CSUCI Specific Reuse Plan Amendment and Phase 2 Development of the East Campus Residential Neighborhood Project

Initial Study

prepared by

California State University, Channel Islands Site Authority
One University Drive
Camarillo, California 93012

prepared with the assistance of

Rincon Consultants
180 North Ashwood Avenue
Ventura, California 93003

Rincon Consultants, Inc.
Environmental Scientists Planners Engineers
www.rinconconsultants.com

November 2016

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Initial Study

1 Project Title

CSUCI Specific Reuse Plan Amendment and Phase 2 Development of the East Campus Residential Neighborhood Project

2 Lead Agency Name and Address

The Trustees of the California State University
400 Golden Shore
Long Beach, California 90802-4275

3 Contact Person and Phone Number

Terry M. Tarr, AIA, LEED AP
CSUCI Facilities Services Department
Assoc. Architect / Project Manager / Planning Design & Construction Dept.
(805) 437-2018

4 Project Sponsor's Name and Address

Owner
The Trustees of the California State University
400 Golden Shore
Long Beach, California 90802-4275

Ground Lessee/Locally represented by
Site Authority
California State University, Channel Islands
P.O. Box 2862
Camarillo, California 93011-2862

5 Project Location

The portion of the project site to be developed (referred to as Phase Two of the East Campus Residential Neighborhood, also known as University Glen Phase 2) is located on the California State University, Channel Islands (CSUCI) campus in southern Ventura County at the eastern edge of the Oxnard Plain and at the western flank of the Santa Monica Mountains. The CSUCI campus lies 2.5 miles south of the city of Camarillo, northeast of the intersection of Lewis and Potrero Roads, and east of Calleguas Creek. Primary access to the CSUCI campus is provided by U.S. Highway 101 to the north, via Lewis Road and Camarillo Street, or by U.S. Highway 1 to the southwest, via Las Posas Road and Hueneme Road. The project site is included within the Specific Reuse Plan and is a part of the Community Development Area (CDA) designated within the plan. The CDA is planned for development of university-related support uses. Figure 1 shows the location of the Specific Reuse Plan area in its regional context. Figure 2 shows the geographic area of East Campus within which the Specific Reuse Plan amendment area and the proposed residential development are located. Figure 3 provides site photos.

Figure 1 Regional Location

Imagery provided by ESRI and its licensors © 2016.

Figure 2 Project Location

Imagery provided by Google and its licensors © 2016.

Figure 3 Site Photos

Photo 1: Aerial from southwest looking northeast over project site.

Photo 2: Facing northeast near the Channel Islands Drive and Santa Rosa Islands Drive intersection.

Photo 3: Facing west toward western boundary of project site.

Photo 4: Facing south from Inspiration Point toward drainage and project site.

6 Existing Setting

The existing CSUCI campus is broadly organized into three areas of development: the Academic Core, which includes classrooms, administrative buildings, student housing, research facilities, offices, and Broome Library; a Town Center directly east of the Academic Core; and University Glen, which consists of residential areas to the east and north of the Town Center (Figure 4). Generally speaking, the Campus Master Plan guides development in the Academic Core area, while the Specific Reuse Plan guides development of University Glen (referred to as East Campus Residential Neighborhoods in prior documents, such as the Specific Reuse Plan), as well as two smaller areas, one to the west of the Academic Core (referred to as Business Campus or Research & Development Area in prior documents), and the far eastern end of the campus, which is planned for K-8 school facilities (CSUCI 2000).

University Glen is intended to provide a range of housing opportunities for faculty and staff near the Academic Core and create a community that invites pedestrian activity and bicycling (CSUCI 2000). Development of University Glen has been subdivided into two phases. The J-shaped area jutting east and then north of the Town Center constitutes Phase I. The undeveloped area that lies north of Phase I and extends eastward constitutes Phase 2 (Figure 4). Development of University Glen Phase 1 has already been completed. The proposed project involves development of Phase 2, the northernmost residential area. The majority of the 32-acre project site is level due to previous grading, and features level building pads, retaining walls, and an array of paved streets, curbs, and gutters.

The northern portion of the project site is accessed by an unpaved road called Inspiration Point that crosses an unnamed drainage feature. The area accessed by the unpaved Inspiration Point roadway (also referred to as Inspiration Point in this document) is at a higher elevation than the majority of the site and contains a eucalyptus tree grove.

Figure 4 Campus Master Plan

7 CSUCI Master Plan and Specific Reuse Plan Density Designation

Existing Designation: Low to Low-Medium (L/LM) Residential Density (0-10 dwellings/acre) University Glen Master Planned Community Phase Two Residential Area

Proposed Designation: Low-Medium to Medium-High (LM/MH) Residential Density (10-20 dwellings/acre) – University Glen Master Planned Community Phase Two Residential Area

8 Description of Project

The proposed project consists of Phase 2 Development of the East Campus Residential Neighborhood, also referred to as University Glen. Development of the proposed project requires an amendment to the CSUCI Specific Reuse Plan, which is one of the documents governing land development for the non-academic portions of the CSUCI complex, including the West and East Campuses. Since the adoption of the Specific Reuse Plan by the CSUCI Site Authority in 2000, extensive development has occurred on the East Campus, resulting in a sizeable residential community and a mixed-use town center located at the pivot of the East Campus and the Academic Core, located east of the Broome Library.

Under the existing CSUCI Specific Reuse Plan, the project site is entitled for 242 single-family residential units. However, under the proposed project, up to 600 residential units would be developed on *the* 32 acres of vacant land. The increase in residential density requires an amendment to the Specific Reuse Plan, which currently designates the project site for low to low-medium residential density (0-10 units per acre) development. The amendment would allow for low-medium to medium-high residential density (10-20 units per acre) at the project site.

The proposed project offers a mix of multi-family apartments, for-sale single-family attached/detached homes, and income/age-restricted apartments (Figure 5). Table 1 provides further details on the types of proposed units, including approximate square footages and parking spaces. The site plan (Figure 5) also includes approximately 2.8 acres of recreation/ park area that consists of a central park and clubhouse, two vista parks along the northern periphery of the project site, and various paseos and courtyards.

To accommodate the increase in density, the number of lots, parcel and roadway configuration, and utility lines would be modified. Existing building pads and roads would be demolished and replaced in accordance with the site plan shown in Figure 5. Much of the existing utilities and infrastructure would also need to *be* replaced and/ or modified to serve the new site layout. Figure 6 shows the conceptual Domestic Water Master Plan; Figure 7 shows the conceptual Storm Drain Master Plan; Figure 8 shows the conceptual Recycled Water Master Plan; Figure 9 shows the conceptual Sewer Master Plan; Figure 10 shows the conceptual Street Light Master Plan; and Figure 11 shows the Circulation Plan. All infrastructure plans are conceptual in nature and will be refined as the project design progresses.

There is the potential that the existing 96-inch reinforced concrete pipe (RCP) running under Channel Islands Drive and the flood control basin it feeds into along Camarillo Street are undersized for a 100-year storm event (Huitt-Zollars 2016). A study is needed to determine whether modifications to the stormwater drain system beyond those shown in Figure 7 are required and will be completed prior to final design. For the purpose of this study, as well as the EIR, it is assumed that some modifications will be required to ensure that potential impacts to biological and hydrological resource areas, in particular, are considered as result of these infrastructure improvements.

Inspiration Point is physically separated from the main body of the project site by an unnamed drainage. The existing drainage crossing, consisting of an unpaved road and culvert, does not provide adequate access to Inspiration Point and the culvert is currently undersized to withstand a 100-year storm event. Consequently, as part of the proposed project, the existing crossing and drainage culvert leading to Inspiration Point would be demolished and replaced with a new culvert and crossing. The culvert would be approximately 75 feet long and 30 feet wide with concrete retaining walls and a corrugated steel culvert pipe and would be sized to accommodate a 100-year storm event.

Figure 5 Site Plan

	LAND USE	ACREAGE	PARKING
🟧	APARTMENTS (+- 310 DU)	14.6 AC	584 SPACES
🟧	SENIOR APARTMENTS (+- 170 DU)	4.4 AC	170 SPACES
🟨	FOR SALE TOWNHOMES (+- 88 DU)	13.3 AC	273 SPACES
🟨	FOR SALE SINGLE FAMILY (+- 54 DU)		
🟥	CLUBHOUSE/AMENITY		
🟩	OPEN SPACE/LANDSCAPE		
⬜	STREETS/ALLEYS		

Table 1 Project Summary

Site Plan Totals

Approximate Site Area (sf)	1,394,000 (32 acres)
Approximate Building Footprint Area (sf)	343,000 (24.6 % site coverage)
Approximate Landscape Area (sf)	460,000 (33% site coverage)
Approximate Hardscape Area (sf)	607,000 (43.5% site coverage)

Building Area

Unit type	Bedrooms x Bathrooms	Unit Size (sf)	Number of Units	Total Area (sf)
Apartment rental	1x1	800	50	40,000
Apartment rental	2x2	950	180	171,000
Apartment rental	3x2	1,200	80	96,000
Income/Age-Restricted rental	1x1	552	85	46,920
Income/Age-Restricted rental	2x1	712	85	60,520
Townhome for sale	2x2.5	1,450	22	31,900
Townhome for sale	3x2.5	1,650	22	36,300
Townhome for sale	3x3	1,850	22	40,700
Single Family for sale	3x2.5	1,675	15	25,125
Single Family for sale	3x2.5	1,727	14	24,178
Single Family for sale	5x3	2,120	14	29,680
Single Family for sale	4x3	2,400	11	26,400
Total			**600**	**628,283**

Community Amenities

Amenity Type	Area (sf)
Central Park and Community Center	60,984
Neighborhood Parks-Vistas	17,424
Neighborhood Parks-Paseos and courtyards	47,916
Total	**126,324**

Parking

Parking Type	Number of Spaces
Enclosed/Covered	508
Standard	519
Handicap	TBD per California Building Code Standards
Total	**Approx. 1,027 spaces**

Notes: sf = square feet

Figure 6 Conceptual Domestic Water Master Plan

Figure 7 Conceptual Storm Drain Master Plan

Figure 8 Conceptual Recycled Water Master Plan

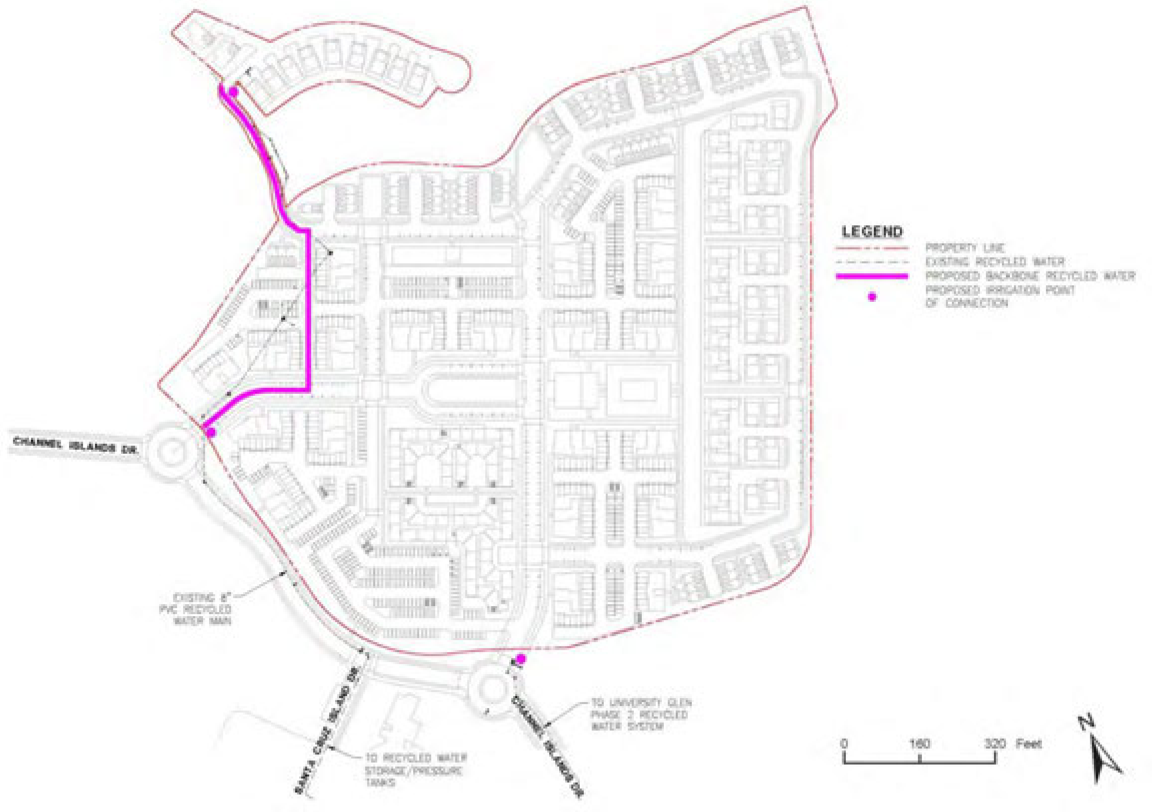


Figure 9 Conceptual Sewer Master Plan

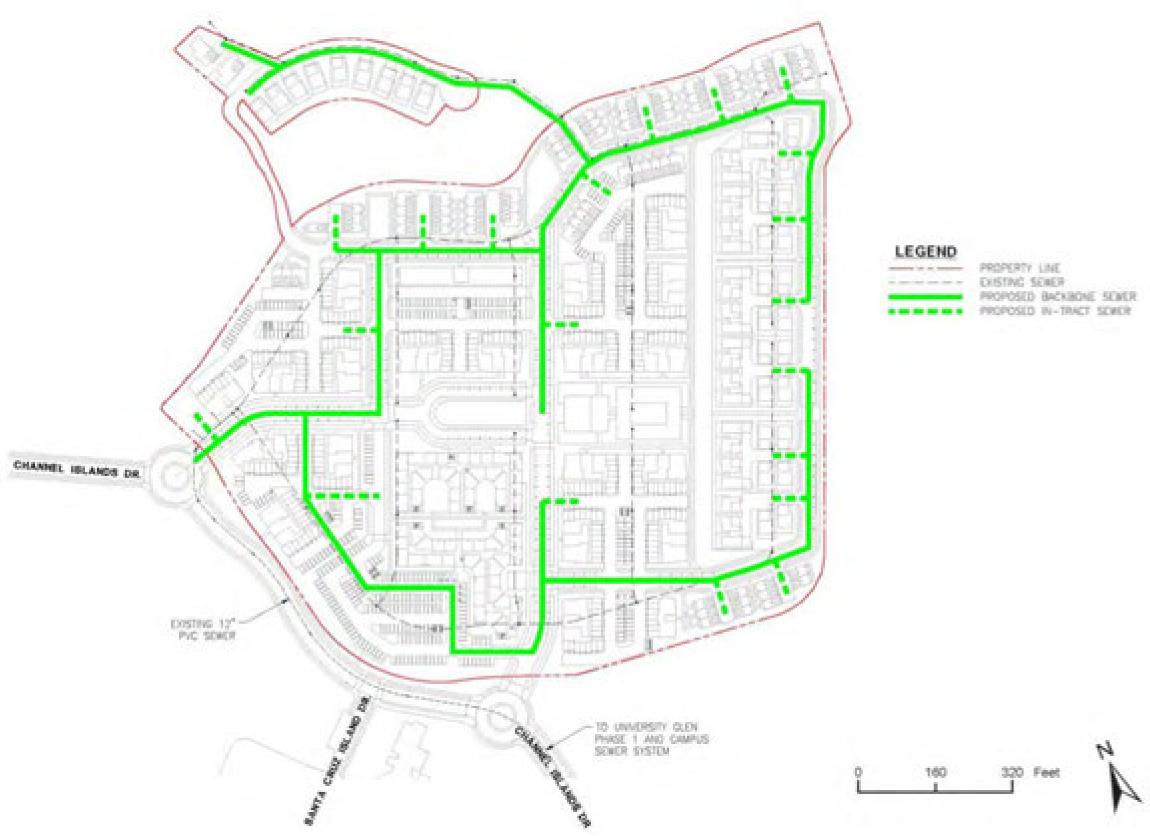


Figure 10 Conceptual Street Light Master Plan

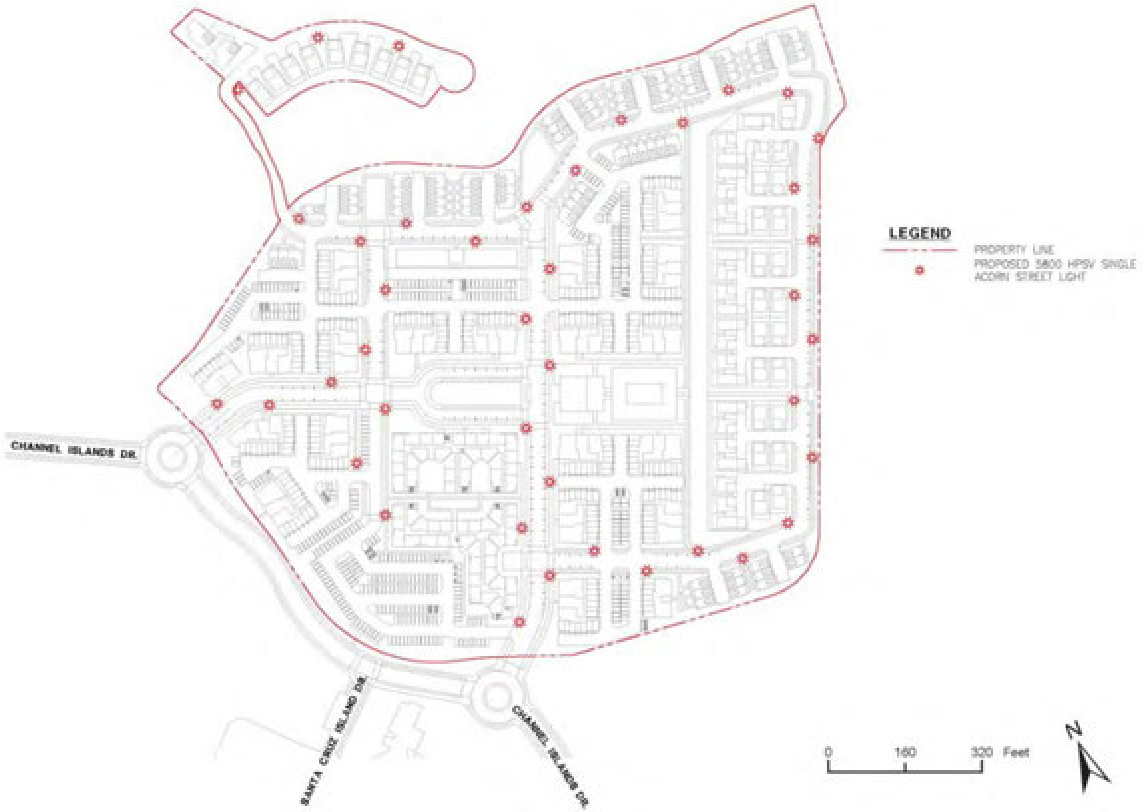
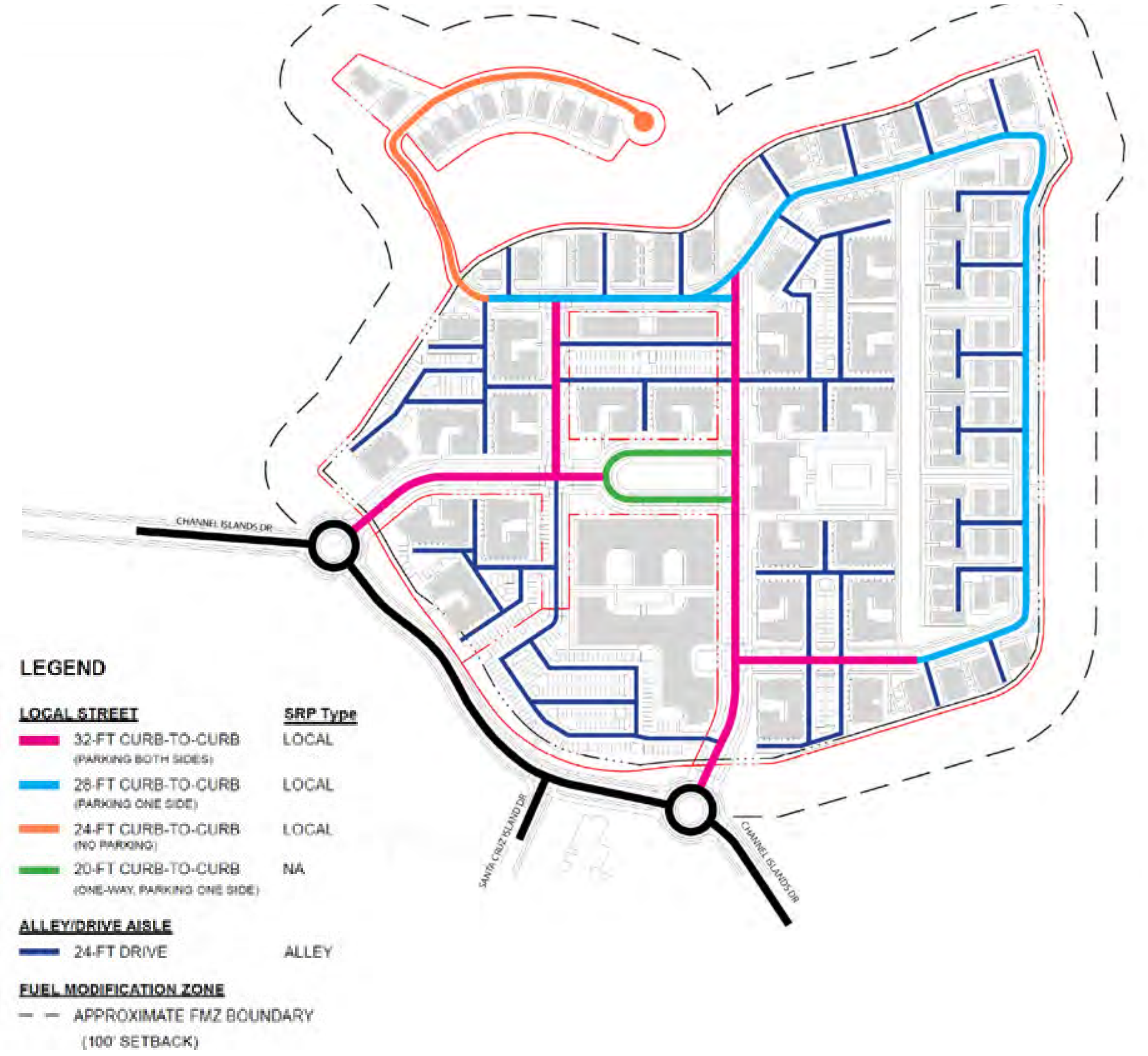


Figure 11 Circulation Plan



8. Description of Project (continued)

Construction

Construction of the proposed project is anticipated to start as early as Fall 2017 and continue until mid-2020.

Access and Parking

Regional access to the project site is provided by US 101 and Lewis Road from the north to Camarillo Street, and State Route (SR) 1 and Hueneme Road from the south. Local access is provided via Channel Islands Drive, which runs along the southwest border of the project site and provides access from the west and south. Access from the main campus north to the project site is provided by Channel Islands Drive.

The proposed project would provide approximately 1,027 new parking spaces, inclusive of accessible parking. Parking for apartment units would consist of a combination of garages, covered, and surface parking. Townhomes and single family homes would have onsite parking spaces, as well as individual one or two-car garages accessible via alleys.

Water Quality and Drainage

Onsite water quality treatment would be managed with multiple bio-filtration/bio-planter systems throughout the project site (Huitt-Zollars 2016). Bio-filtration/bio-planter systems would be provided at all inlet locations to the public storm drain system, which would be modified for the proposed project as shown in Figure 7 (Storm Drain Master Plan). Catch basin inserts would also be installed. Treated on-site water would flow downstream and then comingle with off-site water and ultimately be stored in the existing flood control basin along Camarillo Street.

9 Surrounding Land Uses and Setting

The CSUCI campus lies at the western edge of the Santa Monica Mountains, east of Calleguas Creek. The site is surrounded by open space to the north, east, and west, and residential development to the south. Less than 0.5 mile to the west is Camarillo Street and agricultural fields. The project site is located about one mile northeast of the eastern edge of the CSUCI Main Campus (Figure 4).

10 Public Agencies Whose Approval is Required

The Board of Trustees is the lead agency with responsibility for approving the proposed project. The Site Authority, U.S. Fish and Wildlife Service, California Department of Fish and Wildlife, the Regional Water Quality Control Board, the U.S. Army Corps of Engineers, Ventura County Watershed Protection District, and Ventura County are all potential responsible agencies for the project.

The following approvals could be required for the proposed project:

- Amendment to the Campus Master Plan
- Specific Reuse Plan Amendment adoption and proposed project approval
- Schematic plan approval
- Final approval of real property public-private partnership
- Streambed Alteration Agreement
- Possible Clean Water Act (CWA) Section 404 permit
- Possible CWA Section 401 Certification
- Others, as may be necessary

Environmental Factors Potentially Affected

This project would potentially affect the environmental factors checked below, involving at least one impact that is "Potentially Significant" or "Potentially Significant Unless Mitigation Incorporated" as indicated by the checklist on the following pages.

■ Aesthetics
☐ Agriculture and Forest Resources
■ Air Quality
■ Biological Resources
■ Cultural Resources
■ Geology and Soils
■ Greenhouse Gas Emissions
☐ Hazards and Hazardous Materials
■ Hydrology / Water Quality
■ Land Use/ Planning
☐ Mineral Resources
■ Noise
☐ Population / Housing
■ Public Services
■ Recreation
■ Transportation / Traffic
☐ Tribal Cultural Resources
■ Utilities / Service Systems
■ Mandatory Findings of Significance

Determination

Based on this initial evaluation:

☐ I find that the proposed project COULD NOT have a significant effect on the environment, and a NEGATIVE DECLARATION will be prepared.

☐ I find that although the proposed project could have a significant effect on the environment, there will not be a significant effect in this case because revisions to the project have been made by or agreed to by the project proponent. A MITIGATED NEGATIVE DECLARATION will be prepared.

■ I find that the proposed project MAY have a significant effect on the environment, and an ENVIRONMENTAL IMPACT REPORT is required.

☐ I find that the proposed project MAY have a "potentially significant impact" or "potentially significant unless mitigated" impact on the environment, but at least one effect (1) has been adequately analyzed in an earlier document pursuant to applicable legal standards, and (2) has been addressed by mitigation measures based on the earlier analysis as described on attached sheets. An ENVIRONMENTAL IMPACT REPORT is required, but it must analyze only the effects that remain to be addressed.

☐ I find that although the proposed project could have a significant effect on the environment, because all potential significant effects (a) have been analyzed adequately in an earlier EIR or NEGATIVE DECLARATION pursuant to applicable standards, and (b) have been avoided or mitigated pursuant to that earlier EIR or NEGATIVE DECLARATION, including revisions or mitigation measures that are imposed upon the proposed project, nothing further is required.

Signature

11/23/2016
Date

Jennifer Haddow
Printed Name

Principal
Title

Environmental Checklist

1 Aesthetics

	Potentially Significant Impact	Potentially Significant Unless Mitigation Incorporated	Less than Significant Impact	No Impact
Would the project have any of the following impacts?				
a. Substantial adverse effect on a scenic vista	■	☐	☐	☐
b. Substantial damage to scenic resources, including but not limited to trees, rock outcroppings, and historic buildings along a state scenic highway	■	☐	☐	☐
c. Substantially degrade the existing visual character or quality of the site and its surroundings	■	☐	☐	☐
d. Create a new source of substantial light or glare that would adversely affect daytime or nighttime views in the area	■	☐	☐	☐

a. Would the project have a substantial adverse effect on a scenic vista?

b. Would the project substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings in a state scenic highway?

There are no scenic resource areas or scenic vistas designated by the Ventura County General Plan (hereafter referred to as the General Plan) in the area of the CSUCI campus (Ventura County 2011). However, the project site may be visible from Lewis Road, which is designated as an “Eligible County” scenic highway in the General Plan. Although the project site is buffered from view by agricultural fields, the development of the proposed project site may have significant impacts on vistas from Lewis Road. Further analysis will be conducted in an Environmental Impact Report (EIR).

POTENTIALLY SIGNIFICANT IMPACT

c. Would the project substantially degrade the existing visual character or quality of the site and its surroundings?

The project site is currently vacant land that has been mowed and disced, with graded building pads and paved roads. The development of up to 600 multi-family and single-family residential units on the project site, which is currently entitled for 242 single-family residential units, would alter the visual character of the project site relative to what currently exists and relative to the visual character of the project site envisioned in the Specific Reuse Plan. The project site is currently designated for Low to Low-Medium Residential density (up to 10 units/acre) and would instead, under the proposed revision, be designated Low-Medium to Medium-High Residential density (10-20 units/acre).

The proposed building designs are consistent with the height and massing of residential development originally envisioned for the project site. The existing Specific Reuse Plan states:

> *The residential community is envisioned to be primarily two stories with one-story elements for massing relief. Three-story elements, if proposed, will tend to be located in interior or in vertical accent locations within the community.*

The proposed project would include two to three story townhomes at heights of 28 feet to 40 feet, three-story senior and market rate apartments at a height of 40 feet, and two-story single-family detached homes at a height of 28 feet. The proposed project is consistent with the vision for three-story elements to be located in interior or vertical accent locations, as three-story townhomes and apartments are planned for the interior of the residential area and in areas adjacent to Channel Islands Drive, while single-family houses and two-story townhomes are located along the northern and eastern boundaries.

The northern boundary of the project site would include nine single-family homes on the southern side of the eastern portion of Inspiration Point area of the site and two townhomes on the southern side of the western portion of the Inspiration Point area. There are potentially significant visual impacts in relation to development adjacent to the hillside within the Inspiration Point area, which will be further analyzed in the EIR.

In addition, construction of the new Inspiration Point culvert and crossing would alter the visual character of the existing drainage crossing, which is part of an unpaved, perimeter road. The proposed culvert would be composed of retaining walls and a steel corrugated culvert. It would be approximately 75 feet long and 30 feet wide with a paved surface, and would include concrete sidewalks and a brick façade in portions of the retaining walls above grade level.

As the proposed project would involve the development of a currently undeveloped site and at a density higher than that identified in the Specific Reuse Plan, impacts would be potentially significant and warrant further analysis in an EIR.

POTENTIALLY SIGNIFICANT IMPACT

d. Would the project create a new source of substantial light or glare that would adversely affect day or nighttime views in the area?

The addition of up to 600 residential units in the northern portion of the East Campus could increase light and glare impacts during daytime and nighttime hours relative to existing site conditions and entitled site development. Potential new sources of lighting include reflections from windows, illumination of exterior building areas, glare from lighted signage, and indoor lights from residential structures. Headlights from vehicles entering and exiting the project site at night could cast light onto roadways and surrounding properties. Construction vehicles could also add glare impacts and contribute headlights when operating in darker conditions. The nearest sensitive receptors are the residential buildings immediately south of the project site. Impacts related to light and glare would be potentially significant and will be further analyzed in an EIR.

POTENTIALLY SIGNIFICANT IMPACT

2 Agriculture and Forest Resources

	Potentially Significant Impact	Potentially Significant Unless Mitigation Incorporated	Less than Significant Impact	No Impact
Would the project have any of the following impacts?				
a. Convert Prime Farmland, Unique Farmland, Farmland of Statewide Importance (Farmland), as shown on maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use	☐	☐	☐	■
b. Conflict with existing zoning for agricultural use or a Williamson Act contract	☐	☐	☐	■
c. Conflict with existing zoning for or cause rezoning of forest land (as defined in Public Resources Code Section 12220(g)); timberland (as defined by Public Resources Code Section 4526); or timberland zoned Timberland Production (as defined by Government Code Section 51104(g))	☐	☐	☐	■
d. Result in the loss of forest land or conversion of forest land to non-forest use	☐	☐	☐	■
e. Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland to non-agricultural use	☐	☐	☐	■

a. Would the project convert Prime Farmland, Unique Farmland, Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?

b. Would the project conflict with existing zoning for agricultural use, or a Williamson Act contract?

c. Would the project conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code Section 12220(g)), timberland (as defined by Public Resources Code Section 4526), or timberland zoned Timberland Production (as defined by Government Code Section 51104(g))?

d. Would the project result in the loss of forest land or conversion of forest land to non-forest use?

e. Would the project involve other changes in the existing environment, which, due to their location or nature, could result in conversion of Farmland to non-agricultural use?

The project site is mostly vacant, features an array of roads and existing infrastructure, and does not contain any designated farmland or forest land. The proposed project would not result in any changes to the land use designation of any such lands. No impact would occur with respect to these issues and further analysis in an EIR is not warranted.

NO IMPACT

3 Air Quality

	Potentially Significant Impact	Potentially Significant Unless Mitigation Incorporated	Less than Significant Impact	No Impact
Would the project have any of the following impacts?				
a. Conflict with or obstruct implementation of the applicable air quality plan	■	☐	☐	☐
b. Violate any air quality standard or contribute substantially to an existing or projected air quality violation	■	☐	☐	☐
c. Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors)	■	☐	☐	☐
d. Expose sensitive receptors to substantial pollutant concentrations	■	☐	☐	☐
e. Create objectionable odors affecting a substantial number of people	☐	☐	■	☐

a. Would the project conflict with or obstruct implementation of the applicable air quality plan?

Vehicle use, energy consumption, and associated air pollutant emissions are directly related to growth. A project may be inconsistent with the Ventura County Air Quality Management Plan (AQMP) if it would generate population, housing, or employment growth that exceeds the forecasts used in the development of the AQMP.

The CSUCI campus lies in an aggregated non-growth area (AGA) of Ventura County. According to the Ventura County Air Quality Assessment Guidelines, a consistency determination with the AQMP for projects in a non-growth area is based on actual population growth relative to projected growth (VCAPCD 2003). If the current estimated population for the AGA is below the following year’s target population, and the proposed project conforms to the applicable General Plan designation, or in this case the Campus Master Plan designation, the proposed project is consistent with the AQMP. The proposed project would increase the number of East Campus dwelling units by up to 358 units relative to entitled conditions, and 600 units relative to existing conditions, thereby inducing local population growth. The proposed project’s consistency with the current AQMP will be analyzed in an EIR.

POTENTIALLY SIGNIFICANT IMPACT

b. Would the project violate any air quality standard or contribute substantially to an existing or projected air quality violation?

c. Would the project result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions that exceed quantitative thresholds for ozone precursors)?

According to the Ventura County Air Quality Assessment Guidelines, if a project is proposed to generate emissions above two pounds per day of reactive organic compounds (ROC) or nitrous oxides (NO_x), an assessment to evaluate consistency with the AQMP is required (VCAPCD 2003). This issue will be further analyzed in an EIR.

The Ventura County Air Pollution Control District (VCAPCD) has set significance thresholds for temporary construction-related and long-term operational emissions of air pollutants (VCAPCD 2003). Projects that comply with these thresholds would not have an individually or cumulatively significant impact and would not jeopardize attainment of federal and/or state standards for Ventura County.

Appendix F of the Air Quality Assessment Guidelines (VCAPCD 2003) provides a Project Screening Analysis table to determine whether a proposed project would potentially exceed significance thresholds for criteria pollutants and thus require further analysis for determination of significance. Using the numbers provided for analysis year 2020, a project with only 345 condominium/townhouse units, or 331 low-rise apartment units, or284 detached single family units would be within ROC or NO_x significance thresholds. The proposed project would involve construction of 120 attached and detached townhomes and houses and 480 low-rise apartment units. As the proposed project exceeds screening criteria guidelines, the proposed project merits further analysis to determine whether it would exceed significance thresholds. Impacts are potentially significant and warrant further analysis in an EIR.

POTENTIALLY SIGNIFICANT IMPACT

d. Would the project expose sensitive receptors to substantial pollutant concentrations?

Certain population groups, such as children, the elderly, and people with health problems, are particularly sensitive to air pollution. For the purposes of this analysis sensitive receptors are defined as land uses that are likely to be regularly used by these population groups and include health care facilities, retirement homes, school and playground facilities, and residential areas. Development of the proposed project would result in emissions associated with construction and operation. The project site is immediately adjacent to residential areas that may house children, the elderly, and people with health problems and would itself also include sensitive receptors once developed. Potential impacts to sensitive receptors may be significant and will be further reviewed in an EIR.

POTENTIALLY SIGNIFICANT IMPACT

e. Would the project create objectionable odors affecting a substantial number of people?

Residential uses typically do not create objectionable odors. However, odors would be generated by the operation of equipment during site preparation and the construction phases of the proposed residential units. Odors associated with construction would be emitted by diesel machinery, which includes oil or diesel fuel odors. The odors would be limited to the time that construction equipment is operating. Some of these odors may reach sensitive receptors south of the project site. All off-road construction equipment would be subject to the California Air Resources Board (ARB) anti-idling rule (SS2449(d)(2)), which limits idling to 5 minutes. Compliance with ARB rules would reduce impacts to less than significant levels.

LESS THAN SIGNIFICANT IMPACT

4 Biological Resources

	Potentially Significant Impact	Potentially Significant Unless Mitigation Incorporated	Less than Significant Impact	No Impact
Would the project have any of the following impacts?				
a. Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service	■	☐	☐	☐
b. Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service	☐	☐	☐	■
c. Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means	■	☐	☐	☐
d. Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites	☐	☐	☐	■
e. Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance	☐	☐	☐	■
f. Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?	☐	☐	☐	■

A reconnaissance-level site visit was conducted on November 10, 2016, to verify previously determined habitat conditions within the project area and identify potential biological resources within and adjacent to the project site for sensitive habitat and special-status species. The dominant plant species observed included wild fennel (*Foeniculum vulgare*), laurel sumac (*Malosma laurina*), brome (*Bromus* sp.), coyote bush (*Baccharis pilularis*), lemonade berry (*Rhus integrifolia*), white sage (*Salvia apiana*), and mallow

(*Malva* sp.). Additionally, one arroyo willow (*Salix lasiolepis*) and scattered mulefat (*Baccharis salicifolia*) shrubs were observed.

Federal, state, and local authorities under a variety of legislative acts share regulatory authority over biological resources. The primary authority for general biological resources lies within the land use control and planning authority of local jurisdictions, in this instance, the California State University. The California Department of Fish and Wildlife (CDFW) is a trustee agency for biological resources throughout the state under CEQA and also has direct jurisdiction under law through the California Fish and Game Code (CFGC). The state and federal Endangered Species Acts also provide direct regulatory authority over specially designated organisms and their habitats to CDFW and the U.S. Fish and Wildlife Service (USFWS). The U.S. Army Corps of Engineers (USACE) and Regional Water Quality Control Board (RWQCB) also have regulatory authority over specific resources, namely waters of the U.S., under Section 401 and 404 of the federal Clean Water Act (CWA). In response to their legislative mandates, regulatory authorities have designated sensitive biological resources to include those specific organisms that have regionally declining populations such that they may become extinct if population trends continue. Habitats are also considered sensitive biological resources if they have limited distributions, have high wildlife value, include sensitive species, or are particularly susceptible to disturbance.

a. Would the project have a substantial adverse effect, either directly or through habitat modifications, on any species identified as candidate, sensitive, or special status in local or regional plans, policies, or regulations, or by the CDFW or the USFWS?

The Specific Reuse Plan Amendment primarily involves the development of a modified residential project on land that has already been disturbed and graded, which would not adversely affect candidate, sensitive, or special status species. However, the proposed project also involves the demolition of a drainage culvert and crossing, and construction of a new approximately 75-foot long, 30-foot wide culvert with two reinforced concrete retaining walls. The Campus Master Plan FEIR (CSUCI 1998) identified the presence of arroyo willows adjacent to and downstream of the existing culvert, as well as several mulefat shrubs with an understory of cattails (*Typha* sp.) and sedges (*Carex* sp.). The Campus Master Plan FEIR determined that well-defined southern willow scrub habitat, which is a sensitive wetland plant community, was not present, but that this category best described the two areas. The 2016 reconnaissance-level site visit only identified one arroyo willow with scattered mulefat shrubs, confirming that this area has not developed into full southern willow scrub habitat. Plant species observed during the reconnaissance-level site visit were not indicative of an intact southern willow scrub community or other wetland habitat (i.e., cattail, sedges, or other hydrophytic vegetation were not observed), and were more typical of a dry river wash. Therefore, southern willow scrub habitat does not occur within the project site.

The Campus Master Plan FEIR did not identify any special-status species specifically within the drainage area. Additionally, the 2016 reconnaissance-level site visit did not identify any sensitive species or suitable habitat for sensitive species within the project site, including the area of Inspiration Point. However, the existing flood basin may provide suitable habitat for sensitive species including Least Bell's Vireo (*Vireo bellii pusillus*). Therefore, the proposed project could result in potentially significant impacts to sensitive species if modifications to the flood basin are required to accommodate stormwater flows.

Existing vegetation within and adjacent to the project areas could provide habitat for nesting birds that are protected under the Migratory Bird Treaty Act (MBTA) (16 United State Code Section 703-711) and CFGC (Section 3500). Protected birds include common songbirds, waterfowl, shorebirds, hawks, owls, eagles, ravens, crows, native doves and pigeons, swifts, martins, swallows, and others, including their body parts (e.g., feathers, plumes), nests, and eggs. The proposed project has the potential to impact migratory and other bird species if construction activities occur during the nesting/breeding/dispersal season, typically February 15 through September 15. Construction-related disturbances could result in nest abandonment or premature fledging of the young. Therefore, the proposed project could result in potentially significant impacts to sensitive species unless mitigation is incorporated.

Mitigation Measure

The following mitigation measure, in compliance with MBTA and CFGC requirements, is required to reduce potential impacts to nesting birds to a less than significant level.

BIO-1 To avoid disturbance of nesting and special-status birds, including raptorial species protected by the MBTA and CFGC, activities related to construction of the proposed project, including, but not limited to vegetation removal, ground disturbance, and construction and demolition, shall occur outside of the nesting season (February 1 through September 15). If construction activities during the nesting season cannot be avoided, a pre-construction nesting bird survey shall be conducted no more than seven days prior to initiation of ground disturbance and vegetation removal activities. The survey shall be conducted on foot and visually assess the entire project area, including a 300-foot line-of-site buffer (500-foot for raptors) using binoculars to the extent practical. The survey shall be conducted by a qualified biologist familiar with the identification of avian species known to occur in southern California coastal communities. If nests are found, an avoidance buffer (dependent upon the species, the proposed work activity, and existing disturbances associated with land uses outside of the site) shall be determined and demarcated by the biologist using bright orange construction fencing, flagging, construction lathe, or other means to mark the boundary. All construction personnel shall be notified as to the existence of the buffer zone and instructed to avoid entering the buffer zone during the nesting season. No ground disturbing activities shall occur within this buffer until the biologist has confirmed that breeding / nesting is completed and the young have fledged. Encroachment into the buffer shall occur only at the discretion of the qualified biologist.

Impacts to nesting birds would be mitigated to a less than significant level. However, potential modifications to the existing flood basin and feeding pipe to meet 100-year storm design standards would result in potentially significant impacts to sensitive species, such as Least Bell’s vireo. Therefore, impacts to sensitive species will be further analyzed in an EIR.

POTENTIALLY SIGNIFICANT IMPACT

b. Would the project have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, or regulations, or by the CDFW or USFWS?

Plant communities are considered sensitive biological resources if they have limited distributions, have high wildlife value, include sensitive species, or are particularly susceptible to disturbance. CDFW ranks sensitive communities as "threatened" or "very threatened" and keeps records of their occurrences in CNDDB.

Local or regional plans, policies, regulations, CDFW, and USFWS do not identify riparian habitat or other sensitive natural communities in the project site. Therefore, the proposed project would not have a substantial adverse effect on any sensitive natural community identified in local or regional plans, policies, or regulations, or by the CDFW or USFWS.

NO IMPACT

c. Would the project have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal) through direct removal, filling, hydrological interruption, or other means?

No wetland vegetation or hydric soils are associated with the unnamed northern drainage, and no wetlands as defined by the USACE were observed on the portion of the project site to be developed during the reconnaissance survey. However, the drainage channel contains approximately 0.009 acre of potential non-wetland waters of the U.S. (0.009 acre) and 0.025 acre of potential CDFW jurisdictional area, as defined by an ordinary high water mark, channel bed and bank, sediment sorting and deposition, wrack and debris, and/or shelving. Additionally, wetland habitat is expected to occur within the flood basin. Therefore, both the unnamed drainage and existing flood basin are potentially subject to USACE, RWQCB, and CDFW jurisdiction.

Impacts to wetlands and waters of the U.S. and State would be potentially significant and will be analyzed further in an EIR.

POTENTIALLY SIGNIFICANT IMPACT

d. Would the project interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?

The project site has been previously disturbed by grading and does not provide for any substantial movement or nursery habitat. The proposed project would not interfere with the movement of any native resident or migratory fish or wildlife species or affect any nursery sites. No impact would occur and further analysis of this issue in an EIR is not warranted.

NO IMPACT

e. Would the project conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?

The project site is part of a designated State and Federal facility and not legally subject to local planning or land use policies. Further discussion of this issue in the EIR is not warranted.

NO IMPACT

f. Would the project conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?

The project site is not within an area of any adopted Habitat Conservation Plan (CDFW 2015, USFWS 2016). Therefore, the proposed Specific Reuse Plan Amendment would not have an effect on areas subject to an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan. Further discussion of this issue in the EIR is not warranted.

NO IMPACT

5 Cultural Resources

	Potentially Significant Impact	Potentially Significant Unless Mitigation Incorporated	Less than Significant Impact	No Impact
Would the project have any of the following impacts?				
a. Cause a substantial adverse change in the significance of a historical resource as defined in §15064.5	☐	☐	☐	■
b. Cause a substantial adverse change in the significance of an archaeological resource as defined in §15064.5	☐	■	☐	☐
c. Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature	☐	■	☐	☐
d. Disturb any human remains, including those interred outside of formal cemeteries	☐	■	☐	☐

a. Would the project cause a substantial adverse change in the significance of a historical resource as defined in §15064.5?

The proposed project would not result in significant impacts to historical resources. No known historic resources exist onsite as the project site is vacant. Further discussion of this issue in the EIR is not warranted.

NO IMPACT

b. Would the project cause a substantial adverse change in the significance of an archaeological resource as defined in §15064.5?

c. Would the project directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?

d. Would the project disturb any human remains, including those interred outside of formal cemeteries?

The project site has previously been disturbed and graded. Previous grading activities did not uncover any archaeological, paleontological, or cultural resources, or any human remains. The likelihood that intact archaeological resources, paleontological resources, or human remains are present in the surficial soil layer is low. In the unlikely event that archaeological or paleontological resources are identified, as defined by Section 2103.2 of the Public Resources Code, the project site would be required to be treated in accordance with the provisions of Section 21083.2 of the Public Resources Code as appropriate.

It is possible that unanticipated cultural resource remains are encountered during construction or land modification activities, and continuation of work may damage or destroy archaeological or paleontological resources or human remains. If human remains are unearthed, State Health and Safety Code Section 7050.5 requires that no further disturbance shall occur until the County Coroner has made the necessary findings as to origin and disposition pursuant to Public Resources Code Section 5097.98. In addition, mitigation measure CR-1 would also be required. With incorporation of mitigation measure CR-1, impacts of the proposed project on cultural resources would be less than significant.

Mitigation Measure

The following mitigation measure is required to reduce impacts to cultural resources to a less than significant level.

CR-1 If unanticipated cultural deposits are encountered during any phase of project construction or land modification activities, work shall stop and the California State University, Board of Trustees shall be notified. A qualified archaeologist, defined as an archaeologist who meets the Secretary of the Interior's Standards for professional archaeology, shall be retained to assess the nature, extent, and potential significance of any cultural remains. If the resources are determined to be Native American in origin, the archaeologist would consult with the project proponent and the California State University, Board of Trustees to begin Native American consultation procedures, as appropriate (see Section 17, Tribal Cultural Resources, of the Environmental Checklist). If the discovery is determined to be not significant, work would be permitted to continue in the area. Potentially significant resources may require a Phase II subsurface testing program to determine the resource boundaries within the project site, assess the integrity of the resource, and evaluate the site's significance through a study of its features and artifacts. If, in consultation with the California State University, Board of Trustees, a discovery is determined to be significant, a mitigation plan would be prepared and carried out in accordance with State guidelines. If the resource cannot be avoided, a data recovery plan would be developed to ensure collection of sufficient information to address archaeological and historical research questions, with results presented in a technical report describing field methods, materials collected, and conclusions. Any cultural material collected as part of an assessment or data recovery effort would be curated at a qualified facility.

Impacts to cultural resources would be mitigated to a less than significant level by contacting an archaeologist to provide assessment of any cultural remains are unearthed during the project's construction. No further analysis of this issue in an EIR is warranted.

POTENTIALLY SIGNIFICANT UNLESS MITIGATION INCORPORATED

6 Geology and Soils

	Potentially Significant Impact	Potentially Significant Unless Mitigation Incorporated	Less than Significant Impact	No Impact
Would the project have any of the following impacts?				
a. Expose people or structures to potentially substantial adverse effects, including the risk of loss, injury, or death involving:	☐	☐	■	☐
1. Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault	☐	☐	■	☐
2. Strong seismic ground shaking	☐	☐	■	☐
3. Seismic-related ground failure, including liquefaction	☐	☐	■	☐
4. Landslides	☐	■	☐	☐
b. Result in substantial soil erosion or the loss of topsoil	☐	☐	■	☐
c. Be located on a geologic unit or soil that is made unstable as a result of the project, and potentially result in on or offsite landslide, lateral spreading, subsidence, liquefaction, or collapse	☐	■	☐	☐
d. Be located on expansive soil, as defined in Table 1-B of the *Uniform Building Code*, creating substantial risks to life or property	☐	■	☐	☐
e. Have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater	☐	☐	☐	■

a.1. Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault?

Alquist-Priolo Earthquake Fault Zones have been established throughout California by the California Geological Survey (CGS). These zones identify areas where potential surface rupture along an active fault could prove hazardous and identify where special studies are required to characterize the fault rupture hazard potential to habitable structures (CGS 2016). Known active faults near the project site include the Camarillo fault and the Simi-Santa Rosa fault system. The Camarillo fault is approximately 2.5 miles from the project site, and the Simi-Santa Rosa fault is approximately 4.5 miles from the project site. Both of these faults are considered active, and the Camarillo fault is designated as an Alquist-Priolo fault zone. However, no known fault lines cross through the project site and the design and construction of the proposed project would be required to comply with California Building Code (CBC) standards. Exposure of people or structures to significant adverse effects resulting from fault rupture would be less than significant. Further analysis of this issue in an EIR is not warranted.

LESS THAN SIGNIFICANT IMPACT

a.2. Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving strong seismic ground shaking?

The Camarillo and Simi-Santa Rosa faults could create substantial ground shaking if a seismic event occurred along either of those faults. Similarly, a strong seismic event on any other fault system in southern California has the potential to create considerable levels of ground shaking throughout the region. However, all new structures would be required to comply with all applicable provisions of the CBC. As a result the exposure of people or structures to significant adverse effects resulting from strong seismic ground shaking would be less than significant. Further analysis of this issue in an EIR is not warranted.

LESS THAN SIGNIFICANT IMPACT

a.3. Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving seismic-related ground failure, including liquefaction?

Liquefaction is a process whereby soil is temporarily transformed to fluid form during intense and prolonged ground shaking or because of a sudden shock or strain. Liquefaction typically occurs in areas where the groundwater is less than 30 feet from the surface and where the soils are composed of poorly consolidated fine to medium sand.

Groundwater depths underlying the East Campus exceed 30 feet and soils above and below groundwater level contain considerable amounts of clay (CSUCI Site Authority 2000). Thus, there is a low potential for liquefaction and other seismic-related ground failure. Any new construction would be required to follow CBC standards that address liquefaction hazards. Thus, this impact would be less than significant. Further analysis of this issue in an EIR is not warranted.

LESS THAN SIGNIFICANT IMPACT

a.4. Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving landslides?

During an earthquake event, the seismic shaking forces applied to native hillside areas can result in “seismically induced landslides.” These typically occur in areas of steeper hillsides, near the tops of ridges, where weathered surficial and bedrock materials are exposed on slopes, and in areas of prior landslides. The topography of the project site is relatively flat. The project site, however, is located near areas where earthquake-induced landslides are mapped and or/where landslide movement has occurred in the past according to the State of California Seismic Hazard Camarillo Quadrangle (California Department of Conservation 2002). There is a possibility for landslides, particularly if residual soils layered between flows of volcanic bedrock in the surrounding slopes are exposed by a slope excavation, as well as rockfalls and surface debris flows along natural slopes (Site Authority 2000).

Fugro West, Inc. conducted a geotechnical study in December 2000 for CSUCI that presents findings, conclusions, and recommendations concerning the geotechnical conditions in the East Campus Development area, including the proposed project site. Fugro West also prepared an addendum in 2007 that provides revised recommendations in anticipation of demolition of the existing Inspiration Point creek crossing and drainage culvert and construction of a new culvert and crossing, which would be included as part of the proposed project. Both documents are included in Appendix A.

The majority of the project site avoids hillside areas and slopes greater than 10 percent. Building pads along Inspiration Point and the road itself have been previously graded. Slopes adjacent to Inspiration Point crossing may exceed 10 percent. In addition, slopes occur to the north, and a landslide on adjacent lands could potentially expose people or structures to substantial adverse effects.

Mitigation Measures

The following mitigation measures are required to reduce geological and soil impacts to a less than significant level, including incorporating the recommendations of the Geotechnical Study: Cal State University Channel Islands East Campus Development (Site Authority 2000) in mitigation measure GEO-1 and potentially conducting a new geotechnical study, if needed in mitigation measure GEO-2.

GEO-1 **Incorporate recommendations of Geotechnical Study: Cal State University Channel Islands East Campus Development (Site Authority 2000).** Recommendations presented in the Geotechnical Study shall be incorporated at the project site. These recommendations include site preparation, excavation considerations, slope construction, subgrade stabilization measures, fill selection and compaction, shrinking and subsidence, shallow foundation design, retaining walls, bridge drilled pier foundation, utility trenching, pipe bedding, trench backfill, and pavements. A brief listing of the recommendations is below. A more detailed explanation of each recommendation is provided in the Geotechnical Report (Appendix A).

GEO-2 **Updates Geotechnical Study, as needed.** The applicability of the existing Geotechnical Study and Addendum for current site conditions and construction/ grading plan will be assessed by a geotechnical consultant. If recommendations in the existing Geotechnical Study and Addendum are no longer applicable to existing conditions, updates and/or a new geotechnical study will be required. Recommendations resulting from the new study shall be incorporated into the proposed project to mitigate geological hazards to a less than significant level.

Impacts to landslide and other geological hazards would be mitigated to a less than significant level once all recommendations by the Geotechnical Report (2000) and any future updates are incorporated. No further analysis of this issue in an EIR is warranted.

POTENTIALLY SIGNIFICANT UNLESS MITIGATION INCORPORATED

b. Would the project result in substantial soil erosion or the loss of topsoil?

Erosion is a normal and inevitable geologic process whereby earth materials are loosened, worn away, decomposed, or dissolved and are then removed from one place and transported to another. Preparing land for construction can remove ground cover, exposing soils to wind erosion.

The majority of the project site is generally flat and has been previously disturbed, which limits the potential for substantial soil erosion. However, construction of the Inspiration Point culvert and crossing could result in erosion along the banks of the drainage. Modifications to the flood basin and the RCP feeding to the flood basin would require excavation and construction along Channel Islands Drive and in the flood basin itself that could also result in erosion. The proposed project would be required to comply with the California State Construction General Permit (Order No. 2009-2009-DWQ) and implement a Stormwater Pollution Prevention Plan (SWPPP), which would include best management practices (BMP) for erosion and sediment control during construction. Compliance with construction BMPs would reduce impacts associated with soil erosion and the loss of topsoil to less than significant levels. Further analysis of this issue in an EIR is not warranted.

LESS THAN SIGNIFICANT IMPACT

c. Would the project be located on a geologic unit or soil that is unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse?

Subsidence is the sudden sinking or gradual downward settling of the earth's surface with little or no horizontal movement. Subsidence is caused by a variety of activities that include, but are not limited to, withdrawal of groundwater, pumping of oil and gas from underground, the collapse of underground mines, liquefaction, and hydrocompaction. Lateral spreading is the horizontal movement or spread of soil toward an open face. The potential for failure from subsidence and lateral spreading is highest in areas where the groundwater table is high and where relatively soft and recent alluvial deposits exist. Lateral spreading hazards may also be present in areas with liquefaction risks.

The Ventura County General Plan Subsidence Zones Map does not identify the project site as being located in an area where subsidence is probable (Ventura County 2011). As discussed in item a.3. in this section of the Environmental Checklist, the project site is located on a geologic unit with low risk for lateral spreading, subsidence, liquefaction, collapse, or landslides, although it is near slopes that may experience landslides. Any new construction would be required to follow CBC standards that address liquefaction hazards, including strengthening the foundation and footings.

An existing culvert and its associated foundations are proposed to be demolished prior to construction of the new Inspiration Point crossing. Since foundation plans for the existing crossings are not available, only estimations of removal depths during demolition are provided. Excavation depths may be increased based on conditions. In addition, due to thick brush and difficult access during a field investigation, actual subsurface conditions are unknown at the exact locations of the proposed footings for the new crossing. It is also unknown if dewatering would be required during demolition or construction. Due to these unknown factors, there is potential for on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse. Incorporation of Mitigation Measures GEO-1 and GEO-2 above and GEO-3 below, would reduce impacts to less than significant levels.

Mitigation Measure

The following mitigation measure is required to reduce impacts related to soil stability during construction of the Inspiration Point crossing to a less than significant level.

GEO-3 **Incorporate recommendations of 2007 Geotechnical Study Addendum.** The proposed project shall incorporate the recommendations presented in the Geotechnical Study Addendum (Site Authority 2007; attached as Appendix A), including, but not limited to observations during demolition, excavation and the use of appropriate backfill material, to mitigate geological hazards to a less than significant level.

Impacts to soil stability would be mitigated to a less than significant level with incorporation of the above mitigation measure. No further analysis of this issue in an EIR is warranted.

POTENTIALLY SIGNIFICANT UNLESS MITIGATION INCORPORATED

d. Would the project be located on expansive soil, as defined in Table 1-B of the Uniform Building Code, creating substantial risks to life or property?

Expansive soils generally contain high percentages of clay. The Geotechnical Study identified the presence of near-surface clay with medium and high to very high expansiveness at the project site. The study provided recommendations for mitigating the expansiveness of soils at the project site. All development would be required to comply with the Uniform Building Code (UBC) and the CBC and incorporate Mitigation Measures GEO-1, GEO-2, and GEO-3. Compliance with building standards and incorporation of mitigation measures would reduce impacts related to expansive soils to a less than significant level. Further analysis of this issue in an EIR is not warranted.

POTENTIALLY SIGNIFICANT UNLESS MITIGATION INCORPORATED

e. Would the project have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater?

The CSUCI campus is serviced by two gravity-flow sewage collection systems, and wastewater generated onsite is currently treated at the adjacent Camrosa Wastewater Treatment Facility. The proposed project would connect into this system and would not utilize septic tanks. Therefore, further discussion of this issue in the EIR is not warranted.

NO IMPACT

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7 Greenhouse Gas Emissions

	Potentially Significant Impact	Potentially Significant Unless Mitigation Incorporated	Less than Significant Impact	No Impact
Would the project have any of the following impacts?				
a. Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment	■	☐	☐	☐
b. Conflict with any applicable plan, policy, or regulation adopted to reduce the emissions of greenhouse gases	■	☐	☐	☐

a. Would the project generate GHG emissions, either directly or indirectly, that may have a significant impact on the environment?

b. Would the project conflict with any applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of greenhouse gases?

Construction and operation of the proposed project would generate additional GHG emissions, primarily from vehicle trips that would result in the burning of fossil fuels. The adopted CEQA Guidelines provide regulatory guidance on the analysis and mitigation of GHG emissions in CEQA documents, while giving lead agencies the discretion to set quantitative or qualitative thresholds for the assessment and mitigation of GHGs and climate change impacts. While the VCAPCD has not yet set significant threshold options for Ventura County, it has stated a preference for GHG threshold consistency with the South Coast AQMD (SCAQMD) and the SCAG region in a white paper, “Greenhouse Gas Thresholds of Significance Options for Land Use Development Projects in Ventura County” (VCAPCD 2011). In the latest guidance provided by the SCAQMD’s GHG CEQA Significance Threshold Working Group, SCAQMD considered a tiered approach to determine the significance of residential and commercial projects. The draft-tiered approach is outlined in the meeting minutes, dated September 28, 2010.

Tier 1 - *If the project is exempt from further environmental analysis under existing statutory or categorical exemptions, there is a presumption of less than significant impacts with respect to climate change. If not, then the Tier 2 threshold should be considered.*

Tier 2 - *Consists of determining whether or not the project is consistent with a GHG reduction plan that may be part of a local general plan, for example. The concept embodied in this tier is equivalent to the existing concept of consistency in CEQA Guidelines section 15064(h)(3), 15125(d) or 15152(a). Under this Tier, if the proposed project is consistent with the qualifying local GHG reduction plan, it is not significant for GHG emissions. If there is not an adopted plan, then a Tier 3 approach would be appropriate.*

Tier 3 - *Establishes a screening significance threshold level to determine significance. The Working Group has provided a recommendation of 3,500 MT CO_2e per year for residential projects.*

Further analysis in an EIR will estimate GHG emissions generated by the proposed project and compare project emissions to SCAQMD’s Tier 3 threshold for residential projects. In addition, while CSUCI does not have a certified GHG reduction plan for the campus, the CSU has committed to reducing CO_2 emissions by 15 percent to reach 1990 levels by 2020, and 80 percent below 1990 levels by 2040 (CSU 2014). Further analysis in an EIR will assess whether the proposed project would impede achievement of these goals and analyze the proposed project's consistency with relevant campus policies. Impacts to GHG emissions may be potentially significant and will be analyzed in an EIR.

POTENTIALLY SIGNIFICANT IMPACT

8 Hazards and Hazardous Materials

	Potentially Significant Impact	Potentially Significant Unless Mitigation Incorporated	Less than Significant Impact	No Impact
Would the project have any of the following impacts?				
a. Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials	☐	☐	■	☐
b. Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment	☐	☐	■	☐
c. Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within 0.25 mile of an existing or proposed school	☐	☐	■	☐
d. Be located on a site that is included on a list of hazardous material sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?	☐	☐	■	☐
e. For a project located in an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard for people residing or working in the project area	☐	☐	☐	■
f. For a project near a private airstrip, would it result in a safety hazard for people residing or working in the project area	☐	☐	☐	■
g. Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan	☐	☐	■	☐
h. Expose people or structures to a significant risk of loss, injury, or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands	☐	☐	■	☐

a. Would the project create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?

The proposed project would involve the construction of multi-family residential, age restricted apartments, and for-sale single family detached and townhomes units in East Campus. No production or manufacturing of any kind that would involve the use or transport of hazardous materials would occur on the project site and operation of the new residences and associated amenities would not involve the routine transport, use or disposal of hazardous substances, other than minor amounts typically used for maintenance. In the event that hazardous materials are used on site, their use, disposal, and transport would be subject to compliance with existing regulations, standards, and guidelines established by the Federal, State, and local agencies, such as the Hazardous Materials Transportation Act, Resource Conservation and Recovery Act, the California Hazardous Material Management Act, and the California Code of Regulations, Title 22. Adherence to these requirements would reduce impacts to a less than significant level. Further analysis of this issue in an EIR is not warranted.

LESS THAN SIGNIFICANT IMPACT

b. Would the project create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?

The proposed project would involve the construction of new residential units and ancillary facilities on vacant land. This activity and resulting uses are unlikely to involve more than minor amounts of hazardous materials. Thus, the proposed project would not create a significant hazard to the public or the environment through the accidental release of hazardous materials, and impacts would be less than significant. Further analysis of this issue in an EIR is not warranted.

LESS THAN SIGNIFICANT IMPACT

c. Would the project emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within 0.25 mile of an existing or proposed school?

The proposed project would occur on a university campus. The nearest K-12 schools are over three miles from the project site. Operation of the proposed project would not involve the use or transport of hazardous materials and development would not require any demolition of existing structures. Therefore, impacts related to hazardous emissions or materials affecting school sites would be less than significant and further analysis of this issue in an EIR is not warranted.

LESS THAN SIGNIFICANT IMPACT

d. Would the project be located on a site included on a list of hazardous material sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?

The following databases were checked on August 30, 2016 for known hazardous materials contamination pursuant to Government Code Section 65962.5:

- GeoTracker (California State Water Resources Control Board)
- EnviroStor (California Department of Toxic Substances Control)
- Comprehensive Environmental Response, Compensation, and Liability Information System database
- Cortese list of Hazardous Waste and Substances Sites
- EnviroMapper (U.S. Environmental Protection Agency)

The following hazardous materials sites were located within 0.5 miles of the project site:

- Leaking Underground Storage Tank (LUST) Cleanup Site- Case Closed: Thornhill Ranch (2350 Portrero Road, Camarillo, California 93010)
- LUST Cleanup Site-Case Closed: Camarillo State Hospital (1878 Lewis Road, Camarillo, California 93010)
- WDR (waste discharge requirement): Highwest Nursery Inc., approved permit for small domestic wastewater treatment system (8620 Santa Rosa Road, Camarillo, California 93012)
- Permitted Underground Storage Tank: OLS Energy-Camarillo (1947 Portrero Road, Camarillo, California 93012)
- LUST Cleanup Site-Case closed: Camrosa Treatment Plant (1574 Lewis Road, Camarillo, California 93010)

None of these sites occur at the project site or within 1,000 feet of the project site. In addition, the nearest hazardous site (Thornhill Ranch) is a LUST site for which cleanup has already been completed. Impacts would be less than significant and further analysis of these issues is not warranted.

LESS THAN SIGNIFICANT IMPACT

e. For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard for people residing or working in the project area?

The nearest public airport is Camarillo Airport, which is located approximately 3.75 miles northwest of the project site. The project site is not located in an airport land use plan or within two miles of a public airport. Although the project site does occasionally get fly overs from the Naval Base at Port Hueneme, this would not pose a safety hazard for people residing or working in the project area. No impact would occur and further analysis of these issues is not warranted.

