



Date: September 9, 2025

Brenda Clemons
Verizon Wireless
10740 Nall Avenue
Overland Park, KS 66211

Subject: Small Cell Pole Foundation Design
Site Name: KCYC_Summit Woods_05SC
Site Address: 560 NW Chipman Rd., Lees Summit, MO 64086
Pole Height and Type: 37.4 ft Steel Pole
Terra Consulting Group Project: 132-358

Dear Brenda Clemons,

Terra Consulting Group is pleased to submit this **“Small Cell Pole Foundation Design”**. The attached foundation was designed to support the proposed 37.4-ft pole with the proposed appurtenances.

The design has been performed in accordance with the 2018 International Building Code and the ANSI/TIA-222-H Standard. This analysis utilizes an basic wind speed of 109 mph and a 40 mph 3-second gust wind speed with 1.5” ice was considered. Exposure Category C with a maximum topographic factor, Kzt, of 1.0 and Risk Category II were used in this analysis.

If you have any questions or require additional information, please feel free to contact us.

Respectfully Submitted by:
TERRA CONSULTING GROUP

Kurt Swarts, P.E.
Structural Engineer
(614) 754-9106
kurts@terra ltd.com



09-10-2025

1) DESCRIPTION

The proposed pole is 37.4' long, A595 Gr. A steel pole designed by ConcealFab, reference document number 902149. The pole will be founded on reinforced concrete drilled pier foundation.

2) ANALYSIS CRITERIA

Table 1 - Proposed Equipment Configuration

Appurtenance Centerline (ft)	Number of Appurtenances	Appurtenance	Note
42'-0"	1	ConcealFab 901171_461N Shroud	2
	1	Commscope V4S4P-360S-F2*	
38'-10"	1	Conceal Fab Shroud 901216_T Shroud	
	3	Ericsson AIR 1672*	
36'6"	1	12-Ft Light Truss Arm (Luminaire at 40')	
Feedlines	8	1/2" Coax (Inside of pole)	

Notes:

1. Existing Equipment
 2. Proposed Equipment
- *Enclosed and not subject to wind loading

3) ANALYSIS PROCEDURE

3.1) Analysis Method

Tnxtower Version 8.3.1.0, a commercially available analysis software package, was used to calculate the foundation reactions.

4) FOUNDATION ANALYSIS

The pole base reactions were determined using the proposed equipment configuration listed in Table 1. The base reactions are as follows: Moment = 36-ft-kips, Axial = 1 kips, Shear = 1 kips. A structural analysis of the proposed pole was not part of this scope of service.

A site specific geotechnical report was not available at the time of the analysis. For information purposes, the foundation has been analyzed using presumptive sandy soil parameters per Table F-1 of the TIA-222-H Standard.

5) CONCLUSION

The proposed drilled pier foundation will have sufficient capacity to support the proposed pole, antennas and equipment. See attached foundation design drawings for the foundation specifications.

STANDARD CONDITIONS FOR PROVIDING PROFESSIONAL ENGINEERING SERVICES FOR EXISTING STRUCTURES

1. The Standard of Care for all Professional Engineering Services performed by Terra Consulting Group under this project will be the skill and care used by members of the Consultant's profession practicing under similar circumstances at the same time and in the same locality.
2. All engineering services are performed on the basis that the information provided to Terra Consulting Group and used in this analysis is current and correct. The proposed equipment loading has been applied at locations determined from the supplied documentation. Any deviation from the loading locations specified in this report shall be communicated to Terra Consulting Group to verify deviation will not adversely impact the analysis.
3. The structural analysis of the foundation was performed according to the minimum design loads recommended by the Reference Standard. If more restrictive design criteria for wind, ice, deflections or serviceability are required, then Terra Consulting Group should be notified.
4. All member connections are assumed to have been designed to meet or exceed the load carrying capacity of the connected member unless otherwise specified in this report.
5. All services are performed, results obtained, and recommendations made in accordance with generally accepted engineering principles and practices. Terra Consulting Group is not responsible for the conclusion, opinions, and recommendations made by others based on the information supplied.

Discrepancies between in-field conditions and the assumptions listed above may render this analysis invalid unless explicitly approved by Terra Consulting Group.

DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
Concealfab 901171_46IN	42	(3) AIR 1672	38.83
V4S4P-360S-F2	42	12-Ft Light Truss Arm	36.5
Concealfab 901216T	38.83		

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A595-55	55 ksi	65 ksi			

TOWER DESIGN NOTES

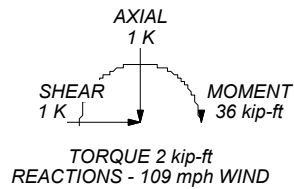
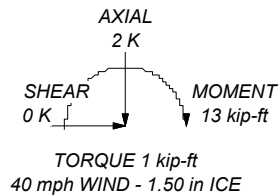
1. Tower designed for Exposure C to the TIA-222-H Standard.
2. Tower designed for a 109 mph basic wind in accordance with the TIA-222-H Standard.
3. Tower is also designed for a 40 mph basic wind with 1.50 in ice. Ice is considered to increase in thickness with height.
4. Deflections are based upon a 60 mph wind.
5. Tower Risk Category II.
6. Topographic Category 1 with Crest Height of 0.00 ft

37.4 ft

Section	1
Length (ft)	37.42
Number of Sides	1
Thickness (in)	0.12
Top Dia (in)	4.96
Bot Dia (in)	10.00
Grade	A595-55
Weight (K)	0.4



ALL REACTIONS
ARE FACTORED



0.0 ft

Terra Consulting Group
1500 Lake Shore Drive, Suite 225
Columbus, OH 43204
Phone: (614) 754-9106
FAX:

Job:	37.4-Ft Pole - KCYC_Summit Woods _05SC		
Project:	132-358		
Client:	Verizon Wireless	Drawn by:	kurts
Code:	TIA-222-H	Date:	09/09/25
Path:	J:\VZW KSMO SC AE\132-358\Foundation SAI\132-358 KCYC Summit Woods _05SC Foundation SA.er		Dwg No. E-1
		App'd:	Scale: NTS

Drilled Pier Foundation

Terra # : 132-358
 Site Name: KCYC Summit Woods 05S
 Order Number:
 TIA-222 Revision: H
 Tower Type: Monopole

Report File:

Applied Loads		
	Comp.	Uplift
Moment (kip-ft)	36	
Axial Force (kips)	1	
Shear Force (kips)	1	

Material Properties		
Concrete Strength, f _c :	4	ksi
Rebar Strength, F _y :	60	ksi
Tie Yield Strength, F _{yt} :	60	ksi

Pier Design Data		
Depth	7	ft
Ext. Above Grade	0	ft
Pier Section 1		
From 0' below grade to 7' below grade		
Pier Diameter	3	ft
Rebar Quantity	8	
Rebar Size	6	
Clear Cover to Ties	3	in
Tie Size	3	
Tie Spacing	9	in

Rebar & Pier Options

Embedded Pole Inputs

Belled Pier Inputs

Analysis Results		
Soil Lateral Check		
	Compression	Uplift
D _{req} (ft from TOC)	2.29	-
Soil Safety Factor	1.85	-
Max Moment (kip-ft)	38.74	-
Rating	71.8%	-

Soil Vertical Check		
	Compression	Uplift
Skin Friction (kips)	17.67	-
End Bearing (kips)	25.29	-
Weight of Concrete (kips)	8.91	-
Total Capacity (kips)	42.96	-
Axial (kips)	9.91	-
Rating	21.0%	-

Reinforced Concrete Flexure		
	Compression	Uplift
Critical Depth (ft from TOC)	2.28	-
Critical Moment (kip-ft)	38.74	-
Critical Moment Capacity	247.19	-
Rating	15.7%	-

