



STATE OF CONNECTICUT

CONNECTICUT SITING COUNCIL

Ten Franklin Square, New Britain, CT 06051

Phone: (860) 827-2935 Fax: (860) 827-2950

E-Mail: siting.council@ct.gov

www.ct.gov/csc

VIA ELECTRONIC MAIL

August 27, 2019

Kyle Richers
Transcend Wireless
10 Industrial Avenue, Suite 3
Mahwah, NJ 07430

RE: **EM-T-MOBILE-162-190809** – T-Mobile notice of intent to modify an existing telecommunications facility located at 15 Oakdale Avenue, Winsted (a/k/a Winchester), Connecticut.

Dear Mr. Richers:

The Connecticut Siting Council (Council) is in receipt of your correspondence of August 21, 2019 submitted in response to the Council's August 13, 2019 notification of an incomplete request for exempt modification with regard to the above-referenced matter.

The submission renders the request for exempt modification complete and the Council will process the request in accordance with the Federal Communications Commission 60-day timeframe.

Thank you for your attention and cooperation.

Sincerely,

Melanie A. Bachman
Executive Director

MAB/IN/emr



Mount Analysis of Existing T-Arms for American Tower on behalf of T-Mobile
302506 - Winchester CT 3
Project #: 12927190
T-Mobile Site ID: CTNH403A
Program: L600

CLS Engineering PLLC Project #41124-12927190-01-MA-R3
 August 20, 2019

MOUNT DESCRIPTION	Existing T-Arms at 164 ft AGL
ANTENNA ELEVATION	Nominal Rad. Elevation of 166 ft AGL (Eccentricity of -2 ft)
SITE DESCRIPTION	180 ft Monopole
SITE ADDRESS	15 Oakdale Avenue, Winsted, CT 06098, Litchfield County
GPS COORDINATES	41.921700, -73.049500
ANALYSIS STANDARD	2015 IBC / 2018 Connecticut State Building Code / TIA-222-G
LOADING CRITERIA	120 mph, V_{ult} / 93 mph, V_{asd} (3-Second Gust) w/o ice & 50 mph (3-Second Gust) w/ 0.75" Ice

■ ANALYSIS RESULT: Pass (Conditional)

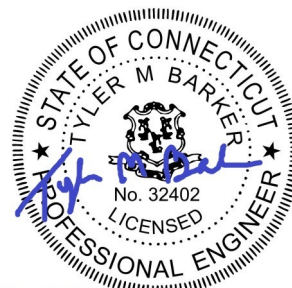
MEMBER USAGE	58%	Pass
CONNECTION USAGE	90%	Pass
COLLAR USAGE	53%	Pass

A maintenance live load of 250 lb has been applied at each mounting pipe location.

Modifications are proposed to bring mounts into compliance; see conclusion for details.

Prepared by:
Jennifer Soza

Reviewed and Approved by:
Tyler M. Barker, P.E.



Tyler M. Barker
 CLS Engineering, PLLC
 Director of Engineering
 PE # 32402 Exp. 1/31/2020
 COA # PEC.001833 Exp. 8/14/2020

■ INTRODUCTION

The proposed equipment is to be mounted to the existing T-Arms. This proposed mounting configuration was analyzed using RISA-3D, a commercially available finite element analysis software package. A selection of input and output from our analysis is attached to the end of this report.

■ STRUCTURAL DOCUMENTS PROVIDED

STRUCTURAL DATA	Site Photos, dated December 20, 2018 Site Pro 1 Drawing #SCX45-K, dated February 19, 2015 Site Pro 1 Drawing #PRK-1245, dated April 10, 2014
PREVIOUS ANALYSES	Tower SA by ATC, Engineering #12629663_C3_01, dated November 27, 2018
LOADING DATA	ATC Application, Project #12927190, dated April 02, 2019

■ ANALYSIS CRITERIA

STANDARD	2015 IBC / 2018 Connecticut State Building Code / TIA-222-G
BASIC WIND SPEED	120 mph, V_{ult} / 93 mph, V_{asd} (3-Second Gust)
BASIC WIND SPEED W/ ICE	50 mph (3-Second Gust) w/ 0.75" Radial Ice (Escalating)
EXPOSURE CATEGORY	B
MAX. TOPOGRAPHIC FACTOR, K_{zt}	1.00
RISK CATEGORY	II
MAINTENANCE LIVE LOAD	L_M : 250 lb

■ FINAL EQUIPMENT

ELEVATION (ft)		ANTENNAS	
MOUNT	RAD.	#	NAME
164.0	166.0	3	Ericsson AIR 21, 1.3 M, B2A B4P
		3	Ericsson AIR 21, 1.3 M, B4A B2P
		3	Ericsson RADIO 4449 B12/B71
		1	Fastback Networks Intelligent Backhaul Radio 1300 Series
		3	RFS Celwave APXVAARR24_43-U-NA20

■ RESULTS SUMMARY

COMPONENT	PEAK USAGE	RESULT
Connections	92%	Pass
Face Horizontals	58%	Pass
Collar Reactions	53%	Pass
Mount Pipes	50%	Pass
Stand-Off Horizontals	41%	Pass
Reinforcement Members	24%	Pass

■ CONCLUSION AND RECOMMENDATIONS

According to our structural analysis, the mounts have been found to **CONDITIONALLY PASS**. The mounting configuration considered in this analysis will be capable of supporting the referenced loading pursuant to referenced standards once the following scope is executed:

- Install (1) proposed Site Pro 1 PRK-1245 platform reinforcement kit on existing T-Arm mounts as shown in the following sketches. Field-cut proposed angles as required. Maintain minimum bolt edge distance. **Re-secure coax after installation of proposed kit. DO NOT PINCH SAFETY CLIMB.**
- Install (1) 8 ft. long, Pipe 2.5 STD, A53 Gr. B mount pipe at Position 2 for proposed panel at each sector (3 total). Connect to existing face horizontal member with Site Pro 1 SCX45-K crossover plate kit or equal (3 total).

See following sketches and Site Pro 1 assembly drawings for additional details.

■ ASSUMPTIONS AND CONDITIONS

This analysis is inclusive of the antenna supporting frames/mounts and all recorded connections that will support the equipment listed in this report. It considers only the theoretical capacity of structural components and it is not a condition assessment. The validity of the analysis may be dependent on the accuracy of structural information supplied by others. The client is responsible for verifying this information. If any provided information is revised after completion of this analysis, CLS Engineering PLLC should be notified immediately to revise results.

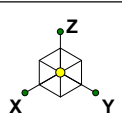
This analysis assumes the following:

1. The tower or other superstructure and mounts (if existing) were properly constructed as per the original design and have been properly maintained in accordance with applicable code standards.
2. Member sizes and strengths are accurate as supplied or are assumed as stated in the calculations.
3. In the absence of sufficient design information, all welds and connections are assumed to develop at least the capacity of the connected member, unless otherwise stated in this analysis.
4. All prior structural modifications, if any, are assumed to be correctly installed and fully effective.
5. The loading configuration is complete and accurate as supplied and/or as modeled in the previous analysis. All appurtenances are assumed to be properly installed and supported as per manufacturer requirements.
6. Some conservative assumptions may be used regarding appurtenances and their projected areas based on careful interpretation of data supplied, previous experience and standard industry practice.

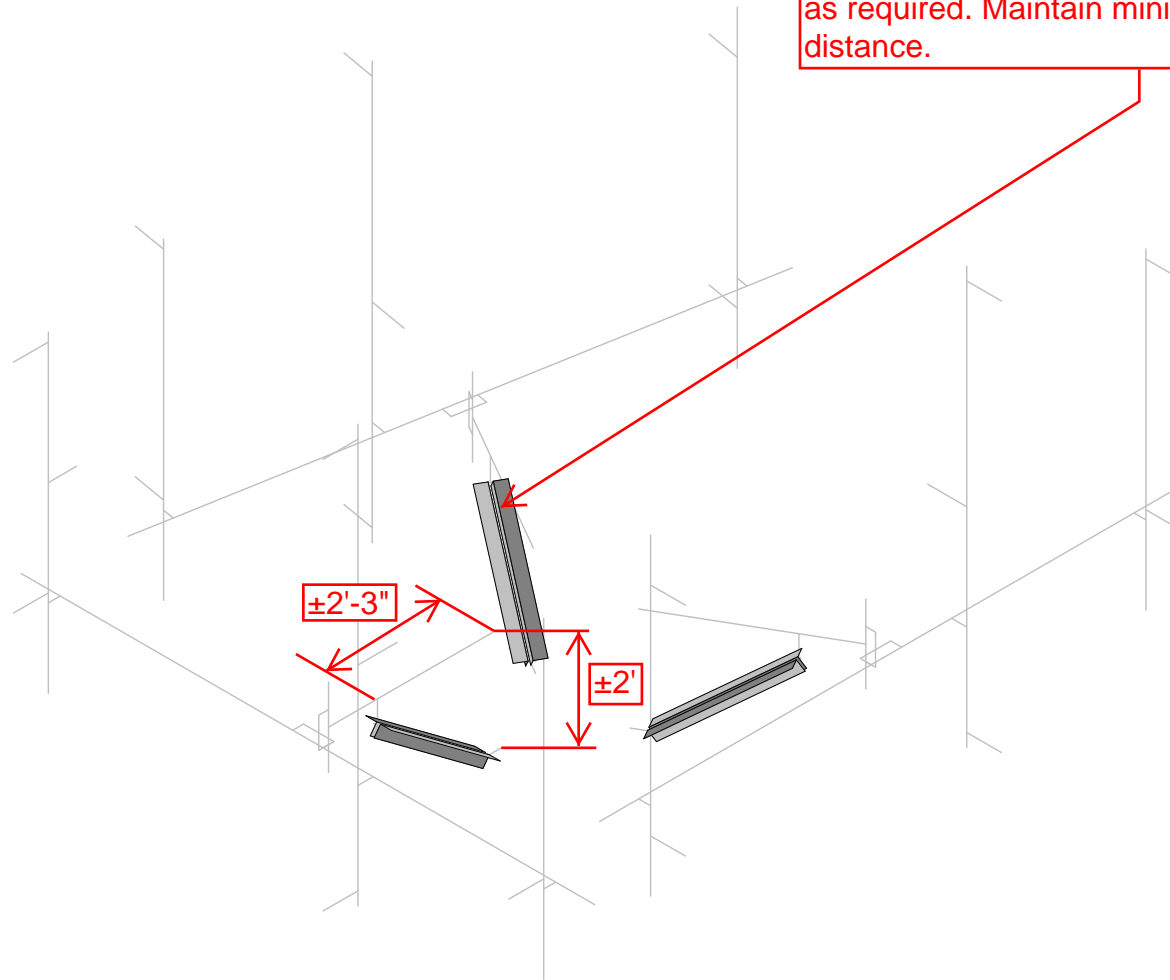
All opinions and conclusions are considered accurate to a reasonable degree of engineering certainty based upon the evidence available at the time of the report. All opinions and conclusions contained herein are subject to revision based upon receipt of new or updated information. All services are provided exercising a level of care and diligence equivalent to the standard of our profession. No warranty or guarantee, either expressed or implied, is offered. All services are confidential in nature and this report will not be released to any other party without the client's consent. The use of this analysis is limited to the expressed purpose for which it was commissioned and it may not be reused, copied or disseminated for any other purpose without consent from CLS Engineering PLLC.

