

city

*Coast-Valley
Testing, Inc.*

Order Number

50311

Reference Number

08-6254

Foundation Exploration

For

Sharon Clenet

1211 Harbor Hills Drive

Santa Barbara, California 93109

Proposed

Residence

1213 Harbor Hills Drive

Santa Barbara, California 93109

March 11, 2008

RECEIVED
AUG 26 2009

CITY OF SANTA BARBARA
PLANNING DIVISION

360 South Fairview Avenue Suite A, Goleta, California 93117
Goleta Office (805) 964-3509

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Los Olivos Office (805) 688-3577

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March 11, 2008

Order Number: 50311

Reference Number: 08-6254

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INTRODUCTION

The proposed single family residence is to be located at 1213 Harbor Hills Drive in Santa Barbara, California as shown on Appendix # 1. The site is presently undeveloped. Site drainage is to the South/West at slopes of 5 to 35 percent.

It is the purpose of this investigation to provide sufficient information about the soils in the supporting soil mantle to enable a suitable foundation design for the proposed structure. This investigation does not include analysis of any geological conditions such as: faults, fractures, potential geological movement. This investigation was conducted in accordance with presently accepted soils engineering procedures consistent with the proposed development and no warranty is implied.

FIELD INVESTIGATION

The subsurface soil conditions were explored by 3 auger borings that were drilled to depths of up to 25.0 feet below present ground surface. Soil samples were obtained during the drilling operations for laboratory testing and analysis and the borings were supplemented by 3-field density test that were performed by the tube method. The boring and density test locations are shown on Appendix # 1, while the boring data is presented graphically on Appendix # 2 thru #4.

LABORATORY TESTING

Laboratory testing and analysis consisted of soil field moisture content summary, Maximum Density-Optimum Moisture content determinations, field density summary, soil grain size analysis (mechanical and hydrometer method), and soil expansion potential tests. The results of our laboratory testing are presented in the Appendix.

FINDINGS

1. No free ground water was encountered in the borings.
2. In general, the top 36 to 48 inches of existing surface soils were found to be loose and porous, becoming firm below this depth.
3. The existing surface soils were found to be moderately expansive.
4. At the time of this exploration, surface vegetation consisted of a low grasses and weeds.

SLOPE STABILITY ANALYSIS:

A slope stability analysis was performed at the existing site topography, as developed by Dodson Land Surveys and presented to this office prior to our investigation. The slope stability analysis was performed using the RockScience Computer Program Slide 5.0 for both the Bishop and Janbu Simplified Method of slices for circular failures. Based upon our analysis a minimum factor of safety of 2.180 was determined for static conditions well above the minimum factor of safety of 1.5 typically required in slope stability analysis. The result of the slope stability analysis is presented graphically in the Appendix of this report.

RECOMMENDATIONS:

Based upon the results of our testing and the understanding of this office that the proposed construction will consist of a split level, single family residence at the location shown on Appendix #1, this office proposes that the structure will be notched into the uphill slope and will be constructed entirely on "cut". Grading will in general consist of backfilling the proposed retaining walls. Based upon the results of our testing this office recommends the following.

I. ROUGH GRADING:

1. Remove all surface vegetation including roots and root structures from the proposed construction area.
2. Cut the site to grade.
3. Stockpile excess soil for proposed yard fill.

FOUNDATION RECOMMENDATIONS:

1. The structure and structural elements (ie retaining walls etc.) shall be supported on caissons and grade beams.
2. Caissons shall be a minimum of 18 inches in diameter and shall be placed at the corners of the proposed \ structure(s) and at intervals sufficient to support the imposed loads.
3. Caissons shall extend a minimum of 15.0 feet below existing grade or to sufficient depth to meet the depth requirements of section 1805 A.3 of the 2007 California Building Code, whichever is deeper.
4. Caissons may be designed for a skin friction development of 400 psf per square foot of bounding area. Disregard the 5.0 feet of surface soils, as measured from outside yard grade, when considering skin friction development.
5. Connecting grade beams shall extend a minimum of 24 inches below outside yard grade, or 12 inches below lowest adjacent grade, whichever is deeper.
6. Connecting grade beams shall be sized and reinforced to properly transfer the imposed loads to the caissons.
7. The soils engineer shall inspect and approve all caisson excavations and grade beam excavations, prior to the placement of rebar or formwork.
8. Compliance with the above recommendations will reduce the potential for total settlement to 1 inch and differential settlement to $\frac{3}{4}$ of an inch in 30.0 feet.

RETAINING WALLS:

1. The following equivalent fluid pressures are applicable for retaining wall design (level backfill- fully drained).

Active Earth Pressure	$P_a = 40$	pcf (yielding / non-constrained)
Active Earth Pressure	$P_{ar} = 60$	pcf (non-yielding / fully constrained) at rest
Passive Pressure	$P_p = 350$	pcf
Friction Factor	$F_f = 0.35$	

2. For sloping backfill add 1 pcf to the active case and 1.5 pcf to the at rest case for each 2 degrees of slope inclination.

3. All retaining wall footing excavations shall be inspected and approved by the soil engineer, prior to the placement of rebar and/or formwork.
4. Retaining wall backfill shall be pre-moistened to at/or near optimum moisture content, placed in lifts not to exceed 6 inches in depth and compacted to a minimum of 90 percent relative compaction, up to final grade as tested and certified by the soil engineer.

CONCRETE SLABS ON GRADE:

1. Concrete slabs on grade shall be a minimum of 4 inches thick and shall be reinforced with a minimum of #3 rebar @ 18 inches on center, each way (placed at mid-depth) and shall be underlain with a 6 inch sand blanket, in which an impervious membrane, is embedded.
2. A minimum of 1.0 foot of compacted sub grade soil (90 percent minimum) shall be provided below all concrete slabs on grade, as tested and certified by the soil engineer.
3. If tile or other brittle surfacing is to be placed over concrete slabs a "slip sheet" is recommended to reduce the potential for reflective cracking.
4. Concrete slabs shall be placed at a maximum slump of 4 ½ inches. Control/shrinkage joints shall be placed at intervals not to exceed 10.0 foot on center in any direction.

SWIMMING POOL:

1. The swimming pool shall be supported on caissons and grade beams, as outlined in the foundation recommendations of this report.
2. If specific lateral pressures are utilized in pool design, the equivalent fluid pressures outlined in the retaining wall section of this report are applicable.
3. The pool shall be fitted with a hydrostatic relief valve.
4. A flexible joint shall be provided between the pool deck and the pool coping.
5. Concrete patio and pool deck slabs shall be constructed in accordance with the concrete slab recommendations of this report. The vapor/moisture barrier may be omitted for exterior concrete slabs.

DRAINAGE:

1. Positive drainage shall be provided away from all manufactured slopes, as directed by the design engineer.
2. The finish structure shall be fitted with rain gutters and down spouts that effectively collect and discharge all roof rain water run-off a minimum 10.0 feet away from the structure.
3. Finish grading shall be performed in such a manner that concentrated water is not allowed to discharge on to adjacent slopes. All surface water shall be collected and discharge to a proper drainage device or non-erosive area.
4. All disturbed slopes or construction areas shall be planted with a deep rooted, drought resistant perennial to reduce the potential for erosion.

TJD/cp



Respectfully,
Coast Valley Testing, Inc.

