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February 2, 2004 *FILE NO.: SL-13133-SA*

Mr. Erich Brown
University of California, Santa Barbara
Office of Design and Construction
Santa Barbara, California 93106-1030

PROJECT: *PROPOSED SAN CLEMENTE STUDENT HOUSING*
UCSB PROJECT NO. 986497
EL COLEGIO & LOS CARNEROS ROADS
UNIVERSITY OF CALIFORNIA, SANTA BARBARA
GOLETA, CALIFORNIA

SUBJECT: *Addendum No. 1 to the Soils Engineering Report*

REF: *Soils Engineering Report, Proposed San Clemente Student Housing, UCSB Project No. 986497, El Colegio & Los Carneros Roads, University of California, Santa Barbara, Goleta, California, by Earth Systems Pacific, dated July 8, 2002, Doc. No.: 0207-038.SER*

Dear Mr. Brown:

As requested, this letter presents an addendum to the above referenced soils engineering report for the proposed San Clemente Student Housing project at the University of California, Santa Barbara in Goleta, California.

Section 7.0, Preliminary Geotechnical Recommendations, Grading – Building and Pavement Areas.

- Paragraph 1., <u>Double Row with Below-Grade Parking</u> – This paragraph should be eliminated.
- Paragraph 2., <u>Single Row without Below-Grade Parking</u> – This paragraph should be changed as follows:

2. *Single and Double Row without Below-Grade Parking*: Following site preparation, over-excavate the soils below the building areas to obtain a minimum depth of 4-feet below the existing grade or 4-feet below the bottom of footings, *whichever is deeper.* The existing side slopes associated with the bike path ramp near Los Carneros Road, which will not be impacted by the over-excavation and recompaction operations, should be benched into a minimum of 3 feet, both vertically and laterally, as the fill placement progresses upward. This is to ensure that an adequate bond is created between the in situ slope soils and the structural fill.

- Paragraph 5 should be added to the report.
  5. *Slabs-on-Grade with Shallow Foundations*: Following site preparation, over-excavate the soils below the slabs-on-grade outside of the building areas to obtain a minimum depth of 2 feet below the existing grade or 2-feet below the bottom of the slab-on-grade, *whichever is deeper.*

Section 7.0, Preliminary Geotechnical Recommendations, Shallow Foundations.

- Paragraph 1 should be changed as follows:
  1. Conventional continuous and spread footings may be used to support the structures. Footings bearing entirely upon a mat of structural fill should be designed utilizing a maximum allowable bearing capacity of 2,000 psf dead load plus sustained live loads. Using these criteria, maximum total and differential settlements are expected to be on the order of 1-inch and ½-inch in 25 feet, respectively.

This addendum is intended to be used in conjunction with the referenced report. Unless specifically superceded herein, all information in the referenced report remains applicable. If there are any questions concerning this letter, please do not hesitate to contact me.

Sincerely,

Earth Systems Pacific

Doug Dunham

Doug Dunham, G.E.
Date Signed: 4-19-04

REGISTERED PROFESSIONAL ENGINEER
DOUGLAS A. DUNHAM
No. 2586
Exp. 12-31-05
GEOTECHNICAL
STATE OF CALIFORNIA

Doc. No.:0402-011.LTR/smk

SOILS ENGINEERING REPORT
PROPOSED SAN CLEMENTE STUDENT HOUSING
UCSB PROJECT N0. 986497
EL COLEGIO & LOS CARNEROS ROADS
UNIVERSITY OF CALIFORNIA, SANTA BARBARA
GOLETA, CALIFORNIA

July 8, 2002

Prepared for

University of California, Santa Barbara
Office of Design and Construction Services

Prepared by

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July 8, 2002

FILE NO.: SL-13133-SA

Mr. Erich Brown
University of California, Santa Barbara
Office of Design and Construction Services
Santa Barbara, California 93106-1030

PROJECT: PROPOSED SAN CLEMENTE STUDENT HOUSING
UCSB PROJECT NO. 986497
EL COLEGIO & LOS CARNEROS ROADS
UNIVERSITY OF CALIFORNIA, SANTA BARBARA
GOLETA, CALIFORNIA

SUBJECT: Soils Engineering Report

REF:

1) Proposal for Geotechnical Investigation, Proposed San Clemente Housing Development by Earth Systems Pacific, dated February 12, 2002, ESP Proposal No. 02-02025.PRO.
2) Fault Evaluation Report, San Clemente Housing, Storke Field Area by CFS Geotechnical Consultants, Inc., dated June 22, 2001, Project No. 010501.

Dear Mr. Brown:

In accordance with your request and authorization of the referenced proposal, this soils engineering report has been prepared for use in the development of the plans and specifications for the proposed San Clemente Student Housing project at the University of California, Santa Barbara in Goleta, California. Preliminary geotechnical recommendations for site preparation, grading, utility trenches, foundations, slabs-on-grade and exterior flatwork, retaining walls, pavement sections, and drainage around improvements are presented herein. Six copies of this report are provided for your use.

We appreciate the opportunity to have provided these services for this project and look forward to working with you again in the future. If there are any questions concerning this report, please do not hesitate to contact the undersigned.

Sincerely,
Earth Systems Pacific

W. Randall Glaze, G.E.
Date Signed: 4/19/04

DENNIS C. SHALLENBERGER
No. GE 2158
Exp. 12/31/05

Doc. No.: 0207-038.SER

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Appendices

1.0 INTRODUCTION

The construction of a student housing complex is proposed for the Storke Field area of the University of California, Santa Barbara in Goleta, California. Although the design plans are in the conceptual phase as of this writing, we understand that the residential development will consist of four main blocks, designated Blocks 1 through 4, which will encompass approximately 300,000 ft^2 in plan view, as shown on the Boring Location Map in Appendix A. The blocks will comprise a single row and a double row of 116, two to four-story apartment type buildings, totaling 383 individual units. However, Block 1 will only consist of a single row of buildings. Two multi-purpose and service buildings, totaling 12,000 ft^2, will be centrally positioned within the double row of apartments. The footprints of the single and double rows are rectangular in plan view with a dimension of approximately 60 feet (north-south) by 440 feet (east-west) and 150 feet (north-south) by 440 feet (east-west), respectively. A partially subterranean parking garage is planned below the entire double row footprint of the blocks. The single row will be at-grade with no below-grade parking. Two elevator shafts will service each block.

The structures will utilize conventional wood-frame construction for the above grade floors and cast-in-place concrete construction for the parking garage structure with concrete slab-on-grade floor systems. We understand that it is preferred that structural support be derived from peripheral continuous bearing wall and interior column spread footings; however, a deep foundation system consisting of drilled, cast-in-place concrete shafts (piers) connected by load bearing grade beams may be considered depending on the project cost constraints. The maximum column and continuous bearing wall loads (DL + sustained LL) for the double row structures with the below-grade parking will not exceed 400 kips and 6 kips per lineal foot, respectively; and will not exceed 75 kips and 2.5 kips per lineal foot, respectively, for the at-grade single row structures without the parking garage. The maximum floor loadings for the parking garage will be relatively light and typical of automobile and light truck traffic.

Although the final finish grade elevations have not been developed as of this writing, we understand that the finish floor elevations for the double row parking garage are currently planned at 23.9 feet for Block 2, 30.0 feet for Block 3, and 36.4 feet for Block 4. The finish floor elevations for the single row will range from 25.8 feet for Block 1 to 45.4 feet for Block 4, with a 3 foot grade break near the middle of each block. Accordingly, site grading for the double rows will entail an excavation ranging from approximately ½ foot along the westerly building line to approximately 6½ feet along the easterly building line for *each* block. Site grading for the single rows will entail a fill ranging from approximately ½ foot along the easterly building line to approximately 5 feet along the westerly building line with an average fill ranging up to 3 to 4 feet to achieve the finish subgrade elevation. However, a fill ranging up to 9 feet will be necessary within the most westerly portion of Block 1 associated with the existing bike path ramp. It should be noted that the site improvement information (ie. cut/fill depths, retaining walls, etc.) within this specific area has not been established as of this writing. It is anticipated that the general site grading around the blocks will be relatively minor and limited to cuts and fills of 2 to 3 feet in order to provide positive drainage away from the structures.

Appurtenant construction will consist of a 96,000 ft^2 asphaltic concrete (AC) parking lot located immediately north of Block 4; AC and/or Portland cement concrete (PCC) ingress and egress drives; exterior PCC flatwork; underground utilities and drainage infra-structures; earth retaining walls up to a maximum height of 6 feet to separate grade differentials across the site; and landscape and planter areas.

2.0 SCOPE OF SERVICES

The scope of work for this soils engineering report included review of the referenced report for the project, a general site reconnaissance, field exploration, laboratory testing of selected soil samples, geotechnical analysis of data, and preparation of this report. The analysis and subsequent preliminary recommendations were based upon review of the preliminary 100% Civil, Structural, and Architectural Schematic Plans prepared by Wolf Architecture and dated May 1, 2002; together with verbal information provided by Mr. Erich Brown of your department, project manager; Mr. Brent Miller of Fields and Deveraux Architects and Engineers, project executive architect; Mr. Lawrence Ho and Mr. Cheng-Ming Lin of Englekirk & Sabol Consulting Structural Engineers, Inc., project structural engineer.

This report and preliminary geotechnical recommendations are intended to comply with the considerations of Sections 1804.2 through 1804.5 and 3309.5 of the Uniform Building Code (UBC), 1997 edition as amended by pertinent sections of Title 24 of the California Code of

Regulations, and standard soils engineering practice. The test procedures were accomplished in general conformance with the standards noted, as modified by common soils engineering practice in this area.

Preliminary geotechnical recommendations for site preparation, grading, utility trenches, foundations, slabs-on-grade and exterior flat work, retaining walls, pavement sections, and drainage around improvements are presented to guide the development of project plans and specifications. Given the preliminary, or otherwise conceptual nature of the current design phase, this firm should be retained to provide consultation as the design progresses and review the project plans as they near completion to assist in verifying that pertinent geotechnical issues have been addressed and to aid in conformance with the intent of this report.

It is our intent that this report be used exclusively by the client to form the geotechnical basis for the design of the project and in the preparation of plans and specifications. Application beyond this intent is strictly at the user's risk.

This report does not address issues in the domain of contractors such as, but not limited to, site safety, loss of volume due to stripping of the site, shrinkage of fill soils during compaction, excavatability, dewatering, shoring, temporary slope angles, construction methods, etc. Analyses of the site geology and of the soil for radioisotopes, asbestos, hydrocarbons, and chemical properties including geotechnical corrosivity are beyond the scope of this investigation. Ancillary structures such as temporary access roads, fences, flag and light poles, signage, and nonstructural fills are not within our scope and are also not addressed. Analysis of any retention/detention basins is also beyond the scope of work.

In the event that there are any changes in the nature, design, or location of improvements, or if any assumptions used in the preparation of this report prove to be incorrect, the conclusions and recommendations contained in this report shall not be considered valid unless the changes are reviewed and the conclusions of this report modified or verified in writing. The criteria presented in this report are considered preliminary until such time as any peer review or review by any jurisdiction(s) has been completed, conditions are observed by the soils engineer in the field during construction, and the recommendations have been verified as appropriate or modified in writing.

3.0 SITE SETTING

The proposed site comprises the southerly one-half of the Storke Field area within the northwesterly portion of the University of California, Santa Barbara campus in Goleta, California. The site is positioned in an undeveloped recreational field and is bound to the north by the continuation of the field furthered by Parking Lot No. 38 and Harder Stadium; to the east by tennis courts furthered by Stadium Way; to the south by a row of mature trees and an AC bike path furthered by El Colegio Road; and to the west by Los Carneros Road. The bike path at the westerly end of the site ramps downward and traverses below Los Carneros Road. Refer to the Boring Location Map for the general location of the site.

Topographically, the site is relatively level with the general drainage gradient toward the west. The existing site elevations range from approximately 45 feet along the easterly boundary to 25 feet within the westerly portion, indicating a maximum relief of 20 feet across the site. The low elevation associated with the bike path ramp is approximately 16 feet. At the time of our field investigation, the site was covered with lawn; aside from the tennis and volleyball courts which occupy its most easterly end. Numerous underground utilities and infra-structures traverse the site.

4.0 FIELD AND LABORATORY INVESTIGATION

On March 19 through 25, 2002, a total of twelve borings, designated Borings B-1 through B-12, were drilled within the proposed building footprints. Additionally, two soil test borings, designated Borings B-13 and B-14, were drilled within the proposed parking lot. The borings for the buildings were advanced to depths ranging from approximately 31 to 61 feet below the existing grade; while the parking lot borings were advanced to a depth of 7½ feet. It should be noted that two of the borings encountered auger refusal near 34½ feet (Boring B-6) and 44½ feet (Boring B-2). The approximate locations of the borings are shown on the Boring Location Map. Additionally, a total of four bucket auger borings and thirteen soil test borings were drilled within, and adjacent to, the proposed site during the previous field investigation performed on May 23 through June 7, 2001 for Reference No. 2. These borings were advanced to depths ranging from 26 to 50 feet. The boring logs were reviewed for additional subsurface information as part of this investigation.

The borings were advanced utilizing a CME 75 high-torque drill rig equipped with 8¼-inch outside diameter (OD) hollow stem augers. Standard penetration tests (SPT) were conducted in conformance with ASTM D1586-99 at various depths within the borings. Penetration was accomplished using a 2-inch OD and 1-⅜ inch inside diameter (ID) standard split tube sampler driven by the 140 pound CME Automatic Trip Hammer free falling 30 inches. Additionally, samples were secured by similarly advancing a 3-inch OD and 2½-inch ID sleeve-lined split tube Modified CAL Sampler (ASTM D 3550-01 with shoe similar to D 2937-00) at various depths within the soil profile for laboratory testing. Bulk soil samples were also obtained from the auger cuttings.

Soils encountered in the borings were categorized and logged by personnel from this firm in general accordance with the Unified Soil Classification System and ASTM D 2488-00. Logs of the borings can also be found in Appendix A.

The sleeve samples were tested for unit weight and moisture content (ASTM D 2937-00, as modified for sleeve liners). For classification purposes, sixteen grain-size distribution tests (ASTM D 1140-00, 422-98) and seven Atterberg Limit tests (ASTM D 4318-00) were performed on soil and rock samples. The maximum density and optimum moisture content (ASTM D 1557-00) of seven surficial bulk samples were determined. Four direct shear tests (ASTM D 3080-98), modified for the consolidated-undrained condition, were performed on in situ samples of the soil and rock and three tests were performed on samples remolded to near 91 percent relative compaction. Ten consolidation tests (ASTM D 2435-96) were performed on ring samples of the soil and rock. The expansion index (ASTM D 4829-95, UBC Standard No. 18-2), an indicator of the potential for the soil to swell when moistened, was determined for two surficial bulk samples. For the purpose of flexible pavement design, one R-value test (ASTM D 2844-94, CAL 301) was performed on a bulk sample of the surficial subgrade materials within the parking lot. The results of the laboratory tests are presented in Appendix B.

5.0 GENERAL SOIL PROFILE

The subsurface profile penetrated by the borings was relatively uniform between the points of exploration and consisted of two major strata typical of this specific geological region. These strata comprised native terrace deposits (Qt) underlain by completely and moderately weathered bedrock materials identified as the Santa Barbara Formation (Qsb & Qsbp).

Terrace Deposits (Qt): The terrace deposits consisted of interbedded strata of very dark grayish brown, high plasticity Sandy Fat Clays (CH); grayish mottled reddish and yellowish brown, medium plasticity Silty and Sandy Lean Clays (CL); grayish brown, dark yellowish brown and olive, fine grained Clayey Sands (SC); olive brown mottled reddish and yellowish brown, slightly to non-plastic Sandy Silts (ML); grayish, olive, yellowish brown, fine grained Silty Sands (SM); and olive to yellowish brown, fine grained Poorly Graded Sands (SP-SM) to depths ranging from 11 to 18 feet, averaging about 13 feet below the existing grade. It should be recognized that it was difficult to ascertain the actual transition depth between the upper terrace materials and the underlying Santa Barbara Formation due to the similarity of physical characteristics between the two materials in most cases and was estimated based on our best engineering judgement. The consistency of the clays and silts generally varied from firm near the surface increasing to very stiff with depth. The relative density of the sands generally varied from medium dense to dense with isolated loose zones encountered near the surface. The upper portion of the terrace materials was generally in a moist to very moist condition; while the lower portion varied from very moist to saturated.

Santa Barbara Formation (Qsb): The upper unit of the Santa Barbara Formation encountered immediately below the terrace deposits consisted of olive and yellowish brown, fine grained Silty Sand (SM) and olive gray mottled yellowish and reddish brown, non-plastic, Sandy Silt (ML) to depths ranging from 16 to 27 feet, averaging about 19 feet below the existing grade. However, this upper unit may extend to a depth of approximately 43 feet at Boring B-2, indicting a subsurface anomaly at this location. Additionally, saturated Poorly Graded Sand with Silt (SP-SM) was encountered between approximately 28 to 43 feet below the existing grade at this boring location. A distinct zone comprising abundant shell fragments was encountered near the transition between the upper and lower units. The consistency of the silt generally varied from very stiff to hard; however, a firm zone was encountered within Boring B-3 near 15 feet. The relative density of the sand generally varied from medium dense to very dense. The materials were generally in a very moist to saturated condition.

Santa Barbara Formation (Qsbp): The lower unit of the Santa Barbara Formation was characterized as moderately weathered, dark olive gray, massive, Siltstone with discontinuous interbeds of Claystone and Sandstone to the maximum explored depth of 61 feet. However, the Siltstone was non-existent at Boring B-2 with only Sandstone being encountered near a depth of approximately 43 feet below the existing grade. When considering rock consistency, the Siltstone was generally soft and weak. However, when considering soil consistency, the Siltstone was generally hard, aside from the upper most weathered zone which yielded a very stiff consistency at several boring locations. The bedrock was in a moist condition.

Groundwater: Groundwater was generally found in a perched condition near depths ranging from 9½ to 18 feet, averaging about 12 feet below the existing grade at the time of our field exploration. At seven boring locations, static perched water levels were measured through temporary piezometers constructed of 2-inch diameter PVC pipe with machined slots near depths ranging from 7 to 11 feet below the existing grade when sounded with an electronic water level indicator on the following day of drilling. Discontinuous water-bearing seams within the bedrock, coinciding with the Sandstone zones, were encountered within several borings. The previous borings performed between May 23 to June 7, 2001 as part of the field investigation for Reference No. 2 generally encountered a "very moist to wet" at depths of approximately 12 to 15 feet below the existing grade and a "wet" condition at depths ranging from 17 to 20 feet.

Refer to the Log of Borings for a more detailed description of the soil and bedrock profile encountered at the boring locations. Additionally, profiles of the borings are incorporated into Appendix A.

6.0 CONCLUSIONS

In our opinion, the site is suitable, from a geotechnical standpoint, for the proposed student housing development, provided the recommendations contained herein are implemented in the design and construction. The major geotechnical factors which could adversely impact the proposed construction and long-term serviceability of the structures and improvements are the undesirable consolidation potential of the upper terrace deposits, the expansion potential of the surficial clays, and the relatively shallow perched water condition.

Based on the field and laboratory tests results, the surficial soils within the immediate zone of influence of the proposed structural elements possess low standard penetration resistance and low in-place density and corresponding degree of relative compaction, and are moderately compressible when subjected to the anticipated bearing stresses. Accordingly, the upper bearing soils in their in situ condition are not considered suitable for the direct support of the foundations, slabs-on-grade, pavements, or structural fill, without the risk of excessive post-construction settlement.

Implementing a site improvement program consisting of over-excavation of the bearing soils to an adequate depth below the critical zone of influence for the foundations, slabs-on-grade, and pavements is warranted to render the site suitable for the proposed construction. The over-excavated materials should be replaced with properly moisture conditioned and compacted structural fill. These efforts will provide a uniform and competent bearing mat and serve to reduce the potential for undesirable post-construction settlement and differential movement. Given that the relative density of the in situ soils below the over-excavation depth increases to medium dense to dense with depth and the majority of the stresses imposed by the structural elements will be dissipated within the upper bearing mat of structural fill, it is our opinion that these underlying soils are adequate for the support of the combined loadings imposed by the structural fill and the proposed construction.

Two expansion index tests performed on bulk samples of the surficial clay strata yielded values of 86 and 88. These values place the surficial clays in the upper bound medium expansion category per UBC Table 18-I-B. Expansive soils tend to swell with seasonal increases in soil moisture and shrink during the dry season as soil moisture decreases. The volume changes that the soils undergo in this cyclical pattern can stress and damage slabs and foundations if precautionary measures are not incorporated in design and in the construction procedure. Methods commonly used for slab protection include placement of nonexpansive material beneath the slab, premoistening of subslab soils, or a combination of the two. While premoistening alone can be helpful in *reducing* the effects of expansive soil, this method generally does not (and should not be expected to) provide protection from expansive soil damage to the extent that can be achieved by use of nonexpansive material or nonexpansive material in conjunction with premoistening. Due to the moderately high expansive nature of the surficial soils and subsequent likelihood that differential expansion and subsequent cracking of slabs would occur if premoistening were used by itself, it is not recommended as the only means of expansive soil mitigation. Use of nonexpansive imported material beneath the slabs, in combination with premoistening, will result in a more uniform slab with less tendency for heave and random cracking. Expansive soil concerns with respect to foundations will be mitigated by increased depth and reinforcement of foundation elements. In light of the anticipated site grading, the expansion potential should be re-evaluated after the finish grade elevation is achieved.

As elaborated previously, groundwater was found in a perched condition near depths ranging from 9½ to 18 feet, averaging about 12 feet below the existing grade at the time of our field investigation. It should be noted that although the static water levels measured approximately 1½ feet to as much as 4 feet higher on the following day, it is our opinion that the perched water level encountered at the time of drilling is more indicative of the actual conditions which could be encountered during construction. Temporary dewatering techniques *may* need to be employed before and during construction to lower the perched water level to an adequate depth below the over-excavation within the most easterly portions of the below-grade parking garage where the excavations are the deepest to stabilize the bottom of the over-excavation prior to fill placement. Temporary dewatering techniques have been successfully utilized during construction for numerous subterranean structures at the campus. As the parking garage finish floor will be constructed above the anticipated perched water level, a permanent dewatering system will not be necessary. It should be recognized that water table elevations fluctuate with time, being dependent upon seasonal precipitation, irrigation, land use, and climatic conditions as well as other factors. Therefore, water level observations at the time of the field investigation may vary from those encountered both during the construction phase and the design life of the project. The evaluation of such factors is beyond the scope of this report. It is our opinion however, that adverse influences to the foundations or floor slabs attributable to any future groundwater fluctuations are unlikely. Notwithstanding these facts, subgrade moisture can be expected to temporary increase to near saturation levels when exposed to manmade water sources (ie. irrigation, leaking pipes and/or faucets, etc.).

The surficial soils within the zone of over-excavation are well over their optimum moisture content. Although our investigation was performed near the end of the rainy season, this over-wet condition may prevail even in the summer months due to the on-going landscape/lawn watering of the recreational fields. Additionally, due to the aforementioned perched water condition, the potential of encountering a near saturated, or otherwise unstable subgrade condition near the bottom of the deeper over-excavations within the most easterly portions of the below grade parking garage does exist. Therefore, the contractor should allow adequate time during grading for drying back the excavated materials and exposed subgrade to their optimum moisture content should this condition be encountered. Additionally, care should be exercised by the contractor not to promote unstable subgrade conditions during the over-excavation and re-compaction operations. Pumping/yielding subgrade conditions typically occur when clayey/silty soils are over their optimum moisture content and are then subjected to heavy equipment traffic and/or compaction. The use of heavy rubber-tired construction equipment for compaction efforts within over optimum materials usually promotes yielding conditions and should be avoided. The contractor should be prepared to employ appropriate mitigative techniques if this condition is encountered.

The liquefaction potential and seismically induced settlement at the site were evaluated based on the data obtained from our field and laboratory investigations. The site is located within a seismically active area and the potential for the occurrence of an earthquake with the intensity and duration characteristics capable of promoting liquefaction does exist during the design life of the proposed project. However, given the presence of shallow bedrock and the moderately high relative density of the overlying soils based on the *corrected* Standard Penetration Test N-values ($(N_1)_{60}$ - NCEER 1997 method), the potential for liquefaction and seismically induced settlement at the site is considered very low.

The on-site soils are erodible and caution must be exercised to control surface runoff. Stabilization of surface soils, particularly those disturbed during construction, by vegetation or other means *during and following* construction is essential to reduce the potential of erosion damage.

As an alternative to a shallow foundation system, a deep foundation system consisting of drilled, cast-in-place concrete friction shafts (piers) socketed into the underlying bedrock may be considered. Utilizing a deep foundation system would eliminate the need for the deeper over-excavations within the most easterly portion of the below-grade parking garage as the loads would be transferred to the underlying bedrock. However, the site improvement techniques would be still be required below the slabs-on-grade and pavement areas. Accordingly, we have presented recommendations for both systems for your consideration. It should be recognized that it is the responsibility of the owner and/or his representative for selection of the appropriate foundation system based on the cost and construction constraints.

7.0 PRELIMINARY GEOTECHNICAL RECOMMENDATIONS

In developing these recommendations, it was assumed that irrigated landscaping and flatwork that will keep the soils at relatively uniform, year-round moisture will be installed for a zone of at least 5 feet around the perimeter of all structures. If drought tolerant vegetation or xeroscaping is planned, or if this zone around the structure is allowed to dry out for any other reason, these recommendations may require modification.

Grading Considerations

1. Temporary de-watering *may* be required to lower the perched water level to an adequate depth below the over-excavation within the most easterly portions of the below-grade parking garage to stabilize the bottom of the over-excavation prior to fill placement. De-watering can be accomplished by means of intersecting peripheral and interior trenches, sumps, or selectively placed well points, or a combination thereof. The trenches should drain into sumps for pumping. The well point and sump pumps should transport the collected waters well outside of the construction area. The perched water should not be allowed to pond upon the bottom of the excavation. The number of well points, trenches, sumps, and pumps should be determined at the time of construction. However, it is the responsibility of the contractor to provide an adequate de-watering program.

2. As the soils within the zone of over-excavation are well over their optimum moisture content and possibly near saturated at the bottom of the deeper over-excavations within the most easterly portions of the below grade parking garage, the excavated soils and

exposed subgrade will need to be mechanically aerated/dried back to their optimum moisture content prior to compaction. This would entail scarification or ripping the exposed subgrade to a minimum of 18 inches, combined with discing, windrowing and/or other techniques to "move" the material. The excavated materials should be spread out, not stockpiled, and similarly processed. Once an adequate moisture content is achieved, the subgrade and excavated soils should then be compacted to the specified density criteria. Should unstable conditions in the form of pumping, shearing, and/or subgrade rutting prevail, a deeper over-excavation depth and replacement with a dry granular import material, or use of a reinforcement/stabilization geotextile fabric, such as Mirafi 600X, Amoco 2006, or an equivalent, overlain by a minimum of 12 to 18 inches of a select "interlocking" uniformly graded crushed rock bridging layer prior to structural fill placement may be warranted. Should this adverse condition be encountered, our firm should be consulted to provide subsequent site preparation recommendations. To reduce the potential for over-wet and unstable conditions, landscape watering should be terminated well in advance of the proposed earthwork operations and the construction schedule should be adjusted such that the grading commences well into the dry season. *It may prove advantageous to the owner to provide extra line items in the original bid package for separate costs for an increased over-excavation depth, emplacement of the stabilization fabric and crushed rock layer, and import/export quantities, etc. (i.e. per unit depth, area and/or volume) in the event that unstable subgrade conditions are encountered.*

Site Preparation

1. The ground surface should be prepared for grading by removing vegetation, large roots, topsoil, debris, and other deleterious materials. Existing utility lines that will not be serving the new structures and improvements should be either removed or abandoned. The appropriate method of abandonment will depend upon the type and depth of the utility. Recommendations for abandonment can be made as necessary.

2. Voids created by the removal of materials or utilities described above should be called to the attention of the soils engineer. No fill should be placed unless the underlying soil has been observed by a representative of this firm.

Grading – Building and Pavements Areas

1. *Double Row with Below-Grade Parking*: Following site preparation and possible temporary de-watering, over-excavate the soils below the building areas to obtain a minimum depth of 8 feet below the existing grade, 6 feet below the proposed finish floor elevation, or 3 feet below the proposed bottom of the footings, *whichever is deeper*.

2. *Single Row Without Below-Grade Parking*: Following site preparation, over-excavate the soils below the building areas to obtain a minimum depth of 6 feet below the existing grade, or 4 feet below the proposed bottom of the footings, *whichever is deeper*. The existing side slopes associated with the bike path ramp near Los Carneros Road, which will not be impacted by the over-excavation and recompaction operations, should be benched into a minimum of 3 feet, both vertically and laterally, as the fill placement progresses upward. This is to ensure that an adequate bond is created between the in situ slope soils and the structural fill.

3. *AC and/or PCC Pavements Areas:* Following site preparation, over-excavate the subgrade soils below the pavement areas to a minimum depth of 18 inches below the existing grade, or 12 inches below the bottom of the proposed aggregate base course, *whichever is deeper*.

4. *Slabs-On-Grade with Deep Foundations:* Following site preparation, over-excavate the soils below the building areas to a minimum depth of 4 feet below the existing grade, or 4 feet below the *bottom* of the proposed slab-on-grade, *whichever is deeper*.

Grading – General

1. The building area is defined as the area within and extending a minimum distance of 5 feet beyond the foundation perimeter of the building, or a distance equal to the depth of the over-excavation, *whichever is greater*. The building area includes the foundation areas (plus a minimum of 5 feet on all sides) of any structures that will be rigidly attached to a building, and are expected to perform in the same manner as the building. Such structures could include staircases, patios, elevators, and covered walkways and canopies.

The pavement area is defined as the area within and extending a minimum of 2 feet beyond the perimeter of the pavement.

2. The exposed subgrade of all over-excavations and below exterior PCC flatwork, as well as all other areas where structural fill is to be placed, should be scarified to a minimum depth of 12 inches, moisture conditioned to a minimum of optimum moisture content, and compacted as structural fill.

3. The minimum depth of fill below the footings should not be less than one-half of the maximum depth of fill below the footings across any individual building area. For example, if the maximum depth of fill below the footings is 6 feet, the minimum depth of fill below the footings within the remaining portion of the building area should not be less than 3 feet.

4. Voids created by dislodging cobbles and/or debris during scarification should be backfilled and recompacted, and the dislodged materials should be removed from the area of work.

5. On-site material and approved import materials may be used as structural fill for general on-site grading and to 18 inches below the bottom of the slabs-on-grade within the building areas. *However*, the excavated Fat Clays (CH) should *not* be reused as structural fill within building areas or structural backfill against retaining walls. Structural fill should be placed in loose, level lifts not exceeding 8 inches, moisture conditioned to a minimum of optimum moisture content, and then compacted. Structural fill should be compacted to a minimum of 90 percent of maximum dry density. The upper 12 inches of the subgrade and all aggregate base material in areas to be paved with AC or PCC should be compacted to a minimum 95 percent of their respective maximum dry densities. Subgrade and aggregate base should be firm and unyielding when proofrolled with heavy, rubber-tired grading equipment prior to continuing construction. The standard test used to define maximum dry density and field density should be ASTM D 1557-00, ASTM D 2922-01, respectively, or other methods acceptable to the soils engineer and jurisdiction.

6. A minimum of 18 inches of nonexpansive material, which includes the sand cushion as discussed in the Slab-on-Grade and Exterior Flatwork section of this report, should be placed beneath all building slabs-on-grade. Nonexpansive material is defined as being coarse grained (ASTM D 2488-00) and having an expansion index of 10 or less (ASTM D 4829-95). Immediately prior to placing the nonexpansive material, the exposed subgrade should be moisture conditioned to within 1 to 2 percent over its optimum moisture content and no desiccation cracks should be present.

7. All materials used as structural fill should be cleaned of any rocks, debris, and irreducible material larger than 6 inches in diameter. No rocks, debris, etc., larger than 3 inches in diameter should be used within the upper 3 feet of finish grade. When fill material includes rocks, the rocks should be placed in a sufficient soil matrix to ensure that voids caused by nesting of the rocks will not occur and that the fill can be properly compacted.

8. All permanent cut and fill slopes should not be constructed steeper than 2:1 (horizontal:vertical). If necessary, this firm, on an individual basis, should evaluate proposed steeper slope inclinations.

Temporary Slopes

1. It is the responsibility of the contractor to provide safe working conditions with respect to excavation stability. Temporary excavations should be constructed in accordance with the latest CAL/OSHA regulations and standards, particularly Title 8, Article 6, entitled "Excavations, Trenches, Earthwork", of the Construction Safety Orders, and any other safety regulations or practices that may apply.

2. The temporary excavation for construction of the parking garage will extend approximately 6 to 8 feet below the existing grade along the easterly building lines. This temporary slope should be constructed at an allowable inclination of 1:1 (horizontal:vertical) or flatter.

3. Due to the granular nature of the lower terrace deposits, sloughing, caving, and/or ravelling of shallow, near vertical cuts should be expected during construction.

Therefore, care should be exercised during excavation to ensure minimal side slope disturbance.

4. The excavated materials or other surcharge loads should not be placed within a lateral distance equal to the depth of the excavation, measured from the top of the side slopes. No vibratory or grading equipment should be operated within this setback distance.

5. Temporary excavation operations should be monitored and/or observed by a representative of our firm to ensure the recommended slope height and gradient criteria contained herein are closely adhered to as well as to identify any areas of instability.

6. Should evidence of side slope instability become apparent during or after excavation operations, whether in the form of sloughing, sliding, and/or ravelling, our firm should be consulted without delay in order to provide additional recommendations, if warranted. These recommendations may include flatter gradients, temporary shoring systems, or slope benching.

7. Should on-site constraints (ie. adjacent structures, improvements, utilities, etc.) and/or slope instability preclude sloping and benching of the side slopes, the excavation should be adequately supported by means of a properly designed and constructed temporary lateral shoring system. The shoring will have to be sufficiently rigid such that damaging soil movement cannot occur in the vicinity of any neighboring structures or infra-structures.

8. The shoring and excavation plan should be prepared by a Registered Civil Engineer experienced with this type of work. This firm should review the plan prior to its implementation.

Utility Trenches

1. Unless otherwise recommended, utility trenches adjacent to foundations should not be excavated within the zone of foundation influence as shown in Typical Detail A in Appendix C.

2. Utilities that must pass beneath a foundation but will be within 3 feet of the bottom of the foundation, should be sleeved and encased in structural concrete; the over-excavation and recompaction program discussed in the Grading section of this report should be extended below the concrete encasement. This situation is depicted in Typical Detail B, also in Appendix C.

3. Utilities that will pass beneath a foundation and will be deeper than 3 feet below the foundation should be placed with properly compacted utility trench backfill and the foundation should be designed to span the trench.

4. A select, noncorrosive, granular, easily compacted material should be used as bedding and shading immediately around utilities. The sands and silts found at the site may be used for trench backfill above the select material provided that they are adequately moisture conditioned. If obtaining compaction is difficult with the site soils, use of an imported well-graded sand may be desirable for trench backfill.

5. In general, trench backfill should be compacted to a minimum of 90 percent of maximum dry density. A minimum of 95 percent of the maximum dry density should be obtained where the trench backfill comprises the upper 1-foot of subgrade beneath AC or PCC and in all aggregate base material. A minimum of 85 percent of maximum dry density will generally be sufficient where trench backfill is located in landscaped or other unimproved areas, where settlement of trench backfill would not be detrimental. It should be noted that the County of Santa Barbara standards for backfill should be reviewed as they take precedence over our recommendations.

6. Jetting or flooding of the trench backfill as a form of compaction should not be allowed.

Shallow Foundations

1. Conventional continuous and spread footings may be used to support the structures. Footings bearing entirely upon a mat of structural fill should be designed utilizing a maximum allowable bearing capacity of 2,750 psf dead load plus sustained live loads.

Using these criteria, maximum total and differential settlements are expected to be on the order of 1-inch and ½-inch in 25 feet, respectively.

2. The footings should be founded at a minimum depth of 24 inches below the lowest adjacent final subgrade within 5 feet of the edge of footing. Continuous and spread footings should have respective minimum widths of 12 and 24 inches, regardless of load. Footing reinforcement should be in accordance with the requirements of the architect/engineer; minimum reinforcement for continuous footings and grade beams should consist of one #4 rebar, top and bottom.

3. Lateral loads may be resisted by friction and by passive resistance of the soil acting on foundations. Lateral capacity is based on the assumption that backfill adjacent to foundations is properly compacted. The passive resistance of the structural fill may be assumed to equal the hydrostatic pressure developed by an equivalent fluid with a density of 375 pcf. A coefficient of friction of 0.36 can be used for design. These are ultimate values, therefore, an appropriate factor of safety against sliding should be incorporated into the design.

