From: Brian Gaudet <BGaudet@allpointstech.com>
Sent: Wednesday, November 11, 2020 5:28 PM
To: CSC-DL Siting Council <Siting.Council@ct.gov>
Cc: Mike Libertine <mlibertine@allpointstech.com>; Lord, Andrew <andrew.lord@eversource.com>; Shanley, Kathleen M <kathleen.shanley@eversource.com>
Subject: RE: Notice of Exempt Modification - Eversource - 173 Mechanic Street, Killingly, CT 06239 - Filing/Electronic Copy

Good evening,

After speaking with Ifeanyi regarding a previous site that was deemed incomplete due to the need for a Mount Analysis, we would like to submit a supplemental Mount Analysis that was performed for this site. Please see attached and let me know if you have any questions.

Best Regards,

Brian Gaudet
Project Manager

D: 860.581.4482
M: 860.798.6597
E: bgaudet@allpointstech.com

All-Points Technology Corporation, P.C.
567 Vauxhall Street Extension – Suite 311
Waterford, CT 06385

Please note our new corporate office address

From: Brian Gaudet
Sent: Wednesday, November 4, 2020 12:06 PM
To: 'CSC-DL Siting Council' <Siting.Council@ct.gov>
Cc: Mike Libertine <mlibertine@allpointstech.com>; 'Lord, Andrew' <andrew.lord@eversource.com>; 'Shanley, Kathleen M' <kathleen.shanley@eversource.com>
Subject: Notice of Exempt Modification - Eversource - 173 Mechanic Street, Killingly, CT 06239 - Filing/Electronic Copy

Good Afternoon,

Please see attached the Notice of Exempt Modification for proposed modifications by Eversource on an existing tower on a rooftop at 173 Mechanic Street in Killingly. Feel free to reach out to me with any questions or if anything further is needed from our end.

Best Regards,

EVERSOURCE ENERGY

BLACK & VEATCH
Building a world of difference.
BLACK & VEATCH CORPORATION
6800 W 115TH ST, SUITE 2292, OVERLAND PARK, KS 66211
+1 913-458-2522 | RILEYJJ@BV.COM

November 11, 2020

MOUNT EVALUATION LETTER

Site Number: ES-153
Site Name: DANIELSON WORK CENTER
Site Data: 173 Mechanic Street
Killingly, CT 06239
Latitude: 41° 48’ 40.6”
Longitude: -71° 53’ 1.6”

Black & Veatch Corporation is pleased to submit this “Mount Evaluation Letter” to determine the structural integrity of antenna mounting system on the above-mentioned site. The purpose of this evaluation is to determine the capacity of the system in supporting the final loading in the attached “Loading Summary”.

Based on our evaluation we have determined the antenna mounting system to be: **SUFFICIENT**

Structure Rating (max from all components) =	59.5%

The existing mounting system will be capable of supporting the existing and proposed equipment, under the assumptions described in Section 4 of the report and the following conditions:

- Contractor shall be responsible for the means and methods of construction.
- Contractor shall inspect the condition of all existing and proposed structural members, all relevant members and connections and report any deficiencies to the engineer prior to installation of any new antennas and other equipment.

The scope of this evaluation pertains only to the existing antenna mounting system and does not include examination of the loads imparted by the antenna mounting system to the existing tower and its structural components. This document was prepared based on information provided to Black & Veatch. If existing conditions do not reflect those represented, this analysis is no longer valid.

Please contact Josh Riley in our Overland Park Office
at 913-458-2522 if you have any questions or comments.

Sincerely,
Black & Veatch Corporation

Prepared By: Joohwan Jung
Submitted By: Josh Riley, P.E.

11/11/2020

TABLE OF CONTENTS

1. LOADING SUMMARY

Appurtenance								
Carrier	Position	Sector	Antenna RAD Center (ft)	Mount Centerline (ft)	Qty	Type	Manufacturer	Model
Eversource	1	-	86	77	1	Omni	dbSpectra	DS2C03F36D-D

2. ANALYSIS CRITERIA SUMMARY

ANALYSIS CRITERIA	
STANDARD	TIA-222-H
WIND SPEED	Ultimate of 140 mph
WIND SPEED WITH ICE	50 mph with 1.5" radial ice thickness
EXPOSURE CATEGORY	B
RISK CATEGORY	III
TOPO CATEGORY	Flat
CREST HEIGHT	N/A
SPECTRAL RESPONSE FACTORS, Ss & S1	0.171 g & 0.062 g

3. REFERENCES

- American Institute of Steel Construction, AISC 15th Edition
- Telecommunications Industry Association Standard, TIA-222-H & 2018 Connecticut State Building Code
- Mount Assembly Drawing (Model: SV197-48) by SitePro 1, dated 04/14/2011

4. ASSUMPTIONS

This analysis may be affected if any assumptions are not valid or have been made in error. Black & Veatch should be notified to determine the effect on the structural integrity of the antenna mounting system.

- The antenna mounting system was properly fabricated, installed and maintained in good condition in accordance with its original design and manufacturer's specifications.
- The configuration of antennas, mounts, and other appurtenances are as specified in the Loading Summary and the referenced drawings.
- All member connections are assumed to have been designed to meet or exceed the load carrying capacity of the connected member unless otherwise specified in this report.
- Sector frame center line: located equidistant between top & bottom boom; Platform center line: located at the base perimeter of platform, unless otherwise specified.
- Steel grades have been assumed as follows, unless noted otherwise:

Channel, Solid Round, Angle, Plate	ASTM A36 (GR 36)
HSS (Rectangular)	ASTM 500 (GR B-46)
Pipe	ASTM A53 (GR B-35)
Connection Bolts	ASTM A325

5. RESULTS SUMMARY

Name	Bending Stress Ratio		Shear Stress Ratio	
Arm: HSS4X4X1/4	45.7%	Pass	34.3%	Pass
Connection Pipe: Pipe 4.0 Std	0.1%	Pass	0.1%	Pass
Mount Pipe: Pipe 3.0 Std	59.5%	Pass	3.9%	Pass
	Tension SR		*Shear SR*	
Bolt Checks on M1 in Load Case 10	21.8%	Pass	17.6%	Pass

*Von Mises SR = (Max Von Mises Value From RISA-3D)/(0.9*Fy)

**Capacity rating per TIA-222-H Section 15.5.

APPENDIX 1:
MOUNT ANALYSIS REPORT

Dead and Live Loads

Maintenance Live Load: L_V = 250 lb
Installation Live Load: L_M = 500 lb

Appurtenance Dead Loads	
Name	Weight (lb)
DS2C03F36D-D	75

BLACK & VEATCH

Client: Eversource | Computed By: Joohwan Jung
Site Name: DANIELSON WORK CENTER (ES-153) | Date: 11/11/2020
Verified By: JW
Title: MOUNT ANALYSIS REPORT | Date: 11/11/2020

Appurtenance Wind Loading

			Equations	TIA-222-H
Exposure Category =	B		$K_z = 2.01\ (z / z_g)^{2/\alpha}$	2.6.5.2
Risk Category =	III			
Topographic Category =	1		$K_h = e^{(f \cdot z / H)}$	2.6.6.2.1
Basic Wind Speed, V =	140	mph		
Height Above Ground, z =	86	ft	$K_{zt} = [1 + K_c K_t / K_h]^2$	2.6.6.2.1
Crest Height, H =	N/A	ft		
Velocity Pressure Coefficient, K_z =	0.95		$K_e = e^{-0.000032 z^{2.5}}$	2.6.8
Topographic Factor, K_{zt} =	1.00			
Wind Directionality Factor, K_d =	0.95		$q_z = 0.00256\ K_z K_{zt} K_e K_d V^2$	2.6.11.6
Shielding Factor, K_a =	0.90			
Ground Elevation Factor, K_e =	0.991		$F_A = q_z G_h (EPA)$	2.6.11.2
Wind Velocity Pressure, q_z =	44.70	psf		
Gust Effect Factor, G_h =	1.00		$F_M = q_z G_h C_f D_p$	2.6.11.2

Appurtenance Wind Loads

Name	Height (ft)	Width (ft)	Depth (ft)	Normal			Tangential		
				C_a	EPA FT2	F_A (lb)	C_a	EPA FT2	F_A (lb)
DS2C03F36D-D	18.50	0.25	0.25	2.00	8.33	372.11	2.00	8.33	372.11

BLACK & VEATCH	Client:	Eversource	Computed By: Joohwan Jung
	Site Name:	DANIELSON WORK CENTER (ES-153)	Date: 11/11/2020
			Verified By: JW
	Title:	MOUNT ANALYSIS REPORT	Date: 11/11/2020

