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Structural Analysis Report

Structure	:	**125 ft Self Supported Tower**
ATC Site Name	:	**Cherry Hill-branford, CT**
ATC Site Number	:	**302536**
Engineering Number	:	**64496921**
Proposed Carrier	:	**AT&T Mobility**
Carrier Site Name	:	**Branford West**
Carrier Site Number	:	**CTL02175/FA#10035093**
Site Location	:	**4 Beaver Road** **Branford, CT 06405-3403** **41.280150,-72.841733**
County	:	**New Haven**
Date	:	**December 18, 2015**
Max Usage	:	**100%**
Result	:	**Pass**

Prepared By:
Jack Stockli
Infinigy

STATE OF CONNECTICUT
JOSEPH R. JOHNSTON
DEC 2015
29460
LICENSED
PROFESSIONAL ENGINEER

Joseph R. Johnston

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Introduction

The purpose of this report is to summarize results of a structural analysis performed on the 125 ft self supported tower to reflect the change in loading by AT&T Mobility.

Supporting Documents

Tower Drawings	Rohn Eng. File # 30329PM, dated November 22, 1993
Foundation Drawing	Rohn Eng. File # 30329PM, dated November 11, 1993
Geotechnical Report	French & Parrello Job # 93N019C, dated June 4, 1993

Analysis

The tower was analyzed using American Tower Corporation's tower analysis software. This program considers an elastic three-dimensional model and second-order effects per ANSI/TIA-222.

Basic Wind Speed:	110 mph (3-Second Gust)
Basic Wind Speed w/ Ice:	50 mph (3-Second Gust) w/ 1"1/4 radial ice concurrent
Code:	ANSI/TIA-222-G / 2003 IBC w/ 2005 CT Supplement & 2009 CT Amendment
Structure Class:	II
Exposure Category:	B
Topographic Category:	1
Spectral Response:	$Ss = 0.23$, $S_1 = 0.06$
Site Class:	D - Stiff Soil

Conclusion

Based on the analysis results, the structure meets the requirements per the applicable codes listed above. The tower and foundation can support the equipment as described in this report.

If you have any questions or require additional information, please contact American Tower via email at Engineering@americantower.com. Please include the American Tower site name, site number, and engineering number in the subject line for any questions.

Existing and Reserved Equipment

Elevation[1] (ft)		Qty	Antenna	Mount Type	Lines	Carrier
Mount	RAD					
125.0	125.0	12	Decibel DB844H90E-XY	Sector Frames	(12) 1 5/8" Coax	Sprint Nextel
113.0	113.0	1	Raycap DC6-48-60-18-8F ("Squid")	Sector Frames	(12) 7/8" Coax (2) 0.74" 8 AWG 7 (1) 0.28" RG-6 (1) 3" Conduit (1) 0.39" Fiber Trunk	AT&T Mobility
		3	KMW AM-X-CD-14-65-00T-RET			
		1	Raycap DC6-48-60-18-8F			
		6	Ericsson RRUS-11			
		6	Powerwave LGP21401			
		3	Powerwave 7770.00			
106.0	106.0	3	RFS APXV18-206517S-C	Leg	(6) 1 5/8" Coax	Metro PCS
89.0	93.0	1	8' Omni	Side Arm	(1) 7/8" Coax	--

Equipment to be Removed

Elevation[1] (ft)		Qty	Antenna	Mount Type	Lines	Carrier
Mount	RAD					
113.0	113.0	6	LGP LGP21903	-	-	AT&T Mobility
		3	Powerwave 7770.00			

Proposed Equipment

Elevation[1] (ft)		Qty	Antenna	Mount Type	Lines	Carrier
Mount	RAD					
113.0	113.0	3	Andrew SBNHH-1D65A	Sector Frames	(4) 0.78" 8 AWG 6 (1) 3" Conduit (1) 0.39" Fiber Trunk	AT&T Mobility
		3	Ericsson RRUS 32			

[1]Mount elevation is defined as height above bottom of steel structure to the bottom of mount, RAD elevation is defined as center of antenna above ground level (AGL).

Install proposed .78” 8 AWG 6 and .39” Fiber Trunk inside of the existing or proposed 3” conduit. Stack proposed 3” conduit on the existing 3” conduit.

Structure Usages

Structural Component	Controlling Usage	Pass/Fail
Legs	93%	Pass
Diagonals	100%	Pass
Horizontals	15%	Pass
Anchor Bolts	76%	Pass
Leg Bolts	90%	Pass

Foundations

Reaction Component	Original Design Reactions	Factored Design Reactions*	Analysis Reactions	% of Design
Uplift (Kips)	154.8	209.0	183.6	88%
Axial (Kips)	169.1	228.3	202.3	89%
Shear (Kips)	18.3	24.7	15.1	61%

*** The design reactions are factored by 1.35 per ANSI/TIA-222-G, Sec. 15.5.1**

The structure base reactions resulting from this analysis are acceptable when compared to those shown on the original structure drawings, therefore no modification or reinforcement of the foundation will be required.

Deflection, Twist and Sway*

Antenna Elevation (ft)	Antenna	Carrier	Deflection (ft)	Twist (°)	Sway (Rotation) (°)
113.0	Ericsson RRUS 32	AT&T Mobility	0.313	0.005	0.322
	Andrew SBNHH-1D65A				

***Deflection, Twist and Sway was evaluated considering a design wind speed of 60 mph (3-Second Gust) per ANSI/TIA-222-G**

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Standard Conditions

All engineering services are performed on the basis that the information used is current and correct. This information may consist of, but is not necessary limited, to:

-- Information supplied by the client regarding the structure itself, antenna, mounts and feed line loading on the structure and its components, or other relevant information.

-- Information from drawings in the possession of American Tower Corporation, or generated by field inspections or measurements of the structure.

It is the responsibility of the client to ensure that the information provided to A.T. Engineering Service, PLLC and used in the performance of our engineering services is correct and complete. In the absence of information to the contrary, we assume that all structures were constructed in accordance with the drawings and specifications and that their capacity has not significantly changed from the "as new" condition.

Unless explicitly agreed by both the client and American Tower Corporation, all services will be performed in accordance with the current revision of ANSI/TIA -222. The design basic wind speed will be determined based on the minimum basic wind speed as prescribed in ANSI/TIA-222. Although every effort is taken to ensure that the loading considered is adequate to meet the requirements of all applicable regulatory entities, we can provide no assurance to meet any other local and state codes or requirements. If wind and ice loads or other relevant parameters are to be different from the minimum values recommended by the codes, the client shall specify the exact requirement.

