

Date: **May 26, 2021**



Crown Castle
2000 Corporate Drive
Canonsburg, PA 15317
(724) 416-2000

Subject: **Structural Analysis Report**

Carrier Designation: **DISH Network Co-Locate**
Site Number: BOBDL00068A
Site Name: CT-CCI-T-842875

Crown Castle Designation: **BU Number:** 842875
Site Name: WINDSORDAY HILL
JDE Job Number: 650059
Work Order Number: 1966751
Order Number: 556624 Rev. 0

Engineering Firm Designation: **Crown Castle Project Number:** 1966751

Site Data: **99 DAY HILL ROAD, WINDSOR, HARTFORD County, CT**
Latitude 41° 52' 16.1", Longitude -72° 40' 16"
168 Foot - Monopole Tower

Crown Castle is pleased to submit this "**Structural Analysis Report**" to determine the structural integrity of the above-mentioned tower.

The purpose of the analysis is to determine acceptability of the tower stress level. Based on our analysis we have determined the tower stress level for the structure and foundation, under the following load case, to be:

LC7: Proposed Equipment Configuration ***Sufficient Capacity – 97.9%**

***The structure has sufficient capacity once the loading changes, described in the Recommendations section of this report, are completed.**

This analysis utilizes an ultimate 3-second gust wind speed of 125 mph as required by the 2018 Connecticut State Building Code. Applicable Standard references and design criteria are listed in Section 2 - "Analysis Criteria".

Structural analysis prepared by: Dolly Hsu, E.I.T.

Respectfully submitted by:

Terry P. Styran, P.E.
Senior Project Engineer

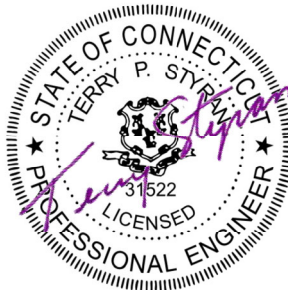


TABLE OF CONTENTS

1) INTRODUCTION

2) ANALYSIS CRITERIA

Table 1 - Proposed Equipment Configuration

Table 2 - Non-Carrier Equipment To Be Conditionally Removed

Table 3 - Other Considered Equipment

3) ANALYSIS PROCEDURE

Table 4 - Documents Provided

3.1) Analysis Method

3.2) Assumptions

4) ANALYSIS RESULTS

Table 5 - Section Capacity (Summary)

Table 6 - Tower Component Stresses vs. Capacity - LC7

4.1) Recommendations

5) APPENDIX A

tnxTower Output

6) APPENDIX B

Base Level Drawing

7) APPENDIX C

Additional Calculations

1) INTRODUCTION

This tower is a 168 ft Monopole tower designed by SUMMIT MANUFACTURING.

2) ANALYSIS CRITERIA

TIA-222 Revision:	TIA-222-H
Risk Category:	II
Wind Speed:	125 mph
Exposure Category:	C
Topographic Factor:	1
Ice Thickness:	2 in
Wind Speed with Ice:	50 mph
Service Wind Speed:	60 mph

Table 1 - Proposed Equipment Configuration

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
120.0	120.0	3	fujitsu	TA08025-B604	1	1-1/2
		3	fujitsu	TA08025-B605		
		3	jma wireless	MX08FRO665-21 w/ Mount Pipe		
		1	raycap	RDIDC-9181-PF-48		
		1	tower mounts	Commscope MC-PK8-DSH		

Table 2 - Non-Carrier Equipment To Be Conditionally Removed

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
120.0	120.0	3	rfs celwave	APL199016-42T0	-	-
		1	tower mounts	Pipe Mount [PM 602-3]		

Table 3 - Other Considered Equipment

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
168.0	168.0	1	rfi antennas	CC807-08	2 6 1 12	3/8 3/4 1-1/4 1-5/8
		2	cci antennas	DMP65R-BU6D w/ Mount Pipe		
		1	cci antennas	DMP65R-BU8D w/ Mount Pipe		
		3	cci antennas	DTMABP7819VG12A		
		1	cci antennas	TPA-65R-LCUUUU-H8 w/ Mount Pipe		
		3	ericsson	RRUS 32 B30		
		3	ericsson	RRUS 32 B66		
		3	ericsson	RRUS 4415 B25		
		3	ericsson	RRUS 4449 B5/B12		
		3	ericsson	RRUS 4478 B14		
		3	kathrein	800 10121 w/ Mount Pipe		
		2	kathrein	80010965 w/ Mount Pipe		

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
		1	kathrein	80010966 w/ Mount Pipe		
		6	kathrein	860 10025		
		2	quintel technology	QS66512-2 w/ Mount Pipe		
		1	raycap	DC6-48-60-0-8F		
		2	raycap	DC6-48-60-18-8F		
		1	tower mounts	Platform Mount [LP 1201-1_KCKR-HR-1]		
160.0	165.0	3	andrew	VHLP2.5-11	3 3	5/16 1/2
	164.0	2	dragonwave	HORIZON COMPACT		
	160.0	3	argus technologies	LLPX310R-V1		
		3	samsung telecommunications	RRH-2WB		
		1	tower mounts	Platform Mount [LP 1201-1]		
	156.0	1	dragonwave	HORIZON COMPACT		
1	rosenberger leoni	FB-15-ABOX				
152.0	152.0	1	rfs celwave	SC3-W100ASTX	1	EU90-FR
		1	tower mounts	Pipe Mount [PM 601-1]		
147.0	148.0	1	kathrein	782 10876	1 1	1/2 EU90-FR
		1	rfi antennas	BPA7496-180-11 w/ Mount Pipe		
		1	rfs celwave	SC3-W100ASTX		
	147.0	1	tower mounts	Pipe Mount [PM 601-1]		
143.0	143.0	1		MPRD2449	1	1/4
		1	kathrein	782 10876		
		1	tower mounts	Pipe Mount [PM 602-1]		
140.0	148.0	1	bird technologies group	432E-83I-01-T	1 2	1/4 7/8
		2	rfi antennas	CC807-11		
		1	telewave	ANT450F6		
	140.0	1		PTP400 w/Mount Pipe		
		1	ericsson	RIU		
		2	tower mounts	Side Arm Mount [SO 306-1]		
135.0	144.0	2	telewave	ANT450F6	2	1/2
	135.0	2	tower mounts	Side Arm Mount [SO 702-1]		
130.0	131.0	3	ericsson	AIR6449 B41_T-MOBILE	4	1-5/8
		3	ericsson	RADIO 4415 B66A		
		3	ericsson	RADIO 4424 B25_TMO		
		3	ericsson	RADIO 4449 B71 B85A_T-MOBILE		
		3	rfs celwave	APX16DWV-16DWV-S-E-A20		
		3	rfs celwave	APXVAALL24_43-U-NA20_TMO		
	130.0	1		12' Platform Mount [#RMQP-496-HK]		

Mounting Level (ft)	Center Line Elevation (ft)	Number of Antennas	Antenna Manufacturer	Antenna Model	Number of Feed Lines	Feed Line Size (in)
120.0	120.0	-	-	-	6	1-5/8
100.0	100.0	1	rfs celwave	SC3-W100ASTX	1	EU90-FR
		1	tower mounts	Pipe Mount [PM 601-1]		
79.0	79.0	2	tower mounts	Side Arm Mount [SO 901-1]	-	-
52.0	52.0	1	pctel	GPS-TMG-HR-26NCM	1	1/2
		1	tower mounts	Side Arm Mount [SO 701-1]		

3) ANALYSIS PROCEDURE

Table 4 - Documents Provided

Document	Reference	Source
4-GEOTECHNICAL REPORTS	4529457	CCISITES
4-TOWER FOUNDATION DRAWINGS/DESIGN/SPECS	4529456	CCISITES
4-TOWER MANUFACTURER DRAWINGS	4589719	CCISITES

3.1) Analysis Method

tnxTower (version 8.0.9.0), a commercially available analysis software package, was used to create a three-dimensional model of the tower and calculate member stresses for various loading cases. Selected output from the analysis is included in Appendix A. When applicable, Crown Castle has calculated and provided the effective area for panel antennas using approved methods following the intent of the TIA-222 standard.

3.2) Assumptions

- 1) Tower and structures were maintained in accordance with the TIA-222 Standard.
- 2) The configuration of antennas, transmission cables, mounts and other appurtenances are as specified in Tables 1 and 2 and the referenced drawings.

This analysis may be affected if any assumptions are not valid or have been made in error. Crown Castle should be notified to determine the effect on the structural integrity of the tower.

4) ANALYSIS RESULTS

Table 5 - Section Capacity (Summary)

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
L1	168 - 119.25	Pole	TP34.288x24x0.25	1	-17.30	1615.32	61.4	Pass
L2	119.25 - 78.5	Pole	TP42.387x32.8911x0.2813	2	-28.50	2248.05	97.2	Pass
L3	78.5 - 38.75	Pole	TP50.213x40.7166x0.375	3	-40.72	3547.28	84.0	Pass
L4	38.75 - 0	Pole	TP57.64x48.1441x0.375	4	-56.93	4186.71	97.9	Pass
							Summary	
						Pole (L4)	97.9	Pass
						Rating =	97.9	Pass

Table 6 - Tower Component Stresses vs. Capacity - LC7

Notes	Component	Elevation (ft)	% Capacity	Pass / Fail
1	Anchor Rods	0	91.8	Pass
1	Base Plate	0	65.9	Pass
1	Base Foundation (Structure)	0	79.4	Pass
1	Base Foundation (Soil Interaction)	0	33.0	Pass
Structure Rating (max from all components) =				97.9%

Notes:

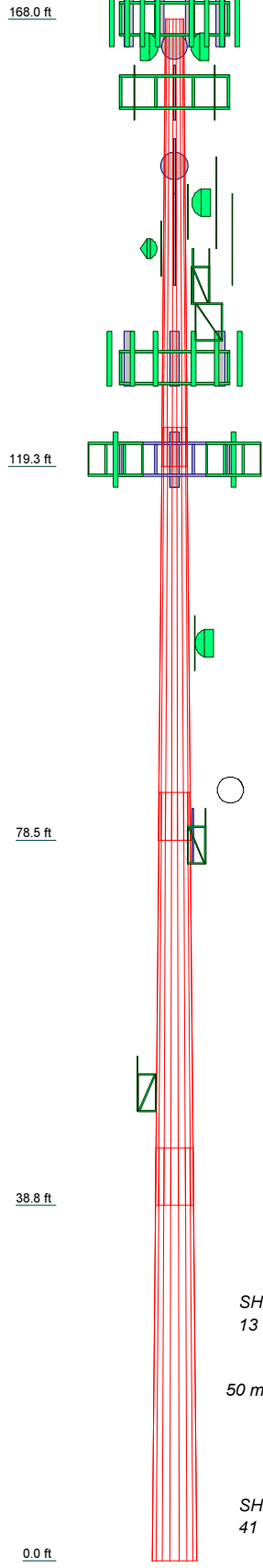
- 1) See additional documentation in "Appendix C – Additional Calculations" for calculations supporting the % capacity consumed.

4.1) Recommendations

Once the equipment in Table 2 is removed, the tower and its foundation have sufficient capacity to carry the proposed load configuration. No modifications are required at this time.

APPENDIX A
TNXTOWER OUTPUT

Section	1	2	3	4	
Length (ft)	48.75	45.00	45.00	45.00	
Number of Sides	18	18	18	18	
Thickness (in)	0.2500	0.2813	0.3750	0.3750	
Socket Length (ft)	4.25	5.25	6.25		
Top Dia (in)	24.0000	32.8911	40.7166	48.1441	
Bot Dia (in)	34.2880	42.3870	50.2130	57.6400	
Grade		A607-65			
Weight (K)	3.8	5.1	8.2	9.6	26.7



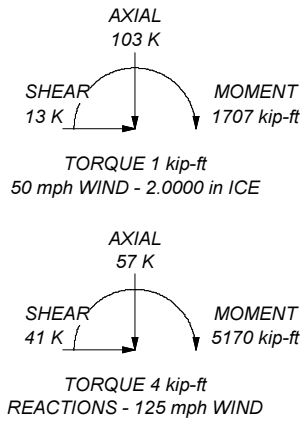
MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A607-65	65 ksi	80 ksi			

TOWER DESIGN NOTES

1. Tower is located in Hartford County, Connecticut.
2. Tower designed for Exposure C to the TIA-222-H Standard.
3. Tower designed for a 125 mph basic wind in accordance with the TIA-222-H Standard.
4. Tower is also designed for a 50 mph basic wind with 2.00 in ice. Ice is considered to increase in thickness with height.
5. Deflections are based upon a 60 mph wind.
6. Tower Risk Category II.
7. Topographic Category 1 with Crest Height of 0.00 ft
8. TOWER RATING: 97.9%

ALL REACTIONS ARE FACTORED



<p>CROWN CASTLE The Pathway to Possible</p>	<p>Crown Castle 2000 Corporate Drive Canonsburg, PA 15317 Phone: (724) 416-2000 FAX:</p>		<p>Job: BU# 842875</p>	
	Project:	Client: Crown Castle	Drawn by: Dolly Hsu	App'd:
	Code: TIA-222-H	Date: 05/25/21	Scale: NTS	Dwg No. E-1
	Path:	C:\Users\dhsu\Documents\Weekend WIP\842875\WO 1966751 - SAIProd\842875 RPA.er		

Tower Input Data

The tower is a monopole.

This tower is designed using the TIA-222-H standard.

The following design criteria apply:

- Tower is located in Hartford County, Connecticut.
- Tower base elevation above sea level: 166.00 ft.
- Basic wind speed of 125 mph.
- Risk Category II.
- Exposure Category C.
- Simplified Topographic Factor Procedure for wind speed-up calculations is used.
- Topographic Category: 1.
- Crest Height: 0.00 ft.
- Nominal ice thickness of 2.0000 in.
- Ice thickness is considered to increase with height.
- Ice density of 56 pcf.
- A wind speed of 50 mph is used in combination with ice.
- Temperature drop of 50 °F.
- Deflections calculated using a wind speed of 60 mph.
- A non-linear (P-delta) analysis was used.
- Pressures are calculated at each section.
- Stress ratio used in pole design is 1.
- Tower analysis based on target reliabilities in accordance with Annex S.
- Load Modification Factors used: $K_{es}(F_w) = 0.95$, $K_{es}(t_i) = 0.85$.
- Maximum demand-capacity ratio is: 1.05.
- Local bending stresses due to climbing loads, feed line supports, and appurtenance mounts are not considered.