Member Wind Loading

Exposure Category =	B		
Risk Category =	III		
Topographic Category =	1		
Basic Wind Speed, V =	140	mph	
Height Above Ground, z =	86	ft	
Crest Height, H =	N/A	ft	
Velocity Pressure Coefficient, K_z =	0.95		
Topographic Factor, K_{zt} =	1.00		
Wind Directionality Factor, K_d =	0.95		
Shielding Factor, K_a =	0.90		
Ground Elevation Factor, K_e =	0.991		
Wind Velocity Pressure, q_z =	44.70	psf	
Gust Effect Factor, G_h =	1.00		

Equations

$K_z = 2.01\ (z / z_g)^{2/\alpha}$

$K_h = e^{(f \cdot z / H)}$

$K_{zt} = [1 + K_c K_t / K_h]^2$

$K_e = e^{-0.000032 z^2}$

$q_z = 0.00256\ K_z K_{zt} K_e K_d V^2$

$F_A = q_z G_h (EPA)$

$F_M = q_z G_h C_f D_p$

TIA-222-H
2.6.5.2
2.6.6.2.1
2.6.6.2.1
2.6.8
2.6.11.6
2.6.11.2
2.6.11.2

Member Wind Loads

Name	Depth (ft)	Width (ft)	C_f	D_p (ft)	F_M (lb)
Arm: HSS4X4X1/4	0.33	0.33	2	0.33	29.80
Connection Pipe: Pipe 4.0 Std	0.38		1.2	0.38	20.11
Mount Pipe: Pipe 3.0 Std	0.29		1.2	0.29	15.64

Client:	Eversource	Computed By:	Joohwan Jung
Site Name:	DANIELSON WORK CENTER (ES-153)	Date:	11/11/2020
		Verified By:	JW
Title:	MOUNT ANALYSIS REPORT	Date:	11/11/2020

BLACK & VEATCH

Appurtenance Ice Dead Loading

			Equations	TIA-222-H
Exposure Category =	B			
Risk Category =	III		$K_h = e^{(f \cdot z / H)}$	2.6.6.2.1
Topographic Category =	1			
Height Above Ground, z =	86	ft	$K_{zt} = [1 + K_c K_t / K_h]^2$	2.6.6.2.1
Crest Height, H =	N/A	ft		
Design Ice Thickness, T_i =	1.50	in	$K_{iz} = (z/33)^{0.10}$	2.6.10
Importance Factor, I =	1.15			
Topographic Factor, K_{zt} =	1.00		$T_{iz} = T_i I K_{iz}(K_{zt})^{0.35}$	2.6.10
Height Escalation Factor, K_{iz} =	1.10			
Factored Ice Thickness, T_{iz} =	1.90	in	$DL_{ice}=[(H_{ice}*D_{ice}*W_{ice}) - (H*W*D)]*56pcf$	
Grating Ice Dead Load, D_{Gice} =	8.86	psf		

Appurtenance Ice Dead Loads

Name	Height w/ ice (ft)	Width w/ice (ft)	Depth w/ ice (ft)	V_{ice} (ft^3)	DL_{ice} (lb)
DS2C03F36D-D	18.82	0.57	0.57	4.88	273.29

BLACK & VEATCH	Client:	Eversource	Computed By: Joohwan Jung
	Site Name:	DANIELSON WORK CENTER (ES-153)	Date: 11/11/2020
			Verified By: JW
	Title:	MOUNT ANALYSIS REPORT	Date: 11/11/2020

Member Ice Dead Loading

			Equations	TIA-222-H
Exposure Category =	B			
Risk Category =	III		$K_h = e^{(f \cdot z / H)}$	2.6.6.2.1
Topographic Category =	1			
Height Above Ground, z =	86	ft	$K_{zt} = [1 + K_c K_t / K_h]^2$	2.6.6.2.1
Crest Height, H =	N/A	ft		
Design Ice Thickness, T_i =	1.50	in	$K_{iz} = (z/33)^{0.10}$	2.6.10
Importance Factor, I =	1.15			
Topographic Factor, K_{zt} =	1.00		$T_{iz} = T_i I K_{iz} (K_{zt})^{0.35}$	2.6.10
Height Escalation Factor, K_{iz} =	1.10			
Factored Ice Thickness, T_{iz} =	1.90	in	Aiz = pi*Tiz*(Dc+Tiz)	2.6.10
Grating Ice Dead Load, D_{Gice} =	8.86	psf		
			DL_{ice}=Aiz*56pcf	

Member Ice Dead Loads

Name	Depth w/ ice (ft)	Width w/ ice (ft)	Dc (ft)	Aiz (ft^2)	DL_{ice} (lb/ft)
Arm: HSS4X4X1/4	0.65	0.65	0.47	0.31	17.52
Connection Pipe: Pipe 4.0 Std	0.69		0.38	0.27	14.84
Mount Pipe: Pipe 3.0 Std	0.61		0.29	0.22	12.52

BLACK & VEATCH	Client:	Eversource	Computed By: Joohwan Jung
	Site Name:	DANIELSON WORK CENTER (ES-153)	Date: 11/11/2020
			Verified By: JW
	Title:	MOUNT ANALYSIS REPORT	Date: 11/11/2020

Appurtenance Ice Wind Loading

			Equations	TIA-222-H
Exposure Category =	B		$K_z = 2.01\ (z / z_g)^{2/\alpha}$	2.6.5.2
Risk Category =	III			
Topographic Category =	1		$K_h = e^{(f \cdot z / H)}$	2.6.6.2.1
Ice Wind Speed, V_{ice} =	50	mph		
Height Above Ground, z =	86	ft	$K_{zt} = [1 + K_c K_t / K_h]^2$	2.6.6.2.1
Crest Height, H =	N/A	ft		
Velocity Pressure Coefficient, K_z =	0.95	psf	$K_e = e^{-0.000032 z s}$	2.6.8
Topographic Factor, K_{zt} =	1.00			
Wind Directionality Factor, K_d =	0.95		$q_z = 0.00256\ K_z K_{zt} K_e K_d V^2$	2.6.11.6
Shielding Factor, K_a =	0.90			
Ground Elevation Factory, K_e =	0.991		$F_{A(ice)} = q_{z(ice)} G_h (EPA)_{A(ice)}$	2.6.11.2
Ice Wind Velocity Pressure, $q_{z(ice)}$ =	5.701			
Factored Ice Thickness, T_{iz} =	1.90	in	$F_{M(ice)} = q_{z(ice)} G_h C_f D_{p(ice)}$	2.6.11.2
Gust Effect Factor, G_h =	1			

Appurtenance Ice Wind Loads

Name	Height w/ Ice (ft)	Width w/ Ice (ft)	Depth w/ Ice (ft)	Normal			Tangential		
				C_a	EPA FT2	F_A (lb)	C_a	EPA FT2	F_A (lb)
DS2C03F36D-D	18.82	0.57	0.57	-	14.84	84.61	-	14.84	84.61

BLACK & VEATCH	Client: Eversource	Computed By: Joohwan Jung	
	Site Name: DANIELSON WORK CENTER (ES-153)	Date: 11/11/2020	
		Verified By: JW	
	Title: MOUNT ANALYSIS REPORT	Date: 11/11/2020	

Member Ice Wind Loading

			Equations	TIA-222-H
Exposure Category =	B		$K_z = 2.01\ (z / z_g)^{2/\alpha}$	2.6.5.2
Risk Category =	III			
Topographic Category =	1		$K_h = e^{(f \cdot z / H)}$	2.6.6.2.1
Ice Wind Speed, V_{ice} =	50	mph		
Height Above Ground, z =	86	ft	$K_{zt} = [1 + K_c K_t / K_h]^2$	2.6.6.2.1
Crest Height, H =	N/A	ft		
Velocity Pressure Coefficient, K_z =	0.95	psf	$K_e = e^{-0.000032 z_s}$	2.6.8
Topographic Factor, K_{zt} =	1.00			
Wind Directionality Factor, K_d =	0.95		$q_z = 0.00256\ K_z K_{zt} K_e K_d V^2$	2.6.11.6
Shielding Factor, K_a =	0.90			
Ground Elevation Factory, K_e =	0.991		$F_{A(ice)} = q_{z(ice)} G_h (EPA)_{A(ice)}$	2.6.11.2
Ice Wind Velocity Pressure, $q_{z(ice)}$ =	5.701			
Factored Ice Thickness, T_{iz} =	1.90	in	$F_{M(ice)} = q_{z(ice)} G_h C_f D_{p(ice)}$	2.6.11.2
Gust Effect Factor, G_h =	1			

Member Ice Wind Loads

Name	Depth w/ Ice (ft)	Width w/ Ice (ft)	C_f	$D_{p(ice)}$ (ft)	$F_{M(ice)}$ (lb/ft)
Arm: HSS4X4X1/4	0.65	0.65	2	0.65	7.41
Connection Pipe: Pipe 4.0 Std	0.69		1.2	0.69	4.73
Mount Pipe: Pipe 3.0 Std	0.61		1.2	0.61	4.16

