REPORT OF
GEOTECHNICAL INVESTIGATION
PROPOSED SINGLE FAMILY RESIDENCES
LOTS 94 AND 95 OF TRACT NO. 7928
9733-9737 NORTH OAK BEND DRIVE
LOS ANGELES, CALIFORNIA

FOR

MR. GEORGE BARSEGHIAN

PROJECT NO. 04-352-02

MARCH 30, 2004

Applied
Earth
Sciences GEOTECHNICLAL & ENVIROMENTAL ENGINEERING CONSULTANTS

March 30, 2004 04-352-02

Mr. George Barseghian
4005 Foothill Boulevard
La Crescenta, California 91214

Subject: Report Of Geotechnical Investigation
Proposed Single Family Residences
Lots 94 And 95 Of Tract No. 7928
9733-9737 North Oak Bend Drive
Los Angeles, California

Dear Mr. Barseghian:

INTRODUCTION

This report presents the results of a preliminary geotechnical investigation for the subject project. During the course of this investigation, the engineering properties of the subsurface materials, native soil and bedrock, were evaluated in order to evaluate slope stability and to provide recommendations for design and construction of temporary excavations, retaining walls, foundations, and grading. The investigation included geologic mapping, subsurface exploration, soil and bedrock sampling, laboratory testing, engineering and geological evaluation and analysis, consultation and preparation of this report.

During the course of this investigation, the provided Site Plans provided by the client were used as reference. The maps showed site topography as well as the preliminary location of the proposed buildings.

The enclosed Geologic Map and Site plan (Drawing No.1), shows surface geology and approximate locations of the test pits in relation to the site boundaries. This drawing also shows the approximate locations of the Geologic Cross Sections A-A' and B-B'. Drawing Nos. 2 and 3 show the profiles of the Geologic Cross Sections A-A' and B-B'. Drawing No. 4 shows the Site Vicinity Map.

The attached Appendix I, describes the method of field exploration. Figure Nos. I-1 through I-6 present summaries of the materials encountered at the location of our exploratory test holes. Figure No. I-7 presents a key to the log of exploratory test pits.

The attached Appendix II describes the laboratory testing procedures. Figure Nos. II-1 and II-2 present the results of direct shear and consolidation tests on selected undisturbed samples.

PROJECT CONSIDERATIONS

It is our understanding that the proposed project will consist of construction of two single family residences (one on each lot). The proposed buildings are expected to be three stories high constructed of wood frame. Garages will be provided beneath the front portions of the building with floors established a few feet above the street level. The floors of the garages and the lower levels, will be in a form of concrete grade slabs. The approximate locations of the proposed buildings with respect to site boundaries are shown on the enclosed Site Plan; Drawing No. 1.

It is anticipated that the finished grades for the proposed buildings will be created through mainly cutting operations (in a form of terraces). The resulting vertical cuts will then be supported by retaining walls having vertical heights of less than 15 feet.

Based on the results of our investigation, it is expected that the major portion of the excavation will be made through massive rock with no through-going planes of weakness. Therefore, all retaining walls for this project can be designed based on normal lateral earth pressures.

Structural loading data was not available during the course of preparation of this report. For the purpose of this investigation, however, it is assumed that maximum concentrated loads will be on the order of 75 kips, combined dead plus frequently applied live loads. The retaining wall footings are expected to have loads of on the order of 6 kips per lineal foot.

SITE GRADING

The proposed grading plan was not available during preparation of this report. It is anticipated, however, that the proposed finished grades will be created in a form of terraces, through mainly cutting operations. As part of the site grading work, some wall backfilling will also be made. Before backfilling, any fill and native soil will be shaved so that the new fill will be constructed and properly benched into rock. Also, all wall backfill materials should be non-expansive and granular in nature.

As part of the site grading, retaining walls will be constructed. The proposed walls are expected to have vertical heights of less than 15 feet. The walls within the proposed buildings will be integrated into the proposed structures and will be part of the permanent buildings.

SITE CONDITIONS

SITE LOCATION AND CONDITIONS

The site is located on a northeasterly-facing slope on the north flank of the Verdugo Mountains in the Tujunga area of the city of Los Angeles, California. The site consists of two contiguous lots that together are roughly rectangular in shape and approximately 155 feet long in the maximum northeasterly direction and approximately 55 to 125 feet wide in the northwesterly direction. The lots are bound on the north and northeast by Oak Bend Drive (currently an unimproved road), on the east and south by undeveloped lots and on the west by a developed lot with a residence. The subject lots are also undeveloped but the western lot has undergone a minor amount of grading next to the road and has a cut slope along the west property line that was cut to provide access to the adjacent lot. A small concrete tank exists on this lot adjacent to the cut.

From the road the lots ascend southerly some 70 feet to the south property lines on an average gradient of 2.2:1 (horizontal to vertical) although locally they are as steep as 1:1 (see Cross Sections A-A' and B-B', Drawing Nos. 2 and 3). There is also a 5 - to 25 - foot high west facing cut slope along the west property line that has a gradient of 0.75:1. Total relief on the site is approximately 70 feet.

Vegetation on the lot slopes consists of annual weeds and grasses and a few medium native shrubs.

Runoff from the lots slopes is by sheetflow to the road.

No evidence of shallow ground water, seepage or springs was observed anywhere on the site including within the test pits.

GEOLOGIC AND SOIL CONDITIONS

Inspection of the test pits, as well as review of published geologic maps indicates that the lots are underlain by artificial fill, colluvial soil and crystalline basement rock of Cretaceous age. Descriptions and distribution of these units are as follows:

Artificial Fill (Af) The fill consists of moderately compact, light-brown, porous, slightly silty, coarse to fine sand containing scattered gravel. The fill rests on natural soil. It is two feet thick and is localized on the western lot.

Colluvial Soil (Qsw) The colluvial soil consists of moderately dense, brown, porous, slightly silty to silty, coarse to fine sand. This unit varies from inches to two feet in thickness and overlies basement rock over nearly the entire slope.

Basement Rock (qm) The basement rock on the site is relatively uniform and consists of very firm to moderately hard, light brown, massive, medium-grained, biotite, quartz monzonite. This rock is slightly jointed and fractured, moderately to highly weathered and competent.

No throughgoing planes of weakness were observed in any of the rock exposed in the test pits or road cuts on the site.

No known faults cross or trend toward the site.

PREVENTIVE SLOPE MAINTENANCE

For the ascending slopes, and all slopes in general, it is important to reduce the risk of problems relating to slope instability. It is recommended that the owners implement a program of normal slope maintenance. This maintenance program should include annual clean out of drains, elimination of gophers and earth burrowing rodents, maintaining low water consumptive, fire retardant, deep rooted ground cover and proper irrigation.

Hillside properties are typically subject to potential geotechnical hazards including mudslides, spalling of slopes, erosion and concentrated flows. It must be emphasized that responsible maintenance of these slopes, and the property in general, by the owner, using proper methods, can reduce the risk of these hazards significantly.

SEISMIC DESIGN CONSIDERATIONS

The subject site is located within UBC Seismic Zone 4. Based on the results of our field exploration, the subject site can be assumed to have a soil profile type of Sc in accordance with Table 16-J of 1997 Uniform Building Code.

The closest active fault to the subject site is the Sierra Madre fault which is designated as Type B seismic source in accordance with CDMG (California Division of Mines and Geology). The subject site occurs less than 2 kilometers from this near source zone in accordance with Map M-32 of ICBO (International Conference of Building Officials February 1998). At this distance, for a seismic source B, the near source factors Na and Nv would be 1.3 and 1.6, respectively, in accordance with Tables 16-S and 16-T of the 1997 UBC.

EVALUATION AND RECOMMENDATIONS

GENERAL

Based on the geotechnical engineering data derived during this investigation, it is believed that the proposed construction may be made as planned. It is our opinion that when the proposed construction and grading are made, following the recommendations in this report, the site will be safe for the proposed structures against the hazard of landslide, settlement, or slippage.

Because of hillside nature of the subject site and that all foundations will be established in bedrock, soil liquefaction will not be an issue at the subject site.

It is anticipated that the major portion of the planned excavation will be made through massive rock with no through-going plane of weakness. Therefore, all retaining walls for this project can be designed based on normal lateral earth pressures.

It is anticipated that, after the planned excavation is made, rock will be exposed at the finished grades. The rock is expected to provide very good support for the proposed residences and the associated retaining walls through conventional spread footing foundation system.

The results of our analysis indicated that the subject lots with the planned grading will remain grossly stable with respect to deep-seated slope instability. See the enclosed engineering calculation sheets

Our analysis also indicated that the soil cover has adequate factor of safety against surficial slope instability. However, normal erosion, the intensity of which will increase during rainy seasons should be anticipated. It is, therefore, recommended that the retaining walls supporting the ascending slope to have a minimum freeboard of 30 inches and a paved drain. The freeboard should be cleaned after each rainy season. Also, the proposed residence should have at least 15 feet horizontal setback from the walls supporting the ascending slope.

Grade slabs may be cast directly over rock, or properly compacted fill soils. Where grade slabs span between soil and rock, the rock should be over-excavated by some 12 inches and the excavated materials could be used for the compacted fill. This will create uniform subgrade conditions beneath grade slabs and reduce the chances of uneven subgrade movements. Due to granular nature, soil expansion will not be an issue at the subject site.