Options

Consider Moments - Legs Consider Moments - Horizontals Consider Moments - Diagonals Use Moment Magnification ✓ Use Code Stress Ratios ✓ Use Code Safety Factors - Guys Escalate Ice Always Use Max Kz Use Special Wind Profile Include Bolts In Member Capacity Leg Bolts Are At Top Of Section Secondary Horizontal Braces Leg Use Diamond Inner Bracing (4 Sided) SR Members Have Cut Ends SR Members Are Concentric	Distribute Leg Loads As Uniform Assume Legs Pinned ✓ Assume Rigid Index Plate ✓ Use Clear Spans For Wind Area Use Clear Spans For KL/r Retension Guys To Initial Tension ✓ Bypass Mast Stability Checks ✓ Use Azimuth Dish Coefficients ✓ Project Wind Area of Appurt. Autocalc Torque Arm Areas Add IBC .6D+W Combination ✓ Sort Capacity Reports By Component Triangulate Diamond Inner Bracing Treat Feed Line Bundles As Cylinder Ignore KL/ry For 60 Deg. Angle Legs	Use ASCE 10 X-Brace Ly Rules Calculate Redundant Bracing Forces Ignore Redundant Members in FEA SR Leg Bolts Resist Compression All Leg Panels Have Same Allowable Offset Girt At Foundation ✓ Consider Feed Line Torque Include Angle Block Shear Check Use TIA-222-H Bracing Resist. Exemption Use TIA-222-H Tension Splice Exemption <div style="text-align: center; background-color: #e0e0e0; padding: 2px;">Poles</div> ✓ Include Shear-Torsion Interaction Always Use Sub-Critical Flow Use Top Mounted Sockets ✓ Pole Without Linear Attachments Pole With Shroud Or No Appurtenances Outside and Inside Corner Radii Are Known
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Tapered Pole Section Geometry

Section	Elevation ft	Section Length ft	Splice Length ft	Number of Sides	Top Diameter in	Bottom Diameter in	Wall Thickness in	Bend Radius in	Pole Grade
L1	168.00-119.25	48.75	4.25	18	24.0000	34.2880	0.2500	1.0000	A607-65 (65 ksi)
L2	119.25-78.50	45.00	5.25	18	32.8911	42.3870	0.2813	1.1250	A607-65 (65 ksi)
L3	78.50-38.75	45.00	6.25	18	40.7166	50.2130	0.3750	1.5000	A607-65 (65 ksi)
L4	38.75-0.00	45.00		18	48.1441	57.6400	0.3750	1.5000	A607-65 (65 ksi)

Tapered Pole Properties

Section	Tip Dia. in	Area in ²	I in ⁴	r in	C in	I/C in ³	J in ⁴	It/Q in ²	w in	w/t
L1	24.3317	18.8456	1342.9976	8.4313	12.1920	110.1540	2687.7623	9.4246	3.7840	15.136
	34.7784	27.0092	3953.4521	12.0835	17.4183	226.9711	7912.1063	13.5071	5.5947	22.379
L2	34.2658	29.1104	3910.9585	11.5765	16.7087	234.0675	7827.0631	14.5580	5.2938	18.823
	42.9975	37.5873	8419.0120	14.9475	21.5326	390.9892	16849.1019	18.7972	6.9651	24.765
L3	42.4119	48.0166	9872.7114	14.3213	20.6841	477.3102	19758.4135	24.0129	6.5061	17.35
	50.9298	59.3197	18614.7607	17.6925	25.5082	729.7558	37254.0152	29.6655	8.1775	21.807
L4	50.1681	56.8571	16391.3897	16.9580	24.4572	670.2076	32804.3475	28.4340	7.8134	20.836
	58.4713	68.1597	28238.6178	20.3291	29.2811	964.3968	56514.3927	34.0863	9.4846	25.292

Tower Elevation ft	Gusset Area (per face) ft ²	Gusset Thickness in	Gusset Grade	Adjust. Factor A _r	Adjust. Factor A _r	Weight Mult.	Double Angle Stitch Bolt Spacing Diagonals in	Double Angle Stitch Bolt Spacing Horizontals in	Double Angle Stitch Bolt Spacing Redundants in
L1 168.00- 119.25				1	1	1			
L2 119.25- 78.50				1	1	1			
L3 78.50- 38.75				1	1	1			
L4 38.75-0.00				1	1	1			

Feed Line/Linear Appurtenances - Entered As Round Or Flat

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Componen t Type	Placement ft	Total Number	Number Per Row	Clear Spacing in	Width or Diamete r in	Perimete r in	Weight plf

Feed Line/Linear Appurtenances - Entered As Area

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Componen t Type	Placement ft	Total Number	C _A A _A ft ² /ft	Weight plf

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Component Type	Placement ft	Total Number		C _A A _A ft ² /ft	Weight plf
LDF6-50A(1-1/4)	A	No	No	Inside Pole	168.00 - 3.00	1	No Ice	0.00	0.60
							1/2" Ice	0.00	0.60
							1" Ice	0.00	0.60
							2" Ice	0.00	0.60

LDF7-50A(1-5/8)	C	No	No	Inside Pole	168.00 - 3.00	12	No Ice	0.00	0.82
							1/2" Ice	0.00	0.82
							1" Ice	0.00	0.82
							2" Ice	0.00	0.82
FB-L98B-034-XXXXXX(3/8)	C	No	No	Inside Pole	168.00 - 3.00	2	No Ice	0.00	0.05
							1/2" Ice	0.00	0.05
							1" Ice	0.00	0.05
							2" Ice	0.00	0.05
WR-VG86ST-BRD(3/4)	C	No	No	Inside Pole	168.00 - 3.00	6	No Ice	0.00	0.58
							1/2" Ice	0.00	0.58
							1" Ice	0.00	0.58
							2" Ice	0.00	0.58

LDF4-50A(1/2)	B	No	No	Inside Pole	160.00 - 7.00	3	No Ice	0.00	0.15
							1/2" Ice	0.00	0.15
							1" Ice	0.00	0.15
							2" Ice	0.00	0.15
ATCB-B01-003(5/16)	B	No	No	Inside Pole	160.00 - 7.00	3	No Ice	0.00	0.07
							1/2" Ice	0.00	0.07
							1" Ice	0.00	0.07
							2" Ice	0.00	0.07

EU 90-FR(ELLIPTICAL)	A	No	No	Inside Pole	152.00 - 3.00	1	No Ice	0.00	0.34
							1/2" Ice	0.00	0.34
							1" Ice	0.00	0.34
							2" Ice	0.00	0.34
LDF4-50A(1/2)	A	No	No	Inside Pole	147.00 - 3.00	1	No Ice	0.00	0.15
							1/2" Ice	0.00	0.15
							1" Ice	0.00	0.15
							2" Ice	0.00	0.15
EU 90-FR(ELLIPTICAL)	A	No	No	Inside Pole	147.00 - 3.00	1	No Ice	0.00	0.34
							1/2" Ice	0.00	0.34
							1" Ice	0.00	0.34
							2" Ice	0.00	0.34
LDF1-50A(1/4)	A	No	No	Inside Pole	143.00 - 3.00	1	No Ice	0.00	0.06
							1/2" Ice	0.00	0.06
							1" Ice	0.00	0.06
							2" Ice	0.00	0.06
CAT5E(1/4)	A	No	No	Inside Pole	140.00 - 3.00	1	No Ice	0.00	0.04
							1/2" Ice	0.00	0.04
							1" Ice	0.00	0.04
							2" Ice	0.00	0.04
LDF5-50A(7/8)	A	No	No	Inside Pole	140.00 - 3.00	2	No Ice	0.00	0.33
							1/2" Ice	0.00	0.33
							1" Ice	0.00	0.33
							2" Ice	0.00	0.33
LDF4-50A(1/2)	A	No	No	Inside Pole	135.00 - 3.00	2	No Ice	0.00	0.15
							1/2" Ice	0.00	0.15
							1" Ice	0.00	0.15
							2" Ice	0.00	0.15

HB158-21U6S24-xxM_TMO(1-5/8)	B	No	No	Inside Pole	130.00 - 3.00	4	No Ice	0.00	2.50
							1/2" Ice	0.00	2.50
							1" Ice	0.00	2.50
							2" Ice	0.00	2.50

LDF7-50A(1-5/8)	C	No	No	Inside Pole	120.00 - 3.00	6	No Ice	0.00	0.82
							1/2" Ice	0.00	0.82
							1" Ice	0.00	0.82
							2" Ice	0.00	0.82

EU 90-	A	No	No	Inside Pole	100.00 - 3.00	1	No Ice	0.00	0.34

Description	Face or Leg	Allow Shield	Exclude From Torque Calculation	Component Type	Placement ft	Total Number		C _A A _A ft ² /ft	Weight plf
FR(ELLIPTICAL)							1/2" Ice	0.00	0.34
							1" Ice	0.00	0.34
							2" Ice	0.00	0.34

CU12PSM9P6XXX (1-1/2)	C	No	No	Inside Pole	120.00 - 0.00	1	No Ice	0.00	2.35
							1/2" Ice	0.00	2.35
							1" Ice	0.00	2.35
							2" Ice	0.00	2.35

5/8 rod/step	C	No	No	CaAa (Out Of Face)	168.00 - 0.00	1	No Ice	0.02	0.27
							1/2" Ice	0.12	0.70
							1" Ice	0.22	1.74
							2" Ice	0.42	5.65
LDF4-50A(1/2)	B	No	No	CaAa (Out Of Face)	52.00 - 3.00	1	No Ice	0.06	0.15
							1/2" Ice	0.16	0.84
							1" Ice	0.26	2.14
							2" Ice	0.46	6.58

Feed Line/Linear Appurtenances Section Areas

Tower Section n	Tower Elevation ft	Face	A _R ft ²	A _F ft ²	C _A A _A In Face ft ²	C _A A _A Out Face ft ²	Weight K
L1	168.00-119.25	A	0.000	0.000	0.000	0.000	0.07
		B	0.000	0.000	0.000	0.000	0.14
		C	0.000	0.000	0.000	0.975	0.67
L2	119.25-78.50	A	0.000	0.000	0.000	0.000	0.11
		B	0.000	0.000	0.000	0.000	0.44
		C	0.000	0.000	0.000	0.815	0.86
L3	78.50-38.75	A	0.000	0.000	0.000	0.000	0.11
		B	0.000	0.000	0.000	0.835	0.43
		C	0.000	0.000	0.000	0.795	0.83
L4	38.75-0.00	A	0.000	0.000	0.000	0.000	0.10
		B	0.000	0.000	0.000	2.252	0.38
		C	0.000	0.000	0.000	0.775	0.76

Feed Line/Linear Appurtenances Section Areas - With Ice

Tower Section n	Tower Elevation ft	Face or Leg	Ice Thickness in	A _R ft ²	A _F ft ²	C _A A _A In Face ft ²	C _A A _A Out Face ft ²	Weight K
L1	168.00-119.25	A	1.968	0.000	0.000	0.000	0.000	0.07
		B		0.000	0.000	0.000	0.000	0.14
		C		0.000	0.000	0.000	20.160	0.93
L2	119.25-78.50	A	1.896	0.000	0.000	0.000	0.000	0.11
		B		0.000	0.000	0.000	0.000	0.44
		C		0.000	0.000	0.000	16.851	1.07
L3	78.50-38.75	A	1.800	0.000	0.000	0.000	0.000	0.11
		B		0.000	0.000	0.000	5.859	0.51
		C		0.000	0.000	0.000	15.869	1.03
L4	38.75-0.00	A	1.613	0.000	0.000	0.000	0.000	0.10
		B		0.000	0.000	0.000	15.121	0.58
		C		0.000	0.000	0.000	14.723	0.94

Feed Line Center of Pressure

Section	Elevation	CP _x	CP _z	CP _x Ice	CP _z Ice
	ft	in	in	in	in
L1	168.00-119.25	-0.1606	0.0927	-1.4981	0.8649
L2	119.25-78.50	-0.1610	0.0930	-1.5852	0.9152
L3	78.50-38.75	0.0182	0.1952	-0.9388	1.2400
L4	38.75-0.00	0.2990	0.3554	0.0305	1.7005

Note: For pole sections, center of pressure calculations do not consider feed line shielding.

Discrete Tower Loads

Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement
			Horz Lateral	Vert		
			ft	ft	°	ft
800 10121 w/ Mount Pipe	A	From Leg	4.00	0.00	0.0000	168.00
			0.00	0.00		
800 10121 w/ Mount Pipe	B	From Leg	4.00	0.00	0.0000	168.00
			0.00	0.00		
800 10121 w/ Mount Pipe	C	From Leg	4.00	0.00	0.0000	168.00
			0.00	0.00		
80010965 w/ Mount Pipe	A	From Leg	4.00	0.00	0.0000	168.00
			0.00	0.00		
80010965 w/ Mount Pipe	B	From Leg	4.00	0.00	0.0000	168.00
			0.00	0.00		
80010966 w/ Mount Pipe	C	From Leg	4.00	0.00	0.0000	168.00
			0.00	0.00		
QS66512-2 w/ Mount Pipe	A	From Leg	4.00	0.00	0.0000	168.00
			0.00	0.00		
QS66512-2 w/ Mount Pipe	B	From Leg	4.00	0.00	0.0000	168.00
			0.00	0.00		
TPA-65R-LCUUUU-H8 w/ Mount Pipe	C	From Leg	4.00	0.00	0.0000	168.00
			0.00	0.00		
CC807-08	C	From Leg	4.00	0.00	0.0000	168.00
			0.00	2.00		
RRUS 4478 B14	A	From Leg	4.00	0.00	0.0000	168.00
			0.00	0.00		
RRUS 4478 B14	B	From Leg	4.00	0.00	0.0000	168.00
			0.00	0.00		
RRUS 4478 B14	C	From Leg	4.00	0.00	0.0000	168.00
			0.00	0.00		
RRUS 32 B66	A	From Leg	4.00	0.00	0.0000	168.00
			0.00	0.00		
RRUS 32 B66	B	From Leg	4.00	0.00	0.0000	168.00
			0.00	0.00		
RRUS 32 B66	C	From Leg	4.00	0.00	0.0000	168.00

Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment	Placement
			Horz Lateral ft	Vert ft		
			0.00			
			0.00			
RRUS 32 B30	A	From Leg	4.00		0.0000	168.00
			0.00			
			0.00			
RRUS 32 B30	B	From Leg	4.00		0.0000	168.00
			0.00			
			0.00			
RRUS 32 B30	C	From Leg	4.00		0.0000	168.00
			0.00			
			0.00			
(2) 860 10025	A	From Leg	4.00		0.0000	168.00
			0.00			
			0.00			
(2) 860 10025	B	From Leg	4.00		0.0000	168.00
			0.00			
			0.00			
(2) 860 10025	C	From Leg	4.00		0.0000	168.00
			0.00			
			0.00			
DTMABP7819VG12A	A	From Leg	4.00		0.0000	168.00
			0.00			
			0.00			
DTMABP7819VG12A	B	From Leg	4.00		0.0000	168.00
			0.00			
			0.00			
DTMABP7819VG12A	C	From Leg	4.00		0.0000	168.00
			0.00			
			0.00			
DC6-48-60-0-8F	A	From Leg	4.00		0.0000	168.00
			0.00			
			0.00			
(2) DC6-48-60-18-8F	A	From Leg	4.00		0.0000	168.00
			0.00			
			0.00			
6' x 2" Mount Pipe	A	From Leg	4.00		0.0000	168.00
			0.00			
			0.00			
6' x 2" Mount Pipe	B	From Leg	4.00		0.0000	168.00
			0.00			
			0.00			
6' x 2" Mount Pipe	C	From Leg	4.00		0.0000	168.00
			0.00			
			0.00			
Platform Mount [LP 1201-1_KCKR-HR-1] ***	C	None			0.0000	168.00
DMP65R-BU6D w/ Mount Pipe	A	From Leg	4.00		0.0000	168.00
			0.00			
			0.00			
DMP65R-BU6D w/ Mount Pipe	B	From Leg	4.00		0.0000	168.00
			0.00			
			0.00			
DMP65R-BU8D w/ Mount Pipe	C	From Leg	4.00		0.0000	168.00
			0.00			
			0.00			
RRUS 4449 B5/B12	A	From Leg	4.00		0.0000	168.00
			0.00			
			0.00			
RRUS 4449 B5/B12	B	From Leg	4.00		0.0000	168.00
			0.00			
			0.00			
RRUS 4449 B5/B12	C	From Leg	4.00		0.0000	168.00
			0.00			
			0.00			
RRUS 4415 B25	A	From Leg	4.00		0.0000	168.00

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft
			0.00		
			0.00		
RRUS 4415 B25	B	From Leg	4.00	0.0000	168.00
			0.00		
			0.00		
RRUS 4415 B25	C	From Leg	4.00	0.0000	168.00
			0.00		
			0.00		

