Date: July 10, 2020

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Omaha, NE 68154
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Subject:	***Geotechnical Report***	
Tower Designation:	**Tower Name:**	*Jemez Springs*
Engineering Firm Designation:	**SGS Towers Project Number:**	*2003830*
Site Data:	1-329 Mooney Blvd., Jemez Springs, New Mexico; Sandoval County Latitude 35.77154° Longitude -106.68880° 62 Foot Monopole Tower	

Dear Anthony Beccasio,

Sinnott Gering and Schmitt Towers, Inc. is pleased to submit this "Geotechnical Report" to evaluate subsurface conditions in the area where the foundation is located. This report has been prepared in accordance with generally accepted geotechnical engineering practice for specific application to this project. While some transitions may be gradual, subsurface conditions in other areas may be quite different. Should actual site conditions vary from those presented in this report, SGS should be provided the opportunity to amend its recommendations as necessary.

We at *Sinnott Gering and Schmitt Towers, Inc.* appreciate the opportunity of providing our continuing professional services to you and SAC Wireless. If you have any questions or need further assistance on this or any other projects, please give us a call.

Respectfully submitted by:
Nathaniel Felten

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Project Description

It is understood an existing Monopole is being evaluated at the referenced site. In this report, foundation capacity is determined to meet intended pressure and settlement criteria when exposed to the tower loading. The structural analysis should be consulted to determine the foundation loads.

Site Conditions

The site is located near the town of Jemez Springs, NM. The tower is located is a cleared lot. The tower site has an elevation of approximately 6904 feet above sea level and the ground topography is relatively level.

Field and Laboratory Investigation

Beginning on June 30, 2020, one exploratory boring was advanced with a truck-mounted drill rig with a 3 1/4-inch diameter hollow stem auger at the location shown in the Appendix. Sub-surface exploration included the performance of a soil test boring (BH1) to a depth of 7.5 feet due to auger refusal. Given this finding, the exploration team switched to a rock coring process that was able to further the boring an additional 5 feet. Split-spoon samples were obtained in accordance with ASTM D 1586 at a frequency of 3 samples in the top 7.5 feet. The soil samples were field classified and logged as shown in the appendix. Intact samples were returned to our laboratories for the determination of their in-situ Moisture Content (ASTM D2216), Material Passing #200 Sieve (ASTM D1140), Density of Soil (ASTM D7263), Atterberg Limits (ASTM D4318), Soil Classification (ASTM D7263), and other relevant properties. See Appendix pages in the back of this report for the methods and results of the tests performed. Performance of these tests was completed with the intent to provide subsurface profile, and design capabilities.

Subsurface Conditions

The following description of subsurface conditions is brief and general. For more detailed information, the Boring Log contained in the Appendix may be consulted.

Foundations

No information cover foundations currently existing onsite were provided for the preparation of this report.

Lithology

As observed in the exploratory boring, earth materials consisted of natural soil and granite rock formation encountered at approximately 7.5 feet below the surface. The rock formation demonstrated an RQD value of 56%.

Soil

The USCS classification of the materials encountered in the boring at the tower includes very-dense sandy silt from 1 to 7.5 feet. Lab soil resistivities were performed and resulted in readings of 36,000 ohms per cm. With this reading being above 25,000 ohms per cm the upper soil layers should be considered progressively less corrosive. For comprehensive information on soil strata and corresponding characteristics, please refer to the boring log in appendix.

Landslide

This site is not located within a mapped landslide. No significant slopes are in the vicinity of the site. No evidence of surficial or deep-seated slope failures was observed at the site.

Subsurface Water

During exploration subsurface, groundwater was not encountered. Subsurface water levels tend to fluctuate during the year, due to seasonal variations and construction activities in the area.

Frost

The TIA frost depth for Sandoval County, NM is 30 inches.

Seismic Hazzard

Faults and Seismic Activity

Most of New Mexico's nearly 2 million people live along the Rio Grande valley, which spans the entire state and includes the major cities of Santa Fe, Albuquerque, Las Cruces, and El Paso. The valley is within the Rio Grande rift, a region of tectonic, volcanic, and seismic activity that extends from north-central Colorado southward to Chihuahua, Mexico. Small earthquakes occur somewhere in New Mexico every day, but no earthquake larger than magnitude 6.2 has occurred within the New Mexico part of the rift since 1849, and probably no damaging event occurred in the previous few hundred years, based on oral history. See Appendix at the end of this report for earthquake design parameters assuming risk category II and site soil class C.

