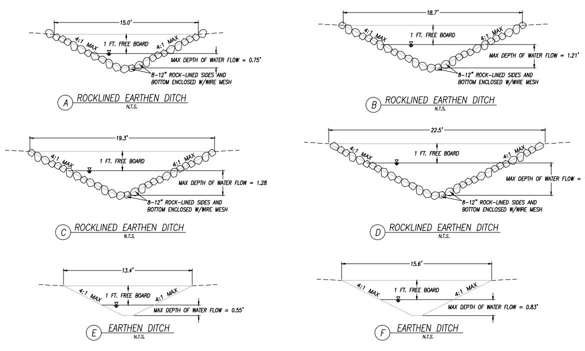
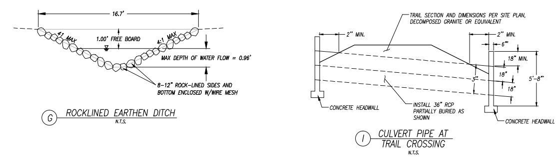
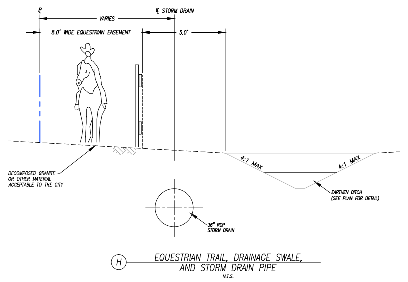
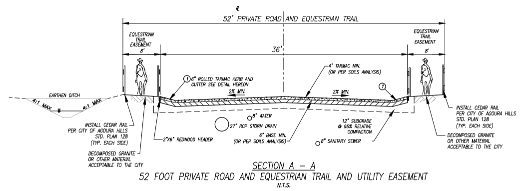
Appendix B

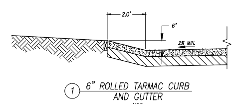
Phase 2 Site Plans

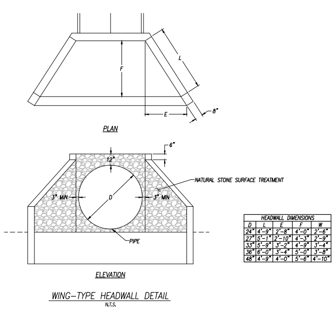


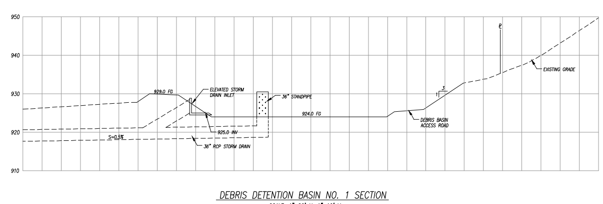


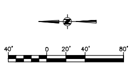












LEGAL DESCRIPTION

ALL THAT CERTAIN REAL PROPERTY SITUATED IN THE COUNTY OF LOS ANGELES, STATE OF CALIFORNIA, DESCRIBED AS FOLLOWS:

APN

BASIS OF BEARINGS

BENCH MARK

TOPOGRAPHY NOTE

BOUNDARY DATUM

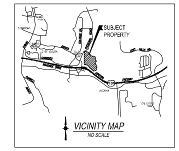
UTILITY NOTE

ZONING NOTE

INDEX :

GENERAL NOTES

FLOOD PLAIN NOTE



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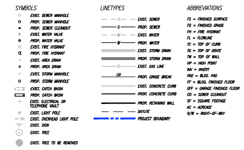


LOT AREA CALCULATIONS

LOT NO.	GROSS AREA S.F.	GROSS AREA AC.	NET AREA S.F.	NET AREA AC.
1	58,856	1.35	45,007	1.06
2	56981	1.31	47,092	1.08
3	56448	1.30	47,600	1.09
4	55796	1.28	47,143	1.08
5	61919	1.42	53,044	1.22
6	69,380	1.59	65,678	1.51
7	71,895	1.65	65,212	1.50
8	71,658	1.65	65,894	1.51
9	77,529	1.78	75,174	1.73
10	71,180	1.63	65,386	1.50
11	75,861	1.74	66,229	1.52
12	59,967	1.38	54,182	1.24
13	64,459	1.48	59,975	1.38
14	57,006	1.31	50,552	1.16
15	56,763	1.30	50,431	1.16
16	13,528	0.31	8,626	0.20
17	2,130,441	48.91	2,130,441	48.91
TOTAL	3,109,667	71.39	2,999,035	68.85

NET AREA DOES NOT INCLUDE CHESEBRO ROAD (20-FT WIDE) AND PRIVATE STREET.

EARTH MOVING QUANTITES

	CUT	FILL	15% SHRINK	SUBSIDENCE (.20 IN.)	TOTAL
STREET	336 CY	1343	210 CY	-300 CY	497 CY (FILL)

	CUT	FILL	15% SHRINK	SUBSIDENCE (.20 IN.)	TOTAL
LOT 1	0 CY	2009 CY	-0 CY	0 CY	2,009 CY FILL

NOTE: PROPOSED LOTS 1, 2, 15, AND 16 ARE IN FLOOD ZONE AREAS AE AND/OR X NO. OF FIRM 06037C1263F (PANEL 1263 OF 2350). LOT 1 FILL SHALL RECEIVE FILL FROM SWALE AND PIPE EXCAVATION.

	CUT	FILL	15% SHRINK	SUBSIDENCE (.20 IN.)	TOTAL
SWALES/ BASINS	3360 CY	0 CY	-504 CY	-350 CY	+2506 CY (CUT)

	CUT	FILL	15% SHRINK	SUBSIDENCE (.20 IN.)	TOTAL
WEST TRAIL	80 CY	43 CY	-12 CY	-25 CY	0 CY FILL

	CUT	FILL	15% SHRINK	SUBSIDENCE (.20 IN.)	TOTAL
EAST TRAIL	237 CY	160 CY	-36 CY	-41 CY	0 CY FILL

TOTAL CUT/FILL IS BALANCED WITH NO EXPORT

The grading of lots 2-15 is shown for informational and environmental review purposes only. The buildable areas on Lots 1-15 are shown for informational and environmental review purposes only. The grading of lots 2-15 and buildable areas on lots 1-15 are subject to separate and future discretionary review, including Site Plan Review, and are not part of the current project being considered for approval.

ENGINEER'S STATEMENT

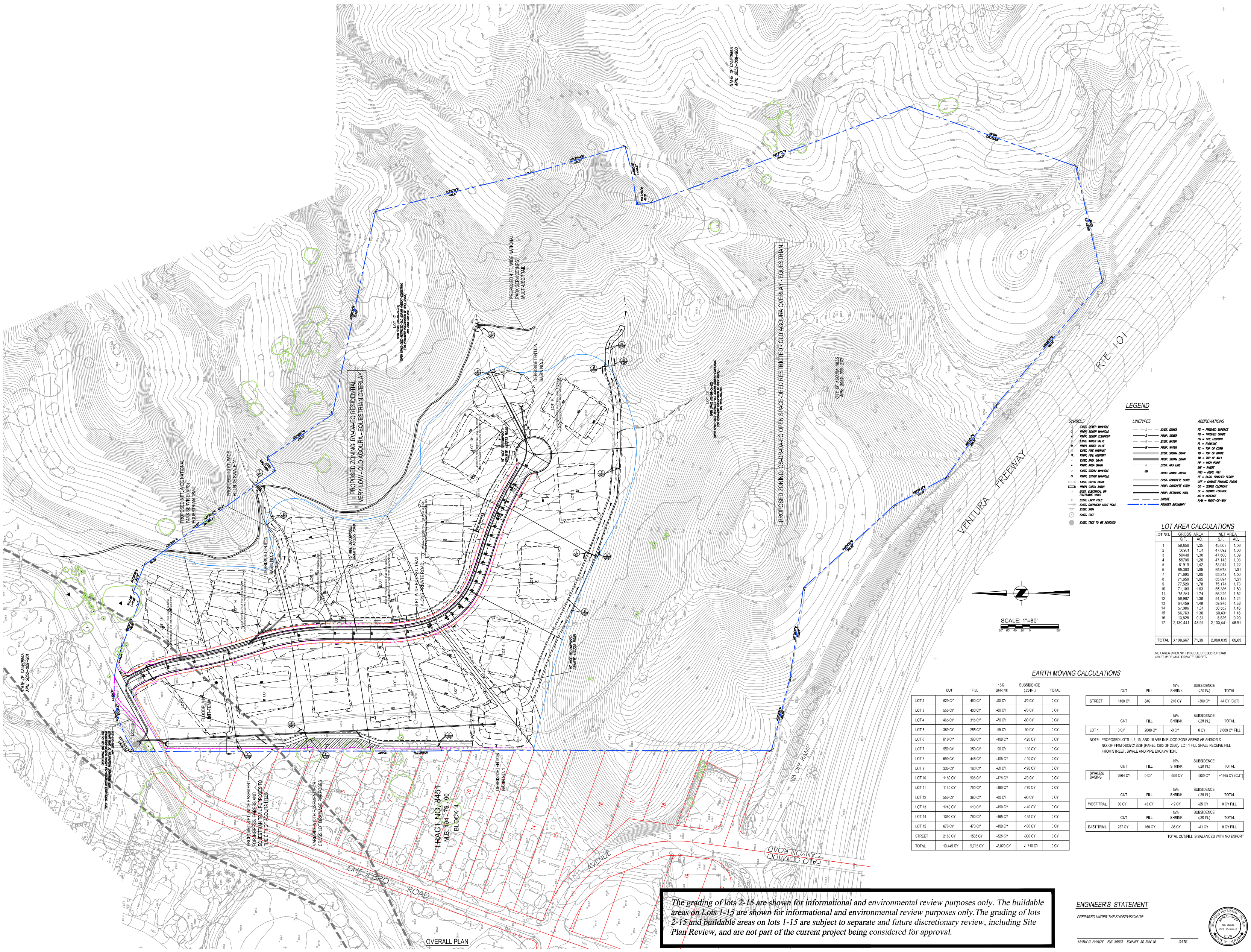
PREPARED UNDER THE SUPERVISION OF:

CONCEPT GRADING FOR RESIDENTIAL LOTS
VESTING TENTATIVE TRACT MAP 72316
AGOURA HILLS, CA 91301

FORTUNE COMPANIES
11911 SAN VICENTE BLVD., STE 375
LOS ANGELES, CA. 90049

HARDY ENGINEERING
CIVIL, ENVIRONMENTAL AND STRUCTURAL ENGINEERS
LAND SURVEYORS LAND PLANNERS

SHEET NO.
CG01



OVERALL PLAN

The grading of lots 2-15 are shown for informational and environmental review purposes only. The buildable areas on Lots 1-15 are shown for informational and environmental review purposes only. The grading of lots 2-15 and buildable areas on lots 1-15 are subject to separate and future discretionary review, including Site Plan Review, and are not part of the current project being considered for approval.

LOT AREA CALCULATIONS

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9	77,529	1.78	75,174	1.73
10	71,180	1.63	65,386	1.50
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TOTAL	3,109,667	71.39	2,999,035	68.85

NET AREA DOES NOT INCLUDE CHESEBRO ROAD (20-FT WIDE) AND PRIVATE STREET.

EARTH MOVING CALCULATIONS

	CUT	FILL	15% SHRINK	SUBSIDENCE (.20 IN.)	TOTAL
LOT 2	620 CY	460 CY	-90 CY	-70 CY	0 CY
LOT 3	550 CY	400 CY	-80 CY	-70 CY	0 CY
LOT 4	465 CY	315 CY	-70 CY	-80 CY	0 CY
LOT 5	360 CY	255 CY	-55 CY	-50 CY	0 CY
LOT 6	610 CY	390 CY	-100 CY	-120 CY	0 CY
LOT 7	550 CY	350 CY	-90 CY	-110 CY	0 CY
LOT 8	650 CY	445 CY	-105 CY	-110 CY	0 CY
LOT 9	330 CY	160 CY	-50 CY	-120 CY	0 CY
LOT 10	1150 CY	905 CY	-175 CY	-70 CY	0 CY
LOT 11	1140 CY	790 CY	-180 CY	-170 CY	0 CY
LOT 12	550 CY	380 CY	-80 CY	-90 CY	0 CY
LOT 13	1240 CY	910 CY	-190 CY	-140 CY	0 CY
LOT 14	1090 CY	790 CY	-165 CY	-135 CY	0 CY
LOT 15	670 CY	470 CY	-100 CY	-100 CY	0 CY
STREET	2160 CY	1535 CY	-325 CY	-300 CY	0 CY
TOTAL	13,445 CY	9,715 CY	-2,020 CY	-1,710 CY	0 CY

	CUT	FILL	15% SHRINK	SUBSIDENCE (.20 IN.)	TOTAL
STREET	1400 CY	846	210 CY	-300 CY	44 CY (CUT)

	CUT	FILL	15% SHRINK	SUBSIDENCE (.20 IN.)	TOTAL
LOT 1	0 CY	2009 CY	-0 CY	0 CY	2,009 CY FILL

NOTE: PROPOSED LOTS 1, 2, 15, AND 16 ARE IN FLOOD ZONE AREAS AE AND/OR X NO. OF FIRM 06037C1263F (PANEL 1263 OF 2350). LOT 1 FILL SHALL RECEIVE FILL FROM STREET, SWALE AND PIPE EXCAVATION.

	CUT	FILL	15% SHRINK	SUBSIDENCE (.20 IN.)	TOTAL
SWALES/ BASINS	2664 CY	0 CY	-399 CY	-300 CY	+1965 CY (CUT)

	CUT	FILL	15% SHRINK	SUBSIDENCE (.20 IN.)	TOTAL
WEST TRAIL	80 CY	43 CY	-12 CY	-25 CY	0 CY FILL

	CUT	FILL	15% SHRINK	SUBSIDENCE (.20 IN.)	TOTAL
EAST TRAIL	237 CY	160 CY	-36 CY	-41 CY	0 CY FILL

TOTAL CUT/FILL IS BALANCED WITH NO EXPORT

ENGINEER'S STATEMENT

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HARDY ENGINEERING
CIVIL, ENVIRONMENTAL AND STRUCTURAL ENGINEERS
LAND SURVEYORS LAND PLANNERS

SHEET NO.
CG02

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Appendix C

Oak Tree Study

OAK TREE REPORT

SUBJECT
Agoura Equestrian Estates
Tentative Tract Map No. 72316
Agoura Hills

PREPARED FOR
Equine Estates, LLC
11911 San Vicente Blvd., Ste. 375
Los Angeles, CA 90049

PREPARED BY

L. NEWMAN DESIGN GROUP, INC.
ASLA, California State License #2464
ISA Certified Arborist WE-6820A
31300 Via Colinas, Suite 104
Westlake Village, CA 91362-4579
E-Mail: *lndg@lndg.net*
Ph.: (818) 991-5056
Fx.: (818) 991-3478

Date: July 17, 2013
Revision Date: August 18, 2014
LNDG Project No.: 200-463

PROJECT LOCATION

The subject project is a proposed residential development located northeast of the Chesebro Road/Palo Comado Canyon Road intersection in the City of Agoura Hills.

OBJECTIVE

The objective of this report is to qualify the present condition of the site's oak trees and to discuss the potential encroachments to them and the effect on the health of the trees. This involved:

1. Determining the general condition of the protected oak trees (see **SUMMARY OF FIELD OBSERVATIONS SHEETS**);
2. Ascertaining the impacts that will occur due to the proposed development (see grading plan/**OAK TREE LOCATION MAP**);
3. Providing guidance to minimize any encroachments of the saved oak trees.

METHOD OF STUDY

Qualifying the oak trees was accomplished by the use of our standard visual survey as completed by **L. NEWMAN DESIGN GROUP, INC.** (**LNDG**) in July of 2013. In the course of fieldwork, we performed the following tasks:

1. Oak trees near the proposed development were tagged with numbered, metal tags. These tags are affixed to the sides of the trees and correspond to the numbers on the **OAK TREE LOCATION MAP.** There are additional trees that fall within 250 feet of the property boundary that are not impacted by the development and, therefore, were not tagged.
2. Live tree trunks were measured at 3½' above mean natural grade and, if they measured at least 2 inches in diameter, were assessed for health and aesthetic quality. Trees included are within the project boundaries (right of way) or are within 50 feet of the right of way;
3. Driplines (the outermost edge of the tree's canopy) were field measured at the eight compass directions equidistant around the circumference of the tree. Most of the trees were land surveyed by and placed on a topographic map/street improvement plan (scale: 1" = 40') prepared by HMK Engineering, Inc. Refer to the **OAK TREE LOCATION MAP** included herein for the oak tree locations.

OAK SPECIES

There were 39 oak trees tagged, as noted above, within the developed area. The 39 oak trees referenced in this report consist of 7 *Quercus agrifolia* (coast live oak) and 32 *Quercus lobata* (valley oaks). There are approximately an additional 80 trees that were not tagged or assessed that are outside the proposed development or outside the property boundary and within 250 feet of the boundary. The majority of the additional oaks are *Quercus lobata*.

OAK TREE ORDINANCE

Oak trees of the genus *Quercus* within the City of Agoura Hills are protected by law. City Council Resolution #374 makes the cutting, moving and/or removal of an oak tree without a permit a misdemeanor.

The major thrust of the oak tree policy approved by the Agoura Hills City Council is to establish a theoretical protected zone in regard to the aerial portion of an oak tree. It is felt by the City that this protected zone shall be defined as follows: "Using the dripline as a point of reference, the "Protected Zone" shall commence at a point 5' outside the dripline and extend inward to the trunk of the tree. In no case shall the "Protected Zone" trace a circumference less than 15' from the trunk of the oak tree."

RESULTS of STUDY

1. **Physiological Condition of the Oaks**

The trees are generally in good condition. The physiological condition of each tree is detailed in the **SUMMARY of FIELD OBSERVATIONS** contained within this report. All recommendations made on our field forms relate only to the specific dates of our fieldwork.

2. **Summary of Data/Plan Review**

A. The development that is proposed consists of a new road and cul-e-sac, flood control devices, i.e. rock-lined drainage swales, storm drains, and infiltration basins, and an equestrian trail. Grading for building pads is not a part of this land development project at this time. Of the 39 oak trees inventoried for this project, five oak trees (#28- #32) will be encroached in a minor way as described below:

B. There is one proposed encroachment by the proposed storm drain line of oak tree #28 which is north of Chesebro Road. The encroachment, as shown on the plan, will occur where the underground storm drain pipes join to empty into the existing creek. The line is shown 2 feet inside the protected zone, 15 feet from the trunk. The actual excavation for the line will be closer, approximately 12 feet from the trunk. Care should be taken to limit construction activity to the side opposite the oak tree. If possible, the pipe location will be re-aligned away from the protected zone but it shall not be re-aligned closer to the tree without City approval. This will be a minor encroachment and no pruning shall be required.

C. Oak trees #29, #30, #31, and #32 will be slightly encroached by the proposed, graded, drainage swale (and/or the construction activity to build it) east of trees #29-#31 and east of tree #32 at the perimeter of their driplines. Construction activity must be limited and kept close to the area of work between the trees and the swale. The edge of the swale will be approximately 35 feet from the trunks of trees #29 and #30, 22 feet from the trunk of tree #31 and 10 feet from tree #32. These will be a minor encroachments and no pruning shall be required.

D. The proposed equestrian trail along the western property boundary will encroach trees #29, #30 and #31 by the 8-foot wide trail itself and by the proposed rail fence. Tree #29 is west of the existing masonry wall. Trees #30 and #31 are west of the existing chainlink fence. The trail will consist of 6-inch deep, compacted decomposed granite with redwood header on each side of the trail. The fence posts will be installed 8 feet on center along both sides of the trail from the property line to approximately 8 feet away. The three oak trees are just on the other side of the fence or wall. The excavation for the equestrian trail and posts will be done by hand ensuring no damage will be done to significant roots (roots 2 inches or larger) and preserving roots in place. The post holes shall be excavated without severing significant roots and post hole locations shall be altered to avoid pruning them unless approved by the arborist. This will be a minor encroachment if the work is done to minimize root damage and to avoid compacting the soil in the protected zones of the trees.

E. The proposed new equestrian trail from the beginning of the new road, where it will intersect Chesebro Road, to where the new trail will join the existing equestrian trail between trees #4 and #5, 150 feet away, will be aligned so that it will not impact any protected oak trees. The new trail for this 150 foot length shall be a cleared pathway to join the existing dirt trail and will not cause any impact to the oak trees although it will pass through the protected zone of oak tree #1. This encroachment will be insignificant because a trail will not be constructed within the protected zone of tree #1.

F. No oaks are proposed to be removed and no pruning will be required.

3. **Mitigation Recommendations**

A. All trees to be saved in place shall be protected with a chain link fence outside of the protected zone or at the limit of the approved excavation or construction. No construction activity shall take place within the protected zones of any oak tree other than tree #29 if the encroachment cannot be eliminated as described above.

B. Any City approved work within the protected zones of the saved oak trees, if any, including branch removals, shall be under the direct inspection/observation of an arborist.

C. Copies of the oak tree report, the oak tree permit, and the City approved site plan, as well as landscape and irrigation plans, shall be kept on site during all site construction.

<u>OAK TREE PRESERVATION PROGRAM</u>

As development occurs around the saved oak trees, they will become dependent upon the future residents for their care and preservation. All construction activities shall follow our established **PRESERVATION PROGRAM**. This program was developed to control the impacts to each tree and to protect them from any unnecessary and unscheduled damage.

Consideration of disease and pest control will play a major role in such a program and for the most part will be long range. The best protection against any problem is to build up the tree's natural defenses and to avoid wounding whenever possible. The proper mitigation measures will encourage vigorous growth within the trees, so that their compartmentalization can effectively control disease.

All oak tree mitigation techniques shall be inspected/observed on-site by the City arborist. The City shall be notified 48 hours prior to any work that is planned within the protected zone of any oak tree. The following list of recommendations (**PRESERVATION PROGRAM**), if followed, should insure that the saved trees will remain valuable assets to the community:

1. **Tree Protection**

A. Before any site construction commences, some specified trees shall be protected with a minimum 5' high chain link fence. Fencing shall be installed to minimize damage that might occur due to equipment storage, debris dumping, parking, etc. within the oak tree protected zones. This fence shall remain during all phases of construction and shall not be moved or removed without the approval of the City of Agoura Hills Planning & Community Development Department (Planning Dept.).

B. Fence posts shall be no closer than 15' from any oak tree trunk as well as being no closer than 15' on-center within any dripline. Digging the fence postholes shall not cause the severing of any oak tree roots larger than 2 inches.

C. Signs of a minimum size of 2'x2' shall be installed on the fence equidistant around each tree. On a grove of trees, sign shall be spaced 50’ apart. The signs must read:

WARNING **- THIS FENCE SHALL NOT BE REMOVED OR RELOCATED WITHOUT WRITTEN AUTHORIZATION FROM THE CITY OF AGOURA HILLS PLANNING & COMMUNITY DEVELOPMENT DEPARTMENT**.

D. Any brush clearance within the dripline areas shall be completed by handwork only.

2. **Pruning and Dead Wood Removal (not anticipated)**

A. A certified arborist shall perform all pruning cuts according to the International Society of Arborists’ Best Management Practices: Tree Pruning and according to ANSI A300 pruning standard. Work shall be performed in accordance with the ANSI Z133.1 safety standard.

3. **Water & Fertilization**

A. Watering should not be done during the months of June, July, and August unless the root system has been compromised by damage done to some of the roots. If recommended by an arborist, water should be applied no more than once or twice a week and allowed to drain thoroughly before more water is applied.

B. Fertilization of these native oak trees is not ordinarily recommended and should not be done unless approved by the City arborist.

4. **Diseases and Pests**

A. Prior to construction, the vigor of the saved trees shall be assessed. Any trees in a weakened condition shall be treated, as deemed necessary by the City arborist to invigorate them.

B. During all phases of construction, the health of the trees shall be monitored for signs of disease. These problems, if determined to exist, shall be addressed in order to remedy them.

5. **Grading Within the Protected Zone**

Exploratory trenching shall be done by hand or with great care by digging equipment under the observation of the consulting arborist for all trees proposed to be encroached by this project. This shall be done in order to minimize the damage to the root system by digging and to allow the proper pruning of the roots that are found. If any roots 2 inches or larger are encountered, they shall be saved (except in a grading cut situation) and covered with a layer of plastic cloth until backfilled.

6. **Other Considerations**

A. Do not nail grade stakes or attach anything to a tree that causes damages to the tree.

B. Do not install any planting, irrigation, or utilities within 15' of any native oak tree trunk unless approved by the Planning Dept.

C. Do not apply chemical herbicides within 100' of any native oak tree dripline.

D. Dust accumulation onto the tree's foliage from construction shall be hosed off periodically during construction under the recommendation of the consulting arborist.

E. A certification letter is required by the Planning Dept. upon completion of all work to the oak trees. This letter shall be submitted within five (5) working days of project completion.

NOTICE of DISCLAIMER:

This report represents the independent opinion of the signatory consultant (L. NEWMAN DESIGN GROUP, INC.). The tree(s) discussed herein was/were generally reviewed for physical, biological function and aesthetic conditions. This examination was conducted in accordance with presently accepted industry procedures, which are a ground-plane macro-visual observation only. No extensive microbiological, soil-root excavations, upper crown examination nor internal tree investigations were conducted. Therefore, the reporting herein reflects the overall visual appearance of the tree(s) on the date reviewed and no warranty is implied as to the potential failure, health or demise of any part or of whole of any tree described in the report. Records may not remain accurate after our inspection due to unknown causes of changeable deterioration of the reviewed site.

Respectfully submitted,

L. NEWMAN DESIGN GROUP, INC.
ASLA, California State License #2464

John Oblinger
OAK TREE CONSULTANT
Certified Arborist WE-6820A

OAK TREE PHOTOGRAPHS

OAK TREES 1, 2 &3 – FACING WEST

OAK TREE 4 - FACING EAST

OAK TREE 5 – FACING WEST

OAK TREE 6 – FACING WEST

OAK TREE 7 – FACING NORTH

OAK TREE 8-10 – FACING EAST

OAK TREE 11, 14-18 – FACING SOUTHEAST

OAK TREE 12 – FACING EAST

OAK TREE 13 – FACING WEST

OAK TREE 19 – FACING WEST

OAK TREE 20-23 – FACING EAST

OAK TREE 24 – FACING SOUTHEAST

OAK TREE 25 – FACING NORTH

OAK TREE 26 – FACING NORTH

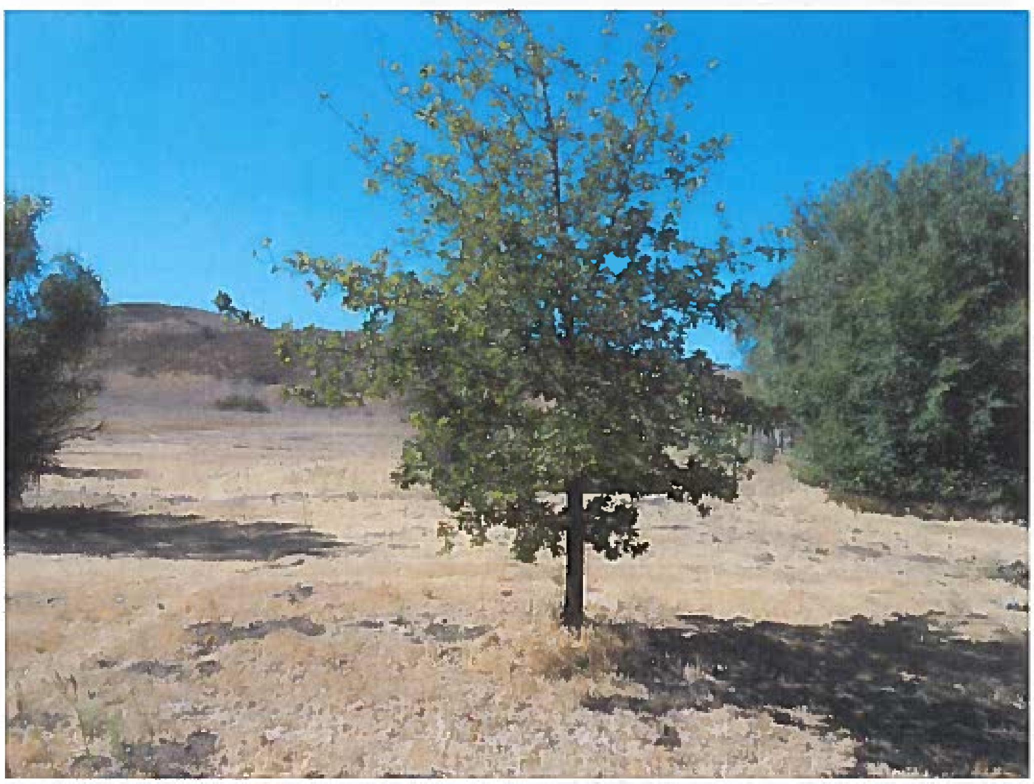
OAK TREE 27 – FACING NORTH

OAK TREE 28 – FACING NORTH

OAK TREE 29 – FACING NORTH

OAK TREE 30 – FACING SOUTH

OAK TREE 31 – FACING SOUTH



OAK TREE 32 – FACING SOUTH

OAK TREE 33-34 – FACING SOUTH

OAK TREE 35 – FACING EAST

OAK TREE 36-37 – FACING WEST

OAK TREE 38-39 – FACING SOUTH

SUMMARY of FIELD OBSERVATIONS

INSPECTION NOTICE

The following information was observed on the date(s) indicated herein, and should only be considered true at the time of field inspection.

LNDG Job No. 200-463

Date 7-17-2013

SUMMARY OF FIELD OBSERVATIONS

	TREE NUMBER	1	2	3	4	5	6	7	8	9	10
SPECIES	*Quercus agrifolia*										
	Quercus lobata	X	X	X	X	X	X	X	X	X	X
	Quercus berberidifolia										
FORM	TREE HEIGHT (EST.)	25'	20'	18'	50'	20'	15'	18'	18'	15'	12'
	LEAN										
	TRUNK DIAMETERS	9" 6"	7" 7"	4.5"	64"	5"	3"	5.5"	3.5" 3.5"	4"	2.5"
PHYSICAL CONDITION	TRUNK CAVITY										
	TRUNK EXUDATION										
	BURIED ROOT COLLAR										
	EXPOSED ROOTS										
	TRUNK DAMAGE										
	WEAK CROTCH(ES)										
	DISEASE										
	INSECT/MITE DAMAGE										
	RECENT FIRE DAMAGE										
	BRANCH CAVITIES										
	MAINSTEM DIEBACK										
	TWIG/BRANCH DIEBACK	X	X	X				X			
	EPICORMIC GROWTH										
	THIN FOLIAGE										
	VIGOR (GOOD/MOD/POOR)	M	M	M	G	G	G	G	G	G	G
	TERRAIN - SLOPED/LEVEL	L	L	L	L	L	L	L	L	L	L
RATING	HERITAGE				X						
	HEALTH	C	C	C	B	B	B	C	C	C	C
	AESTHETICS/COMFORMITY	C	C	C	A	B	B	C	C	C	C
TREAT-MENT	REMOVE DEADWOOD										
	INSECT/DISEASE TREAT										
	REMARKS:										

LNDG Job No. 200-463

Date 7-17-2013

SUMMARY OF FIELD OBSERVATIONS

	TREE NUMBER	11	12	13	14	15	16	17	18	19	20
SPECIES	*Quercus agrifolia*										
	Quercus lobata	X	X	X	X	X	X	X	X	X	X
	Quercus berberidifolia										
FORM	TREE HEIGHT (EST.)	25'	15'	20'	15'	15'	18'	18'	18'	40'	18'
	LEAN										
	TRUNK DIAMETERS	5"	5.5"	4"	3"	2.5"	5"	4"	5"	40"	3.5"
				3.5"	3"			4"			2.5"
PHYSICAL CONDITION	TRUNK CAVITY										
	TRUNK EXUDATION										
	BURIED ROOT COLLAR										
	EXPOSED ROOTS										
	TRUNK DAMAGE										
	WEAK CROTCH(ES)										
	DISEASE										
	INSECT/MITE DAMAGE										
	RECENT FIRE DAMAGE										
	BRANCH CAVITIES										
	MAINSTEM DIEBACK										
	TWIG/BRANCH DIEBACK										
	EPICORMIC GROWTH										
	THIN FOLIAGE							X	X		
	VIGOR (GOOD/MOD/POOR)	G	G	G	G	G	G	G	G	G	G
	TERRAIN - SLOPED/LEVEL	L	L	L	L	L	L	L	L	S	L
RATING	HERITAGE										
	HEALTH	B	B	B	B	B	B	B	B	B	B
	AESTHETICS/COMFORMITY	B	B	B	A	B	B	B	B	A	B
TREAT-MENT	REMOVE DEADWOOD										
	INSECT/DISEASE TREAT										
	REMARKS:										

LNDG Job No. 200-463 Date 7-17-2013

SUMMARY OF FIELD OBSERVATIONS

	TREE NUMBER	21	22	23	24	25	26	27	28	29	30
SPECIES	*Quercus agrifolia*	X	X	X	X					X	X
	Quercus lobata					X	X	X	X		
	Quercus berberidifolia										
FORM	TREE HEIGHT (EST.)	20'	22'	18'	18'	18'	30'	10'	15'	50'	40'
	LEAN		S								NE
	TRUNK DIAMETERS	5"	5"	4"	5.5"	4.5"	11"	3"	5"	25"	18"
		4.5"	4"	3.5"		4"	10"	2.5"	5"		
			3.5"			4"	8.5"		5"		
			2.5"								
PHYSICAL CONDITION	TRUNK CAVITY										
	TRUNK EXUDATION										
	BURIED ROOT COLLAR										
	EXPOSED ROOTS										
	TRUNK DAMAGE										
	WEAK CROTCH(ES)										
	DISEASE										
	INSECT/MITE DAMAGE										
	RECENT FIRE DAMAGE										
	BRANCH CAVITIES										
	MAINSTEM DIEBACK										
	TWIG/BRANCH DIEBACK							X			
	EPICORMIC GROWTH										X
	THIN FOLIAGE							X			
	VIGOR (GOOD/MOD/POOR)	G	G	G	G	G	G	M	G	G	G
	TERRAIN - SLOPED/LEVEL	L	L	L	L	L	L	L	S	L	L
RATING	HERITAGE										
	HEALTH	B	B	B	B	B	B	C	B	B	B
	AESTHETICS/COMFORMITY	A	A	A	B	A	B	C	B	A	B
TREATMENT	REMOVE DEADWOOD										
	INSECT/DISEASE TREAT										
	REMARKS:										Pruned

LNDG Job No. 200-463

Date 7-17-2013

SUMMARY OF FIELD OBSERVATIONS

		31	32	33	34	35	36	37	38	39	
SPECIES	TREE NUMBER	31	32	33	34	35	36	37	38	39	
	Quercus agrifolia	X									
	Quercus lobata		X	X	X	X	X	X	X	X	
	Quercus berberidifolia										
FORM	TREE HEIGHT (EST.)	15'	15'	12'	10'	15'	15'	18'	12'	15'	
	LEAN										
	TRUNK DIAMETERS	7.5"	4"	3.5"	2"	4.5" 3"	4.5"	4.5"	3.5"	2.5"	
PHYSICAL CONDITION	TRUNK CAVITY										
	TRUNK EXUDATION										
	BURIED ROOT COLLAR										
	EXPOSED ROOTS										
	TRUNK DAMAGE										
	WEAK CROTCH(ES)										
	DISEASE										
	INSECT/MITE DAMAGE										
	RECENT FIRE DAMAGE										
	BRANCH CAVITIES										
	MAINSTEM DIEBACK										
	TWIG/BRANCH DIEBACK										
	EPICORMIC GROWTH										
	THIN FOLIAGE			X	X		X	X			
	VIGOR (GOOD/MOD/POOR)	G	G	M	M	G	M	M	M	M	
	TERRAIN - SLOPED/LEVEL	L	L	S	S	S	S	S	S	S	
RATING	HERITAGE										
	HEALTH	B	B	C	C	B	C	C	C	C	
	AESTHETICS/COMFORMITY	B	B	C	C	B	C	C	C	C	
TREAT-MENT	REMOVE DEADWOOD										
	INSECT/DISEASE TREAT										
	REMARKS:	REMARKS:	REMARKS:	REMARKS:	REMARKS:	REMARKS:	REMARKS:	REMARKS:	REMARKS:	REMARKS:	

DRIPLINE MEASUREMENTS

INSPECTION NOTICE

The following information was observed on the date(s) indicated herein, and should only be considered true at the time of field inspection.

DRIPLINE MEASUREMENTS

TREE No.	N	NE	E	SE	S	SW	W	NW
1	8	8	8	8	8	8	8	8
HEIGHT TO CANOPY	3	3	3	3	3	3	3	3
2	8	8	8	8	8	8	8	8
HEIGHT TO CANOPY	3	3	3	3	3	3	3	3
3	5	5	5	5	5	5	5	5
HEIGHT TO CANOPY	1	1	1	1	1	1	1	1
4	52	55	48	64	55	48	52	35
HEIGHT TO CANOPY	25	2	6	10	3	3	15	20
5	5	5	5	5	5	5	5	5
HEIGHT TO CANOPY	1	1	1	1	1	1	1	1
6	6	5	3	3	3	3	4	4
HEIGHT TO CANOPY	1	1	1	1	1	1	1	1
7	6	6	5	5	5	6	10	10
HEIGHT TO CANOPY	6	6	3	6	6	6	10	12
8	5	5	0	2	4	9	5	4
HEIGHT TO CANOPY	3	3	0	4	4	4	2	1
9	0	0	6	4	7	5	5	0
HEIGHT TO CANOPY	0	0	6	6	3	8	10	0
10	8	3	3	3	4	4	3	3
HEIGHT TO CANOPY	10	1	1	3	3	3	1	3

DRIPLINE MEASUREMENTS

TREE No.	N	NE	E	SE	S	SW	W	NW
11	6	3	4	6	5	5	2	2
HEIGHT TO CANOPY	3	4	8	10	3	3	1	1
12	6	10	6	6	6	5	3	3
HEIGHT TO CANOPY	5	10	1	1	1	1	1	1
13	3	3	4	4	3	4	3	3
HEIGHT TO CANOPY	1	1	3	1	1	1	1	1
14	3	3	3	3	3	3	3	3
HEIGHT TO CANOPY	1	1	1	1	1	1	1	1
15	3	2	2	2	3	3	3	4
HEIGHT TO CANOPY	1	1	1	1	1	1	3	5
16	7	0	0	0	7	5	5	7
HEIGHT TO CANOPY	9	0	0	0	1	3	1	6
17	0	0	0	0	8	6	0	0
HEIGHT TO CANOPY	0	0	0	0	10	5	0	0
18	0	0	0	0	10	4	4	0
HEIGHT TO CANOPY	0	0	0	0	8	10	10	0
19	40	40	45	45	45	40	40	40
HEIGHT TO CANOPY	25	25	15	8	2	12	15	25
20	4	4	4	9	6	5	5	6
HEIGHT TO CANOPY	1	2	3	5	3	1	1	3

DRIPLINE MEASUREMENTS

TREE No.	N	NE	E	SE	S	SW	W	NW
21	3	3	4	6	6	4	3	3
HEIGHT TO CANOPY	1	1	3	1	2	1	1	1
22	6	6	5	6	5	4	4	4
HEIGHT TO CANOPY	6	3	4	4	1	1	1	4
23	6	5	5	4	4	4	4	3
HEIGHT TO CANOPY	5	4	4	3	1	1	1	5
24	8	8	2	5	5	12	7	7
HEIGHT TO CANOPY	6	6	3	1	2	15	6	6
25	8	5	8	7	8	5	5	5
HEIGHT TO CANOPY	4	3	5	2	4	1	1	5
26	15	11	16	16	18	15	16	17
HEIGHT TO CANOPY	2	1	10	15	15	12	5	12
27	6	6	6	5	3	3	3	2
HEIGHT TO CANOPY	4	4	4	5	2	1	2	2
28	12	13	13	11	12	12	14	12
HEIGHT TO CANOPY	1	1	1	1	1	1	1	1
29	38	27	32	34	32	35	32	38
HEIGHT TO CANOPY	15	6	6	1	6	10	10	15
30	27	28	28	30	28	25	20	20
HEIGHT TO CANOPY	10	12	15	20	12	20	20	15

DRIPLINE MEASUREMENTS

TREE No.	N	NE	E	SE	S	SW	W	NW
31	12	12	12	10	9	8	8	10
HEIGHT TO CANOPY	5	5	6	6	6	6	6	6
32	10	6	11	7	6	4	6	6
HEIGHT TO CANOPY	5	4	8	4	5	3	4	3
33	5	4	3	1	1	4	5	6
HEIGHT TO CANOPY	6	6	5	4	5	7	5	7
34	1	2	2	2	1	1	5	5
HEIGHT TO CANOPY	4	4	4	4	4	4	5	4
35	3	3	4	10	4	3	7	4
HEIGHT TO CANOPY	10	10	8	7	4	4	3	8
36	6	6	4	4	3	3	3	3
HEIGHT TO CANOPY	6	6	4	4	4	4	3	5
37	12	4	3	3	5	4	3	3
HEIGHT TO CANOPY	12	4	4	4	5	4	4	4
38	3	0	8	8	6	6	3	3
HEIGHT TO CANOPY	2	0	3	4	5	5	3	3
39	2	1	5	5	4	3	3	1
HEIGHT TO CANOPY	4	4	5	5	4	4	1	4
40								
HEIGHT TO CANOPY								

DEFINITIONS

SUMMARY of FIELD OBSERVATIONS DEFINITIONS

INTRODUCTION

Familiarity with the following definitions is necessary to the basic understanding of the tree ordinance, this tree report, and of the procedures used to evaluate the trees and the site conditions. There are numerous diseases and insects that frequently attack trees. A long discourse in plant pathology or entomology is not a prerequisite to develop a basic understanding of the effects of disease and insects upon living plant tissue but a basic knowledge of disease and insects should include an understanding of the following definitions:

FORM

1. **Tree Number** - each protected tree in the field has been assigned a number that corresponds to a tree location on the "Tree Location Map".