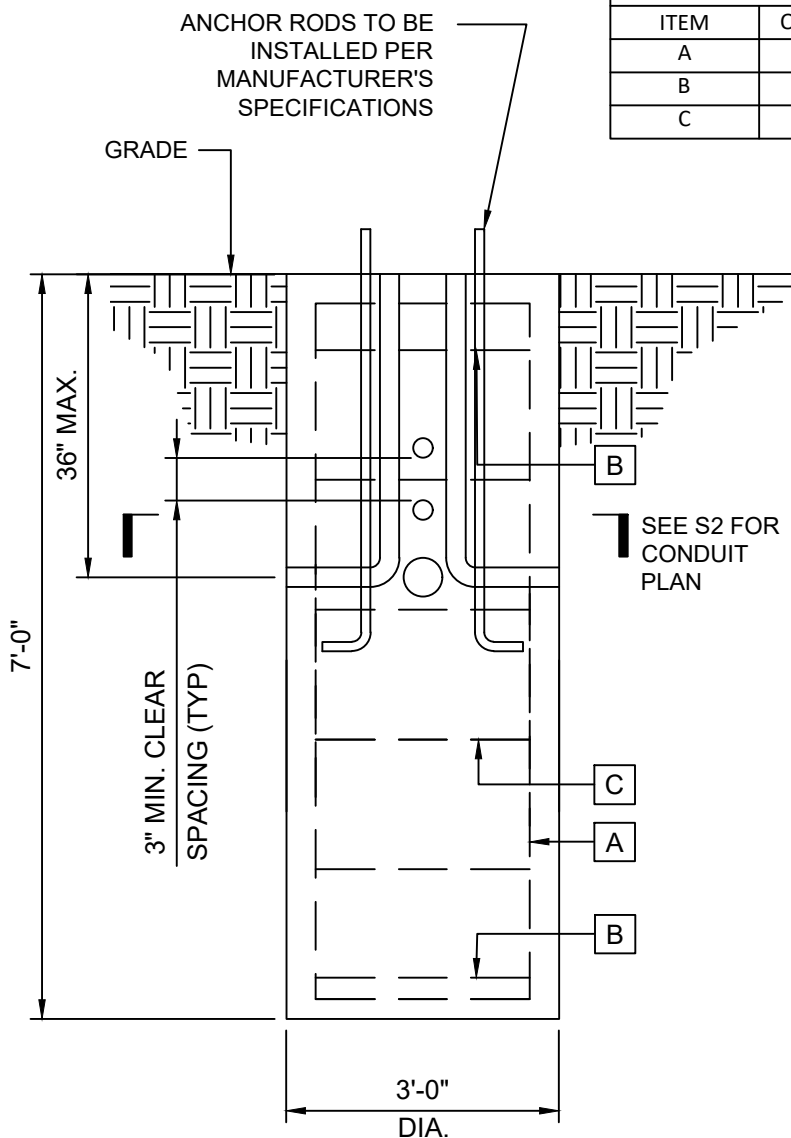
Reinforced Concrete Shear		
	Compression	Uplift
Critical Depth (ft from TOC)	5.21	-
Critical Shear (kip)	17.53	-
Critical Shear Capacity	132.66	-
Rating	13.2%	-

Structural Foundation Rating	15.7%
Soil Interaction Rating	71.8%

Check Limitation	
Apply TIA-222-H Section 15.5:	<input type="checkbox"/>
N/A	<input checked="" type="checkbox"/>
Additional Longitudinal Rebar	
Input Effective Depths (else Actual):	<input 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		n/a		# of Layers		2								
Layer	Top (ft)	Bottom (ft)	Thickness (ft)	Y _{soil} (pcf)	Y _{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. Net Bearing Capacity (ksf)	SPT Blow Count	Soil Type
1	0	2	2	110	150	0	0	0.000	0.000	0.00	0.00		6	Cohesionless
2	2	7	5	110	150	0	30	0.240	0.240	0.50	0.50	4	6	Cohesionless



ELEVATION VIEW

REINFORCING BAR SCHEDULE

ITEM	QUANTITY	SIZE	SPACING
A	8	#6	EQUALLY
B	2	#3	(2) BARS WITHIN TOP/BOTTOM 5"
C	9 +/-	#3	9" O.C.

FOUNDATION NOTES:

1. TOWER AND FOUNDATION DESIGN HAS BEEN COMPLETED IN ACCORDANCE WITH THE 2018 INTERNATIONAL BUILDING CODE AND THE TIA-222-H STANDARD.
2. CONCRETE SHALL HAVE A MINIMUM 28-DAY COMPRESSIVE STRENGTH OF 4,000 PSI, IN ACCORDANCE WITH ACI 318-11.
3. REBAR TO CONFORM TO ASTM A615 GRADE 60.
4. ALL REBAR TO HAVE A MINIMUM OF 3" CONCRETE COVER.
5. ALL EXPOSED CONCRETE CORNERS TO BE CHAMFERED 3/4".
6. THE FOUNDATION DESIGN IS BASED ON THE FOLLOWING FACTORED LOADS:

MOMENT = 36.0 K-FT

AXIAL = 1.0 K

SHEAR = 1.0 K

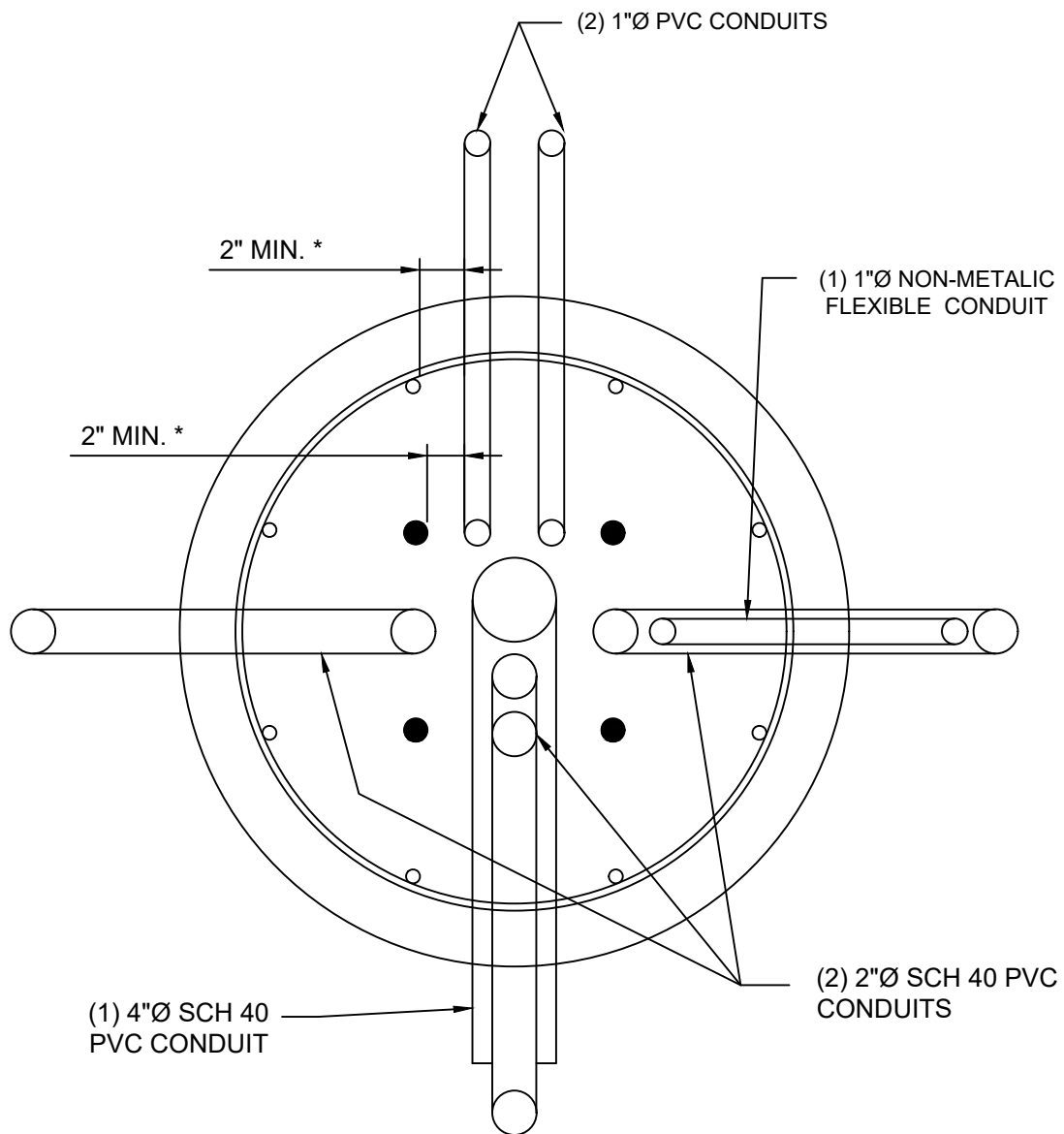
7. TOTAL CONCRETE VOLUME: 2.0 CUBIC YARDS
8. FOUNDATION HAS BEEN DESIGNED USING THE USING THE FOLLOWING PRESUMPTIVE SOIL PROPERTIES PROVIDED IN ANNEX F OF TIA-222 H STANDARD:

UNIT SOIL WEIGHT: 110 PCF

FRICTION ANGLE: 30 DEGREES

ULTIMATE SKIN FRICTION: 500 PSF

ULTIMATE NET BEARING CAPACITY:
4000 PSF



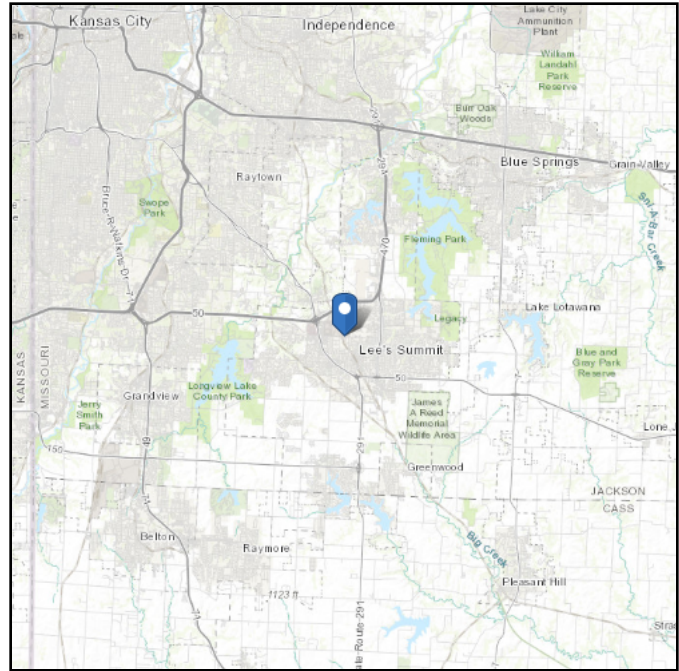
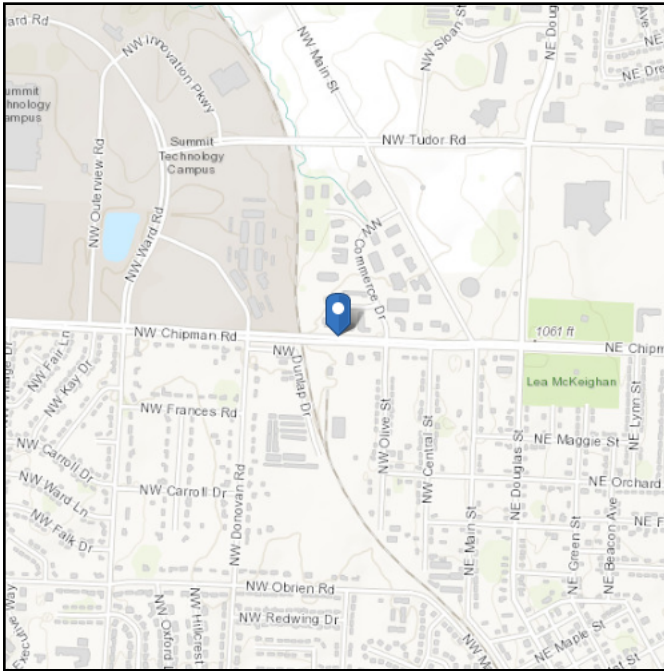
CONDUIT PLAN

* MINIMUM CLEAR SPACING BETWEEN
CONDUITS AND ANCHOR RODS/ REBAR
/CONDUITS SHALL BE 2".

ASCE Hazards Report

Standard: ASCE/SEI 7-16
Risk Category: II
Soil Class: D - Default (see Section 11.4.3)

Latitude: 38.925319
Longitude: -94.38636
Elevation: 1014.0315703230249 ft
(NAVD 88)



Wind

Results:

Wind Speed	109 Vmph
10-year MRI	76 Vmph
25-year MRI	83 Vmph
50-year MRI	88 Vmph
100-year MRI	94 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: Fri Aug 29 2025