Timothy J. Dolan, President
RCE 33758 Expires 06-30-2008

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** APPENDIX **

APPENDIX

I.
MAXIMUM DENSITY-OPTIMUM MOISTURE DETERMINATIONS
 Maximum Density-Optimum Moisture data was determined in the laboratory using the ASTM D-1557-91 Method of Compaction. The results are as follows:

SOIL TYPE	SOIL DESCRIPTION	DRY DENSITY (LBS/CU.FT)	MOISTURE (%)
I	dark brown clayey silt sand	115.0	14.3
	curve points: (114.0 @ 13.1) (114.1 @ 15.2) (109.2 @ 17.0)		

II
FIELD DENSITY SUMMARY

TEST NUMBER	DEPTH (ft)	SOIL TYPE	FIELD MOISTURE (%)	DRY DENSITY (lbs/cu. ft)	% OF MAXIMUM DRY DENSITY
1	1.2	I	23.1	89.9	78.2
2	1.2	I	20.5	87.9	76.4
3	1.2	I	25.8	90.2	78.4

III
SOIL PARTICLE SIZE ANALYSIS
MECHANICAL ANALYSIS (values in percent passing)

SIEVE SIZE	B-1 @ 1.0	B-1 @ 3.0	B-1 @ 5.0	B-1 @ 8.0	B-1 @ 10.0	B-1 @ 15.0	B-1 @ 20.0
3/8	100	100	100	100	100	100	100
No. 4	100	100	100	100	100	100	100
No. 8	100	100	100	100	100	99	100
No. 16	100	100	99	100	99	99	100
No. 30	99	100	99	100	99	98	99
No. 50	97	99	90	99	98	97	98
No. 100	96	98	75	99	97	95	97
No. 200	75	79	75	66	64	70	61

IV SOIL PARTICLE SIZE ANALYSIS
MECHANICAL ANALYSIS (values in percent passing)

SIEVE SIZE	B-1 @ 18.0	B -1 @ 20.0	B -1 @ 25.0
3/8	100	100	100
No. 4	100	100	100
No. 8	100	100	100
No. 16	100	100	100
No. 30	99	99	99
No. 50	98	98	98
No. 100	97	97	97
No. 200	51	38	55

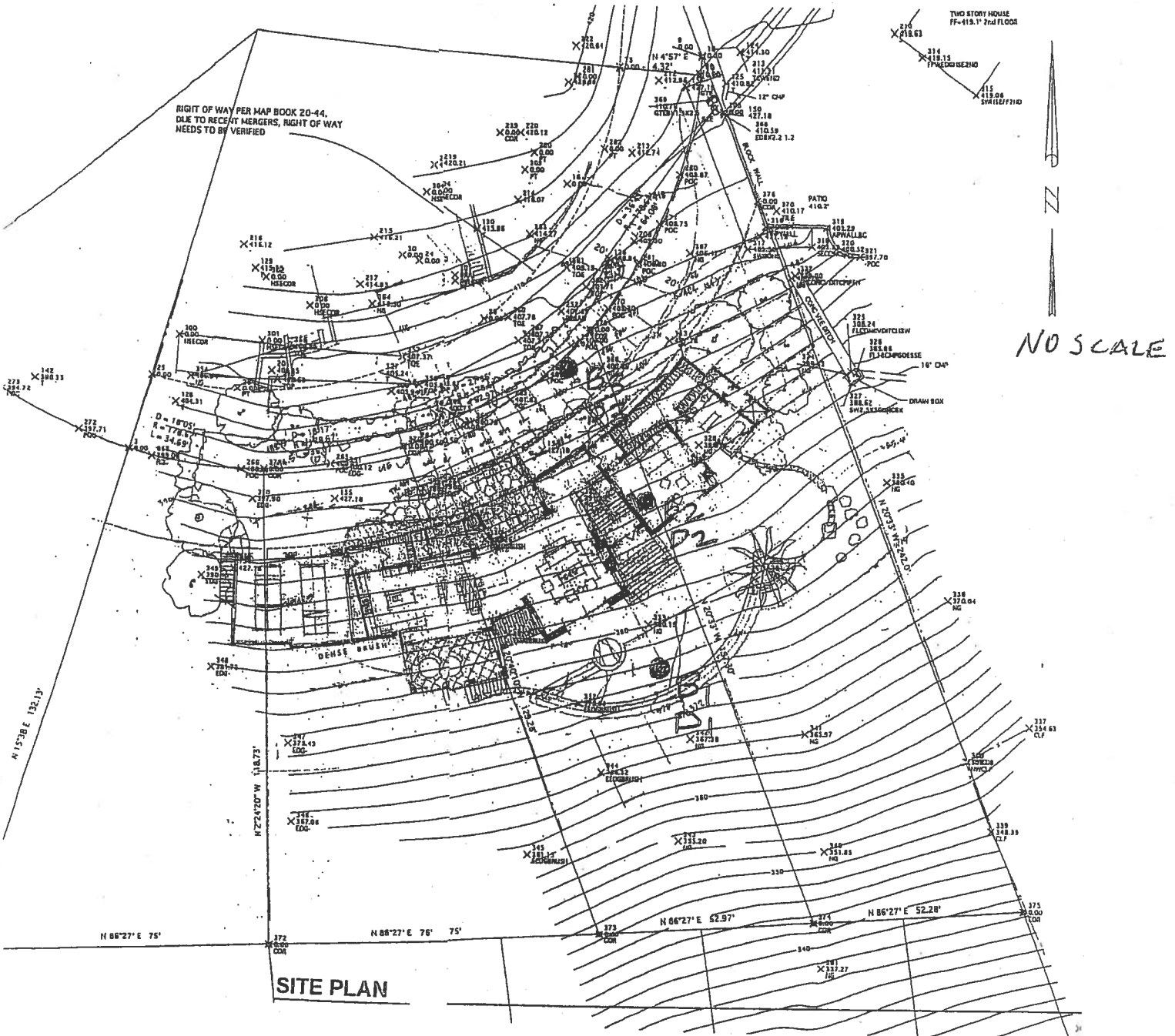
V BY HYDROMETER

BORING NO.	DEPTH (FT)	SAND (%)	SILT (%)	CLAY (%)	SOIL DESCRIPTION
1	1.0	32	42	26	clayey silt sand
1	3.0	46	26	28	clayey silt sand
1	5.0	60	20	20	clayey sand
1	8.0	66	20	14	silty sand
1	10.0	34	54	12	sandy silt
1	12.0	30	58	2	sandy silt
1	15.0	38	52	10	sandy silt
1	18.0	44	48	8	silt sand
1	20.0	48	48	4	silt sand
1	25.0	58	30	12	silty sand

VI. EXPANSION TESTS

Expansion tests were performed on a representative soil sample, which was recompactd to 90 percent relative compaction at near optimum moisture content, and allowed to air dry to a moisture content below the shrinkage limit.

SOIL TYPE	SURCHARGE PRESSURE	EXPANSION %
I	60	6.2



2001 CALIFORNIA BUILDING CODE SEISMIC DESIGN DATA

FAULT NAME: MISSION RIDGE ARROYO PARIDO FAULT-SANTA ANA FAULT
FAULT TYPE: B
DISTANCE: 3 km (+)
MAGNITUDE: 6.8

Seismic Zone – Figure 16-2	<u>4</u>
Seismic Zone Factor Z – Table 16A-1	<u>0.40</u>
Soil Profile Type – Table 16A-1	<u>Sd</u>
Seismic Coefficient Ca – Table 16A-Q	<u>0.44 Na</u>
Seismic Coefficient Cv – Table 16A-R	<u>0.64 Nv</u>
Near Source Factor Na – Table 16A-S	<u>1.2</u>
Near Source Factor Nv – Table 16A-T	<u>1.46</u>
Seismic Source Type – Table 16A-U	<u>B</u>