All services were performed, results obtained and recommendations made in accordance with generally accepted engineering principles and practices. CLS Engineering PLLC is not responsible for the conclusions, opinions or recommendations made by others based on the information supplied in this analysis.

It is not possible to have the fully detailed information necessary to perform a complete and thorough analysis of every structural sub-component of an existing structure. The structural analysis by CLS Engineering PLLC verifies the adequacy of the primary members of the structure. CLS Engineering PLLC provides a limited scope of service in that we cannot verify the adequacy of every weld, bolt, gusset, etc.



Install (1) proposed Site Pro 1 PRK-1245 platform reinforcement kit on existing T-Arm mounts as shown. Field-cut proposed angles as required. Maintain minimum bolt edge distance.

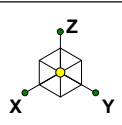


NOTE:
* Re-secure Coax after installation of kicker kit.
* Do not pinch safety climb.

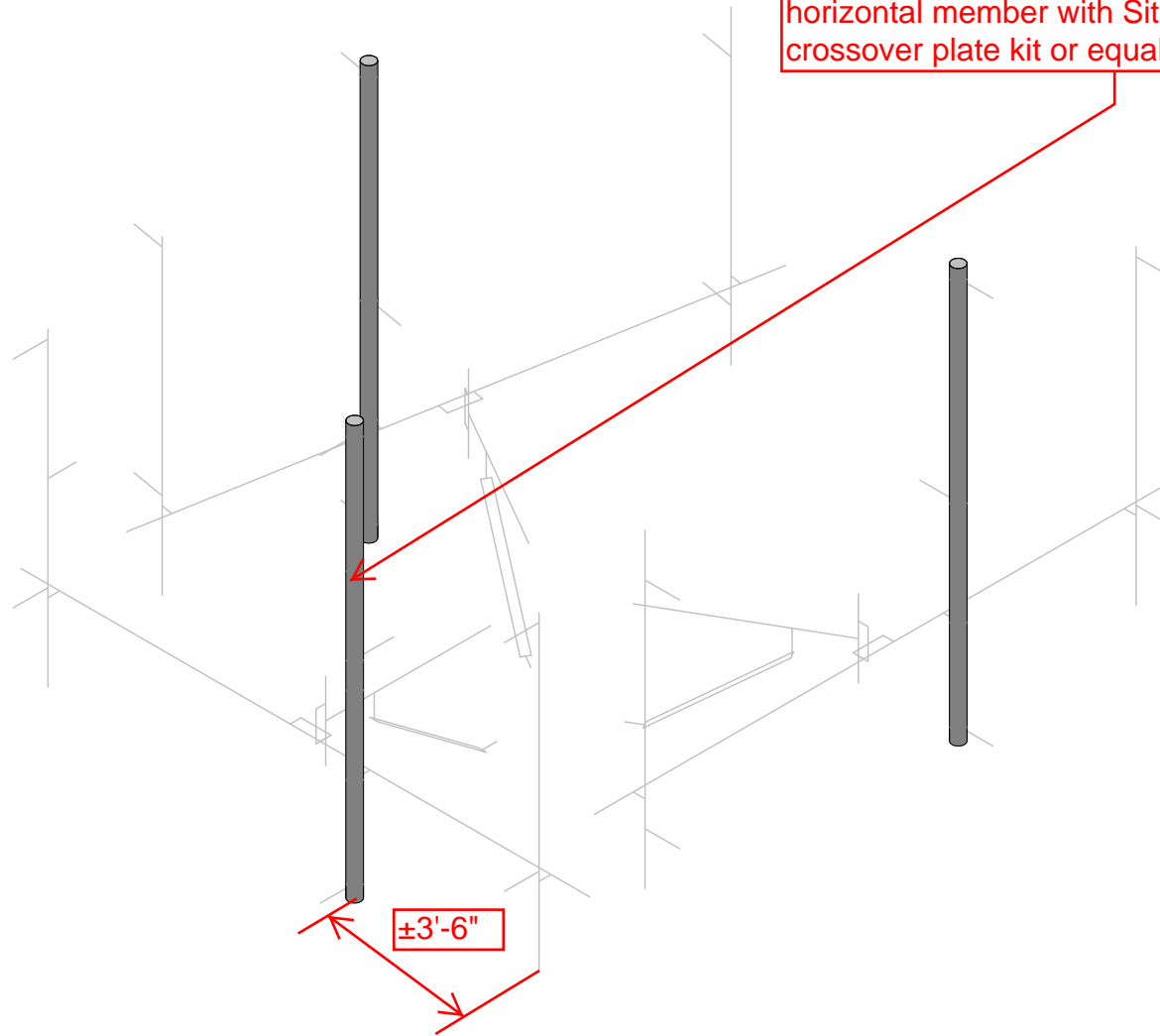
CLS
JLS
41124-12927190-01-MA-R3

41124-12927190-Winchester CT 3
Proposed Modifications - PRK-1245 - Rendered

IN - 1
Aug 20, 2019 at 3:52 PM
41124-12927190-01-MA-R3.r3d



Install (1) 8 ft. long, Pipe 2.5 STD, A53 Gr. B
mount pipe at Position 2 for proposed panel at
each sector (3 total). Connect to existing face
horizontal member with Site Pro 1 SCX45-K
crossover plate kit or equal (3 total).

