APPENDIX A

RESIDENTIAL STRUCTURES DOCUMENTS
May 15, 1979

Mrs. Ann Brady
3429 Paseo Del Campo
Palos Verdes Estates, Ca. 90274

SUBJECT: REPORT OF GEOTECHNICAL INVESTIGATION
SINGLE FAMILY RESIDENCE
LOT 3, BLOCK 12, TRACT 7117, MAP BOOK 78198
1471 PASO DEL MAR
SAN PEDRO, CALIFORNIA

Dear Mrs. Brady:

In accordance with your request, we have performed a preliminary geotechnical investigation for the proposed single family residence at the referenced site in order to evaluate the geologic conditions and engineering properties of the existing surface and subsurface soils and bedrocks.

The accompanying report has been substantiated by surface and subsurface exploration and mathematical analysis made in accordance with generally accepted engineering practice, including those field and laboratory tests considered necessary in the circumstances.

It is the professional opinion of the undersigned that this report presents fairly the information requested by you.

Respectfully submitted,

LOCKWOOD-SINGH & ASSOCIATES

R. Bruce Lockwood
CEG 204

Awtar Singh
CE 17727

RBL/AS/CP/TW: so

EXHIBIT A
INTRODUCTION

This report presents the findings and conclusions of a preliminary geotechnical investigation for a proposed single family residence situated on Lot 3, Block 12, Tract 7117, Map Book 78198 at 1471 Paseo Del Mar, San Pedro, California. This investigation of the parcel was undertaken to obtain information on soil and geologic conditions, and to provide recommendations pertinent to construction of the proposed single family residence.

During the course of this investigation, the following reports prepared for Mr. Irving Chaiken and Dr. Kurt Fantl were reviewed:


Soil and geologic data are plotted on a 8-scale Partial Boundary and Topographic Survey, prepared by South Bay Engineering Corporation dated March 26, 1979, and included herein as Plate A. A geologic cross-section was prepared utilizing the same scale, and is included herein as Plate B.
FIELD INVESTIGATION

The field investigation consisted of geologic reconnaissance of the subject site and adjacent areas, along with the excavation of 2 exploratory test pits. The test pits were excavated by a rubber-tired backhoe with a 24-inch wide bucket at the locations shown on Plate A, to a depth of 6 feet below the existing ground surface. Drive tube and bulk samples were obtained from the test pits for subsequent laboratory testing.

Logs of the Test Pits, included as Plates C-1 and C-2, provide a description of the subsurface soils, sample depths, and other pertinent data. All exploratory test pits were backfilled following examination, logging, and mapping.

SITE CONDITIONS

Location and Topography

The subject site is located at the top of a sea cliff in San Pedro. Elevations within the property range from a low of approximately 20 feet to a high of about 101 feet above sea level. The proposed building site consists of a flat pad situated between Paseo Del Mar and the top of a slope that descends to the beach. The southerly facing slope has a ratio of 1 horizontal to 1 vertical. An existing house is located on the slope directly below the pad. At the time of this investigation two open sewer trenches were present at the entry point of the lot. The trenches were left in the same condition as they were found.
Ground Water and Drainage

No evidence of near surface ground water was encountered on the existing slope or in the exploratory test pits. No ground water is anticipated within depths pertinent to proposed future development owing to the elevated position of the property.

Surface drainage comprises sheet flow runoff of incident rainfall derived primarily within the parcel boundaries. No evidence of significant adverse erosion or instability was observed during the course of this investigation.

GEOLOGIC CONDITIONS

Earth Materials

Fill

No significant fill was found on the subject lot during the course of this investigation.

Topsoil

The level portion of the lot is mantled by black, clay topsoil. The topsoil exposed in the exploratory test pits and sewer trench ranges from 3.5 to 4 feet in thickness. Although these thicknesses are thought to be representative, it is possible that thicker soils may be present at other locations on the lot. Desiccation cracks on the surface indicate that the soil is expansive.
Bedrock (Tma)

Bedrock underlying the lot consists of marine sediments of the Altamira member of the Monterey formation of Miocene geologic age. The principal rock type consists of a moderately hard, moderately well bedded, buff colored siltstone.

GEOLOGIC STRUCTURE AND STABILITY

No conditions of past geologic instability were observed during the course of this investigation, and none are anticipated providing customary procedures and precautions are observed during and following grading.

Bedding exposed in the exploratory test pits and on the slope is inclined between 5 degrees and 12 degrees to the west, a direction of dip neutral to the existing slope and favorable from the standpoint of geologic gross stability.

Some ravelling of the slope should be expected, but is not considered a hazard to the proposed residence.
LABORATORY INVESTIGATION

Laboratory testing was programmed following a review of the field data and consideration of the probable foundation design to be evaluated. Laboratory testing included determinations of unit weights, moisture contents, shear strengths, and swelling potential of in situ soils.

The results of shear tests on undisturbed samples are plotted on Plate D.

To determine the expansiveness of the on-site materials, samples were remolded at 50% saturation and then allowed to absorb moisture under a surcharge of 144 psf. The samples of topsoil and bedrock exhibited expansion indices of 132 and 57, respectively. The on-site materials can be classified as moderately to highly expansive. The expansion index tests were performed in accordance with UBC Standard No. 29-2.

SLOPE STABILITY ANALYSIS

The stability of an assumed 100 foot high 1:2:1 (horizontal to vertical ratio) slope along section A-A' is analyzed by using "Singh's Charts". The bedrock materials are considered relatively homogeneous with bedding neutral to the slope. The slope inclination analyzed is the result of an imaginary line projected at 1:4:1 upward from the bedrock contact at the toe of the existing sea cliff to the existing ground surface.

The following shear strength parameters have been assumed in the analysis:
Unit Weight $\gamma = 110$ pcf
Cohesion $C = 400$ psf
Angle of Internal Friction $\phi = 34$ degrees

The values used are ultimate values based on direct shear tests performed on undisturbed samples of the underlying siltstone soaked prior to shearing.

Based on the above values, a factor-of-safety of 1.58 has been obtained for the projected 1:1/2:1 slope. Calculations are included on Plate E.

CONCLUSIONS AND RECOMMENDATIONS:

Based on the field and laboratory investigation described herein, it is the professional opinion of the undersigned that the proposed construction is feasible, subject to the following specific recommendations.

Slope Stability and Restricted Use Area

The calculated factor-of-safety demonstrates an adequate slope stability for the 1:1/2:1 projected slope as shown on Plate B. The area located between the 1:1 projection line and the downslope property line shall be considered a "Restricted Use Area", and no grading or development shall take place therein without further consideration by the soil engineer and engineering geologist. The approximate setback line is shown on Plate A. All development plans for the site shall be reviewed and approved by the soil engineer and engineering geologist prior to construction.
Slope Surface Stability

A slough wall with a freeboard of at least 4 feet is recommended along the lower property lines to retain any talus material that may wash off the face of the existing natural slope. The retaining wall footings shall be established at a minimum depth of 18 inches into competent bedrock. Access shall be provided for periodic clearing away of the retained debris. The existing slope shall be planted as soon as possible with approved ground cover in accordance with local regulations.

Foundations

No foundation shall be placed in existing fill, topsoil, or talus deposit.

All foundations shall be placed a minimum of 18 inches into competent bedrock. The depth to bedrock at the test pit locations ranged from 3 to 4 feet below the existing surface, however, the unsuitable materials could be deeper between test pit locations.

An allowable bearing value of 2000 psf may be assumed for footings placed at the minimum recommended depth in competent bedrock. The bearing value may be increased by 200 psf for each foot of additional depth of footing in bedrock to a maximum of 3000 psf.

Footing reinforcement against expansion shall consist of at least one #5 bar provided near the top of all continuous footings and one #5 bar near the bottom.
Lateral Design

An allowable lateral bearing value of 400 psf may be assumed per foot of foundation placed in competent bedrock to a maximum of 1000 psf. A friction factor of 0.4 may be assumed. Frictional and lateral resistances may be combined, provided the lateral bearing resistance does not exceed 2/3 of allowable bearing. The above values may be increased by 1/3 for short durations of seismic and wind forces.

Setback for Foundations

The outer face of the bottom of all foundations shall be setback a minimum distance of 10 feet from the face of the 14:1 projected imaginary slope shown on Plate B.

Settlement

If the entire building is founded in competent bedrock, as recommended, settlement of 1/2 inch may be anticipated. Overall differential settlement should be on the order of 1/4 inch.

Drainage

Adequate site drainage shall be designed by the civil engineer. In no case shall water be allowed to pond within the site or be drained down the slope in an uncontrolled and concentrated manner.
Earth Pressure

Walls retaining backfill of drained soils or undisturbed bedrock may be designed for earth pressures equivalent to those exerted by a fluid having a density not less than that shown in the following table.

<table>
<thead>
<tr>
<th>Surface Slope of Backfill Horizontal to Vertical</th>
<th>Fluid Density lb/cu. ft.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level</td>
<td>30</td>
</tr>
<tr>
<td>5 to 1</td>
<td>32</td>
</tr>
<tr>
<td>4 to 1</td>
<td>35</td>
</tr>
<tr>
<td>3 to 1</td>
<td>38</td>
</tr>
<tr>
<td>2 to 1</td>
<td>43</td>
</tr>
<tr>
<td>1½ to 1</td>
<td>55</td>
</tr>
<tr>
<td>1 to 1</td>
<td>80</td>
</tr>
</tbody>
</table>

Backfill of drained soils shall have a width at the top of the wedge equal to at least 6/10 of the height of the wall.

The equivalent fluid pressures shall be increased in the event of surcharge affecting the wall.

A drainage blanket and weep holes shall be incorporated in the retaining wall design.
Slabs

Since the site soils and bedrocks are expansive, seasonal moisture changes can cause significant strains in the floor systems, resulting in undesirable cracking. The following floor systems are recommended in the order of preference.

1. First preference - Conventional wood floors.

2. Second preference - If slabs on grade are used, they shall be supported by a minimum thickness of 2 feet of granular non-expansive soil in order to minimize the effects of the underlying expansive soils. Such slabs shall have a minimum thickness of 4 inches and be reinforced with at least No. 3 bars spaced at 24 inches on center both ways, or 6x6-6/6 WWP. At a minimum No. 3 bars at 24 inches shall be provided in the exterior footings and bent three feet into slabs.

A moisture barrier consisting of at least 4 inches of crushed rock, or a plastic waterproof vapor barrier, such as vinyl with a thickness of at least six mils, is recommended for placement beneath the slab to prevent upward capillary movement of soil moisture.

The compacted subgrade soils up to 30 inches below lowest adjacent floor slabs and paving shall be premoistened to at least 120% of the optimum moisture content. The placement and compaction of granular subgrade soils shall be under the observation of the soils engineer. No significant distress to the slabs is anticipated.
3. Third preference - Slabs on-grade may be supported by a lesser thickness of granular non-expansive soil, to a minimum thickness of 4 inches. Slabs constructed in this manner may be subject to some cracking, but this condition is not anticipated to cause any gross instability to the structure. Regular maintenance may be required. All other recommendations, with respect to reinforcement, waterproof barrier, and premoistening of the subgrade soils shall be followed as in Paragraph 2 above.

Grading

Although no grading plan is presently available, it is understood that only very minor grading is planned at the site. Any and all grading shall be approved in advance by the soil engineer and engineering geologist and shall be accomplished in accordance with grading specifications contained elsewhere in this report.

Grading Specifications (If Required)

1. Prior to placement of compacted fill, the site shall be cleared of all vegetation, existing fill, loose topsoil, debris, and any other deleterious materials.

2. If properly mixed, the existing site soils may be used in the compacted fill.

3. Surfaces receiving fill soils shall be scarified, aerated, or moistened to moisture content acceptable to the soils engineer.
4. If the moisture content of the fill soils is below the limits specified by the soils engineer, water shall be added until the moisture content is as required.

5. If the moisture content of the fill soils is above the limits specified by the soils engineer, the fill shall be aerated by blading or other satisfactory methods until the moisture content is as required. If drying of soils are not desired, the wet soils shall be mixed with drier materials to achieve an acceptable moisture content.

6. Natural slopes steeper than 5 horizontal to 1 vertical shall be benched into competent bedrock prior to placement of fill.

7. All fill soils shall be placed in lifts such that after compaction they do not exceed six (6) inches in thickness and compacted until field density test indicate that a compaction of not less than 90% of the maximum density as determined by ASTM D 1557-70 has been obtained.