2007 CALIFORNIA BUILDING CODE SEISMIC DESIGN DATA

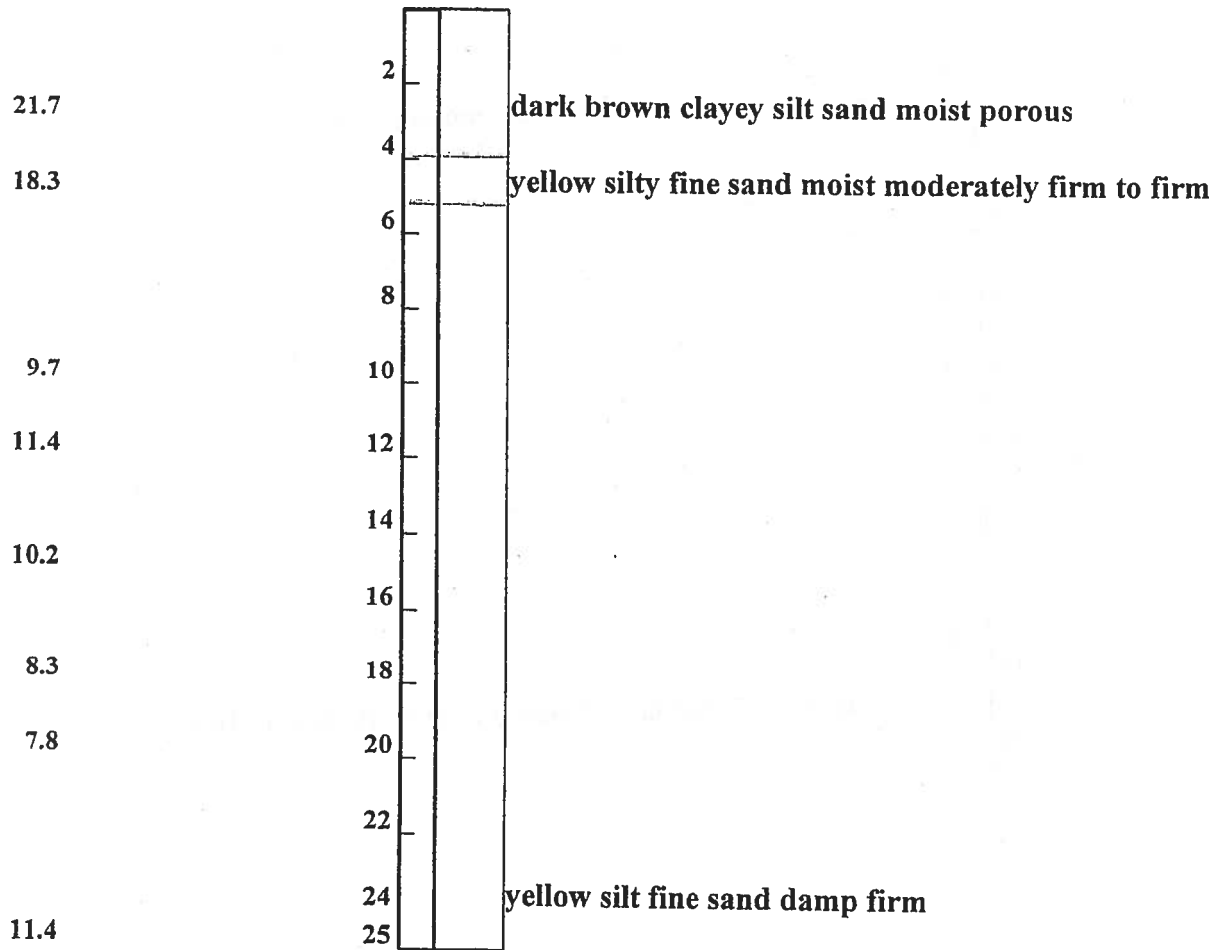
(2003 NEHRP SEISMIC DESIGN PROVISIONS)

SITE LOCATION: **LATITUDE** 34.41
 LONGITUDE - 119.71
SITE CLASS: D

F (a)	<u>1.0</u>	
F (v)	<u>1.5</u>	
S (ms)	<u>1.989</u>	<u>EQT.16-37 CBC-07</u>
S (m1)	<u>1.128</u>	<u>EQT.16-38 CBC-07</u>
S (ds)	<u>1.326</u>	<u>EQT.16-39 CBC-07</u>
S (d1)	<u>0.752</u>	<u>EQT.16-40 CBC-07</u>

