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February 6, 2009

Tompkins Architects
612 NW Kay Drive
Lee's Summit, Missouri 64063

Attn: Mr. James E. Tompkins

Re: Geotechnical Engineering Services Supplemental Report
Proposed Out-Patient Mental Health Building
Overton Brooks VAMC
Shreveport, Louisiana
Project No. VA256-08-RP-0307
PSI Project Number 249-85040(1)

Dear Mr. Tompkins:

Per your authorization, PSI has completed a supplemental geotechnical engineering study for the referenced project. This supplement is intended to be an expansion to the deep foundation recommendations section of our original report and is to be used in conjunction with the recommendations of the original report. This study was done to verify the soil characteristics between thirty and seventy feet deep and to allow recommendations for a deep foundation system using drilled and cast in place shafts.

The soils found in the additional depth explored consisted of hard clay mixed with intermittent strata of lignite. Detailed soil descriptions can be found on the attached boring logs.

Load curves for various diameter drilled and cast in place shafts are also attached. The curves include a safety factor of two applied to both skin friction and end bearing values.

Lateral forces will be resisted by passive soil pressure acting on pile caps below grade as well the soil and the rigidity of the shafts. Once the locations, loads and other pertinent information are provided, PSI can assist in performing shaft lateral load analyses based on methods ranging from chart solutions to the 'p-y' approach utilizing computer programs such as LPILE or COM 624. The relationship between the soil resistance (p) and pile deflection (y) is commonly referred to as 'p-y'. Soil resistance (p) along the depth of the shaft is expressed as a non-linear function of lateral shaft deflection (y). Various researchers developed 'p-y' criteria for different kinds of soils. Lateral design information regarding the 'p-y' data is provided in Table 1.

Table 1: Soil Parameters for use in the Lateral Load Analyses

Stratum	Soil Criteria	Effective Unit Weight, γ (pcf)	S_u (psf), or ϕ (degrees)	K_c (pci)	ε_{50}
I* (0 to 4)	Medium Clay	Neglect	Neglect	Neglect	Neglect
II (4 to 15)	Stiff Clay	120	$S_u = 1300$	$K_c = 200$	$\varepsilon_{50} = 0.007$
V (15 to 70)	Hard Clay	58	$S_u = 3000$	$K_c = 400$	$\varepsilon_{50} = 0.005$

Note: S_u-Undrained Shear Strength (psf); k_c-modulus of subgrade reaction (pci) for cyclic loading condition; ε_{50} – strain corresponding to one-half the principle stress.

Groups of shafts can have less capacity than the sum of the individual shafts due to the group effect. Maintaining a minimum spacing of three (3) shaft diameters will lessen the possibility of the group effect occurring. If maintaining the recommended minimum spacing is impractical, PSI should be contacted for further evaluation of the shaft after the actual shaft spacing is determined. Construction sequence and other installation issues must be addressed if the shaft spacing is designed to be closer.

Drilled Shaft Considerations

It is recommended the design and construction of drilled shafts should generally follow methods outlined in the manual titled Drilled Shafts: Construction Procedures and Design Methods (Publication No: FHWA-IF-99-025, August 1999).

Drilled shaft excavations below the groundwater depth or through sand strata may experience problems with ground water infiltration or sloughing soil and require the use of casing or drilling slurry.

The successful completion of drilled pier excavations will depend, to a large extent, on the suitability of the drilling equipment together with the skill of the operator. The sequence of operations should be scheduled so that each pier can be drilled, reinforcing steel placed, and the concrete poured in a continuous, rapid, and orderly manner to reduce the time the excavation is open.

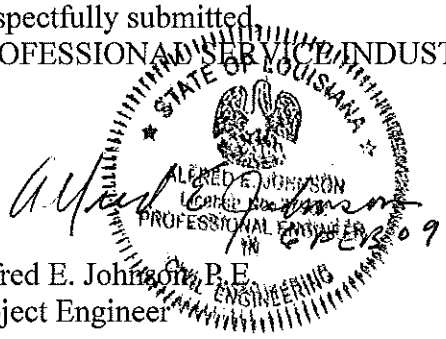
Shafts should be clean and be free of all loose materials prior to placement of concrete. The drilled shafts should be installed in accordance with the guidelines provided in FHWA-IF-99-025. We recommend a PSI representative should verify the bearing stratum, bearing depth, bearing soil condition and bearing area prior to placing the reinforcing steel and concrete.