The following sections present our specific recommendations for temporary excavations, site grading, site drainage, foundations, lateral design, grade slabs, retaining walls, and observations during construction.

TEMPORARY EXCAVATIONS

Unsupported/open Cuts: It is expected that temporary excavations will be made during the course of site grading work. The vertical height of such cuts are expected to be less than 15 feet.

Based upon the engineering characteristics of the subsurface materials, it is our opinion that temporary excavation slopes through soil and massive rock with no through-going plane of weakness may be made in accordance with the following table:

Maximum Depth of Cut (FT)	Maximum Slope Ratio (Horizontal:Vertical)	
	Soil	Rock
5	Vertical	Vertical
5-12	3/4:1	Vertical
>12	1:1	1/2:1

It is recommended that the project Engineering Geologist inspect the cut slopes within larger scale excavations as soon as five feet of bedrock is exposed in order to confirm the results of our findings. Modification to our recommendations may be necessary if significant variations are noted.

Water should not be allowed to flow over the top of the excavation in an uncontrolled manner. No surcharge should be allowed within a 45-degree line drawn from the bottom of the excavation. Excavation surfaces should be kept moist but not saturated to retard raveling and sloughing during construction.

It would be advantageous, particularly during wet season construction, to place polyethylene plastic sheeting over the slopes. This will reduce the chances of moisture changes within the soil banks and material wash into the excavation.

It should be noted that the recommendations presented in this section are for use in design and for cost estimating purposes prior to construction. The contractor is solely responsible for safety during construction.

SITE GRADING

The major portion of the site grading work will involve excavation (cutting operation) in order to create the proposed finished grades. As part of the site grading work, some wall backfilling will also be made. All wall backfill should be granular in nature.

Prior to placing any fill, the Soil Engineer and Engineering Geologist should observe the excavation bottoms. The areas to receive fill should be scarified and compacted in-place to a relative compaction of at least 90 percent at optimum moisture content.

General guidelines regarding site grading are presented below in an itemized form which may be included in the earthwork specification. It is recommended that all fill be placed under engineering observation and in accordance with the following guidelines:

1. All vegetation should be shaved and removed from the site before site grading work is initiated;

2. Subdrain should be installed behind all retaining walls. All subdrain should be observed and approved by this office before backfilling;

3. The subdrain pipes should be laid at a minimum grade of two percent for self cleaning.

4. The excavated materials from the site may be reused in the areas of new fill. Wall backfill, however, should consist of granular materials.

5. Rocks larger than 6 inches in diameter should be excluded from the areas of compacted fill .

6. Fill material, approved by the Soil Engineer, should be placed in controlled layers. Each layer should be compacted to at least 90 percent of the maximum unit weight as determined by ASTM designation D 1557-00 for the material used. All new fill should be properly benched into bedrock;

7. The fill material shall be placed in layers which, when compacted, shall not exceed 8 inches per layer. Each layer shall be spread evenly and shall be thoroughly mixed during the spreading to insure uniformity of material in each layer.

8. When moisture content of the fill material is too low to obtain adequate compaction, water shall be added and thoroughly dispersed until the moisture content is near optimum.

9. When the moisture content of the fill material is too high to obtain adequate compaction, the fill material shall be aerated by blading or other satisfactory methods until near optimum moisture condition is achieved.

10. Inspection and field density tests should be conducted by the Soil Engineer during grading work to assure that adequate compaction is attained. Where compaction of less than 90 percent is indicated, additional compactive effort should be made with adjustment of the moisture content or layer thickness, as necessary, until at least 90 percent compaction is obtained.

FOUNDATIONS

The foundations of the proposed residence, and the associated retaining walls should be established in rock using conventional spread footings. The retaining wall footings should be at least 24 inches wide and should be established at least 24 inches into rock. The footings of the proposed buildings should be at least 18 inches wide and should be established at least 18 inches into rock.

Due to competent nature of the rock, and in-lieu of the Code required 1/3 of the slope height foundation setback, a horizontal foundation setback of 10 feet (to the sloping rock surface) can be maintained for the foundations of this project. This condition will also apply along the west property line of the west lot).

Properly designed and constructed spread footings established in bedrock may be based on allowable maximum bearing pressure of 4,800 pounds per square foot.

The above given allowable maximum bearing value is for the total of dead, plus frequently applied live loads. For short duration transient loading; wind or seismic forces, the given values may be increased by one third.

Total and differential settlements of the proposed residence and the associated retaining walls, supported through spread footings established in rock are expected to be within tolerable limits; less than 1/2 and 1/4 of one inch, respectively. The major portion of the settlements are expected to occur during construction.

LATERAL DESIGN

Lateral resistance at the base of footings in contact with bedrock may be assumed to be the product of the dead load forces and a coefficient of friction of 0.45. Passive pressure cal also be used to resist lateral forces.

A passive pressure of 200 pounds per square foot at the surface of rock and increasing at a rate of 300 pounds per square foot per foot of depth to a maximum value of 4,000 pounds per square foot, may be used for foundations poured against rock.

GRADE SLABS

Grade slabs may be cast directly over rock, or properly compacted fill soils. Where grade slabs span between soil and rock, the rock should be over-excavated by some 12 inches and the excavated materials could be used for the compacted fill. This will create uniform subgrade conditions beneath grade slabs and reduce the chances of uneven subgrade movements. Due to granular nature of the site materials, soil expansion will not be an issue at this site.

In the areas where moisture sensitive floor covering is used and slab dampness cannot be tolerated, a vapor-barrier should be used beneath the slabs. This normally consists of a 6-mil polyethylene film covered with 2 inches of clean sand.

RETAINING WALLS

As part of the site grading work, retaining walls will be constructed. Such walls are expected to be in a form of a cantilevered system with heights of less than 15 feet.

Static design of retaining walls supporting cuts of rock and/or properly compacted granular backfill and level ground conditions, may be based on an equivalent fluid pressure of 40 pounds per square foot per foot of depth. The retaining walls supporting the ascending slope should be based on an equivalent fluid pressure of 48 pounds per square foot per foot of depth.

The above given pressures, assume that hydrostatic pressure will be relieved from the back of the retaining walls through a properly designed and constructed backdrain system. The backdrain system should consist of 4-inch diameter perforated pipes encased in free draining gravel; at least one cubic foot per lineal foot of the pipe.

The uppermost retaining walls supporting the ascending slope should have a minimum freeboard of 30 inches and a paved drain to collect minor debris washed down during rainy season. The freeboard should then be cleaned after rainy seasons.

SITE DRAINAGE

Site drainage should be provided to divert roof and surface waters from the property through non-erodible drainage devices to the street. In no case should the surface waters be allowed to pond behind the walls or flow over the slope surfaces in an uncontrolled manner. A minimum surface slope of one and two percent should be maintained in paved and unpaved areas, respectively.

EXCAVATION

During the course of our field investigation, site materials, soils and upper bedrock were excavated using hand tools. Such materials were explored without significant difficulty. It is anticipated, however, that when excavating deeper rock, coring and/or use of jackhammer will be required.

OBSERVATION DURING CONSTRUCTION

The presented recommendations in this report assume that all structural footings will be established in rock. All foundation excavations should be observed by a representative of this office. It is essential to assure that all excavations are made at proper dimensions, are established in the recommended bearing material and are free of loose and disturbed soils.

The project engineering geologist should observe the temporary cut slopes. Modification to our recommendations may be necessary if significant variations are noted in the geologic features of the underlying rock.

Site grading work should be made under continuous observation and testing by a representative of this firm.

CLOSURE

The findings and recommendations presented in this report were based on the results of our field and laboratory investigations combined with professional engineering experience and judgment. The report was prepared in accordance with generally accepted engineering principles and practice. We make no other warranty, either express or implied.

It is noted that the conclusions and recommendations presented are based on exploration "window" borings and excavations which is in conformance with accepted engineering practice. Some variations of subsurface conditions are common between "windows" and major variations are possible.