2. **Species** - is the type of tree that is being evaluated.

3. **Number of Trunks** - as measured in accordance to the ordinance existing at the time of evaluation.

4. **Diameter of Trunks** - as measured at 4½' above mean natural grade.

5. **Tree Height** - is the approximate height of each numbered, evaluated tree.

6. **Leaning** - is the direction the tree is inclined from the natural vertical position.

PHYSICAL CONDITION

1. **Trunk Cavity/Damage** - A **Cavity** is a hollow area in the trunk, usually due to wood decay. **Damage** is a damaged area on the trunk, usually due to an external force onto the tree.

2. **Exposed Roots** - roots exposed near tree; e.g. in creek bed.

3. **Exfoliating Bark** - the flaking off of bark from trunk, branches and/or twigs.

4. **Water Pocket** - pockets formed at branch crotches that can hold water and possibly weaken the tree's structure (possible hazard).

5. **Exudation** - the issuance or expelling of liquid, usually from wounds.

6. **Fruiting Bodies** - are the external signs (i.e. mushrooms, conks) of internal wood decay.

7. **Insect/Mite Damage** - is some form of damage to the parts of the tree caused by insects or mites (i.e. scale, caterpillars, weevils, borers, mites, etc.).

8. **Galls/Oak Pit Scale** - **Galls** are abnormal growth (tumors) on the tree, which may be caused by insects, mites, bacteria, etc. **Oak Pit Scale** has a severe weakening effect on the twigs, sometimes resulting in their death. When the scale settles on the twig, a swelling of the twig tissue occurs so that the insect, in effect, is in a pit, hence, the name.

9. **Fire Damage** - each tree is rated on the amount of burn it has received. These are:

Category	Percent of Tree Burned
Slight (S)	0% - 25%
Moderate (M)	26% - 75%
Heavy (H)	76% - 100%
Complete (C)	Burned to the ground

A. A check mark only, indicates a sign of past fire damage;
B. The trees with slight damage have an excellent chance of recovering to their original form. Trees with moderate damage have a good chance of recovery with alterations in form. Heavy percentage of burn on trees will significantly alter their form and lower their probability of survival to half;
C. The "complete" category is for those trees that burned to the ground.

10. **Mainstem Dieback** - death of healthy mainstems from the growing tip back.

11. **Branch Cavities** - hollow areas in the trunk or limbs in the upper tree, usually due to the decay of wood.

12. **Weak Crotches** - poorly formed branch attachments.

13. **Twig/Branch Dieback** - death of unhealthy twigs from the growing tip back.

14. **Exocormic Growth** - excessive growth along main limbs, rather than on twigs.

15. **Thin Foliage** - defoliation and twig dieback throughout the canopy.

16. **Vigor** - is the capacity of a tree for growth and survival. Below are the ratings:

    Good (G) - New tip growth; good leaf color; relatively smooth bark free from cracks/decay;
    Moderate (M) - Some new tip growth; medium leaf color, some dead wood; thinning crown;
    Poor (P) - No new tip growth; poor leaf color; abnormal bark; much dead wood; heavily thinned crown.
    A vigorous tree will more easily ward off disease and/or insect attacks, and should recover from impacts more quickly than a weak tree.

17. **Terrain** - refers to the topography of the land where the tree is found.

18. **Potential Hazard** - any tree may be more or less a hazard to people depending on its location and/or health.

RATINGS

1. The **Health** of the trees was visually determined from a macroscopic inspection of signs and symptoms of disease. The following describes our system:

    A. **Outstanding** - A healthy and vigorous tree characteristic of its species and free of any visible signs of disease or pest infestation;
    B. **Above Average** - A healthy and vigorous tree. However, there are minor visible signs of disease and pest infestation;
    C. **Average** - Although healthy in overall appearance, there is a normal amount of disease and/or pest infestation;
    D. **Below Average/Poor*** - This tree is characterized by exhibiting a greater degree of disease and/or pest infestation or structural instability than normal and appears to be in a state of decline. This tree also exhibits extensive signs of dieback;
    E. **Dead*** - This tree exhibits no signs of life whatsoever at the time of field evaluation.
    *A tree rating of "D" and lower is in a low stage of vigor and naturally a meaningful level of recovery is doubtful. Removal should be considered if it is within the proposed project development.

2. The **Aesthetic/Conformity** quality of the trees was visually determined from an overall inspection of appearance. The following describes our system:

    A. **Outstanding** - The tree is visually symmetrical, having the ideal form & appearance for the species;
    B. **Average** - The tree, though non-symmetrical, has an appealing form for the species with very little dieback of foliage or twigs/branches;
    C. **Below Average** - The tree is non-symmetrical for the species with an unappealing form and/or has much dieback of foliage and twigs/branches;

D. **Poor** - The tree has few positive characteristics and may detract from the beauty of the landscape.

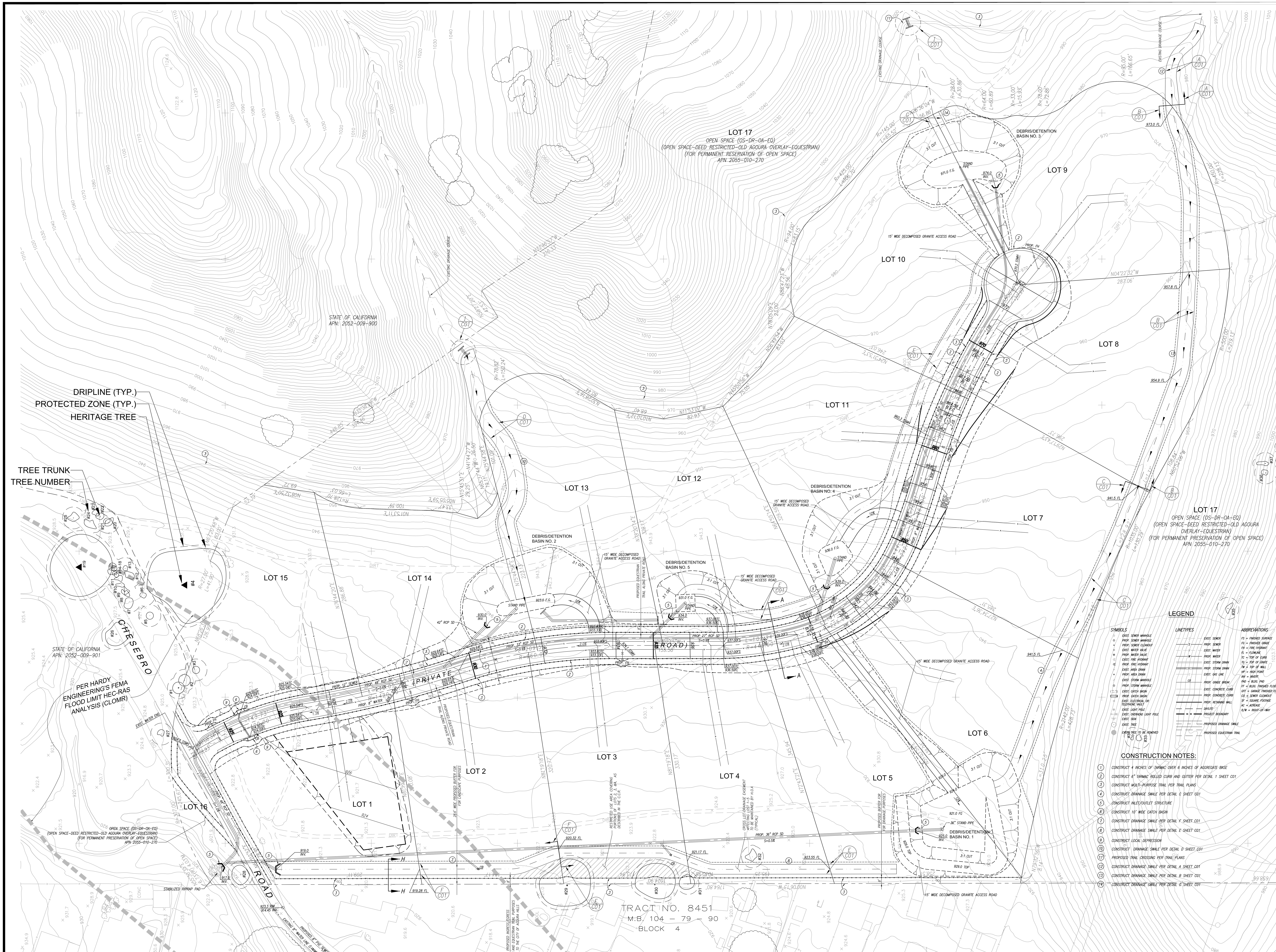
TREATMENT

1. **Remove Dead Wood** - if noticeable dead wood in the canopy makes tree unattractive, it can be removed.
2. **Remove Wire, etc.** - if anything has been physically attached to the tree, it should be removed.
3. **Insect/Disease Treatment** - see TREE PRESERVATION PROGRAM within this report for explanation.
4. **Cable/Brace** - can extend the time the tree remains healthy, attractive and hazard free.
5. **None** - no treatment is recommended.
6. **Remove Tree** - if the tree can't be saved through any type of treatment, it should be removed.

REMARKS (Some other terms that may be used)

1. **Basal Growth** - is leaf growth generating from around base of trunk.
2. **Exposed Buttress Roots** - when soil is absent at the base of the tree.
3. **Heart Rot** - is decomposition of heartwood (the central portion of a twig/branch/trunk).
4. **Powdery Mildew** - are leaves that are covered by a white powdery growth generally when new growth becomes wet for long periods of time; leaves may be distorted, stunted and drop prematurely.
5. **Cankers** - are rough swellings with depressed centers resulting in death of tissue that later cracks open and exposes the wood underneath in twigs, branches, and/or trunks.
6. **Chlorotic Leaves** - leaf veins remain normally green, but the tissue between veins becomes yellow, which is usually caused by nutrient deficiencies.
7. **Mottling** - are leaves that have a variegated pattern of green and yellow.
8. **Defoliation** - is a premature leaf drop.
9. **Bark Beetle Frass** - are wood fragments mixed in the insect's excrement.
10. **Witches Broom** - is an abnormal growth cluster of twigs that may be caused by pruning, insects, mites, fungus, etc.
11. **Mistletoe** - is a leafy evergreen perennial parasite with dark green leathery leaves.
12. **Crowded** - is a tree within the canopy of an adjacent tree or canopy.
13. **Shading Out** - is the defoliation and twig dieback inside the canopy due to the lack of sunlight.

OAK TREE LOCATION MAP



NO.	DESCRIPTION	DATE

GRADING PLAN - PRIVATE ROAD
VESTING TENTATIVE TRACT MAP 72316
AGOURA HILLS, CA 91301

FORTUNE COMPANIES
11911 SAN VICENTE BLVD., STE 375
LOS ANGELES, CA. 90049

CIVIL, ENVIRONMENTAL AND STRUCTURAL ENGINEERS
LAND SURVEYORS LAND PLANNERS
1552 EIGHTEENTH STREET
SANTA MONICA, CA 90404
PHONE 310.449.5511
351 ROLLING OAKS DR., STE 202
THOUSAND OAKS, CA 91361
PHONE 818.222.2606

HARDY ENGINEERING

SHEET NO.
C03

L. Newman Design Group, Inc.

OAK TREE LOCATION MAP

JOB # 200-463
September 2, 2014

ENGINEER'S STATEMENT
PREPARED UNDER THE SUPERVISION OF:
MARK D. HARDY P.E. 36538 EXPIRY 30-JUN-16
DATE

SCALE: 1"=40'

Kay J. Greeley

Memo

To: Allison Cook, City of Agoura Hills

From: Ann Burroughs for Kay Greeley, Landscape and Oak Tree Consultant

Date: September 23, 2014

Re: 13-OTP-021 - Agoura Equestrian Estates

As requested, we reviewed the following materials submitted with respect to the subject entitlement request:

- Oak Tree Report prepared by L. Newman Design Group, Inc. dated July 17, 2013, revised August 18, 2014 and received by the City of Agoura Hills September 19, 2014

Following are our comments with respect to the oak trees for the subject entitlement request:

<u>Oak Trees</u>

The subject property, consisting of approximately 69 acres, is located within an unincorporated area of Los Angeles County adjacent to the City of Agoura Hills, northeast of the Ventura Freeway Palo Comado Interchange. As part of an annexation and development agreement project the current entitlement request seeks permission to subdivide the two undeveloped lots into 15 residential lots and two open-space lots. The site is currently zoned 'light agricultural'. Proposed zoning is 'residential very low' for the 20 acres that would be subdivided into single-family residential lots. The applicant proposes to donate the remaining 49 acres to a public entity, to be named at a later date, to be designated 'open space deed restricted'. The request also seeks permission to construct a private road, equestrian trails, and drainage facilities. Development of the residences is not part of the currently proposed project. As each residence is proposed, an oak tree report will be necessary to determine potential impacts to individual oak trees within the residential lot.

There are a total of approximately 119 coast live oak (*Quercus agrifolia*) and valley oak trees (*Q. lobata*) on or adjacent to the site. Thirty-nine coast live oak and valley oak trees are located within 50 feet of the proposed development. Fourteen of these oak trees are located on the property and the remaining 25 oak trees are located on the adjacent properties.

No oak trees would be removed to accommodate the road, equestrian trails, and drainage facilities. One hundred fourteen of the existing oak trees would be retained with no direct impacts.

Construction of the private road, equestrian trails, and drainage facilities as proposed would encroach within the protected zones of five oak trees located within 50 feet of the proposed development. Construction of the drainage swale near the westerly property line would result in encroachment within the edge of the protected zone of Oak Tree 29, and within the protected zone but outside the dripline of Oak Tree 32. Construction of a new storm drain would encroach within the protected zone but outside the dripline of Oak Tree 28. Impacts to these three trees should be minor and as long as the work is performed carefully the trees should not experience any long term impacts. The proposed equestrian trail and the fence to run along its easterly side will encroach within the driplines of Oak Trees 29, 30, and 31 which are located off-site on the properties to the west. Impacts to these three trees should be minor to moderate but as long as the work is performed carefully the trees should not experience any long term impacts.

Following are our comments and recommended conditions of approval with respect to the oak trees for the subject entitlement request:

Oak Trees

1. The applicant is permitted to encroach within the protected zones of Oak Trees 28, 29, 30, 31, and 32 in order to complete the approved site development program.
2. No activities are permitted within the protected zone of the remaining 114 oak trees. They shall be preserved in place with no direct impacts.
3. All excavation within the protected zones of Oak Trees 28, 29, 30, 31, and 32 shall be performed using hand tools only under the direct observation of the applicant's oak tree consultant.
4. The applicant shall comply with all mitigation measures recommended in the above Revised Oak Tree Report.
5. The applicant shall provide forty-eight (48) hour notice prior to the start of any approved work within the protected zone of any oak tree.
6. The project shall be subject to periodic inspections by the City of Agoura Hills Landscape and Oak Tree Consultant. The number and timing of the inspections shall be determined by the Director of Planning and Community Development and the City Landscape and Oak Tree Consultant to ensure compliance by the applicant.
7. No planting or irrigation is permitted within the protected zone of an existing oak tree without approval from the City of Agoura Hills Landscape and Oak Tree Consultant.
8. Prior to the start of any mobilization or construction activities on the site, Oak Trees shall be fenced at the edge of the protected zone in strict accordance with Article IX, Appendix A, Section V.C.1.1 of the City of Agoura Hills Oak Tree Preservation and Protection Guidelines. The City Oak Tree Consultant shall approve the fencing location subsequent to installation and prior to the start of any mobilization or work on the site.
9. No vehicles, equipment, materials, spoil or other items shall be used or placed within the protected zone of any oak tree at any time, except as specifically required to complete the approved work.
10. No pruning of live wood shall be permitted unless specifically authorized by the City Oak Tree Consultant. Any authorized pruning shall be performed by a qualified arborist under the direct observation of the applicant's oak tree consultant. All pruning operations shall be consistent with ANSI A300 Standards – Part 1 Pruning and the most recent edition of the International Society of Arboriculture Best Management Practices for Tree Pruning.
11. Upon completion of construction, each existing oak tree shall be mulched throughout the dripline with three inches (3") of approved organic mulch as needed to supplement natural leaf litter where encroachment has occurred.
12. Within ten (10) calendar days of the completion of work and prior to removal of the protective fencing, the applicant shall contact the City Oak Tree Consultant to perform a final inspection. The applicant shall proceed with any remedial measures the City Oak Tree Consultant deems necessary to protect or preserve the health of the subject oak trees at that time.

Appendix D

Floral Compendium
Faunal Compendium

Floral Compendium

Latin Name	Common Name	**Native**
ANGIOSPERMS: MONOCOTS		
Poaceae (Gramineae)	**Grass Family**	
Avena fatua	Wild oat	No
Bromus diandrus	Ripgut brome	No
Bromus hordaeceus	Soft brome	No
Distichlis spicata	Saltgrass	Yes
Eremocarpus setigerus	Dove weed	Yes
Hordeum murinum	Foxtail barley	No
Hordeum sp.	Barley sp.	Yes
Nassella pulchra	Purple needlegrass	Yes
Melica imperfecta	California melic	Yes
Hordeum depressum	Alkali barley	Yes
Themidaceae	--	
Bloomeria crocea	Common goldenstar	Yes
ANGIOSPERMS: DICOTS		
Amaranthaceae	**Amaranth Family**	
Chenopodium californicum	California goosefoot	Yes
Salsola tragus	Russian thistle	No
Anacardiaceae	**Sumac or Cashew Family**	
Malosma laurina	Laurel sumac	Yes
Rhus ovata	Sugar bush	Yes
Apocynaceae	**Dogbane Family**	
Asclepias fascicularis	Narrowleaf milkweed	Yes
Asteraceae	**Sunflower Family**	
Artemisia californica	California sagebrush	Yes
Artemisia douglasiana	mugwort	Yes
Baccharis pilularis	Coyote brush	Yes
Baccharis salicifolia	Mule fat	Yes
Corethrogyne filaginifolia	Common sandaster	Yes
Grindelia camporum	Common gumplant	Yes
Hazzardia squarrosa	Sawtooth goldenbush	Yes
Lactuca serriola	Prickly lettuce	No
Microseris douglasii tenella	Douglas' silverpuffs	Yes
Silybum marianum	Milk thistle	No
Xanthium strumarium	Cocklebur	Yes
Brassicaceae (Cruciferae)	**Mustard Family**	
Brassica nigra	Black mustard	No
Capsella bursa-pastoris	Shepard's purse	No
Hirschfeldia incana	Wild mustard	No
Sisymbrium irio	London rocket	No

Boraginaceae	**Borage Family**	
Amsinckia menziesii	Menzies' fiddleneck	Yes
Eucrypta chrysanthemifolia	Spotted Eucrypta	Yes
Heliotropium curassavicum	Chinese parsley	Yes
Caprifoliaceae	**Honeysuckle Family**	
Sambucus nigra ssp. caerulea	Blue elderberry	Yes
Convolvulaceae	**Morning-Glory Family**	
Calystegia macrostegia	Morning glory	Yes
Cucurbitaceae	**Gourd Family**	
Marah macrocarpus	Wild cucumber	Yes
Fabaceae (Leguminosae)	**Legume Family**	
Lupinus bicolor	Bicolor lupine	Yes
Lupinus succulentus	Arroyo lupine	Yes
Medicago sp.	Alfalfa	No
Quercus lobata	Valley oak	Yes
Geraniaceae	**Geranium Family**	
Erodium botrys	Broad leaf filaree	No
Lamiaceae	**Mint Family**	
Marrubium vulgare	Common horehound	No
Salvia leucophylla	White sage	Yes
Malvaceae	**Mallow Family**	
Malacothamnus fasciculatus	Chaparral mallow	Yes
Malva parviflora	Cheeseweed	No
Portulacaceae	**Purselane Family**	
Calandrinia ciliata	Redmaids	Yes
Claytonia perfoliata	Miner's lettuce	Yes
Polygonaceae	**Buckwheat FAMILY**	
Rumex hymenosepalus	Wild rhubarb	Yes
Rubiaceae	**Madder or Coffee Family**	
Galium angustifolium	narroleaf bedstraw	Yes
Salicaceae	**Willow Family**	
Salix laevigata	Red willow	Yes
Salix lasiolepis	arroyo willow	
Scrophulariaceae	**Figwort Family**	
Castilleja martinii	Martin's paintbrush	Yes
Castilleja affinis	Indian paintbrush	Yes
Solanaceae	**Nightshade Family**	
Datura wrightii	Jimsonweed	Yes
Verbenaceae	**Vervain Family**	
Verbena lasiostachys	Common verbena	Yes

Faunal Compendium

Latin Name	Common Name
Insects	
Pieris rapae	cabbage white butterfly
Pontia protodice	checkered white butterfly
Pyrgus communis	common skipper butterfly
Sphingidae sp.	sphinx moth
Vanessa sp.	painted lady
Amphibians and Reptiles	
Batrachoseps nigriventris	black-bellied slender salamander
Bufo boreas halophilus	California Toad
Crotalus viridis helleri	southern pacific rattlesnake
Elgaria multicarinata	alligator lizard
Eumeces skiltonianus	western skink
Lampropeltis getulus	common kingsnake
Maticophis flagellum piceus	red coachwhip
Masticophis lateralis lateralis	California striped racer
Pituophis melanoleucus	gopher snake
Pseudacris cadaverina	California chorus frog
Pseudacris regilla	Pacific chorus frog
Sceloporous occidentalis	western fence lizard
Uta stansburiana	side-blotched lizard
Birds	
Agelaius phoeniceus	red-winged blackbird
Aphelocoma coerulescens	scrub jay
Buteo jamaicensis	red-tailed hawk
Buteo lineatus	red-shouldered hawk
Callipepla californica	California quail
Carduelis psaltria	lesser goldfinch
Carpodacus mexicanus	house finch
Cathartes aura	turkey vulture
Circus cyaneus	northern harrier
Corvus brachyrhynchos	American crow
Corvus corax	common raven
Elanus leucurus	white-tailed kite
Falco sparverius	American kestrel
Geothlypis trichas	common yellowthroat
Hirundo pyrrhonota	cliff swallow
Melospiza melodia	song sparrow
Pipilo crissalis	California towhee
Pipilo erythrophthalmus	spotted towhee
Sayornis nigricans	black phoebe
Sturnella neglectat	western meadowlark

Sturnus vulgaris	European starling
Thryomanes bewickii	Bewick's wren
Toxostoma redivivum	California thrasher
Tyrannus verticalis	western kingbird
Zenaida macroura	mourning dove
Mammals	
Canis latrans	coyote
Chaetodipus californicus	California pocket mouse
Didelphis virginana	opossum
Felis concolor	mountain lion
Lynx rufus	bobcat
Mephitis mephitis	striped skunk
Microtus californicus	California vole
Neotoma fuscipes	dusky-footed woodrat
Odocoileus hemionus	mule deer
Peromyscus boylii	brush mouse
Peromyscus californicus	California mouse
Peromyscus maniculatus	deer mouse
Spennophilus beechyi	California ground squirrel
Sylvilagus auduboni	desert cottontail
Taxidea taxus	American badger
Thomomys bottae	Botta's pocket gopher
Urocyon cinereoargenteus	Gray fox

Appendix E

Geotechnical Evaluation

Geotechnical Site Evaluation
Proposed Agoura Equestrian Estates
East of Chesebro Road and North of US 101
Agoura Hills, California

prepared for

Fortune Realty LLC
5423 Village Road, Suite 200
Long Beach, CA 90808

GORIAN & ASSOCIATES, INC.

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Figure 1: Location Map
Appendix A: Logs of Subsurface Exploration
Appendix B: Laboratory Testing
Appendix C: Slope Stability Analyses

GORIAN & ASSOCIATES, INC.

Applied Earth Sciences
Geotechnical Engineers
Engineering Geologists
DSA Accepted Testing Laboratory
Special Inspection and Materials Testing

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July 24, 2013

Fortune Realty LLC
5423 Village Road, Suite 200
Long Beach, CA 90808

Work Order: 2232-0-FR-100

Attention: Mr. Benjamin Efraim

Subject: **Geotechnical Site Evaluation, Proposed Agoura Equestrian Estates, East of Chesebro Road and North of US 101, Agoura Hills, California.**

1. INTRODUCTION

Pursuant to our proposal dated March 22, 2013 (Proposal Number: 5699-10) addressed to Fortune Realty LLC we are providing herein a site evaluation of the property east of Chesebro Road and north of US 101 in Agoura Hills, California. Property development addressed in this report consists of large equestrian style residential lots as shown on Plate 1 based on the grading plan prepared by HMK Engineering, Inc. This map serves as the base map for our Geotechnical Map (Plate 1) showing the site, proposed development, and approximate points of prior subsurface exploration.

This evaluation and report were prepared as a stand alone document to address the current proposed residential development of the site and supersedes the referenced geotechnical reports addressing the site and previous proposed developments. Our prior evaluation report and responses to reviews of the County of Los Angeles are listed following the text of this report under References. Based on our site evaluation, the property is suitable for the proposed residential construction from a geotechnical standpoint provided recommendations presented herein are implemented in the project design and construction. Descriptions of the site and geologic units along with our conclusions and recommendations are presented within the text of this report.

Remedial grading will be necessary to prepare the site for the proposed development. Remedial grading will consist of the stabilization of a landslide, removal of the upper soils within the lower portions of the property, and undercutting the bedrock areas to provide a minimal thickness of engineered compacted fill below the proposed residential buildings. Setback of the buildings from the ascending slopes will be needed per the City of Agoura Hills Building Code. Detail grading and site preparation recommendations are presented later in the text of this report.

2. PROPOSED DEVELOPMENT

The property will be developed for fifteen equestrian style residential lots as shown on Plate 1. Conventional cut and fill grading will be used to construct the building pads and access drives within the valley floor. The building pads will be raised above the valley floor as shown on Plate 1 and no major cut slopes are planned into the hillsides. Access to the lots will be via a private road from Cheseboro Road. The drive off Cheseboro Road is also anticipated to carry standard utilities including public domestic sewer. Cut and fill slopes shown on Plate 1 are shallow in gradient at roughly 5(horizontal):1(vertical) at maximum heights of roughly 12 and 5 feet, respectively.

No architectural plans have been reviewed for this site evaluation. However, the homes are anticipated to be of wood with limited steel framing supported on conventional foundations with concrete slabs on grade. Structural loads should be relatively light with column loads of less than 10 kips and continuous foundation loads of roughly 1 kip per linear foot.

3. SCOPE OF SERVICES

The purpose of this scope of services was to evaluate our previously acquired subsurface and laboratory data and perform analyses to provide geotechnical recommendation for design and construction of the proposed residential development. Our scope of services outlined below was performed under the supervision of a State registered geotechnical engineer and certified engineering geologist.

3.1 BACKGROUND RESEARCH

Regional geologic maps and prior geotechnical reports for the site in our files (see attached reference list) were reviewed for this site evaluation. Additional pertinent geologic and geotechnical literature in our files was researched to assist characterization of the site.

3.2 GEOLOGIC MAPPING

Previously detailed geologic mapping of existing surficial exposures on and adjacent the site was performed by this firm. As part of this evaluation a geologist from our office visited the site to evaluate if readily observable changes have occurred to the property since our prior reports were prepared. The previously acquired data was utilized in the current site evaluation.

3.3 SUBSURFACE EXPLORATION AND SAMPLING

For our prior evaluation of the site a detailed program of subsurface exploration was performed within the property. The program consisted of fifteen bucket auger borings excavated to depths ranging from 21 feet (borings B-1 through B-7) to 63.5 feet (B-13) below the ground surface. The borings were excavated by a subcontractor supplied and operated, truck mounted bucket auger drilling rig. Bulk and relatively undisturbed drive samples were obtained from each bucket auger boring for geotechnical laboratory testing. Where safety permitted, the borings were entered by a geologist for detailed “down-hole” logging. Logs of these exploratory excavations are presented in Appendix A along with the exploratory borings by Applied Earth Sciences (1998).

3.4 LABORATORY TESTING

A program of laboratory testing was performed previously by this firm to evaluate the geotechnical properties of the samples obtained during the referenced drilling operations. Testing included expansion potential, shear strength, in-situ moisture content and dry density, consolidation potential, and compaction characteristics (see Appendix B). The prior laboratory testing was supplement for this evaluation with collection of samples for corrosion testing. The samples were submitted to an independent corrosion engineer for testing and report preparation. The completed corrosion report is presented in Appendix B.

3.5 GEOLOGIC AND GEOTECHNICAL ANALYSES

Geologic data from archival research, geologic mapping, and subsurface exploration is presented on the Geotechnical Map (Plate 1) along with Geotechnical Cross Sections (Plate 2) to illustrate geologic structure and relationships between geologic structure, geologic units, and proposed grades. In addition, select cross sections were evaluated for slope stability with the results presented in Appendix C. Rough grading requirements were evaluated including remedial grading (i.e., stability fills or buttresses), removal depths, and shrinkage and subsidence. Foundation recommendations were prepared based upon subsurface information and laboratory test results. Preliminary recommendations for structural sections (pavements) are also presented herein.

3.6 REPORT

This report was prepared to summarize our geotechnical evaluation of the proposed residential site development. This summary includes geologic setting, description of geologic units, geologic structure, ground water conditions, seismicity, and summary of earth material properties. The report includes logs of subsurface exploration, geotechnical map, geologic cross sections, laboratory test methods and results, stability analyses, and design and construction recommendations.

4. SITE LOCATION AND DESCRIPTION

The site is northeast of the intersection of Chesebro Road and the Ventura Freeway (101) within Agoura Hills (Figure 1). The site is in a relatively level alluvial valley (on the eastern side of Palo Comado Canyon) surrounded by ascending hills on the north, east, and south. Existing slope gradients range from nearly level in the alluvial valley floor to locally as steep as 2(h):1(v) on the surrounding hillsides. Drainage of the property is accomplished generally by sheet and rill flow off the hillsides to incised ravines that outlet onto the valley floor and sheet flow to the northwest where a creek is located on the western side of Chesebro Road. Total relief of the property is roughly 230 feet.

Vegetation on the site consists of seasonal weeds and grasses with some native scrub and oak trees on the hillside areas.

5. SITE GEOLOGY

5.1 LITHOLOGY

Two Miocene-age sedimentary bedrock formations underlie the property. These units have been referred to the middle Miocene Calabasas Formation and middle to upper Miocene Modelo Formation. Surficial deposits on-site include topsoil/colluvial soils, Quaternary to Recent age alluvial deposits and landslide debris. These units are described below with detailed exploration excavation specific descriptions presented on the logs of Borings (Appendix A). The interpreted areal distribution and structural relationships of these units (except for topsoil/colluvium) are shown on the attached Geotechnical Map (Plate 1) and Cross Sections (Plate 2).

5.1.1 Calabasas Formation

Representing the oldest rock unit exposed on-site, the Calabasas Formation underlies the southern half of the property. While natural exposures are rare because of its residual soil mantle, as encountered in Borings B-2, B-3, B-4, B-6, B-12, B-13, B-14, and B-15, the on-site Calabasas Formation consists of claystone and clayey siltstone interbedded with silty fine-grained sandstone. Colors vary from light olive brown, dark brown, yellowish brown and gray for the silt/claystones and yellowish-brown, olive to brownish yellow and light gray for the sandstone. The bedrock unit is generally thinly bedded, weathered, and fractured (ellipsoidal fractures) with scattered calcium carbonate filled fractures and iron staining. At depth the Calabasas Formation becomes less weathered, indurated, and unoxidized light and dark gray in color.

Structurally, the Calabasas bedrock is inclined to the north-northeast at moderate to steep angles (28 to 78 degrees). This overall structure is consistent with regional geologic maps (Yerkes et al. 1993, Dibblee 1992) that indicate bedding is generally inclined to the northeast at moderate angles (30 to 45 degrees). Variations in bedding orientation and inclinations were noted particularly in Borings B-13 and B14 where local zones of tight chevron folding were observed in the subsurface, and at limited ridge/ranch road cut exposures.

5.1.2 Modelo Formation
Overlying the Calabasas Formation and in slight angular unconformity, the Modelo Formation underlies the hillside terrain of the northeastern portion of the site. Similar to the Calabasas Formation on site, natural exposures are few due to residual soil development. As encountered in Borings B-5, B-8, B-9, B-10, B-11, and at limited ridge/ranch road cut exposures, the Modelo Formation consists of interbedded clayey siltstone, claystone, and fine-grained sandstone. Diatomaceous siltstone commonly with fossil fish scales and occasional interbeds of siliceous fissile shale were also encountered in outcrop and in the exploratory borings. Colors vary from light yellowish to olive brown and gray to dark gray for the silt/claystone and pale yellow to light gray for the sandstone. Generally thinly bedded to fissile, the Modelo Formation is slightly weathered and fractured. Fractures often have gypsum infillings and iron oxide staining.

Structurally, the bedding is inclined to the north at moderate to steep angles (25 to 53 degrees). Tight folding was not observed within the Modelo Formation on-site. Regional maps (Yerkes, et al., 1993, Dibblee, 1992) indicate the Modelo Formation in this area is inclined to the northeast at moderate angles (25-32 degrees).

5.1.3 Alluvium
Alluvial soils were encountered in the main valley area of the property in borings B-1 through B-7, B-12, and B-15. The thickness of these soils ranges from at least 21 feet (B-1) to 6 feet (B-15). As observed in the borings, the alluvium generally consists of very dark grayish brown to light olive brown to yellowish brown silty clay with various amounts of sand in a very stiff to hard and moist condition. Scattered cobbles and gravel composed of siltstone were noted as were scattered carbonate veinlets. Based on laboratory data, the alluvium is not subject to significant consolidation and when wetted under load, expansion occurs rather than hydrocollapse.

5.1.4 Residual Soil
Residual soil typically mantles the bedrock and alluvial soils on the site and generally consists of light olive brown slightly sandy clay to clayey sand in a hard and moist condition. The thickness of this material varies from 1 to 4.5 feet.

5.1.5 Artificial Fill
Man made fills exist supporting Palo Comado/Driver Road and locally are associated with existing dirt roads on site. While not encountered in the exploratory borings, the fills are anticipated to be composed of soils locally derived from bedrock and alluvium.

5.2 LANDSLIDES
A rotational landslide was encountered in the area of boring B-10. Interpreted to be a relatively shallow failure, 10-15 feet thick, the failure surface was encountered at 11 feet below the ground surface in B-10 and is comprised of gray plastic clay inclined at 5 degrees to the southwest. Truncated beds were observed just above the slide plane with scattered fractures filled with gypsum. No other landslides were encountered during this evaluation. Although suspected features have been delineated by others, these features were drilled and no evidence of a landslide was encountered.

5.3 GROUNDWATER
Groundwater was encountered as minor seepage in boring B-6 at 19.5 ft, B-8 at 26 ft, B-9 at 25 ft, B-10 from 20 to 29 ft, B-11 below 36.5 ft, B-12 at 18 and heavy flow below 25 ft, B-13 below 28 ft, B-14 at 27 ft, and B-15 below 12 ft deep.

5.4 FAULTING AND SEISMICITY
Agoura Hills and surrounding area are in a seismically active region prone to occasional damaging earthquakes. The destructive power of earthquakes can be grouped into fault-rupture, ground shaking

(strong motion), and secondary effects of ground shaking such as tsunami, liquefaction, settlement, landslides, etc. The hazard of fault-rupture is generally thought to be associated with a relatively narrow zone along well defined pre-existing active or potentially active faults. No doubt there are and will be exceptions to this, because it is not possible to predict the precise location of a new fault where none existed before (CDMG, 1975). No active or potentially active faults are known to cross the site and the site is not currently within an Alquist-Priolo Earthquake Fault Zone as defined by the State Geologist (Bryant and Hart, 2007). The potential for ground rupture due to faulting onsite during the lifetime of the project is considered remote.

Nevertheless, the property will be subject to strong ground motion from occasional earthquakes in the region. Significant earthquakes have occurred within a 40 mile radius of the site within the last 3 decades. The 1994 Northridge earthquake produced strong ground motion at the site with peak horizontal acceleration between 20 and 40 percent of gravity (0.2g to 0.4g) [Chang, et al., 1994]. Therefore, it is likely significant earthquakes will occur in the region within the life of the proposed project.

Based on the latest United States Geological Survey (USGS) interactive web application, *2008 Interactive Deaggregations* https://geohazards.usgs.gov/deaggint/2008/, probabilistic seismic hazard analyses (PSHA) predict the Design Basis Earthquake peak ground acceleration will be on the order of 0.40g for the soft rock (Vs=475 m/sec) conditions of the site (Lat. 34.145°N, Long. 118.735°W). The Design Basis Ground Motion is defined as having a 10% chance of being exceeded in 50 years is based on probabilistic analyses. The mean magnitude from this PSHA is 6.76 (Mw) with a mean distance of 18.9 km from the property with a modal magnitude of 7.02 (Mw) and a modal distance of 13.5 km from the property.

Secondary effects of strong ground motion include tsunami, seiche, liquefaction, seismic settlement, landslides, etc. Tsunami (seismic sea wave) and seiche (standing wave) are effects not inherent to the site given its inland location and lack of large bodies of water proximal to the site. The potential for earthquake induced landslides is discussed in the slope stability section and Appendix C of this report.

5.5 LIQUEFACTION

Liquefaction is a seismic phenomenon were saturated soils with low cohesion lose strength when severely shaken and develop excess pore pressures. Due to the excess pore pressures the soils react more as a liquid than a soil and during shaking or after the shaking subsides settlement or lateral movement can occur. The potential for liquefaction is currently of most concern in the upper 50 feet of the subsurface profile.

The area of proposed residential construction is underlain by either bedrock at the surface or at a shallow depth within the alluvial valley. For example in borings B-2, -3, -4, and -6 bedrock was encountered at depths of 19, 18, 14.5, and 9 feet (Gorian, 1999). Also, in borings B-1, -2, and -3 bedrock was encountered at depths of 16, 13.5, and 14.5 feet, respectively (AES, 1998). Groundwater was not encountered within the alluvial soils above the bedrock and the alluvium is predominately well consolidated clay at depth as described in the boring logs (see Appendix A). Therefore, the area of proposed residential construction is not considered to be potentially susceptible to liquefaction.

6. CONCLUSIONS AND RECOMMENDATIONS

6.1 GENERAL

The site was evaluated from a geotechnical perspective for the proposed residential development as described herein and may be developed as proposed provided geotechnical recommendations presented in the forthcoming sections of this report are followed and incorporated in the design and construction of the project. If the proposed development or site conditions change, the following recommendations may require revision.

6.2 GEOTECHNICAL SEISMIC DESIGN

Active faults identified by the State are not present onsite nor is the site within an Alquist-Priolo Earthquake Fault Zone. Nevertheless, the site is within a seismically active region prone to occasional damaging earthquakes.

Seismic ground motion parameters were evaluated using a simplified code based approach and ground motion procedures for seismic design. The simplified code based approach follows the procedures in the 2010 California Building Code (CBC) based on ASCE/SEI 7-05 Section 11.4. The 2010 CBC is based on the 2009 IBC which references the Minimum Design Loads for Buildings and Other Structures (ASCE/SEI 7-05) as indicated under Effective use of the IBC/CBC on page ix of the 2010 CBC. In addition, the seismic parameters based on ASCE/SEI 7-10 are proved which will be included in the upcoming CBC.

Seismic ground motion values are initially determined based on site class B (rock) conditions. The values are adjusted to obtain the maximum considered earthquake (MCE) spectral acceleration values for the site based on its site class of D. The seismic design parameters for the site's coordinates (latitude 34.1465° North and longitude 118.7359° West) were obtained from the USGS web based spectral acceleration response maps and calculator:
http://earthquake.usgs.gov/hazards/designmaps/grdmotion.php

Seismic Parameters based on ASCE/SEI 7-05

2010 CBC CHAPTER 16 TABLE/FIGURE NO.	SEISMIC PARAMETER	VALUE PER CALIFORNIA BUILDING CODE
Figure 1613.5 (3)	Short Period Mapped Acceleration (S_s)	1.61g
Figure 1613.5 (4)	Long Period Mapped Acceleration (S_1)	0.66g
Table 1613.5.2	Site Class Definition	D
Table 1613.5.3 (1)	Site Coefficient (F_a)	1.0
Table 1613.5.3 (2)	Site Coefficient (F_v)	1.5
Equation 16-37	$S_{MS} = F_a S_s$	1.61g
Equation 16-38	$S_{M1} = F_v S_1$	0.99g
Equation 16-39	$S_{DS} = 2/3 S_{MS}$	1.07g
Equation 16-40	$S_{D1} = 2/3 S_{M1}$	0.66g

Seismic Parameters based on ASCE/SEI 7-10

2010 CBC CHAPTER 16 TABLE/FIGURE NO.	SEISMIC PARAMETER	VALUE PER CALIFORNIA BUILDING CODE
Figure 1613.5 (3)	Short Period Mapped Acceleration (S_s)	1.67g
Figure 1613.5 (4)	Long Period Mapped Acceleration (S_1)	0.61g
Table 1613.5.2	Site Class Definition	D
Table 1613.5.3 (1)	Site Coefficient (F_a)	1.0
Table 1613.5.3 (2)	Site Coefficient (F_v)	1.5
Equation 16-37	$S_{MS} = F_a S_s$	1.67g
Equation 16-38	$S_{M1} = F_v S_1$	0.91g
Equation 16-39	$S_{DS} = 2/3 S_{MS}$	1.12g
Equation 16-40	$S_{D1} = 2/3 S_{M1}$	0.61g

The purpose of the building code earthquake provisions is primarily to safeguard against major structural failures and loss of life, not to limit damage nor maintain function. Therefore, values provided in the building code should be considered minimum design values and should be used with the understanding site acceleration could be higher than addressed by code based parameters. Cracking of walls and possible structural damage should be anticipated in a significant seismic event.

