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GEOLABS-WESTLAKE VILLAGE

Foundation and Soils Engineering, Geology

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W.O. 7632

ENVIRONMENTAL SERVICES

3802-ELL
Rec'd 5/11/88

Pactel Mobile Access
2355 Main Street
Irvine, California 92713

ATTENTION: Mr. Joe Cylwik

SUBJECT: Geotechnical Investigation for Proposed Monopole
Antenna, 30940 Hawthorne Boulevard,
City of Rancho Palos Verdes, California

Dear Mr. Cylwik:

In accordance with your request, our firm has undertaken a study of the geotechnical conditions at the subject property. Our purpose was to evaluate the distribution and engineering characteristics of the earth materials which occur at the site so that we might assess their impact upon the proposed development of the property.

The scope of work for this project included: 1) geologic mapping of the site and its immediate vicinity; 2) logging and sampling of one exploratory boring excavated with a truck-mounted bucket auger; 3) selected laboratory testing of the retrieved samples; 4) review of previous work which was judged both pertinent to our purpose and readily available to our office; 5) soil engineering analysis of the assembled data; and 6) preparation of this report. The approximate location of the exploratory excavation is shown on the attached plot map, Plate 1. Descriptions of the materials encountered in the exploratory are

provided on the enclosed log (Plate 2.1). Pertinent laboratory test results are also provided herein.

PROPOSED PROJECT

Based upon the site plans submitted to our office and conversation between our offices, the project consists of the development and construction of an 80-85 foot monopole antenna adjacent to the south side of a two story office building. The building is occupied by the City of Rancho Palos Verdes and the complex has a street address of 30940 Hawthorne Boulevard, in the city of Rancho Palos Verdes, California. The antenna is to be located between the building wall (north) and the existing concrete walkway (south), and west of the building doorway.

The anticipated vertical load for the antenna is approximately eleven (11) kips with a base moment of 578 ft/kips.

SITE DESCRIPTION

The site, as indicated on the drawings submitted to this office, consist of a relatively flat, level grass area located between an existing two-story building to the north, and paved parking/access roads to the west and south. Concrete walkways cross irrigated grass areas surrounding the site from the access road, parking areas, and adjacent buildings to the building immediately adjacent (north) of the site. Beside the aforementioned grass, small trees and brushes flank portions of the concrete walkways.

In addition to the irrigation lines present in the grass area, a water line parallels the south side of the two-story building and crosses under the sidewalk to the grass area. This water line (2 inches) rises above the ground approximately half way across the grass area (south of the monopole site) to a fire access nozzle. Underground electric lines parallel the water line in places and feed light poles adjacent to the walkways.

FINDINGS

Earth Materials

As encountered in our boring, and exposed in outcrops about the site vicinity, the earthen materials at the site consist of a thin veneer of artificial fill overlying the sedimentary and metamorphic bedrock.

The artificial fill consists of approximately six (6) inches of brown colored, pebble, silty clay, plastic soil. This zone was moist, loose, and contained roots. Underlying this zone, the fill was encountered to a depth of approximately three feet (3) feet. These materials were found to consist of gravelly, silty clay, tan to brown colored, damp to moist, and typically medium dense.

The bedrock materials encountered at the site have been assigned to the Tertiary Aged Monterey Formation (Tm). The Monterey Formation, as it exists at this site, consist of massive to thin bedded, reddish to yellow brown, clayey sandstone, gravelly sandstone, with interbedded, hard, porcelaneous shale

and chert. The black to dark grey colored siliceous interbeds were noted as hard to very hard, fractured, and ranged in thickness from approximately one (1) inch to several feet. Additionally, within the massive sandstone strata (nearer surface), "clasts" of fractured, hard, porcelanitic and/or limestone were observed. These clasts ranged in size, the largest observed was several feet in diameter. Additionally, sections of volcanic rock was noted cropping out of the nearby roadcut along Hawthorne Boulevard.

Groundwater

Free groundwater was not encountered in our investigation. Groundwater is not anticipated to effect the proposed development.

LABORATORY TESTING

Bulk samples of soil and rock materials encountered at the site were collected during the course of our field work. Selected laboratory tests completed on the retrieved samples are described below:

Compaction and Expansion Tests

To determine the compaction characteristics of the onsite materials, compaction tests are performed in accordance with ASTM D 1557-78. The maximum dry density is reported in pounds per cubic foot and the optimum moisture content as a percentage of the maximum dry density. The results of these tests are included in Table I.