All services are performed, results obtained, and recommendations made in accordance with generally accepted engineering principles and practices. A.T. Engineering Service, PLLC is not responsible for the conclusions, opinions and recommendations made by others based on the information we supply.

Job Information

Tower : 302536	Location : Cherry Hill-branford, CT	
Code: ANSI/TIA-222-G	Shape : Triangle	Base Width : 10.75 ft
Client : AT&T MOBILITY		Top Width : 4.56 ft

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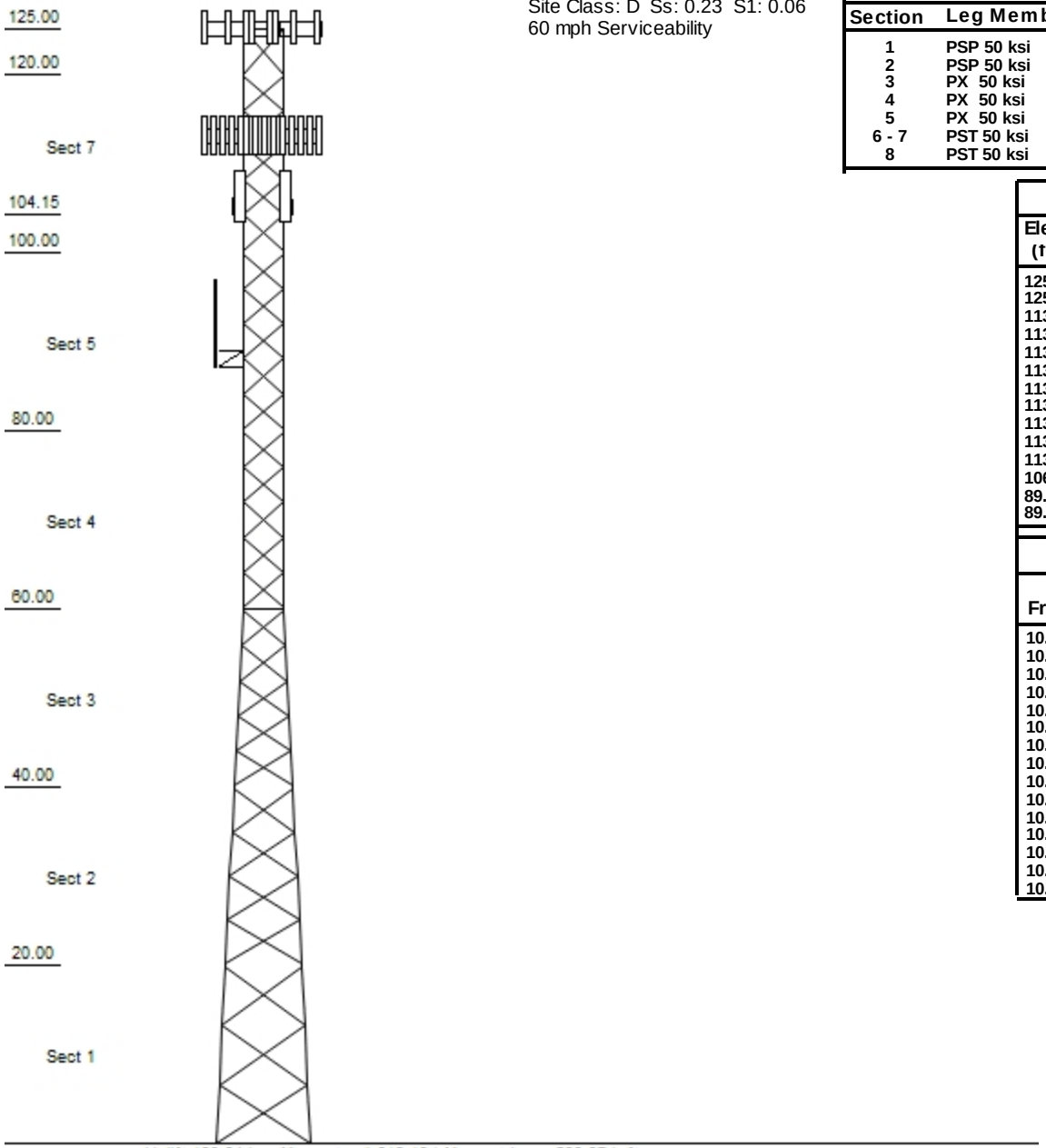
Loads: 110 mph no ice
50 mph w / 1"1/4 radial ice
Site Class: D Ss: 0.23 S1: 0.06
60 mph Serviceability



Uplift 183.64 k Moment 1,819.10 k Moment Ice 566.67 k-ft
Vert 202.33 k Tot Down 20.81 k Tot Down Ice 117.39 k
Horiz 15.11 k Tot Shear 22.95 k Tot Shear Ice 7.22 k

Sections Properties

Section	Leg Members		Diagonal Members	Horizontal Members
1	PSP 50 ksi	ROHN 5 EH	SAE 36 ksi 1.75X1.75X0.125	
2	PSP 50 ksi	ROHN 5 EH	SAE 36 ksi 1.5X1.5X0.1875	
3	PX 50 ksi	4" DIA PIPE	SAE 36 ksi 1.5X1.5X0.1875	SAE 36 ksi 1.5X1.5X0.125
4	PX 50 ksi	4" DIA PIPE	SAE 36 ksi 2X2X0.25	
5	PX 50 ksi	3" DIA PIPE	SAE 36 ksi 1.5X1.5X0.1875	
6 - 7	PST 50 ksi	2-1/2" DIA PIPE	SAE 36 ksi 1.5X1.5X0.1875	
8	PST 50 ksi	2-1/2" DIA PIPE	SAE 36 ksi 1.5X1.5X0.125	SAE 36 ksi 1.5X1.5X0.125

Discrete Appurtenance

Elev (ft)	Type	Qty	Description
125.00	Panel	12	Decibel DB844H90E-XY
125.00	Mounting Frame	3	Flat Light Sector Frame
113.00	Panel	1	Raycap DC6-48-60-18-8F ("Squid
113.00	Panel	3	Andrew SBNHH-1D65A
113.00	Panel	3	Ericsson RRUS 32
113.00	Panel	3	KMW AM-X-CD-14-65-00T-RET
113.00	Panel	1	Raycap DC6-48-60-18-8F
113.00	Panel	6	Ericsson RRUS-11
113.00	Panel	6	Powerwave LGP21401
113.00	Panel	3	Powerwave Allgon 7770.00
113.00	Mounting Frame	3	Flat Light Sector Frame
106.00	Panel	3	RFS APXV18-206517S-C
89.00	Straight Arm	1	Side Arm
89.00	Whip	1	8' Omni