Liquefaction

The potential of soils to liquefy is influenced by factors such as soil type, relative density, particle size, gradation, depth of ground water table, confining pressure, intensity and duration of the shaking. The highest potential for liquefaction occurs in saturated, loosely consolidated sands and silts below the water table when the water table is within about 50 ft of the ground. During our subsurface investigation, very-dense silts and sands were encountered during the exploration process indicating a low possibility of liquefaction in occurrence of an earthquake.

Foundation Recommendations

Based on the soil conditions and SGS's understanding of the existing monopole, the foundation can be supported by the use of a shallow mat foundation or drilled pier foundation.

Shallow Mat Foundation

The following table should be used for shallow mat foundation design.

Table 1 – Shallow Mat Foundation Analysis Parameters

Depth		Soil Type	Static Bearing [1]	Cohesion	Friction Angle	Effective Unit Weight
Top	Bottom					
(ft)	*(ft)*		*(psf)*	*(psf)*	*(°)*	*(pcf)*
0	2.5	ML	0	0	0	135
2.5	4	ML	1,100	2000	0	135
4	6	ML	3,700	0	40	135
6	7.5	ML	3,700	0	40	132
7.5	13	Granite Rock	9,000	0	41	160

[1] The bearing values provided are net allowable with a minimum factor of safety of 2 with anticipated settlement less than 1 in. Bearing may be increased by 1/3 for transient loading (e.g. wind or earthquake loading)

Drilled Pier Foundation

The following table should be used for drilled pier foundation design.

Table 2 – Drilled Pier Foundation Analysis Parameters

Depth		Soil Type	Static Bearing [1]	Side Frictional Resistance [2]	Cohesion	Friction Angle	Effective Unit Weight
Top	Bottom						
(ft)	*(ft)*		*(psf)*	*(psf)*	*(psf)*	*(°)*	*(pcf)*
0	2.5	ML	0	0	0	0	135
2.5	4	ML	1,100	550	2,000	0	135
4	6	ML	4,000	250	0	40	135
6	7.5	ML	4,000	300	0	40	132
7.5	13	Granite Rock	10,000	550	0	41	160

[1] The bearing values provided are net allowable with a minimum factor of safety of 2. Bearing may be increased by 1/3 for transient loading (e.g. wind or earthquake loading). If the bearing depth of the foundation is less than 5 diameters below the ground surface the bearing values listed in Table 1 – Shallow Foundation Analysis Parameters should be utilized

[2] The side frictional resistance values provided are allowable with a minimum factor of safety of 2. Side frictional resistance values may be increased by 1/3 for transient loading (e.g. wind or earthquake loading)

Appendix

Site Map

Boring Map of 62 ft Monopole Project

Located:	Jemez Springs, NM	Drilled By:	SGS
Latitude:	35.77154°	Drill Date:	06/30/2020
Longitude:	-106.68880°	Photo Date:	09/19/2017

Boring Location

Bore Hole 1 BH1

N

125 250 500 Feet

Boring Logs

Project No. 2003830 | **LOG OF BOREHOLE NO. BH1** | **Sheet 1 of 1**

CLIENT: **SAC** | ARCHITECT/ENGINEER:

SITE: **Jamez Springs, NM** | PROJECT: **62ft Monopole**

REMARKS:

DRILL METHOD: 3 1/4 HSA

DESCRIPTION OF STRATUM

Surface Elev.:

DEPTH (FEET)	GRAPHIC LOG	DESCRIPTION OF STRATUM	SAMPLES TYPE	SAMPLES BLOWS/6-INCH N - VALUE RQD	SAMPLES IN. DRIVEN IN. RECOVERED	TESTS WATER CONTENT (%)	TESTS DRY DENSITY PCF	TESTS LIQUID LIMIT	TESTS PLASTIC LIMIT	TESTS UNCONFINED STRENGTH (PSF)	TESTS -200 Wash (%)	TESTS ORGANICS (%)	TESTS COMPACTION (%)	REMARKS
0.5		Topsoil + Grass												
		Gravely Silt with Sand (ML), Brown Colored	SS	9-50	18/10 56%	5		0	0		59			
			SS	50-50	18/12 67%	5								
5														
6.0		Sandy Silty (ML), Brown Colored	SS	50-50	18/13 72%	4		0	0		65			
7.5		Granite	NX											
10			NX	RQD= 56%										
13.0		End of Boring												