6.3 SLOPE STABILITY

The proposed project is within the valley floor surrounded by hillside. Shallow cuts and fills are proposed for the site development as shown on Plate 1 and no cuts are planned for the adjacent hillsides. However, stability of the natural hillside area was evaluated as indicated in Appendix C. The only hillside area needing remediation is the landslide illustrated in cross section C-C'. This area will require a shear key/buttress to provide stabilization of the relatively shallow feature. Our analysis indicates the native slopes and remediated slopes (where necessary) have static and pseudo static factors of safety in excess of 1.5 and 1.1 respectively. A complete discussion of our analyses regarding slope stability is presented in Appendix C.

6.4 SITE PREPARATION AND GRADING

6.4.1 General

Site preparation and grading recommendations presented below are for preparation of the development area for support of residential structures and related site improvements. All aspects of grading including site preparation, grading, and fill placement should be per the City of Agoura Hills Building Code. Fill placement and bottom preparation for fill placement, backfill placement, utility trench backfill, and subgrade should be observed (and tested when appropriate) by this firm during construction.

6.4.2 Vegetation / Debris Removal

Vegetation or construction debris within the areas of construction should be removed prior to the grading operations.

6.4.3 Soil Removal (building pad over-excavation)

The upper soil zone overlying the entire site is highly weathered and desiccated to a depth of approximately 3 feet. These upper soils should be removed and recompacted in all development areas including structures, hardscape, paving, and areas supporting engineered fill.

To reduce the potential for differential settlement due to variable supporting soil conditions, soil removals should be performed to establish nearly uniform supporting soil conditions for each structure. Additional removals should be made such that building pads have a maximum variable fill thickness of 5 feet including the removal of the upper 3 feet of weathered, desiccated soils. That is the depth of fill should not vary by more than 5 feet across an individual building pad (structure envelope).

In addition, the building area (structure envelope) should be undercut to allow a minimum of 5 feet of compacted fill below the bottom of the footings. The removal area should extend to a minimum of five feet beyond the building pad or the removal should slope down past the toe at the same gradient as the fill slope above or a maximum of 10 feet, whichever is less.

After the removals are completed as addressed above, the exposed soil/bedrock should be observed by this office to evaluate if additional removals are needed. If critically expansive material is encountered in the subgrade, the undercut may need to be deepened to 8 feet or more below the bottom of proposed footings. Existence or absence of critically expansive material should be evaluated during grading by this office. Fill soils should not be placed until the geotechnical observation of removal areas is completed.

6.4.4 Bedrock Undercutting

To reduce problems later with landscaping and excavation for buried utilities and footings, bedrock cut areas should be over excavated (undercut) and capped with engineered compacted fill. Overexcavation should extend below the anticipated depths of footing bottoms and utility trenches, whichever is deeper. The undercut zone should extend a minimum of 5 feet beyond the building area. The excavated rock may be reused as fill providing it is mixed and blended and does not contain rocks over 8 inches in maximum dimension. Consideration should be given to over excavating possible pool areas.

6.4.5 Transition Pads

Removals are recommended where transitions between contrasting materials (bedrock/alluvium, alluvium/engineered compacted fill, or bedrock/engineered compacted fill) cross the foot print of settlement sensitive structures. For transition pads which incorporate both cut and fill materials, the cut portions within building areas and 5 feet beyond the building perimeters should be undercut at least 5 feet below the bottom of the footings, and capped with engineered compacted fill. The purpose of the undercut is to reduce the potential for significant differential settlement or uplift between these contrasting materials.

6.4.6 Preparation of Fill Areas

After removals are performed as addressed above, areas to receive fill should be processed before placing fill. Processing should consist of surface scarification to a depth of 6 to 8 inches, moisture conditioning to slightly over the optimum moisture content, and compaction to a minimum of 90% of the maximum dry density (90% relative compaction).

6.4.7 Keying and Benching

Fills placed on ground sloping steeper than 5(horizontal):1(vertical) should be keyed and benched (horizontal benches) into firm competent native materials (after all required removals are made). All keyways should be a minimum of 15 feet wide and cut a minimum depth of 2 feet at the toe into firm competent in-place bedrock. Keyways should be tilted into the slope and should be at least 3 feet deep at the heel (measured from below the slope toe elevation). The keyways and benching should be observed by this firm before placing fill. Horizontal benches should be a minimum of 5 feet wide, i.e., a minimum 5 feet of competent material. The vertical portion of the bench in competent soils should not exceed 5 feet.

6.4.8 Fill Placement

On-site materials obtained from excavations may be used as fill soils. Fill soils should be free of deleterious materials including trash, debris, organic matter, and rocks larger than 6 inches. Fill soils should be placed in thin uniform lifts, brought to slightly over the optimum moisture content, and compacted to a minimum of 90% relative compaction. The need for import fill is not anticipated.

6.4.9 Relative Compaction

Relative compaction is the ratio of the in place dry soil weight to the maximum dry soil weight as determined per ASTM test method D1557. Optimum moisture content and maximum dry density should be determined per ASTM D 1557.

6.4.10 Temporary Excavations

Temporary slopes should conform to the requirements of CAL/OSHA. Surcharge loads should be set-back a distance at least equal to the depth of the cut or trench from the tops of temporary excavations.

6.4.11 Utility Trenches

Utility trench backfill within slopes, building, parking, and drive areas should be compacted to a minimum of 90% relative compaction.

6.4.12 Slab Areas

The upper 6 inches of slab subgrade soils should be re-compacted before placing sand subbase, if soils were disturbed during footing construction or utility installation.

6.4.13 Shrinkage and Subsidence
Shrinkage is considered to be the volume loss of soils from cut to fill. Subsidence is considered to account for densification of the upper subgrade soils over the site, and densification of the underlying soils (below the zone of in-place recompaction). Based upon available data, and using previous experience on similar projects, the preliminary estimated shrinkage and subsidence factors for the various site materials are presented below. Values presented for shrinkage and subsidence are estimates only.

Material Type	Shrinkage*	Bulking	Subsidence
Alluvium	10-15%	---	0.2 ft.
Bedrock	---	0-5%	0.2 ft.

***** Assuming an average relative compaction of 93%.

If a more accurate determination of estimated shrinkage amount is critical for the balance of cut and fill quantities, values can be reevaluated during the early stages of site grading.

6.5 MANUFACTURED SLOPE CONSTRUCTION AND MAINTENANCE
6.5.1 General
Cut and fill slopes are generally at a shallow gradient of 5 (horizontal):1(vertical). However, if necessary slopes may be constructed at a maximum gradient of 2(horizontal):1(vertical). All cut slopes and retaining wall backcuts should be observed by an engineering geologist from this office. All manufactured slopes will require maintenance as discussed below.

6.5.2 Cut Slopes
Cut slopes may be constructed at a maximum gradient of 2(h):1(v). Other than in the landslide area (Boring B-10), no adverse geologic conditions are anticipated. Nevertheless, all cut slopes or backcuts for retaining walls should be observed by an engineering geologist from our office for the presence of adverse geologic conditions. Where topsoil is present at the top of a cut slope, the top of the slope should be “laid back” or rounded.

6.5.3 Fill Slopes
Fill slopes may be constructed at a maximum gradient of 2(h):1(v). Fill slopes should be keyed and benched into firm in-place soil or bedrock. Fill slope keyways should be a minimum of 15 feet wide and cut to a minimum depth of 2 feet at the toe into competent in-place materials. The keyway should be tilted into the slope and should be at least 3 feet deep at the heel (measured from below the slope toe elevation). The keyway should be observed by a representative of this office prior to placing any fill.

Where possible, the outer slope faces should be overfilled and trimmed back to provide for firm, well-compacted surfaces. It may be necessary to sheepfoot and/or grid roll the slopes if they are not overfilled and trimmed. Slope faces should be tested and reworked as necessary to achieve the required 90 percent relative compaction.

Depending on the conditions encountered during keying and benching operations, fill slopes should be constructed with a backdrain consisting of a 24 inch square section of rock (1/2"-3/4") wrapped in filter cloth. A perforated 4 inch diameter PVC schedule 40 pipe should be installed at the base of the gravel material with non-perforated outlet pipes. The outlets should be roughly 12 inches above the toe of slope or tied into the storm drain system. The outlets at the surface should be protected with a concrete monument and the ends covered with a slotted cap to prevent rodent entry.

6.5.4 Shear Key / Buttress Fill Slope Construction
A shear key/buttress fill should be constructed to support the existing landslide illustrated in cross section C-C’. The buttress should be a minimum of 30 feet wide perpendicular to the movement of the slide as shown on cross section C-C’. The depth of the buttress fill should extend to a minimum of 3 feet below

the slide plan into firm in place bedrock. The bottom of the fill may be benched providing the benches are tilted into the hillside. The bottom of the buttress should be observed by any engineering geologist from this office. The surface of the buttress may be regraded to the original surface grades. All other construction of the buttress including construction of the backdrain should be per the recommendations presented in the Fill Slopes section. Keyway size and location for buttress fills based on stability analyses (to remediate the existing landslide) are presented in Appendix C.

The shear key/buttress is intended to support the area above the shear key/buttress and does not provide remediation of the area below the shear key/buttress. Therefore, if construction is proposed within the area of the landslide additional removal and recompaction of the landslide will be necessary. This area is not suitable for the support of structures unless further geotechnical/geological evaluations and additional removal and recompaction of the landslide are performed. An alternate to the construction of a shear key/buttress is to completely remove the landslide mass and replace that mass with engineered compacted fill with appropriate drainage structures.

6.5.5 Slope Maintenance

Slopes will require maintenance to reduce the risk of erosion and degradation with time due to natural or man-made conditions. Future performance of the slopes will depend on the control of burrowing animals and maintenance of brow ditches, drainage structures, and slope vegetation as discussed below.

Graded or exposed natural slopes should be maintained with dense, deep rooting (minimum 2± feet deep), drought resistant ground cover and shrubs or trees. A reliable irrigation system should be installed on the slopes where necessary, adjusted so over watering does not occur, and periodically checked for leakage. Care should be taken to maintain a uniform, near optimum moisture content in the slopes, and to avoid over drying, or excess irrigation. Excess watering of slopes should be avoided to reduce the risk of erosion and surficial failures. Slopes should not be watered before forecasted rain.

All drainage structures (including those at the surface such as V-ditches and buried) should be kept in good condition and clean the entire length to the outlet. Final grading of the site should provide positive drainage away from slopes, and water should not be allowed to pond or gather in a slope area. Burrowing animals, particularly ground squirrels, can destroy slopes; therefore, where present, immediate measures should be taken to evict them.

6.6 SOIL EXPANSIVENESS

Expansion tests were performed on two samples of soil representative of the materials which will be placed for future compacted fill. Based on these test results, the soils at the site should be classified as moderately expansive. Preliminary foundation design should be in the 51-90 expansion range. However, expansion tests should be performed at the finish grade materials at the conclusion of grading for each building pad area.

Expansive soils contain clay particles that change in volume (shrink or swell) due to a change in the soil moisture content. The amount of volume change depends upon the soil swell potential, availability of water, and soil restraining pressure. Swelling occurs when clay soils become wet due to excessive water. Excessive water can be caused by poor surface drainage, over-irrigation of lawns and planters, and sprinkler or plumbing leaks.

Swelling clay soils can cause distress to residential construction (generally as uplift). Construction on expansive soil has an inherent risk that should be acknowledged and understood by the developer and property owner. The geotechnical recommendations presented herein are intended to reduce the potential for expansive soil action. However, these recommendations are not intended, nor designed to provide complete and full mitigation of expansive soil conditions. Additional recommendations can be provided to upon request to further reduce the risk of expansive soil movement. Soil movement can be roughly 1 to 2 inches depending upon the conditions incurred as described herein. Therefore, the following should be maintained within the property:

a) Positive drainage should be consistently provided and maintained away from all structures. Drainage should not be changed creating an adverse drainage condition.

b) Landscape watering should be held to a minimum. Sprinkler systems should be maintained and plumbing leaks should be immediately repaired so that subgrade soils underlying or adjacent the structures do not become saturated. Trees should be spaced so that roots will not extend under foundations or slabs.

c) Water should not be allowed to pond or accumulate around pool decking allowing water migration into the subgrade. Pool hardware fittings should be adequately water tight, and caulking should be maintained between hardscape joints, and interfaces between hardscape and adjoining house.

d) Information regarding care and maintenance of improvements on expansive soils should be passed on to future owners of the property.

6.7 CONVENTIONAL FOUNDATION DESIGN

6.7.1 General

Shallow foundations in the form of spread and continuous footings may be used for the support of the proposed buildings provided remedial grading is performed as addressed above. As mentioned earlier, for preliminary foundation design, the finish grade materials are assumed to have a moderate expansion potential in the 51-90 expansion index range. However, the expansion potential of the building envelope should be determined at the completion of rough grading.

6.7.2 Design Data

Conventional foundations embedded into engineered compacted fill may be designed to impose a maximum allowable bearing pressure of 2,000 pounds per square foot (psf). The bearing pressure may be increased by one third for temporary loading.

Reinforcement should be a minimum of two #4 bars in the top and bottom (total of 4 bars). Vertical reinforcement of #4 bars should be installed at 24 inch centers. The vertical steel should extend to the bottom footing reinforcement and extended a minimum of 36 inches into the slab.

Footings should have a minimum depth 24 inches for soils in the 51-90 expansion range and 30 inches for soils in the 91-130 expansion range. Embedment should be measured below the lowest adjacent interior or exterior grade. Footing embedment for raised wood floors should be measured below the interior grade if it is lower than the exterior, this could result in footings of roughly 5 feet deep measured from the exterior. Footings behind retaining walls should be embedded below a 2(h):1(v) line extending up from the base of the wall or the wall should be designed to support the footing surcharge. The minimum footing width should be 18 inches.

Soil disturbed near the footings should be replaced with compacted engineered fill. A representative of this office should observe the placement of any fill intended for structural support.

The footing embedments provided above are considered the minimum acceptable embedments for the soil expansion range. Generally, foundation depth is increased with an increased potential for soil expansion (greater soil expansion index value). Therefore, footing embedment that is deeper than the recommended minimum may provide additional reduction in the potential for foundation distress due to expansive soil movement. Recommendations for deeper foundation embedment can be provided at the owner’s request. The above recommendations for foundation design should be considered the minimum standard for geotechnical concerns only and the design should be supplemented with the appropriate structural design.

6.7.3 Lateral Resistance

Lateral forces exerted by retained soil or compacted fill may be resisted by passive soil pressure and friction. To develop full passive earth pressure, footings should meet the required footing to slope setback. Passive soil pressure may be taken as an equivalent fluid having a density of 250 pounds per cubic foot (pcf). Friction between the bottom of the footings and soil may be taken as 0.4. The values may be combined with no reduction. The above values are ultimate values with no factors of safety applied.

6.7.4 Settlement

Static settlement of the footings as recommended above should be minimal, less than 1 inch in a 30 foot span, depending upon the foundation loading and size. Settlements are anticipated to occur rapidly as the foundations are loaded. No long-term settlement is anticipated for properly constructed foundations embedded in the recommended bearing material. However, expansive soils movement could occur as previously discussed herein.

Minor wall cracking could occur within the structure associated with expansion and contraction of the structural wood members due to thermal or moisture changes. In addition, minor wall or slab cracking may be associated with settlement or expansive soil movement. All structures settle during construction and some minor settlement of the structures on site can occur after construction during the life of the project. However, additional settlement/soil movement could occur if the soils become saturated due to excessive water infiltration generally caused by excessive irrigation, poor drainage, etc.

6.7.5 Footings on or Near Slopes

Deepened footings or setbacks should be used for all buildings and accessory structures sensitive to differential movement. In general, minimum setbacks are provided in Chapter 18 of the California Building Code or a minimum of 5 feet, whichever provides the greater setback. Setback requirements pertain to slopes having a gradient over 3(horizontal):1(vertical).

6.7.6 Footing Excavations

Footings should be cut square and level and cleaned of loose soils. Soil excavated from the footing trenches (including utility trenches) should not be spread over areas of construction or slopes, unless properly placed and compacted. A representative of this office should observe the footing excavations before placing reinforcing steel. Soils silted into the footing excavations during the premoistening operations should be removed to the required depth before casting the concrete. The footings should be cast as soon as possible to avoid deep desiccation of the footing subsoil.

6.7.7 Premoistening

Conventional footing and slab on-grade subgrade soils should be moistened to a minimum of 3% over the optimum moisture content to a minimum depth of 18 inches for soils in the 51-90 soil expansion range and 24 inches for soils in the 91-130 soil expansion range. The above moisture should be obtained and maintained at least a suggested 2 days prior to casting the concrete. A representative of this office should observe the subgrade soil premoistening prior to casting the concrete. Soils silted into the footing excavations during the premoistening operations should be removed prior to placing concrete.

6.7.8 Conventional Slab-On-Grade Design

Lightly loaded slabs-on-grade within the building interior should be a minimum of 4 inches thick. Reinforcement should consist of a minimum of No. 3 bars at 18 inches on center in both directions or per the structural engineer's design. The slab should be tied to the foundations per the structural engineer's design. Conventional slabs on-grade should be underlain by a minimum of 6 inch thick aggregate layer or as required by code. The subgrade should be processed prior to sand/gravel placement if the subgrade has been disturbed during construction.

6.7.9 Moisture Vapor Retarder Layer

An appropriate moisture vapor retarder layer should be installed and maintained below slabs on grade. The intent of the moisture vapor retarder layer is to reduce moisture vapor transmission through a slab.

Ten-mil plastic sheeting may be used as a minimum moisture vapor retarder layer below the slab. The retarder should be installed with the edges overlapped at least 12 inches.

Where necessary per site conditions, code requirements, or if desired, heavier moisture vapor retarder layers should be used. Perforations through the moisture vapor retarder such as at pipes, conduits, columns, grade beams, and wall footing penetrations should be sealed. Proper construction practices should be followed during construction of the slab on-grade. Repair and seal tears or punctures in the moisture barrier resulting from the construction process prior to concrete placement.

Minimizing shrinkage cracks in the slab-on-grade can further minimize moisture vapor emissions. A properly cured slab utilizing low-slump concrete will reduce the risk of shrinkage cracks in the slab as described herein.

The concrete contractor should be made aware of the moisture vapor retarder and required to protect the layer. Perforations made in the layer by the concrete contractor should be properly sealed prior to concrete placement. In addition, for concrete placed directly on top of the layer, the concrete contractor should make any necessary changes in the concrete placement and curing. Placing the concrete directly on top of the moisture vapor retarder layer allows the layer to be observed for damage directly prior to concrete placement.

The grade of the project should be kept as high as practical and the interior slabs should be maintained as high as practical above the exterior grades. Drainage should be maintained away from the structures. Provide proper drainage and elevation of ground adjacent the slab (that is the ground surface should be at least 6 inches below the wall plate or per Code requirements). In addition, the landscaping should not be over watered resulting in excess moisture below the slab

6.7.10 Flooring

Tile flooring can crack, reflecting cracks in the concrete slab below the tile. Therefore, the slab designer should consider this in the design of concrete slabs on-grade where tile will be placed. The tile installer should use installation methods that reduce possible tile cracking. A vinyl crack isolation membrane (approved by the Tile Council of America/Ceramic Tile Institute) is recommended between tile and concrete slabs on grade.

Slabs on grade should be tested for moisture content prior to the selection of the flooring and adhesives. Moisture in the slabs should not exceed the flooring manufacturer's specifications. Regardless, site conditions can change and therefore sealing of the concrete surface should be considered per the manufacturer's specifications.

6.7.11 Concrete Placement and Cracking

Minor cracking of concrete slabs is common and is generally the result of concrete shrinkage continuing after construction. Concrete shrinks as it cures resulting in shrinkage tension within the concrete mass. Since concrete is weak in tension, development of tension results in cracks within the concrete. Therefore, concrete should be placed using procedures to minimize cracking within the slab. Shrinkage cracks can become excessive if water is added to the concrete above the allowable limit and proper finishing and curing practices are not followed. Concrete mixing, placement, finishing, and curing should be performed per the current American Concrete Institute Guide for Concrete Floor and Slab Construction (ACI 302.1R). Concrete slump during concrete placement should not exceed the design slump specified by the structural engineer. Concrete slabs on grade should be provided with tooled crack control joints at 10-15 foot centers or as specified by the structural engineer.

6.8 RETAINING WALL DESIGN

6.8.1 Foundations

The foundation design recommendations including bearing and lateral pressures presented above may be used for retaining wall design.

6.8.2 Active Pressures

Retaining walls should be designed to resist an active pressure exerted by compacted backfill or retained soil. Retaining walls that may yield at the top should be designed for an equivalent fluid pressure equal to 45 and 60 pounds per cubic foot (pcf) for a level backfill and 2(horizontal:1(vertical) sloping backfill, respectively.

The above active pressures are not designed to resist expansion of the backfill. Therefore, if water is allowed to saturate backfill or backcut materials consisting of clayey soils, the expansion pressure could exceed the active pressures provided. Furthermore, the above active pressures are not designed to accommodate any adverse geologic conditions such as unsupported bedding or joint sets. Should such conditions be encountered additional evaluation would be required. Retaining wall backcuts should be observed by the project geotechnical consultant to evaluate backcut conditions.

Footings behind retaining walls should be embedded below a 2(horizontal):1(vertical) line extending up from the base of the wall or the wall should be designed to support the footing surcharge.

A surcharge has not been included in the recommended lateral earth pressures. The above lateral pressures are ultimate values with no factor of safety included. Walls should be designed for an appropriate factor of safety as determined by the structural engineer.

Aerial surcharge may be treated as additional height of backfill where one foot of additional height is assumed for each 125 psf of aerial surcharge. Light vehicle wheel loads may be taken as 300 psf of additional surcharge. Where surcharge conditions from adjacent foundations are identified, we can provide a pressure distribution of the surcharge for retaining wall design.

6.8.3 Lateral Seismic Pressure

A lateral seismic pressure is not required where the retaining wall is less than 6 feet in height. Walls greater than 6 feet to 8 feet high should be designed using a seismic pressure per the County of Los Angeles Building Code Manuel 1807.2 Article 1 (dated 10-25-12).

6.8.4 Wall Free Board

Retaining walls supporting ascending slopes should be provided with appropriate free board and drainage swales per the civil engineer's design. Commonly the free board is one foot high.

6.8.5 Retaining Wall Drainage and Backfill

Retaining walls should be provided with a drainage system behind the wall consisting of a continuous minimum 1 foot wide section of No. 4 rock (pea gravel or equivalent) wrapped in filter cloth. A composite drain board may be used in lieu of an aggregate drain. The drain material should extend from the base of the wall to the top of the wall or to within 2 feet of the top of wall for interior and exterior walls, respectively. The material should be drained by a perforated 4 inch diameter pipe (3/8 inch perforations, perforations down) or weep holes (where applicable in landscaped areas). The invert of the drainpipe should be at least 6 inches below the top of any adjacent slabs-on-grade. Surface drainage systems and the retaining wall backdrain should not share a common outlet pipe such that water could flow back to the backdrains. Outlet pipe locations should be surveyed and recorded.

Retaining walls should be waterproofed to resist moisture infiltration through the wall. The upper 2 feet of exterior wall backfill should consist of compacted native soils. In addition, if possible the backfill below the 2 foot thick cap should be low in expansion if possible.

Retaining wall backfill should be compacted to a minimum of 90% of the maximum soil density using light equipment. The retaining wall backfill should be benched into the backcut where the backcut is shallower than 3/4(h):1(v).

6.9 SWIMMING POOL

6.9.1 General

Swimming pool design should be per the following design recommendations. These geotechnical recommendations are preliminary and should be reviewed and revised as necessary when the locations are known and prior to finalizing the pool plans. Risks associated with pool construction, such as pool or deck movement, cannot be completely eliminated, especially if proper construction practices, drainage, maintenance of landscaping, pool plumbing and pool equipment are not provided. This office should observe all geotechnical aspects of pool construction addressed herein.

Highly expansive soils and soils with variable densities may be encountered in the pool bottom or walls. The existence of critically expansive and variable density soils should be evaluated by an engineering geologist from this office. Therefore, the excavation should be observed by this office prior to completing the excavation or the placement of any steel or forms.

6.9.2 Pool Excavation

All aspects of grading for the pool including site preparation, excavation, and fill placement should be per the City of Agoura Hills Building Code except where more restrictive requirements are presented herein. Soil/bedrock exposed in the pool excavation should be kept moist until the concrete is placed. The concrete should be cast as soon as possible after excavation to avoid desiccation of the subgrade material. Completion of the pool excavation and construction should be performed so the excavation is open for a maximum of two weeks.

A layback of the pool wall may be necessary if adverse bedrock is exposed in the pool walls. Therefore, the pool excavation should be observed by a geologist from this office. It may be necessary to undercut the pool if the pool excavation crosses a daylight line. In addition, this office should observe the excavation prior to placing structural steel. Soil excavated from the pool area should not be spread over any areas of construction and slopes or used for support of structures or slabs unless properly placed and compacted.

6.9.3 Pool Walls

The minimum pool wall design should be per the City of Agoura Hills standards for a highly expansive soil condition. In addition, the pool walls should be designed as self-supported retaining walls. Pool walls should be designed to resist an at-rest earth pressure equivalent to a fluid having a density of 60 pounds per cubic foot for level backfill.

The owner should be cautioned to keep the soils near and beneath the pool and hardscape at uniform and constant moisture content. Previously discussed differential movement could occur if the expansive soils become excessively wet and/or dry. Constant soil moisture content should be maintained to reduce the potential for expansive soil movements.

A vertical pool excavation near a foundation or structure should not extend below a 2(h):1(v) line extending down from the structure at the ground surface at the ground level. Pool walls supporting loads imposed by an adjacent structure should be designed by a structural engineer. Foundations below a 2(h):1(v) line extending up from the base of the pool wall should not impose loads on the pool.

The spa and infinity edge structures should not be cantilevered off the main pool structure due to the possible effects of soil expansion. The foundation of the pool should be setback from a descending slope as outlined in the foundation section of this report.

6.9.4 Swimming Pool Plumbing

Pool and water feature piping should be flexible and able to accommodate the possibility of movement. Leaks in the plumbing or drainage system should be repaired at once.

6.9.5 Concrete Deck

Decking and hardscape surrounding the swimming pool should be constructed on engineered compacted fill or firm native material. All exterior concrete slabs-on-grade and walkways should be designed as described in Exterior Slabs and Walkways section of this report. Loose excavated soil from the swimming pool area or elsewhere, should not be used underneath the deck unless properly moisture conditioned and compacted as described above. Joints between adjoining sections of pool decking and between the pool decking and the pool walls should be caulked. Periodic inspection by the owner and subsequent recaulking, if necessary, are maintenance procedures to prevent water from migrating into the supporting subgrade. Drainage should be collected at area drains to convey water to paved drainage surfaces. Drainage water should not be disposed of on any of the adjacent descending slopes.

6.10 EXTERIOR SLABS AND WALKWAYS

Exterior concrete slabs-on-grade and walkways should be a minimum of 4 inches thick and underlain by a minimum of 4 inches of sand. Driveway and motor court slabs should be a minimum 5 inches thick and underlain by 6 inches of compacted base material. Exterior slabs should be reinforced with a minimum of #3 bars on 24 inch centers in each direction. All slabs should have crack control joints (full depth joints) at intervals of 10 to 15 feet. Sidewalks may consist of unreinforced concrete provided the walks are provided with crack control joints spaced at a distance equal to the panel width. Recommendations for concrete placement are included herein under Concrete Placement and Cracking.

Concrete subgrade soils should be properly placed and compacted for the support of the concrete flatwork. Driveway subgrade soils should be prepared and compacted according to recommendations herein. Prior to placing concrete, subgrade soils should be premoistened to a minimum of 3% over the optimum moisture content for a minimum depth of 24 inches. Proper premoistening can reduce the risk of slab subgrade expansion, if used in addition to other preventive measures. Where critical, the subgrade soil premoistening should be observed by this office prior to placing the concrete.

Exterior slabs can experience differential uplift caused by non-uniform expansion of the subgrade soils due to varied migration of water beneath the slab. Differential uplift can occur at the corner, edge, or center of slab. Therefore, planter areas should be graded so that water drains positively away from the hardscape and not below the hardscape. A reinforced deepened perimeter edge should be considered on all slabs to minimize non-uniform moisture migration and water infiltration into the sand layer under the slab. The perimeter edge should extend a minimum of 12 inches below the bottom of the slab and have a width of 8 inches. A deeper edge would further reduce the risk of deep water migration into the slab subsoils. Where a slab or walkway is adjacent a descending slope (within 2 feet) the slope side edge should be equipped with a minimum 24 inch deep, 12 inch wide perimeter edge reinforced with at least 1 - #4 bar in the top and bottom.

Concrete shrinkage cracks will become excessive if water is added to the concrete above the allowable limit, and proper finishing and curing practices are not followed. Finishing and curing should be performed per the Portland Cement Association Guidelines. The concrete slump should not exceed 6 inches unless otherwise specified by the structural engineer.

6.11 PRELIMINARY PAVEMENT DESIGN

Based on an estimated R Value of 15 for existing upper soils at the site and an assumed Traffic Index of 5, 3 inches of asphaltic concrete over 8 inches of aggregate base should be used for preliminary design of drive areas. The final structural sections should be confirmed at the conclusion of grading. The upper 6 inches of subgrade, and the base materials should be compacted to at least 90% and 95% of the maximum dry density, respectively.

Planter areas should be graded so excess water drains onto and not beneath the adjacent AC pavement and curbs. Concrete curbs near the top of descending slopes should be embedded so the bottom of the curb has a setback of 5 feet to the slope face.

6.12 SITE DRAINAGE

Positive drainage should be provided away from structures and hardscape during and after construction per the grading plan or applicable building codes. Water should not be allowed to gather or pond against foundations. In addition, planters near a structure should be constructed so that irrigation water will not saturate footing and slab subgrade soils. Landscape planting and trees should be located to avoid roots extending beneath foundations and slabs. Irrigation lines and landscape watering should be kept away from building lines wherever possible. Irrigation lines and sprinklers should be placed so that water is not sprayed on the footings or saturates the soil adjacent the footings. Landscape watering should be held to a minimum; however, landscaped areas should be maintained in a uniformly moist condition and not allowed to dry out or became saturated. Planters adjacent to a structure should be constructed so that irrigation water does not saturate the soil underlying the footings and slabs.

6.13 GUTTERS AND DOWNSPOUTS

Gutters and downspouts should be installed to collect roof water that might otherwise infiltrate the soils adjacent structures. The downspouts should be drained into collector pipes to carry water away from the structures or other positive drainage should be provided.

6.14 PLAN REVIEW

As the development process continues and detailed grading and/or foundation plans and specifications are developed, they should be reviewed by Gorian and Associates, Inc. Additional geotechnical recommendations may be warranted at that time.

6.15 SECTION 111

It is the opinion of this office that if the project is constructed in accordance with our recommendations and properly maintained, the proposed structures will be safe against hazard from landslide, settlement, or slippage, and that the proposed building or grading construction will have no adverse effect on the geologic stability of property outside of the building site. The nature and extent of tests conducted for purposes of this declaration are, in the opinion of the undersigned, in conformance with generally accepted practice in the area. Test findings and statements of professional opinion do not constitute a guarantee or warranty, express or implied.

7. CLOSURE

This report was prepared under the direction of a registered geotechnical engineer and certified engineering geologist. No warranty, express or implied, is made as to conclusions and professional advice included in this report. Gorian and Associates, Inc. disclaim responsibility and liability for problems that may occur if recommendations presented herein are not followed.

This report was prepared for Fortune Realty LLC and design consultants solely for design and construction of the project described herein. It may not contain sufficient information for other uses or the purposes of other parties. These recommendations should not be extrapolated to other areas or used for other facilities without consulting Gorian and Associates, Inc. Grading and foundation work at the site should be performed per the current City of Agoura Hills Building Code. Due to possible subsurface variations, this office should observe all aspects of field construction addressed in this report.

The scope of the services provided by Gorian and Associates, Inc. and its staff, excludes responsibility and/or liability for work conducted by others. Such work includes, but is not limited to, means and methods of work performance, quality control of the work, superintendence, sequencing of construction and safety in, on, or about the jobsite.

Recommendations herein are based on interpretations of the subsurface conditions concluded from information gained from subsurface explorations and a surficial site reconnaissance. The interpretations may differ from actual subsurface conditions, which can vary horizontally and vertically across the site. Therefore, persons using this report for bidding or construction purposes should perform such independent evaluations, as they deem necessary.

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We appreciate the opportunity to submit this geotechnical report. If you have any questions concerning this report or require additional information, please do not hesitate to give us a call.

Respectfully,

Gorian and Associates, Inc.

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APPENDIX A

LOGS OF SUBSURFACE EXPLORATION

SUB-SURFACE DATA

EXCAVATION NUMBER: B-1

Project: HESCHEL WEST SCHOOL - AGOURA HILLS

Work Order: 2232-0-10

Method of Excavation: 24" Diameter Bucket Auger

Logged By: CHD

Ground Elevation: 927±

Location: SEE GEOTECHNICAL MAP

Date Observed: 2-16-99

D	USC	SYM	U	B	S	MC	DD		DESCRIPTION	REMARKS
0–1	CL								ALLUVIUM: Very dark grayish brown silty clay, scattered siliceous siltstone fragments. (Moist, very stiff). Some sand.	At 1' 4/12"
1–2			■	■		15.0	103.4			
3									At 3'; becoming hard.	At 3' 5/12"
3–4			■			14.9	106.1			
4–5	CL								Dark grayish brown sandy silty clay (moist, hard).	At 5' 6/12"
5–6			■	■		16.0	111.2			
7	CL								Yellowish brown sandy silty clay (moist, hard to very stiff).	
9									At 9'; scattered gravel to cobbles.	
10–11			■	■		19.0	91.1			At 10' 2/12"
14	CL								Brown silty clay (very stiff, moist). Some sand.	
15–16			■	■		22.5	99.3			At 15' 2/12"
17	CL								Light olive brown slightly sandy silty clay (very stiff, moist).	
20–21			■			14.0	106.8			At 20' 1/12"
21									Total depth 21' No caving No groundwater	

This log applies only at the location of this excavation and at the time of excavating. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented are a simplification of actual conditions encountered.

LEGEND:

B - Bulk Sample
D - Depth Below Ground Elevation (ft)
DD - In Place Dry Density (pcf)
MC - Moisture Content (%)
N - SPT Blows From 6" to 18"
PP - Pocket Penetrometer Values (TSF)
SMC - %Sand-%Silt-%Clay
S/SPT - Standard Penetration Test
SYM - Graphic Symbol
U - Relatively Undisturbed Drive Sample
USC - Unified Soil Classification System

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SUB-SURFACE DATA

EXCAVATION NUMBER: B-2

Project: HESCHEL WEST SCHOOL - AGOURA HILLS

Work Order: 2232-0-10

Method of Excavation: 24" Diameter Bucket Auger

Logged By: CHD

Ground Elevation: 941± Location: SEE GEOTECHNICAL MAP

Date Observed: 2-16-99

D	USC	SYM	U	B	S	MC	DD		DESCRIPTION	REMARKS
0–2	CL		■			13.3	98.9		ALLUVIUM: Very dark grayish brown slightly sandy silty clay (moist, hard). Scattered siltstone fragments.	At 1' 2/12"
3–9	CL		■	■		11.9	95.8		Light olive brown slightly porous sandy silty clay (moist, hard). Scattered siltstone fragments.	At 3' 2/12"
			■			13.3	104.1		Slightly porous.	At 5' 2/12"
9–13	CL		■	■		13.6	108.5		Yellowish brown slightly sandy silty clay (moist, hard). Scattered gravel of siltstone and siliceous shale. Scattered carbonate veinlets.	At 10' 3/12"
13–16	CL		■	■		24.4	99.8		Dark grayish brown sandy silty clay (moist, hard). Scattered gravel. Scattered carbonate.	At 15' 2/12"
16–19	CL								Light olive brown slightly sandy silty clay (moist, hard). Scattered gravel. Mottled with iron oxide.	
19–21			■			19.9	96.6		CALABASAS FORMATION: Light olive brown claystone interbedded with brown yellow siltstone (moist, hard). Thinly bedded.	At 20' 5/12"
21–27									Total depth 21' No caving No groundwater	

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LEGEND:

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D - Depth Below Ground Elevation (ft)
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SMC - %Sand-%Silt-%Clay
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SYM - Graphic Symbol
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USC - Unified Soil Classification System

SUB-SURFACE DATA

EXCAVATION NUMBER: B-3

Project: HESCHEL WEST SCHOOL - AGOURA HILLS

Work Order: 2232-0-10

Method of Excavation: 24" Diameter Bucket Auger

Logged By: CHD

Ground Elevation: 949.5±

Location: SEE GEOTECHNICAL MAP

Date Observed: 2-16-99

D	USC	SYM	U	B	S	MC	DD		DESCRIPTION	REMARKS
0–2	CL					15.2	92.4		ALLUVIUM: Very dark grayish brown silty clay (moist, very stiff).	At 1' 1/12"
2–4.5	CL					15.7	105.4		Dark grayish brown silty clay (moist, hard).	At 3' 3/12"
4.5–6	CL					15.9	106.5		Light olive brown silty clay (moist, hard). Some sand.	At 5' 3/12"
6–7	CL								Dark grayish brown silty clay (moist, hard). Some sand. Scattered carbonate veinlets.	
7–8	CL								Light yellowish brown silty clay (moist, hard).	
8–11	CL					23.0	99.3		Brown silty clay (moist, hard). Scattered gravel. Scattered carbonate veinlets.	At 10' 3/12"
11–14	CL								Light olive brown silty clay (moist, hard). Scattered carbonate veinlets. Scattered gravel.	
14–18	CL					21.7	102.6		Light yellowish brown silty clay (moist, hard). Few gravel. Below 16½'; scattered gravel, few cobbles.	At 15' 4/12"
18–21						27.9	97.4		CALABASAS FORMATION: Olive yellow siltstone and strong brown claystone. Carbonate veinlets. Thinly interbedded. Highly weathered. Fractured. Becomes fresh with depth.	At 20' 5/12"
21–27									Total depth 21' No caving No groundwater	

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LEGEND:

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D - Depth Below Ground Elevation (ft)
DD - In Place Dry Density (pcf)
MC - Moisture Content (%)
N - SPT Blows From 6" to 18"
PP - Pocket Penetrometer Values (TSF)
SMC - %Sand-%Silt-%Clay
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USC - Unified Soil Classification System

SUB-SURFACE DATA

EXCAVATION NUMBER: B-4

Project: HESCHEL WEST SCHOOL -AGOURA HILLS

Work Order: 2232-0-10

Method of Excavation: 24" Diameter Bucket Auger

Logged By: CHD

Ground Elevation: 964±

Location: SEE GEOTECHNICAL MAP

Date Observed: 2-16-99

D	USC	SYM	U	B	S	MC	DD		DESCRIPTION	REMARKS
0–2	CL		▮			13.6	93.8		ALLUVIUM: Very dark grayish brown silty clay (moist, very stiff to hard).	At 1' 1/12"
2–8	CL		▮			13.3	108.6		Light olive brown silty clay (moist, hard). Some sand.	At 3' 2/12"
										At 5' 3/12"
			▮			19.9	104.2		Few gravels.	
8–12	CL		▮	▮		22.2	98.4		Dark grayish brown silty clay, some manganese staining on coarse sand (moist, hard).	At 10' 2/12"
12–14.5	CL								Light olive brown silty clay (moist, hard).	
14.5–19			▮			27.1	94.5		CALABASAS FORMATION: Light olive brown claystone, interbedded with dark brown siltstone. Carbonate veinlets. (Moist, hard). Thinly bedded.	At 15' 3/12"
19–21			▮			24.8	101.1		Light brown claystone interbedded with gray silty fine-grained sandstone. Slightly weathered. Slightly fractured. Iron oxide staining along fractures. Becomes fresh with depth.	At 20' 5/12"
21									Total depth 21' No caving No groundwater	

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LEGEND:

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D - Depth Below Ground Elevation (ft)
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MC - Moisture Content (%)
N - SPT Blows From 6" to 18"
PP - Pocket Penetrometer Values (TSF)
SMC - %Sand-%Silt-%Clay
S/SPT - Standard Penetration Test
SYM - Graphic Symbol
U - Relatively Undisturbed Drive Sample
USC - Unified Soil Classification System

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SUB-SURFACE DATA

EXCAVATION NUMBER: B-5

Project: HESCHEL WEST SCHOOL -AGOURA HILLS

Work Order: 2232-0-10

Method of Excavation: 24" Diameter Bucket Auger

Logged By: CHD

Ground Elevation: 961±

Location: SEE GEOTECHNICAL MAP

Date Observed: 2-16-99

D	USC	SYM	U	B	S	MC	DD		DESCRIPTION	REMARKS
0	CL								ALLUVIUM: Very dark grayish brown silty clay (moist, hard).	
1			▮	▮		17.0	99.1			At 1' 4/12"
3			▮			19.6	99.3			At 3' 3/12"
5									MODELO FORMATION: Light yellowish brown siltstone thinly bedded (moist, hard). Slightly weathered. Fractured. Interbedded with fine-grained sandstone and light brown claystone. Occasional olive claystone interbeds. Some gypsum seams. Fissile. Becoming fresh with depth.	At 5' 5/12"
6			▮			29.2	95.0			
10			▮	▮		24.4	95.9			At 10' 6/12"
11									At 11½'; thin gray betonitic(?) clay seam.	
13									At 13'; Gray brown siliceous siltstone interbeds.	
14									Gray to light gray interbedded siltstone, siliceous siltstone and claystone (indurated, damp).	
15			▮			26.4	95.0			At 15' 9/12"
19									At 19'; interbeded with brownish yellow calcareous siltstone.	
20			▮			24.1	92.7			At 20' 5/12"
21									Total depth 21' No caving No groundwater	

This log applies only at the location of this excavation and at the time of excavating. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented are a simplification of actual conditions encountered.

