

Date: **January 25, 2022**



Morrison Hershfield
1455 Lincoln Parkway, Suite 500
Atlanta, GA 30346
(770) 379-8500

Structural Analysis Report

7 7

7 Co-Locate

Site Number: 228811
Site Name: Crown Nassau

7 7

BU Number: 817532
Site Name: Lake City FL
JDE Job Number: 666400
Work Order Number: 2069307
Order Number: 567465 Rev. 3

7 7

Morrison Hershfield Project Number: CN2-664R3/ 2200039

7

154 SW Nassau Street, Lake City, Columbia County, FL 32025
Latitude 7 7 , Longitude 7 7
165 Foot - Self Support Tower

Morrison Hershfield 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:

LC5: Proposed Equipment Configuration

Sufficient Capacity

This analysis utilizes an ultimate 3-second gust wind speed of 118 mph as required by the 2020 Florida Building Code 7th Edition. Applicable Standard references and design criteria are listed in Section 2 - Analysis Criteria.

Respectfully submitted by:

G. Lance Cooke, P.E. (FL License No. 68787)
Senior Engineer

Certificate of Authorization # 8508



Digitally signed by
G. Lance Cooke
Date: 2022.01.26
09:43:05-08'00'

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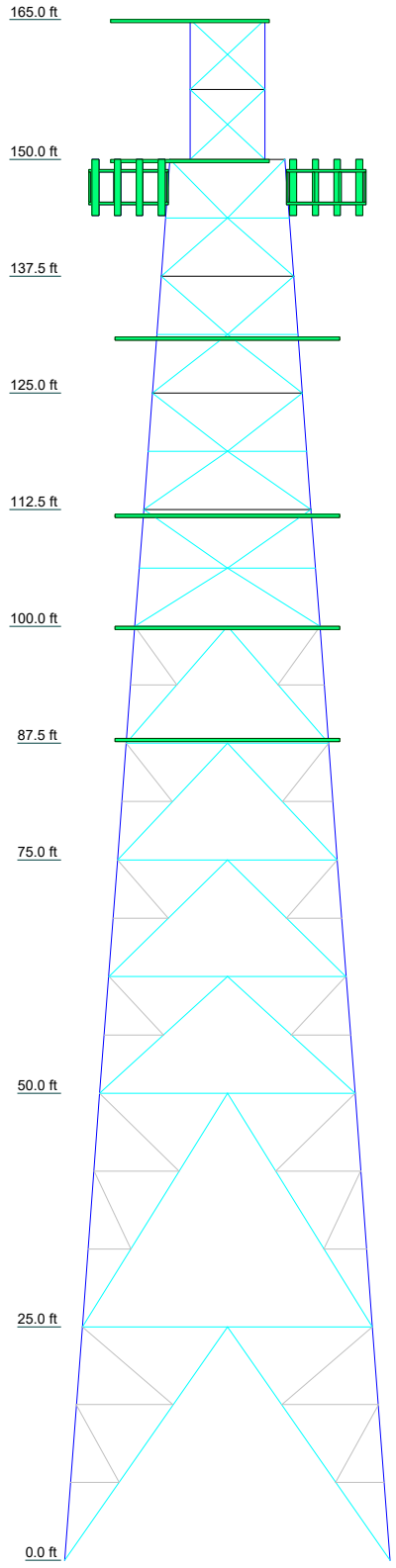
Additional Calculations

$$\begin{array}{ccccc} & & N & 9Ng & \\ N & N & N & & \\ & & & & N \end{array}$$

Section No.	Elevation (ft)	Component Type	Size	Critical Element	P (K)	SF*P_allow (K)	% Capacity	Pass / Fail
T5	100 - 87.5	Horizontal	2L2 1/2x2 1/2x1/4x3/8	185	-4.97	31.71	15.7	Pass
T6	87.5 - 75	Horizontal	2L2 1/2x2 1/2x1/4x3/8	222	-6.10	26.33	23.2	Pass
T7	75 – 50	Horizontal	2L2 1/2x2 1/2x1/4x3/8	259	-6.75	38.43	17.6	Pass
T8	50 – 25	Horizontal	2L2 1/2x2 1/2x1/4x3/8	329	-7.34	59.54	12.3	Pass
T9	25 – 0	Horizontal	2L3x3x5/16x3/8	382	-8.64	93.09	9.3	Pass
T1	150 - 137.5	Top Girt	2L3 1/2x3x1/4x3/8	36	0.23	92.23	0.2	Pass
T2	137.5 - 125	Top Girt	2L3 1/2x3x1/4x3/8	74	2.26	92.23	2.5	Pass
T3	125 - 112.5	Top Girt	2L3x2 1/2x1/4x3/8	112	2.13	75.11	2.8	Pass
T4	112.5 - 100	Top Girt	2L3x2 1/2x1/4x3/8	150	2.06	75.11	2.7	Pass
T5	100 - 87.5	Redund Horiz 1 Bracing	L2x2x1/4	187	-0.81	13.62	5.9	Pass
T6	87.5 - 75	Redund Horiz 1 Bracing	L2x2x1/4	224	-0.96	11.26	8.5	Pass
T7	75 – 50	Redund Horiz 1 Bracing	L2 1/2x2 1/2x3/16	261	-1.28	12.42	10.3	Pass
T8	50 – 25	Redund Horiz 1 Bracing	2L3 1/2x3 1/2x1/4x3/8	331	-1.45	101.44	1.4	Pass
T9	25 – 0	Redund Horiz 1 Bracing	2L2 1/2x3x1/4x3/8	384	-1.75	77.78	2.3	Pass
T8	50 – 25	Redund Horiz 2 Bracing	2L3 1/2x3 1/2x1/4x3/8	332	-1.45	90.48	1.6	Pass
T9	25 – 0	Redund Horiz 2 Bracing	2L2 1/2x2x3/16x3/8	385	-1.75	19.37	9.0	Pass
T5	100 - 87.5	Redund Diag 1 Bracing	L2 1/2x2x1/4	188	-0.63	26.74	2.4	Pass
T6	87.5 - 75	Redund Diag 1 Bracing	L2 1/2x2x1/4	225	-0.71	25.58	2.8	Pass
T7	75 – 50	Redund Diag 1 Bracing	L2 1/2x2 1/2x1/4	295	-0.90	31.76	2.8	Pass
T8	50 – 25	Redund Diag 1 Bracing	L3x3x1/8	333	-1.47	13.59	10.8	Pass
T9	25 – 0	Redund Diag 1 Bracing	L3 1/2x3 1/2x1/4	386	-1.61	52.20	3.1	Pass
T8	50 – 25	Redund Diag 2 Bracing	L3 1/2x3 1/2x1/4	334	-0.95	44.29	2.1	Pass
T9	25 – 0	Redund Diag 2 Bracing	L2 1/2x2 1/2x3/16	425	-1.09	12.06	9.0	Pass
T1	150 - 137.5	Inner Bracing	L3x3x1/4	58	-0.00	6.06	0.3	Pass
T2	137.5 - 125	Inner Bracing	2L2 1/2x2x3/16x3/8	96	-0.00	9.37	0.3	Pass
T3	125 - 112.5	Inner Bracing	2L2 1/2x2 1/2x3/16x3/8	134	-0.00	7.93	0.3	Pass
T4	112.5 - 100	Inner Bracing	2L2 1/2x2 1/2x3/16x3/8	172	-0.01	6.42	0.4	Pass
T5	100 - 87.5	Inner Bracing	2L2 1/2x2 1/2x3/16x3/8	217	-0.01	23.32	0.4	Pass
T6	87.5 - 75	Inner Bracing	2L2 1/2x2 1/2x3/16x3/8	254	-0.01	19.45	0.4	Pass
T7	75 – 50	Inner Bracing	2L2 1/2x2 1/2x3/16x3/8	291	-0.01	14.13	0.5	Pass
T8	50 – 25	Inner Bracing	L2 1/2x2 1/2x1/4	376	-0.05	6.45	0.7	Pass
T9	25 – 0	Inner Bracing	L2 1/2x2 1/2x1/4	429	-0.06	4.98	1.2	Pass
							Summary	
						Latticed Pole Leg (L1)	3.7	Pass
						Latticed Pole Diagonal	10.9	Pass