Shear Test

Shear tests were performed in a Direct Shear Machine of the strain control type. The rate of deformation is approximately 0.05 inches per minute. Shearing occurred under a variety of confining loads in order to determine the Coulomb shear strength parameters. The test was performed on remolded (@ 90% relative compaction) samples in an artificially saturated condition. The test results are presented graphically on Plates S1 and S2.

Laboratory Test DataTABLE 1

<u>Sample Description</u>	<u>Maximum Dry Density PCF</u>	<u>Optimum Moisture Content, %</u>
B1 @ Gravelly Sand 6-8' & Clayey Sandstone	112.0	16.4
B1 @ Red Brown 15-17' Clayey Sandstone	114.5	17.2

DISCUSSION AND RECOMMENDATIONS

Data from our field exploration and laboratory testing, coupled with the inferred conditions beyond our exploratory excavation, and our understanding of the proposed development, are the basis for the following discussion. Recommendations, based upon the presently available data, are presented for your consideration.

The on-site materials have been judged suitable for support of the proposed monopole tower antenna. It is anticipated that drilling for the foundation excavation should be able to proceed

with minor difficulties. Based upon the drilling of our excavation, the upper seventeen (17) feet is easily excavatable. However, nearby bedrock exposures of limestone clast, porcelanitic and/or volcanic intrusions may occur within this zone. These materials, if encountered, may slow the drilling to some extent. Below seventeen (17) feet, harder chert to porcelaneous shale beds were encountered. Although hard, the fractured nature of this material allowed drilling advancement of approximately ten (10) feet per forty (40) minutes (18" diameter bucket utilized).

A careful search should be made for abandoned or presently in-use utility lines. Where the proposed monopole is situated, no underground utility lines are anticipated. However, a water nozzle does exit the building approximately where the tower is proposed.

Additionally, depending upon the setback from the building to the north, footing material may be encountered which may inhibit construction. Care should be taken to reduce the chance of undermining the existing foundations and/or concrete walkways.

FOUNDATION SYSTEMS

The monopole antenna proposed for the site is to be supported via cast-in-place concrete friction pile. Enclosed as Plate 3 is the graphic presentation of allowable pile capacity plotted as a function of pile embedment. This reflects the frictional resistance for concrete against undisturbed bedrock.

Allowable pile capacities have been determined utilizing our exploration findings and resultant laboratory analysis, with a safety factor of two (2) in the calculation. The results of the weakest strength remolded shear tests was utilized in our calculation (remolded @ 90% relative compaction) in order to obtain a conservative estimate of the in-place bedrock strength parameters. We have taken five feet as the minimum pile diameter and utilized the weakest bedrock material type to model the foundation requirements. Larger diameter piles (or smaller) are not anticipated, although capacities for other diameter piles may be evaluated upon request.

Minimum pile embedment is recommended to be ten (10) feet. Caving is not anticipated, although minor sluffing or widening of the excavation may occur about the sandstone and porcelanitic/chert interface (± 17 ft) and within the sandstone conglomerate where larger gravels or clasts may be encountered. Care should be taken to reduce the sluffing as much as possible. Concrete must be placed in direct contact with the in-place materials in order to achieve the specified allowable capacities.

Lateral support may be taken from the passive pressure in the bedrock. An allowable bearing of 350 psf/ft to a limiting value of 3000 psf is considered appropriate for the conditions at hand.

Pull out resistance may be taken as one-half the allowable capacity. Capacities may be increased by one-third for short duration loading (i.e., by wind or seismic loading). Settlement

of the pile is anticipated to be less than one-half inch.

Lateral deflection of the five (5) foot diameter, cast-in-place pile is anticipated to be less than one-quarter inch.

Drainage

Positive control of surface water should be established. Water should be directed away from footings and not be allowed to flow over the tops of manufactured slopes. Ponding of water should be prevented.

Utility Trench Backfill

Backfill for utility trench excavations should be compacted to at least 90% relative compaction. Where installed in sloping areas, the backfill should be properly keyed and benched.

Construction Monitoring

Finalized grading plans and foundation plans should be submitted to this office. Additional recommendations may be provided at that time, if such are considered warranted.

Placement of all fill and backfill should be monitored by representatives of this office. This includes our observation of prepared bottoms prior to filling. All excavated slopes, both temporary and permanent, should be observed by a representative of this office. Supplemental recommendations may prove warranted based upon the materials exposed in the actual excavations.

Foundation excavations should be observed by representatives of this office to see if the recommended penetration of proper supporting strata has been achieved. Such observations should be made prior to placing concrete, steel or forms. This office

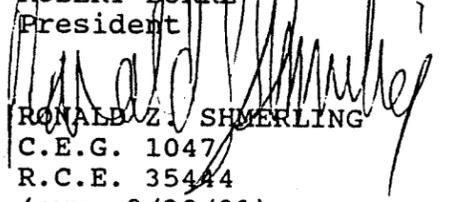
should be notified at least 24 hours prior to placing concrete.