8. Field density tests shall be made in accordance with ASTM D 1556-64. Field density tests shall be made every 2-foot intervals and not less than 1 test per 500 cubic yards of fill placed.

9. Rocks less than 6 inches in greatest dimension may be placed in the fill, provided:
   a. They are not placed in concentrated pockets.
   b. The fine-grained materials surrounding the rocks are sufficiently compacted.
10. Rocks larger than 6 inches in greatest dimension shall be removed from the site or placed in accordance with specific recommendations of the soils engineer.

11. No fill soils shall be placed during unfavorable weather conditions. When work is interrupted by rains, fill operations shall not be resumed until the field tests by the soils engineer indicate that the moisture content and density of the fill are as previously specified.

12. Planting and irrigation of slopes and installation of erosion control and drainage devices shall comply with the requirements of the Grading Code of controlling agencies.

Inspection

As a necessary requisite to the use of this report, the following shall be observed by the soils engineer and the engineering geologist.

1. Inspection of all foundation excavations.

2. Inspection and testing of all grading and compaction.

3. Inspection of drainage blanket and weep holes for retaining walls.

4. Geologic inspection to verify absence of adverse geologic conditions.
The consultants should be notified at least 2 days in advance of the start of construction. A joint meeting between the client, contractor, and soil and geology consultants is recommended prior to the start of construction to discuss specific procedures and scheduling.

REMARKS:

The conclusions and recommendations contained herein are based on the surface examination and the findings and observations at the test pit locations. Although no significant variations in soil or bedrock conditions are anticipated, if conditions are encountered during construction which appear to be different from those disclosed by the exploratory work, this office shall be notified so as to consider the need for modifications.

Your attention is directed to the fact that while caving was not encountered, it is possible that a trench or excavation would react in an entirely different manner. All shoring and bracing shall be in accordance with the current requirements of the State of California Division of Industrial Safety and other public agencies having jurisdiction.

The report is subject to review by controlling public agencies having jurisdiction.
\textbf{GEOLOGIC CROSS SECTION}

Proj. BRADY - Paseo Del Mar
No. 1561-92
Date May 1979

\textbf{PLATE B}

LOCKWOOD-SINGH & ASSOCIATES
Engineers - Geologists
0.0 - 3.5' **TOPSOIL**

Clay

Black, adobe, moist, sandy, stiff, expansive. Drive tube and bag sample at 3'.

3.5 - 6.0' **BEDROCK (Tma)**

Siltstone

Buff, moist, moderately well-bedded, diatomaceous, moderately hard. Bag Sample at 3.5' to 5' - Drive Tube Sample at 6'.

Strike and dip of bedding: N15°E 50°SE; N15°E 11°NW; Horizontal.

Test Pit Size 2' x 12'

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**GEOLOGIC SKETCH**

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**EQUIPMENT** 24" Rubber-tired Backhoe

**SURFACE ELEVATION** 100

**DATE LOGGED** 30 April 1979

**PROJECT No.** 1561-92

**LOCKWOOD - SINGH & ASSOC.**

**TEST PIT No. 1**

**BRADY-Paseo Del Mar**

**by** GHP

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**PLATE C-1**
Clay

Black, adobe, moist, sandy, stiff, expansive.

4.0 - 6.0' BEDROCK (Tma)

Siltstone

Moist, buff, moderately well bedded, moderately hard.

Strike and dip of bedding: \( N25^\circ E 5^\circ NW \)

Test Pit Size 2' x 10'

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GEOLOGIC SKETCH

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<table>
<thead>
<tr>
<th>EQUIPMENT</th>
<th>TEST PIT No. 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>24'' Rubber-tired backhoe</td>
<td>BRADY-Paseo Del Mar</td>
</tr>
<tr>
<td>SURFACE ELEVATION</td>
<td>100</td>
</tr>
<tr>
<td>DATE LOGGED</td>
<td>30 April 1979</td>
</tr>
<tr>
<td>by CHP</td>
<td>PROJECT No. 1561-92</td>
</tr>
<tr>
<td>PLATE c-2</td>
<td></td>
</tr>
</tbody>
</table>
Undisturbed sample of bedrock (Gritstone), soaked prior to shearing.

- Initial dry density = 77.3%
- Adopted ultimate shear strength parameters:
  - C = 400 psi
  - g = 60
  - h = 500 psi

Shear Strength - kips per square foot

Normal Load - kips per square foot
Given $c$ and $\phi$ of soil and $\gamma$ and $H$ of the slope plot point $c/\gamma H$, $\phi$ and read factor of safety.


\[
\gamma = 110 \text{pcf} \\
c = 400 \text{psf} \\
\phi = 34^\circ \\
H = 100 \text{ ft} \\
\frac{c}{\gamma H} = 0.036 \Rightarrow F.S. = 1.58
\]

SLOPE STABILITY ANALYSIS

Proj. BRADY-Paseo Del Mar
No. 1561-92
Date May 1979

PLATE E

LOCKWOOD-SINGH & ASSOCIATES
GEOTECHNICAL INVESTIGATION
1479 Paseo Del Mar
FR-MR-207-142
in the
City of San Pedro, California
for
MR. DALE McCONNACHIE
1479 Paseo Del Mar
San Pedro, California

October 13, 1978
R-2/2
Scope

Site Conditions

Earth Materials

\ Fill

\ Natural Soil

\ Bedrock

Seismicity

\ Slope Stability

Surface Water

Groundwater

\ Erosion

Conclusions & Recommendations

\ Retaining Wall

\ Slope Stability

\ Seismicity

\ Flooding

Groundwater

\ Soil Parameters

Illustrations

Plate 1 Geologic Map 1" = 20'

Plate 2 Cross Section A-A' 1" = 20'

Plate 3 Cross Section B-B' 1" = 20'

Plate 4 Trench Logs 1 & 2

Plate 5 Trench Logs 3 & 4

Pocket
SCOPE

A geologic investigation was completed during September, 1978, to evaluate geologic conditions related to the subject proposed retaining wall. Specifically, our purpose was to determine if geologic conditions contributed to the causes of failure of the existing retaining wall along the northeast side of the house. This wall, 5.0 feet high and at least 38± feet long when constructed, was broken and collapsed for about 16 feet along the east end, and tilted toward the house for the remaining 22 feet. Several long concrete blocks, partly buried, extend northwesterly to the utility shed and suggest that the original wall was up to 90± feet long.

A proposed retaining wall will be located at the site of the old wall and will be about 95± inches, and 5.0 - 7.0 feet high.

Special efforts were made during this investigation to determine geologic slope stability and its relation to the proposed wall design. Therefore, a geologic map was constructed of the entire slope area above, below, and adjacent to both ends of the proposed wall. In addition, four hand dug trenches were logged.

It should be noted that the base map used in this study was constructed from Brunton-Tape methods, i.e., a method using a graduated magnetic compass for direction, a clinometer for slope angles, and a tape (100') for distance. Such a map is sufficient for purposes of this investigation, but should not be construed as a survey where

(2)
precise locations, elevations, and distances are required.

SITE CONDITIONS

The proposed retaining wall is located on the lower part of a steep (40-45 degrees) sea cliff 115± feet high (see Cross Section A-A') in the City of San Pedro. It will serve to protect an existing residence from surficial downslope movements and possibly sheetflow, while maintaining a walkway between the residence and adjacent slope.

Access to the site is via a four foot wide easement extending 100± feet across the terrace from the centerline of Paseo Del mar Avenue. A wooden stairs zigzags across the steep slope to the proposed retaining wall site approximately 95± feet below the terrace. The slope is located on the southeast part of the Palos Verdes Hills about 6000 feet northwest of Point Fermin. It was formed largely by wave erosion as modified by slope erosion processes such as creep, small mudflows, sheetwash and possibly small (surficial?) landslides.

Existing development at the site includes a residence (currently occupied), guestroom, and utility shed at about the same elevation as the proposed retaining wall; and a vacant house below. The seaward part of the residence is supported by two concrete retaining walls located near the toe of the slope.

Earth Materials

Fill. Artificial fill at or near the proposed construction site is limited to backfill for the existing wall, and possibly a thin layer (1.0± feet) generated during excavation of the walkway between the existing residence and the proposed wall. Fill probably also occurs on the outer portion of the house pad (est. 3-5 feet thick), and as
The fill is apparently generated from native soil and difficult to distinguish from it. It consists of brown, soft, damp, clayey silt and sand with 20-30 percent platy rock fragments where observed as backfill near the existing deformed wall.

**Natural Soil.** Soils in the vicinity of the proposed retaining wall (Trenches 1, 2, & 3) consists of rocky silt and sand. The rocky fraction (20-40 percent) consists of a mixture of plates and blocks of sandstone, siltstone, and hard cherty shale two to six inches in diameter. The matrix silt and sand is brown, damp to moist, soft, and porous. It varies in clay content, but is generally cohesive and slightly to moderately plastic in the field.

The soil layer measured parallel to the natural slope surface is at least five to eight feet thick adjacent to the proposed retaining wall. It accumulates through both soil and surficial rock creep processes with little apparent residual soil development. Trench 1 shows a well defined contact of soil creep with rock creep, and Trench 3 a well defined contact of soil creep with bedrock. Both these well defined contacts are interpreted as active soil creep surfaces.

Soil thickness decreases to about four feet upslope (Trench 4), and feathers out to zero approximately 20 feet from the top of the slope.

**Bedrock** on the site consists of interbedded sandstone, soft as well as hard calcareous siltstone, and cherty shale of the Altamira shale. The sandstone is generally grey to tan, soft, and medium grained; but includes some hard, blue-grey sandstone. The bedrock is generally moderately well bedded and highly fractured. The Altamira shale is overlain by the San Pedro (?) sand.
retaining wall site. The overlying San Pedro sand formation is essentially flat lying. Bedding attitudes in the Altamira Formation measured in Trench 3 and on the periphery of the property in conjunction with data of previous workers suggest a locally folded homocline dipping 5-20 degrees westward. This is an adversely oriented structure day-lighting on the natural sea cliff.

Seismicity

Faults were not observed on or adjacent to the site by previous workers, and none were found during this investigation.

The active Newport-Inglewood, Sierra Madre-Cucamonga and San Andreas faults are located 10, 36, and 57 miles, respectively, from the site. The potentially active Whittier fault lies 25 miles from the site.

Earthquakes with maximum probable magnitudes of 7.0, 6.5, 8.5, and 6.5 are possible during the lifetime of the proposed retaining wall on the Newport-Inglewood, Sierra Madre-Cucamonga, San Andreas, and Whittier faults, respectively.

Slope Stability

Surficial soil failures in the form of small landslides, debris slides, and mudflows occurred during the heavy rains of February-March, 1978. The resulting debris (est. 5-10 yards) accumulated along the northeast side of the house and adjacent areas of the patio. Portions of the old wall were collapsed or tilted during these failures, although some deformation had been noticed earlier by the owner.
Two small, but significant potential landslides are involved during this investigation. One occurs behind the existing tilted retaining wall upslope from the northeast part of the house and is approximately 32 feet wide, 18 feet long, and perhaps at least 8 feet thick. This potential slide is delineated on the basis of an anomalous appearing bulge in the slab and the seaward tilted old retaining wall. The other slide occurs along the west property line and is approximately 30 feet in maximum width, 35-40 feet long, and of unknown depth. It is marked by several 2-6 inch scarplets near the head of the slide.

Large landslides common to other areas of the Palos Verdes Hills were not observed on or adjacent to the proposed construction site during this investigation and none are shown on regional maps of the area. However, the available geologic data suggests the possibility of gross slope instability resulting from adversely oriented bedding planes dipping 5-20 degrees westerly at the proposed construction site. However, gross slope instability was not verified because of the deep soil cover.

Surface Water

Runoff from sheetflow collected on the large area upslope from the proposed retaining wall will be significant.

Groundwater

Groundwater was not observed during this investigation, but the soil is damp to moist. The thick soil column is soft and porous in the vicinity of the proposed retaining wall, and is expected to become saturated during prolonged heavy rainfall.

(6) R-272
Erosion

The slope above the proposed retaining wall is prone to surficial erosion from sheetflow, mudflows, and surficial landslides.

Active beach erosion at the toe of the slope below the proposed retaining wall near the southeast corner of the property was noted during this investigation.

CONCLUSIONS & RECOMMENDATIONS

1) Retaining Wall

The failure of the existing retaining wall is due to lateral forces exerted by the steeply sloping backfill (including natural soil) exceeding the strength of the wall. There is no evidence that gross instability of the slope due to bedding plane failure in the bedrock contributed to wall failure.