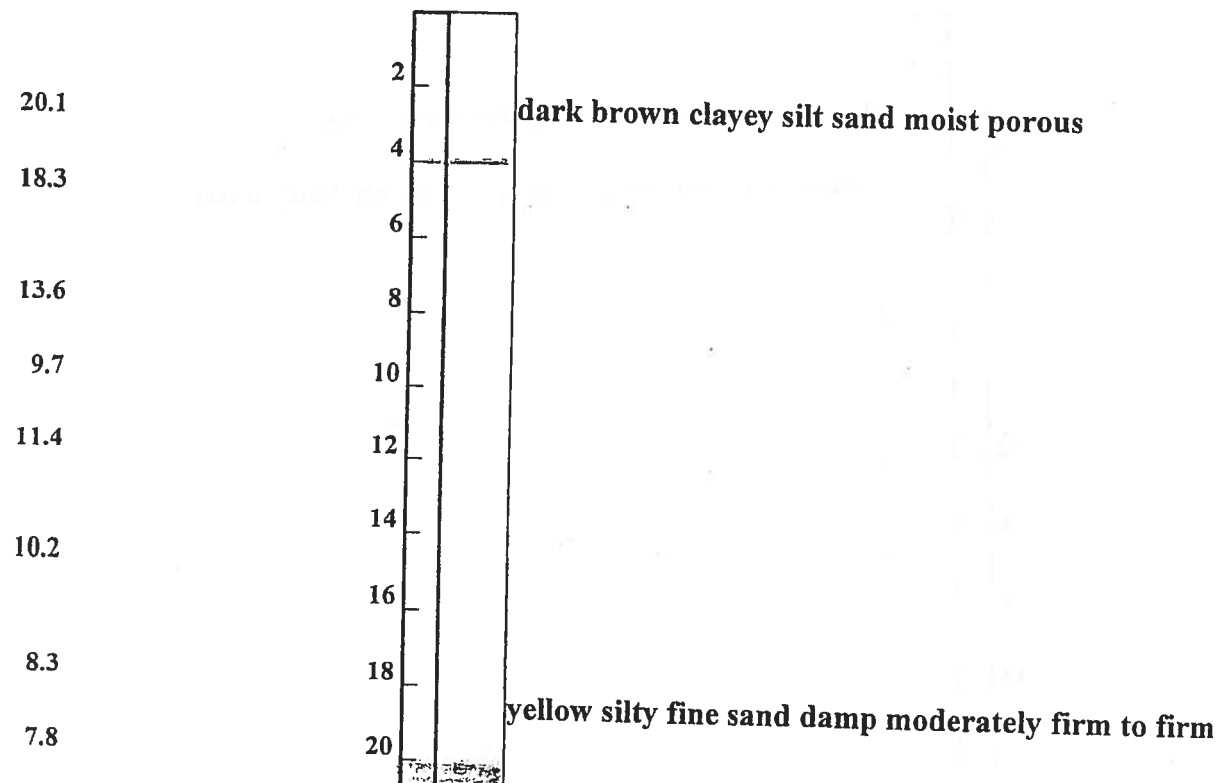
MOISTURE %

Boring Log #1



MOISTURE %

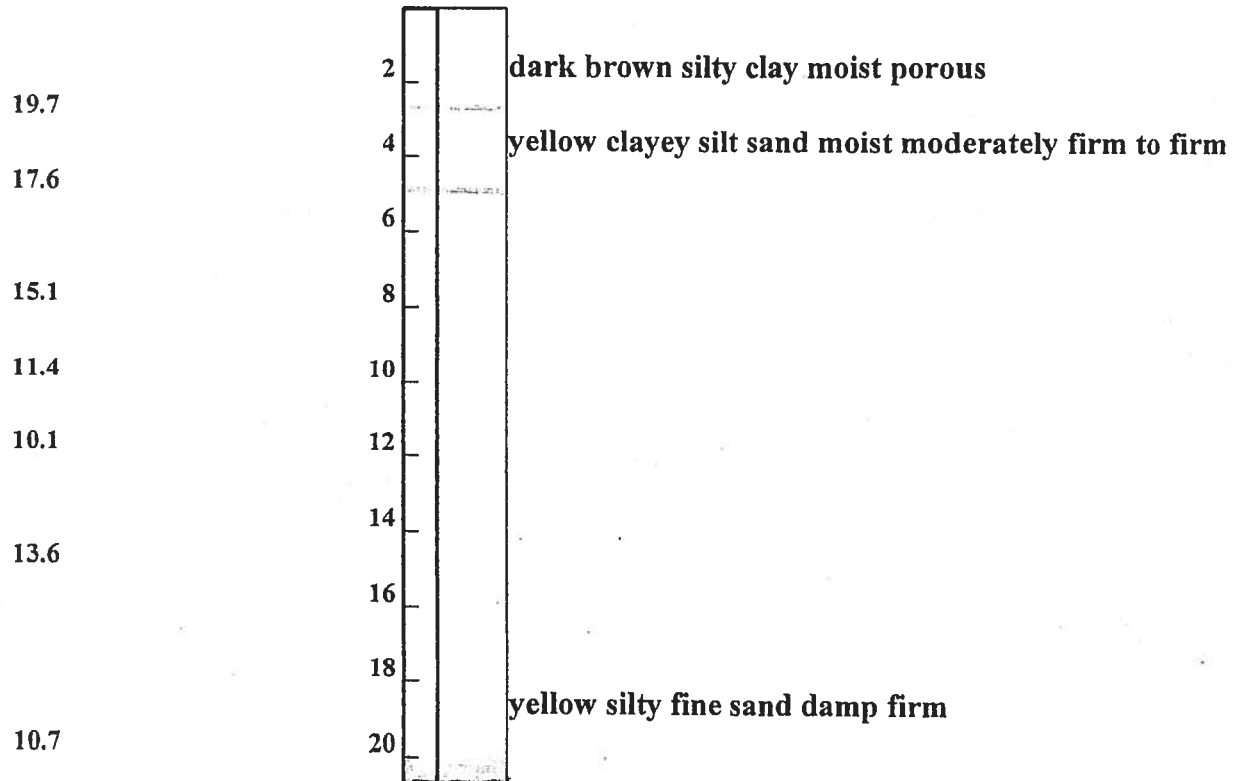
Boring Log #2



11.4

MOISTURE %

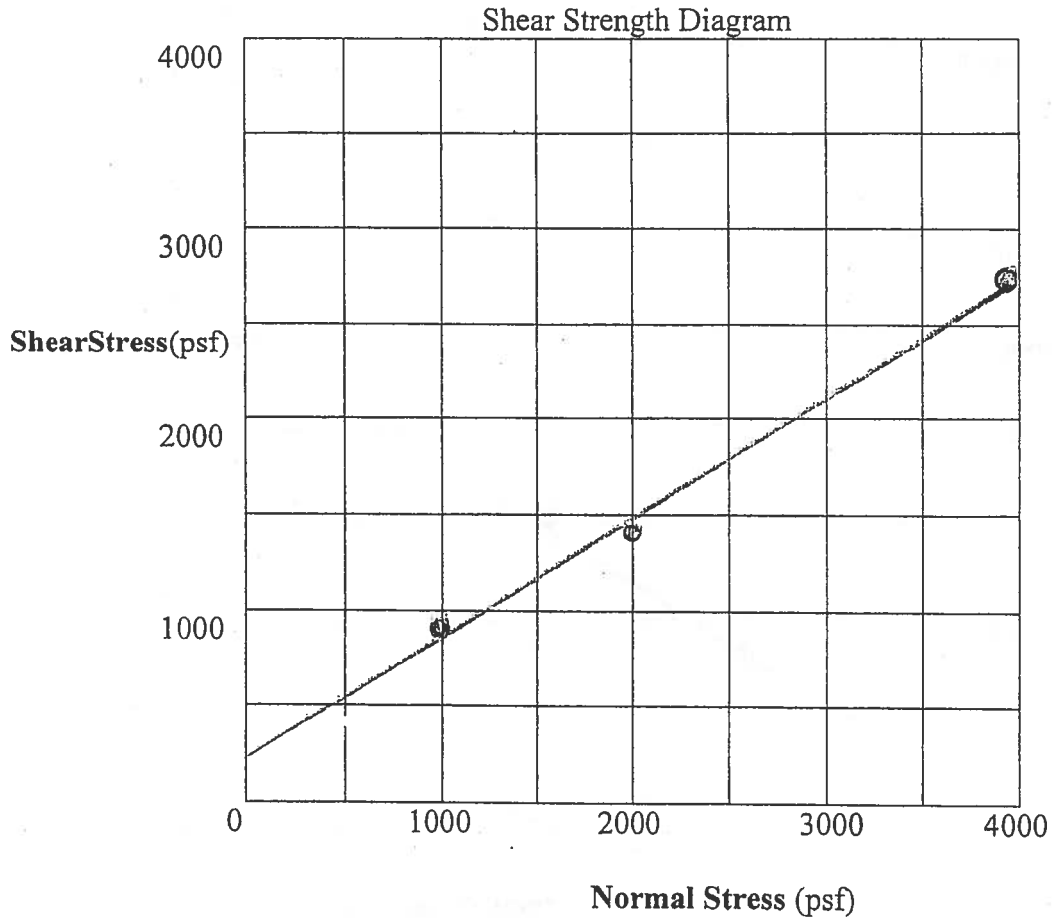
Boring Log #3



DIRECT SHEAR TEST

ASTM D3080-90

(Modified for Unconsolidated Un-drained Conditions)



Sample Location: B-1 @ 10.0 feet

Soil Description: yellow silty sand

Peak Shear Angle: 31.1 °

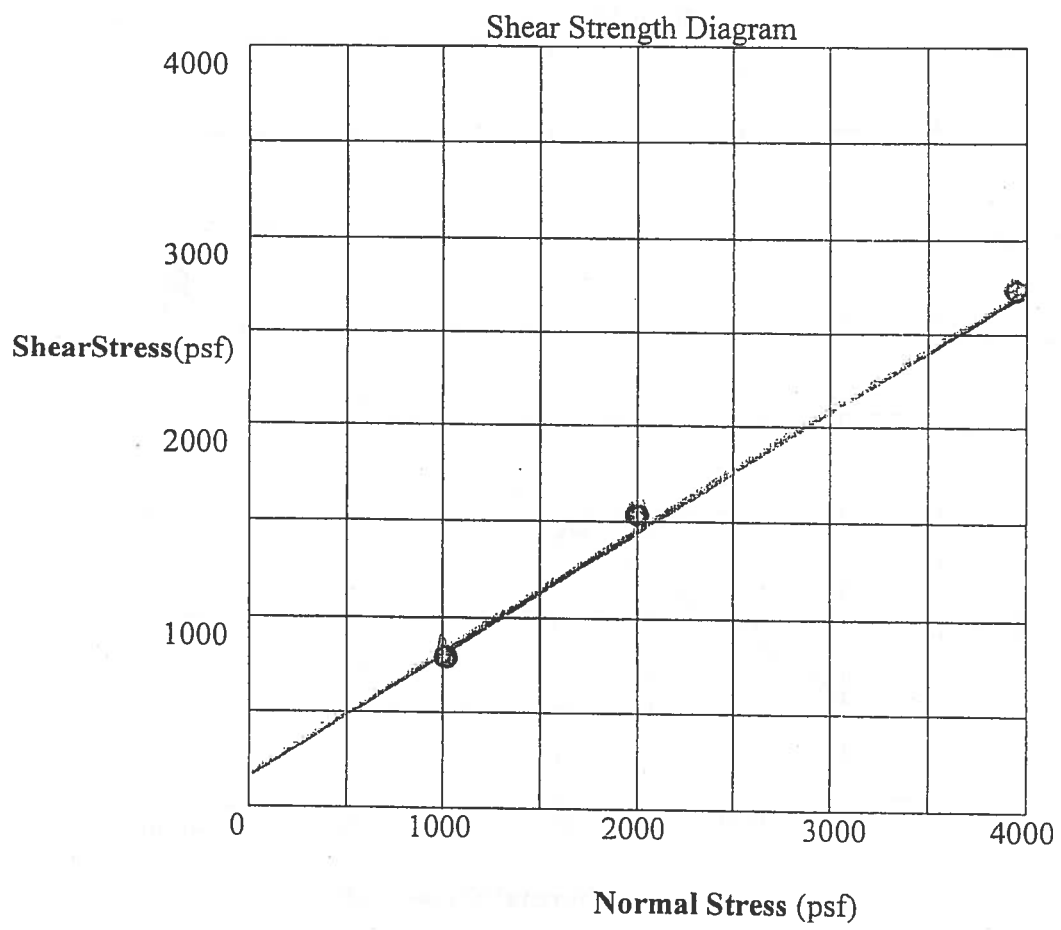
Cohesion: 300 psf

Sample Type: Remolded @ 90 % of maximum dry density – sample submerged 24 hrs. prior to test.