APPENDIX A
TNXTOWER OUTPUT

Section	T8	T7	T6	T5	T4	T3	T2	T1	L1
Legs	L8x8x7/8	L8x8x3/4	L6x6x1	2L3x3 1/2x5/16x3/8	2L2 1/2x2 1/2x1/4x3/8	2L2 1/2x2 1/4x3/8	2L3 1/2x3x1/4x3/8	2L2 1/2x2 1/4x3/8	L6x6x3/4
Leg Grade	2L3 1/2x5x1/4x3/8	2L3 1/2x3 1/2x1/4x3/8	2L2 1/2x3 1/2x5/16x3/8	2L2 1/2x3 1/2x5/16x3/8	2L2 1/2x3 1/2x5/16x3/8	2L2 1/2x2 1/4x3/8	2L3 1/2x3x1/4x3/8	2L2 1/2x2 1/4x3/8	L2 1/2x2x1/4
Diagonals	2L3 1/2x5x1/4x3/8	2L3 1/2x3 1/2x1/4x3/8	2L2 1/2x3 1/2x5/16x3/8	2L2 1/2x3 1/2x5/16x3/8	2L2 1/2x3 1/2x5/16x3/8	2L2 1/2x2 1/4x3/8	2L3 1/2x3x1/4x3/8	2L2 1/2x2 1/4x3/8	L2 1/2x2x1/4
Diagonal Grade	2L3 1/2x5x1/4x3/8	2L3 1/2x3 1/2x1/4x3/8	2L2 1/2x3 1/2x5/16x3/8	2L2 1/2x3 1/2x5/16x3/8	2L2 1/2x3 1/2x5/16x3/8	2L2 1/2x2 1/4x3/8	2L3 1/2x3x1/4x3/8	2L2 1/2x2 1/4x3/8	L2 1/2x2x1/4
Top Girts	2L3 1/2x5x1/4x3/8	2L3 1/2x3 1/2x1/4x3/8	2L2 1/2x3 1/2x5/16x3/8	2L2 1/2x3 1/2x5/16x3/8	2L2 1/2x3 1/2x5/16x3/8	2L2 1/2x2 1/4x3/8	2L3 1/2x3x1/4x3/8	2L2 1/2x2 1/4x3/8	L2 1/2x2x1/4
Mid Girts	2L3 1/2x5x1/4x3/8	2L3 1/2x3 1/2x1/4x3/8	2L2 1/2x3 1/2x5/16x3/8	2L2 1/2x3 1/2x5/16x3/8	2L2 1/2x3 1/2x5/16x3/8	2L2 1/2x2 1/4x3/8	2L3 1/2x3x1/4x3/8	2L2 1/2x2 1/4x3/8	L2 1/2x2x1/4
Horizontal	2L3 1/2x5x1/4x3/8	2L3 1/2x3 1/2x1/4x3/8	2L2 1/2x3 1/2x5/16x3/8	2L2 1/2x3 1/2x5/16x3/8	2L2 1/2x3 1/2x5/16x3/8	2L2 1/2x2 1/4x3/8	2L3 1/2x3x1/4x3/8	2L2 1/2x2 1/4x3/8	L2 1/2x2x1/4
Red. Horizontals	2L3 1/2x5x1/4x3/8	2L3 1/2x3 1/2x1/4x3/8	2L2 1/2x3 1/2x5/16x3/8	2L2 1/2x3 1/2x5/16x3/8	2L2 1/2x3 1/2x5/16x3/8	2L2 1/2x2 1/4x3/8	2L3 1/2x3x1/4x3/8	2L2 1/2x2 1/4x3/8	L2 1/2x2x1/4
Red. Diagonals	2L3 1/2x5x1/4x3/8	2L3 1/2x3 1/2x1/4x3/8	2L2 1/2x3 1/2x5/16x3/8	2L2 1/2x3 1/2x5/16x3/8	2L2 1/2x3 1/2x5/16x3/8	2L2 1/2x2 1/4x3/8	2L3 1/2x3x1/4x3/8	2L2 1/2x2 1/4x3/8	L2 1/2x2x1/4
Inner Bracing	2L3 1/2x5x1/4x3/8	2L3 1/2x3 1/2x1/4x3/8	2L2 1/2x3 1/2x5/16x3/8	2L2 1/2x3 1/2x5/16x3/8	2L2 1/2x3 1/2x5/16x3/8	2L2 1/2x2 1/4x3/8	2L3 1/2x3x1/4x3/8	2L2 1/2x2 1/4x3/8	L2 1/2x2x1/4
Face Width (ft)	34.75	27.25	23.5	21.625	19.75	17.875	16	14.125	12.25
# Panels @ (ft)	2 @ 25	2 @ 25	4 @ 12.5	5.0	4.4	3.9	3.3	2.8	2.8
Weight (K)	61.9	11.8	10.2	11.1	4.8	4.7	4.4	3.3	2.8

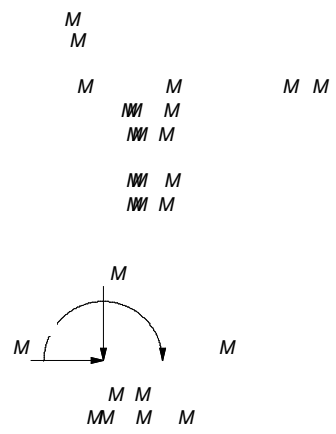


MARK	SIZE	MARK	SIZE
A	2L2 1/2x2x3/16x3/8		

GRADE	Fy	Fu	GRADE	Fy	Fu
A36	36 ksi	58 ksi			

TOWER DESIGN NOTES

1. Tower is located in Columbia County, Florida.
2. Tower designed for Exposure B to the TIA-222-H Standard.
3. Tower designed for a 118 mph basic wind in accordance with the TIA-222-H Standard.
4. Deflections are based upon a 60 mph wind.
5. Tower Risk Category II.
6. Topographic Category 1 with Crest Height of 0.00 ft
7. TOWER RATING: 33.9%





1455 Lincoln Parkway, Suite 500
Atlanta, GA 30346
Phone: (770) 379-8500
FAX: (770) 379-8500

Job:

Project:

Client: Crown Castle USA	Drawn by: AL	App'd:
Code: TIA-222-H	Date: 01/25/22	Scale: NTS
Path:		Dwg No. E-1