4. Allowable bearing and friction capacities may be increased by one-third when transient loads such as wind or seismicity are included. Foundations may be designed using the following seismic parameters:

Seismic Source	Mission Ridge-Arroyo Parida - Santa Ana Fault
Distance to Seismic Source	$\leq$ 2 km
Seismic Zone	4
Seismic Zone Factor (UBC Table 16-I)	0.40
Seismic Source Type (UBC Table 16-U)	B
Soil Profile Type (UBC Table 16-J)	S_C
Seismic Coefficient-C_A (UBC Table 16-Q)	0.52
Seismic Coefficient-C_V (UBC Table 16-R)	0.90
Near Source Factor-N_A (UBC Table 16-S)	1.3
Near Source Factor-N_V (UBC Table 16-T)	1.6

5. Foundation excavations should be observed by this firm during excavation, and prior to placement of reinforcing steel or formwork. The expansive soils encompassing the footing trenches should be maintained within 1 to 2 percent above their optimum moisture content until the footings are poured. This criteria should be verified by a representative of our firm within 24-hours prior to concrete placement. All shrinkage cracks in the soils should be closed by moisture conditioning prior to placing concrete.

Deep Foundations

1. A deep foundation system consisting of drilled, cast-in-place concrete shafts (piers) may also be utilized for this project in lieu of a shallow foundation system. The shafts should have a minimum diameter of 24 inches and should extend a minimum depth of 10 feet into the Siltstone bedrock. They should not be constructed closer than three diameters (clear span) to each other without approval from this firm.

2. Allowable skin friction values of 800 psf and 1,500 psf should be assumed for the upper unit (Silty Sand/Sandy Silt) and lower unit (Siltstone) of the Santa Barbara Formation, respectively. No end bearing capacity should be used in the calculations. Additionally, the upper 10 feet of the existing profile should also be neglected for frictional resistance. The uplift capacity of the piers can be assumed as two-thirds of the allowable skin friction value together with dead weight of the pier.

3. Using these criteria, maximum total and differential settlement are expected to be less than ½-inch and ¼-inch in 25 feet, respectively.

4. The piers should be connected by grade beams, tie-beams, or structural slabs so that the foundation acts as an integral unit.

5. The lateral load capacity of piers is contingent upon soil/rock type, lateral spacing, axial loading, allowable deflection, and overturning movements. Once the design plans are further advanced and the actual loading conditions and final pier layout plan have been developed, our firm can provide allowable capacities and deflections for laterally loaded shafts, as warranted.

6. The pier excavation and construction should comply with provisions of ACI 336.1 "Specification for the Construction of Drilled Piers" unless modified by the project plans and specifications. The piers should be drilled to the minimum diameter and depth indicated in the project plans and specifications as well as to the satisfaction of the field representative of our firm. Once the drilling operations have begun on an individual pier, work on the pier including the reinforcing steel and concrete placements should be continued without interruption until completion of the pier.

7. As the piers would be excavated through the Terrace Deposits and perched water, casing, drilling fluid, or other means of keeping the holes open will need to be employed to stabilize the shafts during pier construction operations. Although the Siltstone is expected to stand vertically, borehole stabilization should be made available in case unstable sidewall conditions are encountered.

8. Due to the possibility of encountering water-bearing fractures within the bedrock during the drilling operations, pier reinforcing should be designed to accommodate a minimum 5-inch diameter tremie pipe. Any water encountered should be removed from the hole prior to placing concrete, or the concrete should be tremied. Appendix D contains a description of the recommended tremie method.

9. As piers will utilize skin friction for support, it is not necessary to thoroughly clean the bottoms of the excavations, although excessive loose debris and slough material should be removed. Upon completion of the drilling and prior to cleaning, the piers should be slightly over-reamed to remove any smeared material on the sidewalls. As stated earlier, use of end-bearing capacity is not recommended.

10. Concrete used in the piers should be placed at a slump between 4 and 6 inches in dry excavations and between 7 and 9 inches when placed under water.

11. The piers should not deviate from a plumb line taken from the center of the piers by more than 2 percent of the shaft length, from the top to the point of interest. Adequate pier oversize may be assumed to provide required tolerance.

12. Pier excavations should be observed by this firm during drilling operations. Special inspection should be provided during reinforcing steel and concrete placement.

Slab-on-Grade and Exterior Flatwork

1. Conventional-duty slabs should have a minimum thickness of 4 full inches. At a minimum, slabs should be reinforced and doweled to the footings by No. 3 rebar at 18-inch spacing, each way, or as required by the architect/engineer.

2. Heavy-duty slabs should be designed by the architect/engineer for the design loading condition. Heavy-duty slabs may be designed based upon a modulus of subgrade reaction (K_{30}) of 250 psi/inch (pci), provided a minimum of 18 inches of non-expansive, granular structural fill underlies the slab. Reinforcing of heavy-duty or structural slabs is left to the architect/engineer.

3. A minimum of 4 inches of *clean* sand should be provided as a cushion directly beneath all interior slabs where moisture transmitted from the soil would be undesirable. Clean sand is defined as a sand (ASTM D 2488-00) of which less than 3 percent passes the No. 200 sieve. The sand cushion should be lightly moistened prior to concrete placement. The sand cushion is part of the 18-inch thickness of nonexpansive material, as discussed in the Grading section of this report, not in addition to it.

4. A vapor barrier placed at the midsection of the sand is recommended to reduce the potential for infiltration of subsurface moisture vapor through the slab. The vapor barrier should be placed a minimum of 1 inch above the elevation of the flow line of the drainage path surrounding the structure, or 1 inch above the elevation of the area drain grates if area drains are used to collect runoff around the structures. Care should be taken to properly lap and seal the barrier, particularly around utilities, and to protect it from damage during construction. Specification of the thickness and type of vapor barrier is left to the architect/engineer.

5. In conventional construction, it is common to use 4 to 6 inches of sand beneath the exterior flatwork. At this site, however, due to the moderately high expansive soil conditions, there is a high risk of movement and damage to such flatwork if conventional measures are used. Heaving and cracking could occur. This movement could be reduced by the placement of a minimum 12 to 18-inch thick layer of compacted, nonexpansive material where flatwork will be cast in highly expansive soil areas. The thicker the layer of nonexpansive material, the better the flatwork should perform. Prior to placement of the nonexpansive material, the soil in the flatwork area should be moistened to within 1 to 2 percent over the optimum moisture content and no desiccation cracks should be present. The flatwork should be designed to be independent of building foundations. The flatwork should not be doweled to the foundations and felt or other appropriate separator should be placed between the two.

6. To reduce shrinkage cracks in concrete, the concrete aggregates should be of appropriate size and proportion, the water/cement ratio should be low, the concrete should be properly placed and finished, contraction joints should be installed, and the concrete should be properly cured. Concrete materials, placement and curing specifications should be at the direction of the architect/engineer.

Retaining Walls

1. Retaining walls connected to or forming part of a structure should be founded in soils recompacted to the same extent as those supporting the structure. Sitework retaining walls should be entirely supported by a minimum of 3 feet of recompacted soils below the bottom of the footings. All retaining walls should have a minimum footing depth (not including the keyway) of 24 inches below lowest adjacent grade with 5 feet of the edge of footing.

2. Wall design should be based on the following parameters:

Active equivalent fluid pressure - (import sand or gravel backfill)	35 pcf
Active equivalent fluid pressure - (native soil backfill)	47 pcf
At-rest equivalent fluid pressure – (import sand or gravel backfill)	55 pcf
At-rest equivalent fluid pressure – (native soil backfill)	70 pcf
Passive equivalent fluid pressure - (recompacted native soil)	375 pcf

Maximum toe pressure ....2,750 psf
Coefficient of sliding friction (recompacted native soil)........................0.36

3. No surcharges are taken into consideration in the above values. These parameters are ultimate values that will require application of appropriate factors of safety by the architect/engineer. The passive pressure capacity is based on the assumption that backfill adjacent to grade beams and foundations is properly compacted as structural fill.

4. The above pressures are applicable to a horizontal retained surface behind the wall. Walls having a retained surface that slopes upward from the wall should be designed for an additional equivalent fluid pressure of 1 pcf for the active case and 1.5 pcf for the at-rest case, for every two degrees of slope inclination.

5. All retaining walls should be drained with rigid perforated pipe encased in a free draining gravel blanket. The pipe should be placed perforations downward and should discharge in a nonerosive manner away from foundations and other improvements. The gravel blanket should have a width of approximately 1 foot and should extend upward to approximately 1 foot from the top of the wall. The upper foot should be backfilled with the on-site "clayey" soils, except in areas where PCC or AC will abut the top of the wall. In such cases, the sand or gravel backfill should extend to the concrete or aggregate base. To reduce infiltration of the native soil into the gravel, a permeable synthetic fabric conforming to Caltrans Standard Specifications, Section 88-1.03 for edge drains, should be placed between the two. Manufactured synthetic drains such as Miradrain or Enkadrain are acceptable alternatives to the use of gravel, provided that they are installed in accordance with the recommendations of the manufacturer. Where seepage can be properly discharged, the perforated pipe may be omitted in lieu of weep holes on maximum 4-foot centers placed at the lowest point in the wall that will still provide drainage. A filter fabric as described above should be placed between the weep holes and the drain gravel.

6. Walls facing habitable areas or areas where moisture transmission through the wall would be undesirable should be *thoroughly* waterproofed in accordance with the specifications of the architect/engineer.

7. The architect/engineer should bear in mind that retaining walls by their nature are flexible structures, and that surface treatments on walls often crack. Where walls are to be plastered or otherwise have a finish applied, the flexibility should be considered in determining the suitability of the surfacing material, spacing of horizontal and vertical control joints, etc. The flexibility should also be considered where a retaining wall will abut or be connected to a rigid structure, and where the geometry of the wall is such that its flexibility will vary along its length.

Pavement Sections

The tested R-value of the subgrade soils within the parking lot area was 13. Pavement design sections are provided for Traffic Indices (TI) of 4.0, 4.5, 5.0, 6.0, and 7.0. Determination of the appropriate TI for specific areas is left to others. The AC sections were calculated in accordance with the Caltrans Highway Design Manual. The calculated aggregate base and AC thickness are for compacted material. Normal Caltrans construction tolerances should apply.

R-value	TI	AC (inches)	Class 2 Base (inches)
13	4.0	2.00	7.50
13	4.5	2.50	8.00
13	5.0	2.50	9.50
13	6.0	3.00	12.00
13	7.0	3.50	13.00

1. Given that the final subgrade elevations were not available as of this writing and the amount of site grading required to construct the site, the pavement sections indicated herein above should be considered preliminary. Once the finish subgrade is achieved, the actual subgrade materials should be re-evaluated/re-tested to verify the designed pavement sections.

2. The upper 12 inches of subgrade and all aggregate base should be compacted to a minimum of 95 percent of maximum dry density.

3. Aggregate base and subgrade should be firm and unyielding when proofrolled by heavy rubber-tired equipment prior to paving. Pavement courses should not be placed after periods of heavy or extended rainfall where the subgrade may become saturated, and thus, promote instability when subjected to construction traffic. Heavy construction vehicles or equipment should not be utilized on asphaltic pavements designed only for automobile and light tuck traffic.

4. Finished AC surfaces should slope toward drainage facilities such that rapid runoff will occur and no ponding is allowed on or adjacent to the AC.

5. To reduce migration of surface drainage into the subgrade, maintenance of pavement areas is critical. Any cracks that develop in the pavement should be promptly sealed.

6. The use of rigid PCC aprons should be provided where trash pick-up necessitates short radius truck wheel maneuvering and/or heavy metal bin movement on rollers, as well as within areas similarly subjected to heavy delivery vehicles.

Drainage Around Improvements

1. Unpaved ground surfaces should be graded *during construction,* and *finish graded* to direct surface runoff away from foundations and other improvements at a minimum 2 percent grade for a minimum distance of 5 feet. Where this is not practical due to terrain, proximity to property lines or adjacent buildings, etc., swales with improved surfaces, area drains, or other drainage facilities should be used to collect and discharge runoff.

2. To reduce the potential for planter drainage to gain access to subslab areas, raised planter boxes adjacent to the structures should be installed with drains and sealed sides and bottoms. Drains should also be provided for areas adjacent to structures that would not otherwise freely drain.

3. The eaves of the structures should be fitted with roof gutters. Runoff from driveways, roof gutters, downspouts, planter drains, area drains, etc. should discharge in a

nonerosive manner away from foundations and other improvements in accordance with the requirements of the governing agencies.

4. The on-site soils are erodible. Stabilization of surface soils, particularly those disturbed during construction, by vegetation or other means *during* and *following* construction is essential to reduce erosion damage. Care should be taken to establish and maintain vegetation. The landscaping should be planned and installed to maintain the surface drainage recommended above. Surface drainage should also be maintained during construction.

8.0 OBSERVATION AND TESTING

It must be recognized that the recommendations contained in this report are based on a limited number of borings and rely on continuity of the subsurface conditions encountered. It is assumed that this firm will be retained to provide consultation during the design phase, to review plans as they near completion, to interpret this report during construction, and to provide construction monitoring in the form of testing and observation. Unless otherwise stated, the term "compacted" or "recompacted" refers to soils placed in loose, level lifts not exceeding 8 inches compacted to a minimum of 90 percent of maximum dry density. The standard test used to define maximum dry density and field density should be ASTM D 1557-00, ASTM D 2922-01, respectively, or other methods acceptable to the soils engineer and jurisdiction. Unless otherwise stated, "moisture conditioning" refers to the moistening or drying of soils to or above optimum moisture content, prior to application of compactive effort. At a minimum, the following items should be reviewed, tested, or observed by this firm:

- Preliminary grading and foundation plans for the structure,
- Stripping and clearing of vegetation and soil materials,
- Over-excavation and recompaction of scarified soil,
- Fill quality, placement and compaction, including nonexpansive import materials,
- Utility trench backfill,
- Foundation/grade beam excavations,
- Pier drilling operations, and
- Pavement subgrade and aggregate base compaction.

It will be necessary to develop a program of quality control prior to beginning grading. It is the responsibility of the owner, contractor, or project manager to determine any additional inspection items required by the architect/engineer or the governing jurisdiction. A preconstruction conference between a representative of the owner, this firm, the architect/engineer and contractors is recommended to discuss planned construction procedures and quality control requirements. This firm should be notified at least 48 hours prior to beginning grading operations.

If Earth Systems Pacific is not retained to provide construction observation and testing services, it shall not be responsible for the interpretation of the information by others or any consequences arising therefrom.

9.0 CLOSURE

This report is valid for conditions as they exist at this time for the type of project described herein. The conclusions and recommendations contained in this report could be rendered invalid, in whole or in part, due to changes in building codes, regulations, standards of geotechnical or construction practices, changes in physical conditions, or the broadening of knowledge. Our intent was to perform the investigation in a manner consistent with the level of care and skill ordinarily exercised by members of the profession currently practicing in the locality of this project under similar conditions. No representation, warranty, or guarantee is either expressed or implied. This report is intended for the exclusive use by the client as discussed in the Scope of Services section. Application beyond the stated intent is strictly at the user's risk.

If changes with respect to development type or location become necessary, if items not addressed in this report are incorporated into plans, or if any of the assumptions used in the preparation of this report are not correct, this firm should be notified for modifications to this report. This firm should be retained early in the design process for the individual structures to provide geotechnical guidance as the design progresses. Any items not specifically addressed in this report shall comply with the Uniform Building Code as modified by pertinent sections of Title 24 of the California Code of Regulations and the requirements of the governing jurisdiction.

The preliminary recommendations of this soils report are based upon the geotechnical conditions encountered at the site, and may be augmented by additional requirements of the architect/engineer, or by additional recommendations provided by this firm based on conditions exposed at the time of construction.

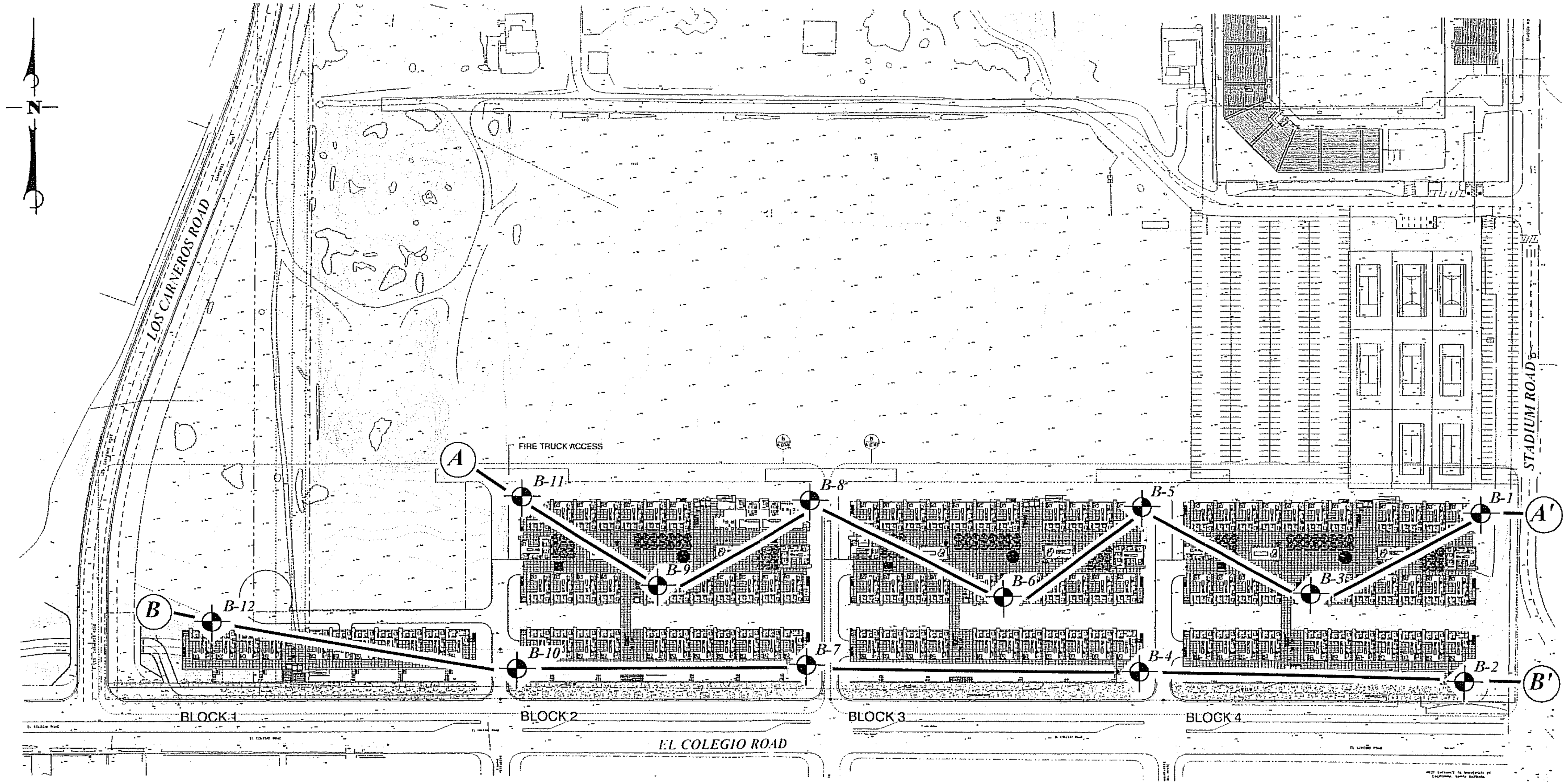
This document, the data, conclusions, and recommendations contained herein are the property of Earth Systems Pacific. This report shall be used in its entirety, with no individual sections reproduced or used out of context. Copies may be made only by Earth Systems Pacific, the client, and the client's authorized agents for use exclusively on the subject project. Any other use is subject to federal copyright laws and the written approval of Earth Systems Pacific.

Thank you for this opportunity to have been of service. If you have any questions, please feel free to contact this office at your convenience.

End of Text

APPENDIX A

Boring Location Map
Profile of Soil Borings
Boring Logs



⌖ - *APPROXIMATE LOCATION OF SOIL TEST BORING*

Ⓐ—Ⓐ' - *PROFILE OF SOIL TEST BORINGS*

Earth Systems Pacific

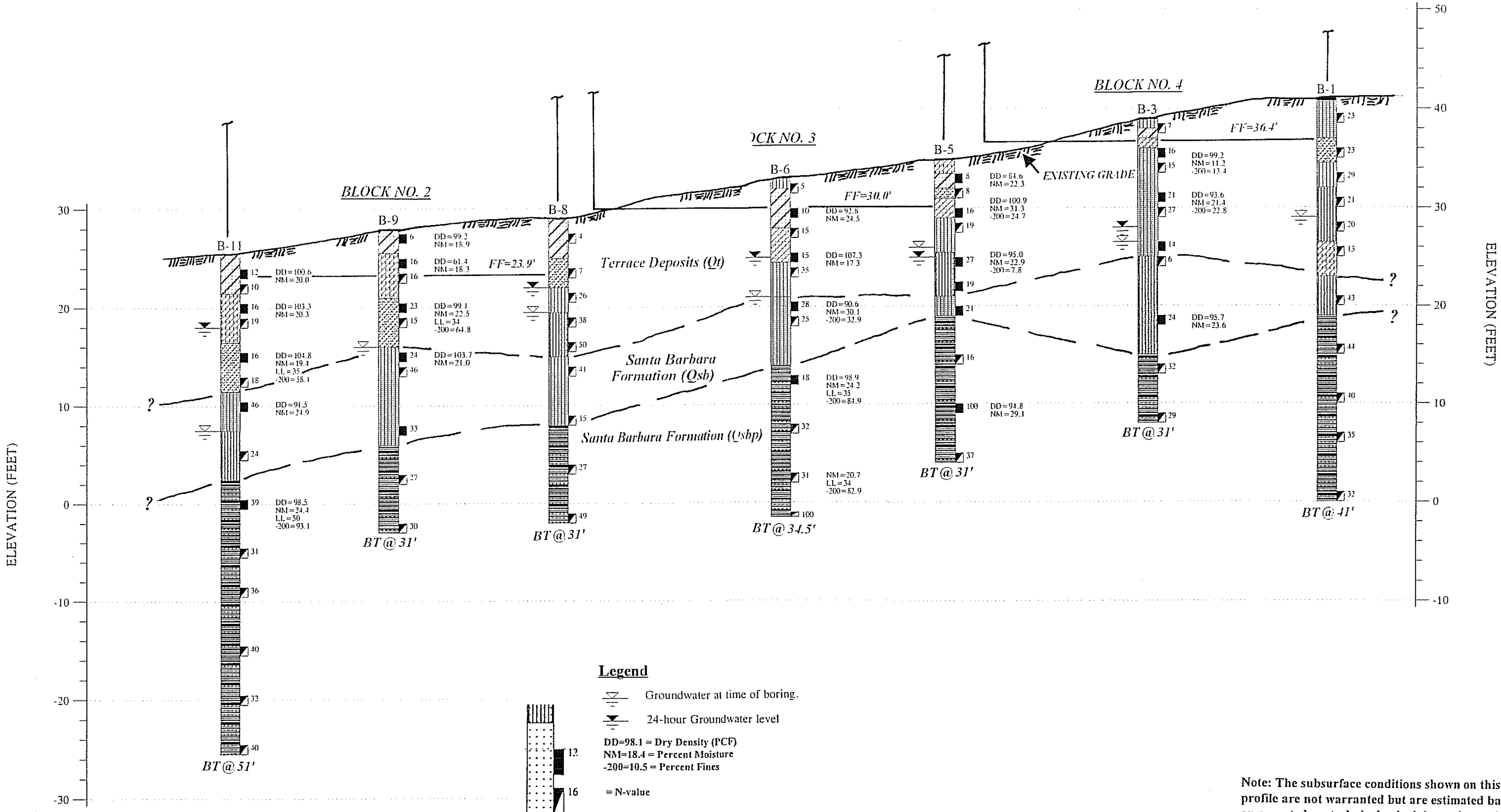
308 North First Street - Lompoc, CA 93436

SAN CLEMENTE STUDENT HOUSING
UNIVERSITY OF CALIFORNIA
AT SANTA BARBARA
GOLETA, CALIFORNIA

Job No. SL-13133-SA

SCALE: 1" ≈ 150'

BORING LOCATION MAP



Legend

Groundwater at time of boring.

24-hour Groundwater level

DD=98.1 = Dry Density (PCF)
NM=18.4 = Percent Moisture
-200=10.5 = Percent Fines

12
16 = N-value

BT @ 26' = Boring Termination Depth

Strata symbols

▨	Sandy Fat CLAY (CH) high plasticity
▥	Poorly Graded SAND with Silt (SP-SM)
▨	Silty Lean CLAY (CL) medium plasticity
▨	Sandy Lean CLAY (CL) medium plasticity
▤	SILTSTONE (Qsbp) w/ interbeds of Claystone & Sandstone
▨	Clayey SAND (SC)
▥	Silty SAND (SM)
▥	Sandy SILT (ML) non & slightly plastic

Note: The subsurface conditions shown on this profile are not warranted but are estimated based on accepted geotechnical principles and practices and reasonable engineering judgement.

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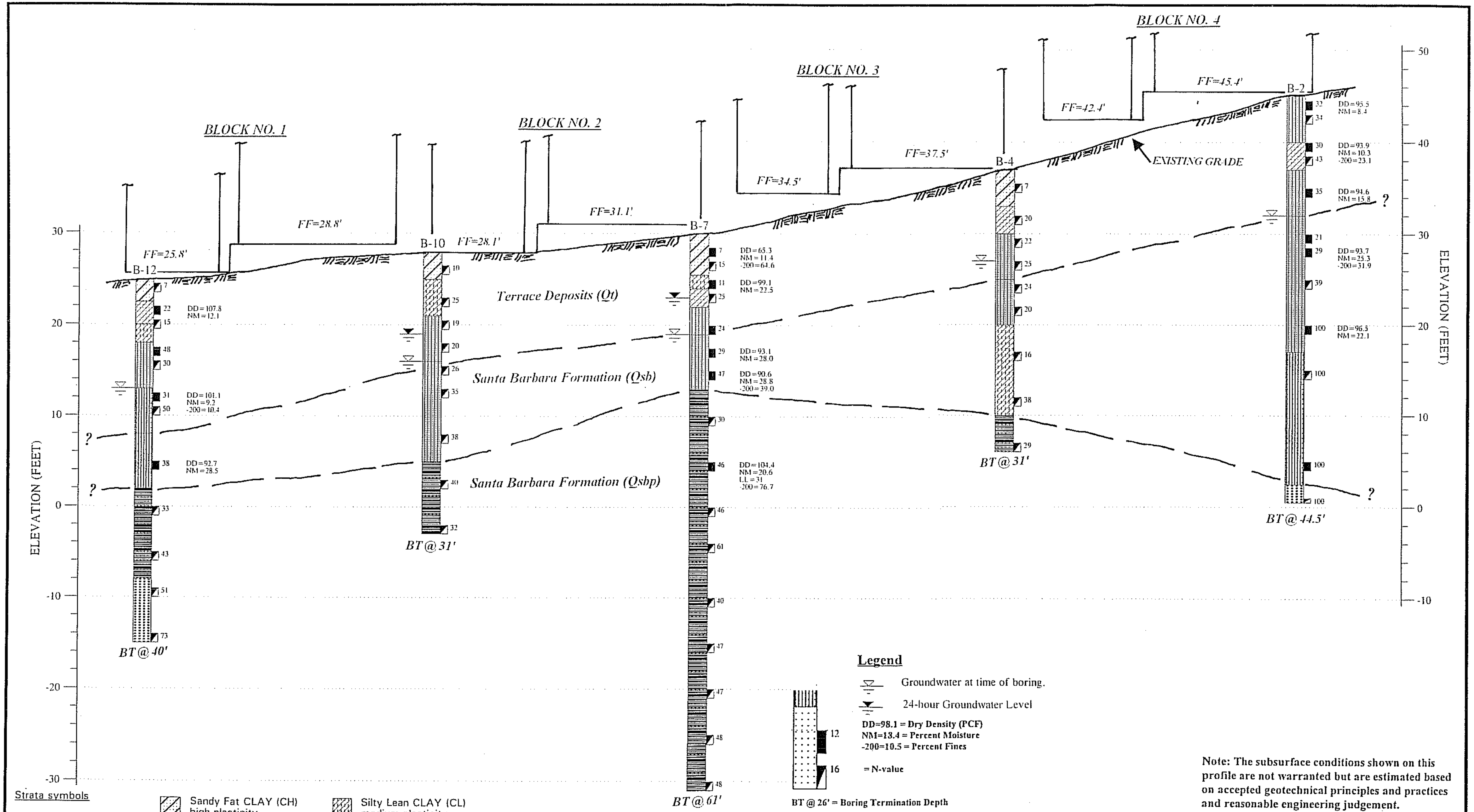
Job No. SL-13133-SA

SCALE(H):1"=150'
SCALE(V):1"=10'

PROFILE OF SOIL BORINGS A-A'



Note: The subsurface conditions shown on this profile are not warranted but are estimated based on accepted geotechnical principles and practices and reasonable engineering judgement.

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Job No. SL-13133-SA

SCALE(H):1"=150'
SCALE(V):1"=10'

PROFILE OF SOIL BORINGS B-B'

UNIFIED SOIL CLASSIFICATION SYSTEM (ASTM D 2487)

MAJOR DIVISIONS			GROUP SYMBOL	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS MORE THAN HALF OF MATERIALS IS LARGER THAN #200 SIEVE SIEZE	GRAVELS MORE THAN HALF OF COARSE FRACTION IS LARGER THAN #4 SIEVE SIZE	CLEAN GRAVELS (LESS THAN 5% FINES)	GW	WELL GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
			GP	POORLY GRADED GRAVELS, GRAVELS OR GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
		GRAVEL WITH FINES	GM	SILTY GRAVELS, GRAVELS-SAND-SILT MIXTURE, NON-PLASTIC FINES
			GC	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES, PLASTIC FINES
	SANDS MORE THAN HALF OF COARSE FRACTION IS SMALLER THAN #4 SIEVE SIZE	CLEAN SANDS (LESS THAN 5% FINES)	SW	WELL GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
			SP	POORLY GRADED SANDS OR GRAVELLY SANDS, LITTLE OR NO FINES
		SANDS WITH FINES	SM	SILTY SANDS, SAND-SILT MIXTURES, NON-PLASTIC FINES
			SC	CLAYEY SANDS, SAND-CLAY MIXTURES, PLASTIC FINES
FINE GRAINED SOILS MORE THAN HALF OF MATERIAL IS SMALLER THAN #200 SIEVE SIZE	SILTS & CLAYS	LIQUID LIMIT IS LESS THAN 50	ML	INORGANIC SILTS AND VERY FINE SANDS, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
			CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAY, SILTY CLAYS, LEAN CLAYS
			OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS & CLAYS	LIQUID LIMIT IS GREATER THAN 50	MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SANDY OR SILTY SOILS, ELASTIC SILTS
			CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
			OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
	HIGHLY ORGANIC SOILS		PT	PEAT AND OTHER HIGHLY ORGANIC SOILS

DEFINITION OF TERMS

GRAIN SIZES

U.S. STANDARD SERIES SIEVE — CLEAR SQUARE SIEVE OPENINGS

200 — 40 — 10 — 4 — 3/4" — 3" — 6"

SILTS & CLAYS DISTINGUISHED ON BASIS OF PLASTICITY	SAND			GRAVEL		COBBLES	BOULDERS
	FINE	MEDIUM	COARSE	FINE	COARSE		

MOISTURE CONDITION (INCREASING MOISTURE ⟶)

DRY — SLIGHTLY DAMP — DAMP — MOIST (PL) — VERY MOIST — WET (SATURATED) (LL)

CONSISTENCY

CLAYS & SILTS	BLOWS / FOOT *
VERY SOFT	0 - 2
SOFT	3 - 4
FIRM	5 - 8
STIFF	9 - 15
VERY STIFF	16 - 30
HARD	OVER 30

RELATIVE DENSITY

SANDS & GRAVELS	BLOWS / FOOT *
VERY LOOSE	0 - 4
LOOSE	5 - 10
MEDIUM DENSE	11 - 30
DENSE	31 - 50
VERY DENSE	OVER 50

* NUMBER OF BLOWS OF 140 POUND HAMMER FALLING 30 INCHES TO DRIVE A 2-INCH O.D. (1-3/8 INCH I.D.) SPLIT SPOON-ASTM D 1586

Earth Systems Pacific
308 North First Street - Lompoc, CA 93436

UNIFIED SOIL CLASSIFICATION SYSTEM
(ASTM D 2487)

KEY TO SYMBOLS

Symbol	Description
Strata symbols	
■	ASPHALTIC CONCRETE (AC)
▥	Silty SAND (SM)
▨	Sandy Lean CLAY (CL) medium plasticity
▥	Sandy SILT (ML) non & slightly plastic
▨	Silty Lean CLAY (CL) medium plasticity
▤	SILTSTONE (Qsbp) w/ interbeds of Claystone & Sandstone
▨	Clayey SAND (SC)
▥	Poorly Graded SAND with Silt (SP-SM)
░	SANDSTONE (Qsbp)

Symbol	Description
Strata symbols	
▨	Sandy Fat CLAY (CH) high plasticity
Soil Samplers	
◪	Standard Penetration Test (ASTM D 1586-99)
■	Modified California Sampler
Misc. Symbols	
▽	Groundwater at time of boring.
⎍	Boring Log continues.
▼	24-hour Groundwater level at time of boring.

Notes:

. The exploratory soil borings were performed on March 19 through 25, 2002 utilizing 8 1/4" O.D. hollow stem auger.

2. Perched water was encountered between depths of 9 1/2 to 13 feet at time of boring and measured between depths of 7 and 11 feet a minimum of 24-hours after boring.

3. Boring locations were taped from existing features.

. These Log of Borings are subject to the limitations, conclusions, and recommendations presented in this report.

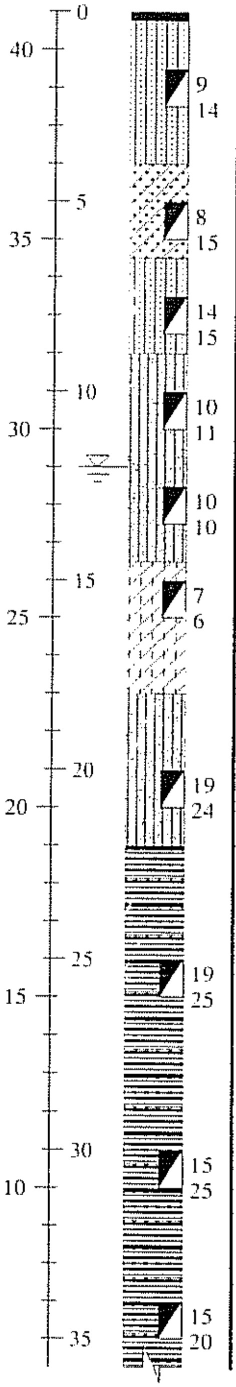
5. Results of tests conducted on samples secured are presented on the Log of Borings.

6. The field data indicated on the logs represent the blow counts for the lower two 6-inch intervals of the Standard Penetration Test, which when combined equals the N-value for the total 12-inch interval. The Modified CAL Sampler N-values were reduced by a common ratio of 0.67.

PROJECT: UCSB SAN CLEMENTE STUDENT HOUSING
EXAM NO.: SL-13133-SA
TYPE OF DRILL: CME 75 - AUTOMATIC TRIP HAMMER
TYPE OF AUGER: 8 1/4-INCH HSA

BORING NUMBER: B-1
DATE DRILLED: MARCH 25, 2002
LOCATION: SEE BORING LOCATION MAP
SURFACE ELEVATION: 41 FEET (approx.)