DIRECT SHEAR TEST

ASTM D3080-90

(Modified for Unconsolidated Un-drained Conditions)



Sample Location: D1, 2 & 3

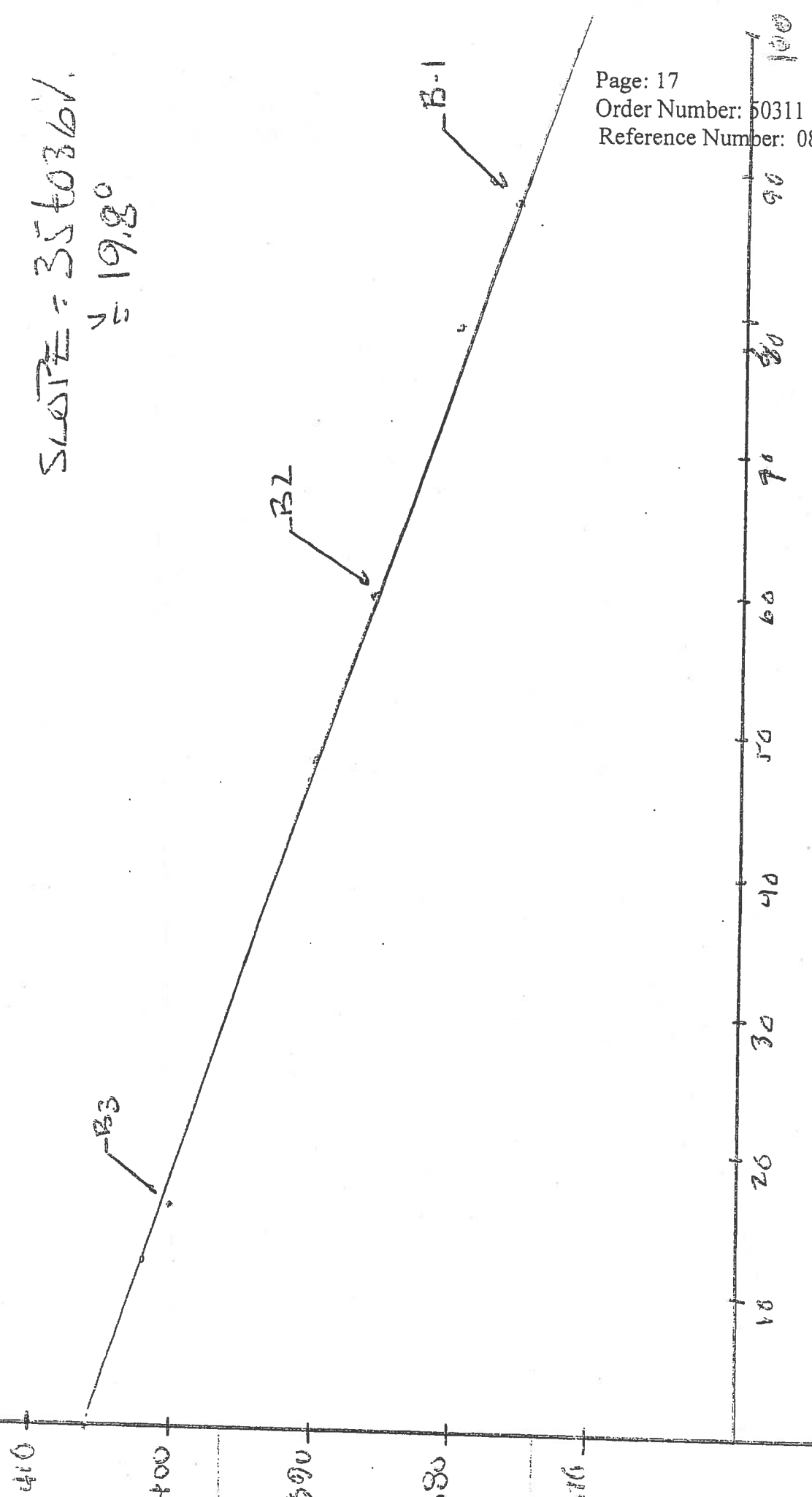
Soil Description: dark brown clayey silt & sand

Peak Shear Angle: 30.8 °

Cohesion: 400 psf

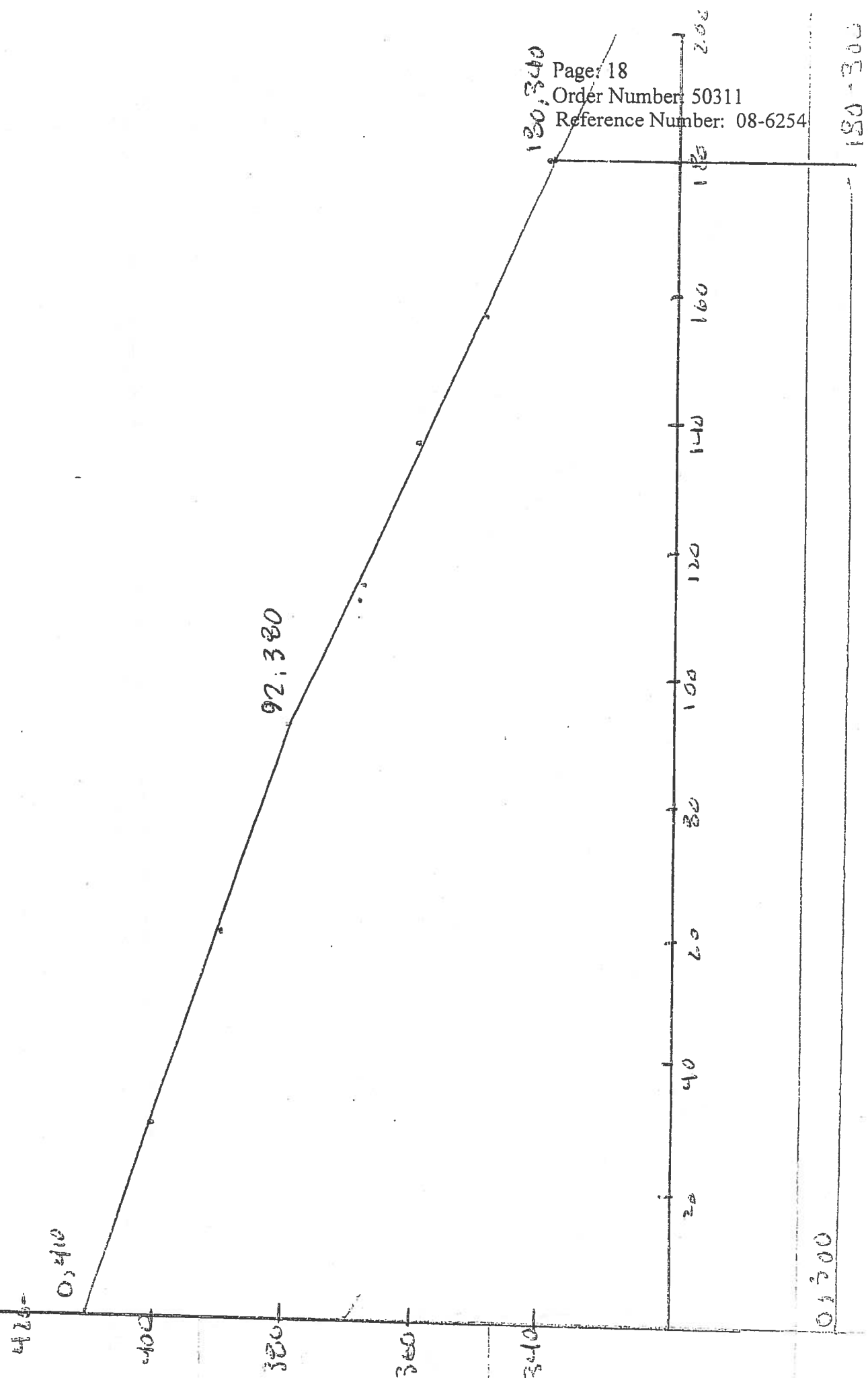
Sample Type: Remolded @ 90 % of maximum dry density – sample submerged 24 hrs. prior to test.