Consequently, a properly designed wall, based on the slope angle and soil parameters included in this report, which is founded below soft surficial soil will resist previously existing and continuing forces which caused failure of the wall. The depth to firm material is at least 5 feet and possibly greater.

Seismic forces generated by earthquakes of the magnitudes noted above should be included in wall design. (See p. 5)

2) Slope Stability

Although there is no indication of gross failures at or near the site, available geologic data suggests that there is a potential for future gross instability due to adversely oriented bedding planes (dipping 5 to 20 degrees to the west) in the Altamira formation.
This potentially unstable condition could not be verified on site within the scope of this investigation because of the thick soil cover and lack of bedrock exposures in the immediate vicinity.

Surficial failures in the form of shallow landslides, debris slides and mudflows can be expected to continue and may constitute a continuing maintenance problem.

3) Seismicity

Ground rupture due to faulting is not expected. As stated under (1) above, earthquake forces from several active or potentially active faults should be included in wall designs.

4) Flooding

Drainage should be provided to prevent overflow of the retaining wall and possible flooding of the adjacent residence area from upslope runoff.

5) Groundwater

The deep soil mantle behind and upslope from the proposed retaining wall is poorly consolidated and may become saturated or nearly saturated during periods of prolonged heavy rainfall. Consequently, subdrains behind the retaining wall should be included in wall design.

6) Soil Parameters for retaining wall design.

Unit Weight = 120# 
Angle of Internal Friction = 28° 
Cohesion = 400#/ft³

Very truly yours,
RICHARD MILLS ASSOCIATES

Lawrence J. Herber  Richard B. Mills
Staff Geologist  President

CEG 1114
To: Mr. Dale A. McConnachie

479 Paseo del Mar
San Pedro, Ca. 90731

Subject: Geotechnical investigation of slope failure, 479 Paseo del Mar, San Pedro, California.

INTRODUCTION/SCOPE:

In accordance with your request and signed authorization we have performed a geotechnical evaluation of the slope and retaining wall failure located at the rear of the existing occupied structure. The purpose of this investigation, which was performed in conjunction with Richard Mills Associates, Inc. (R.M.A.), was to determine and evaluate the failure mechanism of the retaining wall located at the toe of the subject slope. Additionally, the scope of work performed by this firm included an evaluation of the stability, strength and usefulness of the on-site soils.

FIELD INVESTIGATION

The scope of field work performed by this firm included the manual excavation of trenches and the sampling of different soil types encountered. These soils were visually classified, logged and delivered to the soils laboratory at R.M.A. for testing. The logs of the trenches and a description of the soils encountered are presented as Appendix A.

LABORATORY TESTING

The soils encountered in the exploratory trenches were evaluated for their potential uses. The materials to be left in
planes were evaluated for bearing capacity and those materials to be used as backfill were tested for gradation, shear strength and maximum density.

All testing was performed by RM’ and the results of these tests are shown as Appendix 3.

CONCLUSIONS

1. The potential gross stability of the on site soils is suitable for the intended use.

2. The failure of the existing retaining wall was probably the result of one or a combination of the following:
   a. Improperly designed wall
   b. Excessive lateral pressures developed by the retained soils;
   c. Improper drainage provided behind the failed wall
   d. Inadequate landscaping and maintenance.

RECOMMENDATIONS

1. The proposed retaining wall should be designed using the following soil parameters:
   a. Maximum allowable bearing capacity = 2000 psf
   b. Active soil pressure = 8500 plf
   c. Passive soil pressure = 10,500 plf
   d. Maximum density/optimum moisture content of backfill materials = 104.5% ± 7.5%

2. Subsequent to the design of an adequate retaining wall and prior to beginning construction of same, the following recommendations should be considered:
   a. During demolition and construction, the backcut for the designed retaining wall should be laid back as flat as possible. This could be accomplished as shown in Appendix 6 and would entail constructing a 2:1 (horizontal to vertical) slope, a maximum of 10 feet high, a 5 foot wide horizontal bench and a 1:1 slope to daylight. This should allow sufficient working room behind the wall and provide a stable, temporary backcut.
   b. As soon as possible and continuously until the completion
of construction, steps should be taken to minimize the amount of moisture introduced into the soils above the retaining wall. This could be accomplished with Viaqueen plastic and sandbags at a minimal cost.

3. The footing of the proposed retaining wall should be founded in firm, undisturbed material. The depth of this material may be the order of 5 feet.

4. Prior to backfilling and compaction of the soils behind the proposed retaining wall, all loose, porous materials should be leached out. These materials are considered suitable for use as compacted backfill.

5. The backfill materials should be compacted to a minimum of 90% of the maximum density. The moisture content of these materials should be at least optimum to a maximum of 5% greater than optimum.

6. The footing excavation and the compaction of all backfill materials for the proposed retaining wall should be inspected, tested and approved by a qualified soils engineer.

7. Drainage devices (terrace drains and toe drains) should be provided above the retaining wall.

We trust this report provides the necessary parameters and recommendations. If there are any additional questions, do not hesitate to call.

Very truly yours,

Richard Cantwell, PE
Partner

Distribution: (3) address see
0-8' Brown, very silty, clayey fine to medium sand-sm. scattered plates and blocks of sandstone, siltstone and shale.

8'-10' Bedrock- sandstone, siltstone and shale. Sandstone is generally grey in color.

BS1 - Bag sample No. 1
Mr. Dennis Letvin
1481 Paseo Del Mar
Los Angeles, CA

TRACT: 7117
LOT: 1, BLOCK 12
LOCATION: 1481 Paseo Del Mar

CURRENT REFERENCE REPORT DATE(S) OF REPORT/LETTER(S) NO. DOCUMENT PREPARED BY
Geology/Soils Report PN 4162-98 11-12-98 Keith W. Ehler
Addendum Letter PN 4162-99 1-26-99 Keith W. Ehler
Soil Report PR 4320-98 11-12-98 SWN

The report has been reviewed by the Grading Section of the Department of Building and Safety. According to the report, it is planned to convert the existing garage into living space and add a second story and a large two-story addition to it. The addition will extend out to the top of the descending ocean bluff.

As part of the exploration a boring 80 feet in depth was drilled near the top of the slope. The boring encountered Monterey Formation bedrock, with bedding planes oriented neutral to somewhat out of the slope. Groundwater flowing along joints was encountered at a depth of 51 feet. The geologic map shows a house below the subject site, but the house is not shown on the cross section.

The report recommends a building setback of 90 feet from the top of the slope. Structures within the setback shall have the foundations embedded more deeply than the code descending slope setback, and apply creep loads. Tables are provided in the report.
July 17, 2001

Dennis Letvin
1481 Pasco Del Mar
San Pedro, CA

1481 PASEO DEL MAR
TRACT: 7117
BLOCK: 12
LOT: 1

This letter is to inform you that the Grading Section of the Department of Building and Safety has recently obtained information that suggests that an updated geologic/soil engineering report is necessary for your proposed construction at 1481 Pasco Del Mar. On January 28, 1999, a letter was issued by the Grading Section, approving geologic reports dated 11/12/98 and 1/26/99, prepared by Keith Eflert, and a soil report dated 11/12/98, prepared by SWN.

The reports were prepared for additions to an existing garage. It is now understood that a new single-family dwelling is proposed, which will require stabilization of the entire site. Additionally, a comparison of the actual site topography to the topography that was presented in the reports indicates a significant difference that needs to be clarified. In particular, a near-vertical cliff exists at the top of the slope, which will require analysis and stabilization. It also appears that the perennial spring on the lower portion of the slope was not considered in the slope stability analysis.

An updated geologic and soil engineering report, which is based upon a detailed topographic survey of the entire site performed by a licensed surveyor, shall be submitted to the Grading Section for review. The report shall show an existing and proposed construction and contain calculations and recommendations for providing a minimum factor of safety of 1.5 for the property. It shall be understood that a complete review of the reports and the proposed construction may reveal additional items of concern, which have not been discussed in this letter.

DAVID HSU
Chief of Grading Section

DANA PREVOST
Engineering Geologist II
(213) 977-6329

cc: Office of Zoning Administration
Council District 15
WLA District Office

G:/grdocs/grletters/1481pascodelmar
The referenced report concerning a proposed carport has been reviewed by the Grading Section of the Department of Building and Safety. It appears that the proposed carport will be located at the top of a steep bluff that may be potentially unstable. The current report refers to a previous geologic report for information on the site conditions. However, the approval of the previous report has been rescinded because the report does not appear to correctly portray the site topography. The review of the subject cannot be completed because the stability or safety of the proposed development cannot be determined at this time.

An addendum to the report shall be submitted which includes, but need not be limited to, the following:

1. Provide recommendations for locating the carport an adequate distance from the top of the near-vertical bluff, so that there is no potential surcharge and so that future retreat of the bluff will not affect the carport.

2. The recommendations shall be based upon an accurate cross section showing the near-vertical top of the slope and the proposed carport.

3. In the event that any building construction is still proposed, provide the updated report requested in the above referenced Department letters.
4. The approval of the carport can only be considered after the geologic and soil engineering reports have been revised to correctly reflect the site conditions.

DAVID HSU
Chief of Grading Section

DANA PREVOST
Engineering Geologist II

DP: dp
34252
(213) 977-6329

cc: Keith W. Ehler
Obelisk Architects
SP District Office
November 12, 2001

Mr. Ronald Letvin
1821 Leland Drive
San Pedro, California 90731

Re: Update of Geotechnical Evaluation—1471 Paseo Del Mar
Part. Por. Lots 1 and 2, Block 12—Tract No. 7117
San Pedro, California
And Carport at 1481 Paseo Del Mar (west side)

Dear Mr. Letvin:

At your request, we have performed an evaluation of your proposed project at 1471 Paseo Del Mar (upper lot). Currently, there is only a garage on the lot. A preliminary geotechnical report on the lot dated November 12, 1998 was prepared by Keith Ehlert and Stephen Ng. The site was evaluated at that time using a topographic survey that was approximately 20 feet top high in top of pad elevation. The project received preliminary approval from the City of Los Angeles Grading Division but the approval was withdrawn when the error in topography was discovered.

A new topographic survey was completed on September 13, 2001. Recently, Mr. Keith Ehlert chose to halt doing business due to health reasons so we were asked to assume the project. At this time, we are the official geotechnical engineer and geologist of record for the project.

Scope of Work

Our scope of work for the project at this time was as follows:

1. Review the Keith Ehlert, Stephen Ng Report dated November 12, 1998


3. Review of numerous letters between the architect (Mr. Nagy Bakhoun), the City and the neighbors of the property (the neighbors oppose the project)

4. Geologic mapping of the slope surface below the property

5. Collection of surface soil samples on the slope
6. Perform laboratory tests on a surface soil sample to determine maximum density (ASTM D-1557-06) and remolded shear strength (ASTM D-3080).

7. Perform new slope stability calculations using the program STABL (attached). The calculations used correct topographic, geologic and groundwater conditions.

8. Prepare this update report of findings.

Geology

Our mapping of the sea cliffs show bedding across the slope that has a small component of dip into the slope. The sea cliff mapping by Ehler shows the bedding mostly across the slope. His down-hole logging shows variable bedding down to a depth of 65 feet with a very small component of out-of-slope dip. This component would be less than three degrees.

The sea cliffs in this area are stable with no indication of bedding plane failures. The observed failures are mostly local mud and debris flows probably caused by over the slope drainage.

The small out-of-slope component of bedding observed in the boring by Ehler should not impact the stability of the slope. The bedding in the Monterey formation siltstone and shale is folded so that continuous bedding planes with out-of-slope dips are unlikely. Bedding can be considered neutral for slope stability analyses.

1997 Uniform Building Code Seismic Design Requirements

The design parameters required to meet the 1997 Uniform Building Code are as follows.