BLACK & VEATCH	Client:	Eversource	Computed By: Joohwan Jung
	Site Name:	DANIELSON WORK CENTER (ES-153)	Date: 11/11/2020
			Verified By: JW
	Title:	MOUNT ANALYSIS REPORT	Date: 11/11/2020

Seismic Loading

			Equations	TIA-222-H
Site Class =	D			
Spectral Response, S_s =	0.171	g	$S_{D1} = 2/3\ F_v S_1$	2.7.5
Max Spectral Response, S_1 =	0.062	g	$S_{DS} = 2/3\ F_a S_s \geq S_{D1}$	2.7.5
Accel. Site Coefficient, F_a =	1.60			
Vel. Site Coefficient, F_v =	2.40		$C_s = 1/2\ S_{DS}\ I \geq 0.03$	2.7.7.1.1
Design Spec. Response (1 sec), S_{D1} =	0.099			
Design Spec. Response, S_{DS} =	0.182		$E_H = A_s\ C_s\ W$	2.7.7
Importantance Factor, I =	1.25			
Seismic Response Coefficient, C_s =	0.114		$E_V = A_s\ 0.2\ S_{DS}\ W$	2.7.6
Amplification Factor, A_s =	3			

Appurtenance Seismic Loads

Name	Weight (lb)	E_H (lb)	E_V (lb)
DS2C03F36D-D	75	25.65	8.21

BLACK & VEATCH

Client: Eversource | Computed By: Joohwan Jung
Site Name: DANIELSON WORK CENTER (ES-153) | Date: 11/11/2020
Verified By: JW
Title: MOUNT ANALYSIS REPORT | Date: 11/11/2020

Bolt Analysis of Antenna Mount Arm to Tower Connection

The forces acting on the plate are from M1 from RISA-3D Load Combination 10

Design Method: LRFD

Applied Loads:

P_x =	0.505	kip
P_y =	0.196	kip
P_z =	0.292	kip
M_x =	29.015	kip-in
M_y =	24.243	kip-in
M_z =	34.934	kip-in

Bolt Properties:

d_b =	0.625	in
A_b =	0.307	in^2
N_b =	4	

Load Location Coordinates:

X_o =	4	in
Y_o =	4	in

Bolt Strength: A325 AISC Table (J3.2)

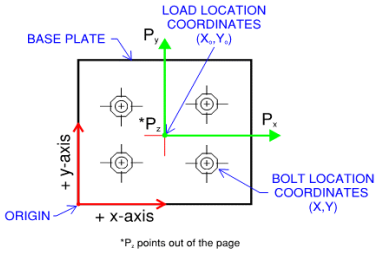
F_{nt} =	90	ksi
F_{nv} =	54	ksi

Bolt Location Coordinates (in):

Bolt #	X_b	Y_b
#1	1	1
#2	1	7
#3	7	7
#4	7	1

CALCULATIONS

Bolt Group Centroid y-coordinate, Y_c =	4	in
Bolt Group Centroid x-coordinate, X_c =	4	in
Load Eccentricity in x-direction, e_x =	0	in
Load Eccentricity in y-direction, e_y =	0	in
Total Moment Including Load Eccentricity, ΣM_x =	29.02	kip-in
Total Moment Including Load Eccentricity, ΣM_y =	24.24	kip-in
Total Moment Including Load Eccentricity, ΣM_z =	34.93	kip-in



Bolt #	Centroid Dist. (in)		Polar Moments of Inertia (in^4/in^2)			Force per Bolt (kip)	
	d_x	d_y	I_x	I_y	I_{xy}	Tension	Shear
#1	-3	-3	9	9	9	0.325	2.117
#2	3	-3	9	9	-9	4.365	2.183
#3	3	3	9	9	9	0.471	2.007
#4	-3	3	9	9	-9	4.511	1.935
SUM:			36	36	0		

Bolt Shear Strength Check

Available Shear Strength per Bolt, ϕV_n =	12.43	kip	AISC Eq. (J3-1)
Bolt Shear Stress Ratio, SR_V =	17.56%		

Bolt Tensile Strength Check

Nom. Tensile Stress (Including Effects of Shear), F'_{nt} =	90	ksi	AISC Eq. (J3-3a)
Available Tensile Strength per Bolt, ϕT_n =	20.72	kip	AISC Eq. (J3-2)
Bolt Tension Stress Ratio, SR_T =	21.77%		

P_x = Major Axis Load (X-Axis) | M_x = Moment About X-Axis | d_b = Diameter of Bolt

P_y = Minor Axis Load (Y-Axis) | M_y = Moment About Y-Axis | A_b = Cross-Sectional Area of Bolt

P_z = Axial Load (Z-Axis) | M_z = Torque About Z-Axis | N_b = Number of Bolts

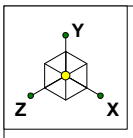
$d_x = Y_b - Y_c$ | $I_{xy} = d_x d_y$ | $SR_V = V_u/\phi V_n$ | $F'_{nt} = 1.3F_{nt} - (F_{nt}/\phi F_{nv})(V_u/A_b) \le F_{nt}$

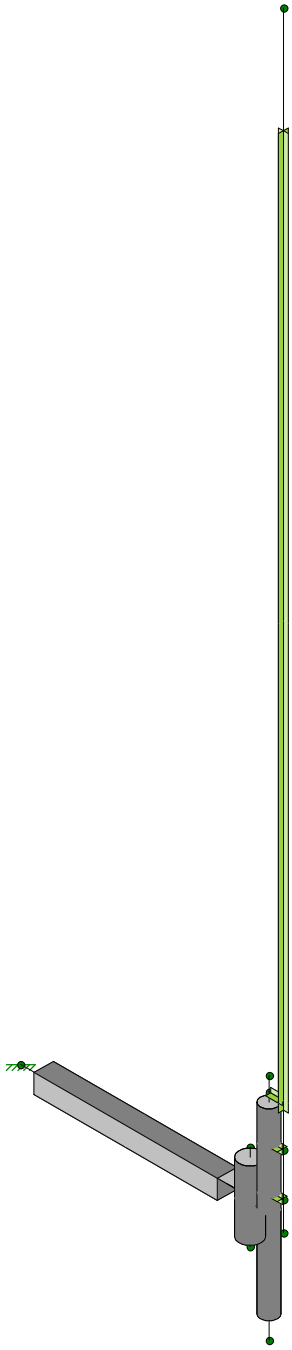
$d_y = X_b - X_c$ | $\Sigma M_x = M_x + P_z(e_y)$ | $SR_T = T_u/\phi T_n$ | $T_{ui} = \Sigma P_z/N_b - [(\Sigma M_x \Sigma I_y + \Sigma M_y \Sigma I_{xy})/(\Sigma I_x \Sigma I_y - \Sigma I_{xy}^2)]d_x + [(\Sigma M_y \Sigma I_x + \Sigma M_x \Sigma I_{xy})/(\Sigma I_x \Sigma I_y - \Sigma I_{xy}^2)]d_y$

$I_x = d_y^2$ | $\Sigma M_y = M_y + P_z(e_x)$ | $\phi V_n = 0.75F_{nv}A_b$

$I_y = d_x^2$ | $\Sigma M_z = M_z + P_x(e_y) + P_y(e_x)$ | $\phi T_n = 0.75F'_{nt}A_b$ | $V_{ui} = [(\Sigma P_x/N_b - \Sigma M_z d_y/(\Sigma I_x + \Sigma I_y))^2 + (\Sigma P_y/N_b - \Sigma M_z d_x/(\Sigma I_x + \Sigma I_y))^2]^{1/2}$

