FDH Engineering, Inc., 2730 Rowland Road, Raleigh, NC 27615, Ph: 919.755.1012, Fax 919.755.1031

Geotechnical Evaluation of Subsurface Conditions

Monopole Tower

Report Prepared for
T-Mobile

Site Name: SF429 Hagemann Meat Company
Site ID: BA00429A

18401 S Highway 1 - Bodega Bay, CA 94923
Lat: 38.339080
Lon: -122.991508

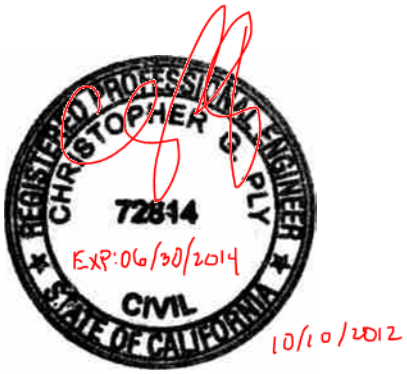
FDH Project Number 1209075EG1

Prepared by:

Michael B. Lazar, E.I.
Geotechnical Engineer

Christopher G. Ply, P.E.
Vice President

FDH Engineering, Inc.
2730 Rowland Rd. Suite 100
Raleigh, NC 27615
(919)-755-1012
info@fdh-inc.com



10/10/2012

FDH Engineering, Inc., 2730 Rowland Road, Raleigh, NC 27615, Ph: 919.755.1012, Fax 919.755.1031

EXECUTIVE SUMMARY

Project Location: 18401 S Highway 1 – Bodega Bay, CA 94923
Structure Type: Monopole
Site ID/Number: BA00429A
Number of Borings: One (1)
Depth of Borings: B-1 to 20.0 ft

INTRODUCTION

FDH Engineering, Inc. has completed the authorized subsurface investigation to evaluate foundation support conditions for the aforementioned telecommunication tower structure. Subsurface conditions were evaluated by obtaining one (1) test boring near the tower's foundation elements base as shown on Figure 1. The boring was sampled at selected intervals using standard penetration test procedures designated in ASTM D-1586, with auger refusal at 9.0 ft. Coring techniques designated in ASTM D-2113 were used to advance B-1 into the underlying rock. This report presents the findings of our work along with soil strength design parameters for use in analyzing the existing foundation support characteristics.

FOUNDATION DESCRIPTION

Based on the Structural Design Report prepared by Sabre Communications (Job No. 04-12086, Revision B), dated May 5, 2004, the structure was designed to be supported by the following foundation:

Foundation Type: Pad and pier foundation. The pad has dimensions of 17.5 ft x 17.5 ft, 4.0 ft thick, with a bottom surface resting 3.0 ft below grade. The pad supports a 5.0 ft diameter pier.

This report presents our findings and recommendations for soil strength design parameters that are to be used only for foundation engineering analyses and/or design, and not for construction.

SUBSURFACE CONDITIONS

Based on the field boring record and laboratory test results, the subsurface conditions on site can be generalized using the following strata descriptions:

Strata #	Approx. Depth (ft)	General Description
I	0.0 – 9.0	Very dense fine SANDY SILT (ML) with trace fine gravel
II	9.0 – 20.0	Very soft, highly fractured SILTSTONE

GROUNDWATER

Groundwater was not encountered in soil boring B-1 at the time of drilling. However, regional groundwater levels will fluctuate with seasonal and climactic changes and may be different at other times.

FDH Engineering, Inc., 2730 Rowland Road, Raleigh, NC 27615, Ph: 919.755.1012, Fax 919.755.1031

RECOMMENDATIONS

The following recommendations are made based on our review of the attached test boring data and laboratory results, along with our past experience with similar projects and subsurface conditions. Ultimate soil strength design parameters are presented on the attached Table 1. Based on the TIA Standard (TIA-222-G), dated August 2005, the recommended design frost penetration depth to be used for Sonoma County, California is 5-inches (0.4 ft).

Pad & Pier Foundation

The tower's foundation capacity can be determined using the soil's bearing capacity, passive pressure resistance, and a sliding friction factor. For these calculations we recommend the following:

- **Net Ultimate Bearing Capacity**: 30,000 psf. This value is an ultimate value and an appropriate factor of safety should be used.
- **Ultimate Passive Pressure vs. Depth**: Shown in Figure 2. This figure contains ultimate values and an appropriate factor of safety should be used. These values have been reduced for frost penetration to a depth of 0.4 ft.
- **Sliding Friction Factor**: 0.35

LIMITATIONS

All opinions and conclusions are considered accurate to a reasonable degree of engineering certainty based upon the evidence available at the time of this report. All opinions and conclusions are subject to revision based upon receipt of new or additional/updated information. All services are provided exercising a level of care and diligence equivalent to the standard and care of our profession. No other warranty or guarantee, expressed or implied, is offered. Our services are confidential in nature and we will not release this report to any other party without the client's consent. The use of this engineering work is limited to the express purpose for which it was commissioned and it may not be reused, copied, or distributed for any other purpose without the written consent of FDH Engineering, Inc.