Competent supervision is essential during installation of the drilled shaft foundations in order to assure construction is performed in accordance with the plans and specifications. Also, to insure proper construction of the drilled piers at this site, close coordination between the drilling and concreting operations is considered to be of great importance. Detailed inspection of drilled shaft construction should be made to verify the shafts are vertical and founded in the proper bearing stratum and to verify all loose materials have

been removed prior to concrete placement.

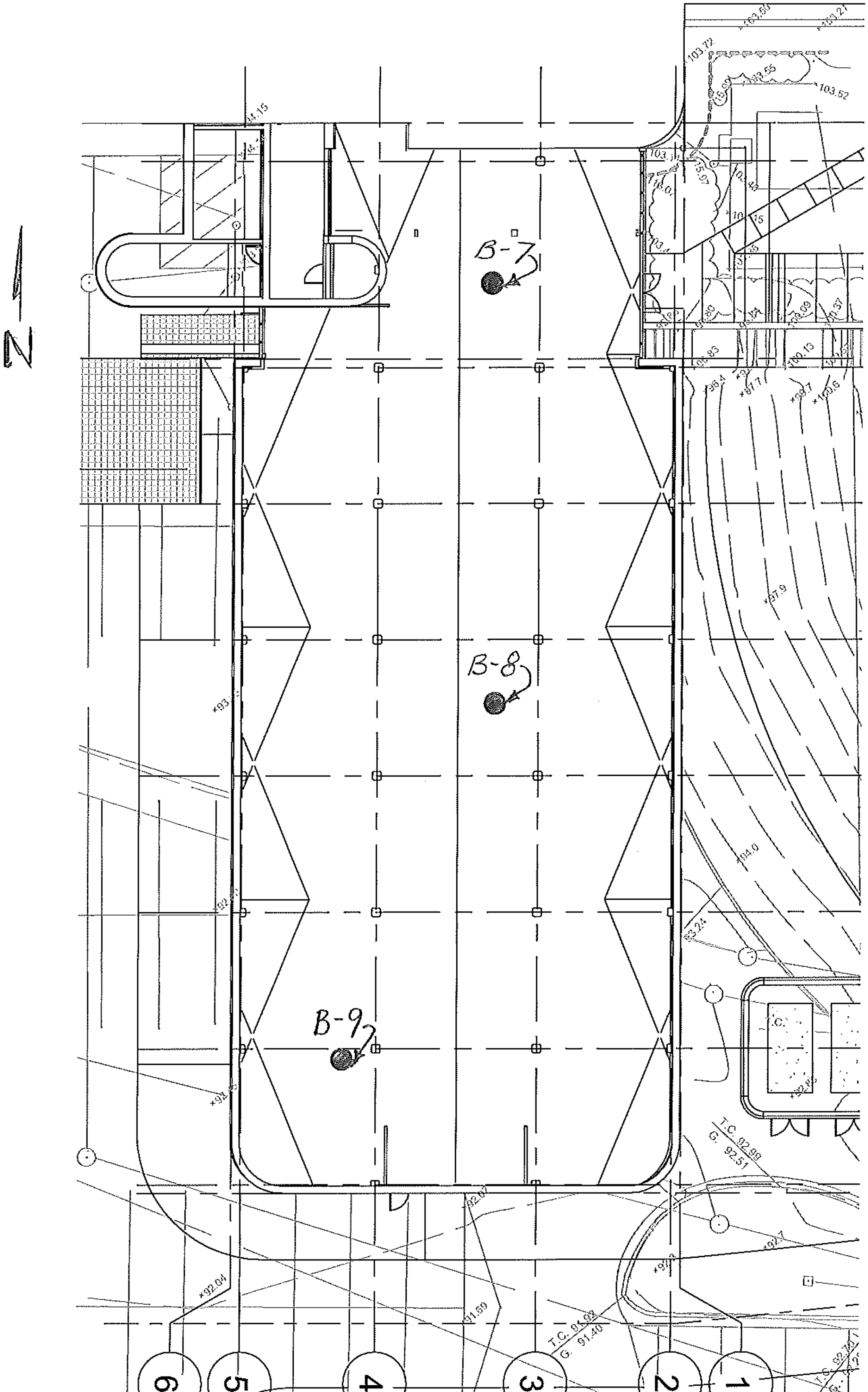
If you have any questions pertaining to this report, please contact our office at (318) 631-5547. PSI would be pleased to continue providing geotechnical services throughout the implementation of the project, and we look forward to working with you and your organization on this and future projects.