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The following Plates and Appendices are attached and complete this report:

Engineering Calculation Sheets
Geologic Map and Site Plan-Drawing No. 1
Geologic Cross Section A-A' - Drawing No. 2
Geologic Cross Section B-B' - Drawing No. 3
Vicinity Map - Drawing No. 4
Appendix I Method of Field Exploration
Figure Nos. I-1 through I-7
Appendix II Methods of Laboratory Testing
Figure Nos. II-1 and II-2

Respectfully Submitted,

APPLIED EARTH SCIENCES

Caro J. Minas
Geotechnical Engineer
GE 601

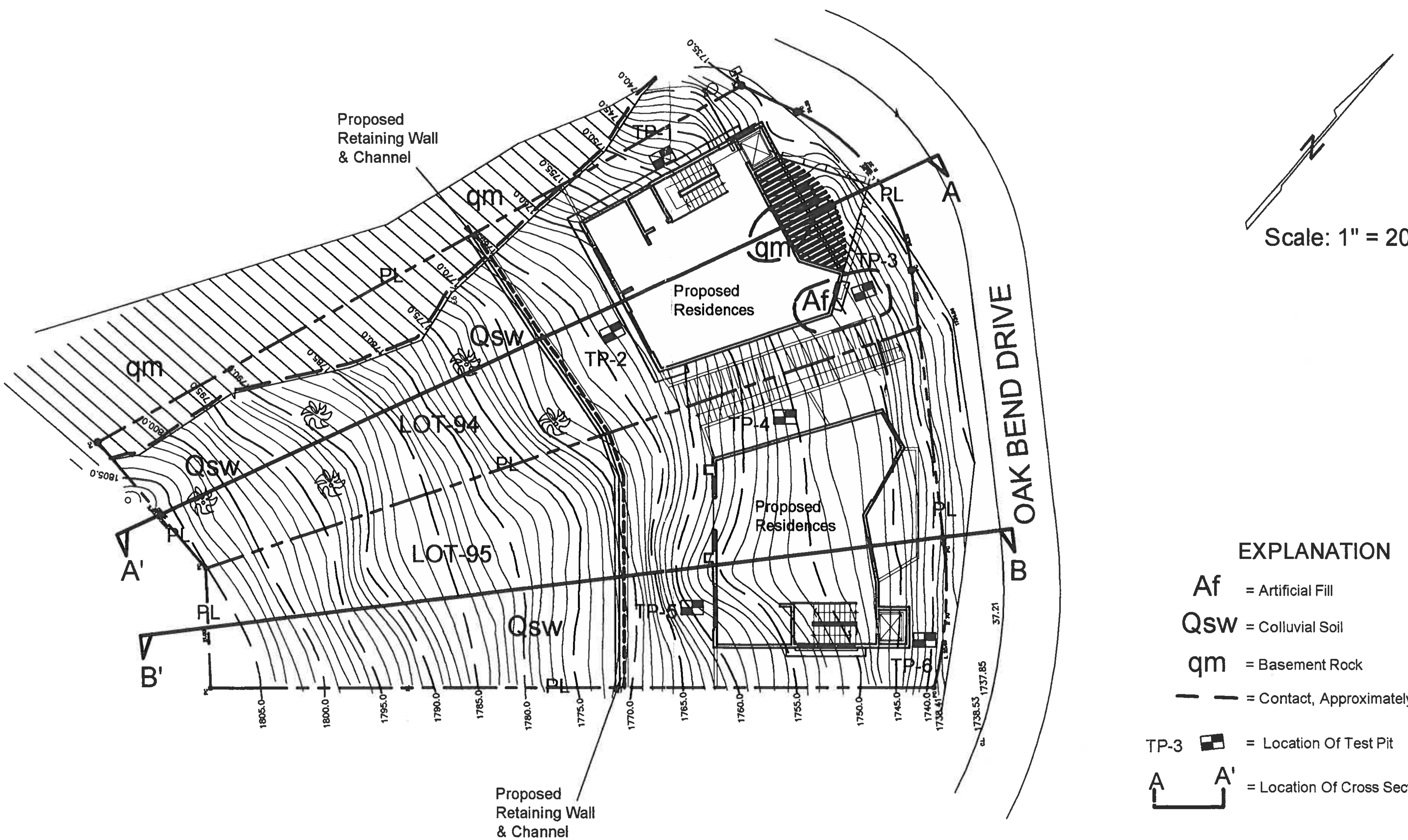
12/2004

Richard Crook Jr.
Engineering Geologist
CEG 924

5/31/05

CJM/RCJ/mg

Distribution: (5)



EXPLANATION

Af = Artificial Fill

Qsw = Colluvial Soil

qm = Basement Rock

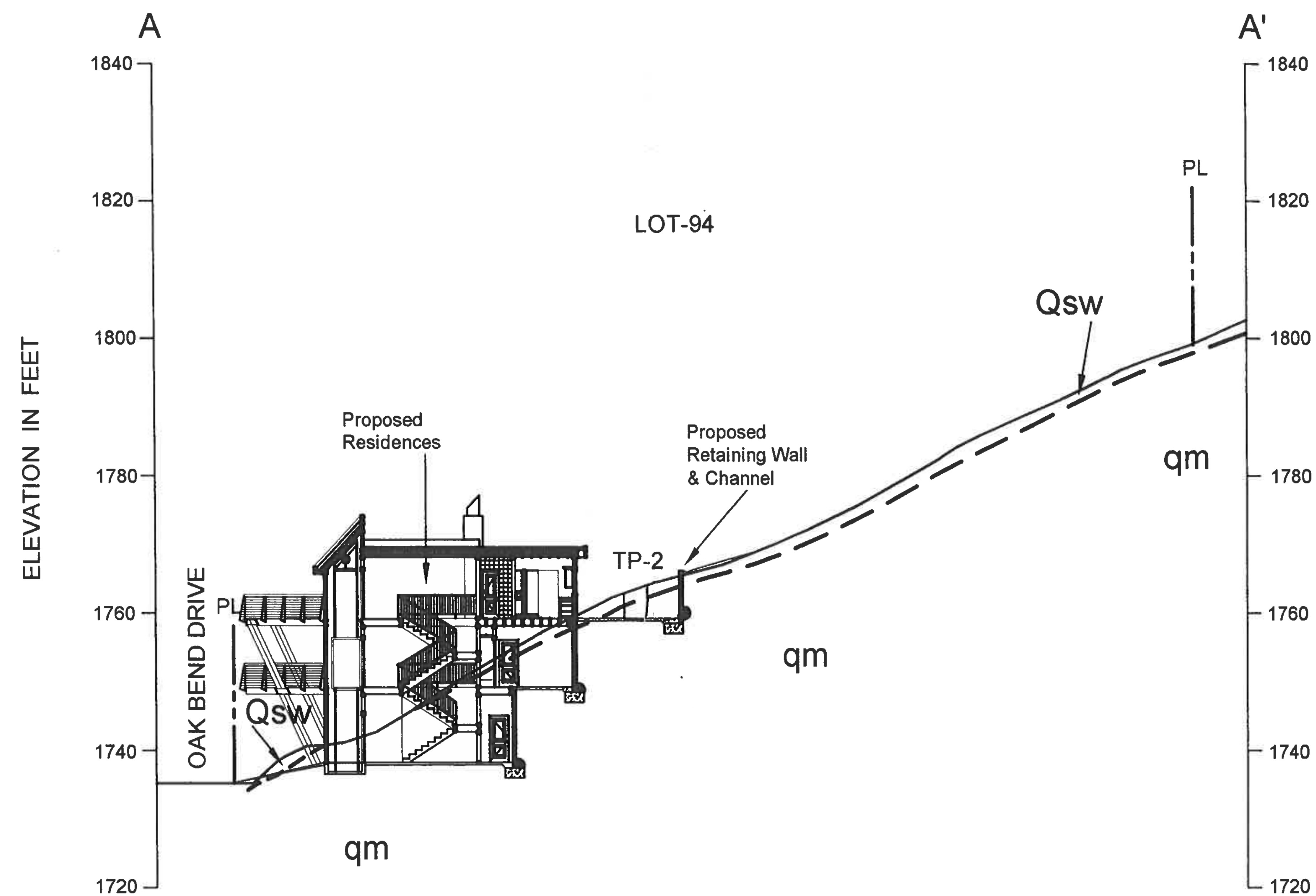
— — = Contact, Approximately Located

TP-3 = Location Of Test Pit

A–A' = Location Of Cross Section

GEOLOGIC MAP & SITE PLAN

Proposed Two Single Family Residences		9733-9737 North Oak Bend Drive, Los Angeles, California	
FOR. Mr. George Barseghian	DATE 3/30/2004	PROJECT No.	04-351-02
APPLIED EARTH SCIENCES GEOTECHAL ENGINEERING CONSULTANTS		DRAWING No.	1