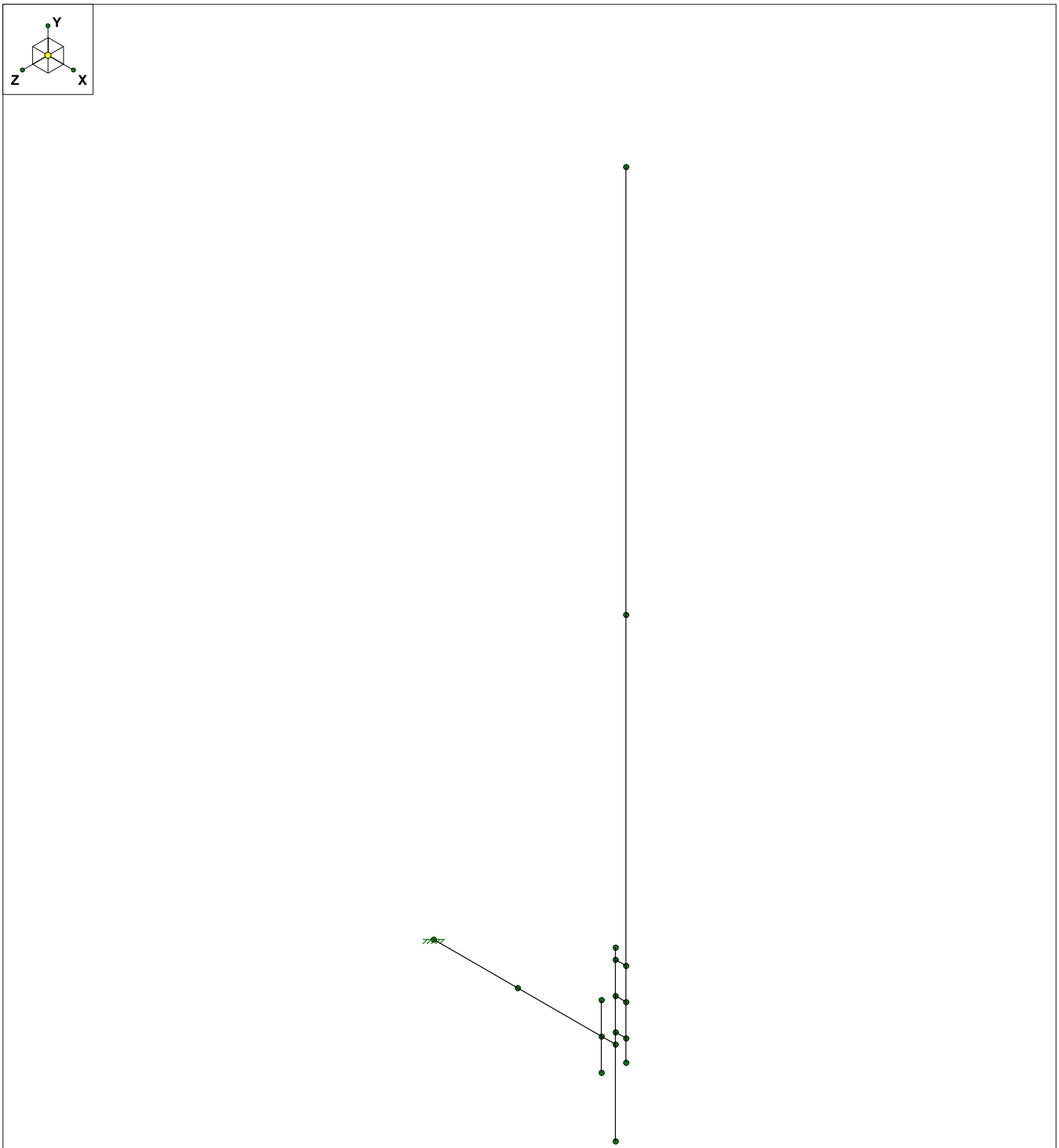
APPENDIX 2:
RISA PRINTOUTS





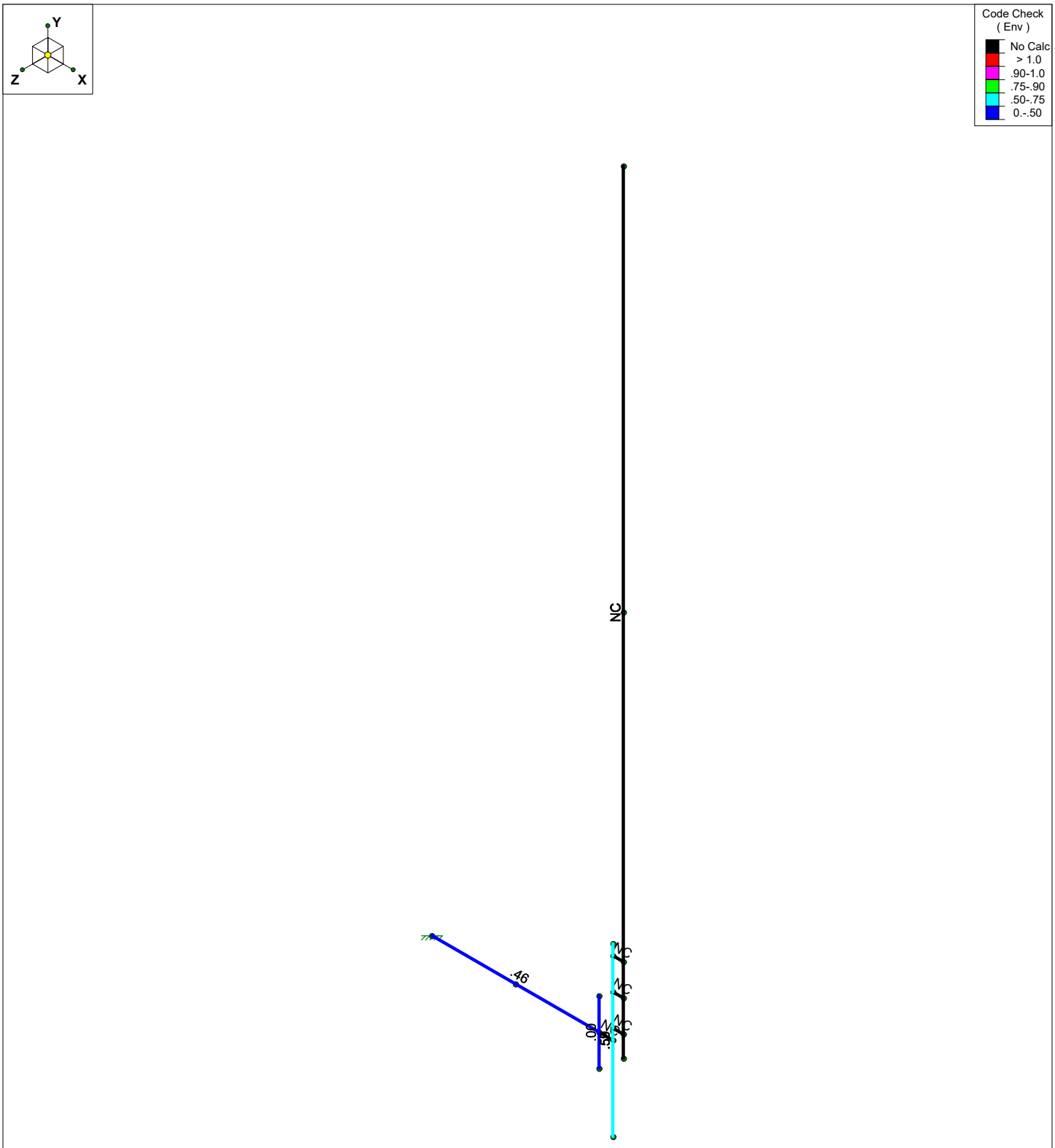
Envelope Only Solution

Black & Veatch Corp.	DanielsonAWC Risa Model	SK - 1
Joohwan Jung		Nov 11, 2020 at 10:09 AM
405025.2021.2200		DanielsonAWC Risa Model.r3d