SLOPE = 35 to 36%
= 19.8°



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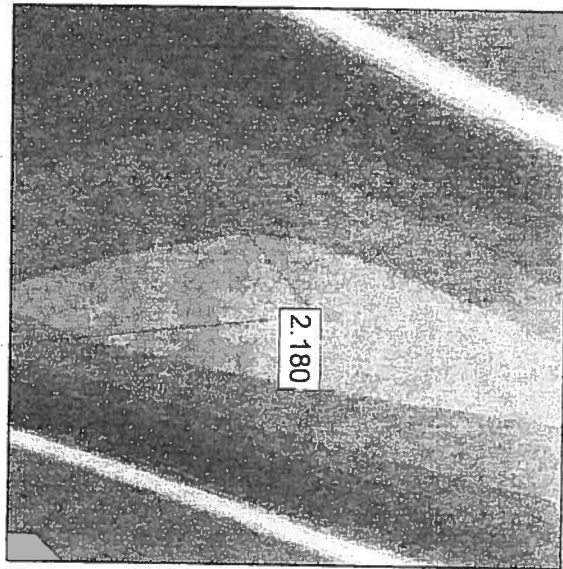
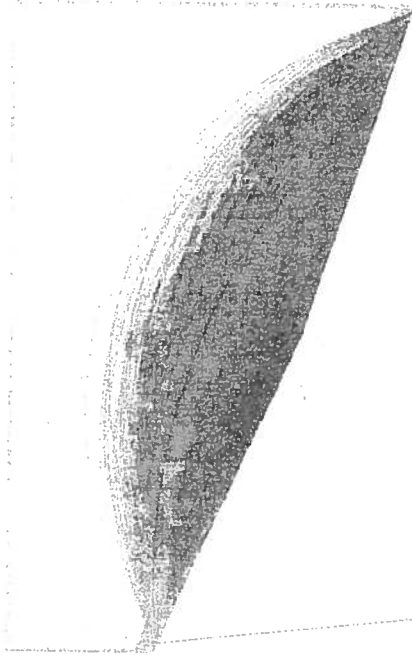


250 300 350 400 450 500 550 600

-150 -100 -50 0 50 100 150 200 250 300 350

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Safety Factor
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0.250
0.500
0.750
1.000
1.250
1.500
1.750
2.000
2.250
2.500
2.750
3.000
3.250
3.500
3.750
4.000
4.250
4.500
4.750
5.000
5.250
5.500
5.750
6.000+



Slide Analysis Information

Document Name

File Name: harbor hills

Project Settings

Project Title: 1213 Harbor Hills drive
Failure Direction: Left to Right
Units of Measurement: Imperial Units
Pore Fluid Unit Weight: 62.4 lb/ft³
Groundwater Method: Water Surfaces
Data Output: Standard
Calculate Excess Pore Pressure: Off
Allow Ru with Water Surfaces or Grids: Off
Random Numbers: Pseudo-random Seed
Random Number Seed: 10116
Random Number Generation Method: Park and Miller v.3

Analysis Methods

Analysis Methods used:
Bishop simplified
Janbu simplified

Number of slices: 25
Tolerance: 0.005
Maximum number of iterations: 50

Surface Options

Surface Type: Circular
Search Method: Grid Search
Radius increment: 10
Composite Surfaces: Disabled
Reverse Curvature: Create Tension Crack
Minimum Elevation: Not Defined
Minimum Depth: Not Defined

Material Properties

Material: Material 1
Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft³
Cohesion: 400 psf
Friction Angle: 30.8 degrees
Water Surface: None

Material: Material 2

Strength Type: Mohr-Coulomb
Unit Weight: 120 lb/ft³
Cohesion: 300 psf
Friction Angle: 31.1 degrees
Water Surface: None

Global Minimums

Method: bishop simplified

FS: 2.180220
Center: 158.857, 516.356
Radius: 176.328
Left Slip Surface Endpoint: 24.682, 401.952
Right Slip Surface Endpoint: 177.714, 341.039
Resisting Moment=4.1841e+007 lb-ft
Driving Moment=1.91912e+007 lb-ft

Method: janbu simplified

FS: 2.058580
Center: 151.179, 454.927
Radius: 117.196
Left Slip Surface Endpoint: 51.565, 393.185
Right Slip Surface Endpoint: 178.099, 340.864
Resisting Horizontal Force=183766 lb
Driving Horizontal Force=89268.7 lb

Valid / Invalid Surfaces

Method: bishop simplified

Number of Valid Surfaces: 4828
Number of Invalid Surfaces: 23
Error Codes:
Error Code -106 reported for 1 surface
Error Code -1000 reported for 22 surfaces

Method: janbu simplified

Number of Valid Surfaces: 4784
Number of Invalid Surfaces: 67
Error Codes:
Error Code -106 reported for 1 surface
Error Code -108 reported for 44 surfaces
Error Code -1000 reported for 22 surfaces

Error Codes

The following errors were encountered during the computation:

-106 = Average slice width is less than
0.0001 * (maximum horizontal extent of soil region).
This limitation is imposed to avoid numerical errors

which may result from too many slices, or too small a slip region.

-108 = Total driving moment or total driving force < 0.1. This is to limit the calculation of extremely high safety factors if the driving force is very small (0.1 is an arbitrary number).

-1000 = No valid slip surfaces are generated at a grid center. Unable to draw a surface.

List of All Coordinates

Search Grid

74.393	431.891
227.965	431.891
227.965	585.463
74.393	585.463

Material Boundary

0.000	405.000
180.000	335.000

External Boundary

180.000	300.000
180.000	335.000
180.000	340.000
92.000	380.000
0.000	410.000
0.000	405.000
0.000	300.000

Coast-Valley Testing, Inc.

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October 13, 2010
Order Number: 54492
Reference Number: 08-6254

Vanguard Planning LLC
735 State Street Suite # 204
Santa Barbara, CA 93101
Attention: Jarrett Gorin

RECEIVED
NOV 11 2010

CITY OF SANTA BARBARA
PLANNING DIVISION

SUBJECT: Report Update/Response to City of Santa Barbara
Letter of September 15, 2010
Proposed Residential Development
1213 Harbor Hills Road
Santa Barbara, California

Reference Number: Coast Valley Testing, Inc 08-6254 – Dated: 03-11-08

Dear Sir:

The referenced report (enclosed) remains applicable and should be considered updated. The 2010 California Building Code Seismic Design Data is attached to supplement the referenced report. In addition, the following is provided in response to the City of Santa Barbara (Planning Division) letter of September 15, 2010.

1. The undersigned has reviewed the soils and geology investigation for the entire tract prepared by Coastal Geo Science on November 25, 2002 (reference VO2125). The undersigned is in conformance with the Coastal Geo Science report and it is the opinion of this office that our report, (Coast Valley Testing, Inc.), meet the intent of the Coastal Geo Science conclusions and recommendations.
2. A slope stability analysis was performed using the Rockslide 5.0 Computer Program (Bishop and Janbu Simplified Method of slides). The results of our laboratory Testing (direct shear tests and soil weight determinations), and the site section profile provided from the preliminary plans prepared by Mike Gones (P.E.) – Section A-A of sheet C-21.