WATER LEVEL OBSERVATIONS		
WL	▽	N/A
Cave Depth	▩	N/A

SGS TESTING
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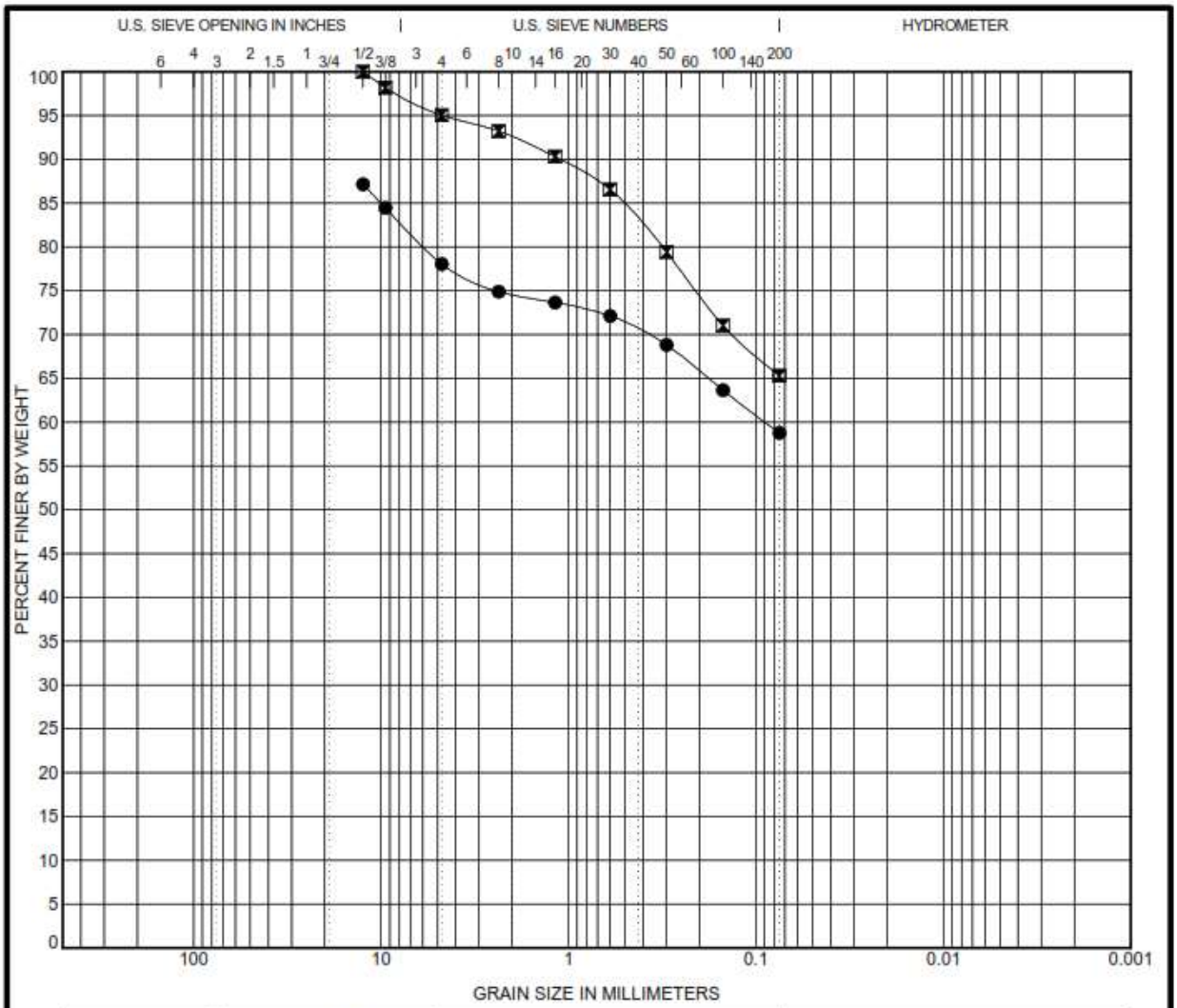
STARTED	6/30/20	FINISHED	6/30/20
DRILL CO.	SGS	DRILL RIG	CME 75
DRILLER	BB	ASS'T DRILLER	
LOGGED BY	MM	APPROVED	