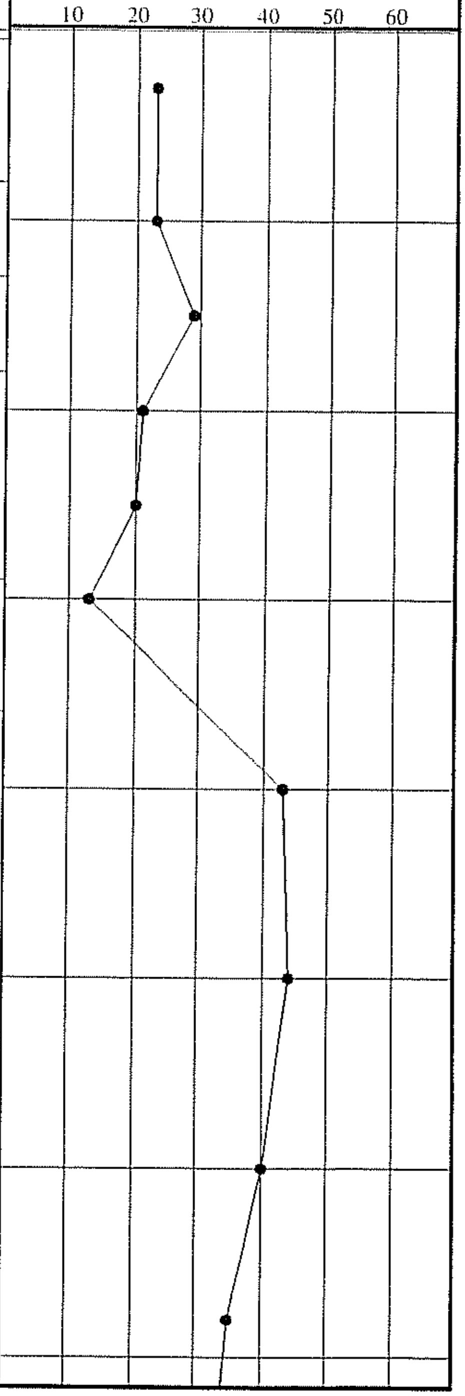
ELEVATION | DEPTH (FT.) | GRAPHIC LOG, SAMPLERS, FIELD DATA



U.S.C.S.	DESCRIPTION AND CLASSIFICATION	MOISTURE CONTENT (%)	INSITU DRY DENSITY (PCF)	% FINES (MINUS #200)	N-VALUE BLOWS/FT
	3" - ASPHALTIC CONCRETE				
SM	Terrace Deposits (Qt): Silty SAND; medium dense, damp, light gray to brown, fine grained				23
CL	Sandy Lean CLAY; very stiff, moist, olive to dark yellowish brown, medium plasticity				
SM	Silty SAND with clay; medium dense, very moist, light gray to brown, fine grained				29
ML	Sandy SILT with clay; very stiff, very moist, grayish brown, slightly plastic				21
	becomes saturated near 12 feet				20
CL	Silty Lean CLAY; stiff, very moist, grayish mottled reddish brown, medium plasticity, fine roots				13
ML	Santa Barbara Formation (Qsb): Sandy SILT; hard, very moist, olive gray mottled yellowish and reddish brown, non-plastic				43
	Santa Barbara Formation (Qsbp): SILTSTONE with interbeds of Claystone and Sandstone; hard, moist, massive, moderately weathered, dark olive gray				44 40 45

GRAPH OF ATTERBERG LIMITS, NATURAL MOISTURE CONTENT, AND STANDARD PENETRATION TEST

PL ├──┤ LL
▲ MOISTURE CONTENT, %
● BLOWS PER FOOT



REMARKS:
THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARIES BETWEEN SOIL TYPES AND THE ACTUAL TRANSITION MAY BE GRADUAL. PERCHED WATER WAS ENCOUNTERED NEAR 12 FEET AT TIME OF BORING.

LOG OF BORING

Earth Systems Pacific
308 North First Street - Lompoc, CA 93436

PROJECT: UCSB SAN CLEMENTE STUDENT HOUSING

EXAM NO.: SL-13133-SA

TYPE OF DRILL: CME 75 - AUTOMATIC TRIP HAMMER

TYPE OF AUGER: 8 1/4-INCH HSA

BORING NUMBER: B-1

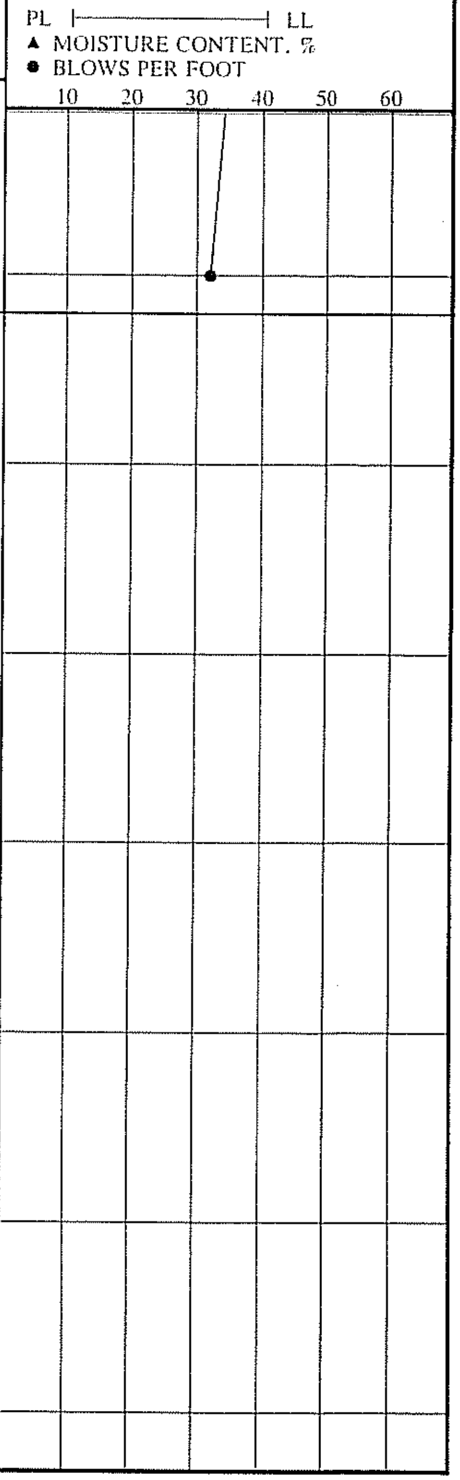
DATE DRILLED: MARCH 25, 2002

LOCATION: SEE BORING LOCATION MAP

SURFACE ELEVATION: 41 FEET (approx.)

ELEVATION	DEPTH (FT.)	GRAPHIC LOG, SAMPLERS, FIELD DATA	U.S.C.S.	DESCRIPTION AND CLASSIFICATION	MOISTURE CONTENT (%)	INSITU DRY DENSITY (PCF)	% FINES (MINUS #200)	N-VALUE BLOWS/FT
5				Santa Barbara Formation (Qsbp): SILTSTONE with interbeds of Claystone and Sandstone; hard, moist, massive, moderately weathered, dark olive gray				
	40	13 19						32
0				BORING TERMINATED AT 41 FEET				
	45							
-5								
	50							
-10								
	55							
-15								
	60							
-20								
	65							
-25								
	70							
-30								

GRAPH OF ATTERBERG LIMITS, NATURAL MOISTURE CONTENT, AND STANDARD PENETRATION TEST



REMARKS:
THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARIES BETWEEN SOIL TYPES AND THE ACTUAL TRANSITION MAY BE GRADUAL. PERCHED WATER WAS ENCOUNTERED NEAR 12 FEET AT TIME OF BORING.

LOG OF BORING

Earth Systems Pacific

308 North First Street - Lompoc, CA 93436

PROJECT: UCSB SAN CLEMENTE STUDENT HOUSING

EXAM NO.: SL-13133-SA

TYPE OF DRILL:

TYPE OF AUGER:

BORING NUMBER: B-1a

DATE DRILLED:

LOCATION:

SURFACE ELEVATION: 25.7

ELEVATION	DEPTH (FT.)	GRAPHIC LOG, SAMPLERS, FIELD DATA	U.S.C.S.	DESCRIPTION AND CLASSIFICATION	MOISTURE CONTENT (%)	INSITU DRY DENSITY (PCF)	% FINES (MINUS #200)		GRAPH OF ATTERBERG LIMITS, NATURAL MOISTURE CONTENT, AND STANDARD PENETRATION TEST PL ├──┤ LL ▲ MOISTURE CONTENT, % ● BLOWS PER FOOT 10 20 30 40 50 60
25	0	▥	sm	BORING TERMINATED AT 0.5 FEET					
20	5								
15	10								
10	15								
5	20								
0	25								
-5	30								
-10	35								

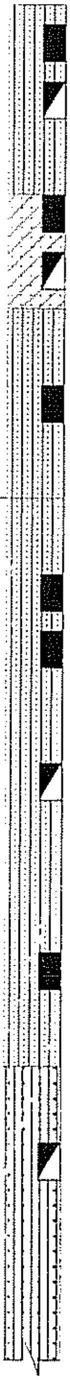
REMARKS:

LOG OF BORING

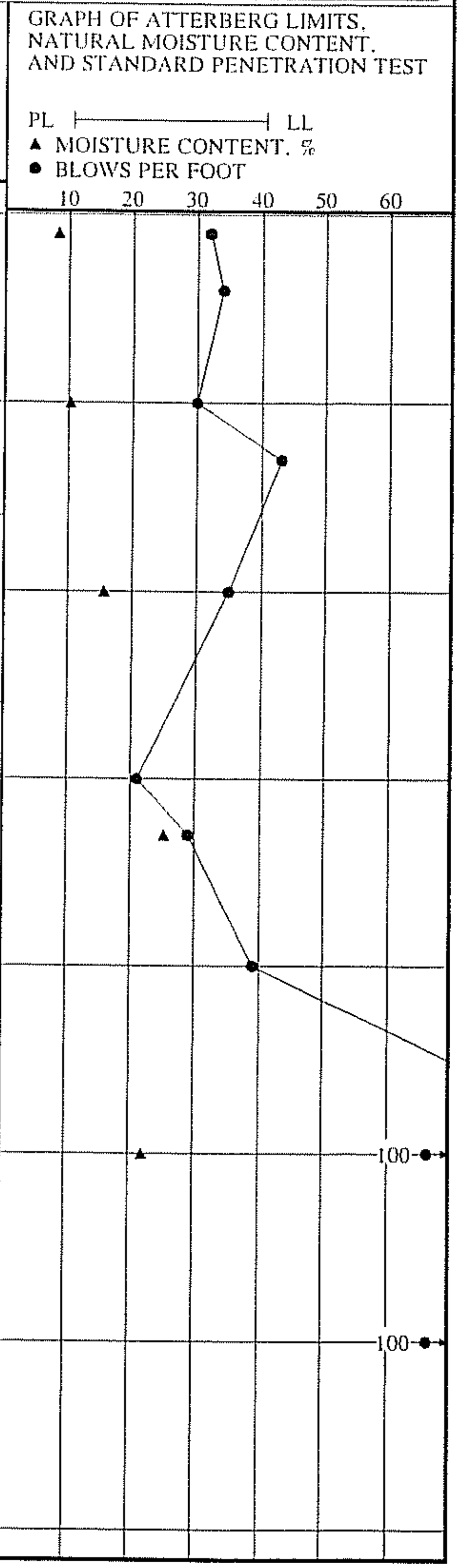
Earth Systems Pacific

308 North First Street - Lompoc, CA 93436

PROJECT: UCSB SAN CLEMENTE STUDENT HOUSING
BORING NUMBER: B-2
EXAM NO.: SL-13133-SA
DATE DRILLED: MARCH 21, 2002
TYPE OF DRILL: CME 75 - AUTOMATIC TRIP HAMMER
LOCATION: SEE BORING LOCATION MAP
TYPE OF AUGER: 8 1/4-INCH HSA
SURFACE ELEVATION: 45 FEET (approx.)



ELEVATION	DEPTH (FT.)	GRAPHIC LOG, SAMPLERS, FIELD DATA	U.S.C.S.	DESCRIPTION AND CLASSIFICATION	MOISTURE CONTENT (%)	INSITU DRY DENSITY (PCF)	% FINES (MINUS #200)	N-VALUE BLOWS/FT
45	0	12 20	SM	Terrace Deposits (Qt): Silty SAND, dense, moist, brown, fine grained	8.4	95.5		32
		15 19						34
40	5	10 20	SC	Clayey SAND; dense, moist, gray mottled yellowish and reddish brown, fine grained, medium plasticity fines	10.3	93.9	23.1	30
		17 26						43
			SM	Silty SAND with clay; dense, moist, grayish brown, fine grained				
35	10	15 20			15.8	94.6		35
			SM	Santa Barbara Formation (Qsb): Silty SAND; medium dense, saturated, olive and yellowish brown, fine grained, fine roots				
30	15	11 10						21
		10 19			25.3	93.7	31.9	29
25	20	19 20		becomes dense near 20 feet				39
20	25	100+		becomes very dense near 25 feet	22.1	96.5		50/5"
			SP-SM	Poorly Graded SAND with Silt; very dense, saturated, yellowish brown, fine grained				
15	30	100+						50/4"
10	35			encountered flow sands - no sampling attempted				



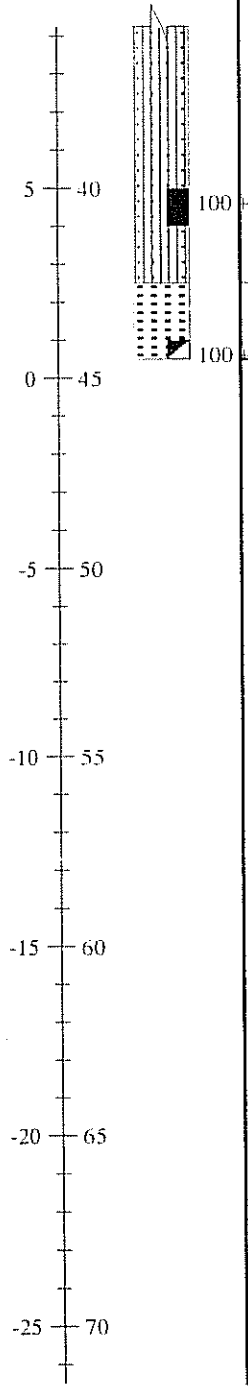
REMARKS:
THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARIES BETWEEN SOIL TYPES AND THE ACTUAL TRANSITION MAY BE GRADUAL. GROUND WATER WAS ENCOUNTERED NEAR 13 FEET AT TIME OF BORING.

LOG OF BORING

Earth Systems Pacific
308 North First Street - Lompoc, CA 93436

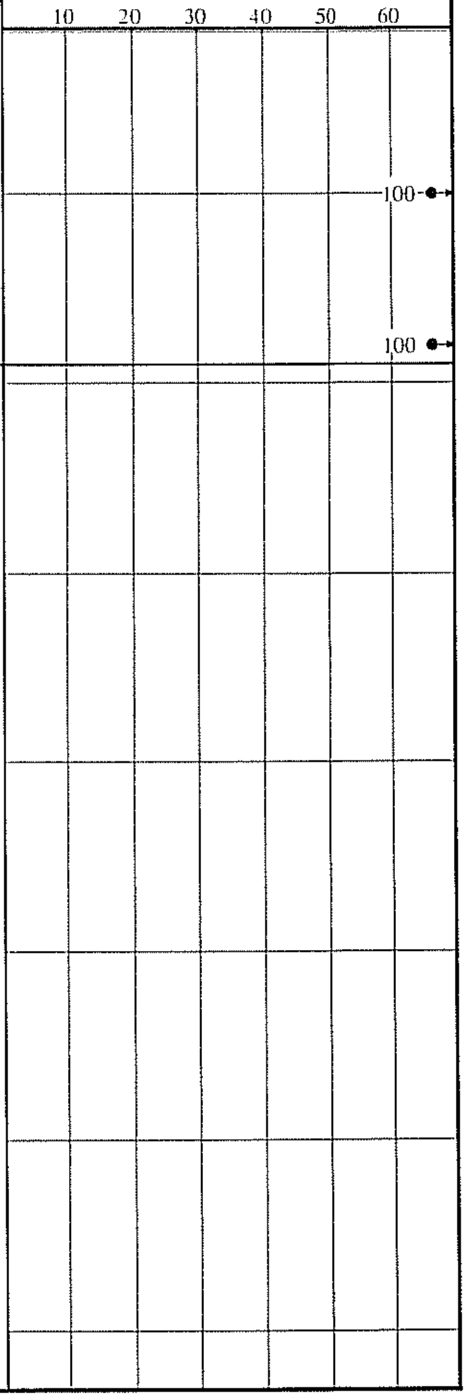
PROJECT: UCSB SAN CLEMENTE STUDENT HOUSING
BORING NUMBER: B-2
EXAM NO.: SL-13133-SA
DATE DRILLED: MARCH 21, 2002
TYPE OF DRILL: CME 75 - AUTOMATIC TRIP HAMMER
LOCATION: SEE BORING LOCATION MAP
TYPE OF AUGER: 8 1/4-INCH HSA
SURFACE ELEVATION: 45 FEET (approx.)

ELEVATION	DEPTH (FT.)	GRAPHIC LOG, SAMPLERS, FIELD DATA	U.S.C.S.	DESCRIPTION AND CLASSIFICATION	MOISTURE CONTENT (%)	INSITU DRY DENSITY (PCF)	% FINES (MINUS #200)	N-VALUE BLOWS/FT
				Poorly Graded SAND with Silt; very dense, saturated, yellowish brown, fine graiend				
5	40	100						50/4"
		100		Santa Barbara Formation (Qsb): SANDSTONE; hard, moist, yellowish brown,fine grained (auger refusal near 44.5 feet)				50/3"
0	45			BORING TERMINATED AT 44.5 FEET				



GRAPH OF ATTERBERG LIMITS, NATURAL MOISTURE CONTENT, AND STANDARD PENETRATION TEST

PL ├──────┤ LL
▲ MOISTURE CONTENT, %
● BLOWS PER FOOT



REMARKS:
THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARIES BETWEEN SOIL TYPES AND THE ACTUAL TRANSITION MAY BE GRADUAL. GROUND WATER WAS ENCOUNTERED NEAR 13 FEET AT TIME OF BORING.

LOG OF BORING

Earth Systems Pacific
308 North First Street - Lompoc, CA 93436

PROJECT: UCSB SAN CLEMENTE STUDENT HOUSING

BORING NUMBER: B-3

EXAM NO.: SL-13133-SA

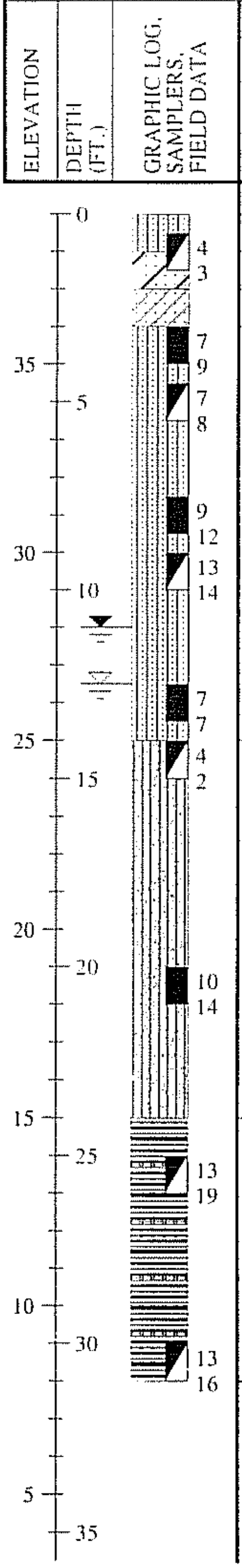
DATE DRILLED: MARCH 19, 2002

TYPE OF DRILL: CME 75 - AUTOMATIC TRIP HAMMER

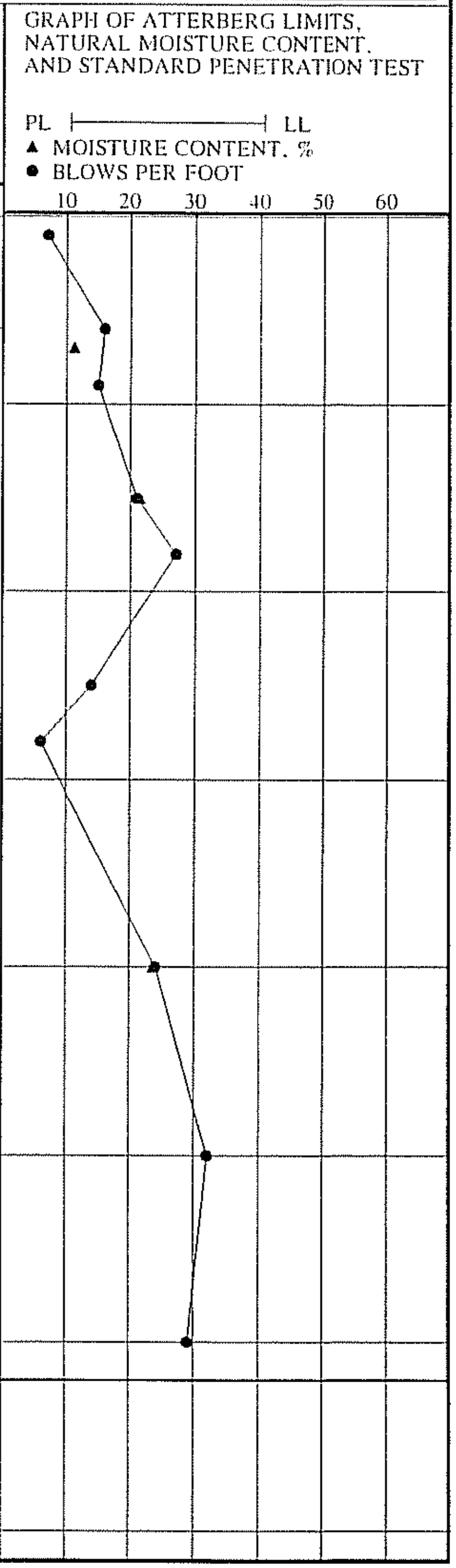
LOCATION: SEE BORING LOCATION MAP

TYPE OF AUGER: 8 1/4-INCH HSA

SURFACE ELEVATION: 39 FEET (approx.)



U.S.C.S.	DESCRIPTION AND CLASSIFICATION	MOISTURE CONTENT (%)	INSITU DRY DENSITY (PCF)	% FINES (MINUS #200)	N-VALUE BLOWS/FT
SM	Terrace Deposits (Qt): Silty SAND; loose, very moist, dark gray, fine grained				7
CH	Sandy Fat CLAY: firm, very moist, very dark grayish brown, high plasticity				
SC	Clayey SAND; medium dense, moist, grayish brown, fine grained, medium plasticity fines	11.2	99.2	13.4	16
SM	Silty SAND with clay fines; medium dense, very moist, yellowish brown, fine grained				15
	becomes light olive brown with decreased clay fines near 7 feet	21.4	93.6	22.8	21
					27
	becomes saturated near 12 1/2 feet				14
ML	Santa Barbara Formation (Qsb): Sandy SILT with clay; firm, very moist, dark gray to olive brown mottled reddish and yellowish brown, slightly plastic				6
		23.6	95.7		24
	Santa Barbara Formation (Qsbp): SILTSTONE with interbeds of Claystone and Sandstone; hard, moist, massive, moderately weathered, dark olive gray				32
	becomes very stiff near 29 feet				29
	BORING TERMINATED AT 31 FEET				



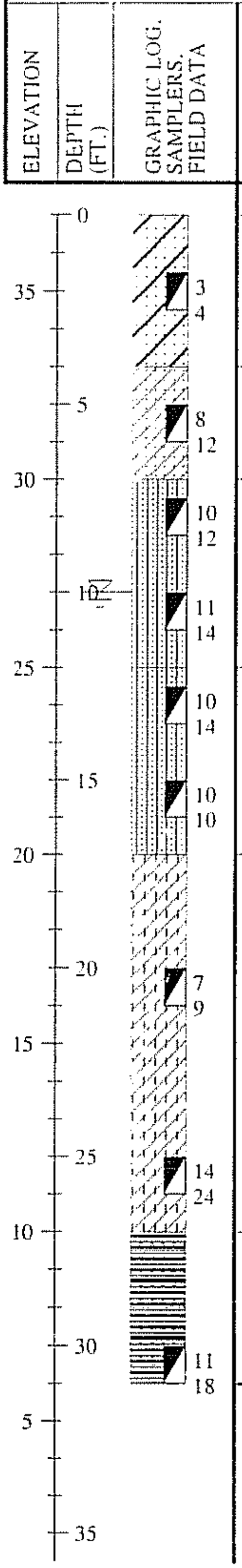
REMARKS:
THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARIES BETWEEN SOIL TYPES AND THE ACTUAL TRANSITION MAY BE GRADUAL. PERCHED WATER WAS ENCOUNTERED NEAR 12 1/2 FEET AT TIME OF BORING AND MEASURED NEAR 11 FEET ON 3/20/02.

LOG OF BORING

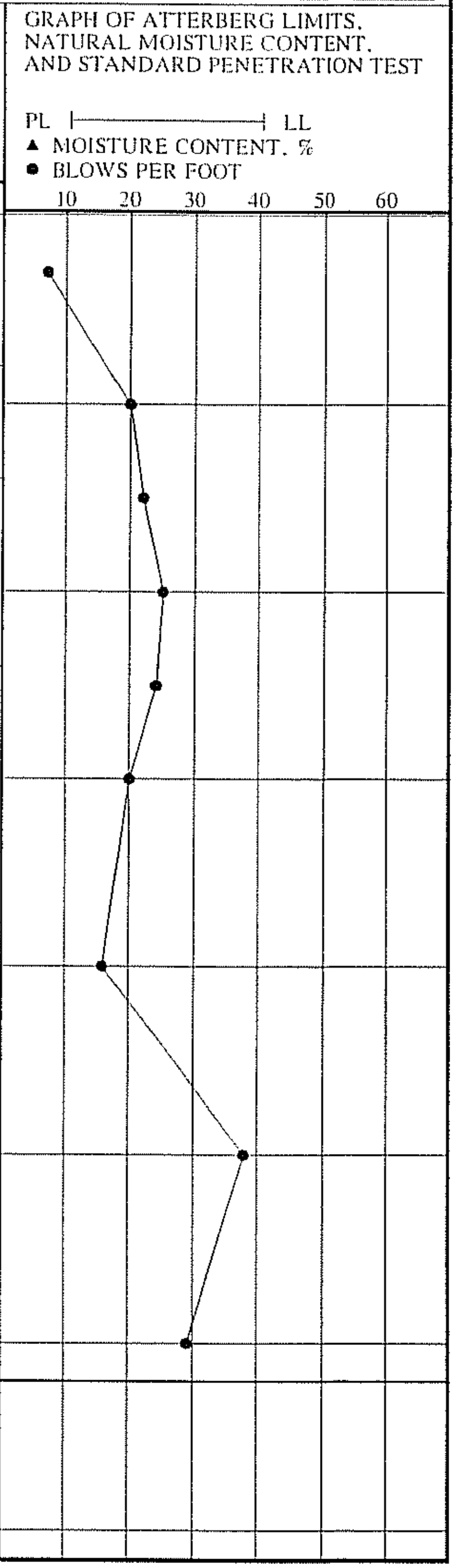
Earth Systems Pacific

308 North First Street - Lompoc, CA 93436

PROJECT: UCSB SAN CLEMENTE STUDENT HOUSING
EXAM NO.: SL-13133-SA
TYPE OF DRILL: CME 75 - AUTOMATIC TRIP HAMMER
TYPE OF AUGER: 8 1/4-INCH HSA
BORING NUMBER: B-4
DATE DRILLED: MARCH 24, 2002
LOCATION: SEE BORING LOCATION MAP
SURFACE ELEVATION: 37 FEET (approx.)



GRAPHIC LOG, SAMPLERS, FIELD DATA	U.S.C.S.	DESCRIPTION AND CLASSIFICATION	MOISTURE CONTENT (%)	INSITU DRY DENSITY (PCF)	% FINES (MINUS #200)	N-VALUE BLOWS/FT
3 4	CH	Terrace Deposits (Qt): Sandy Fat CLAY; firm, very moist, very dark grayish brown, high plasticity				7
8 12	SC	Clayey SAND; medium dense, very moist, dark yellowish brown, fine grained, medium plasticity fines				20
10 12	SM	Silty SAND; medium dense, moist, yellowish mottled reddish brown, fine grained				22
11 14		becomes saturated and grayish brown near 10 feet				25
10 14	SM	Santa Barbara Formation (Qsb): Silty SAND; medium dense, saturated, dark yellowish brown, fine grained				24
10 10		abundant shell fragments near 15 feet				20
	CL	Silty Lean CLAY; very stiff, very moist, olive brown mottled yellowish and grayish brown, medium plasticity				
7 9						16
14 24		becomes hard with Silty SAND (SM) lenses near 25 feet				38
		Santa Barbara Formation (Qsbp): SILTSTONE with interbeds of Claystone and Sandstone; very stiff, moist, massive, moderately weathered, dark olive gray				
11 18						29
		BORING TERMINATED AT 31 FEET				



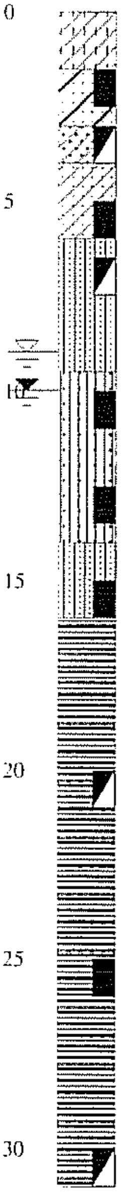
REMARKS:
THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARIES BETWEEN SOIL TYPES AND THE ACTUAL TRANSITION MAY BE GRADUAL. PERCHED WATER WAS ENCOUNTERED NEAR 10 FEET AT TIME OF BORING.

LOG OF BORING

Earth Systems Pacific
308 North First Street - Lompoc, CA 93436

PROJECT: UCSB SAN CLEMENTE STUDENT HOUSING
EXAM NO.: SL-13133-SA
TYPE OF DRILL: CME 75 - AUTOMATIC TRIP HAMMER
TYPE OF AUGER: 8 1/4-INCH HSA

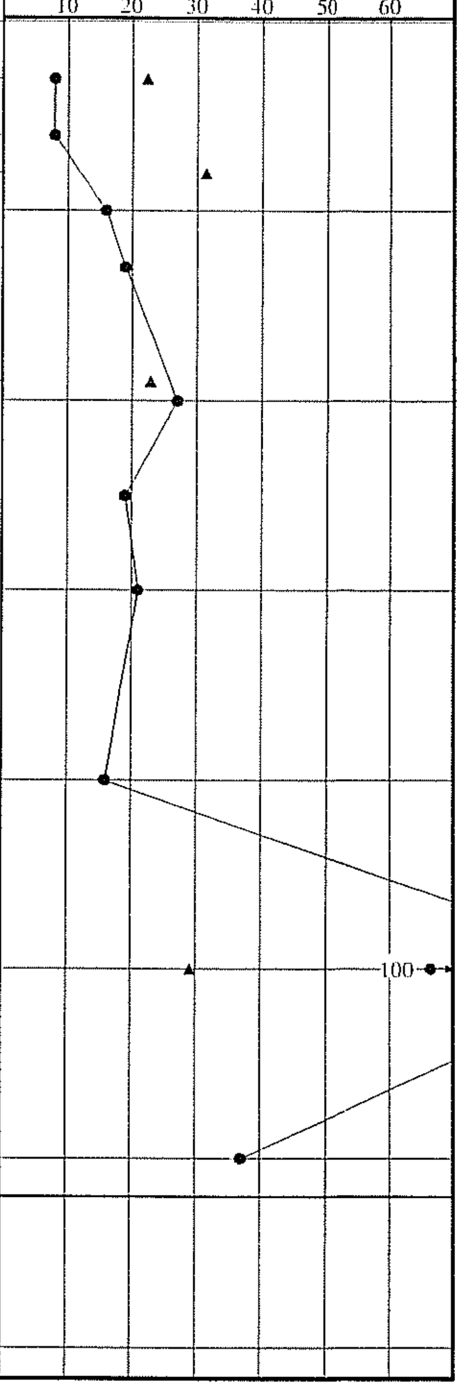
BORING NUMBER: B-5
DATE DRILLED: MARCH 19, 2002
LOCATION: SEE BORING LOCATION MAP
SURFACE ELEVATION: 35 FEET (approx.)



ELEVATION	DEPTH (FT.)	GRAPHIC LOG, SAMPLERS, FIELD DATA	U.S.C.S.	DESCRIPTION AND CLASSIFICATION	MOISTURE CONTENT (%)	INSITU DRY DENSITY (PCF)	% FINES (MINUS #200)	N-VALUE BLOWS/FT
35	0		CL	Terrace Deposits (Qt): Silty Lean CLAY; firm, very moist, very dark gray brown, medium plasticity				
		3 5	CH	Sandy Fat CLAY; firm, very moist, very dark grayish brown, high plasticity	22.3	84.6		8
		3 5	CL	Sandy Lean CLAY; firm, very moist, grayish mottled yellowish reddish brown, medium plasticity				8
30	5	7 9	SC	Clayey SAND; medium dense, very moist, dark yellowish to olive brown, fine grained, medium plasticity fines	31.3	100.9	24.7	16
		9 10	SM	Silty SAND; medium dense, very moist, yellowish to olive brown, fine grained				19
25	10	11 16	SP-SM	Poorly Graded SAND with Silt; medium dense, saturated, yellowish to light olive brown, fine grained	22.9	95.0	7.8	27
		9 10						19
20	15	8 13	SM	Santa Barbara Formation (Qsb): Silty SAND with shell fragments; medium dense, saturated, olive mottled dark yellowish brown, fine grained				21
				Santa Barbara Formation (Qsbp); SILTSTONE with interbeds of Claystone and Sandstone; hard, moist, massive, moderately weathered, dark olive gray				
15	20	7 9						16
10	25	100+		encountered saturated seam near 25 feet	29.1	94.8		50/5"
5	30	15 22						37
				BORING TERMINATED AT 31 FEET				
0	35							

GRAPH OF ATTERBERG LIMITS, NATURAL MOISTURE CONTENT, AND STANDARD PENETRATION TEST

PL |——| LL
▲ MOISTURE CONTENT, %
● BLOWS PER FOOT



REMARKS:
THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARIES BETWEEN SOIL TYPES AND THE ACTUAL TRANSITION MAY BE GRADUAL. PERCHED WATER WAS ENCOUNTERED NEAR 9 1/2 FEET AT TIME OF BORING AND MEASURED NEAR 10 FEET ON 3/20/02.

LOG OF BORING

Earth Systems Pacific
308 North First Street - Lompoc, CA 93436

PROJECT: UCSB SAN CLEMENTE STUDENT HOUSING

EXAM NO.: SL-13133-SA

TYPE OF DRILL: CME 75 - AUTOMATIC TRIP HAMMER

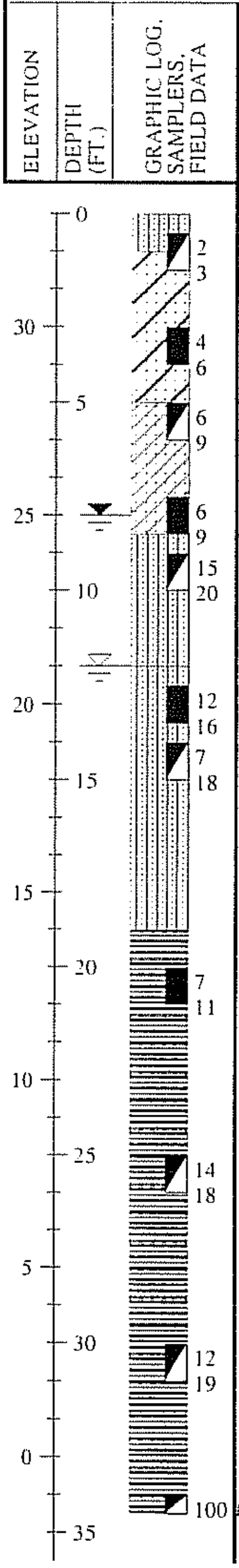
TYPE OF AUGER: 8 1/4-INCH HSA

BORING NUMBER: B-6

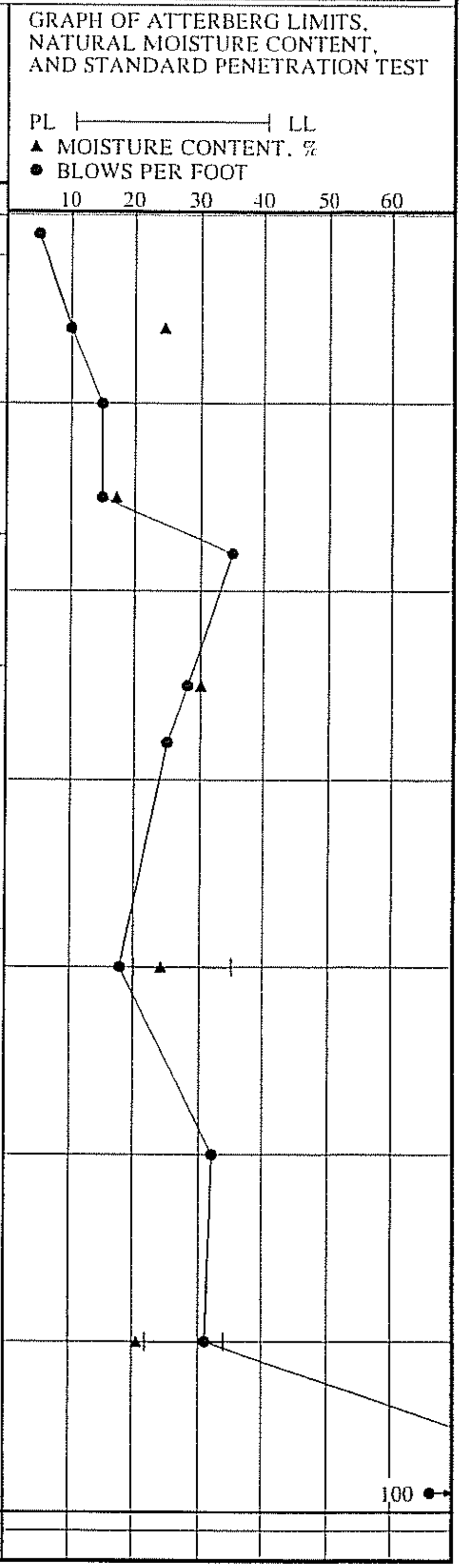
DATE DRILLED: MARCH 19, 2002

LOCATION: SEE BORING LOCATION MAP

SURFACE ELEVATION: 33 FEET (approx.)