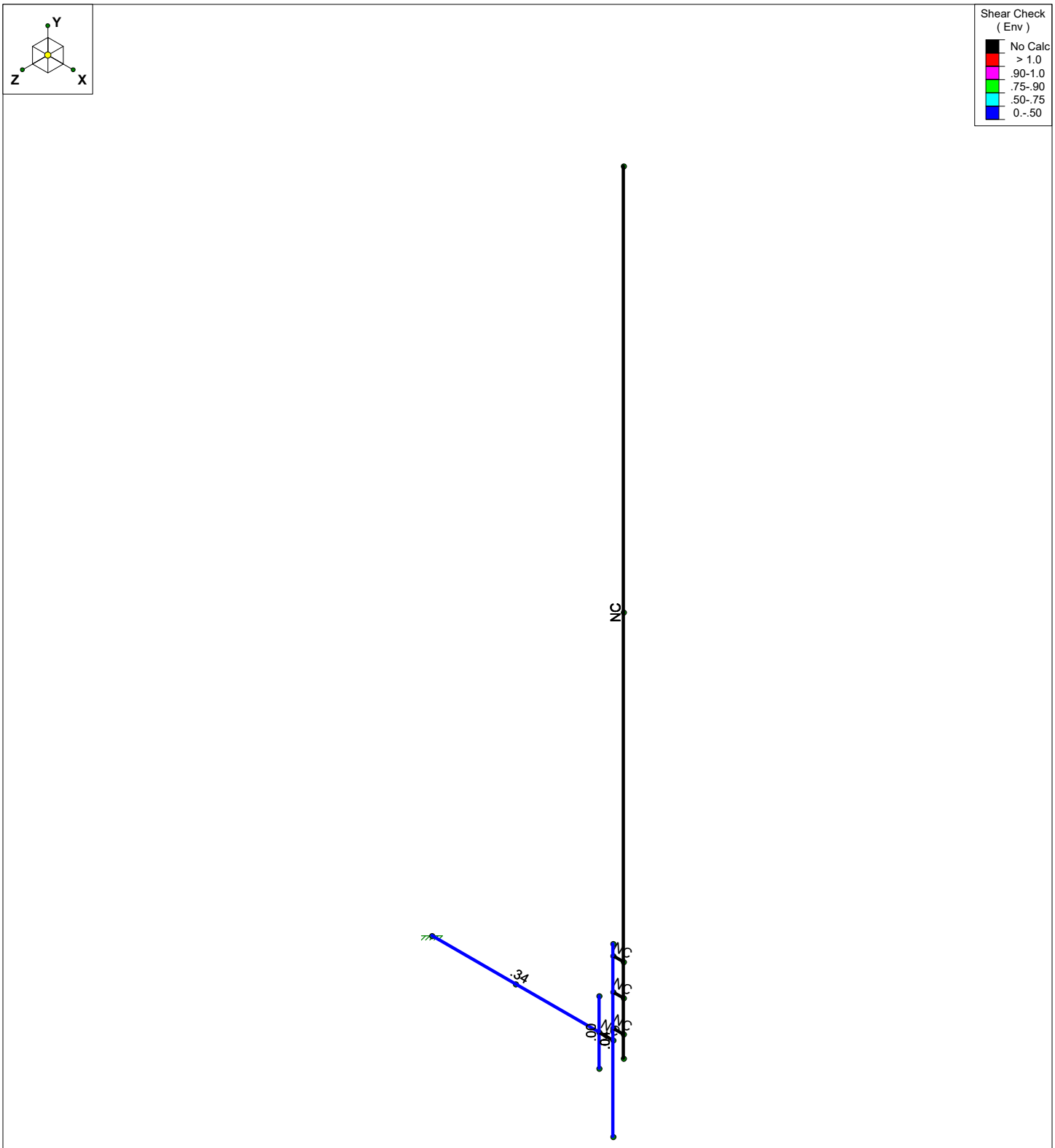
Envelope Only Solution

Black & Veatch Corp.	DanielsonAWC Risa Model	SK - 2
Joohwan Jung		Nov 11, 2020 at 10:09 AM
405025.2021.2200		DanielsonAWC Risa Model.r3d



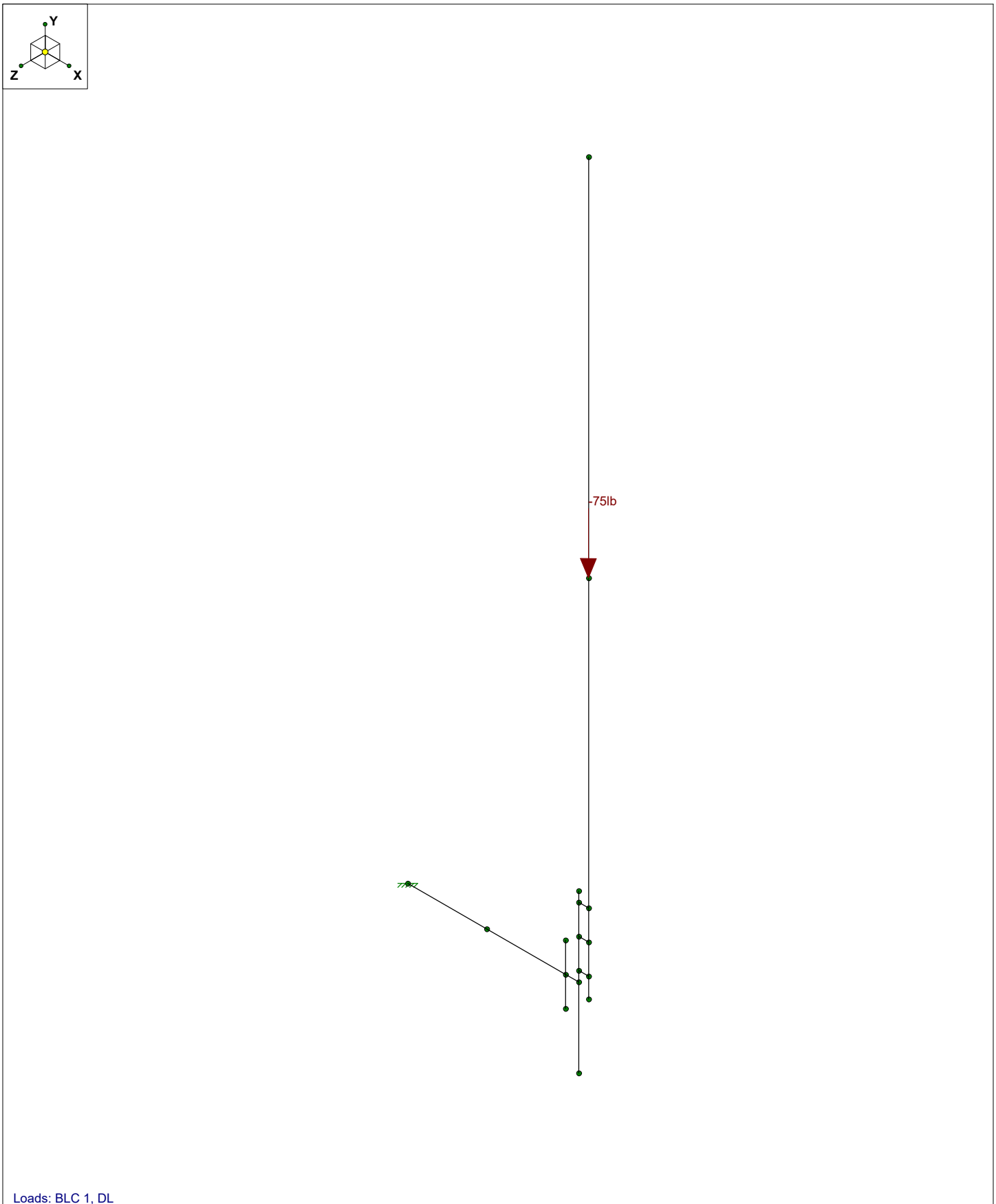
Member Code Checks Displayed (Enveloped)
Envelope Only Solution

Black & Veatch Corp.	DanielsonAWC Risa Model	SK - 3
Joohwan Jung		Nov 11, 2020 at 10:09 AM
405025.2021.2200		DanielsonAWC Risa Model.r3d



Member Shear Checks Displayed (Enveloped)
Envelope Only Solution

Black & Veatch Corp.	DanielsonAWC Risa Model	SK - 4
Joohwan Jung		Nov 11, 2020 at 10:09 AM
405025.2021.2200		DanielsonAWC Risa Model.r3d



Loads: BLC 1, DL
Envelope Only Solution

Black & Veatch Corp.	DanielsonAWC Risa Model	SK - 5
Joohwan Jung		Nov 11, 2020 at 10:09 AM
405025.2021.2200		DanielsonAWC Risa Model.r3d

(Global) Model Settings

Display Sections for Member Calcs	5
Max Internal Sections for Member Calcs	97
Include Shear Deformation?	Yes
Increase Nailing Capacity for Wind?	Yes
Include Warping?	Yes
Trans Load Btwn Intersecting Wood Wall?	Yes
Area Load Mesh (in^2)	144
Merge Tolerance (in)	.12
P-Delta Analysis Tolerance	0.50%
Include P-Delta for Walls?	Yes
Automatically Iterate Stiffness for Walls?	Yes
Max Iterations for Wall Stiffness	3
Gravity Acceleration (in/sec^2)	386.4
Wall Mesh Size (in)	24
Eigensolution Convergence Tol. (1.E-)	4
Vertical Axis	Y
Global Member Orientation Plane	XZ
Static Solver	Sparse Accelerated
Dynamic Solver	Accelerated Solver

Hot Rolled Steel Code	AISC 15th(360-16): LRFD
Adjust Stiffness?	Yes(Iterative)
RISAConnection Code	None
Cold Formed Steel Code	None
Wood Code	None
Wood Temperature	< 100F
Concrete Code	None
Masonry Code	None
Aluminum Code	None - Building
Stainless Steel Code	None

Number of Shear Regions	4
Region Spacing Increment (in)	4
Biaxial Column Method	Exact Integration
Parme Beta Factor (PCA)	.65
Concrete Stress Block	Rectangular
Use Cracked Sections?	Yes
Use Cracked Sections Slab?	No
Bad Framing Warnings?	No
Unused Force Warnings?	Yes
Min 1 Bar Diam. Spacing?	No
Concrete Rebar Set	REBAR_SET_ASTMA615
Min % Steel for Column	1
Max % Steel for Column	8

(Global) Model Settings, Continued

Seismic Code	None
Seismic Base Elevation (in)	Not Entered
Add Base Weight?	Yes
Ct X	.02
Ct Z	.02
T X (sec)	Not Entered
T Z (sec)	Not Entered
R X	3
R Z	3