LEGEND:

B - Bulk Sample
D - Depth Below Ground Elevation (ft)
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MC - Moisture Content (%)
N - SPT Blows From 6" to 18"
PP - Pocket Penetrometer Values (TSF)
SMC - %Sand-%Silt-%Clay
S/SPT - Standard Penetration Test
SYM - Graphic Symbol
U - Relatively Undisturbed Drive Sample
USC - Unified Soil Classification System

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SUB-SURFACE DATA

EXCAVATION NUMBER: B-6

Project: HESCHEL WEST SCHOOL -AGOURA HILLS

Work Order: 2232-0-10

Method of Excavation: 24" Diameter Bucket Auger

Logged By: CHD

Ground Elevation: 958± Location: SEE GEOTECHNICAL MAP

Date Observed: 2-16-99

D	USC	SYM	U	B	S	MC	DD		DESCRIPTION	REMARKS
0–2	CL		■			19.9	96.5		ALLUVIUM: Very dark grayish brown silty clay (moist to wet, hard). Few cobbles.	At 1' 2/12"
2–4.5	CL		■			15.2	103.0		Dark grayish brown silty clay, some sand. Scattered gravel to cobbles. (Moist, hard).	At 3' 3/12"
4.5–7.5	SC		■			15.5	108.1		Light olive brown clayey sand (moist, dense). Scattered gravel.	At 5' 3/12"
7.5–9	CL								Light olive brown silty clay (moist, hard). Scattered gravel.	
9–21			■	■		20.6	99.8		CALABASAS FORMATION: Light olive brown claystone and siltstone interbedded with olive yellow silty fine-grained sandstone. Weathered. Fractured. Becoming fresh with depth. Thinly bedded. Fissile. Elipsodial fractures. Minor interbeds of pale yellow fine-grained sandstone and brown clayey siltstone.	At 10' 5/12"
			■			34.6	90.3			At 15' 4/12"
			■			29.7	91.3			At 20' 7/12"
21–27									Total depth 21' No caving Minor seepage at 19½'	

This log applies only at the location of this excavation and at the time of excavating. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented are a simplification of actual conditions encountered.

LEGEND:

B - Bulk Sample
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MC - Moisture Content (%)
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PP - Pocket Penetrometer Values (TSF)

SMC - %Sand-%Silt-%Clay
S/SPT - Standard Penetration Test
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USC - Unified Soil Classification System

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SUB-SURFACE DATA

EXCAVATION NUMBER: B-7

Project: HESCHEL WEST SCHOOL -AGOURA HILLS

Work Order: 2232-0-10

Method of Excavation: 24" Diameter Bucket Auger

Logged By: CHD

Ground Elevation: 946±

Location: SEE GEOTECHNICAL MAP

Date Observed: 2-16-99

D	USC	SYM	U	B	S	MC	DD		DESCRIPTION	REMARKS
	CL								ALLUVIUM: Very dark grayish brown silty clay (moist to damp, hard). Some sand and gravel.	
1			■	■		15.5	108.2			At 1' 5/12"
2										
3			■			15.2	116.4			At 3' 8/12"
4	CL								Light olive brown silty clay (damp, hard). Scattered coarse-grained sand to gravel. Scattered carbonate veinlets.	
5			■	■		23.2	103.1		At 5'; becoming moist.	At 5' 4/12"
6										
7										
8									Below 8'; few gravel.	
9										
10			■			25.3	98.5			At 10' 3/12"
11										
12										
13										
14										
15			■	■		25.0	100.7			At 15' 3/12"
16										
17										
18										
19									At 19'; becoming wet.	
20			■			30.2	92.8			At 20' 1/12"
21									Total depth 21' No caving No groundwater	
22										
23										
24										
25										
26										
27										

This log applies only at the location of this excavation and at the time of excavating. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented are a simplification of actual conditions encountered.

LEGEND:

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SUB-SURFACE DATA

EXCAVATION NUMBER: B-8

Project: HESCHEL WEST SCHOOL -AGOURA HILLS

Work Order: 2232-0-10

Method of Excavation: 24" Diameter Bucket Auger

Logged By: CHD

Ground Elevation: 975±

Location: SEE GEOTECHNICAL MAP

Date Observed: 2-17-99

D	USC	SYM	U	B	S	MC	DD		DESCRIPTION	REMARKS
	CL								RESIDUAL SOIL: Light olive brown silty clay (moist, hard).	
1									Scattered siltstone fragements.	
2									MODELO FORMATION: Gray claystone interbedded with pale yellow fine-grained sandstone (damp, hard) and light olive brown clayey siltstone. Thinly bedded. Fissile. Slightly weathered. Fractured. Scattered gypsum seams. Elipsodial fractures common.	
3										Attitude on Bedding at 4½'
4										N50°W/42°NE
5			■	■		21.4	101.4			At 5' 8/12" Attitude on Bedding at 5½'
6										N48°W/41°NE
7										At 7' N40°W/44°NE
8										
9									Light olive brown clayey siltstone to silty claystone (damp, hard) interbedded with gray claystone. Some gypsum seams. Slightly weathered. Fractured. Thinly bedded. Fissile. Fractures filled with gypsum from 9' to 15'	
10			■			13.1	106.6			At 10' 10/12" At 10' N48°W/42°NE
11										
12										At 12½' N52°W/43°NE
13										
14										
15			■	■		26.3	96.7			At 15' 10/12" At 15' N48°W/45°NE
16										
17										
18									At 18'; becoming interbedded with very dark gray clayey siltstone to silty claystone and gray clayey siltstone. Minor interbeds of pale yellow silty very fine-grained sandstone.	At 18' N44°W/42°NE At 19½' N48°W/42°NE
19										
20			■			22.4	104.0			At 20' 12/12"
21									Gray silty very fine-grained sandstone interbedded with very dark gray claystone and clayey siltstone (damp, hard).	At 21½' N49°W/40°NE
22										
23										
24										
25			■	■		17.0	113.8			At 25' 12/12"
26									At 26'; becoming indurated, minor seepage.	
27									Total depth 26½' (practical refusal) No caving	
28									Minor seepage at 26' Downhole logged to 21½'	

This log applies only at the location of this excavation and at the time of excavating. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented are a simplification of actual conditions encountered.

LEGEND:

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SYM - Graphic Symbol
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SUB-SURFACE DATA

EXCAVATION NUMBER: B-9

Project: HESCHEL WEST SCHOOL -AGOURA HILLS

Work Order: 2232-0-10

Method of Excavation: 24" Diameter Bucket Auger

Logged By: CHD

Ground Elevation: 994±

Location: SEE GEOTECHNICAL MAP

Date Observed: 2-17-99

D	USC	SYM	U	B	S	MC	DD		DESCRIPTION	REMARKS
0–2	CL			■					RESIDUAL SOIL: Light olive brown silty clay with scattered shale fragments.	At 2' 5/12"
2–16			■			26.4	93.4		MODELO FORMATION: Light olive brown clayey siltstone. Occasional pale yellow fine-grained sandstone interbeds. (Damp, hard). Slightly weathered. Fractured. Fractures coated with iron oxide. Occasional siliceous shale and brown claystone interbeds. Thinly bedded. Fissile. Diatomaceous. Fish scale fossils common.	Attitude on Bedding at 4' N30°W/28°NE
5			■	■		17.6	103.7			At 5' 6/12" Attitude on Bedding at 5½' N33°W/33°NE
9										At 9½' N20°W/30°NE
10			■			31.2	88.9			At 10' 6/12" Attitude on Bedding at 11' N20°W/30°NE
15			■			29.9	88.2			At 15' 7/12" Attitude on Bedding 15½' N17°W/29°NE
16–20									Brown siliceous shale (indurated, damp). Thinly bedded. Fissile. Slightly weathered. Fractured. Fractures filled with gypsum.	At 19½' N30°W/33°NE
20–25			■	■		34.6	85.4		Brown clayey siltstone to dark brown claystone (damp, hard). Slightly weathered. Fractured. Minor faulting offsets beds ½" to 1".	At 20' 7/12"
23									At 23'; becoming interbedded with very dark gray claystone to clayey siltstone (indurated, damp).	At 22½' N18°W/35°NE At 24' N12°W/36°NE
25–28			■	■		23.2	86.6		Gray to very dark gray clayey siltstone and claystone (indurated, damp).	At 25' 13/10"
28–29									Total depth 28' (Practical Refusal) Minor seepage below 25' No caving Downhole logged to 24'	

This log applies only at the location of this excavation and at the time of excavating. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented are a simplification of actual conditions encountered.

LEGEND:

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PP - Pocket Penetrometer Values (TSF)

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Gorian and Associates, Inc.

SUB-SURFACE DATA

EXCAVATION NUMBER: B-10

Project: HESCHEL WEST SCHOOL -AGOURA HILLS

Work Order: 2232-0-10

Method of Excavation: 24" Diameter Bucket Auger

Logged By: CHD

Ground Elevation: 1004±

Location: SEE GEOTECHNICAL MAP

Date Observed: 2-17-99

D	USC	SYM	U	B	S	MC	DD		DESCRIPTION	REMARKS
0–3	CL		■	■		19.3	102.5		RESIDUAL SOIL: Light olive brown silty clay (moist, hard). Scattered siltstone fragments and carbonate nodules.	At 2' 4/12"
3–4	CL								Brownish yellow silty clay (moist, hard).	
4–6			■			11.9	119.5		MODELO FORMATION DERIVED LANDSLIDE DEPOSIT: Brownish yellow silty very fine-grained sandstone (damp, hard).	At 5' 5/12"
6–12			■	■		14.2	108.8		Light olive brown claystone to clayey siltstone. Occasional gray claystone interbeds. Slightly weathered. Fractured. Tight. Scattered fractures filled with gypsum. At 10'; gray claystone (high-grade bulk). From 10' to 12'; claystone (plastic) fractures filled with gypsum. Mottled gray and light olive brown. Truncated beds. No shearing. Occasional light gray silty very fine-grained sandstone interbeds. Scattered fish scale fossils.	Attitude on Bedding at 7' N70°W/46°NE At 9½' N55°W/50°NE At 10' 5/12" Attitude on Slip Surface @ 11' N5°W/5°SW
12–14									MODELO FORMATION: Light olive brown claystone to clayey siltstone (hard, dry).	At 20' 4/3"
14–20			■			26.1	98.7		Becoming interbedded with very dark gray claystone. Scattered gypsum seams. Thinly bedded. Fissile.	At 15' 5/12" Attitude on Bedding 16½' N55°W/53°NE
20–23			■			--	---		Pale yellow to light gray fine-grained sandstone (damp, indurated).	At 20' 4/3" Bouncing At 22½' At 20' 7/12"
23–25									Very dark gray claystone to clayey siltstone (damp, hard). Interbedded with light olive brown to light gray silty very fine-grained sandstone.	Attitude on Bedding 24½' N53°W/50°NE
25–28			■	■		10.9	125.2		Pale yellow silty fine-grained sandstone (damp, indurated). Minor interbeds of light gray silty fine-grained sandstone.	At 25' 18/11"
28–29									Gray clayey siltstone interbedded with fine-grained sandstone and claystone (damp, hard).	Attitude on Bedding 29' N55°W/45°NE

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LEGEND:

B - Bulk Sample
D - Depth Below Ground Elevation (ft)
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MC - Moisture Content (%)
N - SPT Blows From 6" to 18"
PP - Pocket Penetrometer Values (TSF)
SMC - %Sand-%Silt-%Clay
S/SPT - Standard Penetration Test
SYM - Graphic Symbol
U - Relatively Undisturbed Drive Sample
USC - Unified Soil Classification System

SUB-SURFACE DATA

EXCAVATION NUMBER: B-10 (page 2)

Project: HESCHEL WEST SCHOOL -AGOURA HILLS

Work Order: 2232-0-10

Method of Excavation: 24" Diameter Bucket Auger

Logged By: CHD

Ground Elevation: 1004± Location: SEE GEOTECHNICAL MAP

Date Observed: 2-17-99

D	USC	SYM	U	B	S	MC	DD		DESCRIPTION	REMARKS
28										
29										
30			■	■		19.5	108.8			At 30' 20/12"
31										
32									At 32'; gray limey siltstone (damp, indurated).	Attitude on Bedding at 33' N52°W/57°NE
33									Gray clayey siltstone to claystone (damp, hard). Massive.	
34										
35			■			14.3	119.7			At 35' 20/10"
36										
37										
38										
39										
40			■			16.8	117.0			At 40' 25/12"
41									Total depth 41' No caving Minor seepage from 20' to 29' Downhole logged to 36'	
42										
43										

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LEGEND:

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SUB-SURFACE DATA

EXCAVATION NUMBER: B-11

Project: HESCHEL WEST SCHOOL -AGOURA HILLS

Work Order: 2232-0-10

Method of Excavation: 24" Diameter Bucket Auger

Logged By: CHD

Ground Elevation: 1018±

Location: SEE GEOTECHNICAL MAP

Date Observed: 2-18-99

D	USC	SYM	U	B	S	MC	DD		DESCRIPTION	REMARKS
0–1	CL								RESIDUAL SOIL: Light olive brown silty clay (wet, hard). Scattered siltstone fragments and carbonate nodules.	At 1' 2/12"
1–2	CL		▮			30.2	93.8		Olive yellow silty clay (moist, hard).	
3									MODELO FORMATION: Light olive brown clayey siltstone to claystone. Slightly weathered. Fractured. Thinly bedded. Fissile. (Moist, hard). Interbedded with grayish brown claystone. Fractures typically filled with gypsum, some iron oxide staining.	Attitude on Bedding at 4' N58°W/43°NE
5			▮	▮		26.6	98.3			At 5' 5/12"
7										Attitude on Bedding at 7' N67°W/36°NE
10			▮			25.9	99.9			At 10' 5/12"
14									At 14'; becoming interbedded with dark gray claystone.	
15			▮			17.2	103.8			
16									At 16'; siliceous shale interbeds, chert.	
17										Attitude on Bedding at 17' N70°W/42°NE
19									At 19'; interbedded with brownish yellow fine-grained sandstone.	
20			▮			27.1	95.9			At 20' 8/12"
22										Attitude on Bedding at 22' N45°W/42°NE
24									Yellowish brown clayey siltstone to claystone (damp, hard). Fractured. Slightly weathered. Gypsum filled fractures.	At 25' 10/12"
26			▮	▮		23.9	102.5			
27										

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SUB-SURFACE DATA

EXCAVATION NUMBER: B-11 (page 2)

Project: HESCHEL WEST SCHOOL -AGOURA HILLS

Work Order: 2232-0-10

Method of Excavation: 24" Diameter Bucket Auger

Logged By: CHD

Ground Elevation: 1018± Location: SEE GEOTECHNICAL MAP

Date Observed: 2-18-99

D	USC	SYM	U	B	S	MC	DD		DESCRIPTION	REMARKS
28									See previous page for description.	Attitude on Bedding 27½' N54°W/51°NE
29									Light olive brown clayey siltstone to claystone (damp, hard). Slightly weathered. Fractured. Fractures commonly filled with gypsum.	
30			▮			27.4	97.7			At 30' 17/12"
31										
32										Attitude on Bedding 32½' N66°W/51°NE
33									Dark gray clayey siltstone to claystone (damp, hard). Minor faulting with beds offset 3".	
34										
35			▮			19.9	91.8			At 35' 24/12" Attitude on Bedding at 35' N60°W/49°NE
36										
37										
38										Attitude on Bedding 38½' N52°W/43°NE
39										
40			▮	▮		22.2	99.3			At 40' 25/9"
41										
42										
43										Attitude on Bedding at 44' N53°W/44°NE
44										
45			▮			19.9	88.2			At 45' 19/6"
46										
47										
48										
49										
50			▮			26.3	77.8			At 50' 30/5"
51									Total depth 51' No caving Minor seepage below 36½' Groundwater at 48' after downhole Downhole logged to 45'	
52										
53										

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SUB-SURFACE DATA

EXCAVATION NUMBER: B-12

Project: HESCHEL WEST SCHOOL -AGOURA HILLS

Work Order: 2232-0-10

Method of Excavation: 24" Diameter Bucket Auger

Logged By: CHD

Ground Elevation: 962± Location: SEE GEOTECHNICAL MAP

Date Observed: 2-18-99

D	USC	SYM	U	B	S	MC	DD		DESCRIPTION	REMARKS
1	CL								ALLUVIUM: Brown silty clay (hard, moist). Scattered carbonate veinlets.	
2			▮	▮		19.5	102.7			At 2' 4/12"
3										At 9'
4	CL								Light olive brown silty clay with siltstone fragements (hard, moist).	
5			▮	▮		22.5	104.7		CALABASAS FORMATION: Olive yellow silty fine-grained sandstone interbedded with light olive brown to light olive gray clayey siltstone to claystone. Slightly weathered. Fractured. (Hard, damp).	At 5' 5/12"
6–8										Attitude on Bedding at 7' N43°W/40°NE
9									Gray clayey siltstone to claystone interbedded with yellowish brown clayey siltstone. Slightly weathered. Fractured. (Hard, damp). Tight. Elipsoidal fractures.	At 9' N42°W/42°NE
10			▮	▮		29.4	95.1			At 10' 4/12"
11										Attitude on Bedding at 11' N48°W/47°NE
13										At 13½' N50°W/54°NE
15			▮			24.2	97.3			At 15' 4/12" Attitude on Bedding 15½' N45°W/45°NE
16									At 16'; minor interbed of brownish yellow silty fine-grained sandstone.	
18									At 18'; becoming interbedded with dark grayish brown clayey siltstone and very dark gray claystone.	At 18' N44°W/42°NE
20			▮			20.0	107.1			At 20' 6/12" Attitude on Bedding at 21' N45°W/42°NE
24										At 24' N53°W/41°NE
25			▮			18.9	109.8			At 25' 8/12"
27									Dark gray clayey siltstone to claystone (hard, damp).	

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LEGEND:

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SYM - Graphic Symbol
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USC - Unified Soil Classification System

SUB-SURFACE DATA

EXCAVATION NUMBER: B-12 (page 2)

Project: HESCHEL WEST SCHOOL -AGOURA HILLS

Work Order: 2232-0-10

Method of Excavation: 24" Diameter Bucket Auger

Logged By: CHD

Ground Elevation: 962±

Location: SEE GEOTECHNICAL MAP

Date Observed: 2-18-99

D	USC	SYM	U	B	S	MC	DD		DESCRIPTION	REMARKS
28										Attitude on Bedding at 28' N55°W/45°NE
29										
30			■	■		20.8	104.6			At 30' 7/12"
31										
32										Attitude on Bedding at 33' N70°W/42°NE
33										
34										
35			■			19.2	109.6			At 35' 17/12" Attitude on Bedding at 35' N84°W/44°NE
36										
37										
38									At 38'; occasional interbeds of light grey silty fine-grained sandstone.	
39										
40			■			23.5	102.4			At 40' 16/12"
41									Total depth 41' No caving Minor seepage below 18' Downhole logged to 35' Groundwater at 39' after downhole	
42										
43										

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SUB-SURFACE DATA

EXCAVATION NUMBER: B-13

Project: HESCHEL WEST SCHOOL -AGOURA HILLS

Work Order: 2232-0-10

Method of Excavation: 24" Diameter Bucket Auger

Logged By: CHD

Ground Elevation: 1029±

Location: SEE GEOTECHNICAL MAP

Date Observed: 2-19-99

D	USC	SYM	U	B	S	MC	DD		DESCRIPTION	REMARKS
	CL								RESIDUAL SOIL: Brown silty clay (hard, moist). Scattered siltstone fragments.	
1										
2									CALABASAS FORMATION: Yellow brown to light olive brown claystone interbedded with light olive brown clayey siltstone (hard, damp). Slightly weathered. Fractured. Thinly bedded. Occasional inter-beds of brownish yellow silty fine-grained sandstone. Elipsoidal fractures.	
3										Attitude on Bedding at 4½' N58°W/33°NE
4										
5			■	■		27.7	98.6			At 5' 5/12"
6										
7										
8										
9										
10			■			24.4	99.4			At 10' 6/12"
11										
12										Attitude on Bedding at 13' N44°W/43°NE
13										
14										
15			■			30.5	94.6			At 15' 4/12"
16										
17										Attitude on Bedding at 18' N59°W/78°NE
18									At 18'; becoming interbedded with gray claystone. Tightly folded, Chevron folds.	
19										
20			■			31.8	93.7			At 20' 4/12"
21										
22										
23										Attitude on Bedding 24½' EW/60°N
24									At 24'; becoming interbedded with very dark gray clayey siltstone to claystone.	
25			■	■		24.7	96.9			At 25' 7/12"
26										
27									Very dark gray clayey siltstone to claystone (hard, damp). Tightly folded, Chevron folds.	

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LEGEND:

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U - Relatively Undisturbed Drive Sample
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SUB-SURFACE DATA

EXCAVATION NUMBER: B-13 (page 2)

Project: HESCHEL WEST SCHOOL -AGOURA HILLS

Work Order: 2232-0-10

Method of Excavation: 24" Diameter Bucket Auger

Logged By: CHD

Ground Elevation: 1029±

Location: SEE GEOTECHNICAL MAP

Date Observed: 2-19-99

D	USC	SYM	U	B	S	MC	DD		DESCRIPTION	REMARKS
28										Attitude on Bedding at 28' N56°W/36°NE
29										
30			X			23.3	99.4			At 30' 22/12"
31										
32										
33										Attitude on Bedding at 33' N57°W/28°NE
34									At 34'; becoming indurated. Light gray silty fine-grained sandstone interbeds.	At 34' N61°W/28°NE
35			X	X		24.8	105.5			At 35' 25/8" Attitude on Bedding at 36' N55°W/35°NE
36										
37										
38										
39										At 39' N53°W/35°NE
40			X			19.5	106.0			At 40' 21/12" Attitude on Bedding at 41' N58°W/53°NE
41										
42										
43										At 43½' N31°W/43°NE
44										
45			X			16.8	114.8			At 45' 13/12"
46										
47										
48										Attitude on Bedding 48½'' N34°E/48°SE
49										
50			X			18.3	105.0			At 50' 50/6"
51										

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LEGEND:

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SUB-SURFACE DATA

EXCAVATION NUMBER: B-13 (page 3)

Project: HESCHEL WEST SCHOOL -AGOURA HILLS

Work Order: 2232-0-10

Method of Excavation: 24" Diameter Bucket Auger

Logged By: CHD

Ground Elevation: 1029±   Location: SEE GEOTECHNICAL MAP

Date Observed: 2-19-99

D	USC	SYM	U	B	S	MC	DD		DESCRIPTION	REMARKS
52										Attitude on Bedding at 53' N56°E/40°SE
53										
54										
55			▮			23.6	104.2			At 55' 50/8"
56										Attitude on Bedding at 57' N5°W/59°NE
57										
58									At 58½'; becoming interbedded with light gray silty fine-grained sandstone. (Indurated).	At 58' EW/49°N
59										
60			▮			20.0	105.1			At 60' 50/8"
61										
62										
63									Below 63'; becoming very indurated, core barrel used. Interbeds of white limy clayey siltstone.	
64									Total depth 63½' (practical refusal) No caving Minor seepage below 28' Downholed to 58' Groundwater at 62' after downhole	
65										
66										

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LEGEND:

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SUB-SURFACE DATA

EXCAVATION NUMBER: B-14

Project: HESCHEL WEST SCHOOL -AGOURA HILLS

Work Order: 2232-0-10

Method of Excavation: 24" Diameter Bucket Auger

Logged By: CHD

Ground Elevation: 1007±

Location: SEE GEOTECHNICAL MAP

Date Observed: 2-19-99/2-22-99

D	USC	SYM	U	B	S	MC	DD		DESCRIPTION	REMARKS
	CL								RESIDUAL SOIL: Light olive brown silty clay (hard, moist). Scattered siltstone framents.	
1										
2									CALABASAS FORMATION: Brownish yellow clayey siltstone and light olive brown claystone. Slightly weathered. Fractured, yet tight. Scattered carbonate filled fractures.	
3										
4										
5										At 5' 5/12"
						27.4	99.4			
6										
7										Attitude on Bedding at 8' N39°W/36°NE
8										
9									At 9'; highly contorted non-continuous Betonite clay seam (½").	At 9' N30°W/63°NE
10										At 9½' N56°W/52°NE
						20.3	100.7			At 10' 6/12"
11										At 11½ N70°W/53°NE
12										
13									To 18' highly folded, Chevron folds.	
14										
15										At 15' 5/12"
						39.1	88.9			
16										
17										Attitude on Bedding at 18' N50°W/53°NE
18										
19										
20									At 20'; ½' thick pale yellow Betonite clay seam non-continuous.	At 20' 6/12"
						26.7	97.7			Attitude on Bedding at 21' N39°W/54°NE
21										
22									At 22'; becoming interbedded with gray clayey siltstone to claystone.	
23										
24										
25										At 25' 8/12"
						25.2	99.1			Attitude on Bedding at 26' N65°W/47°NE
26										
27									Light olive brown clayey siltstone to claystone interbedded with gray claystone to very dark gray clayey siltstone (hard, damp). Generally massive to 41'.	
28										

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LEGEND:

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SUB-SURFACE DATA

EXCAVATION NUMBER: B-14 (page 2)

Project: HESCHEL WEST SCHOOL -AGOURA HILLS

Work Order: 2232-0-10

Method of Excavation: 24" Diameter Bucket Auger

Logged By: CHD

Ground Elevation: 1007+ Location: SEE GEOTECHNICAL MAP

Date Observed: 2-19-99/2-22-99

D	USC	SYM	U	B	S	MC	DD		DESCRIPTION	REMARKS
									See previous page for description.	
29									Very dark gray clayey siltstone to claystone (hard, damp).	
30						19.2	108.1			At 30' 21/12"
31										
32										
33										
34									At 34'; interbedded with light gray silty very fine-grained sandstone.	
35						19.9	105.6			At 35' 22/12"
36										
37										
38										
39										
40						19.6	112.3			At 40' 21/12" Attitude on Bedding at 41' N75°W/77°NE
41										
42										
43										
44										
45						20.9	105.3			At 45' 27/12"
46										
47										Attitude on Bedding 47½' N70°W/44°NE
48										
49										At 49' N76°W/53°NE
50						16.7	101.6			At 50' 50/7"
51										At 51½' N77°W/44°NE

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LEGEND:

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SUB-SURFACE DATA

EXCAVATION NUMBER: B-14 (page 3)

Project: HESCHEL WEST SCHOOL -AGOURA HILLS

Work Order: 2232-0-10

Method of Excavation: 24" Diameter Bucket Auger

Logged By: CHD

Ground Elevation: 1007± Location: SEE GEOTECHNICAL MAP

Date Observed: 2-19-99/2-22-99

D	USC	SYM	U	B	S	MC	DD		DESCRIPTION	REMARKS
52										
53										
54										
55			▮			19.2	105.9			At 55' 50/9" Attitude on Bedding at 55' N90°E/48°N
56										
57										
58										
59										
60			▮			15.7	110.5			At 60' 50/10"
61									Total depth 61' No caving Minor seepage at 27' Downholed to 56'	
62										
63										
64										
65										
66										

This log applies only at the location of this excavation and at the time of excavating. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented are a simplification of actual conditions encountered.

LEGEND:

B - Bulk Sample
D - Depth Below Ground Elevation (ft)
DD - In Place Dry Density (pcf)
MC - Moisture Content (%)
N - SPT Blows From 6" to 18"
PP - Pocket Penetrometer Values (TSF)
SMC - %Sand-%Silt-%Clay
S/SPT - Standard Penetration Test
SYM - Graphic Symbol
U - Relatively Undisturbed Drive Sample
USC - Unified Soil Classification System

SUB-SURFACE DATA

EXCAVATION NUMBER: B-15

Project: HESCHEL WEST SCHOOL -AGOURA HILLS

Work Order: 2232-0-10

Method of Excavation: 24" Diameter Bucket Auger

Logged By: CHD

Ground Elevation: 936±

Location: SEE GEOTECHNICAL MAP

Date Observed: 2-22-99

D	USC	SYM	U	B	S	MC	DD		DESCRIPTION	REMARKS
0–3	CL								ALLUVIUM: Brown silty clay with scattered gravel of sandstone (hard, moist). Trace sand.	
2–3			■	■		19.2	103.6			At 2' 3/12"
3–6	CL								Yellowish brown silty clay (hard, moist to wet). Scattered carbonate veinlets. Trace sand.	
5–6			■	■		24.7	97.8			At 5' 1/12"
6–14									CALABASAS FORMATION: Yellowish brown to light olive brown clayey - siltstone to claystone (hard, wet). Slightly fractured. Weathered. Minor interbeds of light brown silty fine-grained sandstone.	Attitude on Bedding at 8' N68°W/51°NE
10–11			■	■		33.7	87.4		At 10'; becoming interbedded with gray claystone.	At 10' 1/12" Attitude on Bedding at 10' N65°W/57°NE At 13' N55°W/44°NE
14–27									Light yellowish brown to olive yellow silty fine-grained sandstone (hard, moist). Scattered iron oxide staining in fractures.	
15–16			■			11.2	128.4			At 15' 10/10"
16½									At 16½'; becoming indurated, sandstone generally massive.	Attitude on Bedding at 18' N52°W/55°NE
20–21			■	■		15.2	91.7			At 20' 11/12" Attitude on Bedding at 21' N60°W/53°NE
22–23									From 22' to 23'; scattered rip-up clasts of very dark gray clayey siltstone to claystone. Some light gray fine-grained sandstone.	
25–26			■			17.2	112.5			At 25' 11/12"

This log applies only at the location of this excavation and at the time of excavating. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented are a simplification of actual conditions encountered.

LEGEND:

B - Bulk Sample
D - Depth Below Ground Elevation (ft)
DD - In Place Dry Density (pcf)
MC - Moisture Content (%)
N - SPT Blows From 6" to 18"
PP - Pocket Penetrometer Values (TSF)
SMC - %Sand-%Silt-%Clay
S/SPT - Standard Penetration Test
SYM - Graphic Symbol
U - Relatively Undisturbed Drive Sample
USC - Unified Soil Classification System

SUB-SURFACE DATA

EXCAVATION NUMBER: B-15 (page 2)

Project: HESCHEL WEST SCHOOL -AGOURA HILLS

Work Order: 2232-0-10

Method of Excavation: 24" Diameter Bucket Auger

Logged By: CHD

Ground Elevation: 936±

Location: SEE GEOTECHNICAL MAP

Date Observed: 2-18-99

D	USC	SYM	U	B	S	MC	DD		DESCRIPTION	REMARKS
28									At 28'; becoming interbedded with light gray silty fine- to coarse-grained sandstone.	
29										
30									At 30'; becoming very indurated. Light gray fine-grained sandstone. Core barrel used.	
31									Total depth 30½' (Practical Refusal)	
32									No caving	
33									Minor seepage below 12' Downholed to 25'	

This log applies only at the location of this excavation and at the time of excavating. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented are a simplification of actual conditions encountered.

LEGEND:

B - Bulk Sample
D - Depth Below Ground Elevation (ft)
DD - In Place Dry Density (pcf)
MC - Moisture Content (%)
N - SPT Blows From 6" to 18"
PP - Pocket Penetrometer Values (TSF)

SMC - %Sand-%Silt-%Clay
S/SPT - Standard Penetration Test
SYM - Graphic Symbol
U - Relatively Undisturbed Drive Sample
USC - Unified Soil Classification System

BORING No. 1

,AVATED: 1/17/98

GROUND ELEVATION: ±

DEPTH IN FEET	DRY DENSITY (PCF)	FIELD MOISTURE (%DRY WEIGHT)	ATTITUDE	BLOWS PER FOOT	MATERIAL TYPE	MATERIAL SYMBOL	MATERIAL DESCRIPTION
					Clay (CL)		Soft, very moist to moist, dark gray, silty slightly sandy, porous
	97	27		8			
							grades to firm to stiff, dark brown, sandier
	103	21		29	(CL)		
							Very stiff, moist, light brown, clayey, sandy
10	104	18		36	SILT (ML)		
	111	17		85			
					Bedrock		Very firm to hard, moist, light brown, fine sandy siltstone with interbedded claystone
20	90	29		120			
							End of Boring @ 22 feet No Water, No Caving
30							

LOG OF BORING

JOB NAME: Mr. David Minas

JOB No. 97-559-02

FIGURE NO: I-1

APPLIED EARTH SCIENCES
GEOTECHNICAL ENGINEERING CONSULTANTS

BORING No. 2

.E EXCAVATED: 1/17/98

GROUND ELEVATION: ±

DEPTH IN FEET	DRY DENSITY (PCF)	FIELD MOISTURE (%DRY WEIGHT)	ATTITUDE	BLOWS PER FOOT	MATERIAL TYPE	MATERIAL SYMBOL	MATERIAL DESCRIPTION
	102	21		13	Clay (CL)		Soft, very moist to moist, dark gray, silty slightly sandy, porous
	106	20		45	(CL)		grades to firm to stiff, light brown, sandier
10	96	27		40	SILT (ML)		Very stiff, moist, light brown, clayey, sandy
	119	29		120	Bedrock		Very firm to hard, moist, light brown, fine sandy siltstone with interbedded claystone
20							End of Boring @ 20 feet No Water, No Caving
30							

LOG OF BORING

JOB NAME: Mr. David Minas

JOB No. 97-559-02

FIGURE NO: I-2

APPLIED EARTH SCIENCES
GEOTECHNICAL ENGINEERING CONSULTANTS

BORING No. 3

DATE EXCAVATED: 1/17/98

GROUND ELEVATION: ±

DEPTH IN FEET	DRY DENSITY (PCF)	FIELD MOISTURE (%DRY WEIGHT)	ATTITUDE	BLOWS PER FOOT	MATERIAL TYPE	MATERIAL SYMBOL	MATERIAL DESCRIPTION
					Clay (CL)		Soft, very moist to moist, dark gray, silty slightly sandy, porous
					(CL)		grades to firm to stiff, light brown, sandier
	103	21		21			
10	96	26		48	SILT (ML)		Very stiff, moist, light brown, clayey, sandy
	102	23		98	Bedrock		Very firm to hard, moist, light brown, fine sandy siltstone with interbedded claystone
20	96	27		100			
	98	25		120			grades to gray
30	111	14		120			End of Boring @ 31 feet No Water, No Caving

LOG OF BORING

JOB NAME: Mr. David Minas

JOB No. 97-559-02

APPLIED EARTH SCIENCES
GEOTECHNICAL ENGINEERING CONSULTANTS

FIGURE NO: I-3

BORING No. 4

DATE EXCAVATED: 1/17/98

GROUND ELEVATION: ±

DEPTH IN FEET	DRY DENSITY (PCF)	FIELD MOISTURE (%DRY WEIGHT)	ATTITUDE	BLOWS PER FOOT	MATERIAL TYPE	MATERIAL SYMBOL	MATERIAL DESCRIPTION
					Clay		Soft, very moist to moist, dark gray, silty
	99	20		20	(CL)		slightly sandy, porous
					(CL)		grades to firm, light brown, sandier
							grades to gray
	100	21		38	(CL)		
					SILT		Stiff, moist, brown, clayey, sandy
10	105	14		45	(ML)		
							grades to light brown
					(ML)		
	105	19		38			
20							
					Bedrock		Very firm to hard, moist, light brown, fine sandy siltstone with interbedded claystone
	99	19		95			
							End of Boring @ 27 feet No Water No Caving
30							

LOG OF BORING

JOB NAME: Mr. David Minas

JOB No. 97-559-02

FIGURE NO: I-4

APPLIED EARTH SCIENCES
GEOTECHNICAL ENGINEERING CONSULTANTS

BORING No. 5

DATE EXCAVATED: 1/17/98

GROUND ELEVATION: ±

DEPTH IN FEET	DRY DENSITY (PCF)	FIELD MOISTURE (%DRY WEIGHT)	ATTITUDE	BLOWS PER FOOT	MATERIAL TYPE	MATERIAL SYMBOL	MATERIAL DESCRIPTION
					Clay (CL)		Soft, very moist to moist, dark gray, silty slightly sandy, porous
							grades to firm, light brown, sandier
	91	22		12	(CL)		
					SILT		Firm, moist, brown, clayey, slightly sandy
10	86	29		44	(ML)		
					Bedrock		Very firm to hard, moist, grayish brown, fine sandy siltstone with interbedded claystone
	101	18		110			
							End of Boring @ 17 feet No Water No Caving
20							
30							

LOG OF BORING

JOB NAME: Mr. David Minas	JOB No. 97-559-02
APPLIED EARTH SCIENCES GEOTECHNICAL ENGINEERING CONSULTANTS	FIGURE NO: I-5

BORING No. 6

DATE EXCAVATED: 1/17/98

GROUND ELEVATION: ±

DEPTH IN FEET	DRY DENSITY (PCF)	FIELD MOISTURE (%DRY WEIGHT)	ATTITUDE	BLOWS PER FOOT	MATERIAL TYPE	MATERIAL SYMBOL	MATERIAL DESCRIPTION
					Clay		Soft, very moist to moist, dark gray, silty
	99	21		10	(CL)		slightly sandy, porous
					(CL)		grades to firm, light brown, sandier
	98	19		13			
					SILT		Very stiff, moist, brown, clayey, sandy
10	107	18		33	(ML)		
	101	23		25	(ML)		grades to firm, brown
20	110	17		100	Bedrock		Very firm to hard, moist, brown, fine sandy siltstone with interbedded claystone
							End of Boring @ 22 feet No Water No Caving
30							

LOG OF BORING

JOB NAME: Mr. David Minas

JOB No. 97-559-02

FIGURE NO: I-6

APPLIED EARTH SCIENCES
GEOTECHNICAL ENGINEERING CONSULTANTS

BORING No. 7

DATE EXCAVATED: 1/17/98

GROUND ELEVATION: ±

DEPTH IN FEET	DRY DENSITY (PCF)	FIELD MOISTURE (%DRY WEIGHT)	ATTITUDE	BLOWS PER FOOT	MATERIAL TYPE	MATERIAL SYMBOL	MATERIAL DESCRIPTION
					Clay		Soft, very moist to moist, dark gray, silty
	99	21		10	(CL)		slightly sandy, porous
					(CL)		grades to firm, light brown, sandier
	99	24		13			
					SILT		Very stiff, moist, brown, clayey, sandy
10	101	19		33	(ML)		
	98	18		27	(ML)		grades to firm
20	110	17		100	Bedrock		Very Firm to hard, moist, light gray, fine sandy siltstone with interbedded claystone
	115	15		120			
							End of Boring @ 26 feet No Water No Caving
30							

LOG OF BORING

JOB NAME: Mr. David Minas

JOB No. 97-559-02

APPLIED EARTH SCIENCES
GEOTECHNICAL ENGINEERING CONSULTANTS

FIGURE NO: I-7

APPENDIX B

LABORATORY TESTING

General
The results of our prior laboratory test results on selected relatively undisturbed and bulk samples are presented below. Tests were performed to evaluate the physical and engineering properties of the encountered earth materials, including field moisture and density, compaction characteristics, expansion potential, shear strength, and consolidation potential. In addition, to the prior testing four samples of the on site materials were submitted to an independent corrosion engineer to evaluate the corrosion potential of concrete and metal in contact with the on site soils.

Field Density and Moisture Tests
In situ dry density and moisture content were determined from the relatively undisturbed samples obtained during drilling operations. The test results and a detailed description of the soils encountered are shown on the attached logs of subsurface data, Appendix A.