Linear Appurtenance

Elev (ft) From	To	Qty	Description
10.000	125.00	1	Wave Guide
10.000	125.00	12	1 5/8" Coax
10.000	113.00	1	Wave Guide
10.000	113.00	6	7/8" Coax
10.000	113.00	6	7/8" Coax
10.000	113.00	1	3" Conduit
10.000	113.00	1	3" Conduit
10.000	113.00	4	0.78" 8 AWG 6
10.000	113.00	2	0.74" 8 AWG 7
10.000	113.00	1	0.39" Fiber Trunk
10.000	113.00	1	0.39" Fiber Trunk
10.000	113.00	1	0.28" RG-6
10.000	106.00	1	Wave Guide
10.000	106.00	6	1 5/8" Coax
10.000	89.000	1	7/8" Coax

Site Number:	**302536**	**Code:**	**ANSI/TIA-222-G**	*© 2007 - 2015 by ATC IP LLC. All rights reserved.*
Site Name:	**Cherry Hill-branford, CT**	**Engineering Number:**	**64496921**	12/18/2015 1:30:24 PM
Customer:	**AT&T MOBILITY**			

Analysis Parameters

Location:	**New Haven County, CT**		
Code:	**ANSI/TIA-222-G**	**Height (ft):**	**125**
Shape:	**Triangle**	**Base Elevation (ft):**	**0.00**
Tower Manufacturer:	**Rohn**	**Bottom Face Width (ft):**	**10.75**
Tower Type:	**Self Support**	**Top Face Width (ft):**	**4.56**

Ice & Wind Parameters

Structure Class:	**II**	**Design Windspeed Without Ice:**	**110 mph**
Exposure Category:	**B**	**Design Windspeed With Ice:**	**50 mph**
Topographic Category:	**1**	**Operational Windspeed:**	**60 mph**
Crest Height:	**0.0 ft**	**Design Ice Thickness:**	**1.25 in**

Seismic Parameters

Analysis Method:	**Equivalent Modal Analysis & Equivalent Lateral Force Methods**
Site Class:	**D - Stiff Soil**
Period Based on Rayleigh Method (sec):	**1.06**

T_L(sec):	**6**	**p:**	**1.3**	**C_S:**	**0.031**
S_S:	**0.233**	**S_1:**	**0.061**	**C_S, Max:**	**0.031**
F_a:	**1.600**	**F_V:**	**2.400**	**C_S, Min:**	**0.030**
S_{ds}:	**0.249**	**S_{d1}:**	**0.098**		

Load Cases

1.2D + 1.6W Normal - Pat 1	**110 mph Normal to Face with No Ice - Pattern 1**
1.2D + 1.6W Normal - Pat 2	**110 mph Normal to Face with No Ice - Pattern 2**
1.2D + 1.6W Normal - Pat 3	**110 mph Normal to Face with No Ice - Pattern 3**
1.2D + 1.6W 60 deg - Pat 1	**110 mph 60 degree with No Ice - Pattern 1**
1.2D + 1.6W 60 deg - Pat 2	**110 mph 60 degree with No Ice - Pattern 2**
1.2D + 1.6W 60 deg - Pat 3	**110 mph 60 degree with No Ice - Pattern 3**
1.2D + 1.6W 90 deg - Pat 1	**110 mph 90 degree with No Ice - Pattern 1**
1.2D + 1.6W 90 deg - Pat 2	**110 mph 90 degree with No Ice - Pattern 2**
1.2D + 1.6W 90 deg - Pat 3	**110 mph 90 degree with No Ice - Pattern 3**
0.9D + 1.6W Normal	**110 mph Normal to Face with No Ice (Reduced DL)**
0.9D + 1.6W 60 deg	**110 mph 60 deg with No Ice (Reduced DL)**
0.9D + 1.6W 90 deg	**110 mph 90 deg with No Ice (Reduced DL)**
1.2D + 1.0Di + 1.0Wi Normal	**50 mph Normal with 1.25 in Radial Ice**
1.2D + 1.0Di + 1.0Wi 60 deg	**50 mph 60 degree with 1.25 in Radial Ice**
1.2D + 1.0Di + 1.0Wi 90 deg	**50 mph 90 degree with 1.25 in Radial Ice**
(1.2 + 0.2Sds) * DL + E Normal	**Seismic Normal**
(1.2 + 0.2Sds) * DL + E 60 deg	**Seismic 60 degree**
(1.2 + 0.2Sds) * DL + E 90 deg	**Seismic 90 degree**
(0.9 - 0.2Sds) * DL + E Normal	**Seismic (Reduced DL) Normal**
(0.9 - 0.2Sds) * DL + E 60 deg	**Seismic (Reduced DL) 60 degree**
(0.9 - 0.2Sds) * DL + E 90 deg	**Seismic (Reduced DL) 90 degree**

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Analysis Parameters

1.0D + 1.0W Service Normal	Serviceability - 60 mph Wind Normal
1.0D + 1.0W Service 60 deg	Serviceability - 60 mph Wind 60 degree
1.0D + 1.0W Service 90 deg	Serviceability - 60 mph Wind 90 degree