Distance to Nearest Type B Fault = 4 km

Soil Profile Type = S (soft soil, soft rock)

Seismic Zone = 4

Seismic Coefficient = 0.8

Near-Source Factor = 1.3

Seismic Coefficient = 44 N

Near-Source Factor = 1.1
The distance to nearest faults is:

<table>
<thead>
<tr>
<th>Fault</th>
<th>Distance (km)</th>
<th>Maximum Credible Magnitude</th>
</tr>
</thead>
<tbody>
<tr>
<td>Palos Verdes</td>
<td>4 km</td>
<td>7.0</td>
</tr>
<tr>
<td>Newport Inglewood</td>
<td>16 km</td>
<td>7.0</td>
</tr>
<tr>
<td>Whittier Elsinore</td>
<td>62 km</td>
<td>7.0</td>
</tr>
<tr>
<td>San Andreas</td>
<td>90 km</td>
<td>8.3</td>
</tr>
</tbody>
</table>

**Slope Stability Evaluation**

Numerous slope stability alternatives were assumed in an attempt to find the worst-case option. The options evaluated were:

1. **Surficial Stability**

   Surficial stability of the 1:1 natural slope was calculated assuming terrace deposits cover the slope and using the remolded strength of soil collected from the slope at a elevation of 90. The calculations using terrace deposits yield a factor of safety of 1.56. The calculation using a sample of slope slough yields a factor of safety of 1.14.

   Our observations are that most of the exposed slope is bedrock which has a factor of safety of 3.7. Where slough or loose soil overlies the rock, the factor of safety can be as low as 1.14. In order to guarantee a factor of safety of 1.5, it is necessary to remove any loose soil on the slope or provide a concrete slough wall to protect any structures which are below the slope. The existing house has a short wall which is probably not adequate to prevent occasional mudflow.

2. **Gross Stability**

   Gross Stability calculations were performed using the program STABLE and the soil strength parameters previously approved in the Ehlert report. The parameters were:

   Terrace Deposits
   
   \[
   \begin{align*}
   \text{Elevation} & : 120 \text{ to } 125 \\
   \phi & : 19^\circ \\
   c & : 340 \text{ p.s.f.} \\
   \gamma & : 110 \text{ p.c.f.}
   \end{align*}
   \]
Altamira Shale

\[
\begin{align*}
\text{Elevation} & \quad -25 \text{ to } 120 \\
\phi & \quad = 38^\circ \\
c & \quad = 810 \text{ p.s} \\
\gamma & \quad = 125 \text{ p.c.}
\end{align*}
\]

Groundwater was modeled at the surface at elevation 50 and following the slope to sea level. The actual groundwater is in thin perched zones which have little effect on the gross stability of the slope.

The bedding was assumed nearly flat in the calculations with no more than a five degree out-of-component dip.

The calculations are attached. A summary of the calculations is shown as Table 1. The table clearly shows that the only stability condition which is less than the required code value is for surficial slough over the bedrock. This material can be cleaned by hand from the surface to create a safe condition.

We also checked the analysis using a Janbu wedge-type failure analysis across bedding and found similar high factors of safety.

Conclusions

Our conclusions are that the project can safely be built without affecting the factor of safety in the slope. We have prepared Tables 2 and 3 to provide a revised setback versus caisson depth for the project. Since the correct topography is 20 feet lower than that assumed by Ehler and NG, the length of caisson is shortened.

The caisson length is determined by an imaginary 2:1 (horizontal to vertical) projected slope starting at the house bench below (elevation 29). Our calculations showed this as the critical toe elevation for slope stability.

The caisson load is controlled by the exposed length above the imaginary 2:1 slope. The City Code requires that the caissons be designed for a lateral load of 1 kip per linear foot for each foot of caisson above the imaginary 2:1 slope. The lateral passive resistance is not allowed in this same length of caisson above the 2:1 slope.

The City has a second slope setback criteria that the bottom of foundations must be set back from the slope face a minimum distance of H/3 (where H is the slope height) or 40 feet. In our case, the 40 feet governs.

The soil design parameters listed in the Ehler/NG report are still correct for design. We accept and approve these values. For clarity we repeat their values as follows:
<table>
<thead>
<tr>
<th>Bedrock</th>
<th>Allowable Lateral Bearing</th>
<th>Maximum Not to Exceed</th>
<th>Coefficient of Friction</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>400 p.s.f./ft.</td>
<td>4,000 p.s.f.</td>
<td>.4</td>
</tr>
</tbody>
</table>

Any concrete slabs or decks or wood deck on the slope side of the structure will be subject to creep forces and will tend to pull away from the structure. We must review the design of any such decks.

Any slope side decks should be designed as structural slabs, a minimum six inches thick with #4 bars at 12 inches each way. If it is desired to avoid cracking and separation from the main structure, the decks would require support by caissons.

309 Statement

The proposed construction is based on bedrock. The affected area will not disturb any adjacent properties. If the construction and design is performed according to the requirements in this report, there will be no danger of landslide, slippage or excessive settlement on this or adjacent properties.

General Site Grading

1. **Clearing & Grubbing**: The site, as it exists, is founded on bedrock. Compaction of the upper 24 inches is required. All material over six inches in diameter should not be used for fill and should be removed from the site.

2. **Subgrade Preparation of Slab & Pavement Areas**: Subgrade for both concrete slabs on grade and asphalt concrete paved areas should be scarified to a depth of 12 inches and recompacted.

3. **Placement of Compacted Fill**: Compacted fill is defined as that material which will be replaced in the areas of removal due to the placement of footings and paving, and also where the grade is to be raised. All fill should be compacted to a minimum of 90 percent based on the maximum density obtained in accordance with ASTM Standard D1557-00. All fill compaction should be performed using a sheetsfoot compactor.

4. **Review of Grading Plan & Specifications**: We are recommending that the soil engineer have the opportunity to review the grading plan, construction procedures and specifications to assure that they include the items of the soil report for the benefit of the owner and the contractor.

5. **Pre-Job Conference**: Prior to the commencement of grading, a pre-job conference should be held with representatives of the owner, developer, contractor, architect and or engineer and soil engineer in attendance. The purpose of this meeting shall be to clarify any questions relating to the intent of the grading recommendations and to verify that the project specifications comply with the recommendations of this report.
General

The recommendations of this report are based on the assumption that all foundations will be founded in oedrock. All footing excavations should be inspected prior to the placement of concrete in order to verify that footings are founded on satisfactory soils and are free of loose and disturbed materials. All grading and fill placement should be performed under the testing and inspection of a representative of the soil engineer.

The findings and recommendations of this report were prepared in accordance with contemporary engineering principles and practice. We make no other warranty, either expressed or implied. Our recommendations are based upon an interpolation of soil conditions between boring locations. Should conditions be encountered during grading that appear to be different than those indicated by this report, this office should be notified.

We appreciate the opportunity to be of service to you. If you have any further questions, please do not hesitate to call our office.

Sincerely,

R. D. Hinkle
RGE #402

G. S. Hunt
CEG #383
December 27, 2001

Log # 34252-01
SOILS GEOLOGY FILE - 2

Dennis Letvin
1481 Paseo Del Mar
San Pedro, CA

TRACT: 7117
LOT: 1
LOCATION: 1481 Paseo Del Mar

CURRENT REFERENCE REPORT NO. DATE(S) OF DOCUMENT PREPARED BY
REPORT/LETTER(S) Geology/Soil Report OVERSIZED DOC. 11/12/01 Dale Hinkle, P.E.

PREVIOUS REFERENCE REPORT NO. DATE(S) OF DOCUMENT PREPARED BY
REPORT/LETTER(S) Department letter 34252 08/20/01 08/10/01 07/17/01 07/12/01 11/12/98
Geology/Soil Report 3462-98L2

The referenced current report concerning proposed construction has been reviewed by the Grading Section of the Department of Building and Safety. The report does not define the current project. Previously proposed projects have ranged from a carport to a new dwelling.

The report does not address the existing oversteepened slope that is immediately below the flat pad and extends down to an elevation of approximately 104 to 107 ft. The steepness of that section of the slope is not readily apparent on the survey map; portions of the slope are near vertical. It appears that adjacent portions of this slope have sloughed. Stabilization is required to develop the property. The review of the subject report cannot be completed because the stability or safety of the proposed development cannot be determined at this time. An addendum to the report shall be submitted which includes, but need not be limited to, the following:

1. Clarify the type of construction that is currently proposed.

2. If the report is for a new dwelling, provide the correct address in the report for the subject lot; 1481 and 1479 are for existing dwellings; if an address does not exist, have one assigned by the Department of Public Works.
3. **Show all proposed construction and grading on the geologic map and cross-section.** Include on the geologic sections the **recommended** foundations, and lines for setback and embayment.

4. **Provide recommendations to stabilize the over-steepened section of slope** that is immediately below the flat pad, as discussed above and as discussed in the Department letter dated 07/17/01.

5. **Show the stabilization on detailed cross-sections** based upon the existing survey data and supplemental data from field measurements.

6. Provide a statement accepting full professional responsibility for the use of data by the previous consultant.

DAVID HSU  
Chief of Grading Section

DANA PREVOST  
Engineering Geologist II

DP/TG:dp/tg  
34252-01  
(213) 977-6329  

cc: Dale Hinkle, P.E.  
Martin Hsich  
SP District Office
January 10, 2002

Mr. Dennis Letvin
1821 Leland Drive
San Pedro, California 90731

Re: Lots 1 and 2, Tract 7117 – 1475 and 1481 Paseo Del Mar
Response to Los Angeles Building and Safety Grading Division
Review Letter dated December 27, 2001

Dear Mr. Letvin:

The following are our responses to the review letter referenced above:

General

The proposed project requires construction on both lots 1 and 2 at the site. The current address of Lot 1 is 1481 Paseo Del Mar. Lot 2 has no address and the lot at the beach level uses 1479 incorrectly. In order to clarify the situation, the owner has applied to have Lot 2 be called 1475 Paseo Del Mar.

The building on Lot 1 currently uses a garage on Lot 2 for parking. This garage will be removed and a new carport built at the rear (top of slope) of Lot 1. Part of this project is to build the one-story carport at the rear of Lot 1.

The then empty Lot 2 will receive a two-story single-family residence with a new attached two-car garage. The scope of this project is the carport on Lot 1 and the two-story, single-family residence and garage on Lot 2.

Both structures are very near the existing top of a 11 natural descending slope. The new correct topography was submitted with our November 12, 2001 report. A new site development plan is attached. The new structures are one to six feet from the top of the descending slope. The structures will be supported on deep drilled caissons with grade beams and the foundation all meeting the City of Los Angeles 40 feet to daylight setback criteria.

The attached Figure 4 has been modified to show the caisson depth and locations.
The specific responses are:

Comment 1: Clarify the type of construction that is currently proposed.

Response 1: The structures are one-story and two-story wood and stucco structures with deep reinforced concrete caissons and reinforced concrete caisson foundations.

Comment 2: If the report is for a new dwelling, provide the correct address in the report for the subject lot. 1481 and 1479 are for existing dwellings. If an address does not exist, have one assigned by the Department of Public Works.

Response 2: The new address of 1475 Paseo Del Mar has been applied for Lot 2. Lot 1 is 1481 Paseo Del Mar.

Comment 3: Show all proposed construction and grading on the geologic map and cross-section. Include on the geologic sections the recommended foundations and lines for setback and embedment.

Response 3: Figure 2 has been modified to show the proposed locations for the structures. The foundations are shown on Figure 4. Figure 4 has three typical caisson embedments shown for setbacks of five feet, 45 feet and 65 feet. The table was included in our November 12, 2001 report.

Comment 4: Provide recommendations to stabilize the over-steepened section of slope that is immediately below the flat pad, as discussed above and as discussed in the Department letter dated 07/17/01.

Response 4: Since the slope is a natural ocean bluff slope, it is not allowed to build a buttress or large retaining structure. We have inspected and photographed the slope. The topography, which is attached, was recently updated and corrected.

The majority of the slope has a gradient 40\(^\circ\) to 45\(^\circ\). Where the stairs have been cut into the slope by the 1479 property owner (below at elevation 29) there is a three to five foot vertical cut. This near-vertical face is exposed Altamira shale.

We assume that the plan for 1475 will include a cantilevered decked supported by the caissons. The deck will be over this near-vertical area. We propose to put hand laborers on the slope to remove loose soil and flatten this small scarp area.

The loose surficial soil will be removed to expose the Altamira shale bedrock.
The removal of the slough, along with a retaining wall at the property line, will protect the property below (1479 Paseo Del Mar). The deck and removal are shown on Figure 4.

Comment 5: Show the stabilization on detailed cross-sections based upon the existing survey data and supplemental data from field measurements.

Response 5: The data are all shown on the attached topography. This was also submitted with out November 12, 2001 letter (Figure 1).

Comment 6: Provide a statement accepting full professional responsibility for the use of data by the previous consultant.

Response 6: We have prepared an update report dated November 12, 2001. At this time, we accept full professional responsibility for the data generated by us and by the previous consultants.