LLPX310R-V1	A	From Leg	4.00	0.0000	160.00
			0.00		
			0.00		
LLPX310R-V1	B	From Leg	4.00	0.0000	160.00
			0.00		
			0.00		
LLPX310R-V1	C	From Leg	4.00	0.0000	160.00
			0.00		
			0.00		
HORIZON COMPACT	A	From Leg	4.00	0.0000	160.00
			0.00		
			4.00		
HORIZON COMPACT	B	From Leg	4.00	0.0000	160.00
			0.00		
			4.00		
HORIZON COMPACT	B	From Leg	4.00	0.0000	160.00
			0.00		
			-4.00		
RRH-2WB	A	From Leg	4.00	0.0000	160.00
			0.00		
			0.00		
RRH-2WB	B	From Leg	4.00	0.0000	160.00
			0.00		
			0.00		
RRH-2WB	B	From Leg	4.00	0.0000	160.00
			0.00		
			0.00		
FB-15-ABOX	C	From Leg	4.00	0.0000	160.00
			0.00		
			-4.00		
(4) 6' x 2" Mount Pipe	A	From Leg	4.00	0.0000	160.00
			0.00		
			0.00		
(4) 6' x 2" Mount Pipe	B	From Leg	4.00	0.0000	160.00
			0.00		
			0.00		
(4) 6' x 2" Mount Pipe	C	From Leg	4.00	0.0000	160.00
			0.00		
			0.00		
7'x2 1/2" Pipe Mount	A	From Leg	4.00	0.0000	160.00
			0.00		
			0.00		
7'x2 1/2" Pipe Mount	B	From Leg	4.00	0.0000	160.00
			0.00		
			0.00		
7'x2 1/2" Pipe Mount	C	From Leg	4.00	0.0000	160.00
			0.00		
			0.00		
Platform Mount [LP 1201-1]	C	None		0.0000	160.00

Pipe Mount [PM 601-1]	A	From Leg	0.50	0.0000	152.00
			0.00		
			0.00		

BPA7496-180-11 w/ Mount Pipe	A	From Leg	1.00	0.0000	147.00
			0.00		

Description	Face or Leg	Offset Type	Offsets:		Azimuth Adjustment °	Placement ft
			Horz Lateral ft	Vert ft		
782 10876	A	From Leg	1.00	1.00	0.0000	147.00
Pipe Mount [PM 601-1]	B	From Leg	0.50	0.00	0.0000	147.00
***			0.00	0.00		
782 10876	C	From Leg	1.00	0.00	0.0000	143.00
Pipe Mount [PM 602-1]	C	From Leg	0.50	0.00	0.0000	143.00
***			0.00	0.00		
(2) CC807-11	A	From Leg	4.00	0.00	0.0000	140.00
ANT450F6	B	From Leg	4.00	0.00	0.0000	140.00
PTP400 w/Mount Pipe	B	From Leg	4.00	0.00	0.0000	140.00
432E-83I-01-T	A	From Leg	4.00	0.00	0.0000	140.00
RIU	B	From Leg	4.00	0.00	0.0000	140.00
Side Arm Mount [SO 306-1]	A	From Leg	2.00	0.00	0.0000	140.00
Side Arm Mount [SO 306-1]	B	From Leg	2.00	0.00	0.0000	140.00
Pipe Mount [PM 601-3]	C	None	0.00	0.00	0.0000	140.00
***			0.00	0.00		
ANT450F6	A	From Leg	6.00	0.00	0.0000	135.00
ANT450F6	B	From Leg	6.00	0.00	0.0000	135.00
4' x 2" Pipe Mount	A	From Leg	6.00	0.00	0.0000	135.00
4' x 2" Pipe Mount	B	From Leg	6.00	0.00	0.0000	135.00
Side Arm Mount [SO 702-1]	A	From Leg	3.00	0.00	0.0000	135.00
Side Arm Mount [SO 702-1]	B	From Leg	3.00	0.00	0.0000	135.00
***			0.00	0.00		
***			0.00	0.00		
APX16DWV-16DWV-S-E-A20	A	From Leg	4.00	0.00	0.0000	130.00
APX16DWV-16DWV-S-E-A20	B	From Leg	4.00	0.00	0.0000	130.00
APX16DWV-16DWV-S-E-A20	C	From Leg	4.00	0.00	0.0000	130.00

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft
			0.00		
APXVAALL24_43-U-NA20_TMO	A	From Leg	1.00		
			4.00	0.0000	130.00
			0.00		
APXVAALL24_43-U-NA20_TMO	B	From Leg	1.00		
			4.00	0.0000	130.00
			0.00		
APXVAALL24_43-U-NA20_TMO	C	From Leg	1.00		
			4.00	0.0000	130.00
			0.00		
AIR6449 B41_T-MOBILE	A	From Leg	1.00		
			4.00	0.0000	130.00
			0.00		
AIR6449 B41_T-MOBILE	B	From Leg	1.00		
			4.00	0.0000	130.00
			0.00		
AIR6449 B41_T-MOBILE	C	From Leg	1.00		
			4.00	0.0000	130.00
			0.00		
RADIO 4415 B66A	A	From Leg	1.00		
			4.00	0.0000	130.00
			0.00		
RADIO 4415 B66A	B	From Leg	1.00		
			4.00	0.0000	130.00
			0.00		
RADIO 4415 B66A	C	From Leg	1.00		
			4.00	0.0000	130.00
			0.00		
RADIO 4449 B71 B85A_T-MOBILE	A	From Leg	1.00		
			4.00	0.0000	130.00
			0.00		
RADIO 4449 B71 B85A_T-MOBILE	B	From Leg	1.00		
			4.00	0.0000	130.00
			0.00		
RADIO 4449 B71 B85A_T-MOBILE	C	From Leg	1.00		
			4.00	0.0000	130.00
			0.00		
RADIO 4424 B25_TMO	A	From Leg	1.00		
			4.00	0.0000	130.00
			0.00		
RADIO 4424 B25_TMO	B	From Leg	1.00		
			4.00	0.0000	130.00
			0.00		
RADIO 4424 B25_TMO	C	From Leg	1.00		
			4.00	0.0000	130.00
			0.00		
12' Platform Mount [#RMQP-496-HK] ***	C	None	1.00	0.0000	130.00
MX08FRO665-21 w/ Mount Pipe	A	From Leg	4.00	0.0000	120.00
			0.00		
MX08FRO665-21 w/ Mount Pipe	B	From Leg	0.00		
			4.00	0.0000	120.00
			0.00		
MX08FRO665-21 w/ Mount Pipe	C	From Leg	0.00		
			4.00	0.0000	120.00
			0.00		
TA08025-B604	A	From Leg	0.00		
			4.00	0.0000	120.00
			0.00		
TA08025-B604	B	From Leg	0.00		
			4.00	0.0000	120.00
			0.00		
TA08025-B604	C	From Leg	0.00		
			4.00	0.0000	120.00

Description	Face or Leg	Offset Type	Offsets: Horz Lateral Vert ft ft ft	Azimuth Adjustment °	Placement ft
			0.00		
TA08025-B605	A	From Leg	0.00 4.00	0.0000	120.00
			0.00		
TA08025-B605	B	From Leg	0.00 4.00	0.0000	120.00
			0.00		
TA08025-B605	C	From Leg	0.00 4.00	0.0000	120.00
			0.00		
RDIDC-9181-PF-48	A	From Leg	0.00 4.00	0.0000	120.00
			0.00		
Commscope MC-PK8-DSH (2) 8' x 2" Mount Pipe	C	None	0.00	0.0000	120.00
	A	From Leg	4.00	0.0000	120.00
			0.00		
(2) 8' x 2" Mount Pipe	B	From Leg	0.00 4.00	0.0000	120.00
			0.00		
(2) 8' x 2" Mount Pipe	C	From Leg	0.00 4.00	0.0000	120.00
			0.00		
***			0.00		

Pipe Mount [PM 601-1]	B	From Leg	1.00	0.0000	100.00
			0.00		
			0.00		

1' x 2-1/2"	A	From Leg	2.00	0.0000	79.00
			0.00		
			0.00		
1' x 2-1/2"	B	From Leg	2.00	0.0000	79.00
			0.00		
			0.00		
Side Arm Mount [SO 901-1]	A	From Leg	1.00	0.0000	79.00
			0.00		
			0.00		
Side Arm Mount [SO 901-1]	B	From Leg	1.00	0.0000	79.00
			0.00		
			0.00		

GPS-TMG-HR-26NCM	C	From Leg	3.00	0.0000	52.00
			0.00		
			0.00		
2' x 2" Pipe Mount	C	From Leg	3.00	0.0000	52.00
			0.00		
			0.00		
Side Arm Mount [SO 701-1]	C	From Leg	1.50	0.0000	52.00
			0.00		
			0.00		

Dishes

Description	Face or Leg	Dish Type	Offset Type	Offsets: Horz Lateral Vert ft	Azimuth Adjustment °	3 dB Beam Width °	Elevation ft	Outside Diameter ft
VHLP2.5-11	A	Paraboloid w/Shroud (HP)	From Leg	1.00 0.00 5.00	38.0000		160.00	2.92
VHLP2.5-11	B	Paraboloid w/Shroud (HP)	From Leg	1.00 0.00 5.00	24.0000		160.00	2.92
VHLP2.5-11	C	Paraboloid w/Shroud (HP)	From Leg	1.00 0.00 5.00	90.0000		160.00	2.92

SC3-W100ASTX	A	Paraboloid w/Shroud (HP)	From Leg	1.00 0.00 0.00	-32.0000		152.00	3.00

SC3-W100ASTX	B	Paraboloid w/Shroud (HP)	From Leg	1.00 0.00 1.00	57.0000		147.00	3.00

MPRD2449	C	Paraboloid w/Radome	From Leg	1.00 0.00 0.00	10.0000		143.00	2.17

SC3-W100ASTX	B	Paraboloid w/Shroud (HP)	From Leg	1.00 0.00 0.00	37.0000		100.00	3.00

Load Combinations

Comb. No.	Description
1	Dead Only
2	1.2 Dead+1.0 Wind 0 deg - No Ice
3	0.9 Dead+1.0 Wind 0 deg - No Ice
4	1.2 Dead+1.0 Wind 30 deg - No Ice
5	0.9 Dead+1.0 Wind 30 deg - No Ice
6	1.2 Dead+1.0 Wind 60 deg - No Ice
7	0.9 Dead+1.0 Wind 60 deg - No Ice
8	1.2 Dead+1.0 Wind 90 deg - No Ice
9	0.9 Dead+1.0 Wind 90 deg - No Ice
10	1.2 Dead+1.0 Wind 120 deg - No Ice
11	0.9 Dead+1.0 Wind 120 deg - No Ice
12	1.2 Dead+1.0 Wind 150 deg - No Ice
13	0.9 Dead+1.0 Wind 150 deg - No Ice
14	1.2 Dead+1.0 Wind 180 deg - No Ice
15	0.9 Dead+1.0 Wind 180 deg - No Ice
16	1.2 Dead+1.0 Wind 210 deg - No Ice
17	0.9 Dead+1.0 Wind 210 deg - No Ice
18	1.2 Dead+1.0 Wind 240 deg - No Ice
19	0.9 Dead+1.0 Wind 240 deg - No Ice
20	1.2 Dead+1.0 Wind 270 deg - No Ice
21	0.9 Dead+1.0 Wind 270 deg - No Ice
22	1.2 Dead+1.0 Wind 300 deg - No Ice
23	0.9 Dead+1.0 Wind 300 deg - No Ice
24	1.2 Dead+1.0 Wind 330 deg - No Ice
25	0.9 Dead+1.0 Wind 330 deg - No Ice
26	1.2 Dead+1.0 Ice+1.0 Temp
27	1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp
28	1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp
29	1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp
30	1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp
31	1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp
32	1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp
33	1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp

Comb. No.	Description
34	1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp
35	1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp
36	1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp
37	1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp
38	1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp
39	Dead+Wind 0 deg - Service
40	Dead+Wind 30 deg - Service
41	Dead+Wind 60 deg - Service
42	Dead+Wind 90 deg - Service
43	Dead+Wind 120 deg - Service
44	Dead+Wind 150 deg - Service
45	Dead+Wind 180 deg - Service
46	Dead+Wind 210 deg - Service
47	Dead+Wind 240 deg - Service
48	Dead+Wind 270 deg - Service
49	Dead+Wind 300 deg - Service
50	Dead+Wind 330 deg - Service

Maximum Member Forces

Section No.	Elevation ft	Component Type	Condition	Gov. Load Comb.	Axial K	Major Axis Moment kip-ft	Minor Axis Moment kip-ft
L1	168 - 119.25	Pole	Max Tension	39	0.00	-0.00	-0.00
			Max. Compression	26	-47.38	-1.37	5.88
			Max. Mx	8	-17.37	-752.11	-11.96
			Max. My	14	-17.30	-4.87	-760.91
			Max. Vy	8	25.64	-752.11	-11.96
			Max. Vx	14	25.94	-4.87	-760.91
			Max. Torque	22			-3.64
L2	119.25 - 78.5	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-66.20	-2.00	6.52
			Max. Mx	8	-28.56	-1988.18	-29.74
			Max. My	14	-28.50	-11.86	-2012.13
			Max. Vy	8	33.39	-1988.18	-29.74
			Max. Vx	2	-33.88	9.55	2011.01
			Max. Torque	22			-4.33
L3	78.5 - 38.75	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-82.43	-1.91	6.48
			Max. Mx	8	-40.75	-3357.73	-49.50
			Max. My	2	-40.72	17.76	3399.14
			Max. Vy	8	37.15	-3357.73	-49.50
			Max. Vx	2	-37.64	17.76	3399.14
			Max. Torque	22			-4.39
L4	38.75 - 0	Pole	Max Tension	1	0.00	0.00	0.00
			Max. Compression	26	-103.18	-1.91	6.00
			Max. Mx	8	-56.93	-5107.18	-72.43
			Max. My	2	-56.93	27.77	5170.30
			Max. Vy	8	40.30	-5107.18	-72.43
			Max. Vx	2	-40.77	27.77	5170.30
			Max. Torque	22			-4.07

Maximum Reactions

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
Pole	Max. Vert	27	103.18	0.03	12.72
	Max. H _x	20	56.97	40.23	0.32
	Max. H _z	3	42.73	0.22	40.72
	Max. M _x	2	5170.30	0.22	40.71
	Max. M _z	8	5107.18	-40.24	-0.49

Location	Condition	Gov. Load Comb.	Vertical K	Horizontal, X K	Horizontal, Z K
	Max. Torsion	10	3.12	-34.81	-20.62
	Min. Vert	11	42.73	-34.81	-20.62
	Min. H _x	9	42.73	-40.24	-0.49
	Min. H _z	14	56.97	-0.21	-40.67
	Min. M _x	14	-5167.83	-0.21	-40.67
	Min. M _z	20	-5104.23	40.23	0.32
	Min. Torsion	22	-4.01	34.69	20.71