ø ND L 9 N D g D D
V V % I N N E L W D
N H



4 Sided Latticed Pole Section Geometry

	N	N	N	x	N	N	N	NN	NN	N
	N	N	N	x	N			NN	NN	N
			N				N	N		N
			A				A			A
L1		165.00-150.00					8.00	1		15.00

4 Sided Latticed Pole Section Geometry - 4

N	N	N	N	x	N	:	N	°	N	°	N	N	:	N	N
N	N	N	N		N		N	N	N	N	N	N		N	N
		N	N		N			q	N			N		N	N
		Λ	Λ		Λ			Λ				Λ		Λ	Λ
L1	165.00-150.00			7.50		X Brace		No		Yes		0.0000		0.0000	

4 Sided Latticed Pole Section Geometry - 4

L1 165.00-150.00	Single Angle	L6x6x3/4	A36 (36 ksi)	Single Angle	L2 1/2x2x1/4	A36 (36 ksi)

4 Sided Latticed Pole Section Geometry - 4

L1 165.00-150.00	Single Angle	L3x3x1/4	A36 (36 ksi)

tnxTower Report - version 8.1.1.0

No	N					x		N		N		N		N		N	
	N		N		N		N		N		N		N		N		
	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	
inΛ																	
T1	150.00-137.50	Sleeve	SS	0.7500	0	0.7500	2*	0.7500	2	0.0000	0	0.6250	0	0.7500	2*	0.6250	0
T2	137.50-125.00	Sleeve	SS	0.7500	0	0.7500	2*	0.7500	2	0.0000	0	0.6250	0	0.7500	2*	0.6250	0
T3	125.00-112.50	Sleeve	SS	0.8750	16	0.7500	2*	0.7500	2	0.0000	0	0.6250	0	0.7500	2*	0.6250	0
T4	112.50-100.00	Sleeve	SS	0.0000	0	0.7500	2*	0.7500	2	0.6250	0	0.6250	0	0.7500	2*	0.6250	0
T5	100.00-87.50	Sleeve	SS	0.8750	16	0.7500	2*	0.7500	0	0.0000	0	0.6250	0	0.7500	2*	0.6250	0
T6	87.50-75.00	Sleeve	SS	0.0000	0	0.7500	2*	0.7500	0	0.6250	0	0.6250	0	0.7500	2*	0.6250	0
T7	75.00-50.00	Sleeve	SS	0.8750	18	0.7500	2*	0.7500	0	0.6250	0	0.6250	0	0.7500	2*	0.6250	0
T8	50.00-25.00	Sleeve	SS	0.8750	20	0.7500	3*	0.7500	0	0.6250	0	0.6250	0	0.7500	2*	0.6250	0
T9	25.00-0.00	Sleeve	SS	0.8750	24	0.7500	3*	0.7500	0	0.6250	0	0.6250	0	0.7500	2*	0.6250	0

Feed Line/Linear Appurtenances - Entered As Round Or Flat												
x N # I Y I q # N V N I # N N 3N 3N V N x N N N N												
1" Rigid Conduit	A	No	No	Ar (CaAa)	165.00 - 5.00	0.0000	-0.45	1	1	1.2500	1.2500	0.700
1/4" Line	A	No	No	Ar (CaAa)	165.00 - 5.00	- 4.5000	-0.44	1	1	0.3500	0.3500	0.060
** Transmission Cage **	A	No	No	Af (CaAa)	30.00 - 5.00	0.0000	0	2	2	48.0000	12.0000	10.000
** Transmission Cage **	C	No	No	Af (CaAa)	30.00 - 5.00	0.0000	0	4	4	48.0000	12.0000	10.000

ø NDL 9NDgDD
VV% N N'E LWD
NE

N	N	#	N	Y_N	$Y_{\#N}$	$V_Y Y_{YN}$	$V_Y Y_{YN}$	N
Λ	Λ			N	N	% $\#$	% $\#$	N
T7	75.00-50.00	C	0.000	0.000	8.333	0.000	0.14	
		D	0.000	0.000	8.333	0.000	0.14	
		A	0.000	0.000	117.575	0.000	0.80	
		B	0.000	0.000	12.500	0.000	0.12	
T8	50.00-25.00	C	0.000	0.000	12.500	0.000	0.12	
		D	0.000	0.000	12.500	0.000	0.12	
		A	0.000	0.000	137.573	0.000	0.90	
		B	0.000	0.000	12.500	0.000	0.12	
T9	25.00-0.00	C	0.000	0.000	52.496	0.000	0.32	
		D	0.000	0.000	12.500	0.000	0.12	
		A	0.000	0.000	172.510	0.000	1.05	
		B	0.000	0.000	12.500	0.000	0.12	
		C	0.000	0.000	172.486	0.000	0.92	
		D	0.000	0.000	12.500	0.000	0.12	

Feed Line Center of Pressure

N	N	q	N/N	V	V	V	V
L1		165.00-150.00		-0.8434	0.7639	-0.8434	0.7639
T1		150.00-137.50		-6.4212	12.3716	-6.4212	12.3716
T2		137.50-125.00		-7.6114	14.7652	-7.6114	14.7652
T3		125.00-112.50		-8.9004	17.1295	-8.9004	17.1295
T4		112.50-100.00		-9.3525	18.0925	-9.3525	18.0925
T5		100.00-87.50		-9.9476	19.2908	-9.9476	19.2908
T6		87.50-75.00		-9.8247	19.2503	-9.8247	19.2503
T7		75.00-50.00		-10.8943	21.3411	-10.8943	21.3411
T8		50.00-25.00		-10.6664	19.2610	-10.6664	19.2610
T9		25.00-0.00		-8.9904	12.9317	-8.9904	12.9317

Shielding Factor Ka

N	#	N	N	x	#	N	N	N	N
		N	c			N	c	N	%
L1		1		1" Rigid Conduit	150.00	-	165.00	0.6000	0.6000
L1		2		1/4" Line	150.00	-	165.00	0.6000	0.6000
L1		8		Climbing Ladder	150.00	-	165.00	0.6000	0.6000
T1		1		1" Rigid Conduit	137.50	-	150.00	0.6000	0.6000
T1		2		1/4" Line	137.50	-	150.00	0.6000	0.6000
T1		8		Climbing Ladder	137.50	-	150.00	0.6000	0.6000
T1		21		LDF7-50A(1-5/8)	137.50	-	147.00	0.6000	0.6000
T1		22		HB114-13U6-S12F18(1-1/4)	137.50	-	147.00	0.6000	0.6000
T1		25		MLE HYBRID 9POWER/18FIBER RL 2(1-5/8)	137.50	-	147.00	0.6000	0.6000
T1		26		LDF7-50A(1-5/8)	137.50	-	147.00	0.6000	0.6000
T2		1		1" Rigid Conduit	125.00	-	137.50	0.6000	0.6000
T2		2		1/4" Line	125.00	-	137.50	0.6000	0.6000
T2		8		Climbing Ladder	125.00	-	137.50	0.6000	0.6000
T2		21		LDF7-50A(1-5/8)	125.00	-	137.50	0.6000	0.6000
T2		22		HB114-13U6-S12F18(1-1/4)	125.00	-	137.50	0.6000	0.6000
T2		25		MLE HYBRID 9POWER/18FIBER RL 2(1-5/8)	125.00	-	137.50	0.6000	0.6000
T2		26		LDF7-50A(1-5/8)	125.00	-	137.50	0.6000	0.6000
T3		1		1" Rigid Conduit	112.50	-	125.00	0.6000	0.6000
T3		2		1/4" Line	112.50	-	125.00	0.6000	0.6000
T3		8		Climbing Ladder	112.50	-	125.00	0.6000	0.6000
T3		21		LDF7-50A(1-5/8)	112.50	-	125.00	0.6000	0.6000
T3		22		HB114-13U6-S12F18(1-1/4)	112.50	-	125.00	0.6000	0.6000
T3		25		MLE HYBRID 9POWER/18FIBER RL 2(1-5/8)	112.50	-	125.00	0.6000	0.6000
T3		26		LDF7-50A(1-5/8)	112.50	-	125.00	0.6000	0.6000
T4		1		1" Rigid Conduit	100.00	-	112.50	0.6000	0.6000
T4		2		1/4" Line	100.00	-	112.50	0.6000	0.6000
T4		8		Climbing Ladder	100.00	-	112.50	0.6000	0.6000
T4		21		LDF7-50A(1-5/8)	100.00	-	112.50	0.6000	0.6000