U.S.C.S.	DESCRIPTION AND CLASSIFICATION	FIELD DATA	MOISTURE CONTENT (%)	INSITU DRY DENSITY (PCF)	% FINES (MINUS #200)	N-VALUE BLOWS/FT
SM	Terrace Deposits (Qt): Silty SAND; loose, very moist, dark grayish brown, fine grained	2 3				5
CH	Sandy Fat CLAY: stiff, very moist, very dark grayish brown, high plasticity	4 6	24.5	92.8		10
SC	Clayey SAND; medium dense, very moist, light and dark grayish brown mottled dark reddish brown, fine grained, medium plasticity fines	6 9				15
	becomes olive to yellowish brown near 71/2 feet	6 9	17.3	107.3		15
SM	Silty SAND, medium dense, very moist, olive to yellowish brown, fine grained	15 20				35
SM	Santa Barbara Formation (Qsb): Silty SAND with shell fragments; medium dense, olive to yellowish brown, saturated, fine grained	12 16	30.1	90.6	32.9	28
		7 18				25
	Santa Barbara Formation (Qsbp): SILTSTONE with interbeds of Claystone and Sandstone: very stiff, moist, massive, moderately weathered, dark olive gray	7 11	24.2	98.9	84.9	18
	becomes hard near 25 feet	14 18				32
		12 19	20.7		82.9	31
	(auger refusal near 34 1/2 feet)	100				50/1"
	BORING TERMINATED AT 34.5 FEET					



REMARKS:
THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARIES BETWEEN SOIL TYPES AND THE ACTUAL TRANSITION MAY BE GRADUAL. PERCHED WATER WAS ENCOUNTERED NEAR 12 FEET AT TIME OF BORING AND MEASURED NEAR 8 FEET ON 3/21/02.

LOG OF BORING

Earth Systems Pacific

308 North First Street - Lompoc, CA 93436

PROJECT: UCSB SAN CLEMENTE STUDENT HOUSING

BORING NUMBER: B-7

EXAM NO.: SL-13133-SA

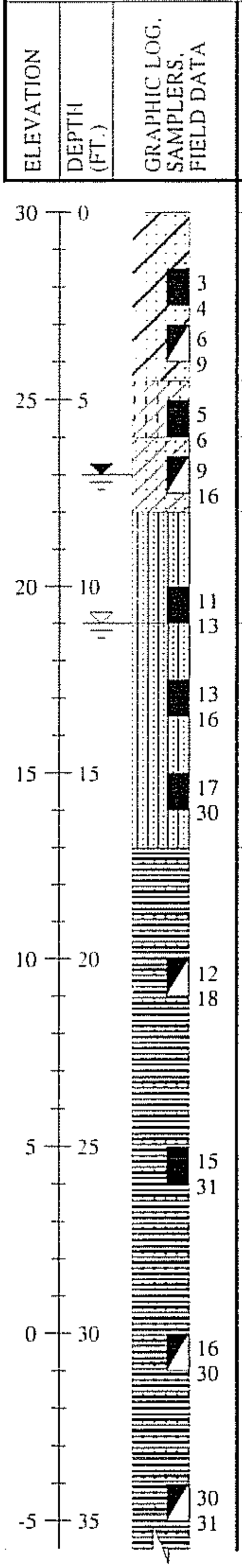
DATE DRILLED: MARCH 20, 2002

TYPE OF DRILL: CME 75 - AUTOMATIC TRIP HAMMER

LOCATION: SEE BORING LOCATION MAP

TYPE OF AUGER: 8 1/4-INCH HSA

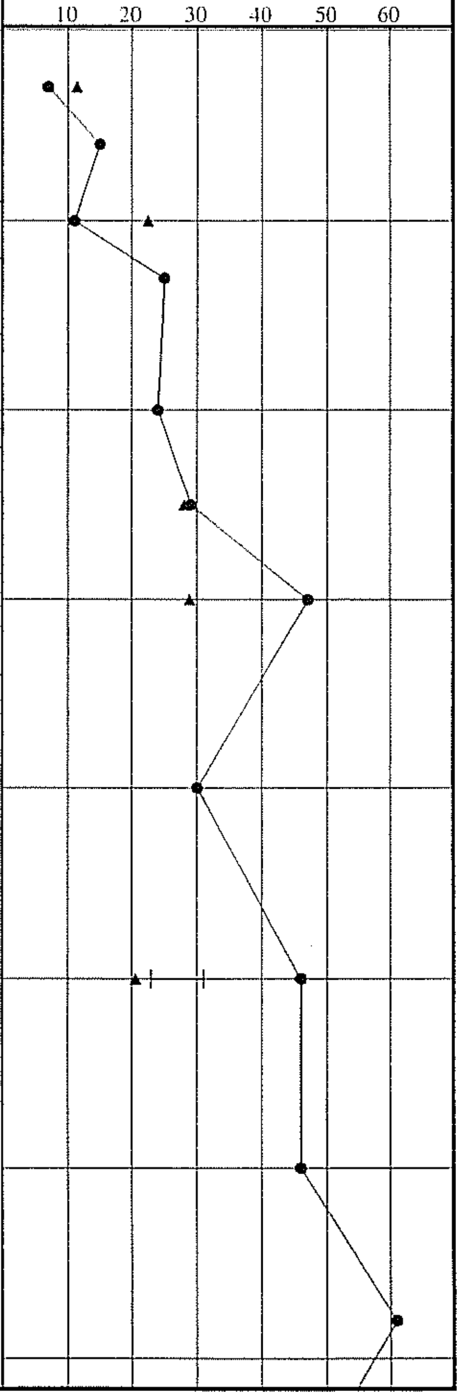
SURFACE ELEVATION: 30 FEET (approx.)



U.S.C.S.	DESCRIPTION AND CLASSIFICATION	MOISTURE CONTENT (%)	INSITU DRY DENSITY (PCF)	% FINES (MINUS #200)	N-VALUE BLOWS/FT
CH	Terrace Deposits (Qt): Sandy Fat CLAY; firm, moist, very dark reddish to grayish brown, high plasticity	11.4	65.3	64.6	7
					15
CL	Silty Lean CLAY: stiff, very moist, dark reddish brown, medium plasticity	22.5	99.1		11
SC	Clayey SAND; medium dense, very moist, dark yellowish brown, fine grained, medium plasticity fines				25
SM	Silty SAND; medium dense, very moist, grayish brown, fine grained				24
SM	Santa Barbara Formation (Qsb): Silty SAND, medium dense, saturated, olive mottled yellowish and grayish brown, fine grained	28.0	93.1		29
	becomes very dense near 15 feet	28.8	90.6	39.0	47
	Santa Barbara Formation (Qsbp): SILTSTONE with interbeds of Claystone and Sandstone; hard, moist, massive, moderately weathered, dark olive gray				
					30
		20.6	104.4	76.7	46
					46
	encountered saturated seam near 35 feet				61

GRAPH OF ATTERBERG LIMITS, NATURAL MOISTURE CONTENT, AND STANDARD PENETRATION TEST

PL ├────┤ LL
▲ MOISTURE CONTENT, %
● BLOWS PER FOOT



REMARKS:
THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARIES BETWEEN SOIL TYPES AND THE ACTUAL TRANSITION MAY BE GRADUAL. PERCHED WATER WAS ENCOUNTERED NEAR 11 FEET AT TIME OF BORING AND MEASURED NEAR 7 FEET ON 3/21/02.

LOG OF BORING

Earth Systems Pacific
308 North First Street - Lompoc, CA 93436

PROJECT: UCSB SAN CLEMENTE STUDENT HOUSING

BORING NUMBER: B-7

EXAM NO.: SL-13133-SA

DATE DRILLED: MARCH 20, 2002

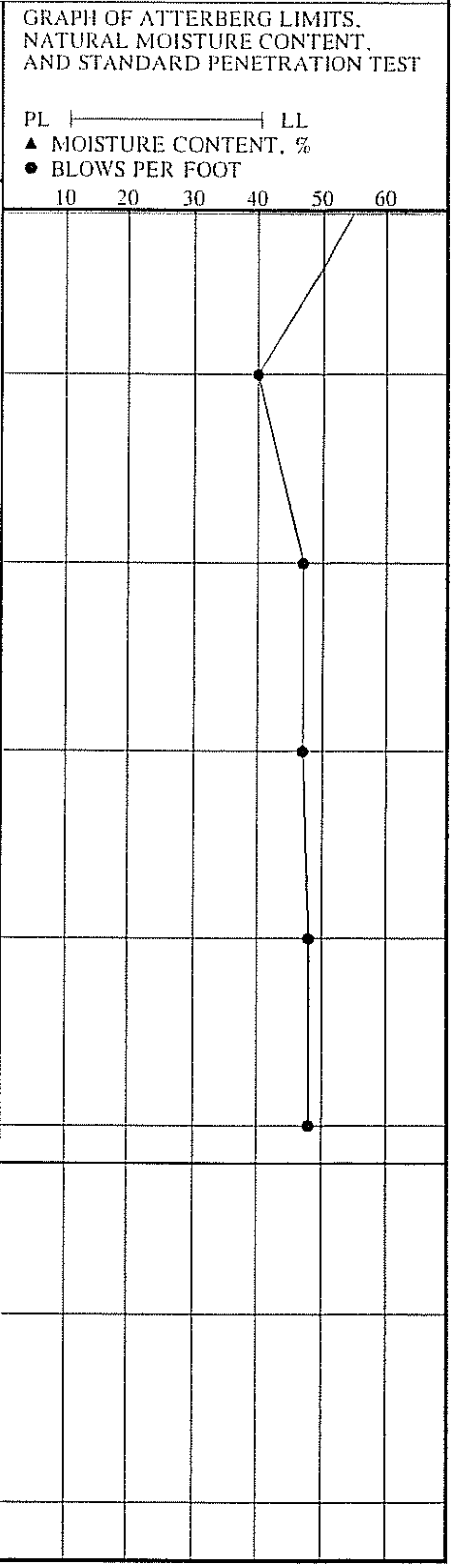
TYPE OF DRILL: CME 75 - AUTOMATIC TRIP HAMMER

LOCATION: SEE BORING LOCATION MAP

TYPE OF AUGER: 8 1/4-INCH HSA

SURFACE ELEVATION: 30 FEET (approx.)

ELEVATION	DEPTH (FT.)	GRAPHIC LOG, SAMPLERS, FIELD DATA	U.S.C.S.	DESCRIPTION AND CLASSIFICATION	MOISTURE CONTENT (%)	INSITU DRY DENSITY (PCF)	% FINES (MINUS #200)	N-VALUE BLOWS/FT.
				Santa Barbara Formation (Qsbp): SILTSTONE with interbeds of Claystone and Sandstone; hard, moist, massive, moderately weathered, dark olive gray				
-10	40	16 24						40
-15	45	19 28						47
-20	50	19 28						47
-25	55	20 28						48
-30	60	21 27						48
				BORING TERMINATED AT 61 FEET				
-35	65							
-40	70							



REMARKS:
THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARIES BETWEEN SOIL TYPES AND THE ACTUAL TRANSITION MAY BE GRADUAL. PERCHED WATER WAS ENCOUNTERED NEAR 11 FEET AT TIME OF BORING AND MEASURED NEAR 7 FEET ON 3/21/02.

LOG OF BORING

Earth Systems Pacific
308 North First Street - Lompoc, CA 93436

PROJECT: UCSB SAN CLEMENTE STUDENT HOUSING

EXAM NO.: SL-13133-SA

TYPE OF DRILL: CME 75 - AUTOMATIC TRIP HAMMER

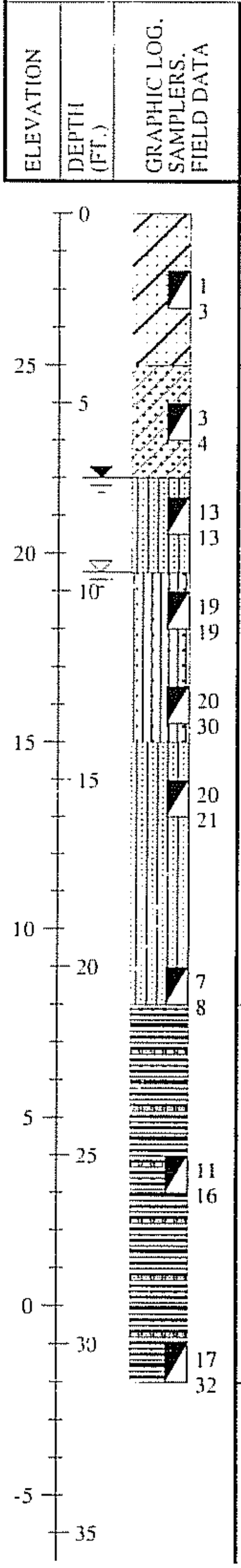
TYPE OF AUGER: 8 1/4-INCH HSA

BORING NUMBER: B-8

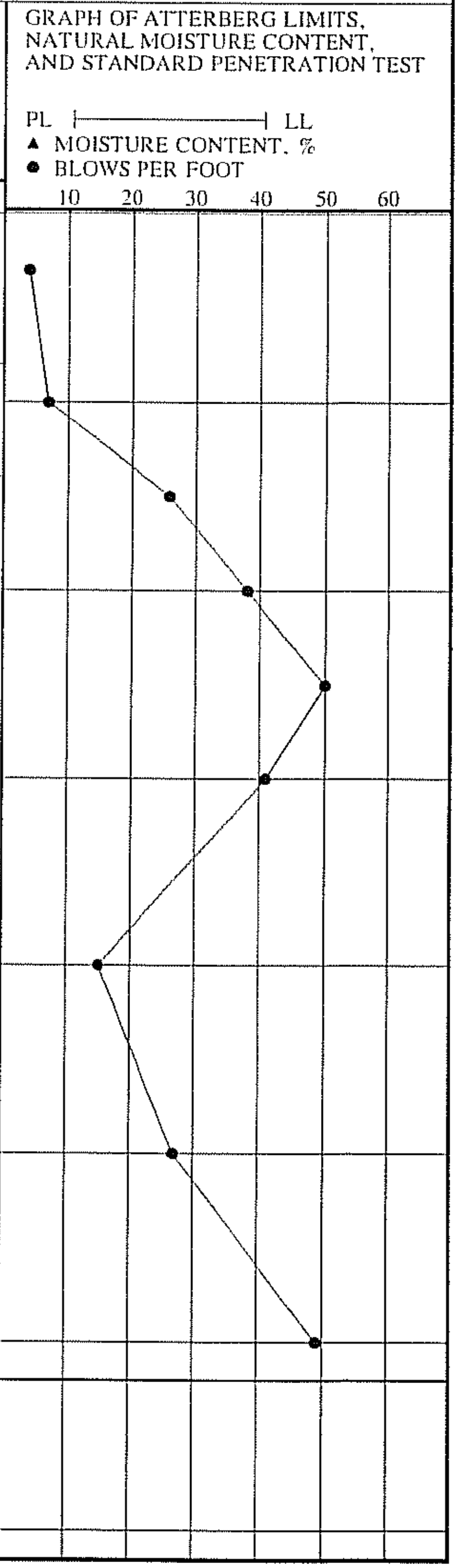
DATE DRILLED: MARCH 20, 2002

LOCATION: SEE BORING LOCATION MAP

SURFACE ELEVATION: 29 FEET (approx.)



U.S.C.S.	DESCRIPTION AND CLASSIFICATION	MOISTURE CONTENT (%)	INSITU DRY DENSITY (PCF)	% FINES (MINUS #200)	N-VALUE BLOWS/FT
CH	Terrace Deposits (Qt): Sandy Fat CLAY: soft, very moist, very dark grayish brown, high plasticity				4
CL	Sandy Lean CLAY: firm, very moist, dark grayish to reddish brown, medium plasticity				7
SM	Silty SAND with clay: medium dense, very moist, dark yellowish brown, fine grained				26
SP-SM	Poorly Graded SAND with Silt: dense, saturated, olive to yellowish brown, fine grained				38 50
SM	Santa Barbara Formation (Qsb): Silty SAND, dense, saturated, olive to yellowish brown, fine grained abundant shell fragments near 20 feet				41 15
	Santa Barbara Formation (Qsbp): SILTSTONE with interbeds of Claystone and Sandstone; very stiff, moist, massive, moderately weathered, dark olive gray encountered dense, saturated seam near 30 feet				27 49
	BORING TERMINATED AT 31 FEET				



REMARKS:
THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARIES BETWEEN SOIL TYPES AND THE ACTUAL TRANSITION MAY BE GRADUAL. PERCHED WATER WAS ENCOUNTERED NEAR 9 1/2 FEET AT TIME OF BORING AND MEASURED 7 FEET ON 3/21/02.

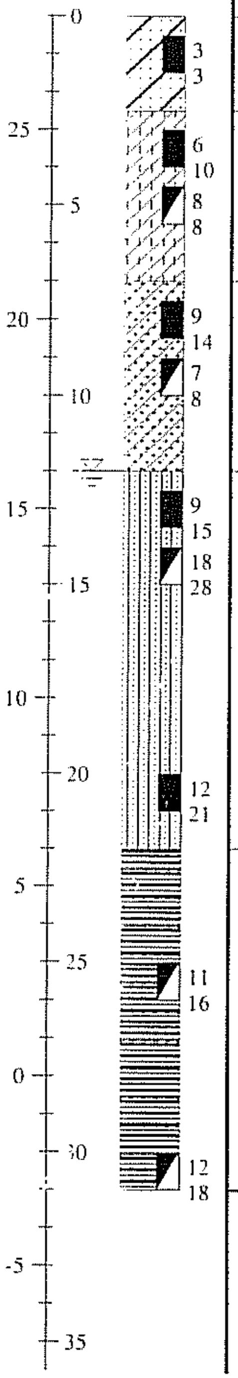
LOG OF BORING

Earth Systems Pacific

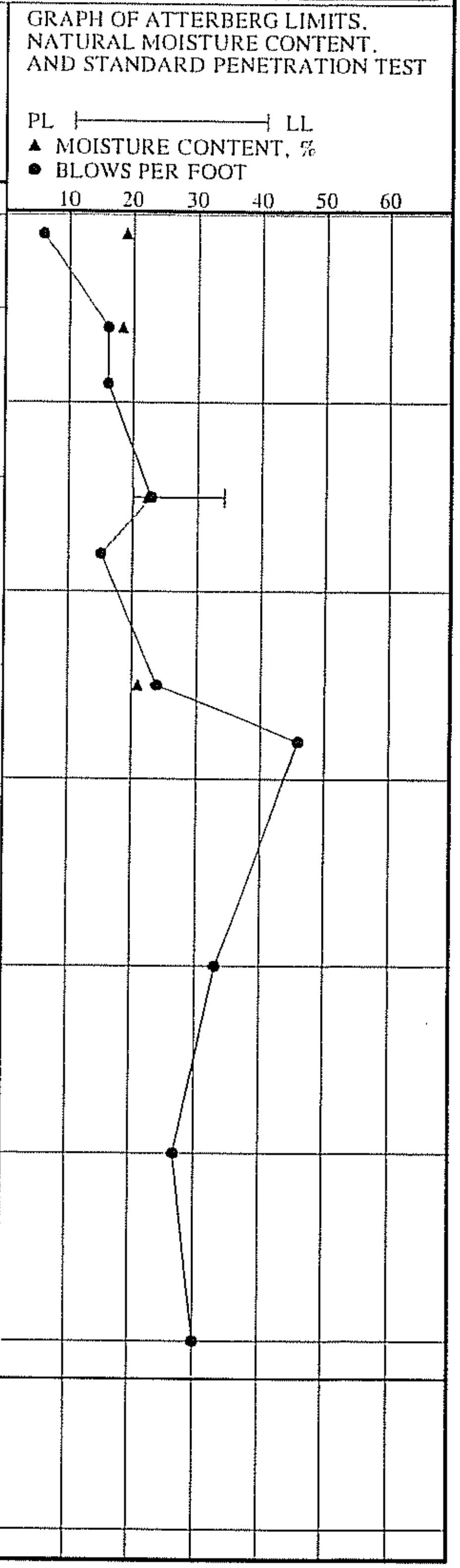
308 North First Street - Lompoc, CA 93436

PROJECT: UCSB SAN CLEMENTE STUDENT HOUSING
EXAM NO.: SL-13133-SA
TYPE OF DRILL: CME 75 - AUTOMATIC TRIP HAMMER
TYPE OF AUGER: 8 1/4-INCH HSA

BORING NUMBER: B-9
DATE DRILLED: MARCH 21, 2002
LOCATION: SEE BORING LOCATION MAP
SURFACE ELEVATION: 28 FEET (approx.)



GRAPHIC LOG, SAMPLERS, FIELD DATA	U.S.C.S.	DESCRIPTION AND CLASSIFICATION	MOISTURE CONTENT (%)	INSITU DRY DENSITY (PCF)	% FINES (MINUS #200)	N-VALUE BLOWS/FT
3 3	CH	Terrace Deposits (Qt): Sandy Fat CLAY; firm, very moist, very dark grayish brown, high plasticity	18.9	99.2		6
6 10	CL	Silty Lean CLAY; very stiff, very moist, dark reddish mottled grayish and yellowish brown, medium plasticity	18.3	61.4		16
8 8						16
9 14	CL	Sandy Lean CLAY; very stiff, very moist, dark reddish mottled yellowish brown and black; medium plasticity	22.5	99.1	64.8	23
7 8						15
9 15	SM	Santa Barbara Formation (Qsb): Silty SAND; medium dense to dense, saturated, light grayish to yellowish brown, fine grained	21.0	103.7		24
18 28						46
12 21		abundant shell fragments near 20 feet				33
		Santa Barbara Formation (Qsbp): SILTSTONE with interbeds of Claystone and Sandstone; very stiff, moist, massive, moderately weathered, dark olive gray				
11 16						27
12 18						30
		BORING TERMINATED AT 31 FEET				



REMARKS:
THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARIES BETWEEN SOIL TYPES AND THE ACTUAL TRANSITION MAY BE GRADUAL. PERCHED WATER WAS ENCOUNTERED NEAR 12 FEET AT TIME OF BORING.

LOG OF BORING

Earth Systems Pacific
308 North First Street - Lompoc, CA 93436

PROJECT: UCSB SAN CLEMENTE STUDENT HOUSING

BORING NUMBER: B-10

EXAM NO.: SL-13133-SA

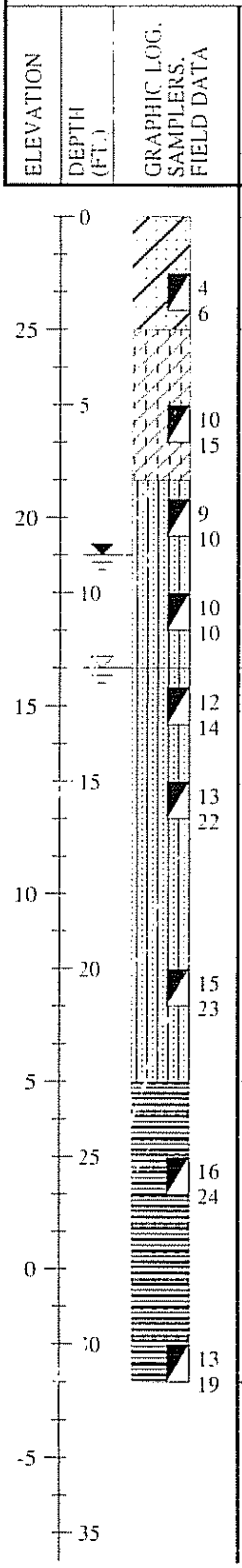
DATE DRILLED: MARCH 20, 2002

TYPE OF DRILL: CME 75 - AUTOMATIC TRIP HAMMER

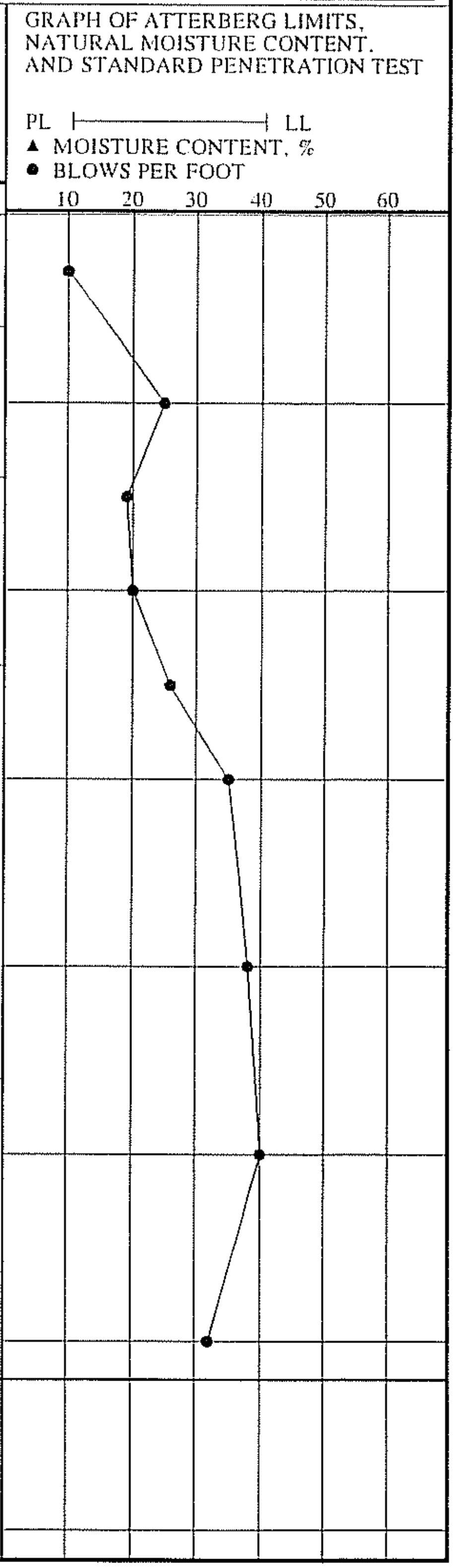
LOCATION: SEE BORING LOCATION MAP

TYPE OF AUGER: 8 1/4-INCH HSA

SURFACE ELEVATION: 28 FEET (approx.)



U.S.C.S.	DESCRIPTION AND CLASSIFICATION	MOISTURE CONTENT (%)	INSITU DRY DENSITY (PCF)	% FINES (MINUS #200)	N-VALUE BLOWS/FT
CH	Terrace Deposits (Qt): Sandy Fat CLAY, firm, very moist, very dark grayish brown, high plasticity				10
CL	Silty Lean CLAY; very stiff, moist, dark reddish mottled yellowish brown, medium plasticity				25
SM	Silty SAND; medium dense, very moist, olive to grayish brown, fine grained				19
	becomes very moist to saturated near 9 feet				20
SM	Santa Barbara Formation (Qsb): Silty SAND; medium dense, saturated, olive to yellowish brown				26
	becomes dense near 15 feet				35
	becomes dark olive mottled grayish and yellowish brown with abundant shell fragments near 20 feet				38
	Santa Barbara Formation (Qsbp): SILTSTONE with interbeds of Claystone and Sandstone; hard, moist, massive, moderately weathered, dark olive gray				40
					32
	BORING TERMINATED AT 31 FEET				

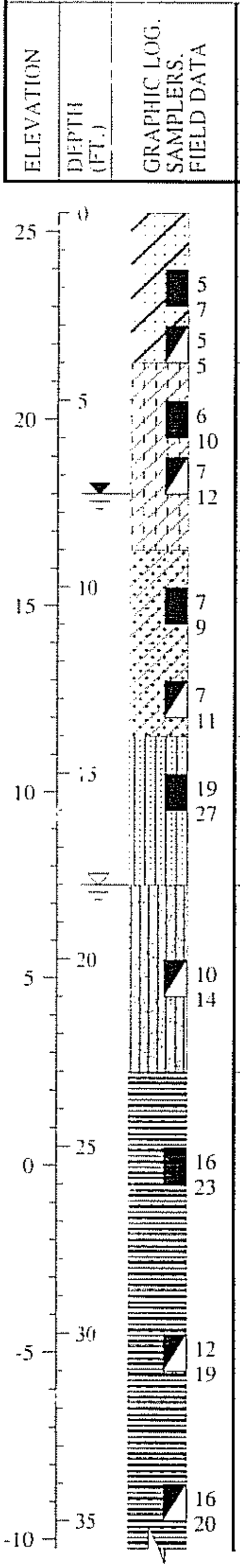


REMARKS:
THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARIES BETWEEN SOIL TYPES AND THE ACTUAL TRANSITION MAY BE GRADUAL. PERCHED WATER WAS ENCOUNTERED NEAR 12 FEET AT TIME OF BORING AND MEASURED NEAR 9 FEET ON 3/21/02.

LOG OF BORING

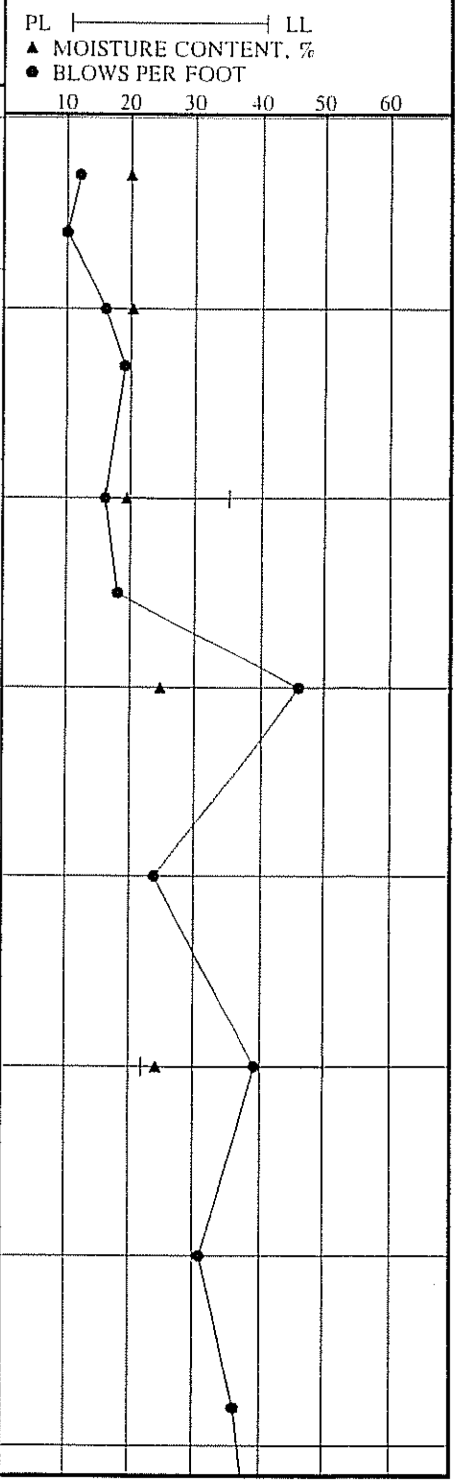
Earth Systems Pacific
308 North First Street - Lompoc, CA 93436

PROJECT: UCSB SAN CLEMENTE STUDENT HOUSING
BORING NUMBER: B-11
EXAM NO.: SL-13133-SA
DATE DRILLED: MARCH 21, 2002
TYPE OF DRILL: CME 75 - AUTOMATIC TRIP HAMMER
LOCATION: SEE BORING LOCATION MAP
TYPE OF AUGER: 8 1/4-INCH HSA
SURFACE ELEVATION: 25.5 FEET (approx.)



U.S.C.S.	DESCRIPTION AND CLASSIFICATION	MOISTURE CONTENT (%)	INSITU DRY DENSITY (PCF)	% FINES (MINUS #200)	N-VALUE BLOWS/FT
CH	Terrace Deposits (Qt): Sandy Fat CLAY; stiff, very moist, very dark grayish brown, high plasticity	20.0	100.6		12
	becomes dark reddish brown near 2 1/2 feet				10
CL	Silty Lean CLAY; very stiff, moist, reddish mottled yellowish brown and black, medium plasticity	20.3	103.3		16
					19
CL	Sandy Lean CLAY; very stiff, very moist, reddish mottled yellowish and grayish brown, medium plasticity	19.4	104.8	58.1	16
					18
SM	Santa Barbara Formation (Qsb): Silty SAND; dense, very moist, olive to yellowish brown, fine grained	24.9	91.5		46
ML	Sandy SILT with shell fragments; very stiff, saturated, olive mottled yellowish and grayish brown, non-plastic				24
	Santa Barbara Formation (Qsbp): SILTSTONE with interbeds of Claystone and Sandstone; hard, moist, massive, moderately weathered, dark olive gray	24.4	98.5	93.1	39
					31
					36

GRAPH OF ATTERBERG LIMITS, NATURAL MOISTURE CONTENT, AND STANDARD PENETRATION TEST



REMARKS:
THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARIES BETWEEN SOIL TYPES AND THE ACTUAL TRANSITION MAY BE GRADUAL. PERCHED WATER WAS ENCOUNTERED NEAR 18 FEET AT TIME OF BORING AND MEASURED NEAR 7 1/2 FEET ON 3/25/02.

LOG OF BORING

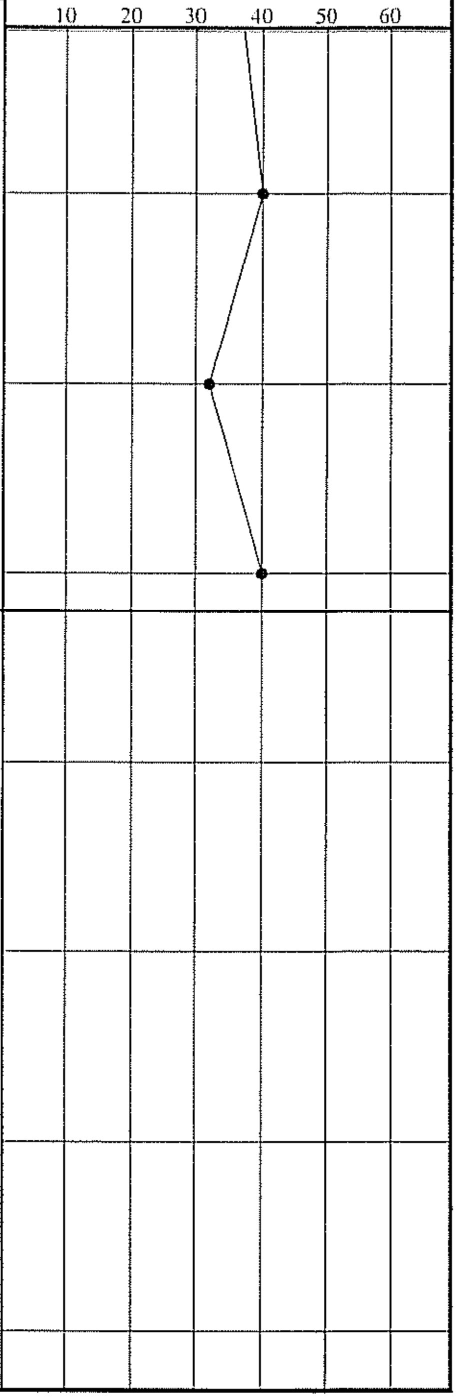
Earth Systems Pacific
308 North First Street - Lompoc, CA 93436

PROJECT: UCSB SAN CLEMENTE STUDENT HOUSING
BORING NUMBER: B-11
EXAM NO.: SL-13133-SA
DATE DRILLED: MARCH 21, 2002
TYPE OF DRILL: CME 75 - AUTOMATIC TRIP HAMMER
LOCATION: SEE BORING LOCATION MAP
TYPE OF AUGER: 8 1/4-INCH HSA
SURFACE ELEVATION: 25.5 FEET (approx.)

ELEVATION	DEPTH (FT.)	GRAPHIC LOG, SAMPLERS, FIELD DATA	U.S.C.S.	DESCRIPTION AND CLASSIFICATION	MOISTURE CONTENT (%)	INSITU DRY DENSITY (PCF)	% FINES (MINUS #200)	N-VALUE BLOWS/FT
				Santa Barbara Formation (Qsbp): SILTSTONE with interbeds of Claystone and Sandstone; hard, moist, massive, moderately weathered, dark olive gray				
-15	40	17 23						40
-20	45	15 17						32
-25	50	17 23						40
				BORING TERMINATED AT 51 FEET				
-30	55							
-35	60							
-40	65							
-45	70							

GRAPH OF ATTERBERG LIMITS, NATURAL MOISTURE CONTENT, AND STANDARD PENETRATION TEST

PL ├──┤ LL
▲ MOISTURE CONTENT, %
● BLOWS PER FOOT



REMARKS:
THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARIES BETWEEN SOIL TYPES AND THE ACTUAL TRANSITION MAY BE GRADUAL. PERCHED WATER WAS ENCOUNTERED NEAR 18 FEET AT TIME OF BORING AND MEASURED NEAR 7 1/2 FEET ON 3/25/02.