NO IMPACT

f. For a project near a private airstrip, would it result in a safety hazard for people residing or working in the project area?

There is no private airstrip within two miles of the project site. No impact would occur and further analysis of these issues is not warranted.

NO IMPACT

g. Would the project impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?

h. Would the project expose people or structures to a significant risk of loss, injury, or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands?

The CSUCI campus lies in a Local Responsibility Area (LRA), meaning that the County is responsible for fire protection and not the federal or state government. The campus lies in an area designated as having Very High and High Fire Hazard Severity by Cal FIRE (Cal FIRE 2007). The campus lies within a mile of the Boney Mountains State Wilderness Area, at the foothills of the Santa Monica Mountains. To mitigate fire hazard, 35 acres along the eastern border of the campus were acquired and cleared of fuels to serve as a fire buffer zone. The Ventura County Fire Department Station 50 and Station 54 are located about 5.5 miles away by road, and the Point Mugu Fire Station is located 5.8 miles away by road.

The proposed project would not interfere with an adopted emergency response plan or emergency evacuation plan and would not increase the risk of fire hazard to people or structures. The impact is less than significant and discussion of this issue in the EIR is not warranted.

LESS THAN SIGNIFICANT IMPACT

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9 Hydrology and Water Quality

	Potentially Significant Impact	Potentially Significant Unless Mitigation Incorporated	Less than Significant Impact	No Impact
Would the project have any of the following impacts?				
a. Violate any water quality standards or waste discharge requirements	☐	☐	■	☐
b. Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering or the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level that would not support existing land uses or planned uses for which permits have been granted)	☐	☐	■	☐
c. Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner that would result in substantial erosion or siltation on- or off-site	■	☐	☐	☐
d. Substantially alter the existing drainage pattern of the site or area, including the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner that would result in flooding on or offsite	■	☐	☐	☐
e. Create or contribute runoff water that would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff	■	☐	☐	☐
f. Otherwise substantially degrade water quality	☐	☐	■	☐
g. Place housing in a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary, Flood Insurance Rate Map, or other flood hazard delineation map	☐	☐	☐	■
h. Place structures in a 100-year flood hazard area that would impede or redirect flood flows	☐	☐	☐	■

	Potentially Significant Impact	Potentially Significant Unless Mitigation Incorporated	Less than Significant Impact	No Impact
i. Expose people or structures to a significant risk of loss, injury, or death involving flooding, including that occurring as a result of the failure of a levee or dam	■	☐	☐	☐
j. Result in inundation by seiche, tsunami, or mudflow	☐	☐	■	☐

a. Would the project violate any water quality standards or waste discharge requirements?

Construction of the proposed project would include excavation and grading activities that may result in soil erosion and sedimentation that could degrade water quality without the implementation of existing laws and regulations.

Development of the proposed project would create more than 10,000 square feet of impervious surface, therefore, the proposed project would be subject to the National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer Systems (MS4) Permit for non-traditional small entities, as set by Order No. 2013-0001-DWQ, and issued by the Los Angeles Regional Water Quality Control Board. This permit would require retention or biofiltration BMPs to capture or treat the stormwater quality design volume (or flow). The proposed project would also be required to comply with the California State Construction General Permit (Order No. 2009-2009-DWQ) and implement a SWPPP, which would include BMPs to prevent stormwater pollution during construction.

As previously described in Section 9, Description of Project, of the Initial Study, onsite water quality treatment would be managed with multiple bio-filtration/bio-planter systems throughout the project site to meet MS4 Phase II Permit requirements and the requirement set forth in the CSUCI Stormwater Implementation Program (Huitt-Zollars 2016). Bio-filtration/bio-planter systems would be required at all inlet locations to the public storm drain system. Catch basin inserts will also be installed to meet the California Zero Trash Policy. Treated on-site water would comingle with offsite water downstream from the project site and be stored in the existing flood control basin along Camarillo Street.

Overall, compliance with existing laws and regulations would ensure that impacts associated with water quality standards and waste discharge requirements would be less than significant. Therefore, further analysis of this issue in an EIR is not warranted.

LESS THAN SIGNIFICANT IMPACT

b. Would the project substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering or the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level that would not support existing land uses or planned uses for which permits have been granted)?

The project site does not overlie any groundwater basin. The Calleguas Creek, approximately one mile west of the project overlies the Pleasant Valley Groundwater Basin, designated a Critically Over Drafted Basin and a High Priority for groundwater management (DWR 2016). However, as the project site does not overlie a groundwater basin and all project related runoff would be directed to a drainage basin that allows percolation of stormwater, the proposed project would not substantially decrease groundwater supplies nor interfere substantially with groundwater recharge. This impact would be less than significant. Further analysis of this issue in an EIR is not warranted.

LESS THAN SIGNIFICANT IMPACT

c. Would the project substantially alter the existing drainage pattern of the site or area, including by altering the course of a stream or river, in a manner that would result in substantial erosion or siltation on or offsite?

d. Would the project substantially alter the existing drainage pattern of the site or area, including the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner that would result in flooding on or offsite?

The proposed project may alter the existing drainage pattern on the project site and surrounding area. The existing RCP that feeds into the flood basin along Camarillo Street and the flood basin itself may require modifications to meet 100-year storm event design standards. Construction and modifications could alter the drainage pattern on or offsite.

The proposed project would also include alterations to the existing storm drain system at the project site (Figure 7, Storm Drain Master Plan) to accommodate the site layout, but would not change points of discharge into onsite and offsite drainages. The proposed project would also include replacement of the existing culvert on the northern unnamed drainage with a new culvert and crossing to access Inspiration Point. The existing culvert is undersized for a 100-year storm flow and could result in flooding in adjacent lots due to backflow. Thus, the proposed alterations to existing drainage would improve existing conditions with regards to flooding. Due to potential and required modifications to the existing drainage system on and offsite, impacts would be potentially significant and warrant further analysis in an EIR.

POTENTIALLY SIGNIFICANT IMPACT

e. Would the project create or contribute runoff water that would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff?

The proposed project would create new impervious surfaces at a site that currently consists of open, unpaved lots and an unpaved access road at Inspiration Point. Currently entitled development at the project site would also result in paving of open lots in the main body of the project site. The proposed project would additionally involve the construction of a new paved crossing and culvert at Inspiration Point. Resident activities, such as vehicle use or car washing, would generate runoff and could contribute to contamination of runoff. The proposed project would include features to reduce runoff impacts. Bio-filtration/bio-planter systems would be provided at all inlet locations to the public storm drain system and catch basin inserts would also be installed to reduce runoff and contamination of stormwater. In addition, the proposed project may include upgrades to the existing RCP feeding into the flood control basin along Carrillo Street and the flood basin itself in order to increase capacity to handle a 100-year storm event. For this reason and because the proposed project would increase potential sources of runoff and contamination, impacts would potentially be significant and warrant further analysis in an EIR.

POTENTIALLY SIGNIFICANT IMPACT

f. Otherwise substantially degrade water quality?

The proposed project would not provide substantial additional sources of polluted runoff that would degrade water quality. The proposed project would be required to comply with the campus MS4 Phase II permit and the California State Construction General Permit (Order No. 2009-2009-DWQ). The proposed project would be required to implement a SWPPP that would include BMPs to protect water quality. BMPs would reduce polluted runoff from the project site by retaining, treating, or infiltrating polluted runoff onsite. Adherence to MS4 and Construction General Permit requirements to capture and treat stormwater runoff would reduce the quantity and level of pollutants in runoff leaving the site. Because the proposed project would be required to use BMPs, it would not cause a negative effect on Calleguas Creek to the west of the project site. Runoff from the project site would be channeled by a system of storm drains and curbs and gutters that discharge directly into, or into drainages that flow to, the existing flood control basin along Camarillo Street (Figure 7). Bio-filtration/bio-planter systems would be placed at all inlet locations to the public storm drain system and catch basin inserts would also be installed. The existing storm drain system would be modified to accommodate the site layout for the proposed project and would be designed to meet the needs of the proposed project. Therefore, the proposed project would not result in an exceedance of capacity for the planned storm drain system, provide substantial additional sources of polluted runoff, or otherwise degrade water quality. No significant impact would occur and further analysis of this issue in an EIR is not warranted.

LESS THAN SIGNIFICANT IMPACT

g. Would the project place housing in a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary, Flood Insurance Rate Map, or other flood hazard delineation map?

h. Would the project place in a 100-year flood hazard area structures that would impede or redirect flood flows?

The project site lies in Flood Zone X, an area outside of the Federal Emergency Management Agency (FEMA) 100-year flood. No housing or structures would be placed in a 100-year flood hazard area. There would be no impact.

NO IMPACT

i. Would the project expose people or structures to a significant risk of loss, injury, or death involving flooding including that occurs as a result of the failure of a levee or dam?

According to the Hazard Mitigation Plan for Ventura County (Ventura County 2010) the project site is not located in a dam inundation area and is not subject to flooding due to dam or levee failure. However, the existing culvert at Inspiration Point is currently undersized for a 100-year storm. There is also potential that the existing flood control basin along Camarillo Street and the 96-inch RCP that feeds into the basin are also inadequately designed for a 100-year storm (Huitt-Zollars 2016). To address these issues, the proposed project would include construction of a new crossing and culvert at Inspiration Point to ensure adjacent lots would not experience flooding during a 100-year storm event and to ensure safe access during a high flow storm event. The proposed project would also include an evaluation of the existing flood control basin along Camarillo Street and the RCP prior to construction to ensure they are adequately designed for a 100-year storm event given the proposed development. Modifications to the basin and RCP, if needed, would be implemented as part of the proposed project are included as part of the project evaluated in this Initial Study. Due to the potential for the existing RCP and flood control basin to be undersized for a 100-year storm event and the need to replace the existing culvert at Inspiration Point, the proposed project’s impact on flood hazards may be potentially significant and warrant further analysis in an EIR.

POTENTIALLY SIGNIFICANT IMPACT

j. Would the project result in inundation by seiche, tsunami, or mudflow?

A tsunami is a series of traveling ocean waves of extremely long length generated primarily by vertical movement on a fault (earthquake) occurring along the ocean floor. The project site is located approximately 5.2 miles from the coastline and approximately 2,000 feet from the Calleguas Creek. The project site is also not located near a large inland body of water that could generate a seiche during seismic ground shaking. According to the County of Ventura General Plan Hazards Appendix, the project site is located in a low hazard area for tsunamis or seiches (Ventura County 2011). Therefore, impacts would be less than significant.

LESS THAN SIGNIFICANT IMPACT

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10 Land Use and Planning

	Potentially Significant Impact	Potentially Significant Unless Mitigation Incorporated	Less than Significant Impact	No Impact
Would the project have any of the following impacts?				
a. Physically divide an established community	☐	☐	☐	■
b. Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including but not limited to the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect	■	☐	☐	☐
c. Conflict with an applicable habitat conservation plan or natural community conservation plan	☐	☐	☐	■

a. Would the project physically divide an established community?

The proposed project involves the development of new residences within the CSUCI East Campus area. The proposed project would not involve a road or other facility that would physically divide an established community; rather, it would complete the final phase of this planned development area. The proposed development would blend into the fabric of the already established campus. Therefore, no impact would occur.

NO IMPACT

b. Would the project conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including but not limited to the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect?

The project site is currently designated Low to Low-Medium density residential in the Specific Reuse Plan. The Specific Reuse Plan Amendment would increase the density of development allowed on the project site to Low-Medium to Medium-High density residential development. This topic and the potential for any conflicts to occur will be reviewed further in an EIR.

POTENTIALLY SIGNIFICANT IMPACT

c. Would the project conflict with an applicable habitat conservation plan or natural community conservation plan?

No Habitat Conservation Plan or Natural Community Conservation Plan applies to Ventura County. Therefore, the proposed project would not pose a conflict (CDFW 2015, USFWS 2016). No impact would occur, and further analysis of this issue is not warranted.

NO IMPACT

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11 Mineral Resources

	Potentially Significant Impact	Potentially Significant Unless Mitigation Incorporated	Less than Significant Impact	No Impact
Would the project have any of the following impacts:				
a. Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?	■	☐	☐	■
b. Result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan, or other land use plan?	☐	☐	☐	■

a. Would the project result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?

b. Would the project result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan, or other land use plan?

The project site is not designated as a known mineral resource site on the Ventura County General Plan Resource Protection Map (Ventura County 2011). No mineral resources that would be of value to the region and the residents of the state are known to exist. Likewise, no mineral recovery sites have been identified on the project site. Given the present residential and academic uses in the surrounding areas, mineral resource extraction would not be considered a compatible use. The proposed project would have no impact on mineral resources. Further discussion of this issue in the EIR is not warranted.

NO IMPACT

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12 Noise

	Potentially Significant Impact	Potentially Significant Unless Mitigation Incorporated	Less than Significant Impact	No Impact
Would the project result in any of the following impacts?				
a. Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies	■	☐	☐	☐
b. Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels	■	☐	☐	☐
c. A substantial permanent increase in ambient noise levels above those existing prior to implementation of the project	■	☐	☐	☐
d. A substantial temporary or periodic increase in ambient noise levels in the project vicinity above those existing prior to implementation of the project	■	☐	☐	☐
e. For a project located in an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels	☐	☐	☐	■
f. For a project near a private airstrip, would it expose people residing or working in the project area to excessive noise	☐	☐	☐	■

a. Would the project result in exposure of persons to, or generation of noise levels in excess of, standards established in the local general plan or noise ordinance, or applicable standards of other agencies?

c. Would the project result in a substantial permanent increase in ambient noise levels above levels existing without the project?

d. Would the project result in a substantial temporary or periodic increase in ambient noise levels in the project vicinity above those existing prior to implementation of the project?

The project site is currently vacant and lies in a part of East Campus that is as yet undeveloped. Consequently, the project site experiences minimal noise from pedestrians and transportation-related sounds from automobiles, trucks, and motorcycles. Construction and operation activities associated with the proposed project would increase noise levels in the vicinity of the project site and along transportation corridors. Development of the project site would introduce new, temporary sources of noise due to construction and new long-term sources of noise due to project-generated traffic and operation. Operational noises would include sounds typically associated with residential communities, such as conversations, doors closing, music playing, cars starting, and trash hauling.

An increase in traffic associated with the proposed projects and operational noise generated onsite could impact nearby sensitive receptors. Temporary noises due to construction activities could also impact sensitive receptors. These receptors include residences located to the south of the project site. The proposed project is separated from adjacent residences by a two-lane roadway. Given the proximity of the project to nearby sensitive receptors, temporary and long-term noise impacts could potentially be significant and will be further analyzed in an EIR.

POTENTIALLY SIGNIFICANT IMPACT

b. Would the project result in exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels?

Vibration is a unique form of noise because its energy is carried through buildings, structures, and the ground, whereas noise is simply carried through the air. Thus, vibration is generally felt rather than heard.

The proposed project would involve construction activities, such as grading and excavation. These activities are anticipated to result in some vibration that could affect nearby residential receptors. Operation of the proposed project would not perceptibly increase ground-borne vibration or ground-borne noise above existing conditions. Due to the presence of residences near the project site, temporary groundborne vibration associated with construction activity could affect sensitive receptors. Impacts could be potentially significant and will be further analyzed in an EIR.

POTENTIALLY SIGNIFICANT IMPACT

e. For a project located in an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?

The project site is not located in the jurisdiction of an airport land use plan and is more than two miles from the nearest public airport, Camarillo Airport (approximately 3.75 miles). There would be no impact related to proximity to an airport land use plan or within two miles of a public airport and further analysis in an EIR is not warranted.

NO IMPACT

f. For a project in the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise?

There is no private air strip in or adjacent to the project site. There would be no impact relative to proximity to a private airstrip and further analysis in an EIR is not warranted.

NO IMPACT

13 Population and Housing

	Potentially Significant Impact	Potentially Significant Unless Mitigation Incorporated	Less than Significant Impact	No Impact
Would the project result in any of the following impacts?				
a. Induce substantial population growth in an area, either directly (e.g., by proposing new homes and businesses) or indirectly (e.g., through extension of roads or other infrastructure)	☐	☐	■	☐
b. Displace substantial amounts of existing housing, necessitating the construction of replacement housing elsewhere	☐	☐	☐	■
c. Displace substantial numbers of people, necessitating the construction of replacement housing elsewhere	☐	☐	☐	■

a. Would the project induce substantial population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?

The proposed Specific Reuse Plan Amendment would increase available housing by up to 358 units above that which is currently entitled, increasing the number of potential residences from 242 single-family residences up to 600 multi-family, single-family, and income/age-restricted residential units. This would induce population growth on the CSUCI Campus.

The California Department of Finance (DOF) states that the population of Ventura County in 2016 is 856,508 persons (DOF 2016). The DOF estimates that there are approximately 3.05 persons per household in Ventura County (DOF 2016). Based on this average, a 600-unit project would accommodate approximately 1,830 people. Consequently, the proposed project alone would increase the population of Ventura County to approximately 858,338 persons. This falls within the 2040 population projection for Ventura County utilized by the Southern California Associate of Government (SCAG) 2016 Regional Transportation Plan-Sustainable Communities Strategy (RTP/SCS) document (SCAG 2016). Furthermore, the proposed project would not extend roads and infrastructure into an undeveloped area and thus, indirectly contribute to further population growth. Impacts to population growth would be less than significant. Further analysis of this issue in an EIR is not warranted.

LESS THAN SIGNIFICANT IMPACT

b. Would the project displace substantial numbers of existing housing, necessitating the construction of replacement housing elsewhere?

c. Would the project displace substantial numbers of people, necessitating the construction of replacement housing elsewhere?

The proposed project would increase housing opportunities for the University Glen Community by up to 600 additional units. As the project site is currently vacant, it would not displace existing housing or any people. No existing housing units would be removed as part of the project. Therefore, no impact to existing housing would occur and a further discussion of this issue in the EIR is not warranted.

NO IMPACT

14 Public Services

	Potentially Significant Impact	Potentially Significant Unless Mitigation Incorporated	Less than Significant Impact	No Impact
Would the project result in any of the following impacts?				
a. Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, or the need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the public services:				
1. Fire protection	■	☐	☐	☐
2. Police protection	■	☐	☐	☐
3. Schools	☐	☐	■	☐
4. Parks	■	☐	☐	☐
5. Other public facilities	☐	☐	■	☐

a.1. Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, or the need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for fire protection?

Fire protection for the entire campus is presently provided by the Ventura County Fire Protection District (VCFPD). Station 54 is the nearest fire station, located approximately five miles from the campus, at Pickwick Drive and Arneill Road in the city of Camarillo. Station 50 is the second nearest station, approximately 5.7 miles from the campus, on Las Posas Road near Camarillo Center Drive. The proposed development would increase the local population by approximately 1,830 persons relative to existing conditions. The increase in population resulting from the proposed project and the distance of the campus from existing fire protection facilities could potentially result in a significant physical impact related to the need to provide new or physically altered facilities. This issue will be further analyzed in an EIR.

POTENTIALLY SIGNIFICANT IMPACT

a.2. Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, or the need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for police protection?

Police protection services are provided by the University Police Department staffed by state police officers. The police station is on the main campus about one mile away on Camarillo Street near the Administration Building. The University provides and funds police protection and traffic law enforcement services for the campus and University Glen. Services would increase as development progresses and demand for protection rises. Additional staff may be necessary in the future as the entire campus continues to develop. Impacts may be potentially significant and further analysis in an EIR is warranted.

POTENTIALLY SIGNIFICANT IMPACT

a.3. Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, or the need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for schools?

As of January 1987, State law allows school districts to levy three different levels of development fees directly on new residential, commercial, and industrial development (Government Code Section 65995). School districts set their own fees within the limits set by the law, based on a nexus study establishing their funding requirements. Pursuant to Senate Bill 50 (Section 65995[h]), payment of mandatory impact fees by a private development partner to the affected school district for public-private developments would reduce school facility impact fees to a less than significant level under CEQA. Therefore, with payment of school facility impact fees, the proposed project would have a less than significant impact related to the need for construction of new schools or alteration of existing schools. Further analysis of this issue in an EIR is not warranted.

LESS THAN SIGNIFICANT IMPACT

a.4. Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, or the need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for parks?

The proposed project would result in a population increase (over the existing condition) of up to 1,830 persons. The proposed project includes 2.8 acres of recreation and park land. No specific trails are identified in the Campus Master Plan on the project site, but some hiking trails are expected to be developed at or connecting to the project site. Given the number of new residents when compared to the amount park area provided within the project site, the proposed project could have a potentially significant impact on existing recreational facilities and/or result in the need for new or expanded facilities. Impacts would be potentially significant and will be analyzed further in an EIR.

POTENTIALLY SIGNIFICANT IMPACT

a.5. Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, or the need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for other public facilities?

Library services are provided by the John Spoor Broome Library located at 50 Camarillo Street, within walking distance of the project site. The proposed project would increase the population by an estimated 1,830 residents over existing conditions. Residents may use existing library facilities, but increased demand would be nominal. This impact would be less than significant and further analysis of this issue in an EIR is not warranted.

No impacts to other governmental facilities are anticipated as a result of the proposed project. For a discussion of impacts to utilities (e.g., sewer, storm drains) and roadways, see Section 16, Transportation, and Section 17, Utilities and Services, of the Environmental Checklist.

LESS THAN SIGNIFICANT IMPACT

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15 Recreation

	Potentially Significant Impact	Potentially Significant Unless Mitigation Incorporated	Less than Significant Impact	No Impact
Would the project result in any of the following impacts?				
a. Would the project increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated	■	☐	☐	☐
b. Does the project include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment	■	☐	☐	☐

a. Would the project increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?

b. Does the project include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment?

The proposed project would result in a population increase (over the existing condition) of up to 1,830 persons. The proposed project includes 2.8 acres of recreation and park land. No specific trails are identified in the Campus Master Plan on the project site, but some hiking trails are expected to be developed at or connecting to the project site. Given the number of new residents when compared to the amount park area provided within the project site, the proposed project could have a potentially significant impact on existing recreational facilities and/or result in the need for new or expanded facilities. Impacts would be potentially significant and will be analyzed further in an EIR.

POTENTIALLY SIGNIFICANT IMPACT

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16 Transportation

	Potentially Significant Impact	Potentially Significant Unless Mitigation Incorporated	Less than Significant Impact	No Impact
Would the project result in any of the following impacts?				
a. Conflict with an applicable plan, ordinance or policy establishing a measure of effectiveness for the performance of the circulation system, taking into account all modes of transportation, including mass transit and non-motorized travel and relevant components of the circulation system, including but not limited to intersections, streets, highways, and freeways, pedestrian and bicycle paths, and mass transit?	■	☐	☐	☐
b. Conflict with an applicable congestion management program, including, but not limited to level of service standards and travel demand measures, or other standards established by the county congestion management agency for designated roads or highways?	■	☐	☐	☐
c. Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks?	☐	☐	☐	■
d. Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible use (e.g., farm equipment)?	■	☐	☐	☐
e. Result in inadequate emergency access?	■	☐	☐	☐
f. Conflict with adopted policies, plans, or programs regarding public transit, bikeways, or pedestrian facilities, or otherwise substantially decrease the performance or safety of such facilities?	■	☐	☐	☐

The California State University system provides a Transportation Impact Study (TIS) Manual to guide the analysis of a proposed project’s transportation impacts on the CSU campuses and adjacent transportation networks. The manual, prepared by Fehr and Peers in November 2012, provides a preferred methodology for level of service (LOS) analysis, as well as criteria to determine the significance of transportation impacts under CEQA. The TIS Manual provides significance criteria for off-site traffic operations, on-site circulation, bicycle facilities, pedestrian facilities and Americans with Disabilities Act (ADA) compliance, transit, intersection traffic control, transportation plan consistency, safety, and construction. As required by the TIS Manual, the TIS will assess the proposed project's consistency with significance criteria. Consistency would indicate a less than significant impact to relevant transportation impacts. A TIS for the proposed project is in the process of being completed and will be incorporated into the EIR for the proposed project.

a. Would the project conflict with an applicable plan, ordinance or policy establishing a measure of effectiveness for the performance of the circulation system, taking into account all modes of transportation, including mass transit and non-motorized travel and relevant components of the circulation system, including but not limited to intersections, streets, highways, and freeways, pedestrian and bicycle paths, and mass transit?

The proposed project would increase traffic along site-adjacent roadways compared to existing levels. Additional temporary and long term traffic would be generated by construction activities and by the operation of the proposed project. Project-generated traffic during construction would include worker-related commuter trips, trucks used for delivering construction equipment, and trucks used for delivering and hauling construction materials and wastes. Project-generated traffic during operation would include resident traffic. The increase in traffic could adversely affect circulation system performance on the CSUCI campus and in adjacent areas, potentially exceeding thresholds in the TIS Manual. Adjacent areas include nearby communities that use highways and roads near the site, including SR 1, SR 34, U.S. Highway 101, Lewis Road, Cawelti Road, Hueneme Road, and Potrero Road. Impacts resulting from both project components would be potentially significant and will be analyzed further in an EIR in accordance with guidelines set forth in the TIS Manual.

POTENTIALLY SIGNIFICANT IMPACT

b. Would the project conflict with an applicable congestion management program, including, but not limited to level of service standards and travel demand measures, or other standards established by the county congestion management agency for designated roads or highways?

Ventura County prepares and updates a Congestion Management Plan (CMP) every two years to meet voluntary state congestion management regulations (Government Code sections 65088-65089) and mandatory federal regulations that require the development and implementation of a congestion management process (Title 23 CFR Part 450.320). The CMP is intended to address congestion and improve traffic primarily on highways, in urban areas, and on principal arteries in Ventura County (Ventura County 2009). The CMP identifies key roadways for monitoring and management, referred to as the CMP Network. The CSUCI campus lies outside of the County's main urban area, but is accessed via routes included in the CMP network, such as Lewis Road and U.S. Highway 101. Congestion impacts resulting from the proposed project could be potentially significant and will be analyzed further in an EIR.

POTENTIALLY SIGNIFICANT IMPACT

c. Would the project result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks?

As discussed in Section 8, Hazards and Hazardous Materials, and Section 12, Noise, of the Environmental Checklist, the project site is more than three miles away from a public airport/private airstrip and would not affect air traffic patterns. There would be no impact, and further analysis is not warranted.

NO IMPACT

d. Would the project substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible use (e.g., farm equipment)?

A traffic study impact analysis will be prepared to evaluate potential traffic hazards. More information on the proposed project's residential driveway design is also forthcoming. The proposed project's impact on traffic hazards due to project design could be significant and will be analyzed further in an EIR.

POTENTIALLY SIGNIFICANT IMPACT

e. Would the project result in inadequate emergency access?

The project site is accessed via Channel Islands Drive, which intersects roads traversing the project at two points: at the western boundary of the project site and at the southern boundary of the project site (see Figure 11). The project site itself is serviced by an array of roads that vary from a 32-foot curb-to-curb roadway with parking on both sides to alleys with 24-foot drive aisles. The project would be required to comply with VCFPD Access Standards, as well as provisions of the International Fire Code Section 504, and California Code of Regulations Title 14, Sections 1270.00-1273.11 (VCFPD 2011). These regulations establish requirements for access design and construction that provide for emergency responders and public safety. In addition, construction plans for the proposed project would be subject to review by the Ventura County Fire Prevention Bureau (VCFPD 2016). Compliance with applicable codes and standards would reduce impacts to emergency access to less than significant levels.

LESS THAN SIGNIFICANT IMPACT

f. Conflict with adopted policies, plans, or programs regarding public transit, bikeways, or pedestrian facilities, or otherwise substantially decrease the performance or safety of such facilities?

The proposed development would result in modifications to existing roadways and paths on the project site to accommodate a new lot configuration for 600 mixed residential units. More details regarding proposed pedestrian and bike facilities are forthcoming. Consequently, conflicts with policies and plans included in the Specific Reuse Plan and the Campus Master Plan regarding public transit, bikeways or pedestrian facilities could be potentially significant and warrant further analysis in an EIR.

POTENTIALLY SIGNIFICANT IMPACT

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17 Tribal Cultural Resources

	Potentially Significant Impact	Potentially Significant Unless Mitigation Incorporated	Less than Significant Impact	No Impact
Would the project cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code Section 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is:				
a. Listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code section 5020.1(k), or	☐	☐	☐	■
b. A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resources Cod Section 2024.1. In applying the criteria set forth in subdivision (c) of Public Resources Code Section 5024.1, the lead agency shall consider the significant of the resource to a California Native American tribe.	☐	☐	☐	■

a. Would the project cause a substantial adverse change in the significance of a tribal cultural resource as defined in Public Resources Code 21074 that is listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code section 5020.1(k)?

b. Would the project cause a substantial adverse change in the significance of a tribal cultural resource as defined in Public Resources Code 21074 that is a resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resources Code Section 2024.1?

Tribal cultural resources are defined in Public Resources Code 21074 as one of the following:

1. Sites, features, places, cultural landscapes, sacred places, and objects with cultural value to a California Native American tribe that are either of the following:

   (a) Included or determined to be eligible for inclusion in the California Register of Historical Resources.

   (b) Included in a local register of historical resources as defined in subdivision (k) of Section 5020.1.

The area on which the project site is located has been previously disturbed and has been evaluated for cultural resources in past environmental reviews (e.g., 2000 Campus Master Plan EIR). No tribal resources have been previously identified on the site and the proposed project does not affect a tribal cultural resource listed or eligible for listing in the state or local register of historical resources, or determined by the lead agency to be significant to a California Native American tribe. No impact would occur.

NO IMPACT

18 Utilities and Service Systems

	Potentially Significant Impact	Potentially Significant Unless Mitigation Incorporated	Less than Significant Impact	No Impact
Would the project result in any of the following impacts?				
a. Exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board	☐	☐	■	☐
b. Require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects	☐	☐	■	☐
c. Require or result in the construction of new stormwater drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects	■	☐	☐	☐
d. Have sufficient water supplies available to serve the project from existing entitlements and resources, or are new or expanded entitlements needed	■	☐	☐	☐
e. Result in a determination by the wastewater treatment provider which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments	■	☐	☐	☐
f. Be served by a landfill with sufficient permitted capacity to accommodate the project's solid waste disposal needs	☐	☐	■	☐
g. Comply with federal, state, and local statutes and regulations related to solid waste	☐	☐	■	☐

a. Would the project exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board?

b. Would the project require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?

e. Result in a determination by the wastewater treatment provider which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?

CSUCI relies on the water and wastewater facilities provided by the Camrosa Water District (CWD; 2015), which provides wastewater treatment and potable and recycled water delivery to the campus. The existing campus water distribution system was reconstructed between 1990 and 1996. Two existing 1.0 million gallon storage tanks located on the hill northeast of the campus core provide additional storage for fire and peak flow demands on campus. Water and wastewater infrastructure would be developed onsite to serve the proposed project. Figure 6 shows the conceptual plan for domestic water facilities at the project site. Figure 8 and Figure 9 show the existing and proposed recycled water and sewer system for the project site, respectively.

The CWD provides the CSUCI campus with recycled water from its Water Reclamation Facility (WRF). The facility reclaims wastewater and provides tertiary treatment at a capacity of 1.5 million gallons per day (mgpd). It has a storage capacity of nearly 100 million gallons (CWD 2009). The sanitary sewer system in University Glen flows by gravity to the existing sewer system in the academic area, which in turn flows to the CWD wastewater treatment plant. The sewer system for the proposed project would connect into the sewer system serving existing University Glen residences and the main campus.

The CWD WRF is currently operating at close to capacity. As a result, CWD is in the process of expanding the capacity of the WRF to accommodate an average flow of 2.25 mgpd—an increase in capacity of 0.75 mgpd (CWD 2015). Based on wastewater generation estimates for different land uses provided in the Los Angeles CEQA Thresholds Guide (City of Los Angeles 2006), the proposed project would generate approximately 102,660 gallons of wastewater per day. This represents fourteen percent of available expanded capacity and less than five percent of total capacity. While the CWD is in the process of providing expanded treatment facilities, allocation of the increased capacity is unknown, and it is yet to be determined as to whether the proposed expansion could accommodate the increase in wastewater generation from the proposed project. The project may result in significant an exceedance of wastewater treatment requirements, or may require result additional wastewater treatment capacity beyond what is already underway. Impacts could be potentially significant and will be analyzed further in an EIR.

Table 2 Project Estimated Wastewater Generation

Land Use	Quantity (Dwelling Units)	Generation Factor (gallons/unit/day)	Amount (gpd)
Apartment-1 bedroom	135	120	16,200
Apartment-2 bedroom	265	160	42,400
Apartment-3 bedroom	80	200	16,000
Townhouse-2 bedroom	22	180	3,960
Townhouse/Single Family-3 bedroom	73	230	16,790
Townhouse/Single Family -4 bedroom	11	270	2,970
Townhouse/Single Family -5 bedroom	14	310	4,340
Total			**102,660**

Source: Los Angeles County Sanitation Districts, "Table 1: Loadings for Each Class of Land Use". Accessed October 5, 2016.
gpd = gallons per day

POTENTIALLY SIGNIFICANT IMPACT

c. Would the project require or result in the construction of new stormwater drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?

As previously discussed in Section 9, Description of Project, of the Initial Study, and Section 9, Hydrology, of the Environmental Checklist, the proposed project would extend the existing storm drain system onsite to serve a mix of 600 residential units (Figure 7). Impacts within the main project site boundaries associated with storm drain system improvements would minimal. However, potential modifications to the existing 96-inch RCP pipe and flood control basin as well as the culvert on the unnamed drainage leading to Inspiration Point could potentially result in significant environmental effects, including in relation to hydrology and biological resources. These impacts will be evaluated further in an EIR.

POTENTIALLY SIGNIFICANT IMPACT

d. Have sufficient water supplies available to serve the project from existing entitlements and resources, or are new or expanded entitlements needed?

The proposed project would include up to 600 new residential units and ancillary facilities and utilize potable and recycled water for construction, operations, and landscape maintenance. As previously mentioned, water supplies would be provided to the project site by the CWD. From 2010 through 2015, the CSUCI campus decreased potable water use despite a growing campus population by substituting recycled water. Campus potable water use fell from 275 acre feet (AF) in 2010 to 217 AF in 2015, while recycled water use rose from 131 AF to 256 AF over the same time period. In addition, CWD water demand projections, presented in CWD's 2015 Urban Water Management Plan (UWMP), factor in student count increases and future buildout of the CSUCI campus over the next 10-15 years (CWD 2016). As indicated in Table 3, CWD projects that it will have a surplus water supply of over 8,000 AF through 2035.

Water demand is estimated to be 120 percent of wastewater generated by a project. Based on wastewater generation rates used previously in this section of the Environmental Checklist, the proposed project would use approximately 123,192 gallons of water per day, or 138 AF per year. That is less than two percent of forecast water supply surplus for the forecast period, 2020-2035. Nonetheless, the proposed project would result in 358 more residential units than originally planned. Furthermore, California is entering a sixth year of drought, and Ventura County water supply in general remains uncertain. Existing water supplies may not be adequate to serve the proposed project. Impacts could be potentially significant and will be analyzed further in an EIR.

Table 3 Camrosa Water District Projected Water Supply and Demand

	2020	2025	2030	2035
Supply totals (AF)	24,450	28,830	28,930	28,930
Demand totals (AF)	15,941	15,587	15,987	16,113
Difference (AF)	8,509	13,243	12,943	12,817

Source: CWD 2015

LESS THAN SIGNIFICANT IMPACT

f. Would the project be served by a landfill with sufficient permitted capacity to accommodate the project's solid waste disposal need?

g. Would the project comply with federal, state, and local statutes and regulations related to solid waste?

If a proposed project has a direct or indirect adverse effect on a landfill such that it impairs the landfill's disposal capacity in terms of reducing its useful life to less than 15 years, the project has a potentially significant impact on the demand for solid waste disposal capacity (VCRMA 2011).

Harrison Industries, a commercial vendor, provides solid waste disposal for CSUCI. It partners with the Gold Coast Recycling and Transfer Station, where recyclables are sorted, baled, and sold for reuse in compliance with Assembly Bill (AB) 341. It also partners with Agromin for the processing of green waste for reuse in agricultural products, fuel, and landscape materials. Refuse haulers are required to implement waste reduction and recycling programs consistent with the Ventura County General Plan's Source Reduction and Recycling Element. The two recycling and transfer centers that may be used are the Del Norte Regional Recycling and Transfer Station and the Gold Coast Recycling Center. The residual waste may be taken to either the Toland Landfill or the Simi Valley Landfill. Toland Landfill has a capacity of 1,500 tons per day with a maximum capacity of 30,000 cubic yards. Simi Valley Landfill has a daily capacity of 9,250 tons per day with a maximum capacity of 119,600,000 cubic yards and both landfills had most of their capacity remaining at the last inspection date (2006 and 2012, respectively) (CalRecycle 2016).

The proposed project has the potential to generate approximately 7,338 lbs (3.7 tons) per day based on a waste generation rate for residential uses of 12.23 lbs per household per day (City of Los Angeles 2006); as the resident amenities/community center would be used primarily by residents, solid waste generated by the community center would be largely captured by residential use estimates and was not estimated as a separate project component. This represents 0.2 percent of the daily capacity of Toland Landfill and less than 0.04 percent of the daily capacity of Simi Valley Landfill. In addition, solid waste generated by the proposed project would be minimized by campus efforts to reduce waste, and presents a nominal increase in capacity use for landfills serving the area. Furthermore, the proposed project would adhere to state and federal regulations pertaining to solid waste. Therefore, this increase would not reduce the landfills' useful lives to less than 15 years. Consequently, the proposed project would have less than significant impacts to landfill capacity and would not conflict with applicable guidelines regarding solid waste. No further analysis in an EIR is warranted.

LESS THAN SIGNIFICANT IMPACT

19 Mandatory Findings of Significance

	Potentially Significant Impact	Potentially Significant Unless Mitigation Incorporated	Less than Significant Impact	No Impact
a. Does the project have the potential to substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self- sustaining levels, eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?	■	☐	☐	☐
b. Does the project have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects)?	■	☐	☐	☐
c. Does the project have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?	■	☐	☐	☐

a. Does the project have the potential to substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self- sustaining levels, eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?

The project site generally lacks native biological habitats, as discussed under Section 4, Biological Resources, of the Environmental Checklist but existing vegetation within and adjacent to the project could provide habitat for nesting birds. The project also includes ground disturbance activities that could impact the unnamed drainage that runs between the main part of the site and Inspiration Point. The proposed project could also include changes to the existing flood basin located west of the project site, which could impact wetland habitat and suitable habitat for the protected Least Bell's vireo.

As discussed under Section 5, Cultural Resources, of the Environmental Checklist, there are no known historic resources or known archaeological or paleontological resources onsite. Compliance with State law and incorporation of Mitigation Measure CR-1 would address potential impacts to any as yet undiscovered archaeological and paleontological resources. Based on this, the proposed project would not eliminate important examples of the major periods of California history or prehistory.

Given the potential impacts to special status species and their associated habitats, impacts related to these issues could be potentially significant and further analysis will be conducted in an EIR.

POTENTIALLY SIGNIFICANT IMPACT

b. Does the project have impacts that are individually limited, but cumulatively considerable? (“Cumulatively considerable” means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects)?

In combination with other planned and pending development in the area, the proposed project could contribute to significant cumulative impacts. In particular, cumulative impacts could occur with respect to such issues as transportation, air quality, biological resources, greenhouse gases, water supply, and noise. The cumulative effects of the proposed project, in combination with other planned projects in the vicinity, will be evaluated in an EIR.

POTENTIALLY SIGNIFICANT IMPACT

c. Does the project have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?

The proposed project may result in potential adverse impacts to human beings. Impacts related to aesthetics, air quality, geology and soils, greenhouse gas emissions, land use/planning, noise, public services, recreation, transportation, and utilities/service systems would be potentially significant. These impacts will be analyzed further in an EIR.

POTENTIALLY SIGNIFICANT IMPACT

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List of Preparers

Rincon Consultants, Inc. prepared this IS under contract to the CSUCI and CSUCI Site Authority. Persons involved in data gathering analysis, project management, and quality control include the following.

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Appendix A

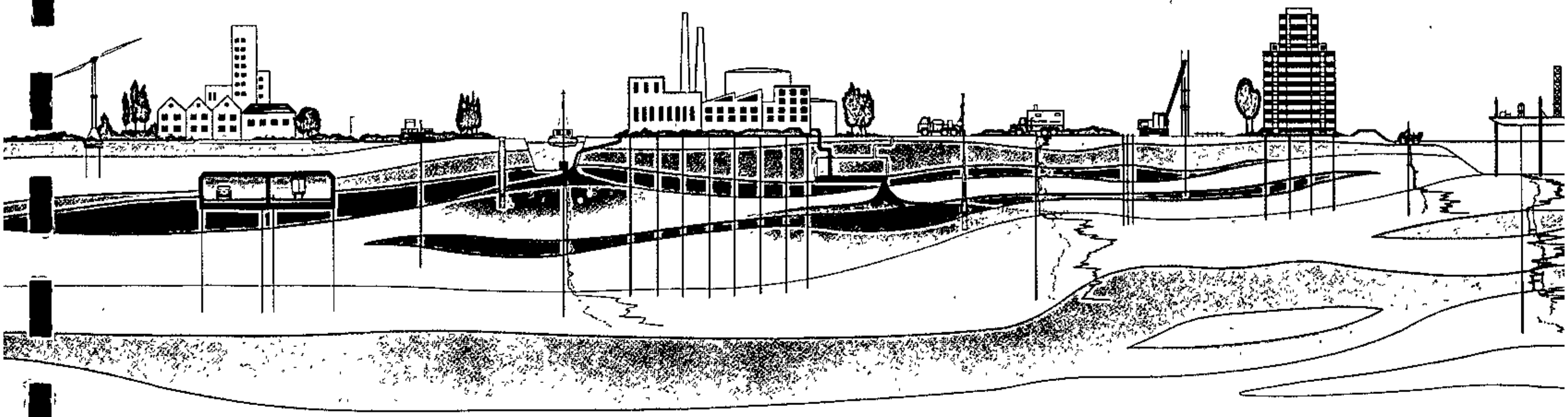
Geotechnical Study and Addendum

FUGRO WEST, INC.

GEOTECHNICAL STUDY
CAL STATE UNIVERSITY CHANNEL ISLANDS
EAST CAMPUS DEVELOPMENT
CAMARILLO AREA
VENTURA COUNTY, CALIFORNIA

Prepared for:
CALIFORNIA STATE UNIVERSITY CHANNEL ISLANDS
SITE AUTHORITY

December 2000



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December 14, 2000
Project No. 99-42-0384

California State University, Channel Islands Site Authority
401 Golden Shore
Long Beach, California 90802-4210

Attention: Mr. David Rosso

Subject: Geotechnical Study for Cal State University Channel Islands, Camarillo Area of Ventura County, California

Dear Mr. Rosso:

Fugro is pleased to submit this geotechnical report for the East Campus Development at California State University, Channel Islands (CSUCI). This study was completed in general accordance with Fugro's proposal dated June 6, 2000, and addendum dated October 3, 2000, and was authorized with the execution of a Service Agreement between CSUCI Site Authority and Fugro on June 30, 2000, and an Extra Service Authorization dated October 6, 2000.

This geotechnical study report presents findings, conclusions, and recommendations concerning the geotechnical conditions in the East Campus Development area.

As discussed in the report, we recommend that the potential for rockfall, debris flow, and bedding plane failure in slope areas adjacent to development areas be evaluated further.

We appreciate the opportunity to provide our services to the CSUCI Site Authority on this project. Please call if we can provide further information, or clarify any findings or recommendations.

Sincerely,

FUGRO WEST, INC.

Carole Wockner

Carole Wockner
Project Engineer

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APPENDICES

INTRODUCTION

GENERAL STATEMENT

Fugro is pleased to submit this report presenting the results of a geotechnical study for the proposed East Campus Development at California State University, Channel Islands (CSUCI), in the Camarillo Area of Ventura County, California. The general location of the site is east and north of the former Camarillo State Hospital facility, which is currently being transformed into the CSUCI campus. The general location of the East Campus Development is shown on Plate 1 - Vicinity Map. The proposed site layout is shown on Plate 2 - Site Development Map.

As shown on Plate 2, the East Campus area consists of an "L"-shaped alluvial corridor located east of the main hospital facility that is bounded on both sides by the western foothills of the Santa Monica Mountains. A former California Conservation Corps housing facility is located at the northern end of the eastern corridor and an unoccupied cluster of structures, which we understand was formerly an elementary school site, is located at the east end of the southern corridor, just west of an existing debris dam. The main core of the former Camarillo State Hospital buildings are located at the west end of the south corridor and are being converted to educational facilities for the CSUCI campus.

PURPOSE

The purpose of this geotechnical study is to evaluate the general geotechnical conditions at the project location, and to develop geotechnical conclusions and recommendations for infrastructure development and for subgrade preparation and foundation design for the proposed residential structures. Specifically excluded from this study was the evaluation of potential environmental impairment or soil/groundwater contamination at the site.

AUTHORIZATION

The original scope of work for this study was set forth in the Fugro proposal dated April 15, 1999, to the Catellus Residential Group. A revised proposal was prepared on April 26, 1999, and an addendum to that revised proposal was prepared on May 7, 1999. This study was authorized with the execution of a Contract for Consultant Services by Catellus Residential Group dated July 1, 1999.

Supplemental studies, as outlined in our proposal to the California State University Chancellor's Office dated June 5, 2000 (revised June 6, 2000) and October 3, 2000, have been incorporated into this geotechnical study. The supplemental studies were authorized with the execution of a Service Agreement with the California State University Channel Islands (CSUCI) Site Authority dated June 30, 2000, and an Extra Service Authorization (No. 1) dated October 6, 2000.

KEY PERSONNEL

The following key personnel are associated with this project:

- Mr. David Rosso, Project Manager, California State University
- Mr. Jeffrey Minter, Vice President, UnivDev, LLC.
- Mr. Marc Haslinger, Senior Project Manager, Tetra Tech ASL Consulting Engineers
- Mr. Dan Novak, Bridge Design Engineer, Tetra Tech ASL Consulting Engineers

PROJECT DESCRIPTION

The information presented herein concerning the proposed East Campus Development at California State University, Channel Islands, is based on conversations with Mr. Rosso of California State University, Mr. Minter of UnivDev, LLC, and Mr. Haslinger of Tetra Tech ASL Consulting Engineers (ASL). The East Campus Development has been reduced in scope by the CSUCI Site Authority from that outlined in our draft preliminary geotechnical study (Fugro, 1999a), to essentially five phases of residential development with associated infrastructure. The revised project description consists of the following:

- **Residential.** About 900 residential units, consisting of single-family, paired homes, townhomes, and rental housing are planned for both the eastern corridor and the southern corridor. Phase I of the development will occur along the southern corridor between the future library at the western end and the elementary school site at the eastern end. Phase I will comprise alley-loaded single family units, townhomes, and multi-family and rental units, totaling about 200 units. The construction of Phases II through IV will continue northward along the eastern development corridor, with a composition of unit types generally consistent with Phase I. The final Phase V, to be located at the northernmost end of the eastern development corridor, will consist predominantly of single-family residences on individual lots. The residential structures for Phases I through V will be one to two stories of wood-frame construction.
- **Backbone Infrastructure.** The main access to the East Campus Development area from the CSUCI campus will be along the existing Rincon Drive, which will be widened between the bridge at Santa Barbara Avenue and Ojai Street. Rincon Drive will continue southward at what is currently Ojai Street, and then will end where the main arterial road ("A" Street) parallels the toe of the north-facing slope along the southern development corridor. The "backbone infrastructure" for the East Campus Development also will incorporate the widening of Rincon Drive and the construction of a new connector road between University Drive and the northern end of the eastern corridor. The new connector road will be constructed by filling the drainage channel at the base of the two slopes. The "backbone infrastructure" will also include the construction of a main arterial road ("A" Street) between the southern and eastern corridors. The main arterial road will traverse the eastern edge of the eastern corridor

and the southern edge of the southern corridor. Several traffic circles (i.e., "roundabouts") are planned at intersections of the main arterial road and neighborhood streets.

The "backbone infrastructure" also will include the installation of underground utilities for future residential development and the construction of a new bridge over the Long Grade Channel on the eastern side of the intersection of the eastern and southern development corridors. An approximately 10-foot-diameter concrete storm drain will be placed in the channel alignment beneath the proposed connector road. The storm drain will outlet into a "meadows" area adjacent to University Drive. A cosmetic bridge at the western end of the connector road will conceal the storm drain outlet. The bridge over the storm drain outlet will retain up to about 20 feet of earth materials.

The various development areas are shown on Plate 2.

FUTURE DEVELOPMENT

Future development that is not a part of this study but has been considered for later phases includes a retail/town square and an elementary school. Additionally, other development areas addressed in the draft preliminary study that have been postponed and/or deleted from the current project scope include the west campus research and development courtyard and corresponding alternate sites along Potrero Road. Field and laboratory data relevant to the future retail/town square and school sites and the (postponed) research and development areas are presented in this report for informational purposes only and should not be used for design. The proposed locations of the future development areas are as follows:

- **Retail/Town Square.** A future retail/town square development is planned for the far western end of the southern corridor of the East Campus area, north of the future library.
- **Elementary School.** An elementary school is planned at the eastern end of the southern corridor, between the existing debris dam and Phase I of the East Campus Development.

PROPOSED GRADING

According to the 90 percent grading plans (Tetra Tech ASL, 2000), we understand that for building development, site grading will range from a few feet of cut to a few feet of fill in the level areas with cuts near the slope toes increasing to about 10 feet and fills near drainage channels and in depressions increasing in thickness up to 20 feet, particularly along the connector road and on the single-family lots at the northwestern end of the eastern corridor. Along the northern edge of those fill lots and roughly parallel to the existing drainage channel, retaining walls up to about 13 feet high are planned.

Cuts into existing slopes on the order of about 10 to 20 feet high are proposed along the arterial road and north of the neighborhood street (e.g. "C" Street) and the northernmost residential lot at the northern end of the eastern development corridor.

WORK PERFORMED

The scope of work performed for this study was described in our proposal dated April 15, 1999, and was amended in subsequent revisions dated April 26 (i.e., revised proposal) and May 7, 1999 (amendment letter), and supplemented in subsequent proposals dated June 5, 2000 (revised June 6, 2000) and October 3, 2000. The scope of work consisted of the following tasks:

DATA AND AERIAL PHOTOGRAPH REVIEW

Existing available geologic and geotechnical data pertinent to the study were compiled from various sources and reviewed. Those data consist of published and unpublished geologic and geotechnical maps, geotechnical reports for adjacent properties, literature, and research data, along with pertinent well logs and historical stereo aerial photographs. References utilized and photographs reviewed are listed in the References section following the text.

Data from the following geotechnical reports (or portions thereof) for adjacent properties were reviewed:

1. A geologic reconnaissance study for Thornhill Ranch, located along the south side of Potrero Road south of the campus area (Fugro, 1999b).
2. A geotechnical study for the Camrosa Wastewater Treatment Plant Expansion (Fugro, 1994), located just west of the western end of the campus property (and the proposed research and development courtyard).
3. Logs of monitoring, sparging, and vapor extraction wells and borings at the former Camarillo State Hospital (SGD, 1988; Geosystem, 1996, 1997)

SUBSURFACE EXPLORATION

The subsurface exploration for this study includes the following:

- Seventeen cone penetrometer test (CPT) soundings to depths ranging from about 23 to 75 feet below the existing ground surface (completed June 29, 1999)
- Twenty-three hollow-stem-auger drill holes ranging from 19 feet to about 61 feet below the ground surface (original exploration completed August 4, 1999, and subsequent exploration completed August 8, 2000)
- Seventeen backhoe trenches excavated to depths ranging from about 4 to 11 feet on July 1 and 2, 1999, and an additional 18 backhoe trenches excavated on October 19 and 23, 2000 for the supplemental study

The approximate locations of the CPT soundings, drill holes, and backhoe test pits are shown on Plate 3 - Geologic Map. Descriptions of the field exploration and logs of the CPT soundings, drill holes, and backhoe test pits are presented in Appendix A - Subsurface Exploration. The CPT logs and associated soil classification chart are presented on Plates A-1.1 through A-1.18, the log of the drill holes and legend are presented as Plates A-2.1 through A-2.24, and the backhoe trench logs are presented on Plates A-3.1 through A-3.35.

Geologic cross sections utilizing the subsurface data obtained from the CPT soundings and drill holes are presented on Plates 4 and 5 - Geologic Cross Section A-A' and B-B'. A key to symbols used on the cross sections is presented on Plate 6 - Key to Cross Sections.

LABORATORY TESTING

Laboratory testing was performed on selected soil samples to estimate pertinent engineering properties for use in the geotechnical evaluation. The laboratory testing program consisted of the following:

- Unit weight and moisture content determinations,
- Index and classification (including grain size, Atterberg limits, and expansion index) tests,
- Direct shear tests,
- Compaction curves,
- One-dimensional consolidation tests,
- Collapse tests,
- Sand equivalent (SE) test,
- R-value tests, and
- Corrosion (limited soil chemical) tests.

The results of the laboratory analyses are presented in Appendix B - Laboratory Testing.

GEOTECHNICAL ENGINEERING AND REPORT

Geotechnical engineering evaluations were performed to develop recommendations to aid in the preliminary design of the proposed residential structures and associated infrastructure development. Engineering evaluations and recommendations summarized in this report consist of the following:

1. Generalized soil and groundwater conditions at the site.
2. Geologic setting and geologic hazards; including the potential for slope instability, rockfall, liquefaction, seismic shaking, fault rupture, seismically-induced settlement of dry sands, seismically-induced lateral movements, hydroconsolidation, and expansion potential.

3. Assessment of engineering properties of encountered soils, including consolidation potential of soils in development areas.
4. Excavation and trenching conditions.
5. Suitability of onsite soils for use as compacted fill, including corrosivity (limited soil chemistry testing: pH, resistivity, chlorides and sulfates).
6. Estimated shrinkage and subsidence from earthwork activities.
7. Subgrade preparation and compaction requirements for road construction and mass grading, including fill and backfill placement.
8. Construction considerations including groundwater, excavation, site preparation and grading, stripping, subgrade stabilization, structural fill, suitability of onsite materials, and pavement subgrade preparation.
9. Mitigation options for expansive soils.
10. Criteria for temporary excavations.
11. Foundation types with overexcavation requirements for the mass grading of the residential development in the east campus area.
12. Allowable bearing pressures for residential structures and retaining walls.
13. Allowable axial and lateral capacities for bridge drilled pier design, with recommended tip elevations.
14. Lateral earth pressures for cantilever and restrained retaining walls.
15. Asphalt-concrete pavement and interlocking paver section design.

SITE CONDITIONS

TOPOGRAPHY

The East Campus Development site is located at the southwestern end of the Santa Monica Mountains about 2-1/2 to 3-1/2 miles south of Camarillo, California, and about 3 miles north of the Pacific Ocean. The Santa Monica Mountains are an east-west-trending mountain range that extends from the Los Angeles basin on the east to the Oxnard Plain on the west, a distance of about 35 miles.

The residential development area comprises an "L"-shaped alluvial valley. The southern leg of the "L"-shaped valley is the western extension of Long Grade Canyon, and the eastern leg is surrounded by foothills of the western Santa Monica Mountains. The gradient of the southern half of the eastern alluvial corridor is less than 1 percent down to the south, the northern half is about 4 percent down to the west, and the southern alluvial valley is about 3 percent down to the west.

With the exception of several residential lots at the northern end of the eastern corridor, no development is planned on the surrounding slopes of the Santa Monica Mountains.

Elevations across the East Campus Development area range from about elevation (El.) 95 feet (mean sea level [MSL]) at the western end of the southern development corridor (Phase I) to about El. 155 feet at the eastern end of the northern half of the eastern corridor (Phase V). Along the connector road, elevations range from about El. 55 feet at the western end (i.e., at University Drive) to about El. 100 feet at the eastern end.

DRAINAGE

Drainage within the project area occurs as sheet flow and through small tributary drainages into several major drainages. The site drains toward the west along Long Grade Canyon and also across the northern end of the eastern corridor following the proposed connector road alignment to University Drive. Long Grade Canyon is channelized west of the debris dam and north of Rincon Drive, and ultimately flows into Calleguas Creek north of the Camrosa Wastewater Treatment Plant.

Before channelization, the natural course of Long Grade Canyon Wash was evident on historical topography maps (State of California DPW, 1941). The natural wash channel bisected the eastern end of the southern alluvial valley between the existing debris dam site and the southern leg of Rincon Drive. The wash channel was abandoned by filling it with artificial fill, which may be on the order of about 6 feet deep. The approximate trace of the original Long Grade Canyon Wash through the east half of the southern development corridor is shown on Plate 3.

The Long Grade Channel empties into another manmade drainage ditch that flows parallel to the northern edge of the west campus property in the western campus wetlands area and ultimately empties into Calleguas Creek.

GEOLOGIC CONDITIONS

REGIONAL GEOLOGY

The CSUCI campus area is situated in the southern portion of the Transverse Ranges geomorphic province of California. The province is characterized by east-west-trending mountain ranges composed of sedimentary and volcanic rocks ranging in age from Cretaceous to Recent. Major east-trending folds, reverse faults, and left-lateral strike-slip faults reflect regional north-south compression and are characteristic of the Transverse Ranges. The Transverse Ranges Geomorphic Province is bounded on the north by the Santa Ynez fault, on the east by the San Bernardino Mountains, on the south by the Transverse Ranges frontal fault zone, and on the west by the Pacific Ocean.

The Ventura basin, including its offshore continuation in the Santa Barbara Channel, is the dominant structural element of the western Transverse Ranges. The basin is filled with a thick sequence of Cenozoic sedimentary rocks estimated to be more than 20,000 feet in total thickness.

The Santa Monica Mountains, together with the northern Santa Barbara Channel Islands offshore to the west, constitute the western Transverse Range uplift south of the Ventura basin. The Santa Monica Mountains are uplifted generally anticlinally on the north-dipping Malibu Coast-Santa Monica fault zone (Dibblee and Ehrenspeck, 1993).

The Oxnard Plain at the western edge of the property represents the ancient delta of the Santa Clara River, formed at the end of the last glacial epoch when the Santa Clara was part of a much more extensive river system.

SITE GEOLOGY

The surficial geology of the CSUCI campus and the surrounding area has been mapped at a scale of 1 inch = 2,000 feet by Dibblee and Ehrenspeck (1990), and 1 inch = 4,000 feet by Weber et al. (1973). The geology presented on Plate 3 (1 inch = 500 feet) was modified, in part, from data presented by Dibblee and Ehrenspeck (1990). The site is underlain by surficial sediments that consist of alluvium (Q_{al}) and colluvium (Q_{col}). The surficial deposits range in age from late Pleistocene to Holocene. Bedrock units at the site consist of middle Miocene-age marine clastic rocks called the lower Topanga Formation that is overlain by middle Miocene Conejo Volcanics. The Conejo Volcanics are composed of both extrusive and intrusive materials.

Geologic Structure

Geologic structure refers to the orientation of layers and planes of weakness in a rock mass. The site is traversed by faults that appear as localized shear zones within the bedrock units. A northwest-trending normal fault appears on Dibblee and Ehrenspeck (1990) just west of the existing water tank above the California Conservation Corps campus. However, after recent reconnaissance mapping with Mr. Dibblee and Mr. Ehrenspeck for this project, the fault trace appears to have been mismapped on Dibblee and Ehrenspeck (1990), and should have been mapped with an east-west trend. The time of last movement on that fault is unknown, but at the present time, it is not thought to be a currently active structure. Recent correspondence by Dibblee and Ehrenspeck (1999) acknowledges the mismapped fault. Both the incorrectly and correctly mapped fault traces are shown on Plate 3.

On the basis of published geologic maps (Weber et al., 1973; and Dibblee and Ehrenspeck, 1990) and our field reconnaissance mapping, the bedding or flow layering in the Conejo Volcanics bedrock exposed on the slopes surrounding the site generally dip between about 10 and 30 degrees toward the north/northwest.

Earth Materials

On the basis of the CPT soundings, backhoe test pits, and drill holes advanced for this study, and on data from previous borings, monitoring wells, and CPTs for adjacent properties, the general soil profile consists predominantly of lean to fat clay, with thin layers of clayey to silty sand.

Ground squirrel burrows are abundant in the upper few feet of soil in most areas of the project site.

Plates 4 and 5 depict the generalized alluvial stratigraphy across the southern and eastern corridors inferred from our subsurface exploration. The locations of those cross-sections are shown on Plate 3.

Artificial Fill (Af). Artificial fill consisting of lean clay, sandy lean to fat clay, sand, and sandy silt (which locally contains construction debris such as concrete, bricks, and cable) was encountered in the wetlands area (drill hole DH-1); along the north-facing slope of the southern corridor (backhoe test pit BH-1A); along the original alignment of Long Grade Canyon Wash (drill hole DH-3 and test pit BH-214); along and adjacent to the embankments of the Long Grade Channel (drill holes DH-207 and DH-208); at the western end of the southern corridor (drill hole DH-2); in the debris dam at the east end of the southern corridor (drill hole DH-4); in the proposed Phase III, IV and V residential development areas (drill hole DH-6 and test pits BH-207 and BH-210); and adjacent to the drainage channel along the proposed connector road alignment (backhoe test pit BH-7A). The artificial fill varied in thickness from about 1 to 7 feet, and was about 10 feet thick at the debris dam location (drill hole DH-4). Near test pits BH-203 and BH-212, piles of trash were observed on the ground surface, and the approximate locations are shown on Plate 3. From our photo-reconnaissance observations, it appears that artificial fill is also present in and around the currently developed areas, and those areas are shown on Plate 3. Also, artificial fill may exist elsewhere within and beyond those areas explored for this study, and maximum thicknesses may exceed those encountered at the exploration locations.

Alluvium (Qal). Recent alluvium (Qal) was mapped along the southern corridor of the East Campus Development area as far west as the wetlands area and as far south as West Potrero Road below the Round Mountain Dam. Alluvium was also encountered at the northern end of the eastern corridor near the east-west trending drainage channel.

The alluvium consists primarily of lean to fat clay to sandy clay, underlain by clayey sand and a few discontinuous layers of silty sand. Fat clay alluvium was common in the upper 15 to 20 feet at the western end of the southern corridor of the East Campus Development area. At the eastern end of that corridor, the surficial clay commonly was lean, not fat (e.g., in drill hole DH-206), and was underlain at a depth of about 24 feet by an approximately 10-foot-thick layer of silty to clayey sand that was underlain by lean clay to a depth of about 5 feet (i.e., the maximum exploration depth in that area).

Recent alluvium in the west campus wetlands area north of Round Mountain Dam appears to consist primarily of a few feet of surficial sand underlain by fat to lean clay to the exploration depth of about 21 feet. Organic material was encountered in the lean to fat clay between depths of about 2-1/2 to 9-1/2 feet in drill hole DH-1. Toward the western end of the west campus wetlands area, clayey to silty sand (SC to SM) layers were encountered in the clay between depths of about 15 and 20 feet, 25 and 30 feet, and below 40 feet (i.e., drill hole DH-107).

South of Round Mountain Dam, the alluvial deposits encountered consist primarily of lean to fat clay and sandy clay (drill holes DH-102 and 103), with about 5 feet of surficial sand in drill hole DH-101 near the south CSUCI campus entrance along West Potrero Road. Silty sand to poorly-graded sand (SM to SP) was encountered from the ground surface to the exploration depth of 21 feet in drill hole DH-104, located about 500 feet southwest of the dam.

Colluvium (Q_{col}). Recent colluvial deposits were encountered in the drill holes and backhoe pits along the eastern corridor, and mapped near the base of the slopes surrounding the eastern corridor. Colluvium was also encountered in the backhoe pits adjacent to the north-facing slopes of the southern corridor, near the base of the slopes along the northern end of the eastern development corridor, connector road alignment, and in the meadow area where the connector road will join University Drive. The colluvium generally consists of lean clay with gravel, cobbles, and rock, and contains abundant visible voids in the upper 2 to 4 feet, with fewer voids between about 4 and 6 feet. In the nearly level eastern corridor areas south of the northern east-west trending drainage channel, fat clay colluvium was common in at least the upper 5-1/2 (or more) feet. (However, in drill hole DH-6, the upper 7 feet was fat clay *fill*, not colluvium.)

Conejo Volcanics Bedrock (T_{cvb}, T_{cvdb}, and T_{cvab}). The slopes surrounding the campus and east development site are composed of basalt, andesitic basalt, and dacitic breccia of the Conejo Volcanics Formation. The Conejo Volcanics were encountered in the backhoe test pits excavated near the slope toes, at a depth of about 14 feet in drill hole DH-103 located about 50 feet southwest of the Round Mountain Dam crest, and at a depth of about 35 feet in drill hole DH-7 located at the north end of the eastern corridor. Conejo Volcanics bedrock is believed to underlie the alluvium and colluvium in both the eastern and southern corridors (e.g., as encountered in drill holes DH-207 and DH-208 for the proposed bridge), the west campus wetlands area, and the potential campus development areas along West Potrero Road between the Round Mountain Dam and the south campus entrance, but most of our subsurface exploration did not extend deep enough to encounter it.