N
E/LN# N N N N N N N
N N N DQ(h WDDgggVHVN NL('h(LGN NNN

ø ND L9DgDD
VV% N N E LVD
NE

N	#	N	N	x	#	N	N	N	N
		N	N			N	N	N	N
T4		22		HB114-13U6-S12F18(1-1/4)	100.00	-	112.50	0.6000	0.6000
T4		25		MLE HYBRID 9POWER/18FIBER RL 2(1-5/8)	100.00	-	112.50	0.6000	0.6000
T4		26		LDF7-50A(1-5/8)	100.00	-	112.50	0.6000	0.6000
T5		1		1" Rigid Conduit	87.50	-	100.00	0.6000	0.6000
T5		2		1/4" Line	87.50	-	100.00	0.6000	0.6000
T5		8		Climbing Ladder	87.50	-	100.00	0.6000	0.6000
T5		21		LDF7-50A(1-5/8)	87.50	-	100.00	0.6000	0.6000
T5		22		HB114-13U6-S12F18(1-1/4)	87.50	-	100.00	0.6000	0.6000
T5		25		MLE HYBRID 9POWER/18FIBER RL 2(1-5/8)	87.50	-	100.00	0.6000	0.6000
T5		26		LDF7-50A(1-5/8)	87.50	-	100.00	0.6000	0.6000
T6		1		1" Rigid Conduit	75.00	-	87.50	0.6000	0.6000
T6		2		1/4" Line	75.00	-	87.50	0.6000	0.6000
T6		8		Climbing Ladder	75.00	-	87.50	0.6000	0.6000
T6		15		4x4x7/16 leg reinforcement	75.00	-	87.50	0.6000	0.6000
T6		16		4x4x7/16 leg reinforcement	75.00	-	87.50	0.6000	0.6000
T6		17		4x4x7/16 leg reinforcement	75.00	-	87.50	0.6000	0.6000
T6		18		4x4x7/16 leg reinforcement	75.00	-	87.50	0.6000	0.6000
T6		21		LDF7-50A(1-5/8)	75.00	-	87.50	0.6000	0.6000
T6		22		HB114-13U6-S12F18(1-1/4)	75.00	-	87.50	0.6000	0.6000
T6		25		MLE HYBRID 9POWER/18FIBER RL 2(1-5/8)	75.00	-	87.50	0.6000	0.6000
T6		26		LDF7-50A(1-5/8)	75.00	-	87.50	0.6000	0.6000
T7		1		1" Rigid Conduit	50.00	-	75.00	0.6000	0.6000
T7		2		1/4" Line	50.00	-	75.00	0.6000	0.6000
T7		8		Climbing Ladder	50.00	-	75.00	0.6000	0.6000
T7		10		3x3x1/4 leg reinforcement	50.00	-	75.00	0.6000	0.6000
T7		11		3x3x1/4 leg reinforcement	50.00	-	75.00	0.6000	0.6000
T7		12		3x3x1/4 leg reinforcement	50.00	-	75.00	0.6000	0.6000
T7		13		3x3x1/4 leg reinforcement	50.00	-	75.00	0.6000	0.6000
T7		21		LDF7-50A(1-5/8)	50.00	-	75.00	0.6000	0.6000
T7		22		HB114-13U6-S12F18(1-1/4)	50.00	-	75.00	0.6000	0.6000
T7		25		MLE HYBRID 9POWER/18FIBER RL 2(1-5/8)	50.00	-	75.00	0.6000	0.6000
T7		26		LDF7-50A(1-5/8)	50.00	-	75.00	0.6000	0.6000
T8		1		1" Rigid Conduit	25.00	-	50.00	0.6000	0.6000
T8		2		1/4" Line	25.00	-	50.00	0.6000	0.6000
T8		4		Transmission Cage	25.00	-	30.00	0.6000	0.6000
T8		6		Transmission Cage	25.00	-	30.00	0.6000	0.6000
T8		8		Climbing Ladder	25.00	-	50.00	0.6000	0.6000
T8		10		3x3x1/4 leg reinforcement	25.00	-	50.00	0.6000	0.6000
T8		11		3x3x1/4 leg reinforcement	25.00	-	50.00	0.6000	0.6000
T8		12		3x3x1/4 leg reinforcement	25.00	-	50.00	0.6000	0.6000
T8		13		3x3x1/4 leg reinforcement	25.00	-	50.00	0.6000	0.6000
T8		21		LDF7-50A(1-5/8)	25.00	-	50.00	0.6000	0.6000
T8		22		HB114-13U6-S12F18(1-1/4)	25.00	-	50.00	0.6000	0.6000
T8		25		MLE HYBRID 9POWER/18FIBER RL 2(1-5/8)	25.00	-	50.00	0.6000	0.6000
T8		26		LDF7-50A(1-5/8)	25.00	-	50.00	0.6000	0.6000
T9		1		1" Rigid Conduit	5.00	-	25.00	0.6000	0.6000
T9		2		1/4" Line	5.00	-	25.00	0.6000	0.6000
T9		4		Transmission Cage	5.00	-	25.00	0.6000	0.6000
T9		6		Transmission Cage	5.00	-	25.00	0.6000	0.6000
T9		8		Climbing Ladder	5.00	-	25.00	0.6000	0.6000
T9		10		3x3x1/4 leg reinforcement	0.00	-	25.00	0.6000	0.6000
T9		11		3x3x1/4 leg reinforcement	0.00	-	25.00	0.6000	0.6000
T9		12		3x3x1/4 leg reinforcement	0.00	-	25.00	0.6000	0.6000
T9		13		3x3x1/4 leg reinforcement	0.00	-	25.00	0.6000	0.6000
T9		21		LDF7-50A(1-5/8)	6.00	-	25.00	0.6000	0.6000
T9		22		HB114-13U6-S12F18(1-1/4)	6.00	-	25.00	0.6000	0.6000
T9		25		MLE HYBRID 9POWER/18FIBER RL 2(1-5/8)	6.00	-	25.00	0.6000	0.6000
T9		26		LDF7-50A(1-5/8)	6.00	-	25.00	0.6000	0.6000