Tower Mast Reaction Summary

Load Combination	Vertical K	Shear _x K	Shear _z K	Overturning Moment, M _x kip-ft	Overturning Moment, M _z kip-ft	Torque kip-ft
Dead Only	47.47	0.00	0.00	-1.21	-0.92	-0.00
1.2 Dead+1.0 Wind 0 deg - No Ice	56.97	-0.22	-40.71	-5170.30	27.77	1.01
0.9 Dead+1.0 Wind 0 deg - No Ice	42.73	-0.22	-40.72	-5087.50	27.64	1.01
1.2 Dead+1.0 Wind 30 deg - No Ice	56.97	19.65	-35.47	-4511.84	-2485.29	-0.66
0.9 Dead+1.0 Wind 30 deg - No Ice	42.73	19.65	-35.47	-4439.49	-2445.40	-0.64
1.2 Dead+1.0 Wind 60 deg - No Ice	56.97	34.68	-20.43	-2602.12	-4397.79	-2.01
0.9 Dead+1.0 Wind 60 deg - No Ice	42.73	34.68	-20.43	-2560.19	-4327.37	-1.98
1.2 Dead+1.0 Wind 90 deg - No Ice	56.97	40.24	0.49	72.43	-5107.18	-2.87
0.9 Dead+1.0 Wind 90 deg - No Ice	42.73	40.24	0.49	71.60	-5025.43	-2.82
1.2 Dead+1.0 Wind 120 deg - No Ice	56.97	34.81	20.62	2621.44	-4416.91	-3.12
0.9 Dead+1.0 Wind 120 deg - No Ice	42.73	34.81	20.62	2580.04	-4346.19	-3.08
1.2 Dead+1.0 Wind 150 deg - No Ice	56.97	20.03	35.26	4479.13	-2535.31	-2.00
0.9 Dead+1.0 Wind 150 deg - No Ice	42.73	20.03	35.26	4408.10	-2494.66	-1.98
1.2 Dead+1.0 Wind 180 deg - No Ice	56.97	0.21	40.67	5167.83	-30.20	-0.68
0.9 Dead+1.0 Wind 180 deg - No Ice	42.73	0.21	40.67	5085.82	-29.43	-0.68
1.2 Dead+1.0 Wind 210 deg - No Ice	56.97	-19.62	35.41	4505.34	2477.29	0.60
0.9 Dead+1.0 Wind 210 deg - No Ice	42.73	-19.62	35.41	4433.83	2438.16	0.58
1.2 Dead+1.0 Wind 240 deg - No Ice	56.97	-34.78	20.35	2585.74	4413.73	1.92
0.9 Dead+1.0 Wind 240 deg - No Ice	42.73	-34.78	20.35	2544.89	4343.62	1.88
1.2 Dead+1.0 Wind 270 deg - No Ice	56.97	-40.23	-0.32	-42.60	5104.23	3.49
0.9 Dead+1.0 Wind 270 deg - No Ice	42.73	-40.23	-0.32	-41.57	5023.14	3.45
1.2 Dead+1.0 Wind 300 deg - No Ice	56.97	-34.69	-20.71	-2635.22	4392.67	4.01
0.9 Dead+1.0 Wind 300 deg - No Ice	42.73	-34.69	-20.71	-2592.84	4322.98	3.97
1.2 Dead+1.0 Wind 330 deg - No Ice	56.97	-20.05	-35.34	-4488.86	2535.45	2.78
0.9 Dead+1.0 Wind 330 deg - No Ice	42.73	-20.05	-35.34	-4416.93	2495.40	2.76
1.2 Dead+1.0 Ice+1.0 Temp	103.18	0.00	-0.00	-6.00	-1.91	-0.00
1.2 Dead+1.0 Wind 0 deg+1.0 Ice+1.0 Temp	103.18	-0.03	-12.72	-1706.84	1.92	-0.04

Load Combination	Vertical	Shear _x	Shear _z	Overturning Moment, M _x	Overturning Moment, M _z	Torque
	K	K	K	kip-ft	kip-ft	kip-ft
1.2 Dead+1.0 Wind 30 deg+1.0 Ice+1.0 Temp	103.18	6.25	-11.06	-1487.52	-835.22	-0.50
1.2 Dead+1.0 Wind 60 deg+1.0 Ice+1.0 Temp	103.18	10.93	-6.38	-862.03	-1463.11	-0.79
1.2 Dead+1.0 Wind 90 deg+1.0 Ice+1.0 Temp	103.18	12.65	0.08	7.44	-1694.12	-0.89
1.2 Dead+1.0 Wind 120 deg+1.0 Ice+1.0 Temp	103.18	10.94	6.40	850.43	-1465.00	-0.78
1.2 Dead+1.0 Wind 150 deg+1.0 Ice+1.0 Temp	103.18	6.30	11.01	1466.40	-841.97	-0.35
1.2 Dead+1.0 Wind 180 deg+1.0 Ice+1.0 Temp	103.18	0.03	12.71	1694.60	-5.97	0.10
1.2 Dead+1.0 Wind 210 deg+1.0 Ice+1.0 Temp	103.18	-6.24	11.05	1474.36	829.97	0.48
1.2 Dead+1.0 Wind 240 deg+1.0 Ice+1.0 Temp	103.18	-10.95	6.37	846.69	1463.08	0.78
1.2 Dead+1.0 Wind 270 deg+1.0 Ice+1.0 Temp	103.18	-12.65	-0.05	-12.71	1689.98	1.01
1.2 Dead+1.0 Wind 300 deg+1.0 Ice+1.0 Temp	103.18	-10.92	-6.42	-865.07	1456.14	0.95
1.2 Dead+1.0 Wind 330 deg+1.0 Ice+1.0 Temp	103.18	-6.30	-11.02	-1480.20	838.45	0.51
Dead+Wind 0 deg - Service	47.47	-0.05	-8.84	-1114.28	5.25	0.22
Dead+Wind 30 deg - Service	47.47	4.26	-7.70	-972.48	-535.88	-0.15
Dead+Wind 60 deg - Service	47.47	7.53	-4.43	-561.24	-947.64	-0.44
Dead+Wind 90 deg - Service	47.47	8.73	0.11	14.62	-1100.37	-0.63
Dead+Wind 120 deg - Service	47.47	7.55	4.47	563.49	-951.80	-0.68
Dead+Wind 150 deg - Service	47.47	4.35	7.65	963.51	-546.66	-0.44
Dead+Wind 180 deg - Service	47.47	0.05	8.83	1111.82	-7.23	-0.15
Dead+Wind 210 deg - Service	47.47	-4.26	7.68	969.15	532.70	0.13
Dead+Wind 240 deg - Service	47.47	-7.55	4.42	555.79	949.63	0.42
Dead+Wind 270 deg - Service	47.47	-8.73	-0.07	-10.15	1098.27	0.77
Dead+Wind 300 deg - Service	47.47	-7.53	-4.49	-568.38	945.09	0.89
Dead+Wind 330 deg - Service	47.47	-4.35	-7.67	-967.54	545.22	0.61

Solution Summary

Load Comb.	Sum of Applied Forces			Sum of Reactions			% Error
	PX K	PY K	PZ K	PX K	PY K	PZ K	
1	0.00	-47.47	0.00	0.00	47.47	0.00	0.000%
2	-0.22	-56.97	-40.71	0.22	56.97	40.71	0.000%
3	-0.22	-42.73	-40.71	0.22	42.73	40.72	0.000%
4	19.65	-56.97	-35.47	-19.65	56.97	35.47	0.000%
5	19.65	-42.73	-35.47	-19.65	42.73	35.47	0.000%
6	34.68	-56.97	-20.43	-34.68	56.97	20.43	0.000%
7	34.68	-42.73	-20.43	-34.68	42.73	20.43	0.000%
8	40.24	-56.97	0.49	-40.24	56.97	-0.49	0.000%
9	40.24	-42.73	0.49	-40.24	42.73	-0.49	0.000%
10	34.81	-56.97	20.62	-34.81	56.97	-20.62	0.000%
11	34.81	-42.73	20.62	-34.81	42.73	-20.62	0.000%
12	20.03	-56.97	35.26	-20.03	56.97	-35.26	0.000%
13	20.03	-42.73	35.26	-20.03	42.73	-35.26	0.000%
14	0.21	-56.97	40.67	-0.21	56.97	-40.67	0.000%
15	0.21	-42.73	40.67	-0.21	42.73	-40.67	0.000%
16	-19.62	-56.97	35.41	19.62	56.97	-35.41	0.000%
17	-19.62	-42.73	35.41	19.62	42.73	-35.41	0.000%
18	-34.78	-56.97	20.35	34.78	56.97	-20.35	0.000%

Load Comb.	Sum of Applied Forces			Sum of Reactions			% Error
	PX K	PY K	PZ K	PX K	PY K	PZ K	
19	-34.78	-42.73	20.35	34.78	42.73	-20.35	0.000%
20	-40.23	-56.97	-0.32	40.23	56.97	0.32	0.000%
21	-40.23	-42.73	-0.32	40.23	42.73	0.32	0.000%
22	-34.69	-56.97	-20.71	34.69	56.97	20.71	0.000%
23	-34.69	-42.73	-20.71	34.69	42.73	20.71	0.000%
24	-20.05	-56.97	-35.34	20.05	56.97	35.34	0.000%
25	-20.05	-42.73	-35.34	20.05	42.73	35.34	0.000%
26	0.00	-103.18	0.00	-0.00	103.18	0.00	0.000%
27	-0.03	-103.18	-12.72	0.03	103.18	12.72	0.000%
28	6.24	-103.18	-11.06	-6.25	103.18	11.06	0.000%
29	10.93	-103.18	-6.38	-10.93	103.18	6.38	0.000%
30	12.65	-103.18	0.08	-12.65	103.18	-0.08	0.000%
31	10.94	-103.18	6.40	-10.94	103.18	-6.40	0.000%
32	6.30	-103.18	11.01	-6.30	103.18	-11.01	0.000%
33	0.03	-103.18	12.71	-0.03	103.18	-12.71	0.000%
34	-6.24	-103.18	11.05	6.24	103.18	-11.05	0.000%
35	-10.95	-103.18	6.37	10.95	103.18	-6.37	0.000%
36	-12.65	-103.18	-0.05	12.65	103.18	0.05	0.000%
37	-10.92	-103.18	-6.42	10.92	103.18	6.42	0.000%
38	-6.30	-103.18	-11.02	6.30	103.18	11.02	0.000%
39	-0.05	-47.47	-8.84	0.05	47.47	8.84	0.000%
40	4.26	-47.47	-7.70	-4.26	47.47	7.70	0.000%
41	7.53	-47.47	-4.43	-7.53	47.47	4.43	0.000%
42	8.73	-47.47	0.11	-8.73	47.47	-0.11	0.000%
43	7.55	-47.47	4.47	-7.55	47.47	-4.47	0.000%
44	4.35	-47.47	7.65	-4.35	47.47	-7.65	0.000%
45	0.05	-47.47	8.83	-0.05	47.47	-8.83	0.000%
46	-4.26	-47.47	7.68	4.26	47.47	-7.68	0.000%
47	-7.55	-47.47	4.42	7.55	47.47	-4.42	0.000%
48	-8.73	-47.47	-0.07	8.73	47.47	0.07	0.000%
49	-7.53	-47.47	-4.49	7.53	47.47	4.49	0.000%
50	-4.35	-47.47	-7.67	4.35	47.47	7.67	0.000%

Non-Linear Convergence Results

Load Combination	Converged?	Number of Cycles	Displacement Tolerance	Force Tolerance
1	Yes	4	0.00000001	0.00000001
2	Yes	5	0.00000001	0.00007311
3	Yes	4	0.00000001	0.00094264
4	Yes	6	0.00000001	0.00044588
5	Yes	6	0.00000001	0.00013119
6	Yes	6	0.00000001	0.00046494
7	Yes	6	0.00000001	0.00013721
8	Yes	5	0.00000001	0.00006212
9	Yes	4	0.00000001	0.00089326
10	Yes	6	0.00000001	0.00044677
11	Yes	6	0.00000001	0.00013035
12	Yes	6	0.00000001	0.00046043
13	Yes	6	0.00000001	0.00013594
14	Yes	5	0.00000001	0.00015116
15	Yes	5	0.00000001	0.00006488
16	Yes	6	0.00000001	0.00045309
17	Yes	6	0.00000001	0.00013400
18	Yes	6	0.00000001	0.00044545
19	Yes	6	0.00000001	0.00013058
20	Yes	5	0.00000001	0.00047774
21	Yes	5	0.00000001	0.00021139
22	Yes	6	0.00000001	0.00047336
23	Yes	6	0.00000001	0.00013986
24	Yes	6	0.00000001	0.00044357
25	Yes	6	0.00000001	0.00012992
26	Yes	4	0.00000001	0.00010490
27	Yes	6	0.00000001	0.00041907
28	Yes	6	0.00000001	0.00076995

29	Yes	6	0.00000001	0.00079910
30	Yes	6	0.00000001	0.00041790
31	Yes	6	0.00000001	0.00075310
32	Yes	6	0.00000001	0.00076726
33	Yes	6	0.00000001	0.00041236
34	Yes	6	0.00000001	0.00076137
35	Yes	6	0.00000001	0.00074814
36	Yes	6	0.00000001	0.00041901
37	Yes	6	0.00000001	0.00079690
38	Yes	6	0.00000001	0.00076355
39	Yes	4	0.00000001	0.00019408
40	Yes	5	0.00000001	0.00009285
41	Yes	5	0.00000001	0.00010318
42	Yes	4	0.00000001	0.00026607
43	Yes	5	0.00000001	0.00009139
44	Yes	5	0.00000001	0.00010051
45	Yes	4	0.00000001	0.00019595
46	Yes	5	0.00000001	0.00009643
47	Yes	5	0.00000001	0.00009050
48	Yes	4	0.00000001	0.00035770
49	Yes	5	0.00000001	0.00010792
50	Yes	5	0.00000001	0.00009044

Maximum Tower Deflections - Service Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	168 - 119.25	34.806	39	1.8273	0.0040
L2	123.5 - 78.5	18.857	39	1.5024	0.0037
L3	83.75 - 38.75	8.443	39	0.9516	0.0016
L4	45 - 0	2.464	39	0.4992	0.0006

Critical Deflections and Radius of Curvature - Service Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
168.00	800 10121 w/ Mount Pipe	39	34.806	1.8273	0.0040	38174
165.00	VHLP2.5-11	39	33.669	1.8114	0.0040	38174
160.00	LLPX310R-V1	39	31.778	1.7844	0.0040	23859
152.00	SC3-W100ASTX	39	28.782	1.7384	0.0040	11929
148.00	SC3-W100ASTX	39	27.306	1.7132	0.0039	9543
147.00	BPA7496-180-11 w/ Mount Pipe	39	26.940	1.7067	0.0039	9088
143.00	MPRD2449	39	25.490	1.6790	0.0039	7634
140.00	(2) CC807-11	39	24.419	1.6567	0.0039	6816
135.00	ANT450F6	39	22.670	1.6161	0.0039	5783
130.00	APX16DWV-16DWV-S-E-A20	39	20.973	1.5704	0.0039	5021
120.00	MX08FRO665-21 w/ Mount Pipe	39	17.765	1.4612	0.0036	4306
100.00	SC3-W100ASTX	39	12.177	1.1852	0.0025	4399
79.00	1' x 2-1/2"	39	7.486	0.8887	0.0014	4426
52.00	GPS-TMG-HR-26NCM	39	3.229	0.5751	0.0007	4143

Maximum Tower Deflections - Design Wind

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L1	168 - 119.25	161.252	14	8.4780	0.0185
L2	123.5 - 78.5	87.466	2	6.9756	0.0170

Section No.	Elevation ft	Horz. Deflection in	Gov. Load Comb.	Tilt °	Twist °
L3	83.75 - 38.75	39.190	2	4.4197	0.0072
L4	45 - 0	11.440	2	2.3183	0.0028

Critical Deflections and Radius of Curvature - Design Wind

Elevation ft	Appurtenance	Gov. Load Comb.	Deflection in	Tilt °	Twist °	Radius of Curvature ft
168.00	800 10121 w/ Mount Pipe	14	161.252	8.4780	0.0185	8564
165.00	VHLP2.5-11	14	155.992	8.4046	0.0185	8564
160.00	LLPX310R-V1	14	147.246	8.2802	0.0185	5351
152.00	SC3-W100ASTX	14	133.389	8.0679	0.0184	2673
148.00	SC3-W100ASTX	14	126.562	7.9518	0.0183	2137
147.00	BPA7496-180-11 w/ Mount Pipe	14	124.869	7.9214	0.0183	2035
143.00	MPRD2449	2	118.162	7.7937	0.0181	1708
140.00	(2) CC807-11	2	113.207	7.6906	0.0179	1523
135.00	ANT450F6	2	105.115	7.5025	0.0178	1291
130.00	APX16DWV-16DWV-S-E-A20	2	97.261	7.2911	0.0177	1119
120.00	MX08FRO665-21 w/ Mount Pipe	2	82.410	6.7848	0.0165	955
100.00	SC3-W100ASTX	2	56.516	5.5040	0.0115	965
79.00	1' x 2-1/2"	2	34.748	4.1278	0.0062	962
52.00	GPS-TMG-HR-26NCM	2	14.989	2.6711	0.0033	895