Respectfully submitted,
PROFESSIONAL SERVICE INDUSTRIES, INC.



Alfred E. Johnson, P.E.
Project Engineer

Geotechnical Engineering Services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B-7
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Professional Service Industries, Inc.

Record of Subsurface Exploration

Boring: B-7

Project Name: VA Hospital

Date of Boring: January 30, 2009

Site:

Project No: 249-95004

Description	Depth feet	Sample type	N	Qu tsf	Qp tsf	δd pcf	Mc %	LL	PI	-200	Remarks
Surface											
Hard Gray Lean Clay (CL)	35	SS	51	–	–	–	–	–	–	–	–
	40	SS	50	–	–	–	–	–	–	–	–
---Becomes Sandy at 43'	45	SS	50@5.5	–	–	–	–	–	–	–	–
---Becomes without Sand at 48'	50	SS	48	–	–	–	–	–	–	–	–
	55	SS	57	–	–	–	–	–	–	–	–
	60	SS	60	–	–	–	–	–	–	–	–
	65	SS	61	–	–	–	–	–	–	–	–
	70	SS	50@5.5	–	–	–	–	–	–	–	–
No water encountered Boring terminated at 70'	75		–	–	–	–	–	–	–	–	–
	80		–	–	–	–	–	–	–	–	–

Professional Service Industries, Inc.

Record of Subsurface Exploration

Boring: B-8

Project Name: VA Hospital

Date of Boring: January 30, 2009

Site:

Project No: 249-95004

Description	Depth feet	Sample type	N	Qu tsf	Qp tsf	δd pcf	Mc %	LL	PI	-200	Remarks
Surface											
Hard Gray Lean Clay (CL)	35	SS	47	–	–	–	–	–	–	–	–
	40	SS	48	–	–	–	–	–	–	–	–
Hard Gray Silty Clay (CL-ML)	45	SS	50@4	–	–	–	–	–	–	–	–
Hard Gray Lean Clay with Lignite (CL)	50	SS	50@5	–	–	–	–	–	–	–	–
---Becomes with Silt Lenses at 53'	55	SS	72	–	–	–	–	–	–	–	–
---Becomes without silt lense at 58'	60	SS	62	–	–	–	–	–	–	–	–
	65	SS	64	–	–	–	–	–	–	–	–
	70	SS	59	–	–	–	–	–	–	–	–
No water encountered Boring terminated at 70'	75		–	–	–	–	–	–	–	–	–
	80		–	–	–	–	–	–	–	–	–

Professional Service Industries, Inc.