Hot Rolled Steel Properties

	Label	E [ksi]	G [ksi]	Nu	Therm (/1...	Density[k/ft^3]	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 ...	A [in2]	Iyy [in4]	Izz [in4]	J [in4]
1	Arm	HSS4X4X4	Beam	SquareTube	A53 Gr.B	Typical	3.37	7.8	7.8	12.8
2	Connection Pipe	PIPE_4.0	Column	Pipe	A53 Gr.B	Typical	2.96	6.82	6.82	13.6
3	Mount Pipe	PIPE_3.0	Column	Pipe	A53 Gr.B	Typical	2.07	2.85	2.85	5.69

General Material Properties

	Label	E [ksi]	G [ksi]	Nu	Therm (/1E5 F)	Density[k/ft^3]
1	gen_Conc3NW	3155	1372	.15	.6	.145
2	gen_Conc4NW	3644	1584	.15	.6	.145
3	gen_Conc3LW	2085	906	.15	.6	.11
4	gen_Conc4LW	2408	1047	.15	.6	.11
5	gen_Alum	10600	4077	.3	1.29	.173
6	gen_Steel	29000	11154	.3	.65	.49
7	RIGID	1e+6		.3	0	0

Joint Boundary Conditions

	Joint Label	X [k/in]	Y [k/in]	Z [k/in]	X Rot.[k-ft/rad]	Y Rot.[k-ft/rad]	Z Rot.[k-ft/rad]
1	N1	Reaction	Reaction	Reaction	Reaction	Reaction	Reaction

Member Primary Data

	Label	I Joint	J Joint	K Joint	Rotate(deg)	Section/Shape	Type	Design List	Material	Design Rules
1	M1	N1	N2			Arm	Beam	SquareTube	A53 Gr.B	Typical
2	M2	N4	N3			Connection Pipe	Column	Pipe	A53 Gr.B	Typical
3	M3	N6	N2			RIGID	None	None	RIGID	Typical
4	M4	N7	N8			Mount Pipe	Column	Pipe	A53 Gr.B	Typical
5	M5	N9	N11			RIGID	None	None	RIGID	Typical
6	M6	N17	N14			RIGID	None	None	RIGID	Typical
7	M7	N16	N13			RIGID	None	None	RIGID	Typical
8	M8	N15	N12			RIGID	None	None	RIGID	Typical

Member Advanced Data

	Label	I Release	J Release	I Offset[in]	J Offset[in]	T/C Only	Physical	Defl Rat...	Analysis ...	Inactive	Seismic...
1	M1						Yes				None
2	M2						Yes	** NA **			None
3	M3						Yes	** NA **			None
4	M4						Yes	** NA **			None
5	M5						Yes	** NA **			None
6	M6						Yes	** NA **			None
7	M7						Yes	** NA **			None
8	M8						Yes	** NA **			None

Hot Rolled Steel Design Parameters

	Label	Shape	Length[in]	Lbyy[in]	Lbzz[in]	Lcomp top[in]	Lcomp bot[in]	L-torqu...	Kyy	Kzz	Cb	Function
1	M1	Arm	48									Lateral
2	M2	Connection ...	18									Lateral
3	M4	Mount Pipe	48									Lateral

Basic Load Cases

	BLC Description	Category	X Gravity	Y Gravity	Z Gravity	Joint	Point	Distributed	Area(Me...	Surface(...
1	DL	DL		-1		1				
2	Maintenance LL - LV	LL				1				
3	Installation LL - LM	LL				1				
4	Wind - 0 Deg (X)	WL				1		3		
5	Wind - 30 Deg (X)	WL				1		3		
6	Wind - 60 Deg (X)	WL				1		3		
7	Wind - 90 Deg (X)	WL				1		3		
8	Wind - 120 Deg (X)	WL				1		3		
9	Wind - 150 Deg (X)	WL				1		3		
10	Wind - 180 Deg (X)	WL				1		3		
11	Wind - 210 Deg (X)	WL				1		3		
12	Wind - 240 Deg (X)	WL				1		3		
13	Wind - 270 Deg (X)	WL				1		3		
14	Wind - 300 Deg (X)	WL				1		3		
15	Wind - 330 Deg (X)	WL				1		3		
16	Wind - 0 Deg (Z)	WL				1		3		
17	Wind - 30 Deg (Z)	WL				1		3		
18	Wind - 60 Deg (Z)	WL				1		3		
19	Wind - 90 Deg (Z)	WL				1		3		
20	Wind - 120 Deg (Z)	WL				1		3		
21	Wind - 150 Deg (Z)	WL				1		3		
22	Wind - 180 Deg (Z)	WL				1		3		
23	Wind - 210 Deg (Z)	WL				1		3		
24	Wind - 240 Deg (Z)	WL				1		3		
25	Wind - 270 Deg (Z)	WL				1		3		
26	Wind - 300 Deg (Z)	WL				1		3		
27	Wind - 330 Deg (Z)	WL				1		3		
28	Ice DL	DL				1		3		
29	Ice Wind - 0 Deg (X)	WL				1		3		
30	Ice Wind - 30 Deg (X)	WL				1		3		
31	Ice Wind - 60 Deg (X)	WL				1		3		
32	Ice Wind - 90 Deg (X)	WL				1		3		
33	Ice Wind - 120 Deg (X)	WL				1		3		
34	Ice Wind - 150 Deg (X)	WL				1		3		
35	Ice Wind - 180 Deg (X)	WL				1		3		
36	Ice Wind - 210 Deg (X)	WL				1		3		

Basic Load Cases (Continued)

	BLC Description	Category	X Gravity	Y Gravity	Z Gravity	Joint	Point	Distributed	Area(Me...	Surface(...
37	Ice Wind - 240 Deg (X)	WL				1		3		
38	Ice Wind - 270 Deg (X)	WL				1		3		
39	Ice Wind - 300 Deg (X)	WL				1		3		
40	Ice Wind - 330 Deg (X)	WL				1		3		
41	Ice Wind - 0 Deg (Z)	WL				1		3		
42	Ice Wind - 30 Deg (Z)	WL				1		3		
43	Ice Wind - 60 Deg (Z)	WL				1		3		
44	Ice Wind - 90 Deg (Z)	WL				1		3		
45	Ice Wind - 120 Deg (Z)	WL				1		3		
46	Ice Wind - 150 Deg (Z)	WL				1		3		
47	Ice Wind - 180 Deg (Z)	WL				1		3		
48	Ice Wind - 210 Deg (Z)	WL				1		3		
49	Ice Wind - 240 Deg (Z)	WL				1		3		
50	Ice Wind - 270 Deg (Z)	WL				1		3		
51	Ice Wind - 300 Deg (Z)	WL				1		3		
52	Ice Wind - 330 Deg (Z)	WL				1		3		
53	Lateral Seismic - Eh (X)	ELX	.342			1				
54	Lateral Seismic - Eh (Z)	ELZ			.342	1				
55	Vertical Seismic - Ev (Y)	ELY		-.109		1				

Load Combinations

	Description	S...	PDe...	SRSS	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...
1	WIND LOAD COMBOS (140 MPH)																									
2	1.2DL + WL (0 DEG)	Y...	Y		1	1.2	4	1	16	1																
3	1.2DL + WL (30 DEG)	Y...	Y		1	1.2	5	1	17	1																
4	1.2DL + WL (60 DEG)	Y...	Y		1	1.2	6	1	18	1																
5	1.2DL + WL (90 DEG)	Y...	Y		1	1.2	7	1	19	1																
6	1.2DL + WL (120 DEG)	Y...	Y		1	1.2	8	1	20	1																
7	1.2DL + WL (150 DEG)	Y...	Y		1	1.2	9	1	21	1																
8	1.2DL + WL (180 DEG)	Y...	Y		1	1.2	10	1	22	1																
9	1.2DL + WL (210 DEG)	Y...	Y		1	1.2	11	1	23	1																
10	1.2DL + WL (240 DEG)	Y...	Y		1	1.2	12	1	24	1																
11	1.2DL + WL (270 DEG)	Y...	Y		1	1.2	13	1	25	1																
12	1.2DL + WL (300 DEG)	Y...	Y		1	1.2	14	1	26	1																
13	1.2DL + WL (330 DEG)	Y...	Y		1	1.2	15	1	27	1																
14																										
15	MOUNT LOAD COMBOS (30 MPH)																									
16	1.4DL	Y...	Y		1	1.4																				
17	1.2DL + 1.5LV	Y...	Y		1	1.2	2	1.5																		
18	1.2DL + 1.5LM + WL (0 DEG)	Y...	Y		1	1.2	3	1.5	4	.046	16	.046														
19	1.2DL + 1.5LM + WL (30 DEG)	Y...	Y		1	1.2	3	1.5	5	.046	17	.046														
20	1.2DL + 1.5LM + WL (60 DEG)	Y...	Y		1	1.2	3	1.5	6	.046	18	.046														
21	1.2DL + 1.5LM + WL (90 DEG)	Y...	Y		1	1.2	3	1.5	7	.046	19	.046														
22	1.2DL + 1.5LM + WL (120 DEG)	Y...	Y		1	1.2	3	1.5	8	.046	20	.046														
23	1.2DL + 1.5LM + WL (150 DEG)	Y...	Y		1	1.2	3	1.5	9	.046	21	.046														
24	1.2DL + 1.5LM + WL (180 DEG)	Y...	Y		1	1.2	3	1.5	10	.046	22	.046														
25	1.2DL + 1.5LM + WL (210 DEG)	Y...	Y		1	1.2	3	1.5	11	.046	23	.046														
26	1.2DL + 1.5LM + WL (240 DEG)	Y...	Y		1	1.2	3	1.5	12	.046	24	.046														
27	1.2DL + 1.5LM + WL (270 DEG)	Y...	Y		1	1.2	3	1.5	13	.046	25	.046														
28	1.2DL + 1.5LM + WL (300 DEG)	Y...	Y		1	1.2	3	1.5	14	.046	26	.046														
29	1.2DL + 1.5LM + WL (330 DEG)	Y...	Y		1	1.2	3	1.5	15	.046	27	.046														
30																										
31	ICE LOAD COMBOS (1.5", 50 MPH)																									
32	1.2DL + Ice DL + Ice WL (0 DEG)	Y...	Y		1	1.2	28	1	29	1	41	1														
33	1.2DL + Ice DL + Ice WL (30 DEG)	Y...	Y		1	1.2	28	1	30	1	42	1														