GROUNDWATER CONDITIONS

Groundwater was encountered at a depth of about 5 to 6 feet in the wetlands area north of the Round Mountain Dam. Further west, groundwater was encountered at a depth of about 15 feet in DH-107 located at the far western end of the wetlands area and adjacent to the east end of the Camrosa Wastewater Treatment Plant. Along the southern corridor, groundwater was encountered between depths of about 36 and 42½ feet at drill hole DH-2 and CPT-2 locations, respectively. Groundwater was not encountered or measured in any of the exploration holes east of CPT-2 to the maximum depth explored (i.e., about 61 feet, or about El. 70 feet, in drill hole DH-207) in the southern corridor and was not encountered or measured in the exploration locations in the eastern corridor. Groundwater was encountered at a depth of between about 12 and 15 feet in the sand encountered in drill hole DH-104 located approximately 500 feet southwest of the Round Mountain Dam. Note that in an alluvial environment such as that in the wetlands, eastern and southern corridors, and the channel along the connector road alignment, the groundwater level likely will fluctuate significantly over the seasons and from one year to the next, depending on rainfall, runoff volumes, and irrigation. The groundwater levels across the site are likely to range from the ground surface near drainage channels and in wetlands areas to depths in excess of 50 feet. Groundwater level data from the drill holes and CPT dissipation tests are summarized in the following table:

Table 1. Groundwater Observations

CPT/Drill Hole	Estimated Depth to Groundwater (feet)	Elevation as/as not Encountered[3]	Drill Hole	Estimated Depth to Groundwater (feet)	Elevation as/as not Encountered[3]
CPT-1[1]	7	33	DH-103	not encountered	17
CPT-2[2]	42-1/2	32-1/2	DH-104	between 12 and 15	16 - 19
CPT-17	not detected	26	DH-105	5	30
DH-1	6	32	DH-106	6	31
DH-2	36	36	DH-201	not encountered	44-1/2
DH-3	not encountered	93-1/2	DH-202	not encountered	51-1/2
DH-4	not encountered	114-1/2	DH-203	not encountered	62-1/2
DH-5	not encountered	66-1/2	DH-204	not encountered	79-1/2
DH-6	not encountered	100-1/2	DH-205	not encountered	46-1/2
DH-7	not encountered	90-1/2	DH-206	not encountered	88-1/2
DH-8	not encountered	64-1/2	DH-207	not encountered	70-1/2
DH-101	13-1/2	19-1/2	DH-208	not encountered	74-1/2
DH-102	10	17			

[1] Groundwater measured with tape upon withdrawal of CPT probe.
[2] Groundwater depth measured from dissipation test.
[3] Where groundwater level was not detected or encountered, elevation corresponds to maximum exploration depth where groundwater was not detected or encountered.

An existing abandoned water well was found approximately 200 feet east/northeast of drill hole DH-8. The well should be sounded to determine the current water level and to measure seasonal fluctuations, if possible.

ENGINEERING PROPERTIES

The surficial clay materials appear to vary in composition and engineering characteristics depending on their proximity to higher-energy depositional environments. Clay deposits closer to the mouth of the Long Grade Canyon Wash seem to be leaner than those further downstream along the southern corridor and in the wetlands area, and also in the lowlands of the south end of the eastern corridor. The expansive characteristics of the fat clay are a significant geotechnical concern for site development.

ARTIFICIAL FILL

The dry densities of the fat to lean sandy clay artificial fill encountered in the upper 5 to 7-1/2 feet of the East Campus Development and connector road areas generally ranged from about 78 to 97 pounds per cubic foot (pcf), with moisture contents between about 11 and 23 percent. The lean clay fill encountered in the upper 5 feet of drill hole DH-3 was low to moderately expansive, with an expansion index of 49. The sandy fat clay fill encountered in drill hole DH-6 located in the eastern corridor was expansive, with an expansion index (EI) of about 88. A sample of the sandy clay artificial fill encountered in test pit BH-207 located in the northern half of the eastern corridor was moderately expansive, with an EI of 62.

The peak friction angle of a sample of the sandy fat clay (from drill hole DH-6) compacted to about 90 percent of maximum dry density at optimum moisture content (according to ASTM D1557) was about 32 degrees, with a cohesion of about 600 pounds per square foot (psf).

ALLUVIUM/COLLUVIUM

Selected engineering properties of the subsurface alluvium/colluvium encountered in the eastern and southern corridors, and along the proposed connector and arterial road alignments are summarized below.

Expansion Potential

Expansive fat clay was encountered in drill hole DH-2 (west of the western end of the southern development corridor) below approximately 5-1/2 feet of artificial fill (sandy lean clay), in the upper 35 feet of drill hole DH-5 at the southern end of the eastern corridor, and in the upper 15 feet of drill hole DH-8 on the western half of the southern corridor. The expansion index of the fat clay encountered in DH-8 was about 131.

Expansion indices of 88 and 65 for samples of the lean clay encountered in drill hole DH-6 and test pit BH-208 (both located in the northern half of the eastern corridor), respectively, suggest moderate expansion potential for those surficial alluvial materials.

In-Place Moisture Densities

The dry densities of the fat clay encountered in the upper 5-1/2 to 35 feet at the western end of the southern corridor, and the eastern corridor ranged from about 79 to 105 pcf, with moisture contents between about 17 and 28 percent. The dry densities of the lean clay encountered at a depth of about 4 feet near the mouth of Long Grade Canyon at the eastern end of the southern corridor and surficially in the backhoe test pits near the base of the surrounding slopes and in the meadows area ranged from about 86 to 106 pcf, with moisture contents between about 9 and 25 percent. The dry densities of the clayey sand alluvium encountered in the upper 4 to 13 feet in the eastern half of the southern corridor, the eastern corridor, and on or near the surrounding slopes ranged from about 82 to 99 pcf, with moisture contents between about 11 and 22 percent.

Consolidation Coefficients

Consolidation test results (presented on Plates B-6.1 through B-6.15 in Appendix B) suggest that the clay layers in the upper 11 feet are overconsolidated, with overconsolidation ratios (OCRs) of about 1.5 to 10. The recompression ratios, $C_{\varepsilon r}$, for the clay tested range from about 0.01 to 0.03. The compression ratios, $C_{\varepsilon c}$, for the clay tested typically range from about 0.1 to 0.15.

Shear Strength

The peak friction angle of a bulk sample of the surficial fat clay (from drill hole DH-8) compacted to about 90 percent of maximum dry density at optimum moisture content (according to ASTM D1557) was about 26 degrees, with a cohesion of about 1,000 pounds per square foot (psf). The peak friction angle of a bulk sample of the surficial sandy fat clay (from drill hole DH-3) compacted to about 90 percent of maximum dry density at optimum moisture content (according to ASTM D1557) was about 32 degrees, with a cohesion of about 600 pounds per square foot (psf). The ultimate friction angle of a liner sample of the sandy lean clay encountered in test pit BH-205 at a depth of about 3-1/2 feet was about 37 degrees, with a cohesion of about 100 psf.

SPT Blow Counts

Blow count data for the lean to fat clay encountered in the drill holes in the southern corridor and the southern half of the eastern corridor suggest that the surficial clayey soil is typically medium stiff, and generally becomes stiffer with depth. Blow count data for the surficial clay in the northern half of the eastern corridor suggest that those materials are stiff to very stiff.

Cone Tip Resistance

The cone tip resistance of the lean to fat clay in the upper 40 feet in the eastern and southern development corridors was typically between 15 and 40 tons per square foot (tsf). The values for tip resistance have been normalized (i.e., corrected to 1 tsf overburden stress).

GEOHAZARDS AND SEISMICITY

The project site is located in a seismically active region and, as such, it can be expected to be subjected to strong ground shaking during its design life. Analyses of seismicity for the project site were conducted to estimate strong ground motion hazards and to develop preliminary input parameters to be used for the seismic design of the proposed facilities. The analyses essentially consisted of: 1) estimating and tabulating the distance to nearby fault sources, 2) estimating ground motion from the State of California's published regional probabilistic seismic hazard evaluation, and 3) development of 1997 UBC seismic coefficients. Results of the analyses are summarized below.

POTENTIAL SEISMICITY

Ventura is the only county in southern California that has not directly experienced the effects of a devastating historical earthquake on a fault within its borders (Weber and Kiessling, 1975). That quiescence is in clear conflict with the active tectonic framework of the county, because there are numerous regional and local active faults in the county that pose a seismic risk to the area.

Geodetic surveys indicate that the Ventura basin is experiencing crustal shortening at a rate of about 1 centimeter (cm) per year in a north-south direction. Because no historical earthquakes have been recorded in the area over the course of at least 200 years (aside from the 1812 and 1857 earthquakes occurring on the San Andreas fault, occurrences that probably did little to relieve crustal strain in the Ventura basin), the Ventura region is likely to experience a large earthquake, or a cluster of large earthquakes, in the near future.

On the basis of the crustal shortening rate noted above, the Ventura region should have experienced the equivalent of two moment magnitude 7.5 earthquakes during the last 200 years. However, no large-magnitude earthquakes have occurred historically along the Simi-Santa Rosa, Oak Ridge, San Cayetano, Ventura, or any other fault in the county. Obviously, portions of Ventura County have been affected by earthquakes occurring in other geographic regions, such as the damage in Fillmore and Simi Valley that resulted from the January 17, 1994, Northridge earthquake (magnitude 6.7). However, no earthquakes with magnitudes larger than 6.0 have occurred historically on faults in Ventura County.

The relative earthquake quiescence in Ventura County is disconcerting because portions of Ventura County exhibit some of the greatest Quaternary deformation rates in California and the world. For instance, the Ventura anticline, located about 12 miles north of the project site, has exhibited uplift rates of about 6 millimeters per year (mm/yr) for the last 40,000 to 100,000 years. That rate compares with typical coastal terrace uplift rates in other areas of California of about 0.1 to 0.5 mm/yr. That high deformation rate implies a high tectonic activity rate for the region, which has not been experienced historically.

NEARBY FAULT SOURCES

Table 2 - Summary of Deterministic Seismicity Analyses, presents a summary of the distances to the project site and the maximum magnitude of some of the nearby fault sources that may cause future shaking at the project site.

Table 2. Summary of Deterministic Seismicity Analyses

Fault Name	Distance Between Site and Surface Projection of Earthquake Rupture Area (miles)	Estimated Maximum Earthquake
Anacapa-Dume	1	7.3
Simi-Santa Rosa	5	6.7
Oak Ridge (Eastern Blind)	6	6.9
Malibu Coast	8-1/2	6.7
Oak Ridge (Blind Thrust) Offshore	12	6.9
Channel Islands Thrust (Eastern)	13	7.4
Ventura-Pitas Point	13	6.8
San Andreas	45	7.8

Ground Rupture Potential

Because the site is not located within a designated Alquist-Priolo Earthquake Hazard Zone and no known active or potentially active faults are believed to exist or trend toward the site, the potential for primary ground surface rupture due to faulting is considered to be low.

Potential for Strong Ground Motion

A published regional probabilistic seismic hazard map prepared by the California Division of Mines and Geology (CDMG, 1996) predicts that a peak ground acceleration (pga) on the order of 0.6 g should have a 10 percent probability of exceedance in a 50-year exposure period. That level of ground shaking generally corresponds to the level of ground motion that would have a return period of about 475 years and a probable moment magnitude between about 7.0 and 7.5. When the location and specific details of significant project components become available, we can develop site-specific probabilistic ground motion estimates, as needed.

Vertical Motions

Although specific analyses were not performed to evaluate vertical acceleration, typically, the vertical acceleration and spectral-ordinate components commonly are taken as twothirds of the horizontal component. However, recent studies associated with the 1994 Northridge earthquake have shown that near-field events can have vertical accelerations equal to or even greater than the horizontal accelerations (Bozorgnia et al., 1999). Considering that the site is located near the active Anacapa-Dume, Malibu Coast, Oak Ridge, and Simi-Santa Rosa faults, we suggest that the vertical acceleration be taken as equal to the horizontal component.

1997 Uniform Building Code Design Criteria

The project location is within Uniform Building Code (UBC) Seismic Zone 4 (Z factor of 0.4). Utilizing UBC (1997) descriptions, the soil profile at the site can be considered type S_D. The nearest Type A fault is the San Andreas, approximately 45 miles away. The nearest Type B fault is the Simi-Santa Rosa, approximately 5 miles away.

Considering those faults, the following 1997 UBC coefficients are applicable to this site:

- N_a: 1.0
- N_v: 1.1
- C_a: 0.44
- C_v: 0.68
- T_s: 0.621
- T_o: 0.124

Using those coefficients, we constructed the 1997 UBC response spectrum shown on Plate C-1 - Design Response Spectrum, in Appendix C.

Liquefaction Potential

General. Soil liquefaction results from the earthquake-induced temporary buildup of excess pore water pressure, which can result in a condition of near-zero effective stress and the temporary loss of strength. Soil materials considered susceptible to liquefaction include loose, saturated sands and non-plastic silts. Clay soil or sand and silt with more than 15 percent clay-sized particles (particles less than 0.005 mm) typically are considered to be non-liquefiable.

According to Seed (1979), two subsurface conditions have been observed to exist at most sites where liquefaction has occurred. Those conditions are: 1) groundwater is shallower than a depth of about 15 feet, and 2) the liquefied layer is shallower than a depth of about 45 feet. However, Seed (1979) states that those conditions should not be construed to indicate that liquefaction cannot be induced at greater depths in response to earthquake shaking.

East Campus Development Corridors. Groundwater was not detected in the upper 60 feet in the eastern corridor and the eastern half of the southern corridor. Beyond the western end of the southern development corridor, at the proposed future retail/town square site, groundwater was encountered between depths of about 36 and 42-1/2 feet in drill hole DH-2 and CPT-2, respectively. However, the soils encountered below the groundwater level at those exploration locations appear to have a considerable clay-sized composition, and are not considered susceptible to liquefaction. Additionally, if the groundwater level were to rise in that area and also in the remaining East Campus Development corridor areas, because the upper 50 feet of soil is predominantly fat to lean clay, the liquefaction potential probably would remain low. For design purposes, estimated liquefaction-induced settlement associated with the few granular layers we encountered in the eastern and southern development corridors should be on the order of about 1/2 inch or less. For large footprint structures planned beyond the west end of the southern development corridor, such as the future retail/town square site, the liquefaction potential should be evaluated further with additional exploration locations to verify the continuity of the clay layers in that area.

Debris Dam Area. Silty sand was encountered between depths of about 25 and 35 feet in drill hole DH-4 and the adjacent CPT-4. The interpreted CPT data suggest N-values (corrected to an overburden pressure of 1 ton per square foot) for that layer range from about 33 to 44 blows per foot. After applying a correction for fines content, which, in that layer, was about 26 percent, the computed N-values would increase to over 40. On that basis, the potential for liquefaction of that layer (if submerged at the time of a seismic event), probably would be low. For preliminary design purposes, liquefaction-induced settlement in the debris dam area could be on the order of about 1/2 to 1 inch.

Lateral Spreading

Lateral spreading movement may occur when a soil mass "rides" on liquefied soil layers, moving downslope or toward a free face. Bartlett and Youd (1995) present empirical procedures for estimating large-scale lateral movements. Their empirically derived procedures for estimating lateral spreading movements depend on earthquake magnitude, distance between the site and the seismic event, thickness of the liquefied layer, ground slope or ratio of free-face height to distance between the free face and structure, fines content, the average particle size of the material comprising the liquefied layer, and N-value. We note that the Bartlett and Youd procedure is not applicable to fine-grained soil, nor to sandy soil where: 1) N-values are greater than about 15, and 2) where N-values are less than 15 and the potentially vulnerable layer is less than 1 meter thick. Because those conditions are generally present at the east campus site, we believe the potential for large earthquake-induced lateral spreading movements (i.e., several inches to feet) is low.

Seismically Induced Settlement

Seismically induced settlement can occur in sandy soils that are loose to medium dense and above the water table. Seismically induced settlement differs from settlement resulting from liquefaction of saturated granular materials. Because unsaturated soils extending down from the ground surface to the groundwater level consist predominantly of clayey soil, and because sandy surficial soils, where encountered as artificial fill in the eastern corridor (drill hole DH-6 and test pit BH-210) will be overexcavated and recompacted (as recommended later) during site grading, the potential for seismically induced settlement at the project site is anticipated to be relatively minor.

Tsunamis and Seiches

According to the Ventura County Seismic Safety and Safety Element (1974), a tsunami runup elevation of about +15 feet was recorded in the Ormond Beach area from the 1812 Santa Barbara Channel earthquake. The project site is located generally above elevation +30 feet MSL datum and about 3 miles from the Pacific Ocean. Therefore, there is no historical basis for tsunami hazards to impact the site.

Other than the treatment ponds located west of the west end of the campus property, landlocked bodies of water are not known to exist in the vicinity of the site. Therefore, the potential for flooding due to an earthquake-induced seiche is considered to be low.

Hydroconsolidation

Hydroconsolidation is a phenomena whereby natural soil deposits or fill materials collapse (settle) when wetted. Natural deposits susceptible to hydroconsolidation are typically aeolian, alluvial, or colluvial materials, with high apparent strength when dry. That dry strength may be attributed to the clay and silt constituency of the soil, and the presence of salts. Additionally, capillary tension may act to "bond" soil grains. Once those soils are wetted, the constituency including any salts or "bonding" agents is weakened or dissolved; capillary tensions are reduced, and collapse occurs.

On the basis of collapse test results for the lean clay presented on Plates B-6.4, B-6.5, B-6.7, B-6.8, B-6.10, and B-6.11 - Hydroconsolidation Test Results (refer to Appendix B), the estimated strain for the silty sand encountered in drill holes DH-7 and DH-8 and the lean to fat clay encountered in drill holes DH-3 and DH-7, is less than 1/2 percent. The clay materials encountered in the East Campus Development area generally should have a low collapse potential because of their high moisture content. Soil with a high degree of saturation (i.e., over 60 percent) typically demonstrates a reduced potential for collapse, and once the degree of saturation reaches about 90 percent, the collapse potential has already been realized. The degree of saturation of the clay materials commonly ranged from 80 to 90 percent. Additionally, native clay layers with lower degrees of saturation typically did not demonstrate a significant collapse potential (i.e., they showed about 1/2 percent strain or less).

The estimated collapse strain in the sandy fat clay to sandy silt artificial fill encountered in the upper 7-1/2 feet of drill hole DH-6 was about 1-3/4 percent, resulting in a total collapse strain of about 1-1/2 inches in the fill.

Native, undisturbed alluvial soils generally have elevated moisture contents, and hydroconsolidation test results suggest little collapse potential. Therefore, collapse settlement appears to be insignificant (particularly when compared to other settlement and expansion phenomena) in those materials.

Landsliding/Slope Instability

Slope failures along bedding or flow layers were not observed on the slopes adjacent to the East Campus Development area. Because of the typically high strength of the volcanic rocks and the apparent absence of deep-seated slope failures on the property, the potential for bedding plane-related slope instability probably is low. However, there is a possibility that colluvial or residual soil horizons may have developed between flow events (or layers) of the Conejo Volcanic bedrock. Those soil layers sandwiched between flow beds could be weak and unstable, particularly if exposed by a slope excavation (i.e., cut slope face).

There also is a potential for rockfalls and surface debris flows to impact the development areas along the natural slopes adjacent to the southern and eastern development corridors and the connector road alignment.

Rockfall Hazard

Large boulders are located on the slopes adjacent to the southern and the southern end of the eastern development corridors. The irregularly shaped boulders vary in size, but generally are less than about 17 feet in average dimension. Loose boulders are a natural result of weathering on steep slopes underlain by volcanic rocks such as those that surround the proposed development. Rocks falling from steep slopes, cliffs, or cut slope faces usually travel downslope in a combination of free fall, bouncing, and rolling movements. Rolling rocks can damage improvements located at or near the toes of slopes adjacent to potential rockfall areas. On the basis of field observations during geologic reconnaissance mapping, there appears to be a potential for rockfalls to impact the proposed structures located near the base of the slopes. Structural setbacks and/or catchment structures and/or restraint mechanisms (e.g., rock cables), are some options that could be considered to reduce the potential for rockfall damage.

Debris Flow Hazard

Surficial colluvium was observed on the slopes surrounding the development areas. The colluvium consists primarily of lean to fat clay with sand and is a weathered derivative of the underlying Conejo Volcanics bedrock. The colluvium has been displaced from its upslope origin through erosion, creep, and mass-wasting processes. Those displaced residual materials typically vary in thickness over the slope faces. Generally, colluvial deposits vary in thickness with the local slope gradients (i.e., they are thicker in areas of flatter gradients and thin out in areas of steeper gradients). Colluvial deposits, particularly those on steep slopes, may have a potential for debris flow. Although not evaluated specifically, there probably are areas on the slopes adjacent to the development areas where there is a potential for debris flow.

GEOTECHNICAL OVERVIEW

On the basis of the groundwater, soil, and geologic conditions encountered for this study, several geotechnical concerns should be addressed and evaluated prior to siting structures, finalizing grading plans, and preparing construction documents. Those concerns, which include rockfall hazard, debris flows, subgrade stabilization during site grading, liquefaction-induced settlement, consolidation settlement, and expansive surficial soils are discussed below. Possible impacts and mitigative measures also are introduced below and their benefits are discussed in greater detail in subsequent sections.

ROCKFALL HAZARD

The rockfall hazard, as discussed in the preliminary draft study (Fugro, 1999a) (and subsequently in planning meetings between Fugro and CSUCI), is being evaluated by the CSUCI Site Authority. Possible mitigative options are being weighed by the Site Authority and their final decision is pending.

DEBRIS FLOWS

The thickness of colluvial deposits on the slopes surrounding the development area varies from one location to another, depending on the steepness of the slope. Consequently, the potential for debris flow of those deposits should be evaluated on a case-by-case basis. The evaluation should include the exploration of the colluvial deposits with excavating equipment such as a backhoe. However, most slope areas currently are inaccessible to exploration equipment for the following reasons:

- Dense brush/cactus on slopes, and/or
- Steep topography, necessitating the grading of a temporary access road, and/or
- Species-protected area (designated by biologist) restricts slope access.

Because of the difficulties noted above (and because the rockfall catchment basins that were previously planned along the slope toes would effectively catch debris flows as well), site-specific exploration to evaluate the potential for debris flow was not performed for this study.

We note that, in many slope areas, the proposed arterial road or bike trails/greenbelt areas provide a buffer zone, or setback from the slope toe, that should help reduce the potential for debris flow impacts to the proposed residences.

We recommend, however, that the potential for debris flow be evaluated by the geotechnical engineer and engineering geologist prior to site development. Areas where debris flows are likely may require the construction of diversion or containment walls or debris basins near the slope toe.

BEDDING OR FLOW PLANE FAILURE

We understand that cut slopes are planned at the following locations:

- Along the southwest-facing slope on the north side of the proposed neighborhood street ("C" Street) at the northern end of the eastern development corridor,

- Along the west-facing slope at the north end of the eastern development corridor,

- Along the west-facing slope along the arterial road ("A" Street) in the central area of the eastern development corridor,

- On the east/northeast-facing slope along the north end of "A" Street in the north half of the eastern development corridor,

- Along the north- and east-facing slope at the western end of the eastern development corridor (at the former California Conservation Corps dormitory site)

- Along the north-facing slope on the south side of Chapel Street at the western end of the southern development corridor (near the intersection of Fillmore Street).

Cuts excavated into north/northwest facing slopes may expose planes of weakness such as clayey soil layers sandwiched between individual flow layers. The potential for cut slope instability should be evaluated with site-specific exploration, including the excavation of bucket auger borings and/or backhoe pits at the proposed slope locations.

GROUNDWATER

Groundwater was encountered as shallow as about 42-1/2 feet below the ground surface beyond the western end of the southern East Campus Development corridor (i.e., the future retail/town center site) in CPT-2. That depth corresponds to a groundwater elevation of about El. 32 feet during the time field exploration was performed for this study. Groundwater was not encountered in the drill holes and backhoe test pits located in the eastern half of the southern corridor, the eastern corridor, and the connector road alignment area. However, the potential for groundwater to rise should be considered in the design and construction of structures located adjacent to the Long Grade Channel (i.e., the bridge abutment). The potential for flooding at the site is not addressed herein, but should be addressed by the project civil engineer.

Construction Impacts of Shallow Groundwater

Along the connector road alignment between University Drive and the eastern residential development corridor, excavations likely will expose wet, unstable subgrade. The impacts of shallow groundwater and/or wet subgrade on site grading, foundation construction, and foundation performance include the following:

- Wet subgrade soil hampers trafficability of site for earth-moving equipment.
- Instability of temporary excavations near or below the groundwater level.
- Difficulty achieving the minimum required degree of compaction.

- Moisture transmission from subgrade soil to slabs-on-grade, particularly interior floor slabs.
- Below-grade walls and slabs-on-grade below the groundwater level are subjected to hydrostatic pressure.
- Seepage and nuisance free-water may collect in work pits or on slabs and pavements.

Additionally, depending on the time of year grading commences, other areas in the East Campus Development also may experience wet subgrade conditions.

Mitigative Measures

The development of unstable conditions during grading (including along the connector road alignment and in the development corridors) may be mitigated with the implementation of the following:

- The use of a geosynthetic material placed beneath a minimum 1-foot-thick lift of gravel or rock fill,
- "Bridging" the unstable subgrade with about 1 to 2 feet of crushed rock (i.e., about 3 to 4 inches in maximum dimension),
- Working lime or cement into the subgrade, depending on the soil type to be stabilized.

Which of the measures noted above may be utilized depends on: 1) the elevation to which the subgrade is excavated, 2) the level to which groundwater is lowered prior to the start of construction (if needed), 3) the moisture content of the subgrade materials, the material type to be stabilized, and 4) the type of compactive effort applied to the fill (i.e., vibratory or wheel-rolled).

We recommend that unit costs for stabilization (including materials, labor, and equipment) be solicited in the bid documents.

SETTLEMENT FROM STATIC LOADS

The lean to fat clay commonly encountered in the near-surface in the East Campus Development area appears to be overconsolidated. Typically, overconsolidated soils are less compressible than normally consolidated soils. However, the additional foundation loads imposed by the proposed structures and fill to be placed in the development areas may exceed the past consolidation pressures, resulting in greater consolidation settlement potential for those soils.

Overconsolidated fine-grained soils may be slightly to moderately vulnerable to consolidation settlement from foundation loads, increases in effective vertical stress (e.g., lowering of the groundwater level), and the addition of surcharge loads such as placement of fill above existing grade.

In most areas, the proposed residential structures for the East Campus Development area will be constructed within a few feet of existing grade. Applied bearing pressures from the residential structures are anticipated to be relatively low (between 1,000 and 1,500 psf), as is typical for one- to two-story wood-frame construction. Existing soils are considered suitable for support of the residential structures, provided other geotechnical concerns such as expansive near-surface soils, artificial fill, and soft to loose, voided near-surface soils, are mitigated and/or accommodated during subgrade preparation and grading and/or in the foundation design.

Consolidation Settlement from Surcharge Loads

Consolidation settlement from surcharge loads induced by placing fill on the site or increasing the density of subgrade soils by compaction has been estimated at about 1/8 to 1/4 inch per foot of fill placed or per 4 feet of compacted subgrade due to the change in density of the compacted materials. However, because fill placement is anticipated to precede the construction of structures (including residences and retaining walls) by several months to years, most consolidation settlement should be realized prior to the construction of those structures.

Settlement from Hydroconsolidation

Settlement from hydroconsolidation of artificial fill materials could be on the order of about 2 percent or more of the fill thickness. Laboratory test results from selected native clay and silty sand samples did not suggest a significant collapse potential in those materials.

The abandoned, now-filled Long Grade Canyon Wash drainage channel, the estimated location of which is approximated on Plate 3, was filled sometime after 1941 with artificial materials. Hydroconsolidation of those fill materials could be significant, potentially resulting in inches of settlement. Consequently, those channel-fill soils should be removed and replaced with compacted fill.

Mitigative Measures

Reducing the potential for consolidation and hydroconsolidation settlement can be accomplished to varying degrees with the following (or combination of the following):

- Overexcavation and recompaction of compressible soils, in conjunction with foundation design to accommodate the resulting estimated differential settlements.
- Complete removal and recompaction of existing artificial fill materials.
- Placement of fills several months in advance of construction of structures, including residences and retaining walls.

EXPANSIVE SOILS

The near-surface fat clay encountered in drill hole DH-6 in the eastern development corridor and in drill hole DH-8 at the western half of the southern development corridor appears to be very expansive, falling in the "high" to "very high" expansion categories of Table 18-I-B of the Uniform Building Code (1997). The near-surface clay encountered in drill hole DH-3 located west of the mouth of Long Grade Canyon at the eastern end of the southern development corridor and in test pits BH-207 and BH-208 at the northern end of the eastern development corridor is less expansive, falling in the "medium" expansion category of Table 18-I-B.

The expansive characteristics of the fat clay can be reduced somewhat by replacement of the upper two or more feet of soil (relative to finish subgrade elevation) with select non-expansive materials generated from potential borrow areas east of the Long Grade Canyon debris dam. Alternatively, the expansive subgrade can be replaced with select non-expansive import or with the less expansive onsite lean clay materials encountered at the eastern end of the southern corridor or the northern half of the eastern corridor. The minimum requirements for select fill are presented in another section of this report. The deeper the subgrade removal and replacement with moderate to low to non-expansive materials, the lower the effective (or weighted) expansion potential of the subgrade. Design of foundations constructed on low expansive soils is less severe in terms of footing depth, footing and slab reinforcement, and premoistening requirements (of both footings and slab areas).

Alternatively, foundations could be designed to accommodate the high expansion pressure of the subgrade soil. Post-tensioned slabs-on-grade are recommended for foundations bearing on soils in the "high" to "very high" expansion categories; however, exterior slabs-on-grade, sidewalks, and pavements would be susceptible to heave and shrinkage, potentially resulting in cracks and uneven surfaces, particularly at slab edges.

RECOMMENDATIONS

The following recommendations are for earthwork for lightly-loaded residential structures (i.e., 1,000 to 2,000 pounds per lineal foot foundation loads) and the associated infrastructure improvements to be constructed in the East Campus Development area. Infrastructure improvements include roadways, particularly the connector road and culvert crossing between University Drive and the northern end of the eastern development corridor, the proposed bridge across Long Grade Channel, retaining walls along the northern end of the fill lots at the northeastern edge of the northern development corridor, and underground utilities.

GRADING, EARTHWORK, AND EXCAVATION

General

The grading recommendations presented below should be incorporated into the project plans and specifications, and should be adhered to during construction. Final grading plans should be reviewed by Fugro for consistency with our recommendations prior to contract bidding.

Site Preparation

Organic material and vegetation, hazardous materials, old foundations from demolished structures, underground utilities, debris, unsuitable fill materials, or other deleterious materials should be stripped, removed, and wasted from construction areas. Abandoned below grade or underground structures such as wells, cesspools, pipelines, old foundations, etc., not relocated prior to grading should be removed or treated in a manner prescribed by the controlling governmental agencies. Excavation bottoms should be observed by Fugro prior to backfilling. Backfilling of excavations created as a result of the removal of below-grade or underground structures should be performed in accordance with recommendations presented herein.

Excavation Considerations

Equipment. We believe grading and excavation can be performed with conventional heavy-duty earthmoving equipment in good working order in the eastern and southern corridor areas. Excavations near the slopes for the arterial and neighborhood roads, cut slopes for the northernmost residential lots, and other improvements may encounter Conejo Volcanics bedrock, which would require the use of heavier equipment or even blasting.

Along the connector road alignment, because of the elevated moisture conditions, the use of equipment that imparts light loads to the soil should be considered. Minimizing the equipment and traffic loads in the excavation bottom may help avert "pumping" subgrade conditions.

Additionally, lightweight equipment may be advantageous for compacting backfill placed on the excavation bottom until "bridging" over potentially unstable pumping subgrade soil is accomplished.

Dewatering. Although not encountered in the backhoe test pits excavated along the proposed connector road alignment, groundwater may be encountered in the excavations within and near the existing drainage channel.

If dewatering is required, the contractor should be responsible for the design of the dewatering system. Appropriate design considerations should be included to prevent piping and soil migration or erosion. The dewatering system should draw down the water level a minimum of 5 feet below the bottom of an excavation.

Runoff should be directed away from temporary slopes (and should not be allowed to flow across slope faces) and excavations.

Temporary Slopes. Sloped excavations may be used as temporary access. Temporary slopes should be no steeper than 2h:1v. The temporary slopes should be continuously monitored by the contractor and loose or unstable soil masses should be removed immediately. Temporary slopes and excavations should conform to federal Occupational Safety and Health Administration (OSHA) and/or California Division of Occupational Safety and Health (DOSH) regulations, and other applicable local ordinances and building codes, as required. However, the contractor should be made responsible for all safety issues affecting open excavations. Stockpiled material or equipment should not be placed within a distance from the slope crest equal to the height of the slope.

Runoff should be directed away from temporary slopes and should not be allowed to flow across slope faces and excavations. In addition, provisions should be made for collecting and pumping seepage or runoff water out of excavations, if water is encountered during construction.

On the basis of observations during the excavation of backhoe test pits BH-10 and BH-11, the gravel with sand (GW), sand with silt (SP/SM), and silty sand (SM) encountered east of the debris dam demonstrate a potential for caving and sloughing. Other material types also may be encountered during grading or construction that will have a potential for caving and sloughing.

Overexcavation Requirements

The following grading recommendations are applicable for foundations supporting lightweight wood-frame construction in the residential development areas. The recommendations below are predicated on mass grading of the entire residential development area, not individual pad areas.

Residential Development Areas. Overexcavation and recompaction of subgrade soils in residential development areas to a depth of 4 feet below existing grade or 2 feet below bottom of foundation, or entirely through existing artificial fill, whichever is deeper, is recommended to decrease the potential for adverse total and differential settlements. This overexcavation recommendation also applies to all areas to receive fill and should be implemented as subgrade preparation prior to placement of new fill. The bottom of the excavation should be observed by Fugro prior to placing backfill. Voided soil or soft conditions exposed in the excavation bottom may require localized deepening of the excavation bottom to firm or unvoided soil. If localized deepening of overexcavation areas is needed, sufficient adjacent area also will need to be overexcavated to soften the transition from shallow to deeper fill so that the variation in fill thickness does not exceed 15 percent. Additionally, unstable, pumping subgrade may require special stabilization measures as described below.

After the excavation bottom has been observed by Fugro, the exposed surface should be scarified to a depth of 8 inches, aerated or moistened as required to bring the soil to 2 to 3 percent over optimum moisture content, and compacted to a minimum of 90 percent relative compaction, according to ASTM D1557.

Former Long Grade Channel Alignment. A portion of the former natural alignment of Long Grade Canyon Wash was filled in sometime after 1941. The artificial fill materials should be removed to expose firm, native soil. The bottom of the removal excavation should be observed by Fugro. Unstable, soft, or otherwise unsuitable materials exposed in the excavation bottom will require deeper removals. After the removal excavation bottom has been observed by Fugro, the exposed surface should be scarified to a depth of 8 inches, aerated or moistened as required to bring the soil to 2 to 3 percent over optimum moisture content, and compacted to a minimum of 90 percent relative compaction, according to ASTM D1557.

Exploratory Trench Backfill. Backfilling of the exploration trenches excavated to date for this study was performed by the backhoe operator without compactive effort. Trench backfill should be removed during mass grading of the eastern campus development and connector road areas. We recommend that the trench locations be staked and excavated to the original exploration depth. The excavations should then be backfilled with compacted fill materials.

Connector Road Area. The subgrade for the connector road between University Drive and the Eastern Development Corridor should be prepared by overexcavating to a depth of 4 feet below existing grade, or 1 foot below pavement subgrade elevation, or entirely through existing artificial fill, whichever is deeper.

Along the drainage channel alignment and in the foundation area for the culvert crossing (to a horizontal distance of 10 feet beyond the foundation footprint), the excavation should be sufficiently deep to remove loose alluvium down to bedrock. The bottom of the excavation should be observed by Fugro. The excavation bottom should be firm and unyielding. Backfill in the culvert crossing foundation area should consist of Class II base compacted to a minimum of 95 percent of maximum dry density. The backfill over the bedrock in the remaining portions of the drainage channel alignment (i.e., outside the culvert crossing foundation area) should consist of onsite materials.

Beyond the existing drainage channel limits and the culvert crossing area, topsoil, colluvium, or voided soil exposed in the excavation bottom should be removed by deepening the excavation. To reduce differential settlements, areas adjacent to deepened removals also should be excavated to a depth such that the variation in fill thickness does not exceed 15 percent.

After observation of the excavation bottom by Fugro, the exposed surface should be scarified to a depth of 8 inches, aerated or moistened as required to bring the soil to 2 to 3 percent over optimum moisture content, and compacted to a minimum of 90 percent relative compaction, according to ASTM D1557.

The depth to bedrock along the drainage channel is not known; however, bedrock was not encountered to a depth of 9 feet in backhoe test pit BH-7A, located near (above) the south side of the channel. Closer to the slope toe, backhoe test pit BH-7 encountered Conejo Volcanics bedrock at a depth of 2 feet. To better estimate the depth to bedrock for channel bottom removals, exploration of the channel bottom with bucket auger borings and/or backhoe test pits are recommended along that portion of the proposed connector road that coincides with the drainage channel.

We recommend that unit costs be solicited in the bid documents for additional removals down to bedrock.

Fill Slope Construction

Reconstructed fill slopes are planned at the Long Grade Channel bridge abutment locations to create an "Expansive Soil Exclusion Zone" as shown on Plate 7. Additionally, fills over natural slopes are planned along the drainage channel embankment at the northwestern end of the eastern corridor and along the connector road alignment.

When fill is to be placed on slopes steeper than 5h:1v, the fill should be keyed and benched as shown on Plate 8 - Sidehill Fill. A keyway should be excavated into firm native soil at the base of the proposed fill slope. The keyway should be at least one equipment width wide, centered at the toe of the proposed fill slope, founded into firm native material, and should be tilted into the slope. The keyway should be at least five feet deep at the outside edge and should be observed by Fugro prior to placement of fill. The fill should be placed in level benches that are cut into the existing natural slope face. The fill should be compacted to a minimum of 90 percent of maximum dry density. Fill slopes should be overfilled, then trimmed back to the compacted core. Fill slopes should not exceed 2h:1v.

Fill slopes should be constructed in accordance with the Ventura County grading ordinance and Chapter 33 of the Uniform Building Code (1997).

Cut Slopes

In general, natural slopes excavated into onsite alluvial/colluvial materials should not be cut steeper than 2h:1v. Cut slopes should be observed by the engineering geologist. Slope excavations that expose dip-slope bedding or flow layers may require buttressing or flattening. Other mitigative measures may be possible.

Cut slopes should be acceptable at 2h:1v to heights of up to 20 feet, provided planes of weakness oriented out of the proposed cut slope face (e.g., dip-slope conditions) are not exposed. On the basis of the geologic reconnaissance mapping, flow layering orientations suggest that dip-slope conditions may be encountered in north/northwest-facing natural slopes; however, those planes of weakness may not be well-developed. If that is the case in that area, the cut slope may be acceptable as proposed. Conversely, if well-developed planes of weakness are encountered with an out-of-slope or dip-slope orientation, further evaluation and possible mitigation of the slope may be necessary.

Provisions for unit costs for excavating the hard volcanic bedrock in some areas (if it is encountered) should be incorporated into the contract documents.

Special Subgrade Stabilization Measures

Special stabilization measures may be required if soft or pumping subgrade is encountered during construction (e.g., high moisture content and/or near groundwater level). Those measures may be required (and should be anticipated) to provide a firm and unyielding subgrade surface. Special subgrade stabilization measures may consist of:

- Use of a geosynthetic fabric, such as Mirafi 600X, or equivalent, placed beneath a minimum 1 foot lift of gravel or rock fill,
- Working of rock fill into clayey subgrade soils, or
- Working lime into the fine-grained subgrade.

Whether those measures are required or not will depend on the elevation of the excavation relative to the groundwater level, the moisture content of the subgrade materials, and the nature of the construction activities (e.g., vibratory compaction equipment, equipment wheel loads, number of equipment passes, trafficability, etc.).

Past experience with wet subgrade soils suggests that gravel or rock thicknesses between 1 and 3 feet may be required to provide a suitable subgrade surface (i.e., firm and unyielding) upon which fill materials may be placed and compacted.

A geosynthetic fabric placed beneath the gravel or rock fill is needed to separate those coarse materials from the underlying soft materials and a filter fabric should encapsulate the gravel or rock layer to reduce migration of fines into the gravel or rock. Rock fill materials successfully used in the past include filter rock materials in accordance with Ventura County specifications or quarry run rock available locally.

Such special measures suggested herein should be considered if soft or pumping subgrade becomes a nuisance during construction. We suggest that contract documents incorporate contingency items for procurement of geosynthetics, gravel or rock fill, labor, and equipment, in case the need arises.

Fill Selection and Compaction

In general, with the exception of base backfill in the culvert crossing area of the connector road, most of the onsite materials likely will be suitable for use as backfill. However, the expansive characteristics of onsite materials should result in more stringent foundation design recommendations. General fill should be placed in the upper 4 feet of finish grade. The general fill materials placed in the upper 4 feet of finish grade should have an expansion index less than 91. Selective grading involving the replacement of the upper few feet of expansive fat clay with select non-expansive import, sand or general fill could result in thinner pavement sections, shallower footing depths, less foundation reinforcement, and less stringent slab premoistening requirements. Select fill should be used as backfill behind retaining walls.

Fill soils should be free of organic material, hazardous material, debris, or any other deleterious materials.

Rock or gravel particles less than 4 inches in maximum dimension may be utilized in the fill, provided those materials are not placed in concentrated pockets and provided they have sufficient sand-sized material surrounding the individual rock fragments. Fill material should not contain more than 15 percent material larger than 2 inches.

General Fill. General fill should have an expansion index of less than 91 and a minimum R-value of 11, and conform to the general requirements for fill as described above.

Select Fill. Select fill should be used behind retaining walls and is desirable in the upper 1 foot of road and exterior slab-on-grade subgrade and in the upper 2 to 4 feet in the mass-graded areas:

- Non-expansive (EI ≤ 20)
- Plasticity Index less than 15
- Amount of soil passing No. 200 sieve is less than 10 percent
- Angle of internal friction ≥ 35 degrees
- R-value (for pavement subgrade) greater than 50
- No rock greater than 4 inches in maximum dimension

Bridge Abutment Fill. Fill placed in the "Expansive Soil Exclusion Zone" shown on Plate 7 should have a sand equivalent (SE) greater than 20, expansion index (EI) less than 50, less than 10 percent of material finer than (i.e., passing) the No. 200 sieve, and an angle of friction of greater than or equal to 35 degrees.

Use of Onsite Soil. Some of the onsite soil may be used as select fill provided it meets the requirements of select fill. For example, samples of the gravel with sand, sand, and silty sand encountered in the upper 7 to 10 feet of backhoe test pits BH-10 and BH-11, located east of the debris dam, appear to meet the requirements of select fill.

Imported Fill. Imported fill materials may be used for general fill and select fill provided that the imported fill meets the characteristics for the particular fill presented above. Imported fill material should be evaluated by the geotechnical engineer to verify suitability for its intended use. Unit costs for imported fill materials should be included in the contract bid documents.

Class II Base or Processed Miscellaneous Base (PMB). Class II base materials to be used as fill in the culvert crossing area and pavement areas should consist of imported material conforming to Caltrans Standard Specifications for Class 2 aggregate base, Section 26-1.02A [Caltrans, 1995]. Processed miscellaneous base to be used in pavement areas should conform to the "Greenbook" (Standard Specifications for Public Works Construction, 1997) standards for Processed Miscellaneous Base (Section 200-2.5).

Compaction Requirements. The bottom of excavations should be observed by Fugro prior to placing fill. Fill materials should be placed in layers that do not exceed 6 to 8 inches in loose thickness. Each layer should be spread evenly, moisture-conditioned to about 2 to 3 percent above optimum moisture content (or within 2 percent above or below optimum for select fill), and processed and compacted to obtain a uniformly dense layer. The fill should be placed and compacted on near-horizontal planes to a minimum of 90 percent (relative compaction) of the maximum dry density determined from ASTM D1557 for general fill, and 92 percent for select fill and bridge abutment fill, and 95 percent for PMB or Class II base.

Shrinkage and Subsidence

A shrinkage factor of 15 percent may be used to estimate the amount of additional material necessary to compensate for volume losses when compacting existing artificial fills and surficial soils into a denser state. Our shrinkage estimate is based on a correlation of limited laboratory data from samples obtained from the drill holes and test pits and should be considered as a rough estimate.

Subsidence of underlying materials as a result of the mass-grading operation should be on the order of about 1 inch.

SHALLOW FOUNDATION DESIGN

GENERAL

A shallow foundation system consisting of either conventional continuous wall footings with interior column spread footings or post-tensioned slabs may be used to provide support for the east campus residential structures, provided that wall loads do not exceed 1,000 to 2,000 pounds per lineal foot (plf) and concentrated loads do not exceed 50 kips.

CONVENTIONAL FOOTING DESIGN CRITERIA

Minimum Footing Embedment

As previously noted, we recommend that continuous wall and isolated column footings be founded on compacted fill soils with an expansion index less than 91. The minimum embedment depth relative to the adjacent finished grade, excavation grade, or slab elevation, whichever is lower, should be 21 inches for single and two-story structures, and 24 inches for three-story structures. Isolated footings should be tied in both directions to adjacent footings. Alternatively, a post-tensioned foundation should be used in place of the conventional continuous and spread footings where expansive foundation subgrade soil has not been replaced with select fill or fill materials with an EI less than 91. Details of post-tensioned foundation design can be provided if it is determined that there is insufficient non-expansive select fill or fill materials with an EI less than 91 available to develop the project.

Minimum Footing Dimensions

Minimum footing widths of 12 and 24 inches are recommended for wall and column footings, respectively. The footing thickness should be determined by the structural engineer, but should not be less than 12 inches thick.

Allowable Bearing Pressure

Assuming footing elements are embedded to at least the minimum recommended depths noted above, and bear on reinforced compacted fill materials as recommended previously, wall and column footing elements can be proportioned for dead load plus probable maximum live loads using a maximum net (in excess of existing overburden stresses) allowable bearing pressure of 1,500 psf.

Safety Factors and Transient Loads

The recommended value for allowable bearing pressure provides a factor of safety against shear failure in excess of 3. A one-third increase in the allowable bearing pressure may be used for transient loads such as seismic or wind forces.

SLIDING AND PASSIVE RESISTANCE

Sliding Resistance

Ultimate sliding resistance generated through a soil/concrete interface can be computed by multiplying the total dead weight structural loads by a coefficient of 0.3, for foundations constructed on general fill subgrade and 0.4 for foundations constructed on select fill subgrade.

Passive Resistance

Ultimate passive resistance developed from lateral bearing of below-grade walls or footings bearing against compacted backfill below a depth of 1 foot below the lowest adjacent grade can be determined using an equivalent fluid weight of 300 pcf.

Safety Factors

Sliding and passive resistance may be used together without reduction, when used with the safety factors recommended below. For static conditions, minimum factors of safety of 1.5 and 2.0 are recommended for foundation overturning and sliding, respectively, where sliding resistance and passive resistance are combined. The safety factor for sliding can be reduced to 1.5 if passive resistance is neglected. The safety factor for transient (seismic, dynamic) conditions should be at least 1.1.

CORROSION CONSIDERATIONS AND CEMENT TYPE SELECTION

Test Results

Bulk samples of soil obtained from drill hole DH-3 and backhoe test pits BH-1, BH-5, BH-209, and BH-212 were tested for sulfates, chlorides, pH, and resistivity. The results are presented in the following table:

Table 3. Summary of Chemical Test Results

Sample	Depth (ft)	Material Description	Sulfates (ppm)	Chlorides (ppm)	Resistivity (ohm-cm)	pH
DH-3	1 - 5	Lean clay	27	68	3358	7 62
BH-1	2	Sandy fat clay	< 2	248	15,609	7.61
BH-5	2	Lean clay	5	97	4,175	7.47
BH-209	1 - 4	Clayey sand	51	108	26,499	6.98
BH-212	1 - 3	Clayey sand	60	145	17,424	7.26

Note: ppm = parts per million

Corrosion

The resistivity and pH values in the samples tested suggest that the existing onsite soil materials in the East Campus Development area range from mildly to fairly corrosive to underground steel. The test results should be evaluated by a corrosion engineer to determine how underground utilities should be protected from corrosion.

Cement Type

The soluble sulfate content in the samples tested is below a level where sulfate-resistant cement is typically required. Therefore, Type II cement probably can be used for concrete that will be placed in contact with onsite materials in the East Campus Development area.

RECOMMENDATIONS FOR RETAINING WALLS

Cantilever retaining walls up to about 13 feet high are planned along the north edge of the single-family lots at the northwestern end of the eastern corridor (Phase V) and restrained walls up to about 22 feet high are planned at the culvert crossing along the connector road. The lateral earth pressures for the cantilever and retrained retaining walls and the allowable bearing pressures for the wall footings are provided subsequently.

Cantilever Retaining Walls

Footings for the cantilever retaining walls should be bottomed a minimum depth of 3-1/2 feet below lowest adjacent grade and should maintain a minimum horizontal setback from the outside edge (toe) of the footing bottom to the adjacent descending slope face, equal to one-third the slope height (H/3) or 5 feet, whichever is greater. Footing areas should be overexcavated consistent with our recommendations for mass grading.

Allowable Bearing Pressure. Assuming retaining wall footings are embedded to at least the minimum recommended depths noted above, wall footings should be designed for dead load plus probable maximum live loads using an allowable bearing pressure of 3,500 psf. A one-third increase in the allowable bearing pressure may be used for transient loads such as seismic or wind forces.

Lateral Earth Pressures. Assuming drained backfill conditions, lateral earth pressures may be estimated using equivalent fluid weights of 35 pcf, for level backfill conditions, and 40 pcf for backfill sloping at 2h:1v.

Select backfill should be placed within a 45-degree envelope projected from the heel of the footing to the ground surface behind the wall.

Drained conditions are based on the assumption that hydrostatic pressures will not develop; recommendations for drainage behind the walls are provided subsequently.

The lateral pressure distributions should be applied along a vertical plane passing through the heel of the wall footing between the intersection of the line with the ground surface above the wall and a point defined by the elevation of the lower structural member of the wall.

Sliding Resistance. Ultimate sliding resistance generated through a soil/concrete interface may be estimated by multiplying the total dead weight structural loads by a coefficient of 0.3.

Passive Resistance. Passive resistance developed from lateral bearing of cantilever retaining wall footings bearing against compacted backfill may be estimated using an equivalent fluid weight of 300 pcf below a depth of 1 foot below lowest adjacent grade, for level conditions. Passive resistance should be neglected above the footing for sloping conditions below the wall.

Settlement. For the overexcavation, subgrade preparation, and backfilling recommendations presented previously, and assuming that maximum wall heights and allowable bearing pressures are not exceeded, the proposed cantilever retaining walls should be designed to accommodate a total settlement up to 1-1/2 inches and a distortion ratio of about 1/360. Construction joints should be spaced at least every 20 feet of wall length.

Restrained Retaining Walls

Footing Embedment and Subgrade Materials. Footings for the restrained retaining wall at the culvert crossing near the western end of the connector road should be bottomed a minimum depth of 3-1/2 feet below lowest adjacent grade. Footing areas should be overexcavated consistent with our recommendations for mass-grading in the connector road area (i.e., removals to bedrock). Backfill placed above the bedrock and within 10 feet of the proposed wall footing should consist of Class II base compacted to a minimum of 95 percent of maximum dry density. Excavated onsite earth materials may be used as backfill above the elevation of the footing bottoms.

Allowable Bearing Pressure. Assuming retaining wall footings are embedded to at least the minimum recommended depths noted above, and that the subgrade is prepared as recommended above, wall footings may be designed for dead load plus probable maximum live loads using an allowable bearing pressure of 5,000 psf.

Lateral Earth Pressure. An at-rest lateral earth pressure may be estimated for restrained walls using an equivalent fluid weight of 50 pcf for level, drained select backfill conditions.

Select backfill should be placed within a 45-degree envelope projected from the heel of the footing to the ground surface behind the restrained wall.

Drained conditions are based on the assumption that hydrostatic pressures will not develop; recommendations for drainage behind the walls are provided subsequently.

The lateral pressure distributions should be applied along a vertical plane through the heel of the wall footing between the intersection of the line with the ground surface above the wall and a point defined by the elevation of the lowest structural member of the wall.

Sliding Resistance. Ultimate sliding resistance generated through a Class II base/concrete interface can be computed by multiplying the total dead weight structural loads by a coefficient of 0.5.

Passive Resistance. Passive resistance developed from lateral bearing of restrained retaining wall footings bearing against compacted backfill can be determined using an equivalent fluid weight of 300 pcf below a depth of 1 foot below lowest adjacent grade, for level conditions.

Surcharge Pressures. Surcharge loads such as traffic loads, induce additional pressures on earth retaining structures and should be considered in the restrained wall design. Uniform area surcharge pressures for restrained or below-grade walls may be assumed equal to 0.5 of the applied surcharge pressure.

Settlement. For the overexcavation, subgrade preparation, and backfilling recommendations presented previously, and assuming that maximum wall heights and allowable bearing pressures are not exceeded, the proposed restrained retaining walls should be designed to accommodate a total settlement of about 1 inch and a distortion ratio of about 1/480. Construction joints should be spaced at least every 20 feet of wall length.

Seismic Conditions

For unrestrained walls, the increase in lateral earth pressure based on earthquake loading can be estimated using Mononobe-Okabe theory, as described by Seed and Whitman (1970). That theory is based on the assumption that sufficient wall movement occurs during seismic shaking to allow active earth pressure conditions to develop. For restrained walls, the increase in lateral earth pressure resulting from earthquake loading can also be estimated using the Mononobe-Okabe theory. Because that theory is based on the assumption that sufficient movement occurs so that active earth pressure conditions develop during seismic shaking, the applicability of the theory to restrained walls is not direct; but there is at least one supporting reference (Nadim and Whitman, 1992) that suggests the theory can be used for such walls.

In the Mononobe-Okabe approach, the total dynamic pressure can be divided into static and dynamic components. The estimated dynamic lateral force increase (based on seismic loading conditions) for either unrestrained or restrained walls with level backfill surfaces may be taken as 45 x PHGA x H^2 in pounds per linear foot of wall. In the above formula, PHGA equals the design peak horizontal ground acceleration (0.6 g) and H is the height of wall below the ground surface in feet.

If some movement of the wall is allowed under seismic conditions (i.e., on the order of 1 or 2 inches), the dynamic lateral force increase may be reduced somewhat by multiplying the PHGA by 0.65 to estimate the repeatable (instead of peak) ground acceleration.

The centroid of that dynamic lateral force increase should be applied at a distance of 0.6H above the base of the wall, where H is equal to the below-grade portion of the wall height in feet.

To estimate the total dynamic lateral forces, the dynamic lateral force increase (estimated using the formula presented above) should be added to the static active pressure of 35 pcf, equivalent fluid weight, for level granular backfill conditions, and 40 pcf for backfill sloping at 2h:1v.

Safety Factors

Sliding resistance and passive pressure for static conditions, may be used together without reduction, when used with the safety factors recommended below. For static conditions, minimum factors of safety of 1.5 and 2.0 are recommended for foundation overturning and sliding, respectively, where sliding resistance and passive resistance are combined. The safety factor for sliding can be reduced to 1.5 if passive resistance is neglected. For dynamic conditions, the factor of safety should be at least 1.1.

Retaining Wall Construction

Drainage Measures. A backdrain should be provided behind the retaining walls to reduce the potential for the development of hydrostatic pressures.

Drainage measures should consist of a 2-foot-wide zone of clean, coarse-grained material (with no more than 5 percent passing the No. 200 sieve) placed behind the wall. Acceptable backfill would be: a) "Pervious Backfill" conforming to Item 300-3.5.2, *Standard Specifications for Public Works Construction ("Greenbook," 1997)*; b) "Permeable Material" conforming to Item 68-1.025, *Caltrans Standard Specifications*; or c) crushed stone, sized between 1/4 and 1/2 inch. The clean, coarse-grained material should be enveloped in a filter fabric such as Mirafi 140N. The free-draining material should be placed in layers along with and by the same methods recommended for "Compacted Fill," and lightly vibrated with a small, hand-operated vibratory compactor.

In lieu of free-draining backfill materials of the types suggested above, manufactured drainage structures (e.g., Miradrain, manufactured by Mirafi, Inc., or similar) can be used against retaining walls. Manufacturer recommendations for the installation of any of those products should generally be followed, although they should be reviewed by the geotechnical engineer. In addition, manufactured drainage structures should be attached to the exterior of the retaining wall rather than on the excavated face.

The drainage material behind retaining walls should be hydraulically connected to a granular material with an embedded perforated drainpipe system, located at the base of the retaining wall. The entire drainage system should be tied to an exterior drainage exit.

Compaction Adjacent to Walls. Backfill within 5 feet, measured horizontally, behind the retaining structures should be compacted with lightweight hand-operated compaction equipment to reduce the potential for induction of large compaction-induced stresses. If large or heavy compaction equipment is used, compaction-induced stresses can result in increased lateral earth pressures on the retaining walls. If anything but lightweight, hand-operated compaction equipment is to be used, further evaluation of the potential for compaction-induced stresses may be warranted.

Backfill material should be brought up uniformly around the retaining walls (i.e., the backfill should be at about the same elevation all around the wall as the backfill is placed). That is, the elevation difference of the backfill surface around the wall should not be greater than about 2 feet, unless the wall is designed for those differences.

BRIDGE DRILLED PIER FOUNDATION

According to Mr. Novak, bridge design engineer with Tetra Tech ASL, the proposed bridge will straddle the existing Long Grade Channel at the approximate location shown on Plate 3. The channel will be recontoured by the removal of the rock rip-rap and construction of a new embankment. The approach area to the embankment is essentially level on each side of the channel. The proposed bridge length between opposite abutments is about 50 feet.

Based on information provided by Mr. Novak, the cast-in-drill-hole (CIDH) pile design will be based on an allowable load capacity of 40 tons. Mr. Novak indicated that the preferred pile diameter is less than or equal to 24 inches.

SUBSURFACE CONDITIONS

Two drill holes (DH-208 and DH-207) were excavated to depths of about 55 and 60 feet below existing grade adjacent to the north and south channel embankments, respectively.

Earth Materials

The data from the two drill hole logs (DH-207 and DH-208) suggest that subsurface conditions consist primarily of the following:

- Very stiff to hard sandy clay and medium dense to very dense clayey sand alluvium to a depth of about 39 to 53 feet below the ground surface.
- Very dense clayey sand materials of the (weathered) Conejo Formation below a depth of about 39 feet in DH-208 and 53 feet in DH-207.

Below the clayey sand materials of the weathered Conejo Formation, bedrock was encountered. The depth to bedrock varied between about 50 feet in drill hole DH-208 adjacent to the north channel embankment and below 60 feet in drill hole DH-207 adjacent to the south channel embankment. (High blow-count data at the bottom of DH-207 and DH-208 suggest refusal on bedrock.) The variation in depth to bedrock may be related to the proximity of DH-208 to the toe of the nearby rock slope and that of DH-207 to the alluvial fan of Long Grade Channel (see Plate 3).

Groundwater

Groundwater was not encountered in either of the drill holes (drilled in August 2000) to a maximum exploration depth of 51 to 61 feet below existing grade. Additionally, groundwater was not detected in the nearby drill holes DH-3 and DH-5 (advanced in June 1999) to depths of 31 and 51 feet, respectively.

Idealized Conditions

Based on our interpretations of the drill hole data for soil materials encountered in the upper 40 feet at the north channel embankment location (DH-208) and in the upper 55 feet at the south channel embankment location (DH-207), we have developed idealized soil conditions described in Table 4 - Summary of Idealized Subsurface Conditions.

Table 4. Summary of Idealized Subsurface Conditions

Drill Hole Location	Depth Interval[1] (feet)	Material	Total Unit Weight (pcf[2])	Undrained Shear Strength (ksf[3])	Friction Angle (degrees)	ε_{50}[4]	k[5] (pci)
DH-207 (South)	0 to 21	Clayey Sand	125	NA	34		90
	21 to 28	Sandy Clay	125	2.8	NA	.005	60
	28 to 38	Clayey Sand	125	NA	29	.005	90
	38 to 50	Clayey Sand	125	NA	32		225
DH-208 (North)	0 to 3	Clayey Sand	125	NA	34		90
	3 to 10	Sandy Clay	125	1.8	NA	.007	500
	10 to 20	Clayey Sand	125	NA	31		225
	20 to 35	Sandy Clay	125	3.9	NA	.005	1,000

[1] Depth is below abutment, which is assumed to be 5 feet below existing grade
[2] Pounds per cubic foot
[3] Kips per square foot
[4] ε_{50} equals the axial strain corresponding to one-half the compressive strength
[5] k equals the lateral modulus of subgrade reaction in pounds per cubic inch (pci)

EMBANKMENT CONSTRUCTION

Soils with an expansion index (EI) greater than 50 and a sand equivalent (SE) less than 20 should be excluded from the foundation subgrade and the embankment face to the extent shown on Plate 7 - Expansive Soil Exclusion Zone. Placement of fill materials with a low expansion index (i.e., EI < 50) and an SE greater than 20 should be performed according to the recommendations in the "Fill Slope Construction" and "Fill Selection and Compaction" sections presented earlier.

CIDH PILE DESIGN RECOMMENDATIONS

CIDH Pile Embedment

We recommend that CIDH piles be embedded into weathered Conejo Formation materials. The recommended minimum pile tip elevation should correspond to an approximate depth of 55 feet (below existing grade), or about El. 76 feet, at the location of DH-207 adjacent to the south channel embankment and 40 feet (below existing grade), or about El. 90 feet, at the location of DH-208 adjacent to the north channel embankment.

Axial Pile Capacity

The ultimate capacity for the CIDH piles for the north and south bridge abutments were estimated based on side resistance, assuming idealized construction techniques during shaft excavation and concrete placement. Because of the variation in depth to dense or hard bearing strata between the north and south abutment locations, we recommend different embedment depths (relative to existing grade) at the two abutment locations.

Side Resistance. For the idealized clayey sand and sandy clay profile in the upper 40 feet at the north embankment location, the ultimate side resistance was estimated for the fine-grained soil layers using an adhesion factor of 0.35 to 0.5 times the undrained shear strength, which varied from about 1,800 psf in the very stiff layer between about 8 and 15 feet to about 3,900 psf in the hard clay (to weathered Conejo Formation materials) between about 25 and 40 feet below the existing ground surface. The ultimate side resistance value in the dense sand between depths of about 15 and 25 feet was estimated at about 650 psf.

For the idealized clayey sand and sandy clay profile in the upper 55 feet at the south embankment location, the ultimate side resistance was estimated for the fine-grained soil layers using an adhesion factor of 0.5 times the undrained shear strength, which was estimated at about 2,800 psf in the hard layer between about 26 and 33 feet below the existing ground surface. The ultimate side resistance value in the medium dense sand in the upper 26 feet was estimated at about 400 psf and in the dense sand below a depth of about 33 feet, that value was estimated at about 1,200 psf.

Summary. The allowable axial capacities for the proposed 24-inch-diameter CIDH piles, assuming embedment lengths of 40 feet at the north abutment and 55 feet at the south abutment are 41 tons and 55 tons, respectively. The allowable capacities reflect a factor of safety of about 2.5.

Group Capacity. The axial capacity of CIDH pile groups may be assumed equal to the number of piles in the group times the capacity of a single pile provided the piles within a pile group are spaced no closer than three pile diameters (center-to-center). If piles are planned closer than three diameters to each other, the group capacity should be evaluated using group reduction factors. Those factors can be provided if necessary. However, for CIDH piles oriented in a single row and spaced between 2 and 3 diameters (center-to- center, the axial capacity of the "group" may be assumed equal to the sum of the individual pile capacities without reduction, provided the ratio of the average group width to the pile diameter is less than 2.

Dynamic Capacity for Single Piles. On the basis of the findings summarized earlier, soils in the vicinity of the proposed bridge are not susceptible to liquefaction or strength degradation with cyclic loading. The allowable axial pile capacities may be increased by one-third for transient dynamic conditions (i.e., earthquake or wind loadings), which effectively reduces the presumed factor of safety of about 2.5 to about 1.9.

Uplift Capacity

The CIDH piles can be designed to resist uplift loads using 70 percent of the estimated frictional resistance along the pile shaft (i.e., the allowable axial capacity) plus the dead weight of the pile. However, the factor of safety for transient uplift loads may be reduced from 2.5 (used for axial capacity) to 1.75. The uplift capacity should only be used over that portion of the pile that is appropriately longitudinally reinforced.

Settlement

Settlement of the CIDH piles from static allowable downward loads is not anticipated to exceed about 1/4 inch.

Lateral Pile Capacity

Laterally loaded pile analyses were performed for single 24-inch-diameter piles using the computer program LPILE^{PLUS} (Reese et al., 1997). The analyses using LPILE^{PLUS} were based on the following assumptions regarding pile properties and loading conditions.

Pile Characteristics. Pile characteristics used for the analyses were based on 24-inch-diameter, 40- and 55-foot-long piles with a free head located about 5 feet below the ground surface. An elastic modulus, E, for concrete of 3 x 10^6 pounds per square inch (psi) and a moment of inertia, I, equal to 50 percent of the gross shaft section (to model a cracked section), were used in the analyses.

We note that for concrete piles, the pile stiffness, EI, varies with pile curvature and bending moment. However, the simplifying assumptions used for the pile characteristics mean the pile is modeled as an elastic pile with no behavioral characteristics associated with a variation in EI versus curvature or the development of an ultimate (or plastic) moment. In general, the assumptions used herein may be considered appropriate for small pile head displacements (e.g., about 1/4 inch), but they probably are not appropriate for greater pile head displacements. Hence, we have presented lateral capacities only for a head displacement of 1/4 inch. Use of a more refined model to characterize nonlinear performance of the pile would require much more study.

The use of pile capacities for small head displacements also reduces uncertainties pertaining to pile-to-cap connections (i.e., larger head displacements can result in distress to the connection) and interactions between pile in pile groups (i.e., as the pile head displacements increase, pile interactions within pile groups probably increase, resulting in the need for group capacity reduction factors).

Soil Parameters. Lateral load capacities were estimated using the idealized soil profile with the characteristics shown in Table 4.

Those parameters listed in Table 4 were used in the computer program LPILE^{PLUS} (Reese et al., 1997) to evaluate lateral load capacities. The program computes the p-y curves in accordance with procedures presented in Reese et al. (1997). The depth to fixity was estimated using procedures presented in the Caltrans (1986) Bridge Design Aid 12-0. The results of the lateral load analyses using LPILE^{PLUS} are summarized in the following table:

Table 5. Lateral Load Capacities for 24-Inch-Diameter CIDH Piles

Location	Pile Head Deflection (inches)	Lateral Load[1] (kips)	Maximum Bending Moment (ft-kips)	Depth to Fixity (ft)
North Abutment	1/4	17	68	8.3
South Abutment	1/4	16	65	8.5

The loads and bending moments presented in Table 5 were estimated without using a factor of safety. Pile design should incorporate appropriate factors of safety. The depth to fixity is calculated as an equivalent column length between the pile head (where the lateral load is applied) and some fixed point at depth (below the ground surface) that results in the same head deflection and head rotation as the laterally loaded pile. The pile and the equivalent column have the same stiffness (EI).