FDH Engineering, Inc., 2730 Rowland Road, Raleigh, NC 27615, Ph: 919.755.1012, Fax 919.755.1031

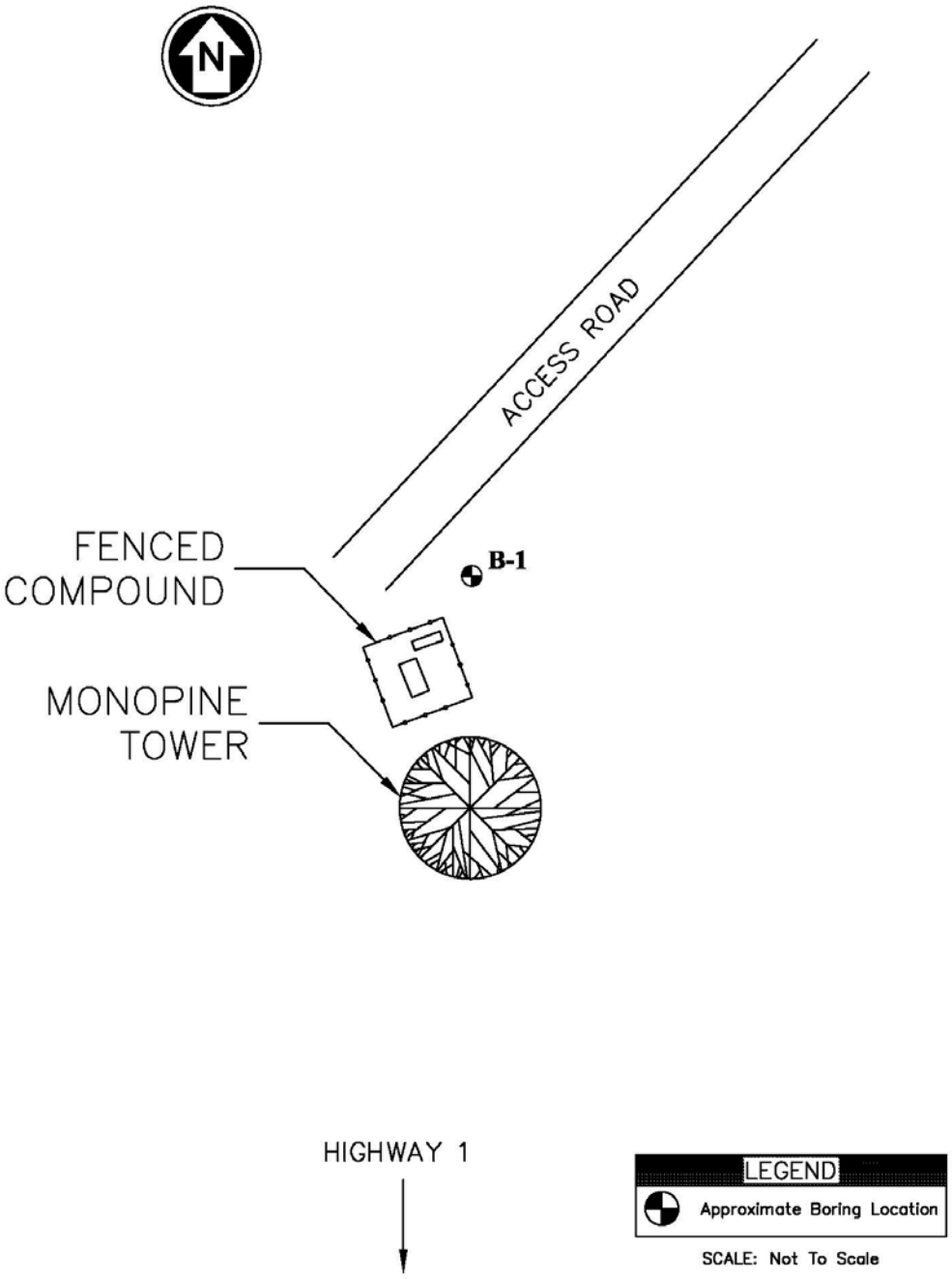
Table 1
ULTIMATE SOIL STRENGTH PARAMETERS

SF429 Hagemann Meat Company
Site ID: BA00429A

Boring #	Depth (ft)	Unified Soil Classification	*Moist Unit Weight (pcf)	Friction Angle (degrees)	Cohesion (psf)	Modulus (pci)	ε_{50}
B-1	0.0 – 9.0	ML	125	40	0	270	--
	9.0 – 20.0	SILTSTONE	135	0	6,000	1,200	0.004

FDH Engineering, Inc., 2730 Rowland Road, Raleigh, NC 27615, Ph: 919.755.1012, Fax 919.755.1031

FIGURE 1: Site Plan – 18401 S Highway 1 - Bodega Bay, CA 94923



Boring B-1 located 30.0 ft from existing monopine

FDH Engineering, Inc., 2730 Rowland Road, Raleigh, NC 27615, Ph: 919.755.1012, Fax 919.755.1031

FIGURE 2: Ultimate Passive Resistance vs. Depth
Soil Boring B-1