Compression Checks

Pole Design Data

Section No.	Elevation ft	Size	L ft	L _u ft	KI/r	A in ²	P _u K	φP _n K	Ratio $\frac{P_u}{\phi P_n}$
L1	168 - 119.25 (1)	TP34.288x24x0.25	48.75	0.00	0.0	26.297 5	-17.30	1538.40	0.011
L2	119.25 - 78.5 (2)	TP42.387x32.8911x0.281 3	45.00	0.00	0.0	36.598 3	-28.50	2141.00	0.013
L3	78.5 - 38.75 (3)	TP50.213x40.7166x0.375	45.00	0.00	0.0	57.749 8	-40.72	3378.36	0.012
L4	38.75 - 0 (4)	TP57.64x48.1441x0.375	45.00	0.00	0.0	68.159 7	-56.93	3987.34	0.014

Pole Bending Design Data

Section No.	Elevation ft	Size	M _{ux} kip-ft	φM _{rx} kip-ft	Ratio $\frac{M_{ux}}{\phi M_{rx}}$	M _{uy} kip-ft	φM _{ry} kip-ft	Ratio $\frac{M_{uy}}{\phi M_{ry}}$
L1	168 - 119.25 (1)	TP34.288x24x0.25	760.93	1206.64	0.631	0.00	1206.64	0.000
L2	119.25 - 78.5 (2)	TP42.387x32.8911x0.281 3	2012.17	2002.83	1.005	0.00	2002.83	0.000
L3	78.5 - 38.75 (3)	TP50.213x40.7166x0.375	3399.19	3912.78	0.869	0.00	3912.78	0.000
L4	38.75 - 0 (4)	TP57.64x48.1441x0.375	5170.38	5107.74	1.012	0.00	5107.74	0.000

Pole Shear Design Data

Section No.	Elevation ft	Size	Actual V_u K	ϕV_n K	Ratio $\frac{V_u}{\phi V_n}$	Actual T_u kip-ft	ϕT_n kip-ft	Ratio $\frac{T_u}{\phi T_n}$
L1	168 - 119.25 (1)	TP34.288x24x0.25	25.94	461.52	0.056	0.05	1339.48	0.000
L2	119.25 - 78.5 (2)	TP42.387x32.8911x0.281 3	33.84	642.30	0.053	0.73	2306.11	0.000
L3	78.5 - 38.75 (3)	TP50.213x40.7166x0.375	37.64	1013.51	0.037	0.91	4306.46	0.000
L4	38.75 - 0 (4)	TP57.64x48.1441x0.375	40.77	1196.20	0.034	1.01	5998.93	0.000

Pole Interaction Design Data

Section No.	Elevation ft	Ratio P_u ϕP_n	Ratio M_{ux} ϕM_{nx}	Ratio M_{uy} ϕM_{ny}	Ratio V_u ϕV_n	Ratio T_u ϕT_n	Comb. Stress Ratio	Allow. Stress Ratio	Criteria
L1	168 - 119.25 (1)	0.011	0.631	0.000	0.056	0.000	0.645	1.050	4.8.2
L2	119.25 - 78.5 (2)	0.013	1.005	0.000	0.053	0.000	1.021	1.050	4.8.2
L3	78.5 - 38.75 (3)	0.012	0.869	0.000	0.037	0.000	0.882	1.050	4.8.2
L4	38.75 - 0 (4)	0.014	1.012	0.000	0.034	0.000	1.028	1.050	4.8.2

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
L1	168 - 119.25	Pole	TP34.288x24x0.25	1	-17.30	1615.32	61.4	Pass
L2	119.25 - 78.5	Pole	TP42.387x32.8911x0.2813	2	-28.50	2248.05	97.2	Pass
L3	78.5 - 38.75	Pole	TP50.213x40.7166x0.375	3	-40.72	3547.28	84.0	Pass
L4	38.75 - 0	Pole	TP57.64x48.1441x0.375	4	-56.93	4186.71	97.9	Pass
Summary								
Pole (L4)							97.9	Pass
RATING =							97.9	Pass

APPENDIX B
BASE LEVEL DRAWING



(OTHER CONSIDERED EQUIPMENT)
(1) 1-1/4" TO 168 FT LEVEL

(OTHER CONSIDERED EQUIPMENT)
(1) 1/4" TO 140 FT LEVEL
(1) 1/4" TO 143 FT LEVEL

(OTHER CONSIDERED EQUIPMENT)
(1) EU 90-FR TO 100 FT LEVEL
(2) 1/2" TO 135 FT LEVEL
(2) 7/8" TO 140 FT LEVEL
(1) EU 90-FR TO 147 FT LEVEL
(1) 1/2" TO 147 FT LEVEL
(1) EU 90-FR TO 152 FT LEVEL

(OTHER CONSIDERED EQUIPMENT)
(6) 1-5/8" TO 120 FT LEVEL

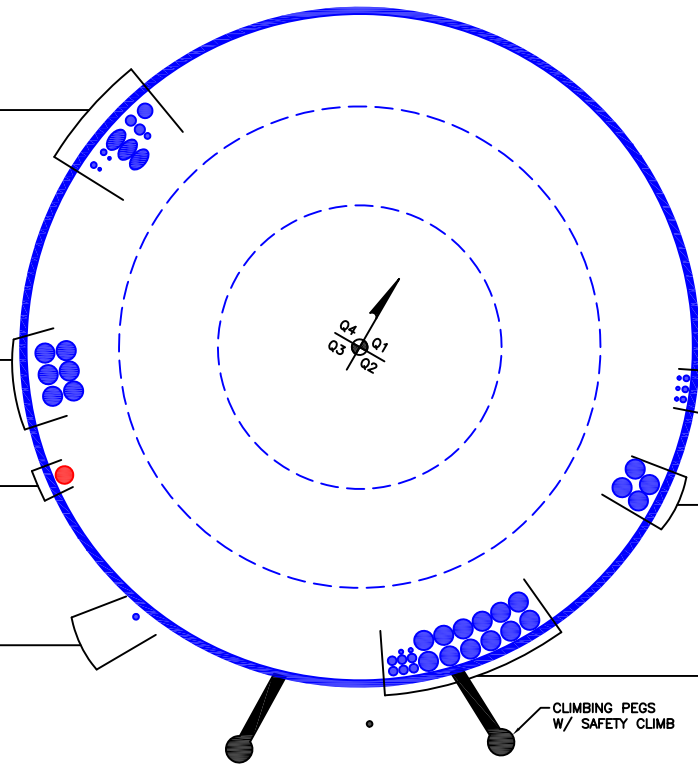
(PROPOSED EQUIPMENT CONFIGURATION)
(1) 1-1/2" TO 120 FT LEVEL

(OTHER CONSIDERED EQUIPMENT)
(1) 1/2" TO 52 FT LEVEL

(OTHER CONSIDERED EQUIPMENT)
(3) 5/16" TO 160 FT LEVEL
(3) 1/2" TO 160 FT LEVEL

(OTHER CONSIDERED EQUIPMENT)
(4) 1-5/8" TO 130 FT LEVEL

(OTHER CONSIDERED EQUIPMENT)
(2) 3/8" TO 168 FT LEVEL
(6) 3/4" TO 168 FT LEVEL
(12) 1-5/8" TO 168 FT LEVEL



CLIMBING PEGS
W/ SAFETY CLIMB

APPENDIX C
ADDITIONAL CALCULATIONS

Monopole Base Plate Connection

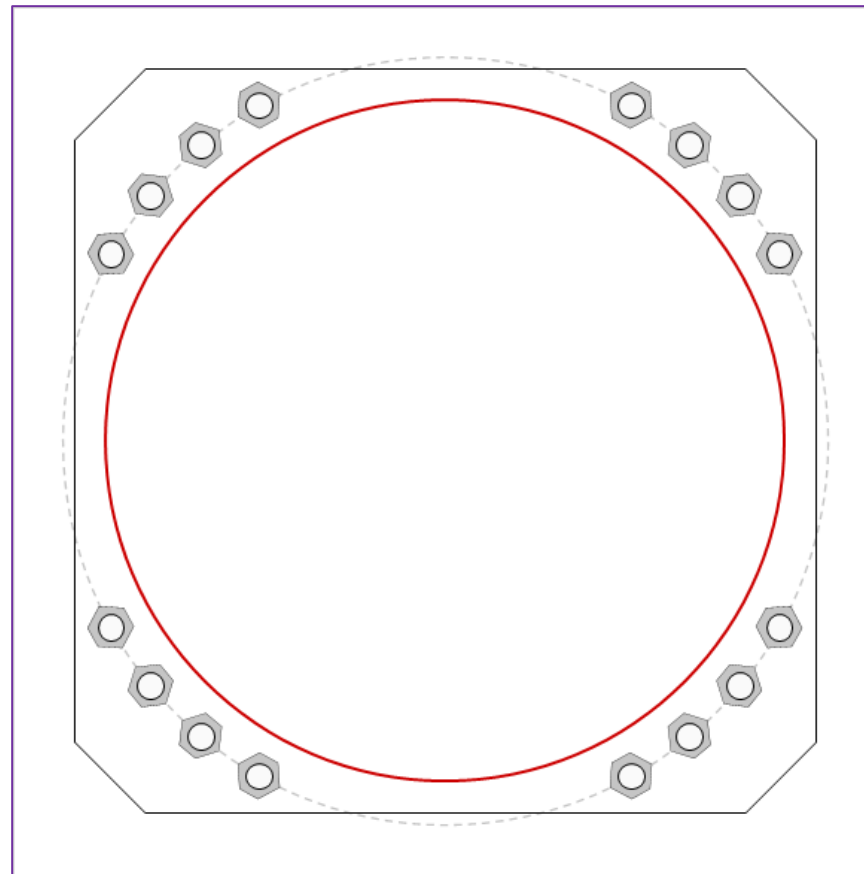


Site Info	
BU #	842875
Site Name	WINDSORDAY HILL
Order #	556624 Rev. 0

Analysis Considerations	
TIA-222 Revision	H
Grout Considered:	No
l_{ar} (in)	1.25

Applied Loads	
Moment (kip-ft)	5170.38
Axial Force (kips)	56.93
Shear Force (kips)	40.77

*TIA-222-H Section 15.5 Applied



Connection Properties	Analysis Results
-----------------------	------------------

Anchor Rod Data
(16) 2-1/4" ϕ bolts (A615-75 N; $F_y=75$ ksi, $F_u=100$ ksi) on 65" BC <i>Anchor Spacing: 6 in</i>
Base Plate Data
63" W x 3.25" Plate (A572-55; $F_y=55$ ksi, $F_u=70$ ksi); Clip: 6 in
Stiffener Data
N/A
Pole Data
57.64" x 0.375" 18-sided pole (A607-65; $F_y=65$ ksi, $F_u=80$ ksi)

Anchor Rod Summary			<i>(units of kips, kip-in)</i>
$P_{u,t} = 234.96$	$\phi P_{n,t} = 243.75$	Stress Rating	
$V_u = 2.55$	$\phi V_n = 149.1$	91.8%	
$M_u = n/a$	$\phi M_n = n/a$	Pass	
Base Plate Summary			
Max Stress (ksi):	34.23	(Flexural)	
Allowable Stress (ksi):	49.5		
Stress Rating:	65.9%	Pass	

Drilled Pier Foundation

BU # :	842875
Site Name:	WINDSORDAY HILL
Order Number:	556624 Rev. 0
TIA-222 Revision:	H
Tower Type:	Monopole



Applied Loads		
	Comp.	Uplift
Moment (kip-ft)	5170.37	
Axial Force (kips)	56.97	
Shear Force (kips)	40.71	

Material Properties		
Concrete Strength, f'c:	3	ksi
Rebar Strength, Fy:	60	ksi
Tie Yield Strength, Fyt:	40	ksi

Pier Design Data		
Depth	24	ft
Ext. Above Grade	0.5	ft
Pier Section 1		
<i>From 0.5' above grade to 24' below grade</i>		
Pier Diameter	8	ft
Rebar Quantity	24	
Rebar Size	11	
Clear Cover to Ties	4	in
Tie Size	5	
Tie Spacing	18	in

Rebar 2, Fy Override (ksi)	Rebar 3, Fy Override (ksi)

[Rebar & Pier Options](#)
[Embedded Pole Inputs](#)
[Belled Pier Inputs](#)

Analysis Results

Soil Lateral Check	Compression	Uplift
D _{v=0} (ft from TOC)	8.73	-
Soil Safety Factor	3.84	-
Max Moment (kip-ft)	5492.45	-
Rating*	33.0%	-

Soil Vertical Check	Compression	Uplift
Skin Friction (kips)	1187.52	-
End Bearing (kips)	3015.93	-
Weight of Concrete (kips)	150.11	-
Total Capacity (kips)	4203.45	-
Axial (kips)	207.08	-
Rating*	4.7%	-

Reinforced Concrete Flexure	Compression	Uplift
Critical Depth (ft from TOC)	8.22	-
Critical Moment (kip-ft)	5490.35	-
Critical Moment Capacity	6993.91	-
Rating*	74.8%	-

Reinforced Concrete Shear	Compression	Uplift
Critical Depth (ft from TOC)	20.09	-
Critical Shear (kip)	677.39	-
Critical Shear Capacity	812.37	-
Rating*	79.4%	-

Structural Foundation Rating*	79.4%
Soil Interaction Rating*	33.0%

*Rating per TIA-222-H Section 15.5

Check Limitation	
Apply TIA-222-H Section 15.5:	<input checked="" type="checkbox"/>
N/A	<input type="checkbox"/>
Additional Longitudinal Rebar	
Input Effective Depths (else Actual):	<input checked="" type="checkbox"/>
Shear Design Options	
Check Shear along Depth of Pier:	<input checked="" type="checkbox"/>
Utilize Shear-Friction Methodology:	<input type="checkbox"/>
Override Critical Depth:	<input type="checkbox"/>

[Go to Soil Calculations](#)

Soil Profile				
Groundwater Depth	5	# of Layers	5	

Layer	Top (ft)	Bottom (ft)	Thickness (ft)	γ _{soil} (pcf)	γ _{concrete} (pcf)	Cohesion (ksf)	Angle of Friction (degrees)	Calculated Ultimate Skin Friction Comp (ksf)	Calculated Ultimate Skin Friction Uplift (ksf)	Ultimate Skin Friction Comp Override (ksf)	Ultimate Skin Friction Uplift Override (ksf)	Ult. Gross Bearing Capacity (ksf)	SPT Blow Count	Soil Type
1	0	5	5	100	150			0.000	0.000	0.00	0.00			Cohesionless
2	5	10	5	60	87.6		35	0.000	0.000	0.00	0.00			Cohesionless
3	10	15	5	55	87.6		33	0.000	0.000	0.00	0.00			Cohesionless
4	15	17	2	80	87.6		40	0.000	0.000	0.00	0.00			Cohesionless
5	17	24	7	95	87.6	20	0	9.000	9.000			80		Cohesive

=====
LPile for Windows, Version 2016-09.010

Analysis of Individual Piles and Drilled Shafts
Subjected to Lateral Loading Using the p-y Method
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Files Used for Analysis

Path to file locations:

\SA Models - Letters\Work Area\DHsu\WIP\LPile\842875\

Name of input data file:

842875_LPile (USCS units).lp9d

Name of output report file:

842875_LPile (USCS units).lp9o

Name of plot output file:

842875_LPile (USCS units).lp9p

Name of runtime message file:

842875_LPile (USCS units).lp9r

Date and Time of Analysis

Date: May 26, 2021

Time: 9:49:32

Problem Title

Project Name:

Job Number:

Client:

Engineer:

Description:

Program Options and Settings

Computational Options:

- Use unfactored loads in computations (conventional analysis)

Engineering Units Used for Data Input and Computations:

- US Customary System Units (pounds, feet, inches)

Analysis Control Options:

- Maximum number of iterations allowed = 500
- Deflection tolerance for convergence = 1.0000E-05 in
- Maximum allowable deflection = 100.0000 in
- Number of pile increments = 100

Loading Type and Number of Cycles of Loading:

- Static loading specified

- Use of p-y modification factors for p-y curves not selected
- No distributed lateral loads are entered
- Loading by lateral soil movements acting on pile not selected
- Input of shear resistance at the pile tip not selected
- Computation of pile-head foundation stiffness matrix not selected
- Push-over analysis of pile not selected
- Buckling analysis of pile not selected

Output Options:

- Output files use decimal points to denote decimal symbols.
- Values of pile-head deflection, bending moment, shear force, and soil reaction are printed for full length of pile.
- Printing Increment (nodal spacing of output points) = 1
- No p-y curves to be computed and reported for user-specified depths
- Print using wide report formats

Pile Structural Properties and Geometry

- Number of pile sections defined = 1
- Total length of pile = 24.500 ft
- Depth of ground surface below top of pile = 0.5000 ft

Pile diameters used for p-y curve computations are defined using 2 points.

p-y curves are computed using pile diameter values interpolated with depth over the length of the pile. A summary of values of pile diameter vs. depth follows.