PILE STRUCTURAL CAPACITY

The structural capacities of the piles should be checked for allowable stresses in the pile, total downward axial loads, tension forces, lateral forces, and bending moments produced by anticipated loads using appropriate load and performance factors designated by the structural engineer.

CIDH PILE CONSTRUCTION

CIDH piles with embedment depths of about 40 and 55 feet below existing grade are recommended for support of the proposed bridge. Because the soil profile is predominantly sandy clay and clayey sand and groundwater is not anticipated in the upper 60 feet of soils, the potential for caving of shaft sidewall is likely to be low. However, because conditions may vary, we recommend that the drilling contractor be prepared for caving conditions, should they arise. Recommendations for drilled shaft excavation and pier construction under dry and non-caving conditions are presented below, followed by recommendations for caving conditions, should they arise. In general, CIDH excavation and construction procedures should be in accordance with the latest edition of the standards and specifications prepared by The International Association of Foundation Drilling (ADSC, 1999).

Pier Excavation and Construction Under Dry Conditions

Shaft excavations should be drilled and reamed to the design diameter and depth. Drilled shafts should be cleaned out with a "clean-out" or "muck-bucket." Flight augers are not recommended for cleaning out the shaft bottom. A geologist from Fugro should observe the pile shafts during excavation.

During concreting, free fall of concrete should be avoided. A hopper or pipe should be used to prevent segregation of aggregate.

Pier Excavation and Construction Under Water or Caving Conditions

During shaft excavation, caving conditions should be mitigated by temporary casing. Casing should be of sufficient strength to withstand handling and driving stresses, concrete pressure, and surrounding earth and/or fluid pressure. Casing diameter should be at least equal to or greater than the design diameter of the pile. Permanent casing should not be allowed.

Concrete mix design should be appropriate for underwater conditions.

During pier construction, if groundwater has accumulated in the cased pier shaft, a tremie pipe and concrete pump should be used for underwater concrete placement. The pipe should be fitted with a valve on its lower end so that the inside of the tremie pipe is not contaminated. During concrete placement, the end of the pipe should be kept at least 6 inches below the top of the concrete. Recommended slump for underwater concrete placement is 7 to 9 inches. A retarder to prevent arching of concrete during casing removal also is recommended.

Casing should be removed during concreting in a manner such that a continuous concrete column is maintained. As casing is withdrawn, a concrete head at least equal to outside soil and water pressure at the bottom of the casing should be continuously maintained. During casing withdrawal, upward movement of the reinforcement steel should not exceed 6 inches (ADSC).

PASSIVE AND SLIDING RESISTANCE

To estimate ultimate sliding resistance for slabs and pile caps, dead weight structural loads may be multiplied by a sliding coefficient of 0.3, for select fill materials with the characteristics indicated on Plate 7 (i.e., sand equivalent > 20 and expansion index < 50). Ultimate sliding resistance should not exceed 300 psf.

Ultimate passive resistance for pile caps may be estimated using an equivalent fluid weight of 250 pcf. Passive resistance should not be used for the upper 1 foot of soil that is not constrained at the ground surface by a slab-on-grade. A one-third increase in the passive resistance value can be used when considering short-term wind or seismic loads.

For static conditions, minimum factors of safety of 1.5 and 2.0 are recommended for overturning and sliding, respectively, where sliding resistance and passive resistance are combined. The factor of safety for transient (i.e., seismic, dynamic) conditions should be at least 1.1.

LATERAL EARTH PRESSURES

We understand that the bridge abutments will be designed as retaining walls. Our recommended lateral earth pressures are for backfill materials that conform to the requirements of Plate 7 (i.e., fill materials with an SE >20 and an EI <50). The following equivalent fluid weights (based on a total soil unit weight of 125 pcf) may be used to estimate lateral earth pressures for the design of retaining walls, assuming the walls are drained:

Table 6. Equivalent Fluid Weights for Estimating Lateral Earth Pressures

Backfill Inclination	Lateral Earth Pressure Condition	Equivalent Fluid Weight (pcf)
Level	Active	35
Level	At-Rest	55

The values do not include hydrostatic forces (for example, standing water in the backfill material). Provisions for drainage should be provided to preclude the buildup of hydrostatic pressures behind the wall.

Also, the values do not include other surcharge loads resulting from foundations, other structure load, traffic loads, or compaction equipment. We recommend that lateral earth pressures resulting from an equivalent 2-foot soil surcharge be considered for traffic loads. If conditions such as surcharge resulting from footings or hydrostatic forces are to be expected, Fugro should be advised so that we can provide recommendations as needed.

SEISMIC DESIGN CRITERIA

Seismic design criteria for the proposed bridge has been developed based on the Caltrans California Seismic Hazard Map (Mualchin, 1996) in conjunction with recommendations presented in Applied Technology Council (ATC) - 32 (1996).

The design fault for the bridge site is the Simi-Santa Rosa fault, located about 5 kilometers north of the site. Mualchin (1996) indicates that the Simi-Santa Rosa fault zone has a reverse-oblique sense of motion, a maximum moment magnitude of 7.5, and a peak horizontal ground bedrock acceleration of about 0.6 g. We note that other active nearby faults include the Oak Ridge and Malibu Coast faults.

Caltrans seismic design criteria typically includes a 10 percent to 20 percent increase above the ATC-32 response spectrum curves if the controlling fault is located within 15 kilometers of the site and has an oblique-slip or reverse sense of motion. The Simi-Santa Rosa fault has a reverse-slip sense of motion and is located within 15 kilometers of the site; therefore, a 10 percent increase above the ATC-32 curves is recommended.

Subsurface soil conditions appear to correspond to those described for Soil Profile D in ATC-32. Soil type D is described as a "stiff soil" with N-values between 15 and 50.

Hence, in accordance with ATC-32, Caltrans seismic design criteria, and based on our subsurface exploration and evaluation, we recommend the following input values:

- Soil Type: D (stiff soil)
- Earthquake Magnitude: 7.5
- Bedrock Acceleration: 0.6 g
- Response Spectrum: Figure R3-8 of ATC-32 with 10 percent increase above a period of 1 second per Caltrans design criteria; see Plate 9 - Modified ARS Curve)

As a result of the statistical variation in attenuation relationships and geologic conditions, there is a potential that peak bedrock accelerations greater than 0.6 g would occur in response to an earthquake on one of the nearby faults discussed above.

UTILITY TRENCHES, PIPE BEDDING, AND TRENCH BACKFILL

UTILITY TRENCHES

Utility trenches greater than 5 feet deep should be braced and shored in accordance with good construction practice and all applicable safety ordinances.

The use of metal, plywood, and/or timber sheeting between shores or pipe jacks along trench sidewalls in excavations adjacent to or within paved areas may be necessary so that sloughing of unconsolidated soils and undermining of paved areas can be minimized. Trench walls that are not provided with adequate sidewall support, in those areas, could fail, resulting in damage or loss of adjacent existing improvements.

Excavated soils should be stockpiled back from the edge of the trench a minimum distance equal to the depth of the trench or 10 feet, whichever is less. If the recommended distance cannot be maintained, a Fugro representative should be consulted to evaluate location-specific minimum distances needed between the edge of the trench and stockpiled soils, to minimize the potential for trench instability. Similarly, heavy equipment should not be operated within 10 feet of the edge of vertical trench sidewalls, unless the surcharge loads imposed by the equipment are accommodated in the design of trench shoring.

Trenches should be excavated no closer than 4 feet away from utility poles where overhead lines parallel the trench alignment. The minimum clear distance from utility poles should be evaluated by the contractor individually where overhead lines run at an angle to the trench alignment. Where the trench is closer than 4 feet from the poles, where the stability of the pole is in question, or where there is a potential for sloughing of the trench sidewalls adjacent to the poles, we recommend that the pole be supported by other means or the trench be shored to prevent loss of lateral support from the pole foundation.

Groundwater

The groundwater level encountered in the East Campus Development area was between El. 32 and 36 feet at the western end of the southern corridor.

Depending on the time of year that construction is scheduled, there may be a potential for groundwater to be encountered during utility excavations and other construction activities.

If groundwater or high moisture conditions are encountered, the excavation bottom could be locally wet, soft, and yielding. For those conditions, the bottom of the trench excavation should be stabilized prior to placement of pipe bedding so that the trench subgrade is firm and unyielding.

Special Subgrade Stabilization Measures

The contractor, after considering input from the design engineer, geotechnical engineer, and owner, should be responsible for design and implementation of trench stabilization techniques. However, contingencies should be included in the contract documents for implementing subgrade stabilization measures. Some methods that have previously been used to stabilize trench subgrade include:

- The use of 1-inch float-rock worked into the trench bottom and covered with a filter fabric such as Mirafi 180N prior to placement of pipe bedding materials;

- Geotextile fabric (such as Mirafi 600X) placed along trench subgrade and covered with at least 1 foot of compacted processed miscellaneous base (PMB) conforming to the requirements of Section 200-2.5 of the Standard Specifications for Public Works Construction (i.e., Greenbook), 1997 edition; and
- Overexcavation of trench subgrade and placement of two-sack sand-cement slurry.

We suggest that contract documents incorporate contingency items for procurement of geosynthetics, gravel or rock fill, labor, and equipment, in case the need for trench subgrade stabilization arises.

PIPE BEDDING

Pipe bedding for utilities should consist of sand having a minimum sand equivalent (SE) of 30; the SE should be evaluated during grading. The sand should be placed in a zone that extends a minimum of 4 inches below and 12 inches above the pipe for the full trench width for ductile iron pipe. The thickness of the bedding sand below the pipe should be increased to 6 inches for pipe materials other than ductile iron. The bedding material should be compacted to a minimum of 90 percent relative compaction. Jetting of the bedding material should not be permitted.

Any overexcavation below the minimum of 6 inches below the pipe also should be backfilled with bedding sand compacted to 95 percent relative compaction or a two-sack sand/cement slurry. However, bedding requirements presented herein should not supersede those required by pertinent code or ordinance requirements if those requirements are more restrictive (i.e., wider or thicker bedding limits).

On the basis of our observations, because of their fine-grained constituency, the soils encountered in the East Campus Development area during the subsurface exploration for the project generally appear unlikely to comply with the recommendations presented above for pipe bedding materials. However, the gravel with sand encountered in the upper 8 feet of backhoe test pit BH-10 located east of the debris dam appears likely to meet the requirements for pipe bedding materials. A sample of that material had a sand equivalent (SE) of 50.

TRENCH BACKFILL

Trench backfill above pipe bedding should consist of approved onsite soils that are equal to or better than surrounding soils at the same elevation. Backfill should be placed within 2 percent of optimum moisture content and compacted to the compaction standard of surrounding soils (e.g., 90 percent relative compaction for general fill, 92 percent relative compaction for select fill, and 95 percent relative compaction for aggregate base), as determined from ASTM D1557. Rock larger than 4 inches in maximum dimension should be excluded. Jetting of trench backfill materials should not be permitted.

BACKFILL LOADS ON PIPES

Backfill loads on pipes will depend on the pipe type (i.e., rigid or flexible), geometrical conditions (embankment or trench configuration), and on the characteristics of the backfill and in situ soils. For design purposes, we recommend that a total unit weight of 120 pcf be used to estimate backfill loads. Appropriate pipe design references should be consulted to determine other pipe design parameters.

PAVEMENTS

Two types of flexible pavement are planned for road improvements for the East Campus Development. Asphalt-concrete is proposed for the connector road from University Drive to the eastern development corridor, the arterial road through the East Campus Development, and the neighborhood streets and parking areas. Interlocking pavers are proposed for the traffic circles and bridge approaches. Additionally, a portion of University Drive and Rincon Drive will be replaced and widened with a new asphalt concrete pavement.

DESIGN BASIS

Asphalt-concrete (AC) and aggregate base (AB) pavement sections were estimated according to Ventura County Road Standards (1982). Pavement sections were estimated on the basis of an R-value of 11 for the clayey subgrade soil along the arterial road alignment, and on the Traffic Index (TI) values listed in Table 7 - Summary of Minimum Asphaltic Concrete Pavement Sections. An alternative pavement section for subgrade consisting of select fill with an R-value of at least 50 is also provided in Table 7. The alternative section thickness is recommended in areas to receive at least 1 foot of fill above existing grade. (Note that prior to fill placement, overexcavation and recompaction of existing materials should occur as recommended previously.) If select fill (imported from debris dam area or offsite source) with an R-value of at least 50 is used as fill in the upper 1 foot of pavement subgrade, the pavement section thickness decreases as shown in Table 7.

Interlocking paver sections will consist of an approximately 3-inch-thick paver set in a 1- to 2-inch-thick sand bed over an aggregate base course. The recommended base thicknesses were estimated using an R-value of 11 and a traffic index of 7.

If design TI values are different from the assumed values, Fugro should be notified accordingly for reevaluation of pavement section thickness. Alternately, the projected daily truck traffic (including number of axles and weight per axle) would need to be furnished to Fugro so that the TI could be estimated per Caltrans procedures.

DESIGN SECTION AND MATERIALS

Asphalt Concrete

The recommended minimum pavement sections, comprising asphaltic concrete over aggregate base, for the assumed TI and measured R-value, are as follows:

Table 7. Summary of Minimum Asphaltic Concrete Pavement Sections

R-Value	Traffic Index	Asphalt Concrete Thickness (inches)	Aggregate Base Thickness (inches)
11[1]	5	3	9
	5-1/2	4	8-1/2
	6	4	10-1/2
	6-1/2	4	12-1/2
	7	4	14
	8	5	17-1/2
50[2]	7	3	6-1/2

[1] R-value of 11 is for native clayey subgrade.
[2] R-value of 50 requires upper 1 foot of pavement subgrade to comprise select fill materials.

The R-values of subgrade materials should be verified near the completion of rough grading. If minimum R-values are not achieved, pavement redesign (with a thicker section) will be necessary.

Interlocking Pavers

Base thicknesses for interlocking pavers have been estimated using the Lockpave® computer program (Shackel, 1998). The recommended aggregate base thickness under an approximate 4- to 5-inch-thick paver/sand bed is 9 inches at the Long Grade Channel bridge approach (where the upper 4 feet of subgrade will be granular "bridge abutment fill") and areas where the upper 1 foot of the subgrade consists of select fill, assuming a Traffic Index of 7. The recommended aggregate base thickness for paver sections placed over native clayey subgrade (i.e., in the traffic circle areas) is 12 inches.

MATERIALS

Aggregate base materials should meet the requirements for Processed Miscellaneous Base presented in section 200-2.5.2 of the Standard Specifications for Public Works Construction ("Greenbook," 1997) or Class II Base conforming to Caltrans Standard Specifications for Class 2 aggregate base, Section 26-1.02A [Caltrans, 1995].

CONSTRUCTION CONSIDERATIONS

Subgrade

Connector Road Alignment. Pavement areas along the connector road alignment should be stripped of vegetation, roots, and organics, and existing artificial fill down to a firm, stable surface (or bedrock along the existing channel alignment). Additionally, the culvert crossing area, to a distance of 10 feet beyond the proposed foundation footprint, should excavated down to bedrock. After observation of the excavation bottom, the exposed surface should be scarified 12 inches, moisture-conditioned to within 2 percent of optimum moisture content, and compacted to a minimum of 90 percent of the maximum density determined from ASTM D1557, latest edition.

If the processed excavation bottom is below finish subgrade elevation, general fill may be used as backfill (refer to the "Fill Selection and Compaction" subsection in the "Grading, Earthwork, and Excavation" section of this report for requirements for general fill). If select fill is used as backfill in the upper 1 foot of subgrade, the pavement section thickness can be reduced as shown in Table 7. Select fill should have a minimum R-value of 50.

Rincon Road Replacement and Widening. The upper 1 foot of subgrade or the upper 1 foot below existing grade in the area along Rincon Road (between University Drive and Chapel Street) should be overexcavated. The bottom of the excavation should be observed by Fugro. Soft or unsuitable materials and artificial fill should be removed if exposed on the excavation bottom. After observation of the excavation bottom, the exposed surface should be scarified 12 inches, moisture-conditioned to within 2 percent of optimum moisture content, and compacted to a minimum of 90 percent of the maximum density determined from ASTM D1557, latest edition.

Interlocking Paver Areas. The subgrade in areas to receive interlocking pavers should be sloped to drain toward a perimeter collection system such as a French drain. The sloping subgrade surface should be covered with a geotextile such as Mirafi 600X prior to placement of the base course. (The base should be pushed onto the geotextile ahead of the spreading equipment [which should not drive directly over the geotextile].)

Aggregate Base

Class II base or processed miscellaneous base (PMB) should be compacted, in lifts not exceeding 8 inches in thickness, to at least 95 percent of the maximum dry density determined by ASTM D1557, latest edition. As-compacted moisture contents for aggregate base materials should be within 2 percent of the optimum moisture, as determined from ASTM D1557.

Drainage

Proper drainage of the paved and surrounding unpaved areas is essential. Grades should be established to expedite runoff away from the pavements and reduce moisture infiltration into the base and subgrade. As recommended previously, the subgrade surface below interlocking pavers should be sloped to drain to a perimeter collection system.

Stabilization of Subgrade

Depending on the moisture content of subgrade soils at the time of grading subgrade, stabilization measures may be necessary. If a pumping condition develops, the following stabilization measures are possible:

- **Lime Treatment of Subgrade.** The upper 1 foot of subgrade could be mixed with lime (depending in the constituency of the subgrade soil, i.e., fine-grained soil is treated with lime, sand is treated with cement). For estimating purposes, about 6 percent lime, by dry weight of soil, usually is effective. The spreading, mixing, and compacting should be performed in accordance with Greenbook specifications.
- **Geotextile with Additional Base.** The subgrade should be excavated an additional 1 foot and a geotextile such as Mirafi 600X, or equivalent, should be placed on the bottom of the excavation. One foot of base should be pushed onto the fabric and compacted to a minimum of 90 percent of maximum dry density. (The base should be placed and compacted in one lift in the fewest passes possible.)

During construction, if trafficability is difficult, lime treatment may be a good option. However, trafficability is difficult to predict. If lime treatment is necessary for trafficability, the treatment thickness might increase to about 2 feet.

We suggest that contract documents incorporate contingency items for the procurement of geosynthetics and base materials, labor, and equipment, in case the need arises.

LIMITATIONS

This geotechnical report has been prepared for The California State University Channel Islands Site Authority solely for the planning and design of the backbone infrastructure and for the preliminary planning and design of the proposed residences, elementary school, and retail and office buildings for the East Campus Development at CSUCI. The applicability of this report is specifically limited to current considerations for the planned facilities.

In performing our professional services, we have used that degree of care and skill ordinarily exercised under similar circumstances by reputable geotechnical engineers currently practicing in this or similar localities. No other warranty, express or implied, is made as to the professional advice included in this report.

We recommend that Fugro West, Inc., be provided the opportunity to review geotechnical aspects of the final design drawings and specifications to evaluate whether the recommendations in this report have been properly interpreted and implemented in the design and specifications. Additional design-level studies are recommended for the proposed structures, as the scope for the work performed for the residential, retail, research, and various support facilities was developed as a preliminary study. Our scope of services includes a review of the mass-grading plan for infrastructure development.

An investigation and discussion of potential subsurface contamination is beyond the scope of this geotechnical study, as are environmental assessments for the presence or absence of hazardous/toxic materials in the soil, surface water, ground water, or atmosphere. Any statements or absence of statements in this report or data presented herein regarding odors, unusual or suspicious items, or conditions observed are strictly for descriptive purposes and are not intended to convey engineering judgment regarding potential hazardous/toxic assessment.

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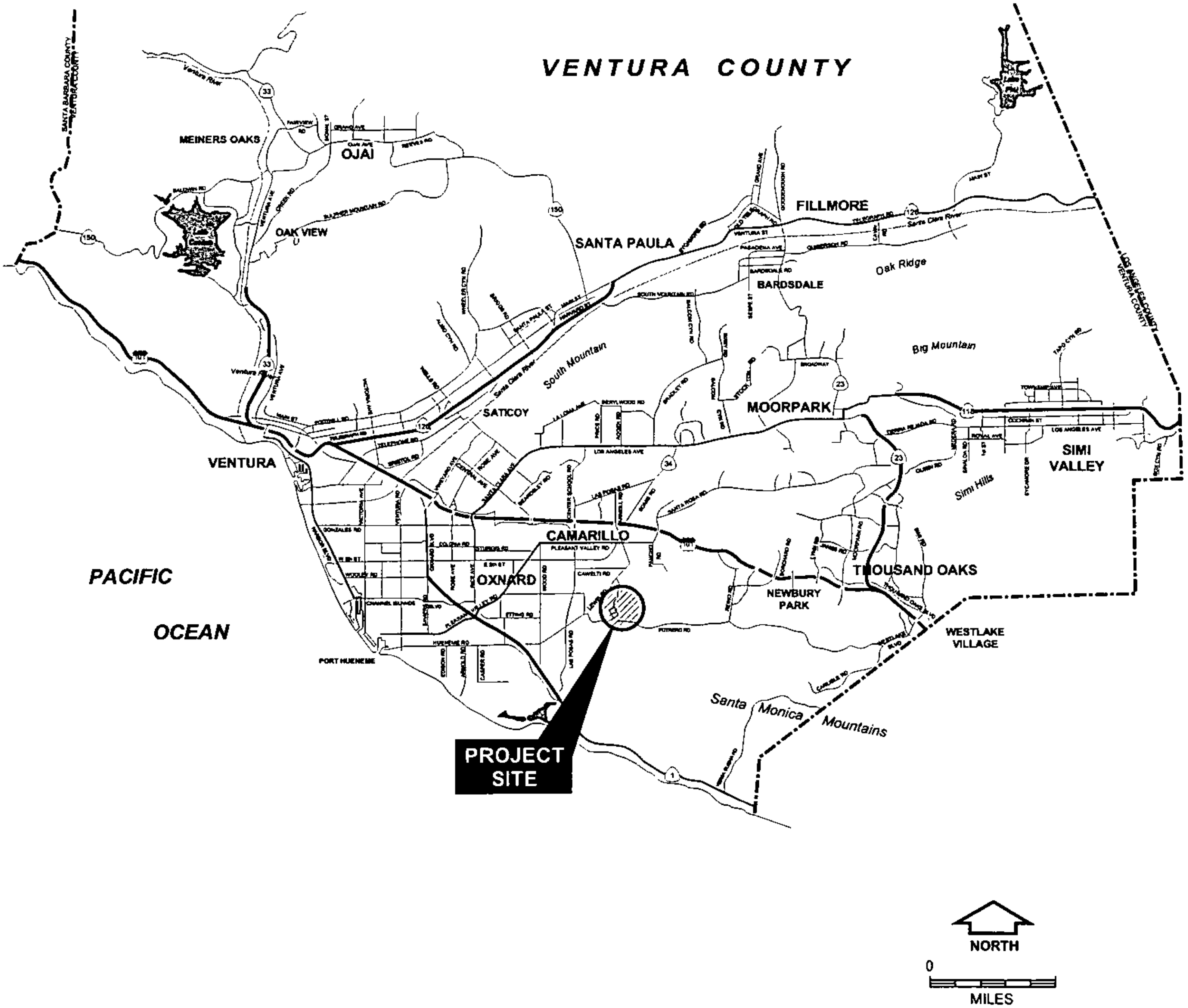
AERIAL PHOTOGRAPHS REVIEWED

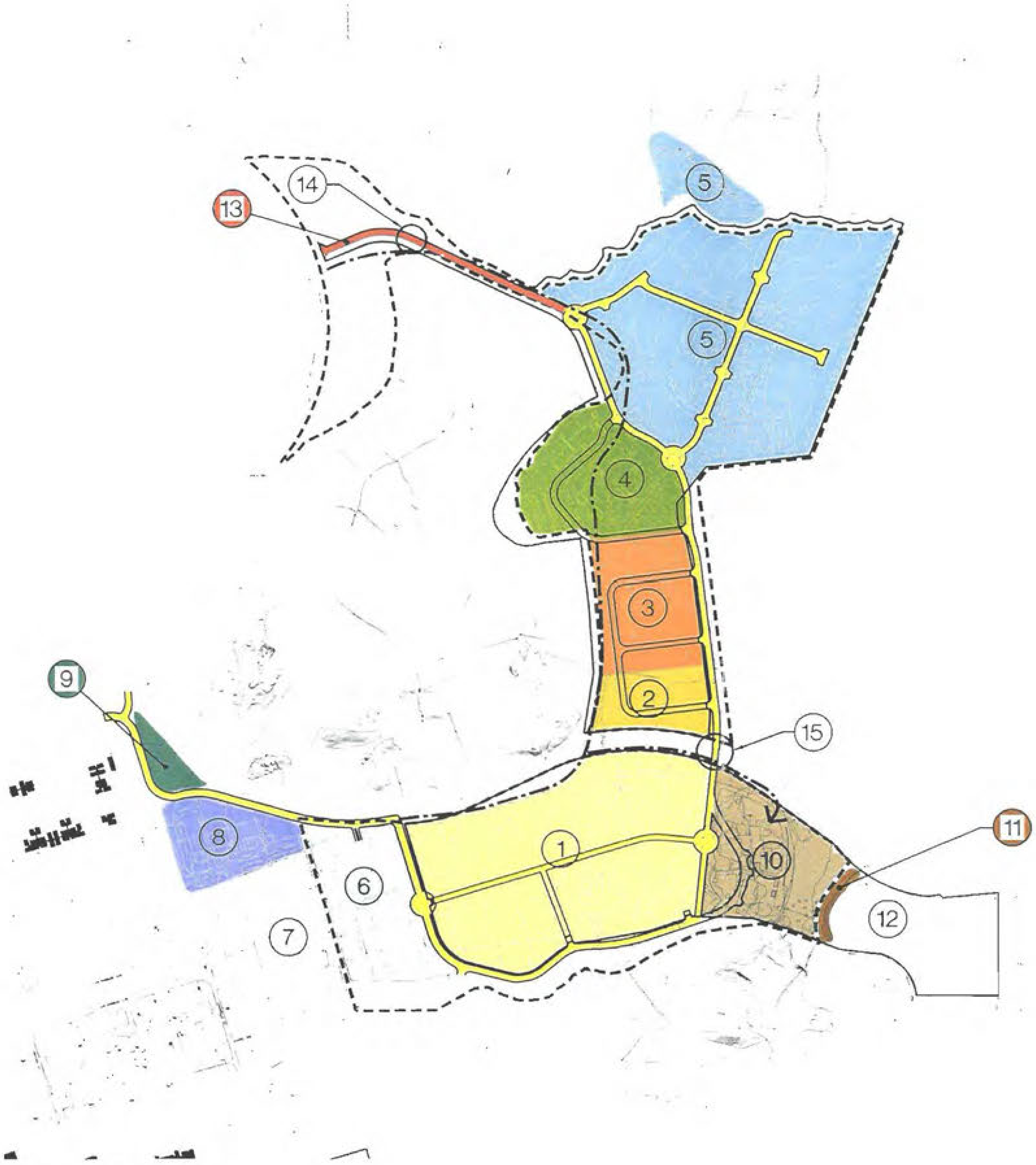
Source	Flight No.	Date	Scale	Frame Nos.
USGS	GS-EM	1947	1:24,000	1-10, 1-11
USGS	GS-VBUK	1967	1:24,000	1-211, 1-212
U.S. Dept. of Agriculture	AXI 1959	1959	1:20,000	17W-101, 102, 104
U.S. Dept. of Agriculture	AXI 1955	1955	1:20,000	2FF-202, 203, 204
Pacific Western Aerial	PW-VEN	1994	1:24,000	11-32, 11-33

PLATES



VICINITY MAP
California State University
Channel Islands
East Campus Development

PLATE 1



LEGEND

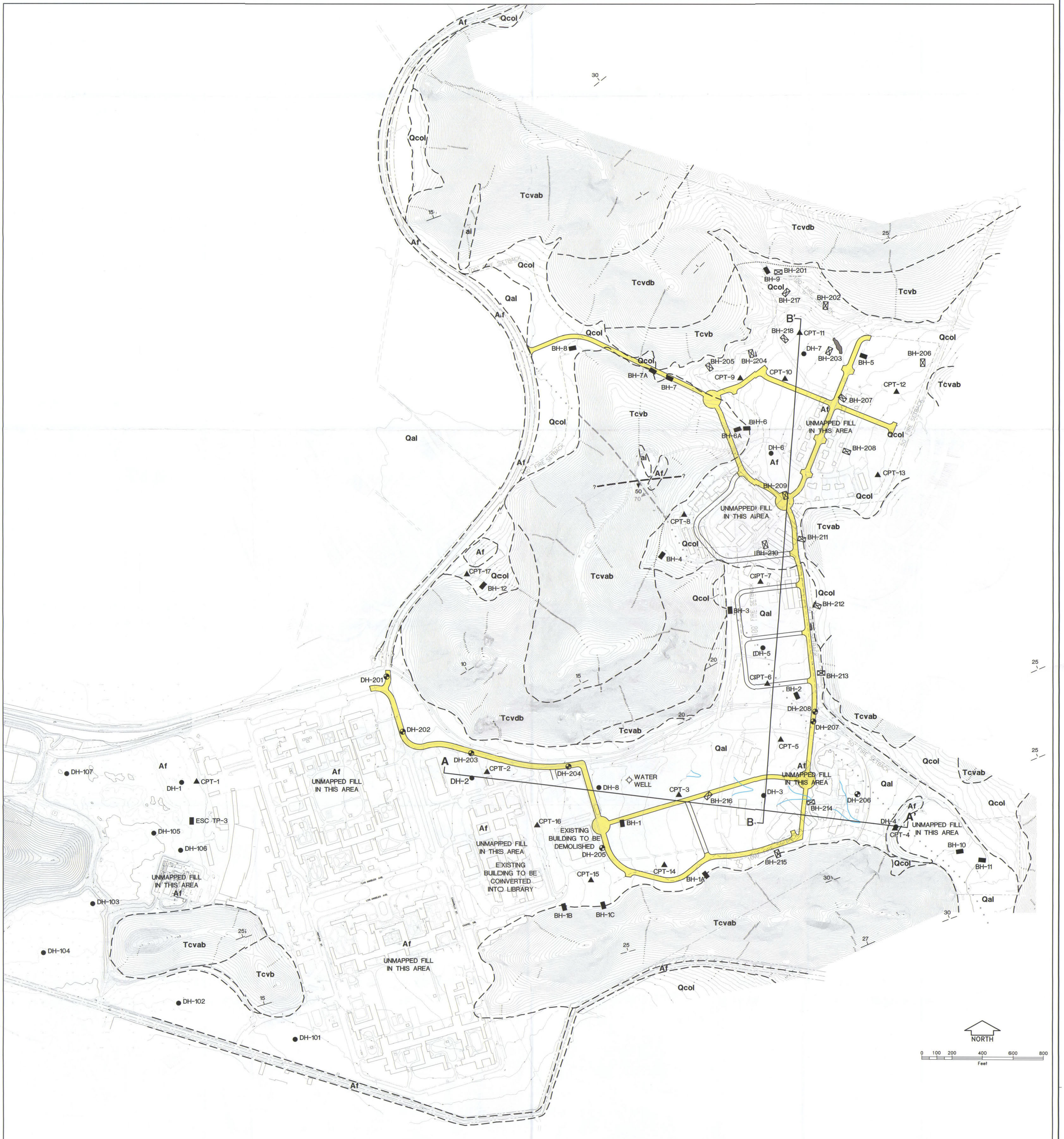
① Phase I
② Phase II
③ Phase III
④ Phase IV
⑤ Phase V
⑥ Exisiting stucture to be demolished and area to be converted into a temporary parking lot
⑦ Existing structure to be converted into campus library (not a part of this study)
⑧ Retail/town square setting (not a part of this study)
⑨ Campus green/gateway
⑩ Future elementary school site (not a part of this study)
⑪ Existing debris dam
⑫ Borrow site
⑬ Connector road
⑭ Approximate location of culvert crossing
⑮ New bridge
Revised arterial road alignment for "Backbone Infrastructure"

NORTH

0 300 600 1200
FEET

SITE DEVELOPMENT MAP
California State University
Channel Islands
East Campus Development

PLATE 2



LEGEND

▇	Trash Pile
Af	Artificial Fill
Qal	Alluvium
Qcol	Colluvium
	Conejo Volcanics - Extrusive Volcanic Rocks:
Tcvbb	Basaltic Flow Breccias
Tcvab	Andesitic Breccias
Tcvdb	Dacitic Breccias
Tcvb	Basaltic Rocks
	Conejo Volcanics - Intrusive Volcanic Rocks:
ai	Andesite
— — ·····	Geologic Contact, Dashed where Approximate, Dotted where Concealed
— ┬ — 50	Fault, Dashed where Approximate, Short Arrow Indicates Dip of Fault Plane
— ┬ · · · 70	Incorrectly Mapped Fault Shown on Published Geologic Map by Dibblee & Ehrenspeck (1990), Dotted where Concealed, Short Arrow Indicates Dip of Fault Plane. See Text for Discussion of Fault.
	Strike and Dip of Stratified Rocks:
25	Inclined
10	Inclined (Approximate)
● DH-1	Approximate Drill Hole Location
◕ DH-107	Approximate Supplemental Drill Hole Location (DH-101 to DH-107 and DH-201 to DH-208)
▲ CPT-1	Approximate Cone Penetration Test (CPT) Location
▮ BH-1	Approximate Backhoe Pit Location
☒ BH-201	Approximate Supplemental Backhoe Pit Location (BH-201 to BH-218)
⌖	Water Well
~	Original Long-Grade Channel Topography Before Filling (State of California, D.P.W., 1941)
A ⌊⌋ A'	Cross Section
🟨	Revised Arterial Road Alignment for "Backbone Infrastructure"

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FUGRO

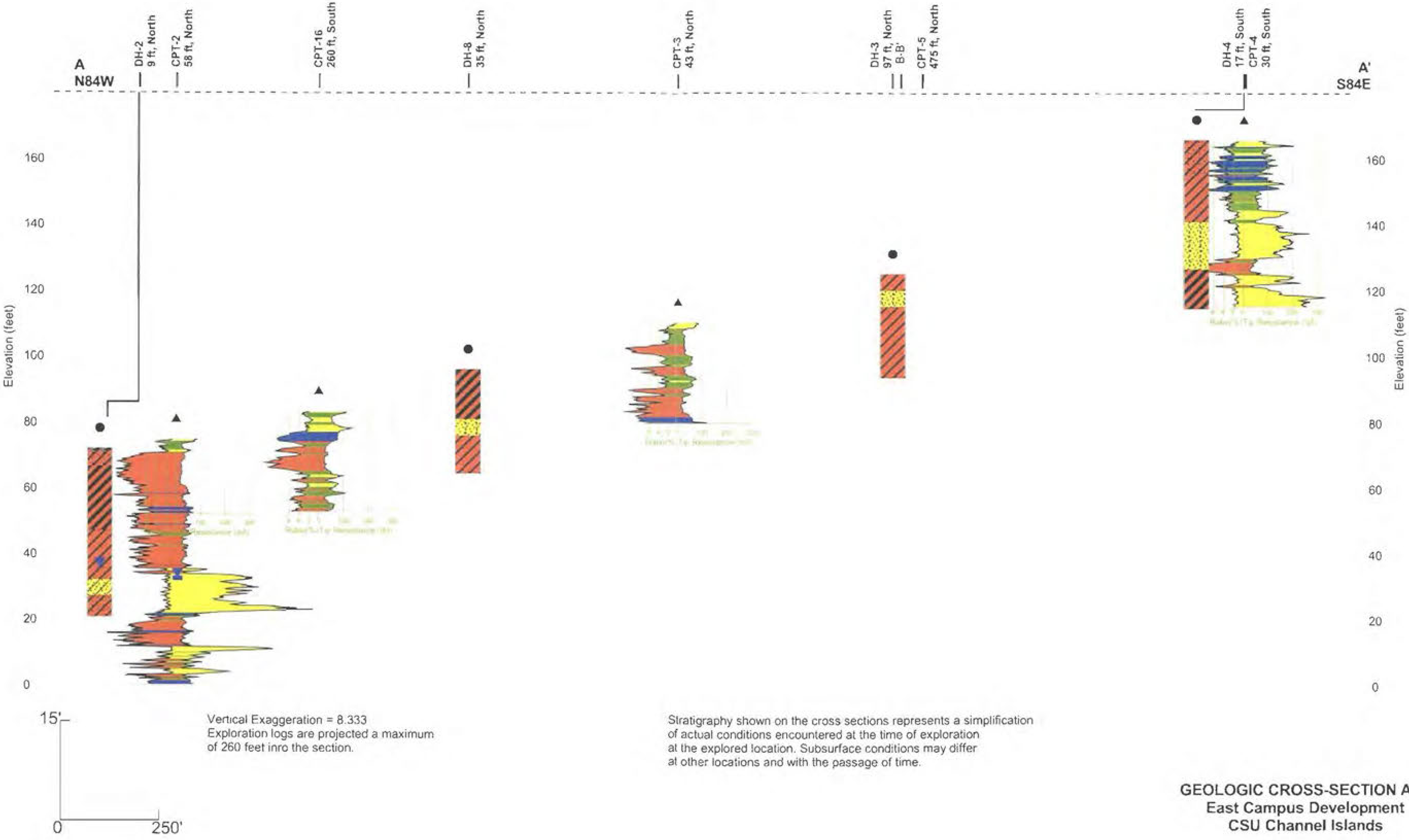
GEOLOGIC MAP

California State University Channel Islands
East Campus Development

Client: CSUCI

99-42-0384 December 2000 PLATE 3

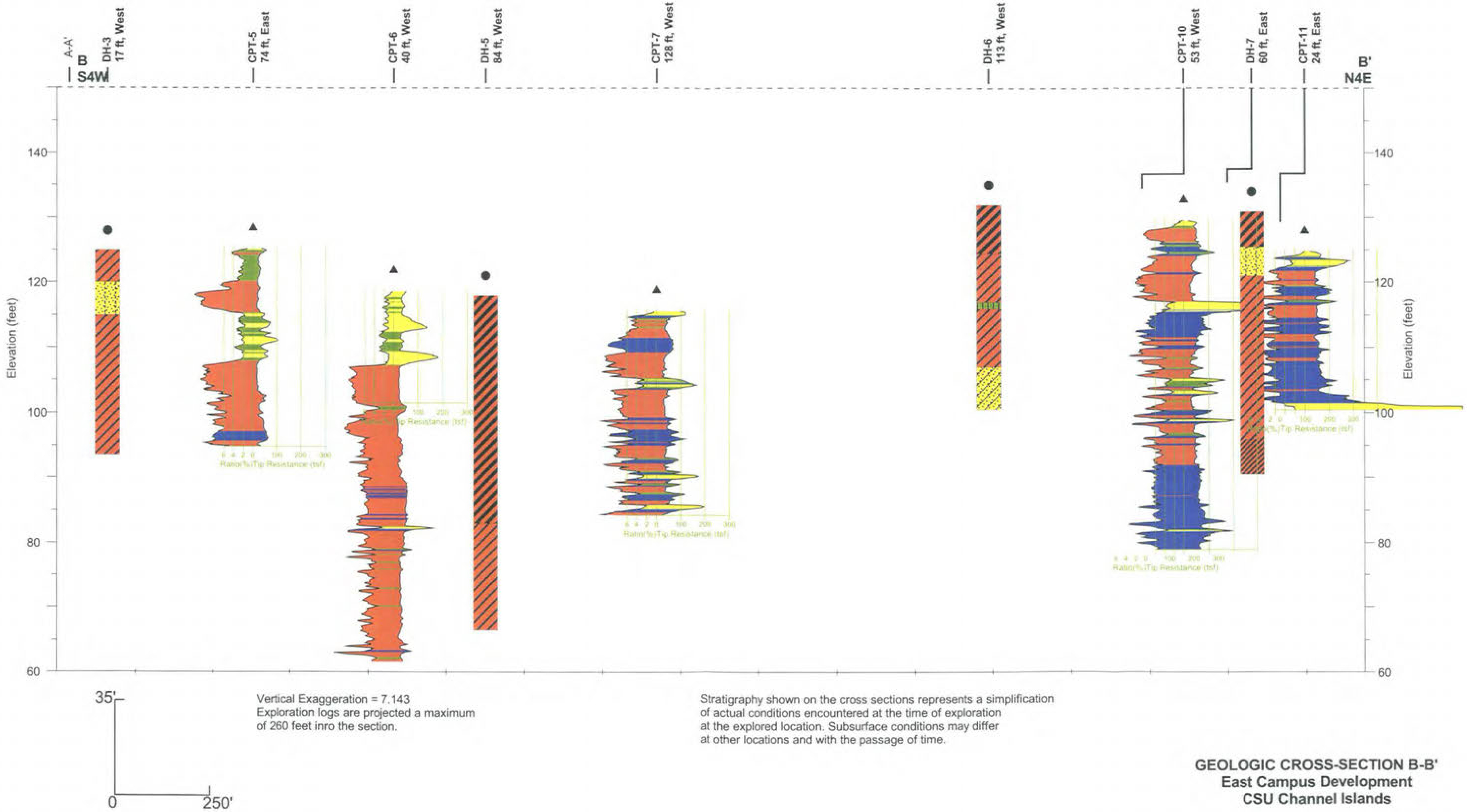
December 2000
Project No. 99-42-0384



Vertical Exaggeration = 8.333
Exploration logs are projected a maximum of 260 feet inro the section.

Stratigraphy shown on the cross sections represents a simplification of actual conditions encountered at the time of exploration at the explored location. Subsurface conditions may differ at other locations and with the passage of time.

GEOLOGIC CROSS-SECTION A-A'
East Campus Development
CSU Channel Islands



Vertical Exaggeration = 7.143
Exploration logs are projected a maximum
of 260 feet inro the section.

Stratigraphy shown on the cross sections represents a simplification
of actual conditions encountered at the time of exploration
at the explored location. Subsurface conditions may differ
at other locations and with the passage of time.

GEOLOGIC CROSS-SECTION B-B'
East Campus Development
CSU Channel Islands

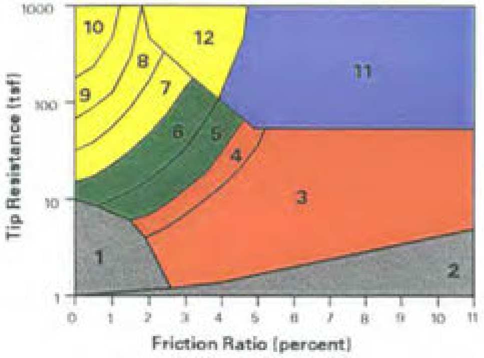
Key to Soil Lithology Symbols

- 🟨 Well graded GRAVEL (GW)
- 🟨 Poorly graded GRAVEL (GP)
- 🟨 GRAVEL with sand (GP or GW)
- 🟨 GRAVEL with clay (GP-GC)
- 🟨 Clayey GRAVEL (GC)
- 🟨 GRAVEL with silt (GP-GM)
- 🟨 Silty GRAVEL (GM)
- 🟨 Well graded SAND (SW)
- 🟨 Poorly graded SAND (SP)
- 🟨 SAND with gravel (SP or SW)
- 🟨 SAND with clay (SP-SC)
- 🟨 Clayey SAND (SC)
- 🟨 SAND with silt (SP-SM)
- 🟨 Silty SAND (SM)
- 🟥 Fat CLAY (CH)
- 🟥 Sandy fat CLAY (CH)
- 🟧 Lean CLAY (CL)
- 🟧 Sandy lean CLAY (CL)
- 🟧 Silty CLAY (CL-ML)
- 🟥 Elastic SILT (MH)
- 🟩 SILT (ML)
- 🟩 Sandy SILT (ML)
- 🟩 Clayey SILT (ML/CL)
- ⬜ Highly Plastic ORGANICS (OH)
- ⬜ Low plasticity ORGANICS (OL)
- 🟨 SANDSTONE (Rx)
- 🟫 SILTSTONE (Rx)
- 🟧 CLAYSTONE (Rx)
- 🟩 Interbedded Rock Strata (Rx)
- 🟨 CONGLOMERATE (Rx)
- 🟨 Rock Fragments
- ⬜ PAVEMENT

KEY TO CROSS SECTIONS
DRILL HOLES

East Campus Development
CSU Channel Islands

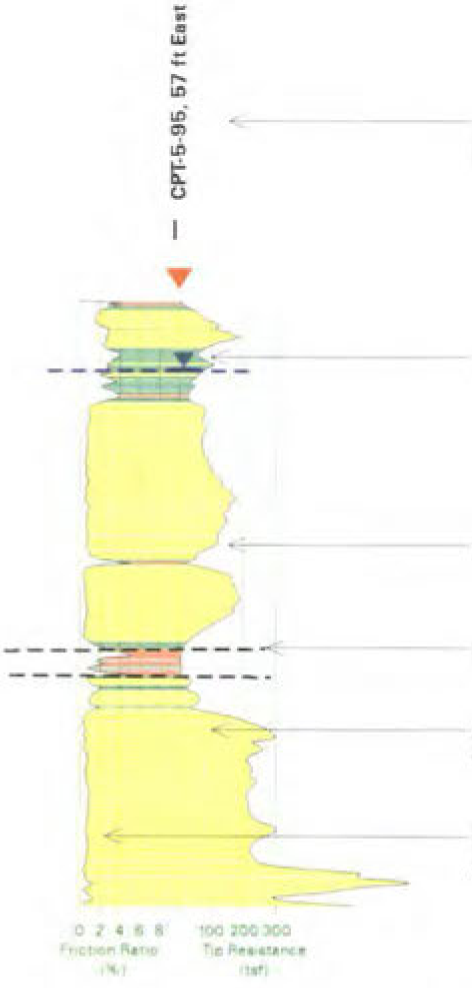
PLATE 6a



Zone	Soil Behavior Type	U.S.C.S.
1	Sensitive Fine-grained	OL-CH
2	Organic Material	OL-OH
3	Clay	CH
4	Silty Clay to Clay	CL-CH
5	Clayey Silt to Silty Clay	MH-CL
6	Sandy Silt to Clayey Silt	ML-MH
7	Silty Sand to Sandy Silt	SM-ML
8	Sand to Silty Sand	SM-SP
9	Sand	SW-SP
10	Gravelly Sand to Sand	SW-GW
11	Very Stiff Fine-grained *	CH-CL
12	Sand to Clayey Sand *	SC-SM

* overconsolidated or cemented

CPT CORRELATION CHART (Robertson and Campanella, 1988)



DISTANCE AND DIRECTION. Measured perpendicular to the cross section line.

ESTIMATED WATER LEVEL (blue triangle)
INTERPRETED WATER LEVEL (dashed blue line)

CPT TIP RESISTANCE (black line).

INTERPRETED STRATIGRAPHY (dashed black line).

SOIL TYPE (multi-colored shading). Based on empirical CPT correlation chart, shown above.

FRICTION RATIO (black line, left side of plot). Calculated as sleeve friction divided by tip resistance.

KEY TO CROSS SECTIONS
CPT LOGS

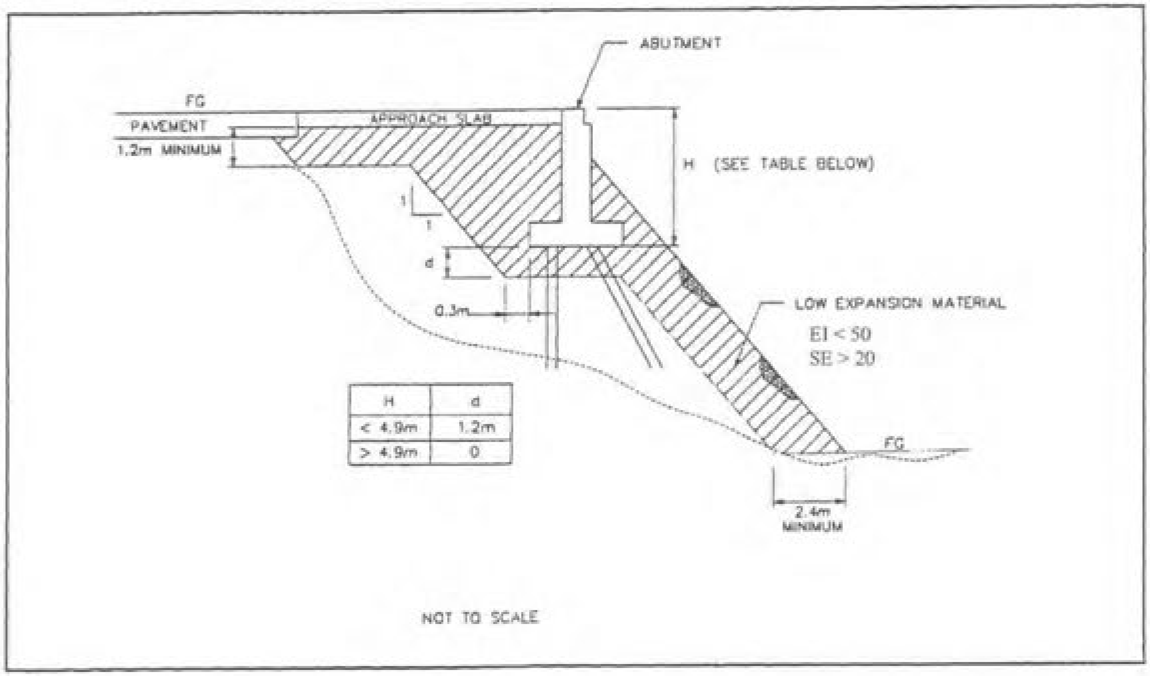
East Campus Development
CSU Channel Islands

EXPANSIVE SOIL EXCLUSION ZONE

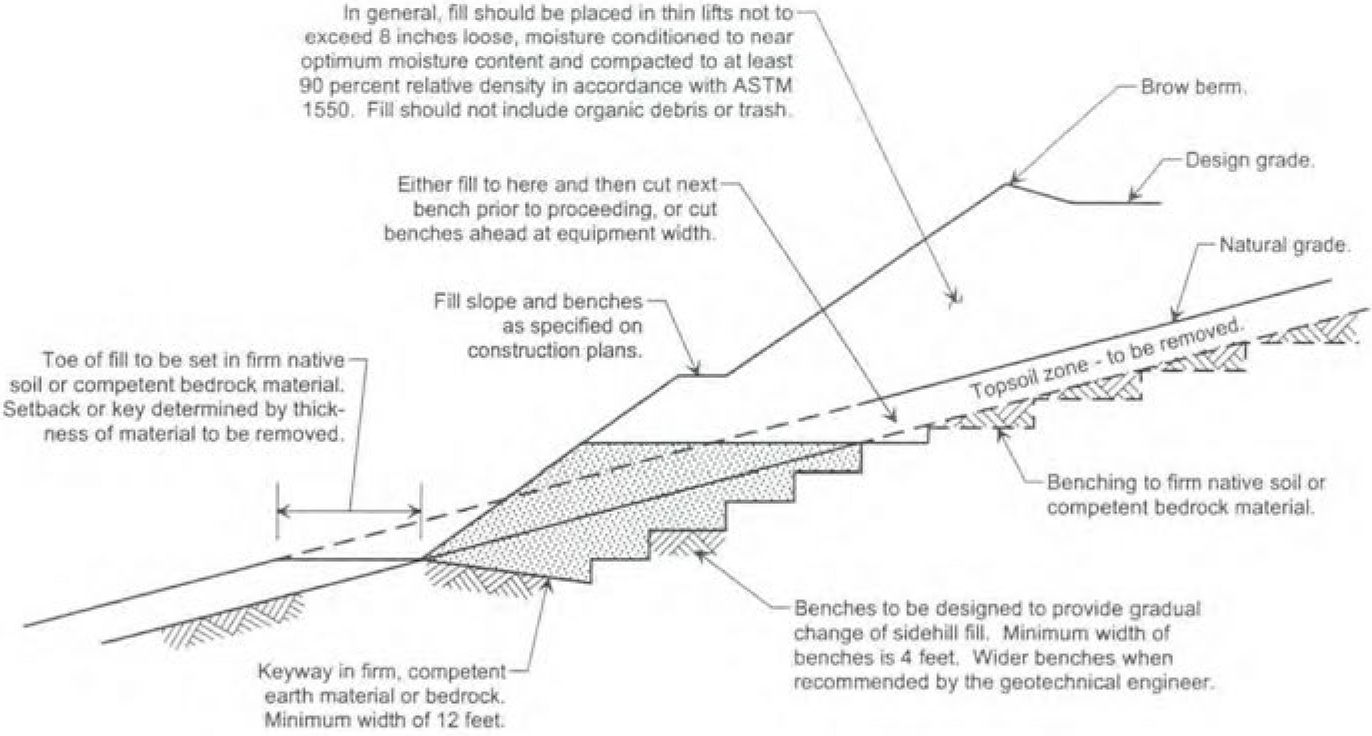
GUIDELINE FOR DEFINING EXPANSIVE SOIL AND THE ZONE AROUND BRIDGE ABUTMENTS IN WHICH EXPANSIVE SOIL IS TO BE EXCLUDED (ALSO APPLICABLE TO WINGWALLS AND RETAINING WALLS).

Expansive soil materials shall not be placed as part of the embankment within the limits of a bridge abutment as shown in Figure 1 below for the full width of the embankment. Expansive soil materials for this requirement are defined as having either an Expansion Index (EI) greater than 50, (Expansion Index to be determined in accordance with ASTM D 4829) or a Sand Equivalent (SE) less than 20 (Sand Equivalent to be determined in accordance with California Test Method 217). This requirement is exclusive of the structure backfill and pervious backfill material requirements as shown on the plans and set forth in the Standard Specifications under Sections 19-3.06 and 19-3.065 respectively.

Figure 1 TYPICAL SECTION - EXPANSIVE SOIL EXCLUSION ZONE IN BRIDGE EMBANKMENT



H	d
< 4.9m	1.2m
> 4.9m	0



In general, fill should be placed in thin lifts not to exceed 8 inches loose, moisture conditioned to near optimum moisture content and compacted to at least 90 percent relative density in accordance with ASTM 1550. Fill should not include organic debris or trash.

Either fill to here and then cut next bench prior to proceeding, or cut benches ahead at equipment width.

Fill slope and benches as specified on construction plans.

Toe of fill to be set in firm native soil or competent bedrock material. Setback or key determined by thickness of material to be removed.

Benching to firm native soil or competent bedrock material.

Benches to be designed to provide gradual change of sidehill fill. Minimum width of benches is 4 feet. Wider benches when recommended by the geotechnical engineer.

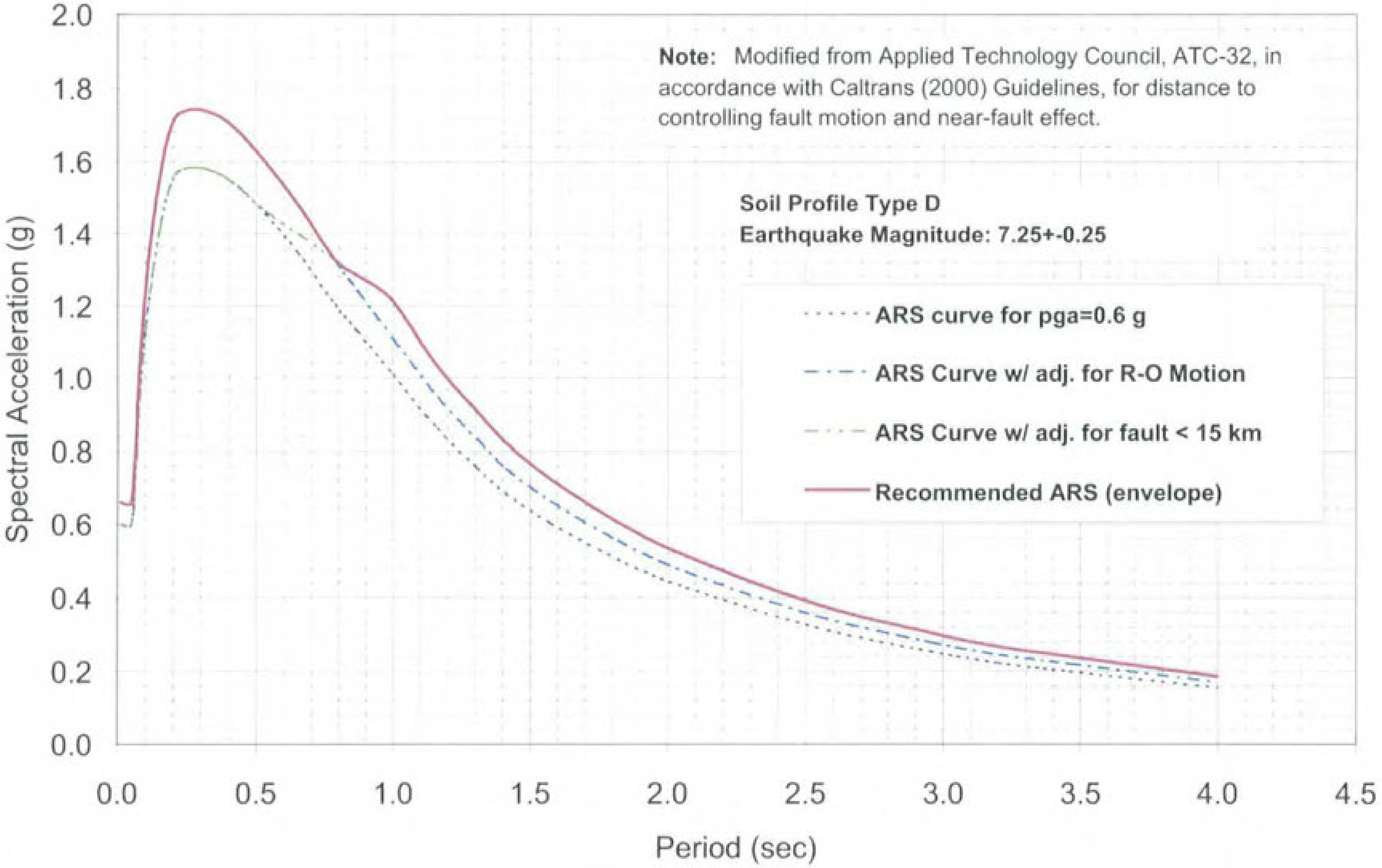
Keyway in firm, competent earth material or bedrock. Minimum width of 12 feet.

SIDEHILL FILL

California State University
Channel Islands
East Campus Development

9942\0384curv.dsf(1.3)

December 2000
Project No. 99-42-0384



Note: Modified from Applied Technology Council, ATC-32, in accordance with Caltrans (2000) Guidelines, for distance to controlling fault motion and near-fault effect.

Soil Profile Type D
Earthquake Magnitude: 7.25+-0.25

MODIFIED ARS CURVE
California State University
Channel Islands
East Campus Development

PLATE 9

APPENDIX A
SUBSURFACE EXPLORATION

APPENDIX A
SUBSURFACE EXPLORATION

Introduction

The contents of this appendix shall be integrated with the geotechnical engineering study of which it is a part. They shall not be used in whole or in part as a sole source for information or recommendations regarding the subject site.

Field Study

The subsurface conditions at the proposed CSUCI east campus development project site were explored by the excavation and sampling of 23 hollow-stem-auger drill holes, the advancement of 17 cone penetrometer test (CPT) soundings, and the excavation of 35 backhoe test pits. The approximate exploration locations are shown on Plate 3. CPT, drill holes, and backhoe pits were located using a Trimble Pathfinder PRO-XR GPS beacon receiver. Positions were estimated by averaging about 12 5-second measurements at each location. Carrier-phase processing techniques were used to differentially correct the data. The resulting locations have an estimated horizontal accuracy (95 percent probability) of about 2 to 4 feet. Their locations should be considered accurate only to the degree implied by the method used.

Cone Penetration Tests. The CPT soundings were performed by Fugro Geosciences of Santa Fe Springs, California, and ranged from about 23 to 75 feet in depth. The CPTs were performed to provide nearly continuous subsurface data at each location for evaluating the engineering characteristics of the subsurface soils. The logs of the CPT soundings are presented as Plates A-1.1 through A-1.17 - Log of CPT. A soil classification chart is presented on Plate A-1.18 - Soil Classification Chart.

The CPT is mounted on a 20-ton truck and consists of a 38 millimeter-diameter rod with a 10-square-centimeter, 60-degree-apex-angle cone at the base. The cone is equipped with electronic load cells that measure both point resistance and frictional resistance between the soils and the cylinder side of the cone. For this study, a cone equipped with a pore pressure transducer, known as a piezocone, was utilized to measure pore pressures during penetration. The pore pressure transducer is located on the friction sleeve part of the cone. The primary purpose of performing CPTs were to provide a nearly continuous log of the earth materials and soil stratigraphy between drill hole locations and sample depths.

Although many factors influence CPT profiles, including: physical cone properties, vertical effective stress, pore pressure, soil compressibility and fabric, and depositional characteristics, the classifications are generally consistent with the laboratory classification data and with the visual descriptions made during the soil borings (Plate A-1.18 presents one example of soil classification using CPT data).

Pore Pressure Dissipation Tests. Plate A-1.19 - Dissipation Test, presents the results of a pore pressure dissipation test that was performed in CPT No. 2. (A second dissipation test was attempted in CPT-17, but groundwater was not detected, and the test was aborted.) The dissipation tests are performed by stopping the advancement at a designated depth and measuring the pore pressure response with time until a relatively constant pressure is attained.

Drilling and Sampling. A total of 23 drill holes were advanced to depths ranging from about 19 to 60 feet on June 28 and 29, August 4, 1999, and August 7 and 8, 2000. The drill holes were excavated with a truck-mounted CME 85 drilling rig supplied by A&R Drilling, Inc., of Gardena, California. The drill holes were backfilled with the native cuttings.

The drill holes were sampled at approximate 2-1/2-foot intervals in the upper 5 feet and approximate 5-foot intervals below 10 feet to the completion depth. Samples were extracted from the subsurface using a 2-3/8-inch-inside-diameter (ID) Modified California sampler above the groundwater level (as encountered) and with a 1-1/2-inch-ID standard penetration test (SPT) split-spoon sampler below the groundwater level. The samplers were driven by a 140-pound automatic-trip hammer free falling from a height of 30 inches. Samples of fine-grained estuarine deposits were also obtained with 3-inch-O.D. Shelby tubes advanced by the hydraulic system of the drilling rig. With Shelby tubes, relatively undisturbed samples (relative to samples obtained using SPT or California liner samplers) can be obtained for laboratory testing. Minimizing sample disturbance of fine-grained soft soil samples is especially critical for consolidation testing.

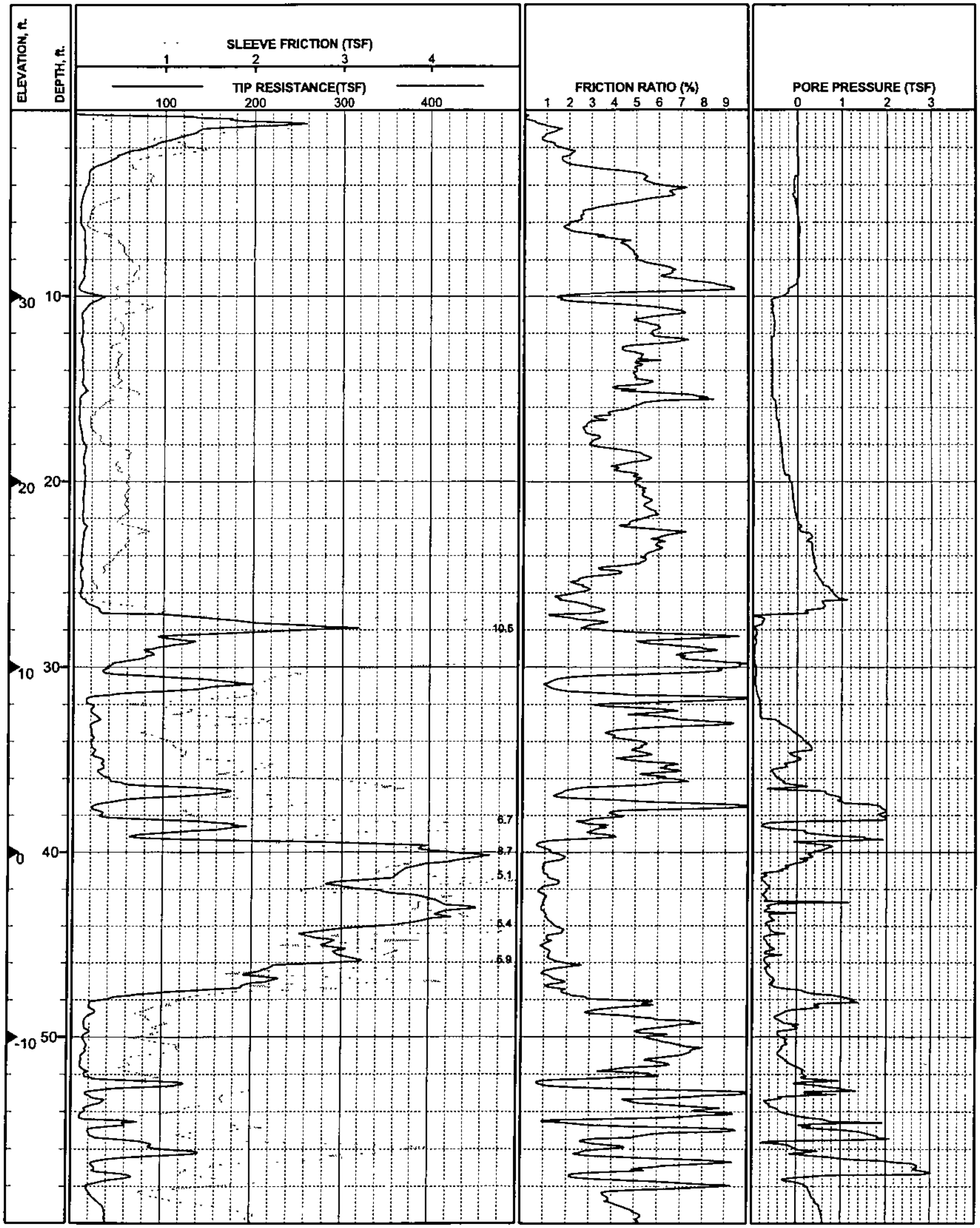
The logs of the drill holes describe the earth materials encountered, sampling method used, and field and laboratory tests performed. The logs also show the location, drill hole number, date of start and completion, and the name of the logger and drilling subcontractor. The drill holes were logged by a staff geologist using ASTM D2487 for visual classification of soils. The boundaries between soil types shown on the logs are approximate because the transition between different soil layers may be gradual and may change with time. The logs of the drill holes are presented as Plates A-2.1 through A-2.23 - Log of Drill Hole. A legend to the logs is presented on Plate A-2.24 - Key to Terms & Symbols Used on Logs.