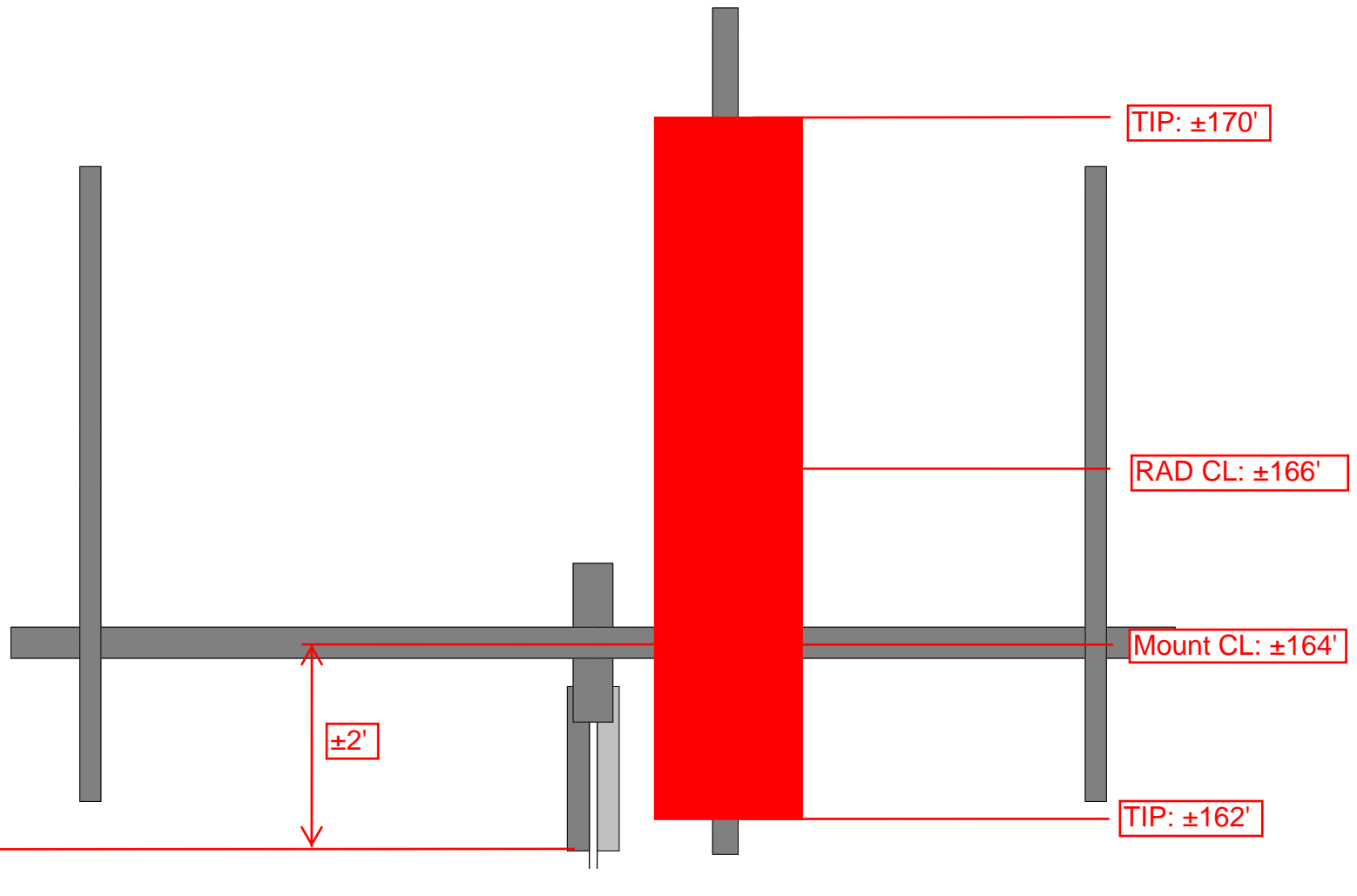


Envelope Only Solution

CLS
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41124-12927190-01-MA-R3

41124-12927190-Winchester CT 3
Proposed Mount Pipes - Rendered

IN - 2
Aug 20, 2019 at 3:52 PM
41124-12927190-01-MA-R3.r3d

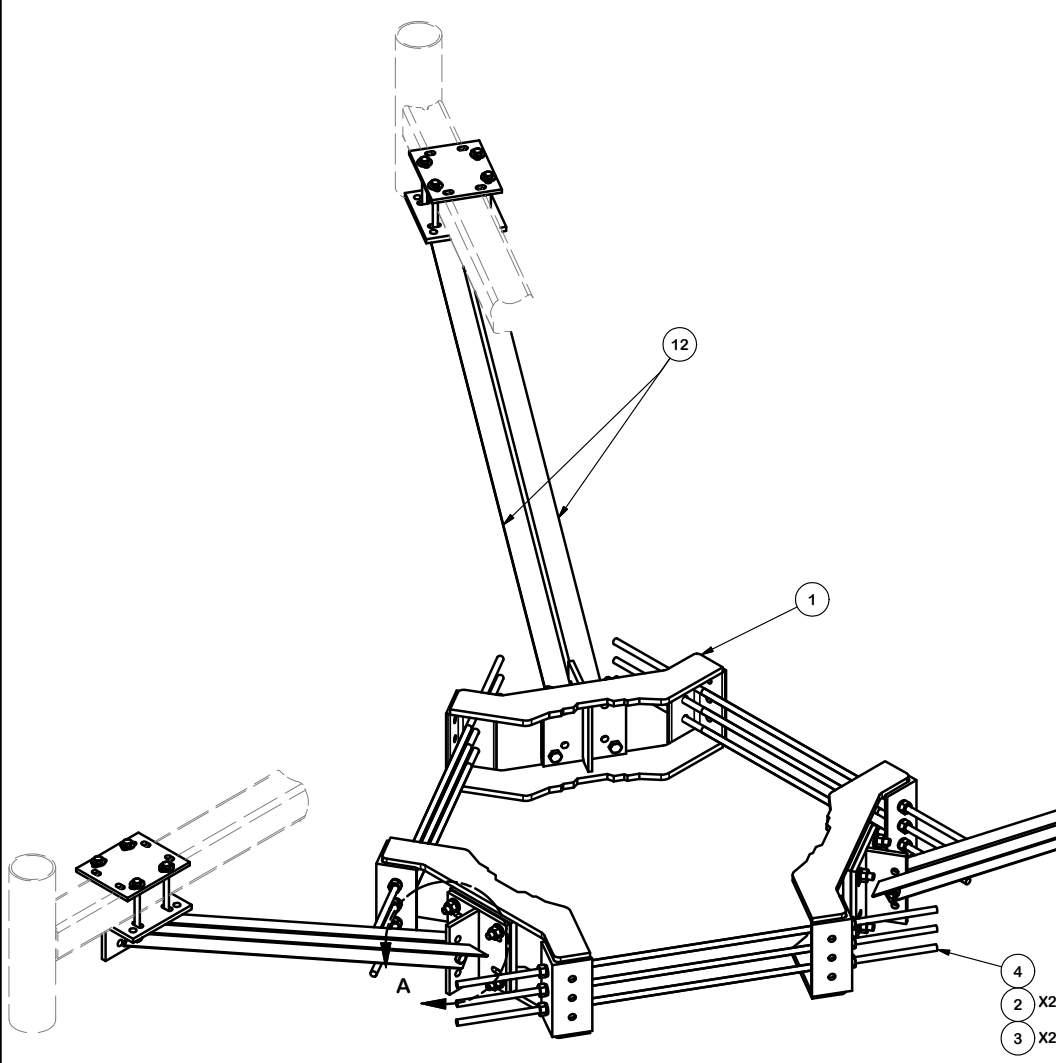


Envelope Only Solution

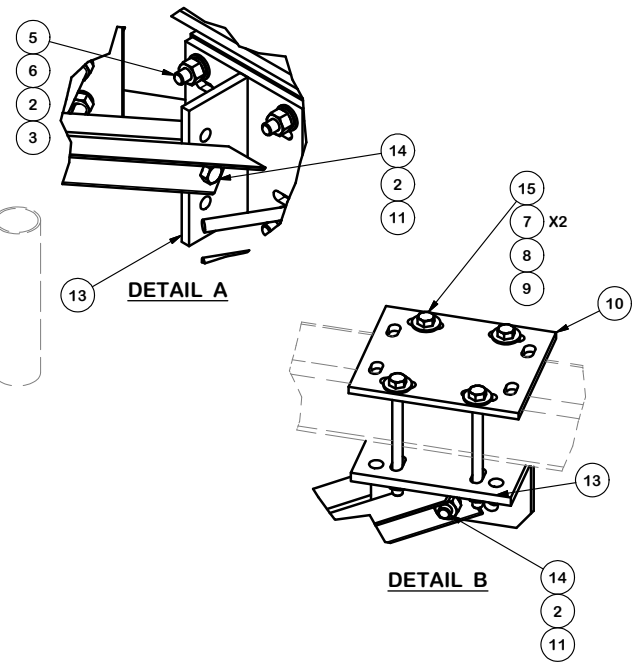
CLS
JLS
41124-12927190-01-MA-R3

41124-12927190-Winchester CT 3
Mount/RAD CL - Front Elevation View

IN - 3
Aug 20, 2019 at 3:53 PM
41124-12927190-01-MA-R3.r3d



PARTS LIST						
ITEM	QTY	PART NO.	PART DESCRIPTION	LENGTH	UNIT WT.	NET WT.
1	3	X-LWRM	RING MOUNT WELDMENT		68.81	206.42
2	36	G58LW	5/8" HDG LOCKWASHER		0.03	0.94
3	30	A58NUT	5/8" HDG A325 HEX NUT		0.13	3.90
4	9	G58R-24	5/8" x 24" THREADED ROD (HDG.)		0.55	4.94
4	9	G58R-48	5/8" x 48" THREADED ROD (HDG.)		0.55	4.94
5	12	A58234	5/8" x 2-3/4" HDG A325 HEX BOLT	2 3/4 in	0.36	4.27
6	12	A58FW	5/8" HDG A325 FLATWASHER		0.03	0.41
7	24	G12FW	1/2" HDG USS FLATWASHER		0.03	0.82
8	12	G12LW	1/2" HDG LOCKWASHER		0.01	0.17
9	12	G12NUT	1/2" HDG HEAVY 2H HEX NUT		0.07	0.86
10	3	SCX4	CROSSOVER PLATE	8 1/2 in	6.02	18.06
11	6	G58NUT	5/8" HDG HEAVY 2H HEX NUT		0.13	0.78
12	6	X-253993	PLATFORM REINFORCEMENT KIT ANGLE	52 25/32 in	14.33	85.99
13	6	X-253992	T-BRACKET FOR REINFORCEMENT KIT		13.55	81.27
14	6	G5802	5/8" x 2" HDG HEX BOLT GR5		0.27	1.62
15	12	G12065	1/2" x 6-1/2" HDG HEX BOLT GR5 FULL THREAD	6 1/2 in	0.41	4.91
TOTAL WT. #						464.91

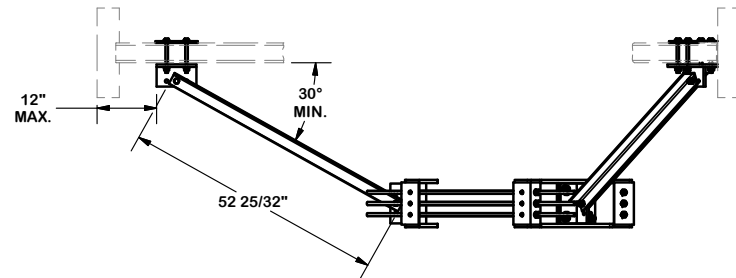
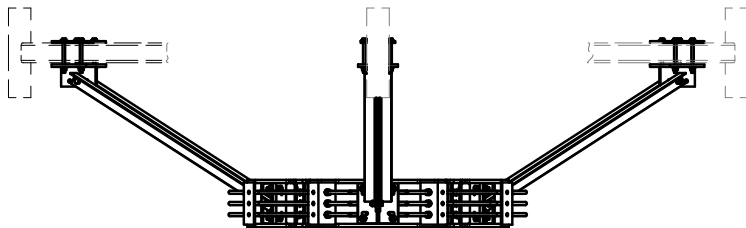
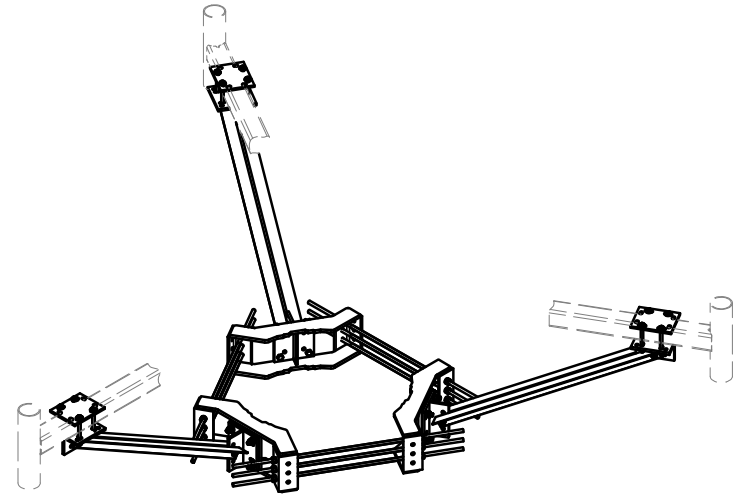
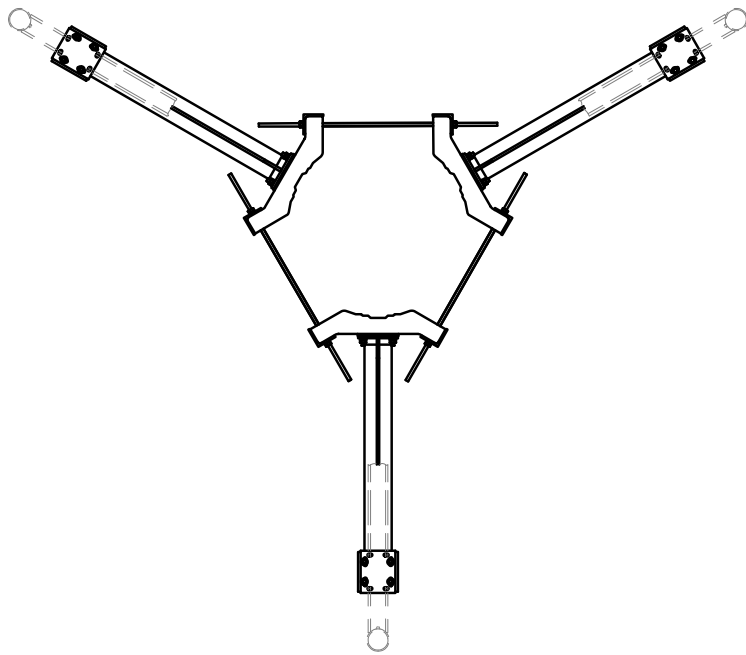


TOLERANCE NOTES
 TOLERANCES ON DIMENSIONS, UNLESS OTHERWISE NOTED ARE:
 SAWED, SHEARED AND GAS CUT EDGES ($\pm 0.030"$)
 DRILLED AND GAS CUT HOLES ($\pm 0.030"$) - NO CONING OF HOLES
 LASER CUT EDGES AND HOLES ($\pm 0.010"$) - NO CONING OF HOLES
 BENDS ARE $\pm 1/2$ DEGREE
 ALL OTHER MACHINING ($\pm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

PROPRIETARY NOTE:
 THE DATA AND TECHNIQUES CONTAINED IN THIS DRAWING ARE PROPRIETARY INFORMATION OF VALMONT INDUSTRIES AND CONSIDERED A TRADE SECRET. ANY USE OR DISCLOSURE WITHOUT THE CONSENT OF VALMONT INDUSTRIES IS STRICTLY PROHIBITED.

DESCRIPTION PLATFORM REINFORCEMENT ON A 12" TO 45" POLE 4' 6" ANGLE	
CPD NO. 4488	DRAWN BY CEK 4/10/2014
CLASS 81	SUB 01
DRAWING USAGE CUSTOMER	ENG. APPROVAL BMC 4/10/2014

 A valmont COMPANY	Locations: New York, NY Atlanta, GA Los Angeles, CA Plymouth, IN Salem, OR Dallas, TX
	Engineering Support Team: 1-888-753-7446
PART NO. PRK-1245	DWG. NO. PRK-1245



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 $\pm 1/2$ DEGREE
 ALL OTHER MACHINING (± 0.030 ")
 ALL OTHER ASSEMBLY (± 0.060 ")

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DESCRIPTION

PLATFORM REINFORCEMENT
 ON A 12" TO 45" POLE
 4' 6" ANGLE

CPD NO.
4488

DRAWN BY
CEK 4/10/2014

ENG. APPROVAL

CLASS SUB
81 01

DRAWING USAGE
CUSTOMER

CHECKED BY
BMC 4/10/2014



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

PART NO.