Point No.	Depth Below Pile Head feet	Pile Diameter inches
1	0.000	96.0000
2	24.500	96.0000

Input Structural Properties for Pile Sections:

Pile Section No. 1:

Section 1 is a round drilled shaft, bored pile, or CIDH pile
 Length of section = 24.500000 ft
 Shaft Diameter = 96.000000 in
 Shear capacity of section = 0.0000 lbs

Ground Slope and Pile Batter Angles

Ground Slope Angle = 0.000 degrees
 = 0.000 radians
 Pile Batter Angle = 0.000 degrees
 = 0.000 radians

Soil and Rock Layering Information

The soil profile is modelled using 5 layers

Layer 1 is soft clay, p-y criteria by Matlock, 1970

Distance from top of pile to top of layer = 0.500000 ft
 Distance from top of pile to bottom of layer = 5.500000 ft

Effective unit weight at top of layer	=	100.000000	pcf
Effective unit weight at bottom of layer	=	100.000000	pcf
Undrained cohesion at top of layer	=	100.000000	psf
Undrained cohesion at bottom of layer	=	100.000000	psf
Epsilon-50 at top of layer	=	0.0000	
Epsilon-50 at bottom of layer	=	0.0000	

NOTE: Default values for Epsilon-50 will be computed for this layer.

Layer 2 is sand, p-y criteria by Reese et al., 1974

Distance from top of pile to top of layer	=	5.500000	ft
Distance from top of pile to bottom of layer	=	10.500000	ft
Effective unit weight at top of layer	=	60.000000	pcf
Effective unit weight at bottom of layer	=	60.000000	pcf
Friction angle at top of layer	=	35.000000	deg.
Friction angle at bottom of layer	=	35.000000	deg.
Subgrade k at top of layer	=	0.0000	pci
Subgrade k at bottom of layer	=	0.0000	pci

NOTE: Default values for subgrade k will be computed for this layer.

Layer 3 is sand, p-y criteria by Reese et al., 1974

Distance from top of pile to top of layer	=	10.500000	ft
Distance from top of pile to bottom of layer	=	15.500000	ft
Effective unit weight at top of layer	=	55.000000	pcf
Effective unit weight at bottom of layer	=	55.000000	pcf
Friction angle at top of layer	=	33.000000	deg.
Friction angle at bottom of layer	=	33.000000	deg.
Subgrade k at top of layer	=	0.0000	pci
Subgrade k at bottom of layer	=	0.0000	pci

NOTE: Default values for subgrade k will be computed for this layer.

Layer 4 is sand, p-y criteria by Reese et al., 1974

Distance from top of pile to top of layer	=	15.500000	ft
Distance from top of pile to bottom of layer	=	17.500000	ft
Effective unit weight at top of layer	=	80.000000	pcf
Effective unit weight at bottom of layer	=	80.000000	pcf

Friction angle at top of layer = 40.000000 deg.
 Friction angle at bottom of layer = 40.000000 deg.
 Subgrade k at top of layer = 0.0000 pci
 Subgrade k at bottom of layer = 0.0000 pci

NOTE: Default values for subgrade k will be computed for this layer.

Layer 5 is stiff clay with water-induced erosion

Distance from top of pile to top of layer = 17.500000 ft
 Distance from top of pile to bottom of layer = 24.500000 ft
 Effective unit weight at top of layer = 95.000000 pcf
 Effective unit weight at bottom of layer = 95.000000 pcf
 Undrained cohesion at top of layer = 8000. psf
 Undrained cohesion at bottom of layer = 8000. psf
 Epsilon-50 at top of layer = 0.0000
 Epsilon-50 at bottom of layer = 0.0000
 Subgrade k at top of layer = 0.0000 pci
 Subgrade k at bottom of layer = 0.0000 pci

NOTE: Default values for Epsilon-50 will be computed for this layer.

NOTE: Default values for subgrade k will be computed for this layer.

(Depth of the lowest soil layer extends 0.000 ft below the pile tip)

 Summary of Input Soil Properties

Layer Layer Num.	Soil Type Name (p-y Curve Type)	Layer Depth ft	Effective Unit Wt. pcf	Undrained Cohesion psf	Angle of Friction deg.	E50 or krm	kpy pci
1	Soft Clay	0.5000 5.5000	100.0000 100.0000	100.0000 100.0000	-- --	default default	-- --
2	Sand (Reese, et al.)	5.5000 10.5000	60.0000 60.0000	-- --	35.0000 35.0000	-- --	default default
3	Sand (Reese, et al.)	10.5000 15.5000	55.0000 55.0000	-- --	33.0000 33.0000	-- --	default default

4	Sand	15.5000	80.0000	--	40.0000	--	default
	(Reese, et al.)	17.5000	80.0000	--	40.0000	--	default
5	Stiff Clay	17.5000	95.0000	8000.	--	default	default
	with Free Water	24.5000	95.0000	8000.	--	default	default

 Static Loading Type

Static loading criteria were used when computing p-y curves for all analyses.

 Pile-head Loading and Pile-head Fixity Conditions

Number of loads specified = 1

Load No.	Load Type	Condition 1	Condition 2	Axial Thrust Force, lbs	Compute Top y vs. Pile Length
1	1	V = 40710. lbs	M = 62044440. in-lbs	56970.	No

V = shear force applied normal to pile axis

M = bending moment applied to pile head

y = lateral deflection normal to pile axis

S = pile slope relative to original pile batter angle

R = rotational stiffness applied to pile head

Values of top y vs. pile lengths can be computed only for load types with specified shear loading (Load Types 1, 2, and 3).

Thrust force is assumed to be acting axially for all pile batter angles.

 Computations of Nominal Moment Capacity and Nonlinear Bending Stiffness

Axial thrust force values were determined from pile-head loading conditions

Number of Pile Sections Analyzed = 1

Pile Section No. 1:

Dimensions and Properties of Drilled Shaft (Bored Pile):

Length of Section	=	24.500000 ft
Shaft Diameter	=	96.000000 in
Concrete Cover Thickness	=	4.625000 in
Number of Reinforcing Bars	=	24 bars
Yield Stress of Reinforcing Bars	=	60000. psi
Modulus of Elasticity of Reinforcing Bars	=	29000000. psi
Gross Area of Shaft	=	7238. sq. in.
Total Area of Reinforcing Steel	=	37.440000 sq. in.
Area Ratio of Steel Reinforcement	=	0.52 percent
Edge-to-Edge Bar Spacing	=	9.729105 in
Maximum Concrete Aggregate Size	=	0.750000 in
Ratio of Bar Spacing to Aggregate Size	=	12.97
Offset of Center of Rebar Cage from Center of Pile	=	0.0000 in

Axial Structural Capacities:

Nom. Axial Structural Capacity = $0.85 F_c A_c + F_y A_s$	=	20608.413 kips
Tensile Load for Cracking of Concrete	=	-2732.748 kips
Nominal Axial Tensile Capacity	=	-2246.400 kips

Reinforcing Bar Dimensions and Positions Used in Computations:

Bar Number	Bar Diam. inches	Bar Area sq. in.	X inches	Y inches
-----	-----	-----	-----	-----
1	1.410000	1.560000	42.670000	0.000000
2	1.410000	1.560000	41.216055	11.043809
3	1.410000	1.560000	36.953304	21.335000
4	1.410000	1.560000	30.172246	30.172246
5	1.410000	1.560000	21.335000	36.953304
6	1.410000	1.560000	11.043809	41.216055
7	1.410000	1.560000	0.000000	42.670000

8	1.410000	1.560000	-11.043809	41.216055
9	1.410000	1.560000	-21.335000	36.953304
10	1.410000	1.560000	-30.172246	30.172246
11	1.410000	1.560000	-36.953304	21.335000
12	1.410000	1.560000	-41.216055	11.043809
13	1.410000	1.560000	-42.670000	0.000000
14	1.410000	1.560000	-41.216055	-11.043809
15	1.410000	1.560000	-36.953304	-21.335000
16	1.410000	1.560000	-30.172246	-30.172246
17	1.410000	1.560000	-21.335000	-36.953304
18	1.410000	1.560000	-11.043809	-41.216055
19	1.410000	1.560000	0.000000	-42.670000
20	1.410000	1.560000	11.043809	-41.216055
21	1.410000	1.560000	21.335000	-36.953304
22	1.410000	1.560000	30.172246	-30.172246
23	1.410000	1.560000	36.953304	-21.335000
24	1.410000	1.560000	41.216055	-11.043809

NOTE: The positions of the above rebars were computed by LPILE

Minimum spacing between any two bars not equal to zero = 9.729 inches
between bars 9 and 10.

Ratio of bar spacing to maximum aggregate size = 12.97

Concrete Properties:

Compressive Strength of Concrete	=	3000. psi
Modulus of Elasticity of Concrete	=	3122019. psi
Modulus of Rupture of Concrete	=	-410.791918 psi
Compression Strain at Peak Stress	=	0.001634
Tensile Strain at Fracture of Concrete	=	-0.0001160
Maximum Coarse Aggregate Size	=	0.750000 in

Number of Axial Thrust Force Values Determined from Pile-head Loadings = 1

Number	Axial Thrust Force
	kips

 1 56.970

Definitions of Run Messages and Notes:

- C = concrete in section has cracked in tension.
- Y = stress in reinforcing steel has reached yield stress.
- T = ACI 318 criteria for tension-controlled section met, tensile strain in reinforcement exceeds 0.005 while simultaneously compressive strain in concrete more than 0.003. See ACI 318, Section 10.3.4.
- Z = depth of tensile zone in concrete section is less than 10 percent of section depth.

Bending Stiffness (EI) = Computed Bending Moment / Curvature.
 Position of neutral axis is measured from edge of compression side of pile.
 Compressive stresses and strains are positive in sign.
 Tensile stresses and strains are negative in sign.

Axial Thrust Force = 56.970 kips

Bending Curvature rad/in.	Bending Moment in-kip	Bending Stiffness kip-in ²	Depth to N Axis in	Max Comp Strain in/in	Max Tens Strain in/in	Max Conc Stress ksi	Max Steel Stress ksi	Run Msg
3.12500E-07	5040.	1.61287E+10	54.6461158	0.00001708	-0.00001292	0.0618498	0.4908804	
6.25000E-07	10052.	1.60825E+10	51.3355049	0.00003208	-0.00002792	0.1156082	0.9217560	
9.37500E-07	15033.	1.60356E+10	50.2320573	0.00004709	-0.00004291	0.1688706	1.3526341	
0.00000125	19986.	1.59884E+10	49.6803859	0.00006210	-0.00005790	0.2216368	1.7835140	
0.00000156	24908.	1.59412E+10	49.3494238	0.00007711	-0.00007289	0.2739070	2.2143958	
0.00000188	29801.	1.58940E+10	49.1288155	0.00009212	-0.00008788	0.3256809	2.6452793	
0.00000219	34665.	1.58467E+10	48.9712665	0.0001071	-0.0001029	0.3769587	3.0761647	
0.00000250	34665.	1.38659E+10	23.7950512	0.00005949	-0.0001805	0.2102688	-5.2000588	C
0.00000281	34665.	1.23252E+10	23.3883687	0.00006578	-0.0002042	0.2319814	-5.8832362	C
0.00000313	34665.	1.10927E+10	23.0533580	0.00007204	-0.0002280	0.2535029	-6.5672894	C
0.00000344	34665.	1.00843E+10	22.7803850	0.00007831	-0.0002517	0.2749541	-7.2512304	C
0.00000375	34665.	9243910851.	22.5536313	0.00008458	-0.0002754	0.2963306	-7.9350926	C
0.00000406	34665.	8532840786.	22.3531398	0.00009081	-0.0002992	0.3175012	-8.6199707	C
0.00000438	34665.	7923352158.	22.1822052	0.00009705	-0.0003230	0.3386026	-9.3047327	C
0.00000469	34665.	7395128681.	22.0349190	0.0001033	-0.0003467	0.3596344	-9.9893782	C

0.00000500	34665.	6932933138.	21.9068497	0.0001095	-0.0003705	0.3805966	-10.6739068	C
0.00000531	34665.	6525113542.	21.7946085	0.0001158	-0.0003942	0.4014891	-11.3583181	C
0.00000563	34665.	6162607234.	21.6955599	0.0001220	-0.0004180	0.4223118	-12.0426118	C
0.00000594	34665.	5838259485.	21.6076230	0.0001283	-0.0004417	0.4430645	-12.7267874	C
0.00000625	34665.	5546346511.	21.5253050	0.0001345	-0.0004655	0.4636663	-13.4115384	C
0.00000656	34665.	5282234772.	21.4511023	0.0001408	-0.0004892	0.4841909	-14.0962371	C
0.00000688	34665.	5042133192.	21.3842656	0.0001470	-0.0005130	0.5046463	-14.7808120	C
0.00000719	34665.	4822910009.	21.3238361	0.0001533	-0.0005367	0.5250326	-15.4652629	C
0.00000750	34665.	4621955426.	21.2690150	0.0001595	-0.0005605	0.5453495	-16.1495892	C
0.00000781	34665.	4437077209.	21.2191313	0.0001658	-0.0005842	0.5655969	-16.8337905	C
0.00000813	34665.	4266420393.	21.1736171	0.0001720	-0.0006080	0.5857747	-17.5178665	C
0.00000844	34665.	4108404823.	21.1319887	0.0001783	-0.0006317	0.6058828	-18.2018165	C
0.00000875	34665.	3961676079.	21.0938317	0.0001846	-0.0006554	0.6259210	-18.8856402	C
0.00000906	34665.	3825066559.	21.0587886	0.0001908	-0.0006792	0.6458893	-19.5693371	C
0.00000938	34665.	3697564340.	21.0265498	0.0001971	-0.0007029	0.6657874	-20.2529067	C
0.00000969	34665.	3578288071.	20.9968454	0.0002034	-0.0007266	0.6856153	-20.9363487	C
0.00001000	34665.	3466466569.	20.9694396	0.0002097	-0.0007503	0.7053728	-21.6196625	C
0.00001031	34665.	3361422128.	20.9441248	0.0002160	-0.0007740	0.7250598	-22.3028476	C
0.00001063	34665.	3262556771.	20.9207181	0.0002223	-0.0007977	0.7446762	-22.9859037	C
0.00001094	34665.	3169340863.	20.8990575	0.0002286	-0.0008214	0.7642218	-23.6688302	C
0.00001125	34665.	3081303617.	20.8789990	0.0002349	-0.0008451	0.7836964	-24.3516266	C
0.00001156	34665.	2998025141.	20.8604139	0.0002412	-0.0008688	0.8031001	-25.0342924	C
0.00001188	34665.	2919129742.	20.8431875	0.0002475	-0.0008925	0.8224325	-25.7168276	C
0.00001219	34665.	2844280262.	20.8272166	0.0002538	-0.0009162	0.8416937	-26.3992309	C
0.00001281	34665.	2705534883.	20.7986791	0.0002665	-0.0009635	0.8800016	-27.7636408	C
0.00001344	34665.	2579696052.	20.7741613	0.0002792	-0.0010108	0.9180225	-29.1275190	C
0.00001406	34665.	2465042894.	20.7531372	0.0002918	-0.0010582	0.9557555	-30.4908612	C
0.00001469	34665.	2360147451.	20.7351702	0.0003045	-0.0011055	0.9931993	-31.8536634	C
0.00001531	35116.	2293313501.	20.7198954	0.0003173	-0.0011527	1.0303529	-33.2159218	C
0.00001594	36468.	2288185511.	20.7070051	0.0003300	-0.0012000	1.0672150	-34.5776313	C
0.00001656	37818.	2283365038.	20.6962382	0.0003428	-0.0012472	1.1037847	-35.9387883	C
0.00001719	39167.	2278818022.	20.6873717	0.0003556	-0.0012944	1.1400606	-37.2993883	C
0.00001781	40515.	2274515177.	20.6802140	0.0003684	-0.0013416	1.1760415	-38.6594270	C
0.00001844	41861.	2270431178.	20.6745996	0.0003812	-0.0013888	1.2117264	-40.0189001	C
0.00001906	43206.	2266544019.	20.6703848	0.0003940	-0.0014360	1.2471139	-41.3778029	C
0.00001969	44550.	2262834480.	20.6674444	0.0004069	-0.0014831	1.2822029	-42.7361309	C
0.00002031	45892.	2259285701.	20.6656686	0.0004198	-0.0015302	1.3169921	-44.0938795	C
0.00002094	47233.	2255882828.	20.6649608	0.0004327	-0.0015773	1.3514802	-45.4510441	C
0.00002156	48572.	2252612724.	20.6652358	0.0004456	-0.0016244	1.3856660	-46.8076197	C
0.00002219	49910.	2249463727.	20.6664180	0.0004585	-0.0016715	1.4195482	-48.1636016	C
0.00002281	51247.	2246425446.	20.6684403	0.0004715	-0.0017185	1.4531255	-49.5189849	C
0.00002344	52582.	2243488593.	20.6712429	0.0004845	-0.0017655	1.4863966	-50.8737646	C