Backhoe Test Pits. Additionally for the project, 35 test pits were excavated to depths ranging from about 4 to 11 feet, on July 1 and 2, 1999, and October 19 and 23, 2000. Excavation was performed using a rubber-tired CASE 580E backhoe with a 24-inch-wide bucket supplied by Dennis Carroll Backhoe Rental, Inc., of Ventura, California. The test pits were performed under the observation of a staff geologist of Fugro, who prepared logs of the soil conditions encountered and obtained soil samples for laboratory observation and testing.

Following excavation, the test pits were backfilled loosely with the excavated material.

The test pit logs describe the materials encountered, soil profile, sampling methods and locations, and bedding attitudes where measured. The logs also show the date of the excavation, name of contractor and logger, location, and test pit number. The logs of the test pits are presented on Plates A-3.1 through A-3.35 - Log of Test Pit. A key to the various terms and symbols used on the logs is presented as Plate A-2.24 - Key to Terms & Symbols Used on Logs.

EXPLORATION NO.:	CPT-1	**COORDINATES.**	E1683419 96 N243257.33 CA State Plane Zone 5, NAD27, feet	**VEHICLE:**	Fugro Geosciences
GROUND ELEVATION:	40 0 FT (MSL)	**DEPTH TO WATER:**	7 0 FT	**TEST DATE:**	6/22/99



Location Per Plate 3

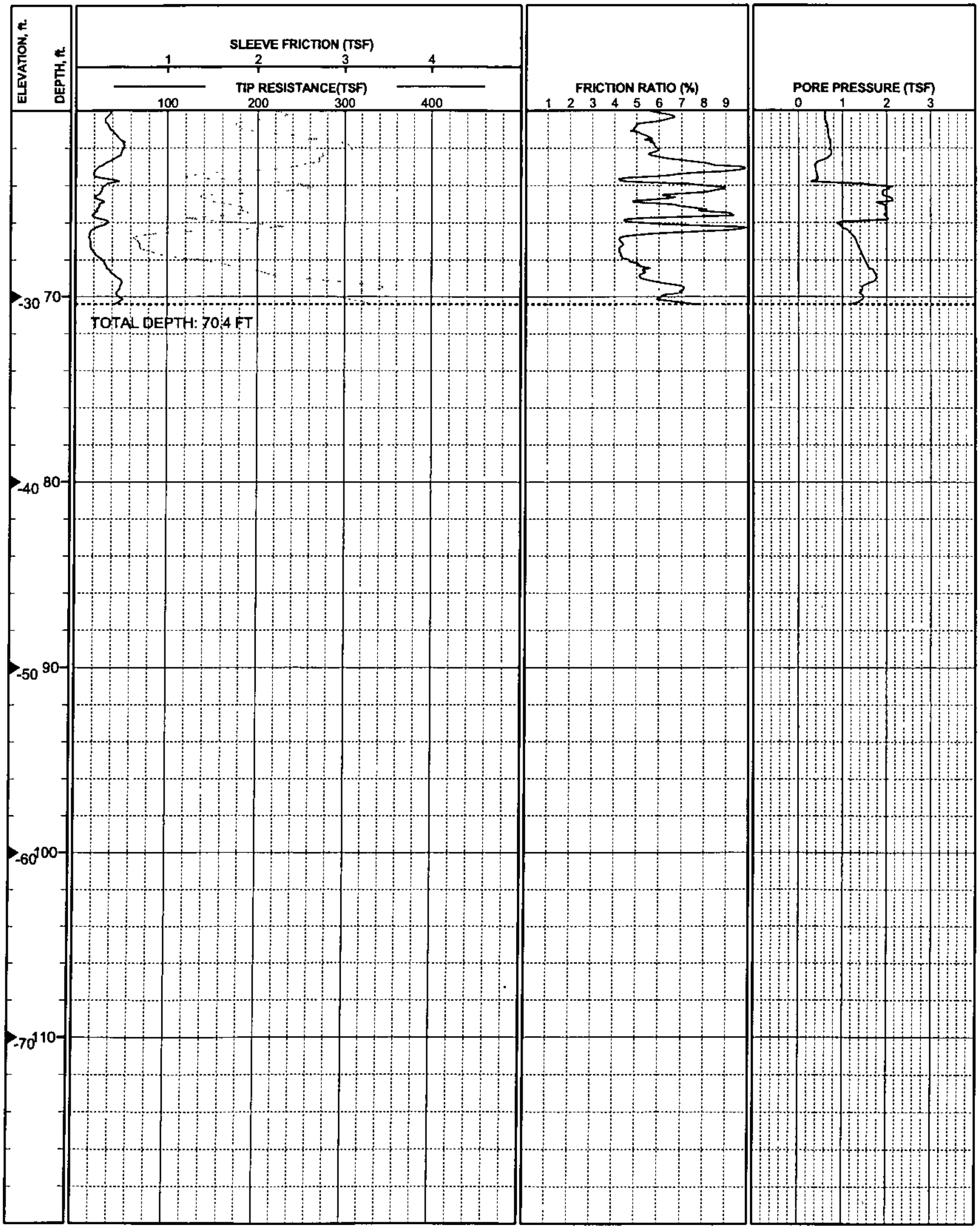
LOG OF CPT-1

East Campus Development

CSU Channel Islands

Report Date: 10/04/99

EXPLORATION NO.: CPT-1
GROUND ELEVATION: 40 0 FT (MSL)
COORDINATES: E1683419 96 N243257 33 CA State Plane Zone 5, NAD27, feet
DEPTH TO WATER: 7 0 FT
VEHICLE: Fugro Geosciences
TEST DATE: 6/22/99



Location Per Plate 3

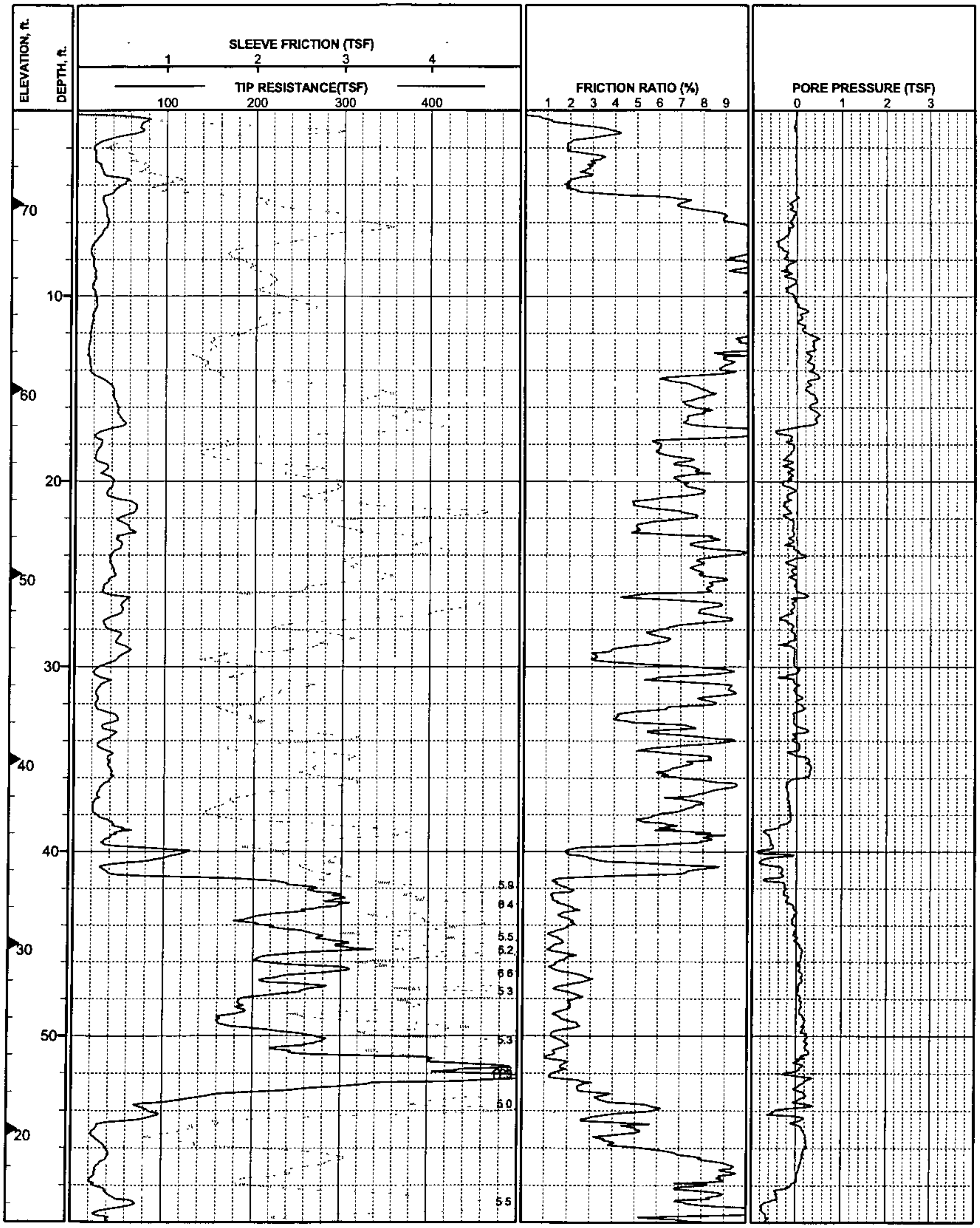
LOG OF CPT-1

East Campus Development

CSU Channel Islands

Report Date: 10/04/99

EXPLORATION NO.: CPT-2
GROUND ELEVATION: 75.0 FT (MSL)
COORDINATES: E1685335 45 N243320.59 CA State Plane Zone 5, NAD27, feet
DEPTH TO WATER: 42 5 FT
VEHICLE: Fugro Geosciences
TEST DATE: 6/22/99



Location Per Plate 3

LOG OF CPT-2

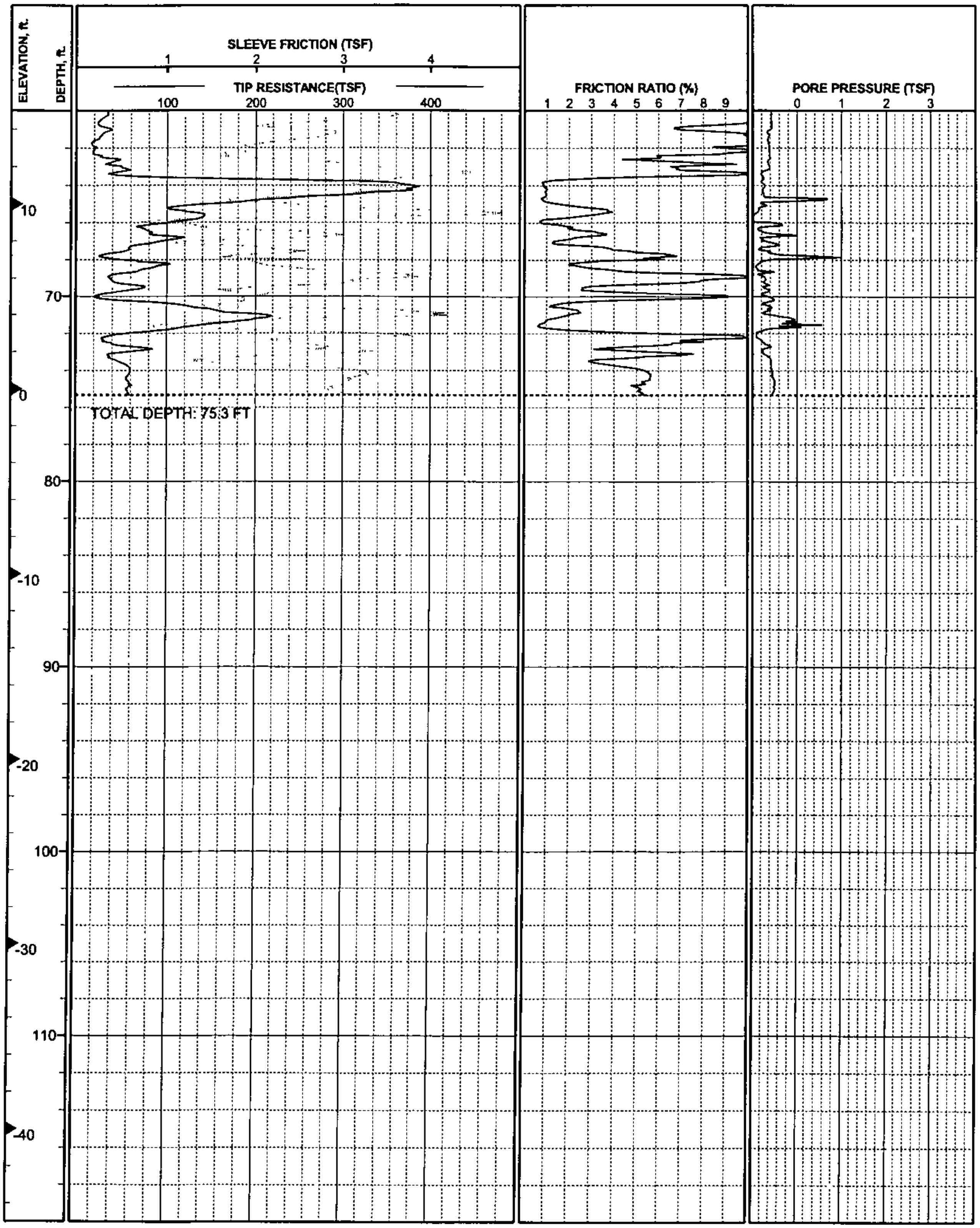
Ease Campus Development

CSU Channel Islands

Report Date 10/04/99

such\cpt-2\log cdb

EXPLORATION NO.:	CPT-2	**COORDINATES:**	E1685335.45 N243320 59 CA State Plane Zone 5, NAD27, feet	**VEHICLE:**	Fugro Geosciences
GROUND ELEVATION:	75.0 FT (MSL)	**DEPTH TO WATER:**	42.5 FT	**TEST DATE:**	6/22/99



Location Per Plate 3

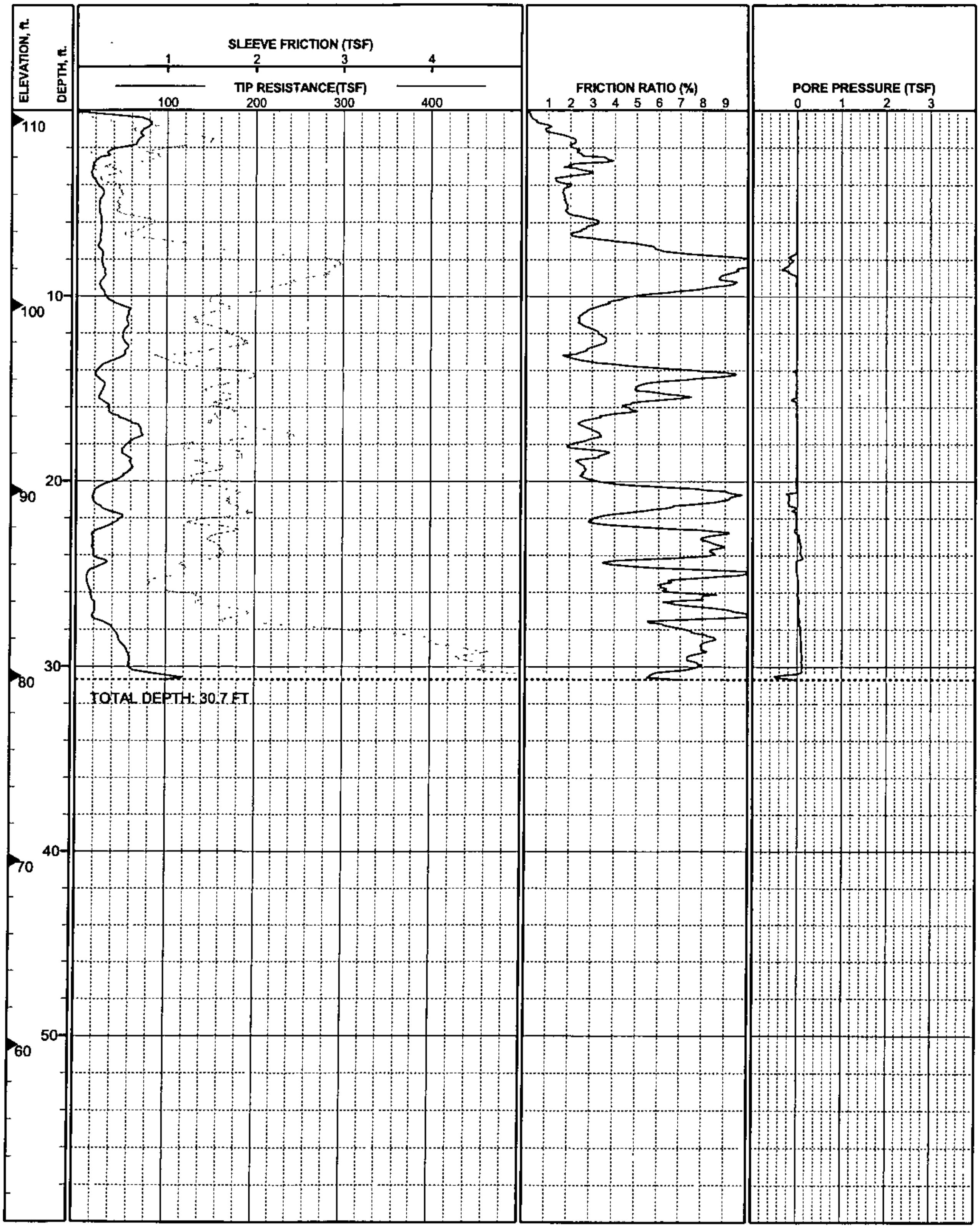
LOG OF CPT-2

Ease Campus Development

CSU Channel Islands

Report Date: 10/04/99

EXPLORATION NO.: CPT-3
GROUND ELEVATION: 110 5 FT (MSL)
COORDINATES: E1686599.96 N243170 6 CA State Plane Zone 5, NAD27, feet
DEPTH TO WATER: Not Measured
VEHICLE: Fugro Geosciences
TEST DATE: 6/29/99



Location Per Plate 3

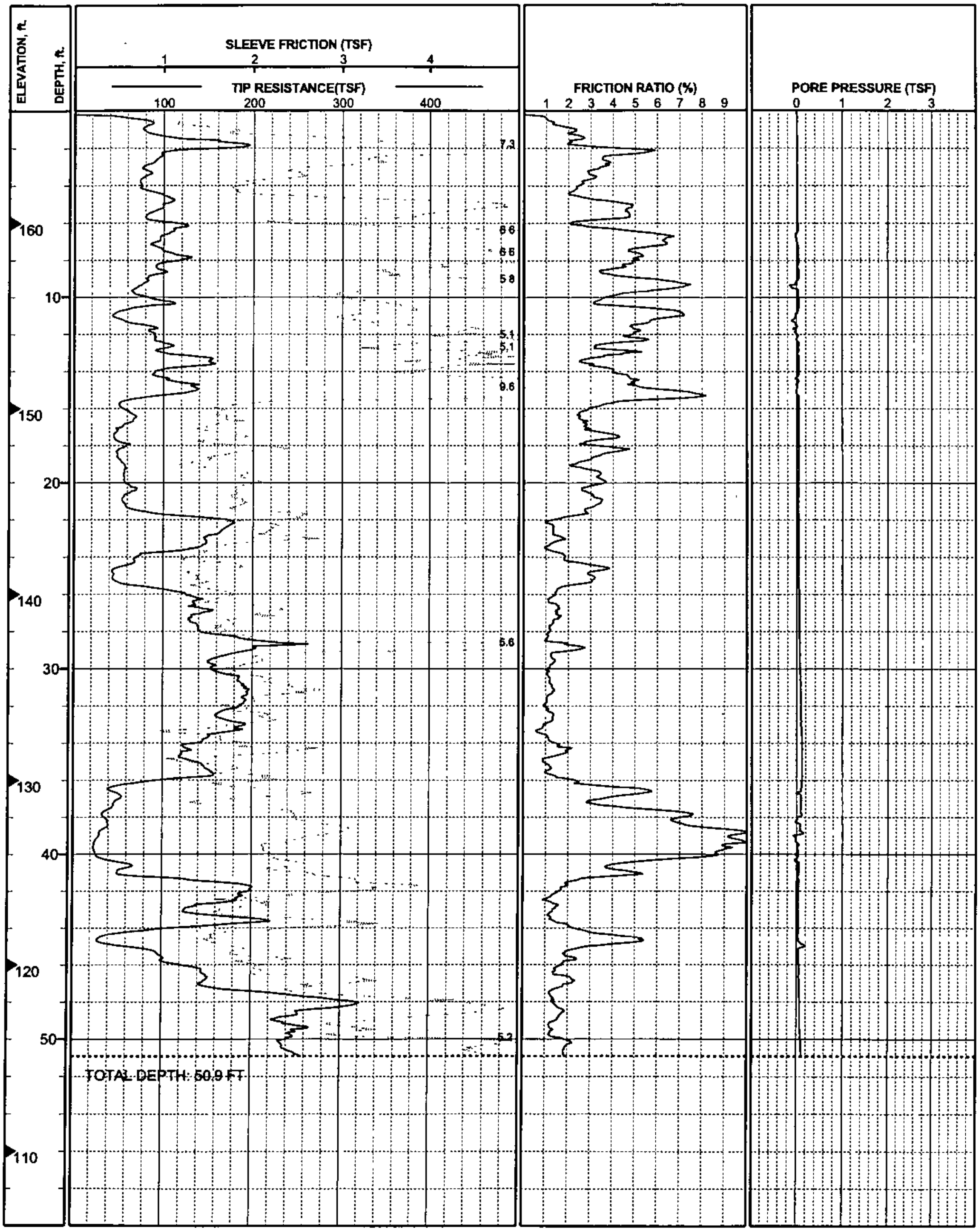
LOG OF CPT-3

Ease Campus Development

CSU Channel Islands

Report Date 10/04/99

EXPLORATION NO.: CPT-4
GROUND ELEVATION: 166 0 FT (MSL)
COORDINATES: E1688017.15 N242946.66 CA State Plane Zone 5, NAD27, feet
DEPTH TO WATER: Not Measured
VEHICLE: Fugro Geosciences
TEST DATE: 6/22/99



Location Per Plate 3

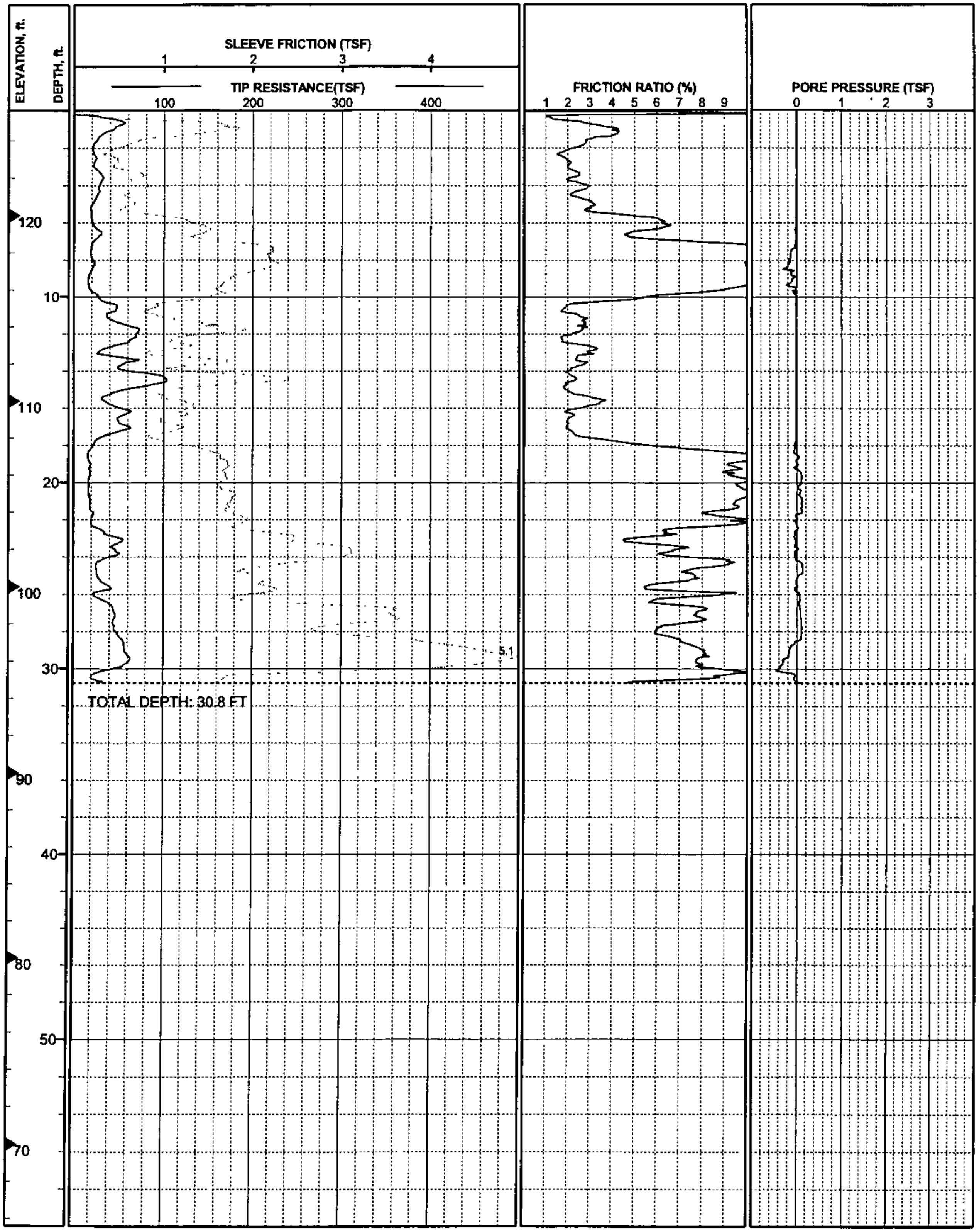
LOG OF CPT-4

Ease Campus Development

CSU Channel Islands

Report Date 10/04/99

EXPLORATION NO.: CPT-5
GROUND ELEVATION: 125 6 FT (MSL)
COORDINATES: E1687260 81 N243534.72 CA State Plane Zone 5, NAD27, feet
DEPTH TO WATER: Not Measured
VEHICLE: Fugro Geosciences
TEST DATE: 6/29/99



Location Per Plate 3

LOG OF CPT-5

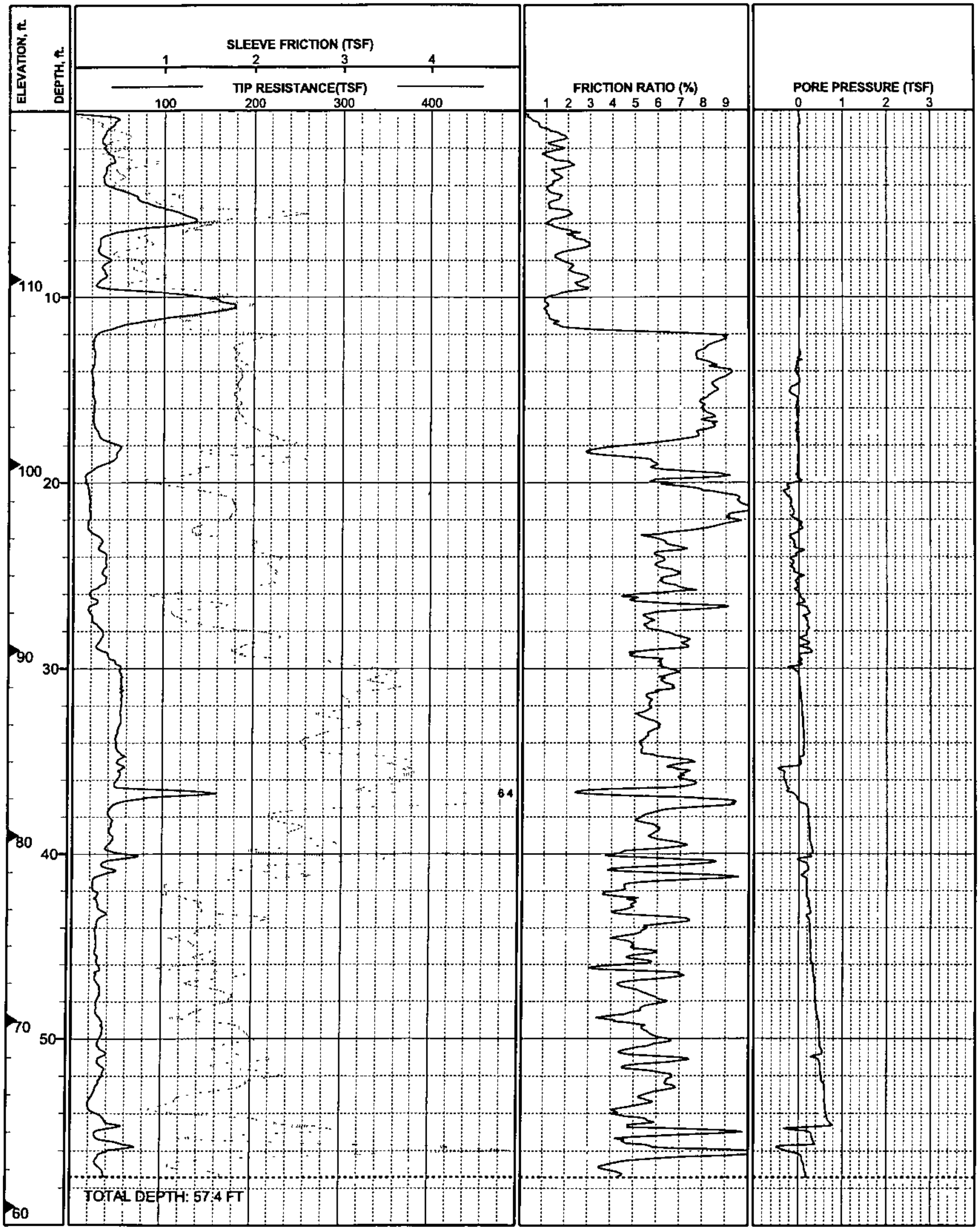
Ease Campus Development

CSU Channel Islands

Report Date 10/04/99

csuc\cpt-5\log.cdb

EXPLORATION NO.:	CPT-6	**COORDINATES:**	E1687170.94 N243903.66 CA State Plane Zone 5, NAD27, feet	**VEHICLE:**	Fugro Geosciences
GROUND ELEVATION:	119.0 FT (MSL)	**DEPTH TO WATER:**	Not Measured	**TEST DATE:**	6/22/99



Location Per Plate 3

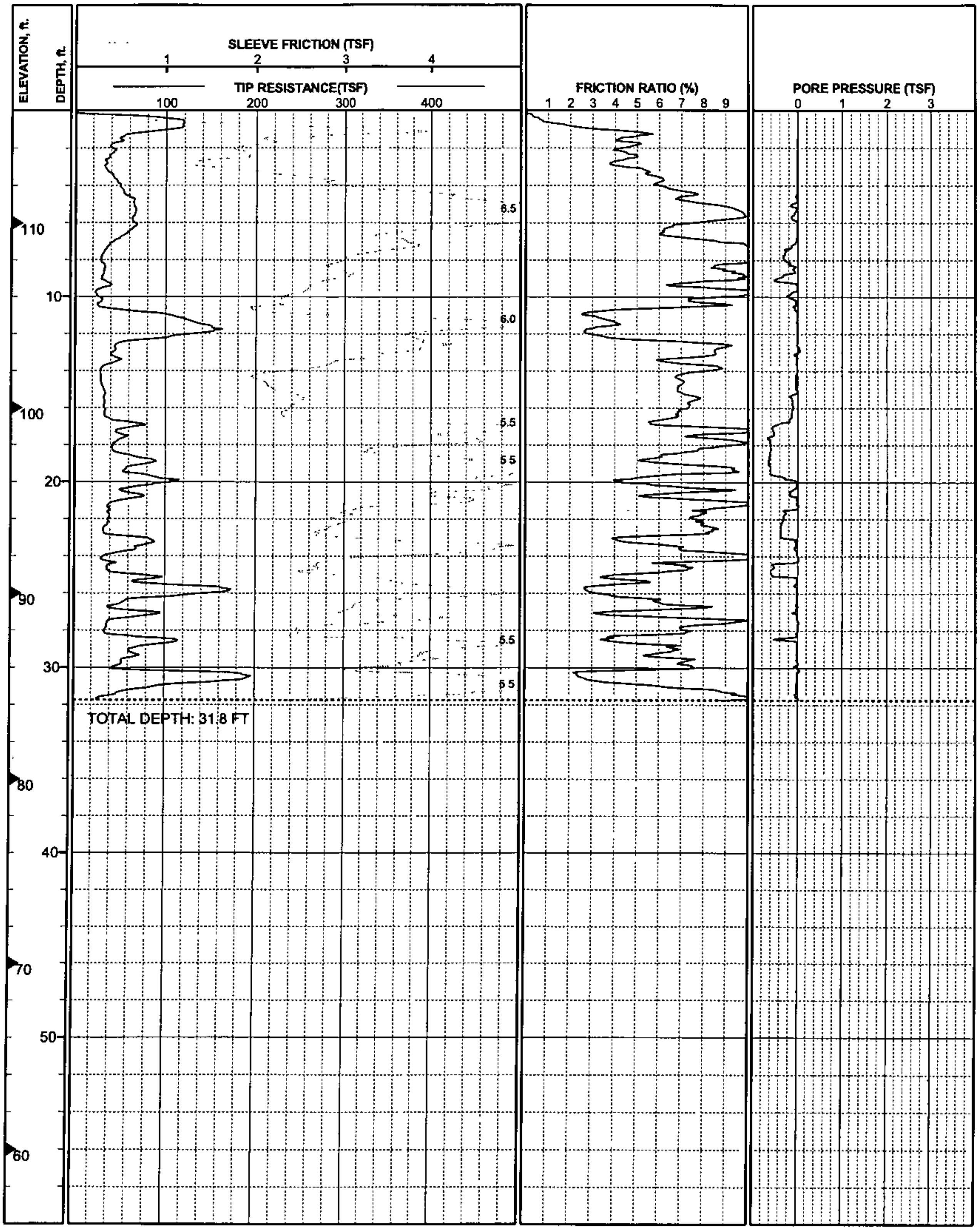
LOG OF CPT-6

Ease Campus Development

CSU Channel Islands

Report Date 10/04/99

EXPLORATION NO.: CPT-7
GROUND ELEVATION: 116.0 FT (MSL)
COORDINATES: E1687125 99 N244580 24 CA State Plane Zone 5, NAD27, feet
DEPTH TO WATER: Not Measured
VEHICLE: Fugro Geosciences
TEST DATE: 6/29/99



Location Per Plate 3

LOG OF CPT-7

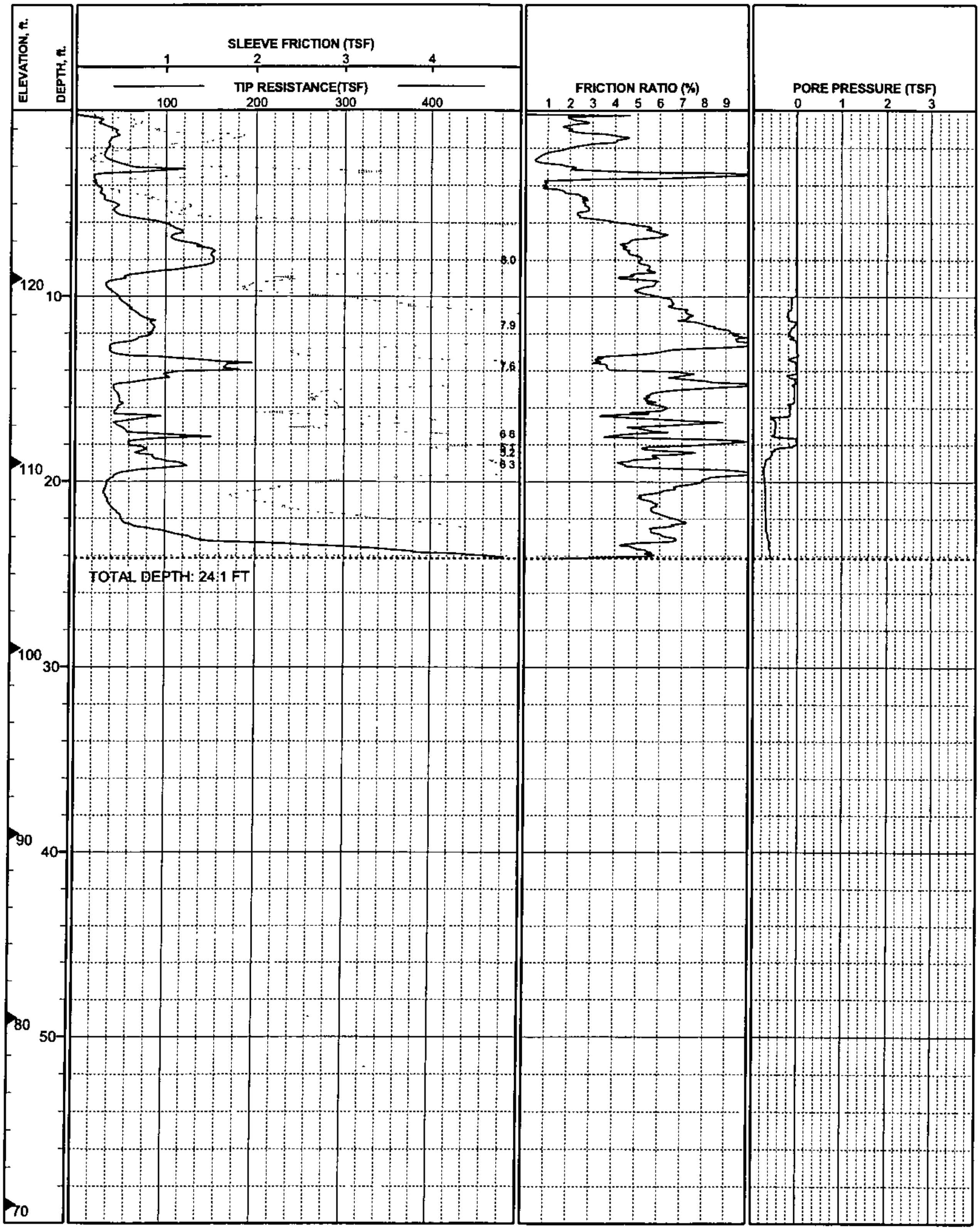
Ease Campus Development

CSU Channel Islands

Report Date 10/04/99

csuc\cpt-7\log odb

EXPLORATION NO.: CPT-8
GROUND ELEVATION: 129 0 FT (MSL)
COORDINATES: E1686633 01 N245024.6 CA State Plane Zone 5, NAD27, feet
DEPTH TO WATER: Not Measured
VEHICLE: Fugro Geosciences
TEST DATE: 6/29/99



Location Per Plate 3

LOG OF CPT-8

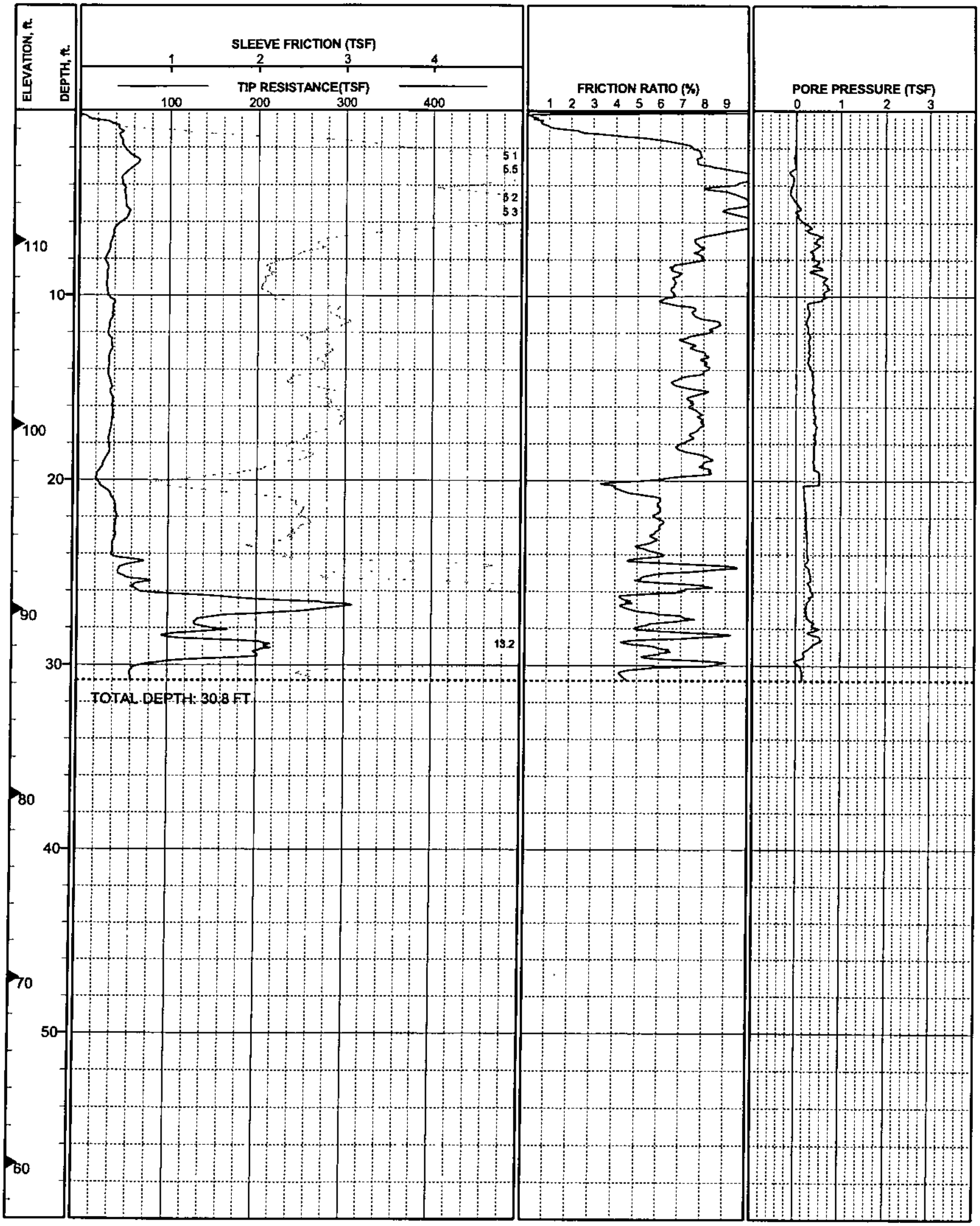
Ease Campus Development

CSU Channel Islands

Report Date 10/04/99

csu\cpt-8\log cdb

EXPLORATION NO.:	CPT-9	**COORDINATES:**	E1687003.41 N245929.42 CA State Plane Zone 5, NAD27, feet	**VEHICLE:**	Fugro Geosciences
GROUND ELEVATION:	117.0 FT (MSL)	**DEPTH TO WATER:**	Not Measured	**TEST DATE:**	6/29/99



Location Per Plate 3

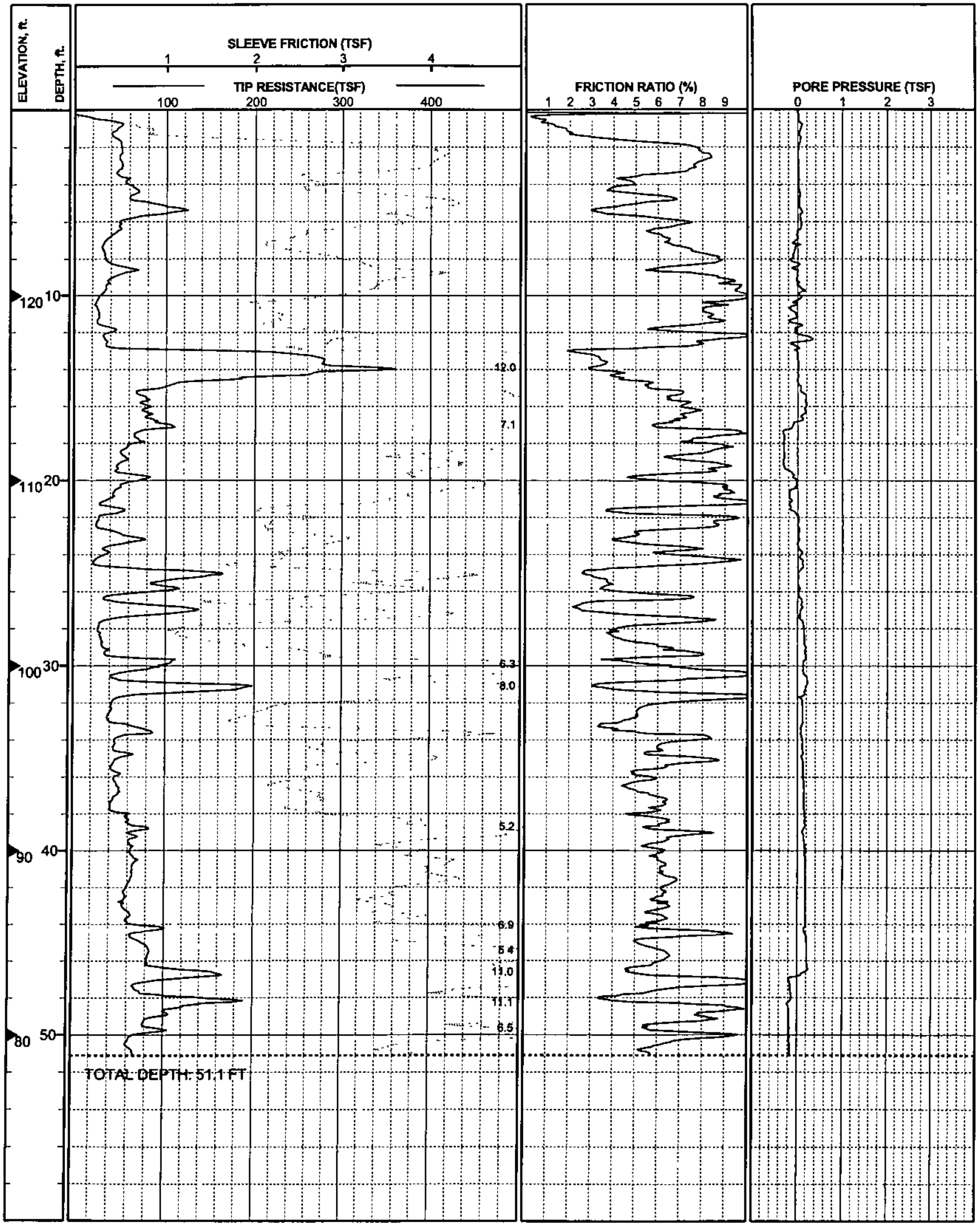
LOG OF CPT-9

Ease Campus Development

CSU Channel Islands

Report Date: 10/04/99

EXPLORATION NO.: CPT-10
GROUND ELEVATION: 130 0 FT (MSL)
COORDINATES: E1687287.32 N245923.55 CA State Plane Zone 5, NAD27, feet
DEPTH TO WATER: Not Measured
VEHICLE: Fugro Geosciences
TEST DATE: 6/29/99



Location Per Plate 3

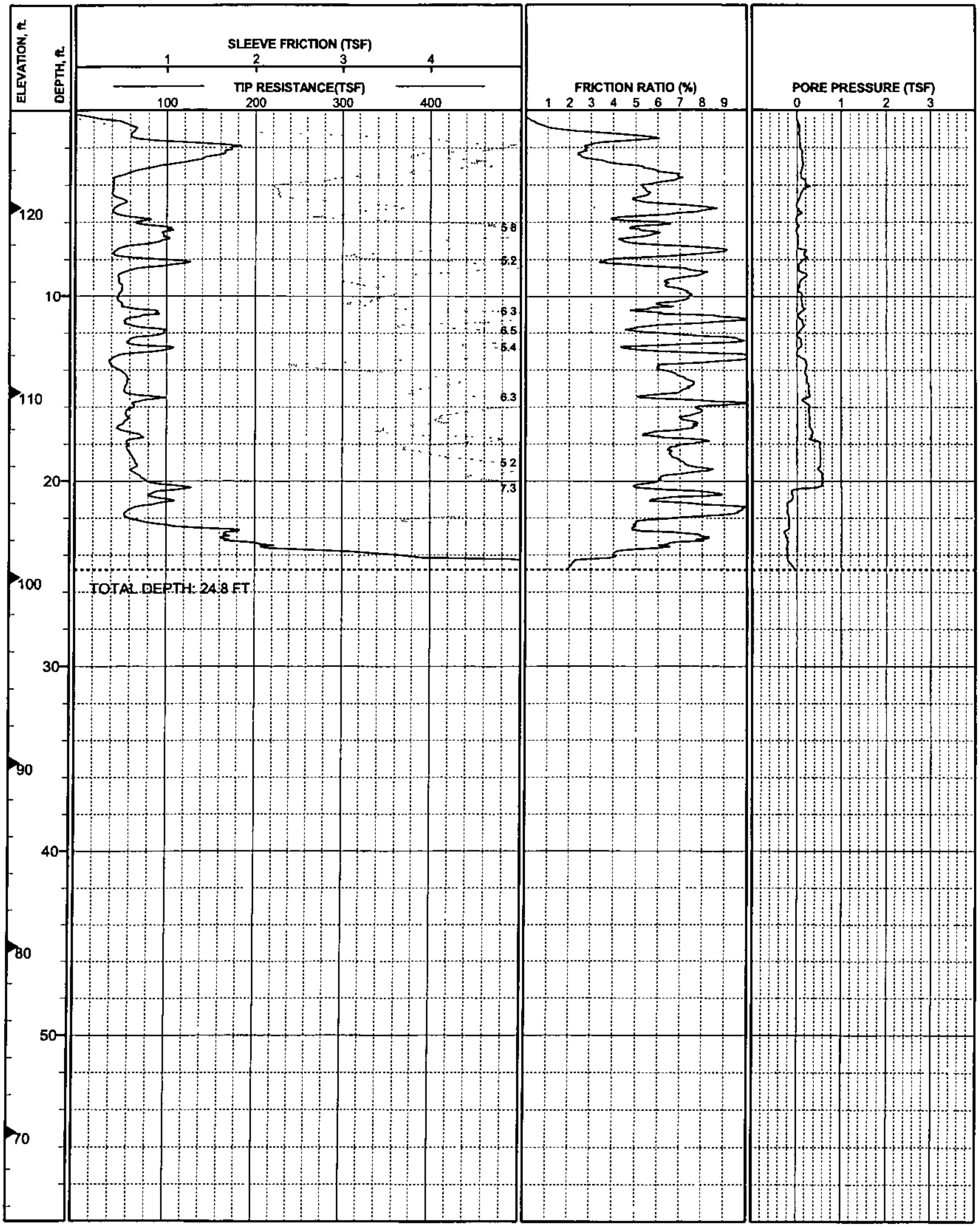
LOG OF CPT-10

East Campus Development

CSU Channel Islands

Report Date 10/04/99

EXPLORATION NO.:	CPT-11	**COORDINATES:**	E1687383 68 N246225.79 CA State Plane Zone 5, NAD27, feet	**VEHICLE:**	Fugro Geosciences
GROUND ELEVATION:	125 2 FT (MSL)	**DEPTH TO WATER:**	Not Measured	**TEST DATE:**	6/29/99



Location Per Plate 3

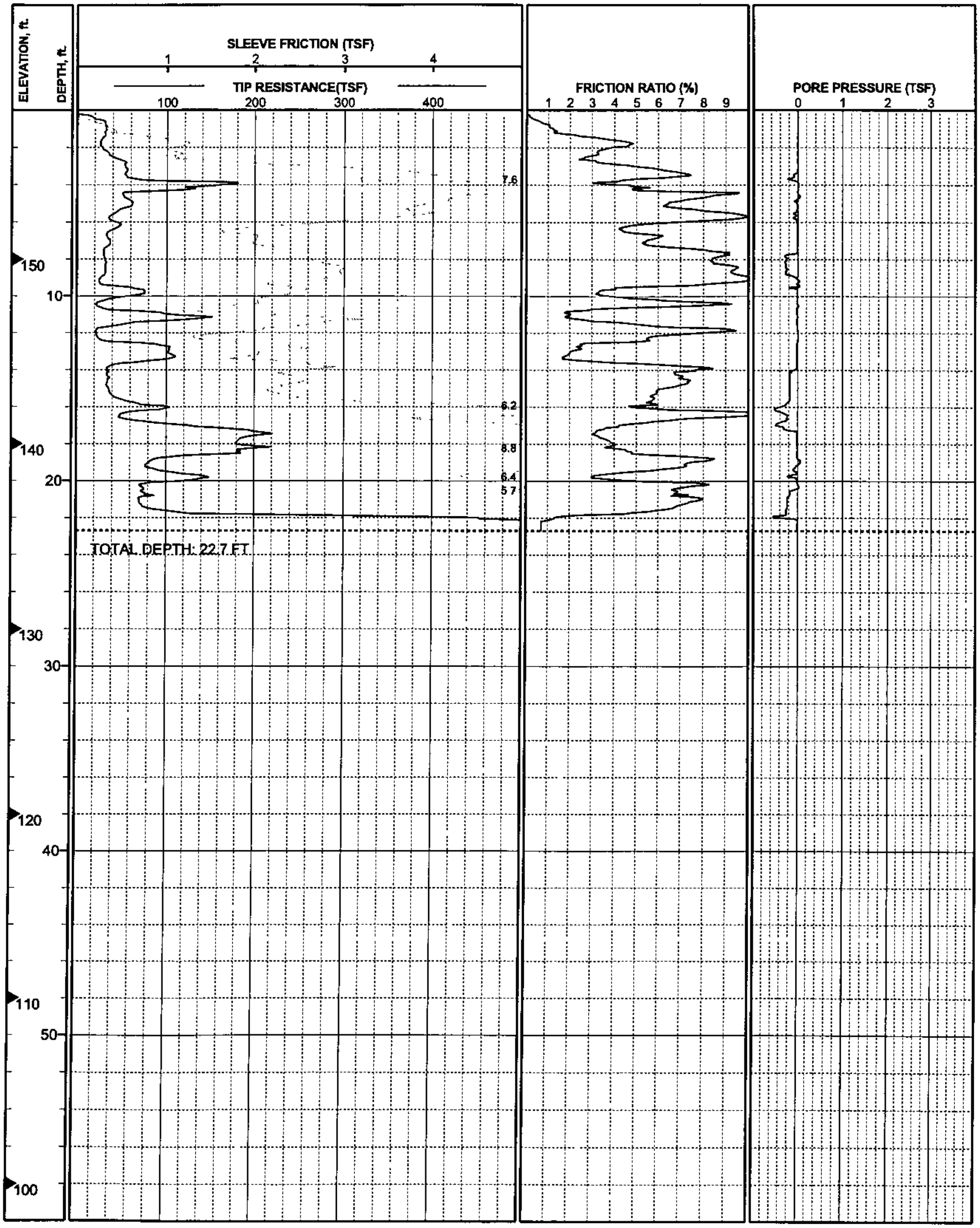
LOG OF CPT-11

East Campus Development

CSU Channel Islands

Report Date: 10/04/99

EXPLORATION NO.: CPT-12
GROUND ELEVATION: 158 0 FT (MSL)
COORDINATES: E1688025 85 N245837 76 CA State Plane Zone 5, NAD27, feet
DEPTH TO WATER: Not Measured
VEHICLE: Fugro Geosciences
TEST DATE: 6/29/99



Location Per Plate 3

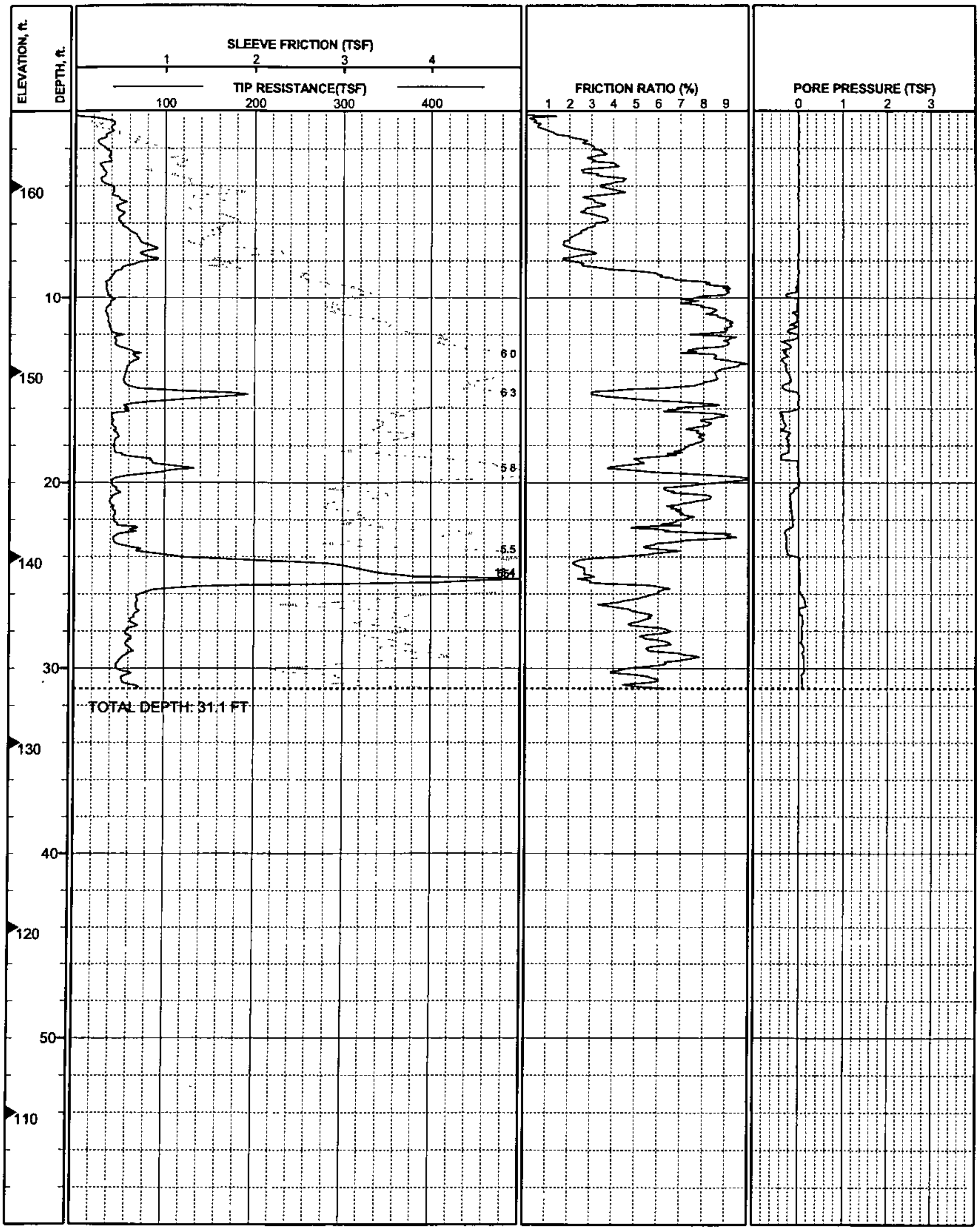
LOG OF CPT-12

Ease Campus Development

CSU Channel Islands

Report Date: 10/04/99

EXPLORATION NO.: CPT-13
GROUND ELEVATION: 164 0 FT (MSL)
COORDINATES: E1687902.42 N245284 38 CA State Plane Zone 5, NAD27, feet
DEPTH TO WATER: Not Measured
VEHICLE: Fugro Geosciences
TEST DATE: 6/29/99



Location Per Plate 3

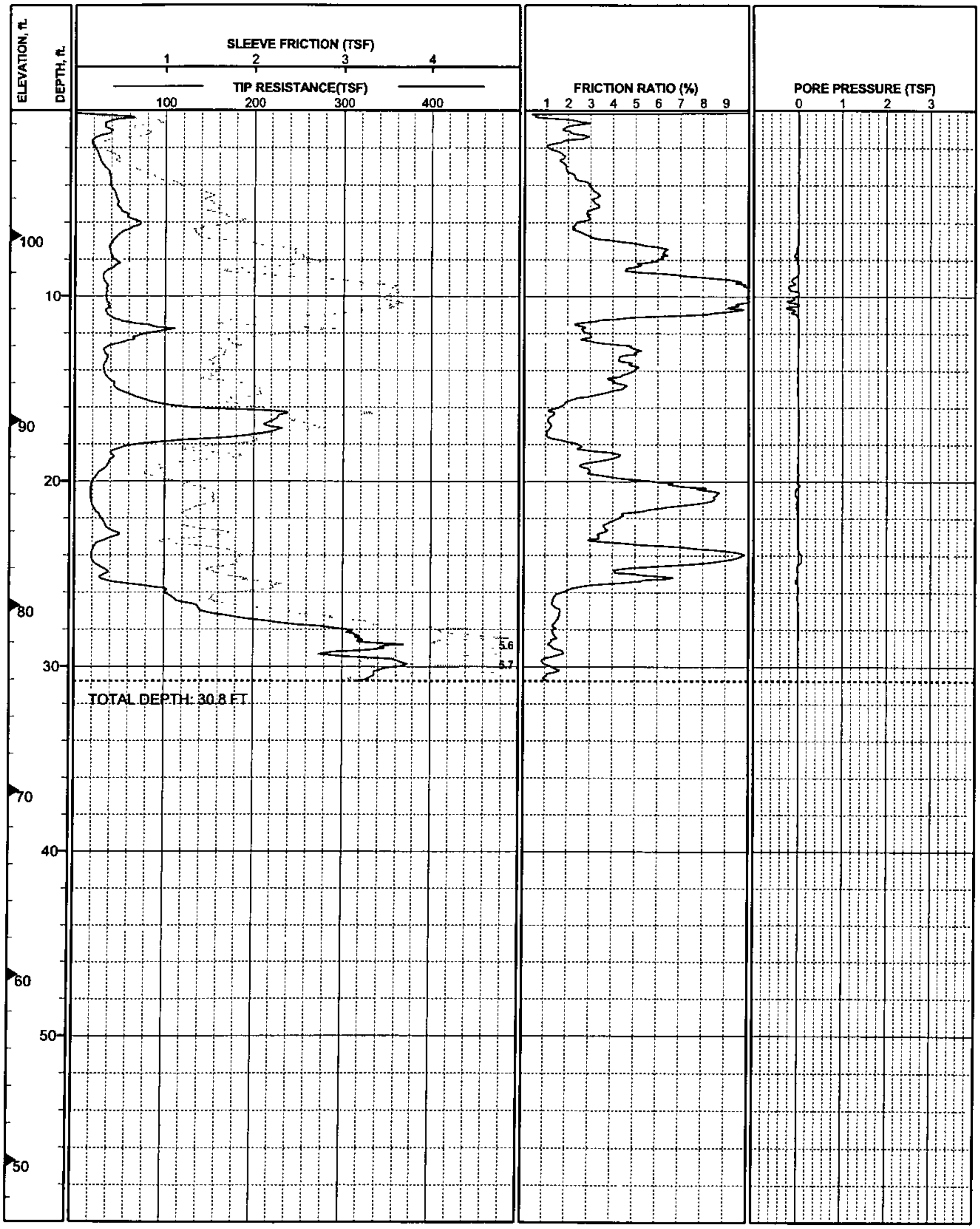
LOG OF CPT-13

Ease Campus Development

CSU Channel Islands

Report Date 10/04/99

EXPLORATION NO.: CPT-14
GROUND ELEVATION: 106.7 FT (MSL)
COORDINATES: E1686503.96 N242704 2 CA State Plane Zone 5, NAD27, feet
DEPTH TO WATER: Not Measured
VEHICLE: Fugro Geosciences
TEST DATE: 6/29/99



Location Per Plate 3

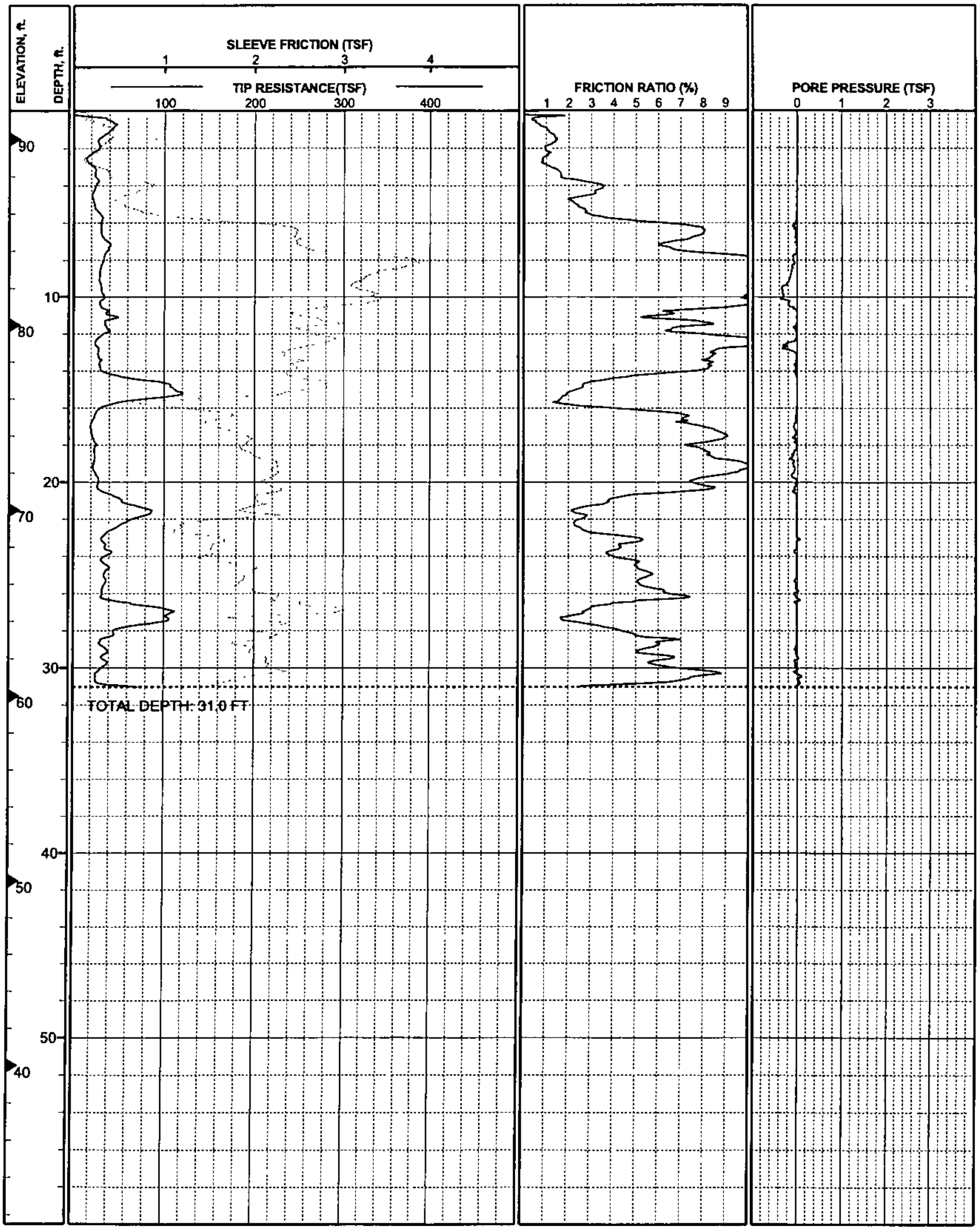
LOG OF CPT-14

Ease Campus Development

CSU Channel Islands

Report Date: 10/04/99

EXPLORATION NO.:	CPT-15	**COORDINATES.**	E1686018.18 N242604.38 CA State Plane Zone 5, NAD27, feet	**VEHICLE:**	Fugro Geosciences
GROUND ELEVATION:	91 5 FT (MSL)	**DEPTH TO WATER:**	Not Measured	**TEST DATE:**	6/29/99



