# - \frac{F_y(A_i \bar{y}_{pi})}{\Omega}$ ← Z_x of shaded area b/c rod penetration

- $F_y = 33^{ksi}$
- $A = 0.12859\ in^2$ (AutoCAD)
- $\bar{y}_p = 1.09375"$

$M_n/\Omega = 1{,}250'\text{-}\# - \frac{(33^{ksi})(0.12859\,in^2 \times 1.09375 \times 2)}{1.67}\ 1/12"$

$M_n/\Omega = 1{,}250'\text{-}\# - 491'\text{-}\#$

$M_n/\Omega = 759'\text{-}\# > M_u \checkmark$

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- Pipe (cond.)

gross section

$M = P_w \times 3' + P_g \times 2'$

$M = 818'\text{-}\#$

$\frac{M_n}{\Omega} = 1{,}250'\text{-}\# > M$ ✓

- Anchors (5/8" Ø anchors)

$\text{Max } V = \sqrt{(P_{sw}/4)^2 + (P_g/4)^2} = 68\#/\text{bolt}$

$\rightarrow P_{sw} = 267 \times 0.6 = 160\#$

$\text{Max } T = [P_w\ 5.25'/2.25]/2\text{bolts} + P_g\ 2'/2.25 = 324\#$

Anchors adhesive unknown cannot pass!

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SCALE

Wind – with ice

$P_w = 71^{\#} \times 0.6 = 43^{\#}$

$P_g = 249^{\#}$

- Rod: $M = P_g \; 15.25/12 = 316'\text{-}\#$

  $M_n/\Omega = 1{,}516'\text{-}\#$ ✓

- Pipe: $M = P_w \times 1.5' + P_g \times 2' = 563'\text{-}\#$

  net section $\frac{M_n}{\Omega_b} = 759'\text{-}\#$ (net section)

  gross section $M = P_w \times 3' + P_g \times 2' = 627'\text{-}\#$

  $\frac{M_n}{\Omega} = 1{,}250'\text{-}\#$ ✓

- Anchors:

  $\text{Max } V = \sqrt{(P_{sw}/4)^2 + (P_g/4)^2} = 63^{\#}/\text{bolt}$

  $\rightarrow P_{sw} = 52 \times 0.6 = 31^{\#}$

  $\text{Max } T = P_w \; 5.25/2.25/2 \text{ bolts} + P_g \; 2'/2.25' = 258^{\#}/\text{bolt}$

Epoxy unknown cannot pass! NG

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SCALE