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	q	N	V	N	V	N	Z	dN	Y	N	N	N	N						
N		N		N			N	N	N		N	N	N						
dA							V	dA	A		C	A	C						
T8	50 - 25																		
														Bracing	Max. Compression	29	-0.31	0.00	0.00
															Max. Mx	2	0.39	-0.03	0.00
															Max. My	2	0.39	0.00	-0.00
															Max. Vy	2	0.01	0.00	0.00
															Max. Vx	2	0.00	0.00	0.00
														Inner Bracing	Max Tension	1	0.00	0.00	0.00
															Max. Compression	4	-0.03	0.00	0.00
															Max. Mx	2	-0.01	0.61	0.00
															Max. Vy	2	-0.10	0.00	0.00
															Max Tension	23	53.44	-0.05	-0.03
														Leg	Max. Compression	22	-96.10	1.02	1.01
															Max. Mx	28	-46.02	3.61	-2.24
															Max. My	14	-27.85	-2.29	3.42
															Max. Vy	28	-0.74	3.61	-2.24
															Max. Vx	14	-0.71	-2.29	3.42
														Diagonal	Max Tension	11	13.89	0.00	0.00
															Max. Compression	10	-14.76	0.00	0.00
															Max. Mx	20	7.02	-0.11	-0.15
															Max. My	10	-0.67	-0.08	0.17
															Max. Vy	20	-0.05	-0.10	0.17
														Horizontal	Max. Vx	10	0.02	0.00	0.00
															Max Tension	10	7.49	0.00	0.00
															Max. Compression	10	-7.34	0.00	0.00
															Max. Mx	26	-0.47	-0.25	0.01
															Max. My	10	-0.29	-0.22	0.03
														Redund Horiz 1 Bracing	Max. Vy	26	0.09	-0.25	0.01
															Max. Vx	10	-0.01	-0.22	0.03
															Max Tension	26	0.64	0.00	0.00
															Max. Compression	27	-0.43	0.00	0.00
															Max. Mx	2	-0.36	0.04	0.00
														Redund Horiz 2 Bracing	Max. My	2	-0.36	0.00	-0.00
															Max. Vy	2	-0.03	0.00	0.00
															Max. Vx	2	-0.00	0.00	0.00
															Max Tension	29	0.31	0.00	0.00
															Max. Compression	12	-0.41	0.00	0.00
														Redund Diag 1 Bracing	Max. Mx	2	-0.34	0.15	0.00
															Max. My	2	-0.34	0.00	-0.01
															Max. Vy	2	0.06	0.00	0.00
															Max. Vx	2	0.00	0.00	0.00
Max Tension	26	0.55	0.00	0.00															
Redund Diag 2 Bracing	Max. Compression	26	-0.56	0.00	0.00														
	Max. Mx	2	0.51	-0.01	0.00														
	Max. My	2	0.51	0.00	-0.00														
	Max. Vy	2	0.01	0.00	0.00														
	Max. Vx	2	0.00	0.00	0.00														
Inner Bracing	Max Tension	12	0.52	0.00	0.00														
	Max. Compression	11	-0.18	0.00	0.00														
	Max. Mx	2	0.47	-0.09	0.00														
	Max. My	2	0.47	0.00	-0.01														
	Max. Vy	2	0.03	0.00	0.00														
Leg	Max. Vx	2	-0.00	0.00	0.00														
	Max Tension	1	0.00	0.00	0.00														
	Max. Compression	4	-0.05	0.00	0.00														
	Max. Mx	2	-0.01	-0.46	0.00														
	Max. Vy	2	0.07	0.00	0.00														
Diagonal	Max Tension	23	67.18	-0.13	-0.13														
	Max. Compression	22	-116.51	0.00	-0.00														
	Max. Mx	28	-52.41	3.61	-2.24														
	Max. My	14	-29.63	-2.29	3.42														
	Max. Vy	28	0.62	3.61	-2.24														
Inner Bracing	Max. Vx	12	0.61	-2.47	3.36														
	Max Tension	11	14.63	-0.08	-0.13														
	Max. Compression	10	-15.82	0.00	0.00														
	Max. Mx	20	7.18	-0.15	-0.18														
	Max. My	10	-0.67	-0.08	0.17														

ø NDL 9NDgDD
VV% N N'E LWD
ND'

Tower Mast Reaction Summary

V	N	N	N	N	N	N	N
	N	N	N	N	N	N	N
Dead Only	101.54	-0.00	0.00	77.32	75.15	0.00	
1.2 Dead+1.0 Wind 0 deg - No Ice	121.85	0.00	-48.79	-4365.39	89.58	-28.80	
0.9 Dead+1.0 Wind 0 deg - No Ice	91.39	0.00	-48.79	-4388.59	67.04	-28.80	
1.2 Dead+1.0 Wind 30 deg - No Ice	121.85	30.17	-52.20	-4354.29	-2481.85	-13.65	
0.9 Dead+1.0 Wind 30 deg - No Ice	91.39	30.17	-52.20	-4377.49	-2504.39	-13.65	
1.2 Dead+1.0 Wind 45 deg - No Ice	121.85	41.12	-41.08	-3439.18	-3447.68	2.95	
0.9 Dead+1.0 Wind 45 deg - No Ice	91.39	41.12	-41.08	-3462.38	-3470.22	2.95	
1.2 Dead+1.0 Wind 60 deg - No Ice	121.85	51.12	-29.49	-2438.67	-4301.05	21.19	
0.9 Dead+1.0 Wind 60 deg - No Ice	91.39	51.12	-29.49	-2461.87	-4323.60	21.19	
1.2 Dead+1.0 Wind 90 deg - No Ice	121.85	56.18	-0.00	92.19	-4719.52	59.84	
0.9 Dead+1.0 Wind 90 deg - No Ice	91.39	56.18	-0.00	69.00	-4742.06	59.84	
1.2 Dead+1.0 Wind 120 deg - No Ice	121.85	52.25	30.14	2659.62	-4363.51	85.02	
0.9 Dead+1.0 Wind 120 deg - No Ice	91.39	52.25	30.14	2636.43	-4386.06	85.02	
1.2 Dead+1.0 Wind 135 deg - No Ice	121.85	41.11	41.07	3623.92	-3446.84	63.69	
0.9 Dead+1.0 Wind 135 deg - No Ice	91.39	41.11	41.07	3600.72	-3469.38	63.69	
1.2 Dead+1.0 Wind 150 deg - No Ice	121.85	27.90	48.27	4320.78	-2354.67	42.25	
0.9 Dead+1.0 Wind 150 deg - No Ice	91.39	27.90	48.27	4297.58	-2377.22	42.25	
1.2 Dead+1.0 Wind 180 deg - No Ice	121.85	-0.00	48.79	4550.97	90.77	28.80	
0.9 Dead+1.0 Wind 180 deg - No Ice	91.39	-0.00	48.79	4527.77	68.22	28.80	
1.2 Dead+1.0 Wind 210 deg - No Ice	121.85	-30.17	52.20	4539.86	2662.20	13.65	
0.9 Dead+1.0 Wind 210 deg - No Ice	91.39	-30.17	52.20	4516.67	2639.65	13.65	
1.2 Dead+1.0 Wind 225 deg - No Ice	121.85	-41.12	41.08	3624.76	3628.03	-2.95	
0.9 Dead+1.0 Wind 225 deg - No Ice	91.39	-41.12	41.08	3601.56	3605.48	-2.95	
1.2 Dead+1.0 Wind 240 deg - No Ice	121.85	-51.12	29.49	2624.24	4481.40	-21.19	
0.9 Dead+1.0 Wind 240 deg - No Ice	91.39	-51.12	29.49	2601.05	4458.86	-21.19	
1.2 Dead+1.0 Wind 270 deg - No Ice	121.85	-56.18	0.00	93.38	4899.87	-59.84	
0.9 Dead+1.0 Wind 270 deg - No Ice	91.39	-56.18	0.00	70.18	4877.32	-59.84	