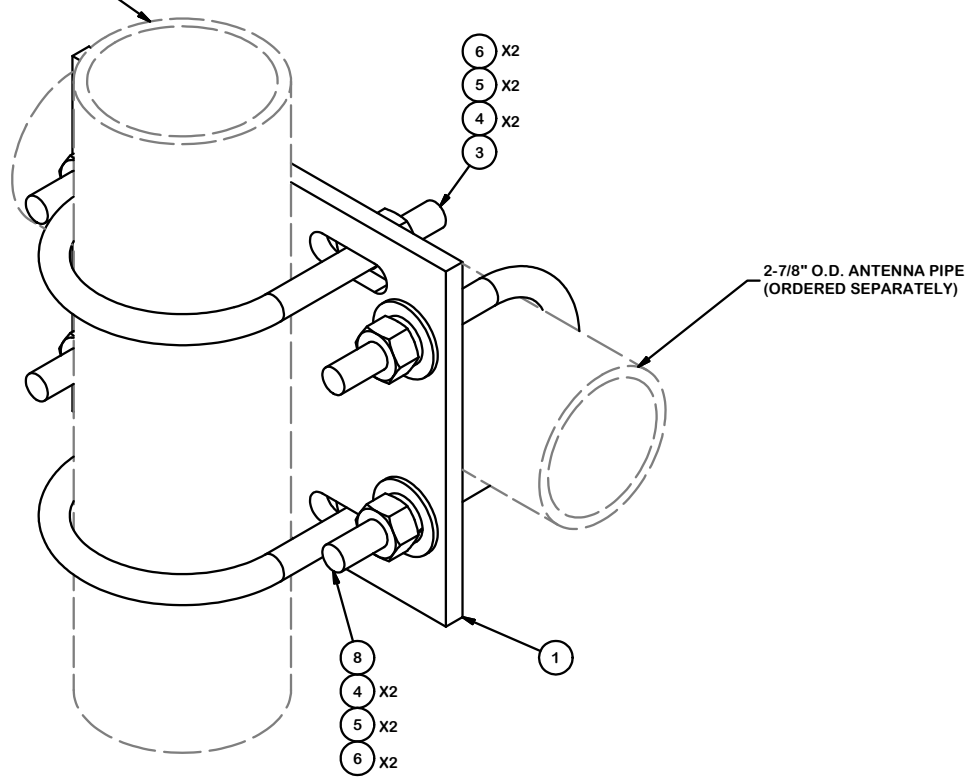
PRK-1245

DWG. NO.

PRK-1245

PARTS LIST						
ITEM	QTY	PART NO.	PART DESCRIPTION	LENGTH	UNIT WT.	NET WT.
1	1	SCX4	CROSSOVER PLATE	8 1/2 in	6.02	6.02
3	2	X-UB1358	1/2" X 3-5/8" X 5-1/2" X 3" U-BOLT (HDG.)		0.73	1.46
8	2	X-UB1300	1/2" X 3" X 5" X 2" U-BOLT (HDG.)		0.73	1.46
4	8	G12FW	1/2" HDG USS FLATWASHER		0.03	0.27
5	8	G12LW	1/2" HDG LOCKWASHER		0.01	0.11
6	8	G12NUT	1/2" HDG HEAVY 2H HEX NUT		0.07	0.57
TOTAL WT. #						9.92

3-1/2" O.D. ANTENNA PIPE
(ORDERED SEPRATELY)



2-7/8" O.D. ANTENNA PIPE
(ORDERED SEPRATELY)


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 $\pm 1/2$ DEGREE
ALL OTHER MACHINING (± 0.030)
ALL OTHER ASSEMBLY (± 0.060)**

PROPRIETARY NOTE:
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DESCRIPTION		CROSSOVER PLATE KIT	
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CPD NO.	DRAWN BY	ENG. APPROVAL
81	CEK 2/19/2015	BMC 2/19/2015
CLASS	SUB	DRAWING USAGE
81	01	CUSTOMER

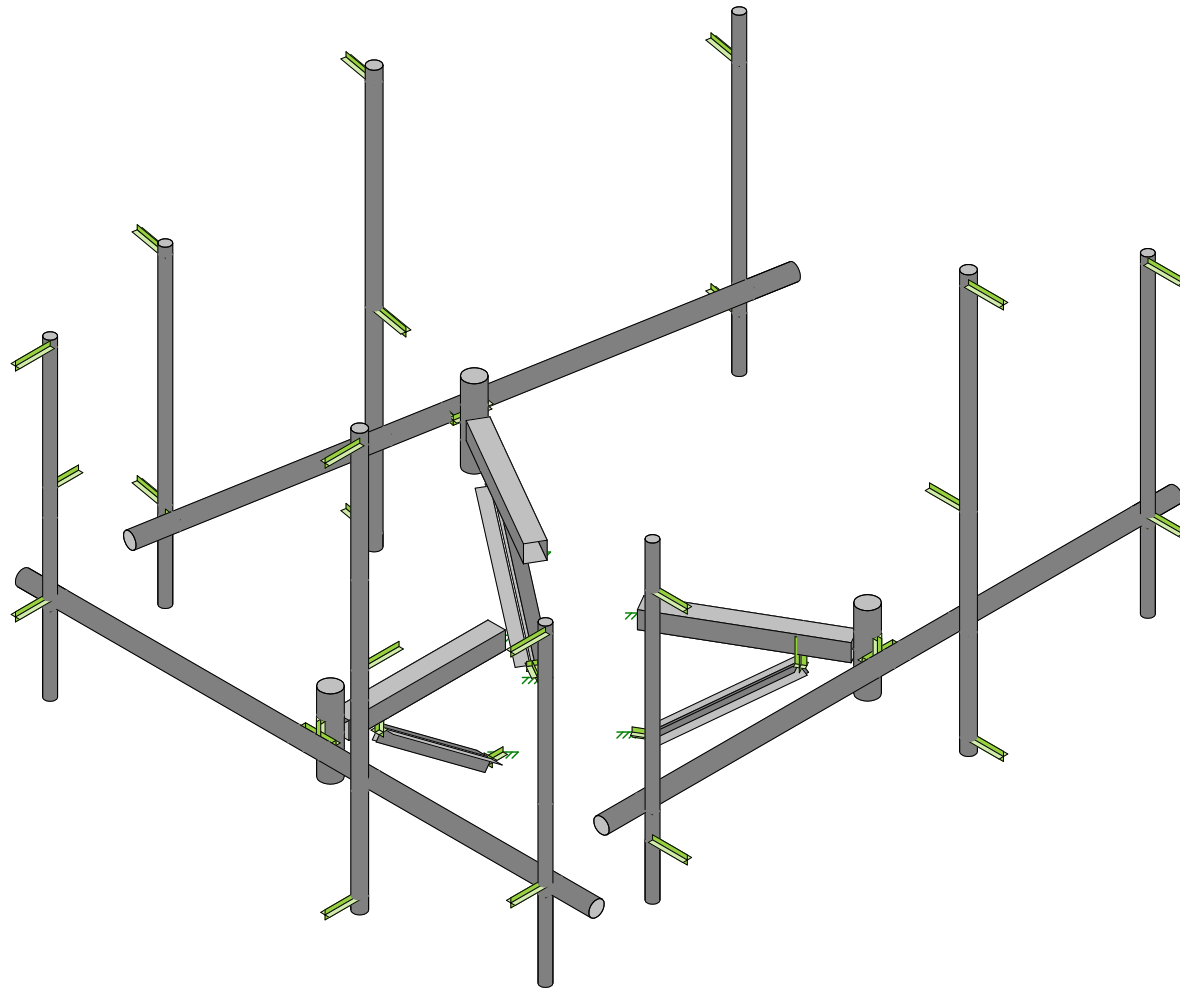
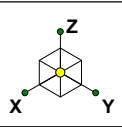
 <p>A valmont COMPANY</p>	<p>Locations: New York, NY Atlanta, GA Los Angeles, CA Plymouth, IN Salem, OR Dallas, TX</p>
	<p>Engineering Support Team: 1-888-753-7446</p>
PART NO.	SCX45-K
DWG. NO.	SCX45-K

Wind & Ice Loading			
Nominal Mount Elevation (AGL), z_{mount}	164 ft	K_a	0.90
Nominal Rad Elevation (AGL), z_{rad}	166 ft	K_d	0.95
Elevation AMSL (ft)	-	K_e	-
TIA Standard	G	K_z	1.14
Basic Wind Speed, V_{ult} (bare)	120 mph	K_{zt}	1.00
Basic Wind Speed, V (ice)	50 mph	K_s	-
Design Ice Thickness, t_i	3/4 in	t_{iz}	1.76 in
Exposure Category	B	G_h	1.00
Risk Category	II	q_z (bare)	39.9 psf
Seismic Response Coeff., C_s	-	q_z (ice)	6.9 psf

Live Loading	
At Mount Pipes, L_M	250 lb
Joint Labels Considered	M1A
	M2A
	M3A

Section Set Label	Shape Label	F_A (lb/ft)		Ice Wt. (lb/ft)
		Bare	Ice	
Standoff Tube	HSS4X4X4	23.92	2.50	14.74
Vertical Pipe	PIPE_4.0	16.14	5.00	13.47
Face Horizontal	PIPE_3.0	12.56	4.37	11.32
Mount Pipe	PIPE_2.0	8.52	3.67	8.90
MOD-Mount Pipe	PIPE_2.5	10.31	3.98	9.97
MOD PRK	L2.5x2.5x3	14.95	2.39	10.38

Appurtenances																														
Appurtenance Model	Status	Azimuth Offset (°, U)	Rad Elev. Override (ft)	Swap Width & Depth	Area Factor		Qty. per Azimuth			Total Qty. Override	0° Joints		120° Joints		240° Joints		Height (in)	Width (in)	Depth (in)	Weight (Bare) (lb)	Shape	Weight of Ice (lb)	EPA _A (Bare) (ft²)		EPA _A (Ice) (ft²)		F _A (Bare) (lb)		F _A (Ice) (lb)	
					Front	Side	0°	120°	240°		1	2	1	2	1	2							N	T	N	T	N	T	N	T
AIR 21, 1.3 M, B2A B4P				<input type="checkbox"/>			1				A1	A2					56	12	8	83	Flat	170.99	6.05	4.36	8.08	6.28	217.78	156.80	50.52	39.26
AIR 21, 1.3 M, B4A B2P				<input type="checkbox"/>			1				A5	A6					56	12.1	7.9	81.5	Flat	170.94	6.09	4.31	8.13	6.24	219.31	155.17	50.80	38.98
APXVAARR24_43-U-NA20				<input type="checkbox"/>			1				A3	A4					0	0	0	153.3	Generic	396.99	14.67	5.32	17.35	7.68	528.14	191.53	108.44	48.02
RADIO 4449 B12/B71				<input type="checkbox"/>	0.25		1				R1A						15	13.2	10.4	75	Flat	60.66	0.41	1.30	0.65	2.15	14.85	46.80	4.03	13.44
AIR 21, 1.3 M, B2A B4P		-20		<input type="checkbox"/>				1					B1	B2			56	12	8	83	Flat	170.99	6.05	4.36	8.08	6.28	217.78	156.80	50.52	39.26
AIR 21, 1.3 M, B4A B2P		-20		<input type="checkbox"/>				1					B5	B6			56	12.1	7.9	81.5	Flat	170.94	6.09	4.31	8.13	6.24	219.31	155.17	50.80	38.98
APXVAARR24_43-U-NA20		-20		<input type="checkbox"/>				1					B3	B4			0	0	0	153.3	Generic	396.99	14.67	5.32	17.35	7.68	528.14	191.53	108.44	48.02
RADIO 4449 B12/B71				<input type="checkbox"/>	0.25			1	1				R1B		R1G		15	13.2	10.4	75	Flat	60.66	0.41	1.30	0.65	2.15	14.85	46.80	4.03	13.44
AIR 21, 1.3 M, B2A B4P		30		<input type="checkbox"/>					1						G1	G2	56	12	8	83	Flat	170.99	6.05	4.36	8.08	6.28	217.78	156.80	50.52	39.26
AIR 21, 1.3 M, B4A B2P		30		<input type="checkbox"/>					1						G5	G6	56	12.1	7.9	81.5	Flat	170.94	6.09	4.31	8.13	6.24	219.31	155.17	50.80	38.98
APXVAARR24_43-U-NA20		30		<input type="checkbox"/>					1						G3	G4	0	0	0	153.3	Generic	396.99	14.67	5.32	17.35	7.68	528.14	191.53	108.44	48.02
Intelligent Backhaul Radio 1300 Series				<input type="checkbox"/>	0.25		1			1	O1A						10.2	7.9	3.5	8.8	Flat	26.57	0.17	0.30	0.33	0.80	6.04	10.87	2.04	5.02