Respectfully submitted,

GEOLABS-WESTLAKE VILLAGE


JEFFREY C. OBRECHT
Staff Geologist

Reviewed by:


ROBERT BURKE
President

RONALD Z. SHIERLING
C.E.G. 1047
R.C.E. 35444
(exp. 9/30/91)

JCO/dc

- Enclosures: Site Location Map-----Plate 1.0
- Exploratory Boring Log-----Plate 2.1
- Shear Test Diagram-----Plate S1 & S2
- Allowable Bearing-----Plate 3.0

XC: (6) Addressee

LOG OF BORING

Number: 1

GEOLABS-WESTLAKE VILLAGE
742-C HAMPSHIRE ROAD
WESTLAKE VILLAGE CA 91361

drop weight
- ft.
- ft.
- ft.

w.o.: 7632
drill date: 3-11-88
logged by: JCO
type rig:

DEPTH H	MOISTURE		DRY. DEN.	DESCRIPTION
	SPT	N %		
				Artificial Fill (af): gravelly, Silty Clay (CL-CH), numerous rock fragments from <1/2" to 10", brown to tan, moist, upper 6" soil with grass, fewer pebbles
5				Bedrock; Monterey Formation (Tm): change to Sandstone conglomerate, brown to red-brown, dense, damp, angular rocks with bentonite pockets
10				Sandstone with gravel to Sandstone conglomerate, breaks to sandy gravel to gravelly Sand (GP-SP), yellow brown, angular rock fragments average 3", very numerous, larger rock fragments, dense, damp, becoming sandier and redder with depth, some bentonite clasts
15				Clayey Sandstone: with silt and scattered gravel, sand fine to coarse grained, average medium, red-brown, damp, medium dense with alternating gravelly Sand (SP), clay is bentonitic
20				Ironoxide staining below 12', easily drilled Occasional larger rock to 8-10", in sand with smaller gravel, red-brown, damp, non-structured, grey sand pockets and white bentonitic pockets
25				Black to dark grey, slightly fractured chert to porcelanitic Return to red-brown, gravelly Sandstone (classifies SP) to Sandstone conglomerate, minor Silt and Clay, minor caving @ 19', associated with fractured siliceous material
30				Return to black grey, siliceous shales and Sandstone, very hard to hard, slow advance continue same as above
35				Black grey, siliceous/chert layers and Sandstone, dry, very hard
				Bottom @ 37', No groundwater, No caving
40				