0.00002406	53916.	2240644838.	20.6747722	0.0004975	-0.0018125	1.5193601	-52.2279355	C
0.00002469	55248.	2237886689.	20.6789801	0.0005105	-0.0018595	1.5520147	-53.5814927	C
0.00002531	56579.	2235207391.	20.6838236	0.0005236	-0.0019064	1.5843591	-54.9344308	C
0.00002594	57908.	2232600829.	20.6892637	0.0005366	-0.0019534	1.6163919	-56.2867446	C
0.00002656	59236.	2230061463.	20.6952653	0.0005497	-0.0020003	1.6481116	-57.6384286	C
0.00002719	60562.	2227584253.	20.7017966	0.0005628	-0.0020472	1.6795169	-58.9894774	C
0.00002781	61887.	2225164608.	20.7088288	0.0005760	-0.0020940	1.7106062	-60.0000000	CY
0.00002844	63211.	2222798335.	20.7163358	0.0005891	-0.0021409	1.7413783	-60.0000000	CY
0.00002906	64533.	2220481594.	20.7242936	0.0006023	-0.0021877	1.7718316	-60.0000000	CY
0.00002969	65823.	2217180565.	20.7295679	0.0006154	-0.0022346	1.8017501	-60.0000000	CY
0.00003031	66946.	2208526205.	20.7187082	0.0006280	-0.0022820	1.8301934	-60.0000000	CY
0.00003094	67872.	2193840391.	20.6891337	0.0006401	-0.0023299	1.8569519	-60.0000000	CY
0.00003156	68778.	2179119533.	20.6594376	0.0006521	-0.0023779	1.8833094	-60.0000000	CY
0.00003219	69656.	2164081103.	20.6278648	0.0006640	-0.0024260	1.9091435	-60.0000000	CY
0.00003281	70329.	2143366773.	20.5747046	0.0006751	-0.0024749	1.9330378	-60.0000000	CY
0.00003344	70983.	2122843727.	20.5219328	0.0006862	-0.0025238	1.9565518	-60.0000000	CY
0.00003406	71635.	2103053030.	20.4715177	0.0006973	-0.0025727	1.9798344	-60.0000000	CY
0.00003469	72287.	2083954976.	20.4233344	0.0007084	-0.0026216	2.0028848	-60.0000000	CY
0.00003531	72936.	2065434139.	20.3769584	0.0007196	-0.0026704	2.0256793	-60.0000000	CY
0.00003594	73520.	2045772908.	20.3255523	0.0007304	-0.0027196	2.0477163	-60.0000000	CY
0.00003656	73978.	2023329077.	20.2624631	0.0007408	-0.0027692	2.0684957	-60.0000000	CY
0.00003719	74417.	2001133322.	20.1998059	0.0007512	-0.0028188	2.0889187	-60.0000000	CY
0.00003969	76169.	1919211113.	19.9718934	0.0007926	-0.0030174	2.1685761	-60.0000000	CY
0.00004219	77801.	1844170948.	19.7630526	0.0008338	-0.0032162	2.2439726	-60.0000000	CY
0.00004469	78898.	1765556735.	19.5141058	0.0008720	-0.0034180	2.3108017	-60.0000000	CY
0.00004719	79975.	1694840698.	19.2881912	0.0009102	-0.0036198	2.3742740	-60.0000000	CY
0.00004969	81047.	1631125341.	19.0883097	0.0009485	-0.0038215	2.4349420	-60.0000000	CY
0.00005219	81998.	1571221033.	18.8966716	0.0009862	-0.0040238	2.4916569	-60.0000000	CY
0.00005469	82624.	1510838118.	18.6846144	0.0010218	-0.0042282	2.5424015	-60.0000000	CY
0.00005719	83225.	1455292723.	18.4787889	0.0010568	-0.0044332	2.5895227	-60.0000000	CY
0.00005969	83821.	1404335950.	18.2925705	0.0010918	-0.0046382	2.6342652	-60.0000000	CY
0.00006219	84414.	1357413180.	18.1236323	0.0011271	-0.0048429	2.6765996	-60.0000000	CY
0.00006469	85003.	1314055495.	17.9700087	0.0011624	-0.0050476	2.7164958	-60.0000000	CY
0.00006719	85588.	1273863736.	17.8300279	0.0011980	-0.0052520	2.7539227	-60.0000000	CY
0.00006969	86027.	1234467979.	17.6764444	0.0012318	-0.0054582	2.7870919	-60.0000000	CY
0.00007219	86326.	1195851681.	17.5097974	0.0012640	-0.0056660	2.8163092	-60.0000000	CY
0.00007469	86621.	1159785538.	17.3560036	0.0012963	-0.0058737	2.8434775	-60.0000000	CY
0.00007719	86915.	1126021080.	17.2138385	0.0013287	-0.0060813	2.8685717	-60.0000000	CY
0.00007969	87205.	1094341003.	17.0822319	0.0013612	-0.0062888	2.8915659	-60.0000000	CY
0.00008219	87493.	1064554426.	16.9602450	0.0013939	-0.0064961	2.9124340	-60.0000000	CY
0.00008469	87778.	1036492991.	16.8470506	0.0014267	-0.0067033	2.9311489	-60.0000000	CY
0.00008719	88055.	1009948151.	16.7355674	0.0014591	-0.0069109	2.9474141	-60.0000000	CY

0.00008969	88325.	984808155.	16.6270056	0.0014912	-0.0071188	2.9613678	-60.0000000	CY
0.00009219	88592.	961002885.	16.5258378	0.0015235	-0.0073265	2.9732226	-60.0000000	CY
0.00009469	88857.	938426041.	16.4315061	0.0015559	-0.0075341	2.9829501	-60.0000000	CY
0.00009719	89113.	916917125.	16.3423690	0.0015883	-0.0077417	2.9904981	-60.0000000	CY
0.00009969	89358.	896381793.	16.2577971	0.0016207	-0.0079493	2.9958565	-60.0000000	CY
0.0001022	89504.	875875383.	16.1612011	0.0016515	-0.0081585	2.9989101	-60.0000000	CY
0.0001047	89634.	856201540.	16.0680937	0.0016821	-0.0083679	2.9999968	-60.0000000	CY
0.0001072	89751.	837331112.	15.9790992	0.0017128	-0.0085772	2.9942357	-60.0000000	CY
0.0001097	89867.	819303704.	15.8952896	0.0017435	-0.0087865	2.9974105	-60.0000000	CY
0.0001122	89979.	802039638.	15.8131424	0.0017740	-0.0089960	2.9995008	-60.0000000	CY
0.0001147	90082.	785459313.	15.7287203	0.0018039	-0.0092061	2.9989242	-60.0000000	CY
0.0001172	90183.	769565575.	15.6493019	0.0018339	-0.0094161	2.9934375	-60.0000000	CY
0.0001197	90283.	754324755.	15.5741024	0.0018640	-0.0096260	2.9963751	-60.0000000	CY
0.0001222	90382.	739696560.	15.5028772	0.0018943	-0.0098357	2.9988088	-60.0000000	CY
0.0001247	90479.	725643925.	15.4354021	0.0019246	-0.0100454	2.9999243	-60.0000000	CY
0.0001272	90574.	712125856.	15.3718563	0.0019551	-0.0102549	2.9966144	-60.0000000	CY
0.0001297	90667.	699116890.	15.3117094	0.0019857	-0.0104643	2.9921483	-60.0000000	CY
0.0001322	90759.	686591783.	15.2545663	0.0020165	-0.0106735	2.9957830	-60.0000000	CY
0.0001347	90850.	674523440.	15.2002712	0.0020473	-0.0108827	2.9983056	-60.0000000	CY
0.0001372	90940.	662886738.	15.1486798	0.0020782	-0.0110918	2.9997013	-60.0000000	CY
0.0001522	91452.	600913738.	14.8902145	0.0022661	-0.0123439	2.9993027	60.0000000	CY
0.0001672	91886.	549599102.	14.6605477	0.0024511	-0.0135989	2.9952138	60.0000000	CY
0.0001822	92128.	505679109.	14.4354531	0.0026300	-0.0148600	2.9928441	60.0000000	CY
0.0001972	92260.	467882042.	14.2293018	0.0028058	-0.0161242	2.9961962	60.0000000	CY
0.0002122	92384.	435387843.	14.0605907	0.0029835	-0.0173865	2.9946258	60.0000000	CY
0.0002272	92496.	407135844.	13.9229558	0.0031631	-0.0186469	2.9873236	60.0000000	CYT
0.0002422	92589.	382301355.	13.7787099	0.0033370	-0.0199130	2.9981762	60.0000000	CYT
0.0002572	92656.	360264686.	13.6694280	0.0035156	-0.0211744	2.9937068	60.0000000	CYT
0.0002722	92715.	340630679.	13.5789021	0.0036960	-0.0224340	2.9786680	60.0000000	CYT
0.0002872	92768.	323022775.	13.5042908	0.0038783	-0.0236917	2.9890382	60.0000000	CYT

Summary of Results for Nominal (Unfactored) Moment Capacity for Section 1

Moment values interpolated at maximum compressive strain = 0.003
or maximum developed moment if pile fails at smaller strains.

Load No.	Axial Thrust kips	Nominal Mom. Cap. in-kip	Max. Comp. Strain
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1 56.970 92394.186 0.00300000

Note that the values of moment capacity in the table above are not factored by a strength reduction factor (phi-factor).

In ACI 318, the value of the strength reduction factor depends on whether the transverse reinforcing steel bars are tied hoops (0.65) or spirals (0.70).

The above values should be multiplied by the appropriate strength reduction factor to compute ultimate moment capacity according to ACI 318, Section 9.3.2.2 or the value required by the design standard being followed.

The following table presents factored moment capacities and corresponding bending stiffnesses computed for common resistance factor values used for reinforced concrete sections.

Axial Load No.	Resist. Factor for Moment	Nominal Moment Cap in-kips	Ult. (Fac) Ax. Thrust kips	Ult. (Fac) Moment Cap in-kips	Bend. Stiff. at Ult Mom kip-in^2
1	0.65	92394.	37.030500	60056.	2.2285E+09
1	0.70	92394.	39.879000	64676.	2.2201E+09
1	0.75	92394.	42.727500	69296.	2.1703E+09

 Layering Correction Equivalent Depths of Soil & Rock Layers

Layer No.	Top of Layer Below Pile Head ft	Equivalent Top Depth Below Grnd Surf ft	Same Layer Type As Layer Above	Layer is Rock or is Below Rock Layer	F0 Integral for Layer lbs	F1 Integral for Layer lbs
1	0.5000	0.00	N.A.	No	0.00	22625.
2	5.5000	2.2931	No	No	22625.	320659.
3	10.5000	7.2931	Yes	No	343284.	442124.
4	15.5000	12.2931	Yes	No	785408.	366636.

3.9200	0.9306	6.39E+07	36804.	-0.00742	0.00	2.22E+12	-127.9792	404.3376	0.00
4.1650	0.9089	6.40E+07	36422.	-0.00733	0.00	2.22E+12	-131.9602	426.8600	0.00
4.4100	0.8874	6.41E+07	36028.	-0.00725	0.00	2.22E+12	-135.8580	450.0809	0.00
4.6550	0.8663	6.42E+07	35623.	-0.00716	0.00	2.22E+12	-139.6720	474.0301	0.00
4.9000	0.8453	6.43E+07	35207.	-0.00708	0.00	2.22E+12	-143.4016	498.7387	0.00
5.1450	0.8247	6.44E+07	34780.	-0.00699	0.00	2.22E+12	-147.0463	524.2398	0.00
5.3900	0.8042	6.45E+07	34343.	-0.00691	0.00	2.22E+12	-150.6054	550.5682	0.00
5.6350	0.7840	6.46E+07	30665.	-0.00682	0.00	2.22E+12	-2351.	8817.	0.00
5.8800	0.7641	6.47E+07	23641.	-0.00673	0.00	2.22E+12	-2426.	9335.	0.00
6.1250	0.7444	6.48E+07	16400.	-0.00665	0.00	2.22E+12	-2500.	9872.	0.00
6.3700	0.7250	6.48E+07	8946.	-0.00656	0.00	2.22E+12	-2572.	10428.	0.00
6.6150	0.7059	6.48E+07	1282.	-0.00648	0.00	2.22E+12	-2642.	11003.	0.00
6.8600	0.6869	6.48E+07	-6585.	-0.00639	0.00	2.22E+12	-2710.	11598.	0.00
7.1050	0.6683	6.48E+07	-14649.	-0.00631	0.00	2.22E+12	-2776.	12214.	0.00
7.3500	0.6499	6.48E+07	-22911.	-0.00622	0.00	2.22E+12	-2844.	12865.	0.00
7.5950	0.6317	6.47E+07	-31370.	-0.00613	0.00	2.22E+12	-2911.	13549.	0.00
7.8400	0.6138	6.46E+07	-40026.	-0.00605	0.00	2.22E+12	-2977.	14260.	0.00
8.0850	0.5961	6.44E+07	-48872.	-0.00596	0.00	2.22E+12	-3041.	14997.	0.00
8.3300	0.5787	6.43E+07	-57904.	-0.00588	0.00	2.22E+12	-3103.	15763.	0.00
8.5750	0.5616	6.41E+07	-67114.	-0.00579	0.00	2.22E+12	-3163.	16558.	0.00
8.8200	0.5447	6.39E+07	-76497.	-0.00571	0.00	2.22E+12	-3220.	17383.	0.00
9.0650	0.5280	6.37E+07	-86046.	-0.00562	0.00	2.22E+12	-3276.	18239.	0.00
9.3100	0.5116	6.34E+07	-95755.	-0.00554	0.00	2.22E+12	-3329.	19128.	0.00
9.5550	0.4954	6.31E+07	-105615.	-0.00546	0.00	2.22E+12	-3379.	20052.	0.00
9.8000	0.4795	6.28E+07	-115619.	-0.00537	0.00	2.22E+12	-3427.	21010.	0.00
10.0450	0.4638	6.24E+07	-125760.	-0.00529	0.00	2.22E+12	-3472.	22006.	0.00
10.2900	0.4484	6.20E+07	-136029.	-0.00521	0.00	2.22E+12	-3514.	23041.	0.00
10.5350	0.4332	6.16E+07	-145770.	-0.00513	0.00	2.23E+12	-3113.	21124.	0.00
10.7800	0.4183	6.12E+07	-154958.	-0.00505	0.00	2.23E+12	-3138.	22056.	0.00
11.0250	0.4035	6.07E+07	-164217.	-0.00496	0.00	2.23E+12	-3160.	23025.	0.00
11.2700	0.3891	6.02E+07	-173539.	-0.00489	0.00	2.23E+12	-3181.	24040.	0.00
11.5150	0.3748	5.97E+07	-182923.	-0.00481	0.00	2.23E+12	-3202.	25119.	0.00
11.7600	0.3608	5.91E+07	-192270.	-0.00473	0.00	2.23E+12	-3156.	25719.	0.00
12.0050	0.3470	5.86E+07	-201470.	-0.00465	0.00	2.23E+12	-3102.	26279.	0.00
12.2500	0.3335	5.80E+07	-210504.	-0.00457	0.00	2.23E+12	-3044.	26838.	0.00
12.4950	0.3201	5.73E+07	-219364.	-0.00450	0.00	2.23E+12	-2983.	27398.	0.00
12.7400	0.3070	5.67E+07	-228042.	-0.00442	0.00	2.24E+12	-2920.	27958.	0.00
12.9850	0.2941	5.60E+07	-236527.	-0.00435	0.00	2.24E+12	-2853.	28517.	0.00
13.2300	0.2814	5.53E+07	-244813.	-0.00428	0.00	2.24E+12	-2784.	29077.	0.00
13.4750	0.2690	5.45E+07	-252890.	-0.00420	0.00	2.24E+12	-2711.	29636.	0.00
13.7200	0.2567	5.38E+07	-260752.	-0.00413	0.00	2.24E+12	-2637.	30196.	0.00
13.9650	0.2447	5.30E+07	-268391.	-0.00406	0.00	2.24E+12	-2560.	30756.	0.00