GEOLOG 1 2003830 JEMEZ SPRINGS.GPJ GEOTECH.GDT 7/10/20

Lab Reports



Specimen Identification		Classification	LL	PL	PI	Cc	Cu
● BH1	1.0	GRAVELLY SILT with SAND ML	NP	NP	NP		
⊠ BH1	6.0	SANDY SILT ML	NP	NP	NP		

Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● BH1	1.0	12.5	0.089			9.1	19.3	58.8	
⊠ BH1	6.0	12.5				5.0	29.7	65.3	

US_GRAIN_SIZE 2003830 JEMEZ SPRINGS.GPJ US_LAB.GDT 7/10/20

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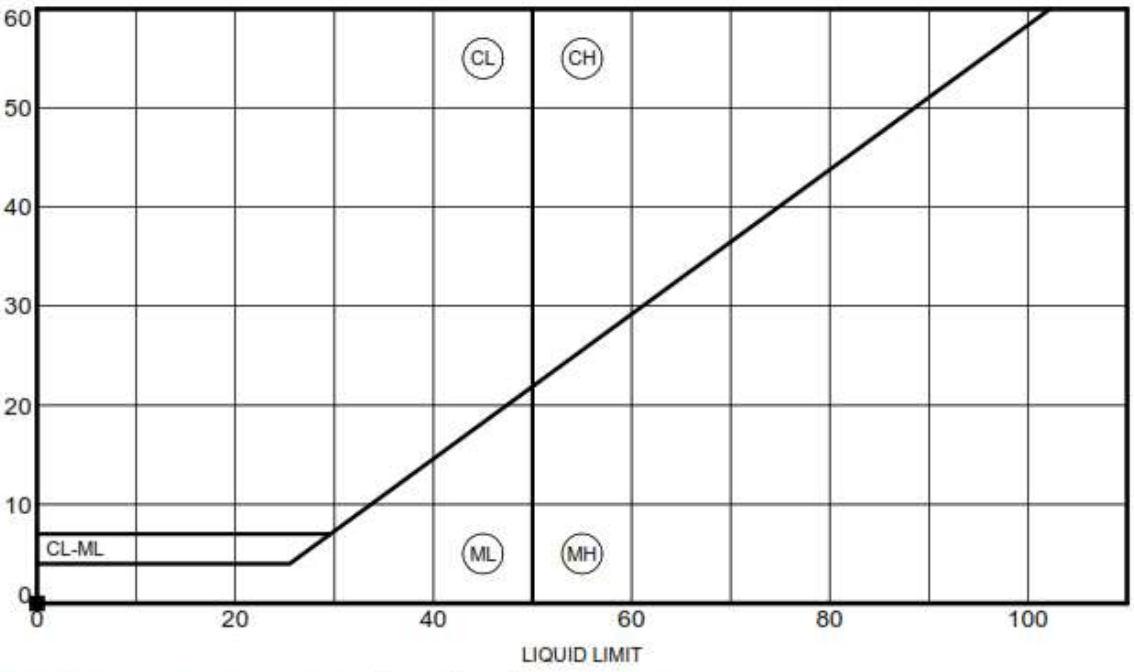
GRAIN SIZE DISTRIBUTION

Project: 62ft Monopole
Location: Jamez Springs, NM
Number: 2003830



	Specimen Identification		LL	PL	PI	Fines	Classification
●	**BH1**	**1.0**	**NP**	**NP**	**NP**	**59**	**GRAVELLY SILT with SAND ML**
⊠	**BH1**	**6.0**	**NP**	**NP**	**NP**	**65**	**SANDY SILT ML**

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ATTERBERG LIMITS' RESULTS

Project: 62ft Monopole
Location: Jamez Springs, NM
Number: 2003830

US ATTERBERG LIMITS 2003830 JEMEZ SPRINGS.GPJ US_LAB.GDT 7/10/20

Seismic Design Values

ASCE 7 Hazards Report

Address:
No Address at This Location

Standard: ASCE/SEI 7-16
Risk Category: II
Soil Class: C - Very Dense Soil and Soft Rock