Location Per Plate 3

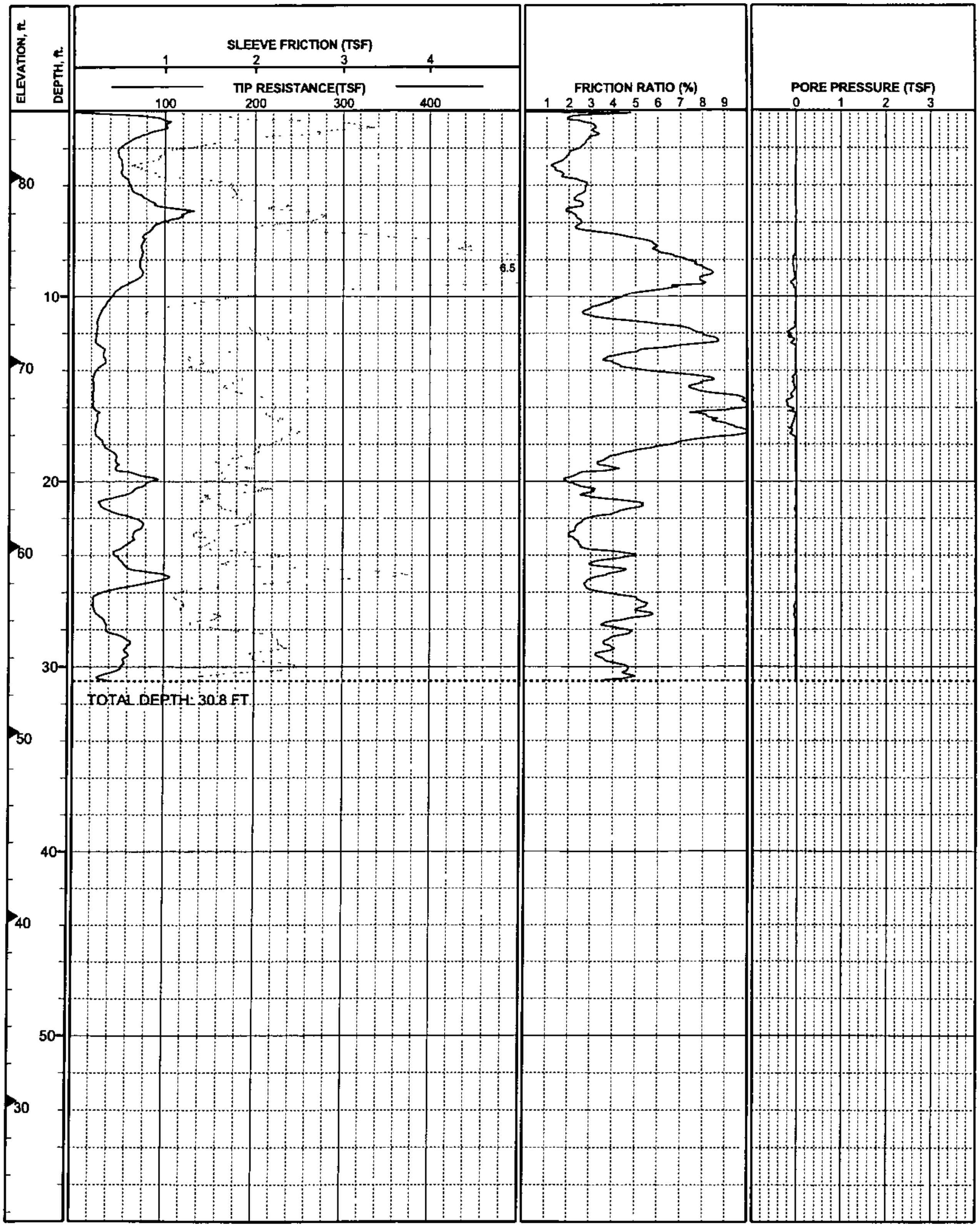
LOG OF CPT-15

Ease Campus Development

CSU Channel Islands

Report Date 10/04/99

EXPLORATION NO.: CPT-16
GROUND ELEVATION: 83.5 FT (MSL)
COORDINATES: E1685662.07 N242966.47 CA State Plane Zone 5, NAD27, feet
DEPTH TO WATER: Not Measured
VEHICLE: Fugro Geosciences
TEST DATE: 6/29/99



Location Per Plate 3

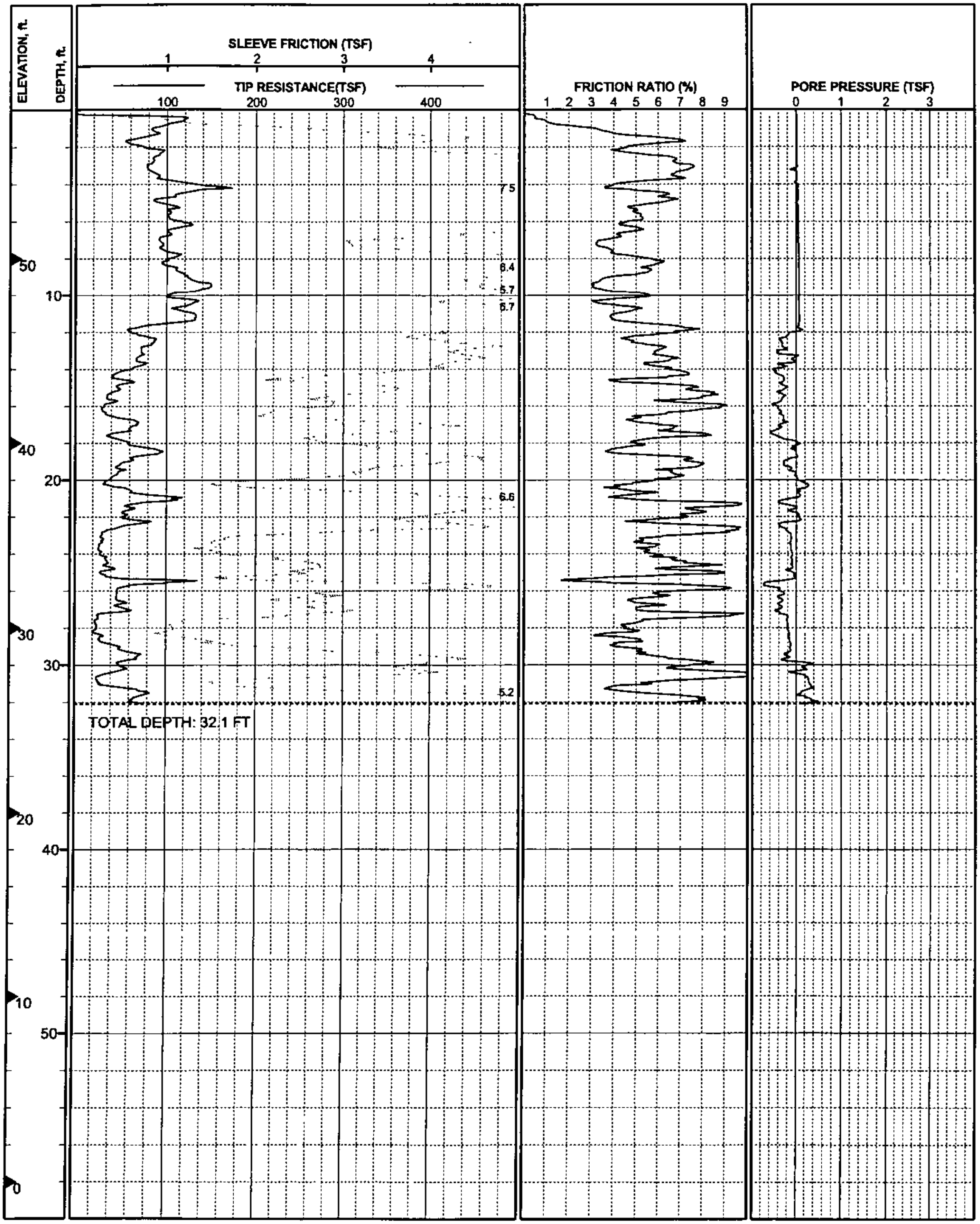
LOG OF CPT-16

Ease Campus Development

CSU Channel Islands

Report Date 10/04/99

EXPLORATION NO.: CPT-17
GROUND ELEVATION: 58 0 FT (MSL)
COORDINATES: E1685202.79 N244630 91 CA State Plane Zone 5, NAD27, feet
DEPTH TO WATER: Not Measured
VEHICLE: Fugro Geosciences
TEST DATE: 6/22/99



Location Per Plate 3

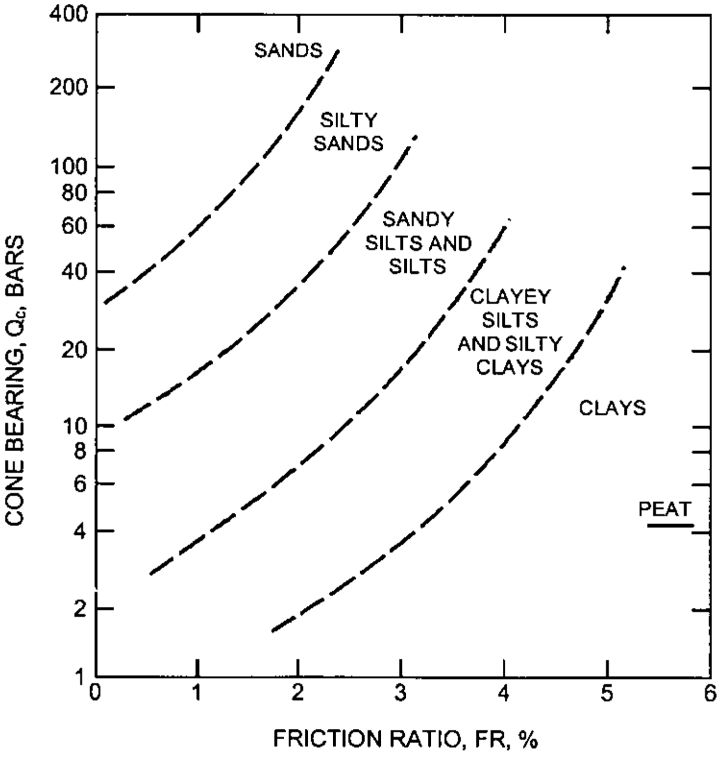
LOG OF CPT-17

Ease Campus Development

CSU Channel Islands

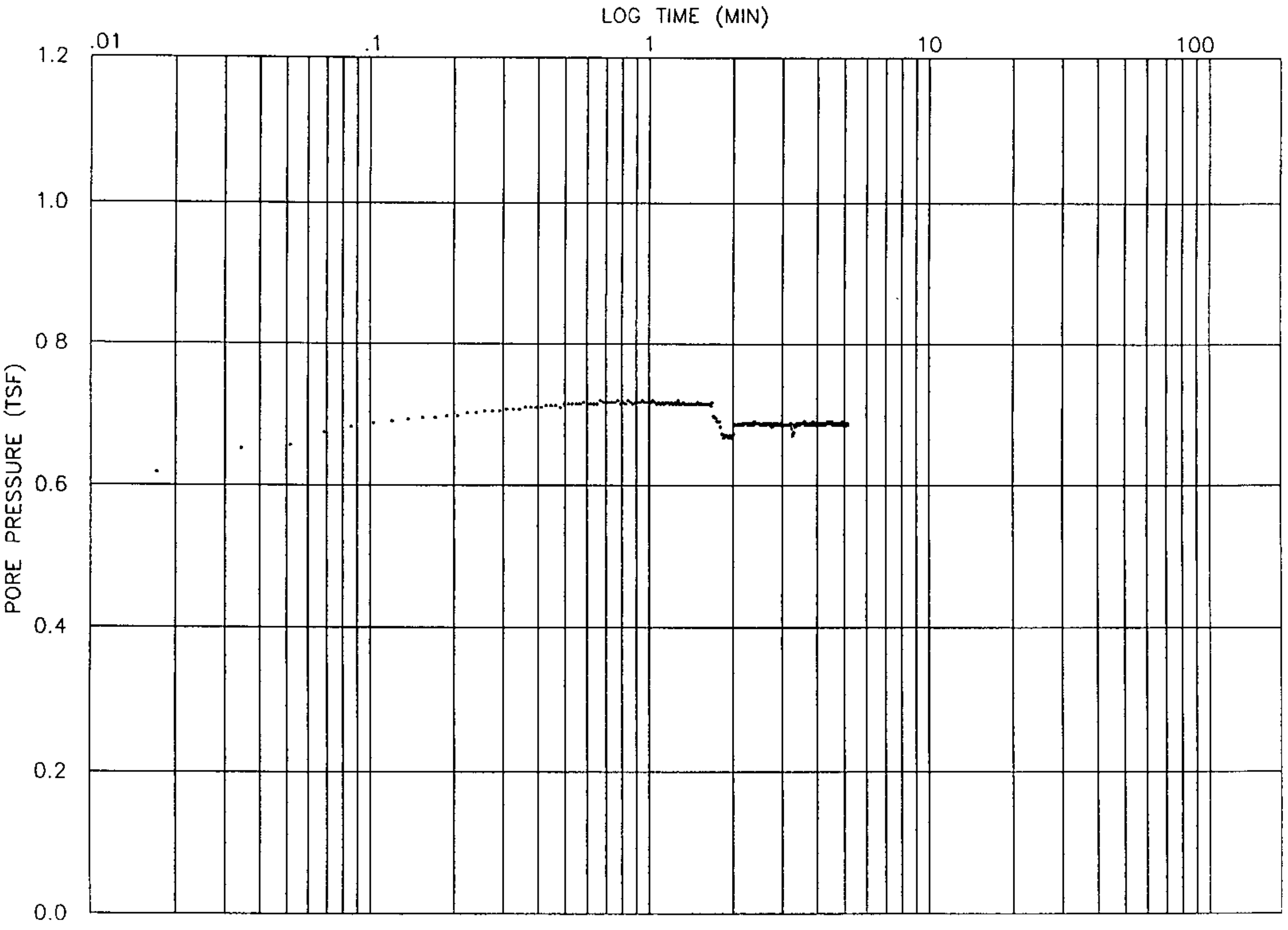
Report Date: 10/04/99

1 BAR = 100 KPA = 1.02 KG/CM^2



CAMPANELLA AND ROBERTSON CLASSIFICATION CHART

SOIL CLASSIFICATION CHART



CPT NUMBER 2
JOB NUMBER: 99-0303

DISSIPATION TEST

DEPTH 64.6 FEET
DATE. 06-22-1999

FUGRO GEOSCIENCES, INC.

DISSIPATION TEST
CSUCI East Campus Development

PLATE A-1.19

December 2000
Project No. 99-42-0384

FUGRO

LOCATION: per Plate 3

SURFACE EL: 38 ft +/- (rel. MSL datum)

ELEVATION, ft	DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLERS	SAMPLER BLOW COUNT	MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	Su, ksf PP, (TV), [uu]
			1a			**ARTIFICIAL FILL (Af)** Interlayered SAND (SP) and Lean CLAY (CL): sand is loose, tan, dry to moist; clay is medium stiff, dark brown, moist							
36	2		1		(9)								
			1A*		PUSH	* - shelby tube sample extracted from new drill hole, adjacent to DH-1	114	89	29				
34	4						123	103	19				(4.8-7.5)
			1b		(5)	**ALLUVIUM (Qal)** Lean to Fat CLAY (CL/CH): soft, dark brown to black, moist - with organic odor, below 5'							2.5
32	6		2				121	98	24				
30	8												0.5
28	10		3		(11)	Interlayered Silty to Clayey SAND (SM/SC) and Fat CLAY (CH): loose to medium stiff, tan with brown mottles, moist to wet	118	91	31				
26	12												2.0
24	14												
			4		(10)								
22	16								32	65			
20	18												
18	20		5		5				32				
16	22		6		(11)								1.5
14	24					- with 3" of flow sand on top of sample, at 23'			26				
			7		8	Interlayered Clayey SAND (SC) to Sandy CLAY (CH): loose/medium stiff, brown, wet							1-1.5
12	26								36	43	48	24	0.8
10	28												
8	30		8		13	- with angular gravel to approx. 3/4", at 30'			20	50			
6	32												
4	34												2.3
			9		11	- stiff/medium dense, at 35'							
2	36								28	55			1.5
0	38												

COMPLETION DEPTH: 51.5 ft
DEPTH TO WATER: 6 ft
BACKFILLED WITH: Native Materials
DRILLING DATE: June 29, 1999

DRILLING METHOD: Hollow Stem Auger
DRILLED BY: A+R Drilling
LOGGED BY: NDerbidge
CHECKED BY: CWockner

The log and data presented are a simplification of actual conditions encountered at the given location and time of drilling. Subsurface conditions may differ at other locations and with the passage of time

LOG OF DRILL HOLE NO. DH-1

Cal State Channel Islands, East Campus Development
Camarillo Area of Ventura County

LOCATION: per Plate 3

SURFACE EL: 38 ft +/- (rel MSL datum)

ELEVATION, ft	DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLERS	SAMPLER BLOW COUNT	MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	Su, ksf PP, (TV), [uu]
			10	☒	9	Interlayered sandy fat CLAY (CH) to clayey SAND (CH/SC): medium stiff/loose, brown, wet			27	44			
-4	42					Grades to silty SAND (SM): loose, brown, wet, with angular gravel							
-6	44												
-8	46		11	☒	45	- dense, gravel stuck in sampler shoe, at 46-1/2'							
-10	48												
-12	50		12	☒	40	- gravel stuck in sampler shoe, at 51-1/2'							
-14	52												
-16	54												
-18	56												
-20	58												
-22	60												
-24	62												
-26	64												
-28	66												
-30	68												
-32	70												
-34	72												
-36	74												
-38	76												
-40	78												

COMPLETION DEPTH: 51.5 ft
DEPTH TO WATER: 6 ft
BACKFILLED WITH: Native Materials
DRILLING DATE: June 29, 1999

DRILLING METHOD: Hollow Stem Auger
DRILLED BY: A+R Drilling
LOGGED BY: NDerbidge
CHECKED BY: CWockner

The log and data presented are a simplification of actual conditions encountered at the given location and time of drilling. Subsurface conditions may differ at other locations and with the passage of time.

LOG OF DRILL HOLE NO. DH-1

Cal State Channel Islands, East Campus Development
Camarillo Area of Ventura County

LOCATION: per Plate 3

SURFACE EL. 72 ft +/- (rel. MSL datum)

ELEVATION, ft	DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLERS	SAMPLER BLOW COUNT	MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	Su, ksf PP, (TV), [uu]
			2a			**ARTIFICIAL FILL (Af)** 3" Asphalt concrete (AC) over 8" Aggregate Base							
70	2		1		(7)	Sandy lean CLAY (CL): loose, light brown, moist	112	91	23				1 5-2.0
68	4												
66	6		2		(32)	**ALLUVIUM (Qal)** Fat CLAY (CH): very stiff, dark brown, moist	120	94	28				>4.5
64	8												
62	10		3		(15)	- stiff, light brown, at 10'	113	89	28				2.5->4.5
60	12												
58	14												
56	16		4		(44)	- very stiff, interlayered light and dark brown, at 15'	128	105	22				>4.5
54	18												
52	20		5		16	Sandy fat CLAY (CH): very stiff, light brown, moist, with few black pockets (possible organic)			24				3-4
50	22												
48	24												
46	26		5		16	Sandy lean CLAY (CL): very stiff, light brown - with 1" sand seam, at 25-1/2'			22				
44	28												
42	30		7		24	- with sand seams from 1" to 3" thick and few angular pea size gravel, at 30' - pieces of gravel stuck in sampler shoe, at 30'			24				3-3.5
40	32												
38	34												
36	36		8		17 ▼				22				3-3 5
34	38												

COMPLETION DEPTH: 51.5 ft
DEPTH TO WATER: 36 ft
BACKFILLED WITH: Native Materials
DRILLING DATE: June 29, 1999

DRILLING METHOD: Hollow Stem Auger
DRILLED BY: A+R Drilling
LOGGED BY: NDerbidge
CHECKED BY: CWockner

The log and data presented are a simplification of actual conditions encountered at the given location and time of drilling. Subsurface conditions may differ at other locations and with the passage of time

LOG OF DRILL HOLE NO. DH-2

Cal State Channel Islands, East Campus Development
Camarillo Area of Ventura County

GEOT(90381/DH-02)\\(12/13/00/03:47PM)REB

PLATE A-2.2a

LOCATION: per Plate 3

SURFACE EL: 72 ft +/- (rel. MSL datum)

ELEVATION, ft	DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLERS	SAMPLER BLOW COUNT	MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	Su, ksf PP, (TV), [uu]
		▨	9	☒	13	- brown, wet, with few angular pea size gravel, at 40'			21	53			
30	42	▨											
28	44	▨											
26	46	▨	10	☒	10	Sandy CLAY (CL): stiff, brown, wet, with angular gravel to approx. 1", with seams and layers of sand - flowing sand and gravel observed between down-hole hammer and auger, at 45'							3.0
24	48	▨											
22	50	▨	11	☒	18	- top 4" of sampler filled with flow sands that flowed into sampler prior to sampling, at 50' - piece of 1" gravel stuck in sampler shoe, at 51.5							1.5
20	52												
18	54												
16	56												
14	58												
12	60												
10	62												
8	64												
6	66												
4	68												
2	70												
0	72												
-2	74												
-4	76												
-6	78												

COMPLETION DEPTH: 51.5 ft
DEPTH TO WATER: 36 ft
BACKFILLED WITH: Native Materials
DRILLING DATE: June 29, 1999

DRILLING METHOD: Hollow Stem Auger
DRILLED BY: A+R Drilling
LOGGED BY: NDerbidge
CHECKED BY: CWockner

The log and data presented are a simplification of actual conditions encountered at the given location and time of drilling. Subsurface conditions may differ at other locations and with the passage of time

LOG OF DRILL HOLE NO. DH-2

Cal State Channel Islands, East Campus Development
Camarillo Area of Ventura County

LOCATION. per Plate 3

SURFACE EL: 125 ft +/- (rel MSL datum)

ELEVATION, ft	DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO	SAMPLERS	SAMPLER BLOW COUNT	MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	Su, ksf PP, (TV), [uu]
124		▨	3a	▩		**ARTIFICIAL FILL (Af)** Lean CLAY (CL): medium stiff, brown, dry to moist, with roots to approx. 1/16"							
	2		1	▩	(7)								
122													
							91	78	16				>4.5
	4												
120													
		⁘	2	▒	(30)	**ALLUVIUM (Qal)** Silty fine SAND (SM): dense, brown, moist, with angular gravel to approx. 1"							
	6						112	101	11	21			
118													
	8												
116													
	10	▨	3	▒	(19)	Lean CLAY (CL): brown, moist - very stiff, at 10'							
114							112	92	22				
	12												>4 5
112													
	14												
110			4	▒	(18)	- with few pieces of angular gravel to approx. 1/2", at 15'							
	16						124	104	20				>4.5
108													
	18												
106													
	20		5	☒	30	- very stiff, angular gravel stuck in sampler shoe, at 20'							
104									14				>4.5
	22												
102													
	24												
100			6	☒	8	- medium stiff, at 25'							
	26								24				2.5-3
98													
	28												
96													
	30		7	☒	20	- very stiff, with few angular gravel to 1", at 30'							
94									22				>4.5
	32												
92													
	34												
90													
	36												
88													
	38												
86													

COMPLETION DEPTH: 31.5 ft
DEPTH TO WATER: Not Encountered
BACKFILLED WITH: Native Materials
DRILLING DATE: June 28, 1999

DRILLING METHOD: Hollow Stem Auger
DRILLED BY: A+R Drilling
LOGGED BY: NDerbidge
CHECKED BY: CWockner

The log and data presented are a simplification of actual conditions encountered at the given location and time of drilling Subsurface conditions may differ at other locations and with the passage of time

LOG OF DRILL HOLE NO. DH-3

Cal State Channel Islands, East Campus Development
Camarillo Area of Ventura County

PLATE A-2.3

LOCATION: per Plate 3

SURFACE EL: 166 ft +/- (rel. MSL datum)

ELEVATION, ft	DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO	SAMPLERS	SAMPLER BLOW COUNT	MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	Su, ksf PP, (TV), [uu]
			4a	☒		**ARTIFICIAL FILL (Af)** Sandy lean CLAY (CL): stiff, dry to moist, light brown, with gravel to approx. 3/4" and few roots to approx. 1/16"							
164	2		1	▨	(20)								
162	4			☒			110	98	12				>4.5
160	6		2	⬚	(24)	- stiff, angular gravel to approx. 1" stuck in sampler shoe, at 6-1/2'	102	89	15	68			>4 5
158	8												
156	10		3	⬚	(38)	**ALLUVIUM (Qal)** Lean CLAY (CL): very stiff, moist, light brown to brown	127	110	15				>4.5
154	12												
152	14												
150	16		4	☒	22	- very stiff, at 15'			14				>4.5
148	18												
146	20		5	☒	13	- stiff, at 20'			15				
144	22												
142	24												
140	26		6	☒	20	Silty SAND (SM): medium dense, brown, moist, with gravel to approx. 1"			8				
138	28												
136	30		7	☒	8	- loose, at 30'			14	26			
134	32												
132	34												
130	36		8	☒	18	- interlayered with medium dense clayey SAND (SM/SC) with angular gravel to approx. 1/2", at 35'			10	20			
128	38												

COMPLETION DEPTH: 51.5 ft
DEPTH TO WATER: Not Encountered
BACKFILLED WITH: Native Materials
DRILLING DATE: June 28, 1999

DRILLING METHOD: Hollow Stem Auger
DRILLED BY: A+R Drilling
LOGGED BY: NDerbidge
CHECKED BY: CWockner

The log and data presented are a simplification of actual conditions encountered at the given location and time of drilling. Subsurface conditions may differ at other locations and with the passage of time.

LOG OF DRILL HOLE NO. DH-4

Cal State Channel Islands, East Campus Development
Camarillo Area of Ventura County

LOCATION: per Plate 3

SURFACE EL: 166 ft +/- (rel. MSL datum)

ELEVATION, ft	DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLERS	SAMPLER BLOW COUNT	MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	Su, ksf PP, (TV), [uu]
		▨	9	☒	15	Fat to lean CLAY (CH/CL): dark yellowish brown, very stiff - interlayered with sand, lean clay, at 40'			23	58			
124	42	▨											
122	44	▨											
		▨	10	☒	7	- lean, medium stiff, at 45'			25				
120	46	▨											
118	48	▨											
116	50	▨	11	☒	18	- lean, very stiff, at 50'			19				
114	52												
112	54												
110	56												
108	58												
106	60												
104	62												
102	64												
100	66												
98	68												
96	70												
94	72												
92	74												
90	76												
88	78												

COMPLETION DEPTH: 51.5 ft
DEPTH TO WATER: Not Encountered
BACKFILLED WITH: Native Materials
DRILLING DATE: June 28, 1999

DRILLING METHOD: Hollow Stem Auger
DRILLED BY: A+R Drilling
LOGGED BY: NDerbidge
CHECKED BY: CWockner

The log and data presented are a simplification of actual conditions encountered at the given location and time of drilling. Subsurface conditions may differ at other locations and with the passage of time.

LOG OF DRILL HOLE NO. DH-4

Cal State Channel Islands, East Campus Development
Camarillo Area of Ventura County

LOCATION: per Plate 3

SURFACE EL: 118 ft +/- (rel. MSL datum)

ELEVATION, ft	DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLERS	SAMPLER BLOW COUNT	MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	Su, ksf PP, (TV), [uu]
116	2		5a 1		(12)	**ALLUVIUM (Qal)** Fat CLAY (CH): medium stiff, dark brown, moist, with roots to 1/16"							
114	4						93	79	17				>4.5
112	6		2		(22)	- stiff, mottled light and dark brown, at 5'	116	93	25				>4.5
110	8												
108	10		3		(24)	- stiff, with few organic pockets to 1/8", at 10'	111	86	29				>4 5
106	12												
104	14												
102	16		4		(69)	- hard, with few caliche veins, at 15' to 20'							>4.5
100	18												
98	20		5		18	- very stiff, at 20'			29				3 0
96	22												
94	24												
92	26		6		19	- with few pea size gravel, at 25'			18				4 5
90	28												
88	30		7		30				22				>4 5
86	32												
84	34												
82	36		8		15	Lean CLAY (CL) with sand: stiff, reddish brown, moist			26				2.0
80	38												

COMPLETION DEPTH: 51.5 ft
DEPTH TO WATER: Not Encountered
BACKFILLED WITH: Native Materials
DRILLING DATE: June 29, 1999

DRILLING METHOD: Hollow Stem Auger
DRILLED BY: A+R Drilling
LOGGED BY: NDerbidge
CHECKED BY: CWockner

The log and data presented are a simplification of actual conditions encountered at the given location and time of drilling. Subsurface conditions may differ at other locations and with the passage of time

LOG OF DRILL HOLE NO. DH-5

Cal State Channel Islands, East Campus Development
Camarillo Area of Ventura County

LOCATION: per Plate 3

SURFACE EL: 118 ft +/- (rel. MSL datum)

ELEVATION, ft	DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLERS	SAMPLER BLOW COUNT	MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	Su, ksf PP, (TV), [uu]
		▨	9	☒	19	Lean CLAY (CL) with sand interlayered with fat CLAY (CH): very stiff, light brown, moist			31				>4.5
76	42	▨											
74	44	▨											
		▨	10	☒	20								
72	46	▨											
70	48	▨											
68	50	▨	11	☒	36	- hard, at 50'							>4.5
66	52												
64	54												
62	56												
60	58												
58	60												
56	62												
54	64												
52	66												
50	68												
48	70												
46	72												
44	74												
42	76												
40	78												

COMPLETION DEPTH: 51.5 ft
DEPTH TO WATER: Not Encountered
BACKFILLED WITH: Native Materials
DRILLING DATE: June 29, 1999

DRILLING METHOD: Hollow Stem Auger
DRILLED BY: A+R Drilling
LOGGED BY: NDerbidge
CHECKED BY: CWockner

The log and data presented are a simplification of actual conditions encountered at the given location and time of drilling. Subsurface conditions may differ at other locations and with the passage of time.

LOG OF DRILL HOLE NO. DH-5
Cal State Channel Islands, East Campus Development
Camarillo Area of Ventura County

GEOT(90381/DH-05)\\(12/13/00/03 47PM)REB

PLATE A-2.5b

LOCATION: per Plate 3

SURFACE EL: 132 ft +/- (rel. MSL datum)

ELEVATION, ft	DEPTH, ft
130	2
128	4
126	6
124	8
122	10
120	12
118	14
116	16
114	18
112	20
110	22
108	24
106	26
104	28
102	30
100	32
98	34
96	36
94	38

SAMPLE NO.	SAMPLER BLOW COUNT	MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	Su, ksf PP, (TV), [uu]
		ARTIFICIAL FILL (Af) Sandy fat CLAY (CH) to sandy SILT (ML): stiff to medium dense, brown, dry to moist, with angular pea-size gravel							
6a 1	(16)		98	89	11				>4.5
2	(25)	- stiff to medium dense, at 5'	114	97	18				
		ALLUVIUM (Qal) Lean CLAY (CL) to sandy SILT (ML): very stiff to dense, light brown, moist, with few gravel to 1"							
3	(32)		128	106	20				
4	(29)	- sandy silt layer, at 15'	121	100	21	70			3.0
5	22	- driller notes gravel at 20' to 25'			20				>4 5
6	18	Interlayered clayey SAND (SC) and sandy CLAY (CL): medium dense to stiff, light to dark brown, moist, with angular pea-size gravel			16	28			>4 5
7	34	- dense to hard, abundant angular pea size gravel			10				

COMPLETION DEPTH: 31.5 ft
DEPTH TO WATER: Not Encountered
BACKFILLED WITH: Native Materials
DRILLING DATE: June 28, 1999

DRILLING METHOD: Hollow Stem Auger
DRILLED BY: A+R Drilling
LOGGED BY: NDerbidge
CHECKED BY: CWockner

The log and data presented are a simplification of actual conditions encountered at the given location and time of drilling. Subsurface conditions may differ at other locations and with the passage of time

LOG OF DRILL HOLE NO. DH-6

Cal State Channel Islands, East Campus Development
Camarillo Area of Ventura County

LOCATION: per Plate 3

SURFACE EL: 131 ft +/- (rel. MSL datum)

ELEVATION, ft	DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLERS	SAMPLER BLOW COUNT	MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	Su, ksf PP, (TV), [uu]
130			7a			**ALLUVIUM (Qal)** Fat CLAY (CH): very stiff to stiff, brown, dry to moist, with few angular pea size gravel							
	2		1		(35)								
128							112	95	17				>4.5
	4												
126													
			2		(21)	- stiff, at 5'							
	6					Silty SAND (SM): medium dense, brown, moist, with few pea gravel	122	103	19	33			
124													
	8												
122													
	10		3		(30)	Lean CLAY (CL): very stiff, dark brown, moist, with seams of sand and angular gravel							
120							118	98	21				
	12												
118													
	14												
116			4		(44)								
	16						129	105	23				
114													
	18												
112													
	20		5		19	- with sand, at 20'							
110									24				4.0
	22												
108													
	24												
106			6		(39)								
	26						123	98	25				>4 5
104													
	28												
102													
	30		7		40								
100						- hard, at 31'			23				>4 5
	32												
98													
	34												
96			8		(31: 1")	**CONEJO VOLCANICS (Tcv)** BASALT (Rx): yellowish brown, highly weathered, blocky - refusal for sampling, at 35' - hard drilling, at 37'							
	36												
94													
	38												
92													
	40		9		(50: 1")								
90													

COMPLETION DEPTH: 40.5 ft
DEPTH TO WATER: Not Encountered
BACKFILLED WITH: Native Materials
DRILLING DATE: June 29, 1999

DRILLING METHOD: Hollow Stem Auger
DRILLED BY: A + R Drilling
LOGGED BY: NDerbidge
CHECKED BY: CWockner

The log and data presented are a simplification of actual conditions encountered at the given location and time of drilling. Subsurface conditions may differ at other locations and with the passage of time

LOG OF DRILL HOLE NO. DH-7

Cal State Channel Islands, East Campus Development
Camarillo Area of Ventura County

LOCATION: per Plate 3

SURFACE EL: 131 ft +/- (rel. MSL datum)

ELEVATION, ft	DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLERS	SAMPLER BLOW COUNT	MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	Su, ksf PP, (TV), [uu]
90			9		(50: 1")	BASALT (Rx)							
88	42												
86	44												
84	46												
82	48												
80	50												
78	52												
76	54												
74	56												
72	58												
70	60												
68	62												
66	64												
64	66												
62	68												
60	70												
58	72												
56	74												
54	76												
52	78												

COMPLETION DEPTH: 40.5 ft
DEPTH TO WATER: Not Encountered
BACKFILLED WITH: Native Materials
DRILLING DATE: June 29, 1999

DRILLING METHOD: Hollow Stem Auger
DRILLED BY: A+R Drilling
LOGGED BY: NDerbidge
CHECKED BY: CWockner

The log and data presented are a simplification of actual conditions encountered at the given location and time of drilling. Subsurface conditions may differ at other locations and with the passage of time

LOG OF DRILL HOLE NO. DH-7

Cal State Channel Islands, East Campus Development
Camarillo Area of Ventura County

LOCATION. per Plate 3

SURFACE EL. 96 ft +/- (rel MSL datum)

ELEVATION, ft	DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLERS	SAMPLER BLOW COUNT	MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	Su, ksf PP, (TV), [uu]
						ALLUVIUM (Qal)							
94	2		8 1		(9)	Fat CLAY (CH): medium stiff, moist, brown, with roots to 1/8" to approx. 3'	104	86	21				2.5
92	4												
90	6		2		(11)		110	89	24				2.5
88	8												
86	10		3		(5)	- with few angular pea-size gravel, at 10'	125	109	15				2.8
84	12												
82	14												
80	16		4		(19)	Silty fine SAND (SM): medium dense, light brown, moist, with angular shale gravel to approx. 3/4"	103	87	18				
78	18												
76	20		5		(18)		115	90	29	46			3.5
74	22					Lean CLAY (CL): stiff, moist, brown, with angular pea size gravel							
72	24												
70	26		6		(44)	- hard, at 25'	121	98	24				>4.5
68	28												
66	30		7		(34)	- very stiff, more silty, at 30'	124	100	23				>4.5
64	32												
62	34												
60	36												
58	38												

COMPLETION DEPTH: 31.5 ft
DEPTH TO WATER: Not Encountered
BACKFILLED WITH: Native Materials
DRILLING DATE: June 28, 1999

DRILLING METHOD: Hollow Stem Auger
DRILLED BY: A+R Drilling
LOGGED BY: NDerbidge
CHECKED BY: CWockner

The log and data presented are a simplification of actual conditions encountered at the given location and time of drilling. Subsurface conditions may differ at other locations and with the passage of time

LOG OF DRILL HOLE NO. DH-8

Cal State Channel Islands, East Campus Development
Camarillo Area of Ventura County

LOCATION: per Plate 3

SURFACE EL: 33 ft +/- (rel. MSL datum)

SAMPLE NO.	SAMPLER BLOW COUNT	MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	Su, ksf PP, (TV), [uu]
		ALLUVIUM (Qal) Silty SAND (SM): light gray, brown, moist							
1	(31)	Lean to fat CLAY (CL/CH): very stiff, dark to light brown, moist	127	105	21				
2	(13)	Lean CLAY (CL): stiff to very stiff, reddish brown, moist, with few gravel to 3/8"	118	94	25				
3	(19)								
4	(40)								

COMPLETION DEPTH: 21.5 ft
DEPTH TO WATER: 13.5 ft
BACKFILLED WITH: Cuttings
DRILLING DATE: August 4, 1999

DRILLING METHOD: Hollow Stem Auger
DRILLED BY: A+R Drilling
LOGGED BY: NDerbidge
CHECKED BY: CWockner

The log and data presented are a simplification of actual conditions encountered at the given location and time of drilling. Subsurface conditions may differ at other locations and with the passage of time.

LOG OF DRILL HOLE NO. DH-101

Cal State Channel Islands, East Campus Development
Camarillo Area of Ventura County

LOCATION: per Plate 3

SURFACE EL. 27 ft +/- (rel. MSL datum)

ELEVATION, ft	DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLERS	SAMPLER BLOW COUNT	MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	Su, ksf PP, (TV), [uu]
26	2	▨	2a	☒		**ALLUVIUM (Qal)** Lean CLAY (CL): stiff, light gray brown, dry to 5-1/2', with some sand							
24	4	▨											
22	6	▨	1	⁝	(17)	- moist, light brown to dark brown, below 5.5'							
20	8	▨											
18	10	▨		●	(9) ▽	- layer of Silty fine SAND (SM),from 10' to 11' - wet, at 10'							
16	12	▨											
14	14	▨											
12	16	▨	2	⁝	(7)	Fat CLAY (CH): medium stiff, blue-gray, wet - Note: flowing sand on top of sample							
10	18		3	▮	PUSH								
8	20												
6	22												
4	24												
2	26												
0	28												
-2	30												
-4	32												
-6	34												
-8	36												
-10	38												
-12													

COMPLETION DEPTH: 19 ft
DEPTH TO WATER: 10 ft
BACKFILLED WITH: Cuttings
DRILLING DATE: August 4, 1999

DRILLING METHOD: Hollow Stem Auger
DRILLED BY: A+R Drilling
LOGGED BY: NDerbidge
CHECKED BY: CWockner

The log and data presented are a simplification of actual conditions encountered at the given location and time of drilling. Subsurface conditions may differ at other locations and with the passage of time

LOG OF DRILL HOLE NO. DH-102

Cal State Channel Islands, East Campus Development
Camarillo Area of Ventura County

LOCATION: per Plate 3

SURFACE EL: 33 ft +/- (rel MSL datum)

ELEVATION, ft	DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLERS	SAMPLER BLOW COUNT	MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	Su, ksf PP, (TV), [uu]
32						**ALLUVIUM (Qal)** Lean CLAY (CL): brown, dry to 3' then moist, with pea size gravel							
	2												
30													
	4												
28													
			1		(11)	Interlayered Lean CLAY (CL) and Silty SAND to SAND (SM/SP): loose to medium stiff, clay is brown, moist							
	6						109	83	31				
26													
	8												
24													
	10		2		(?)								
22									29	37			
	12					- Silty SAND layer, from 10' to 11.5'							
			3		PUSH								
20						- with gravel, at 13'							
	14					- very difficult drilling, below 14'							
18													
	16												
16			4		Ref/3"	**CONEJO VOLCANICS (Tcvb)**							
	18												
14													
	20												
12													
	22												
10													
	24												
8													
	26												
6													
	28												
4													
	30												
2													
	32												
0													
	34												
-2													
	36												
-4													
	38												
-6													

COMPLETION DEPTH: 16.25 ft
DEPTH TO WATER: Not Encountered
BACKFILLED WITH: Cuttings
DRILLING DATE: August 4, 1999

DRILLING METHOD: Hollow Stem Auger
DRILLED BY: A+R Drilling
LOGGED BY: NDerbidge
CHECKED BY: CWockner

The log and data presented are a simplification of actual conditions encountered at the given location and time of drilling. Subsurface conditions may differ at other locations and with the passage of time.

LOG OF DRILL HOLE NO. DH-103

Cal State Channel Islands, East Campus Development
Camarillo Area of Ventura County

LOCATION: per Plate 3

SURFACE EL: 31 ft +/- (rel. MSL datum)

ELEVATION, ft	DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLERS	SAMPLER BLOW COUNT	MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	Su, ksf PP, [TV], (uu)
30 28 26	2 4					**ALLUVIUM (Qal)** Silty SAND (SM): loose, light gray brown, dry to approx. 3' then moist							
24 22	6 8		1	▨	(15)	SAND (SP) to SAND with SILT (SP-SM): loose to medium dense, very light yellowish gray, moist	97	93	5				
20	10			●	(12)				25	10			
18	12			●	(7)								
16	14 16		2	▨	(12)	- wet, at 15'							
14 12	18												
10	20		3	▨	(20)					10			
8 6 4 2 0 -2 -4 -6 -8	22 24 26 28 30 32 34 36 38					Hole caved to 12' at completion of drilling; no water measured above 12'							

COMPLETION DEPTH: 21.5 ft
DEPTH TO WATER: Not Measured
BACKFILLED WITH: Cuttings
DRILLING DATE: August 4, 1999

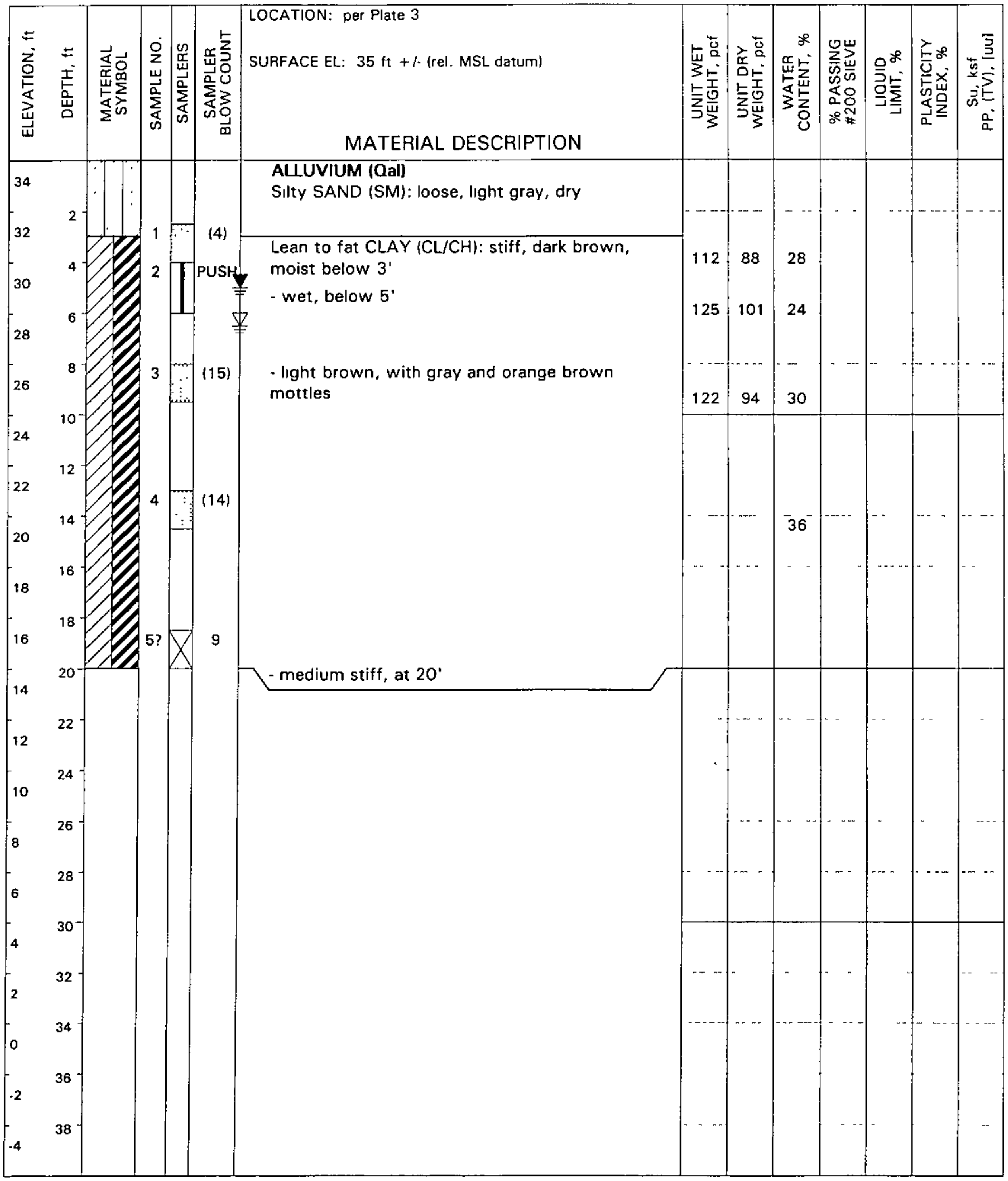
DRILLING METHOD: Hollow Stem Auger
DRILLED BY: A+R Drilling
LOGGED BY: NDerbidge
CHECKED BY: CWockner

The log and data presented are a simplification of actual conditions encountered at the given location and time of drilling. Subsurface conditions may differ at other locations and with the passage of time

LOG OF DRILL HOLE NO. DH-104
Cal State Channel Islands, East Campus Development
Camarillo Area of Ventura County

LOCATION: per Plate 3

SURFACE EL: 35 ft +/- (rel. MSL datum)



SAMPLE NO.	SAMPLER BLOW COUNT	MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	Su, ksf PP, (TV), [uu]
		ALLUVIUM (Qal) Silty SAND (SM): loose, light gray, dry							
1	(4)	Lean to fat CLAY (CL/CH): stiff, dark brown, moist below 3'	112	88	28				
2	PUSH	- wet, below 5'	125	101	24				
3	(15)	- light brown, with gray and orange brown mottles	122	94	30				
4	(14)				36				
5?	9								
		- medium stiff, at 20'							

COMPLETION DEPTH: 20 ft
DEPTH TO WATER: 5 ft
BACKFILLED WITH: Cuttings
DRILLING DATE: August 4, 1999

DRILLING METHOD: Hollow Stem Auger
DRILLED BY: A+R Drilling
LOGGED BY: NDerbidge
CHECKED BY: CWockner

The log and data presented are a simplification of actual conditions encountered at the given location and time of drilling. Subsurface conditions may differ at other locations and with the passage of time.

LOG OF DRILL HOLE NO. DH-105

Cal State Channel Islands, East Campus Development
Camarillo Area of Ventura County

LOCATION: per Plate 3

SURFACE EL: 37 ft +/- (rel. MSL datum)

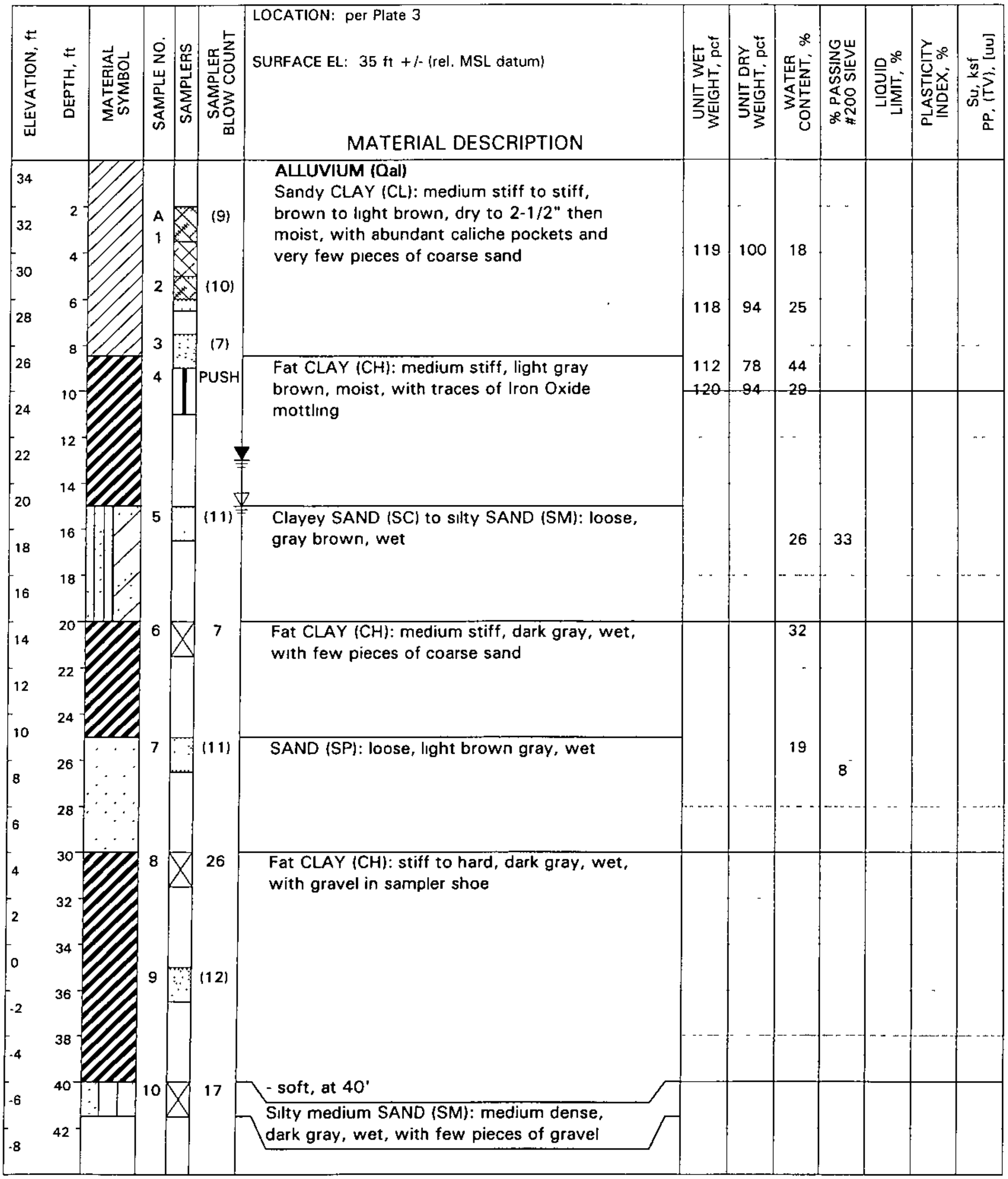
ELEVATION, ft	DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLERS	SAMPLER BLOW COUNT	MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	Su, ksf PP, (TV), [uu]
			1		(15)	**ALLUVIUM (Qal)** Silty SAND (SM): loose, light brown gray, dry to 3'							
						Lean CLAY (CL): medium stiff to stiff, dark brown, moist, with some sand and roots to 1/8"	127	107	19				
			2		(7)		128	106	21				
			3		PUSH	Sandy CLAY (CL): medium stiff to stiff, light brown, wet	135	114	18				
			4		(8)	- grades to Fat CLAY (CH), medium stiff, brown, wet, at 12'			36				
			5		8	- with a few pieces of coarse sand, at 16'							
			6		(9)								

COMPLETION DEPTH: 21.5 ft
DEPTH TO WATER: 6 ft
BACKFILLED WITH: Cuttings
DRILLING DATE: August 4, 1999

DRILLING METHOD: Hollow Stem Auger
DRILLED BY: A+R Drilling
LOGGED BY: NDerbidge
CHECKED BY: CWockner

The log and data presented are a simplification of actual conditions encountered at the given location and time of drilling. Subsurface conditions may differ at other locations and with the passage of time.

LOG OF DRILL HOLE NO. DH-106
Cal State Channel Islands, East Campus Development
Camarillo Area of Ventura County



LOCATION: per Plate 3

SURFACE EL: 35 ft +/- (rel. MSL datum)

SAMPLE NO.	SAMPLER BLOW COUNT	MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	Su, ksf PP, (TV), [uu]
A 1	(9)	**ALLUVIUM (Qal)** Sandy CLAY (CL): medium stiff to stiff, brown to light brown, dry to 2-1/2" then moist, with abundant caliche pockets and very few pieces of coarse sand	119	100	18				
2	(10)		118	94	25				
3	(7)								
4	PUSH	Fat CLAY (CH): medium stiff, light gray brown, moist, with traces of Iron Oxide mottling	112 ~~120~~	78 ~~94~~	44 ~~29~~				
5	(11)	Clayey SAND (SC) to silty SAND (SM): loose, gray brown, wet			26	33			
6	7	Fat CLAY (CH): medium stiff, dark gray, wet, with few pieces of coarse sand			32				
7	(11)	SAND (SP): loose, light brown gray, wet			19	8			
8	26	Fat CLAY (CH): stiff to hard, dark gray, wet, with gravel in sampler shoe							
9	(12)								
10	17	- soft, at 40' Silty medium SAND (SM): medium dense, dark gray, wet, with few pieces of gravel							

COMPLETION DEPTH: 41.5 ft
DEPTH TO WATER: 15 ft
BACKFILLED WITH: Cuttings
DRILLING DATE: August 4, 1999

DRILLING METHOD: Hollow Stem Auger
DRILLED BY: A+R Drilling
LOGGED BY: NDerbidge
CHECKED BY: CWockner

The log and data presented are a simplification of actual conditions encountered at the given location and time of drilling. Subsurface conditions may differ at other locations and with the passage of time.

LOG OF DRILL HOLE NO. DH-107

Cal State Channel Islands, East Campus Development
Camarillo Area of Ventura County

LOCATION per Plate 3

SURFACE EL 55 0 ft +/- (rel MSL datum)

ELEVATION, ft	DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLERS	SAMPLER BLOW COUNT	MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	Su, ksf PP, (TV), [uu]
54			1			6" Asphalt concrete pavement, over 5" of deteriorated asphalt concrete (no base)							
	2					**ARTIFICIAL FILL (Af)**							
52			2		(23)	Sandy Lean CLAY (CL) medium stiff, dark brown to brown, moist, some gravel							
	4					**ALLUVIUM (Qal)**	117	101	16				
50			3		(24)	Clayey SAND with gravel (SC): dense, moderate brown, moist - more sand, at 5'							
	6						132	115	15				
48													
	8												
46			4		(10)	Sandy Lean CLAY (CL): medium stiff, moderate brown, moist, with thin lenses of Silty SAND (SM)							
	10												
44													
	12												
42													
	14												
40													
	16												
38													
	18												
36													
	20												
34													
	22												
32													
	24												
30													
	26												
28													
	28												
26													
	30												
24													
	32												
22													
	34												
20													
	36												
18													
	38												
16													

COMPLETION DEPTH: 10.5 ft
DEPTH TO WATER: Not Encountered
BACKFILLED WITH: Native Materials
DRILLING DATE: August 7, 2000

The log and data presented are a simplification of actual conditions encountered at the time of drilling at the drilled location Subsurface conditions may differ at other locations and with the passage of time

DRILLING METHOD: 8-in. dia. Hollow Stem Auger
HAMMER TYPE: Automatic Trip
DRILLED BY: A & R Drilling
LOGGED BY: CWelke
CHECKED BY: CAWockner

LOG OF DRILL HOLE NO. DH-201

Cal State Channel Islands, East Campus Development
Camarillo Area of Ventura County

LOCATION: per Plate 3

SURFACE EL 62.0 ft +/- (rel MSL datum)

ELEVATION, ft	DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLERS	SAMPLER BLOW COUNT	MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	Su, ksf PP, (TV), [uu]
						5" Asphalt concrete pavement							
			1			**ARTIFICIAL FILL (Af)** Silty SAND (SM): loose, light brown, damp to moist, some gravel							
60	2												
			2		(9)								
58	4												
			3		(7)	- moist, at 5'							
56	6												
54	8												
			4		(28)	**ALLUVIUM (Qal)** Sandy Lean CLAY (CL): very stiff, moderate brown, moist, weak caliche							
52	10												>4 5
50	12												
48	14												
46	16												
44	18												
42	20												
40	22												
38	24												
36	26												
34	28												
32	30												
30	32												
28	34												
26	36												
24	38												

COMPLETION DEPTH: 10.5 ft
DEPTH TO WATER: Not Encountered
BACKFILLED WITH: Native Materials
DRILLING DATE: August 8, 2000

DRILLING METHOD: 8-in. dia. Hollow Stem Auger
HAMMER TYPE: Automatic Trip
DRILLED BY: A & R Drilling
LOGGED BY: CWelke
CHECKED BY: CAWockner

LOG OF DRILL HOLE NO. DH-202

Cal State Channel Islands, East Campus Development
Camarillo Area of Ventura County

PLATE A-2.17

LOCATION. per Plate 3

SURFACE EL 73.0 ft +/- (rel MSL datum)

ELEVATION, ft	DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLERS	SAMPLER BLOW COUNT	MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	Su, ksf PP, (TV), [uu]
						5" Asphalt concrete pavement							
72			1	☒		**ARTIFICIAL FILL (Af)** Clayey SAND (SC): moderate brown, slightly moist, some gravel							
	2												
70			2	▒	(14)								
	4					**ALLUVIUM (Qal)** Sandy Lean CLAY (CL): stiff to very stiff, light brown, damp, some gravel, slight caliche	119	104	14				>4.5
68			3	▒	(35)								
	6												
66						Clayey SAND with gravel (SC): dense, light brown, damp							
	8												
64			4	▒	(37)	- lenses of Lean CLAY (CL), at 9'							
	10												
62													
	12												
60													
	14												
58													
	16												
56													
	18												
54													
	20												
52													
	22												
50													
	24												
48													
	26												
46													
	28												
44													
	30												
42													
	32												
40													
	34												
38													
	36												
36													
	38												
34													

COMPLETION DEPTH: 10.5 ft
DEPTH TO WATER: Not Encountered
BACKFILLED WITH: Native Materials
DRILLING DATE: August 7, 2000

The log and data presented are a simplification of actual conditions encountered at the time of drilling at the drilled location Subsurface conditions may differ at other locations and with the passage of time

DRILLING METHOD: 8-in. dia. Hollow Stem Auger
HAMMER TYPE: Automatic Trip
DRILLED BY: A & R Drilling
LOGGED BY: CWelke
CHECKED BY: CAWockner

LOG OF DRILL HOLE NO. DH-203

Cal State Channel Islands, East Campus Development
Camarillo Area of Ventura County

LOCATION: per Plate 3

SURFACE EL: 90.0 ft +/- (rel MSL datum)

ELEVATION, ft	DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLERS	SAMPLER BLOW COUNT	MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	Su, ksf PP, (TV), [uu]
						3 5" Asphalt concrete pavement							
			1	☒		**ALLUVIUM (Qal)** Sandy Lean CLAY (CL): stiff to very stiff, moderate brown, damp, trace to some gravel, trace caliche							
88	2												>4.5
			2	▨	(12)								
86	4												
			3	▨	(33)		109	95	15				>4 5
84	6												
82	8												
			4	▨	(16)								>4 5
80	10												
78	12												
76	14												
74	16												
72	18												
70	20												
68	22												
66	24												
64	26												
62	28												
60	30												
58	32												
56	34												
54	36												
52	38												

COMPLETION DEPTH: 10.5 ft
DEPTH TO WATER Not Encountered
BACKFILLED WITH: Native Materials
DRILLING DATE: August 7, 2000

DRILLING METHOD: 8-in. dia. Hollow Stem Auger
HAMMER TYPE: Automatic Trip
DRILLED BY: A & R Drilling
LOGGED BY: CWelke
CHECKED BY: CAWockner

LOG OF DRILL HOLE NO. DH-204

Cal State Channel Islands, East Campus Development
Camarillo Area of Ventura County

LOCATION: per Plate 3

SURFACE EL 98 0 ft +/- (rel. MSL datum)

ELEVATION, ft	DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLERS	SAMPLER BLOW COUNT	MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	Su, ksf PP, (TV), [uu]
			1	☒		3.5" Asphalt concrete pavement over 6" Base materials							
96	2		2	▨	(10)	**ALLUVIUM (Qal)** Sandy Lean CLAY (CL), medium stiff to very stiff, moderate brown, damp to moist, some gravel, trace caliche							4.0
94	4												
92	6		3	▨	(15)	- root up to 1/4" diameter, trace organics, trace gravel, at 5'							
90	8												
88	10		4	▨	(28)	- lense of Clayey SAND with gravel (SC), dense, light brown damp, at 10'							
86	12												
84	14												
82	16		5	☒	5	- thin lenses of fine grained Silty SAND (SM), at 15'							
80	18												
78	20		6	▨	(21)	- slightly lighter brown, damp, at 20'							3.8
76	22												
74	24					Clayey SAND (SC) dense, orangish brown, damp, trace gravel, weak CaCO3 (caliche)							
72	26		7	☒	26								
70	28												
68	30		8	▨	(28)	- medium dense, damp to moist, some gravel, at 30'							
66	32												
64	34												
			9	☒	27								
62	36					Sandy Lean CLAY (CL): hard, moderate brown, damp							
60	38					Clayey SAND with gravel (SC): dense, orangish brown, damp to moist, weak caliche							

COMPLETION DEPTH: 51.5 ft
DEPTH TO WATER: Not Encountered
BACKFILLED WITH. Native Materials
DRILLING DATE: August 7, 2000

The log and data presented are a simplification of actual conditions encountered at the time of drilling at the drilled location Subsurface conditions may differ at other locations and with the passage of time

DRILLING METHOD: 8-in. dia. Hollow Stem Auger
HAMMER TYPE: Automatic Trip
DRILLED BY: A & R Drilling
LOGGED BY: CWelke
CHECKED BY: CAWockner

LOG OF DRILL HOLE NO. DH-205

Cal State Channel Islands, East Campus Development
Camarillo Area of Ventura County

PLATE A-2.20a

LOCATION per Plate 3

SURFACE EL. 98.0 ft +/- (rel MSL datum)

ELEVATION, ft	DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO	SAMPLERS	SAMPLER BLOW COUNT	MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	Su, ksf PP, (TV), [uu]
		▨	10	▨	(58)								
56	42	▨											
54	44	▨											
		▨	11	☒	14	- with lens of Lean CLAY (CL); very stiff, at 45'							
52	46	▨											
50	48	▨											
48	50	▨											
		▨	12	▨	(30)	- medium dense, damp, mostly fine to medium grained sand, trace gravel, at 50'							
46	52												
44	54												
42	56												
40	58												
38	60												
36	62												
34	64												
32	66												
30	68												
28	70												
26	72												
24	74												
22	76												
20	78												

COMPLETION DEPTH: 51 5 ft
DEPTH TO WATER: Not Encountered
BACKFILLED WITH: Native Materials
DRILLING DATE: August 7, 2000

The log and data presented are a simplification of actual conditions encountered at the time of drilling at the drilled location Subsurface conditions may differ at other locations and with the passage of time

DRILLING METHOD: 8-in. dia. Hollow Stem Auger
HAMMER TYPE Automatic Trip
DRILLED BY: A & R Drilling
LOGGED BY: CWelke
CHECKED BY: CAWockner

LOG OF DRILL HOLE NO. DH-205

Cal State Channel Islands, East Campus Development
Camarillo Area of Ventura County

PLATE A-2.20b

ELEVATION, ft	DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLERS	SAMPLER BLOW COUNT	LOCATION per Plate 3 SURFACE EL 140 0 ft +/- (rel. MSL datum) MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	Su, ksf PP, (TV), [uu]
			1	☒		**ALLUVIUM (Qal)** Sandy Lean CLAY (CL) stiff to very stiff, moderate to dark brown, damp							
138	2					- numerous voids, rootlets, weak caliche, at 2'							
			2	▒	(15)								>4 5
136	4												
			3	▒	(26)	- trace gravel, at 5'							>4.5
134	6												
132	8												
130	10												
			4	▒	(22)	- some voids, rootlets, at 10'							>4.5
128	12												
126	14												
			5	▒	(23)	- more sand and some gravel, at 15'							>4 5
124	16												
122	18												
120	20												
			6	☒	8	medium stiff, moist, less sand, at 20'							
118	22												
116	24					Clayey SAND with gravel (SC): medium dense, dark orangish brown, damp to moist, includes thin lenses of Silty SAND (SM) and Lean CLAY (CL)							
			7	▒	(23)								
114	26												
112	28												
110	30												
			8	☒	12								
108	32												
						Sandy Lean CLAY (CL): very stiff, medium to dark brown, damp to moist							
106	34												
			9	▒	(30)								3.0
104	36												
102	38												

COMPLETION DEPTH: 51.5 ft
DEPTH TO WATER: Not Encountered
BACKFILLED WITH: Native Materials
DRILLING DATE: August 8, 2000

The log and data presented are a simplification of actual conditions encountered at the time of drilling at the drilled location Subsurface conditions may differ at other locations and with the passage of time

DRILLING METHOD: 8-in. dia. Hollow Stem Auger
HAMMER TYPE: Automatic Trip
DRILLED BY: A & R Drilling
LOGGED BY CWelke
CHECKED BY: CAWockner

LOG OF DRILL HOLE NO. DH-206

Cal State Channel Islands, East Campus Development
Camarillo Area of Ventura County

PLATE A-2.21a

LOCATION: per Plate 3

SURFACE EL: 140.0 ft +/- (rel MSL datum)

ELEVATION, ft	DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLERS	SAMPLER BLOW COUNT	MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	Su, ksf PP, (TV), [uu]
			10	⊠	30	- hard, more fine sands, at 40'							1.8
98	42												
96	44												
			11	▨	(32)	- very stiff, moist, thin SILT (ML) lens, at 45'							>4.5
94	46												
92	48												
90	50		12	⊠	12	- stiff, thin SILT (ML) lens, at 50'							
88	52												
86	54												
84	56												
82	58												
80	60												
78	62												
76	64												
74	66												
72	68												
70	70												
68	72												
66	74												
64	76												
62	78												

COMPLETION DEPTH: 51.5 ft
DEPTH TO WATER: Not Encountered
BACKFILLED WITH: Native Materials
DRILLING DATE: August 8, 2000

The log and data presented are a simplification of actual conditions encountered at the time of drilling at the drilled location. Subsurface conditions may differ at other locations and with the passage of time

DRILLING METHOD: 8-in. dia. Hollow Stem Auger
HAMMER TYPE: Automatic Trip
DRILLED BY: A & R Drilling
LOGGED BY: CWelke
CHECKED BY: CAWockner

LOG OF DRILL HOLE NO. DH-206

Cal State Channel Islands, East Campus Development
Camarillo Area of Ventura County

PLATE A-2.21b

LOCATION. per Plate 3

SURFACE EL: 131.0 ft +/- (rel MSL datum)

ELEVATION, ft	DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLERS	SAMPLER BLOW COUNT	MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	Su, ksf PP, (TV), [uu]
130			1			**ARTIFICIAL FILL (Af)** Sandy Lean CLAY (CL): medium stiff to stiff, moderate to dark brown, trace gravel							
	2												
128			2		(23)	**ALLUVIUM (Qal)** Silty SAND (SM): medium dense, light brown, damp							
	4												
126			3		(23)	Clayey SAND (SC) medium dense, dark orangish brown, moist							
	6												
124													
	8												
122													
	10		4		(16)								
120													
	12												
118													
	14												
116			5		30	- very dense, damp, at 15'							
	16												
114													
	18												
112													
	20		6		(50)	- very dense, moist, with gravel and trace cobbles, at 20'							
110													
	22												
108													
	24												
106			7		18								
	26					Sandy Lean CLAY (CL): very stiff, moderate brown, moist, trace gravel							
104													
	28												
102													
	30		8		(33)								>4 5
100													
	32												
98						Clayey SAND with gravel (SC): dense, dark orangish brown, damp							
	34												
96			9		27	- 6" layer of Lean CLAY (CL), at 40'							3.5
	36												
94													
	38												
92													

COMPLETION DEPTH: 60.5 ft
DEPTH TO WATER: Not Encountered
BACKFILLED WITH: Native Materials
DRILLING DATE: August 8, 2000

The log and data presented are a simplification of actual conditions encountered at the time of drilling at the drilled location Subsurface conditions may differ at other locations and with the passage of time

DRILLING METHOD: 8-in. dia. Hollow Stem Auger
HAMMER TYPE: Automatic Trip
DRILLED BY: A & R Drilling, Inc.
LOGGED BY: CWelke
CHECKED BY: CAWockner

LOG OF DRILL HOLE NO. DH-207

Cal State Channel Islands, East Campus Development
Camarillo Area of Ventura County

PLATE A-2.22a

LOCATION per Plate 3

SURFACE EL: 131.0 ft +/- (rel MSL datum)

ELEVATION, ft	DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLERS	SAMPLER BLOW COUNT	MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	Su, ksf PP, (TV), [uu]
			10		(27)	- medium dense, moist, at 40'							
			11	☒	38	- dense, at 45'							
			12	☒	27	- dense, damp, thin lenses of Lean CLAY (CL), at 50'							
			13	☒	52								
						CONEJO FORMATION (Tcv) Clayey SAND (SC): very dense, orangish brown							
			14		57/6"	- refusal on bedrock, at 60' **CONEJO VOLCANICS BEDROCK (Tcv)** Adesitic Breccia: very dense							

COMPLETION DEPTH: 60.5 ft
DEPTH TO WATER: Not Encountered
BACKFILLED WITH. Native Materials
DRILLING DATE: August 8, 2000

The log and data presented are a simplification of actual conditions encountered at the time of drilling at the drilled location Subsurface conditions may differ at other locations and with the passage of time

DRILLING METHOD: 8-in. dia. Hollow Stem Auger
HAMMER TYPE: Automatic Trip
DRILLED BY: A & R Drilling, Inc.
LOGGED BY: CWelke
CHECKED BY: CAWockner

LOG OF DRILL HOLE NO. DH-207

Cal State Channel Islands, East Campus Development
Camarillo Area of Ventura County

PLATE A-2.22b

LOCATION: per Plate 3

SURFACE EL 130 0 ft +/- (rel. MSL datum)

ELEVATION, ft	DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLERS	SAMPLER BLOW COUNT	MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	Su, ksf PP, (TV), [uu]
			1			**ARTIFICIAL FILL (Af)** Sandy Lean CLAY (CL): stiff to very stiff, dark brown to moderate brown, damp							
128	2		2		(16)	**ALLUVIUM (Qal)** Clayey fine SAND (SC): medium dense, light to moderate brown, trace gravel, rootlets							
126	4												
			3		(22)	- weak caliche cementation, at 5'							
124	6												
122	8					Sandy Lean CLAY (CL): stiff, medium brown, damp							
120	10		4		(20)								>4 5
118	12												
116	14												
			5		(24)	Clayey SAND with gravel (SC): dense, light brown, damp							
114	16												
112	18												
110	20		6		27								
108	22												
106	24												
			7		(59)	Sandy Lean CLAY (CL): hard, moderate brown, damp to moist, trace gravel, weak caliche cementation							4.5
104	26												
102	28												
100	30		8		35								>4 5
98	32												
96	34												
			9		(52)	- with thin lenses of Silty fine SAND (SM), at 35'							>4.5
94	36												
92	38												
						CONEJO FORMATION (Tcv)							

COMPLETION DEPTH: 55 5 ft
DEPTH TO WATER: Not Encountered
BACKFILLED WITH. Native Materials
DRILLING DATE: August 7, 2000

The log and data presented are a simplification of actual conditions encountered at the time of drilling at the drilled location Subsurface conditions may differ at other locations and with the passage of time

DRILLING METHOD: 8-in. dia. Hollow Stem Auger
HAMMER TYPE: Automatic Trip
DRILLED BY: A & R Drilling, Inc.
LOGGED BY: CWelke
CHECKED BY· CAWockner

LOG OF DRILL HOLE NO. DH-208

Cal State Channel Islands, East Campus Development
Camarillo Area of Ventura County

PLATE A-2.23a

LOCATION per Plate 3

SURFACE EL: 130.0 ft +/- (rel MSL datum)

ELEVATION, ft	DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLERS	SAMPLER BLOW COUNT	MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	Su, ksf PP, (TV), [uu]
			10		67	Clayey SAND with gravel (SC): very dense, moderate brown to orangish brown, damp							
88	42												
86	44												
			11		(62)	- dense, grayish brown, moist, caliche veins, at 45'							>4.5
84	46												
82	48												
80	50		12		81	**CONEJO VOLCANICS BEDROCK (Tcv)** Andesitic Breccia: moderately indurated, grayish blue, extremely fractured, damp							
78	52												
76	54												
			13		60/5"	- refusal on bedrock, at 55' 5"							
74	56												
72	58												
70	60												
68	62												
66	64												
64	66												
62	68												
60	70												
58	72												
56	74												
54	76												
52	78												

COMPLETION DEPTH: 55.5 ft
DEPTH TO WATER: Not Encountered
BACKFILLED WITH: Native Materials
DRILLING DATE: August 7, 2000

The log and data presented are a simplification of actual conditions encountered at the time of drilling at the drilled location. Subsurface conditions may differ at other locations and with the passage of time.