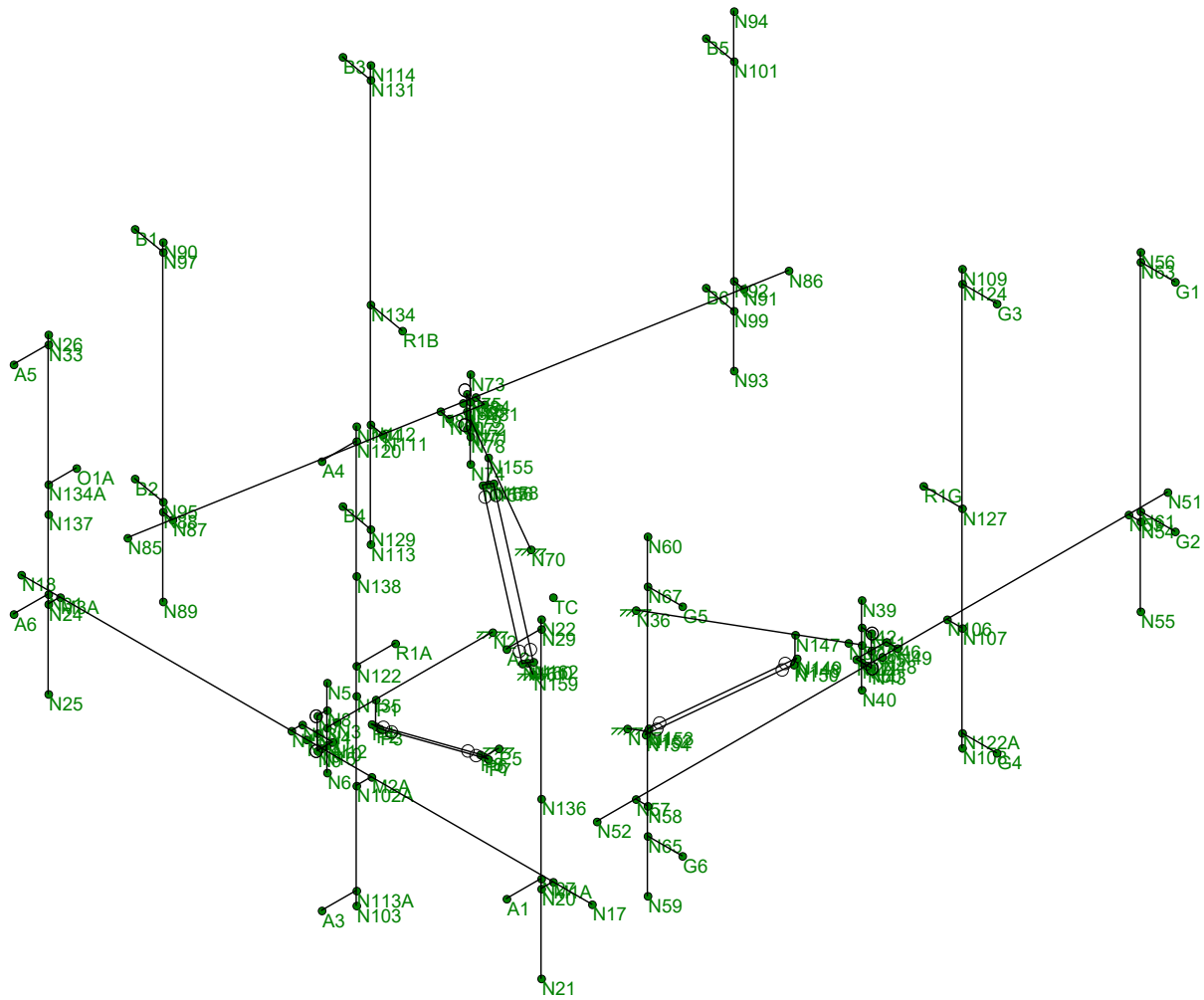
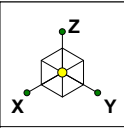


Envelope Only Solution

CLS
JLS
41124-12927190-01-MA-R3

41124-12927190-Winchester CT 3
Rendered

SK - 1
Aug 20, 2019 at 3:48 PM
41124-12927190-01-MA-R3.r3d

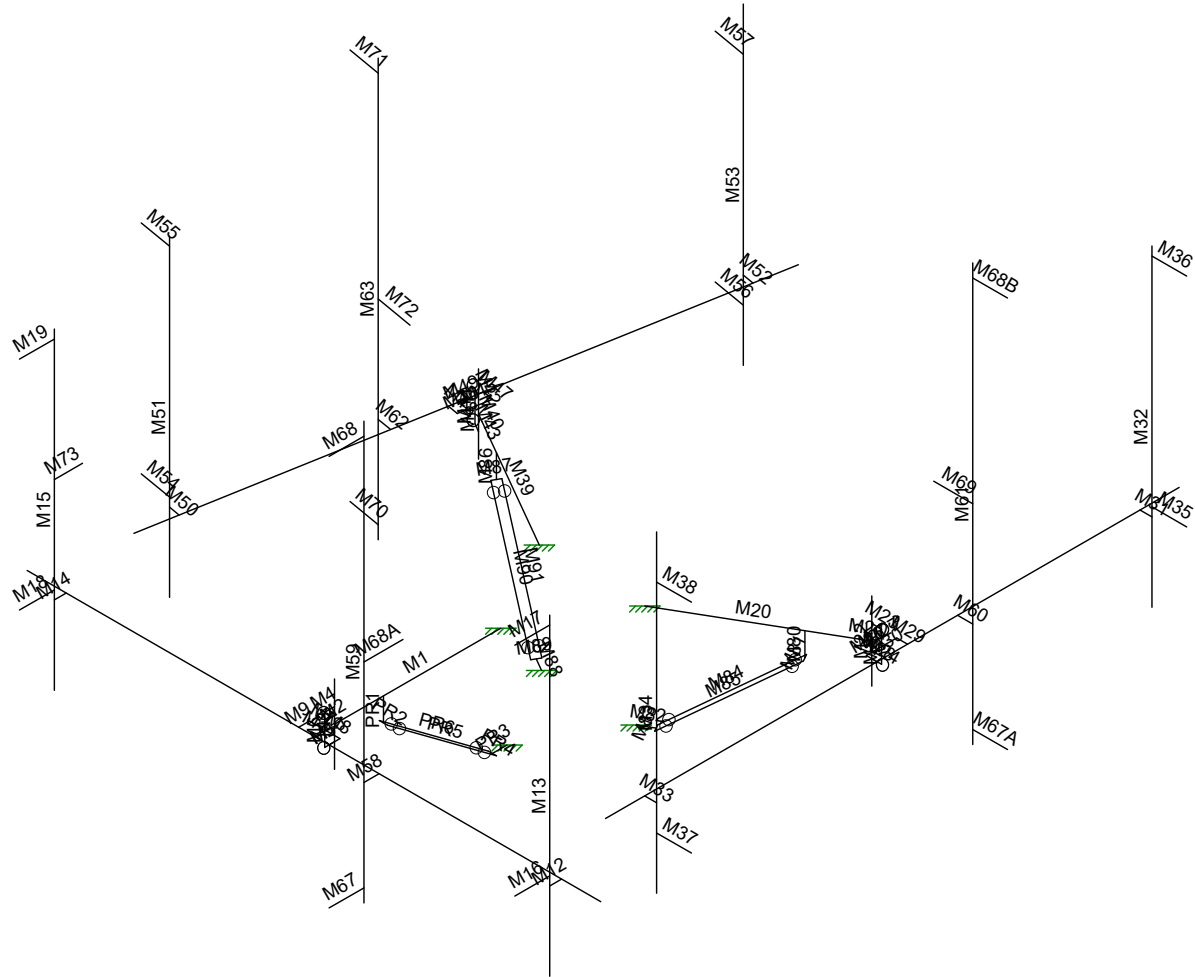
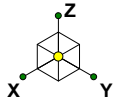


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CLS
JLS
41124-12927190-01-MA-R3