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Tower Loading

Discrete Appurtenance Properties 1.2D + 1.6W

Elevation (ft)	Description	Qty	Wt. (lb)	EPA (sf)	Length (ft)	Width (in)	Depth (in)	K_a	Orient. Factor	Vert. Ecc.(ft)	M_u (lb-ft)	Q_z (psf)	F_a (WL) (lb)	P_a (DL) (lb)
125.0	Decibel DB844H90E-	12	14	3.6	4.0	8.0	6.5	0.80	0.74	0.0	0.0	27.73	967	242
125.0	Flat Light Sector	3	400	17.9	0.0	0.0	0.0	0.75	0.75	0.0	0.0	27.73	1139	1728
113.0	Raycap DC6-48-60-	1	20	1.1	2.0	11.0	11.0	0.80	1.00	0.0	0.0	26.94	33	29
113.0	Raycap DC6-48-60-	1	20	1.1	2.0	11.0	11.0	0.80	1.00	0.0	0.0	26.94	33	29
113.0	Powerwave	6	14	1.3	1.2	9.2	2.6	0.80	0.50	0.0	0.0	26.94	113	122
113.0	Ericsson RRUS 32	3	51	2.7	2.2	12.1	6.7	0.80	0.67	0.0	0.0	26.94	159	219
113.0	Ericsson RRUS-11	6	55	4.4	2.1	18.2	6.7	0.80	0.67	0.0	0.0	26.94	521	475
113.0	KMW AM-X-CD-14-	3	36	5.5	4.0	11.8	5.9	0.80	0.66	0.0	0.0	26.94	319	157
113.0	Powerwave Allgon	3	35	5.5	4.6	11.0	5.0	0.80	0.65	0.0	0.0	26.94	315	151
113.0	Andrew SBNHH-	3	34	5.9	4.6	11.9	7.1	0.80	0.69	0.0	0.0	26.94	357	145
113.0	Flat Light Sector	3	400	13.6	0.0	0.0	0.0	0.75	0.67	0.0	0.0	26.94	751	1728
106.0	RFS APXV18-	3	26	5.2	6.0	6.8	3.2	1.00	0.80	0.0	0.0	26.46	446	114
89.00	8' Omni	1	40	2.4	8.0	3.0	3.0	0.90	1.00	4.0	299.5	25.49	75	58
89.00	Side Arm	1	150	3.0	0.0	0.0	0.0	1.00	1.00	0.0	0.0	25.17	103	216
	Totals	49	3759	253.9										

Discrete Appurtenance Properties 1.2D + 1.6W

Elevation (ft)	Description	Qty	Wt. (lb)	EPA (sf)	Length (ft)	Width (in)	Depth (in)	K_a	Orient. Factor	Vert. Ecc.(ft)	M_u (lb-ft)	Q_z (psf)	F_a (WL) (lb)	P_a (DL) (lb)
125.0	Decibel DB844H90E-	12	14	3.6	4.0	8.0	6.5	0.80	0.74	0.0	0.0	27.73	967	242
125.0	Flat Light Sector	3	400	17.9	0.0	0.0	0.0	0.75	0.75	0.0	0.0	27.73	1139	1728
113.0	Raycap DC6-48-60-	1	20	1.1	2.0	11.0	11.0	0.80	1.00	0.0	0.0	26.94	33	29
113.0	Raycap DC6-48-60-	1	20	1.1	2.0	11.0	11.0	0.80	1.00	0.0	0.0	26.94	33	29
113.0	Powerwave	6	14	1.3	1.2	9.2	2.6	0.80	0.50	0.0	0.0	26.94	113	122
113.0	Ericsson RRUS 32	3	51	2.7	2.2	12.1	6.7	0.80	0.67	0.0	0.0	26.94	159	219
113.0	Ericsson RRUS-11	6	55	4.4	2.1	18.2	6.7	0.80	0.67	0.0	0.0	26.94	521	475
113.0	KMW AM-X-CD-14-	3	36	5.5	4.0	11.8	5.9	0.80	0.66	0.0	0.0	26.94	319	157
113.0	Powerwave Allgon	3	35	5.5	4.6	11.0	5.0	0.80	0.65	0.0	0.0	26.94	315	151
113.0	Andrew SBNHH-	3	34	5.9	4.6	11.9	7.1	0.80	0.69	0.0	0.0	26.94	357	145
113.0	Flat Light Sector	3	400	13.6	0.0	0.0	0.0	0.75	0.67	0.0	0.0	26.94	751	1728
106.0	RFS APXV18-	3	26	5.2	6.0	6.8	3.2	1.00	0.80	0.0	0.0	26.46	446	114
89.00	8' Omni	1	40	2.4	8.0	3.0	3.0	0.90	1.00	4.0	299.5	25.49	75	58
89.00	Side Arm	1	150	3.0	0.0	0.0	0.0	1.00	1.00	0.0	0.0	25.17	103	216
	Totals	49	3759	253.9										

Discrete Appurtenance Properties 1.2D + 1.6W

Elevation (ft)	Description	Qty	Wt. (lb)	EPA (sf)	Length (ft)	Width (in)	Depth (in)	K_a	Orient. Factor	Vert. Ecc.(ft)	M_u (lb-ft)	Q_z (psf)	F_a (WL) (lb)	P_a (DL) (lb)
125.0	Decibel DB844H90E-	12	14	3.6	4.0	8.0	6.5	0.80	0.74	0.0	0.0	27.73	967	242
125.0	Flat Light Sector	3	400	17.9	0.0	0.0	0.0	0.75	0.75	0.0	0.0	27.73	1139	1728
113.0	Raycap DC6-48-60-	1	20	1.1	2.0	11.0	11.0	0.80	1.00	0.0	0.0	26.94	33	29
113.0	Raycap DC6-48-60-	1	20	1.1	2.0	11.0	11.0	0.80	1.00	0.0	0.0	26.94	33	29
113.0	Powerwave	6	14	1.3	1.2	9.2	2.6	0.80	0.50	0.0	0.0	26.94	113	122
113.0	Ericsson RRUS 32	3	51	2.7	2.2	12.1	6.7	0.80	0.67	0.0	0.0	26.94	159	219
113.0	Ericsson RRUS-11	6	55	4.4	2.1	18.2	6.7	0.80	0.67	0.0	0.0	26.94	521	475
113.0	KMW AM-X-CD-14-	3	36	5.5	4.0	11.8	5.9	0.80	0.66	0.0	0.0	26.94	319	157
113.0	Powerwave Allgon	3	35	5.5	4.6	11.0	5.0	0.80	0.65	0.0	0.0	26.94	315	151
113.0	Andrew SBNHH-	3	34	5.9	4.6	11.9	7.1	0.80	0.69	0.0	0.0	26.94	357	145

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Tower Loading

113.0	Flat Light Sector	3	400	13.6	0.0	0.0	0.0	0.75	0.67	0.0	0.0	26.94	751	1728
106.0	RFS APXV18-	3	26	5.2	6.0	6.8	3.2	1.00	0.80	0.0	0.0	26.46	446	114
89.00	8' Omni	1	40	2.4	8.0	3.0	3.0	0.90	1.00	4.0	299.5	25.49	75	58
89.00	Side Arm	1	150	3.0	0.0	0.0	0.0	1.00	1.00	0.0	0.0	25.17	103	216
	Totals	49	3759	253.9										