DRILLING METHOD: 8-in dia. Hollow Stem Auger
HAMMER TYPE: Automatic Trip
DRILLED BY: A & R Drilling, Inc.
LOGGED BY: CWelke
CHECKED BY: CAWockner

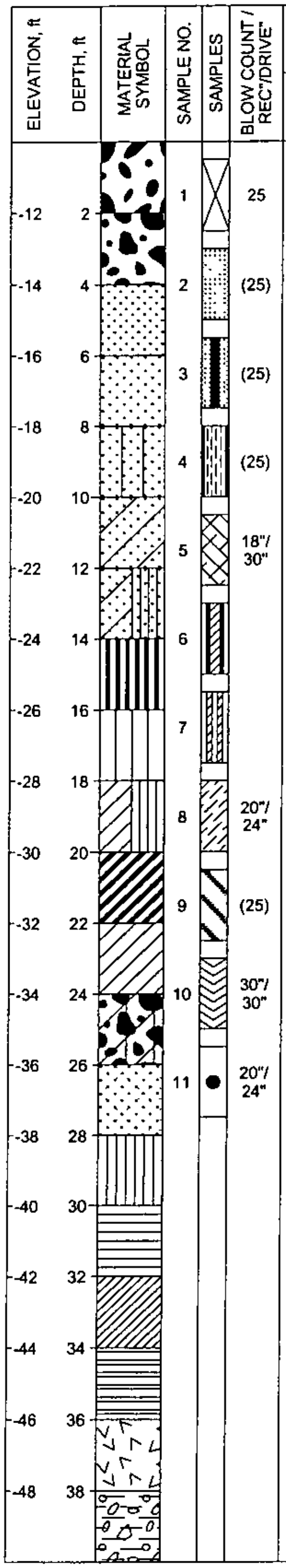
LOG OF DRILL HOLE NO. DH-208

Cal State Channel Islands, East Campus Development
Camarillo Area of Ventura County

PLATE A-2.23b

99420384LOG G:\GINT\99420384.GPJ\DH-208 REB VTA
12/14/00 5:33:56 PM

LOCATION. The drill hole location referencing local landmarks or coordinates
SURFACE EL: Using local, MSL, MLLW or other datum



MATERIAL DESCRIPTION

COARSE GRAINED
- Well graded GRAVEL (GW)
- Poorly graded GRAVEL (GP)
- Well graded SAND (SW)
- Poorly graded SAND (SP)
- Silty SAND (SM)
- Clayey SAND (SC)
- Silty, Clayey SAND (SC-SM)

FINE GRAINED
- Elastic SILT (MH)
- SILT (ML)
- Silty CLAY (CL-ML)
- Fat CLAY (CH)
- Lean CLAY (CL)

ROCK
- CONGLOMERATE
- SANDSTONE
- SILTSTONE
- MUDSTONE
- CLAYSTONE
- SHALE
- GRANITE

Paving and/or Base Materials

General Notes

Soil Texture Symbol

Sloped line in symbol column indicates transitional boundary

Samplers and sampler dimensions (unless otherwise noted in report text) are as follows:

Symbol for:

1	SPT Sampler, driven 1 3/8" ID, 2" OD
2	CA Liner Sampler, driven 2 3/8" ID, 3" OD
3	CA Liner Sampler, disturbed 2 3/8" ID, 3" OD
4	Thin-walled Tube, pushed 2 7/8" ID, 3" OD
5	Bulk Bag Sample (from cuttings)
6	Hand Auger Sample
7	CME Core Sample
8	Lexan Sample
9	Pitcher Sample
10	Vibracore Sample
11	No Sample Recovered

Sampler Driving Resistance

Number of blows with 140 lb. hammer, falling 30-in to drive sampler 1-ft after seating sampler 6-in.; for example,

Blows/ft	Description
25	25 blows drove sampler 12" after initial 6" of seating
86/11"	After driving sampler the initial 6" of seating, 36 blows drove sampler through the second 6" interval, and 50 blows drove the sampler 5" into the third interval
50/6"	50 blows drove sampler 6" after initial 6" of seating
Ref/3"	50 blows drove sampler 3" during initial 6" seating interval

Blow counts for California Liner Sampler shown in ( )

Length of sample symbol approximates recovery length

Classification of Soils per ASTM D2487 or D2488

Geologic Formation noted in bold font at the top of interpreted interval

Strength Legend

Q = Unconfined Compression
u = Unconsolidated Undrained Triaxial
t = Torvane
p = Pocket Penetrometer
m = Miniature Vane

Water Level Symbols

∇ Initial or perched water level
▼ Final ground water level
∿ Seepages encountered

Rock Quality Designation (RQD) is the sum of recovered core pieces greater than 4 inches divided by the length of the cored interval.

KEY TO TERMS & SYMBOLS USED ON LOGS

PLATE A-2.2.24

LOCATION: See Plate 3

SURFACE EL: 100 ft +/- (rel. MSL datum)

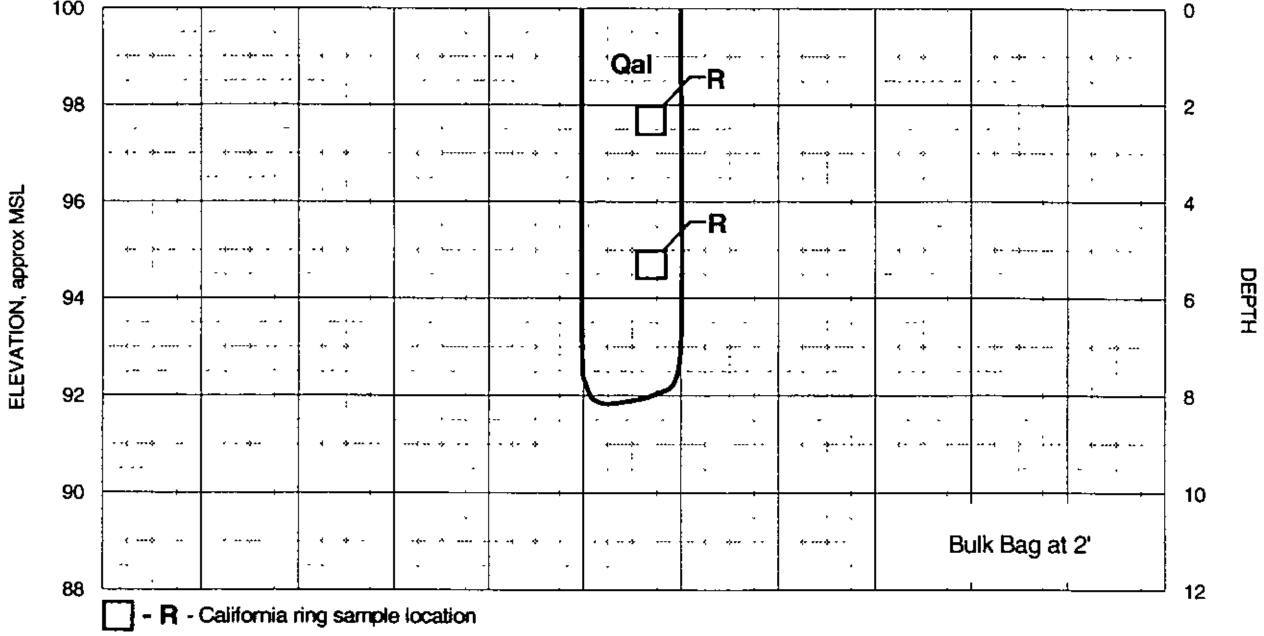
ELEV, ft	DEPTH, ft	GEOLOGIC UNIT	MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	Su, ksf
		Qal	**ALLUVIUM (Qal)** Fat sandy CLAY (CH): medium stiff, light brown, dry to approx. 2-1/2' then moist, layer of sand from 1" to 4" thick at approx 2-1/2'							
98	2			117	110	6				
96	4		- with few gravel (angular and sub-rounded)							
94	6			120	110	9				
92	8		- sand layer approx. 3" thick, at 7' and 8'							
90	10									
88	12									
86	14									

The log and data presented are a simplification of actual conditions encountered at the time of excavation. Subsurface conditions may differ at other locations and with the passage of time.

COMPLETION DEPTH: 8 ft
DEPTH TO WATER: Not Encountered
EXPLORATION DATE: July 1, 1999

LOGGED BY: NDerbidge
CHECKED BY: CWockner

TEST PIT GRAPHICAL REPRESENTATION



LOG OF TEST PIT NO. BH-1

Cal State Channel Islands, East Campus Development
Camarillo Area of Ventura County

LOCATION: See Plate 3

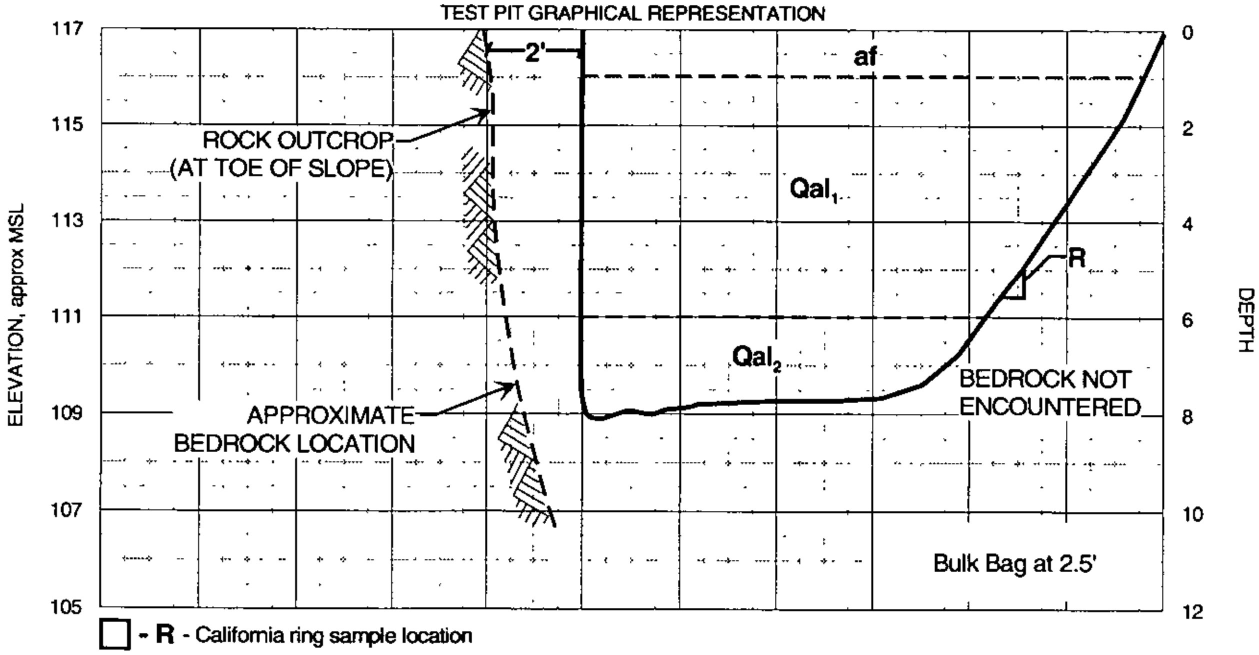
SURFACE EL: 117 ft +/- (rel MSL datum)

ELEV, ft	DEPTH, ft	GEOLOGIC UNIT	MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	Su, ksf
116		af	**ARTIFICIAL FILL (af)** - Pile of pieces of RCP on surface and to about 1'							
114	2	Qal1	**ALLUVIUM (Qal)** Sandy CLAY (CL): loose to medium dense, dry to 2' then moist, with gravel and roots to 3/4", abundant voids to 1/16"							
112	4		- gravel layer (1' thick), at about 3'	95	78	21				
110	6	Qal2	Grades to Silty SAND (SM) or SAND with SILT (SP-SM): medium dense, light brown, moist fewer voids to 1/32", with roots to 1/4"							
108	8									
106	10									
104	12									
	14									

The log and data presented are a simplification of actual conditions encountered at the time of excavation. Subsurface conditions may differ at other locations and with the passage of time.

COMPLETION DEPTH: 8 ft
DEPTH TO WATER: Not Encountered
EXPLORATION DATE: July 1, 1999

LOGGED BY: NDerbidge
CHECKED BY: CWockner



LOG OF TEST PIT NO. BH-1A

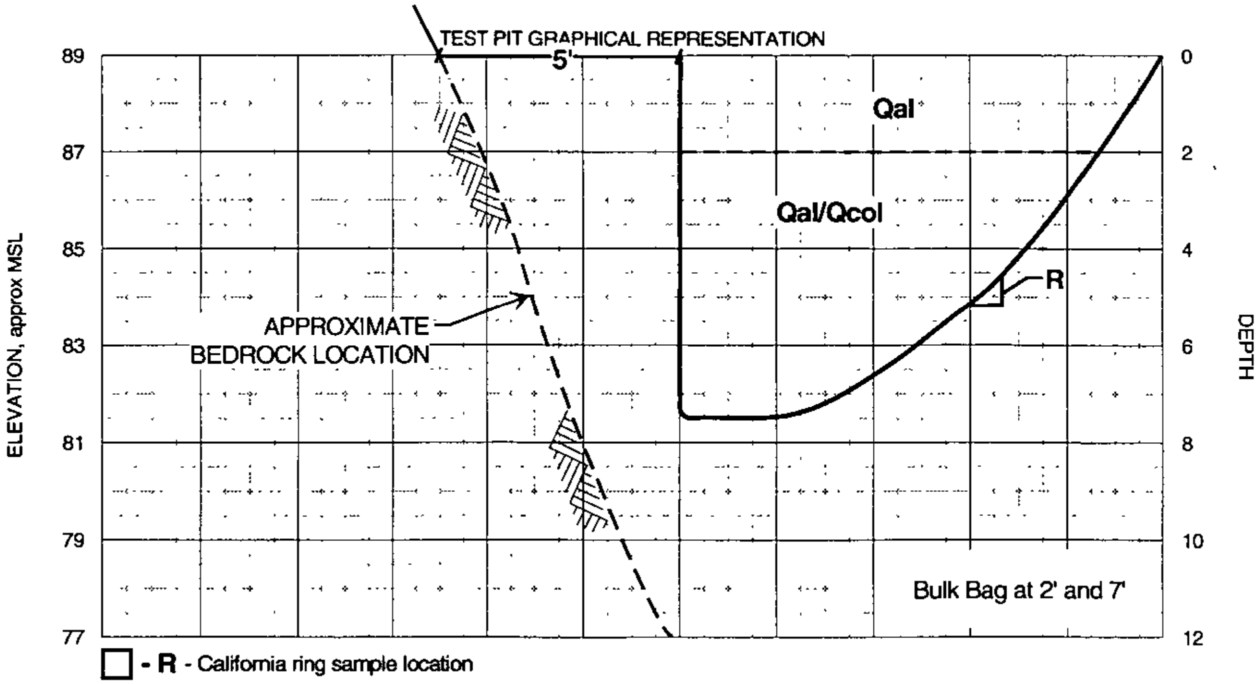
Cal State Channel Islands, East Campus Development
Camarillo Area of Ventura County

ELEV, ft	DEPTH, ft	GEOLOGIC UNIT	LOCATION: See Plate 3 SURFACE EL: 89 ft +/- (rel. MSL datum) MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	Su, ksf
88	2	Qal1	**TOPSOIL (Qal)** Lean CLAY (CL): soft, brown, dry, with minor sand and gravel and abundant roots to approx. 3/4", abundant voids to 1/6"							
86 84 82	4 6	Qal/Qcol	**ALLUVIUM (Qal)/COLLUVIUM (Qcol)** Lean CLAY (CL): soft, light brown, moist below approx. 2', with gravel and cobbles to approx. 5", with roots to 3/4" to approx. 6', fewer voids, below 2', very few voids below approx. 6' Note: operator notes soft digging.	108	103	5				
80 78 76	8 10 12 14		Note: materials about 10' from top of slope is loose sand with silt to maximum depth explored of about 8' (see sample #3 at 5')							

The log and data presented are a simplification of actual conditions encountered at the time of excavation. Subsurface conditions may differ at other locations and with the passage of time.

COMPLETION DEPTH: 8 ft
DEPTH TO WATER: Not Encountered
EXPLORATION DATE: July 1, 1999

LOGGED BY: NDerbidge
CHECKED BY: CWockner



LOG OF TEST PIT NO. BH-1B

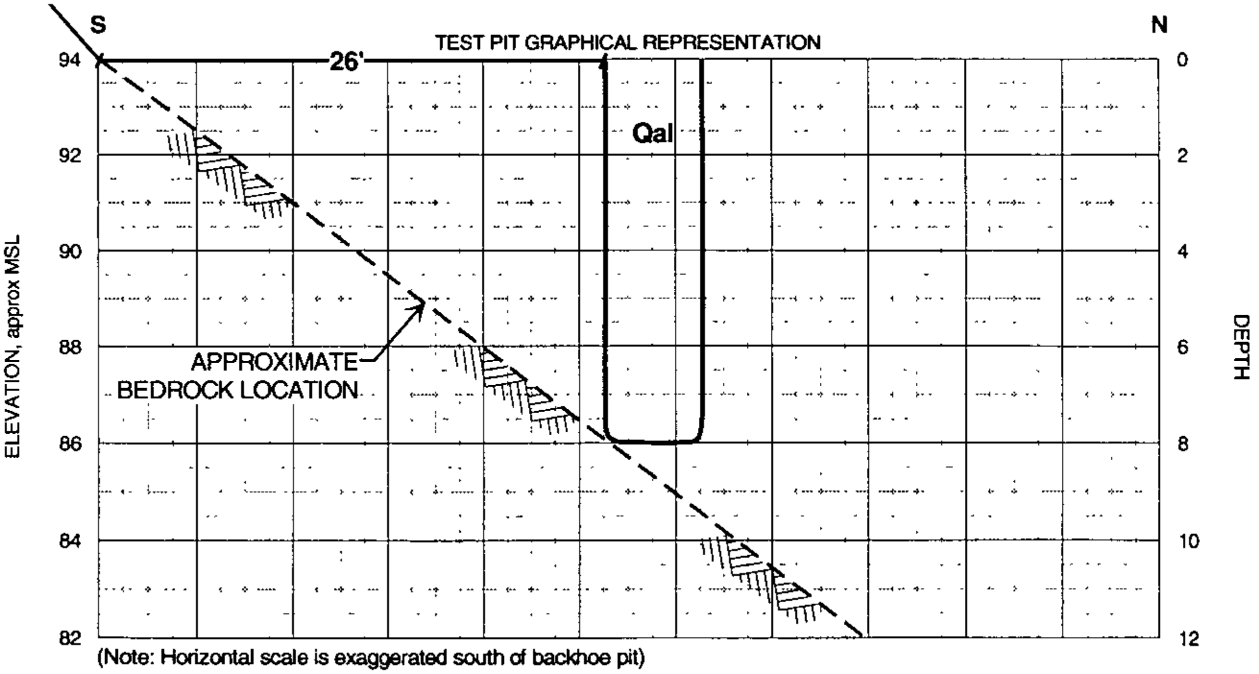
Cal State Channel Islands, East Campus Development
Camarillo Area of Ventura County

ELEV, ft	DEPTH, ft	GEOLOGIC UNIT	LOCATION: See Plate 3 SURFACE EL: 94 ft +/- (rel. MSL datum) MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	Su, ksf
		Qal	**ALLUVIUM (Qal)** Lean CLAY (CL): medium stiff, brown, dry to approx. 2' then moist, with roots to approx 3/4" one roots to approx. 3", with gravel, abundant voids to approx 1/16" to approx. 3'							
92	2									
90	4									
88	6		- grades to light brown, at 5'							
86	8									
84	10									
82	12									
80	14									

The log and data presented are a simplification of actual conditions encountered at the time of excavation. Subsurface conditions may differ at other locations and with the passage of time.

COMPLETION DEPTH: 8 ft
DEPTH TO WATER: Not Encountered
EXPLORATION DATE: July 2, 1999

LOGGED BY: NDerbidge
CHECKED BY: CWockner



(Note: Horizontal scale is exaggerated south of backhoe pit)

LOG OF TEST PIT NO. BH-1C

Cal State Channel Islands, East Campus Development
Camarillo Area of Ventura County

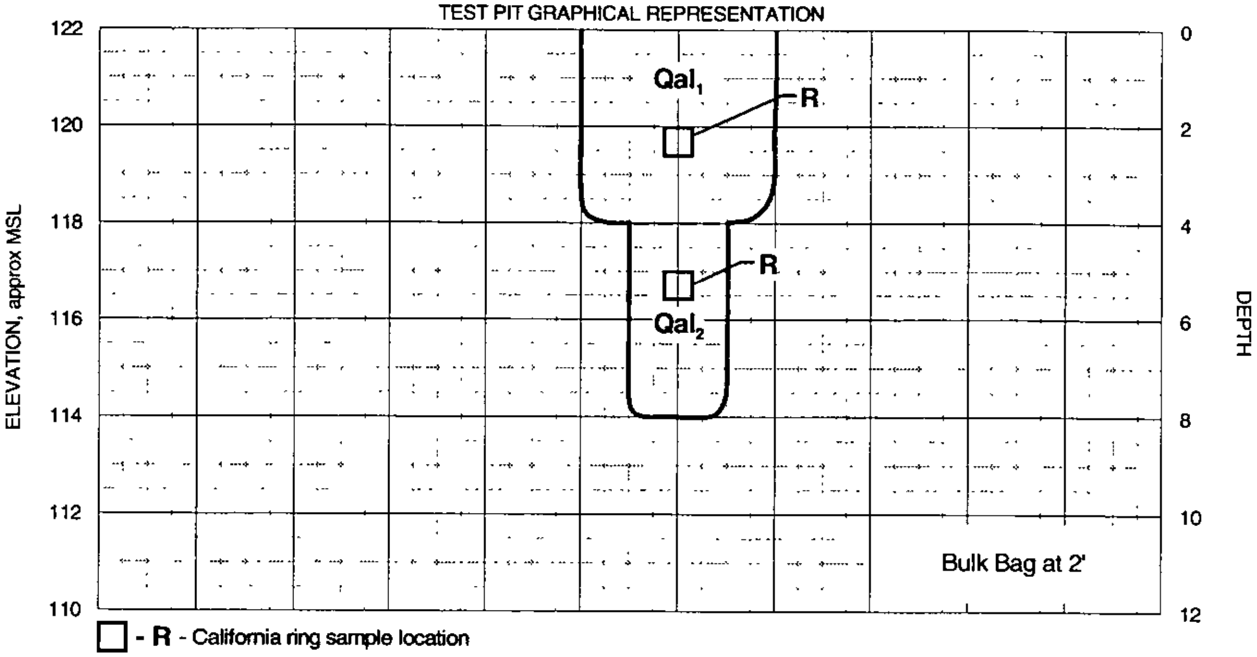
PLATE A-3.4

ELEV, ft	DEPTH, ft	GEOLOGIC UNIT	LOCATION: See Plate 3 SURFACE EL: 122 ft +/- (rel. MSL datum) MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	Su, ksf
120	2	Qal1	**ALLUVIUM (Qal)** Sandy lean CLAY (CL): stiff, light brown, dry to about 3', with gravelly sand layer from 1-1/2' to 2-1/2', moist, below 3', with abundant voids up to approx. 1/16" to approx. 4'	102	86	18				
118	4	Qal2	Lean CLAY (CL): stiff, brown, moist, few voids, some minor caliche veining	119	95	25				
116	6									
114	8									
112	10									
110	12									
108	14									

The log and data presented are a simplification of actual conditions encountered at the time of excavation. Subsurface conditions may differ at other locations and with the passage of time

COMPLETION DEPTH: 8 ft
DEPTH TO WATER: Not Encountered
EXPLORATION DATE: July 1, 1999

LOGGED BY: NDerbidge
CHECKED BY. CWockner



LOG OF TEST PIT NO. BH-2

Cal State Channel Islands, East Campus Development
Camarillo Area of Ventura County

LOCATION: See Plate 3

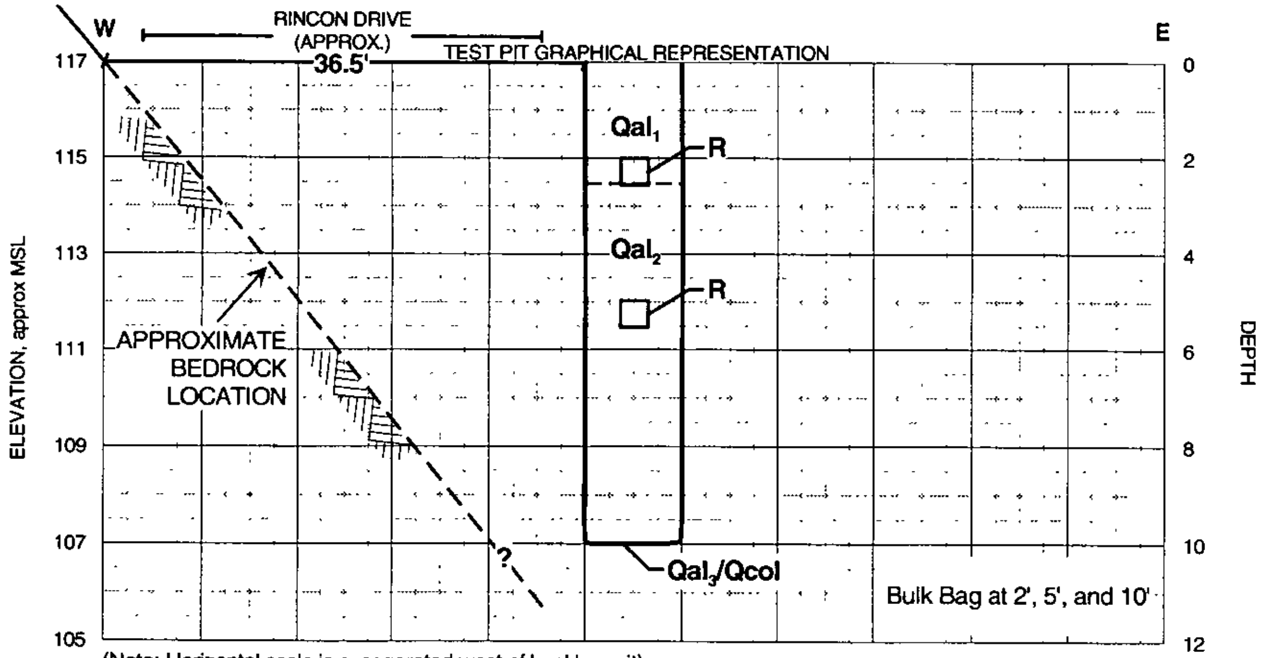
SURFACE EL: 117 ft +/- (rel. MSL datum)

ELEV, ft	DEPTH, ft	GEOLOGIC UNIT	MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	Su, ksf
116 114	2	Qal1	**ALLUVIUM (Qal)** Lean CLAY (CL): medium stiff, brown, dry to approx. 1/2' then moist, with frequent gravel and few cobbles, moderate veining to approx. 2-1/2'	118	97	22				
112 110 108	4 6 8	Qal2	Lean to Fat CLAY (CL/CH): medium stiff, dark brown to black, moist, with very few voids to approx. 1/16" and few angular pea-size gravel	119	90	33				
106 104	10 12 14	Qal3/Qco	**ALLUVIUM (Qal)/COLLUVIUM (Qcol)** CLAY (CL): stiff, light brown, moist, with abundant gravel, Qcol or (pieces of conejo) to approx 3", excavator notes much firmer than above							

The log and data presented are a simplification of actual conditions encountered at the time of excavation Subsurface conditions may differ at other locations and with the passage of time.

COMPLETION DEPTH: 10 ft
DEPTH TO WATER: Not Encountered
EXPLORATION DATE: July 2, 1999

LOGGED BY: NDerbidge
CHECKED BY: CWockner



(Note: Horizontal scale is exaggerated west of backhoe pit)

☐ - **R** - California ring sample location

LOG OF TEST PIT NO. BH-3

Cal State Channel Islands, East Campus Development
Camarillo Area of Ventura County

PLATE A-3.6

LOCATION: See Plate 3

SURFACE EL: 156 ft +/- (rel. MSL datum)

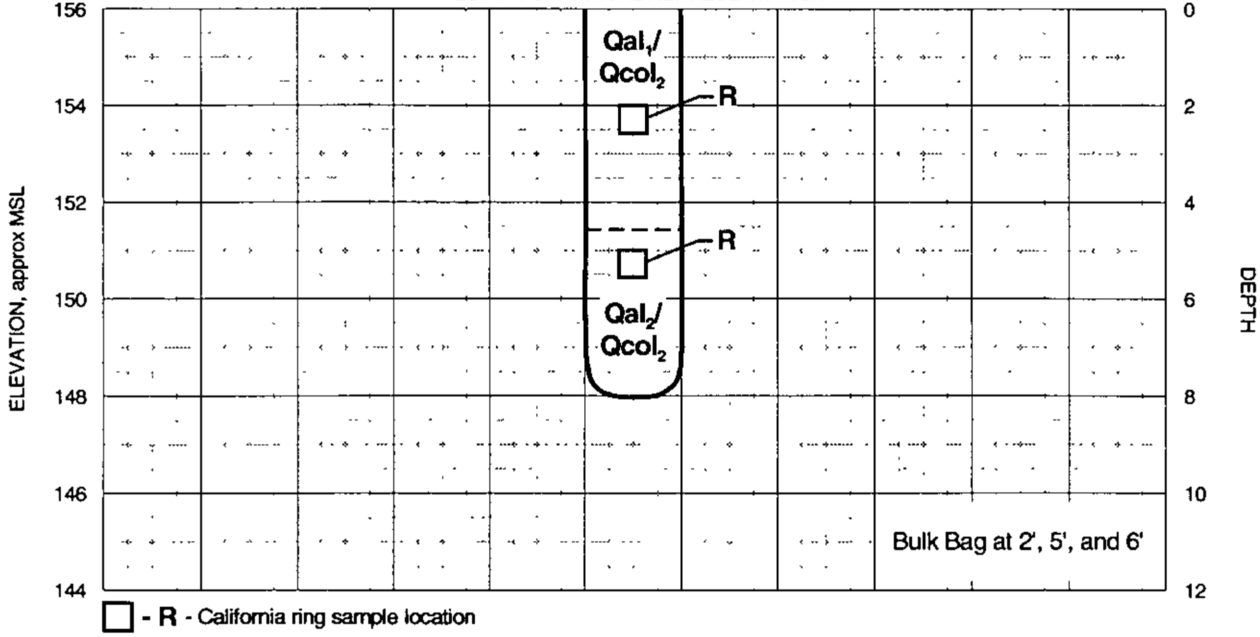
ELEV, ft	DEPTH, ft	GEOLOGIC UNIT	MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	Su, ksf
		Qal/Qcol	**ALLUVIUM (Qal)/COLLUVIUM (Qcol)**							
154	2		Lean CLAY (CL): stiff, grayish brown, dry to approx 2-1/2' then moist, with frequent gravel and abundant roots to approx. 1/2", moderate voids to approx. 1/16" to approx. 2-1/2'	127	104	22				
152	4									
			- with gravel (pieces of conejo formation) to approx. 4", few voids, difficult excavating, at 4-1/2'	126	106	19				
150	6		- grades to light brown, fewer large gravel, minor pea size gravel, waxy luster, at approx. 6'							
148	8									
146	10									
144	12									
142	14									

The log and data presented are a simplification of actual conditions encountered at the time of excavation. Subsurface conditions may differ at other locations and with the passage of time

COMPLETION DEPTH: 8 ft
DEPTH TO WATER: Not Encountered
EXPLORATION DATE: July 2, 1999

LOGGED BY: NDerbidge
CHECKED BY: CWockner

TEST PIT GRAPHICAL REPRESENTATION



LOG OF TEST PIT NO. BH-4

Cal State Channel Islands, East Campus Development
Camarillo Area of Ventura County

TP-GEOT(90381/BH-04)\\(10/04/99/04 35PM)REB

PLATE A-3.7

LOCATION: See Plate 3

SURFACE EL: 143 ft +/- (rel. MSL datum)

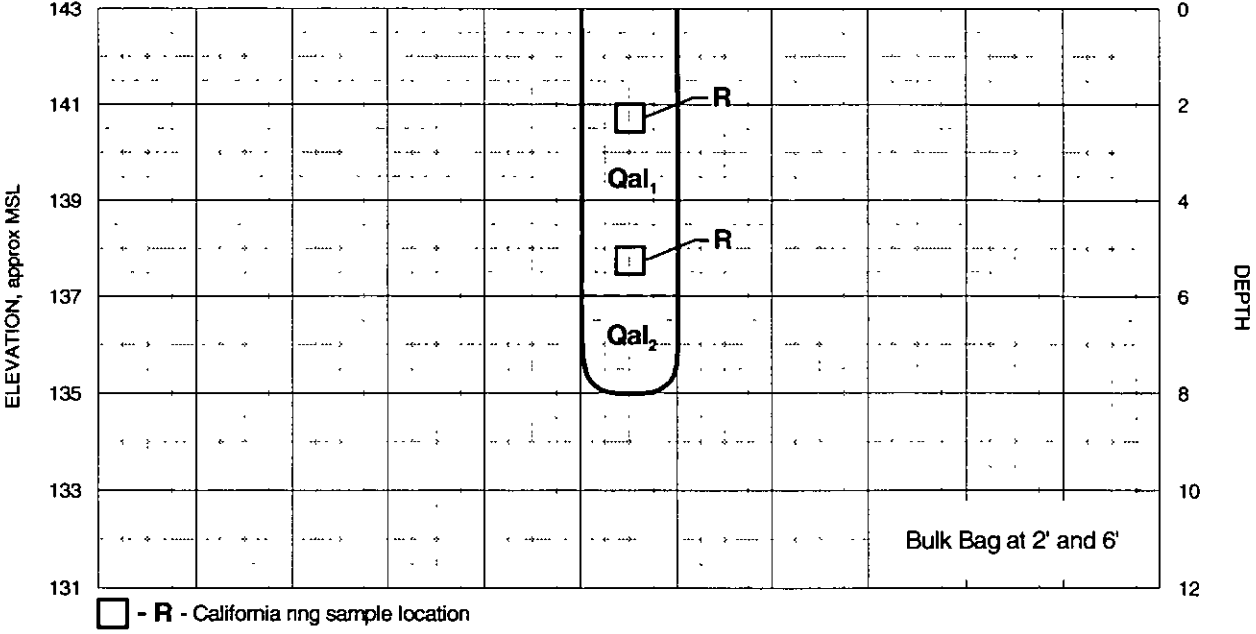
ELEV, ft	DEPTH, ft	GEOLOGIC UNIT	MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	Su, ksf
142		Qal1	**ALLUVIUM (Qal)** Lean CLAY (CL): medium stiff, brown, dry to approx 2-1/2' the moist, with abundant gravel to approx. 1', minor gravel below moderate voids, to approx. 1/16" with roots less than 1/32"							
	2			115	100	16				
140										
	4									
138				116	100	16				
	6	Qal2	Sandy CLAY (CL): very stiff, light brown, moist, with gravel and few cobbles to approx. 4"							
136										
	8									
134										
	10									
132										
	12									
130										
	14									

The log and data presented are a simplification of actual conditions encountered at the time of excavation. Subsurface conditions may differ at other locations and with the passage of time.

COMPLETION DEPTH: 8 ft
DEPTH TO WATER: Not Encountered
EXPLORATION DATE: July 2, 1999

LOGGED BY: NDerbidge
CHECKED BY: CWockner

TEST PIT GRAPHICAL REPRESENTATION



LOG OF TEST PIT NO. BH-5

Cal State Channel Islands, East Campus Development
Camarillo Area of Ventura County

LOCATION: See Plate 3

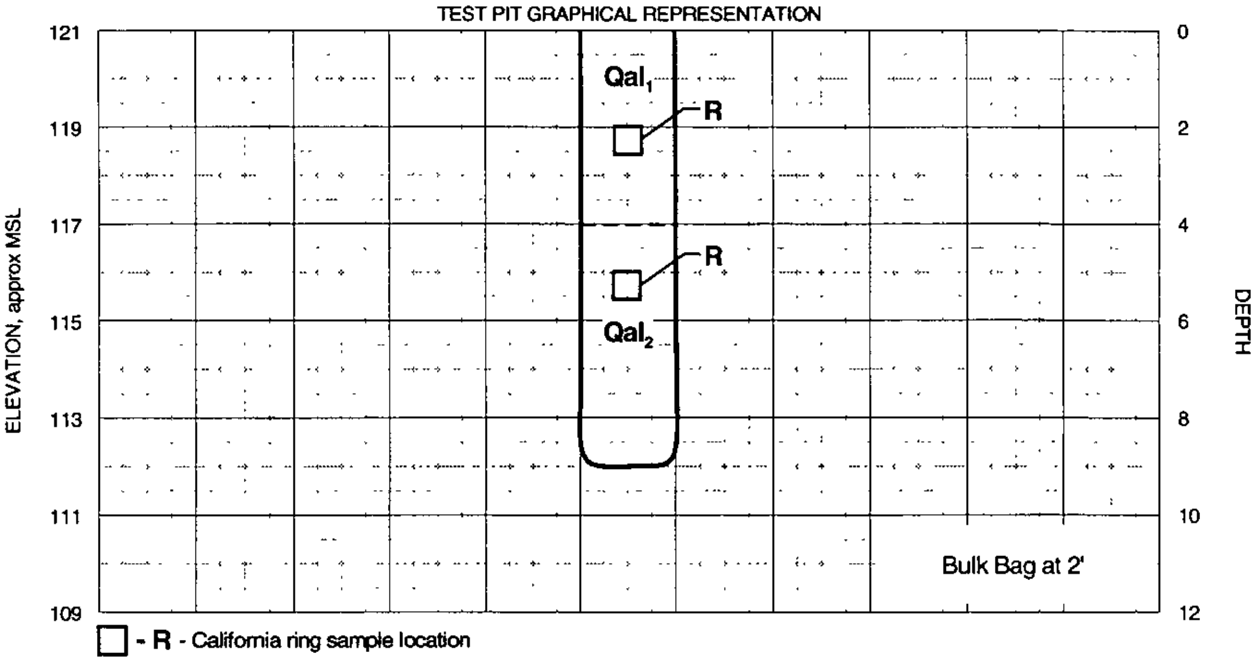
SURFACE EL: 121 ft +/- (rel. MSL datum)

ELEV, ft	DEPTH, ft	GEOLOGIC UNIT	MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	Su, ksf
120		Qal1	**ALLUVIUM (Qal)** Sandy lean CLAY (CL): medium stiff, dark brown, dry to 1-1/2' with roots to approx 1/4", ?? voids, to approx. 1/16", with gravel to approx. 1"				7			
118	2			108	91	19				
116	4	Qal2	Grades to Clayey SAND (SC): light brown, few voids	67	61	11				
114	6									
112	8									
110	10									
108	12									
	14									

The log and data presented are a simplification of actual conditions encountered at the time of excavation. Subsurface conditions may differ at other locations and with the passage of time.

COMPLETION DEPTH: 9 ft
DEPTH TO WATER. Not Encountered
EXPLORATION DATE: July 2, 1999

LOGGED BY: NDerbidge
CHECKED BY· CWockner



LOG OF TEST PIT NO. BH-6

Cal State Channel Islands, East Campus Development
Camarillo Area of Ventura County

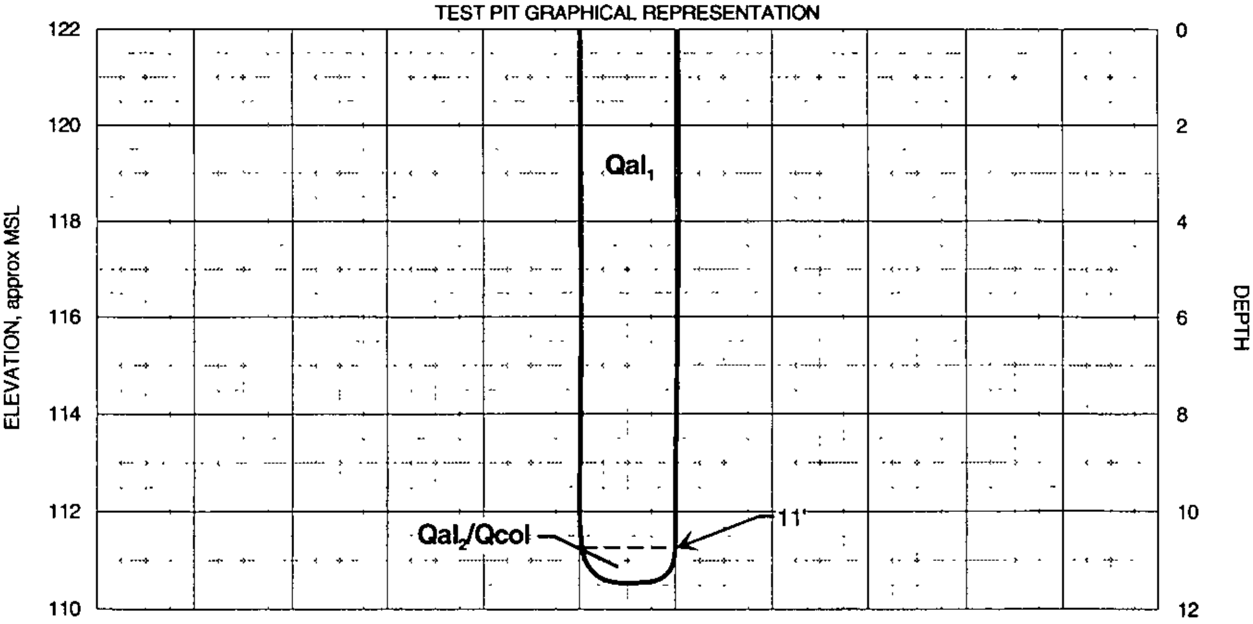
ELEV, ft	DEPTH, ft	GEOLOGIC UNIT	LOCATION: See Plate 3 SURFACE EL: 122 ft +/- (rel. MSL datum) MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	Su, ksf
120	2	Qal1	**ALLUVIUM (Qal)** Lean CLAY (CL): medium stiff, dark brown, dry to approx. 2' with roots to approx 1/2", voids??, with few gravel							
118	4	Qal2								
116	6		Grades to Clayey SAND (SC): very stiff, light brown							
114	8									
112	10									
110	12	Qal3/Qco	**ALLUVIUM (Qal)/COLLUVIUM (Qcol)** - with abundant cobbles to approx. 7", waxy luster - difficult excavating, below 11'							
108	14									

The log and data presented are a simplification of actual conditions encountered at the time of excavation. Subsurface conditions may differ at other locations and with the passage of time.

COMPLETION DEPTH: 11 ft
DEPTH TO WATER: Not Encountered
EXPLORATION DATE. July 2, 1999

LOGGED BY: NDerbidge
CHECKED BY: CWockner

TEST PIT GRAPHICAL REPRESENTATION



LOG OF TEST PIT NO. BH-6A

Cal State Channel Islands, East Campus Development
Camarillo Area of Ventura County

LOCATION: See Plate 3

SURFACE EL: 94 ft +/- (rel. MSL datum)

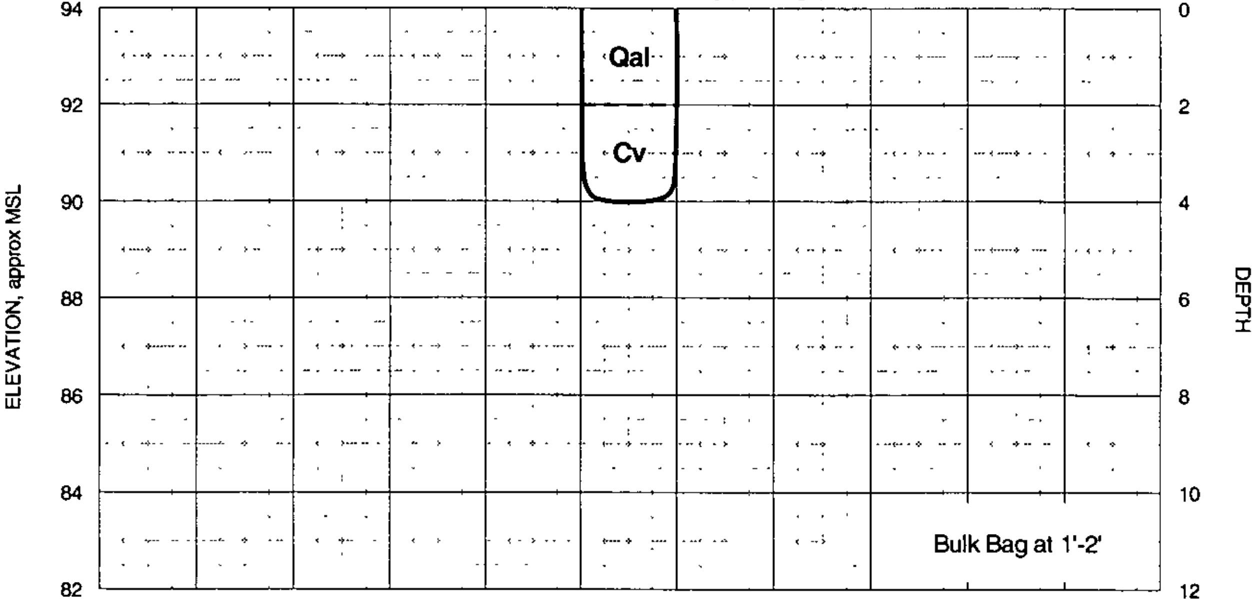
ELEV, ft	DEPTH, ft	GEOLOGIC UNIT	MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	Su, ksf
		Qal1	**ALLUVIUM (Qal)** Lean CLAY (CL): stiff, reddish brown, dry to slightly moist, with sand few voids to approx. 1/32" with minor cobbles to approx 5", and abundant caliche veining to about 2'							
92	2	Qal2/Cv	**CONEJO VOLCANICS (Tcv)** Grades to extremely weathered conejo basalt with sandy clay, tan, from 2' to 3' - becoming less weathered, at 3' to 4' - dipping to the north, difficult excavating, at approx. 3'							
90	4									
88	6									
86	8									
84	10									
82	12									
80	14									

The log and data presented are a simplification of actual conditions encountered at the time of excavation. Subsurface conditions may differ at other locations and with the passage of time.

COMPLETION DEPTH: 4 ft
DEPTH TO WATER: Not Encountered
EXPLORATION DATE: July 1, 1999

LOGGED BY: NDerbidge
CHECKED BY: CWockner

TEST PIT GRAPHICAL REPRESENTATION



LOG OF TEST PIT NO. BH-7

Cal State Channel Islands, East Campus Development
Camarillo Area of Ventura County

LOCATION: See Plate 3

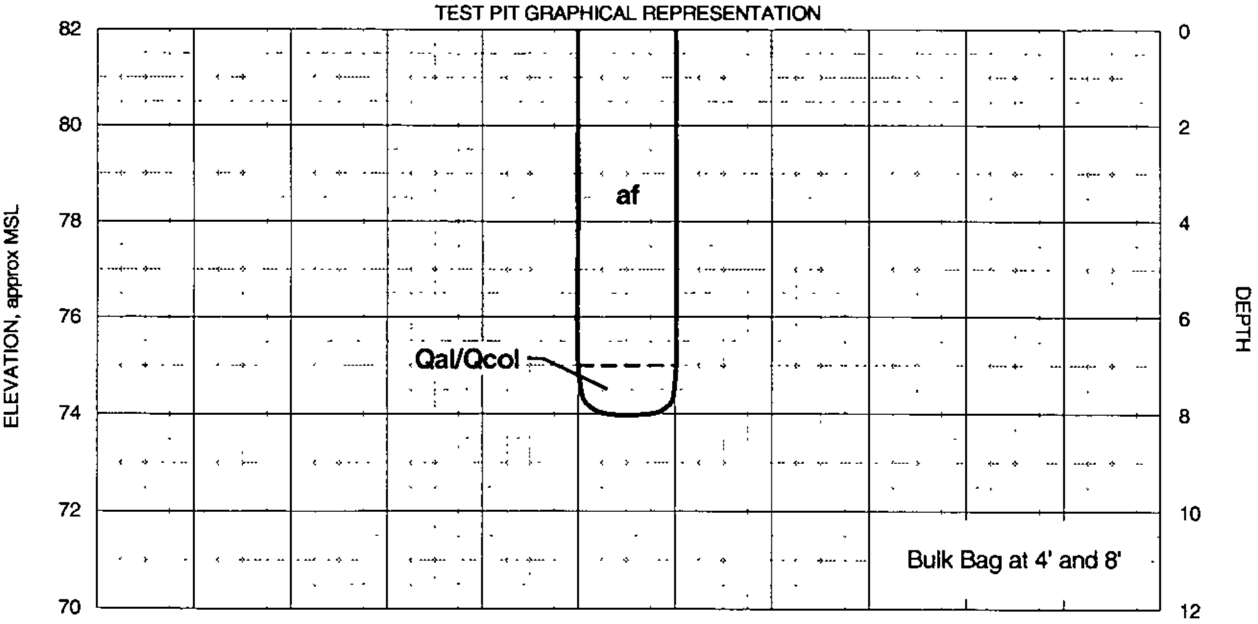
SURFACE EL: 82 ft +/- (rel. MSL datum)

ELEV, ft	DEPTH, ft	GEOLOGIC UNIT	MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	Su, ksf
		af	**ARTIFICIAL FILL (af)** Lean CLAY (CL): medium stiff, dry to approx 2' then moist, with roots up to approx. 6", with cobbles to approx. 8", and pieces of brick							
80	2									
78	4									
76	6		- with cable, at 6-1/2'							
74	8	Qal/Qcol	**ALLUVIUM (Qal)/COLLUVIUM (Qcol)** Lean CLAY (CL) with sand and abundant pieces of Conejo Volcanic rock to about 9" - difficult excavating, at 9'							
72	10									
70	12									
68	14									

The log and data presented are a simplification of actual conditions encountered at the time of excavation. Subsurface conditions may differ at other locations and with the passage of time.

COMPLETION DEPTH: 9 ft
DEPTH TO WATER: Not Encountered
EXPLORATION DATE. July 2, 1999

LOGGED BY: NDerbidge
CHECKED BY: CWockner



Bulk Bag at 4' and 8'

LOG OF TEST PIT NO. BH-7A

Cal State Channel Islands, East Campus Development
Camarillo Area of Ventura County

LOCATION: See Plate 3

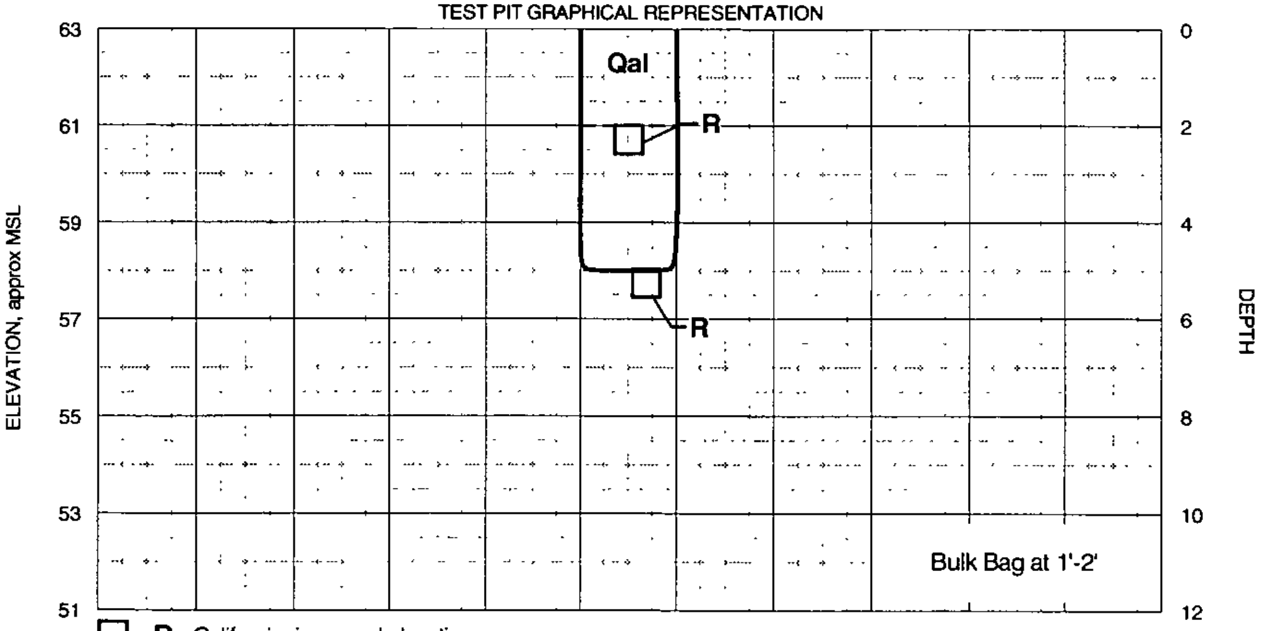
SURFACE EL: 63 ft +/- (rel. MSL datum)

ELEV, ft	DEPTH, ft	GEOLOGIC UNIT	MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	Su, ksf
62 60 58	2 4	Qal	**ALLUVIUM (Qal)** Lean CLAY (CL): stiff, brown, dry to approx. 2', moist, below 2', with gravel and few cobbles to approx. 4", few voids to about 1/32" - operator notes "firm" excavating	111	98	13				
56 54	6 8 10			116	103	13				
52 50	12 14									

The log and data presented are a simplification of actual conditions encountered at the time of excavation. Subsurface conditions may differ at other locations and with the passage of time.