309 Statement

The proposed construction is based on deep caissons founded in undisturbed bedrock. The affected area will not disturb any adjacent properties. If the construction and design is performed according to the requirements in this report, there will be no danger of landslide, slippage or excessive settlement on this or adjacent properties.

We appreciate the opportunity to be of service to you. If you have any further questions, please do not hesitate to call our office.

Sincerely,

[Signatures]

R. D. Hinkle
RGE #402

G. S. Hunt
CEG #584

STATE OF CALIFORNIA

Attachments
February 14, 2002

Dennis Letvin
1481 Paseo Del Mar
San Pedro, CA

TRACT: 7117
LOT: 1 / 2
LOCATION: 1481 / 1475 Paseo Del Mar

The referenced current report concerning a proposed single-family residence with attached garage on Lot 2 and a carport on Lot 1 has been reviewed by the Geology Section of the Department of Building and Safety. Section A does not match the elevations shown on the geologic map.

The review of the subject report cannot be completed because the stability or safety of the proposed development cannot be determined at this time. An addendum to the report shall be submitted which includes, but need not be limited to, the following:

1. Provide a geologic cross-section showing the proposed carport and the existing landslide. Include specific calculations and recommendations to stabilize the landslide within the lot and prevent future enlargement.

2. Revise Section A-A', including the elevation point for 103.91 at the toe of the oversteepened section of slope. Correct the angle of the 2:1 projection line drawn on the section.
3. Clarify and show on the geologic map and section the proposed retaining wall at property line described in Pg.3 response 4 of the 1/10/2002 report. Include calculations and recommendations, as appropriate.

4. Provide a proof of assignment of the address for 1975 Paseo Del Mar from the Department of Public Works.

5. Show on the sections and provide recommendations to stabilize the over-steepened section of slope that is immediately below the flat pad, as previously requested. Depiction should be consistent with the existing survey data and supplemental data from field measurements.

DAVID HSU
Chief of Grading Section

DANA PREVOST
Engineering Geologist II

DP/TG:dp/tg
34252-02
(213) 977-6329

cc: Dale Hinkle, P.E.
Martin Hsieh
SP District Office
April 3, 2002

Mr. Dennis Letvin
1821 Leland Street
San Pedro, California 90731

Re: Lots 1 and 2, Tract 7117 - 1475 and 1481 Paseo Del Mar
Response to City of Los Angeles Department of Building and Safety
Grading Division Review Letter dated February 14, 2002

Dear Mr. Letvin:

The area has been re-surveyed and new topography prepared which we have submitted to the City. Out Section A-A' (Figure 4) agrees with the corrected topography. All old sections from the Keith Ehler or SWA Soiltech reports should be eliminated from City files to prevent further confusion. We have duplicated the data on the attached maps for the City's use.

Our responses and clarifications for the City review are as follows:

Comment 1: Provide a geologic cross-section showing the proposed carport and the existing landslide. Include specific calculations and recommendations to stabilize the landslide within the lot and prevent future enlargement.

Response 1: We have performed additional mapping and research regarding the house above the landslide. Our investigation has shown that there is a 14-foot to 16-foot tall concrete (or gunite) wall at the top of slope. We have shown this wall on Figure 4. Apparently the wall has a large concrete block behind it, or possibly the wall is the edge of the block. We don't know the extent of the block, but it extends beneath the existing house.

We recommend that a tied-back anchor system be installed to hold the block and wall in place on 1481 Paseo Del Mar and upgrade to the current code. The concrete block is estimated to be 1922± construction. There most likely will be a grade beam required and some new shotcrete to stabilize the old wall. The anchors will be 75 feet ± long. Calculations are attached for the wall and anchors.
They do not change the gross stability calculations; we estimate that anchors will be designed for 100k to 150k capacity. Anchors will be placed approximately 10 feet on-center at approximately the 1/3 height of the wall. Calculations are attached. The section is shown as Figure 3 (attached).

Final anchor design will be done by the structural engineer. The attached calculation shows that the the anchor location is bonded behind the worst case failure conditions up to a factor of safety of 1.76. The localized wall design will control the anchor placement.

Comment 2: Revise Section A-A', including the elevation point for 103.91 at the toe of the over-steepened section of slope. Correct the angle of the 2:1 projection line drawn on the section.

Response 2: We have recommended that the architect create an extension of the concrete wall from 1481 Paseo Del Mar. The new wall will be eight feet tall and founded on the first (outward) row of caissons. The new wall will allow a 2:1 slope to be created at the top of slope, starting approximately at elevation 104±. The new wall section is shown on the attached architectural Section C-C' (Figure 1).

Comment 3: Clarify and show on the geologic map and section the proposed retaining wall at property line described in Pg. 3 response 4 of the 1/10/2007 report. Include calculations and recommendations, as appropriate.

Response 3: The wall is clearly shown on Figure 4. The wall is designed to collect mudflows and prevent them from affecting the adjacent property.

We estimate that a worst case mudflow would be two feet deep by 30 feet long by 20 feet wide; this amounts to 1,200 c. ft. The wall proposed is approximately six feet tall. The six feet tall wall on a 40° slope will hold approximately 24 c. ft. per linear foot of mud. This will fill a width of 50 feet behind the wall. Since the lot is 100 feet wide, this yields a factor of safety of 2.0. We cannot guarantee the size of the mudflow, but this seems to be a reasonable design.

Comment 4: Provide a proof of assignment of the address for 1975 Paseo Del Mar from the Department of Public Works.

Response 4: The Los Angeles Department of Building and Safety address approval form is attached.

Comment 5: Show on the sections and provide recommendations to stabilize the over-steepened section of slope that is immediately below the flat pad, as previously requested. Depiction should be consistent with the existing survey data and supplemental data from field measurements.
Response 5: We have provided a retaining wall eight feet tall which lowers the slope to 2:1. The new 2:1 slope and retaining wall will be cut into bedrock. The wall is shown on Section C-C' (Figure 1). We will inspect the cut to verify bedrock.

We appreciate the opportunity to be of service to you. If you have any further questions, please do not hesitate to call our office.

Sincerely,

[Signatures]

G. S. Hunt
CEG #384.

R. D. Hin
RGE #402
CORRECTION LETTER
Log # 34252-0
SOILS/GEOLOGY FILE - 2

July 16, 2002

Dennis Letvin
1481 Paseo Del Mar
San Pedro, CA

TRACT: 7117
LOT: 1 / 2
LOCATION: 1481 / 1475 Paseo Del Mar

CURRENT REFERENCE REPORT/LETTER(S) REPORT NO. DATE(S) OF DOCUMENT PREPARED BY
Geology/Soil Report -- 04/03/02 Dale Hinkle, P.E.

PREVIOUS REFERENCE REPORT/LETTER(S) REPORT NO. DATE(S) OF DOCUMENT PREPARED BY
Geology/Soil Report -- 01/10/02 Dale Hinkle, P.E.
Geology/Soil Report 4162-98L2 07/12/01 Keith W. Ehler
Geology/Soil Report -- 11/12/98 Dale Hinkle, P.E.
Department letter 34252 11/12/01 LADBS
34252-01 08/20/01
34252-02 12/27/01
-- 02/14/02
-- 08/10/01
-- 07/17/01

The referenced reports concerning a proposed family residence with attached garage on Lot 2 and a carport on Lot 1 has been reviewed by the Geologic Section of the Department of Building and Safety. The new section CC' has no scale. All of the information previously requested in items 1 and 3 of the Department letter dated 02/14/02 was not provided. The review of the subject report cannot be completed because the stability or safety of the proposed development cannot be determined at this time. An addendum to the report shall be submitted which includes, but need not be limited to, the following:

1. Revise geologic cross-sections B and D to match the geologic map, showing the existing landslide.

2. Provide a scale for section CC' and verify that the section matches the topographic map.

3. Provide calculations and recommendations for design of the footings for the proposed
property line wall to provide a minimum factor of safety of 1.5 where it is located on the landslide. It appears that geologic exploration will be required to determine the depth of the landslide at and above the wall.

4. Show on the geologic sections how the code compliant horizontal setback of the debris/impact wall foundation from the descending slope face is to be provided and provide design lateral earth pressure recommendations for the stated 6ft high freeboard. Include the northern property lines and recommended anchors on the geologic sections.

5. Clearly show on the geologic map the location of each proposed: slope trim, wall, wall type, and identify what the hatched area south of the residence and proposed carport at 1481 Paseo Del Mar represents.

6. Show on the geologic map how the debris/impact wall will prevent flow of debris around the end of the wall by extending to an elevation similar to the top of wall elevation, etc.

7. Permanent tie-back anchors can not be approved.

DAVID HSU
Chief of Grading Section

DANA PREVOST
Engineering Geologist II

DP/TG:dp/tg
34252-03
(213) 977-6329

cc: Dale Hinkle, P.E. Inc
Obelisk Architects
SP District Office

THEODORE GILMORE
Geotechnical Engineer I
Mr. Dennis Letvin  
1481 Paseo Del Mar  
San Pedro, California 90731

Re: Supplemental Geotechnical Report  
Response to City of Los Angeles, Review Letter  
Dated July 16, 2002  
1475 and 1481 Paseo Del Mar, San Pedro

Dear Mr. Letvin:

This report is being prepared to respond to the City of Los Angeles review letter regarding this site. We participated in a meeting with David Hsu and Dana Prevost on August 6, 2002 to discuss the scope of this report.

Item 1: Revise geologic cross-section B and D to match the geologic map, showing the existing landslide.

Response 1: Section B-B and D-D have been revised to show the landslide and B-B now shows the carport. The landslide actually represents shallow slumping and erosion in an old gully underlying the existing residence. The loose slump material is less than about three feet in thickness and will be removed during site construction.

Item 2: Provide a scale for Section CC' and verify that the section matches the topographic map.

Response 2: Section A-A has been revised to include the elevation point. The slope descending slope has been corrected and the slope angle revised.

Item 3: Provide calculations and recommendations for design of the footings for the proposed property line wall to provide a minimum factor of safety of 1.5 where it is located on the landslide. It appears that geologic exploration will be required to determine the depth of the landslide at and above the wall.

Response 3: Here really is no landslide on the property. Our research shows that a small gully or arroyo existed on the property beneath the existing house at 1481 Paseo...
Del Mar. The arroyo was a drainage area and the eroded soil was deposited on the steep slope. This soil fill deposit was mapped as possible landslide.

We believe that these deposits are under four feet thick. It is planned to remove these loose deposits during site preparation.

After the former gully at the top of slope was filled with concrete in 1925 and the existing house built over the concrete plug.

The concrete plug is up to 12 feet thick. This plug was mistaken for a retaining wall, but now is recognized as a concrete plug approximately 12 feet thick at the bluff tapering to zero at the street. The plug is 20 to 30 feet wide at the bluff and underlies the house (see Figure 4).

Because of the three sides of the plug being placed in an irregular channel, it is considered stable. This plug will not be disturbed during this construction.

There are other areas of the slope which will also have loose soil removed during grading. These areas will be inspected by our geologist and a report prepared showing the area and extent of removals.

Because of the extensive slope cleaning and soil removal, the wall will not be required at the property line. A new short wall may be placed at the top of site, but this will be attached to the caissons for the house.

Slope maintenance will be required to ensure that no future surficial material collects in areas which can affect adjacent properties.

A revised surficial stability calculation is attached which assumes a worst case two feet of sloughed soil on the slope. This calculation yields a factor of safety of 2.0 for surficial stability.

Item 4:

Show on the geologic sections how the code compliant horizontal setback of the debris/impact wall foundation from the descending slope face is to be provided and provide design lateral earth pressure recommendations for the stated 6 ft high freeboard. Include the northern property line and recommended anchors on the geologic sections.

Response 4: The wall has been eliminated from the plan. The anchors are also eliminated because all of the new structures are caisson supported and we are not modifying the existing house at 1481 Paseo Del Mar.

Item 5: Clearly show on the geologic map the location of each proposed: slope trim, wall, wall type, and identify what the hatched area south of the residence and proposed carport at 1481 Paseo Del Mar represents.
Response 5: **We cannot show each area where loose soil exist on the slope.** We will have a crew on the slope, supervised by a geologist who will remove the loose soil as directed by our geologist. There will be no wall modifications or new walls except at the top of slope. The new top of slope wall will be supported by the house caisson.

The hatched area south of the carport is the edge of the concrete plug on the site. Some of the area is old wall. Any unstable portion of the old wall will be replaced or repaired. During site grading our engineer and the City Inspector will inspect the wall to evaluate its condition. If a new wall section is required, it will be caisson supported.