Load Combinations (Continued)

	Description	S...	PDe...	SRSS	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...
34	1.2DL + Ice DL + Ice WL (60 DEG)	Y...	Y		1	1.2	28	1	31	1	43	1												
35	1.2DL + Ice DL + Ice WL (90 DEG)	Y...	Y		1	1.2	28	1	32	1	44	1												
36	1.2DL + Ice DL + Ice WL (120 DEG)	Y...	Y		1	1.2	28	1	33	1	45	1												
37	1.2DL + Ice DL + Ice WL (150 DEG)	Y...	Y		1	1.2	28	1	34	1	46	1												
38	1.2DL + Ice DL + Ice WL (180 DEG)	Y...	Y		1	1.2	28	1	35	1	47	1												
39	1.2DL + Ice DL + Ice WL (210 DEG)	Y...	Y		1	1.2	28	1	36	1	48	1												
40	1.2DL + Ice DL + Ice WL (240 DEG)	Y...	Y		1	1.2	28	1	37	1	49	1												
41	1.2DL + Ice DL + Ice WL (270 DEG)	Y...	Y		1	1.2	28	1	38	1	50	1												
42	1.2DL + Ice DL + Ice WL (300 DEG)	Y...	Y		1	1.2	28	1	39	1	51	1												
43	1.2DL + Ice DL + Ice WL (330 DEG)	Y...	Y		1	1.2	28	1	40	1	52	1												
44																								
45	SEISMIC LOAD COMBOS																							
46	1.2DL + Ev (Y) + Eh (X)	Y...	Y		1	1.2	55	1	53	1														
47	1.2DL - Ev (Y) + Eh (X)	Y...	Y		1	1.2	55	-1	53	1														
48	1.2DL + Ev (Y) - Eh (X)	Y...	Y		1	1.2	55	1	53	-1														
49	1.2DL - Ev (Y) - Eh (X)	Y...	Y		1	1.2	55	-1	53	-1														
50	1.2DL + Ev (Y) + Eh (Z)	Y...	Y		1	1.2	55	1	54	1														
51	1.2DL - Ev (Y) + Eh (Z)	Y...	Y		1	1.2	55	-1	54	1														
52	1.2DL + Ev (Y) - Eh (Z)	Y...	Y		1	1.2	55	1	54	-1														
53	1.2DL - Ev (Y) - Eh (Z)	Y...	Y		1	1.2	55	-1	54	-1														
54																								

Envelope Joint Reactions

	Joint		X [lb]	LC	Y [lb]	LC	Z [lb]	LC	MX [k-in]	LC	MY [k-in]	LC	MZ [k-in]	LC
1	N1	max	584.037	2	947.001	24	584.037	5	40.338	5	28.028	11	52.089	24
2		min	-584.038	8	179.018	49	-584.037	11	-40.338	11	-28.028	5	-31.54	2
3	Totals:	max	584.037	2	947.001	24	584.037	5						
4		min	-584.038	8	179.018	49	-584.037	11						

Envelope AISC 15th(360-16): LRFD Steel Code Checks

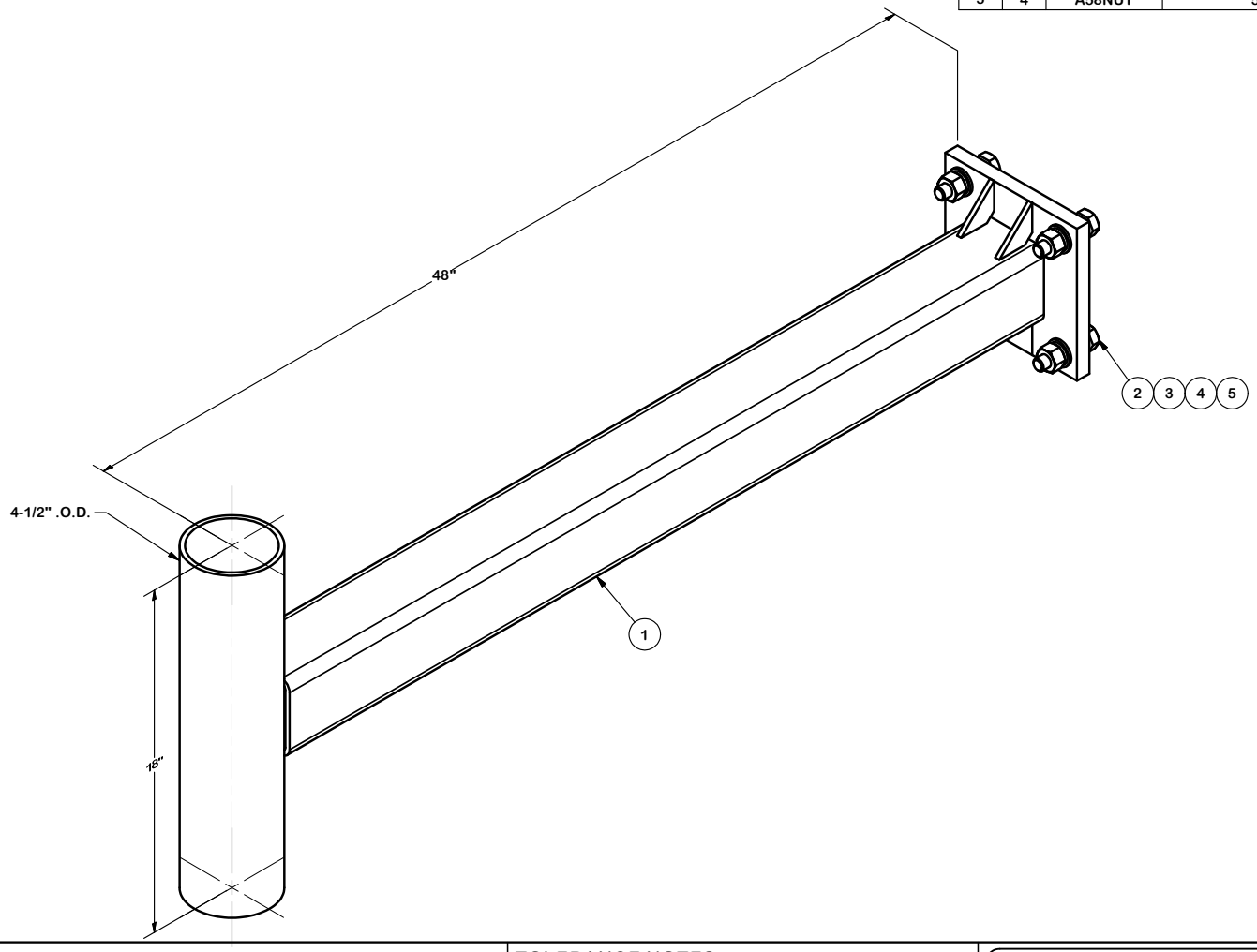
	Member	Shape	Code Check	Loc[in]	LC	Shear...	Loc[...	Dir	LC	phi*Pn...	phi*Pnt...	phi*Mn...	phi*Mn...	Cb	Eqn
1	M1	HSS4X4X4	.457	0	10	.343	0	z	11	100881...	106155	147.735	147.735	1...	H3-6
2	M2	PIPE_4.0	.001	9	10	.001	9		10	92571....	93240	127.575	127.575	1...	H1-1b
3	M4	PIPE_3.0	.595	24	8	.039	24		11	59852....	65205	68.985	68.985	1...	H1-1b