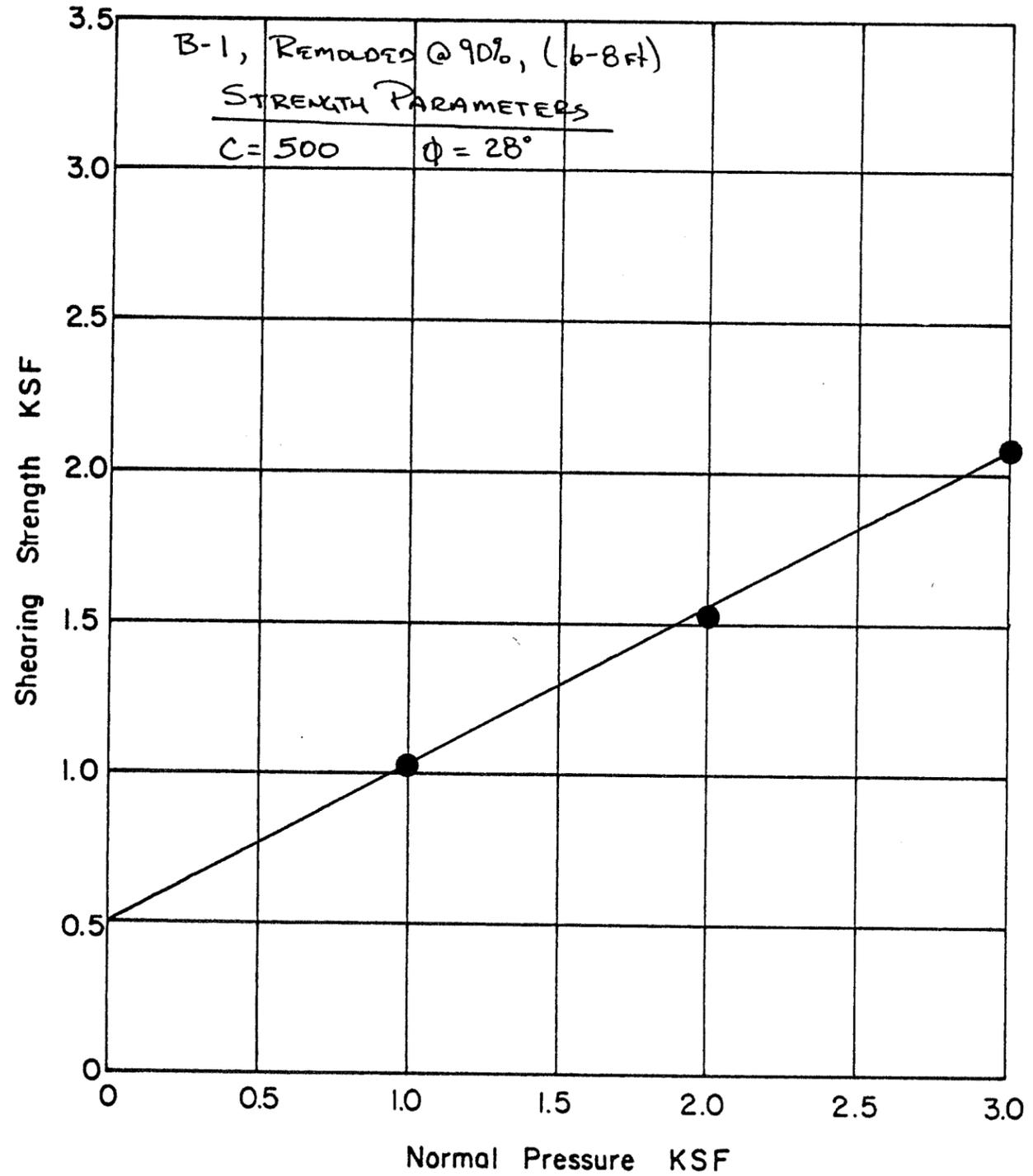
GEOLABS

Date 3/88

Job PACTEL - PALOS VERDE

W.O. 7632

SHEAR TEST DIAGRAM



Key:

- Tests at field moisture content.
- Tests at saturated moisture content.