Discrete Appurtenance Properties 0.9D + 1.6W

Elevation (ft)	Description	Qty	Wt. (lb)	EPA (sf)	Length (ft)	Width (in)	Depth (in)	K_a	Orient. Factor	Vert. Ecc.(ft)	M_u (lb-ft)	Q_z (psf)	F_a (WL) (lb)	P_a (DL) (lb)
125.0	Decibel DB844H90E-	12	14	3.6	4.0	8.0	6.5	0.80	0.74	0.0	0.0	27.73	967	136
125.0	Flat Light Sector	3	400	17.9	0.0	0.0	0.0	0.75	0.75	0.0	0.0	27.73	1139	972
113.0	Raycap DC6-48-60-	1	20	1.1	2.0	11.0	11.0	0.80	1.00	0.0	0.0	26.94	33	16
113.0	Raycap DC6-48-60-	1	20	1.1	2.0	11.0	11.0	0.80	1.00	0.0	0.0	26.94	33	16
113.0	Powerwave	6	14	1.3	1.2	9.2	2.6	0.80	0.50	0.0	0.0	26.94	113	69
113.0	Ericsson RRUS 32	3	51	2.7	2.2	12.1	6.7	0.80	0.67	0.0	0.0	26.94	159	123
113.0	Ericsson RRUS-11	6	55	4.4	2.1	18.2	6.7	0.80	0.67	0.0	0.0	26.94	521	267
113.0	KMW AM-X-CD-14-	3	36	5.5	4.0	11.8	5.9	0.80	0.66	0.0	0.0	26.94	319	88
113.0	Powerwave Allgon	3	35	5.5	4.6	11.0	5.0	0.80	0.65	0.0	0.0	26.94	315	85
113.0	Andrew SBNHH-	3	34	5.9	4.6	11.9	7.1	0.80	0.69	0.0	0.0	26.94	357	81
113.0	Flat Light Sector	3	400	13.6	0.0	0.0	0.0	0.75	0.67	0.0	0.0	26.94	751	972
106.0	RFS APXV18-	3	26	5.2	6.0	6.8	3.2	1.00	0.80	0.0	0.0	26.46	446	64
89.00	8' Omni	1	40	2.4	8.0	3.0	3.0	0.90	1.00	4.0	299.5	25.49	75	32
89.00	Side Arm	1	150	3.0	0.0	0.0	0.0	1.00	1.00	0.0	0.0	25.17	103	122
	Totals	49	3759	253.9										

Discrete Appurtenance Properties 1.2D + 1.0Di + 1.0Wi

Elevation (ft)	Description	Qty	Ice Wt (lb)	Ice EPA (sf)	Length (ft)	Width (in)	Depth (in)	K_a	Orient. Factor	Vert. Ecc.(ft)	M_u (lb-ft)	Q_z (psf)	F_a (WL) (lb)	P_a (DL) (lb)
125.0	Decibel DB844H90E-	12	224	5.2	4.0	8.0	6.5	0.80	0.74	0.0	0.0	5.73	178	3266
125.0	Flat Light Sector	3	893	42.6	0.0	0.0	0.0	0.75	0.75	0.0	0.0	5.73	350	3501
113.0	Raycap DC6-48-60-	1	192	3.3	2.0	11.0	11.0	0.80	1.00	0.0	0.0	5.57	13	236
113.0	Raycap DC6-48-60-	1	192	3.3	2.0	11.0	11.0	0.80	1.00	0.0	0.0	5.57	13	236
113.0	Powerwave	6	83	1.9	1.2	9.2	2.6	0.80	0.50	0.0	0.0	5.57	22	615
113.0	Ericsson RRUS 32	3	211	3.9	2.2	12.1	6.7	0.80	0.67	0.0	0.0	5.57	30	795
113.0	Ericsson RRUS-11	6	249	5.1	2.1	18.2	6.7	0.80	0.67	0.0	0.0	5.57	78	1870
113.0	KMW AM-X-CD-14-	3	279	6.7	4.0	11.8	5.9	0.80	0.66	0.0	0.0	5.57	50	1029
113.0	Powerwave Allgon	3	285	7.3	4.6	11.0	5.0	0.80	0.65	0.0	0.0	5.57	54	1052
113.0	Andrew SBNHH-	3	323	7.7	4.6	11.9	7.1	0.80	0.69	0.0	0.0	5.57	60	1185
113.0	Flat Light Sector	3	888	32.2	0.0	0.0	0.0	0.75	0.67	0.0	0.0	5.57	230	3485
106.0	RFS APXV18-	3	250	7.2	6.0	6.8	3.2	1.00	0.80	0.0	0.0	5.47	80	919
89.00	8' Omni	1	251	5.5	8.0	3.0	3.0	0.90	1.00	4.0	88.1	5.27	22	311
89.00	Side Arm	1	266	5.5	0.0	0.0	0.0	1.00	1.00	0.0	0.0	5.20	24	355
	Totals	49	14962	444.4										

Discrete Appurtenance Properties 1.0D + 1.0W Service

Elevation (ft)	Description	Qty	Wt. (lb)	EPA (sf)	Length (ft)	Width (in)	Depth (in)	K_a	Orient. Factor	Vert. Ecc.(ft)	M_u (lb-ft)	Q_z (psf)	F_a (WL) (lb)	P_a (DL) (lb)
125.0	Decibel DB844H90E-	12	14	3.6	4.0	8.0	6.5	0.80	0.74	0.0	0.0	8.25	180	168
125.0	Flat Light Sector	3	400	17.9	0.0	0.0	0.0	0.75	0.75	0.0	0.0	8.25	212	1200

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Tower Loading

113.0	Raycap DC6-48-60-	1	20	1.1	2.0	11.0	11.0	0.80	1.00	0.0	0.0	8.02	6	20
113.0	Raycap DC6-48-60-	1	20	1.1	2.0	11.0	11.0	0.80	1.00	0.0	0.0	8.02	6	20
113.0	Powerwave	6	14	1.3	1.2	9.2	2.6	0.80	0.50	0.0	0.0	8.02	21	85
113.0	Ericsson RRUS 32	3	51	2.7	2.2	12.1	6.7	0.80	0.67	0.0	0.0	8.02	29	152
113.0	Ericsson RRUS-11	6	55	4.4	2.1	18.2	6.7	0.80	0.67	0.0	0.0	8.02	97	330
113.0	KMW AM-X-CD-14-	3	36	5.5	4.0	11.8	5.9	0.80	0.66	0.0	0.0	8.02	59	109
113.0	Powerwave Allgon	3	35	5.5	4.6	11.0	5.0	0.80	0.65	0.0	0.0	8.02	59	105
113.0	Andrew SBNHH-	3	34	5.9	4.6	11.9	7.1	0.80	0.69	0.0	0.0	8.02	66	101
113.0	Flat Light Sector	3	400	13.6	0.0	0.0	0.0	0.75	0.67	0.0	0.0	8.02	140	1200
106.0	RFS APXV18-	3	26	5.2	6.0	6.8	3.2	1.00	0.80	0.0	0.0	7.87	83	79
89.00	8' Omni	1	40	2.4	8.0	3.0	3.0	0.90	1.00	4.0	55.7	7.58	14	40
89.00	Side Arm	1	150	3.0	0.0	0.0	0.0	1.00	1.00	0.0	0.0	7.49	19	150
	Totals	49	3759	253.9										