Member Section Forces

	LC	Member Label	Sec	Axial[k]	y Shear[k]	z Shear[k]	Torque[k-in]	y-y Moment[k-in]	z-z Moment[k-in]
1	10	M1	1	-.292	.196	-.505	-34.934	24.243	29.015
2			2	-.277	.183	-.48	-34.934	18.332	26.74
3			3	-.262	.169	-.454	-34.934	12.731	24.63
4			4	-.247	.154	-.428	-34.934	7.445	22.694
5			5	-.232	.141	-.402	-34.934	2.468	20.923

APPENDIX 3:
ATTACHMENTS

PARTS LIST						
ITEM	QTY	PART NO.	PART DESCRIPTION	LENGTH	UNIT WT.	NET WT.
1	1	X-SV197-48	SUPPORT ARM WELDMENT - 36"		76.32	76.32
2	4	A58234	5/8" x 2-3/4" HDG A325 HEX BOLT		0.36	1.42
3	4	A58FW	5/8" HDG A325 FLATWASHER		0.03	0.14
4	4	G58LW	5/8" HDG LOCKWASHER		0.03	0.10
5	4	A58NUT	5/8" HDG A325 HEX NUT		0.13	0.52
					TOTAL WT. #	78.50



TOLERANCE NOTES

TOLERANCES ON DIMENSIONS, UNLESS OTHERWISE NOTED ARE:
SAWED, SHEARED AND GAS CUT EDGES *(± 0.030")*
DRILLED AND GAS CUT HOLES *(± 0.030")* - NO CONING OF HOLES
LASER CUT EDGES AND HOLES *(± 0.010")* - NO CONING OF HOLES
BENDS ARE ± 1/2 DEGREE
ALL OTHER MACHINING *(± 0.030")*
ALL OTHER ASSEMBLY *(± 0.060")*

DESCRIPTION: 48" SUPPORT ARM

SITE PRO 1 — A valmont COMPANY

Engineering Support Team: 1-888-753-7446

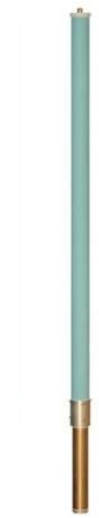
Locations: New York, NY; Atlanta, GA; Los Angeles, CA; Plymouth, IN; Salem, OR; Dallas, TX

CPD NO.	DRAWN BY	ENG. APPROVAL	PART NO.	PAGE
4470	CEK 4/14/2011		SV197-48	1 OF 1

CLASS	SUB	DRAWING USAGE	CHECKED BY	DWG. NO.
81	01	CUSTOMER	BMC 4/14/2011	SV197-48

VHF Omni Antennas (160-222 MHz)

		160-174 MHz						217-222 MHz									
	Model Number	**DS1G03F36U-N**	**DS1G03F36U-D**	**DS1G06F36U-N**	**DS1G06F36U-D**	**DS1G03F36D-N**	**DS1G03F36D-D**	**DS2C00F36U-N**	**DS2C00F36U-D**	**DS2C03F36U-N**	**DS2C03F36U-D**	**DS2C06F36U-N**	**DS2C06F36U-D**	**DS2C00F36D-N**	**DS2C00F36D-D**	**DS2C03F36D-N**	**DS2C03F36D-D**
	Input Connector	N(F)	7/16 DIN	N(F)	7/16 DIN	N(F)	7/16 DIN	N(F)	7/16 DIN	N(F)	7/16 DIN	N(F)	7/16 DIN	N(F)	7/16 DIN	N(F)	7/16 DIN
	Type	Single		Single		Dual		Single		Single		Single		Dual		Dual	
ELECTRICAL	**Bandwidth**, MHz	14		14		14		5		5		5		5		5	
ELECTRICAL	**Power**, Watts	500		500		350		500		500		500		350		350	
ELECTRICAL	**Gain**, dBd	3		6		3		0		3		6		0		3	
ELECTRICAL	**Horizontal Beamwidth**, degrees	360		360		360		360		360		360		360		360	
ELECTRICAL	**Vertical Beamwidth**, degrees	30		16		30		60		30		16		60		30	
ELECTRICAL	**Beam Tilt**, degrees	0		0		0		0		0		0		0		0	
ELECTRICAL	**Isolation (minimum)**, dB	N/A		N/A		30		N/A		N/A		N/A		30		30	
MECHANICAL	**Number of Connectors**	1		1		2		1		1		1		2		2	
MECHANICAL	**Flat Plate Area**, ft^2	2.10		3.63		3.69		1.28		1.64		2.58		2.09		3.08	
MECHANICAL	**Lateral Windload Thrust**lbf	88		152		155		54		69		109		88		129	
MECHANICAL	**Wind Speed Rating without ice**, mph	190		150		150		250		225		175		190		160	
MECHANICAL	**Mounting Hardware** included	DSH3V3R		DSH3V3N		DSH3V3N		DSH2V3R		DSH2V3R		DSH3V3N		DSH3V3R		DSH3V3N	
DIMENSIONS	**Length**, ft(m)	12.7 (3.9)		21.9 (6.7)		22.3 (6.8)		7.7 (2.3)		9.9 (3)		15.6 (4.8)		12.6 (3.8)		18.6 (5.7)	
DIMENSIONS	**Radome O.D.**, in(cm)	3 (7.6)		3 (7.6)		3 (7.6)		3 (7.6)		3 (7.6)		3 (7.6)		3 (7.6)		3 (7.6)	
DIMENSIONS	**Mast O.D.**, in(cm)	2.5 (6.4)		2.5 (6.4)		2.5 (6.4)		2.5 (6.4)		2.5 (6.4)		2.5 (6.4)		2.5 (6.4)		2.5 (6.4)	
DIMENSIONS	**Net Weight** w/o bracket, lb(kg)	37 (16.8)		60 (27.2)		63 (28.6)		19 (8.6)		26 (11.8)		47 (21.3)		40 (18.1)		70 (31.8)	
DIMENSIONS	**Shipping Weight**, lb(kg)	67 (30.4)		90 (40.8)		93 (42.2)		39 (17.7)		56 (25.4)		77 (34.9)		70 (31.8)		100 (45.4)	



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VERTICAL PATTERNS

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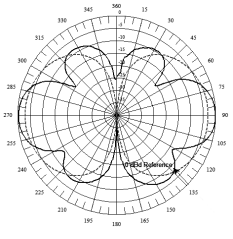

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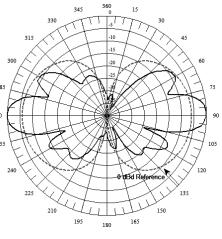

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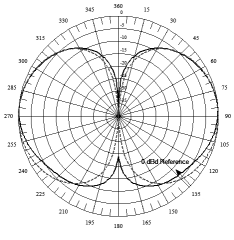

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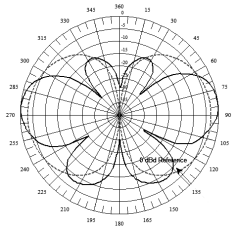

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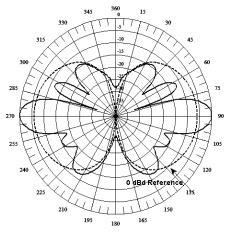

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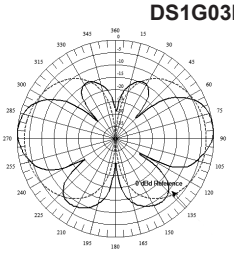

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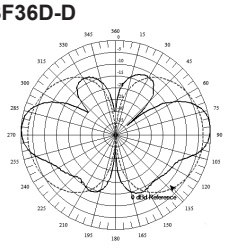

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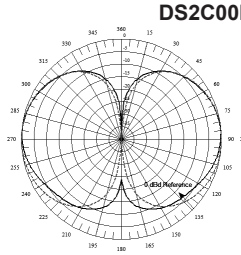

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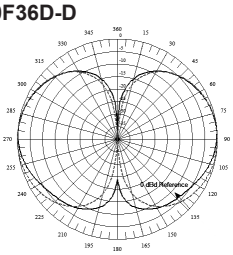

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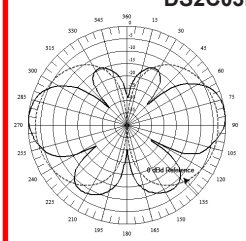

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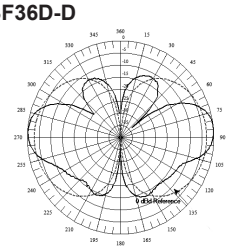

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