14.2100	0.2328	5.22E+07	-275800.	-0.00399	0.00	2.24E+12	-2480.	31315.	0.00
14.4550	0.2212	5.14E+07	-282971.	-0.00393	0.00	2.25E+12	-2398.	31875.	0.00
14.7000	0.2098	5.06E+07	-289899.	-0.00386	0.00	2.25E+12	-2314.	32435.	0.00
14.9450	0.1985	4.97E+07	-296576.	-0.00379	0.00	2.25E+12	-2228.	32994.	0.00
15.1900	0.1875	4.88E+07	-302996.	-0.00373	0.00	2.25E+12	-2140.	33554.	0.00
15.4350	0.1766	4.79E+07	-309153.	-0.00367	0.00	2.25E+12	-2049.	34113.	0.00
15.6800	0.1659	4.70E+07	-318661.	-0.00360	0.00	2.26E+12	-4419.	78301.	0.00
15.9250	0.1554	4.60E+07	-331338.	-0.00354	0.00	2.26E+12	-4206.	79565.	0.00
16.1700	0.1451	4.50E+07	-343384.	-0.00348	0.00	2.26E+12	-3989.	80828.	0.00
16.4150	0.1349	4.40E+07	-354785.	-0.00343	0.00	2.26E+12	-3767.	82092.	0.00
16.6600	0.1249	4.30E+07	-365530.	-0.00337	0.00	2.27E+12	-3542.	83356.	0.00
16.9050	0.1151	4.19E+07	-375607.	-0.00331	0.00	2.27E+12	-3313.	84620.	0.00
17.1500	0.1054	4.08E+07	-385005.	-0.00326	0.00	2.27E+12	-3080.	85883.	0.00
17.3950	0.09593	3.96E+07	-393713.	-0.00321	0.00	2.28E+12	-2844.	87147.	0.00
17.6400	0.08657	3.84E+07	-418367.	-0.00316	0.00	2.28E+12	-13928.	472995.	0.00
17.8850	0.07736	3.72E+07	-458195.	-0.00311	0.00	2.29E+12	-13166.	500373.	0.00
18.1300	0.06828	3.57E+07	-495732.	-0.00306	0.00	2.29E+12	-12370.	532583.	0.00
18.3750	0.05934	3.42E+07	-530867.	-0.00304	0.00	1.59E+13	-11532.	571289.	0.00
18.6200	0.05042	3.26E+07	-563443.	-0.00303	0.00	1.59E+13	-10630.	619765.	0.00
18.8650	0.04152	3.09E+07	-593248.	-0.00303	0.00	1.59E+13	-9646.	682983.	0.00
19.1100	0.03264	2.91E+07	-619998.	-0.00302	0.00	1.59E+13	-8552.	770372.	0.00
19.3550	0.02377	2.73E+07	-643296.	-0.00301	0.00	1.59E+13	-7297.	902760.	0.00
19.6000	0.01491	2.54E+07	-662520.	-0.00301	0.00	1.59E+13	-5780.	1139732.	0.00
19.8450	0.00607	2.34E+07	-675159.	-0.00301	0.00	1.60E+13	-2818.	1364983.	0.00
20.0900	-0.00276	2.14E+07	-677394.	-0.00300	0.00	1.60E+13	1297.	1382270.	0.00
20.3350	-0.01158	1.94E+07	-668000.	-0.00300	0.00	1.60E+13	5093.	1293438.	0.00
20.5800	-0.02038	1.75E+07	-650578.	-0.00299	0.00	1.60E+13	6758.	974772.	0.00
20.8250	-0.02918	1.56E+07	-628757.	-0.00299	0.00	1.60E+13	8086.	814695.	0.00
21.0700	-0.03797	1.38E+07	-603311.	-0.00299	0.00	1.60E+13	9224.	714209.	0.00
21.3150	-0.04675	1.20E+07	-574707.	-0.00299	0.00	1.61E+13	10235.	643648.	0.00
21.5600	-0.05553	1.04E+07	-543264.	-0.00298	0.00	1.61E+13	11154.	590603.	0.00
21.8050	-0.06430	8839877.	-509223.	-0.00298	0.00	1.61E+13	12003.	548851.	0.00
22.0500	-0.07306	7395135.	-472771.	-0.00298	0.00	1.61E+13	12795.	514878.	0.00
22.2950	-0.08182	6060985.	-434058.	-0.00298	0.00	1.61E+13	13540.	486534.	0.00
22.5400	-0.09058	4843872.	-393212.	-0.00298	0.00	1.61E+13	14246.	462416.	0.00
22.7850	-0.09933	3749899.	-350338.	-0.00298	0.00	1.61E+13	14919.	441569.	0.00
23.0300	-0.1081	2784880.	-305530.	-0.00298	0.00	1.61E+13	15562.	423312.	0.00
23.2750	-0.1168	1954377.	-258869.	-0.00298	0.00	1.61E+13	16180.	407150.	0.00
23.5200	-0.1256	1263730.	-210424.	-0.00298	0.00	1.61E+13	16775.	392710.	0.00
23.7650	-0.1343	718081.	-160260.	-0.00298	0.00	1.61E+13	17350.	379706.	0.00
24.0100	-0.1431	322396.	-108435.	-0.00298	0.00	1.61E+13	17906.	367914.	0.00
24.2550	-0.1518	81482.	-54999.	-0.00298	0.00	1.61E+13	18445.	357157.	0.00

24.5000 -0.1606 0.00 0.00 -0.00298 0.00 1.61E+13 18969. 173646. 0.00

* This analysis computed pile response using nonlinear moment-curvature relationships. Values of total stress due to combined axial and bending stresses are computed only for elastic sections only and do not equal the actual stresses in concrete and steel. Stresses in concrete and steel may be interpolated from the output for nonlinear bending properties relative to the magnitude of bending moment developed in the pile.

Output Summary for Load Case No. 1:

Pile-head deflection = 1.31093471 inches
 Computed slope at pile head = -0.00874923 radians
 Maximum bending moment = 64844673. inch-lbs
 Maximum shear force = -677394. lbs
 Depth of maximum bending moment = 6.61500000 feet below pile head
 Depth of maximum shear force = 20.09000000 feet below pile head
 Number of iterations = 63
 Number of zero deflection points = 1

 Summary of Pile-head Responses for Conventional Analyses

Definitions of Pile-head Loading Conditions:

Load Type 1: Load 1 = Shear, V, lbs, and Load 2 = Moment, M, in-lbs
 Load Type 2: Load 1 = Shear, V, lbs, and Load 2 = Slope, S, radians
 Load Type 3: Load 1 = Shear, V, lbs, and Load 2 = Rot. Stiffness, R, in-lbs/rad.
 Load Type 4: Load 1 = Top Deflection, y, inches, and Load 2 = Moment, M, in-lbs
 Load Type 5: Load 1 = Top Deflection, y, inches, and Load 2 = Slope, S, radians

Load Case No.	Load Type 1	Pile-head Load 1	Load Type 2	Pile-head Load 2	Axial Loading lbs	Pile-head Deflection inches	Pile-head Rotation radians	Max Shear in Pile lbs	Max Moment in Pile in-lbs
1	V, lb	40710.	M, in-lb	6.20E+07	56970.	1.3109	-0.00875	-677394.	6.48E+07

Maximum pile-head deflection = 1.3109347081 inches

Maximum pile-head rotation = -0.0087492311 radians = -0.501294 deg.

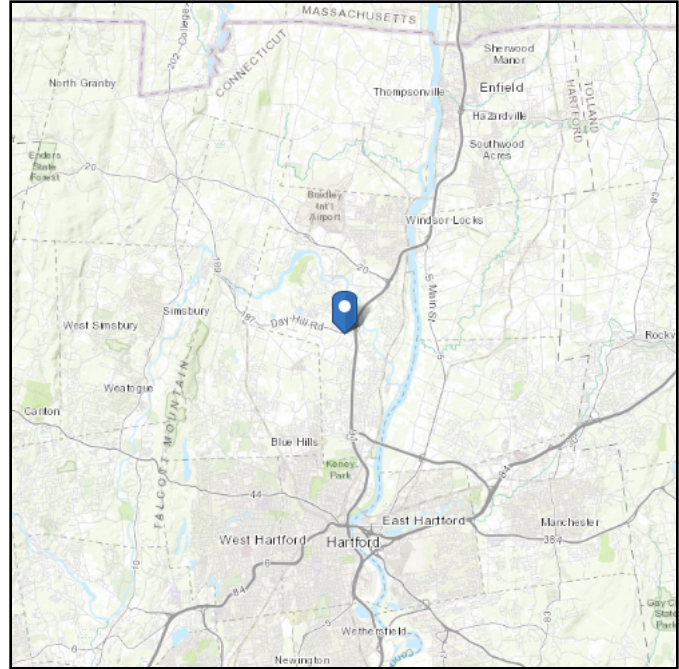
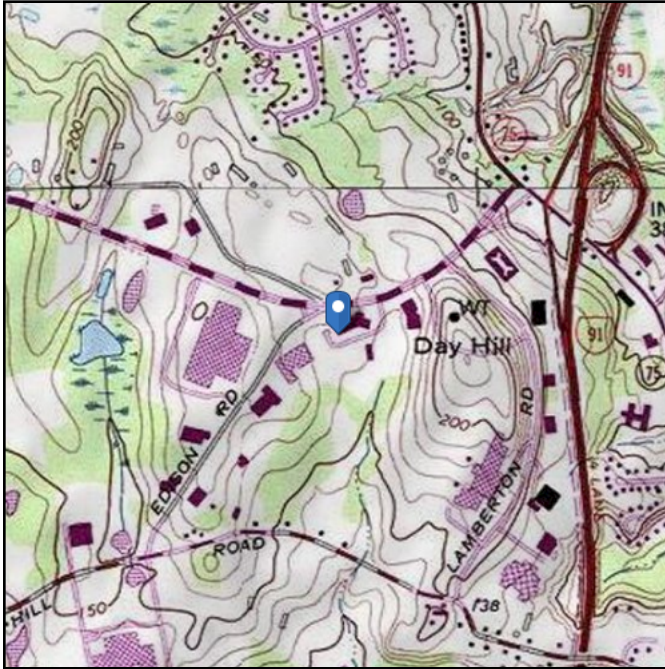
The analysis ended normally.

ASCE 7 Hazards Report

Address:
No Address at This
Location

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

Elevation: 166.35 ft (NAVD 88)
Latitude: 41.871139
Longitude: -72.671111

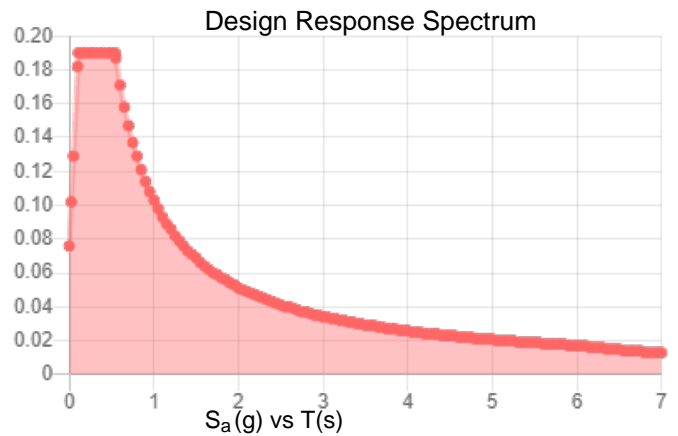
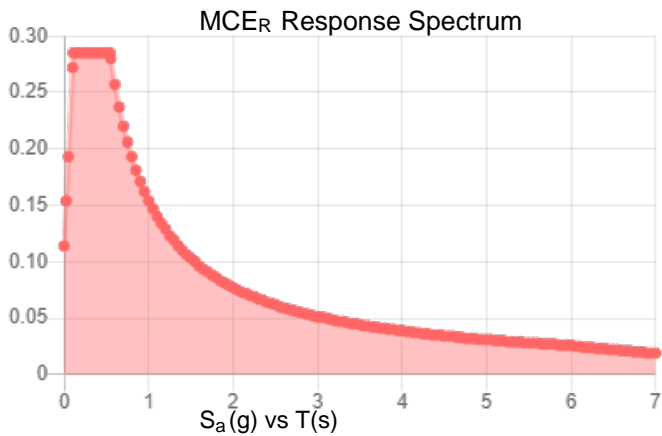


Site Soil Class: D - Stiff Soil

Results:

S_s :	0.179	S_{DS} :	0.19
S_1 :	0.064	S_{D1} :	0.103
F_a :	1.6	T_L :	6
F_v :	2.4	PGA :	0.089
S_{MS} :	0.285	PGA _M :	0.142
S_{M1} :	0.154	F _{PGA} :	1.6
		I_e :	1

Seismic Design Category B



Data Accessed:

Wed Nov 04 2020

Date Source:

USGS Seismic Design Maps based on ASCE/SEI 7-10, incorporating Supplement 1 and errata of March 31, 2013, and ASCE/SEI 7-10 Table 1.5-2. Additional data for site-specific ground motion procedures in accordance with ASCE/SEI 7-10 Ch. 21 are available from USGS.

Ice

Results:

Ice Thickness: 1.00 in.

Concurrent Temperature: 5 F

Gust Speed: 50 mph

Data Source: Standard ASCE/SEI 7-10, Figs. 10-2 through 10-8

Date Accessed: Wed Nov 04 2020

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

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

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