360 South Fairview Avenue Suite A, Goleta, California 93117
Goleta Office (805) 964-3509 Los Olivos Office (805) 688-3577
Fax (805) 964-9897 EXHIBIT J cont.

Continued -

Because the loads of the proposed structure and structural elements are to be supported on deep foundations (ie caissons and grade beams), with support developed by skin friction surcharge loading from the proposed structures was considered negligible and therefore not required in the analysis.

The results of the Slope Stability Analysis of the section described above were found to have a minimum Factor of Safety of 1.845 for the static analysis and 1.058 for the Pseudostatic Analysis (0.309 horizontal and verticals). The results of the Slope Stability Analysis are presented graphically in the attachments to this letter. Based upon the results of the Slope Stability Analysis, it is the opinion of this office that the site is safe for the proposed development provided the recommendations of the referenced report are adhered to .

→ 1.1 normal

TJD/cp

Respectfully,
Coast Valley Testing, Inc.

Timothy J. Dolan, President
RCE 33758 Expires 06-30-2012

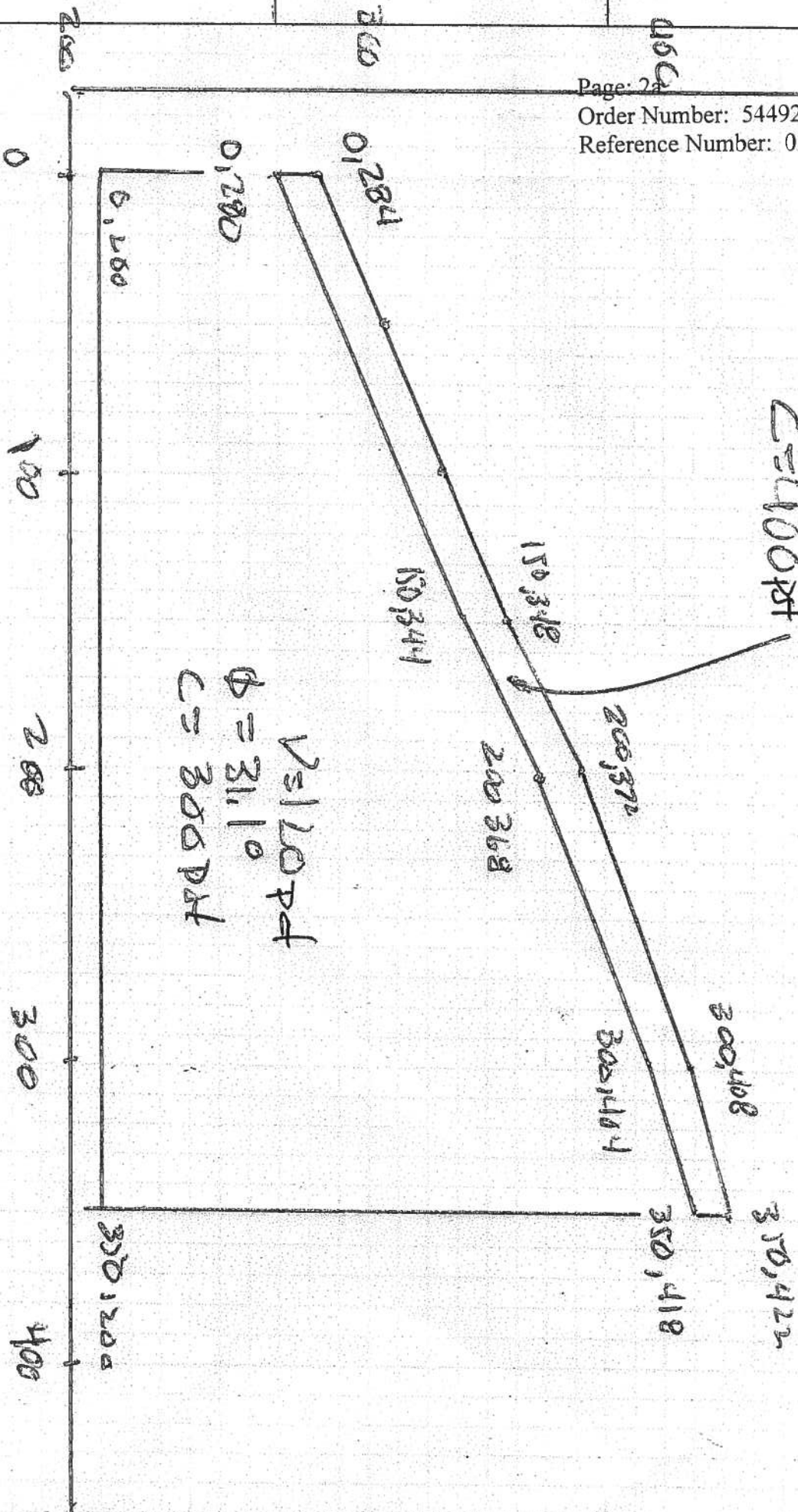


2007 CALIFORNIA BUILDING CODE SEISMIC DESIGN DATA

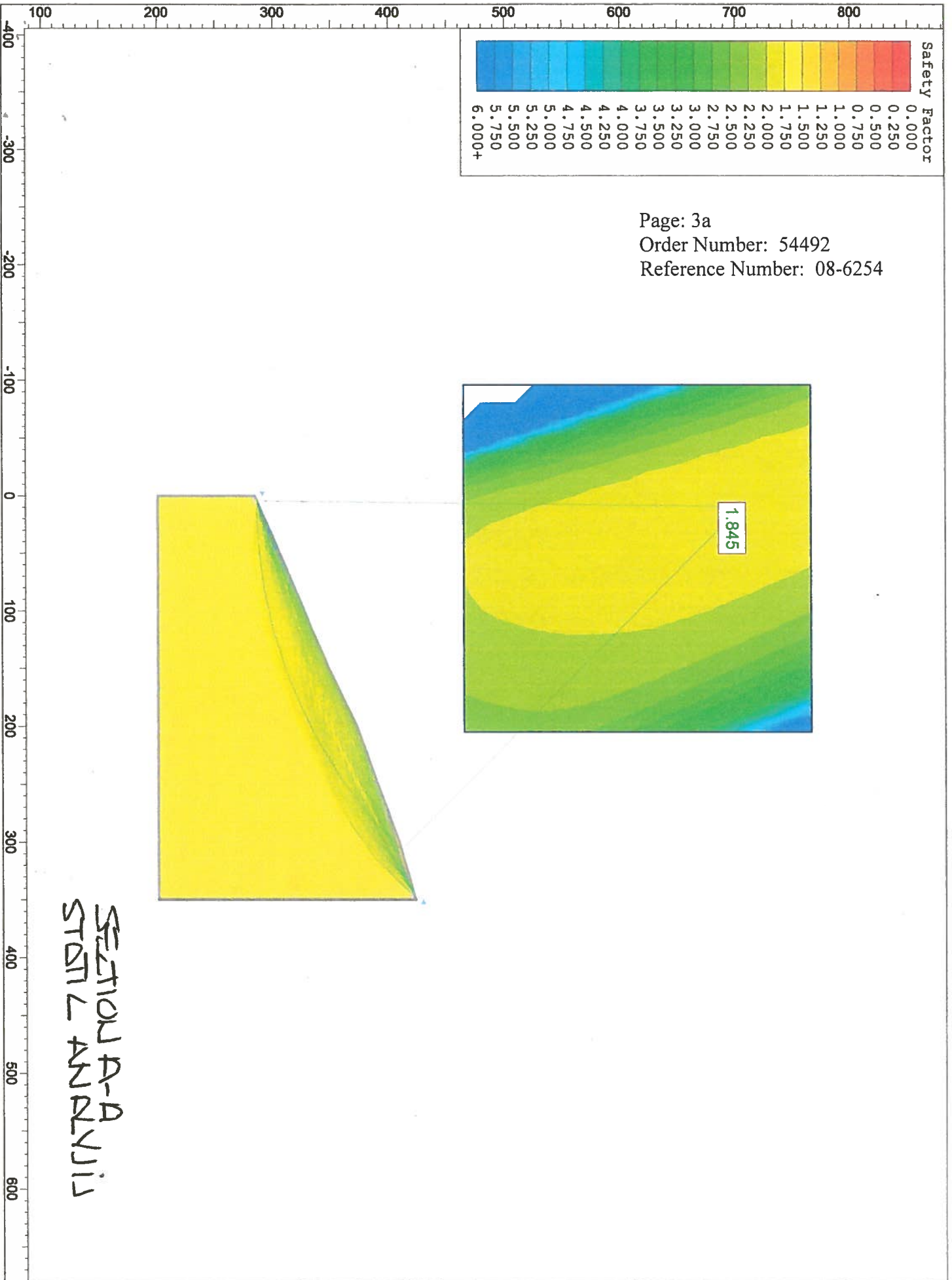
(2003 NEHRP SEISMIC DESIGN PROVISIONS)