Elevation: 6333.76 ft (NAVD 88)
Latitude: 35.771536
Longitude: -106.688798

ASCE
AMERICAN SOCIETY OF CIVIL ENGINEERS

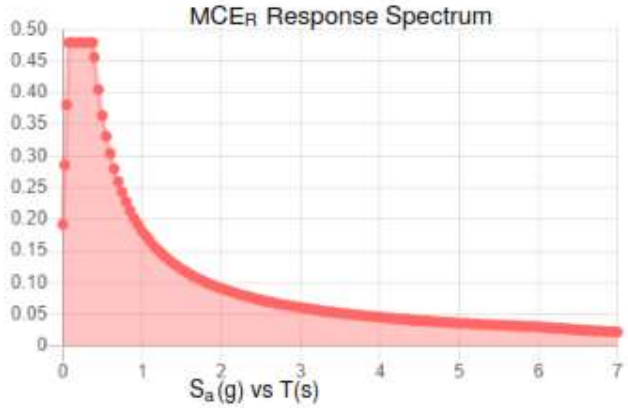
Seismic

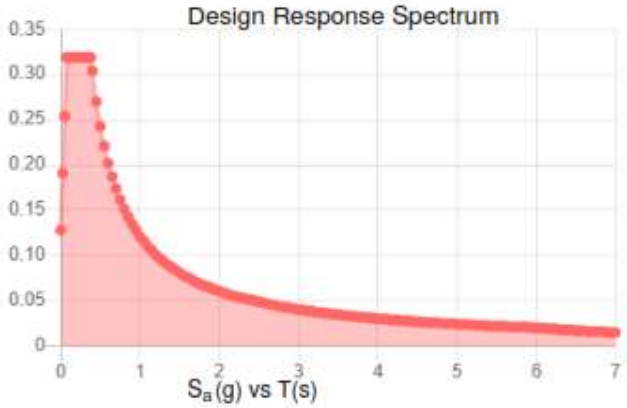
Site Soil Class: C - Very Dense Soil and Soft Rock

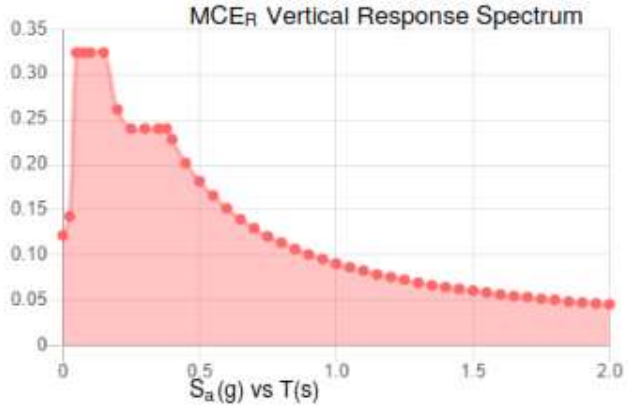
Results:

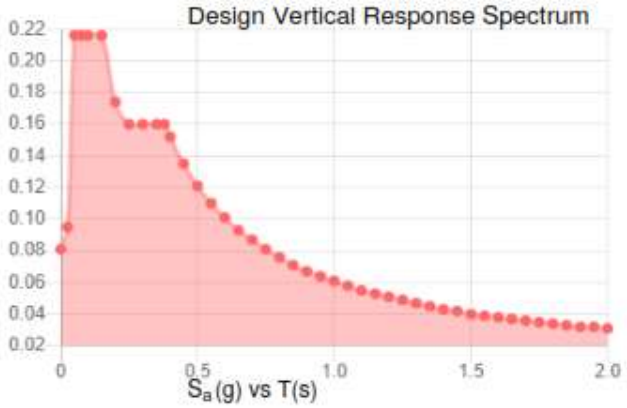
S_S :	0.369	S_{D1} :	0.121
S_1 :	0.121	T_L :	6
F_a :	1.3	PGA :	0.162
F_v :	1.5	PGA_M :	0.201
S_{MS} :	0.479	F_{PGA} :	1.238
S_{M1} :	0.182	I_e :	1
S_{DS} :	0.319	C_v :	0.846

Seismic Design Category B









Data Accessed: Fri Jul 10 2020

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.