LOG OF BORING

Earth Systems Pacific
308 North First Street - Lompoc, CA 93436

PROJECT: UCSB SAN CLEMENTE STUDENT HOUSING

EXAM NO.: SL-13133-SA

TYPE OF DRILL: CME 75 - AUTOMATIC TRIP HAMMER

TYPE OF AUGER: 8 1/4-INCH HSA

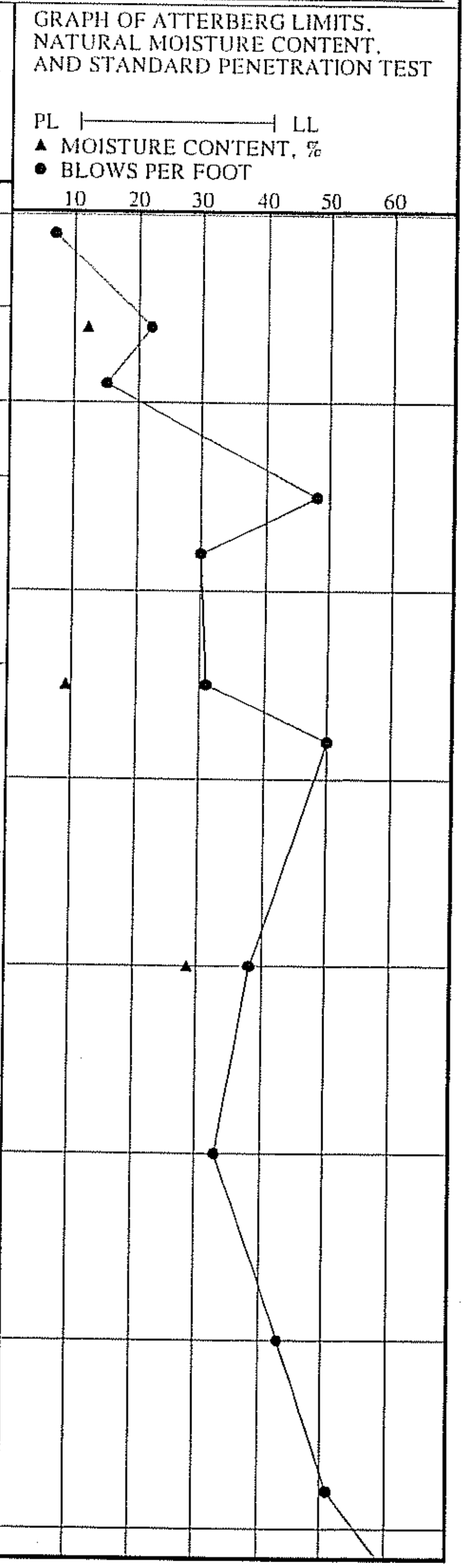
BORING NUMBER: B-12

DATE DRILLED: MARCH 25, 2002

LOCATION: SEE BORING LOCATION MAP

SURFACE ELEVATION: 25 FEET (approx.)

ELEVATION	DEPTH (FT.)	GRAPHIC LOG, SAMPLERS, FIELD DATA	U.S.C.S.	DESCRIPTION AND CLASSIFICATION	MOISTURE CONTENT (%)	INSITU DRY DENSITY (PCF)	% FINES (MINUS #200)	N-VALUE BLOWS/FT
25	0	3 4	CH	Terrace Deposits (Qt): Sandy Fat CLAY: firm, very moist, dark grayish brown, high plasticity				7
		9 13	SC	Clayey SAND: medium dense, moist, reddish mottled yellowish and grayish brown, medium plasticity fines	12.1	107.8		22
20	5	7 8	CL	Silty Lean CLAY: stiff, moist, reddish mottled yellowish and grayish brown, medium plasticity				15
		23 25	SM	Silty SAND: dense, very moist, olive to yellowish brown, fine grained				48
15	10	14 16						30
		13 18	SP-SM	Poorly Graded SAND with Silt: dense, saturated, yellowish mottled olive and grayish brown, fine grained	9.2	101.1	10.4	31
10	15	20 30						50
5	20	13 25	ML	Santa Barbara Formation (Qsb): Sandy SILT: hard, saturated, dark olive mottled yellowish and grayish brown, non-plastic brown abundant shell fragments near 20 feet	28.5	92.7		38
0	25	13 20		Santa Barbara Formation (Qsbp): SILTSTONE with interbeds of Claystone and Sandstone; hard, moist, massive, moderately weathered, dark olive gray				33
-5	30	17 26						43
-10	35	19 32		SANDSTONE; very dense, saturated, dark olive gray, fine grained				51



REMARKS:
THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARIES BETWEEN SOIL TYPES AND THE ACTUAL TRANSITION MAY BE GRADUAL. PERCHED WATER WAS ENCOUNTERED NEAR 12 FEET AT TIME OF BORING.

LOG OF BORING

Earth Systems Pacific

308 North First Street - Lompoc, CA 93436

PROJECT: UCSB SAN CLEMENTE STUDENT HOUSING

EXAM NO.: SL-13133-SA

TYPE OF DRILL: CME 75 - AUTOMATIC TRIP HAMMER

TYPE OF AUGER: 8 1/4-INCH HSA

BORING NUMBER: B-12

DATE DRILLED: MARCH 25, 2002

LOCATION: SEE BORING LOCATION MAP

SURFACE ELEVATION: 25 FEET (approx.)

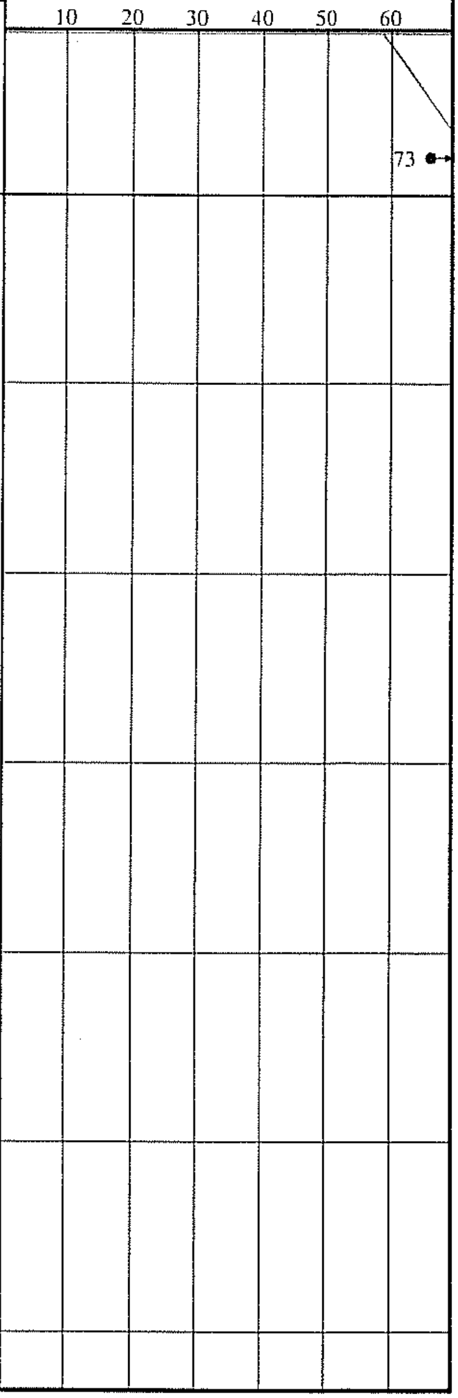
ELEVATION	DEPTH (FT.)	GRAPHIC LOG, SAMPLERS, FIELD DATA	U.S.C.S.	DESCRIPTION AND CLASSIFICATION	MOISTURE CONTENT (%)	INSITU DRY DENSITY (PCF)	% FINES (MINUS #200)	N-VALUE BLOWS/FT
		29 44		SANDSTONE; very dense, saturated, dark olive gray, fine grained				73
-15	40			BORING TERMINATED AT 40 FEET				
-20	45							
-25	50							
-30	55							
-35	60							
-40	65							
-45	70							

GRAPH OF ATTERBERG LIMITS, NATURAL MOISTURE CONTENT, AND STANDARD PENETRATION TEST

PL ├──┤ LL

▲ MOISTURE CONTENT, %

● BLOWS PER FOOT



REMARKS:
THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARIES BETWEEN SOIL TYPES AND THE ACTUAL TRANSITION MAY BE GRADUAL. PERCHED WATER WAS ENCOUNTERED NEAR 12 FEET AT TIME OF BORING.

LOG OF BORING

Earth Systems Pacific
308 North First Street - Lompoc, CA 93436

PROJECT: UCSB SAN CLEMENTE STUDENT HOUSING

EXAM NO.: SL-13133-SA

TYPE OF DRILL: CME 75 - AUTOMATIC TRIP HAMMER

TYPE OF AUGER: 8 1/4-INCH HSA

BORING NUMBER: B-13

DATE DRILLED: MARCH 19, 2002

LOCATION: SEE BORING LOCATION MAP

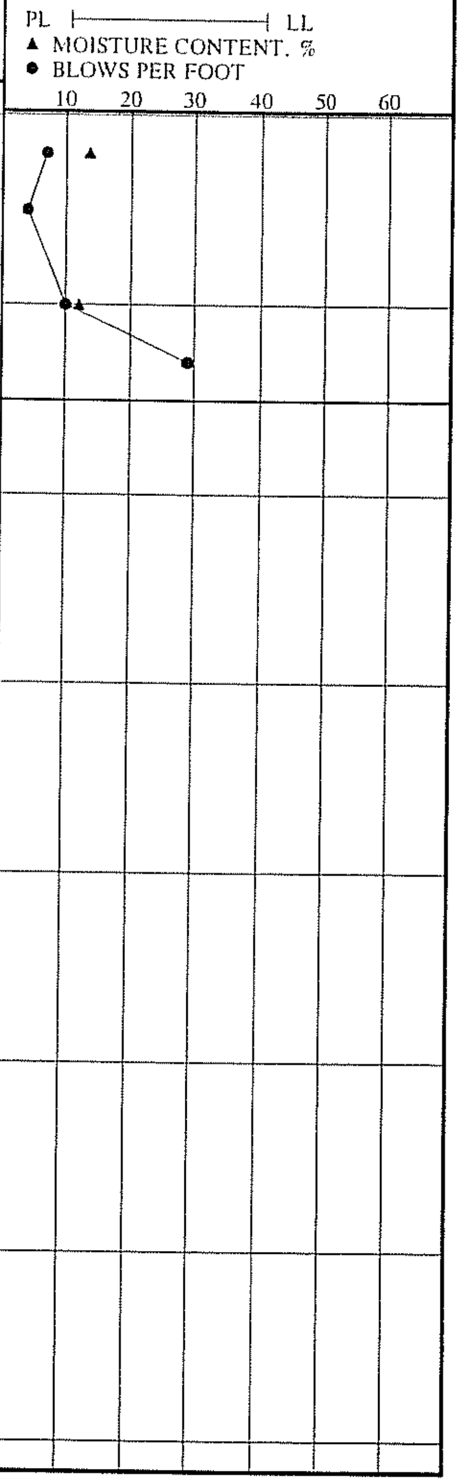
SURFACE ELEVATION: 38 FEET (approx.)

ELEVATION	DEPTH (FT.)	GRAPHIC LOG, SAMPLERS, FIELD DATA	U.S.C.S.	DESCRIPTION AND CLASSIFICATION	MOISTURE CONTENT (%)	INSITU DRY DENSITY (PCF)	% FINES (MINUS #200)	N-VALUE BLOWS/FT
	0	3 4	CH	Terrace Deposits (Qt): Sandy Fat CLAY; firm, very moist, very dark reddish brown, high plasticity	13.6	100.6		7
35		2 2	SC	Clayey SAND; loose, very moist, dark reddish brown, fine grained, high plasticity fines				4
	5	4 6	SM	Silty SAND; loose, moist, yellowish brown, fine grained	12.1	102.6		10
		13 16	SC	Clayey SAND; medium dense, moist, grayish mottled reddish brown, fine grained, medium plasticity fines				29
30			SM	Silty SAND; medium dense, moist, yellowish brown, fine grained				
				BORING TERMINATED AT 7.5 FEET				

ELEVATION: 35, 30, 25, 20, 15, 10, 5

DEPTH (FT.): 0, 5, 10, 15, 20, 25, 30, 35

GRAPH OF ATTERBERG LIMITS, NATURAL MOISTURE CONTENT, AND STANDARD PENETRATION TEST



REMARKS:
THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARIES BETWEEN SOIL TYPES AND THE ACTUAL TRANSITION MAY BE GRADUAL. NO GROUND WATER WAS ENCOUNTERED AT TIME OF BORING.

LOG OF BORING

Earth Systems Pacific
308 North First Street - Lompoc, CA 93436

PROJECT: UCSB SAN CLEMENTE STUDENT HOUSING

EXAM NO.: SL-13133-SA

TYPE OF DRILL: CME 75 - AUTOMATIC TRIP HAMMER

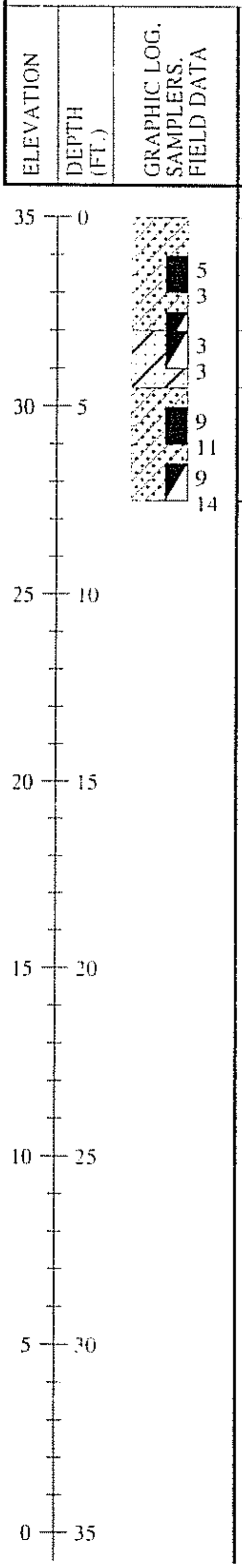
TYPE OF AUGER: 8 1/4-INCH HSA

BORING NUMBER: B-14

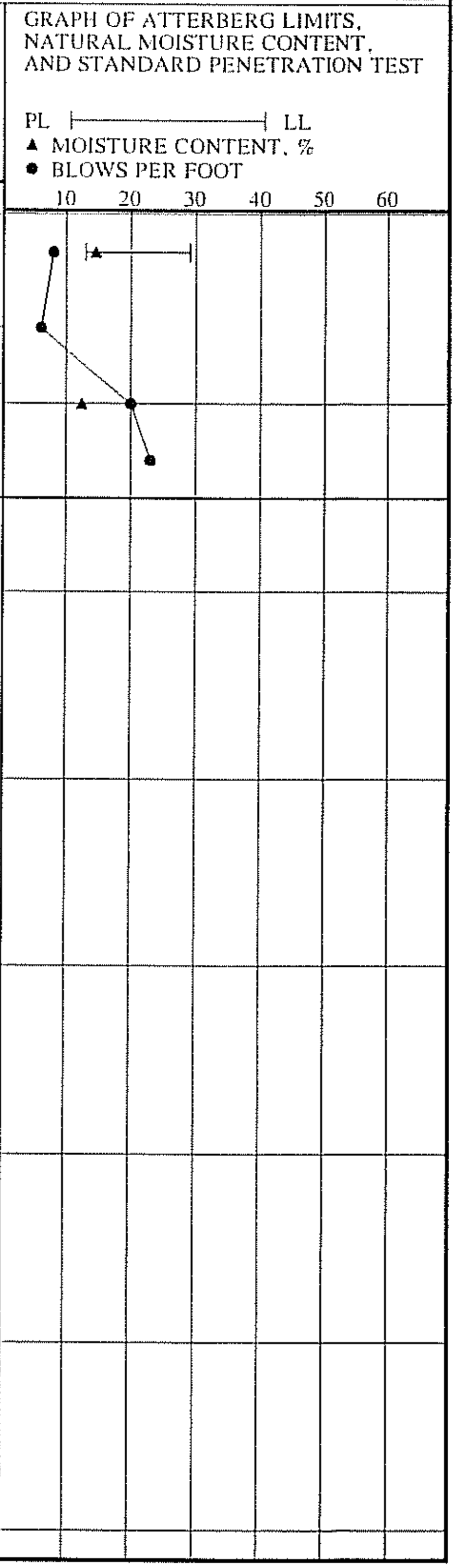
DATE DRILLED: MARCH 19, 2002

LOCATION: SEE BORING LOCATION MAP

SURFACE ELEVATION: 35 FEET (approx.)



U.S.C.S.	DESCRIPTION AND CLASSIFICATION	MOISTURE CONTENT (%)	INSITU DRY DENSITY (PCF)	% FINES (MINUS #200)	N-VALUE BLOWS/FT
CL	Terrace Deposits (Qt): Sandy Lean CLAY: firm, very moist, very dark reddish brown, low to medium plasticity	14.7	101.1	54.5	8
CH	Sandy Fat CLAY: firm, moist, dark reddish brown, high plasticity				6
CL	Sandy Lean CLAY: very stiff, moist, reddish mottled yellowish and grayish brown, medium plasticity	12.5	114.3		20 23
	BORING TERMINATED AT 7.5 FEET				



REMARKS:
THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARIES BETWEEN SOIL TYPES AND THE ACTUAL TRANSITION MAY BE GRADUAL. NO GROUND WATER WAS ENCOUNTERED AT TIME OF BORING.

LOG OF BORING

Earth Systems Pacific
308 North First Street - Lompoc, CA 93436

APPENDIX B

Laboratory Test Results

TABLE I
SUMMARY OF LABORATORY TEST RESULTS

LOCATION	DEPTH (ft.)	NATURAL MOISTURE CONTENT (%)	OPTIMUM MOISTURE CONTENT (%)	IN-PLACE DRY DENSITY (PCF)	MAXIMUM DRY DENSITY ASTM D1557-91 (PCF)	RELATIVE COMPACTION OF LABORATORY MAXIMUM DENSITY (%)	ANGLE OF INTERNAL FRICTION	COHESION (PSF)	LL/PI (ASTM D4318)	GRAVELS % OF COARSE FRACTION (PLUS Nº 4)	% FINES (MINUS Nº 200)	MATERIAL CLASSIFICATION (U.S.C.S.)
B-2	0^5-1^5	8.4		95.5								SM
B-2	5-6	10.3		93.9						0	23.1	SC
B-2	10-11	15.8		94.6								SM
B-2	16^5-17^5	25.3	13.8	93.7	108.6	86				0	31.9	SM
B-2	25-26	22.1		96.5								SM
B-3	3-4	11.2	12.9	99.2	116.7	85	35°*	74*		0	13.4	SM
B-3	7^5-8^5	21.4		93.6						0	22.8	SM
B-3	20-21	23.6		95.7								ML
B-5	1^5-2^5	22.3		84.6								CH
B-5	5-6	31.3	10.7	100.9	124.6	81	30°*	116*		0	24.7	SC
B-5	7^5-8^5								N.P.			SM
B-5	10-11	22.9		95.0			35°	429		0	7.8	SP-SM
B-5	25-26	29.1		94.8								Qsbp**
B-6	3-4	24.5	13.4	92.8	119.1	78						CH
B-6	7^5-8^5	17.3	10.0	107.3	124.2	86	28°*	415*				SC
B-6	12^5-13^5	30.1	13.8	90.6	108.6	83				0	32.9	SM
B-6	20-21	24.2		98.9			28°	855	35/15	0	84.9	Qsbp**
B-6	30-31	20.7							34/12	0	82.9	Qsbp**
B-7	1^5-2^5	11.4		65.3						0	64.6	CH
B-7	5-6	22.5		99.1								CL

**Remolded to near 91 percent relative compaction*

***Santa Barbara Formation (Qsbp) - SILTSTONE*

N.P. = Non-Plastic

PROJECT: PROPOSED SAN CLEMENTE STUDENT HOUSING
UNIVERSITY OF CALIFORNIA AT SANTA BARBARA
GOLETA, CALIFORNIA

EARTH SYSTEMS PACIFIC
PAGE No. 1 of 2
PLATE Nº 1

ESP JOB Nº SL-13133-SA

T A B L E I

SUMMARY OF LABORATORY TEST RESULTS

LOCATION	DEPTH (ft.)	NATURAL MOISTURE CONTENT (%)	OPTIMUM MOISTURE CONTENT (%)	IN-PLACE DRY DENSITY (PCF)	MAXIMUM DRY DENSITY ASTM D1557-91 (PCF)	RELATIVE COMPACTION OF LABORATORY MAXIMUM DENSITY (%)	ANGLE OF INTERNAL FRICTION	COHESION (PSF)	LL/PI (ASTM D4318)	EXPANSION INDEX (UBC 29-2)	R-VALUE (300 PSI EXUDATION)	GRAVELS % OF COARSE FRACTION (PLUS Nº 4)	% FINES (MINUS Nº 200)	MATERIAL CLASSIFICATION (U.S.C.S.)
B-7	12^5-13^5	28.0	13.8	93.1	108.6	86								SM
B-7	15-16	28.8		90.6								1	39.0	SM
B-7	25-26	20.6		104.4					31/8			0	76.7	Qsbp**
B-9	0^5-1^5	18.9	13.4	99.2	119.1	83								CH
B-9	3-4	18.3		61.4						86				CL
B-9	7^5-8^5	22.5		99.1					34/14			0	64.8	CL
B-9	12^5-13^5	21.0		103.7										SM
B-11	1^5-2^5	20.0	13.4	100.6	119.1	84				88				CH
B-11	5-6	20.3		103.3										CL
B-11	10-11	19.4		104.8					35/19			0	58.1	CL
B-11	15-16	24.9		91.5			41°	212						SM
B-11	25-26	24.4		98.5			40°	1318	50/28			0	93.1	Qsbp**
B-12	3-4	12.1	10.4	107.8	127.2	85								SC
B-12	12^5-13^5	9.2		101.1								0	10.4	SP-SM
B-12	20-21	28.5		92.7										ML
B-13	1-2	13.6		100.6										CH
B-13	5-6	12.1		102.6										SM
B-14	1-2	14.1	12.0	101.1	121.8	83			29/16				54.5	CL
B-14	5-6	12.5		114.3							13			CL

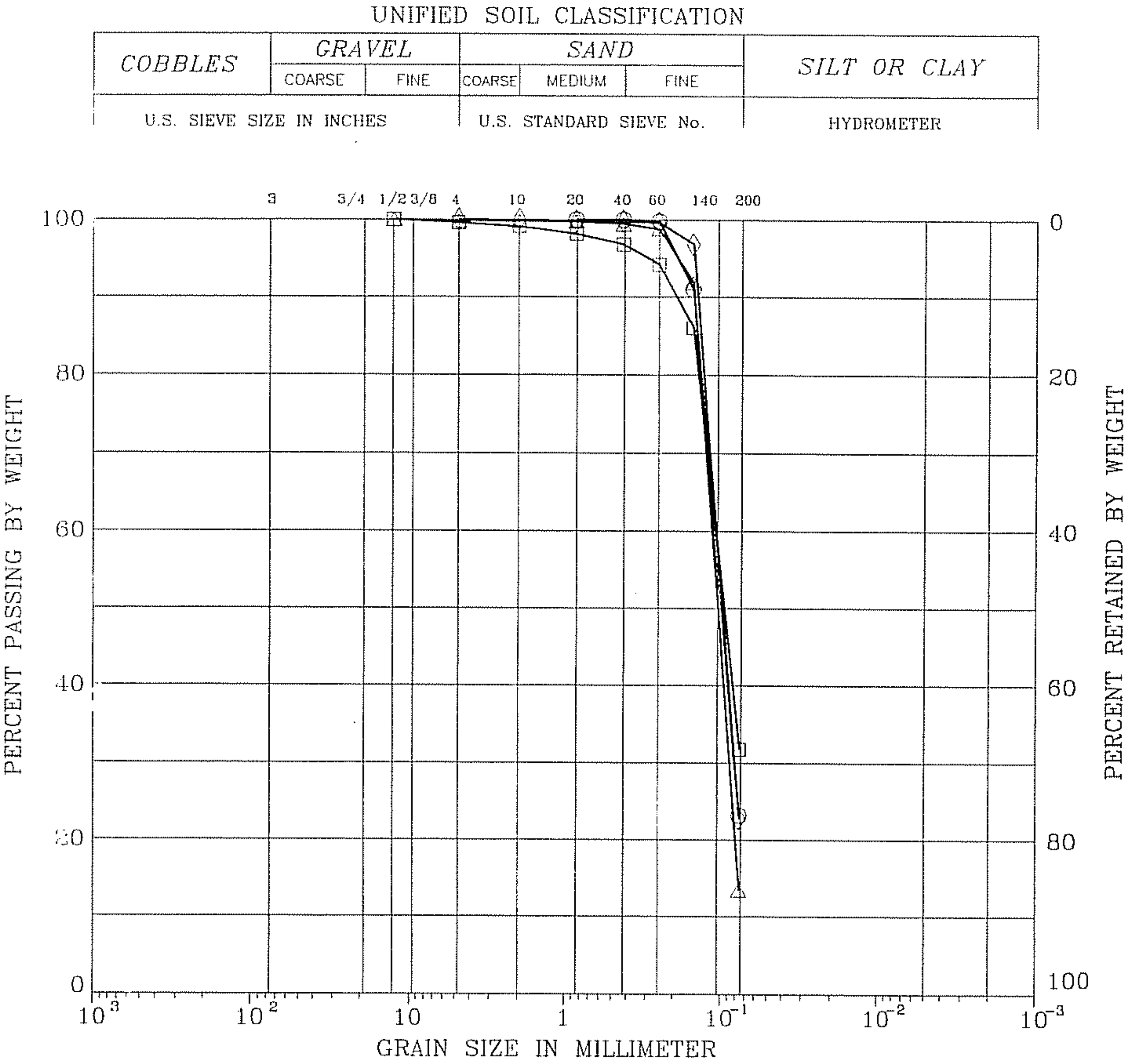
**Remolded to near 91 percent relative compaction*

***Santa Barbara Formation (Qsbp) - SILTSTONE*

PROJECT: PROPOSED SAN CLEMENTE STUDENT HOUSING
UNIVERSITY OF CALIFORNIA AT SANTA BARBARA
GOLETA, CALIFORNIA

EARTH SYSTEMS PACIFIC
PAGE No. 2 of 2
PLATE Nº 1

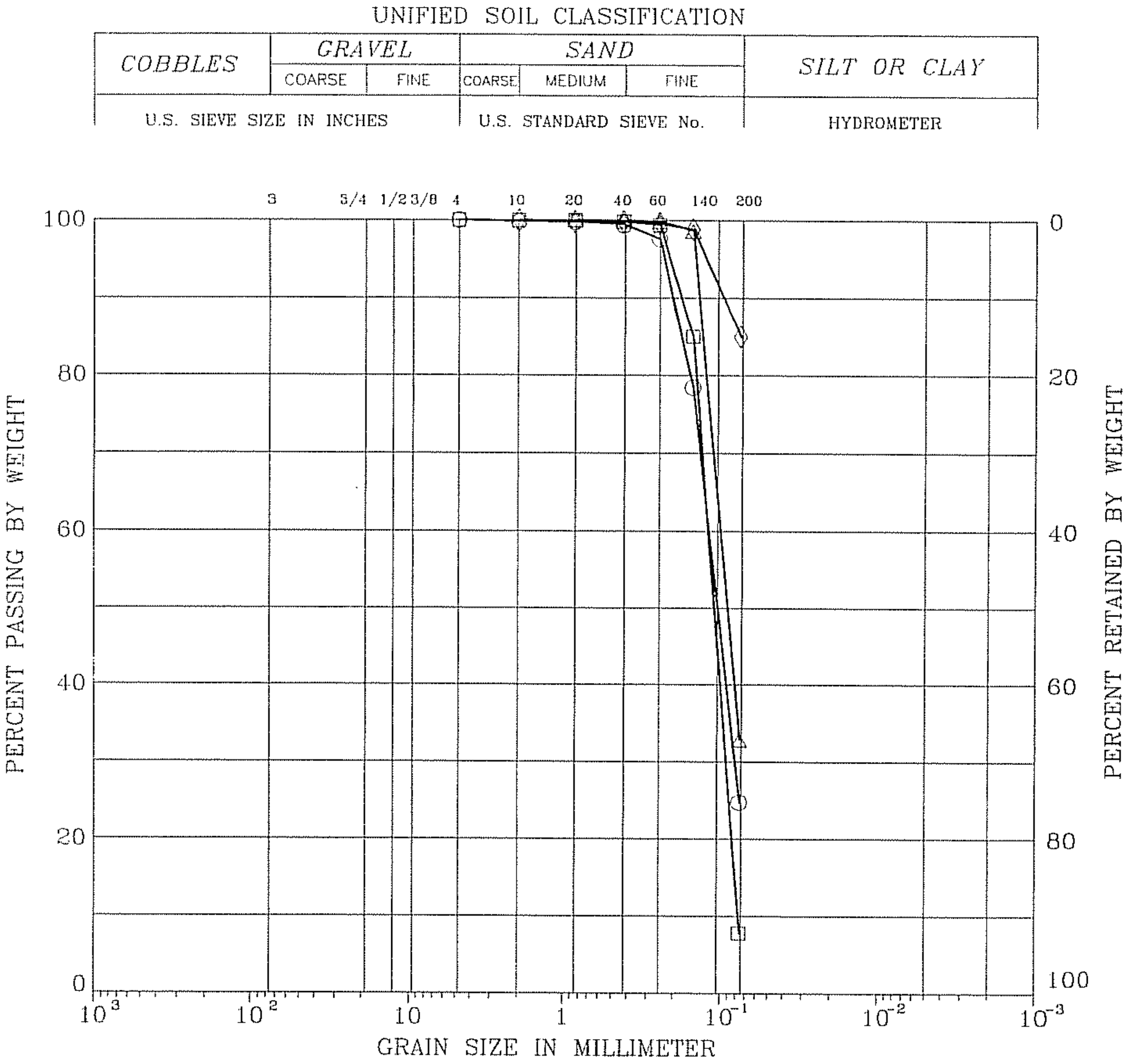
ESP JOB Nº SL-13133-SA



SYMBOL	BORING	DEPTH (ft)	LL (%)	PI (%)	DESCRIPTION
○	B-2	5-6			fine, Clayey SAND (SC)
□	B-2	16-17.5			fine, Silty SAND (SM)
△	B-3	3-4			fine, Clayey SAND (SC)
◇	B-3	7.5-8.5			fine, Silty SAND (SM)

Remark :

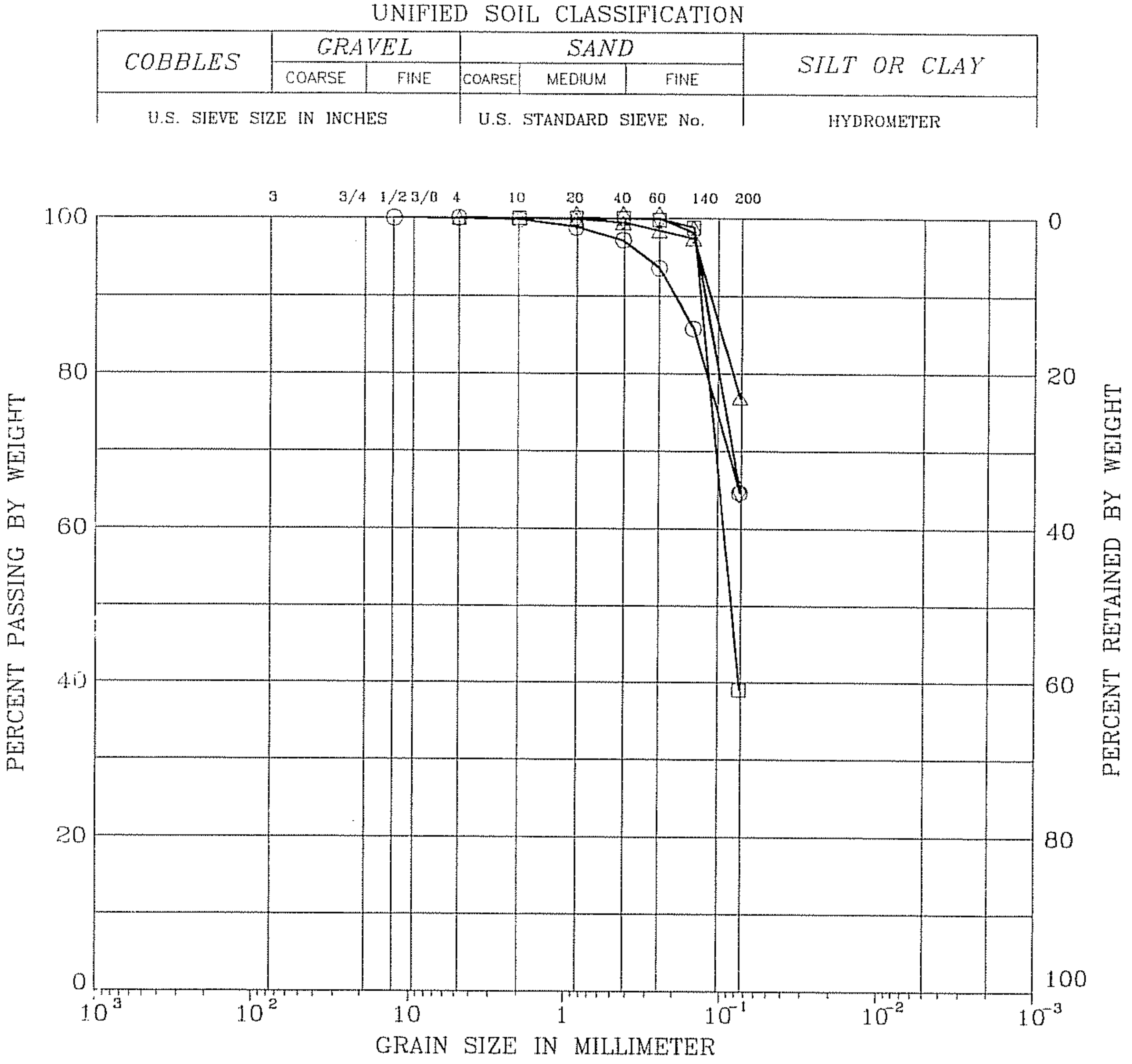
ESP No SL-13133-SA	SAN CLEMENTE APARTMENTS-UCSB
Earth Systems Pacific Lompoc, CA	GRAIN SIZE DISTRIBUTION PLATE No. 2



SYMBOL	BORING	DEPTH (ft)	LL (%)	PI (%)	DESCRIPTION
○	B-5	5-6			fine, Clayey SAND (SC)
□	B-5	10-11			fine, Poorly Graded SAND w/Silt (SP-SM)
△	B-6	12-13.5			fine, Silty SAND (SM)
◇	B-6	20-21	35	15	SILTSTONE (Qspb)

Remark :