41124-12927190-Winchester CT 3
Joint Labels

SK - 2
Aug 20, 2019 at 3:48 PM
41124-12927190-01-MA-R3.r3d

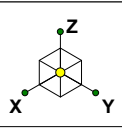


Envelope Only Solution

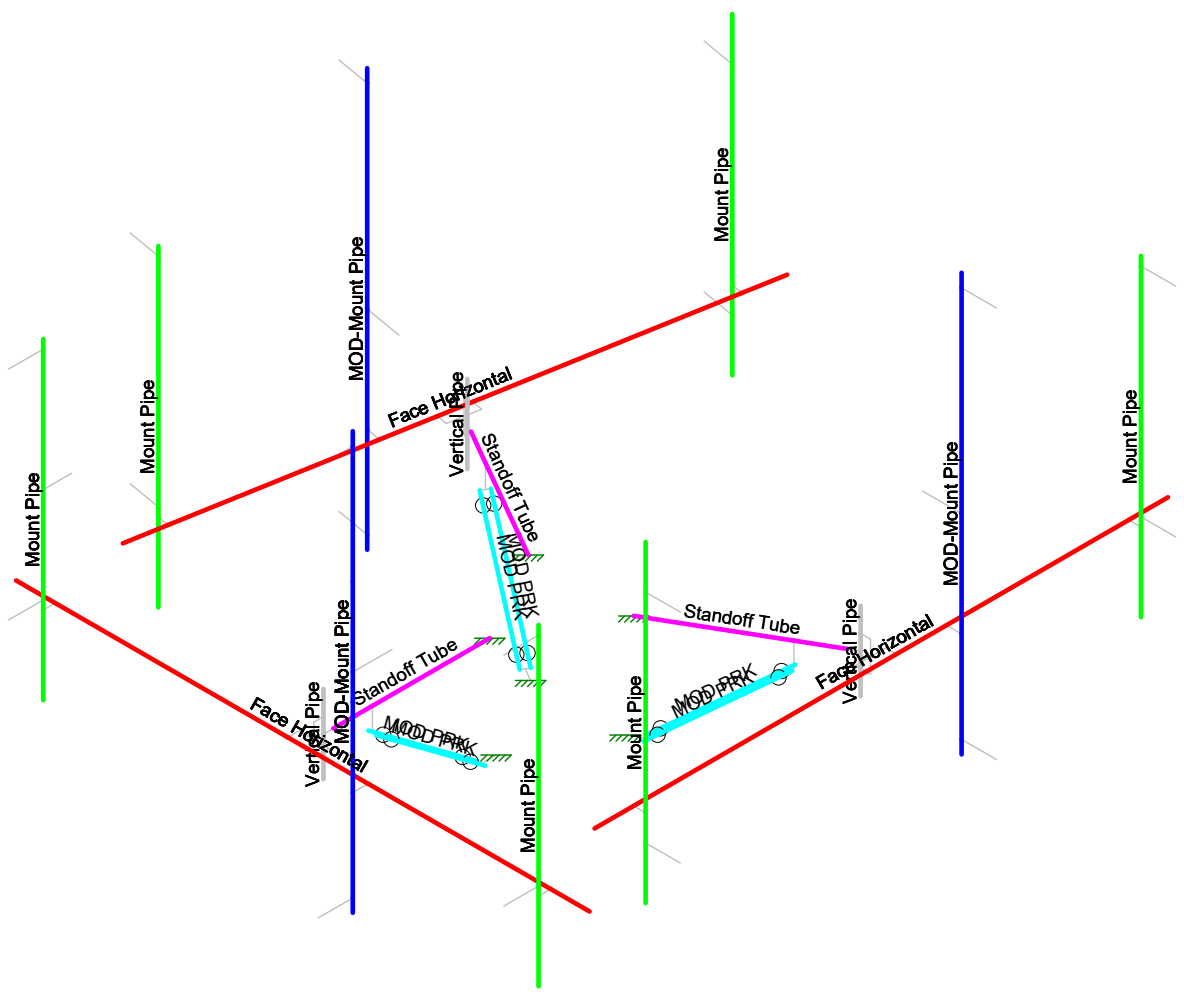
CLS
JLS
41124-12927190-01-MA-R3

41124-12927190-Winchester CT 3
Member Labels

SK - 3
Aug 20, 2019 at 3:48 PM
41124-12927190-01-MA-R3.r3d



- Section Sets
- MOD-Mount Pipe
 - Mount Pipe
 - Face Horizontal
 - Vertical Pipe
 - Standoff Tube
 - MOD PRK
 - RIGID

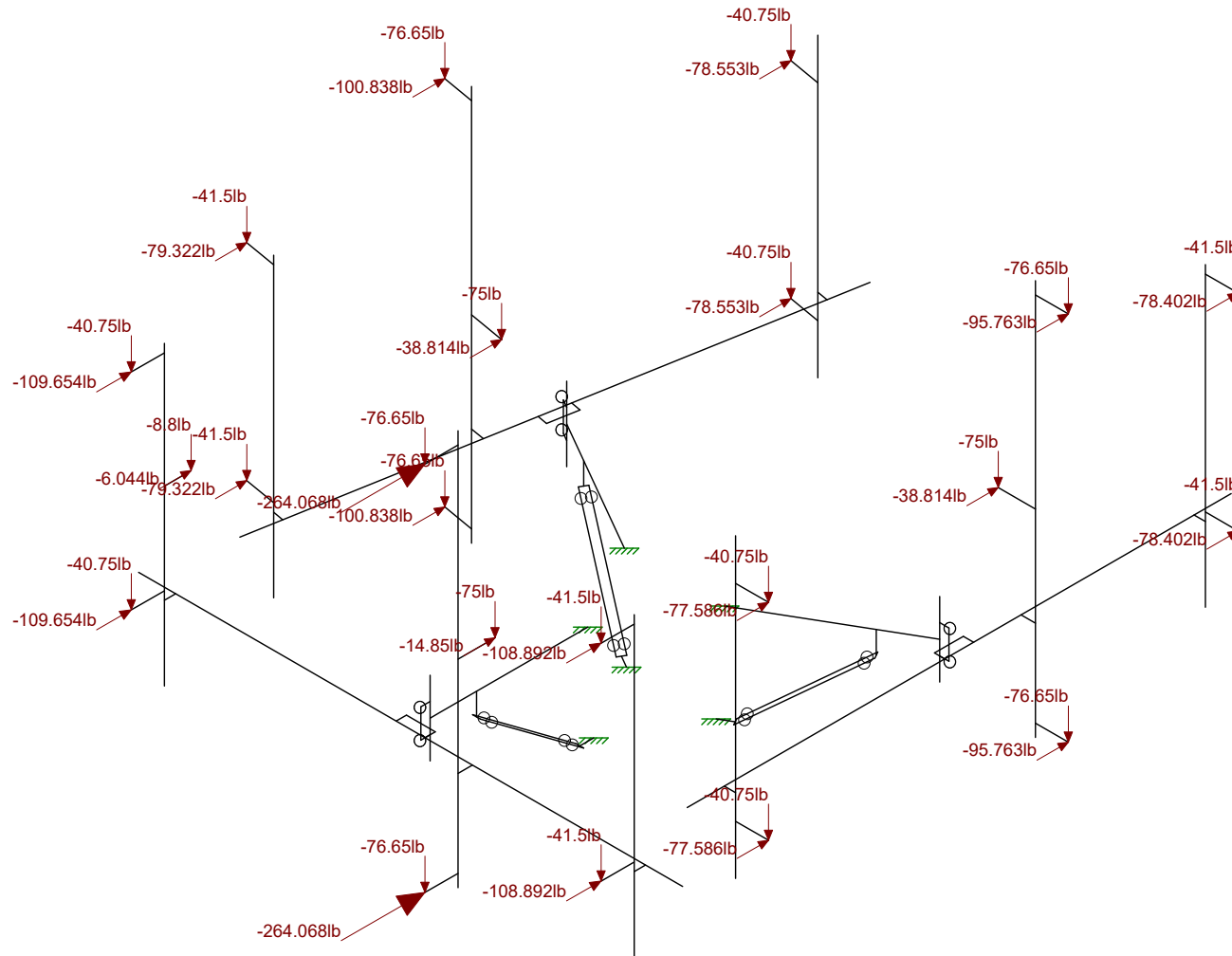
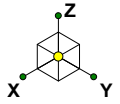


Envelope Only Solution

CLS
JLS
41124-12927190-01-MA-R3

41124-12927190-Winchester CT 3
Section Sets

SK - 4
Aug 20, 2019 at 3:48 PM
41124-12927190-01-MA-R3.r3d

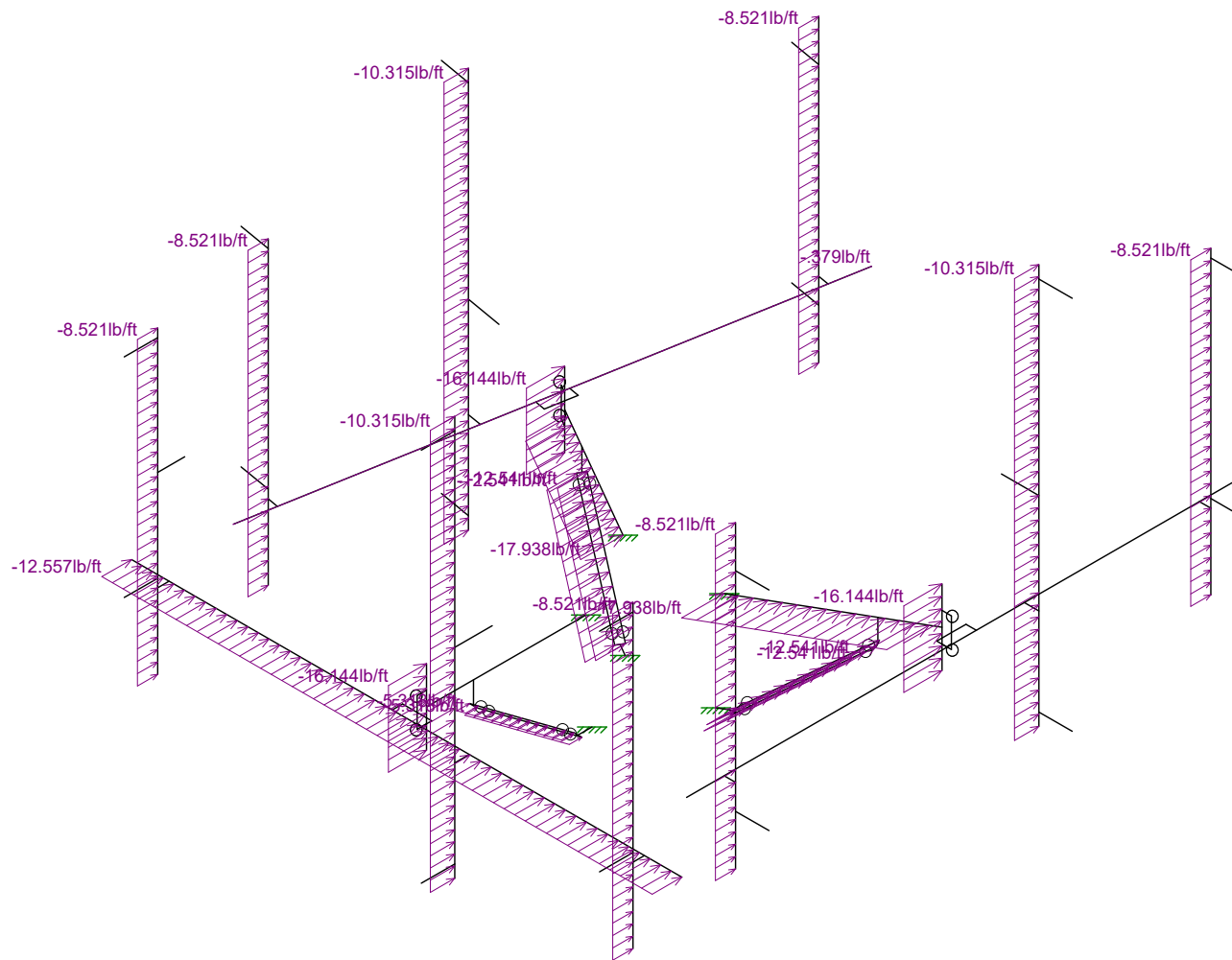
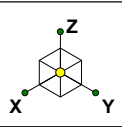