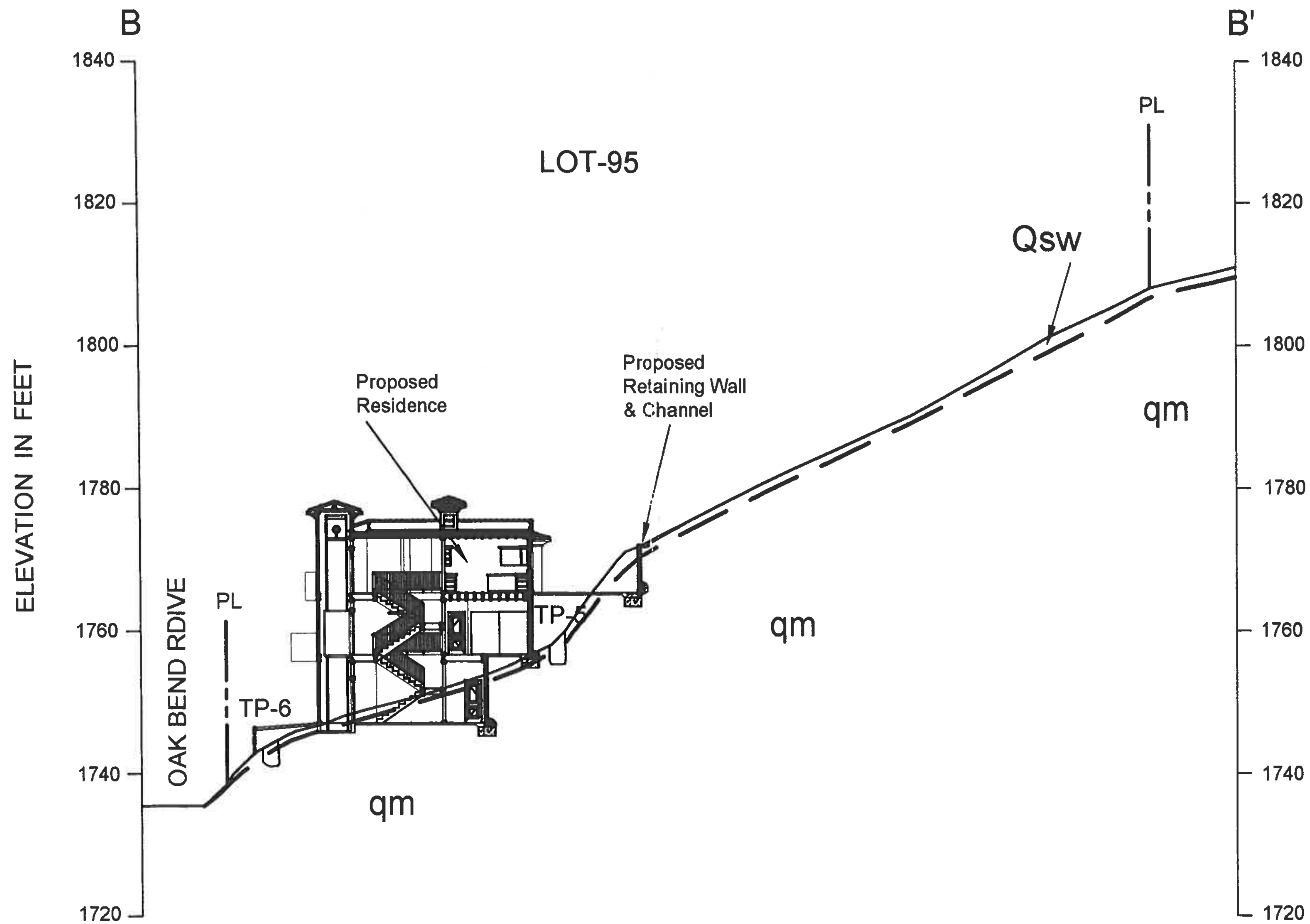
N23°E

Scale: 1" = 20' (V=H)

EXPLANATION

- Af = Artificial Fill
- Qsw = Colluvial Soil
- qm = Basement Rock
- — — — = Contact, Approximately Located

GEOLOGIC CROSS SECTION A-A'					
Proposed Single Family Residence 9733-9737 North Oak Bend Drive, Los Angeles, California					
FOR.	Mr. George Barseghian	DATE	3/30/2004	PROJECT No.	04-351-02
APPLIED EARTH SCIENCES GEOTECHNICAL ENGINEERING CONSULTANTS				DRAWING No.	2



EXPLANATION

Af = Artificial Fill

Qsw = Colluvial Soil

qm = Basement Rock

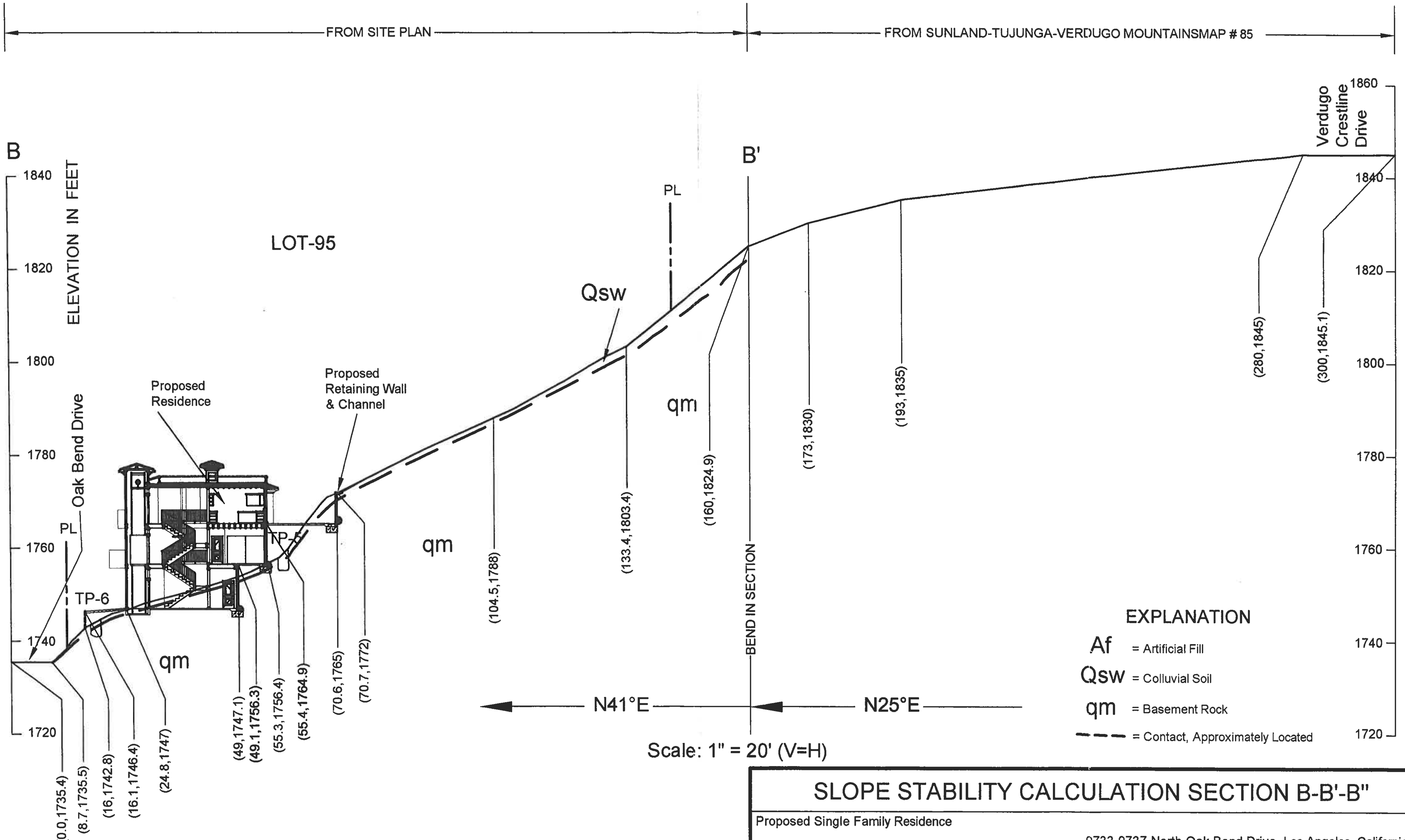
— — = Contact, Approximately Located

N41°E

Scale: 1" = 20' (V=H)

GEOLOGIC CROSS SECTION B-B'

Proposed Single Family Residence		9733-9737 North Oak Bend Drive, Los Angeles, California	
FOR. Mr. George Barseghian	DATE 3/30/2004	PROJECT No.	04-351-02
APPLIED EARTH SCIENCES GEOTECHNICAL ENGINEERING CONSULTANTS		DRAWING No.	3