The procedure for trimming the loose material from the 11 slope is as follows:

A. **The geologist inspects the slope and probes with a 1/4-inch diameter soil probe.** The areas where the probe penetrates over two feet are marked with colored paint.
B. The painted areas are hand-excavated and soil-carried to the top of hill for removal.
C. The excavation stops at weathered Altamira shale bedrock.
D. The edges of the cleaned areas are raked and smoothed
E. The excavated soils are removed from the site

**Item 6:** Show on the geologic map how the debris/impact wall will prevent flow of debris around the end of the wall by extending to an elevation similar to the top of wall elevation, etc.

**Response 6:** The flows will be prevented by removing loose soil prior to development.

**Item 7:** Permanent tie-back anchors can not be approved.

**Response 7:** **No anchors are proposed**

We appreciate the opportunity to be of service to you. If you have any further questions, please do not hesitate to call our office.

Sincerely,

[R. D. Hinkle's signature]

R. D. Hinkle
R.G.E. 000402
Exp. 3-31-2003

[Geotechnical Engineer's stamp]
September 10, 2002

Dennis Letvin
1481 Paseo Del Mar
San Pedro, CA

TRACT: 7117
LOT: 1 / 2
LOCATION: 1481 / 1475 Paseo Del Mar

CURRENT REFERENCE REPORT/LETTER(S)
REPORT NO. DATE(S) OF DOCUMENT PREPARED BY
Geology/Soil Report -- 08/15/02 Dale Hinkle, P.E.

PREVIOUS REFERENCE REPORT/LETTER(S)
REPORT NO. DATE(S) OF DOCUMENT PREPARED BY
Geology/Soil Report -- 04/03/02 Dale Hinkle, P.E.
Geology/Soil Report -- 01/10/02 Dale Hinkle, P.E.
Geology/Soil Report 4162-98L2 07/12/01 Keith W. Ehlerth
Geology/Soil Report -- 11/12/98
Geology/Soil Report Correction letter 34252 08/20/01 Dale Hinkle, P.E.
Geology/Soil Report 34252-01 12/27/01 LADB
Geology/Soil Report 34252-02 02/14/02
Geology/Soil Report 34252-03 07/16/02
Geology/Soil Report -- 07/17/01

The referenced reports concerning a proposed two-story single-family residence with attached garage on Lot 2 and a carport on Lot 1 have been reviewed by the Grading Section of the Department of Building and Safety. A potentially unstable steep bluff exists at the top of the slope. It is recommended in the reports to stabilize the oversteepened bluff by a combination of trimming and construction of a retaining wall. In order to prevent the creation of steep cuts from the proposed trimming, it appears that return walls will be necessary at both ends of the proposed retaining wall. All structures are to be supported by deep pile foundations. The consultants have also recommended the trimming of all potentially unstable soil from the face of the descending slope.

Based on seismic slope stability analyses included as part of the report, it is the consultant's opinion that the site is safe for seismically induced landsliding potential in accordance with California Public Resources Code, Section 2690 et. seq. (Seismic Hazard Mapping Act). It is understood that the lots are currently tied. This approval is contingent upon obtaining approval at un-tie the two lots. The reports are acceptable, provided the following conditions are complied with during site development:
1. Prior to issuance of any permits for the proposed single-family residence, obtain approval to un-tie the two lots and provide evidence of recordation to the plan checker.

2. On lot 2 (proposed single-family residence), the existing steep bluff face, above the elevations of 103.91 to 106.71, shown on the map, and extending east to the property line, shall be stabilized by trimming to no steeper than 2:1 and construction of a pile-supported retaining wall, as recommended.

3. Loose soil/landslide debris shall be trimmed from the slope under the inspection of the geologist and soils engineer, as recommended.

4. Return walls shall be provided at both ends of the pile-supported retaining wall to make the transition from the proposed 2:1 graded slope to the steep slopes beyond lot 2.

5. In the event that any of the proposed trimming or wall construction is not approved by any other City Department or the Coastal Commission, then an updated geologic and soil engineering report shall be submitted to the Grading Section for the revised plan, prior to issuance of any permits.

6. All structures shall be supported by piles extending below an imaginary 2:1 plane projected up from the toe of the slope; The piles along the top of the slope shall be a minimum of 75 feet in depth as shown and recommended in the report.

7. The piles shall be designed such that all passive pressure is derived from below the imaginary 2:1 plane projected up from the toe of the slope.

8. The portion of the piles above the imaginary 2:1 plane shall be designed for a lateral load of 1000 pounds per linear foot of shaft, as recommended.

9. The geologist and soils engineer shall review and approve the detailed plans prior to issuance of any permits. This approval shall be by signature on the plans which clearly indicates that the geologist and soils engineer have reviewed the plans prepared by the design engineer and that the plans include the recommendations contained in their reports.

10. All recommendations of the reports which are in addition to or more restrictive than the conditions contained herein shall be incorporated into the plans.

11. All roof and pad drainage shall be conducted to the street in a non-erosive device.

12. The applicant is advised that the approval of this report does not waive the requirements for excavations contained in the State Construction Safety Orders enforced by the State Division of Industrial Safety.

13. A copy of the subject and appropriate referenced reports and this approval letter shall be attached to the District Office field set of plans. Submit one copy of the above reports to the Building Department Plan Checker prior to issuance of the permit.

14. The geologist and soil engineer shall inspect all excavations to determine that conditions anticipated in the report have been encountered and to provide recommendations for the correction of hazards found during grading.

15. All retaining walls shall be provided with a standard surface backdrain system and all drainage shall be conducted to the street in an acceptable manner and in a non-erosive device.
16. Prior to issuance of the building permit, the design of the subdrainage system required to prevent possible hydrostatic pressure behind retaining walls shall be approved by the Soil Engineer and accepted by the Department. Installation of the subdrainage system shall be inspected and approved by the Soil Engineer.

17. All man-made fill shall be compacted to a minimum 90 percent of the maximum dry density of the fill material per the latest version of ASTM D 1557; or 95 percent where less than 15 percent fines passes 0.005mm.

18. Prior to the placing of compacted fill, a representative of the consulting Soils Engineer shall inspect and approve the bottom excavations. He shall post a notice on the job site for the City Grading Inspector and the Contractor stating that the soil inspected meets the conditions of the report, but that no fill shall be placed until the City Grading Inspector has also inspected and approved the bottom excavations. A written certification to this effect shall be filed with the Department upon completion of the work. The fill shall be placed under the inspection and approval of the Foundation Engineer. A compaction report shall be submitted to the Department upon completion of the compaction.

19. Prior to the pouring of concrete, a representative of the consulting Soil Engineer shall inspect and approve the footing excavations. He shall post a notice on the job site for the City Building Inspector and the Contractor stating that the work so inspected meets the conditions of the report, but that no concrete shall be poured until the City Building Inspector has also inspected and approved the footing excavations. A written certification to this effect shall be filed with the Department upon completion of the work.

20. Footings adjacent to a descending slope steeper than 3:1 in gradient shall be located a horizontal distance of one-third the vertical height of the slope, but need not exceed 40 feet, measured horizontally from the face of descending slope (Code Section 91.1806.5.3).

21. All loose foundation excavation material shall be removed prior to commencement of framing. Slopes disturbed by construction activities shall be restored.

22. The LABC Soil Type underlying the site is S_0.

23. The dwelling shall be connected to the public sewer system. (Section 1101 - Uniform Plumbing Code)

24. No use of tie-back anchors is anticipated. Tie-back anchors are not approved herein.

DAVID HSU
Chief of Grading Section

DANA PREVOST
Engineering Geologist II

THEODORE GILMORE
Geotechnical Engineer I

DP/TG:dp/tg
34252-04
(213) 977-6329
cc: Dale Hinkle, P.E. Inc
Obelisk Architects
SP District Office
November 12, 1998

Mr. Dennis Letvin
1481 Paseo Del Mar
San Pedro, CA

SUBJECT: REPORT OF GEOLOGIC AND SOILS ENGINEERING INVESTIGATION
Proposed Residential Improvements
1481 Paseo Del Mar
San Pedro, CA

Dear Mr. Letvin:

Pursuant to your request, the accompanying report has been prepared for the purpose of providing geologic and soils engineering information pertaining to proposed residential improvements at the subject site. Information obtained during this investigation indicates that the site is geotechnically suitable for the proposed construction.

If you have any questions regarding the information presented in this report, please contact our office.

Respectfully submitted,

Keith W. Ehlert
California C.E.G. 1742

[Stamp]

Stephen W. Ng
GE 637
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APPENDIX
Test Boring

APPENDIX II
Laboratory Test Data

APPENDIX III
Slope Stability Analysis
INTRODUCTION

PURPOSE AND PROPOSED IMPROVEMENTS

The purpose of this investigation was to obtain sufficient information to evaluate geologic and soils engineering conditions within the site with regard to the proposed improvements.

Based on review of architectural plans prepared by the project architect, Mr. Nagy Bakhoum, it is understood that the proposed improvements will consist of an addition to the existing detached garage. It is understood that the garage will be converted into a guest house.

SCOPE OF WORK

The scope of work performed for this investigation included the following items:

- Gathering and review of published and unpublished reports and maps pertaining to the geologic conditions on the site and in the surrounding area.
- Review of aerial photographs of the site area.
- Subsurface exploration consisting of one exploratory boring.
- Detailed logging of features observed in the exploratory excavation.
- Detailed mapping and evaluation of features observed in the site area.
- Laboratory testing of samples collected.
- Soils engineering interpretation of site conditions.
Preparation of this report with maps and other graphics to present the findings and recommendations.

The logs of test pits are presented in Appendix I.

Procedures and findings of laboratory testing are presented in Appendix II.

Procedures and results of a stability analysis of the subject slope are presented in Appendix III.

SITE DESCRIPTION

The site essentially consists of a developed lot situated on the southerly side of Paseo Del Mar in the area of San Pedro, City of Los Angeles. Figure 1 is a map showing the approximate geographic location of the site. Single-family dwellings are located on adjacent lots. The existing house is located on a level pad. A steep cliff descends from the southerly (rear) margin of the pad to the ocean below. Based on information obtained from the boring, it appears that the house pad area is essentially at natural grade on a wave cut terrace platform.
GEOLOGY

Information obtained from the referenced reports and maps, previous experience in the area and from our exploratory boring indicates the area is underlain by bedrock of the Miocene Monterey Formation locally mantled by what appears to be natural soil/terrace deposits and minor amount till soils. Talus deposits are present at the base of the cliff. A log of the boring is included in Appendix I of this report.

Figure 2 is an enlarged copy of a portion of the City of Los Angeles topographic map of the San Pedro area with the estimated site location and geologic information obtained during this investigation. Figure 3 is a sketch geologic cross-section drawn through the site area.

Bedrock observed in the test boring generally consists of siltstone. The bedrock is firm to locally hard and tight. Bedding within the bedrock exposed in the test boring is nearly horizontal, gently dipping westerly at very low angles.

Up to approximately 2.5 feet of fill soils were found in the test boring. The fill soils consist of dry and soft sandy silt.

Natural soil/terrace deposits observed in the test boring generally consist of moist and stiff silty clay with scattered rock fragments. The natural soil/terrace is shown as soil but likely includes some terrace materials. Typical terrace deposits essentially consisting of silty clay with scattered rounded cobble and pebble size rock fragments are exposed at the top of the cliff.

No features were observed during this investigation which in our opinion indicate the site has recently undergone, or is undergoing, any major gross instability.
It is important to recognize the potential for damage from earthquakes is a risk common to all of southern California. Although we are not aware of any active faults that trend through the site, the site could be subjected to severe and destructive ground shaking from earthquakes that occur on one of several active faults that are located in southern California.
CONCLUSIONS AND RECOMMENDATIONS

GENERAL CONCLUSIONS

The proposed project is considered feasible from a geotechnical standpoint provided that the recommendations given below are followed. In addition, the recommendations of the project structural engineer should be followed. The local department of building and safety should also be contacted and the project properly permitted and inspected during construction.

Stability analyses presented on Appendix III of this report have shown that the subject site exhibits a static factor-of-safety in excess of 1.50 and a seismic factor-of-safety in excess of 1.25 against gross failure behind the recommended Building Setback Line. The potential for gross failure that may affect the proposed development is considered to be low if the site is improved and maintained in accordance with our recommendations.

A Building Setback Line has been established. No new habitable structure shall be placed south of the recommended Building Setback Line without special foundation design.