Maximum Density-Optimum Moisture
Maximum density/optimum moisture tests (compaction characteristics) were performed on selected samples of the encountered materials. The tests were performed in general accordance with ASTM test method D 1557. The results are as follows:

Boring Number	Depth (ft)	Visual Soil Classification	Maximum Dry Density (pcf)	Optimum Moisture Content %
B-3	3.0	Brown sandy clay	108.5	16.5
B-9	5.0	Yellow brown clayey silt	95.0	26.5
B-10	2 & 10 (mix)	Brown clayey silt with siltstone	115.0	16.5

Soil Expansion Tests
Samples of the encountered soils were tested for expansiveness in general accordance with ASTM test method D4829. The results are as follows:

Boring Number	Depth (ft)	Expansion Index	Expansion Range
B-3	3.0	69	51-90
B-9	5.0	74	51-90

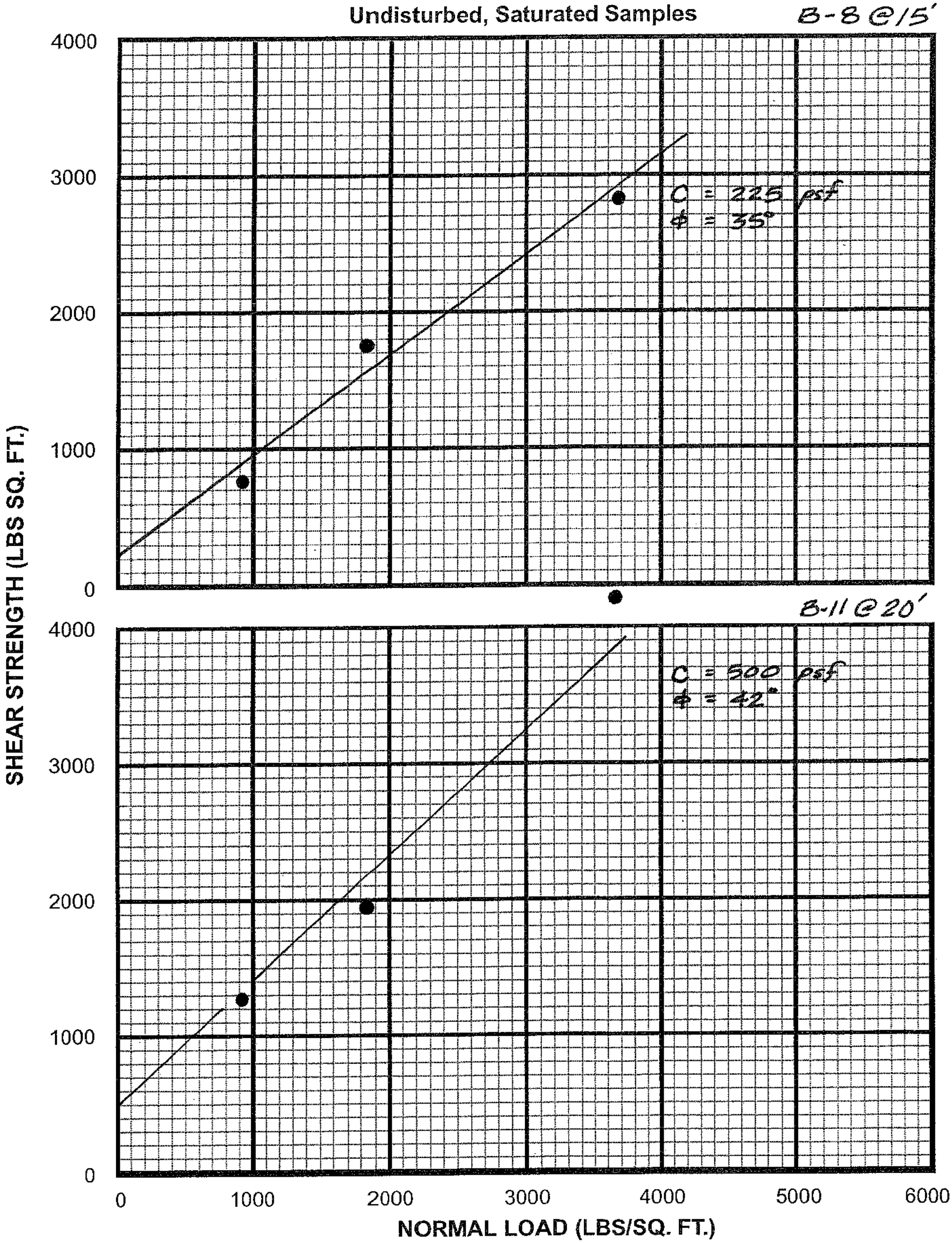
Direct Shear Tests
Direct shear tests were performed on relatively undisturbed and remolded samples of the soil encountered from the borings. The sample sets were saturated prior to being sheared under axial loads ranging from 920 to 3,680 psf at a rate of 0.05 inches per minute. The ultimate shear strength results are attached as graphic summaries.

Load-Consolidation Tests
Load-consolidation tests were conducted on seven relatively undisturbed soil samples. Test loads were added in increments to a maximum of 8,000 psf or 9,400 psf. Water was added at an axial load of 1,000 psf or 1,175 psf to study the effect of moisture infiltration on potential foundation behavior. The results are attached as graphic summaries.

Soil Corrosion
The potential for corrosion of concrete and metals in contact with the on site soil was evaluated by an independent corrosion engineer. The results of that evaluation are presented in this appendix.

Work Order No.: 2232-0-10

Results of Shearing Strength Test



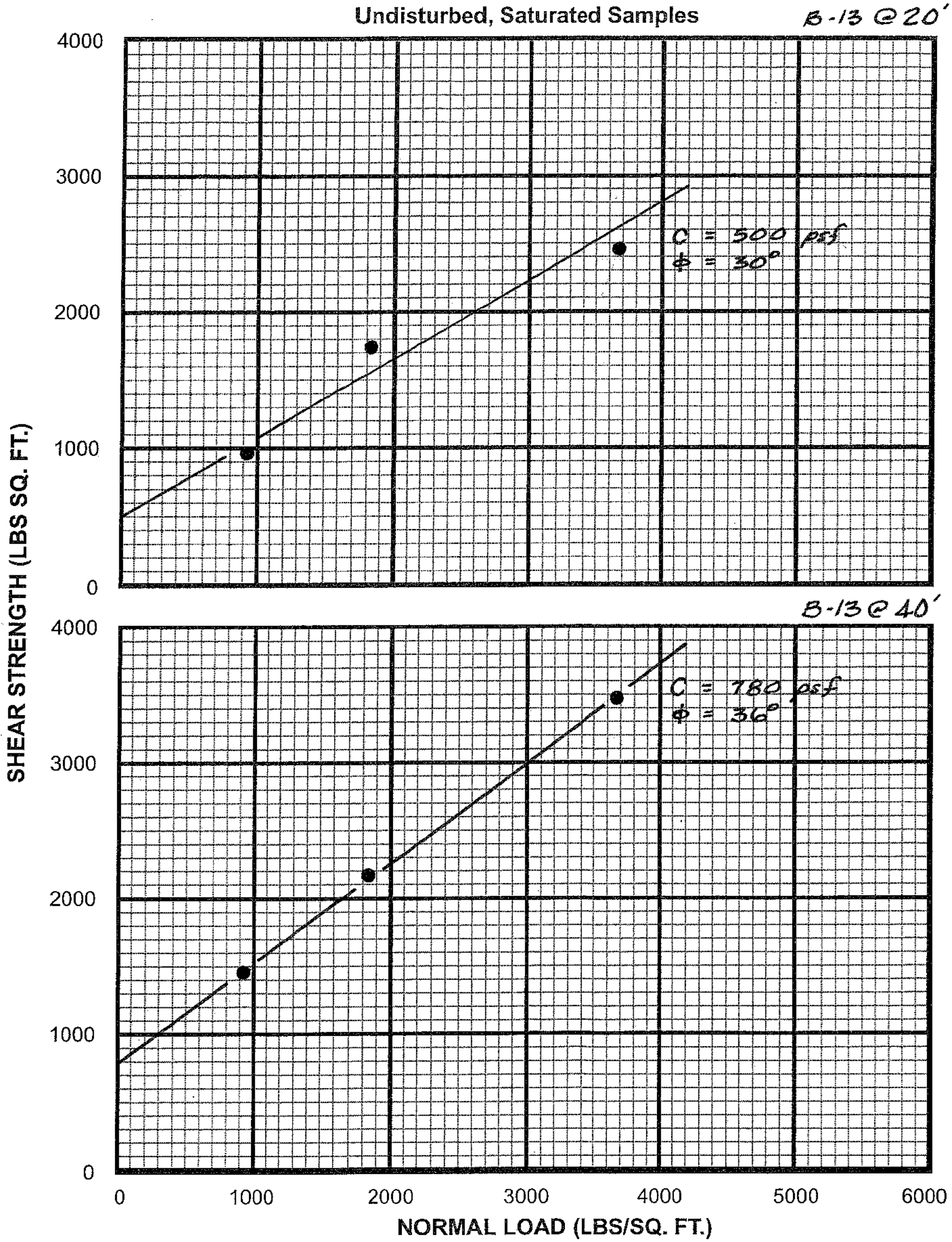
Explanation: B-9 @ 12' = Sample taken from boring 9 at 12 feet in depth.

SHEARFORM #1003

GORIAN & ASSOCIATES, INC

Work Order No.: 2232-0-10

Results of Shearing Strength Test



Explanation: B-9 @ 12' = Sample taken from boring 9 at 12 feet in depth.

SHEARFORM #1003

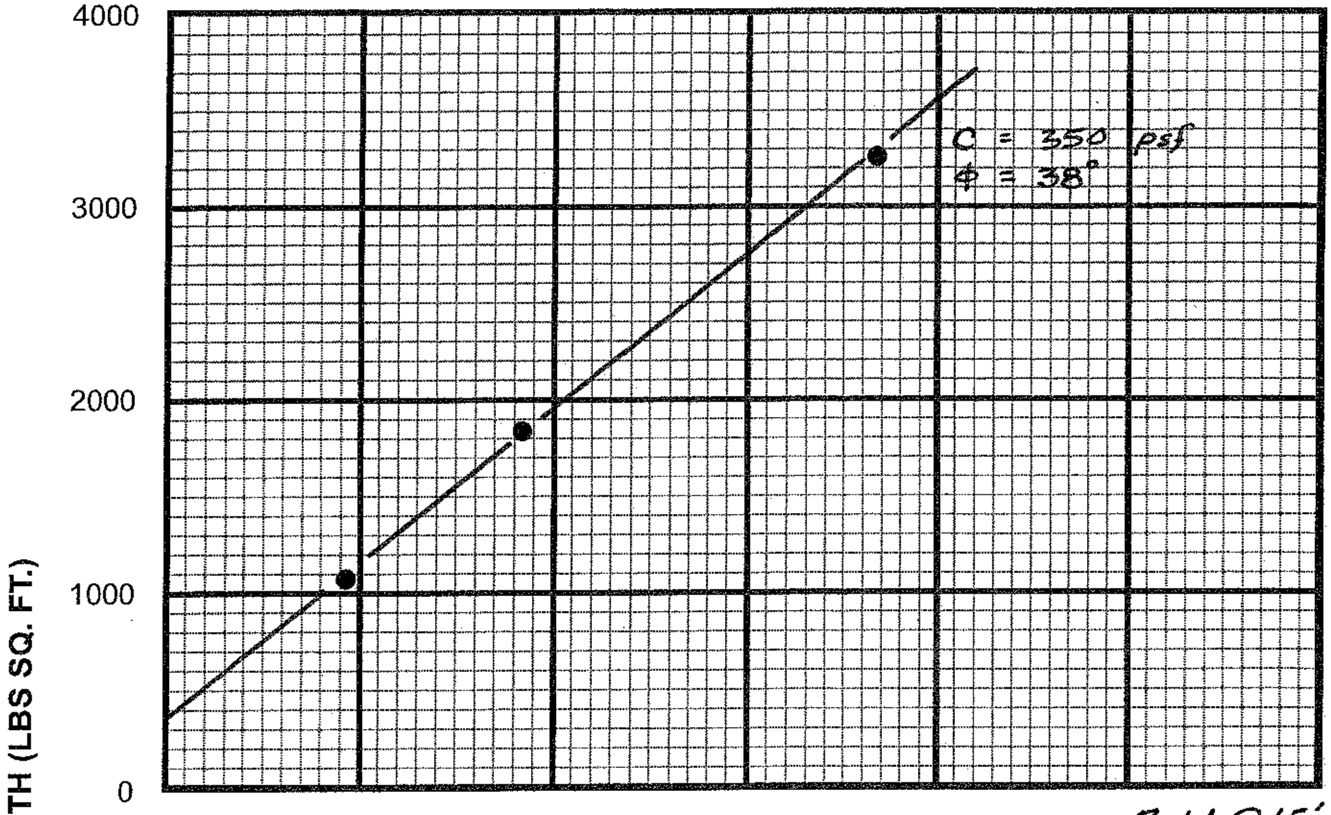
GORIAN & ASSOCIATES, INC

Work Order No.: 2232-0-10

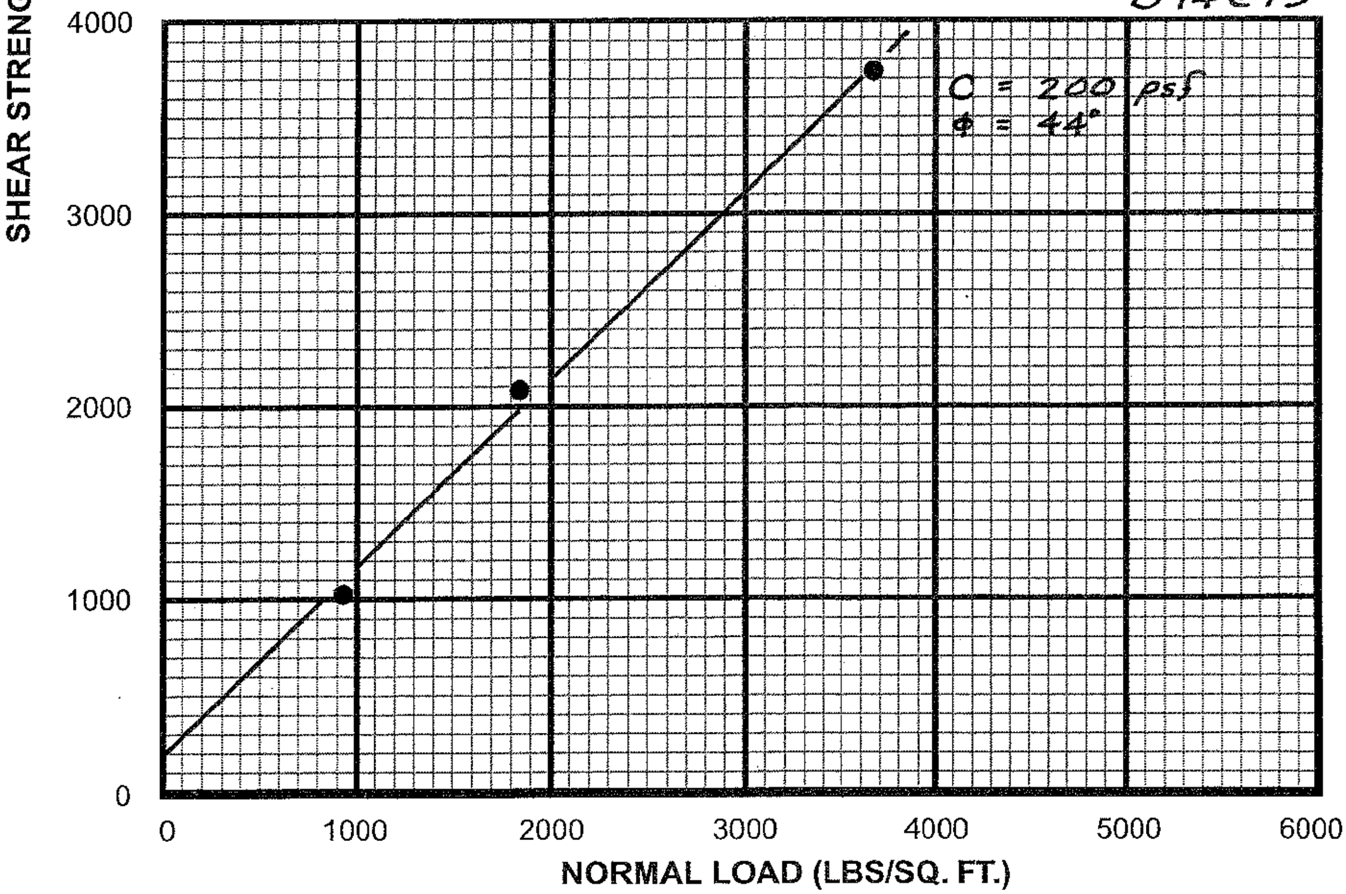
Results of Shearing Strength Test

Undisturbed, Saturated Samples

B-13 @ 60'



B-14 @ 15'



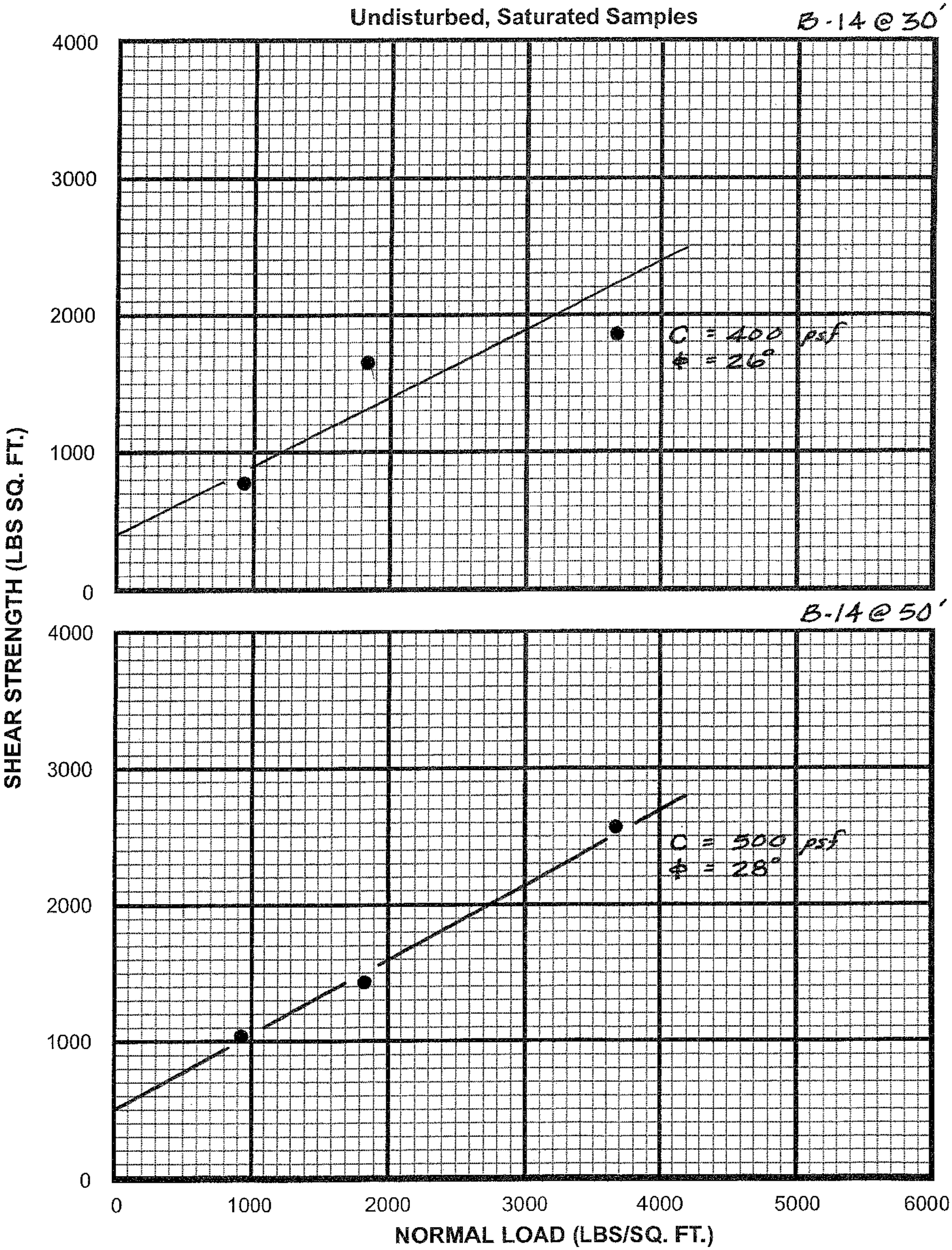
Explanation: B-9 @ 12' = Sample taken from boring 9 at 12 feet in depth.

SHEARFORM #1003

Work Order No.: 2232-0-10

Results of Shearing Strength Test

Undisturbed, Saturated Samples



Explanation: B-9 @ 12' = Sample taken from boring 9 at 12 feet in depth.

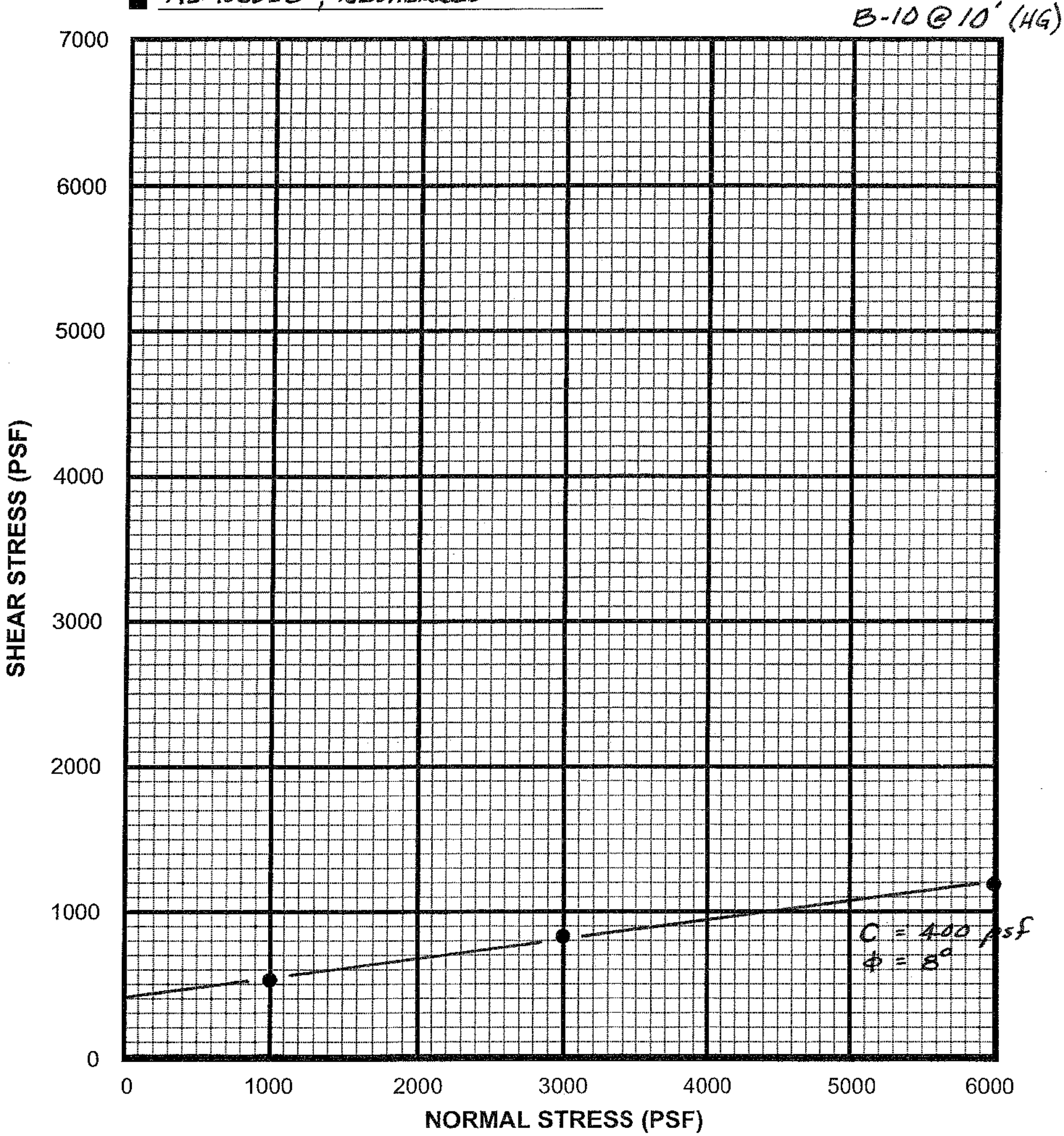
SHEARFORM #1003

GORIAN & ASSOCIATES, INC

Work Order No.: 2232-0-10

Results of Direct Shear Test

- ☐ Undisturbed, saturated sample
- ☐ Bulk sample remolded to 90% and saturated
- ■ REMOLDED, RESHEARED



Explanation: B-9 @ 12' = Sample taken from boring 9 at 12 feet in depth.

SHEARFORM #1001

GORIAN & ASSOCIATES, INC

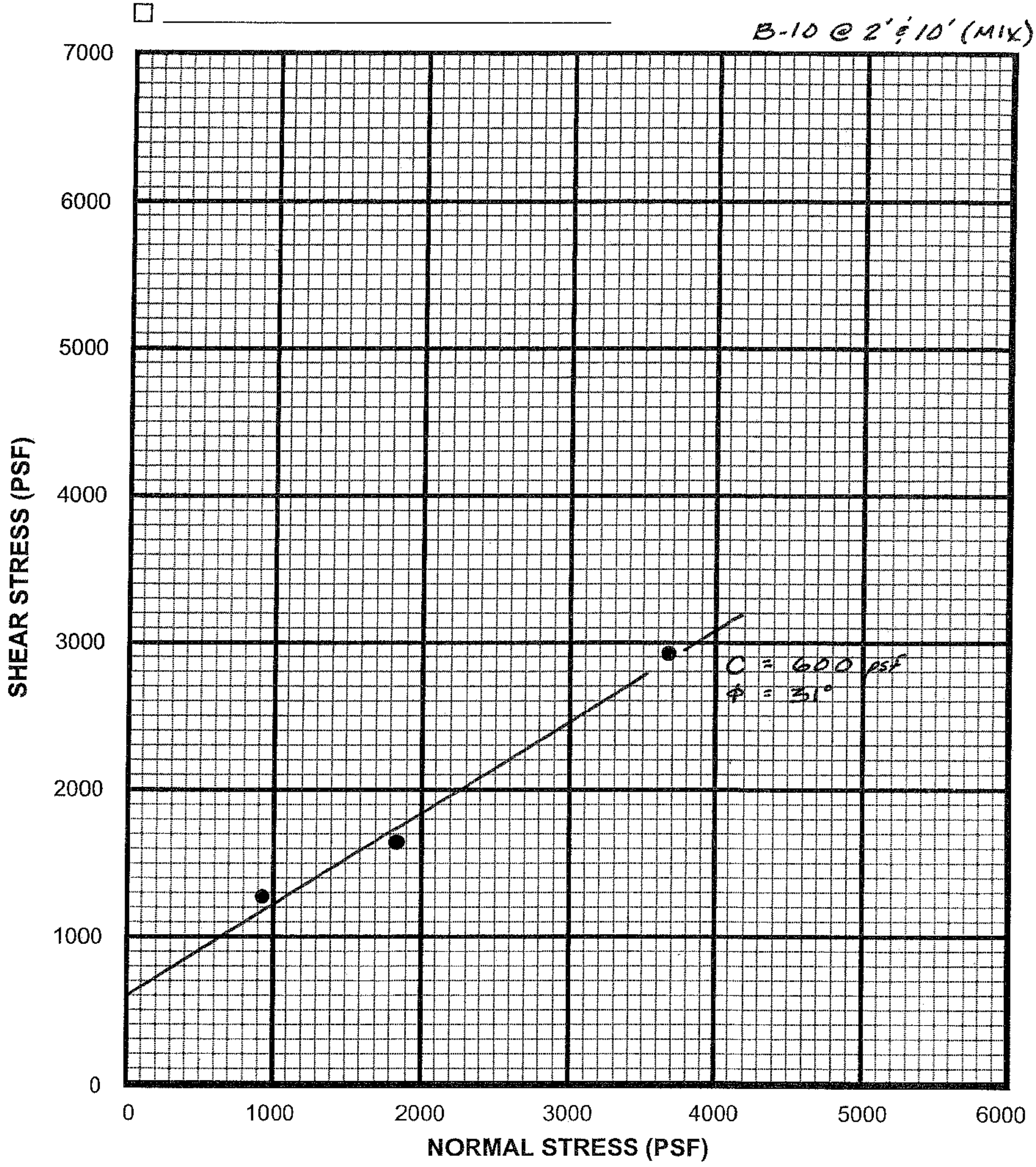
Work Order No.: 2232-0-10

Results of Direct Shear Test

☐ Undisturbed, saturated sample

■ Bulk sample remolded to 90% and saturated

☐ ____________________



Explanation: B-9 @ 12' = Sample taken from boring 9 at 12 feet in depth.

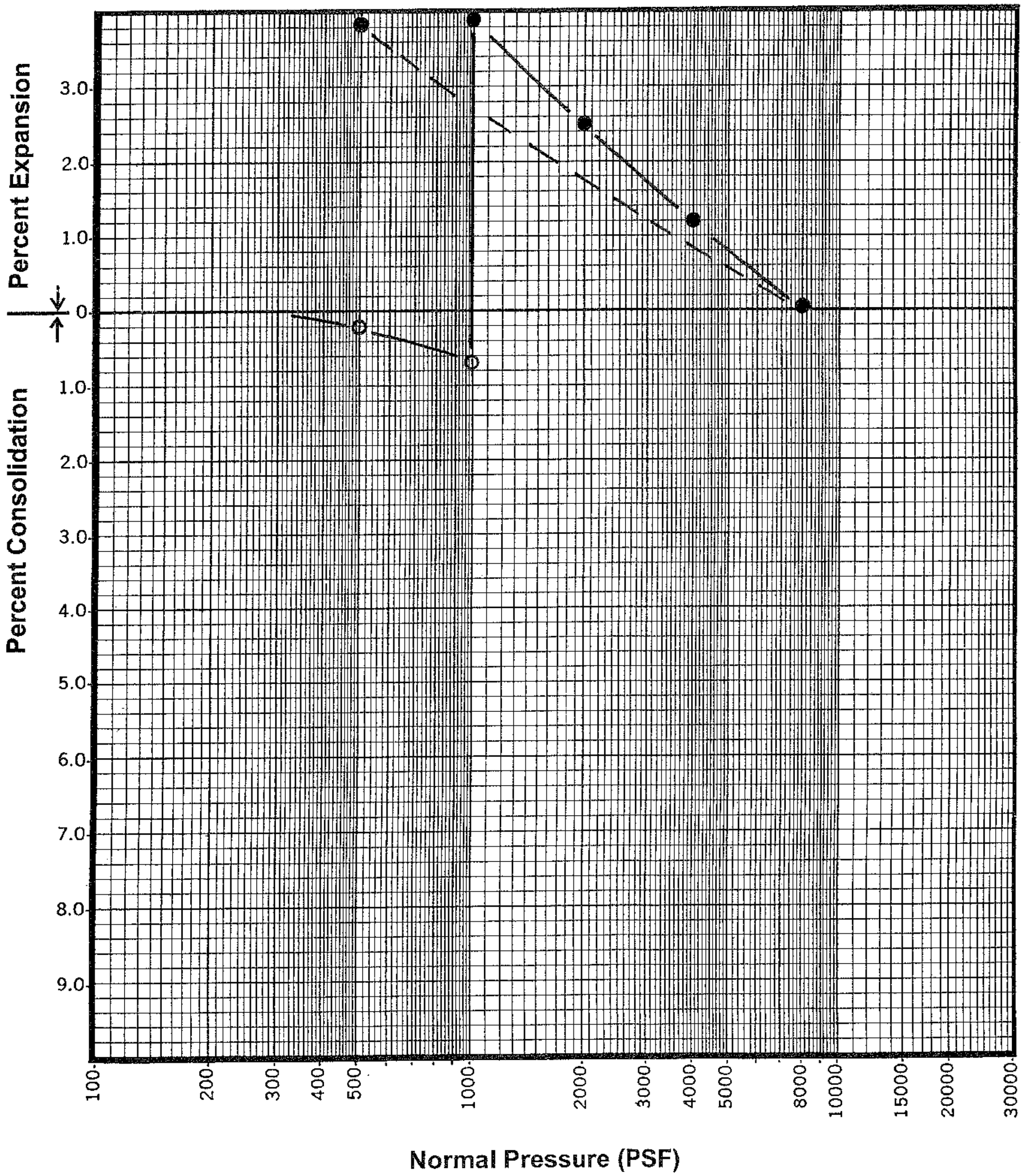
SHEARFORM #1001

GORIAN & ASSOCIATES, INC.

Work Order No.: 2232-0-10

Load Consolidation Results

B-1 @ 3'



○ Field Moisture

● Effect of Adding Moisture

---- Rebound

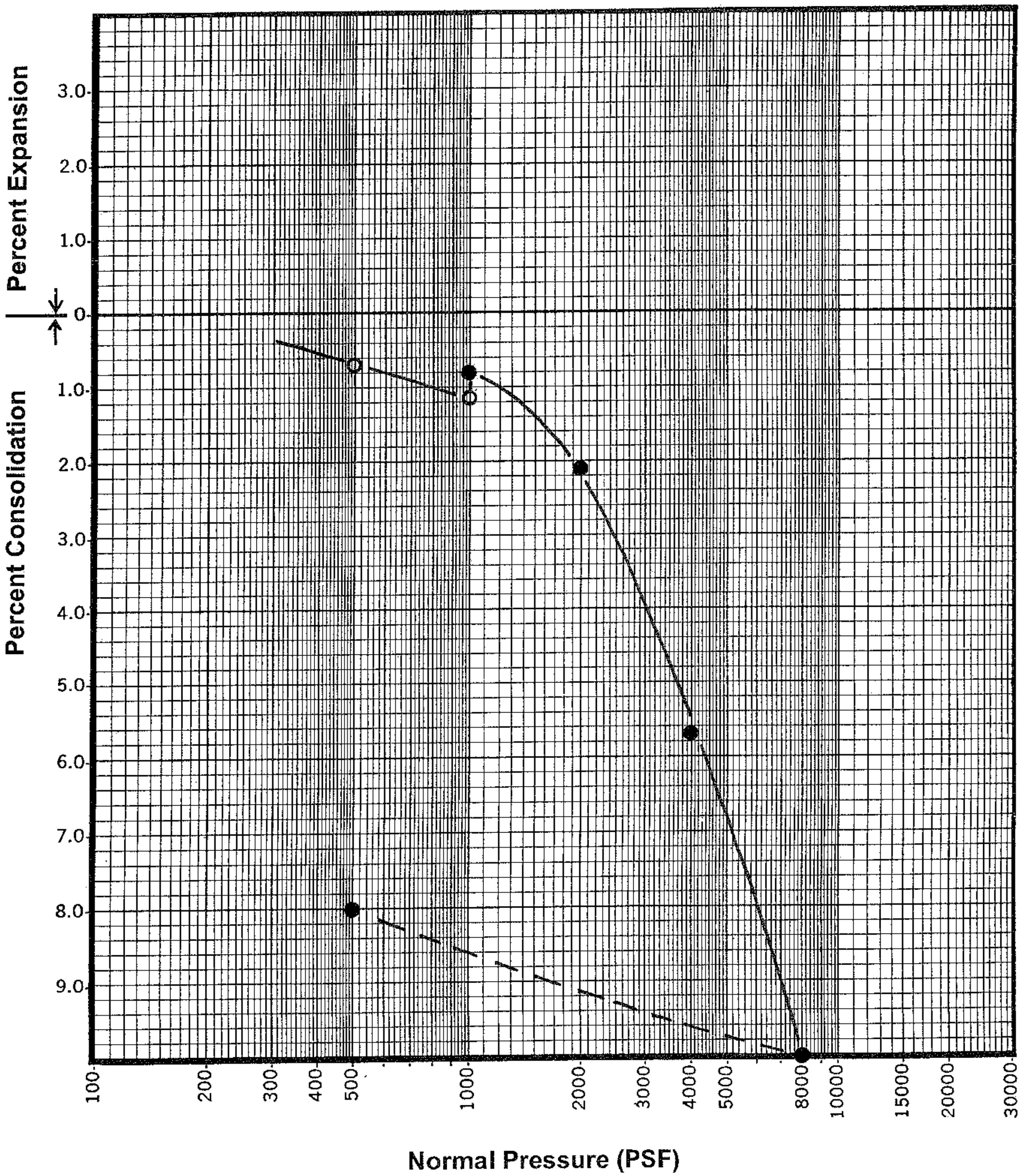
CONSOLIDATION #1002

GORIAN & ASSOCIATES, INC

Work Order No.: 2232-0-10

Load Consolidation Results

B-1 @ 10'



○ Field Moisture

● Effect of Adding Moisture

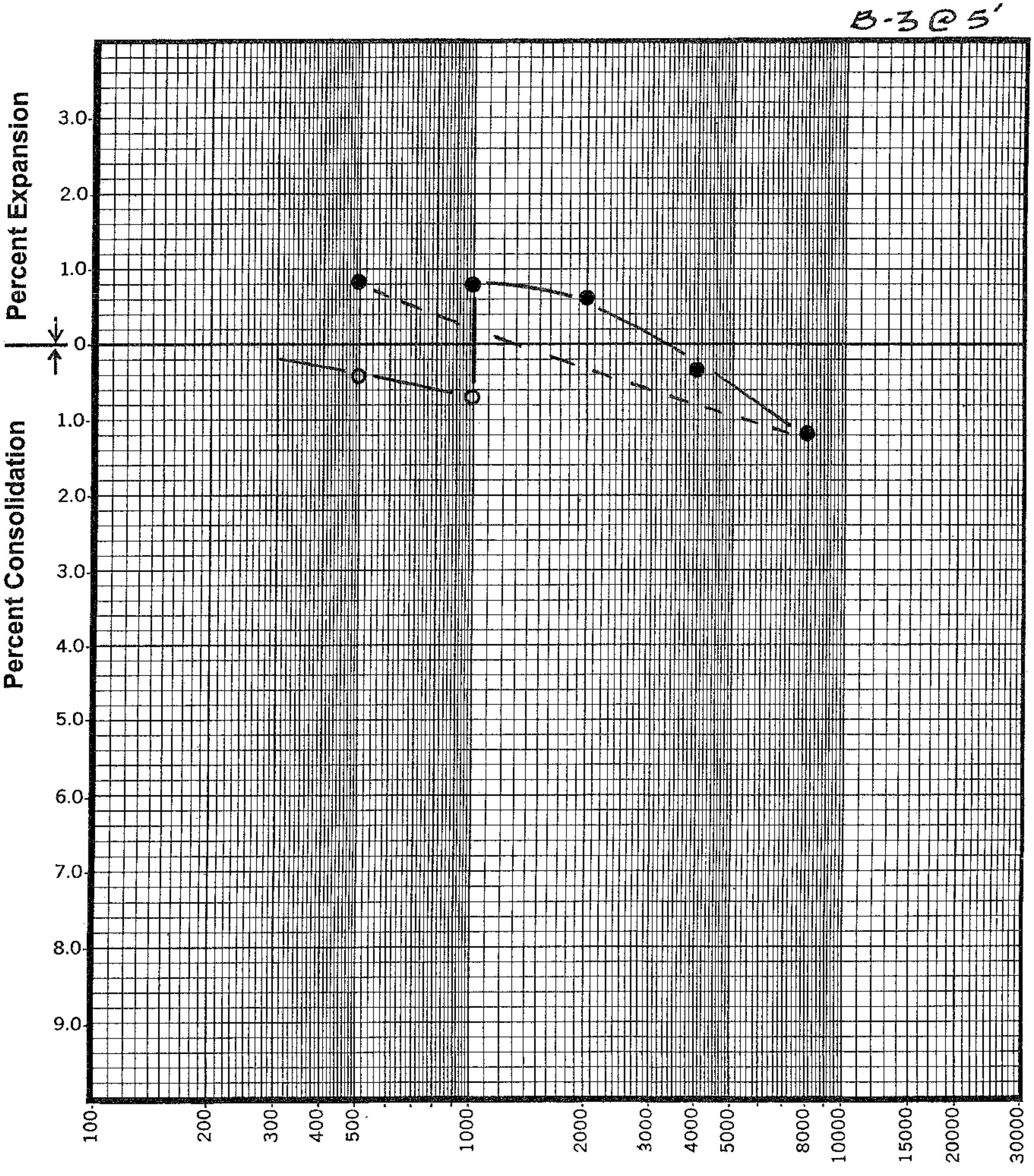
- - - - Rebound

CONSOLIDATION #1002

GORIAN & ASSOCIATES, INC.