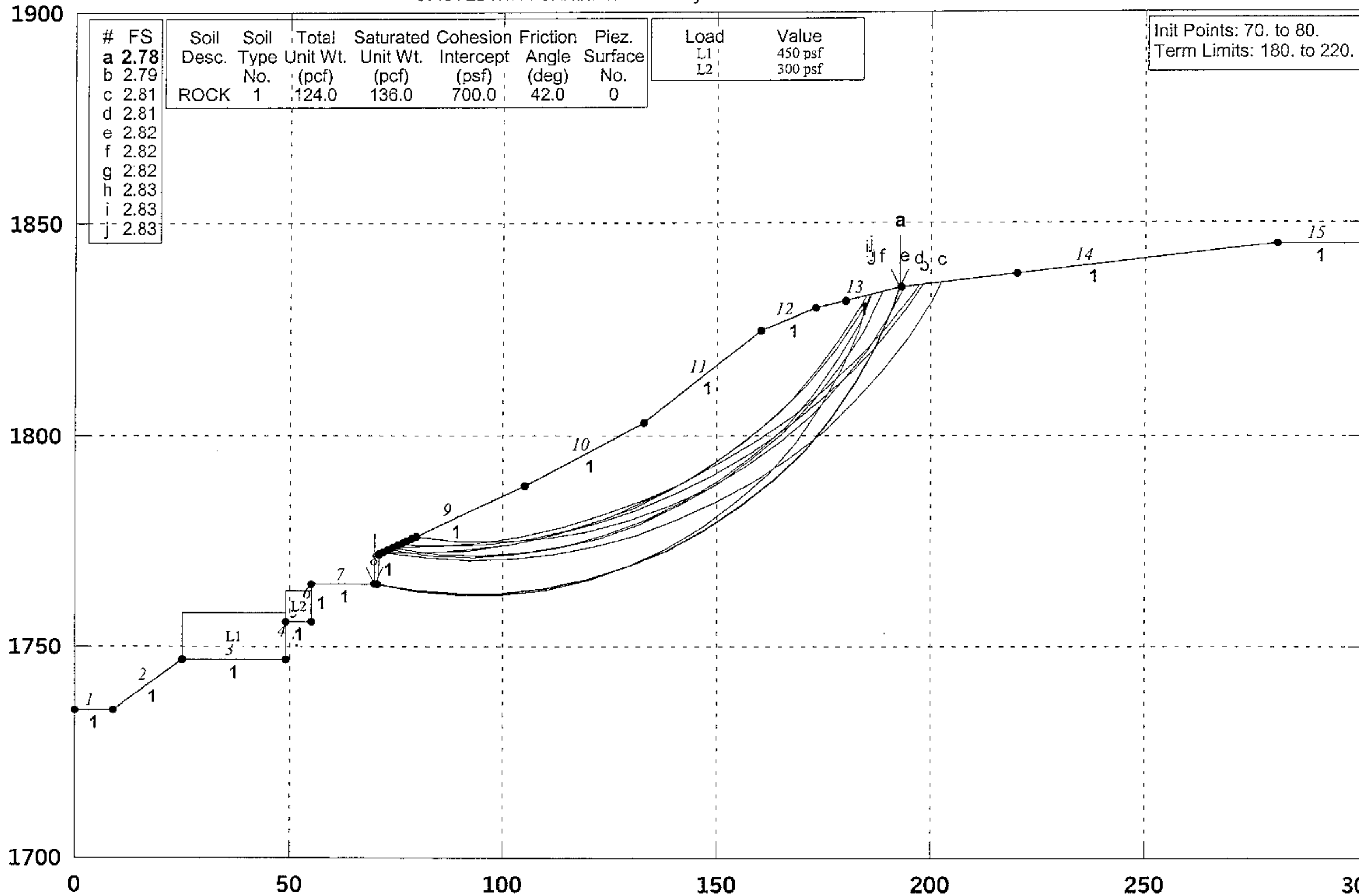


SLOPE STABILITY CALCULATION SECTION B-B'-B"

Proposed Single Family Residence		9733-9737 North Oak Bend Drive, Los Angeles, California	
FOR. Mr. George Barseghian	DATE 3/30/2004	PROJECT No.	04-351-02
APPLIED EARTH SCIENCES GEOTECHNICAL ENGINEERING CONSULTANTS		SHEET No.	1

SLOPE STABILITY FOR SECTION B-B' 04-351-02 OAK BEND DRIVE

C:\STEDWIN\-OAK1.PL2 Run By: ARA JITECHIAN 4/27/04 2:48PM



GSTABL7 v.2 FSmin=2.78

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 2.002, December 2001 **

****
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 Earthquake, and Applied Force Options.
****

Analysis Run Date: 4/27/04
Time of Run: 2:48PM
Run By: ARA JITECHIAN
Input Data Filename: C:-OAK1.
Output Filename: C:-OAK1.OUT
Unit System: English
Plotted Output Filename: C:-OAK1.PLT
PROBLEM DESCRIPTION: SLOPE STABILITY FOR SECTION B-B'
04-351-02 OAK BEND DRIVE

BOUNDARY COORDINATES
15 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	1735.00	9.00	1735.00	1
2	9.00	1735.00	25.00	1747.00	1
3	25.00	1747.00	49.00	1747.00	1
4	49.00	1747.00	49.10	1756.00	1
5	49.10	1756.00	55.00	1756.00	1
6	55.00	1756.00	55.10	1765.00	1
7	55.10	1765.00	71.00	1765.00	1
8	71.00	1765.00	71.10	1772.00	1
9	71.10	1772.00	105.00	1788.00	1
10	105.00	1788.00	133.00	1803.00	1
11	133.00	1803.00	160.00	1825.00	1
12	160.00	1825.00	173.00	1830.00	1
13	173.00	1830.00	193.00	1835.00	1
14	193.00	1835.00	280.00	1845.00	1
15	280.00	1845.00	300.00	1845.00	1

User Specified Y-Origin = 1700.00(ft)

ISOTROPIC SOIL PARAMETERS
1 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	124.0	136.0	700.0	42.0	0.00	0.0	0

BOUNDARY LOAD(S)
2 Load(s) Specified

Load No.	X-Left (ft)	X-Right (ft)	Intensity (psf)	Deflection (deg)
1	25.00	49.00	450.0	0.0
2	49.10	55.00	300.0	0.0

NOTE - Intensity Is Specified As A Uniformly Distributed
Force Acting On A Horizontally Projected Surface.

A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Circular Surfaces, Has Been Specified.
100 Trial Surfaces Have Been Generated.
10 Surface(s) Initiate(s) From Each Of 10 Points Equally Spaced
Along The Ground Surface Between X = 70.00(ft)
and X = 80.00(ft)
Each Surface Terminates Between X = 180.00(ft)
and X = 220.00(ft)
Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is Y = 1750.00(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 Evaluated = 100
Statistical Data On All Valid FS Values:
FS Max = 4.098 FS Min = 2.781 FS Ave = 3.188
Standard Deviation = 0.346 Coefficient of Variation = 10.85 %
Failure Surface Specified By 17 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	70.00	1765.00
2	79.86	1763.31
3	89.83	1762.55
4	99.83	1762.75
5	109.76	1763.90
6	119.54	1765.98
7	129.08	1768.98
8	138.29	1772.87
9	147.09	1777.62
10	155.40	1783.18
11	163.15	1789.51
12	170.26	1796.54
13	176.67	1804.21
14	182.32	1812.46
15	187.17	1821.21
16	191.16	1830.38
17	192.64	1834.91

Circle Center At X = 92.75 ; Y = 1867.80 ; and Radius = 105.29
Factor of Safety
*** 2.781 ***
Individual data on the 22 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	1.0	10.7	0.0	0.0	0.	0.	0.0	0.0	0.0
2	0.1	45.6	0.0	0.0	0.	0.	0.0	0.0	0.0
3	8.8	10866.2	0.0	0.0	0.	0.	0.0	0.0	0.0
4	10.0	19235.5	0.0	0.0	0.	0.	0.0	0.0	0.0
5	10.0	25472.7	0.0	0.0	0.	0.	0.0	0.0	0.0
6	5.2	15225.8	0.0	0.0	0.	0.	0.0	0.0	0.0
7	4.8	15141.2	0.0	0.0	0.	0.	0.0	0.0	0.0
8	9.8	34241.5	0.0	0.0	0.	0.	0.0	0.0	0.0
9	9.5	36510.4	0.0	0.0	0.	0.	0.0	0.0	0.0
10	3.9	15625.1	0.0	0.0	0.	0.	0.0	0.0	0.0
11	5.3	21915.5	0.0	0.0	0.	0.	0.0	0.0	0.0
12	8.8	38905.4	0.0	0.0	0.	0.	0.0	0.0	0.0
13	8.3	38609.4	0.0	0.0	0.	0.	0.0	0.0	0.0
14	4.6	21703.5	0.0	0.0	0.	0.	0.0	0.0	0.0
15	3.1	14589.6	0.0	0.0	0.	0.	0.0	0.0	0.0
16	7.1	30465.6	0.0	0.0	0.	0.	0.0	0.0	0.0
17	2.7	10641.3	0.0	0.0	0.	0.	0.0	0.0	0.0
18	3.7	12937.8	0.0	0.0	0.	0.	0.0	0.0	0.0
19	5.7	16325.8	0.0	0.0	0.	0.	0.0	0.0	0.0
20	4.8	9675.1	0.0	0.0	0.	0.	0.0	0.0	0.0
21	4.0	4085.3	0.0	0.0	0.	0.	0.0	0.0	0.0
22	1.5	382.6	0.0	0.0	0.	0.	0.0	0.0	0.0

Failure Surface Specified By 16 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	72.22	1772.53
2	82.22	1772.46
3	92.20	1773.07
4	102.12	1774.37
5	111.92	1776.34

6	121.57	1778.97
7	131.01	1782.26
8	140.21	1786.19
9	149.12	1790.73
10	157.69	1795.88
11	165.89	1801.60
12	173.69	1807.87
13	181.03	1814.65
14	187.90	1821.92
15	194.25	1829.65
16	198.51	1835.63

Circle Center At X = 78.31 ; Y = 1918.27 ; and Radius = 145.86

Factor of Safety

*** 2.792 ***

Failure Surface Specified By 17 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	72.22	1772.53
2	82.13	1771.20
3	92.12	1770.68
4	102.12	1770.97
5	112.06	1772.06
6	121.88	1773.95
7	131.51	1776.63
8	140.90	1780.08
9	149.98	1784.27
10	158.69	1789.18
11	166.98	1794.78
12	174.78	1801.03
13	182.06	1807.88
14	188.76	1815.31
15	194.84	1823.25
16	200.26	1831.65
17	202.65	1836.11

Circle Center At X = 93.57 ; Y = 1894.50 ; and Radius = 123.82

Factor of Safety

*** 2.813 ***

Failure Surface Specified By 16 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	74.44	1773.58
2	84.44	1773.81
3	94.40	1774.70
4	104.28	1776.26
5	114.03	1778.47
6	123.61	1781.33
7	132.99	1784.82
8	142.10	1788.93
9	150.92	1793.64
10	159.41	1798.93
11	167.53	1804.77
12	175.24	1811.14
13	182.50	1818.01
14	189.29	1825.35
15	195.58	1833.13
16	197.24	1835.49

Circle Center At X = 76.10 ; Y = 1923.02 ; and Radius = 149.45

Factor of Safety

*** 2.814 ***

Failure Surface Specified By 15 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	80.00	1776.20
2	89.94	1775.09
3	99.94	1774.90
4	109.91	1775.63
5	119.77	1777.28