Record of Subsurface Exploration

Boring: B-9

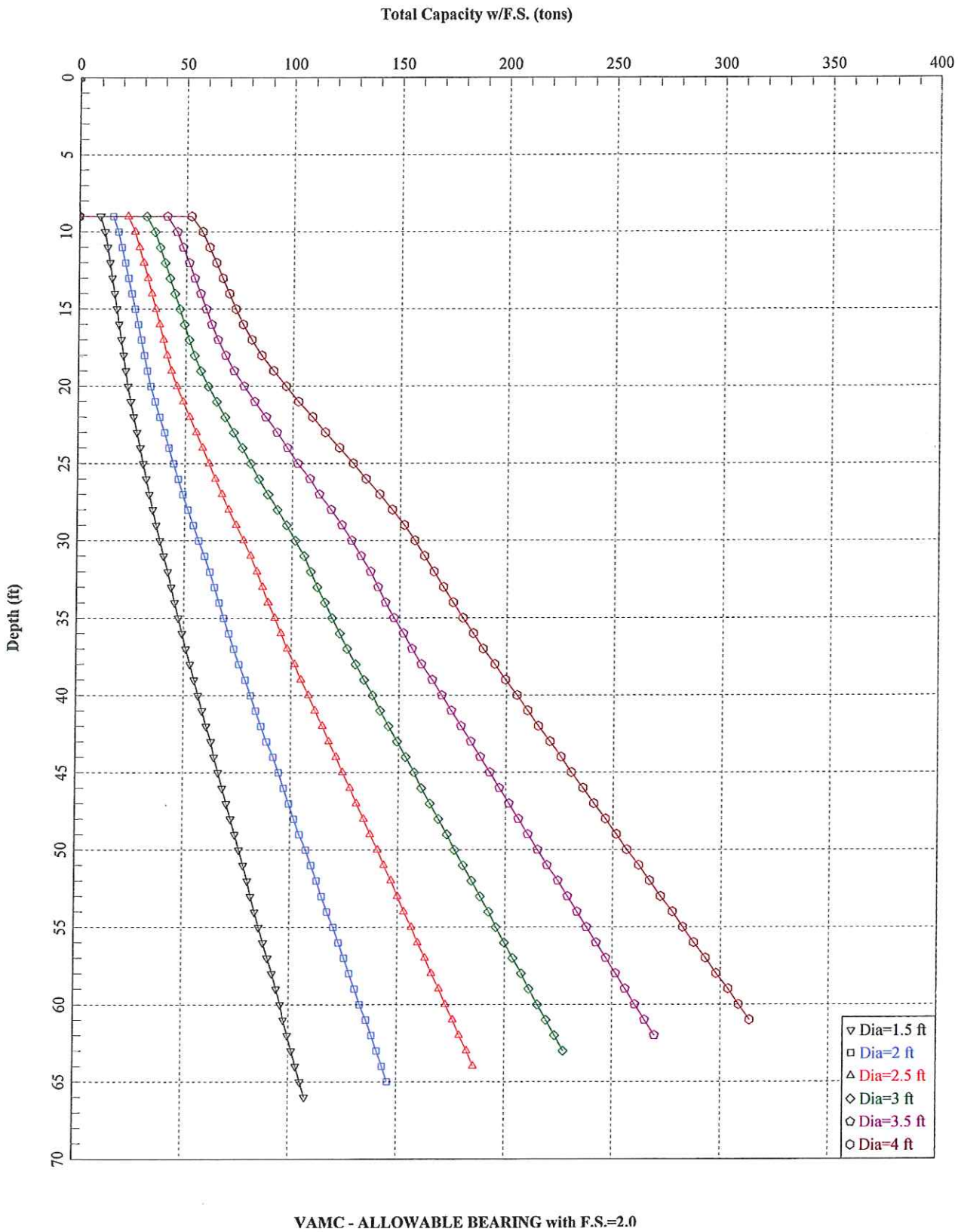
Project Name: VA Hospital

Date of Boring: January 30, 2009

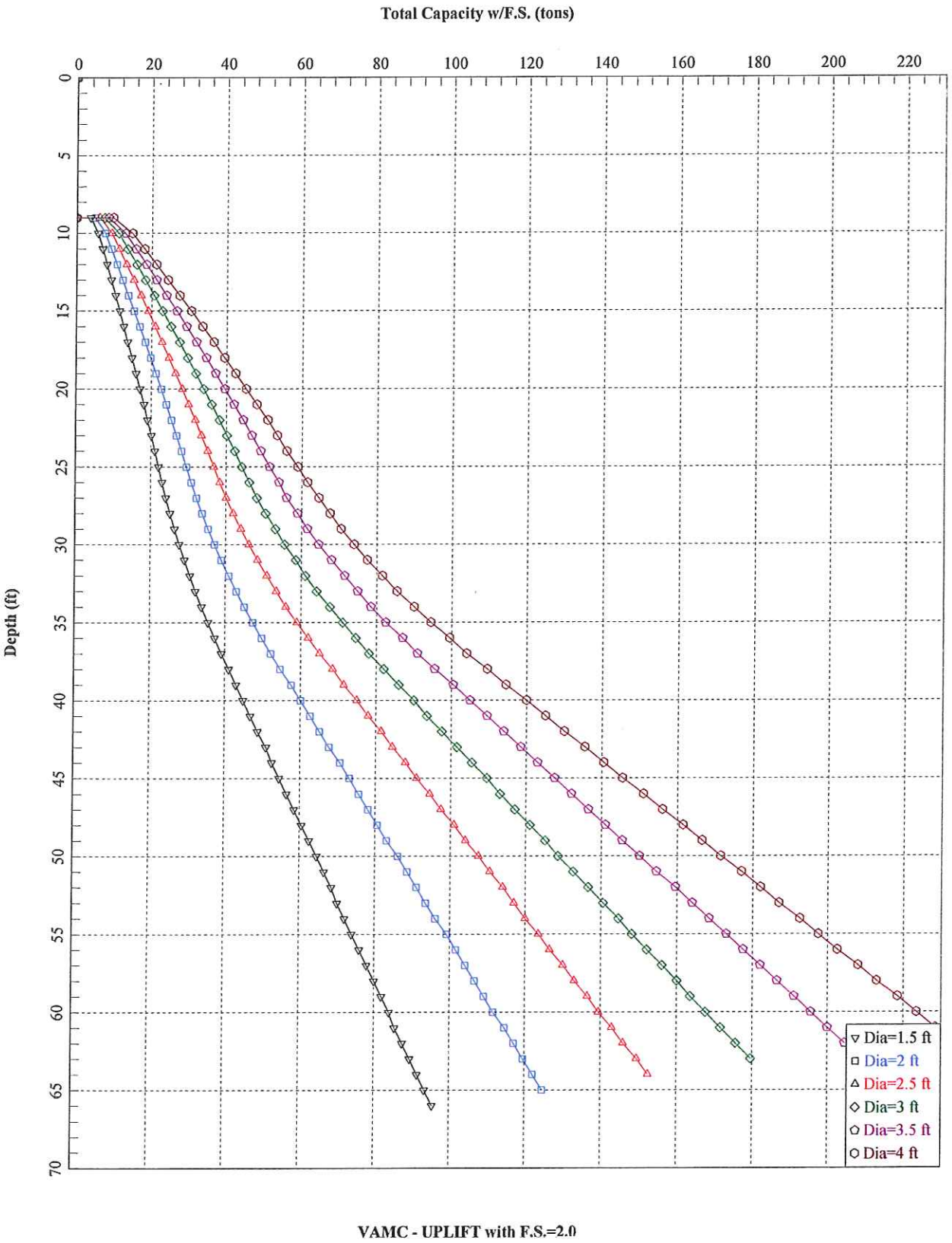
Site:

Project No: 249-95004

Description	Depth feet	Sample type	N	Qu tsf	Qp tsf	δd pcf	Mc %	LL	PI	-200	Remarks
Surface											
Hard Gray Lean Clay (CL)	35	SS	50@5	–	–	–	–	–	–	–	–
---with Lignite at 38'	40	SS	50@5.5	–	–	–	–	–	–	–	–
	45	SS	52	–	–	–	–	–	–	–	–
---with Lignite at 48'	50	SS	69	–	–	–	–	–	–	–	–
	55	SS	73	–	–	–	–	–	–	–	–
---with Lignite at 58'	60	SS	50@4	–	–	–	–	–	–	–	–
	65	SS	58	–	–	–	–	–	–	–	–
	70	SS	57	–	–	–	–	–	–	–	–
No water encounted Boring terminated at 70'	75		–	–	–	–	–	–	–	–	–
	80		–	–	–	–	–	–	–	–	–



VAMC - ALLOWABLE BEARING with F.S.=2.0



VAMC - UPLIFT with F.S.=2.0