Loads: LC 1, DISPLAY (1.0D + 1.0W_0°)
Envelope Only Solution

CLS
JLS
41124-12927190-01-MA-R3

41124-12927190-Winchester CT 3
Joint Loads - Dead and Normal Wind

SK - 5
Aug 20, 2019 at 3:49 PM
41124-12927190-01-MA-R3.r3d

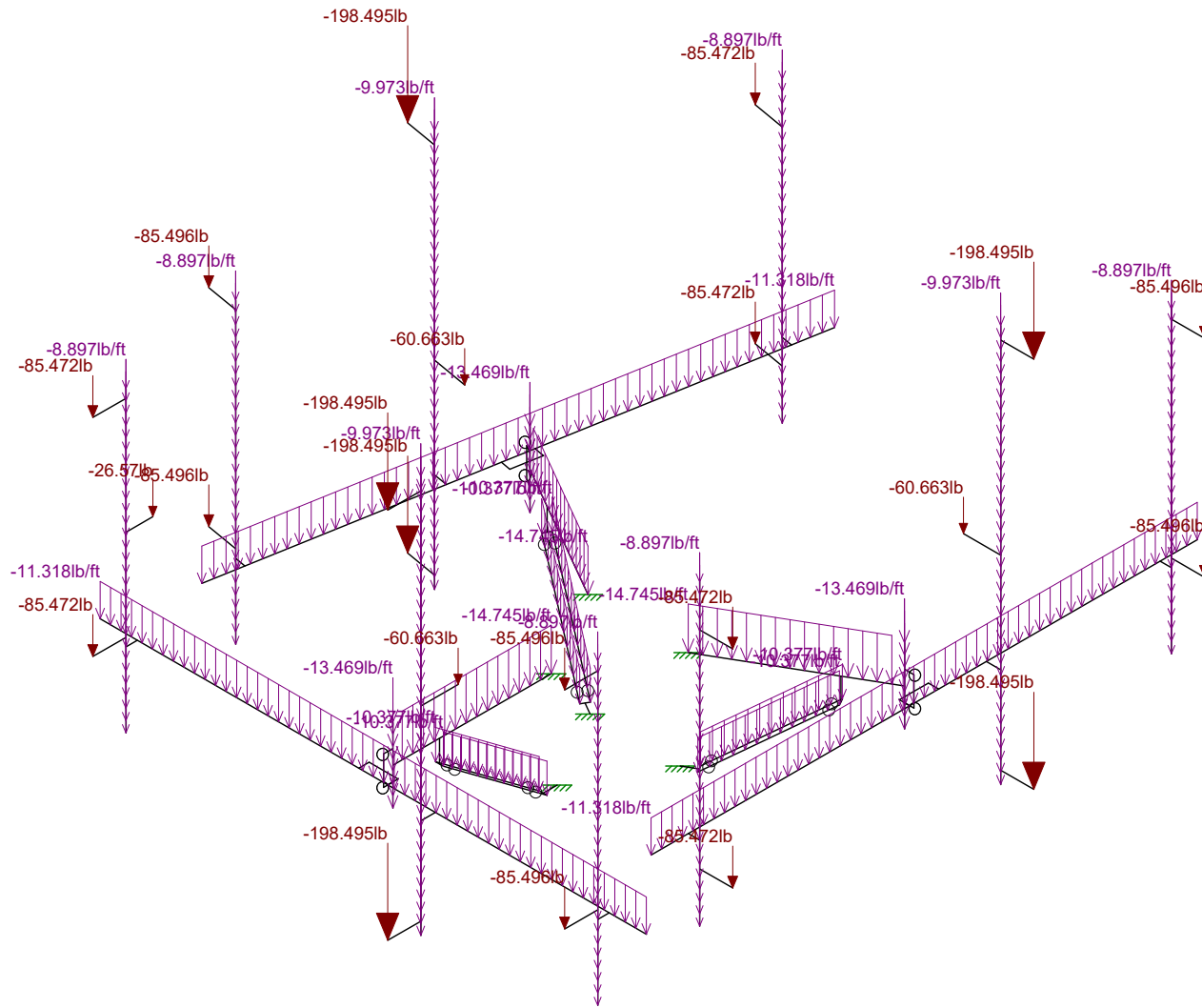
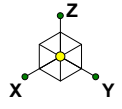


Loads: BLC 4, Structure Wind 0°
Envelope Only Solution

CLS
JLS
41124-12927190-01-MA-R3

41124-12927190-Winchester CT 3
Distributed Load - Normal Wind

SK - 6
Aug 20, 2019 at 3:49 PM
41124-12927190-01-MA-R3.r3d

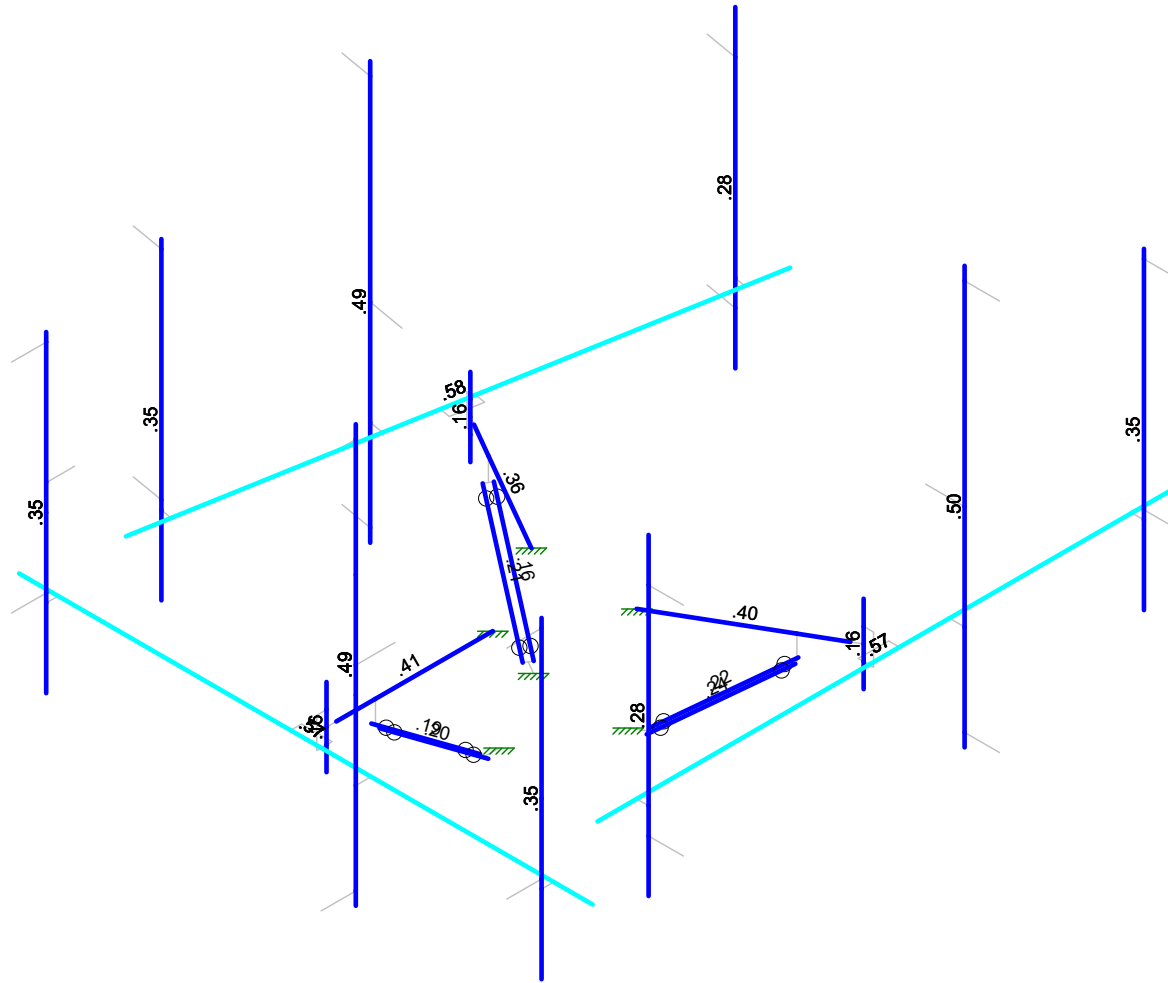
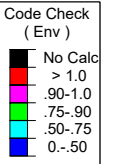
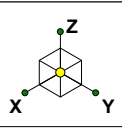


Loads: BLC 2, Ice Dead
Envelope Only Solution

CLS
JLS
41124-12927190-01-MA-R3

41124-12927190-Winchester CT 3
Ice Dead Loads

SK - 7
Aug 20, 2019 at 3:49 PM
41124-12927190-01-MA-R3.r3d

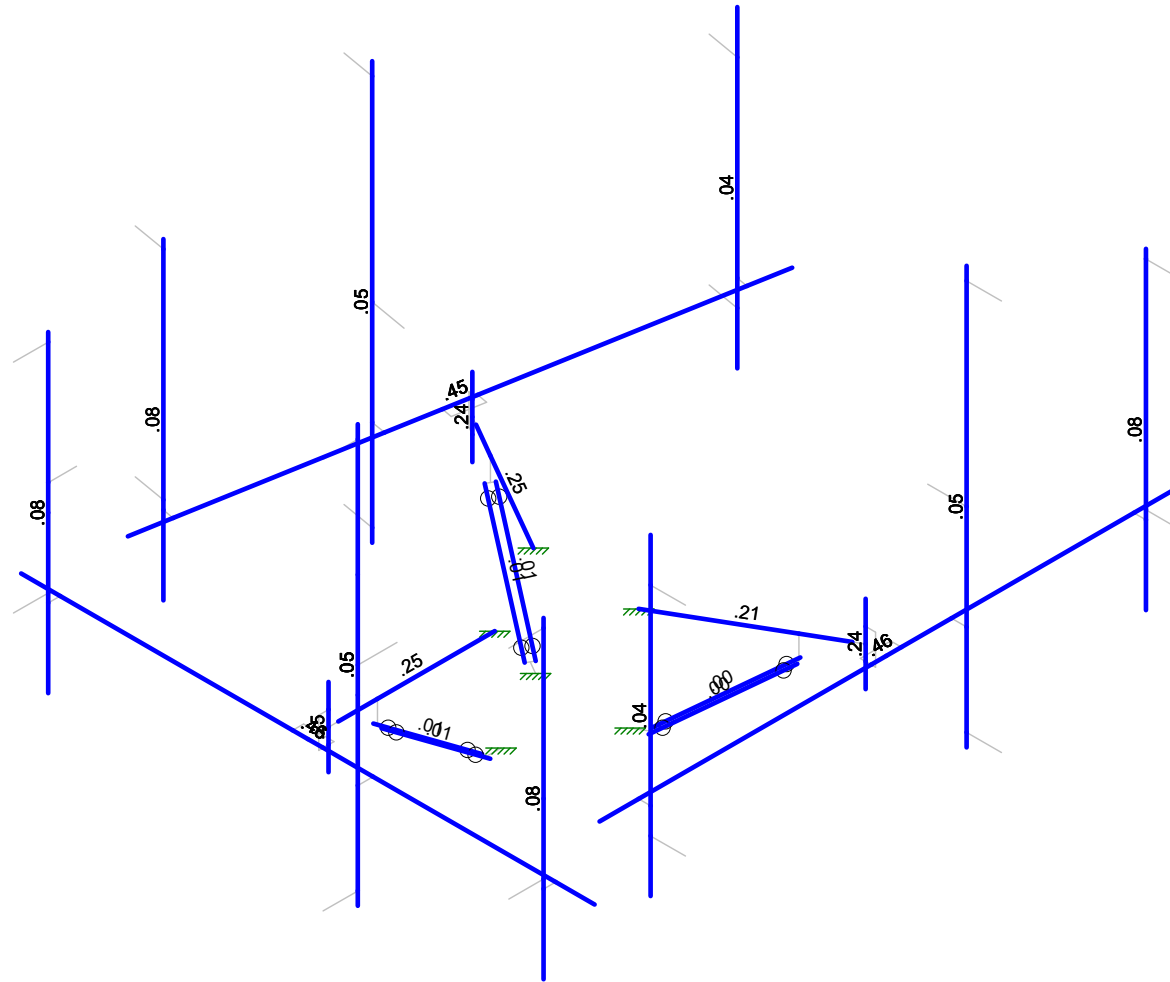
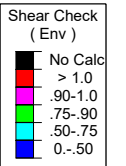
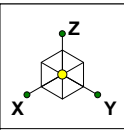