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Tower Loading

Linear Appurtenance Properties

Elev From (ft)	Elev To (ft)	Description	Qty	Width (in)	Weight (lb/ft)	Pct In Block	Spread On Faces	Bundling Arrangement	Cluster Dia (in)	Out Of Zone	Spacing (in)	Orientation Factor	Ka Override
10.00	125.0	1 5/8" Coax	12	1.98	0.82	0	Lin App	Individual	0.00	N	1.00	1.00	0.00
10.00	125.0	Wave Guide	1	2.00	6.00	0	1	Individual	0.00	N	1.00	1.00	0.00
10.00	113.0	0.28" RG-6	1	0.28	0.03	0	2	Individual	0.00	N	0.50	1.00	0.00
10.00	113.0	0.39" Fiber Trunk	1	0.39	0.06	0	2	Individual	0.00	N	0.01	1.00	0.01
10.00	113.0	0.39" Fiber Trunk	1	0.39	0.06	0	2	Individual	0.00	N	0.01	1.00	0.01
10.00	113.0	0.74" 8 AWG 7	2	0.74	0.49	0	2	Individual	0.00	N	0.01	1.00	0.01
10.00	113.0	0.78" 8 AWG 6	4	0.78	0.59	0	2	Individual	0.00	N	0.01	1.00	0.01
10.00	113.0	3" Conduit	1	3.50	7.58	0	2	Individual	0.00	N	0.01	1.00	0.01
10.00	113.0	3" Conduit	1	3.50	7.58	0	2	Individual	0.00	N	1.00	1.00	0.00
10.00	113.0	7/8" Coax	6	1.09	0.33	0	Lin App	Individual	0.00	N	1.00	1.00	0.42
10.00	113.0	7/8" Coax	6	1.09	0.33	0	Lin App	Individual	0.00	N	1.00	1.00	0.42
10.00	113.0	Wave Guide	1	2.00	6.00	0	2	Individual	0.00	N	1.00	1.00	0.00
10.00	106.0	1 5/8" Coax	6	1.98	0.82	0	3	Individual	0.00	N	1.00	1.00	0.36
10.00	106.0	Wave Guide	1	0.00	6.00	0	3	Individual	0.00	N	1.00	1.00	0.00
10.00	89.00	7/8" Coax	1	1.09	0.33	0	Lin App	Individual	0.00	N	1.00	1.00	0.00

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Force/Stress Summary

Section: 1 9N39 Bot Elev (ft): 0.00 Height (ft): 20.000

Max Compression Member	Pu (kip)	Load Case	Len (ft)	Bracing % X	Bracing % Y	Bracing % Z	KL/R	F'y (ksi)	Phic Pn (kip)	Num Bolts	Num Holes	Shear phiRnv (kip)	Bear phiRn (kip)	Use %	Controls
LEG PSP - ROHN 5 EH	-199.95	1.2D + 1.6W	6.59	100	100	100	43.0	50.0	240.17	0	0	0.00	0.00	83	Member X
HORIZ	0.00		0.000	0	0	0	0.0	0.0	0.00	0	0	0.00	0.00	0	
DIAG SAE - 1.75X1.75X0.12	-2.28	1.2D + 1.6W	12.31	48	48	48	204.5	36.0	2.27	1	1	7.95	6.96	100	Member Z

Max Tension Member	Pu (kip)	Load Case	Fy (ksi)	Fu (ksi)	Phit Pn (kip)	Num Bolts	Num Holes	Shear phiRnv (kip)	Bear phiRn (kip)	Use %	Controls
LEG PSP - ROHN 5 EH	184.24	0.9D + 1.6W 60	50	65	274.95	0	0	0.00	0.00	67	Member
HORIZ	0.00		0	0	0.00	0	0	0.00	0.00	0	
DIAG SAE - 1.75X1.75X0.12	2.15	1.2D + 1.6W 90	36	58	11.15	1	1	7.95	4.13	52	Bolt Bear

Max Splice Forces	Pu (kip)	Load Case	phiRnt (kip)	Use %	Num Bolts	Bolt Type
Top Tension	172.10	0.9D + 1.6W 60	0.00	0	0	
Top Compression	188.90	1.2D + 1.6W	0.00	0		
Bot Tension	184.24	0.9D + 1.6W 60	242.28	76	4	1" A354-BC
Bot Compression	202.72	1.2D + 1.6W	0.00	0		

Section: 2 8N199 Bot Elev (ft): 20.00 Height (ft): 20.000

Max Compression Member	Pu (kip)	Load Case	Len (ft)	Bracing % X	Bracing % Y	Bracing % Z	KL/R	F'y (ksi)	Phic Pn (kip)	Num Bolts	Num Holes	Shear phiRnv (kip)	Bear phiRn (kip)	Use %	Controls
LEG PSP - ROHN 5 EH	-186.64	1.2D + 1.6W	4.88	100	100	100	31.8	50.0	255.30	0	0	0.00	0.00	73	Member X
HORIZ	0.00		0.000	0	0	0	0.0	0.0	0.00	0	0	0.00	0.00	0	
DIAG SAE - 1.5X1.5X0.1875	-2.00	1.2D + 1.6W 90	9.784	50	50	50	200.3	36.0	2.98	1	1	7.95	10.44	67	Member Z

Max Tension Member	Pu (kip)	Load Case	Fy (ksi)	Fu (ksi)	Phit Pn (kip)	Num Bolts	Num Holes	Shear phiRnv (kip)	Bear phiRn (kip)	Use %	Controls
LEG PSP - ROHN 5 EH	171.23	1.2D + 1.6W 60	50	65	274.95	0	0	0.00	0.00	62	Member
HORIZ	0.00		0	0	0.00	0	0	0.00	0.00	0	
DIAG SAE - 1.5X1.5X0.1875	1.86	1.2D + 1.6W 90	36	58	13.47	1	1	7.95	6.20	30	Bolt Bear