Work Order No.: 2232-0-10

Load Consolidation Results



○ Field Moisture

● Effect of Adding Moisture

---- Rebound

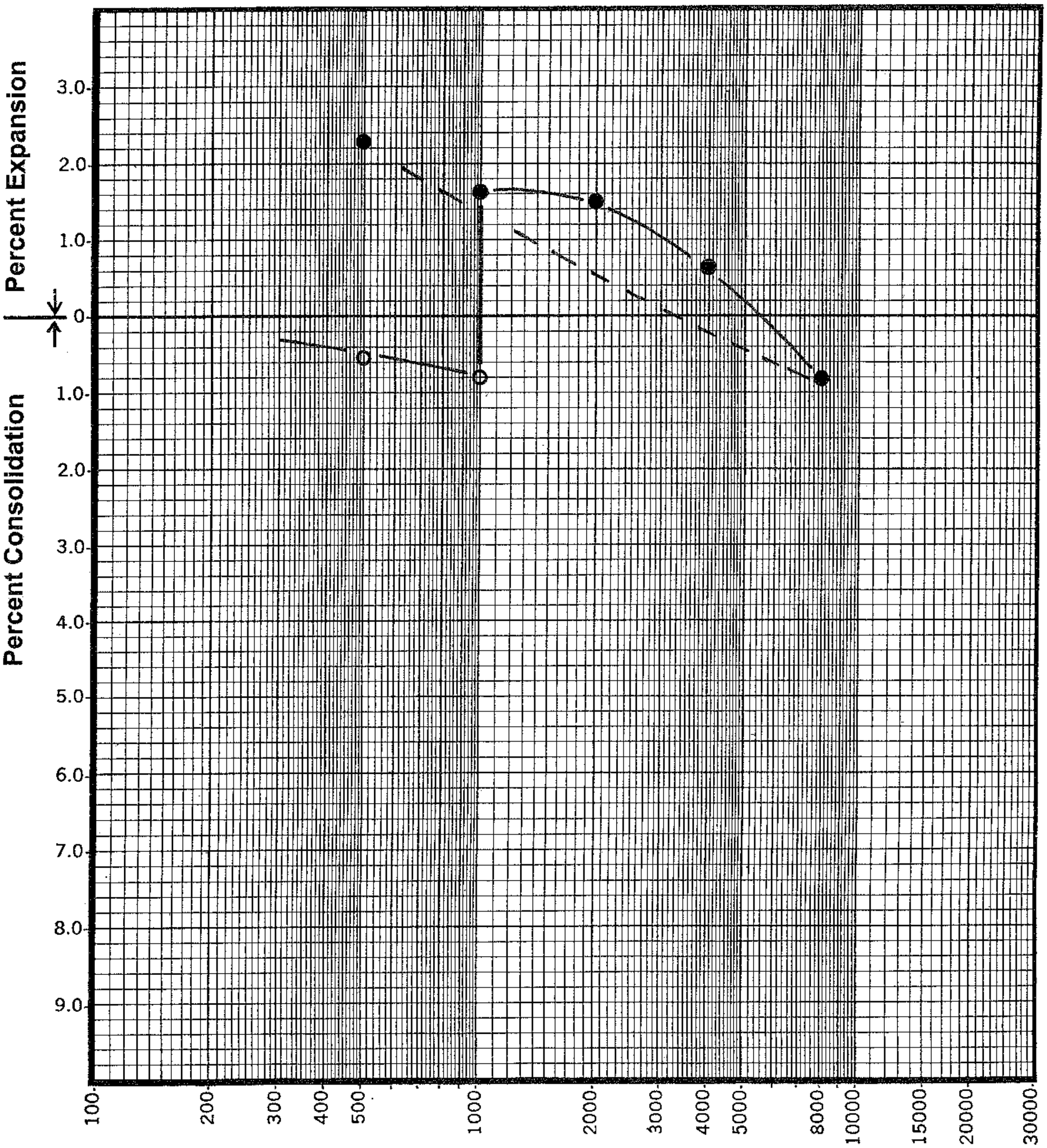
CONSOLIDATION #1002

GORIAN & ASSOCIATES, INC

Work Order No.: 2232-0-10

Load Consolidation Results

B-4 @ 5'



○ Field Moisture

● Effect of Adding Moisture

---- Rebound

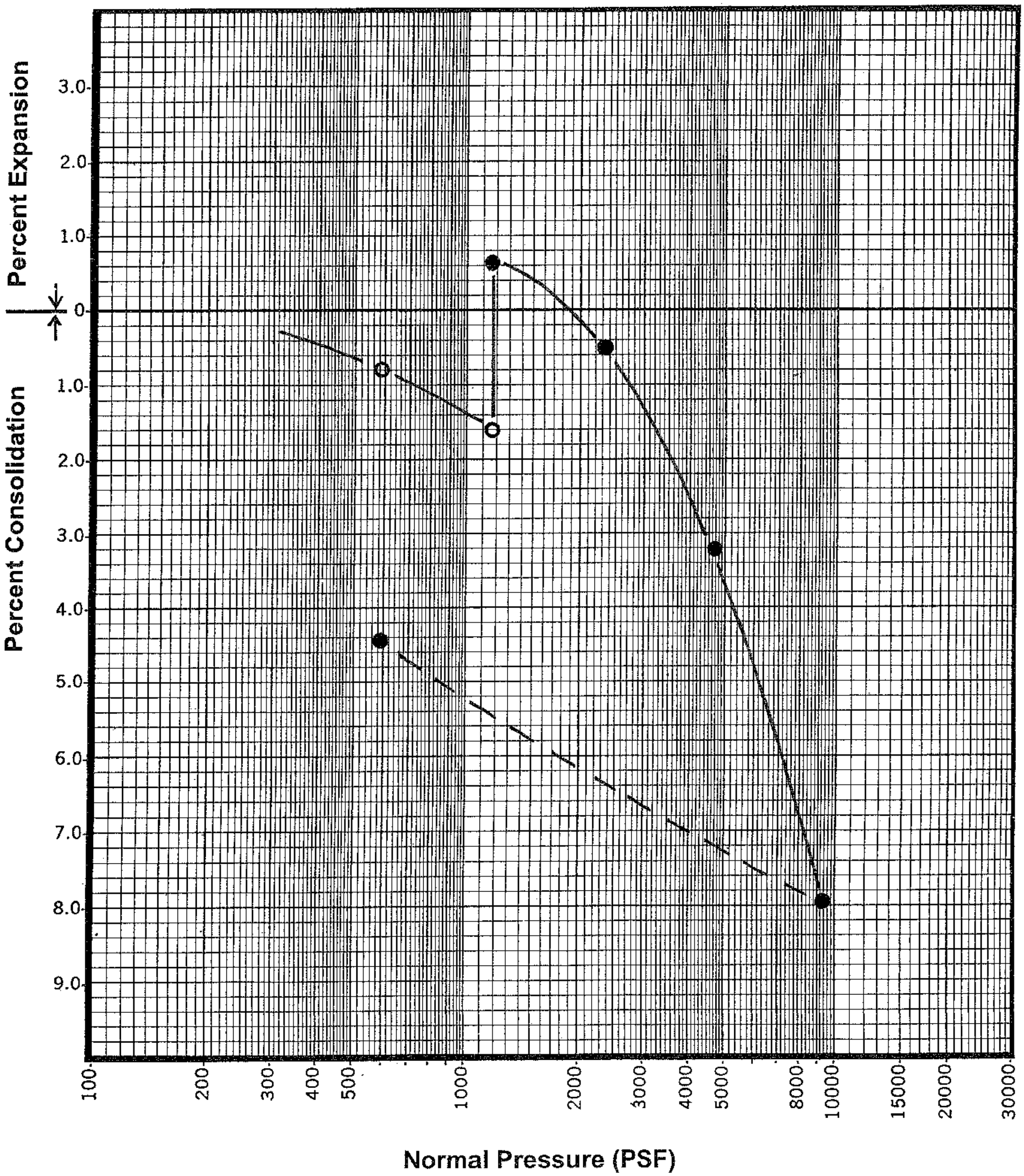
CONSOLIDATION #1002

GORIAN & ASSOCIATES, INC

Work Order No.: 2232-0-10

Load Consolidation Results

B-5 @ 3'



○ Field Moisture

● Effect of Adding Moisture

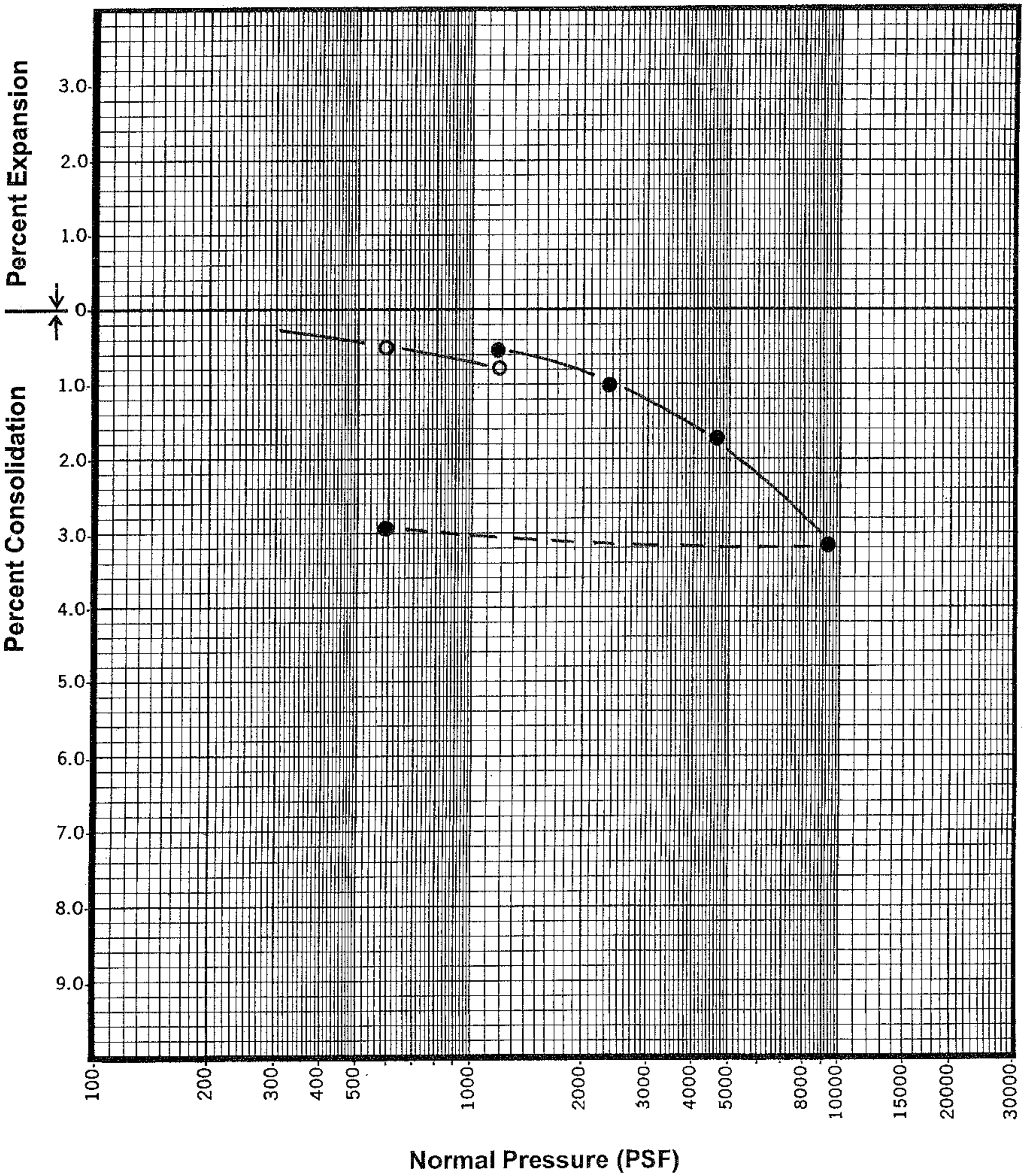
---- Rebound

CONSOLIDATION #1002

Work Order No.: 2232-0-10

Load Consolidation Results

B-6 @ 5'



○ Field Moisture

● Effect of Adding Moisture

---- Rebound

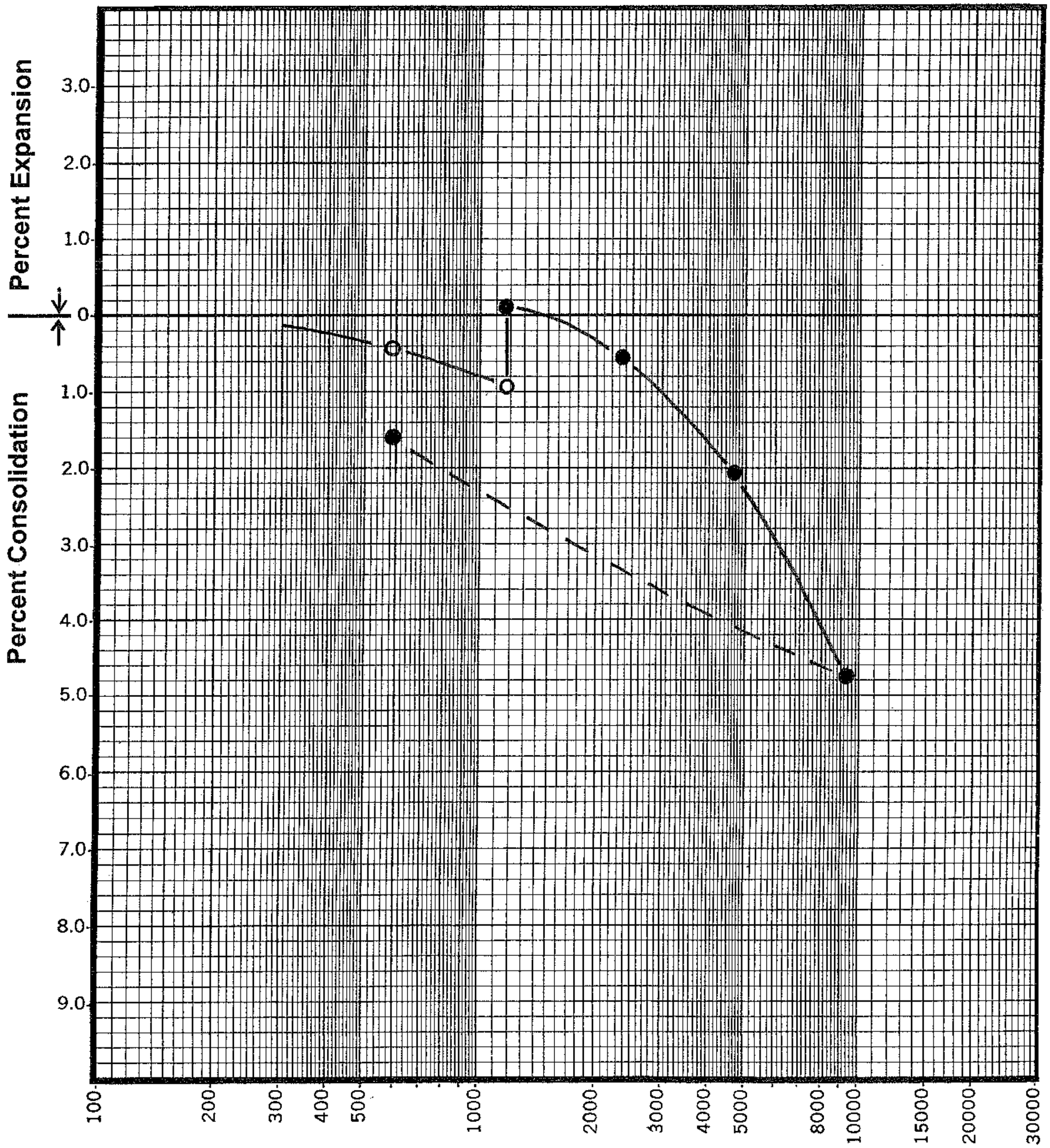
CONSOLIDATION #1002

GORIAN & ASSOCIATES, INC

Work Order No.: 2232-0-10

Load Consolidation Results

B-7 @ 10'



○ Field Moisture

● Effect of Adding Moisture

- - - - Rebound

CONSOLIDATION #1002

ConCeCo Engineering, Inc.

2160 Winifred Street
Mail: P.O. Box 115
Simi Valley, CA 93062

Date: April 21, 1999

APR 26 1999

Gorian Associates, Inc.
Attention: Randy Wendt
766 Lakefield Road Suite A
Westlake Village, CA 91361

Job No.: 1S99028

Subject: Soil Chemistry Analysis for Gorian Job # 2232-1-10 - 4 Samples

Dear Mr. Wendt:

Soil Chemistry Analysis for the above referenced samples are provided below.

Lot Number	[1]Minimum Resistivity (ohm-cm)	[2]pH	[3]Sulfate (mg/kg)	[3]Chloride (mg/kg)	(As Rec'd) Description
B2 @ 3'	1560	6.78	79	86	Brown clayey silt, dry
B3 @ 3'	1120	6.98	75	86	Dark brown lean clay, dry
B5 @ 1'	700	6.54	313	95	Dark brown dense clay, moist
B7 @ 1'	1160	6.21	53	90	Dark brown silty clay, dry

NOTE: SAMPLES WERE ANALYZED IN ACCORDANCE WITH THE FOLLOWING METHODS.
1. MINIMUM RESISTIVITY DETERMINED BY SOIL BOX METHOD, (PER ASTM G-57)
2. PH MEASURED BY POTENTIOMETRIC METHOD USING STANDARD ELECTRODES. (PER CAL TRANS. #643)
3. CHLORIDE AND SULFATE WERE ANALYZED IN ACCORDANCE WITH EPA METHODS FOR CHEMICAL ANALYSIS FOR WATER AND WASTE, NO. 300 EPA-600/4-79-020. CONCENTRATION BY WEIGHT OF DRY SOIL.

Comments:

1. *Type II modified Portland Cement is recommended for concrete products.*
2. *Soils are corrosive to uncoated ferrous metals.*
3. *Copper pipe should be encased with a minimum of 3" of sand.*
4. *Hot and cold water copper pipes require special procedures when installed under concrete floor slabs. Electrical isolation from structural concrete such as footing and steel reinforcing wire or bars in the floor slab should be maintained to prevent future corrosion. We recommend overhead plumbing as the most effective method of preventing corrosion.*

Please call if you have any questions.

Very truly yours,
ConCeCo Engineering, Inc.

Roger J. Carlsen, P.E.

RJC:ch

Atlantic Consultants
112 Bunker Court
Folsom, CA 95630
(ph) 916.849.6420 (fax) 916.983.1838
Kerri@AtlanticCorrosionEngineers.com
corrprincess@ardennet.com
www.AtlanticCorrosionEngineers.com

July 1, 2013

Gorian and Associates, Inc.
Attention: Sheryl N. Shatz
Thousand Oaks, CA 91320

Atlantic Job No.: 2013-013

Subject: Soil Chemistry Analysis for Gorian Job # Soil Chemistry Analysis for Gorian Job #2232-FR-0-100
Fortune Realty, Agoura Equestrian Estates, 4 Samples (C-1, C-2, C-3 and C-4)

Sample Number	As Rec'd Resistivity (ohm-cm)	[1]Minimum Resistivity (ohm-cm)	[2] Ph	[3] Sulfate %	[3] Chloride %	[4] Ammonia %	[5] Keldahl Nitrogen %	(As Rec'd) Description
C-1	68,000	4,800	7.45	0.0089	<0.0005	<0.0010	0.0303	Med. Brn. Dry
C-2	920,000	1,120	6.95	0.0110	<0.0005	<0.0010	0.0680	Med. Brn. Dry, gravely
C-3	168,000	1,640	6.51	0.0005	0.0002	<0.0010	0.0588	Ned, brn. Moist
C-4	840,000	880	6.68	0.0031	<0.0005	<0.0010	0.0688	Med. Brn. Dry, gravely

NOTE: SAMPLES WERE ANALYZED IN ACCORDANCE WITH THE FOLLOWING METHODS.

1. MINIMUM RESISTIVITY DETERMINED BY SOIL BOX METHOD, (PER ASTM G-57)
2. PH MEASURED BY POTENTIOMETRIC METHOD USING STANDARD ELECTRODES. (PER CAL TRANS. #643)
3. CHLORIDE AND SULFATE WERE ANALYZED IN ACCORDANCE WITH EPA METHODS FOR CHEMICAL ANALYSIS FOR WATER AND WASTE, NO. 300 EPA-600/4-79-020. CONCENTRATION BY WEIGHT OF DRY SOIL.
4. AMMONIA WAS ANALYZED IN ACCORDANCE WITH EPA METHOD 350.2
5. KELDAHL NITROGEN WAS ANALYZED IN ACCORDANCE WITH EPA METHOD 351.2

CONCLUSIONS:

Material	**Corrosion Class**	**Recommendation**
Concrete	Negligible for sulfate and chloride exposure. pH is neutral to slightly basic. (ACI 318)	-Type II Portland cement for concrete with maximum water cement ratio of 0.50 and a minimum of 3 inches of cover for steel reinforcement. - It is recommended that an impermeable moisture barrier (6 mil visqueen) be installed between concrete slabs and soil to reduce penetration of moisture and sulfates from the soil into concrete slabs.
Steel Cast/Ductile Iron Mortar Coated Steel	Corrosive to Mildly corrosive	- Install corrosion monitoring and cathodic protection for buried ferrous metal structures and piping. - Install joint bonds on all non-welded joints on buried metallic piping to facilitate corrosion monitoring and effectiveness of a cathodic protection system. - Electrically isolate underground metal piping from above grade piping and other metallic structures. - Use separate ground rods for grounding interior piping.
Copper Piping	Corrosive.	- Overhead plumbing is the most effective method of corrosion control. - Copper pipe is subject to corrosion when exposed to even trace amounts of ammonia. - Electrical isolation between hot and cold water lines and between structural steel should be maintained.

APPENDIX C

SLOPE STABILITY ANALYSES

Geotechnical sections have been prepared, using geologic data, through natural slopes within and adjacent proposed development areas. A discussion of each of the analyze sections, results of the analyses, and proposed remedial grading solutions as necessary are presented below.

Our analyses considered postulated planar and rotational type failures within the natural and graded slopes. The material strengths for the bedrock were developed using information from our laboratory direct shear testing of both undisturbed and remolded samples.

The undisturbed samples were saturated and sheared to develop cross-bedding strengths. Bulk samples were remolded to field densities, saturated, precut along the plane to be sheared, and sheared repeatedly to develop residual along-bedding strengths. The strengths used in our slope stability analyses are provided below:

Earth Material	Ultimate Cohesion (psf)	Ultimate Friction Angle (deg)
Calabasas Formation – Across Bedding	400	36
Modelo Formation – Across Bedding	400	36
Slide Plane and Along Bedding	400	8
Engineered Fill	400	30

The strengths used in our analyses are based upon the materials encountered in our subsurface exploration. Both static analyses and pseudostatic analyses were completed using the ultimate strengths.

Planar failures were evaluated utilizing Janbu's method. This method divides the postulated failure mass into a series of slices. Interslice forces are not taken into account. The analyses utilized anisotropic soil parameters as previously discussed. Numerous trial surfaces were analyzed for each section. Slope stability is commonly stated in terms of calculated factor of safety. The surfaces analyzed are presented graphically. The ten trial surfaces with the lowest factors of safety are presented graphically and listed in our computer output files. Stability results are listed below and analyses are shown on the attached calculation sheets.

The generally accepted lower limit for factor of safety is 1.5 and 1.1 for static and pseudostatic conditions, respectively. Where calculated factors of safety are less than the accepted lower limit, remedial measures were analyzed.

Section A-A'
This section is oriented approximately north-south and includes a portion of the east-west ridge along the south side of the property. A rotational analysis was conducted for this section. The results of the analyses indicate that the critical factor of safety is greater than 1.5 and 1.1 for static and pseudostatic conditions, respectively.

Section C-C'

The slide plane, as observed in boring B-10, is shallow and dips at a low angle (~5°). In the analyses, the slide was limited to a thickness of approximately 10 feet based on the subsurface data and geomorphic expression of the slope face.

This section portrays the slope in the direction of the landslide movement and represents the worst case scenario. The landslide was modeled as both a shallow planner and rotational failure. All materials above the slide plane were assumed to have the weakened residual clay strength (400 psf and 8°). A buttress is recommended with a minimum width of 30 feet. Construction recommendations are contained in the report text. Because the buttress will be constructed with drainage measures in place, the stability analyses were completed by assuming zero pore pressures in the buttress fill. The location of the buttress should be substantially as shown on Cross Section C and should extend laterally across the width of the landslide. Analyses of the slope following the proposed remedial measures indicate the factors of safety are above the minimum required.

WO 2232-0-FR-100 Section A-A'

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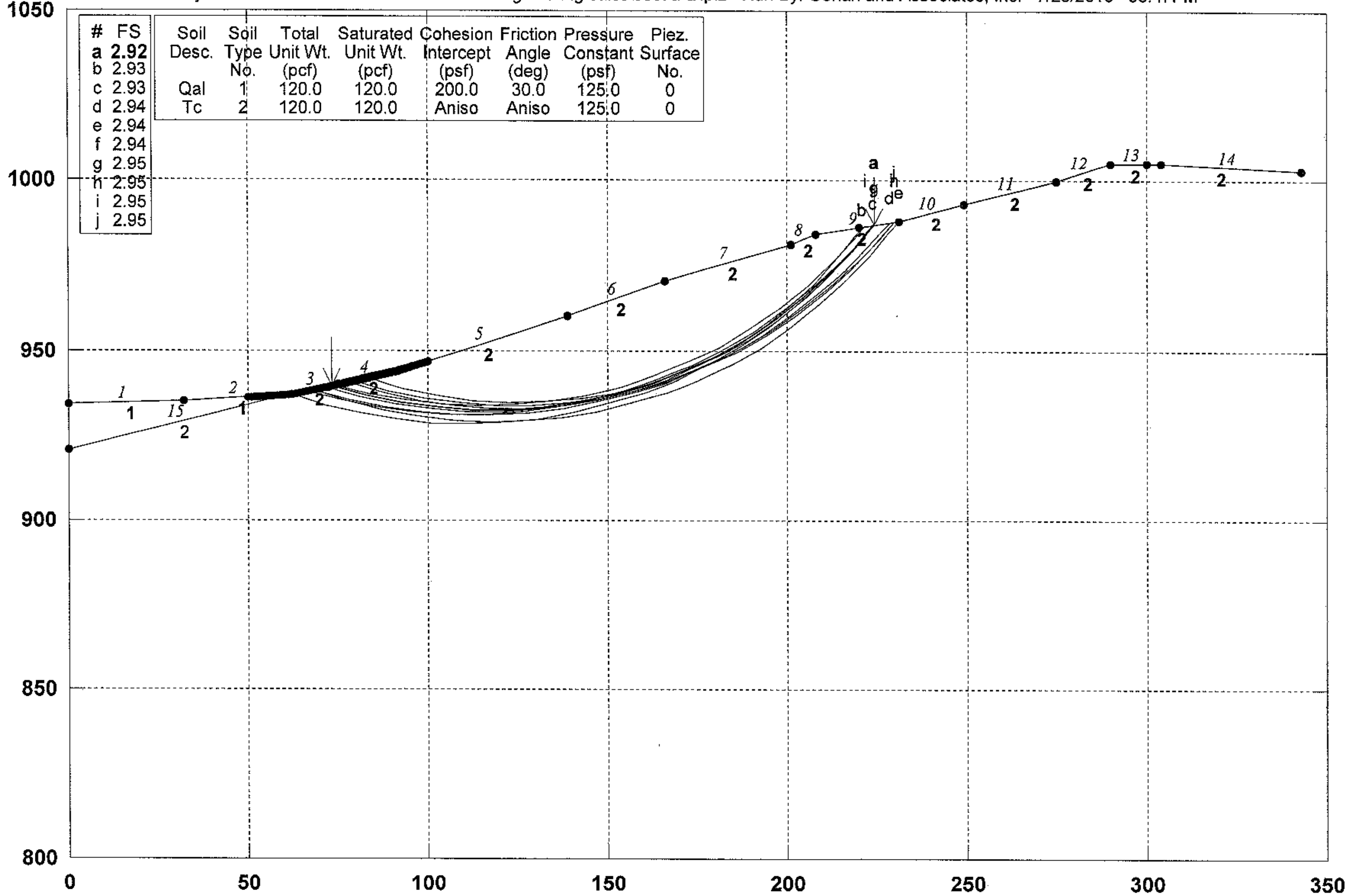

#	FS
a	**2.92**
b	2.93
c	2.93
d	2.94
e	2.94
f	2.94
g	2.95
h	2.95
i	2.95
j	2.95

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pressure Constant (psf)	Piez. Surface No.
Qal	1	120.0	120.0	200.0	30.0	125.0	0
Tc	2	120.0	120.0	Aniso	Aniso	125.0	0

GSTABL7 v.2 FSmin=2.92

Safety Factors Are Calculated By The Modified Bishop Method

GSTABL7

*** **GSTABL7** ***

** GSTABL7 by Garry H. Gregory, P.E. **

** Original Version 1.0, January 1996; Current Version 2.005, Sept. 2006 **

****

SLOPE STABILITY ANALYSIS SYSTEM

Modified Bishop, Simplified Janbu, or GLE Method of Slices.
(Includes Spencer & Morgenstern-Price Type Analysis)
Including Pier/Pile, Reinforcement, Soil Nail, Tieback,
Nonlinear Undrained Shear Strength, Curved Phi Envelope,
Anisotropic Soil, Fiber-Reinforced Soil, Boundary Loads, Water
Surfaces, Pseudo-Static & Newmark Earthquake, and Applied Forces.

****

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Unit System: English
Plotted Output Filename: Y:\2232 Heschel West School\2232-0-FR engineering calcs\Sect A-A'.PLT
PROBLEM DESCRIPTION: WO 2232-0-FR-100
Section A-A'

BOUNDARY COORDINATES
14 Top Boundaries
15 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	0.00	934.00	32.00	935.00	1
2	32.00	935.00	62.00	937.00	1
3	62.00	937.00	75.00	940.00	2
4	75.00	940.00	92.00	944.00	2
5	92.00	944.00	139.00	960.00	2
6	139.00	960.00	166.00	970.00	2
7	166.00	970.00	201.00	981.00	2
8	201.00	981.00	208.00	984.00	2
9	208.00	984.00	231.00	988.00	2
10	231.00	988.00	249.00	993.00	2
11	249.00	993.00	275.00	1000.00	2
12	275.00	1000.00	290.00	1005.00	2
13	290.00	1005.00	304.00	1005.00	2
14	304.00	1005.00	343.00	1003.00	2
15	0.00	921.00	62.00	937.00	2

User Specified Y-Origin = 800.00(ft)
Default X-Plus Value = 0.00(ft)
Default Y-Plus Value = 0.00(ft)

ISOTROPIC SOIL PARAMETERS
2 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	120.0	120.0	200.0	30.0	0.00	125.0	0
2	120.0	120.0	400.0	36.0	0.00	125.0	0

ANISOTROPIC STRENGTH PARAMETERS
1 soil type(s)
Soil Type 2 Is Anisotropic
Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	39.0	400.00	36.00
2	52.0	400.00	8.00
3	90.0	400.00	36.00

ANISOTROPIC SOIL NOTES:
(1) An input value of 0.01 for C and/or Phi will cause Aniso

C and/or Phi to be ignored in that range.
(2) An input value of 0.02 for Phi will set both Phi and C equal to zero, with no water weight in the tension crack.
(3) An input value of 0.03 for Phi will set both Phi and C equal to zero, with water weight in the tension crack.

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Circular Surfaces, Has Been Specified.
5000 Trial Surfaces Have Been Generated.
100 Surface(s) Initiate(s) From Each Of 50 Points Equally Spaced Along The Ground Surface Between X = 50.00(ft) and X = 100.00(ft)
Each Surface Terminates Between X = 220.00(ft) and X = 300.00(ft)
Unless Further Limitations Were Imposed, The Minimum Elevation At Which A Surface Extends Is Y = 0.00(ft)
10.00(ft) Line Segments Define Each Trial Failure Surface.
Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Evaluated. They Are Ordered - Most Critical First.
* * Safety Factors Are Calculated By The Modified Bishop Method * *
Total Number of Trial Surfaces Attempted = 5000
Number of Trial Surfaces With Valid FS = 5000
Statistical Data On All Valid FS Values:
FS Max = 4.984 FS Min = 2.922 FS Ave = 3.517
Standard Deviation = 0.381 Coefficient of Variation = 10.83 %
Failure Surface Specified By 18 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	73.469	939.647
2	83.044	936.762
3	92.808	934.603
4	102.707	933.181
5	112.684	932.504
6	122.684	932.577
7	132.650	933.398
8	142.527	934.963
9	152.258	937.263
10	161.791	940.286
11	171.070	944.015
12	180.043	948.427
13	188.661	953.500
14	196.875	959.203
15	204.639	965.506
16	211.909	972.372
17	218.644	979.764
18	224.158	986.810

Circle Center At X = 116.716 ; Y = 1065.783 ; and Radius = 133.344
Factor of Safety
*** 2.922 ***
Individual data on the 23 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	1.5	74.8	0.0	199.8	0.	0.	0.0	0.0	0.0
2	8.0	2869.3	0.0	1050.2	0.	0.	0.0	0.0	0.0
3	9.0	7710.2	0.0	1146.5	0.	0.	0.0	0.0	0.0
4	0.8	916.3	0.0	103.5	0.	0.	0.0	0.0	0.0
5	9.9	14334.6	0.0	1250.0	0.	0.	0.0	0.0	0.0
6	10.0	19755.3	0.0	1250.0	0.	0.	0.0	0.0	0.0
7	10.0	24243.0	0.0	1250.0	0.	0.	0.0	0.0	0.0
8	10.0	27691.9	0.0	1250.0	0.	0.	0.0	0.0	0.0
9	6.4	19064.4	0.0	803.7	0.	0.	0.0	0.0	0.0
10	3.5	10990.1	0.0	446.3	0.	0.	0.0	0.0	0.0
11	9.7	31525.5	0.0	1250.0	0.	0.	0.0	0.0	0.0
12	9.5	31914.8	0.0	1250.0	0.	0.	0.0	0.0	0.0
13	4.2	14188.5	0.0	567.1	0.	0.	0.0	0.0	0.0

14	5.1	16912.4	0.0	682.9	0.	0.	0.0	0.0	0.0
15	9.0	28840.7	0.0	1250.0	0.	0.	0.0	0.0	0.0
16	8.6	25651.9	0.0	1250.0	0.	0.	0.0	0.0	0.0
17	8.2	21745.4	0.0	1250.0	0.	0.	0.0	0.0	0.0
18	4.1	9639.1	0.0	664.1	0.	0.	0.0	0.0	0.0
19	3.6	7751.5	0.0	585.9	0.	0.	0.0	0.0	0.0
20	3.4	6528.3	0.0	577.9	0.	0.	0.0	0.0	0.0
21	3.9	6479.5	0.0	672.1	0.	0.	0.0	0.0	0.0
22	6.7	7433.5	0.0	1250.0	0.	0.	0.0	0.0	0.0
23	5.5	2013.7	0.0	1118.4	0.	0.	0.0	0.0	0.0

Failure Surface Specified By 18 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	78.571	940.840
2	88.032	937.601
3	97.732	935.169
4	107.602	933.563
5	117.573	932.794
6	127.572	932.866
7	137.530	933.781
8	147.376	935.530
9	157.040	938.102
10	166.452	941.479
11	175.547	945.636
12	184.260	950.544
13	192.529	956.168
14	200.294	962.469
15	207.502	969.400
16	214.100	976.914
17	220.043	984.957
18	220.827	986.231

Circle Center At X = 121.707 ; Y = 1051.265 ; and Radius = 118.551

Factor of Safety

*** 2.929 ***

Failure Surface Specified By 20 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	62.245	937.057
2	71.754	933.961
3	81.459	931.551
4	91.311	929.839
5	101.261	928.835
6	111.257	928.543
7	121.248	928.965
8	131.183	930.099
9	141.013	931.938
10	150.686	934.474
11	160.153	937.693
12	169.367	941.580
13	178.280	946.113
14	186.847	951.272
15	195.025	957.028
16	202.770	963.352
17	210.045	970.214
18	216.812	977.576
19	223.037	985.403
20	223.979	986.779

Circle Center At X = 110.342 ; Y = 1068.510 ; and Radius = 139.976

Factor of Safety

*** 2.933 ***

Failure Surface Specified By 19 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	68.367	938.469
2	77.955	935.626
3	87.716	933.454
4	97.604	931.964

5	107.572	931.163
6	117.572	931.056
7	127.554	931.641
8	137.473	932.918
9	147.278	934.878
10	156.925	937.514
11	166.365	940.813
12	175.554	944.758
13	184.448	949.330
14	193.002	954.508
15	201.178	960.267
16	208.934	966.579
17	216.235	973.413
18	223.044	980.737
19	228.571	987.578

Circle Center At X = 114.125 ; Y = 1075.170 ; and Radius = 144.155

Factor of Safety

*** 2.935 ***

Failure Surface Specified By 20 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	68.367	938.469
2	77.806	935.165
3	87.460	932.558
4	97.278	930.661
5	107.209	929.486
6	117.199	929.037
7	127.195	929.318
8	137.144	930.327
9	146.993	932.058
10	156.690	934.503
11	166.182	937.648
12	175.420	941.476
13	184.354	945.968
14	192.938	951.100
15	201.124	956.843
16	208.869	963.168
17	216.133	970.041
18	222.877	977.425
19	229.065	985.281
20	230.889	987.981

Circle Center At X = 118.342 ; Y = 1065.923 ; and Radius = 136.901

Factor of Safety

*** 2.940 ***

Failure Surface Specified By 17 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	83.673	942.041
2	93.189	938.966
3	102.928	936.697
4	112.823	935.250
5	122.804	934.636
6	132.802	934.859
7	142.745	935.917
8	152.566	937.803
9	162.195	940.504
10	171.563	944.000
11	180.607	948.267
12	189.262	953.276
13	197.469	958.991
14	205.168	965.372
15	212.307	972.374
16	218.835	979.949
17	223.763	986.741

Circle Center At X = 125.143 ; Y = 1054.095 ; and Radius = 119.482

Factor of Safety

*** 2.944 ***

Failure Surface Specified By 19 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	66.327	937.998
2	75.964	935.332
3	85.762	933.332
4	95.674	932.008
5	105.654	931.367
6	115.654	931.411
7	125.627	932.141
8	135.527	933.553
9	145.307	935.639
10	154.921	938.392
11	164.323	941.796
12	173.470	945.837
13	182.319	950.496
14	190.827	955.750
15	198.956	961.575
16	206.666	967.943
17	213.921	974.825
18	220.688	982.188
19	224.421	986.856

Circle Center At X = 110.007 ; Y = 1077.114 ; and Radius = 145.812

Factor of Safety

*** 2.946 ***

Failure Surface Specified By 18 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	79.592	941.080
2	89.147	938.130
3	98.898	935.912
4	108.789	934.440
5	118.763	933.723
6	128.763	933.764
7	138.731	934.563
8	148.609	936.116
9	158.342	938.414
10	167.872	941.444
11	177.145	945.188
12	186.107	949.624
13	194.707	954.727
14	202.895	960.467
15	210.624	966.813
16	217.850	973.726
17	224.530	981.167
18	229.598	987.756

Circle Center At X = 123.216 ; Y = 1065.264 ; and Radius = 131.623

Factor of Safety

*** 2.946 ***

Failure Surface Specified By 18 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	74.490	939.882
2	84.140	937.261
3	93.958	935.361
4	103.889	934.192
5	113.880	933.761
6	123.875	934.070
7	133.820	935.117
8	143.661	936.897
9	153.342	939.400
10	162.812	942.612
11	172.019	946.516
12	180.912	951.089
13	189.442	956.309
14	197.563	962.144
15	205.229	968.564

```
   16        212.400      975.534
   17        219.036      983.015
   18        221.590      986.364
Circle Center At X =   114.705 ; Y =  1068.619 ; and Radius =   134.872
       Factor of Safety
      ***    2.946   ***
Failure Surface Specified By 19 Coordinate Points
  Point      X-Surf      Y-Surf
   No.        (ft)        (ft)
    1         71.429     939.176
    2         81.041     936.419
    3         90.821     934.333
    4        100.722     932.928
    5        110.696     932.211
    6        120.696     932.186
    7        130.674     932.852
    8        140.582     934.206
    9        150.372     936.242
   10        159.999     938.951
   11        169.414     942.318
   12        178.575     946.328
   13        187.437     950.963
   14        195.956     956.198
   15        204.094     962.011
   16        211.810     968.372
   17        219.067     975.251
   18        225.832     982.616
   19        229.991     987.824
Circle Center At X =   116.063 ; Y =  1076.652 ; and Radius =   144.541
       Factor of Safety
      ***    2.949   ***
         **** END OF GSTABL7 OUTPUT ****
```

WO 2232-0-FR-100 Section A-A' pseudo-static

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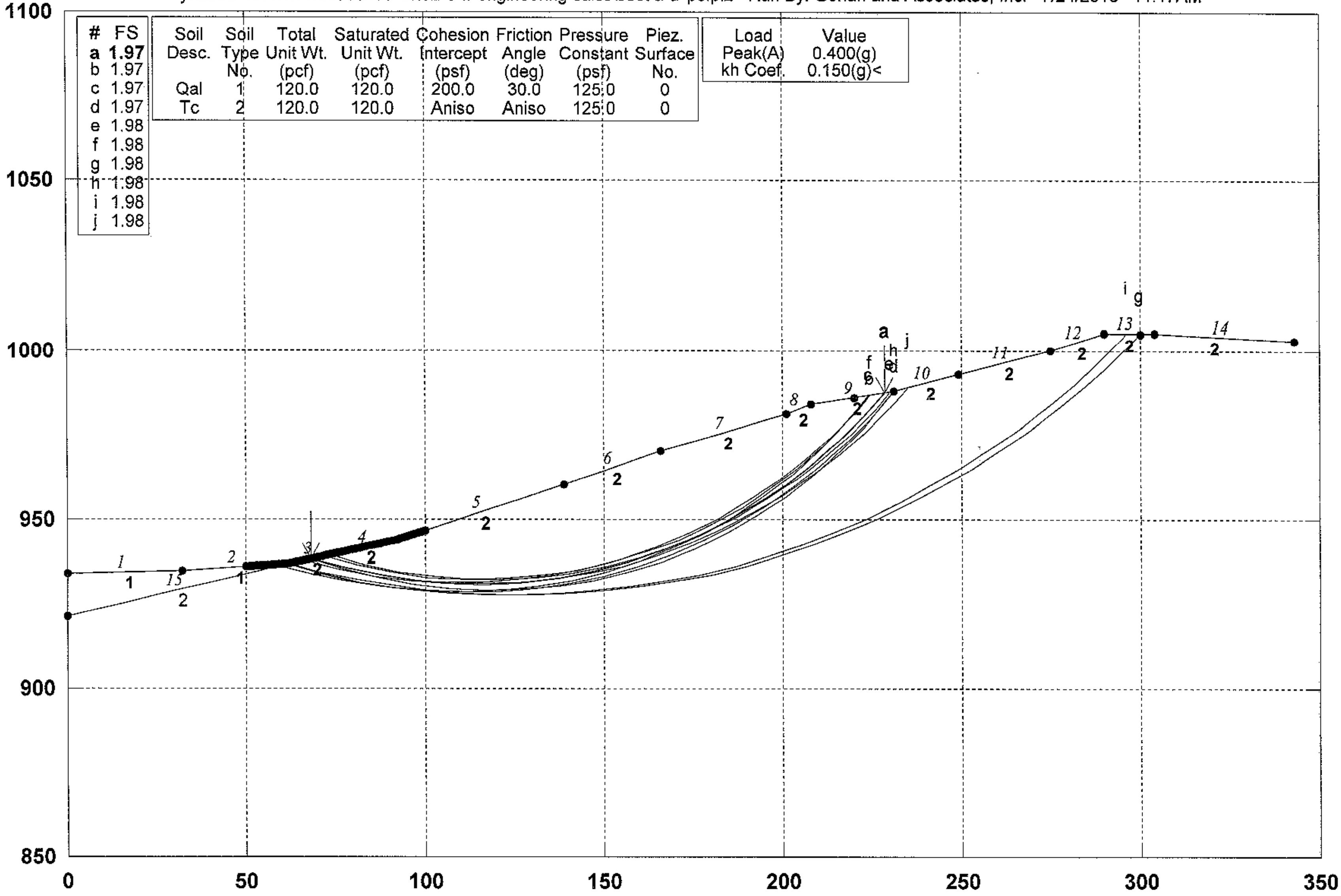

#	FS
a	**1.97**
b	1.97
c	1.97
d	1.97
e	1.98
f	1.98
g	1.98
h	1.98
i	1.98
j	1.98

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pressure Constant (psf)	Piez. Surface No.
Qal	1	120.0	120.0	200.0	30.0	125.0	0
Tc	2	120.0	120.0	Aniso	Aniso	125.0	0

Load	Value
Peak(A)	0.400(g)
kh Coef.	0.150(g)<

GSTABL7 v.2 FSmin=1.97

Safety Factors Are Calculated By The Modified Bishop Method

GSTABL7

*** **GSTABL7** ***

** GSTABL7 by Garry H. Gregory, P.E. **

** Original Version 1.0, January 1996; Current Version 2.005, Sept. 2006 **

****

SLOPE STABILITY ANALYSIS SYSTEM

Modified Bishop, Simplified Janbu, or GLE Method of Slices.
(Includes Spencer & Morgenstern-Price Type Analysis)
Including Pier/Pile, Reinforcement, Soil Nail, Tieback,
Nonlinear Undrained Shear Strength, Curved Phi Envelope,
Anisotropic Soil, Fiber-Reinforced Soil, Boundary Loads, Water
Surfaces, Pseudo-Static & Newmark Earthquake, and Applied Forces.