ø NDL 90g DD
VV% N N'E LWD
Nq

N	q	N	$\circ$	dN	Z	dN	N	N
dN		N	x	N		N	N	N
		Λ		Λ	V	$d\Lambda$	Λ	Λ
L1	165 - 150		1.847		20		0.0791	0.0185
T1	150 - 137.5		1.590		20		0.0755	0.0135
T2	137.5 - 125		1.382		20		0.0718	0.0130
T3	125 - 112.5		1.182		20		0.0661	0.0124
T4	112.5 - 100		0.991		20		0.0610	0.0116
T5	100 - 87.5		0.811		20		0.0548	0.0106
T6	87.5 - 75		0.655		20		0.0480	0.0095
T7	75 - 50		0.516		20		0.0402	0.0084
T8	50 - 25		0.279		4		0.0269	0.0058
T9	25 - 0		0.098		4		0.0133	0.0023

Critical Deflections and Radius of Curvature - Design Wind

q	N	Y	N	Z	dN	x	N	N	N	N	V	N
N	N			V	cN		N	N	N	N		N
N	N						N	N	N	N		N
180.00		Beacon + Support Pipe		20		1.847	0.0791	0.0185			651642	
165.00		25' Square Platform		20		1.847	0.0791	0.0185			651642	
150.00		25' Square Platform		20		1.590	0.0755	0.0135			248751	
147.00		(2) X7CQAP-86-865-VRO w/ Mount Pipe		20		1.539	0.0747	0.0131			252568	
131.00		30' X-Platform		20		1.277	0.0689	0.0128			189725	
112.00		Large Access Platform		20		0.984	0.0608	0.0115			267337	
100.00		Large Access Platform		20		0.811	0.0548	0.0106			65144	
88.00		Large Access Platform		20		0.661	0.0483	0.0096			123427	

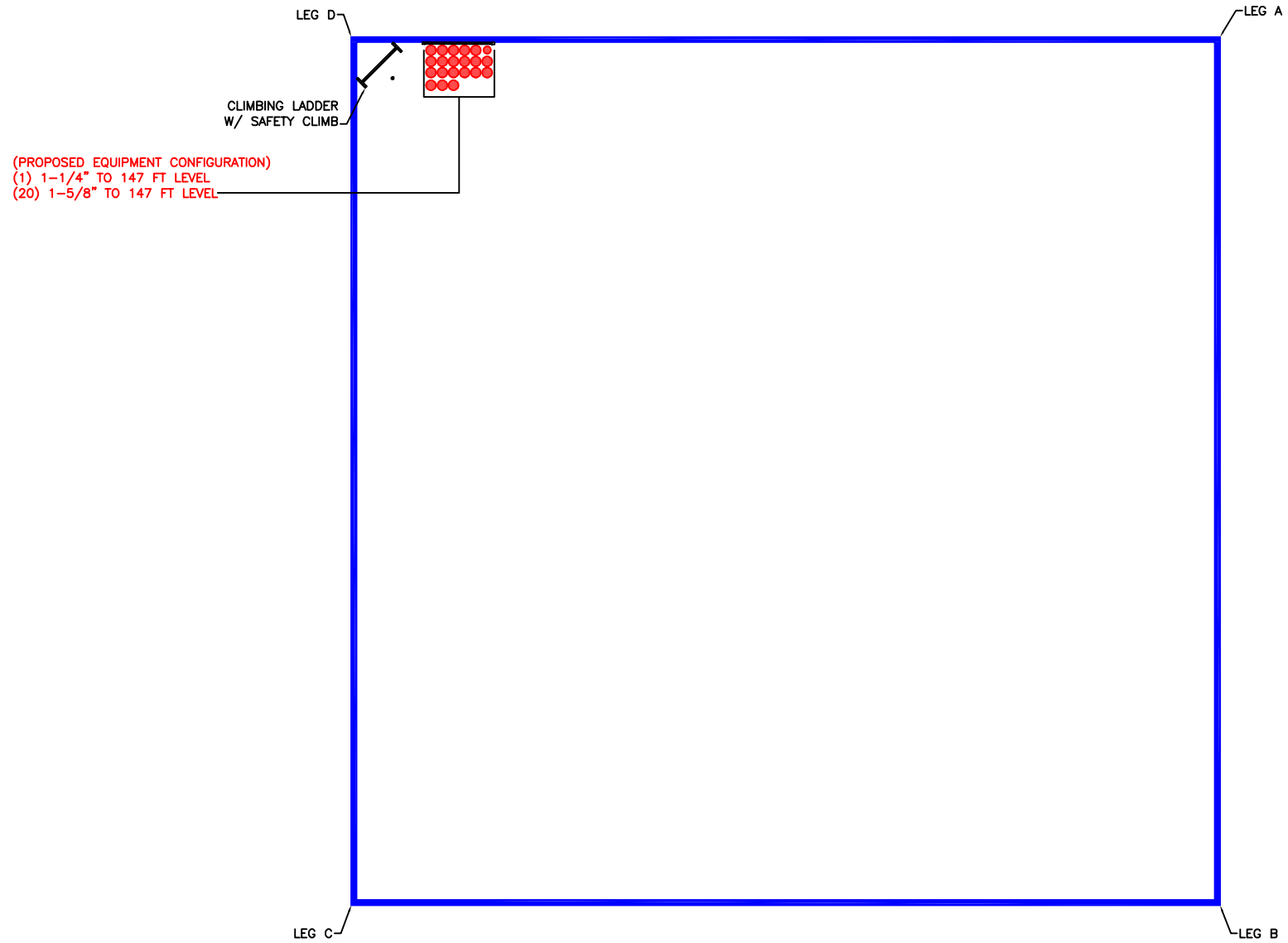
Bolt Design Data

	N	q	N	V	N	Z	N	I	N	Y	N	N	Y	N	V	N
	dN	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
L1	165		Latticed Pole Diagonal	SAEGR-5	0.7500	3	0.54	9.97	0.054	1.05	Member Block Shear					
T1	150		Latticed Pole Top Girt Diagonal	SAEGR-5	0.7500	2	0.06	11.15	0.006	1.05	Member Block Shear					
			Horizontal	SAEGR-5	0.7500	2	1.59	20.93	0.076	1.05	Member Block Shear					
			Top Girt	SAEGR-5	0.7500	2	0.30	10.47	0.029	1.05	Member Block Shear					
T2	137.5		Diagonal	SAEGR-5	0.7500	2	0.11	25.01	0.005	1.05	Member Block Shear					
			Horizontal	SAEGR-5	0.7500	2	1.89	20.93	0.090	1.05	Member Block Shear					
			Top Girt	SAEGR-5	0.7500	2	0.30	16.70	0.018	1.05	Member Bearing					
T3	125		Leg	SAEGR-5	0.7500	2	1.13	25.01	0.045	1.05	Member Block Shear					
			Diagonal	SAEGR-5	0.8750	16	4.30	33.82	0.127	1.05	Bolt SS					
			Horizontal	SAEGR-5	0.7500	2	2.31	20.93	0.110	1.05	Member Block Shear					
			Top Girt	SAEGR-5	0.7500	2	0.26	11.15	0.023	1.05	Member Block Shear					
T4	112.5		Diagonal	SAEGR-5	0.7500	2	1.06	22.29	0.048	1.05	Member Block Shear					
			Horizontal	SAEGR-5	0.7500	2	2.62	20.93	0.125	1.05	Member Block Shear					
			Top Girt	SAEGR-5	0.7500	2	0.34	11.15	0.030	1.05	Member Block Shear					
			Top Girt	SAEGR-5	0.7500	2	1.03	22.29	0.046	1.05	Member Block Shear					