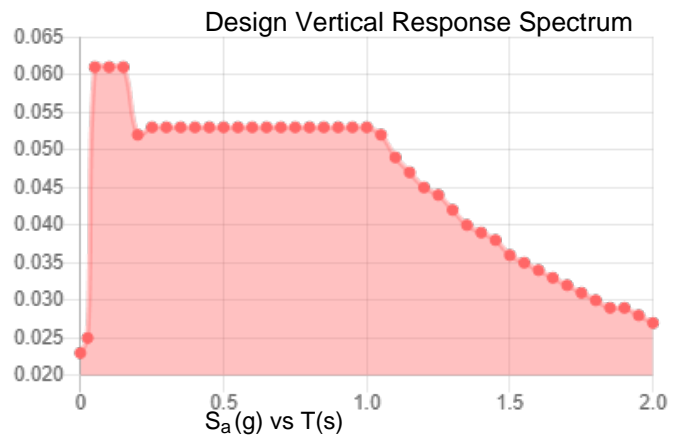
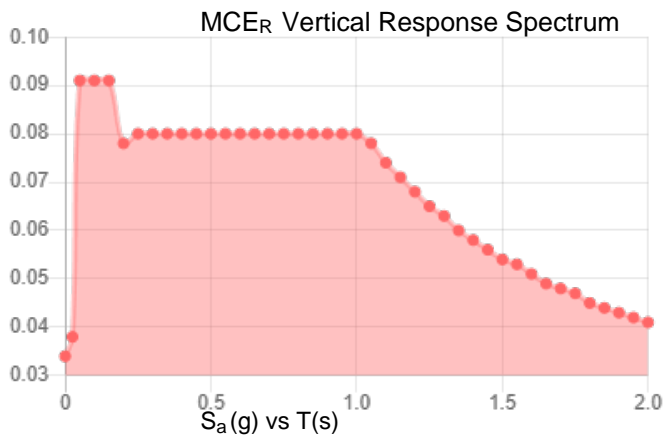
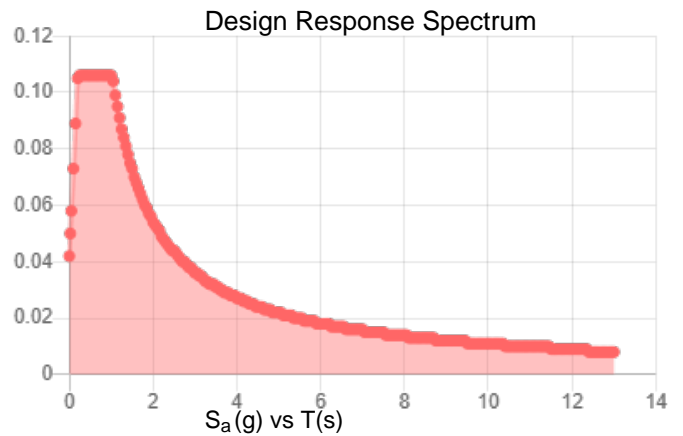
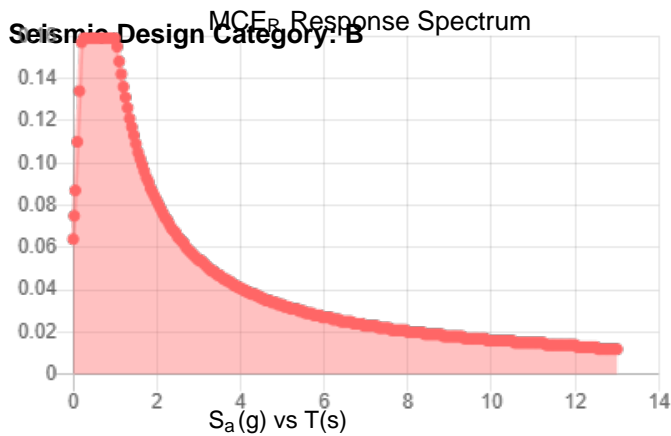
Value provided is 3-second gust wind speeds at 33 ft above ground for Exposure C Category, based on linear interpolation between contours. Wind speeds are interpolated in accordance with the 7-16 Standard. Wind speeds correspond to approximately a 7% probability of exceedance in 50 years (annual exceedance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

Site is not in a hurricane-prone region as defined in ASCE/SEI 7-16 Section 26.2.

Site Soil Class: D - Default (see Section 11.4.3)

Results:

S_S :	0.099	S_{D1} :	0.109
S_1 :	0.068	T_L :	12
F_a :	1.6	PGA :	0.047
F_v :	2.4	PGA _M :	0.075
S_{MS} :	0.159	F_{PGA} :	1.6
S_{M1} :	0.163	I_e :	1
S_{DS} :	0.106	C_v :	0.7



Data Accessed: Fri Aug 29 2025

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: 1.50 in.
Concurrent Temperature: 5 F
Gust Speed 40 mph

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

Date Accessed: Fri Aug 29 2025

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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