****

Analysis Run Date: 7/24/2013
Time of Run: 11:17AM
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Unit System: English
Plotted Output Filename: Y:\2232 Heschel West School\2232-0-FR engineering calcs\sect a-a' ps.PLT
PROBLEM DESCRIPTION: WO 2232-0-FR-100
Section A-A' pseudo-static

BOUNDARY COORDINATES
14 Top Boundaries
15 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	0.00	934.00	32.00	935.00	1
2	32.00	935.00	62.00	937.00	1
3	62.00	937.00	75.00	940.00	2
4	75.00	940.00	92.00	944.00	2
5	92.00	944.00	139.00	960.00	2
6	139.00	960.00	166.00	970.00	2
7	166.00	970.00	201.00	981.00	2
8	201.00	981.00	208.00	984.00	2
9	208.00	984.00	231.00	988.00	2
10	231.00	988.00	249.00	993.00	2
11	249.00	993.00	275.00	1000.00	2
12	275.00	1000.00	290.00	1005.00	2
13	290.00	1005.00	304.00	1005.00	2
14	304.00	1005.00	343.00	1003.00	2
15	0.00	921.00	62.00	937.00	2

User Specified Y-Origin = 850.00(ft)
Default X-Plus Value = 0.00(ft)
Default Y-Plus Value = 0.00(ft)

ISOTROPIC SOIL PARAMETERS
2 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	120.0	120.0	200.0	30.0	0.00	125.0	0
2	120.0	120.0	400.0	36.0	0.00	125.0	0

ANISOTROPIC STRENGTH PARAMETERS
1 soil type(s)
Soil Type 2 Is Anisotropic
Number Of Direction Ranges Specified = 3

Direction Range No.	Counterclockwise Direction Limit (deg)	Cohesion Intercept (psf)	Friction Angle (deg)
1	39.0	400.00	36.00
2	52.0	400.00	8.00
3	90.0	400.00	36.00

ANISOTROPIC SOIL NOTES:
(1) An input value of 0.01 for C and/or Phi will cause Aniso

C and/or Phi to be ignored in that range.
(2) An input value of 0.02 for Phi will set both Phi and C equal to zero, with no water weight in the tension crack.
(3) An input value of 0.03 for Phi will set both Phi and C equal to zero, with water weight in the tension crack.

Specified Peak Ground Acceleration Coefficient (A) = 0.400(g)
Specified Horizontal Earthquake Coefficient (kh) = 0.150(g)
Specified Vertical Earthquake Coefficient (kv) = 0.000(g)
Specified Seismic Pore-Pressure Factor = 0.000
A Critical Failure Surface Searching Method, Using A Random Technique For Generating Circular Surfaces, Has Been Specified.
5000 Trial Surfaces Have Been Generated.
100 Surface(s) Initiate(s) From Each Of 50 Points Equally Spaced Along The Ground Surface Between X = 50.00(ft) and X = 100.00(ft)
Each Surface Terminates Between X = 220.00(ft) and X = 300.00(ft)
Unless Further Limitations Were Imposed, The Minimum Elevation At Which A Surface Extends Is Y = 0.00(ft)
10.00(ft) Line Segments Define Each Trial Failure Surface.
Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Evaluated. They Are Ordered - Most Critical First.
* * Safety Factors Are Calculated By The Modified Bishop Method * *
Total Number of Trial Surfaces Attempted = 5000
Number of Trial Surfaces With Valid FS = 5000
Statistical Data On All Valid FS Values:
FS Max = 3.362 FS Min = 1.969 FS Ave = 2.329
Standard Deviation = 0.264 Coefficient of Variation = 11.34 %
Failure Surface Specified By 19 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	68.367	938.469
2	77.955	935.626
3	87.716	933.454
4	97.604	931.964
5	107.572	931.163
6	117.572	931.056
7	127.554	931.641
8	137.473	932.918
9	147.278	934.878
10	156.925	937.514
11	166.365	940.813
12	175.554	944.758
13	184.448	949.330
14	193.002	954.508
15	201.178	960.267
16	208.934	966.579
17	216.235	973.413
18	223.044	980.737
19	228.571	987.578

Circle Center At X = 114.125 ; Y = 1075.170 ; and Radius = 144.155
Factor of Safety
*** 1.969 ***
Individual data on the 24 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	6.6	1392.0	0.0	864.8	0.	0.	208.8	0.0	0.0
2	3.0	1518.7	0.0	385.2	0.	0.	227.8	0.0	0.0
3	9.8	8555.0	0.0	1250.0	0.	0.	1283.3	0.0	0.0
4	4.3	5328.4	0.0	541.6	0.	0.	799.3	0.0	0.0
5	5.6	8451.8	0.0	708.4	0.	0.	1267.8	0.0	0.0
6	10.0	19187.0	0.0	1250.0	0.	0.	2878.1	0.0	0.0
7	10.0	23871.0	0.0	1250.0	0.	0.	3580.7	0.0	0.0
8	10.0	27619.7	0.0	1250.0	0.	0.	4143.0	0.0	0.0

9	9.9	30364.5	0.0	1250.0	0.	0.	4554.7	0.0	0.0
10	1.5	4888.2	0.0	194.7	0.	0.	733.2	0.0	0.0
11	8.3	27301.4	0.0	1055.3	0.	0.	4095.2	0.0	0.0
12	9.6	33171.0	0.0	1250.0	0.	0.	4975.6	0.0	0.0
13	9.1	31820.8	0.0	1201.6	0.	0.	4773.1	0.0	0.0
14	0.4	1284.3	0.0	48.4	0.	0.	192.6	0.0	0.0
15	9.2	31727.8	0.0	1250.0	0.	0.	4759.2	0.0	0.0
16	8.9	29194.7	0.0	1250.0	0.	0.	4379.2	0.0	0.0
17	8.6	25893.6	0.0	1250.0	0.	0.	3884.0	0.0	0.0
18	8.0	21514.7	0.0	1222.8	0.	0.	3227.2	0.0	0.0
19	0.2	444.7	0.0	27.2	0.	0.	66.7	0.0	0.0
20	6.8	15959.9	0.0	1099.4	0.	0.	2394.0	0.0	0.0
21	0.9	2005.1	0.0	150.6	0.	0.	300.8	0.0	0.0
22	7.3	12966.5	0.0	1250.0	0.	0.	1945.0	0.0	0.0
23	6.8	7312.1	0.0	1250.0	0.	0.	1096.8	0.0	0.0
24	5.5	1949.7	0.0	1099.3	0.	0.	292.5	0.0	0.0

Failure Surface Specified By 18 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	73.469	939.647
2	83.044	936.762
3	92.808	934.603
4	102.707	933.181
5	112.684	932.504
6	122.684	932.577
7	132.650	933.398
8	142.527	934.963
9	152.258	937.263
10	161.791	940.286
11	171.070	944.015
12	180.043	948.427
13	188.661	953.500
14	196.875	959.203
15	204.639	965.506
16	211.909	972.372
17	218.644	979.764
18	224.158	986.810

Circle Center At X = 116.716 ; Y = 1065.783 ; and Radius = 133.344

Factor of Safety

*** 1.969 ***

Failure Surface Specified By 20 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	62.245	937.057
2	71.754	933.961
3	81.459	931.551
4	91.311	929.839
5	101.261	928.835
6	111.257	928.543
7	121.248	928.965
8	131.183	930.099
9	141.013	931.938
10	150.686	934.474
11	160.153	937.693
12	169.367	941.580
13	178.280	946.113
14	186.847	951.272
15	195.025	957.028
16	202.770	963.352
17	210.045	970.214
18	216.812	977.576
19	223.037	985.403
20	223.979	986.779

Circle Center At X = 110.342 ; Y = 1068.510 ; and Radius = 139.976

Factor of Safety

*** 1.970 ***

Failure Surface Specified By 20 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	68.367	938.469
2	77.806	935.165
3	87.460	932.558
4	97.278	930.661
5	107.209	929.486
6	117.199	929.037
7	127.195	929.318
8	137.144	930.327
9	146.993	932.058
10	156.690	934.503
11	166.182	937.648
12	175.420	941.476
13	184.354	945.968
14	192.938	951.100
15	201.124	956.843
16	208.869	963.168
17	216.133	970.041
18	222.877	977.425
19	229.065	985.281
20	230.889	987.981

Circle Center At X = 118.342 ; Y = 1065.923 ; and Radius = 136.901

Factor of Safety

*** 1.973 ***

Failure Surface Specified By 19 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	71.429	939.176
2	81.041	936.419
3	90.821	934.333
4	100.722	932.928
5	110.696	932.211
6	120.696	932.186
7	130.674	932.852
8	140.582	934.206
9	150.372	936.242
10	159.999	938.951
11	169.414	942.318
12	178.575	946.328
13	187.437	950.963
14	195.956	956.198
15	204.094	962.011
16	211.810	968.372
17	219.067	975.251
18	225.832	982.616
19	229.991	987.824

Circle Center At X = 116.063 ; Y = 1076.652 ; and Radius = 144.541

Factor of Safety

*** 1.977 ***

Failure Surface Specified By 19 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	66.327	937.998
2	75.964	935.332
3	85.762	933.332
4	95.674	932.008
5	105.654	931.367
6	115.654	931.411
7	125.627	932.141
8	135.527	933.553
9	145.307	935.639
10	154.921	938.392
11	164.323	941.796
12	173.470	945.837
13	182.319	950.496
14	190.827	955.750

15	198.956	961.575
16	206.666	967.943
17	213.921	974.825
18	220.688	982.188
19	224.421	986.856

Circle Center At X = 110.007 ; Y = 1077.114 ; and Radius = 145.812

Factor of Safety

*** 1.977 ***

Failure Surface Specified By 28 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	61.224	936.948
2	70.881	934.349
3	80.640	932.168
4	90.484	930.408
5	100.395	929.074
6	110.353	928.166
7	120.342	927.688
8	130.342	927.639
9	140.334	928.020
10	150.302	928.831
11	160.225	930.070
12	170.085	931.734
13	179.865	933.820
14	189.546	936.325
15	199.111	939.244
16	208.541	942.571
17	217.819	946.301
18	226.929	950.426
19	235.853	954.939
20	244.574	959.831
21	253.077	965.094
22	261.346	970.718
23	269.365	976.692
24	277.121	983.005
25	284.597	989.646
26	291.781	996.602
27	298.660	1003.861
28	299.650	1005.000

Circle Center At X = 126.471 ; Y = 1160.050 ; and Radius = 232.446

Factor of Safety

*** 1.978 ***

Failure Surface Specified By 21 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	61.224	936.948
2	70.752	933.909
3	80.460	931.513
4	90.307	929.769
5	100.248	928.686
6	110.239	928.268
7	120.236	928.517
8	130.194	929.433
9	140.069	931.011
10	149.817	933.243
11	159.393	936.121
12	168.757	939.632
13	177.866	943.758
14	186.679	948.484
15	195.157	953.786
16	203.263	959.642
17	210.961	966.026
18	218.215	972.909
19	224.994	980.260
20	231.268	988.047
21	231.292	988.081

Circle Center At X = 111.502 ; Y = 1078.120 ; and Radius = 149.857

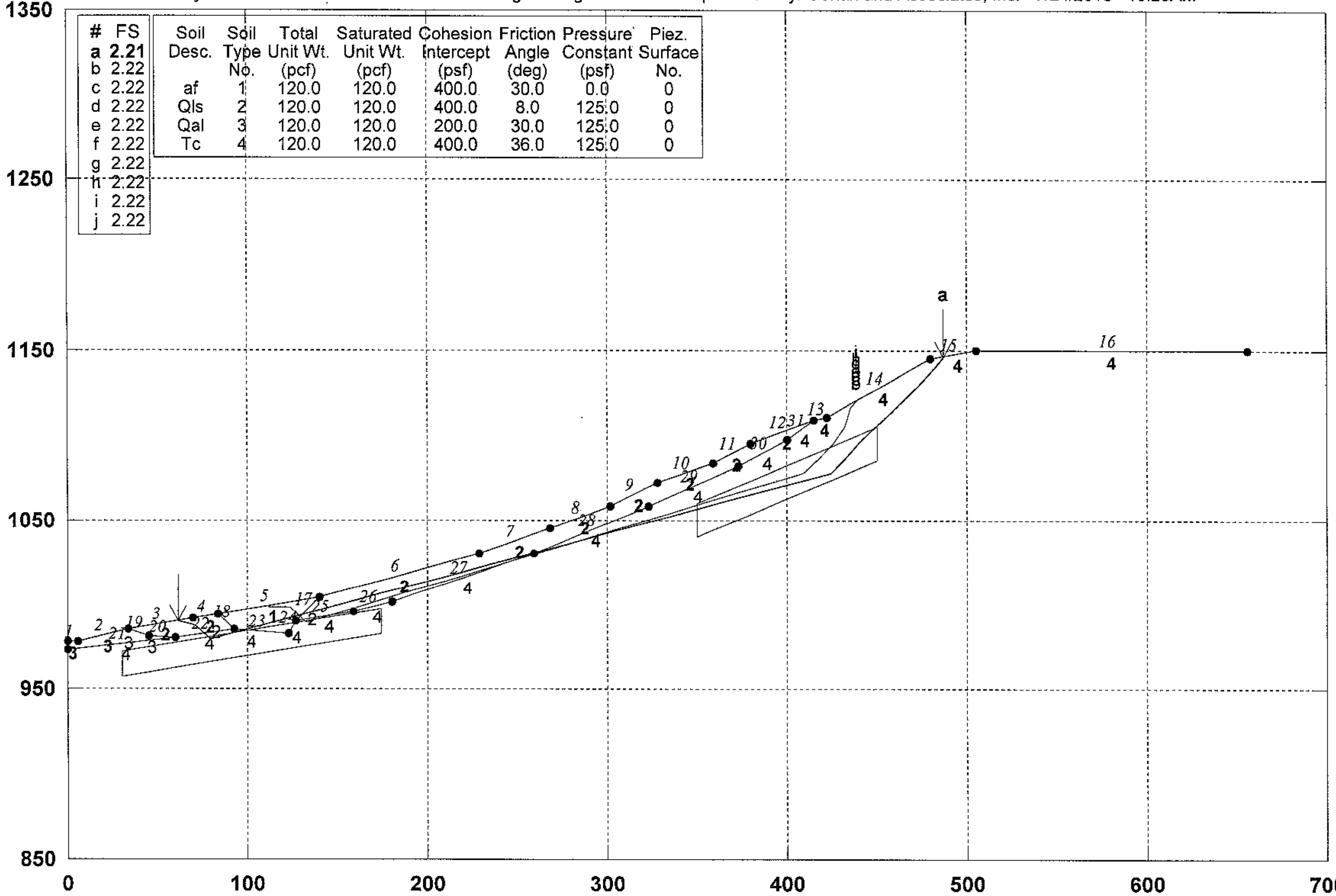
```
       Factor of Safety
      ***    1.979    ***
Failure Surface Specified By 28 Coordinate Points
  Point      X-Surf      Y-Surf
   No.        (ft)        (ft)
    1        58.163     936.744
    2        67.821     934.151
    3        77.582     931.977
    4        87.428     930.227
    5        97.340     928.903
    6       107.299     928.007
    7       117.289     927.542
    8       127.289     927.509
    9       137.281     927.907
   10       147.246     928.736
   11       157.167     929.994
   12       167.024     931.678
   13       176.799     933.787
   14       186.474     936.315
   15       196.031     939.258
   16       205.452     942.611
   17       214.720     946.367
   18       223.817     950.520
   19       232.727     955.061
   20       241.432     959.983
   21       249.916     965.275
   22       258.165     970.928
   23       266.162     976.933
   24       273.892     983.276
   25       281.342     989.947
   26       288.497     996.934
   27       295.343    1004.222
   28       296.013    1005.000
Circle Center At X =   123.063 ; Y =  1159.132 ; and Radius =   231.665
       Factor of Safety
      ***    1.979    ***
Failure Surface Specified By 20 Coordinate Points
  Point      X-Surf      Y-Surf
   No.        (ft)        (ft)
    1        66.327     937.998
    2        75.951     935.283
    3        85.729     933.191
    4        95.622     931.730
    5       105.588     930.907
    6       115.587     930.724
    7       125.576     931.184
    8       135.515     932.283
    9       145.364     934.018
   10       155.081     936.381
   11       164.626     939.362
   12       173.960     942.949
   13       183.045     947.128
   14       191.844     951.881
   15       200.319     957.188
   16       208.436     963.029
   17       216.162     969.378
   18       223.465     976.209
   19       230.315     983.495
   20       234.939     989.094
Circle Center At X =   113.422 ; Y =  1086.339 ; and Radius =   155.637
       Factor of Safety
      ***    1.979    ***
         **** END OF GSTABL7 OUTPUT ****
```

WO 2232-0-FR-100 Section C-C'

y:\2232 heschel west school\2232-0-fr engineering calcs\sect c-c'.pl2 Run By: Gorian and Associates, Inc. 7/24/2013 10:29AM

#	FS
a	**2.21**
b	2.22
c	2.22
d	2.22
e	2.22
f	2.22
g	2.22
h	2.22
i	2.22
j	2.22

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pressure Constant (psf)	Piez. Surface No.
af	1	120.0	120.0	400.0	30.0	0.0	0
Qls	2	120.0	120.0	400.0	8.0	125.0	0
Qal	3	120.0	120.0	200.0	30.0	125.0	0
Tc	4	120.0	120.0	400.0	36.0	125.0	0



GSTABL7 v.2 FSmin=2.21

Safety Factors Are Calculated By The Simplified Janbu Method

GSTABL7

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                         ***  GSTABL7  ***
              ** GSTABL7 by Garry H. Gregory, P.E. **
  ** Original Version 1.0, January 1996; Current Version 2.005, Sept. 2006 **
          (All Rights Reserved-Unauthorized Use Prohibited)
*********************************************************************************
                  SLOPE STABILITY ANALYSIS SYSTEM
        Modified Bishop, Simplified Janbu, or GLE Method of Slices.
        (Includes Spencer & Morgenstern-Price Type Analysis)
        Including Pier/Pile, Reinforcement, Soil Nail, Tieback,
        Nonlinear Undrained Shear Strength, Curved Phi Envelope,
        Anisotropic Soil, Fiber-Reinforced Soil, Boundary Loads, Water
        Surfaces, Pseudo-Static & Newmark Earthquake, and Applied Forces.
*********************************************************************************
   Analysis Run Date:         7/24/2013
   Time of Run:               10:29AM
   Run By:                    Gorian and Associates, Inc.
   Input Data Filename:       y:\2232 Heschel West School\2232-0-FR engineering calcs\sect
c-c'.dat
   Output Filename:           y:\2232 Heschel West School\2232-0-FR engineering calcs\sect
c-c'.OUT
   Unit System:               English
   Plotted Output Filename:   y:\2232 Heschel West School\2232-0-FR engineering calcs\sect
c-c'.PLT
   PROBLEM DESCRIPTION:  WO 2232-0-FR-100
                         Section C-C'
   BOUNDARY COORDINATES
```

16 Top Boundaries
31 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	0.00	978.00	6.00	978.00	3
2	6.00	978.00	34.00	985.00	3
3	34.00	985.00	70.00	992.00	2
4	70.00	992.00	84.00	994.00	2
5	84.00	994.00	140.00	1004.00	1
6	140.00	1004.00	229.00	1030.00	2
7	229.00	1030.00	268.00	1045.00	2
8	268.00	1045.00	302.00	1058.00	2
9	302.00	1058.00	328.00	1072.00	2
10	328.00	1072.00	359.00	1084.00	2
11	359.00	1084.00	380.00	1095.00	2
12	380.00	1095.00	415.00	1109.00	2
13	415.00	1109.00	422.00	1111.00	4
14	422.00	1111.00	480.00	1145.00	4
15	480.00	1145.00	505.00	1150.00	4
16	505.00	1150.00	656.00	1150.00	4
17	127.00	990.00	140.00	1004.00	2
18	84.00	994.00	93.00	985.00	2
19	34.00	985.00	45.00	981.00	3
20	45.00	981.00	60.00	980.00	3
21	0.00	973.00	60.00	980.00	4
22	60.00	980.00	93.00	985.00	4
23	93.00	985.00	123.00	983.00	4
24	123.00	983.00	127.00	990.00	4
25	127.00	990.00	159.00	996.00	4
26	159.00	996.00	180.00	1002.00	4
27	180.00	1002.00	259.00	1030.00	4
28	259.00	1030.00	323.00	1058.00	4
29	323.00	1058.00	373.00	1082.00	4
30	373.00	1082.00	400.00	1098.00	4
31	400.00	1098.00	415.00	1109.00	4

User Specified Y-Origin = 850.00(ft)
Default X-Plus Value = 0.00(ft)
Default Y-Plus Value = 0.00(ft)

ISOTROPIC SOIL PARAMETERS

4 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	120.0	120.0	400.0	30.0	0.00	0.0	0
2	120.0	120.0	400.0	8.0	0.00	125.0	0
3	120.0	120.0	200.0	30.0	0.00	125.0	0
4	120.0	120.0	400.0	36.0	0.00	125.0	0

A Critical Failure Surface Searching Method, Using A Random Technique For Generating Sliding Block Surfaces, Has Been Specified.
5000 Trial Surfaces Have Been Generated.
2 Boxes Specified For Generation Of Central Block Base
Length Of Line Segments For Active And Passive Portions Of Sliding Block Is 12.0

Box No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Height (ft)
1	30.00	965.00	175.00	990.00	15.00
2	350.00	1050.00	450.00	1095.00	20.00

Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Evaluated. They Are Ordered - Most Critical First.
* * Safety Factors Are Calculated By The Simplified Janbu Method * *
Total Number of Trial Surfaces Attempted = 5000
Number of Trial Surfaces With Valid FS = 5000
Statistical Data On All Valid FS Values:
FS Max = 3.587 FS Min = 2.211 FS Ave = 2.716
Standard Deviation = 0.247 Coefficient of Variation = 9.08 %

Failure Surface Specified By 12 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	61.438	990.335
2	70.919	987.850
3	79.445	979.406
4	425.067	1077.822
5	432.963	1086.859
6	440.635	1096.085
7	449.036	1104.655
8	457.442	1113.218
9	465.927	1121.704
10	474.096	1130.494
11	482.328	1139.225
12	487.082	1146.416

Factor of Safety
*** 2.211 ***

Individual data on the 31 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	8.6	2008.3	0.0	1106.4	0.	0.	0.0	0.0	0.0
2	0.9	451.9	0.0	118.8	0.	0.	0.0	0.0	0.0
3	5.4	4788.9	0.0	954.5	0.	0.	0.0	0.0	0.0
4	3.1	4534.5	0.0	545.5	0.	0.	0.0	0.0	0.0
5	4.6	7444.3	0.0	591.9	0.	0.	0.0	0.0	0.0
6	9.0	13845.3	0.0	1169.7	0.	0.	0.0	0.0	0.0
7	4.9	7156.0	0.0	641.6	0.	0.	0.0	0.0	0.0
8	32.8	39644.2	0.0	0.0	0.	0.	0.0	0.0	0.0
9	9.3	8735.3	0.0	1206.1	0.	0.	0.0	0.0	0.0
10	89.0	82022.3	0.0	11567.2	0.	0.	0.0	0.0	0.0
11	33.5	38913.9	0.0	4353.5	0.	0.	0.0	0.0	0.0
12	5.5	7680.0	0.0	715.3	0.	0.	0.0	0.0	0.0
13	34.0	55334.5	0.0	4418.9	0.	0.	0.0	0.0	0.0
14	21.0	45071.5	0.0	2729.3	0.	0.	0.0	0.0	0.0
15	5.0	12710.2	0.0	649.8	0.	0.	0.0	0.0	0.0
16	31.0	87064.4	0.0	4029.0	0.	0.	0.0	0.0	0.0
17	14.0	44795.6	0.0	1819.6	0.	0.	0.0	0.0	0.0
18	7.0	24506.3	0.0	909.8	0.	0.	0.0	0.0	0.0
19	20.0	74792.3	0.0	2599.4	0.	0.	0.0	0.0	0.0
20	15.0	59724.5	0.0	1949.5	0.	0.	0.0	0.0	0.0
21	7.0	28600.3	0.0	909.8	0.	0.	0.0	0.0	0.0
22	3.1	12703.0	0.0	398.6	0.	0.	0.0	0.0	0.0
23	7.9	31051.0	0.0	1500.0	0.	0.	0.0	0.0	0.0
24	7.7	25966.6	0.0	1500.0	0.	0.	0.0	0.0	0.0
25	8.4	24210.1	0.0	1500.0	0.	0.	0.0	0.0	0.0
26	8.4	20553.5	0.0	1500.0	0.	0.	0.0	0.0	0.0
27	8.5	17107.8	0.0	1500.0	0.	0.	0.0	0.0	0.0
28	8.2	12789.2	0.0	1500.0	0.	0.	0.0	0.0	0.0
29	5.9	6833.0	0.0	1075.8	0.	0.	0.0	0.0	0.0
30	2.3	2023.5	0.0	424.2	0.	0.	0.0	0.0	0.0
31	4.8	1780.0	0.0	1077.6	0.	0.	0.0	0.0	0.0

Failure Surface Specified By 10 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	111.750	998.955
2	111.986	998.749
3	123.976	998.258
4	132.475	989.786
5	408.905	1077.590
6	417.351	1086.114
7	425.189	1095.201
8	432.175	1104.958
9	435.551	1116.474
10	438.587	1120.724

Factor of Safety

*** 2.219 ***

Failure Surface Specified By 10 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	111.750	998.955
2	111.986	998.749
3	123.976	998.258
4	132.475	989.786
5	408.905	1077.590
6	417.351	1086.114
7	425.189	1095.201
8	432.175	1104.958
9	435.551	1116.474
10	438.587	1120.724

Factor of Safety
*** 2.219 ***

Failure Surface Specified By 10 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	111.750	998.955
2	111.986	998.749
3	123.976	998.258
4	132.475	989.786
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Factor of Safety
*** 2.219 ***

Failure Surface Specified By 10 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
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Factor of Safety
*** 2.219 ***

Failure Surface Specified By 10 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	111.750	998.955
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Factor of Safety
*** 2.219 ***

Failure Surface Specified By 10 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	111.750	998.955
2	111.986	998.749
3	123.976	998.258

```
    4        132.475      989.786
    5        408.905     1077.590
    6        417.351     1086.114
    7        425.189     1095.201
    8        432.175     1104.958
    9        435.551     1116.474
   10        438.587     1120.724
       Factor of Safety
      ***    2.219    ***
Failure Surface Specified By 10 Coordinate Points
  Point      X-Surf       Y-Surf
   No.        (ft)         (ft)
    1        111.750      998.955
    2        111.986      998.749
    3        123.976      998.258
    4        132.475      989.786
    5        408.905     1077.590
    6        417.351     1086.114
    7        425.189     1095.201
    8        432.175     1104.958
    9        435.551     1116.474
   10        438.587     1120.724
       Factor of Safety
      ***    2.219    ***
Failure Surface Specified By 10 Coordinate Points
  Point      X-Surf       Y-Surf
   No.        (ft)         (ft)
    1        111.750      998.955
    2        111.986      998.749
    3        123.976      998.258
    4        132.475      989.786
    5        408.905     1077.590
    6        417.351     1086.114
    7        425.189     1095.201
    8        432.175     1104.958
    9        435.551     1116.474
   10        438.587     1120.724
       Factor of Safety
      ***    2.219    ***
Failure Surface Specified By 10 Coordinate Points
  Point      X-Surf       Y-Surf
   No.        (ft)         (ft)
    1        111.750      998.955
    2        111.986      998.749
    3        123.976      998.258
    4        132.475      989.786
    5        408.905     1077.590
    6        417.351     1086.114
    7        425.189     1095.201
    8        432.175     1104.958
    9        435.551     1116.474
   10        438.587     1120.724
       Factor of Safety
      ***    2.219    ***
          **** END OF GSTABL7 OUTPUT ****
```

WO 2232-0-FR-100 Section C-C' pseudo-static

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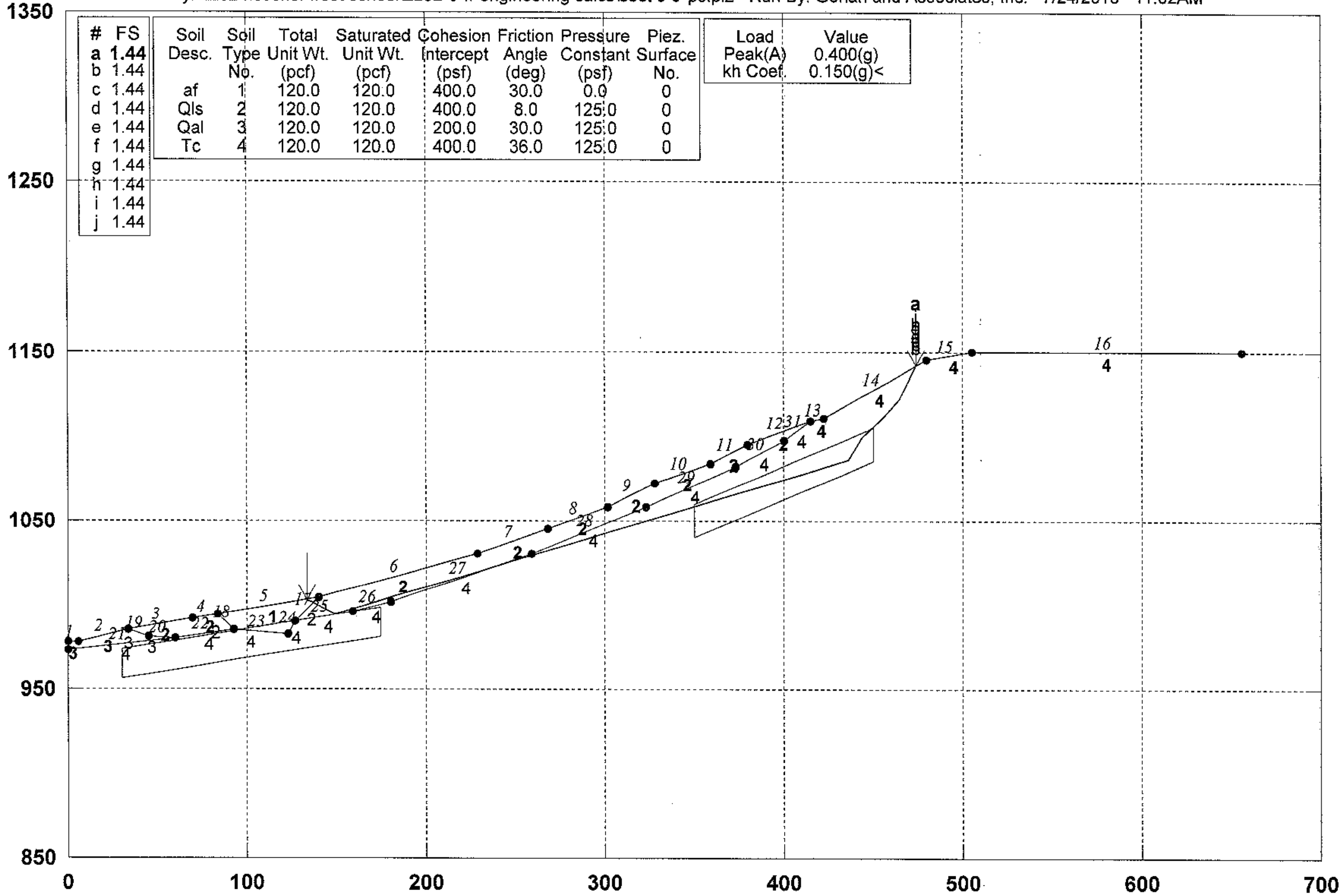

GSTABL7 v.2 FSmin=1.44

Safety Factors Are Calculated By The Simplified Janbu Method

GSTABL7

*** **GSTABL7** ***

** GSTABL7 by Garry H. Gregory, P.E. **

** Original Version 1.0, January 1996; Current Version 2.005, Sept. 2006 **

****

SLOPE STABILITY ANALYSIS SYSTEM

Modified Bishop, Simplified Janbu, or GLE Method of Slices.
(Includes Spencer & Morgenstern-Price Type Analysis)
Including Pier/Pile, Reinforcement, Soil Nail, Tieback,
Nonlinear Undrained Shear Strength, Curved Phi Envelope,
Anisotropic Soil, Fiber-Reinforced Soil, Boundary Loads, Water
Surfaces, Pseudo-Static & Newmark Earthquake, and Applied Forces.

****

Analysis Run Date: 7/24/2013
Time of Run: 11:02AM
Run By: Gorian and Associates, Inc.
Input Data Filename: Y:\2232 Heschel West School\2232-0-FR engineering calcs\sect c-c' ps.dat
Output Filename: Y:\2232 Heschel West School\2232-0-FR engineering calcs\sect c-c' ps.OUT
Unit System: English
Plotted Output Filename: Y:\2232 Heschel West School\2232-0-FR engineering calcs\sect c-c' ps.PLT
PROBLEM DESCRIPTION: WO 2232-0-FR-100
Section C-C' pseudo-static

BOUNDARY COORDINATES
16 Top Boundaries
31 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	0.00	978.00	6.00	978.00	3
2	6.00	978.00	34.00	985.00	3
3	34.00	985.00	70.00	992.00	2
4	70.00	992.00	84.00	994.00	2
5	84.00	994.00	140.00	1004.00	1
6	140.00	1004.00	229.00	1030.00	2
7	229.00	1030.00	268.00	1045.00	2
8	268.00	1045.00	302.00	1058.00	2
9	302.00	1058.00	328.00	1072.00	2
10	328.00	1072.00	359.00	1084.00	2
11	359.00	1084.00	380.00	1095.00	2
12	380.00	1095.00	415.00	1109.00	2
13	415.00	1109.00	422.00	1111.00	4
14	422.00	1111.00	480.00	1145.00	4
15	480.00	1145.00	505.00	1150.00	4
16	505.00	1150.00	656.00	1150.00	4
17	127.00	990.00	140.00	1004.00	2
18	84.00	994.00	93.00	985.00	2
19	34.00	985.00	45.00	981.00	3
20	45.00	981.00	60.00	980.00	3
21	0.00	973.00	60.00	980.00	4
22	60.00	980.00	93.00	985.00	4
23	93.00	985.00	123.00	983.00	4
24	123.00	983.00	127.00	990.00	4
25	127.00	990.00	159.00	996.00	4
26	159.00	996.00	180.00	1002.00	4
27	180.00	1002.00	259.00	1030.00	4
28	259.00	1030.00	323.00	1058.00	4
29	323.00	1058.00	373.00	1082.00	4
30	373.00	1082.00	400.00	1098.00	4
31	400.00	1098.00	415.00	1109.00	4

User Specified Y-Origin = 850.00(ft)
Default X-Plus Value = 0.00(ft)
Default Y-Plus Value = 0.00(ft)

ISOTROPIC SOIL PARAMETERS
4 Type(s) of Soil

Soil Total Saturated Cohesion Friction Pore Pressure Piez.

Type No.	Unit Wt. (pcf)	Unit Wt. (pcf)	Intercept (psf)	Angle (deg)	Pressure Param.	Constant (psf)	Surface No.
1	120.0	120.0	400.0	30.0	0.00	0.0	0
2	120.0	120.0	400.0	8.0	0.00	125.0	0
3	120.0	120.0	200.0	30.0	0.00	125.0	0
4	120.0	120.0	400.0	36.0	0.00	125.0	0

Specified Peak Ground Acceleration Coefficient (A) = 0.400(g)
Specified Horizontal Earthquake Coefficient (kh) = 0.150(g)
Specified Vertical Earthquake Coefficient (kv) = 0.000(g)
Specified Seismic Pore-Pressure Factor = 0.000
A Critical Failure Surface Searching Method, Using A Random Technique For Generating Sliding Block Surfaces, Has Been Specified.
5000 Trial Surfaces Have Been Generated.
2 Boxes Specified For Generation Of Central Block Base
Length Of Line Segments For Active And Passive Portions Of Sliding Block Is 15.0

Box No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Height (ft)
1	30.00	965.00	175.00	990.00	17.00
2	350.00	1050.00	450.00	1095.00	20.00

Following Are Displayed The Ten Most Critical Of The Trial Failure Surfaces Evaluated. They Are Ordered - Most Critical First.
* * Safety Factors Are Calculated By The Simplified Janbu Method * *
Total Number of Trial Surfaces Attempted = 5000
Number of Trial Surfaces With Valid FS = 5000
Statistical Data On All Valid FS Values:
FS Max = 2.258 FS Min = 1.441 FS Ave = 1.838
Standard Deviation = 0.151 Coefficient of Variation = 8.21 %
Failure Surface Specified By 9 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	133.440	1002.829
2	135.774	1001.294
3	148.866	993.972
4	436.420	1086.354
5	443.676	1099.482
6	454.149	1110.220
7	464.329	1121.237
8	470.297	1134.998
9	474.207	1141.604

Factor of Safety
*** 1.441 ***
Individual data on the 25 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	2.3	273.3	0.0	0.0	0.	0.	41.0	0.0	0.0
2	1.1	320.4	0.0	0.0	0.	0.	48.1	0.0	0.0
3	3.1	1459.8	0.0	443.7	0.	0.	219.0	0.0	0.0
4	8.7	9151.4	0.0	1245.3	0.	0.	1372.7	0.0	0.0
5	0.2	257.1	0.0	24.5	0.	0.	38.6	0.0	0.0
6	1.0	1441.9	0.0	125.2	0.	0.	216.3	0.0	0.0
7	79.2	108667.2	0.0	10395.9	0.	0.	16300.1	0.0	0.0
8	10.5	13430.7	0.0	1384.0	0.	0.	2014.6	0.0	0.0
9	19.5	27010.1	0.0	2554.7	0.	0.	4051.5	0.0	0.0
10	9.0	13466.4	0.0	1181.6	0.	0.	2020.0	0.0	0.0
11	34.0	56273.3	0.0	4463.9	0.	0.	8441.0	0.0	0.0
12	21.0	43120.9	0.0	2757.1	0.	0.	6468.1	0.0	0.0
13	5.0	11961.0	0.0	656.5	0.	0.	1794.1	0.0	0.0
14	31.0	79974.1	0.0	4070.1	0.	0.	11996.1	0.0	0.0
15	14.0	40213.4	0.0	1838.1	0.	0.	6032.0	0.0	0.0
16	7.0	21893.1	0.0	919.0	0.	0.	3284.0	0.0	0.0
17	20.0	66143.0	0.0	2625.8	0.	0.	9921.4	0.0	0.0
18	15.0	52087.3	0.0	1969.4	0.	0.	7813.1	0.0	0.0

19	7.0	24698.9	0.0	919.0	0.	0.	3704.8	0.0	0.0
20	14.4	53968.6	0.0	1893.2	0.	0.	8095.3	0.0	0.0
21	7.3	24956.7	0.0	1875.0	0.	0.	3743.5	0.0	0.0
22	10.5	27555.1	0.0	1875.0	0.	0.	4133.3	0.0	0.0
23	10.2	20891.5	0.0	1875.0	0.	0.	3133.7	0.0	0.0
24	6.0	6765.0	0.0	1875.0	0.	0.	1014.7	0.0	0.0
25	3.9	1011.9	0.0	959.5	0.	0.	151.8	0.0	0.0

Failure Surface Specified By 9 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	133.440	1002.829
2	135.774	1001.294
3	148.866	993.972
4	436.420	1086.354
5	443.676	1099.482
6	454.149	1110.220
7	464.329	1121.237
8	470.297	1134.998
9	474.207	1141.604

Factor of Safety
*** 1.441 ***

Failure Surface Specified By 9 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	133.440	1002.829
2	135.774	1001.294
3	148.866	993.972
4	436.420	1086.354
5	443.676	1099.482
6	454.149	1110.220
7	464.329	1121.237
8	470.297	1134.998
9	474.207	1141.604

Factor of Safety
*** 1.441 ***

Failure Surface Specified By 9 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	133.440	1002.829
2	135.774	1001.294
3	148.866	993.972
4	436.420	1086.354
5	443.676	1099.482
6	454.149	1110.220
7	464.329	1121.237
8	470.297	1134.998
9	474.207	1141.604

Factor of Safety
*** 1.441 ***

Failure Surface Specified By 9 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	133.440	1002.829
2	135.774	1001.294
3	148.866	993.972
4	436.420	1086.354
5	443.676	1099.482
6	454.149	1110.220
7	464.329	1121.237
8	470.297	1134.998
9	474.207	1141.604

Factor of Safety
*** 1.441 ***

Failure Surface Specified By 9 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	133.440	1002.829