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S	Λ	q	N	V	N	N	j	N	N
	d_N					q	Λ	N	N
T2	137.5 - 125	Inner Bracing	2L2 1/2x2x3/16x3/8	96	-0.00	9.37	0.3	Pass	
T3	125 - 112.5	Inner Bracing	2L2 1/2x2 1/2x3/16x3/8	134	-0.00	7.93	0.3	Pass	
T4	112.5 - 100	Inner Bracing	2L2 1/2x2 1/2x3/16x3/8	172	-0.01	6.42	0.4	Pass	
T5	100 - 87.5	Inner Bracing	2L2 1/2x2 1/2x3/16x3/8	217	-0.01	23.32	0.4	Pass	
T6	87.5 - 75	Inner Bracing	2L2 1/2x2 1/2x3/16x3/8	254	-0.01	19.45	0.4	Pass	
T7	75 - 50	Inner Bracing	2L2 1/2x2 1/2x3/16x3/8	291	-0.01	14.13	0.5	Pass	
T8	50 - 25	Inner Bracing	L2 1/2x2 1/2x1/4	376	-0.05	6.45	0.7	Pass	
T9	25 - 0	Inner Bracing	L2 1/2x2 1/2x1/4	429	-0.06	4.98	1.2	Pass	
							Summary		
							Latticed Pole Leg (L1)	3.7	Pass
							Latticed Pole Diagonal (L1)	10.9	Pass
							Latticed Pole Top Girt (L1)	0.3	Pass
							Latticed Pole Mid Girt (L1)	0.5	Pass
							Leg (T9)	24.1	Pass
							Diagonal (T8)	33.9	Pass
							Horizontal (T6)	23.2	Pass
							Top Girt (T3)	2.8	Pass
							Redund Horiz 1 Bracing (T7)	10.3	Pass
							Redund Horiz 2 Bracing (T9)	9.0	Pass
							Redund Diag 1 Bracing (T8)	10.8	Pass
							Redund Diag 2 Bracing (T9)	9.0	Pass
							Inner Bracing (T9)	1.2	Pass
							Bolt Checks	27.3	Pass
							RATING =	33.9	Pass

APPENDIX B
BASE LEVEL DRAWING



APPENDIX C
ADDITIONAL CALCULATIONS

Pier and Pad Foundation



BU # : 817532
 Site Name: Lake City FL
 App. Number: 567465 Rev. 3

TIA-222 Revision: H
 Tower Type: Self Support

Top & Bot. Pad Rein. Different?: ☐
 Block Foundation?: ☐
 Rectangular Pad?: ☐

Superstructure Analysis Reactions		
Compression, P_{comp} :	134.82	kips
Compression Shear, V_{u_comp} :	23.67	kips
Uplift, P_{uplift} :	80.85	kips
Uplift Shear, V_{u_uplift} :	17.48	kips
Tower Height, H :	165	ft
Base Face Width, BW :	34.75	ft
BP Dist. Above Fdn, bp_{dist} :	1	in

Pier Properties		
Pier Shape:	Circular	
Pier Diameter, d_{pier} :	2.5	ft
Ext. Above Grade, E :	2	ft
Pier Rebar Size, S_c :	9	
Pier Rebar Quantity, mc :	12	
Pier Tie/Spiral Size, S_t :	5	
Pier Tie/Spiral Quantity, mt :		
Pier Reinforcement Type:	Tie	
Pier Clear Cover, cc_{pier} :	3	in

Pad Properties		
Depth, D :	9	ft
Pad Width, W_1 :	15	ft
Pad Thickness, T :	3	ft
Pad Rebar Size (Bottom dir. 2), Sp_2 :	9	
Pad Rebar Quantity (Bottom dir. 2), mp_2 :	12	
Pad Clear Cover, cc_{pad} :	2.8	in

Material Properties		
Rebar Grade, F_y :	60	ksi
Concrete Compressive Strength, F'_c :	3	ksi
Dry Concrete Density, δ_c :	150	pcf

Soil Properties		
Total Soil Unit Weight, γ :	150	pcf
Ultimate Gross Bearing, Q_{ult} :	9.000	ksf
Cohesion, C_u :	0.000	ksf
Friction Angle, ϕ :	28	degrees
SPT Blow Count, N_{blows} :		
Base Friction, μ :		
Neglected Depth, N :		ft
Foundation Bearing on Rock?	No	
Groundwater Depth, gw :	20	ft

Foundation Analysis Checks				
	Capacity	Demand	Rating*	Check
Uplift (kips)	348.46	80.85	22.1%	Pass
Lateral (Sliding) (kips)	214.41	23.67	10.5%	Pass
Bearing Pressure (ksf)	6.75	2.23	31.4%	Pass
Pier Flexure (Comp.) (kip*ft)	567.59	189.36	31.8%	Pass
Pier Flexure (Tension) (kip*ft)	473.53	139.84	28.1%	Pass
Pier Compression (kip)	1295.78	141.89	10.4%	Pass
Pad Flexure (kip*ft)	1659.08	177.85	10.2%	Pass
Pad Shear - 1-way (kips)	465.96	33.00	6.7%	Pass
Pad Shear - 2-way (Comp) (ksi)	0.164	0.020	11.7%	Pass
Flexural 2-way (Comp) (kip*ft)	2425.43	113.62	4.5%	Pass
Pad Shear - 2-way (Uplift) (ksi)	0.164	0.017	9.8%	Pass
Flexural 2-way (Tension) (kip*ft)	2425.43	83.90	3.3%	Pass

*Rating per TIA-222-H Section 15.5

Structural Rating*:	31.8%
Soil Rating*:	31.4%

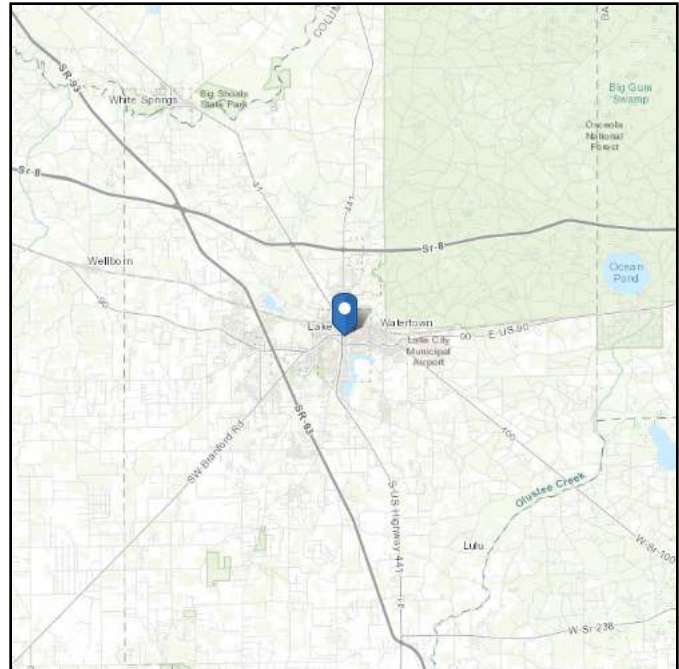
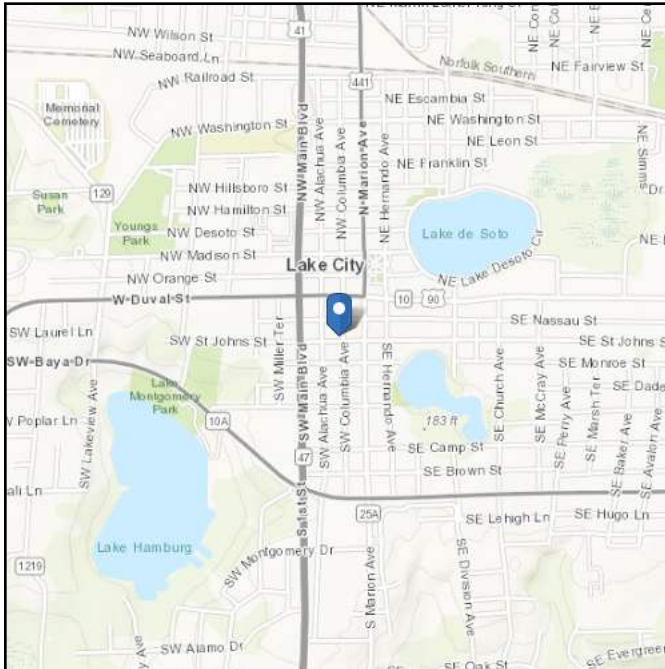
<-- Toggle between Gross and Net