Max Splice Forces	Pu (kip)	Load Case	phiRnt (kip)	Use %	Num Bolts	Bolt Type
Top Tension	159.37	0.9D + 1.6W 60	0.00	0	0	
Top Compression	173.66	1.2D + 1.6W	0.00	0		
Bot Tension	172.10	0.9D + 1.6W 60	218.08	79	4	1 A325
Bot Compression	188.90	1.2D + 1.6W	0.00	0		

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Force/Stress Summary

Section: 3 7N344 Bot Elev (ft): 40.00 Height (ft): 20.000

Max Compression Member	Pu (kip)	Load Case	Len (ft)	Bracing % X	Bracing % Y	Bracing % Z	KL/R	F'y (ksi)	Phic Pn (kip)	Num Bolts	Num Holes	Shear phiRnv (kip)	Bear phiRn (kip)	Use %	Controls
LEG PX - 4" DIA PIPE	-172.06	1.2D + 1.6W	3.91	100	100	100	31.7	50.0	184.41	0	0	0.00	0.00	93	Member X
HORIZ SAE - 1.5X1.5X0.125	-0.32	1.2D + 1.6W	4.677	100	100	100	189.6	36.0	2.26	1	1	7.95	6.96	14	Member Z
DIAG SAE - 1.5X1.5X0.1875	-1.90	1.2D + 1.6W 90	6.268	50	50	50	128.3	36.0	7.21	1	1	7.95	10.44	26	Member Z

Max Tension Member	Pu (kip)	Load Case	Fy (ksi)	Fu (ksi)	Phit Pn (kip)	Num Bolts	Num Holes	Shear phiRnv (kip)	Bear phiRn (kip)	Use %	Controls
LEG PX - 4" DIA PIPE	158.88	1.2D + 1.6W 60	50	65	198.45	0	0	0.00	0.00	80	Member
HORIZ SAE - 1.5X1.5X0.125	0.24	1.2D + 1.6W 60	36	58	9.20	1	1	7.95	4.13	5	Bolt Bear
DIAG SAE - 1.5X1.5X0.1875	1.81	1.2D + 1.6W 90	36	58	13.47	1	1	7.95	6.20	29	Bolt Bear

Max Splice Forces	Pu (kip)	Load Case	phiRnt (kip)	Use %	Num Bolts	Bolt Type
Top Tension	149.73	0.9D + 1.6W 60	0.00	0	0	
Top Compression	161.73	1.2D + 1.6W	0.00	0		
Bot Tension	159.37	0.9D + 1.6W 60	218.08	73	4	1 A325
Bot Compression	173.66	1.2D + 1.6W	0.00	0		

Section: 4 6N166 Bot Elev (ft): 60.00 Height (ft): 20.000

Max Compression Member	Pu (kip)	Load Case	Len (ft)	Bracing % X	Bracing % Y	Bracing % Z	KL/R	F'y (ksi)	Phic Pn (kip)	Num Bolts	Num Holes	Shear phiRnv (kip)	Bear phiRn (kip)	Use %	Controls
LEG PX - 4" DIA PIPE	-152.18	1.2D + 1.6W	3.90	100	100	100	31.6	50.0	184.46	0	0	0.00	0.00	82	Member X
HORIZ	0.00		0.000	0	0	0	0.0	0.0	0.00	0	0	0.00	0.00	0	
DIAG SAE - 2X2X0.25	-7.04	1.2D + 1.6W	6.090	50	50	50	100.1	36.0	17.97	1	1	7.95	13.92	88	Bolt Shear

Max Tension Member	Pu (kip)	Load Case	Fy (ksi)	Fu (ksi)	Phit Pn (kip)	Num Bolts	Num Holes	Shear phiRnv (kip)	Bear phiRn (kip)	Use %	Controls
LEG PX - 4" DIA PIPE	149.31	1.2D + 1.6W 60	50	65	198.45	0	0	0.00	0.00	75	Member
HORIZ	0.00		0	0	0.00	0	0	0.00	0.00	0	
DIAG SAE - 2X2X0.25	6.57	1.2D + 1.6W 60	36	58	25.57	1	1	7.95	8.27	82	Bolt Shear

Max Splice Forces	Pu (kip)	Load Case	phiRnt (kip)	Use %	Num Bolts	Bolt Type
Top Tension	82.90	0.9D + 1.6W 60	0.00	0	0	
Top Compression	90.76	1.2D + 1.6W	0.00	0		
Bot Tension	149.73	0.9D + 1.6W 60	166.24	90	4	7/8 A325
Bot Compression	161.73	1.2D + 1.6W	0.00	0		

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Force/Stress Summary

Section: 5 6N309 Bot Elev (ft): 80.00 Height (ft): 20.000

Max Compression Member	Pu (kip)	Load Case	Len (ft)	Bracing % X	Y	Z	KL/R	F'y (ksi)	Phic Pn (kip)	Num Bolts	Num Holes	Shear phiRnv (kip)	Bear phiRn (kip)	Use %	Controls
LEG PX - 3" DIA PIPE	-84.55	1.2D + 1.6W	3.90	100	100	100	41.1	50.0	120.14	0	0	0.00	0.00	70	Member X
HORIZ	0.00		0.000	0	0	0	0.0	0.0	0.00	0	0	0.00	0.00	0	
DIAG SAE - 1.5X1.5X0.1875	-5.12	1.2D + 1.6W 90	6.084	50	50	50	124.6	36.0	7.59	1	1	7.95	10.44	67	Member Z

Max Tension Member	Pu (kip)	Load Case	Fy (ksi)	Fu (ksi)	Phit Pn (kip)	Num Bolts	Num Holes	Shear phiRnv (kip)	Bear phiRn (kip)	Use %	Controls
LEG PX - 3" DIA PIPE	83.02	0.9D + 1.6W 60	50	65	135.90	0	0	0.00	0.00	61	Member
HORIZ	0.00		0	0	0.00	0	0	0.00	0.00	0	
DIAG SAE - 1.5X1.5X0.1875	5.02	1.2D + 1.6W 90	36	58	13.47	1	1	7.95	6.20	80	Bolt Bear