```
    2        135.774     1001.294
    3        148.866      993.972
    4        436.420     1086.354
    5        443.676     1099.482
    6        454.149     1110.220
    7        464.329     1121.237
    8        470.297     1134.998
    9        474.207     1141.604
       Factor of Safety
      ***    1.441    ***
Failure Surface Specified By  9 Coordinate Points
  Point      X-Surf       Y-Surf
   No.        (ft)         (ft)
    1        133.440     1002.829
    2        135.774     1001.294
    3        148.866      993.972
    4        436.420     1086.354
    5        443.676     1099.482
    6        454.149     1110.220
    7        464.329     1121.237
    8        470.297     1134.998
    9        474.207     1141.604
       Factor of Safety
      ***    1.441    ***
Failure Surface Specified By  9 Coordinate Points
  Point      X-Surf       Y-Surf
   No.        (ft)         (ft)
    1        133.440     1002.829
    2        135.774     1001.294
    3        148.866      993.972
    4        436.420     1086.354
    5        443.676     1099.482
    6        454.149     1110.220
    7        464.329     1121.237
    8        470.297     1134.998
    9        474.207     1141.604
       Factor of Safety
      ***    1.441    ***
Failure Surface Specified By  9 Coordinate Points
  Point      X-Surf       Y-Surf
   No.        (ft)         (ft)
    1        133.440     1002.829
    2        135.774     1001.294
    3        148.866      993.972
    4        436.420     1086.354
    5        443.676     1099.482
    6        454.149     1110.220
    7        464.329     1121.237
    8        470.297     1134.998
    9        474.207     1141.604
       Factor of Safety
      ***    1.441    ***
Failure Surface Specified By  9 Coordinate Points
  Point      X-Surf       Y-Surf
   No.        (ft)         (ft)
    1        133.440     1002.829
    2        135.774     1001.294
    3        148.866      993.972
    4        436.420     1086.354
    5        443.676     1099.482
    6        454.149     1110.220
    7        464.329     1121.237
    8        470.297     1134.998
    9        474.207     1141.604
       Factor of Safety
      ***    1.441    ***
          **** END OF GSTABL7 OUTPUT ****
```

WO 2232-0-FR-100 Section C-C' circular search

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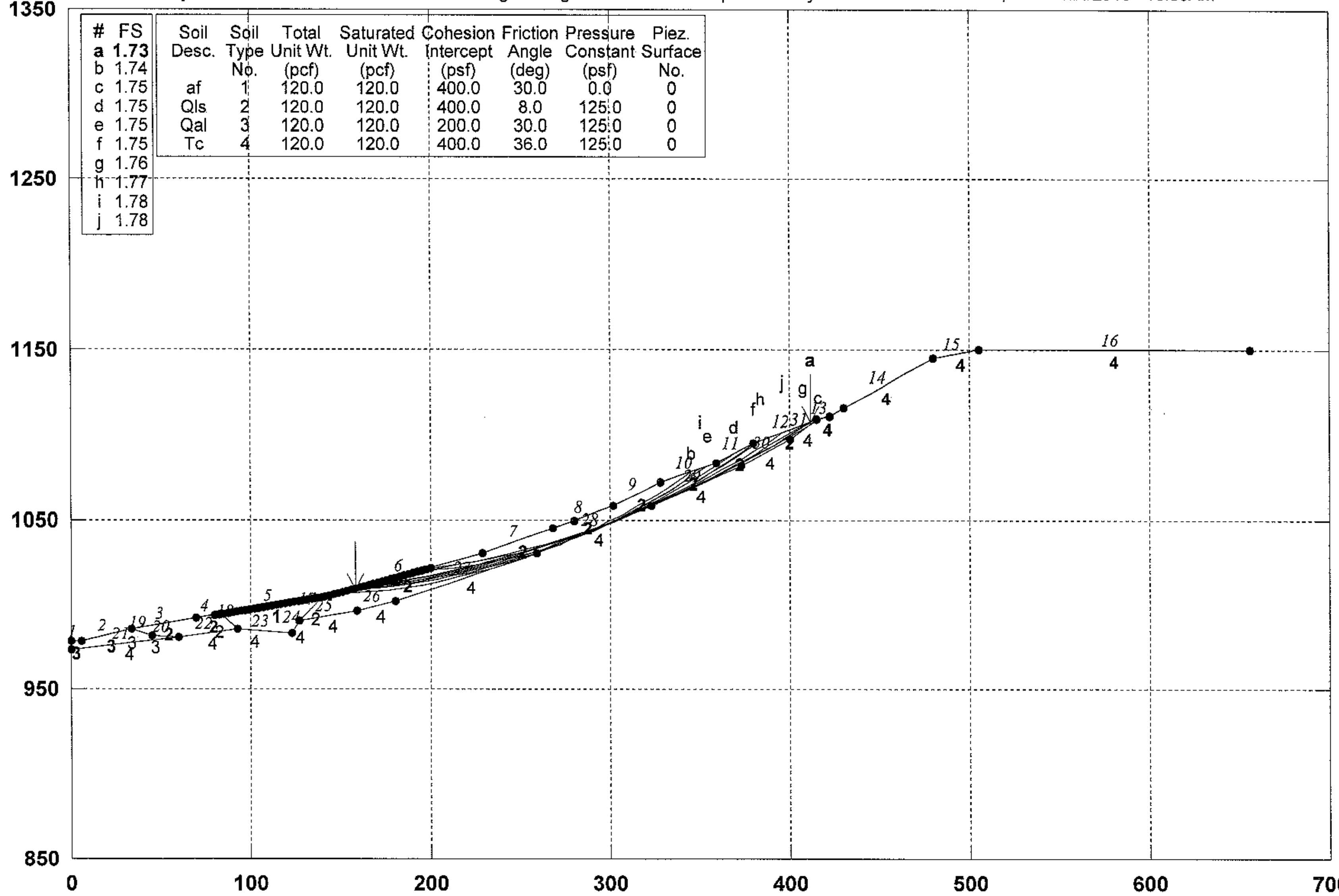


GSTABL7 v.2 FSmin=1.73

Safety Factors Are Calculated By The Modified Bishop Method

GSTABL7

*** **GSTABL7** ***

** GSTABL7 by Garry H. Gregory, P.E. **

** Original Version 1.0, January 1996; Current Version 2.005, Sept. 2006 **

****

SLOPE STABILITY ANALYSIS SYSTEM

Modified Bishop, Simplified Janbu, or GLE Method of Slices.
(Includes Spencer & Morgenstern-Price Type Analysis)
Including Pier/Pile, Reinforcement, Soil Nail, Tieback,
Nonlinear Undrained Shear Strength, Curved Phi Envelope,
Anisotropic Soil, Fiber-Reinforced Soil, Boundary Loads, Water
Surfaces, Pseudo-Static & Newmark Earthquake, and Applied Forces.

****

Analysis Run Date: 7/24/2013
Time of Run: 10:35AM
Run By: Gorian and Associates, Inc.
Input Data Filename: Y:\2232 Heschel West School\2232-0-FR engineering calcs\sect c-c' circ.dat
Output Filename: Y:\2232 Heschel West School\2232-0-FR engineering calcs\sect c-c' circ.OUT
Unit System: English
Plotted Output Filename: Y:\2232 Heschel West School\2232-0-FR engineering calcs\sect c-c' circ.PLT
PROBLEM DESCRIPTION: WO 2232-0-FR-100
Section C-C' circular search

BOUNDARY COORDINATES
16 Top Boundaries
31 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	0.00	978.00	6.00	978.00	3
2	6.00	978.00	34.00	985.00	3
3	34.00	985.00	70.00	992.00	2
4	70.00	992.00	84.00	994.00	2
5	84.00	994.00	140.00	1004.00	1
6	140.00	1004.00	229.00	1030.00	2
7	229.00	1030.00	268.00	1045.00	2
8	268.00	1045.00	302.00	1058.00	2
9	302.00	1058.00	328.00	1072.00	2
10	328.00	1072.00	359.00	1084.00	2
11	359.00	1084.00	380.00	1095.00	2
12	380.00	1095.00	415.00	1109.00	2
13	415.00	1109.00	422.00	1111.00	4
14	422.00	1111.00	480.00	1145.00	4
15	480.00	1145.00	505.00	1150.00	4
16	505.00	1150.00	656.00	1150.00	4
17	127.00	990.00	140.00	1004.00	2
18	84.00	994.00	93.00	985.00	2
19	34.00	985.00	45.00	981.00	3
20	45.00	981.00	60.00	980.00	3
21	0.00	973.00	60.00	980.00	4
22	60.00	980.00	93.00	985.00	4
23	93.00	985.00	123.00	983.00	4
24	123.00	983.00	127.00	990.00	4
25	127.00	990.00	159.00	996.00	4
26	159.00	996.00	180.00	1002.00	4
27	180.00	1002.00	259.00	1030.00	4
28	259.00	1030.00	323.00	1058.00	4
29	323.00	1058.00	373.00	1082.00	4
30	373.00	1082.00	400.00	1098.00	4
31	400.00	1098.00	415.00	1109.00	4

User Specified Y-Origin = 850.00(ft)
Default X-Plus Value = 0.00(ft)
Default Y-Plus Value = 0.00(ft)

ISOTROPIC SOIL PARAMETERS
4 Type(s) of Soil

Soil Total Saturated Cohesion Friction Pore Pressure Piez.

Type No.	Unit Wt. (pcf)	Unit Wt. (pcf)	Intercept (psf)	Angle (deg)	Pressure Param.	Constant (psf)	Surface No.
1	120.0	120.0	400.0	30.0	0.00	0.0	0
2	120.0	120.0	400.0	8.0	0.00	125.0	0
3	120.0	120.0	200.0	30.0	0.00	125.0	0
4	120.0	120.0	400.0	36.0	0.00	125.0	0

A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Circular Surfaces, Has Been Specified.
5000 Trial Surfaces Have Been Generated.
100 Surface(s) Initiate(s) From Each Of 50 Points Equally Spaced
Along The Ground Surface Between X = 80.00(ft)
and X = 200.00(ft)
Each Surface Terminates Between X = 280.00(ft)
and X = 430.00(ft)
Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is Y = 0.00(ft)
10.00(ft) Line Segments Define Each Trial Failure Surface.
Following Are Displayed The Ten Most Critical Of The Trial
Failure Surfaces Evaluated. They Are
Ordered - Most Critical First.
* * Safety Factors Are Calculated By The Modified Bishop Method * *
Total Number of Trial Surfaces Attempted = 5000
Number of Trial Surfaces With Valid FS = 5000
Statistical Data On All Valid FS Values:
FS Max = 6.416 FS Min = 1.731 FS Ave = 3.162
Standard Deviation = 0.582 Coefficient of Variation = 18.41 %
Failure Surface Specified By 29 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	158.367	1009.366
2	168.242	1010.943
3	178.090	1012.679
4	187.910	1014.572
5	197.697	1016.623
6	207.450	1018.830
7	217.167	1021.194
8	226.844	1023.714
9	236.480	1026.388
10	246.072	1029.217
11	255.617	1032.199
12	265.112	1035.334
13	274.557	1038.621
14	283.947	1042.059
15	293.281	1045.648
16	302.556	1049.386
17	311.770	1053.272
18	320.921	1057.305
19	330.005	1061.485
20	339.022	1065.810
21	347.967	1070.279
22	356.840	1074.892
23	365.638	1079.646
24	374.358	1084.540
25	382.999	1089.574
26	391.557	1094.746
27	400.032	1100.055
28	408.420	1105.499
29	411.615	1107.646

Circle Center At X = 65.025 ; Y = 1625.433 ; and Radius = 623.098
Factor of Safety
*** 1.731 ***
Individual data on the 34 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	9.9	774.6	0.0	1250.0	0.	0.	0.0	0.0	0.0

2	9.8	2219.6	0.0	1250.0	0.	0.	0.0	0.0	0.0
3	9.8	3459.9	0.0	1250.0	0.	0.	0.0	0.0	0.0
4	9.8	4496.3	0.0	1250.0	0.	0.	0.0	0.0	0.0
5	9.8	5329.2	0.0	1250.0	0.	0.	0.0	0.0	0.0
6	9.7	5960.1	0.0	1250.0	0.	0.	0.0	0.0	0.0
7	9.7	6390.4	0.0	1250.0	0.	0.	0.0	0.0	0.0
8	2.2	1467.4	0.0	279.6	0.	0.	0.0	0.0	0.0
9	7.5	5465.2	0.0	970.4	0.	0.	0.0	0.0	0.0
10	9.6	7963.9	0.0	1250.0	0.	0.	0.0	0.0	0.0
11	9.5	8812.5	0.0	1250.0	0.	0.	0.0	0.0	0.0
12	9.5	9454.2	0.0	1250.0	0.	0.	0.0	0.0	0.0
13	2.9	2982.8	0.0	382.2	0.	0.	0.0	0.0	0.0
14	6.6	6903.0	0.0	867.8	0.	0.	0.0	0.0	0.0
15	9.4	10098.8	0.0	1250.0	0.	0.	0.0	0.0	0.0
16	9.3	10112.4	0.0	1250.0	0.	0.	0.0	0.0	0.0
17	8.7	9341.6	0.0	1175.0	0.	0.	0.0	0.0	0.0
18	0.6	592.5	0.0	75.0	0.	0.	0.0	0.0	0.0
19	9.2	10450.5	0.0	1250.0	0.	0.	0.0	0.0	0.0
20	9.2	11459.2	0.0	1250.0	0.	0.	0.0	0.0	0.0
21	7.1	9480.7	0.0	974.1	0.	0.	0.0	0.0	0.0
22	2.0	2734.6	0.0	275.9	0.	0.	0.0	0.0	0.0
23	9.0	11764.8	0.0	1250.0	0.	0.	0.0	0.0	0.0
24	8.9	10684.4	0.0	1250.0	0.	0.	0.0	0.0	0.0
25	8.9	9434.6	0.0	1250.0	0.	0.	0.0	0.0	0.0
26	2.2	2101.2	0.0	306.9	0.	0.	0.0	0.0	0.0
27	6.6	6281.6	0.0	943.1	0.	0.	0.0	0.0	0.0
28	8.7	8023.9	0.0	1250.0	0.	0.	0.0	0.0	0.0
29	5.6	4968.5	0.0	816.2	0.	0.	0.0	0.0	0.0
30	3.0	2482.5	0.0	433.8	0.	0.	0.0	0.0	0.0
31	8.6	5906.5	0.0	1250.0	0.	0.	0.0	0.0	0.0
32	8.5	3983.8	0.0	1250.0	0.	0.	0.0	0.0	0.0
33	8.4	1926.3	0.0	1250.0	0.	0.	0.0	0.0	0.0
34	3.2	166.6	0.0	481.2	0.	0.	0.0	0.0	0.0

Failure Surface Specified By 23 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	146.122	1005.789
2	156.099	1006.467
3	166.054	1007.420
4	175.978	1008.648
5	185.865	1010.148
6	195.707	1011.921
7	205.496	1013.965
8	215.224	1016.278
9	224.886	1018.858
10	234.472	1021.704
11	243.977	1024.813
12	253.392	1028.183
13	262.710	1031.811
14	271.925	1035.695
15	281.029	1039.832
16	290.016	1044.218
17	298.878	1048.851
18	307.610	1053.726
19	316.203	1058.840
20	324.652	1064.189
21	332.950	1069.769
22	341.092	1075.576
23	345.137	1078.634

Circle Center At X = 126.519 ; Y = 1367.797 ; and Radius = 362.539

Factor of Safety

*** 1.737 ***

Failure Surface Specified By 30 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	153.469	1007.935
2	163.334	1009.572

3	173.174	1011.357
4	182.986	1013.288
5	192.768	1015.364
6	202.518	1017.587
7	212.233	1019.954
8	221.913	1022.466
9	231.554	1025.122
10	241.154	1027.921
11	250.711	1030.863
12	260.224	1033.948
13	269.689	1037.173
14	279.106	1040.539
15	288.471	1044.046
16	297.783	1047.691
17	307.039	1051.475
18	316.238	1055.396
19	325.378	1059.454
20	334.456	1063.648
21	343.471	1067.976
22	352.420	1072.439
23	361.301	1077.034
24	370.114	1081.761
25	378.854	1086.619
26	387.522	1091.607
27	396.114	1096.723
28	404.629	1101.967
29	413.064	1107.337
30	416.049	1109.300

Circle Center At X = 48.624 ; Y = 1670.311 ; and Radius = 670.623

Factor of Safety

*** 1.746 ***

Failure Surface Specified By 25 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	155.918	1008.650
2	165.865	1009.685
3	175.784	1010.951
4	185.671	1012.450
5	195.521	1014.180
6	205.327	1016.139
7	215.084	1018.328
8	224.788	1020.745
9	234.432	1023.388
10	244.012	1026.256
11	253.522	1029.347
12	262.957	1032.660
13	272.312	1036.194
14	281.582	1039.945
15	290.762	1043.912
16	299.846	1048.093
17	308.829	1052.485
18	317.708	1057.087
19	326.476	1061.895
20	335.129	1066.907
21	343.663	1072.120
22	352.072	1077.532
23	360.352	1083.139
24	368.499	1088.938
25	368.665	1089.063

Circle Center At X = 116.715 ; Y = 1434.020 ; and Radius = 427.173

Factor of Safety

*** 1.748 ***

Failure Surface Specified By 23 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	153.469	1007.935
2	163.433	1008.785

3	173.372	1009.893
4	183.278	1011.259
5	193.146	1012.881
6	202.968	1014.758
7	212.738	1016.890
8	222.449	1019.274
9	232.096	1021.910
10	241.671	1024.795
11	251.167	1027.927
12	260.580	1031.304
13	269.901	1034.925
14	279.126	1038.786
15	288.247	1042.885
16	297.259	1047.220
17	306.155	1051.786
18	314.930	1056.582
19	323.578	1061.604
20	332.092	1066.849
21	340.468	1072.312
22	348.699	1077.991
23	354.610	1082.300

Circle Center At X = 125.691 ; Y = 1392.399 ; and Radius = 385.467

Factor of Safety

*** 1.748 ***

Failure Surface Specified By 21 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	200.000	1021.528
2	209.915	1022.829
3	219.790	1024.402
4	229.619	1026.246
5	239.393	1028.360
6	249.105	1030.742
7	258.748	1033.391
8	268.314	1036.304
9	277.797	1039.479
10	287.188	1042.914
11	296.482	1046.606
12	305.670	1050.553
13	314.746	1054.751
14	323.703	1059.197
15	332.535	1063.888
16	341.234	1068.820
17	349.794	1073.990
18	358.208	1079.394
19	366.471	1085.027
20	374.575	1090.885
21	379.841	1094.917

Circle Center At X = 157.709 ; Y = 1382.362 ; and Radius = 363.304

Factor of Safety

*** 1.751 ***

Failure Surface Specified By 30 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	146.122	1005.789
2	156.006	1007.308
3	165.865	1008.982
4	175.697	1010.811
5	185.498	1012.793
6	195.267	1014.929
7	205.002	1017.218
8	214.699	1019.660
9	224.357	1022.253
10	233.973	1024.997
11	243.545	1027.891
12	253.071	1030.936
13	262.547	1034.129

14	271.972	1037.471
15	281.344	1040.959
16	290.660	1044.595
17	299.917	1048.376
18	309.114	1052.302
19	318.249	1056.371
20	327.319	1060.583
21	336.321	1064.937
22	345.254	1069.432
23	354.115	1074.066
24	362.903	1078.838
25	371.615	1083.748
26	380.249	1088.794
27	388.802	1093.974
28	397.273	1099.288
29	405.660	1104.734
30	407.610	1106.044

Circle Center At X = 54.243 ; Y = 1636.566 ; and Radius = 637.434

Factor of Safety

*** 1.762 ***

Failure Surface Specified By 26 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	155.918	1008.650
2	165.844	1009.866
3	175.743	1011.288
4	185.609	1012.915
5	195.440	1014.746
6	205.231	1016.782
7	214.977	1019.020
8	224.675	1021.460
9	234.320	1024.101
10	243.908	1026.942
11	253.435	1029.982
12	262.896	1033.219
13	272.289	1036.651
14	281.608	1040.278
15	290.850	1044.097
16	300.010	1048.108
17	309.085	1052.308
18	318.071	1056.696
19	326.964	1061.270
20	335.760	1066.027
21	344.456	1070.966
22	353.046	1076.084
23	361.529	1081.380
24	369.900	1086.850
25	378.155	1092.494
26	383.777	1096.511

Circle Center At X = 102.430 ; Y = 1486.764 ; and Radius = 481.096

Factor of Safety

*** 1.766 ***

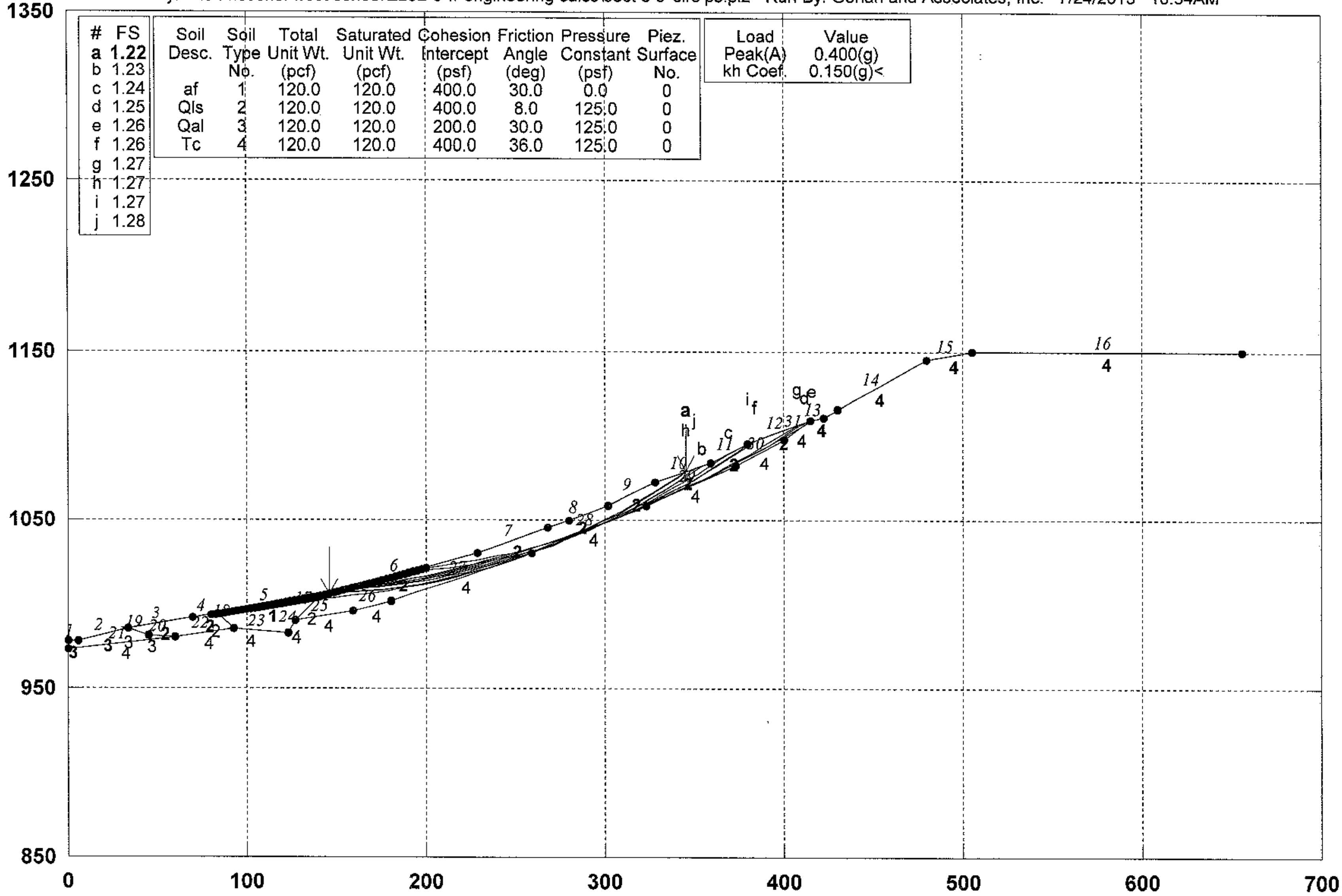
Failure Surface Specified By 19 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	192.653	1019.382
2	202.621	1020.179
3	212.554	1021.334
4	222.439	1022.845
5	232.264	1024.712
6	242.014	1026.930
7	251.679	1029.498
8	261.245	1032.412
9	270.700	1035.668
10	280.032	1039.262
11	289.229	1043.189
12	298.278	1047.445

```
    13        307.168     1052.023
    14        315.888     1056.919
    15        324.426     1062.124
    16        332.771     1067.634
    17        340.913     1073.440
    18        348.841     1079.536
    19        350.047     1080.535
 Circle Center At X =   175.489 ; Y =  1296.793 ; and Radius =   277.941
        Factor of Safety
      ***    1.778   ***
 Failure Surface Specified By 23 Coordinate Points
   Point      X-Surf      Y-Surf
    No.        (ft)        (ft)
     1        195.102     1020.097
     2        204.973     1021.698
     3        214.807     1023.510
     4        224.601     1025.533
     5        234.349     1027.765
     6        244.046     1030.205
     7        253.689     1032.853
     8        263.273     1035.707
     9        272.794     1038.765
    10        282.247     1042.027
    11        291.628     1045.491
    12        300.932     1049.156
    13        310.156     1053.019
    14        319.295     1057.078
    15        328.345     1061.333
    16        337.301     1065.781
    17        346.160     1070.420
    18        354.918     1075.247
    19        363.570     1080.262
    20        372.112     1085.460
    21        380.541     1090.841
    22        388.853     1096.401
    23        395.978     1101.391
 Circle Center At X =   125.374 ; Y =  1481.291 ; and Radius =   466.435
        Factor of Safety
      ***    1.778   ***
          **** END OF GSTABL7 OUTPUT ****
```

WO 2232-0-FR-100 Section C-C' circ search pseudo-static

y:\2232 heschel west school\2232-0-fr engineering calcs\sect c-c' circ ps.pl2 Run By: Gorian and Associates, Inc. 7/24/2013 10:54AM



GSTABL7 v.2 FSmin=1.22

Safety Factors Are Calculated By The Modified Bishop Method

GSTABL7

*** **GSTABL7** ***

** GSTABL7 by Garry H. Gregory, P.E. **

** Original Version 1.0, January 1996; Current Version 2.005, Sept. 2006 **

****

SLOPE STABILITY ANALYSIS SYSTEM

Modified Bishop, Simplified Janbu, or GLE Method of Slices.
(Includes Spencer & Morgenstern-Price Type Analysis)
Including Pier/Pile, Reinforcement, Soil Nail, Tieback,
Nonlinear Undrained Shear Strength, Curved Phi Envelope,
Anisotropic Soil, Fiber-Reinforced Soil, Boundary Loads, Water
Surfaces, Pseudo-Static & Newmark Earthquake, and Applied Forces.

****

Analysis Run Date: 7/24/2013
Time of Run: 10:54AM
Run By: Gorian and Associates, Inc.
Input Data Filename: Y:\2232 Heschel West School\2232-0-FR engineering calcs\sect c-c' circ ps.dat
Output Filename: Y:\2232 Heschel West School\2232-0-FR engineering calcs\sect c-c' circ ps.OUT
Unit System: English
Plotted Output Filename: Y:\2232 Heschel West School\2232-0-FR engineering calcs\sect c-c' circ ps.PLT
PROBLEM DESCRIPTION: WO 2232-0-FR-100
Section C-C' circ search pseudo-static

BOUNDARY COORDINATES
16 Top Boundaries
31 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	0.00	978.00	6.00	978.00	3
2	6.00	978.00	34.00	985.00	3
3	34.00	985.00	70.00	992.00	2
4	70.00	992.00	84.00	994.00	2
5	84.00	994.00	140.00	1004.00	1
6	140.00	1004.00	229.00	1030.00	2
7	229.00	1030.00	268.00	1045.00	2
8	268.00	1045.00	302.00	1058.00	2
9	302.00	1058.00	328.00	1072.00	2
10	328.00	1072.00	359.00	1084.00	2
11	359.00	1084.00	380.00	1095.00	2
12	380.00	1095.00	415.00	1109.00	2
13	415.00	1109.00	422.00	1111.00	4
14	422.00	1111.00	480.00	1145.00	4
15	480.00	1145.00	505.00	1150.00	4
16	505.00	1150.00	656.00	1150.00	4
17	127.00	990.00	140.00	1004.00	2
18	84.00	994.00	93.00	985.00	2
19	34.00	985.00	45.00	981.00	3
20	45.00	981.00	60.00	980.00	3
21	0.00	973.00	60.00	980.00	4
22	60.00	980.00	93.00	985.00	4
23	93.00	985.00	123.00	983.00	4
24	123.00	983.00	127.00	990.00	4
25	127.00	990.00	159.00	996.00	4
26	159.00	996.00	180.00	1002.00	4
27	180.00	1002.00	259.00	1030.00	4
28	259.00	1030.00	323.00	1058.00	4
29	323.00	1058.00	373.00	1082.00	4
30	373.00	1082.00	400.00	1098.00	4
31	400.00	1098.00	415.00	1109.00	4

User Specified Y-Origin = 850.00(ft)
Default X-Plus Value = 0.00(ft)
Default Y-Plus Value = 0.00(ft)

ISOTROPIC SOIL PARAMETERS
4 Type(s) of Soil

Soil Total Saturated Cohesion Friction Pore Pressure Piez.

Type No.	Unit Wt. (pcf)	Unit Wt. (pcf)	Intercept (psf)	Angle (deg)	Pressure Param.	Constant (psf)	Surface No.
1	120.0	120.0	400.0	30.0	0.00	0.0	0
2	120.0	120.0	400.0	8.0	0.00	125.0	0
3	120.0	120.0	200.0	30.0	0.00	125.0	0
4	120.0	120.0	400.0	36.0	0.00	125.0	0

Specified Peak Ground Acceleration Coefficient (A) = 0.400(g)
Specified Horizontal Earthquake Coefficient (kh) = 0.150(g)
Specified Vertical Earthquake Coefficient (kv) = 0.000(g)
Specified Seismic Pore-Pressure Factor = 0.000
A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Circular Surfaces, Has Been Specified.
5000 Trial Surfaces Have Been Generated.
100 Surface(s) Initiate(s) From Each Of 50 Points Equally Spaced
Along The Ground Surface Between X = 80.00(ft)
and X = 200.00(ft)
Each Surface Terminates Between X = 280.00(ft)
and X = 430.00(ft)
Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is Y = 0.00(ft)
10.00(ft) Line Segments Define Each Trial Failure Surface.
Following Are Displayed The Ten Most Critical Of The Trial
Failure Surfaces Evaluated. They Are
Ordered - Most Critical First.
* * Safety Factors Are Calculated By The Modified Bishop Method * *
Total Number of Trial Surfaces Attempted = 5000
Number of Trial Surfaces With Valid FS = 5000
Statistical Data On All Valid FS Values:
FS Max = 4.472 FS Min = 1.216 FS Ave = 2.171
Standard Deviation = 0.386 Coefficient of Variation = 17.76 %
Failure Surface Specified By 23 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	146.122	1005.789
2	156.099	1006.467
3	166.054	1007.420
4	175.978	1008.648
5	185.865	1010.148
6	195.707	1011.921
7	205.496	1013.965
8	215.224	1016.278
9	224.886	1018.858
10	234.472	1021.704
11	243.977	1024.813
12	253.392	1028.183
13	262.710	1031.811
14	271.925	1035.695
15	281.029	1039.832
16	290.016	1044.218
17	298.878	1048.851
18	307.610	1053.726
19	316.203	1058.840
20	324.652	1064.189
21	332.950	1069.769
22	341.092	1075.576
23	345.137	1078.634

Circle Center At X = 126.519 ; Y = 1367.797 ; and Radius = 362.539
Factor of Safety
*** 1.216 ***
Individual data on the 26 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	10.0	1338.6	0.0	1250.0	0.	0.	200.8	0.0	0.0
2	10.0	3838.7	0.0	1250.0	0.	0.	575.8	0.0	0.0
3	9.9	5986.5	0.0	1250.0	0.	0.	898.0	0.0	0.0

4	9.9	7778.7	0.0	1250.0	0.	0.	1166.8	0.0	0.0
5	9.8	9213.4	0.0	1250.0	0.	0.	1382.0	0.0	0.0
6	9.8	10290.7	0.0	1250.0	0.	0.	1543.6	0.0	0.0
7	9.7	11012.8	0.0	1250.0	0.	0.	1651.9	0.0	0.0
8	9.7	11383.6	0.0	1250.0	0.	0.	1707.5	0.0	0.0
9	4.1	4902.6	0.0	536.5	0.	0.	735.4	0.0	0.0
10	5.5	6672.3	0.0	713.5	0.	0.	1000.9	0.0	0.0
11	9.5	12174.1	0.0	1250.0	0.	0.	1826.1	0.0	0.0
12	9.4	12510.2	0.0	1250.0	0.	0.	1876.5	0.0	0.0
13	9.3	12497.5	0.0	1250.0	0.	0.	1874.6	0.0	0.0
14	5.3	7018.4	0.0	717.6	0.	0.	1052.8	0.0	0.0
15	3.9	5125.6	0.0	532.4	0.	0.	768.8	0.0	0.0
16	9.1	11446.8	0.0	1250.0	0.	0.	1717.0	0.0	0.0
17	9.0	10433.1	0.0	1250.0	0.	0.	1565.0	0.0	0.0
18	8.9	9122.0	0.0	1250.0	0.	0.	1368.3	0.0	0.0
19	3.1	2877.2	0.0	446.9	0.	0.	431.6	0.0	0.0
20	5.6	4947.9	0.0	803.1	0.	0.	742.2	0.0	0.0
21	8.6	7271.2	0.0	1250.0	0.	0.	1090.7	0.0	0.0
22	8.4	6496.8	0.0	1250.0	0.	0.	974.5	0.0	0.0
23	3.3	2323.7	0.0	504.3	0.	0.	348.6	0.0	0.0
24	5.0	2883.0	0.0	745.7	0.	0.	432.4	0.0	0.0
25	8.1	2754.1	0.0	1250.0	0.	0.	413.1	0.0	0.0
26	4.0	362.1	0.0	633.9	0.	0.	54.3	0.0	0.0

Failure Surface Specified By 23 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	153.469	1007.935
2	163.433	1008.785
3	173.372	1009.893
4	183.278	1011.259
5	193.146	1012.881
6	202.968	1014.758
7	212.738	1016.890
8	222.449	1019.274
9	232.096	1021.910
10	241.671	1024.795
11	251.167	1027.927
12	260.580	1031.304
13	269.901	1034.925
14	279.126	1038.786
15	288.247	1042.885
16	297.259	1047.220
17	306.155	1051.786
18	314.930	1056.582
19	323.578	1061.604
20	332.092	1066.849
21	340.468	1072.312
22	348.699	1077.991
23	354.610	1082.300

Circle Center At X = 125.691 ; Y = 1392.399 ; and Radius = 385.467

Factor of Safety

*** 1.233 ***

Failure Surface Specified By 25 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	155.918	1008.650
2	165.865	1009.685
3	175.784	1010.951
4	185.671	1012.450
5	195.521	1014.180
6	205.327	1016.139
7	215.084	1018.328
8	224.788	1020.745
9	234.432	1023.388
10	244.012	1026.256
11	253.522	1029.347
12	262.957	1032.660

13	272.312	1036.194
14	281.582	1039.945
15	290.762	1043.912
16	299.846	1048.093
17	308.829	1052.485
18	317.708	1057.087
19	326.476	1061.895
20	335.129	1066.907
21	343.663	1072.120
22	352.072	1077.532
23	360.352	1083.139
24	368.499	1088.938
25	368.665	1089.063

Circle Center At X = 116.715 ; Y = 1434.020 ; and Radius = 427.173

Factor of Safety

*** 1.242 ***

Failure Surface Specified By 29 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	158.367	1009.366
2	168.242	1010.943
3	178.090	1012.679
4	187.910	1014.572
5	197.697	1016.623
6	207.450	1018.830
7	217.167	1021.194
8	226.844	1023.714
9	236.480	1026.388
10	246.072	1029.217
11	255.617	1032.199
12	265.112	1035.334
13	274.557	1038.621
14	283.947	1042.059
15	293.281	1045.648
16	302.556	1049.386
17	311.770	1053.272
18	320.921	1057.305
19	330.005	1061.485
20	339.022	1065.810
21	347.967	1070.279
22	356.840	1074.892
23	365.638	1079.646
24	374.358	1084.540
25	382.999	1089.574
26	391.557	1094.746
27	400.032	1100.055
28	408.420	1105.499
29	411.615	1107.646

Circle Center At X = 65.025 ; Y = 1625.433 ; and Radius = 623.098

Factor of Safety

*** 1.250 ***

Failure Surface Specified By 30 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	153.469	1007.935
2	163.334	1009.572
3	173.174	1011.357
4	182.986	1013.288
5	192.768	1015.364
6	202.518	1017.587
7	212.233	1019.954
8	221.913	1022.466
9	231.554	1025.122
10	241.154	1027.921
11	250.711	1030.863
12	260.224	1033.948
13	269.689	1037.173

14	279.106	1040.539
15	288.471	1044.046
16	297.783	1047.691
17	307.039	1051.475
18	316.238	1055.396
19	325.378	1059.454
20	334.456	1063.648
21	343.471	1067.976
22	352.420	1072.439
23	361.301	1077.034
24	370.114	1081.761
25	378.854	1086.619
26	387.522	1091.607
27	396.114	1096.723
28	404.629	1101.967
29	413.064	1107.337
30	416.049	1109.300

Circle Center At X = 48.624 ; Y = 1670.311 ; and Radius = 670.623

Factor of Safety

*** 1.259 ***

Failure Surface Specified By 26 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	155.918	1008.650
2	165.844	1009.866
3	175.743	1011.288
4	185.609	1012.915
5	195.440	1014.746
6	205.231	1016.782
7	214.977	1019.020
8	224.675	1021.460
9	234.320	1024.101
10	243.908	1026.942
11	253.435	1029.982
12	262.896	1033.219
13	272.289	1036.651
14	281.608	1040.278
15	290.850	1044.097
16	300.010	1048.108
17	309.085	1052.308
18	318.071	1056.696
19	326.964	1061.270
20	335.760	1066.027
21	344.456	1070.966
22	353.046	1076.084
23	361.529	1081.380
24	369.900	1086.850
25	378.155	1092.494
26	383.777	1096.511

Circle Center At X = 102.430 ; Y = 1486.764 ; and Radius = 481.096

Factor of Safety

*** 1.262 ***

Failure Surface Specified By 30 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	146.122	1005.789
2	156.006	1007.308
3	165.865	1008.982
4	175.697	1010.811
5	185.498	1012.793
6	195.267	1014.929
7	205.002	1017.218
8	214.699	1019.660
9	224.357	1022.253
10	233.973	1024.997
11	243.545	1027.891
12	253.071	1030.936

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     13         262.547     1034.129
     14         271.972     1037.471
     15         281.344     1040.959
     16         290.660     1044.595
     17         299.917     1048.376
     18         309.114     1052.302
     19         318.249     1056.371
     20         327.319     1060.583
     21         336.321     1064.937
     22         345.254     1069.432
     23         354.115     1074.066
     24         362.903     1078.838
     25         371.615     1083.748
     26         380.249     1088.794
     27         388.802     1093.974
     28         397.273     1099.288
     29         405.660     1104.734
     30         407.610     1106.044
 Circle Center At X =    54.243 ; Y =  1636.566 ; and Radius =   637.434
        Factor of Safety
       ***    1.266   ***
 Failure Surface Specified By 25 Coordinate Points
   Point        X-Surf       Y-Surf
    No.          (ft)         (ft)
     1          128.980     1002.032
     2          138.960     1002.662
     3          148.921     1003.541
     4          158.857     1004.668
     5          168.762     1006.042
     6          178.630     1007.663
     7          188.455     1009.530
     8          198.229     1011.641
     9          207.948     1013.995
    10          217.605     1016.590
    11          227.195     1019.426
    12          236.711     1022.500
    13          246.147     1025.810
    14          255.498     1029.355
    15          264.757     1033.131
    16          273.920     1037.138
    17          282.979     1041.371
    18          291.931     1045.829
    19          300.768     1050.509
    20          309.486     1055.408
    21          318.079     1060.523
    22          326.541     1065.850
    23          334.869     1071.387
    24          343.055     1077.130
    25          345.036     1078.595
 Circle Center At X =   108.705 ; Y =  1402.500 ; and Radius =   400.981
        Factor of Safety
       ***    1.269   ***
 Failure Surface Specified By 21 Coordinate Points
   Point        X-Surf       Y-Surf
    No.          (ft)         (ft)
     1          200.000     1021.528
     2          209.915     1022.829
     3          219.790     1024.402
     4          229.619     1026.246
     5          239.393     1028.360
     6          249.105     1030.742
     7          258.748     1033.391
     8          268.314     1036.304
     9          277.797     1039.479
    10          287.188     1042.914
    11          296.482     1046.606
    12          305.670     1050.553
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13	314.746	1054.751
14	323.703	1059.197
15	332.535	1063.888
16	341.234	1068.820
17	349.794	1073.990
18	358.208	1079.394
19	366.471	1085.027
20	374.575	1090.885
21	379.841	1094.917

Circle Center At X = 157.709 ; Y = 1382.362 ; and Radius = 363.304

Factor of Safety

*** 1.272 ***

Failure Surface Specified By 19 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	192.653	1019.382
2	202.621	1020.179
3	212.554	1021.334
4	222.439	1022.845
5	232.264	1024.712
6	242.014	1026.930
7	251.679	1029.498
8	261.245	1032.412
9	270.700	1035.668
10	280.032	1039.262
11	289.229	1043.189
12	298.278	1047.445
13	307.168	1052.023
14	315.888	1056.919
15	324.426	1062.124
16	332.771	1067.634
17	340.913	1073.440
18	348.841	1079.536
19	350.047	1080.535

Circle Center At X = 175.489 ; Y = 1296.793 ; and Radius = 277.941

Factor of Safety

*** 1.276 ***

**** END OF GSTABL7 OUTPUT ****