SITE LOCATION: **LATITUDE** 34.4037
 LONGITUDE - 119.7132
SITE CLASS: **D**

F (a) 1.0
F (v) 1.5
S (ms) 1.967 EQT.16-37 CBC-07
S (m1) 1.110 EQT.16-38 CBC-07
S (ds) 1.311 EQT.16-39 CBC-07
S (d1) 0.740 EQT.16-40 CBC-07



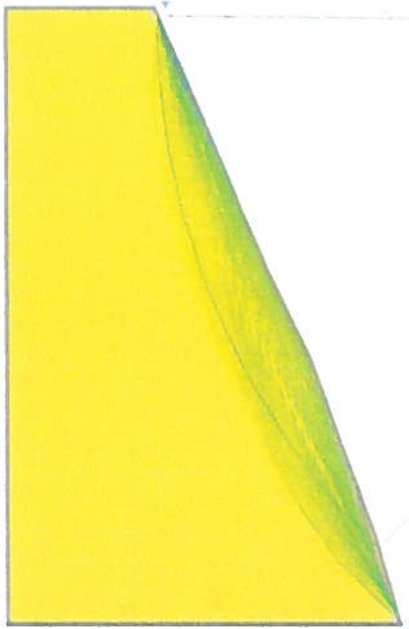
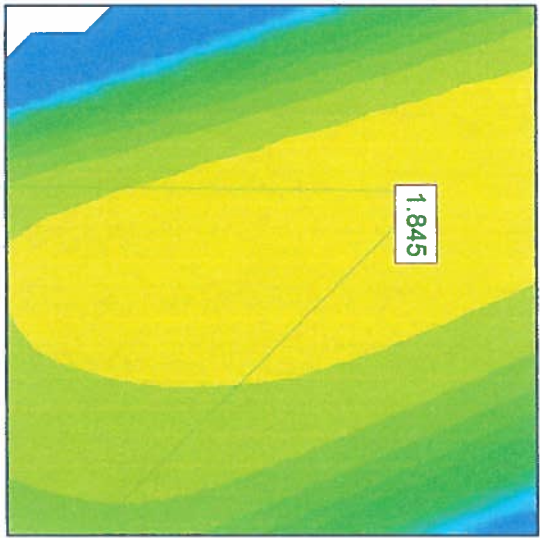
SECTION A-A
 1213 HANSON HILLS DRIVE
 S.B. (FROM PLANS)



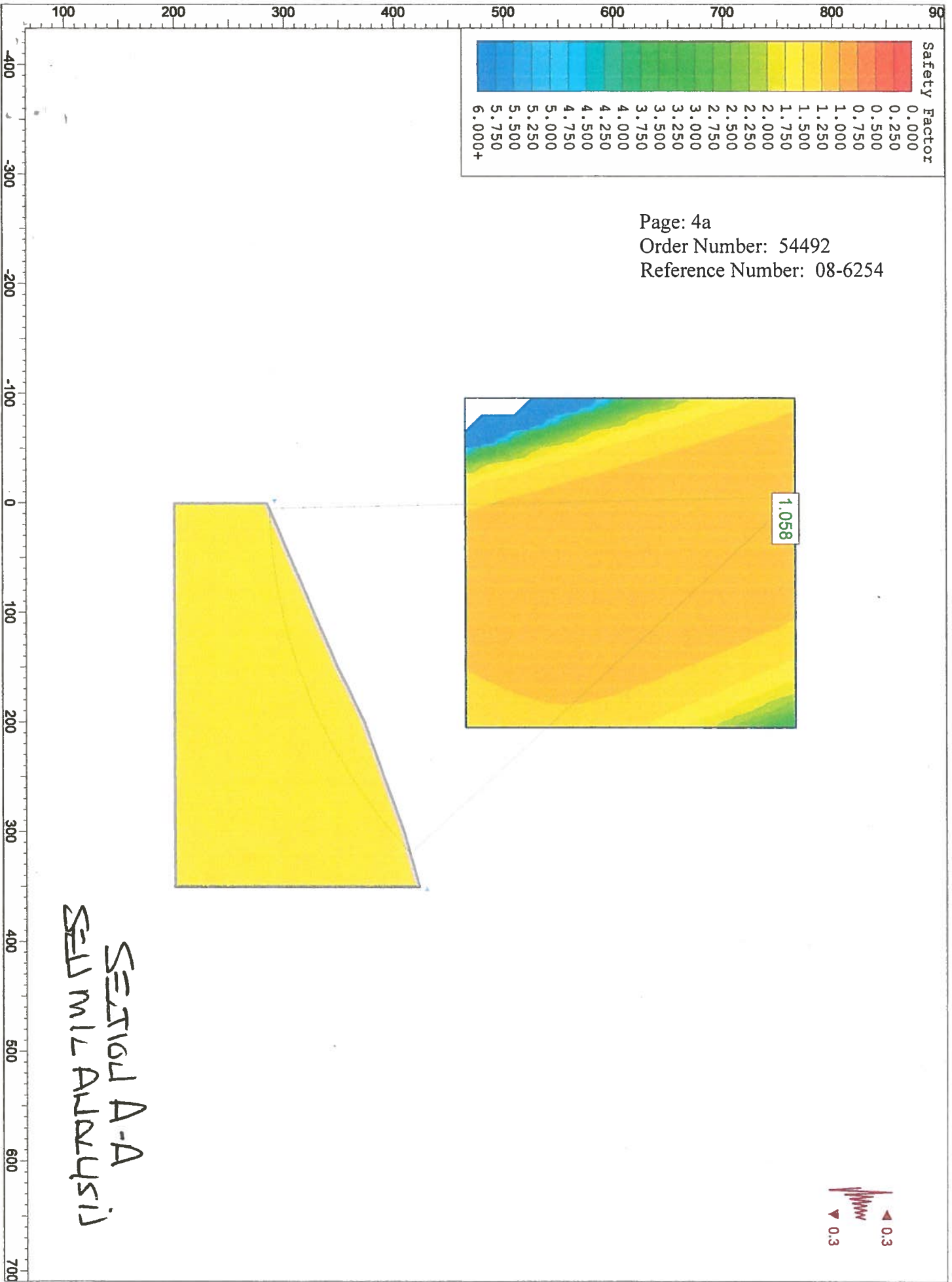
Safety Factor

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3.500
3.750
4.000
4.250
4.500
4.750
5.000
5.250
5.500
5.750
6.000+

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SECTION A-A
 STABIL ANALYSIS



Safety Factor
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2.000
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2.500
2.750
3.000
3.250
3.500
4.000
4.250
4.500
4.750
5.000
5.250
5.500
5.750
6.000+

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1.058

SEITIGL A-A
 SELL MIL ANALYSIS