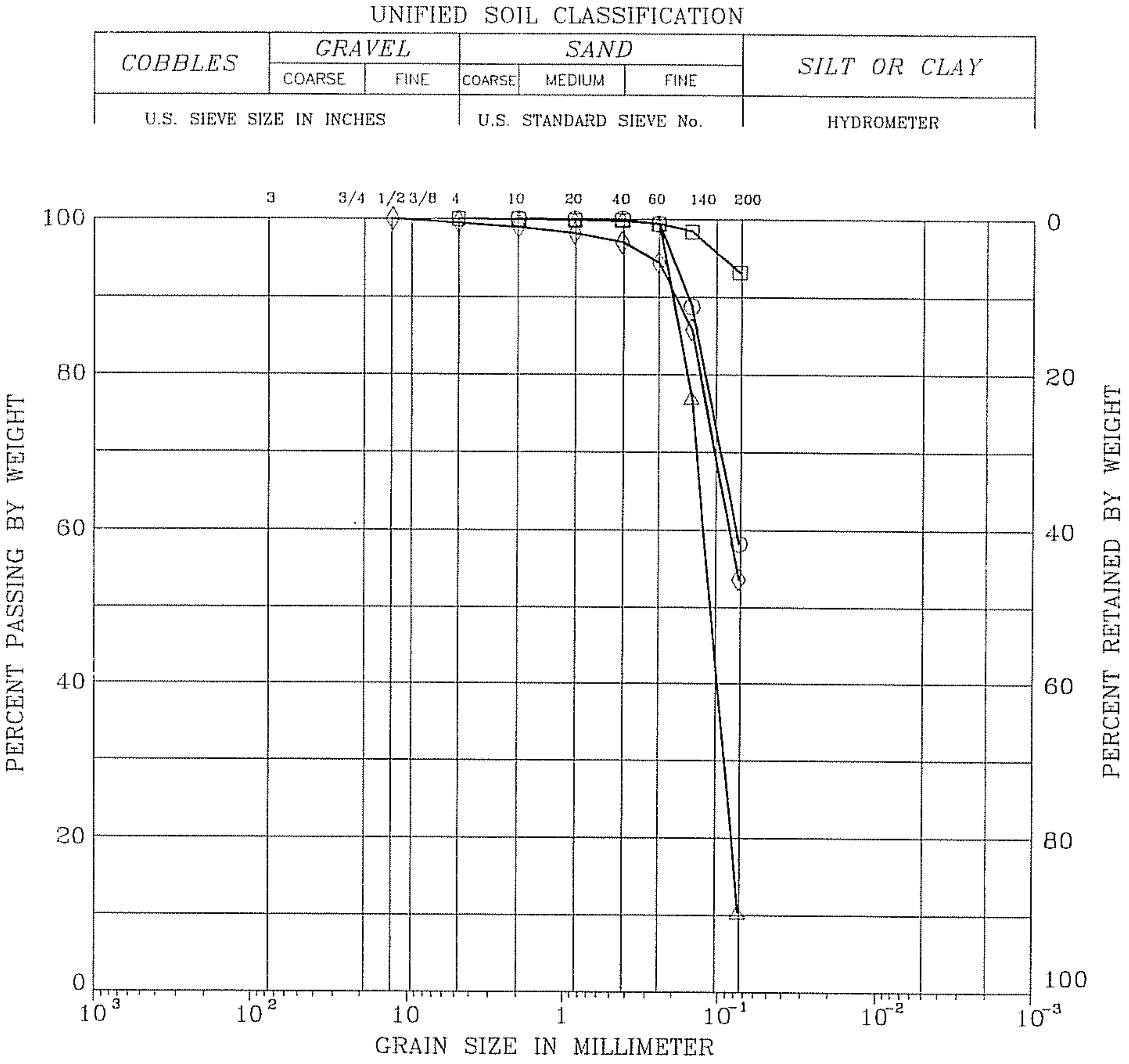
ESP No SL-13133-SA	SAN CLEMENTE APARTMENTS-UCSB
Earth Systems Pacific Lompoc, CA	GRAIN SIZE DISTRIBUTION PLATE No. 3



SYMBOL	BORING	DEPTH (ft)	LL (%)	PI (%)	DESCRIPTION
○	B-7	1.5-2.5			high plasticity, Sandy Fat CLAY (CH)
□	B-7	15-16			fine, Silty SAND (SM)
△	B-7	25-26	31	8	SILTSTONE (Qsbp)
◇	B-9	7.5-8.5	34	14	medium plasticity, Sandy Lean CLAY (CL)

Remark :

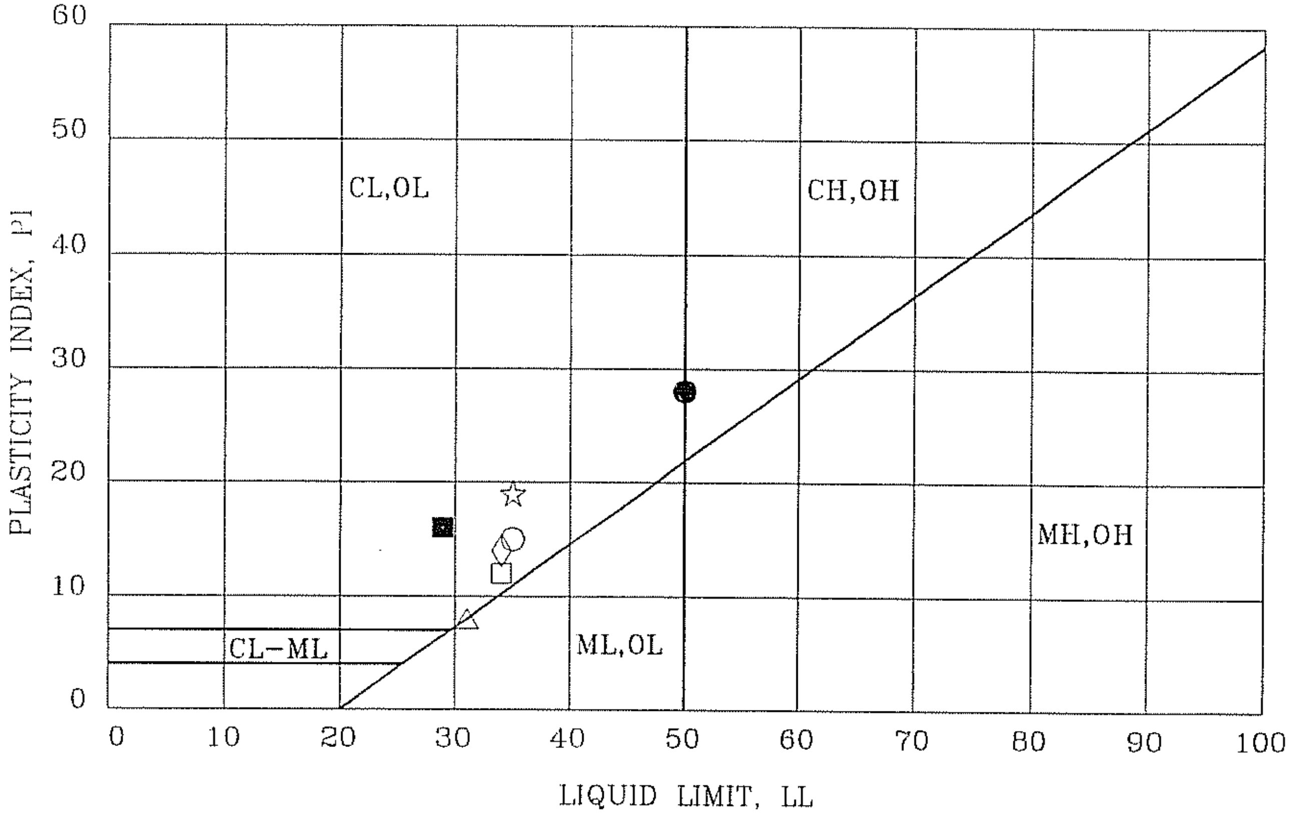
ESP No SL-13133-SA	SAN CLEMENTE APARTMENTS-UCSB
Earth Systems Pacific Lompoc, CA	GRAIN SIZE DISTRIBUTION PLATE No. 4



SYMBOL	BORING	DEPTH (ft)	LL (%)	PI (%)	DESCRIPTION
○	B-11	10-11	35	19	medium plasticity, Sandy Lean CLAY (CL)
□	B-11	25-26	50	28	CLAYSTONE (Qsbp)
△	B-12	12-13.5			fine, Poorly Graded SAND w/Silt (SP-SM)
◇	B-14	1-2	26	16	low to medium plasticity, Sandy Lean CLAY (CL)

Remark :

ESP No SL-13133-SA	SAN CLEMENTE APARTMENTS-UCSB
Earth Systems Pacific Lompoc, CA	GRAIN SIZE DISTRIBUTION PLATE No. 5



SYMBOL	BORING	DEPTH (ft)	MC (%)	LL (%)	PL (%)	PI (%)	LI (–)	DESCRIPTION
○	B–6	20–21	24.2	35	20	15	.29	SILTSTONE (Qsbp)
□	B–6	30–31	20.7	34	22	12	–.12	SILTSTONE (Qsbp)
△	B–7	25–26	20.6	31	23	8	–.24	SILTSTONE (Qsbp)
◇	B–9	7.5–8.5	20.2	34	20	14	–.01	med.plastic, Sandy Lean CLAY(CL)
☆	B–11	10–11	19.4	35	16	19	.19	med.plastic, Sandy Lean CLAY(CL)
●	B–11	25–26	24.4	50	22	28	.08	CLAYSTONE (Qsbp)
■	B–14	1–2	14.7	29	13	16	.09	Sandy Lean CLAY (CL)

Remark :

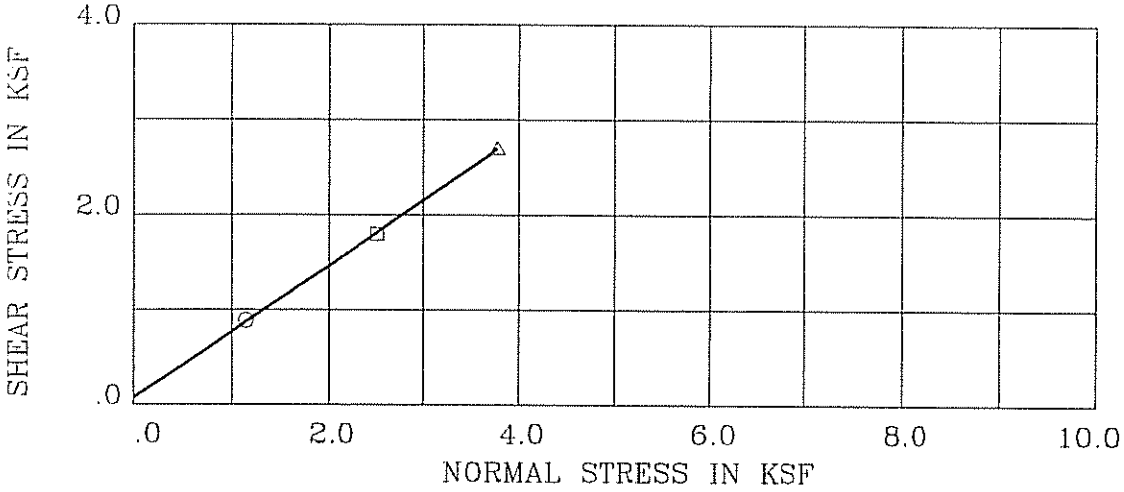
ESP No SL–13133–SA

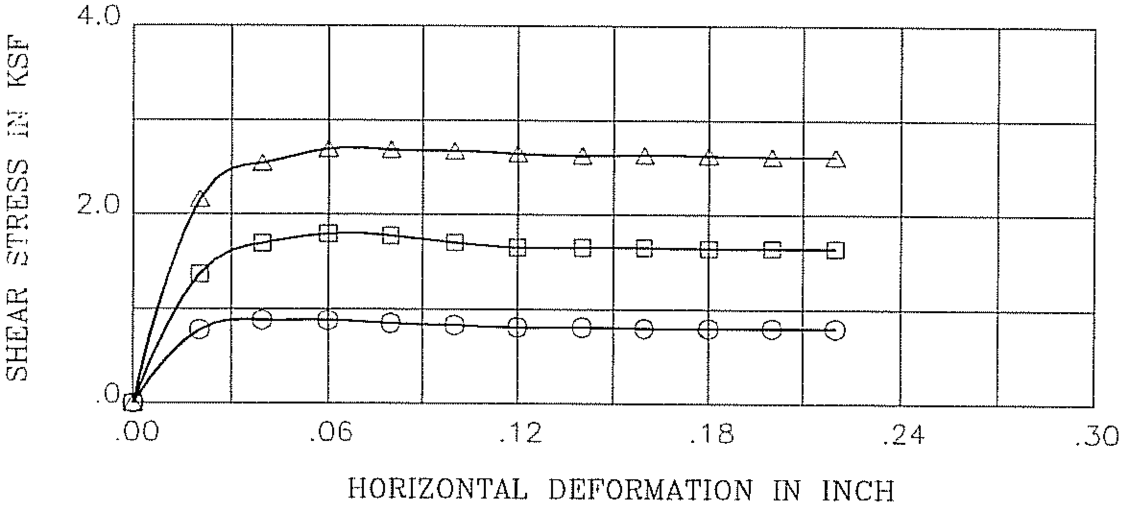
SAN CLEMENTE APARTMENTS–UCSB

Earth Systems
Pacific
Lompoc, CA

PLASTICITY CHART

PLATE No. 6





BORING/SAMPLE : B-3 DEPTH (ft) : 3-4

DESCRIPTION : fine, Clayey SAND (SC)

STRENGTH INTERCEPT (C) : .074 KSF

FRICTION ANGLE (PHI) : 34.8 DEG

(PEAK STRENGTH)

SYMBOL	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	VOID RATIO	NORMAL STRESS (ksf)	PEAK SHEAR (ksf)	RESIDUAL SHEAR (ksf)
○	12.8	106.1	.588	1.16	.89	.80
□	12.6	106.9	.575	2.51	1.80	1.64
△	13.3	106.2	.587	3.78	2.71	2.61

Remark : Remolded to near 91 percent relative compaction.

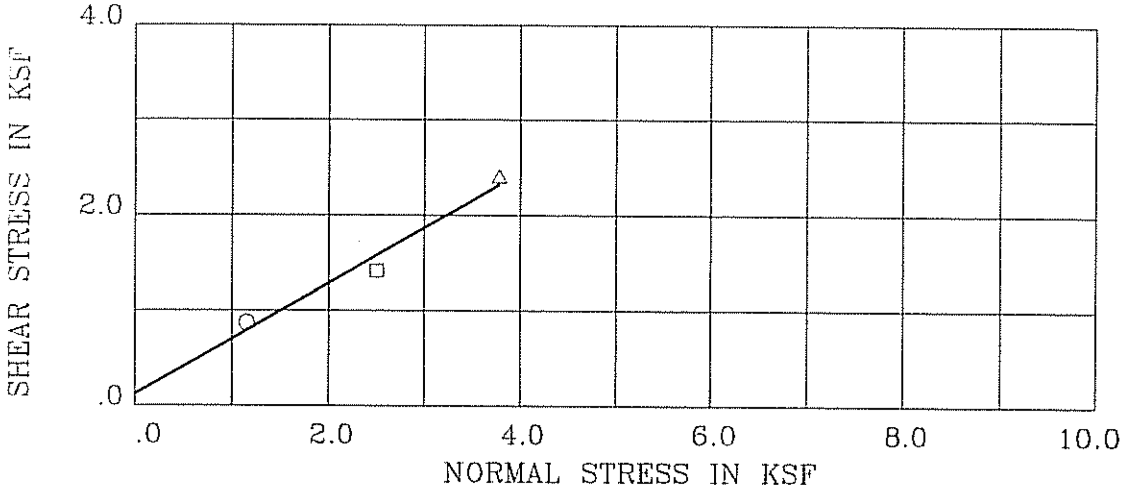
ESP No SL-13133-SA

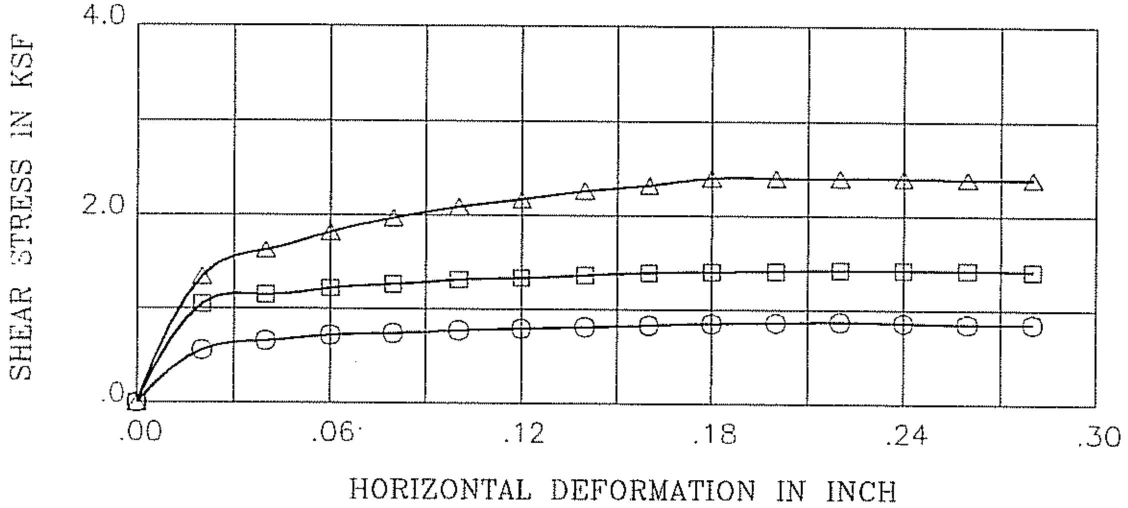
SAN CLEMENTE APARTMENTS-UCSB

Earth Systems
Pacific
Lompoc, CA

DIRECT SHEAR TEST

PLATE No. 7





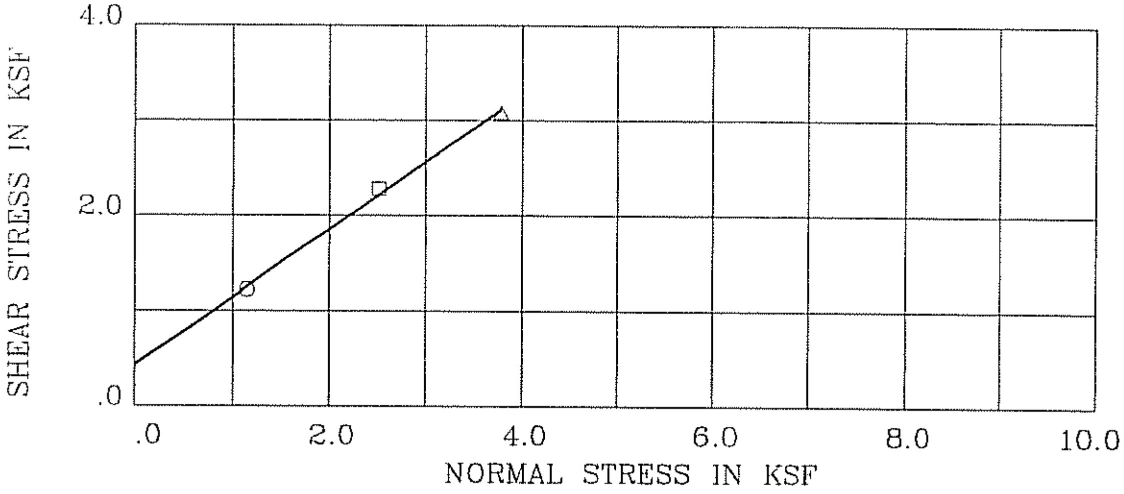
BORING/SAMPLE : B-5 DEPTH (ft) : 5-6
DESCRIPTION : fine, Clayey SAND (SC)
STRENGTH INTERCEPT (C) : .116 KSF
FRICTION ANGLE (PHI) : 30.3 DEG

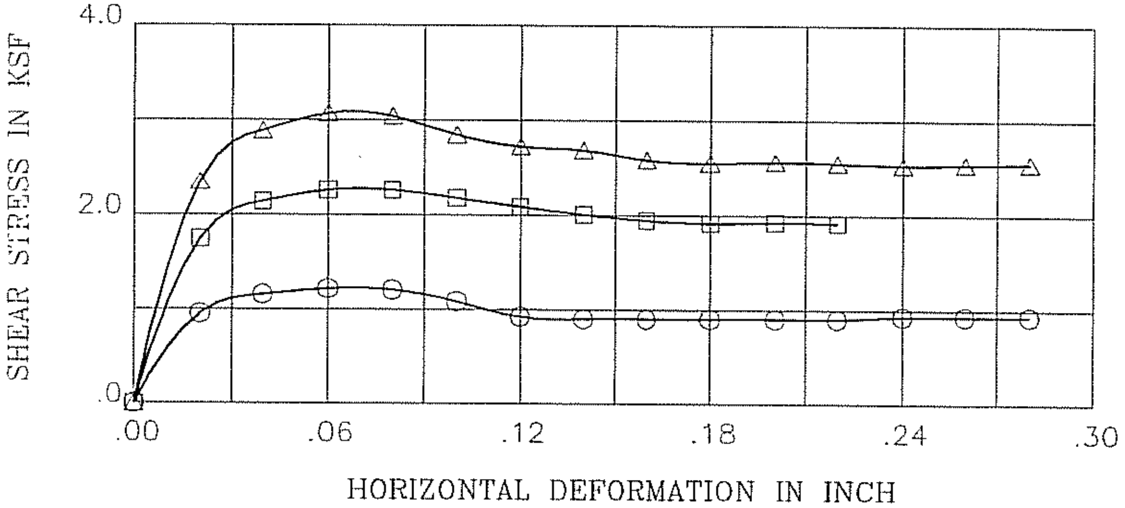
(PEAK STRENGTH)

SYMBOL	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	VOID RATIO	NORMAL STRESS (ksf)	PEAK SHEAR (ksf)	RESIDUAL SHEAR (ksf)
○	12.8	111.7	.508	1.16	.87	.85
□	12.7	111.7	.508	2.51	1.42	1.41
△	12.4	111.6	.510	3.78	2.41	2.39

Remark : Remolded to near 90 percent relative compaction.

ESF No SL-13133-SA	SAN CLEMENTE APARTMENTS-UCSB
Earth Systems Pacific Lompoc, CA	DIRECT SHEAR TEST PLATE No. 8





BORING/SAMPLE : B-5 DEPTH (ft) : 10-11

DESCRIPTION : fine, Poorly Graded SAND w/Silt (SP-SM)

STRENGTH INTERCEPT (C) : .429 KSF

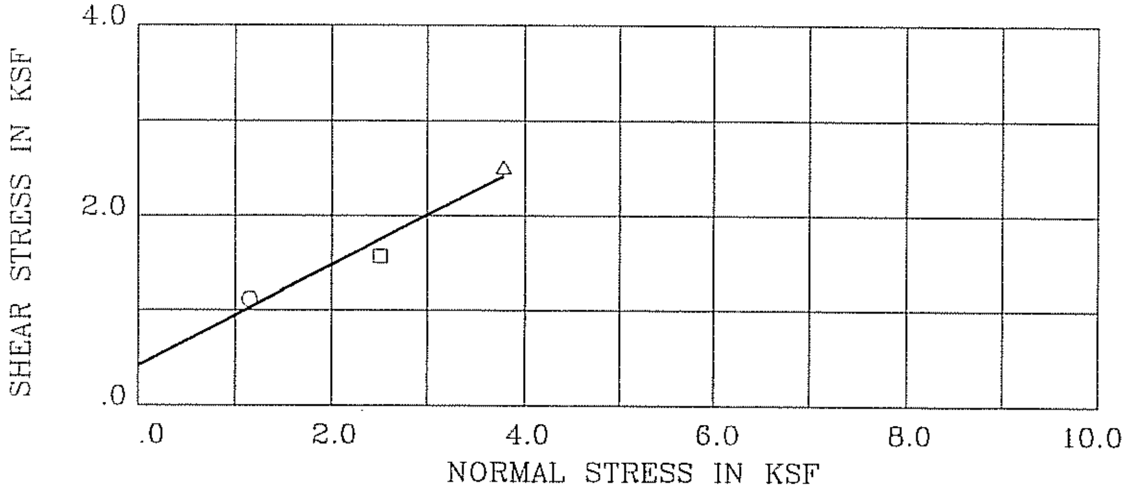
FRICTION ANGLE (PHI) : 35.4 DEG

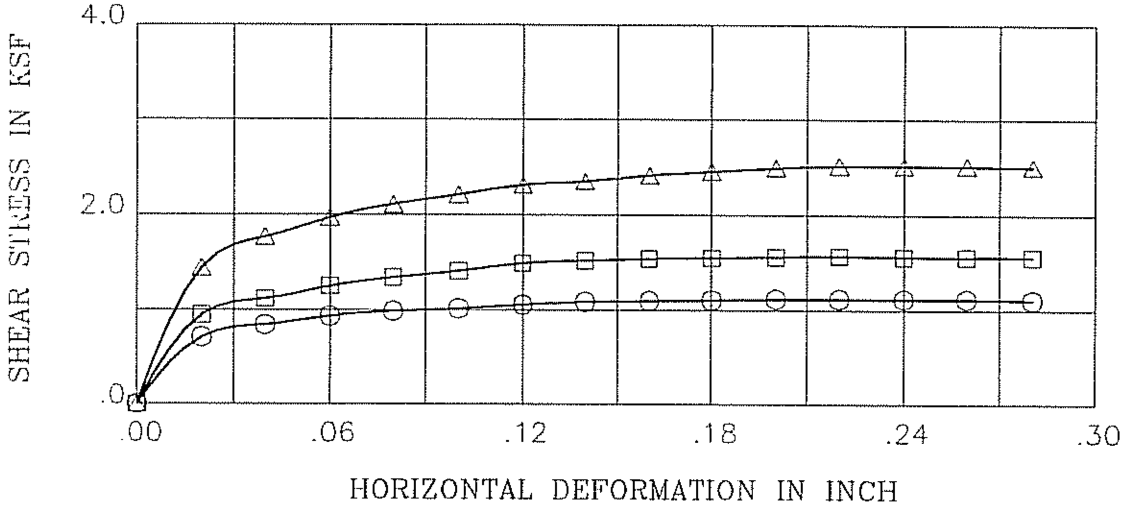
(PEAK STRENGTH)

SYMBOL	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	VOID RATIO	NORMAL STRESS (ksf)	PEAK SHEAR (ksf)	RESIDUAL SHEAR (ksf)
○	25.0	92.6	.819	1.16	1.22	.90
□	25.1	95.1	.772	2.51	2.27	1.91
△	25.1	91.9	.834	3.78	3.08	2.53

Remark : Relatively Undisturbed Sample. C-U Method.

ESP No SL-13133-SA	SAN CLEMENTE APARTMENTS-UCSB
Earth Systems Pacific Lompoc, CA	DIRECT SHEAR TEST PLATE No. 9



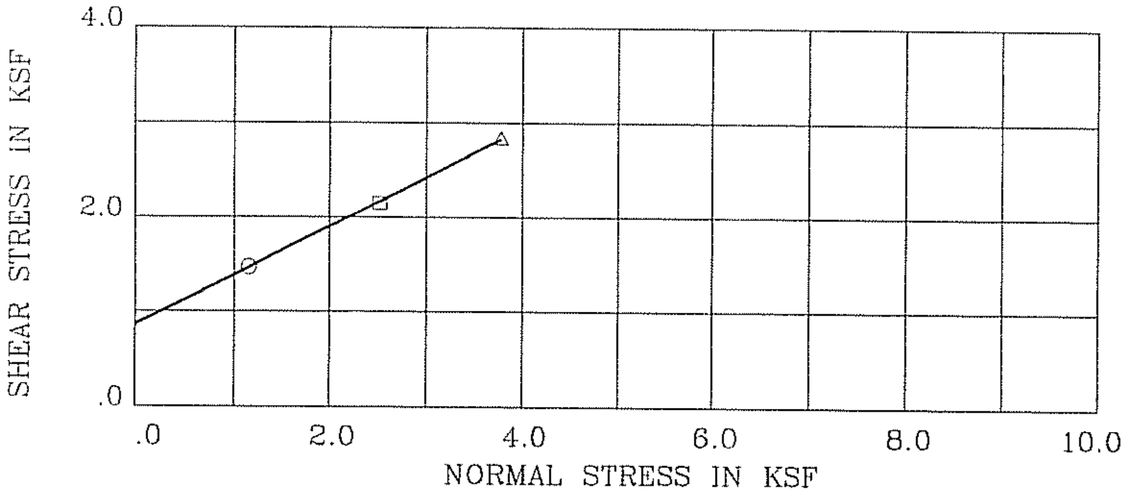


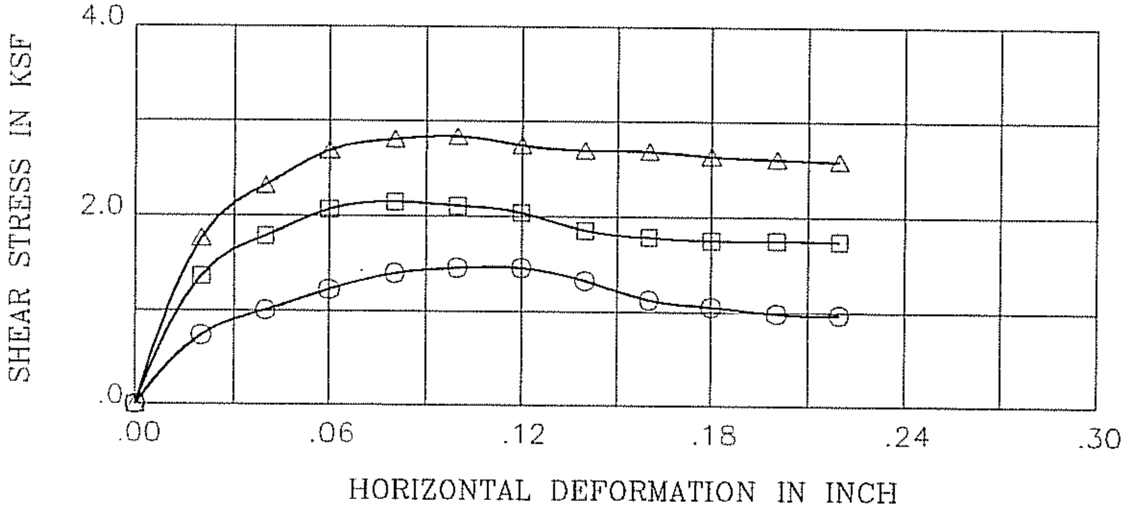
BORING/SAMPLE : B-6 DEPTH (ft) : 7.5-8.5
DESCRIPTION : fine, Clayey SAND (SC)
STRENGTH INTERCEPT (C) : .415 KSF
FRICTION ANGLE (PHI) : 28.0 DEG
(PEAK STRENGTH)

SYMBOL	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	VOID RATIO	NORMAL STRESS (ksf)	PEAK SHEAR (ksf)	RESIDUAL SHEAR (ksf)
○	9.9	113.6	.483	1.16	1.11	1.10
□	12.2	111.4	.512	2.51	1.57	1.56
△	10.9	112.5	.498	3.78	2.51	2.50

Remark : Remolded to near 91 percent relative compaction.

ESP No SL-13133-SA	SAN CLEMENTE APARTMENTS-UCSB
Earth Systems Pacific Lompoc, CA	DIRECT SHEAR TEST PLATE No. 10





BORING/SAMPLE : B-6 DEPTH (ft) : 20-21
DESCRIPTION : SILTSTONE (Qsbp)
STRENGTH INTERCEPT (C) : .855 KSF
FRICTION ANGLE (PHI) : 27.6 DEG (PEAK STRENGTH)

SYMBOL	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	VOID RATIO	NORMAL STRESS (ksf)	PEAK SHEAR (ksf)	RESIDUAL SHEAR (ksf)
○	24.0	97.0	.737	1.16	1.47	.97
□	24.3	98.4	.713	2.51	2.15	1.74
△	24.8	98.5	.710	3.78	2.84	2.58

Remark : Relatively Undisturbed Sample. C-U Method.

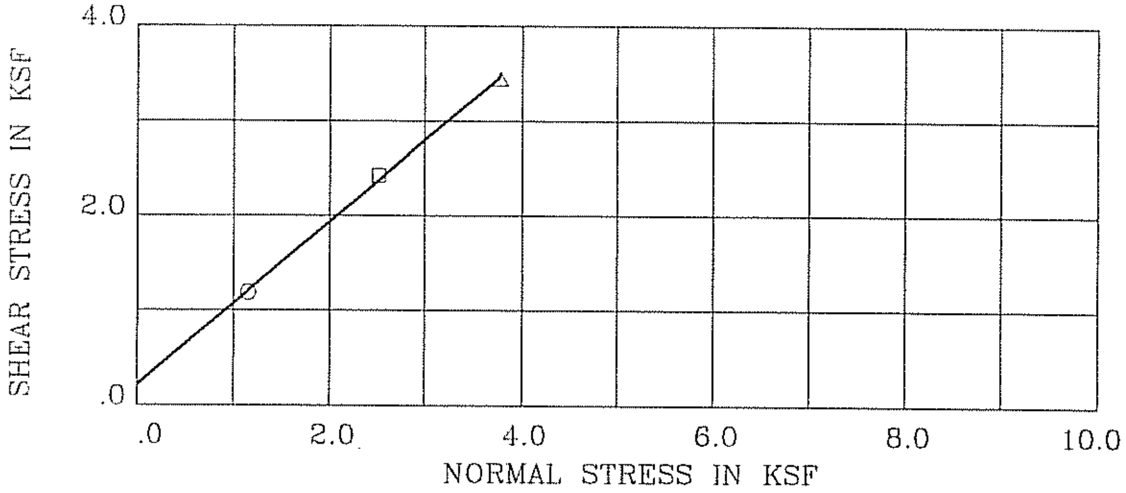
ESP No SL-13133-SA

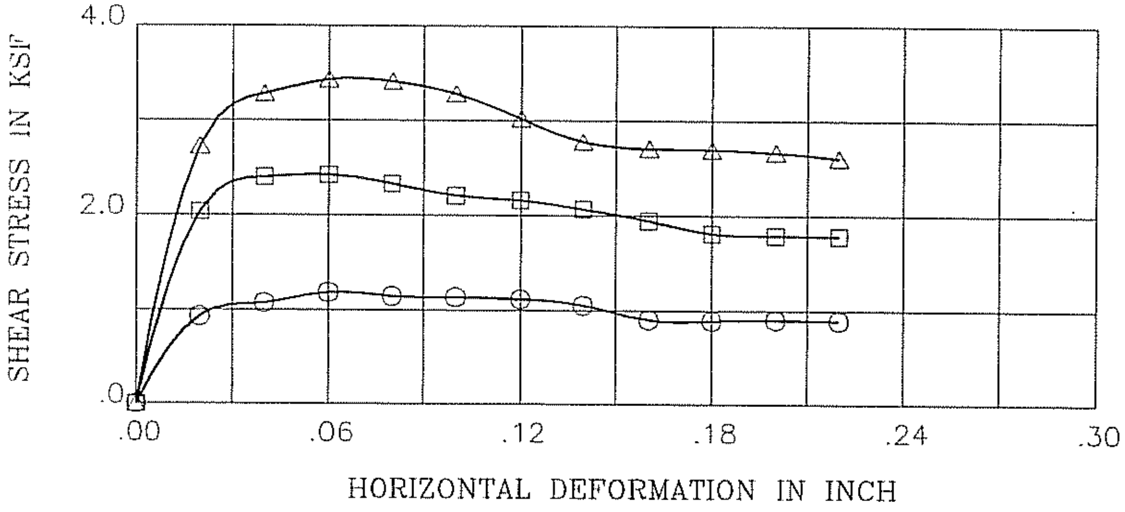
SAN CLEMENTE APARTMENTS-UCSB

Earth Systems
Pacific
Lompoc, CA

DIRECT SHEAR TEST

PLATE No. 11



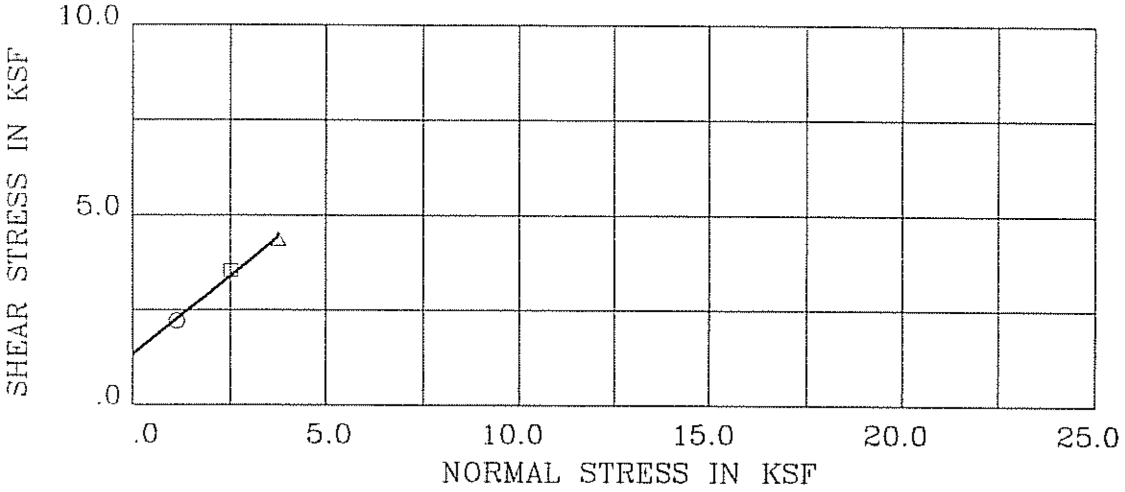


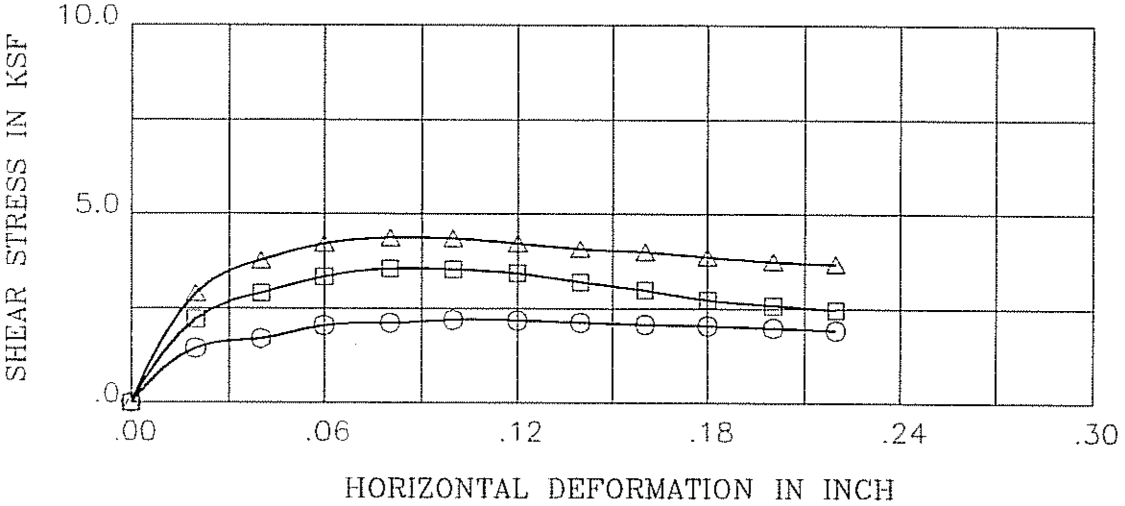
BORING/SAMPLE : B-11 DEPTH (ft) : 15-16
DESCRIPTION : fine, Silty SAND (SM)
STRENGTH INTERCEPT (C) : .212 KSF
FRICTION ANGLE (PHI) : 40.7 DEG
(PEAK STRENGTH)

SYMBOL	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	VOID RATIO	NORMAL STRESS (ksf)	PEAK SHEAR (ksf)	RESIDUAL SHEAR (ksf)
○	24.7	95.2	.771	1.16	1.19	.88
□	20.2	96.7	.743	2.51	2.42	1.78
△	21.5	96.5	.746	3.78	3.44	2.60

Remark : Relatively Undisturbed Sample. C-U Method.