6	129.44	1779.83
7	138.84	1783.26
8	147.87	1787.54
9	156.48	1792.64
10	164.57	1798.51
11	172.10	1805.09
12	178.98	1812.35
13	185.16	1820.21
14	190.60	1828.60
15	194.00	1835.12

Circle Center At X = 97.00 ; Y = 1883.23 ; and Radius = 108.37
Factor of Safety
*** 2.817 ***
Failure Surface Specified By 16 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	73.33	1773.05
2	83.25	1771.74
3	93.24	1771.36
4	103.22	1771.94
5	113.11	1773.45
6	122.81	1775.89
7	132.23	1779.23
8	141.30	1783.45
9	149.92	1788.51
10	158.03	1794.36
11	165.56	1800.95
12	172.42	1808.22
13	178.57	1816.11
14	183.95	1824.54
15	188.50	1833.44
16	188.69	1833.92

Circle Center At X = 92.20 ; Y = 1877.04 ; and Radius = 105.69
Factor of Safety
*** 2.817 ***
Failure Surface Specified By 15 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	72.22	1772.53
2	82.22	1772.26
3	92.20	1772.81
4	102.11	1774.18
5	111.87	1776.36
6	121.42	1779.32
7	130.70	1783.06
8	139.63	1787.55
9	148.17	1792.75
10	156.26	1798.63
11	163.84	1805.16
12	170.85	1812.28
13	177.27	1819.96
14	183.03	1828.13
15	186.05	1833.26

Circle Center At X = 80.48 ; Y = 1894.28 ; and Radius = 122.03
Factor of Safety
*** 2.823 ***
Failure Surface Specified By 16 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	70.00	1765.00
2	79.81	1763.06
3	89.77	1762.15
4	99.77	1762.30
5	109.70	1763.49
6	119.45	1765.71
7	128.91	1768.95
8	137.98	1773.16

9	146.56	1778.29
10	154.55	1784.30
11	161.87	1791.11
12	168.44	1798.65
13	174.18	1806.84
14	179.03	1815.59
15	182.94	1824.79
16	185.48	1833.12

Circle Center At X = 93.41 ; Y = 1857.26 ; and Radius = 95.18

Factor of Safety

*** 2.831 ***

Failure Surface Specified By 15 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	75.56	1774.10
2	85.55	1773.69
3	95.54	1774.16
4	105.45	1775.51
5	115.20	1777.72
6	124.72	1780.79
7	133.93	1784.67
8	142.77	1789.36
9	151.16	1794.80
10	159.04	1800.95
11	166.34	1807.78
12	173.02	1815.22
13	179.02	1823.22
14	184.30	1831.72
15	184.93	1832.98

Circle Center At X = 85.20 ; Y = 1887.32 ; and Radius = 113.63

Factor of Safety

*** 2.831 ***

Failure Surface Specified By 15 Coordinate Points

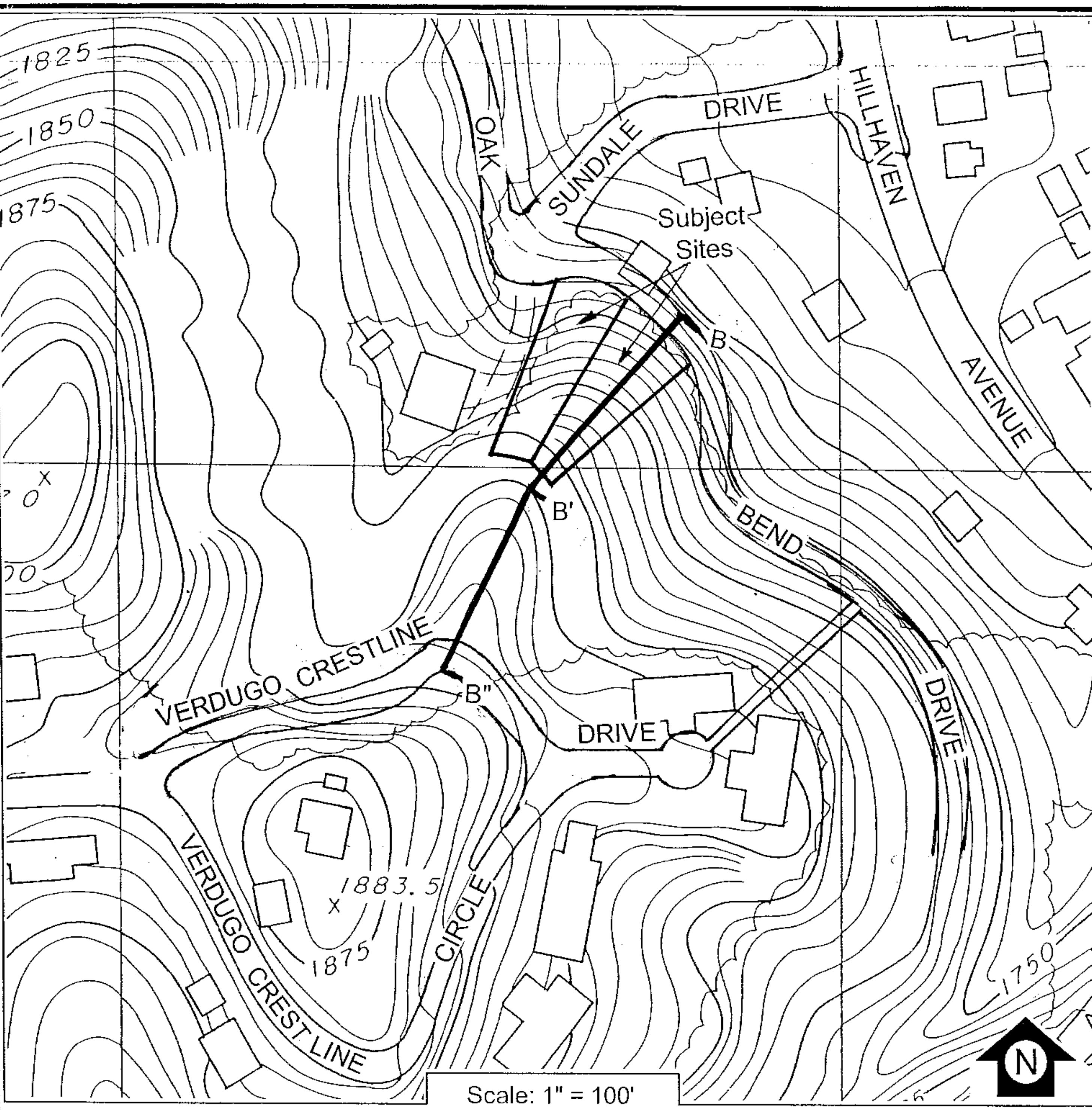
Point No.	X-Surf (ft)	Y-Surf (ft)
1	74.44	1773.58
2	84.34	1772.16
3	94.33	1771.73
4	104.32	1772.30
5	114.20	1773.86
6	123.87	1776.40
7	133.24	1779.88
8	142.22	1784.28
9	150.72	1789.55
10	158.65	1795.64
11	165.94	1802.49
12	172.51	1810.03
13	178.30	1818.18
14	183.24	1826.88
15	186.08	1833.27

Circle Center At X = 93.62 ; Y = 1872.14 ; and Radius = 100.40

Factor of Safety

*** 2.833 ***

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



Scale: 1" = 100'

Reference: From Sunland-Tujunga-Verdugo Mountains Area Map # 85

VICINITY MAP

Proposed Two Single Family residences

9733-9737 North Oak Bend Drive, Los Angeles, California

FOR. Mr. George Barseghian	DATE 3 / 30 / 2004	PROJECT No. 04-351-02
APPLIED EARTH SCIENCES GEOTECHNICAL ENGINEERING CONSULTANTS		DRAWING No. 4

APPENDIX I

METHOD OF FIELD EXPLORATION

In order to define the subsurface conditions, six test pits were excavated on the site. The test pits, extended to a maximum depth of about 6 feet were excavated using hand tools.

The approximate location of the excavated test pits are shown on the enclosed Site Plan. Continuous logs of the subsurface conditions, as encountered in the test pits, were recorded during the field work and are presented on Figure Nos. I-1 through I-6 within this Appendix. These figures also show the number and approximate depths of each of the recovered soil and rock samples.

Relatively undisturbed samples of the subsurface materials were obtained by driving successive drops of a 36-pound metal weight free-falling a vertical distance of about 30 inches. The relatively undisturbed soil and bedrock samples were retained in brass liner rings 2.5 inches in diameter and 1.0 inch in height.

Field investigation for this project was performed on March 8, 2004. The material excavated from the test pits was placed back and compacted upon completion of the field work. Such material may settle. The owner should periodically inspect these areas and notify this office if the settlement creates a hazard to persons or property.