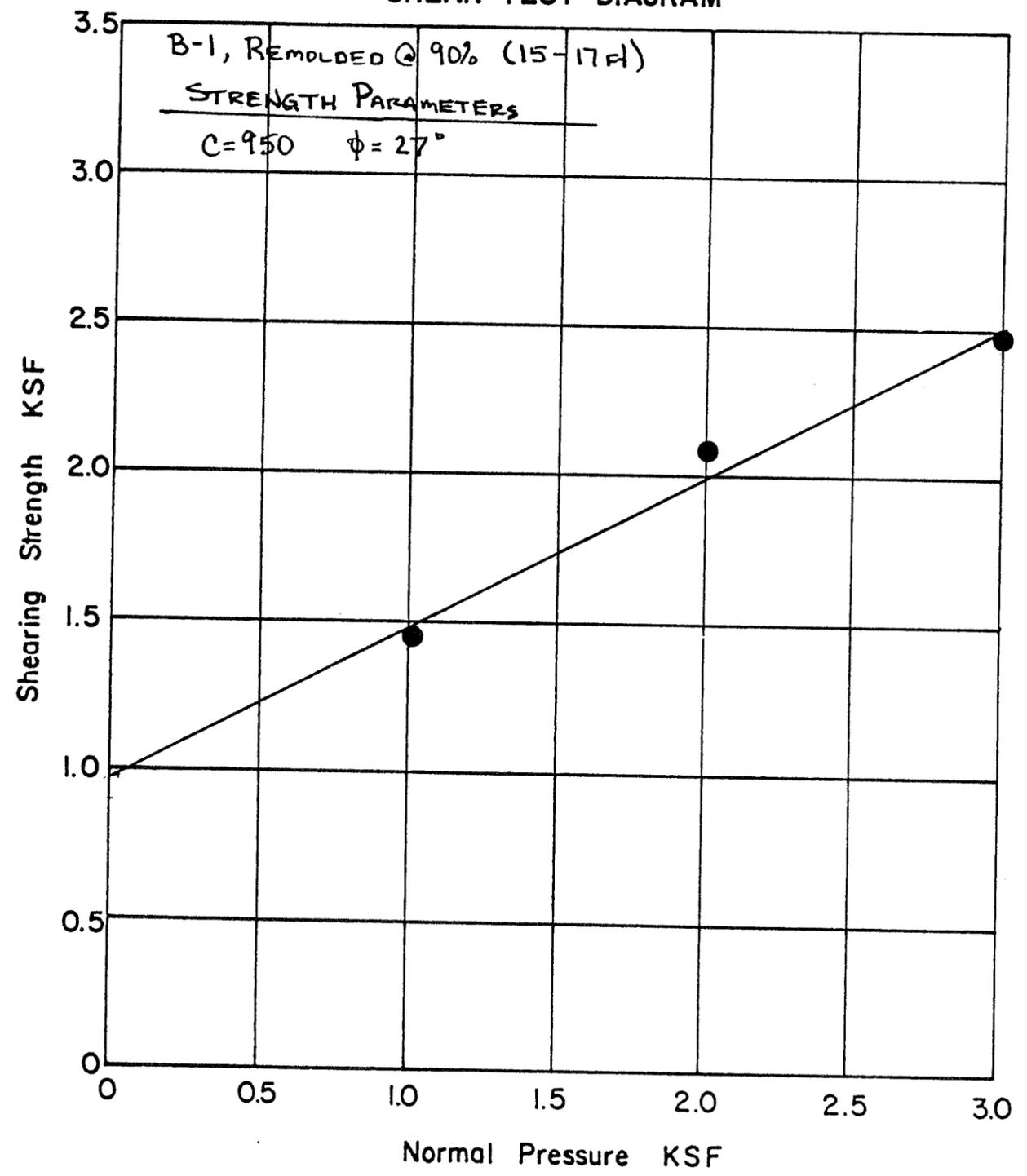
GEOLABS

Date 3/88

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SHEAR TEST DIAGRAM



- Key:
- Tests at field moisture content.
 - Tests at saturated moisture content.

FRICION PILE CAPACITIES

(drilled, cast-in-place, SF=2)

Soil Data:

Density= 115 pcf
 Cohesion= 500 psf
 Phi= 28 deg.
 Water Depth= 100 ft.

Pile Configuration:

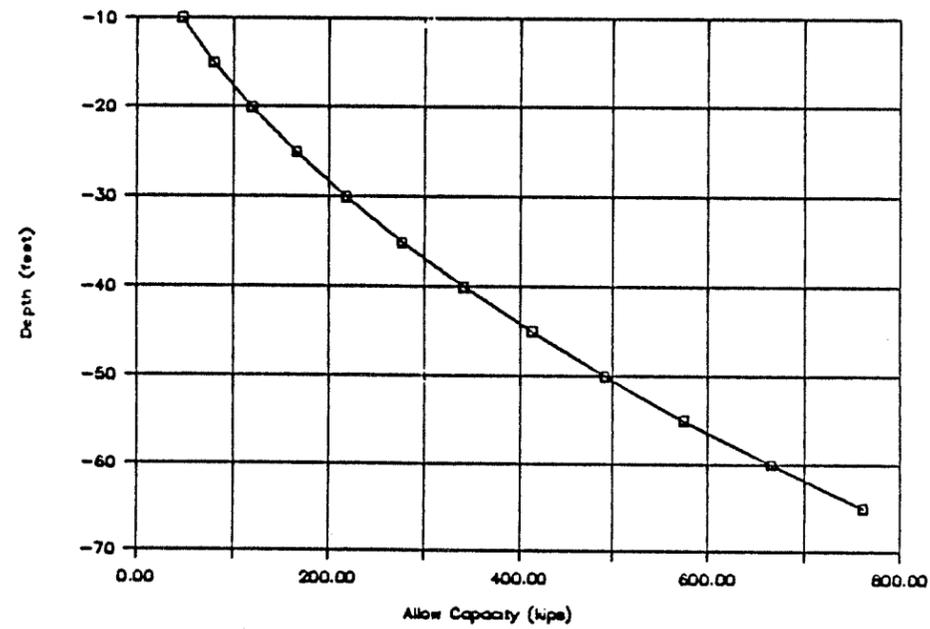
Non-Bearing Depth= 0 ft.
 Diameter= 5 ft.
 Min. Embedment= 10 ft.
 Depth Increment= 5 ft.

Calculations:

qu= 1664.3 C'= 438.5
 Depth F(ult) Q(ult) Allow. Capacity

Depth	F(ult)	Q(ult)	Allow. Capacity
10	0.601	94	47
15	0.682	161	80
20	0.763	240	120
25	0.844	331	166
30	0.925	436	218
35	1.006	553	277
40	1.087	683	342
45	1.168	826	413
50	1.250	981	491
55	1.331	1150	575
60	1.412	1330	665
65	1.493	1524	762

FRICION PILE CAPACITIES





Geolabs-Westlake Village
 GEOLOGY AND SOIL ENGINEERING

DATE 3/88 BY JCO
 SCALE N/A NO. 7632