ESP No SL-13133-SA	SAN CLEMENTE APARTMENTS-UCSB
Earth Systems Pacific Lompoc, CA	DIRECT SHEAR TEST PLATE No. 12





BORING/SAMPLE : B-11 DEPTH (ft) : 25-26
DESCRIPTION : CLAYSTONE (Qsbp)
STRENGTH INTERCEPT (C) : 1.317 KSF
FRICTION ANGLE (PHI) : 39.7 DEG
(PEAK STRENGTH)

SYMBOL	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	VOID RATIO	NORMAL STRESS (ksf)	PEAK SHEAR (ksf)	RESIDUAL SHEAR (ksf)
○	24.2	97.6	.726	1.16	2.20	1.92
□	26.0	95.9	.757	2.51	3.55	2.46
△	24.7	95.7	.760	3.78	4.37	3.67

Remark : Relatively Undisturbed Sample. C-U Method.

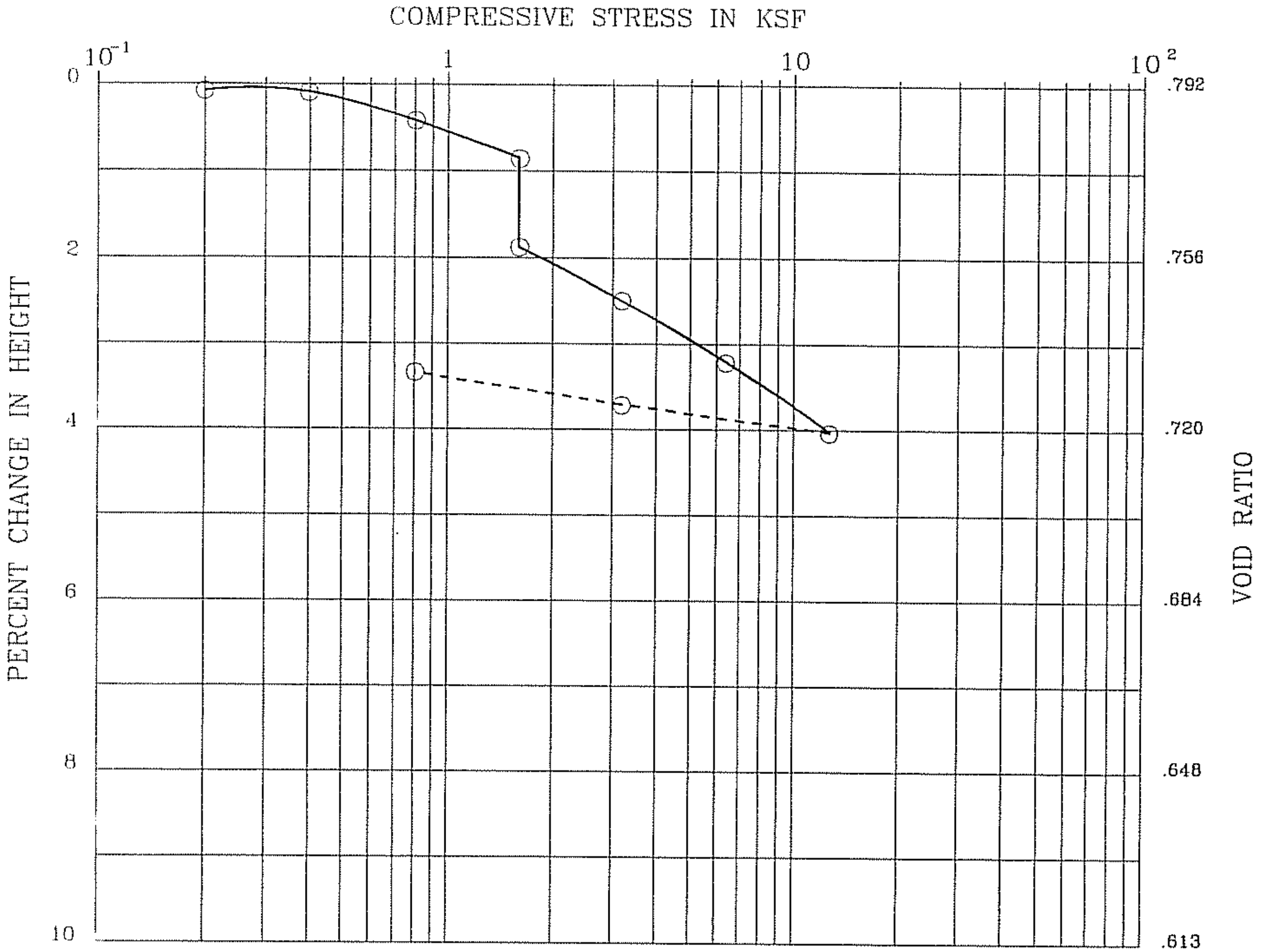
ESP No SL-13133-SA

SAN CLEMENTE APARTMENTS-UCSB

Earth Systems
Pacific
Lompoc, CA

DIRECT SHEAR TEST

PLATE No. 13



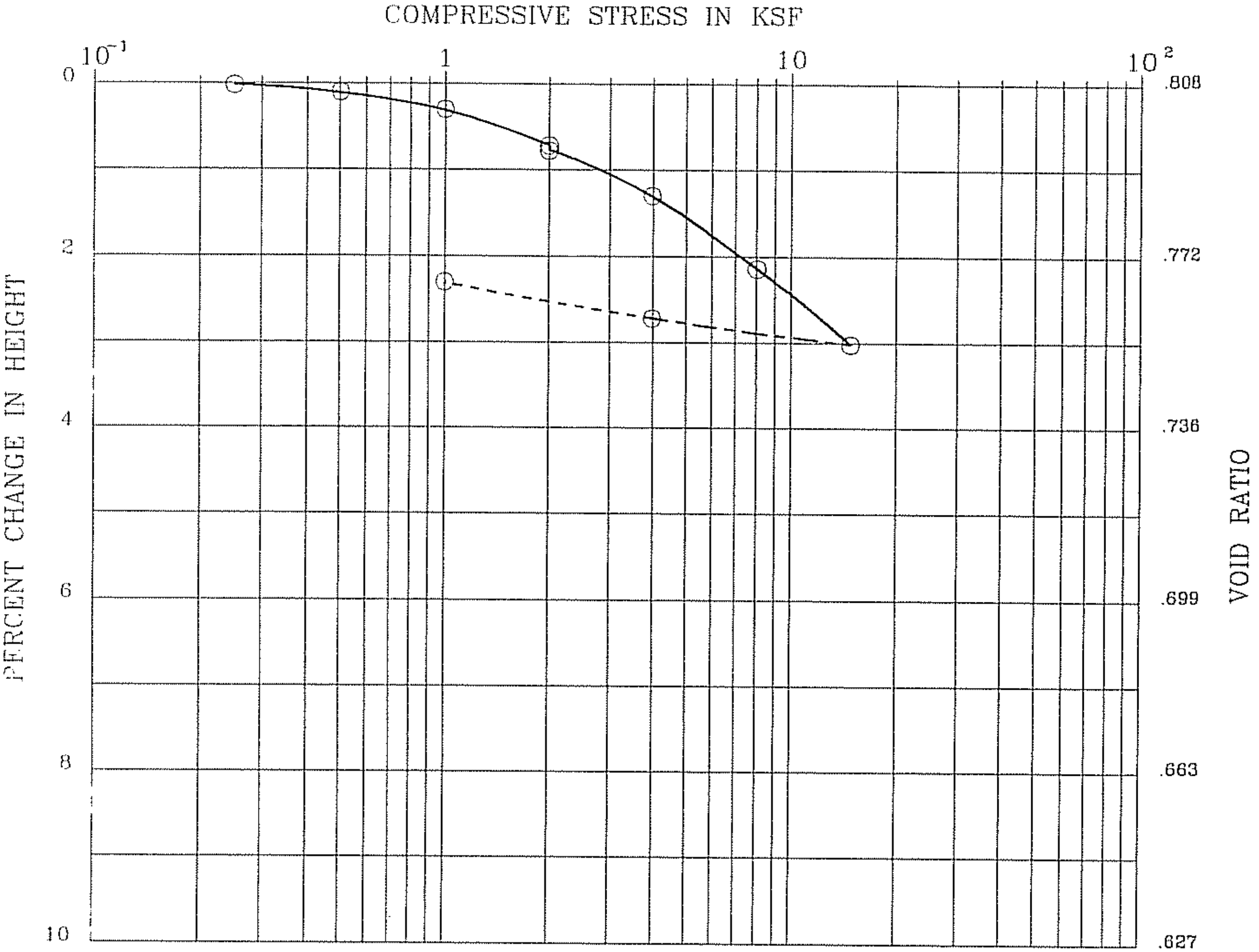
BORING : B-2
DEPTH (ft) : 5-6
SPEC. GRAVITY : 2.70

DESCRIPTION : fine, Clayey SAND (SC)
LIQUID LIMIT :
PLASTIC LIMIT :

	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	PERCENT SATURATION	VOID RATIO
INITIAL	10.3	94.1	35	.792
FINAL	19.7	97.4	73	.733

Remark : Relatively Undisturbed Sample. Inundated at 1.6 ksf.

ESP No SL-13133-SA	SAN CLEMENTE APARTMENTS-UCSB
Earth Systems Pacific Lompoc, CA	CONSOLIDATION TEST PLATE No. 14



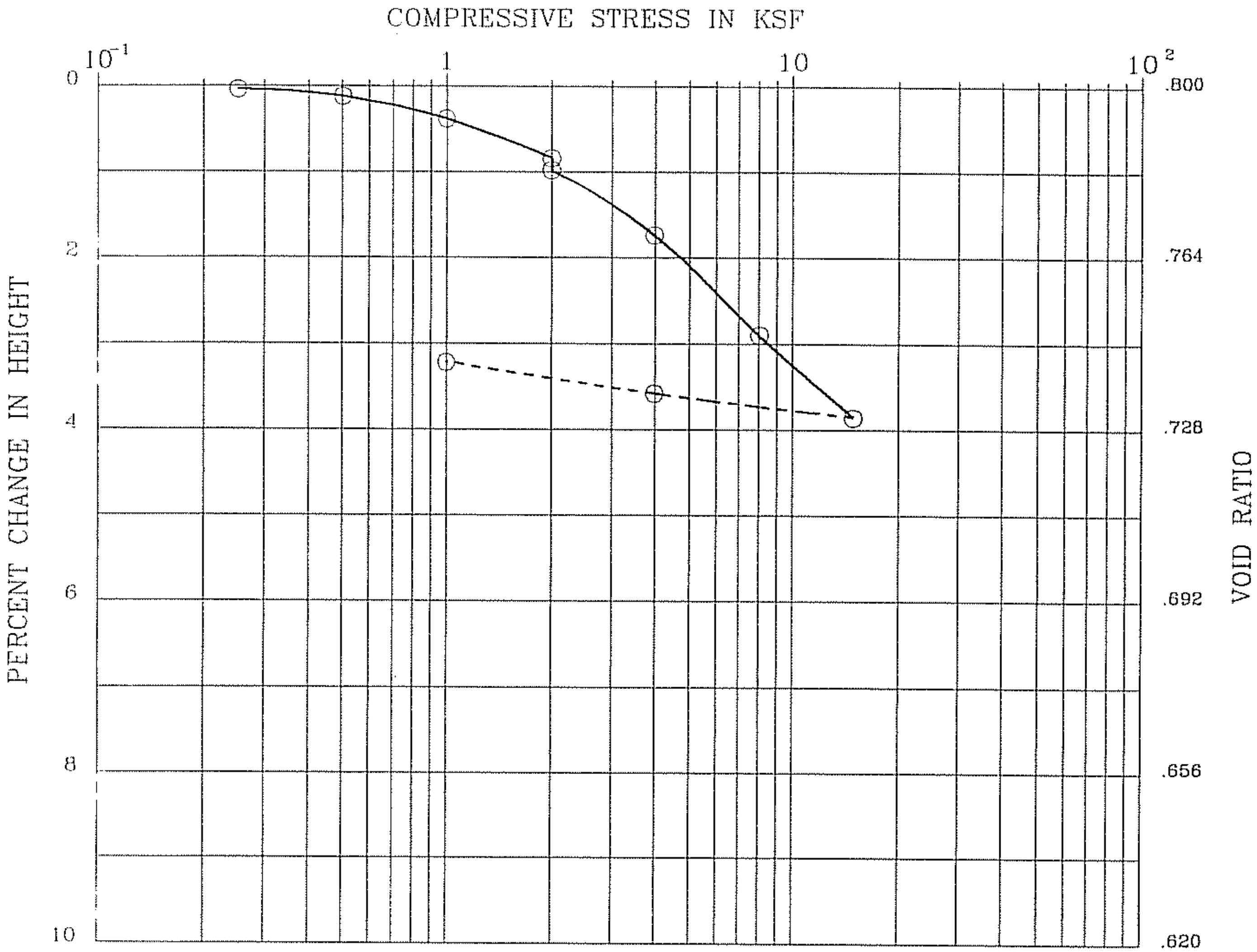
BORING : B-2
DEPTH (ft) : 16.5-17.5
SPEC. GRAVITY : 2.70

DESCRIPTION : fine, Silty SAND (SM)
LIQUID LIMIT :
PLASTIC LIMIT :

	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	PERCENT SATURATION	VOID RATIO
INITIAL	25.5	93.3	85	.808
FINAL	26.8	95.5	95	.766

Remark : Relatively Undisturbed Sample. Inundated at 2.0 ksf.

ESP No SL-13133-SA	SAN CLEMENTE APARTMENTS-UCSB
Earth Systems Pacific Lompoc, CA	CONSOLIDATION TEST PLATE No. 15



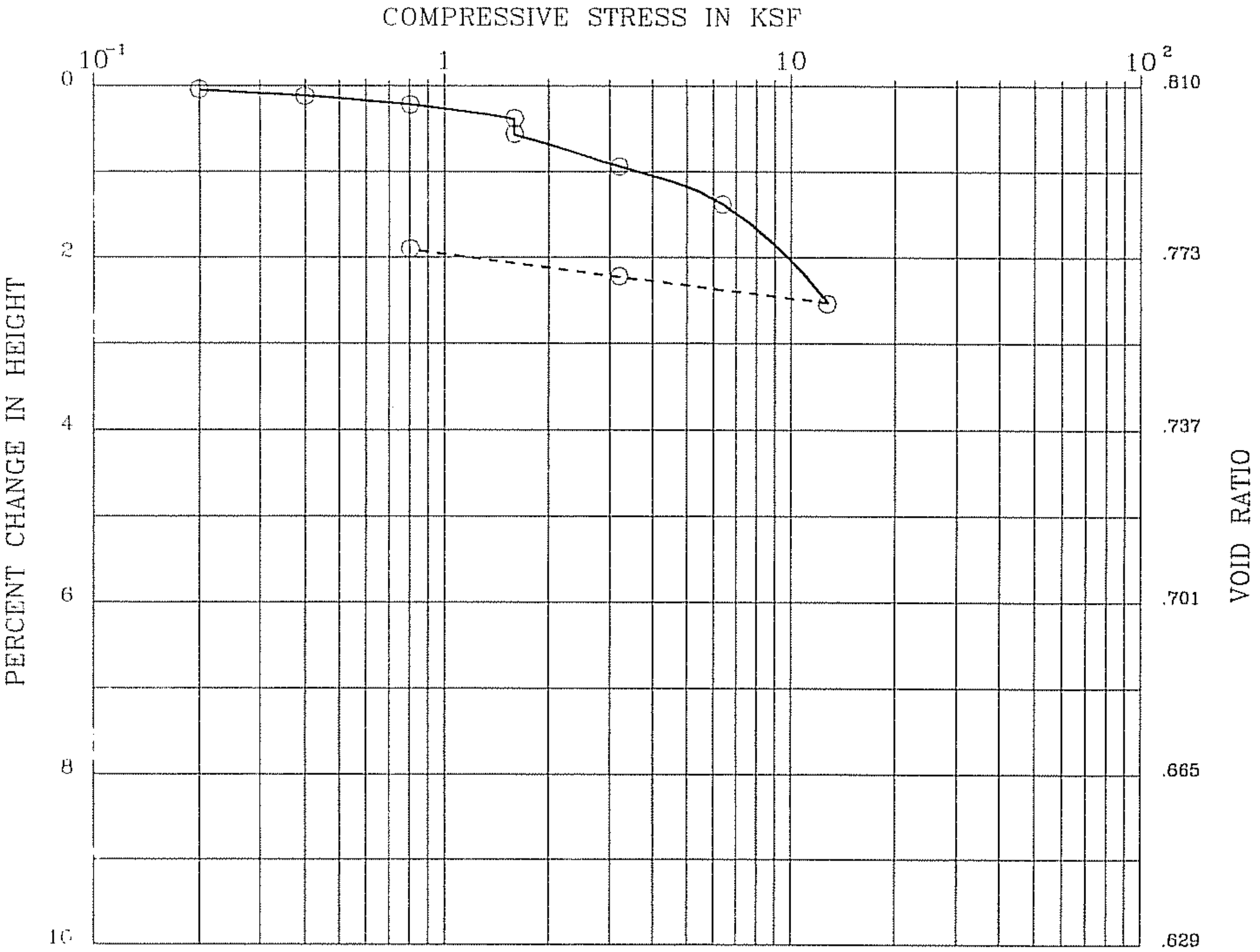
BORING : B-3
DEPTH (ft) : 7.5-8.5
SPEC. GRAVITY : 2.70

DESCRIPTION : fine, Silty SAND (SM)
LIQUID LIMIT :
PLASTIC LIMIT :

	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	PERCENT SATURATION	VOID RATIO
INITIAL	21.7	93.7	74	.800
FINAL	22.6	96.8	82	.742

Remark : Relatively Undisturbed Sample. Inundated at 2.0 ksf.

ESP No SL-13133-SA	SAN CLEMENTE APARTMENTS-UCSB
Earth Systems Pacific Lompoc, CA	CONSOLIDATION TEST PLATE No. 16



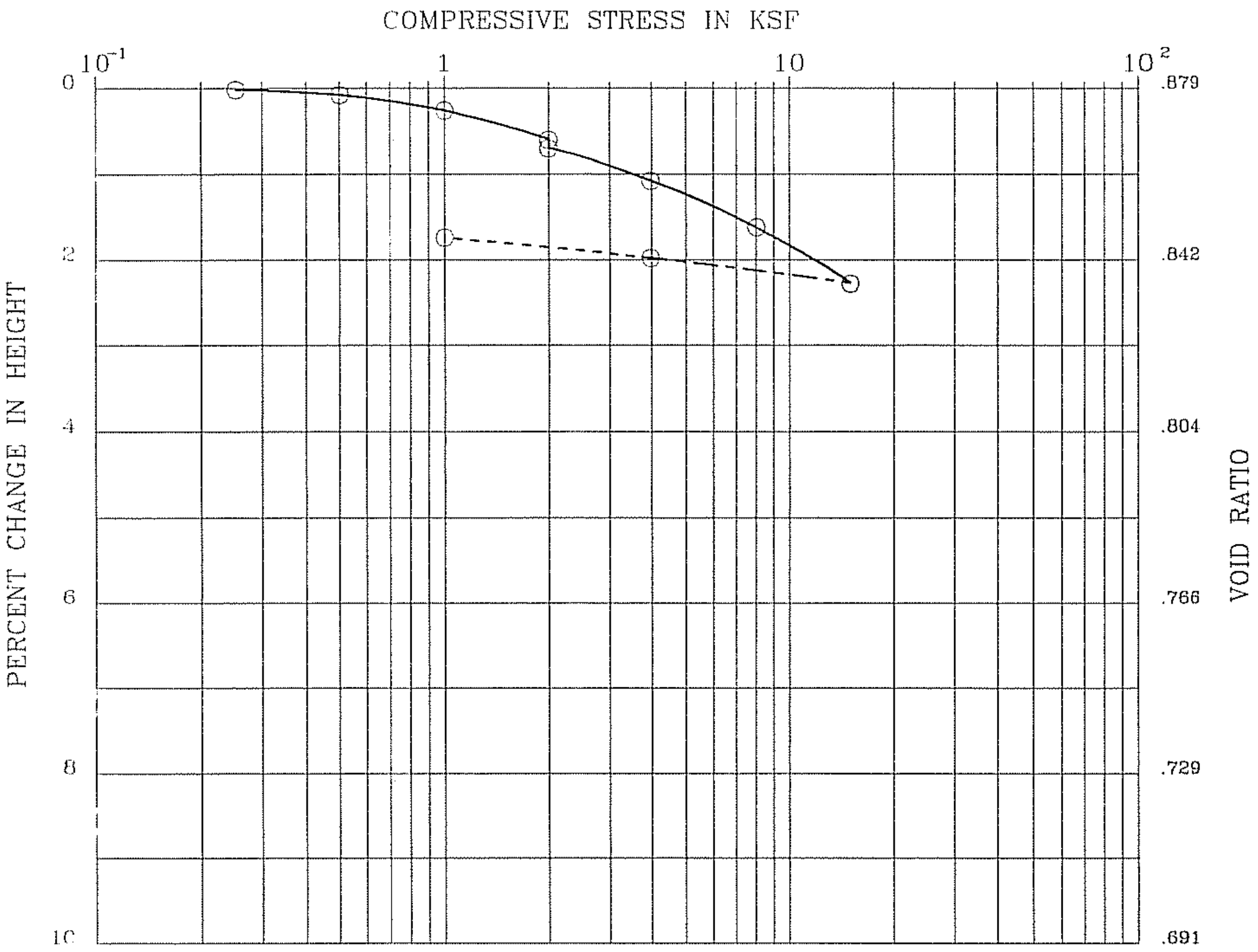
BORING : B-5
DEPTH (ft) : 10-11
SPEC. GRAVITY : 2.70

DESCRIPTION : Poorly Graded SAND w/Silt(SP-SM)
LIQUID LIMIT :
PLASTIC LIMIT :

	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	PERCENT SATURATION	VOID RATIO
INITIAL	26.4	93.2	88	.810
FINAL	27.5	95.0	96	.775

Remark : Relatively Undisturbed Sample. Inundated at 1.6 ksf.

ESP No SL-13133-SA	SAN CLEMENTE APARTMENTS-UCSB
Earth Systems Pacific Lompoc, CA	CONSOLIDATION TEST PLATE No. 17



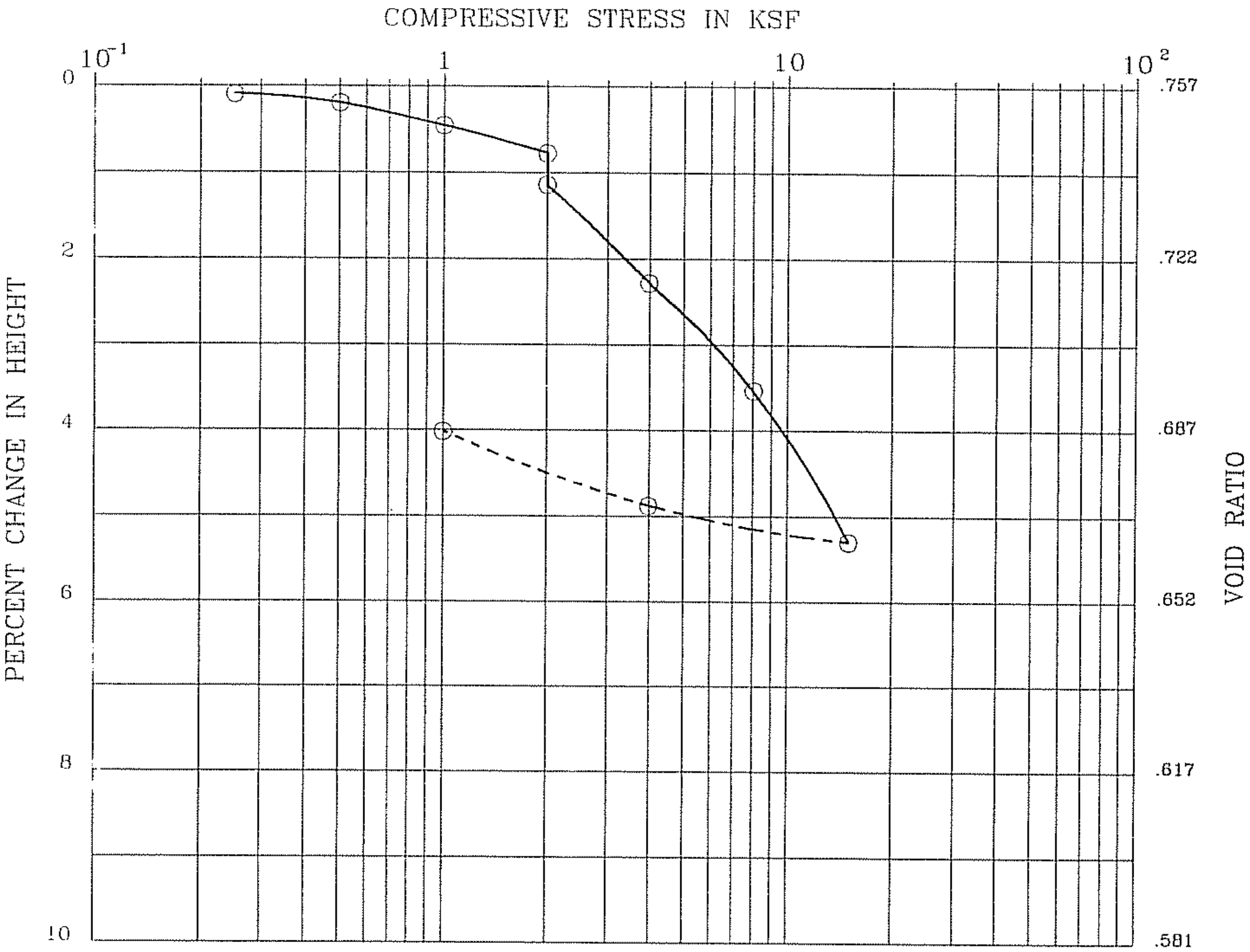
BORING : B-6
DEPTH (ft) : 12.5-13.5
SPEC. GRAVITY : 2.70

DESCRIPTION : fine, Silty SAND (SM)
LIQUID LIMIT :
PLASTIC LIMIT :

	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	PERCENT SATURATION	VOID RATIO
INITIAL	30.9	89.8	95	.879
FINAL	30.9	91.3	99	.847

Remark : Relatively Undisturbed Sample. Inundated at 2.0 ksf.

ESP No SL-13133-SA	SAN CLEMENTE APARTMENTS-UCSB
Earth Systems Pacific Lompoc, CA	CONSOLIDATION TEST PLATE No. 18



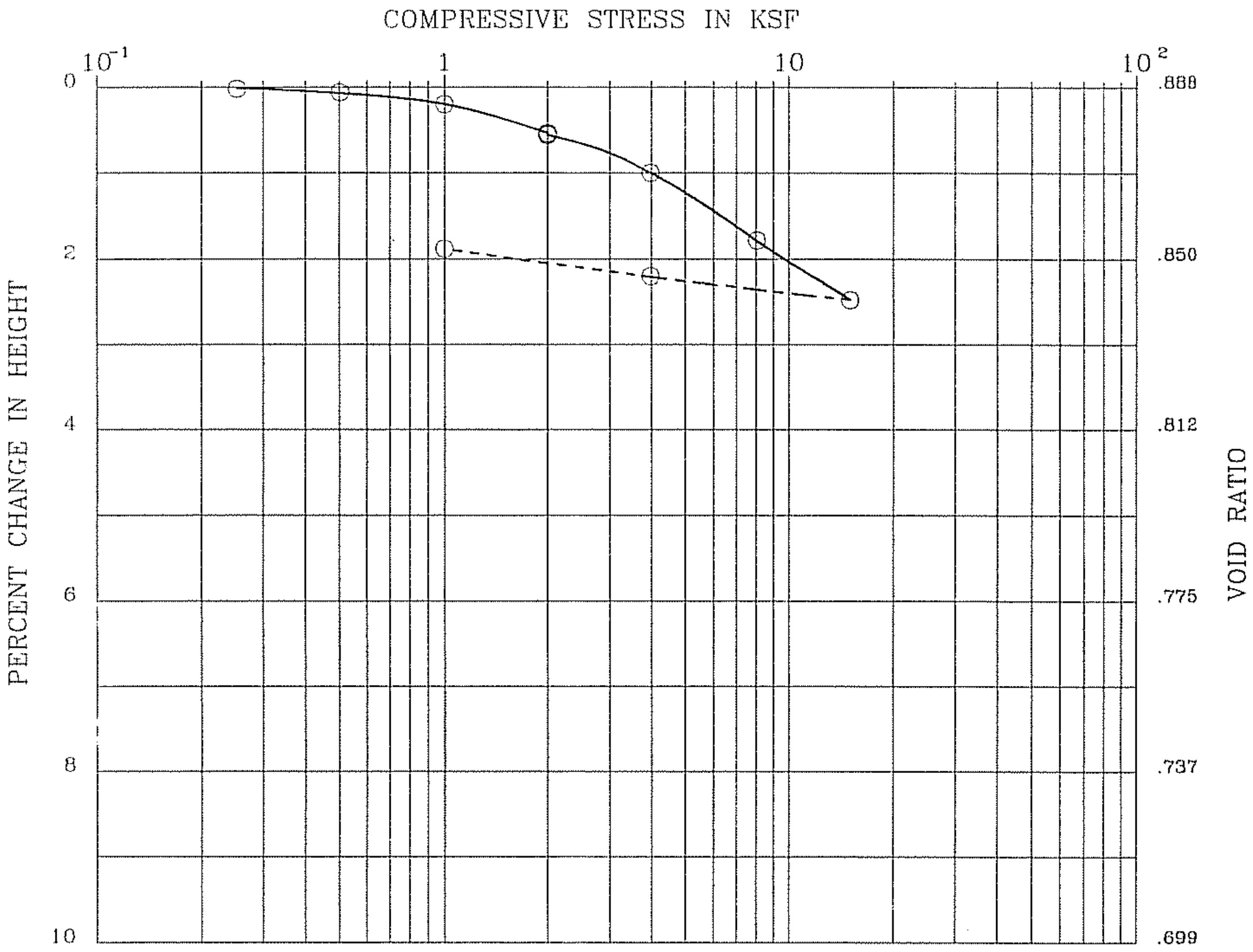
BORING : B-6
DEPTH (ft) : 20-21
SPEC. GRAVITY : 2.70

DESCRIPTION : SILTSTONE (Qsbp)
LIQUID LIMIT : 35
PLASTIC LIMIT : 20

	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	PERCENT SATURATION	VOID RATIO
INITIAL	17.9	96.0	64	.757
FINAL	25.3	100.0	100	.687

Remark : Relatively Undisturbed Sample. Inundated at 2.0 ksf.

ESP No SL-13133-SA	SAN CLEMENTE APARTMENTS-UCSB
Earth Systems Pacific Lompoc, CA	CONSOLIDATION TEST PLATE No. 19



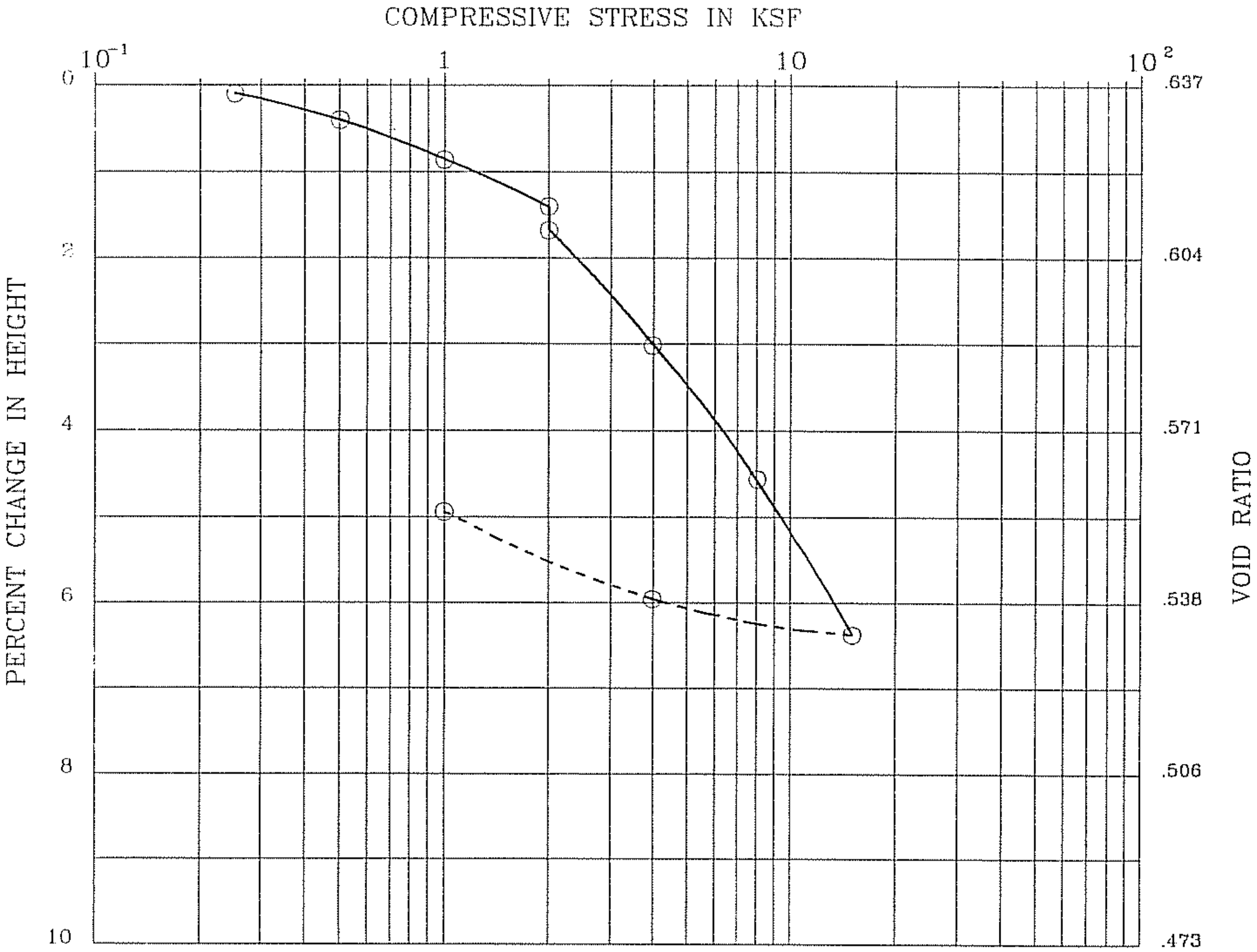
BORING : B-7
DEPTH (ft) : 15-16
SPEC. GRAVITY : 2.70

DESCRIPTION : fine, Silty SAND (SM)
LIQUID LIMIT :
PLASTIC LIMIT :

	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	PERCENT SATURATION	VOID RATIO
INITIAL	28.3	89.3	86	.888
FINAL	26.0	91.1	83	.852

Remark : Relatively Undisturbed Sample. Inundated at 2.0 ksf.