TEST PIT No. 1

DATE EXCAVATED: 03/08/04

GROUND ELEVATION: ± 1750'

DEPTH IN FEET	DRY DENSITY (PCF)	FIELD MOISTURE (%DRY WEIGHT)	ATTITUDE	BLOWS PER FOOT	MATERIAL TYPE	MATERIAL SYMBOL	MATERIAL DESCRIPTION
	105	4		22	SAND (SM)		**Colluvium,** Medium dense, slightly moist, light brown, silty, fine to medium grained, porous, numerous roots
	124	6		61	ROCK (GD)		**Biotite Quarts Monzonite,** Very firm to moderately hard, slightly moist, light brown, medium grained, massive (top 12 inches moderately fractured, highly weathered and creep prone), slightly fractured, moderately weathered (below 12 inches)
5							End Of Test Pit @ 4 feet No Water No Caving
10							
15							

LOG OF EXPLORATORY TEST PIT

JOB NAME: Mr. George Barseghian

JOB No. 04-352-02

APPLIED EARTH SCIENCES
GEOTECHNICAL ENGINEERING CONSULTANTS

FIGURE NO. I-1

TEST PIT No. 2

DATE EXCAVATED: 03/08/04

GROUND ELEVATION: ± 1764'

DEPTH IN FEET	DRY DENSITY (PCF)	FIELD MOISTURE (%DRY WEIGHT)	ATTITUDE	BLOWS PER FOOT	MATERIAL TYPE	MATERIAL SYMBOL	MATERIAL DESCRIPTION
					SAND (SM)		**Colluvium,** Medium dense, slightly moist, light brown, silty, fine to medium grained, porous, numerous roots
	107	6		19			
					ROCK (GD)		**Biotite Quarts Monzonite,** Very firm to moderately hard, slightly moist, light brown, medium grained, massive (top 12 inches moderately to highly fractured, highly weathered and creep effected), slightly fractured, moderately weathered (below 12 inches)
	133	5		82			
5							End Of Test Pit @ 4.5 feet No Water No Caving
10							
15							

LOG OF EXPLORATORY TEST PIT

JOB NAME: Mr. George Barseghian

JOB No. 04-352-02

APPLIED EARTH SCIENCES
GEOTECHNICAL ENGINEERING CONSULTANTS

FIGURE NO. I-2

TEST PIT No. 3

DATE EXCAVATED: 03/08/04

GROUND ELEVATION: ± 1744'

DEPTH IN FEET	DRY DENSITY (PCF)	FIELD MOISTURE (%DRY WEIGHT)	ATTITUDE	BLOWS PER FOOT	MATERIAL TYPE	MATERIAL SYMBOL	MATERIAL DESCRIPTION
					SAND (SM)		**Fill:** Moderately compact, slightly moist, light brown, silty, fine to coarse grained **SAND** with scattered gravel, porous
	101	4		51			
	109	3		24	SAND (SM)		**Colluvium,** Medium dense, slightly moist, brown, silty, fine to medium grained, porous, fine roots
					ROCK (GD)		**Biotite Quarts Monzonite,** Very firm to moderately hard, slightly moist, light brown, medium grained, massive, slightly to moderately fractured, moderately to highly weathered
5	127	5		68			
							End Of Test Pit @ 6 feet No Water No Caving
10							
15							

LOG OF EXPLORATORY TEST PIT

JOB NAME: Mr. George Barseghian

JOB No. 04-352-02

APPLIED EARTH SCIENCES
GEOTECHNICAL ENGINEERING CONSULTANTS

FIGURE NO. I-3

TEST PIT No. 4

DATE EXCAVATED: 03/08/04

GROUND ELEVATION: ± 1752'

DEPTH IN FEET	DRY DENSITY (PCF)	FIELD MOISTURE (%DRY WEIGHT)	ATTITUDE	BLOWS PER FOOT	MATERIAL TYPE	MATERIAL SYMBOL	MATERIAL DESCRIPTION
	107	3		19	SAND (SM)		**Colluvium,** Medium dense, slightly moist, light brown, silty, fine to medium grained, scattered gravel, porous
	119	4		82	ROCK (GD)		**Biotite Quarts Monzonite,** Very firm to moderately hard, slightly moist, light brown, medium grained, massive (top 12 inches highly fractured, highly weathered), slightly fractured, moderately weathered (below 12 inches)
5							End Of Test Pit @ 4 feet No Water No Caving
10							
15							

LOG OF EXPLORATORY TEST PIT

JOB NAME: Mr. George Barseghian

JOB No. 04-352-02

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FIGURE NO. I-4

TEST PIT No. 5

DATE EXCAVATED: 03/08/04 **GROUND ELEVATION: ± 1762'**

DEPTH IN FEET	DRY DENSITY (PCF)	FIELD MOISTURE (%DRY WEIGHT)	ATTITUDE	BLOWS PER FOOT	MATERIAL TYPE	MATERIAL SYMBOL	MATERIAL DESCRIPTION
	106	5		16	SAND (SM)		**Colluvium,** Medium dense, slightly moist, light brown, silty, fine to medium grained, scattered gravel, porous, numerous roots
	126	5		63	ROCK (GD)		**Biotite Quarts Monzonite,** Firm to moderately hard, slightly moist, light brown, medium grained, massive (top 12 inches highly fractured, highly weathered), slightly fractured, moderately weathered (below 12 inches)
5							End Of Test Pit @ 4 feet No Water No Caving
10							
15							

LOG OF EXPLORATORY TEST PIT

JOB NAME: Mr. George Barseghian JOB No. 04-352-02

APPLIED EARTH SCIENCES
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FIGURE NO. I-5

TEST PIT No. 6

DATE EXCAVATED: 03/08/04 **GROUND ELEVATION: ± 1743'**

DEPTH IN FEET	DRY DENSITY (PCF)	FIELD MOISTURE (%DRY WEIGHT)	ATTITUDE	BLOWS PER FOOT	MATERIAL TYPE	MATERIAL SYMBOL	MATERIAL DESCRIPTION
					SAND (SM)		**Colluvium,** Medium dense, slightly moist, light brown, silty, fine to medium grained, scattered gravel, porous, numerous roots
	111	7		24			
					ROCK (GD)		**Biotite Quarts Monzonite,** Firm to moderately hard, slightly moist, light brown, medium grained, massive (top 12 inches highly fractured, highly weathered), slightly fractured, moderately weathered (below 12 inches)
	129	4		72			
5							End Of Test Pit @ 4 feet No Water No Caving
10							
15							

LOG OF EXPLORATORY TEST PIT

JOB NAME: Mr. George Barseghian JOB No. 04-352-02

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FIGURE NO. I-6

MAJOR DIVISIONS			GROUP SYMBOLS	TYPICAL NAMES
COARSE GRAINED SOILS (More than 50% of material is LARGER than No. 200 sieve size)	GRAVELS (More than 50% of coarse fraction is LARGER than the No. 4 sieve size)	CLEAN GRAVELS (Little or no fines)	GW	Well graded gravels, gravel-sand mixtures, little or no fines.
			GP	Poorly graded gravels or gravel-sand mixtures, little or no fines.
		GRAVELS WITH FINES (Appreciable amt. of fines)	GM	Silty gravels, gravel-sand-silt mixtures.
			GC	Clayey gravels, gravel-sand-clay mixtures.
	SANDS (More than 50% of coarse fraction is SMALLER than the No. 4 sieve size)	CLEAN SANDS (Little or no fines)	SW	Well graded sands, gravelly sands, little or no fines.
			SP	Poorly graded sands or gravelly sands, little or no fines.
		SANDS WITH FINES (Appreciable amt. of fines)	SM	Silty sands, sand-silt mixtures.
			SC	Clayey sands, sand-clay mixtures.
FINE GRAINED SOILS (More than 50% of material is SMALLER than No. 200 sieve size)	SILTS AND CLAYS (Liquid limit LESS than 50)		ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity.
			CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays.
			OL	Organic silts and organic silty clays of low plasticity.
	SILTS AND CLAYS (Liquid limit GREATER than 50)		MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts.
			CH	Inorganic clays of high plasticity, fat clays.
			OH	Organic clays of medium to high plasticity, organic silts.
HIGHLY ORGANIC SOILS			Pt	Peat and other highly organic soils.

BOUNDARY CLASSIFICATIONS: Soils possessing characteristics of two groups are designated by combinations of group symbols.

PARTICLE SIZE LIMITS

SILT OR CLAY	SAND			GRAVEL		COBBLES	BOULDERS
	FINE	MEDIUM	COARSE	FINE	COARSE		

NO. 200 NO. 40 NO. 10 NO. 4 3/4 in. 3 in. (12 in.)

U. S. STANDARD SIEVE SIZE

UNIFIED SOIL CLASSIFICATION SYSTEM

JOB NAME: Mr. George Barseghian JOB No. 04-352-02

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FIGURE No: I-7

APPENDIX II

LABORATORY TESTING PROCEDURES

MOISTURE DENSITY

The moisture-density information provides a summary of soil consistency for each stratum and can also provide a correlation between soils found on this site and other nearby sites. The dry unit weight and field moisture content were determined for each undisturbed sample, and the results are shown on the log of exploratory borings.