The existing fill soil and natural soil/terrace are subject to local soil movement. These materials should not be used to support any structure or new structural fill and their potential for movements should be considered in the design of retaining walls and foundations.

The underlying bedrock are suitable for structural support. The proposed addition shall be supported by foundations embedded in bedrock. Any existing foundations to be used to support the proposed addition shall be extended (underpinned) into bedrock.
Due to the depths of the bedrock, deep foundations will be required.

The on-site soils have a medium to high potential for expansion. These materials could swell significantly in the presence of moisture and shrink when dried. Foundations and slabs supported on these soils should be designed for expansive soil conditions.

Excavation is anticipated to be difficult due to the hardness of some of the bedrock and the presence of ground water at lower depths. Coring and dewatering will likely be required for excavation of bedrock at lower depths.

Cracking of reinforced concrete is a relatively common occurrence. Some cracking of reinforced concrete, including slabs, can be anticipated. Irregularities in new slabs are also common. If cracking of slabs cannot be tolerated, the slabs should be structurally supported by foundations embedded in bedrock.

Unless structurally designed to resist expansive soil influences, concrete walkways, steps and other appurtenances could experience some distress (i.e., cracking and movement). Walkways and other appurtenances located on or near a slope could be subject to very noticeable creep influences.

It is important to recognize that considerable damage could occur to the proposed development from earthquakes. Damaging earthquakes could be generated on any of several faults in southern California (i.e., Palos Verdes, San Andreas, Newport-Inglewood, etc.). Such a risk is common to most areas in southern California.
RECOMMENDATIONS

BUILDING SETBACK LINE

A Building Setback Line is recommended. The recommended Building Setback Line is located approximately 90 feet from the top of the steep cliff. No new habitable structure shall be placed south of the recommended Building Setback Line without special foundations design. Foundations encroaching into the Building Setback area (south of the recommended Setback Line) shall be embedded at the following minimum depths:

<table>
<thead>
<tr>
<th>Encroachment South of Building Setback Line</th>
<th>Distance from Top of Slope</th>
<th>Minimum Depth of Embedment Below Ground Surface</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 feet</td>
<td>90 feet</td>
<td>10 feet</td>
</tr>
<tr>
<td>10 feet</td>
<td>80 feet</td>
<td>25 feet</td>
</tr>
<tr>
<td>20 feet</td>
<td>70 feet</td>
<td>40 feet</td>
</tr>
<tr>
<td>30 feet</td>
<td>60 feet</td>
<td>50 feet</td>
</tr>
<tr>
<td>40 feet</td>
<td>50 feet</td>
<td>60 feet</td>
</tr>
<tr>
<td>50 feet</td>
<td>40 feet</td>
<td>70 feet</td>
</tr>
<tr>
<td>60 feet</td>
<td>30 feet</td>
<td>80 feet</td>
</tr>
<tr>
<td>70 feet</td>
<td>20 feet</td>
<td>90 feet</td>
</tr>
<tr>
<td>80 feet</td>
<td>10 feet</td>
<td>100 feet</td>
</tr>
<tr>
<td>90 feet</td>
<td>0 feet</td>
<td>110 feet</td>
</tr>
</tbody>
</table>

The exact depths of embedment will be determined from design loads by the structural engineer.

FOUNDATION DESIGN

The proposed addition and any retaining wall shall be supported by foundations embedded into bedrock.

All foundations shall be continuous or tied with grade beams. At a minimum, two #4 bars shall be placed near the top and two #4 bars near the bottom of all continuous footings.
Spread footings shall be embedded at least 18 inches into bedrock, measured from the lowest adjacent finished grade of the bedrock. Caissons shall be embedded at least 3 feet into bedrock. Friction piles shall be embedded at a minimum of 10 feet into bedrock.

Continuous footings shall be at least 12 inches wide. Square footings shall be at least 24 inches wide. Caissons shall be at least 24 inches in diameter. Friction piles shall be at least 18 inches in diameter.

**Allowable Bearing Capacity**

For preliminary design purposes, the allowable bearing value for foundations placed as recommended may be calculated from the following. The allowable bearing value should not exceed 6,000 pounds per square foot for the bedrock.

<table>
<thead>
<tr>
<th>Bedrock:</th>
<th>Continuous Footings:</th>
<th>q = 800 + 800 d + 400 b</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Square Footings:</td>
<td>q = 900 + 800 d + 300 b</td>
</tr>
<tr>
<td></td>
<td>Caissons:</td>
<td>q = 900 + 800 d + 200 b</td>
</tr>
</tbody>
</table>

where:

\[ q = \text{allowable soil bearing value, in pounds per square foot.} \]
\[ d = \text{depth of foundation into bedrock, in feet.} \]
\[ b = \text{diameter of caissons, in feet.} \]

The recommended values are for dead load plus frequently applied live load and may be increased by one-third when considering total loads including short durations of wind or seismic forces.
Skin Frictional Resistance

The preliminary design purposes, the allowable load capacities of each pile placed as recommended may be assumed as follows:

<table>
<thead>
<tr>
<th>Depth of Embedment In Bedrock</th>
<th>Allowable Load Capacity of each Pile</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>18-inch Diameter</td>
</tr>
<tr>
<td>10 feet</td>
<td>20 kips</td>
</tr>
<tr>
<td>15 feet</td>
<td>32 kips</td>
</tr>
<tr>
<td>20 feet</td>
<td>46 kips</td>
</tr>
<tr>
<td>25 feet</td>
<td>64 kips</td>
</tr>
</tbody>
</table>

Intermediate values may be interpolated. The point of fixity may be assumed to be 3 feet into bedrock.

The above recommended values are for dead loads plus frequently applied live load and may be increased by one-third when considering total loads including short duration of wind or seismic forces.

Settlement

Total and differential settlements of the proposed foundations, embedded in bedrock as recommended, are anticipated to be within tolerable limits. Total settlement of each foundation subject to no more than the allowable pressure is expected to be no more than 1/2 inch, accompanied by differential settlement on the order of 1/4 inch.

Differential settlement between the proposed addition and the existing garage is anticipated. The differential settlement may result in distress, requiring periodic maintenance.
Lateral Design

Lateral loads may be resisted by passive earth pressure and friction.

<table>
<thead>
<tr>
<th>Bedrock</th>
<th>Allowable Lateral Bearing</th>
<th>Maximum Lateral Bearing</th>
<th>Coefficient of Friction</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>400 psf/ft.</td>
<td>7,000 psf</td>
<td>0.40</td>
</tr>
</tbody>
</table>

The allowable bearing values may be used provided there is positive contact between bearing surface and the bedrock.

Lateral bearings for the following portions of foundations encroaching into the recommended Building Setback Line should be neglected:

<table>
<thead>
<tr>
<th>Encroachment South of Building Setback Line</th>
<th>The Upper Portion of Foundations Where Lateral Bearing Should Be Neglected</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 feet</td>
<td>0 feet</td>
</tr>
<tr>
<td>10 feet</td>
<td>15 feet</td>
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<tr>
<td>20 feet</td>
<td>30 feet</td>
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<tr>
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<td>60 feet</td>
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<tr>
<td>60 feet</td>
<td>70 feet</td>
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<tr>
<td>70 feet</td>
<td>75 feet</td>
</tr>
<tr>
<td>80 feet</td>
<td>80 feet</td>
</tr>
<tr>
<td>90 feet</td>
<td>90 feet</td>
</tr>
</tbody>
</table>

If the frictional and lateral bearing resistances are combined, the lateral bearing resistance should be reduced by one-third. The above values may be increased by one-third for short durations of seismic and wind forces.
A creep force of 1,000 pounds per linear foot shall be assumed to act upon each caisson or pile for their following portions encroaching into the recommended Building Setback Line:

<table>
<thead>
<tr>
<th>Encroachment South of Building Setback Line</th>
<th>The Upper Portion of Foundations Where Creep Force Should Be Applied</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 feet</td>
<td>0 feet</td>
</tr>
<tr>
<td>10 feet</td>
<td>15 feet</td>
</tr>
<tr>
<td>20 feet</td>
<td>30 feet</td>
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<tr>
<td>30 feet</td>
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<td>50 feet</td>
<td>60 feet</td>
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<tr>
<td>60 feet</td>
<td>70 feet</td>
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<tr>
<td>70 feet</td>
<td>75 feet</td>
</tr>
<tr>
<td>80 feet</td>
<td>80 feet</td>
</tr>
<tr>
<td>90 feet</td>
<td>90 feet</td>
</tr>
</tbody>
</table>

Grade beams and wall footings subject to the downhill creep shall be designed for earth pressures presented in the section on Earth Pressure on Retaining Walls.

**CONCRETE SLABS**

Concrete slabs should be supported on bedrock or compacted fill placed on the bedrock. The existing fill soils and natural soil above the bedrock should be removed and recompacted. Alternatively, the slabs may be structurally supported by foundations embedded in the bedrock. It should be noted that slabs not structurally supported in bedrock may still be subject to some distress. Some periodic maintenance may be required. Patio slabs and walkways are generally not given the level of treatment floor slabs are given.

The fill soils shall be compacted to a minimum of 90% relative compaction in accordance with ASTM D 1557-91 method of compaction. Fill placement shall be in accordance with specifications given in the section on Grading Specifications.
It is recommended that slabs placed on grade be supported by a minimum of 4 inches of base. These slabs shall be at least 5 inches thick and be reinforced with at least No. 3 bars at 18 inches, both ways. A moisture barrier, such as 6-mil visqueen, shall be placed beneath the slabs where upward capillary of moisture is undesirable. The visqueen should be covered with one inch of sand to prevent puncture.

Presoaking of 24 inches of subgrade soils is recommended.

The subgrade soils shall be further tested for expansion potential during construction to determine if revised slab design would be necessary.

Exterior slabs (i.e., patio, walkway, etc.) should be provided with proper crack control joints. Typical concrete shrinkage can result in cracks and gaps along the crack control joints and where the slab connects to structures. The gaps will require periodic caulking to limit infiltration of moisture.

Exterior slabs planned adjacent to the descending slope should be provided with a thickened edge. The thickened edge should be a minimum of 12 inches wide, 24 inches deep and reinforced with 4 #4 bars, 2 placed near the top and 2 placed near the bottom.

Decking which caps a retaining wall should be provided with a flexible joint to allow for the normal 1 to 2 percent deflection of the retaining wall. Decking which does not cap a retaining wall should not be tied to the wall. The space between the wall and decking will require periodic caulking to prevent moisture intrusion into the retaining wall backfill.
It is important to recognize that patio slabs, walkways, etc., could be subjected to cracking and tilting due to local soil influences, unless they are structurally designed to resist such influences.

EXISTING EXPLORATORY EXCAVATION BACKFILL

The exploratory boring was backfilled upon completion of the field exploration using the excavated soils. Backfilling was performed to the extent possible with the equipment on hand. However, the backfill was not compacted to the requirements of "structural fill". Any improvement may be designed to "span" over the excavation.
GRADING SPECIFICATIONS

It is understood that major grading is not anticipated in conjunction with the proposed project. However, if grading is anticipated, the following specifications should be followed:

1. Prior to placement of compacted fill, the site shall be cleared of all vegetation, existing fill, loose subsoil, debris, and other deleterious materials.

2. Import soils shall be tested and approved by the soils engineer prior to import.

3. Surfaces receiving fill soils shall be scarified, aerated, or moistened to moisture content acceptable to the soils engineer, then compacted to a compaction of not less than 90% of the maximum density.

4. If the moisture content of the fill soils is below the limits specified by the soils engineer, water shall be added until the moisture content is as required.

5. If the moisture content of the fill soils is above the limits specified by the soils engineer, the fill soils shall be aerated by blading or other satisfactory methods until the moisture content is as required. If drying of soils is not desired, the wet soils shall be mixed with drier materials to achieve an acceptable moisture content.

6. The fill soils shall be placed in lifts of no more than eight (8) inches in thickness and compacted until field density tests indicate that a compaction of not less than 90% of the maximum density as determined by ASTM D 1557-78 has been obtained.

7. Field density tests shall be made in accordance with ASTM D 1556-82. Field density tests shall be made every 2 foot intervals and not less than one test per 500 cubic yards of fill placed.

8. Rocks larger than 6 inches in greatest dimension shall be removed from the site or placed in accordance with specific recommendations of the soils engineer.