ESP No SL-13133-SA	SAN CLEMENTE APARTMENTS-UCSB
Earth Systems Pacific Lompoc, CA	CONSOLIDATION TEST PLATE No. 20



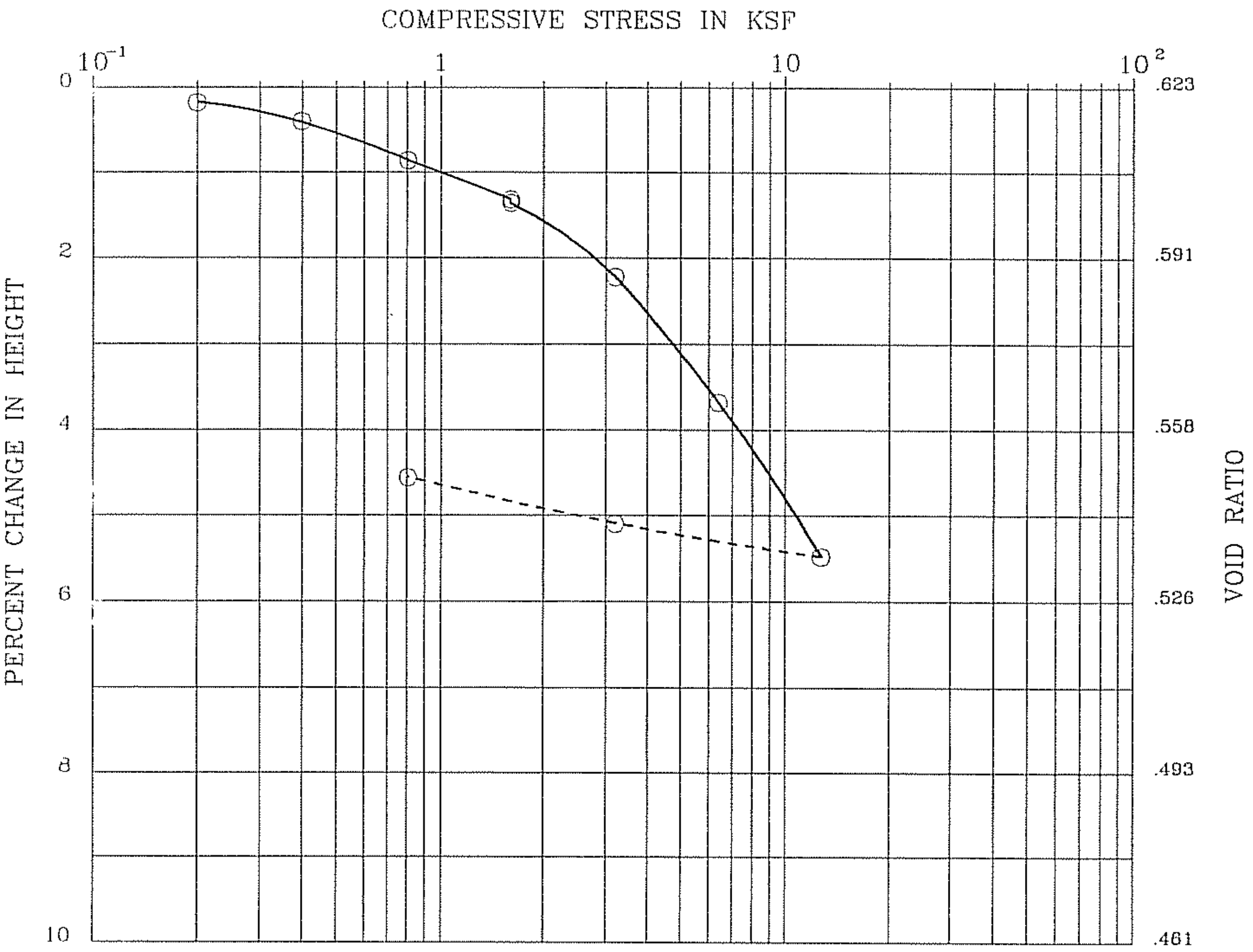
BORING : B-9
DEPTH (ft) : 7.5-8.5
SPEC. GRAVITY : 2.70

DESCRIPTION : Sandy Lean CLAY (CL)
LIQUID LIMIT : 34
PLASTIC LIMIT : 20

	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	PERCENT SATURATION	VOID RATIO
INITIAL	21.0	103.1	89	.637
FINAL	20.0	108.4	97	.556

Remark : Relatively Undisturbed Sample. Inundated at 2.0 ksf.

ESP No SL-13133-SA	SAN CLEMENTE APARTMENTS-UCSB
Earth Systems Pacific Lompoc, CA	CONSOLIDATION TEST PLATE No. 21



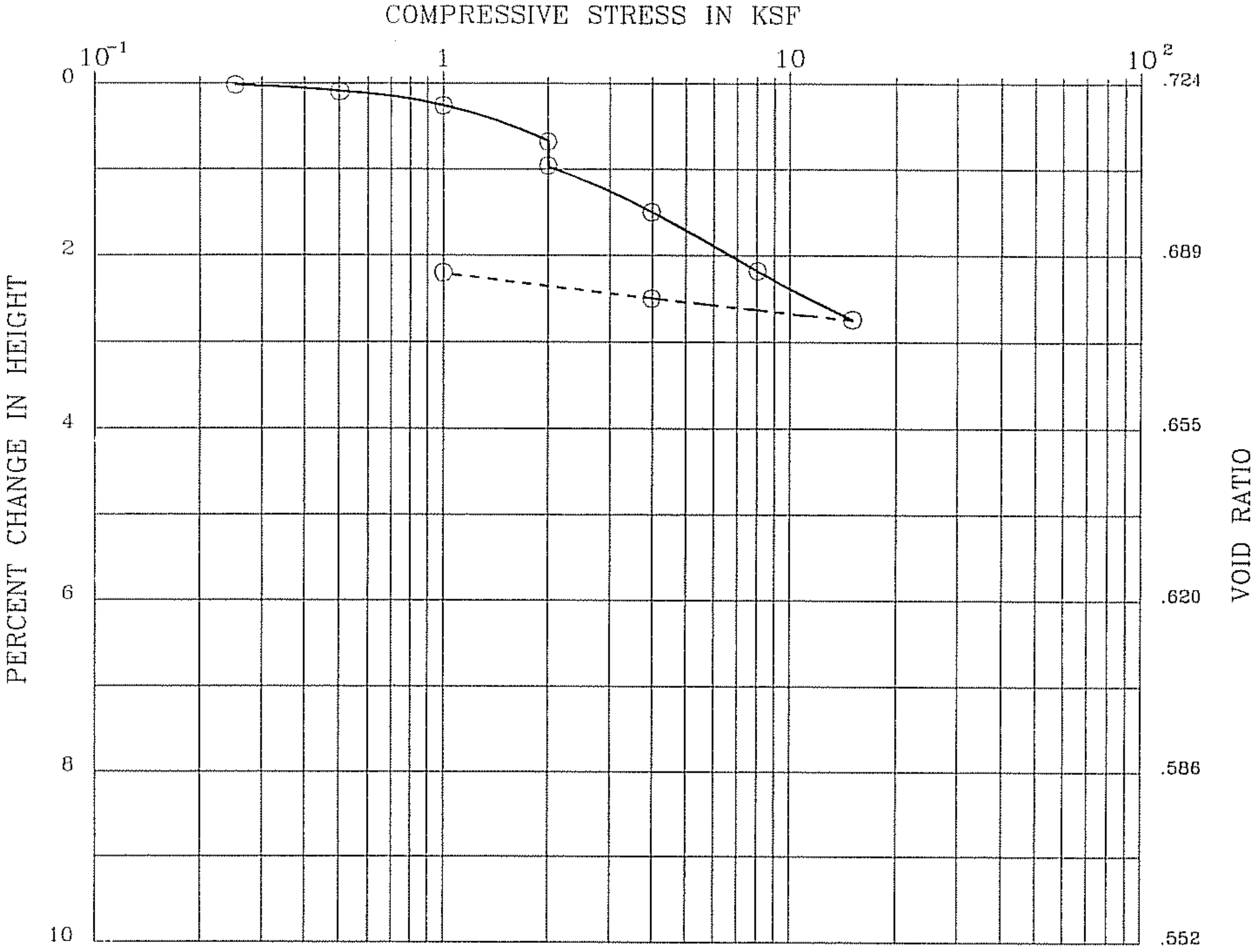
BORING : B-11
DEPTH (ft) : 10-11
SPEC. GRAVITY : 2.70

DESCRIPTION : Sandy Lean CLAY (CL)
LIQUID LIMIT : 35
PLASTIC LIMIT : 16

	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	PERCENT SATURATION	VOID RATIO
INITIAL	22.0	103.9	95	.623
FINAL	20.2	108.8	99	.550

Remark : Relatively Undisturbed Sample. Inundated at 1.6 ksf.

ESP No SL-13133-SA	SAN CLEMENTE APARTMENTS-UCSB
Earth Systems Pacific Lompoc, CA	CONSOLIDATION TEST PLATE No. 22



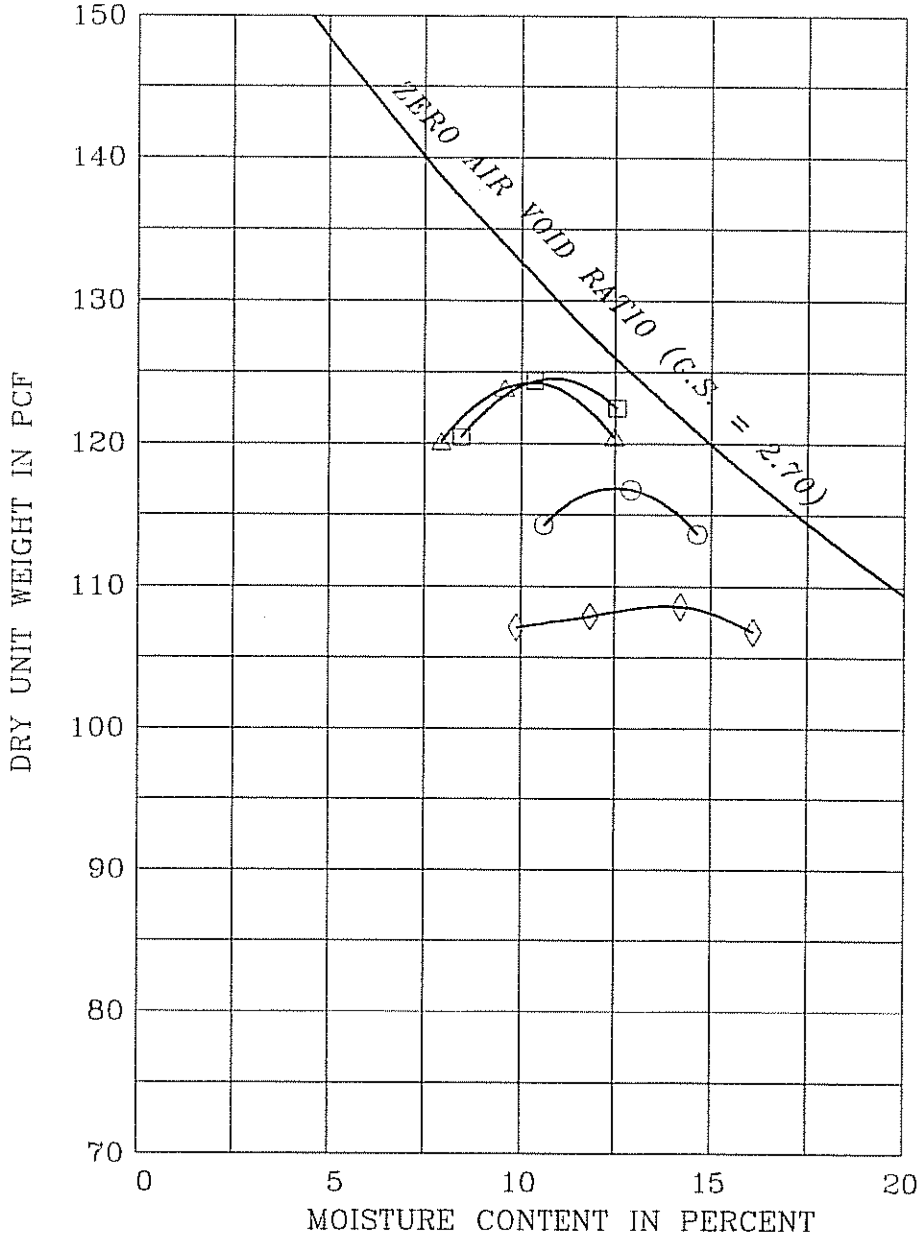
BORING : B–12
DEPTH (ft) : 12.5–13.5
SPEC. GRAVITY : 2.70

DESCRIPTION : Poorly Graded SAND w/Silt(SP–SM)
LIQUID LIMIT :
PLASTIC LIMIT :

	MOISTURE CONTENT (%)	DRY DENSITY (pcf)	PERCENT SATURATION	VOID RATIO
INITIAL	9.7	97.9	36	.724
FINAL	22.2	100.1	88	.686

Remark : Relatively Undisturbed Sample. Inundated at 2.0 ksf.

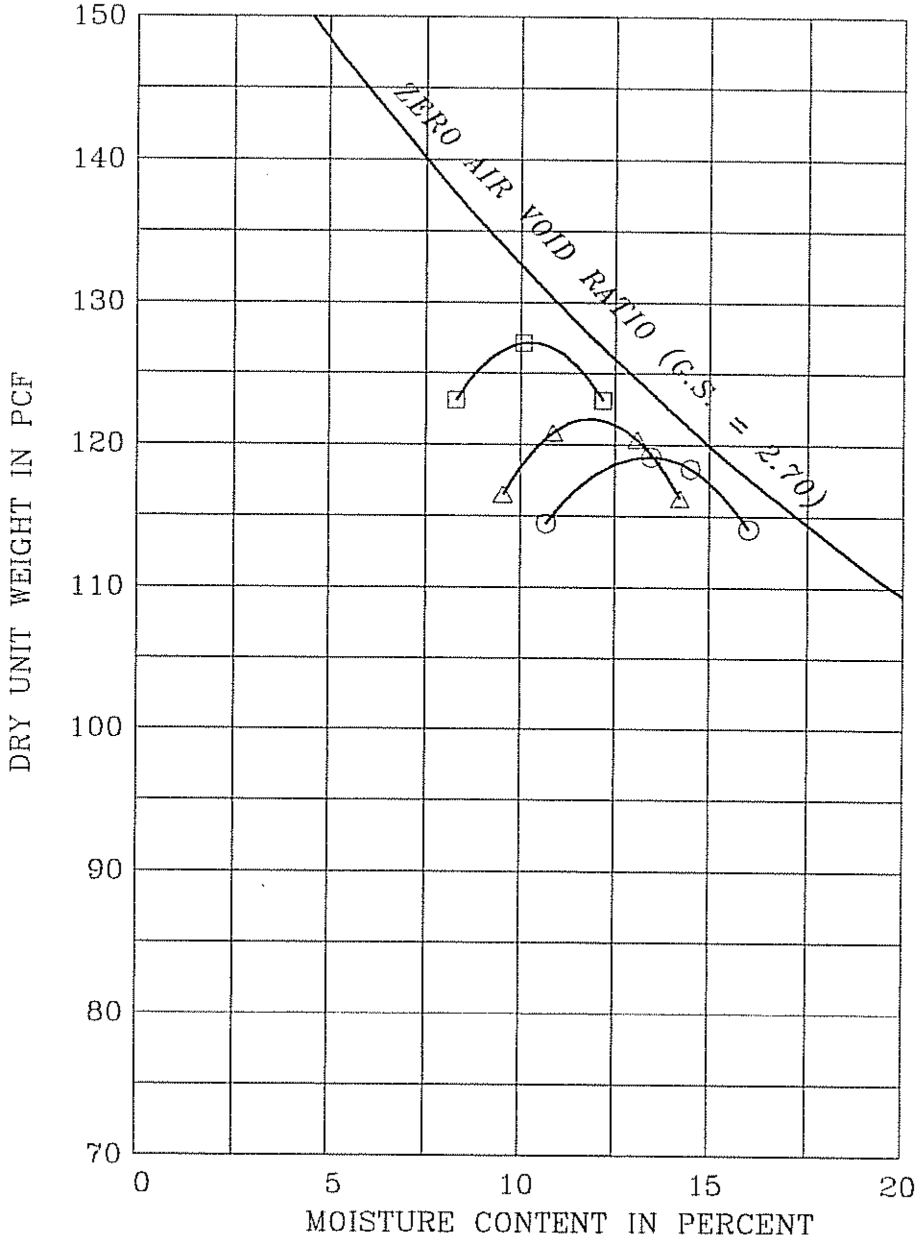
ESP No SL–13133–SA	SAN CLEMENTE APARTMENTS–UCSB
Earth Systems Pacific Lompoc, CA	CONSOLIDATION TEST PLATE No. 23



SYMBOL	SAMPLE LOCATION	DEPTH (ft)	DESCRIPTION	TEST METHOD	OPTIMUM MOISTURE (%)	MAXIMUM DRY DENSITY (pcf)
○	B-3	3-4	Silty SAND (SM)	ASTM D 1557	12.5	116.9
□	B-5	5-6	Clayey SAND (SC)	ASTM D 1557	10.7	124.6
△	B-6	7.5-8.5	Clayey SAND (SC)	ASTM D 1557	10.0	124.2
◊	B-6	12.5-13.5	Silty SAND (SM)	ASTM D 1557	13.8	108.6

Remark :

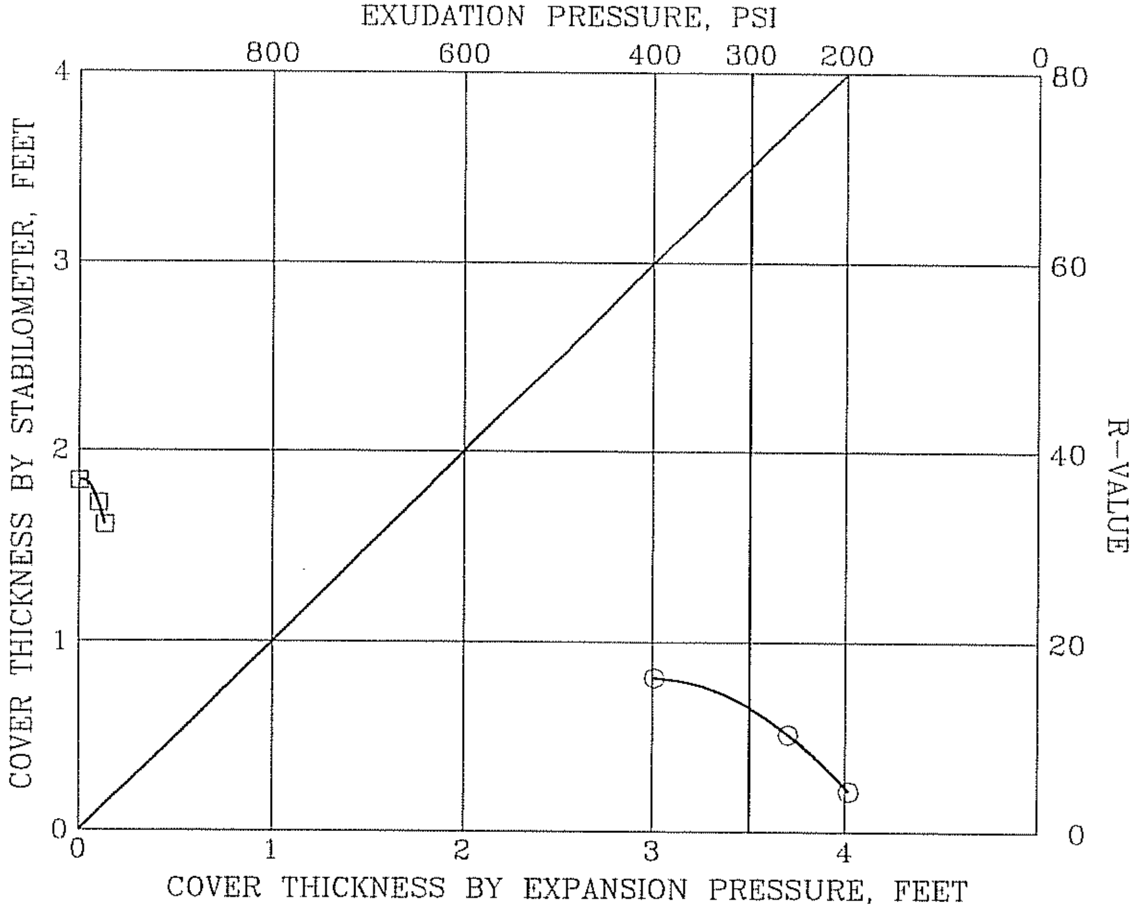
ESP No SL-13133-SA	SAN CLEMENTE APARTMENTS-UCSB
Earth Systems Pacific Lompoc, CA	COMPACTION TEST PLATE No. 24



SYMBOL	SAMPLE LOCATION	DEPTH (ft)	DESCRIPTION	TEST METHOD	OPTIMUM MOISTURE (%)	MAXIMUM DRY DENSITY (pcf)
○	B-11	1.5-2.5	Sandy Fat CLAY (CH)	ASTM D 1557	13.4	119.1
□	B-12	3-4	Clayey SAND (SC)	ASTM D 1557	10.4	127.2
△	B-14	1-2	Sandy Lean CLAY (CL)	ASTM D 1557	12.0	121.8

Remark :

ESP No SL-13133-SA	SAN CLEMENTE APARTMENTS-UCSB
Earth Systems Pacific Lompoc, CA	COMPACTION TEST PLATE No. 25



SAMPLE LOCATION : B-14 at 1-2 FEET
SOIL DESCRIPTION : Sandy Lean CLAY (CL)
LIQUID LIMIT : 29
SPECIFIC GRAVITY : 2.7
PLASTIC LIMIT : 13
DATE : 04/16/02

TEST NUMBER	1	2	3	4	5
COMPACTION PRESSURE, PSI	350.0	350.0	350.0		
INITIAL MOISTURE,	9.0	9.0	9.0		
MOISTURE AT COMPACTION,	12.6	13.5	14.4		
DRY DENSITY, PCF	118.8	117.0	114.5		
EXUDATION PRESSURE, PSI	398.7	258.6	196.6		
G.E. (STABILITY), FT	1.61	1.72	1.84		
G.E. (EXPANSION), FT	.13	.10	.00		

R-VALUE BY EXPANSION : Not Applicable
TRAFFIC INDEX : 6.0
G.E. FACTOR : 1.0
R-VALUE BY STABILITY : 13.1

ESP No SL-13133-SA

SAN CLEMENTE APARTMENTS-UCSB

Earth Systems
Pacific
Lompoc, CA

R-VALUE TEST

PLATE No. 26

TABLE II

RESULTS OF EXPANSION TEST
(UBC STANDARD #18-2)*

Location	B-9	B-11
Depth (Ft.)	3-4	15-25
Remolded Moisture Content (%)	11.7	12.1
Initial Dry Density, pcf	102.0	102.1
Expansion Index	86	88
Expansion Potential	*Medium*	*Medium*

* 1-inch thick specimen -- swell measured from near 50% saturation to the saturated condition on a remolded specimen.

PROJECT: SAN CLEMENTE APARTMENTS
UNIVERSITY OF CALIFORNIA, SANTA BARBARA
GOLETA, CALIFORNIA

ESP JOB № SL-13133-SA

EARTH SYSTEMS PACIFIC
PLATE № 27

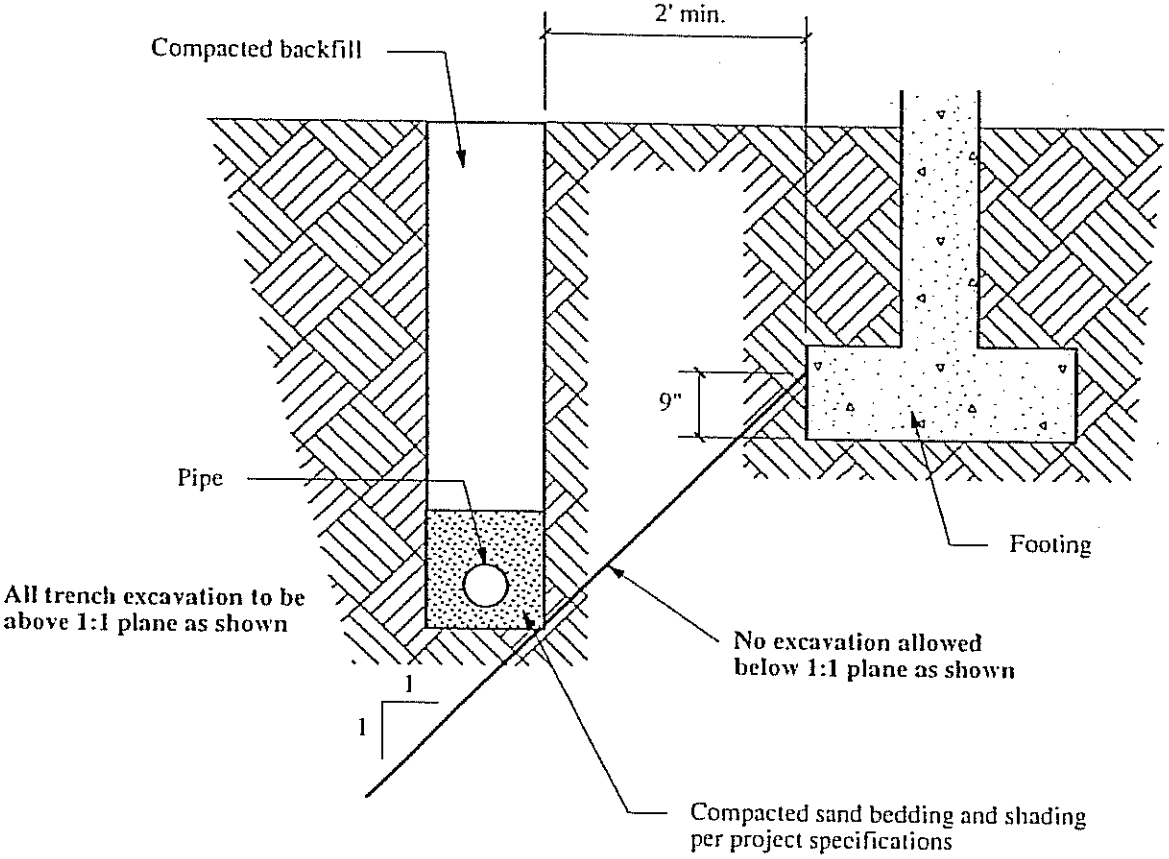
APPENDIX C

Typical Detail A: Pipe Placed Parallel to Foundations

Typical Detail B: Pipe Placed Perpendicular Under Foundations

TYPICAL DETAIL A:
PIPE PLACED PARALLEL TO FOUNDATIONS

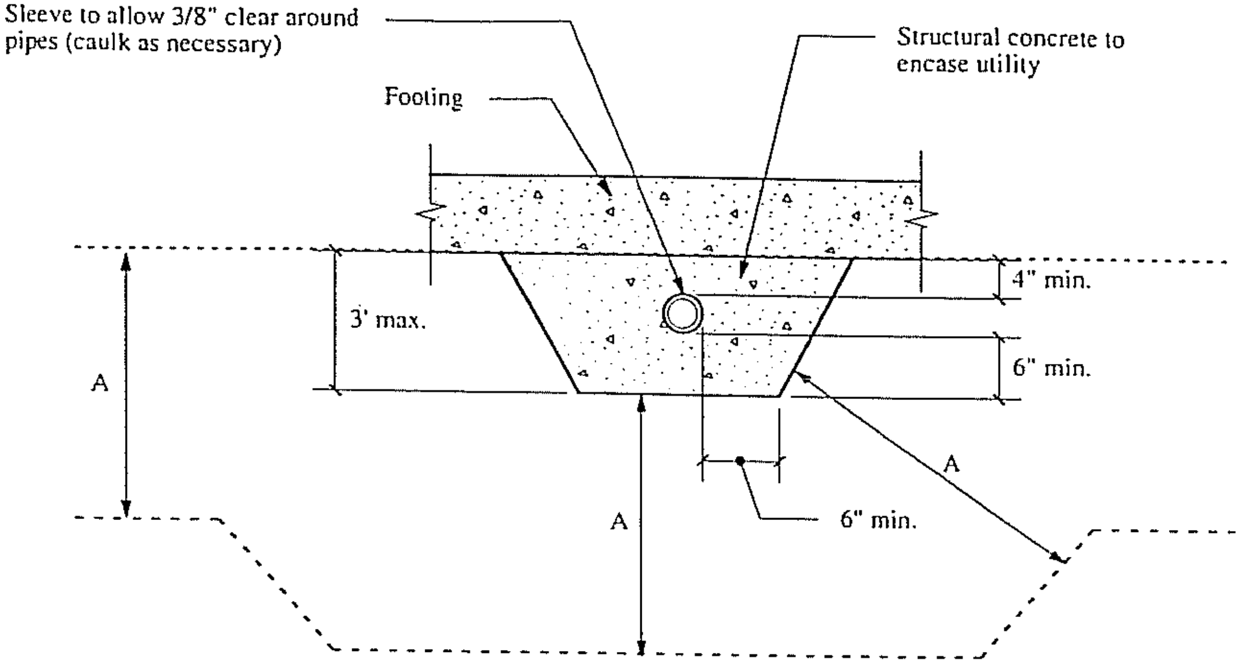
SAN CLEMENTE STUDENT HOUSING
UNIVERSITY OF CALIFORNIA
AT SANTA BARBARA
GOLETA, CALIFORNIA
SL-13133-SA



Schematic Only
Not to Scale

TYPICAL DETAIL B:
PIPE PLACED PERPENDICULAR UNDER FOUNDATIONS

SAN CLEMENTE STUDENT HOUSING
UNIVERSITY OF CALIFORNIA
AT SANTA BARBARA
GOLETA, CALIFORNIA
SL-13133-SA



A = depth of recommended overexcavation, where applicable.

Schematic Only
Not to Scale

APPENDIX D

Tremie Method

TREMIE METHOD FOR CAISSON (DRILLED SHAFT) FOUNDATION CONSTRUCTION

1. Concrete should be placed in caisson excavations by means of a tremie when the depth of water in the excavation cannot be limited to a maximum of 2 inches, or to the depth specified by the architect/engineer. A tremie should also be used when the freefall of the concrete would result in the concrete striking the rebar cage as it falls.

2. The concrete should be pumped to the tremie pipe or, if a hopper tremie is to be used, it should be approved by the architect/engineer. An elephant's trunk may be used to direct the fall of the concrete in dry excavations. The elephant's trunk should be of sufficient length to prevent the concrete from striking the rebar cage as it falls.

3. Concrete for dry excavations should be designed for and placed at a slump of 4 to 6 inches. Concrete to be placed below water should be designed for and placed at a slump of 6 to 8 inches.

4. The tremie pipe should consist of rigid steel pipe with tight couplings. The tremie pipe should be 4 to 6 inches in diameter and should be longer than the deepest caisson excavation.

5. The tremie pipe should be lowered through the center of the reinforcing cage, with caution, to within 1 foot of the bottom of the excavation.

6. The hose and tremie pipe should be "slicked" with Portland cement slurry. No clay, bentonite, or other material should be used unless approved by the architect/engineer.

7. Pumping of the concrete should begin immediately after the reinforcing cage and the tremie pipe have been placed in the excavation and inspected. The tremie pipe should not be raised until the concrete surface in the caisson excavation is at least 5 feet above the bottom of the tremie pipe. The bottom of the tremie pipe should then be kept at least 5 feet below the top of the concrete until the pour is completed.

8. The concrete should be pumped until all muck, laitance, and unsuitable concrete has been lifted above the top of the caisson. All muck, laitance and unsuitable concrete should be immediately removed from the excavation.

9. Concrete poured at a 6-inch or greater slump should not be vibrated, unless directed by the architect/engineer. When vibration is required, it should not be started until the concrete pour is completed and the muck, laitance and unsuitable concrete have been removed. At a minimum, the upper 10 feet of the concrete should then be vibrated. Additional concrete may be added as necessary during vibration. The vibrator should not be allowed to contact any reinforcing members.

10. If, during the pour, the tremie pipe has to be removed from the concrete, (e.g., to allow removal of casing), it should be reset at the top of the concrete. It should then be purged as directed, and lowered to at least 5 feet below the top of the concrete as the concrete is being pumped. All degraded concrete should be lifted with the continuing pour and removed from the top of the caisson.

11. The above are general guidelines only, and may be subject to modification by the architect/engineer.

Earth Systems Pacific

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E-mail: esc@earthsys.com

April 19, 2004

FILE NO.: SL-13133-SB

Mr. Erich Brown
University of California at Santa Barbara
Design Construction and Physical Facilities
Santa Barbara, CA 93106-1030

PROJECT: SAN CLEMENTE APARTMENTS AND PARKING STRUCTURE
UNIVERSITY OF CALIFORNIA, SANTA BARBARA
SANTA BARBARA, CALIFORNIA

SUBJECT: Summary of Site Conditions

REF:
1) Soils Engineering Report, San Clemente Apartments Parking Structure, University of California, Santa Barbara, California, by Earth Systems Pacific, dated April 19, 2004.
2) Soils Engineering Report, Proposed San Clemente Student Housing, UCSB Project No. 98647, El Colegio & Los Carneros Roads, University of California, Santa Barbara, California, by Earth Systems Pacific, dated July 8, 2002, Doc. No. 0207-038. SER
3) Fault Evaluation Report, San Clemente Housing, University of California, Santa Barbara, California, by CFS Geotechnical Consultants, Inc., dated June, 2001.

Dear Mr. Brown:

In accordance with your request, this letter has been prepared to provide a summary of, and commentary regarding, the geotechnical and geologic stability of the proposed San Clemente Apartments and Parking Structure site. The project consists of a student-housing complex in several blocks of multi-story apartment buildings, and a four-level parking structure with an adjacent central plant.

Site Conditions

The project site is located in the southern half of Storke Field, in the northwest portion of the University of California, Santa Barbara. The site is bounded to the west by Los Carneros Road, to the east by Stadium Way, and by El Colegio Road to the south. Topography is relatively level. Current site use is as a recreational field, with sand volleyball courts and tennis courts at the east end. Elevations range from approximately 45 feet along the easterly boundary to approximately 25 feet within the westerly portion.

Geotechnical and Geologic Conditions

Based upon the borings drilled by this firm for the purposes of the referenced soils engineering reports, and a review of the referenced Fault Evaluation Report, the upper soils at the site are terrace deposits comprising silty sand and clayey sand, with occasional interbedded layers of lean clay and fat clay. The terrace deposits are underlain by the Santa Barbara formation. The Santa Barbara formation was encountered at depths ranging from 11 to 17 feet below the existing ground surface. Groundwater was observed in several of the borings perched above and within the Santa Barbara formation. The groundwater was encountered at depths ranging from 9.5 feet to 18 feet, averaging about 12 feet. The groundwater occupies a thin zone perched on and within the denser layers of the Santa Barbara formation.

Faulting and Seismicity

The project site is located in the seismically active Southern California area, and as such will most likely to be subject to strong seismic ground motion during its design life. Structural design should take this likelihood into consideration and should adhere to current building code requirements. Per the referenced Fault Evaluation Report, the south branch of the More Ranch fault lies along the north side of El Colegio Road in the project area. The south and north branches of the More Ranch fault displace the base of the terrace deposits, indicating that these branches of the fault may be at least potentially active as classified in the University Long Range Development Plan (LRDP), Environmental Impact Report (EIR). Although the potential for surface rupture to occur on the south branch of the fault is believed to be relatively low, per the minimum structure setback criteria established by the LRDP EIR, it is recommended that any new structures be located at least 50 feet from the trace of the fault.

As evidence of faulting associated with the north branch of the fault was not encountered in exploratory borings drilled by CFS for the Fault Evaluation Report, or in other investigations cited in the report, it is not believed to lie within or in close proximity to the project site.

Liquefaction

Due to the medium dense to dense condition of the terrace deposits, the relatively high percentage of fine soil particles, and as groundwater within these soils occurs only in a thin zone perched above the bedrock, the potential for liquefaction to occur at the site is considered very low.

Landsliding

The site is generally flat lying; consequently, landsliding and slope instability is not considered to represent a hazard to the project.

Conclusions

No evidence of slope instability, such as landslides or surficial failures, was observed at the site or the adjacent sites at the time of our investigations. Based on the investigations performed and review of the referenced Fault Evaluation Report, it is our opinion that the site should be safe from landslides, undue static or dynamic settlement, and slippage. The potential for surface rupture on the south branch of the More Ranch fault is relatively low; however, a minimum 50-foot setback from the fault is recommended to conform to criteria established by the University Long Range Development Plan Environmental Impact Report. Furthermore, it is our opinion that the proposed development should not adversely impact adjacent sites.

Thank you for this opportunity to have been of service. If you have any questions or require additional information, please contact the undersigned.

Sincerely,

Earth Systems Pacific

Dennis Shallenberger, G.E.
Date Signed: 4/19/04

DENNIS C. SHALLENBERGER
No. GE 2158
Exp. 12/31/05

Doc. No.: 0404-089.LTR/rlw