SHEAR AND RE-SHEAR TESTS

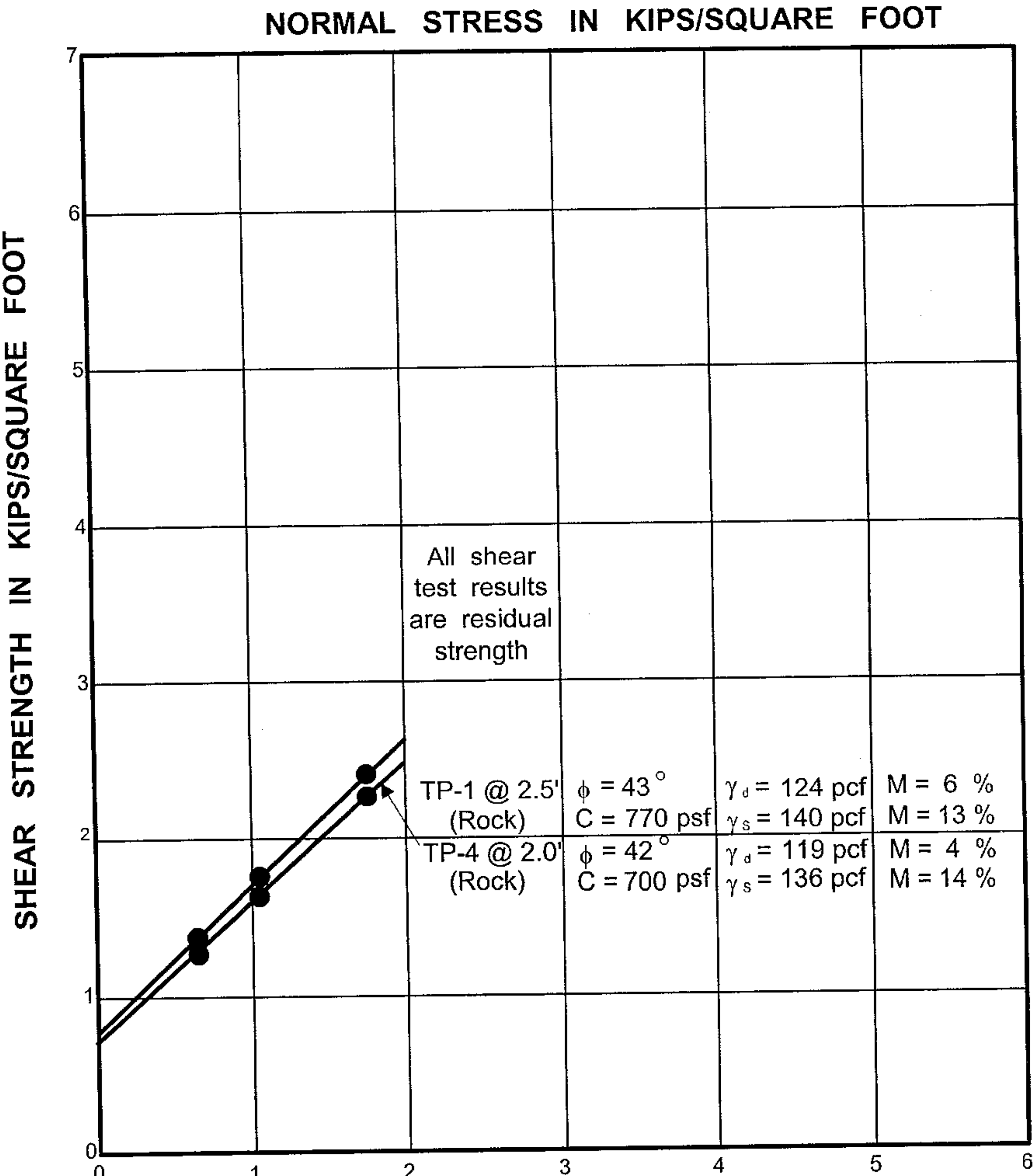
After the samples are pre-soaked overnight under initial confining pressure, a range of normal stresses are applied vertically, and the shear strengths are progressively determined under each load in order to determine the internal angle of friction and the cohesion of the sample. After application of each of the confining pressures, and before the shearing tests, sufficient amount of time is allowed for any excess pore pressure to dissipate. During the course of shear test, the sample is allowed to undergo volume change under a given confining pressure. Under each load, the direct sear tests are continued until the ultimate strength or about 3 percent strain (whichever is lower) is reached. The sample is then allowed to relax to remove the major portion of the viscous component of the shear strength. It should be noted that due to normal disturbance during sampling and laboratory extruding, the measured bedrock strengths are normally significantly lower than the actual values.

In order to determine the strength of the bedrock along bedding, foliation or joint planes or landslide debris strengths, the sample is soaked overnight under initial confining pressure. The sample is then re-sheared several times until the least strengths are obtained. During typical testing, the shearing of the samples are continued until the residual strengths are developed (the shear strengths remain constant, after the peak has been reached, or about 5 percent strain corresponding to approximately 0.100 inches of shearing deformation has occurred). At this point, the tests are stopped. The samples are then pushed back to their original position. The shear test procedure is then repeated along the previously sheared plane. This procedure is repeated several times until constant residual strengths are obtained.

CONSOLIDATION

The apparatus used for the consolidation tests is designed to receive the undisturbed brass ring of soil as it comes from the field. Loads were applied to the test specimen in several increments, and the resulting deformations were recorded at selected time intervals. Porous stones were placed in contact with the top and bottom of the specimen to permit the ready addition or release of water.

Undisturbed specimens were tested at the field and added water conditions. The test results are shown on Figure No. II-2 within this Appendix.



○ FIELD MOISTURE ● WATER ADDED

DIRECT SHEAR TESTS

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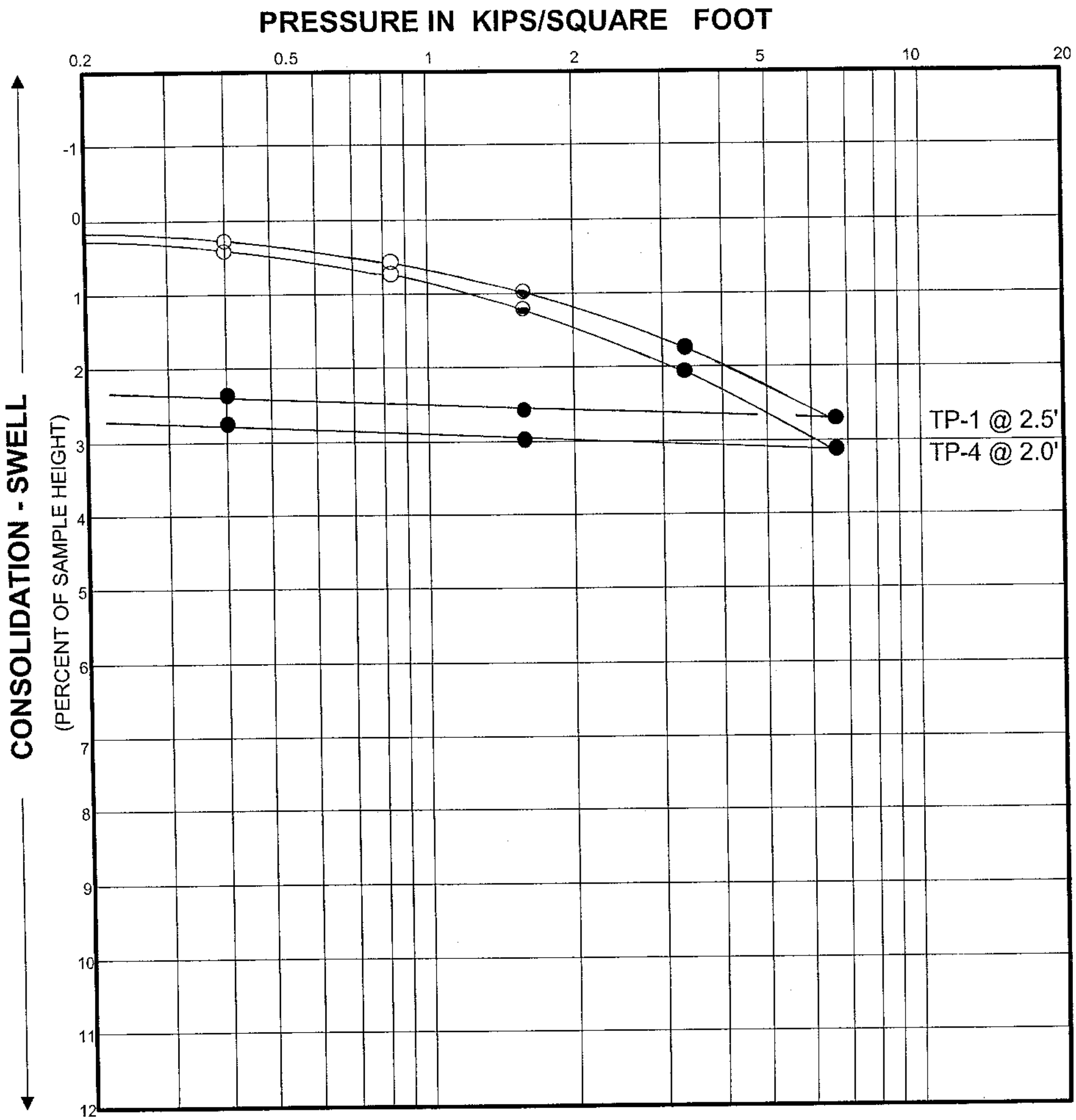
FIGURE NO. II-1



○ **FIELD MOISTURE** ● **WATER ADDED**

SWELL-CONSOLIDATION TESTS

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FIGURE NO. II-2