9. No fill soils shall be placed during unfavorable weather conditions. When work is interrupted by rains, fill operations shall not be resumed until the field tests by the soils engineer indicate that the moisture content and density of the fill are as previously specified.
10. Planting and irrigation of cut and fill slopes and installation of erosion control and drainage devices shall comply with the requirements of the Grading Code of controlling agencies.

SLOPE SURFACE INSTABILITY

We recommend that the homeowner maintain an adequate debris, erosion and fire control program to protect the property.

Sloughing and slumping of the surface of any slope may be anticipated if the slope is left unprotected over a period of time, especially during rainy seasons. It should be noted that excessive landscape watering, rodent burrows and uncontrolled surface runoff may cause instability of the slope surface. The following recommendations are provided so as to reduce the potential for slope erosion.

1. The slope shall be planted and maintained with a suitable deep-rooted ground cover as soon as possible. Additional protection may be provided by the use of jute mesh or suitable geofabrics. If adequate ground cover is not established before the rainy season, sloughing and slumping of the surficial soils may occur. It is imperative that landscape watering be kept to the minimum required for normal plant growth.

2. Any paved drainage swale and downdrain on the slope and drain inlet should be kept free of soils and debris.

3. Adequate site drainage shall be provided. All roof and surface drainage shall be conducted away from foundation and slope areas via engineered non-erosive devices to existing storm drain facilities on the street. In no case shall water be allowed to pond within the site, drain towards structures or flow in a concentrated and uncontrolled manner down the slope.
DRAINAGE CONTROL

Drainage control is imperative for continued site stability. The risk of unusual settlement or stability of structures can be reduced by proper drainage control and maintenance of yards. It is the responsibility of the owner to maintain the drainage facilities and correct any deficiency found during occupancy of the property.

Roof gutters and area drains with proper gradient for the surrounding soils should be provided. Pad and roof drainage should be positively collected and transferred to the street via non-erosive drainage devices. Water should not be allowed to pond on the pad, flow towards any foundations or wall, or sheet-flow over any descending slope. Drainage from the street, ascending slopes and off-site properties should not be permitted to flow onto the site, unless such runoff can be directed to the street via non-erosive drainage devices. Upslope runoff should be properly directed around the development.

Any crack in paved surfaces should be sealed to limit infiltration of surface water. Slopes and yards should be provided with low maintenance, erosion control vegetation. Care should be taken not to over-irrigate the site. Landscape watering shall be kept to the minimum necessary for normal plant growth.

Planting around the house should be minimized. Planters located adjacent to the house and walls should be sealed and properly drained. The feasibility of utilizing contained planters should be considered.

Water and sewer lines within the subject site shall be checked for leakage periodically and repaired if necessary.
EARTH PRESSURE ON RETAINING WALLS

The earth pressure on cantilevered walls retaining the on-site materials, or grade beams and wall footings subject to the downhill creep, may be assumed equal to that exerted by a fluid having a density not less than that shown in the following table:

<table>
<thead>
<tr>
<th>Backfill Slope (Horiz. to Vert.)</th>
<th>Equivalent Fluid Pressure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level</td>
<td>45 pcf</td>
</tr>
<tr>
<td>5 to 1</td>
<td>48</td>
</tr>
<tr>
<td>4 to 1</td>
<td>52</td>
</tr>
<tr>
<td>3 to 1</td>
<td>58</td>
</tr>
<tr>
<td>2 to 1</td>
<td>65</td>
</tr>
</tbody>
</table>

Walls restrained from movements at the top, such as basement walls, shall be designed for 150% of the above recommended values.

Walls designed for the recommended earth pressure need not be designed for additional creep forces.

The recommend equivalent fluid pressure shall be increased in the event of surcharge loads affecting the wall.

Backdrain and Waterproofing

An adequate backdrain system shall be incorporated in the design of the retaining walls. One of such backdrain system may consist of 4-inch diameter perforated pipes, placed with perforations facing down and surrounded by crushed rock. The backdrain should be wrapped with suitable geofabrics to minimize the potential for clogging. Water collected in the pipes may be drained by gravity flow in a controlled manner to the street. If the gradients at the
site do not allow for gravity flow, a suitable pumping system should be installed. Drains should not outlet on the descending slope face.

The retaining walls shall be suitably waterproofed to reduce the potential for damage due to moisture intrusion, seepage and leakage. Conventional waterproofing materials, such as asphalt emulsion, have often proved ineffective. Certain precautions can be taken to reduce the possibility of future seepage problems. Superplasticized and water-retardant concrete may be utilized to make pouring easier and reduce shrinkage and cracking.

**Wall Backfill**

If the retaining walls are not constructed directly against the face of the temporary excavation, the space between the walls and the cut face should be backfilled with pea gravel, or equivalent. The pea gravel backfill should be placed in lifts of no more than 2 feet in thickness and should be compacted with vibratory equipment. In areas where sloped temporary cuts are made that require placement of larger quantities of backfill, the fill material should consist of approved granular soils.

It is recommended that the upper 2 feet of the backfill be composed of fine-grained soils such as to minimize the potential for water infiltration. The new fill soils shall be compacted to a minimum of 90% relative compaction.

Revised specifications may be required after review of the detailed construction drawings.

Some settlement of the backfill is anticipated and should be allowed for in the design and placement of the slabs and utilities.
EXCAVATION

Where necessary construction space is available, temporary unsurcharged excavations may be considered to the depths and slope ratios tabulated below:

<table>
<thead>
<tr>
<th>Maximum Depth of cut (Feet)</th>
<th>Maximum Slope Ratio (Horizontal to Vertical)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fill/Soil</td>
<td></td>
</tr>
<tr>
<td>0 - 4</td>
<td>Vertical</td>
</tr>
<tr>
<td>4+</td>
<td>1:1</td>
</tr>
<tr>
<td>Bedrock</td>
<td></td>
</tr>
<tr>
<td>0 - 5</td>
<td>Vertical</td>
</tr>
<tr>
<td>5+</td>
<td>3/4:1</td>
</tr>
</tbody>
</table>

Soils exposed in the cuts should be kept moist but not saturated, to reduce the tendency for raveling and sloughing during construction. The top of the cut slopes should be barricaded to keep vehicles and heavy storage loads at least five feet away from the top of the slopes. During the rainy season, berms should be constructed and maintained along the top of the slopes and plastic sheets should be placed over the slopes to prevent runoff water from eroding the slope faces.

Where construction space is not available or where the excavation will be surcharged by the existing footings, the cuts shall be shored or made in slots. A cut is considered to be surcharged if it is made below a plane projected 1:1 (45 degrees) downward from the outer edge of a footing.

The shoring system shall be designed for an equivalent fluid pressure of 30 pounds per square foot per foot.

Slots shall be no more than 6 feet wide and shall be made in an A-B-C-A-B-C sequence.
Sequence of construction and method shall be determined by the contractor. Care should be exercised when excavating adjacent to the existing footings such as not to unduly undermine the existing footings and cause damage. We recommend that no more than 6 feet of the existing footings be exposed at one time. It may be necessary to brace portions of the existing footings prior to excavation for the new foundations or for recompression of the subgrade soils.

Although no significant amount of soil caving was encountered in the exploratory test boring, other excavations may experience caving. Construction methods shall meet the requirements of the California Occupational Safety and Health Association (CAL-OSHA), and other public agencies having jurisdiction.

We recommend that the cut slopes be inspected during excavation by personnel of this facility, so that necessary modifications can be made.

CONSTRUCTION SITE MAINTENANCE

It is the responsibility of the contractor to maintain a safe construction site. When excavations exist on a site, the area should be fenced and warning signs posted. All pile and caisson excavations must be properly covered and secured.

Earth materials generated from foundation and subgrade excavations should be either removed from the site or properly compacted. Fill temporarily stockpiled on the site should be placed in a stable area, away from slopes, excavations and improvements. Earth materials must not be spilled over any descending slope.

Workers should not be allowed to enter any unshored trench excavations over five feet deep.
Temporary erosion control measures and protection of excavation from drainage and erosion during the rainy season is required.

PLAN REVIEW AND CONSULTATION

It is recommended that prior to proceeding with construction, consultation among the homeowner, structural engineer, geotechnical engineer, and the contractor be scheduled to discuss the project.

RECOMMENDED INSPECTIONS

It is strongly recommended that as a condition of use of this report, that the homeowner insist that each phase of construction be properly inspected and approved by the local building department official, the structural engineer, and geotechnical engineer.

REGULATORY AGENCY REVIEW

This report is subject to review by regulatory agencies. No guarantee that the regulatory public agency or agencies will approve the project is intended, expressed or implied. If the regulatory agency asks questions regarding site geology and/or requests that further work be performed, we will perform such work on a time and expense basis.

ADDITIONAL CONSULTING

Any additional consulting, such as for foundation reviews, grading reviews, meetings, response to review sheets, etc., will be performed on a time and expense basis.
The conclusions and recommendations presented in this report are based on research, site observations and limited subsurface information. The conclusions and recommendations presented are based on the assumption that subsurface conditions do not vary significantly from those indicated. Although no significant variations in subsurface conditions are anticipated, the possibility of significant variations cannot be ruled out. If such conditions are encountered, this consultant should be contacted immediately to consider the need for modification of this project.

This report is subject to review by regulatory agencies and these agencies may require their approval before the project can proceed. No guarantee that the regulatory public agency or agencies will approve the project is intended, expressed or implied.

One of the purposes of this report is to provide the client with advice regarding geotechnical conditions on the site. It is important to recognize that other consultants could arrive at different conclusions and recommendations. No warranties of future site performance are intended, expressed or implied.
Boring #1  1481 Paseo del Mar

FILL:  0.0 - 2.5 feet

Fill consists of brown sandy silt, dry, soft, powdery.

NATURAL SOIL:  2.5 - 6.0 feet

Dark brown silty clay, scattered pebbles sized rock fragments, stiff, tight, tectonic contact with bedrock at 6.0 feet.

BEDROCK:  6.0 - 75.0 feet

Bedding orientation at a depth of 8.5 feet is N20E 5SW.

Bedrock consists of light brown to orange brown siliceous siltstone, hard, tight, thinly bedded.

Bedding orientation at 12.5 feet is N47W 4SW, nearly horizontal.

Bedrock consists of orange brown to blue gray siliceous siltstone, hard to very hard, tight, thinly bedded.

Bedding orientation at 15.5 feet is N16W 7SW.

Bedrock consists of orange brown to brown interbedded with light blue gray siltstone, hard, tight, very well bedded.

Bedding orientation at 21.0 feet is N22E 7NW.

Bedrock consists of same light orange brown siliceous siltstone with light blue gray interbeds on the order of 1/4 inch thickness, hard, tight, scattered gypsum veins observed starting at a depth of about 20.0 feet.

Bedding orientation at 25.5 feet is N11E 14NW.

Bedrock consists of orange brown siltstone with blue gray interbeds, becoming more cherty, cherty layers are 2 to 3 inches thick and are hard and brittle, well bedded, tight.

From 27.5 to 30.0 feet is light gray dolostone layer, extremely hard, tight, breaks out in boulder sized fragments. Below dolostone layer is orange brown to orange brown siltstone, scattered white gypsum veins.

Bedding orientation at 31.0 feet is N11W 13SW.

Starting at 36.0 feet bedrock becomes noticeably darker in color to dark brown to almost black, bedrock consists of siliceous siltstone, very hard, tight, well bedded, scattered white gypsum veins, nearly horizontal bedding.

Bedding orientation at 39.0 feet is N35W 6SW.
Bedrock consists of dark brown to black siliceous siltstone, very hard, gypsum veins are becoming more abundant, bedrock appears to become harder with depth.

Bedding orientation at 47.0 feet is N43W 4SW.

Bedrock consists of dark gray to black siliceous siltstone, thinly bedded, very tight, very hard.

Bedding orientation at 50.0 feet is N30W 5SW.

Water is percolating out of the side of the boring at 51 feet, slight seep making sides of boring muddy.

Bedrock consists of dark gray siliceous siltstone, very hard, tight, thinly bedded, nearly horizontal bedding.

At 59 feet water is squiring out of the side of the boring. Bedrock is dry when picked out, water appears to be percolating through joints in rock, not along bedding planes.

Bedding orientation at a depth of 60.0 feet is N37W 5SW.

Bedding orientation at a depth of 65.0 feet is N11W 9SW.

Water level has risen to a depth of 67.0 feet.

TOTAL DEPTH = 80.0 FEET

NO CAVING

WATER OBSERVED STARTING AT A DEPTH OF 51.0 FEET