ASCE 7 Hazards Report

Address:
No Address at This
Location

Standard: ASCE/SEI 7-16
Risk Category: II
Soil Class: D - Stiff Soil

Elevation: 193.23 ft (NAVD 88)
Latitude: 30.188111
Longitude: -82.63805



Wind

Results:

Wind Speed	118 Vmph
10-year MRI	75 Vmph
25-year MRI	84 Vmph
50-year MRI	90 Vmph
100-year MRI	97 Vmph

Data Source: ASCE/SEI 7-16, Fig. 26.5-1B and Figs. CC.2-1–CC.2-4, and Section 26.5.2
Date Accessed: Tue Jan 25 2022

Value provided is 3-second gust wind speeds at 33 ft above ground for Exposure C Category, based on linear interpolation between contours. Wind speeds are interpolated in accordance with the 7-16 Standard. Wind speeds correspond to approximately a 7% probability of exceedance in 50 years (annual exceedance probability = 0.00143, MRI = 700 years).

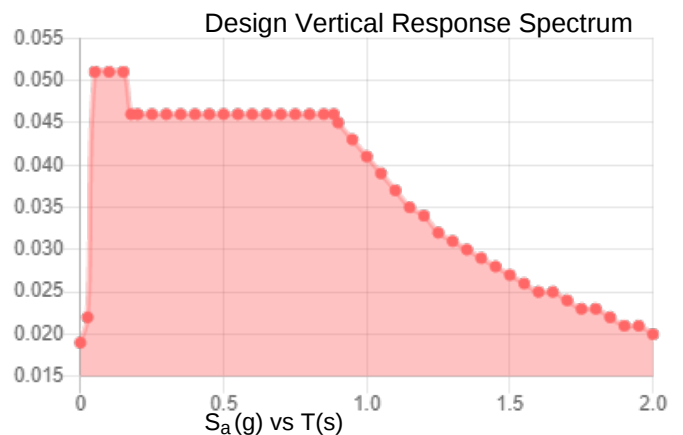
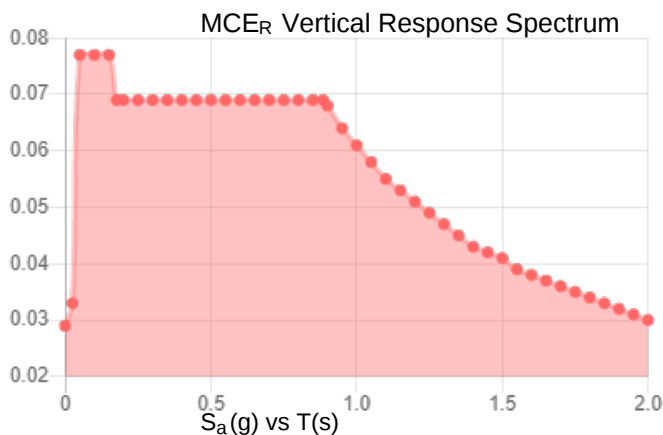
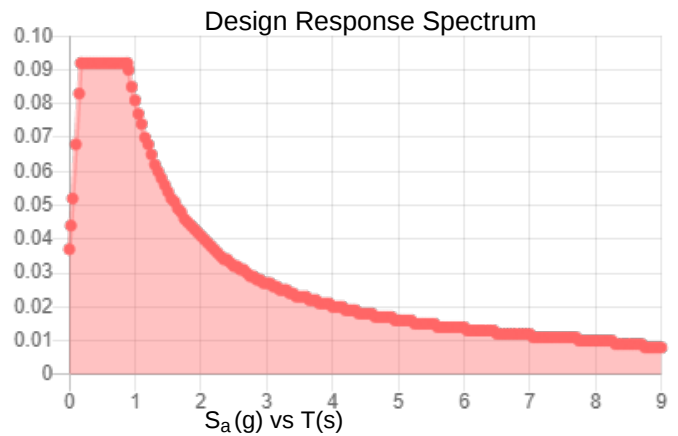
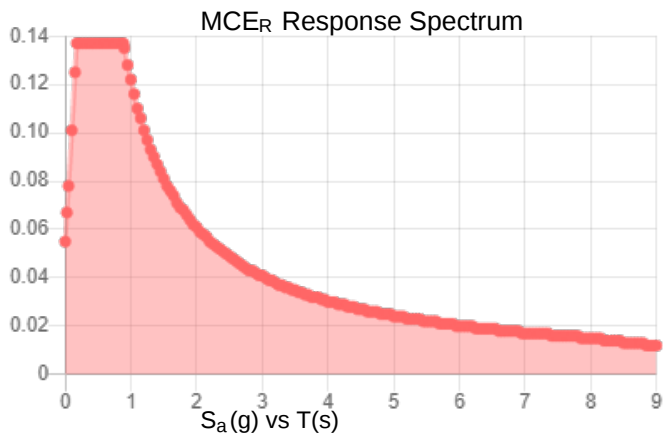
Site is in a hurricane-prone region as defined in ASCE/SEI 7-16 Section 26.2. Glazed openings need not be protected against wind-borne debris.

Site Soil Class: D - Stiff Soil

Results:

S_S :	0.086	S_{D1} :	0.081
S_1 :	0.051	T_L :	8
F_a :	1.6	PGA :	0.041
F_v :	2.4	PGA _M :	0.065
S_{MS} :	0.137	F_{PGA} :	1.6
S_{M1} :	0.122	I_e :	1
S_{DS} :	0.092	C_v :	0.7

Seismic Design Category B



Data Accessed: Tue Jan 25 2022

Date Source:

USGS Seismic Design Maps based on ASCE/SEI 7-16 and ASCE/SEI 7-16 Table 1.5-2. Additional data for site-specific ground motion procedures in accordance with ASCE/SEI 7-16 Ch. 21 are available from USGS.

Results:

Ice Thickness: 0.25 in.
Concurrent Temperature: 25 F
Gust Speed 30 mph

Data Source: Standard ASCE/SEI 7-16, Figs. 10-2 through 10-8

Date Accessed: Tue Jan 25 2022

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 500-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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