Member Code Checks Displayed (Enveloped)
Envelope Only Solution

CLS
JLS
41124-12927190-01-MA-R3

41124-12927190-Winchester CT 3
Envelope Member Unity Check Results - Bending

SK - 8
Aug 20, 2019 at 3:49 PM
41124-12927190-01-MA-R3.r3d



Member Shear Checks Displayed (Enveloped)
Envelope Only Solution

CLS
JLS
41124-12927190-01-MA-R3

41124-12927190-Winchester CT 3
Envelope Member Check Results - Shear

SK - 9
Aug 20, 2019 at 3:49 PM
41124-12927190-01-MA-R3.r3d

Basic Load Cases

	BLC Description	Category	X Gravi...	Y Gravi...	Z Gravity	Joint	Point	Distributed	Area(Member)	Surfac...
1	Dead	DL			-1	22				
2	Ice Dead	RL				22		24		
4	Structure Wind 0°	None						22		
5	Structure Wind 30°	None						48		
6	Structure Wind 45°	None						48		
7	Structure Wind 60°	None						46		
8	Structure Wind 90°	None						23		
9	Structure Wind 120°	None						46		
10	Structure Wind 135°	None						48		
11	Structure Wind 150°	None						48		
12	Structure Wind w/ Ice 0°	None						22		
13	Structure Wind w/ Ice 30°	None						48		
14	Structure Wind w/ Ice 45°	None						48		
15	Structure Wind w/ Ice 60°	None						46		
16	Structure Wind w/ Ice 90°	None						23		
17	Structure Wind w/ Ice 120°	None						46		
18	Structure Wind w/ Ice 135°	None						48		
19	Structure Wind w/ Ice 150°	None						48		
20	Antenna Wind 0°	None				22				
21	Antenna Wind 30°	None				44				
22	Antenna Wind 45°	None				44				
23	Antenna Wind 60°	None				44				
24	Antenna Wind 90°	None				22				
25	Antenna Wind 120°	None				44				
26	Antenna Wind 135°	None				44				
27	Antenna Wind 150°	None				44				
28	Antenna Wind w/ Ice 0°	None				22				
29	Antenna Wind w/ Ice 30°	None				44				
30	Antenna Wind w/ Ice 45°	None				44				
31	Antenna Wind w/ Ice 60°	None				44				
32	Antenna Wind w/ Ice 90°	None				22				
33	Antenna Wind w/ Ice 120°	None				44				
34	Antenna Wind w/ Ice 135°	None				44				
35	Antenna Wind w/ Ice 150°	None				44				
39	Maintenance Live 500 (1)	OL1				1				
40	Maintenance Live 500 (2)	OL2				1				
41	Maintenance Live 500 (3)	OL3				1				

Load Combinations

	Description	S...	P...	S...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...
1	DISPLAY (1.0D + 1.0W_0°)	Yes	Y		DL	1	20	1												
2	1.4D	Yes	Y		DL	1.4														
3	1.2D + 1.0W_0°	Yes	Y		DL	1.2	4	1	20	1										
4	1.2D + 1.0W_30°	Yes	Y		DL	1.2	5	1	21	1										
5	1.2D + 1.0W_45°	Yes	Y		DL	1.2	6	1	22	1										
6	1.2D + 1.0W_60°	Yes	Y		DL	1.2	7	1	23	1										
7	1.2D + 1.0W_90°	Yes	Y		DL	1.2	8	1	24	1										
8	1.2D + 1.0W_120°	Yes	Y		DL	1.2	9	1	25	1										
9	1.2D + 1.0W_135°	Yes	Y		DL	1.2	10	1	26	1										
10	1.2D + 1.0W_150°	Yes	Y		DL	1.2	11	1	27	1										
11	1.2D + 1.0W_180°	Yes	Y		DL	1.2	4	-1	20	-1										
12	1.2D + 1.0W_210°	Yes	Y		DL	1.2	5	-1	21	-1										
13	1.2D + 1.0W_225°	Yes	Y		DL	1.2	6	-1	22	-1										
14	1.2D + 1.0W_240°	Yes	Y		DL	1.2	7	-1	23	-1										

Hot Rolled Steel Design Parameters (Continued)

	Label	Shape	Length[in]	Lbyy[in]	Lbzz[in]	Lcomp top[in]	Lcomp bot[in]	L-torg...	Kyy	Kzz	Cb	Function
20	PR6	MOD PRK	31.225									Lateral
21	M84	MOD PRK	31.225									Lateral
22	M85	MOD PRK	31.225									Lateral
23	M90	MOD PRK	31.225									Lateral
24	M91	MOD PRK	31.225									Lateral

Envelope Joint Reactions

Joint		X [lb]	LC	Y [lb]	LC	Z [lb]	LC	MX [lb-ft]	LC	MY [lb-ft]	LC	MZ [lb-ft]	LC	
1	N36	max	2443.564	21	1134.667	15	556.988	14	478.93	12	1338.69	16	4207.441	8
2		min	-528.896	13	-4241.881	23	-1409.669	22	-994.334	4	-1501.367	8	-4215.059	16
3	N2	max	1428.086	3	883.687	15	806.627	3	2101.277	40	1078.927	11	3332.892	14
4		min	-4764.462	27	-883.102	7	-1491.965	11	-1409.936	80	-649.074	3	-3271.615	6
5	N70	max	2219.925	34	3799.801	31	760.489	8	665.136	18	843.113	6	3320.816	5
6		min	-747.234	9	-1270.813	7	-1281.41	16	-913.376	10	-1894.585	14	-3213.506	13
7	N151	max	-127.292	14	3897.457	22	3384.23	22	847.124	23	523.157	34	487.697	8
8		min	-2250.088	22	220.518	14	188.481	14	-64.857	15	-112.758	10	-501.353	16
9	P5	max	4409.664	27	35.986	15	3316.671	27	317.271	6	23.535	1	368.211	14
10		min	-123.373	1	-36.575	7	-83.681	1	-267.9	14	-932.814	27	-434.023	6
11	N159	max	9.623	8	16.713	8	3021.866	32	32.108	7	389.536	18	344.916	5
12		min	-2010.408	32	-3473.571	32	-15.021	8	-799.946	31	-170.517	10	-442.413	13
13	Totals:	max	3119.766	3	3688.234	15	5960.803	21						
14		min	-3119.765	11	-3688.217	7	1872.491	1						

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

Member	Shape	Code Check	Loc[in]	LC	Shear Check	Loc[in]	Dir	LC	phi*Pn...	phi*Pn...	phi*Mn...	phi*Mn.....	Eqn	
1	M49	PIPE 3.0	.577	70.125	30	.452	70.125	15	34117...	65205	5748.75	5748.75...	H3-6	
2	M11	PIPE 3.0	.574	70.125	26	.460	70.125	11	34117...	65205	5748.75	5748.75...	H3-6	
3	M30	PIPE 3.0	.573	70.125	22	.464	70.125	7	34117...	65205	5748.75	5748.75...	H3-6	
4	M61	PIPE 2.5	.497	72	15	.046	72	17	30038...	50715	3596.25	3596.25...	H1-1b	
5	M59	PIPE 2.5	.493	72	3	.045	72	5	30038...	50715	3596.25	3596.25...	H1-1b	
6	M63	PIPE 2.5	.489	72	7	.046	72	6	30038...	50715	3596.25	3596.25...	H1-1b	
7	M1	HSS4X4X4	.405	27	12	.247	27	z	39	95877...	109188	12663	12663...	H1-1b
8	M20	HSS4X4X4	.395	0	8	.209	27	y	16	95877...	109188	12663	12663...	H1-1b
9	M39	HSS4X4X4	.365	27	17	.247	27	z	29	95877...	109188	12663	12663...	H1-1b
10	M15	PIPE 2.0	.352	54	11	.080	54	15	20866...	32130	1871.6...	1871.6.....	H1-1b	
11	M32	PIPE 2.0	.348	54	7	.083	54	3	20866...	32130	1871.6...	1871.6.....	H1-1b	
12	M13	PIPE 2.0	.348	54	11	.083	54	7	20866...	32130	1871.6...	1871.6.....	H1-1b	
13	M51	PIPE 2.0	.345	54	15	.083	54	11	20866...	32130	1871.6...	1871.6.....	H1-1b	
14	M34	PIPE 2.0	.281	54	7	.043	54	11	20866...	32130	1871.6...	1871.6.....	H1-1b	
15	M53	PIPE 2.0	.279	54	15	.043	54	4	20866...	32130	1871.6...	1871.6.....	H1-1b	
16	M85	L2.5x2.5x3	.239	15.613	8	.004	31.225	z	9	23111...	29192.4	872.574	1902.1.....	H2-1
17	M84	L2.5x2.5x3	.216	15.613	17	.004	31.225	y	9	23111...	29192.4	872.574	1902.1.....	H2-1
18	M90	L2.5x2.5x3	.211	15.613	14	.010	0	z	32	23111...	29192.4	872.574	1902.1.....	H2-1
19	PR5	L2.5x2.5x3	.200	15.613	8	.012	31.225	z	43	23111...	29192.4	872.574	1902.1.....	H2-1
20	PR6	L2.5x2.5x3	.195	15.613	13	.012	0	y	43	23111...	29192.4	872.574	1902.1.....	H2-1
21	M3	PIPE 4.0	.163	9	11	.249	9	11	92571...	93240	10631...	10631.....	H1-1b	
22	M91	L2.5x2.5x3	.162	15.613	4	.010	31.225	y	32	23111...	29192.4	872.574	1902.1.....	H2-1
23	M41	PIPE 4.0	.157	9	15	.240	9	16	92571...	93240	10631...	10631.....	H1-1b	
24	M22	PIPE 4.0	.156	9	7	.242	9	7	92571...	93240	10631...	10631.....	H1-1b	

BOLTED CONNECTION ROTATIONAL SLIP RESISTANCE

v. 2017.11.20

DESIGN LOADS	
Factored Moment, M_u (lb-ft)	2192

BOLT PROPERTIES	
Bolt Type	U-Bolt
# of U-Bolts	2
Hole Type	Standard
Bolt Grade	A36
Bolt Diameter, d (in)	0.5
Leg Width, W_{leg} (in)	3.5
Bolt Torque Override, T (lb-ft)	50
Bolt Pretension Stress Override (ksi)	
Bolt Ultimate Strength, F_u (ksi)	58
Specified Torque, T (lb-ft)	50.00
Clamping Force per Bolt, P_u (lb)	6000.00
Bolt Pretension Stress (ksi)	30.56
Tensile Strength per Bolt, ϕP_n (lb)	6405.90
Slip Resistance per Bolt, ϕM_n (lb-ft)	593.25
Total Slip Resistance, ϕM_n (lb-ft)	2373.00
Connection Slip Usage, $M_u / \phi M_n$	0.92

FACTORS	
Nut Factor, K	0.20
$\phi_{(BOLT\ TENSION)}$	0.75
$\phi_{(SLIP-CRITICAL)}$	1.00
Mean Slip Coefficient, μ	0.30
Installed Pretension Ratio, D_u	1.13

Rule-of-thumb estimate

AISC 15th, J3.6

AISC 15th, J3.8

AISC 15th, J3.8

AISC 15th, J3.8

Using Torque Override