Max Splice Forces	Pu (kip)	Load Case	phiRnt (kip)	Use %	Num Bolts	Bolt Type
Top Tension	32.38	0.9D + 1.6W 60	0.00	0	0	
Top Compression	36.94	1.2D + 1.6W	0.00	0		
Bot Tension	82.90	0.9D + 1.6W 60	166.24	50	4	7/8 A325
Bot Compression	90.76	1.2D + 1.6W	0.00	0		

Section: 6 6N30 Bot Elev (ft): 100.0 Height (ft): 4.150

Max Compression Member	Pu (kip)	Load Case	Len (ft)	Bracing % X	Y	Z	KL/R	F'y (ksi)	Phic Pn (kip)	Num Bolts	Num Holes	Shear phiRnv (kip)	Bear phiRn (kip)	Use %	Controls
LEG PST - 2-1/2" DIA PIP	-32.26	1.2D + 1.6W	3.90	100	100	100	49.4	50.0	64.14	0	0	0.00	0.00	50	Member X
HORIZ	0.00		0.000	0	0	0	0.0	0.0	0.00	0	0	0.00	0.00	0	
DIAG SAE - 1.5X1.5X0.1875	-3.84	1.2D + 1.6W 90	6.031	50	50	50	123.5	36.0	7.69	1	1	7.95	10.44	49	Member Z

Max Tension Member	Pu (kip)	Load Case	Fy (ksi)	Fu (ksi)	Phit Pn (kip)	Num Bolts	Num Holes	Shear phiRnv (kip)	Bear phiRn (kip)	Use %	Controls
LEG PST - 2-1/2" DIA PIP	32.46	0.9D + 1.6W 60	50	65	76.68	0	0	0.00	0.00	42	Member
HORIZ	0.00		0	0	0.00	0	0	0.00	0.00	0	
DIAG SAE - 1.5X1.5X0.1875	3.82	1.2D + 1.6W 90	36	58	13.47	1	1	7.95	6.20	61	Bolt Bear

Max Splice Forces	Pu (kip)	Load Case	phiRnt (kip)	Use %	Num Bolts	Bolt Type
Top Tension	24.00	0.9D + 1.6W 60	0.00	0	0	
Top Compression	28.05	1.2D + 1.6W	0.00	0		
Bot Tension	32.38	0.9D + 1.6W 60	120.40	27	4	3/4 A325
Bot Compression	36.94	1.2D + 1.6W	0.00	0		

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Force/Stress Summary

Section: 7 6N30 Bot Elev (ft): 104.1 Height (ft): 15.850

Max Compression Member	Pu (kip)	Load Case	Len (ft)	Bracing % X	Y	Z	KL/R	F'y (ksi)	Phic Pn (kip)	Num Bolts	Num Holes	Shear phiRnv (kip)	Bear phiRn (kip)	Use %	Controls
LEG PST - 2-1/2" DIA PIP	-24.27	1.2D + 1.6W	3.90	100	100	100	49.4	50.0	64.14	0	0	0.00	0.00	37	Member X
HORIZ	0.00		0.000	0	0	0	0.0	0.0	0.00	0	0	0.00	0.00	0	
DIAG SAE - 1.5X1.5X0.1875	-3.30	1.2D + 1.6W 90	6.024	50	50	50	123.4	36.0	7.71	1	1	7.95	10.44	42	Member Z

Max Tension Member	Pu (kip)	Load Case	Fy (ksi)	Fu (ksi)	Phit Pn (kip)	Num Bolts	Num Holes	Shear phiRnv (kip)	Bear phiRn (kip)	Use %	Controls
LEG PST - 2-1/2" DIA PIP	20.14	1.2D + 1.6W 60	50	65	76.68	0	0	0.00	0.00	26	Member
HORIZ	0.00		0	0	0.00	0	0	0.00	0.00	0	
DIAG SAE - 1.5X1.5X0.1875	3.28	1.2D + 1.6W 90	36	58	13.47	1	1	7.95	6.20	52	Bolt Bear

Max Splice Forces	Pu (kip)	Load Case	phiRnt (kip)	Use %	Num Bolts	Bolt Type
Top Tension	3.05	0.9D + 1.6W 60	0.00	0	0	
Top Compression	4.43	1.2D + 1.0Di +	0.00	0		
Bot Tension	24.00	0.9D + 1.6W 60	120.40	20	4	3/4 A325
Bot Compression	28.05	1.2D + 1.6W	0.00	0		

Section: 8 6N285 Bot Elev (ft): 120.0 Height (ft): 5.000

Max Compression Member	Pu (kip)	Load Case	Len (ft)	Bracing % X	Y	Z	KL/R	F'y (ksi)	Phic Pn (kip)	Num Bolts	Num Holes	Shear phiRnv (kip)	Bear phiRn (kip)	Use %	Controls
LEG PST - 2-1/2" DIA PIP	-3.09	1.2D + 1.0Di +	5.00	100	100	100	63.4	50.0	57.18	0	0	0.00	0.00	5	Member X
HORIZ SAE - 1.5X1.5X0.125	-0.37	1.2D + 1.6W 60	4.563	100	100	100	185.0	36.0	2.38	1	1	7.95	6.96	15	Member Z
DIAG SAE - 1.5X1.5X0.125	-1.41	1.2D + 1.6W 90	6.769	50	50	50	137.2	36.0	4.32	1	1	7.95	6.96	32	Member Z

Max Tension Member	Pu (kip)	Load Case	Fy (ksi)	Fu (ksi)	Phit Pn (kip)	Num Bolts	Num Holes	Shear phiRnv (kip)	Bear phiRn (kip)	Use %	Controls
LEG PST - 2-1/2" DIA PIP	0.99	1.2D + 1.6W 60	50	65	76.68	0	0	0.00	0.00	1	Member
HORIZ SAE - 1.5X1.5X0.125	0.39	1.2D + 1.6W	36	58	9.20	1	1	7.95	4.13	9	Bolt Bear
DIAG SAE - 1.5X1.5X0.125	1.40	1.2D + 1.6W 90	36	58	9.20	1	1	7.95	4.13	33	Bolt Bear

Max Splice Forces	Pu (kip)	Load Case	phiRnt (kip)	Use %	Num Bolts	Bolt Type
Top Tension	0.00		0.00	0	0	
Top Compression	2.67	1.2D + 1.0Di +	0.00	0		
Bot Tension	3.05	0.9D + 1.6W 60	81.36	4	4	5/8 A325
Bot Compression	4.43	1.2D + 1.0Di +	0.00	0		