COMPLETION DEPTH: 5 ft
DEPTH TO WATER: Not Encountered
EXPLORATION DATE: July 1, 1999

LOGGED BY: NDerbidge
CHECKED BY: CWockner



☐ - **R** - California ring sample location

LOG OF TEST PIT NO. BH-8

Cal State Channel Islands, East Campus Development
Camarillo Area of Ventura County

LOCATION: See Plate 3

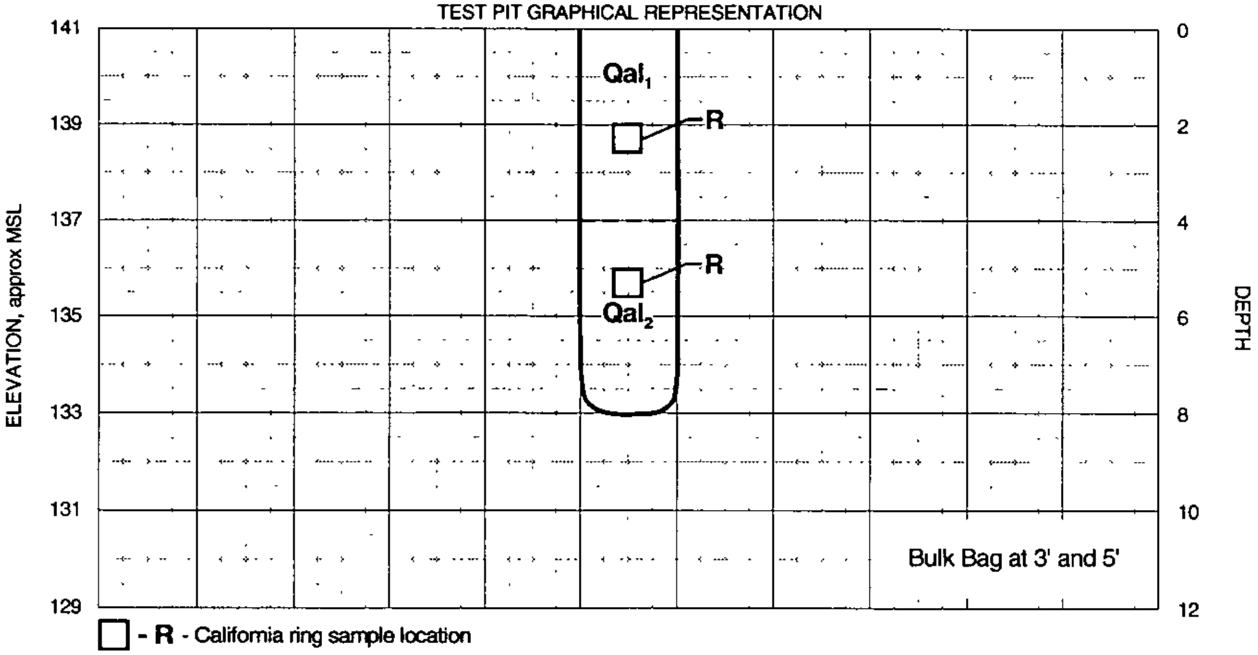
SURFACE EL: 141 ft +/- (rel. MSL datum)

ELEV, ft	DEPTH, ft	GEOLOGIC UNIT	MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	Su, ksf
140		Qal1	**ALLUVIUM (Qal)** Clayey SAND (SC): medium stiff, grayish brown, moist below 1-1/2', with gravel and roots to approx. 1/2", minor voids to approx. 1/32"							
	2			91	82	11				
138			- grades to light brown, with roots to 1/8", at 2' to 4'							
	4	Qal2	Sandy SILT (ML): very dense, gray, moist, with abundant gravel							
136				70	61	14				
	6									
134										
	8		- operator notes very difficult excavating, below 8'							
132										
	10									
130										
	12									
128										
	14									

The log and data presented are a simplification of actual conditions encountered at the time of excavation. Subsurface conditions may differ at other locations and with the passage of time

COMPLETION DEPTH: 8 ft
DEPTH TO WATER: Not Encountered
EXPLORATION DATE: July 2, 1999

LOGGED BY: NDerbidge
CHECKED BY: CWockner



LOG OF TEST PIT NO. BH-9

Cal State Channel Islands, East Campus Development
Camarillo Area of Ventura County

LOCATION: See Plate 3

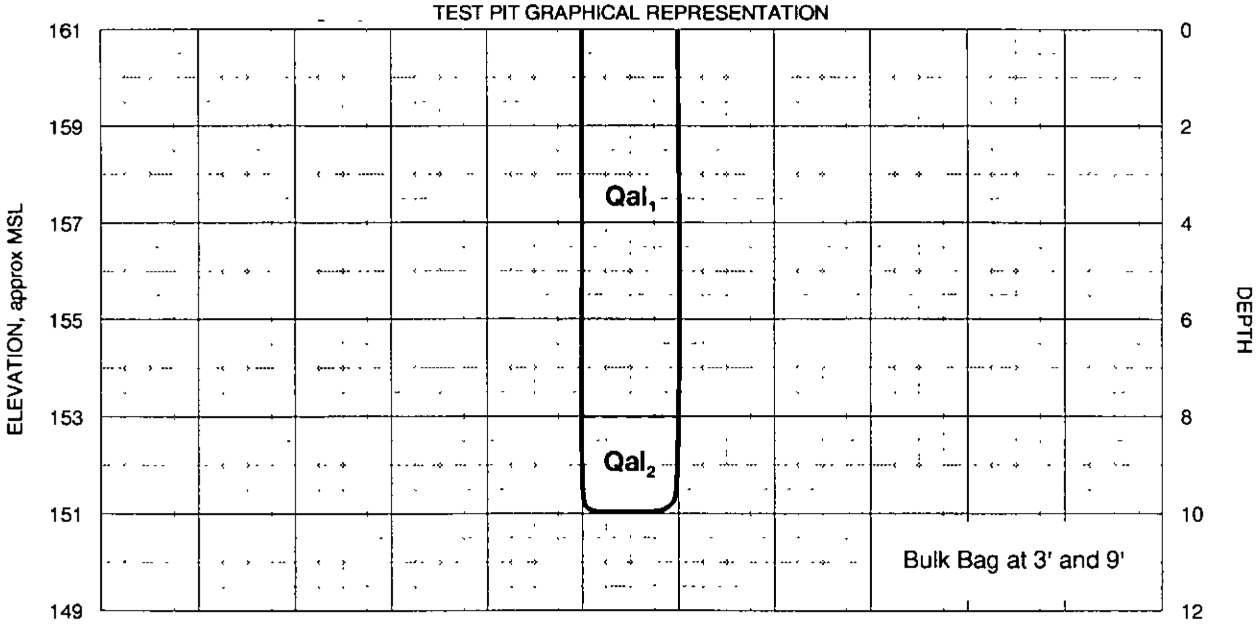
SURFACE EL: 161 ft +/- (rel MSL datum)

ELEV, ft	DEPTH, ft	GEOLOGIC UNIT	MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	Su, ksf
160 158 156 154	2 4 6	Qal1	**ALLUVIUM (Qal)** Gravel with SAND (GW): loose, grayish brown, dry to 3' then moist				6			
152	8	Qal2	Silty fine SAND (SM): loose, light brown, moist, no voids, few clay pockets							
150 148	10 12 14									

The log and data presented are a simplification of actual conditions encountered at the time of excavation Subsurface conditions may differ at other locations and with the passage of time.

COMPLETION DEPTH. 10 ft
DEPTH TO WATER: Not Encountered
EXPLORATION DATE: July 1, 1999

LOGGED BY: NDerbidge
CHECKED BY: CWockner



LOG OF TEST PIT NO. BH-10

Cal State Channel Islands, East Campus Development
Camarillo Area of Ventura County

LOCATION: See Plate 3

SURFACE EL: 163 ft +/- (rel. MSL datum)

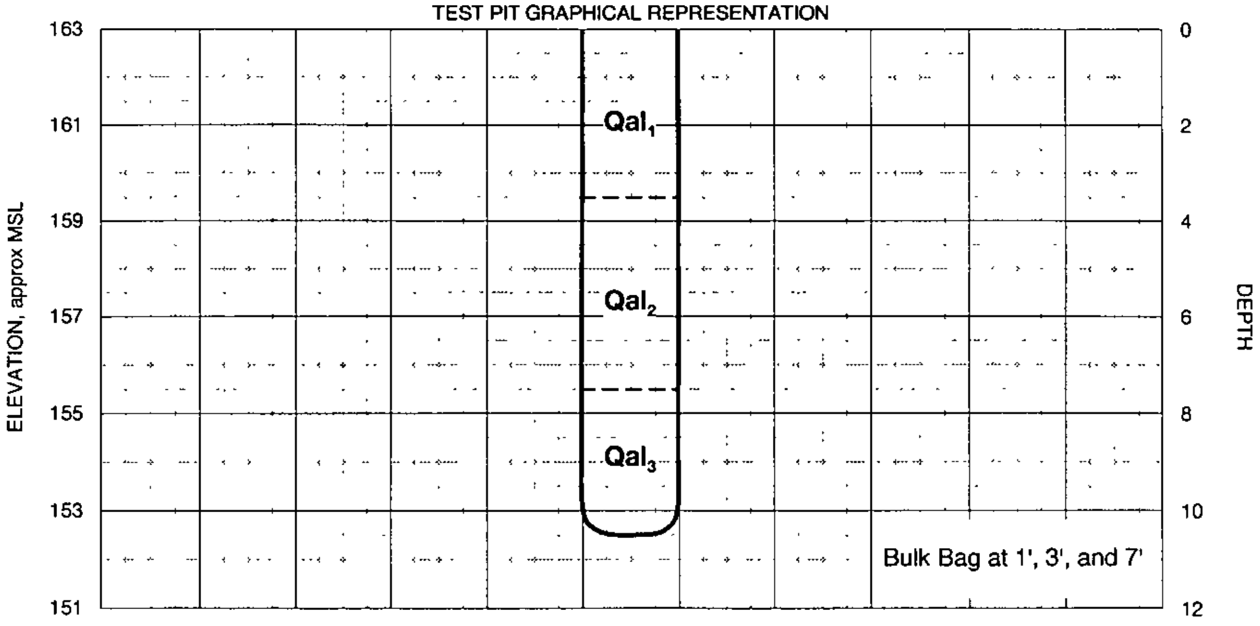
ELEV, ft	DEPTH, ft	GEOLOGIC UNIT	MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	Su, ksf
162	2	Qal1	**ALLUVIUM (Qal)** SAND with SILT (SP-SM): loose, brown, dry to moist, with roots to approx 1/2"							
160 158	4	Qal2	Silty fine SAND (SM): loose, light brown, moist, no voids, roots to approx. 1/8"				46			
156 154	6 8	Qal3	Lean CLAY (CL): soft, very dark brown, mottled gray, blocky structure							
152 150	10 12 14									

The log and data presented are a simplification of actual conditions encountered at the time of excavation. Subsurface conditions may differ at other locations and with the passage of time

COMPLETION DEPTH: 10 ft
DEPTH TO WATER: Not Encountered
EXPLORATION DATE: July 1, 1999

LOGGED BY: NDerbidge
CHECKED BY: CWockner

TEST PIT GRAPHICAL REPRESENTATION



LOG OF TEST PIT NO. BH-11

Cal State Channel Islands, East Campus Development
Camarillo Area of Ventura County

TP-GEOT(90381/BH-11)\\(10/06/99/05 40PM)REB

PLATE A-3.16

LOCATION: See Plate 3

SURFACE EL: 76 ft +/- (rel. MSL datum)

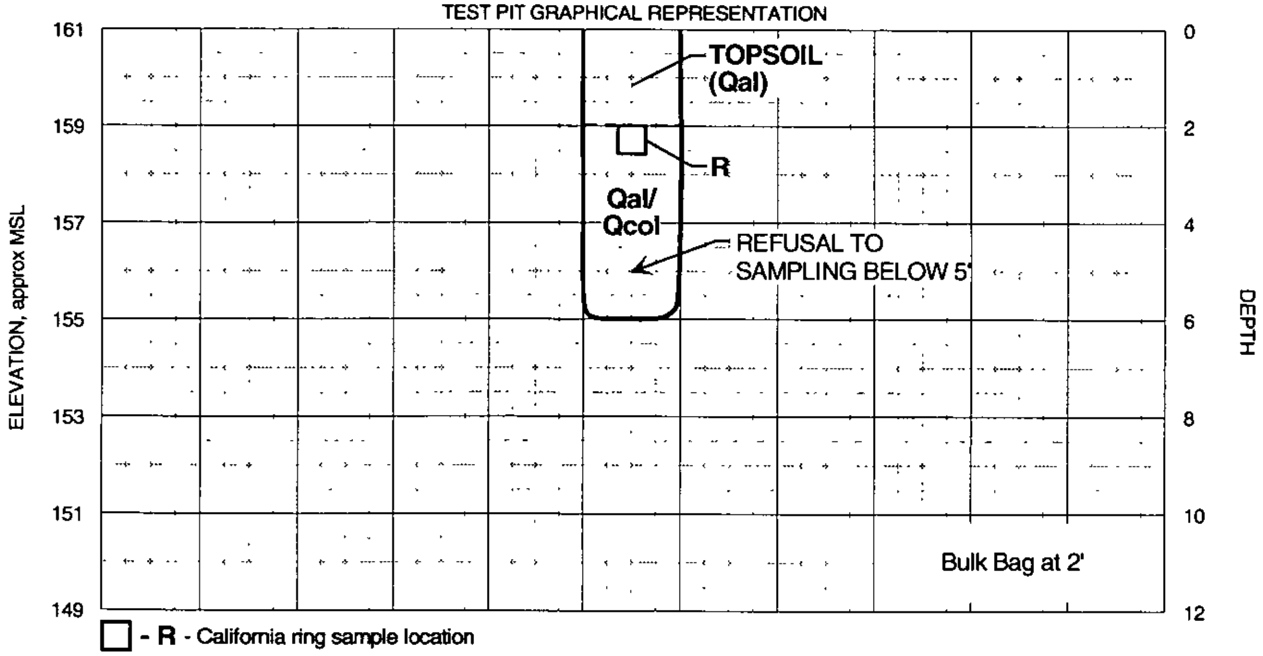
ELEV, ft	DEPTH, ft	GEOLOGIC UNIT	MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	Su, ksf
		Qal1	**TOPSOIL (Qal)** Lean CLAY (CL): medium stiff, dark brown, dry, with gravel to approx. 1", with few voids to 1/32", with roots to 1/2"							
74	2	Qal2/Qco		115	102	12				
72	4		**ALLUVIUM (Qal)/COLLUVIUM (Qcol)** Gravel, Cobbles, boulders in a matrix of dark brown Lean CLAY (CL), hard dry, with abundant caliche veining							
70	6		- very difficult excavating (teeth on bucket rip bottom and then scoop), below 2'							
68	8		Termination at 6' due to difficult excavating and no sampling possiblility							
66	10									
64	12									
62	14									

The log and data presented are a simplification of actual conditions encountered at the time of excavation. Subsurface conditions may differ at other locations and with the passage of time.

COMPLETION DEPTH: 6 ft
DEPTH TO WATER: Not Encountered
EXPLORATION DATE: July 1, 1999

LOGGED BY: NDerbidge
CHECKED BY: CWockner

TEST PIT GRAPHICAL REPRESENTATION



LOG OF TEST PIT NO. BH-12

Cal State Channel Islands, East Campus Development
Camarillo Area of Ventura County

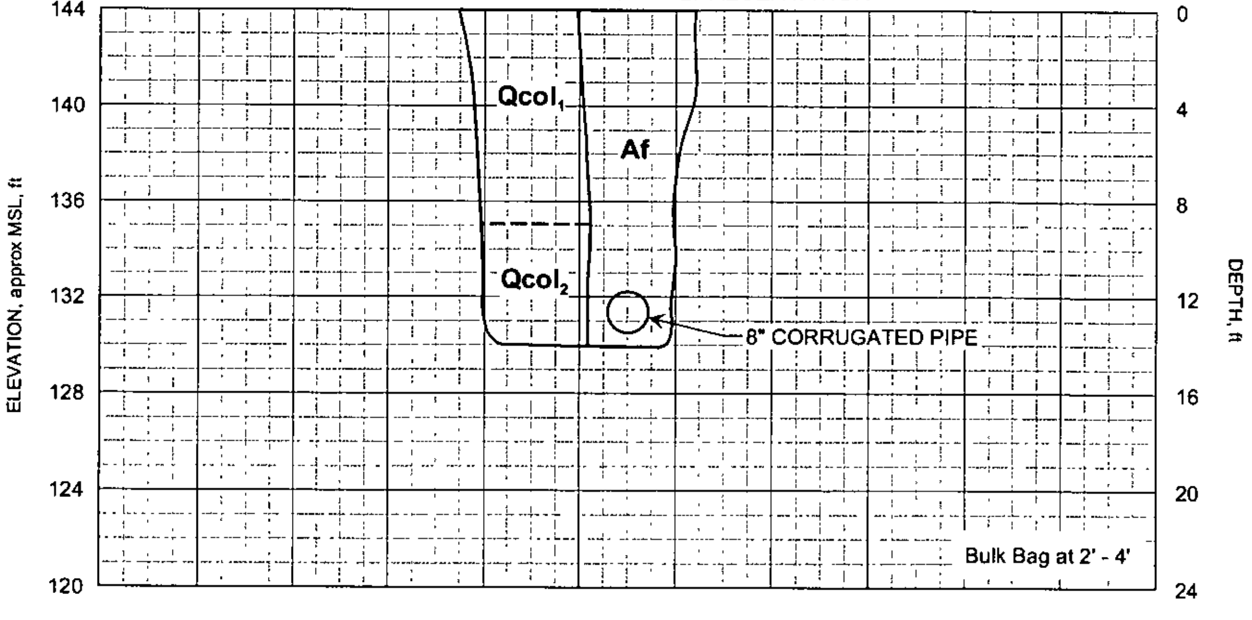
ELEVATION, ft	DEPTH, ft	GEOLOGIC UNIT	LOCATION: per Plate 3 SURFACE EL: 144 ft +/- (rel MSL datum) MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	Su, ksf PP, (TV), [uu]
142 140 138 136	0 2 4 6 8	Qcol$_1$	**COLLUVIUM (Qcol)** Sandy Lean CLAY (CL): medium stiff to stiff, grayish brown, damp, numerous voids							
134 132	10 12	Qcol$_2$	**COLLUVIUM (Qcol)** Clayey GRAVEL with sand (GC): dense to very dense, pale yellowish brown, damp, some voids, not too difficult to excavate with 16" bucket, moderately to well cemented - harder digging, at 10'							
130	14									

The log and data presented are a simplification of actual conditions encountered at the time of excavating at the excavated location Subsurface conditions may differ at other locations and with the passage of time

COMPLETION DEPTH. 13.5 ft
DEPTH TO WATER: Not encountered
EXPLORATION DATE: October 19, 2000

LOGGED BY CWelke
BACKFILL: Excavated Materials
CHECKED BY CAWockner

TEST PIT GRAPHICAL REPRESENTATION



LOG OF TEST PIT NO. BH-201

Cal State Channel Islands, East Campus Development
Camarillo Area of Ventura County

LOCATION: per Plate 3

SURFACE EL: 136 ft +/- (rel. MSL datum)

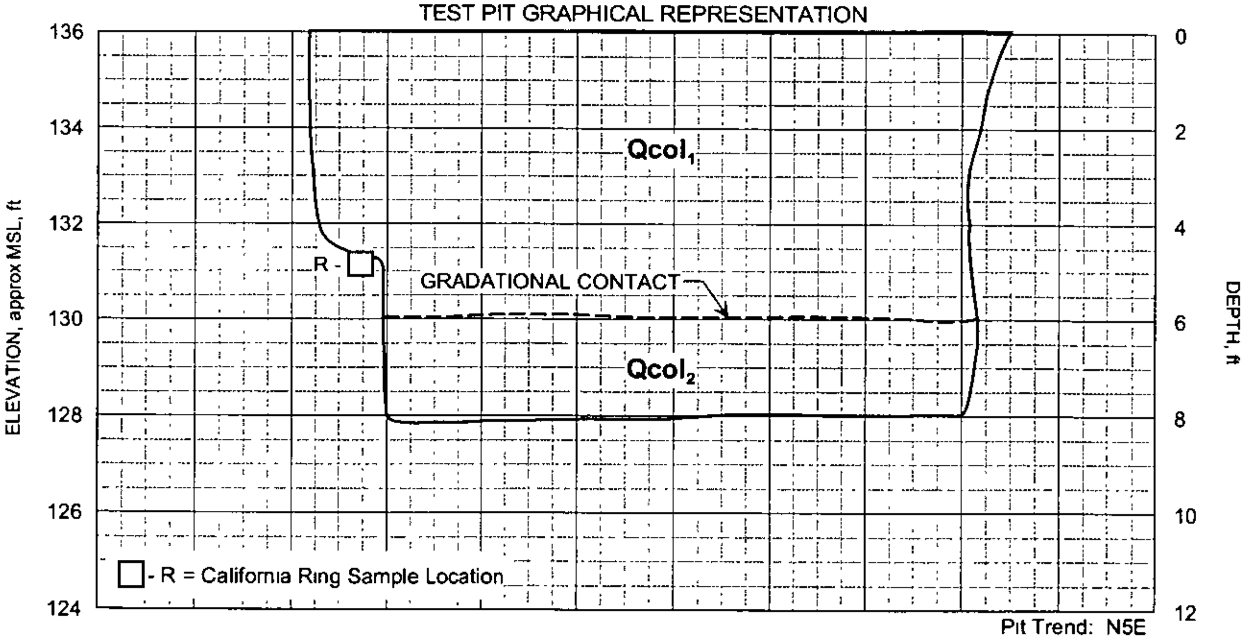
ELEVATION, ft	DEPTH, ft	GEOLOGIC UNIT	MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	Su, ksf PP, (TV), [uu]
	0	Qcol$_1$	**COLLUVIUM (Qcol)** Sandy Lean CLAY (CL): stiff, dark grayish brown, damp, slightly voided							
134	2									
132	4		- stiff, grayish brown, damp, at 4'	159	140	14				
130	6	Qcol$_2$	Clayey GRAVEL with sand (GC): very dense, pale yellowish brown, damp to moist							
128	8									
126	10									
124	12									
122	14									

The log and data presented are a simplification of actual conditions encountered at the time of excavating at the excavated location. Subsurface conditions may differ at other locations and with the passage of time.

COMPLETION DEPTH: 8.0 ft
DEPTH TO WATER: Not encountered
EXPLORATION DATE: October 19, 2000

LOGGED BY: CWelke
BACKFILL: Excavated Materials
CHECKED BY: CAWockner

TEST PIT GRAPHICAL REPRESENTATION



LOG OF TEST PIT NO. BH-202

Cal State Channel Islands, East Campus Development
Camarillo Area of Ventura County

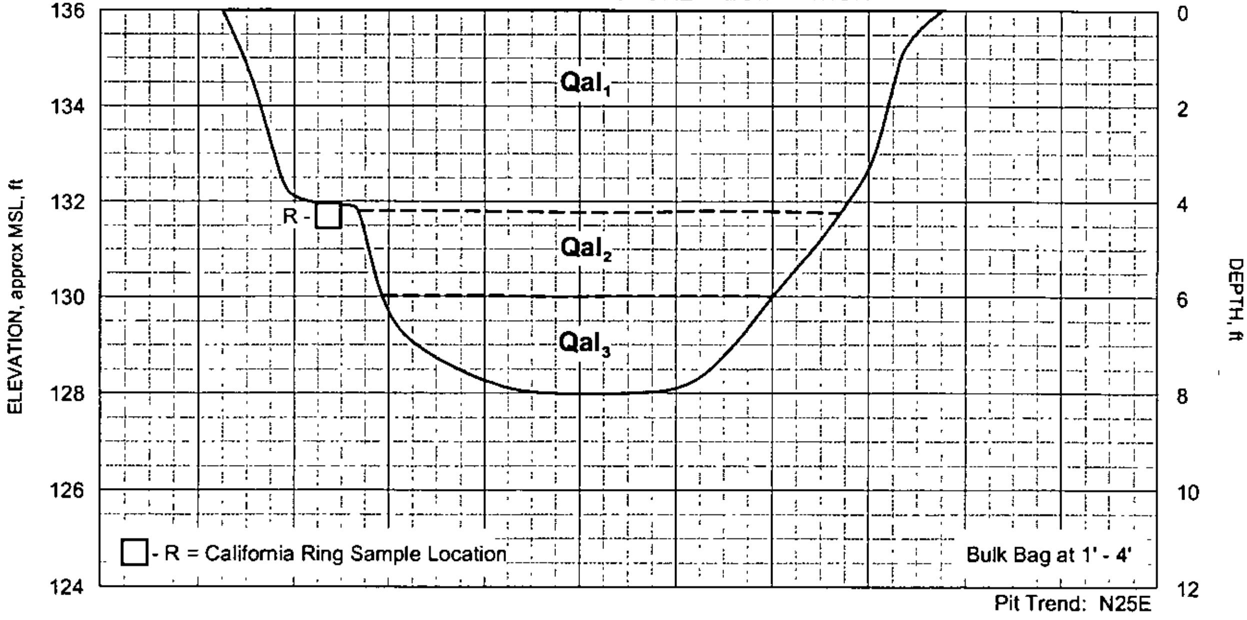
ELEVATION, ft	DEPTH, ft	GEOLOGIC UNIT	LOCATION: per Plate 3 SURFACE EL: 136 ft +/- (rel MSL datum) MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	Su, ksf PP, (TV), [uu]
	0	Qal$_1$	**ALLUVIUM (Qal)** Sandy Lean CLAY (CL): stiff, dark grayish brown, damp, some voids							
134	2									
132	4			110	96	14				
		Qal$_2$	Clayey SAND (SC): medium dense, moderate brown, some gravel, some voids							
130	6	Qal$_3$	Lean CLAY with sand (CL): soft, dark yellowish brown, moist							
128	8									
126	10									
124	12									
122	14									

The log and data presented are a simplification of actual conditions encountered at the time of excavating at the excavated location Subsurface conditions may differ at other locations and with the passage of time

COMPLETION DEPTH: 8.0 ft
DEPTH TO WATER: Not encountered
EXPLORATION DATE: October 19, 2000

LOGGED BY CWelke
BACKFILL Excavated Materials
CHECKED BY CAWockner

TEST PIT GRAPHICAL REPRESENTATION



LOG OF TEST PIT NO. BH-203

Cal State Channel Islands, East Campus Development
Camarillo Area of Ventura County

LOCATION: per Plate 3

SURFACE EL: 117 ft +/- (rel. MSL datum)

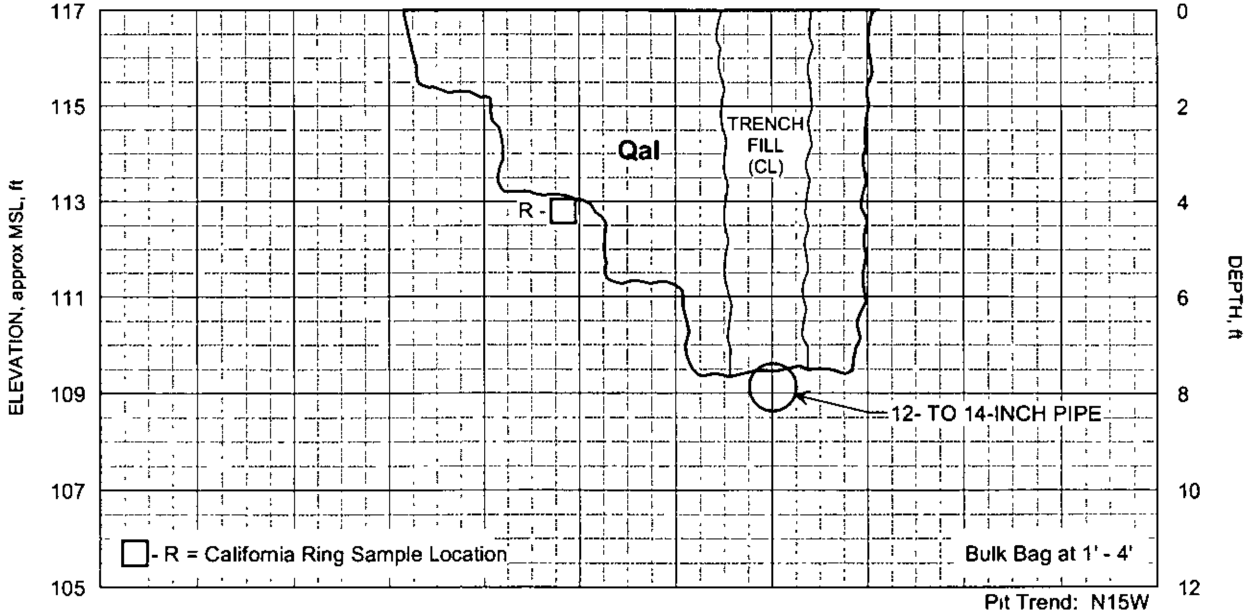
ELEVATION, ft	DEPTH, ft	GEOLOGIC UNIT	MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	Su, ksf PP, (TV), [uu]
	0	Qal	**ALLUVIUM (Qal)** Sandy Lean CLAY (CL). stiff, dark grayish brown, damp, roots at rootlets, some voids							
116										
	2									
114			- weak calcium carbonate cementation, slight voids, at 3'							
	4									
				111	95	17				
112				107	95	13				
	6									
110										
	8									
108										
	10									
106										
	12									
104										
	14									
102										

The log and data presented are a simplification of actual conditions encountered at the time of excavating at the excavated location Subsurface conditions may differ at other locations and with the passage of time

COMPLETION DEPTH: 7 5 ft
DEPTH TO WATER Not encountered
EXPLORATION DATE October 19, 2000

LOGGED BY: CWelke
BACKFILL: Excavated Materials
CHECKED BY: CAWockner

TEST PIT GRAPHICAL REPRESENTATION



LOG OF TEST PIT NO. BH-204

Cal State Channel Islands, East Campus Development

Camarillo Area of Ventura County

PLATE A-3.21

LOCATION: per Plate 3

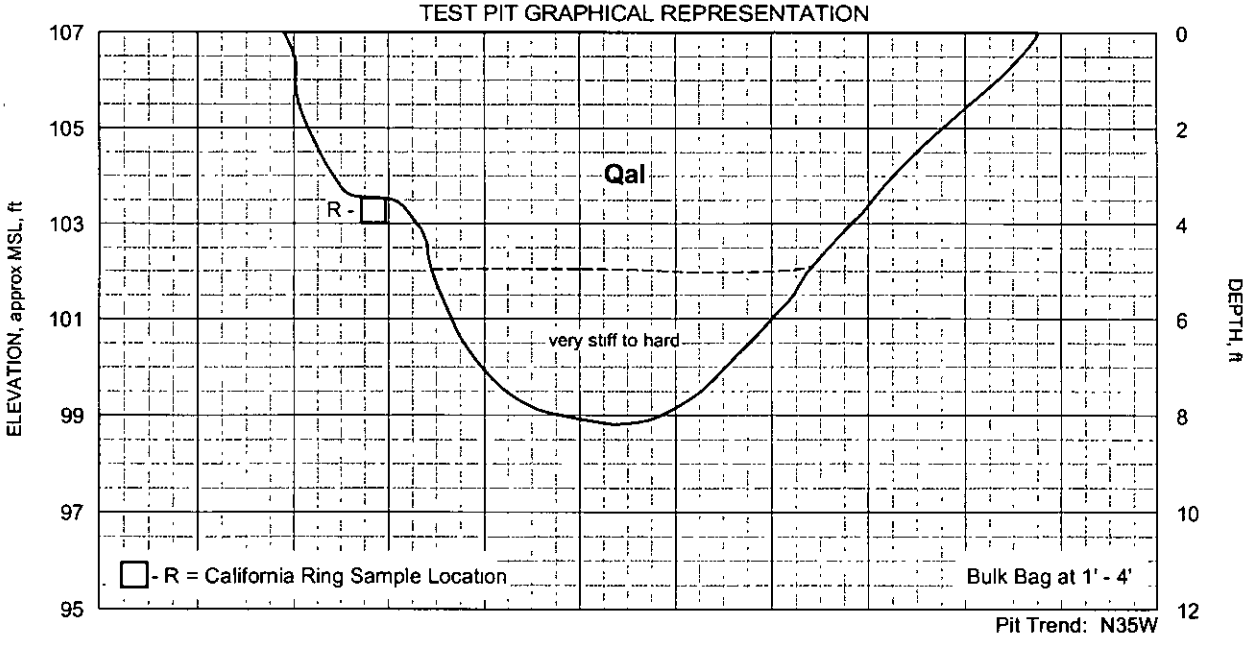
SURFACE EL: 107 ft +/- (rel. MSL datum)

ELEVATION, ft	DEPTH, ft	GEOLOGIC UNIT	MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	Su, ksf PP, (TV), [uu]
106 104 102 100 98 96 94 92	0 2 4 6 8 10 12 14	Qal	**ALLUVIUM (Qal)** Sandy Lean CLAY (CL): stiff to very stiff, dark grayish brown, damp, some voids - roots up to 1/2" diameter, weak to moderate cementation (caliche), at 2' - few voids, at 3' - very stiff to hard, at 5'	115	102	13				

The log and data presented are a simplification of actual conditions encountered at the time of excavating at the excavated location. Subsurface conditions may differ at other locations and with the passage of time

COMPLETION DEPTH 8.0 ft
DEPTH TO WATER. Not encountered
EXPLORATION DATE: October 19, 2000

LOGGED BY: CWelke
BACKFILL Excavated Materials
CHECKED BY: CAWockner



LOG OF TEST PIT NO. BH-205

Cal State Channel Islands, East Campus Development
Camarillo Area of Ventura County

PLATE A-3.22

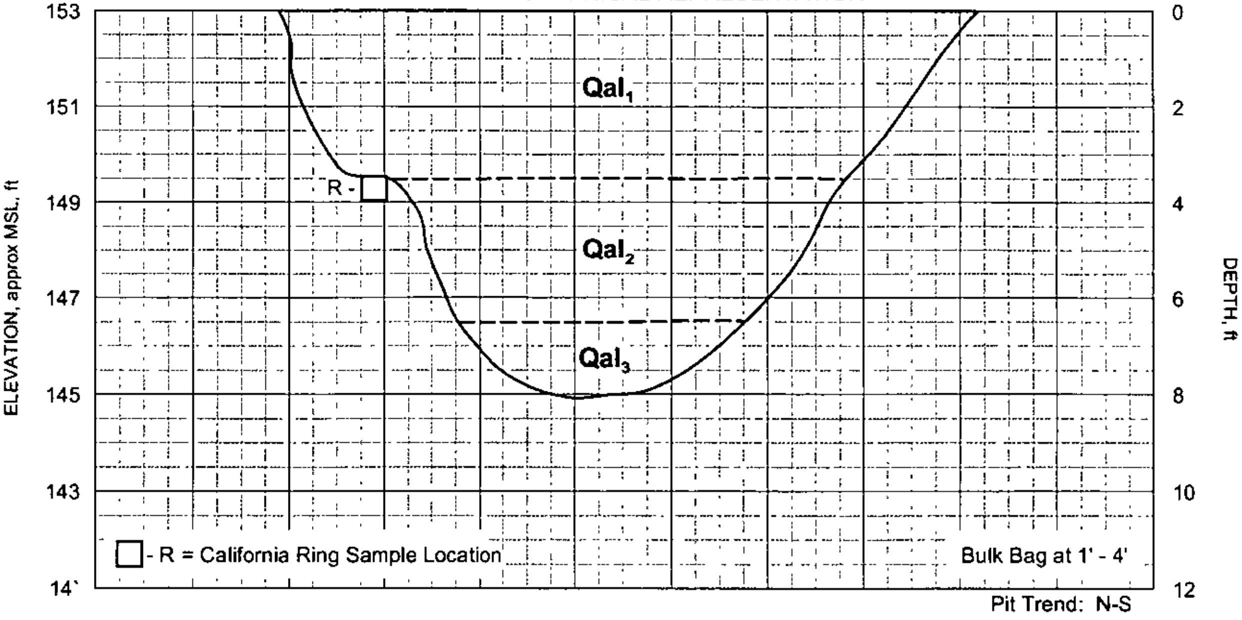
ELEVATION, ft	DEPTH, ft	GEOLOGIC UNIT	LOCATION: per Plate 3 SURFACE EL: 153 ft +/- (rel. MSL datum) MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	Su, ksf PP, (TV), [uu]
152	0	Qal_1	**ALLUVIUM (Qal)** Sandy Lean CLAY (CL): stiff to very stiff, dark grayish brown, damp, some voids							
150	2									
148	4	Qal_2	Clayey SAND (SC): medium dense, moderate brown, moist, some gravel	114	99	15				
146	6	Qal_3	Sandy Lean CLAY (CL) soft to stiff, dark yellowish brown, moist							
144	8									
142	10									
140	12									
138	14									

The log and data presented are a simplification of actual conditions encountered at the time of excavating at the excavated location Subsurface conditions may differ at other locations and with the passage of time

COMPLETION DEPTH 8.0 ft
DEPTH TO WATER. Not encountered
EXPLORATION DATE: October 19, 2000

LOGGED BY: CWelke
BACKFILL: Excavated Matenals
CHECKED BY: CAWockner

TEST PIT GRAPHICAL REPRESENTATION



LOG OF TEST PIT NO. BH-206

Cal State Channel Islands, East Campus Development
Camarillo Area of Ventura County

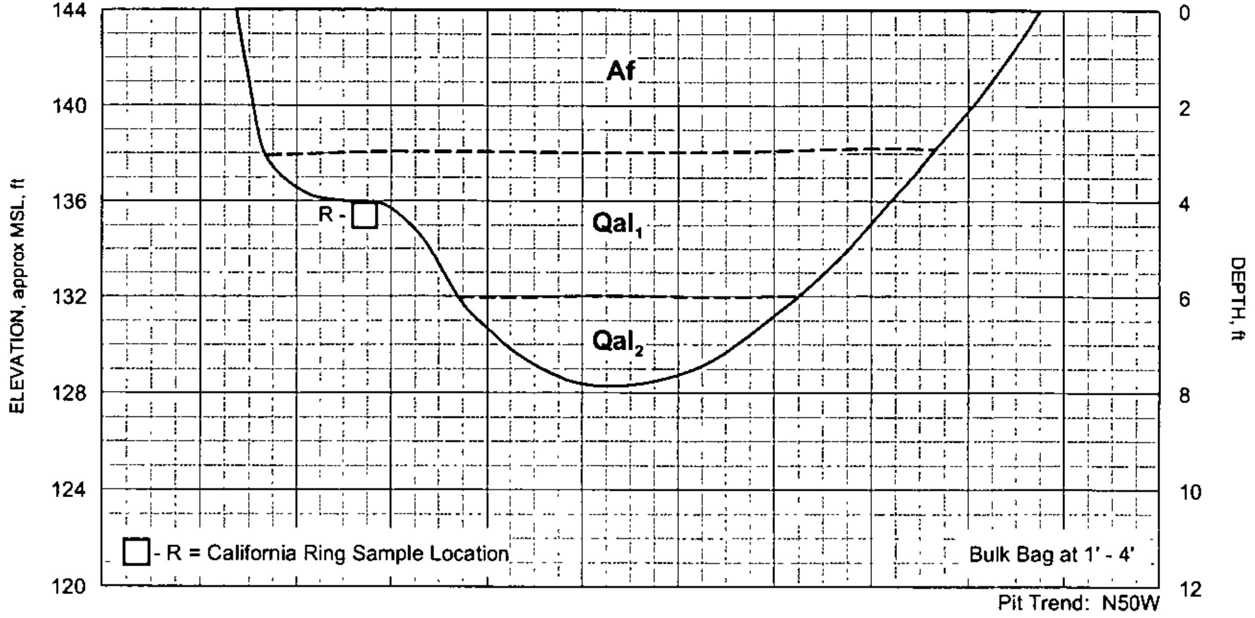
ELEVATION, ft	DEPTH, ft	GEOLOGIC UNIT	LOCATION: per Plate 3 SURFACE EL: 146 ft +/- (rel MSL datum) MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	Su, ksf PP, (TV), [uu]
	0	Af	**ARTIFICIAL FILL (Af)** Sandy Lean CLAY (CL): stiff, dark grayish brown, moist, slight voids, trace gravel, 2" diameter roots							
144	2									
142	4	Qal$_1$	**ALLUVIUM (Qal)** Sandy Lean CLAY (CL): stiff to very stiff, very slight voids, roots up to 1/2" diameter, at 3'	114	98	17				
140	6	Qal$_2$	Clayey SAND (SC): medium dense, moderate brown, moist, some gravel							
138	8									
136	10									
134	12									
132	14									

The log and data presented are a simplification of actual conditions encountered at the time of excavating at the excavated location Subsurface conditions may differ at other locations and with the passage of time

COMPLETION DEPTH 8.0 ft
DEPTH TO WATER Not encountered
EXPLORATION DATE: October 19, 2000

LOGGED BY CWelke
BACKFILL Excavated Materials
CHECKED BY CAWockner

TEST PIT GRAPHICAL REPRESENTATION



LOG OF TEST PIT NO. BH-207

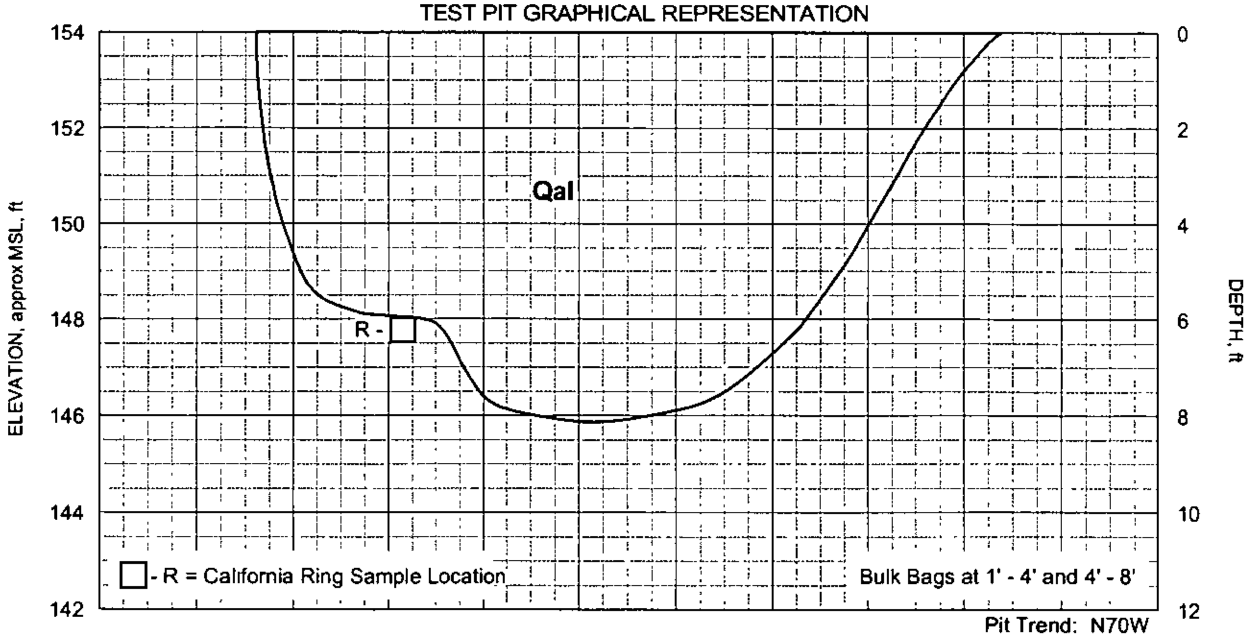
Cal State Channel Islands, East Campus Development
Camarillo Area of Ventura County

ELEVATION, ft	DEPTH, ft	GEOLOGIC UNIT	LOCATION: per Plate 3 SURFACE EL 154 ft +/- (rel. MSL datum) MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	Su, ksf PP, (TV), [uu]
	0	Qal	**ALLUVIUM (Qal)** Clayey SAND (SC): medium dense, grayish brown, damp to moist, some gravel							
152	2									
150	4									
148	6		- slightly lighter, at 6'	103	88	18				
146	8									
144	10									
142	12									
140	14									

The log and data presented are a simplification of actual conditions encountered at the time of excavating at the excavated location Subsurface conditions may differ at other locations and with the passage of time

COMPLETION DEPTH 8.0 ft
DEPTH TO WATER Not encountered
EXPLORATION DATE October 19, 2000

LOGGED BY CWelke
BACKFILL: Excavated Materials
CHECKED BY CAWockner



LOG OF TEST PIT NO. BH-208

Cal State Channel Islands, East Campus Development
Camarillo Area of Ventura County

PLATE A-3.25

LOCATION per Plate 3

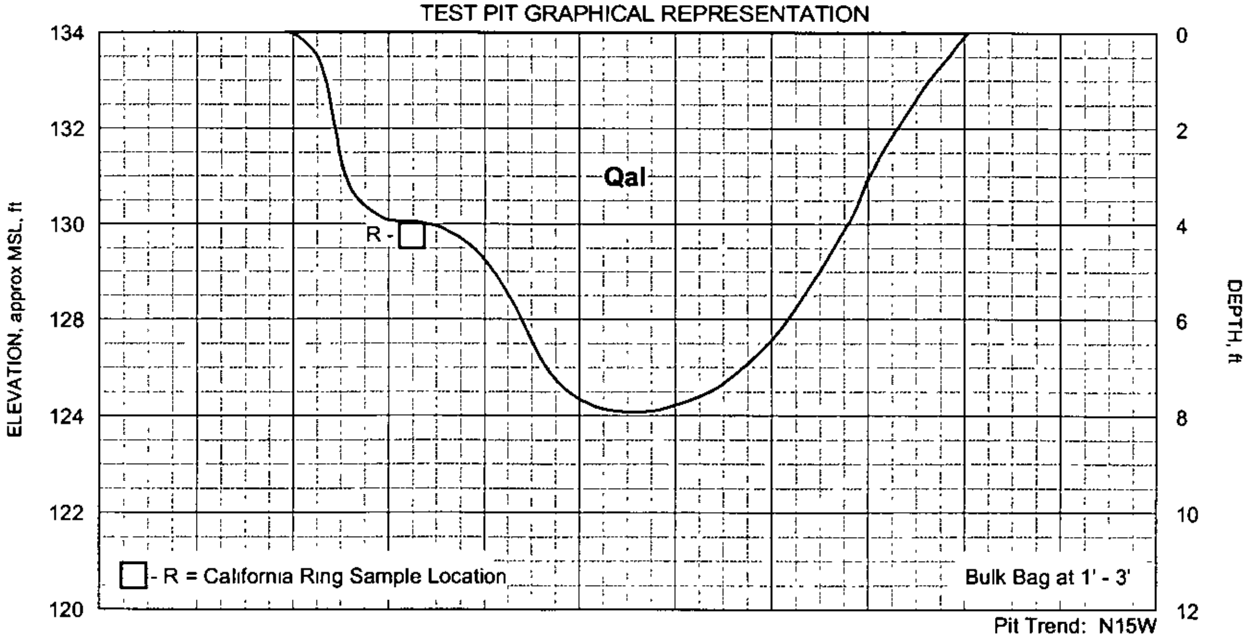
SURFACE EL: 134 ft +/- (rel. MSL datum)

ELEVATION, ft	DEPTH, ft	GEOLOGIC UNIT	MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	Su, ksf PP, (TV), [uu]
	0	Qal	**ALLUVIUM (Qal)** Clayey SAND (SC): medium dense, moderate brown, damp to moist, some gravel							
132	2									
130	4		- slightly lighter brown, moist, at 4'	117	96	22				
128	6									
126	8									
124	10									
122	12									
120	14									

The log and data presented are a simplification of actual conditions encountered at the time of excavating at the excavated location. Subsurface conditions may differ at other locations and with the passage of time

COMPLETION DEPTH: 8.0 ft
DEPTH TO WATER Not encountered
EXPLORATION DATE: October 19, 2000

LOGGED BY: CWelke
BACKFILL: Excavated Materials
CHECKED BY CAWockner



LOG OF TEST PIT NO. BH-209

Cal State Channel Islands, East Campus Development
Camarillo Area of Ventura County

LOCATION per Plate 3

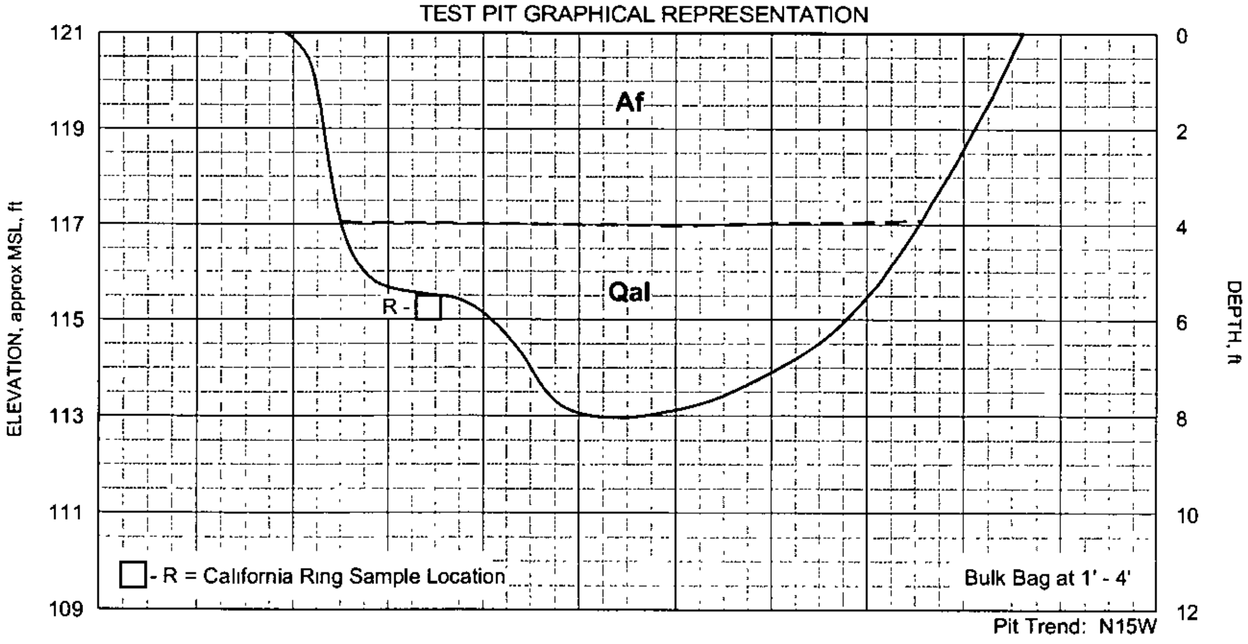
SURFACE EL: 121 ft +/- (rel. MSL datum)

ELEVATION, ft	DEPTH, ft	GEOLOGIC UNIT	MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	Su, ksf PP, (TV), [uu]
	0	Af	**ARTIFICIAL FILL (af)** Clayey SAND with gravel (SC): loose to medium dense							
120										
	2									
118										
	4	Qal	**ALLUVIUM (Qal)** Clayey SAND with gravel (SC): medium dense to dense, grayish brown, moist, slight voids							
116				100	87	15				
	6									
114										
	8									
112										
	10									
110										
	12									
108										
	14									
106										

The log and data presented are a simplification of actual conditions encountered at the time of excavating at the excavated location Subsurface conditions may differ at other locations and with the passage of time

COMPLETION DEPTH 8.0 ft
DEPTH TO WATER: Not encountered
EXPLORATION DATE: October 19, 2000

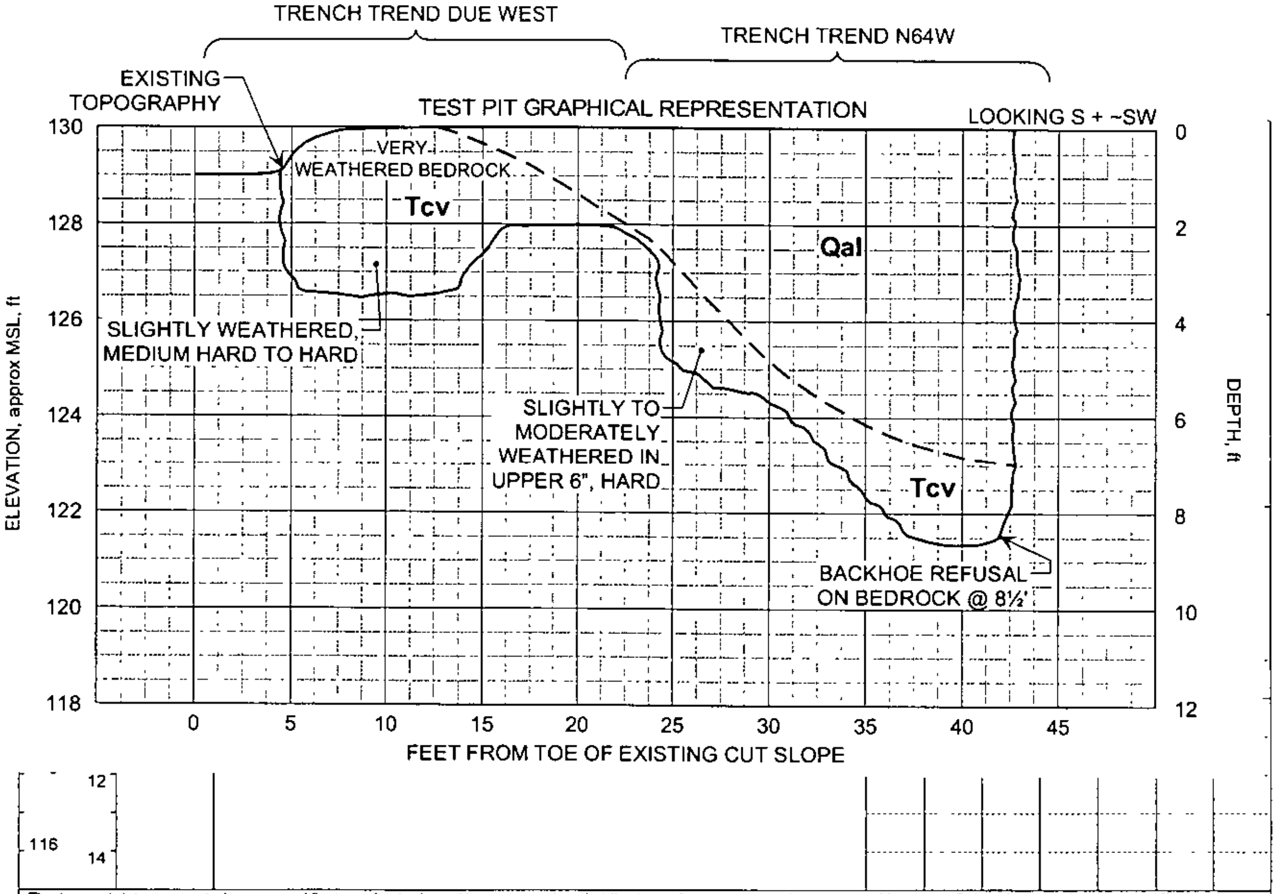
LOGGED BY: CWelke
BACKFILL: Excavated Materials
CHECKED BY: CAWockner



LOG OF TEST PIT NO. BH-210

Cal State Channel Islands, East Campus Development
Camarillo Area of Ventura County

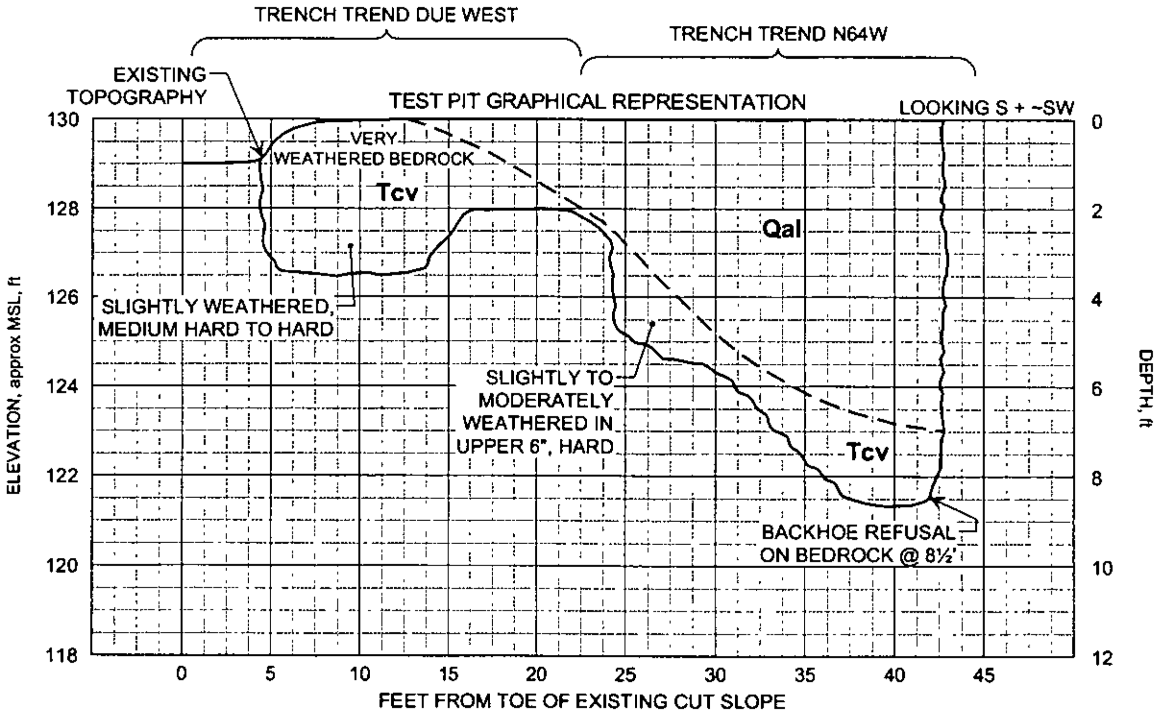
PLATE A-3.27



The log and data presented are a simplification of actual conditions encountered at the time of excavating at the excavated location Subsurface conditions may differ at other locations and with the passage of time

COMPLETION DEPTH 8.5 ft
DEPTH TO WATER: Not encountered
EXPLORATION DATE October 19, 2000

LOGGED BY. CWelke
BACKFILL Excavated Materials
CHECKED BY: CAWockner



LOG OF TEST PIT NO. BH-211

Cal State Channel Islands, East Campus Development
Camarillo Area of Ventura County

PLATE A-3.28

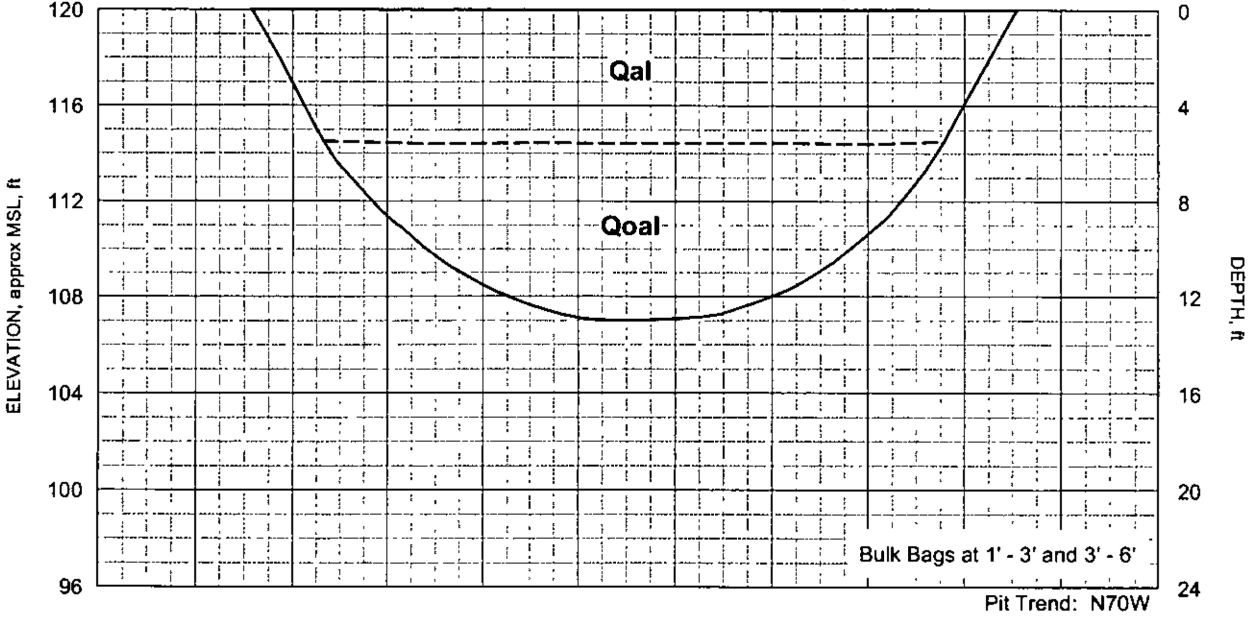
ELEVATION, ft	DEPTH, ft	GEOLOGIC UNIT	LOCATION. per Plate 3 SURFACE EL: 120 ft +/- (rel. MSL datum) MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	Su, ksf PP, (TV), [uu]
	0	Qal	**ALLUVIUM (Qal)** Clayey SAND with gravel (SC). medium dense, moderate brown, damp to moist							
118	2									
116	4									
114	6	Qoal	**OLDER ALLUVIUM (Qoal)** Clayey SAND with gravel (SC) dense to very dense, well cemented							
112	8									
110	10									
108	12									
106	14									

The log and data presented are a simplification of actual conditions encountered at the time of excavating at the excavated location Subsurface conditions may differ at other locations and with the passage of time

COMPLETION DEPTH 13.0 ft
DEPTH TO WATER· Not encountered
EXPLORATION DATE: October 19, 2000

LOGGED BY: CWelke
BACKFILL Excavated Matenals
CHECKED BY: CAWockner

TEST PIT GRAPHICAL REPRESENTATION



LOG OF TEST PIT NO. BH-212

Cal State Channel Islands, East Campus Development
Camarillo Area of Ventura County

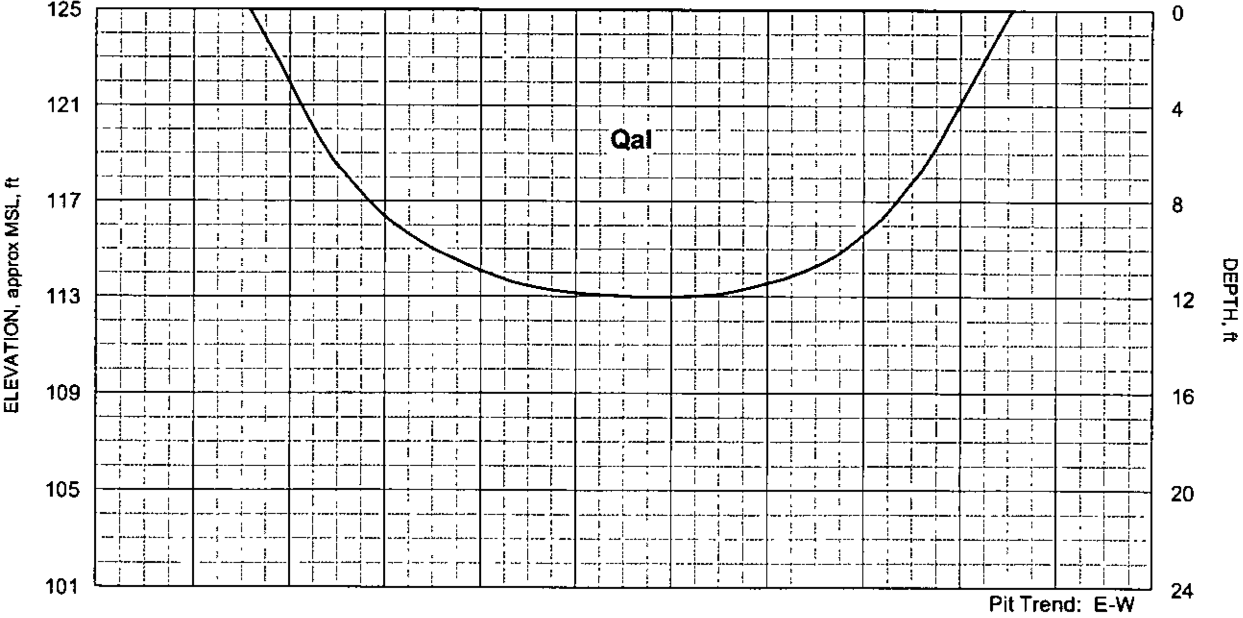
ELEVATION, ft	DEPTH, ft	GEOLOGIC UNIT	LOCATION per Plate 3 SURFACE EL. 125 ft +/- (rel. MSL datum) MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	Su, ksf PP, (TV), [uu]
124 122 120 118 116 114 112 110	0 2 4 6 8 10 12 14	Qal	**ALLUVIUM (Qal)** Sandy Lean CLAY (CL)· stiff, dark grayish brown, damp, some gravel - very stiff to hard, moist, at 3'							

The log and data presented are a simplification of actual conditions encountered at the time of excavating at the excavated location Subsurface conditions may differ at other locations and with the passage of time

COMPLETION DEPTH: 12.0 ft
DEPTH TO WATER: Not encountered
EXPLORATION DATE· October 19, 2000

LOGGED BY: CWelke
BACKFILL· Excavated Materials
CHECKED BY: CAWockner

TEST PIT GRAPHICAL REPRESENTATION



LOG OF TEST PIT NO. BH-213

Cal State Channel Islands, East Campus Development
Camarillo Area of Ventura County

PLATE A-3.30

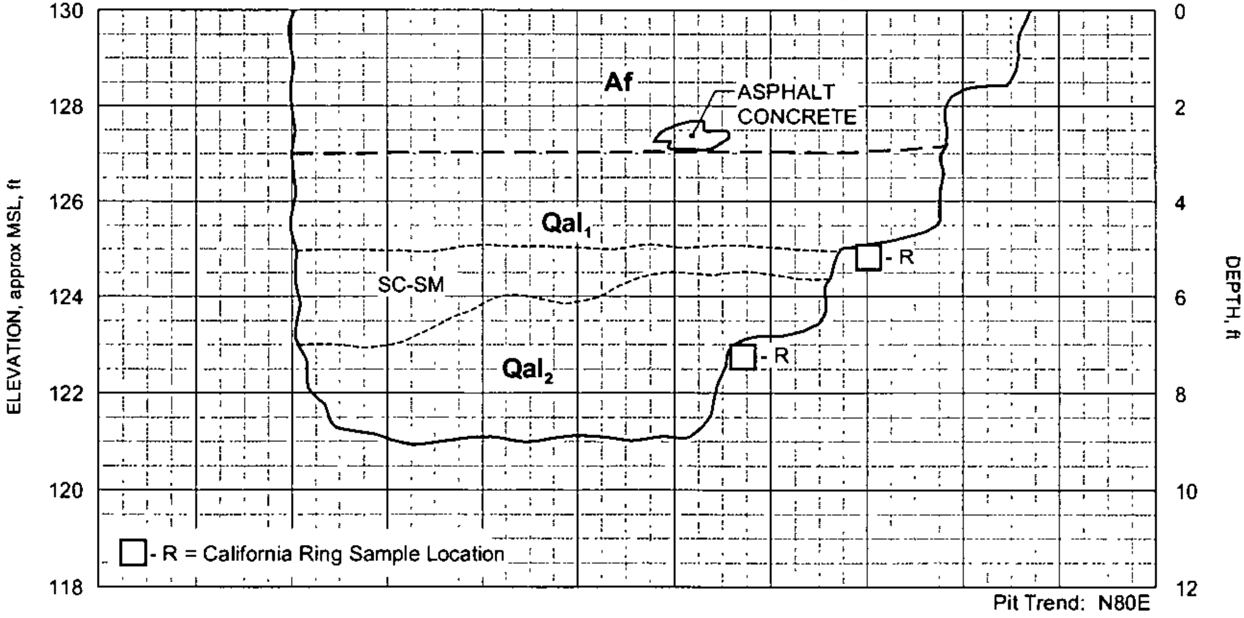
ELEVATION, ft	DEPTH, ft	GEOLOGIC UNIT	LOCATION. per Plate 3 SURFACE EL: 130 ft +/- (rel. MSL datum) MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	Su, ksf PP, (TV), [uu]
	0	Af	**ARTIFICIAL FILL (af)** Clayey SAND (SC): medium dense, moderate brown, damp, pieces of copper wire, plastic, and asphalt fragments up to approx. 6" diameter							
128	2									
126	4	Qal_1	**ALLUVIUM (Qal)** Clayey SAND with gravel (SC) medium dense, moderate brown, damp, some voids, lense of Silty, Clayey SAND with gravel (SC-SM) up to 2' thick							
124	6			102	89	14				
122	8	Qal_2	Sandy Lean CLAY (CL)· soft to stiff, moderate to light brown, damp to moist, some voids	119	102	17				
120	10									
118	12									
116	14									

The log and data presented are a simplification of actual conditions encountered at the time of excavating at the excavated location Subsurface conditions may differ at other locations and with the passage of time

COMPLETION DEPTH· 9.0 ft
DEPTH TO WATER Not encountered
EXPLORATION DATE October 23, 2000

LOGGED BY CWelke
BACKFILL: Excavated Materials
CHECKED BY: CAWockner

TEST PIT GRAPHICAL REPRESENTATION



LOG OF TEST PIT NO. BH-214

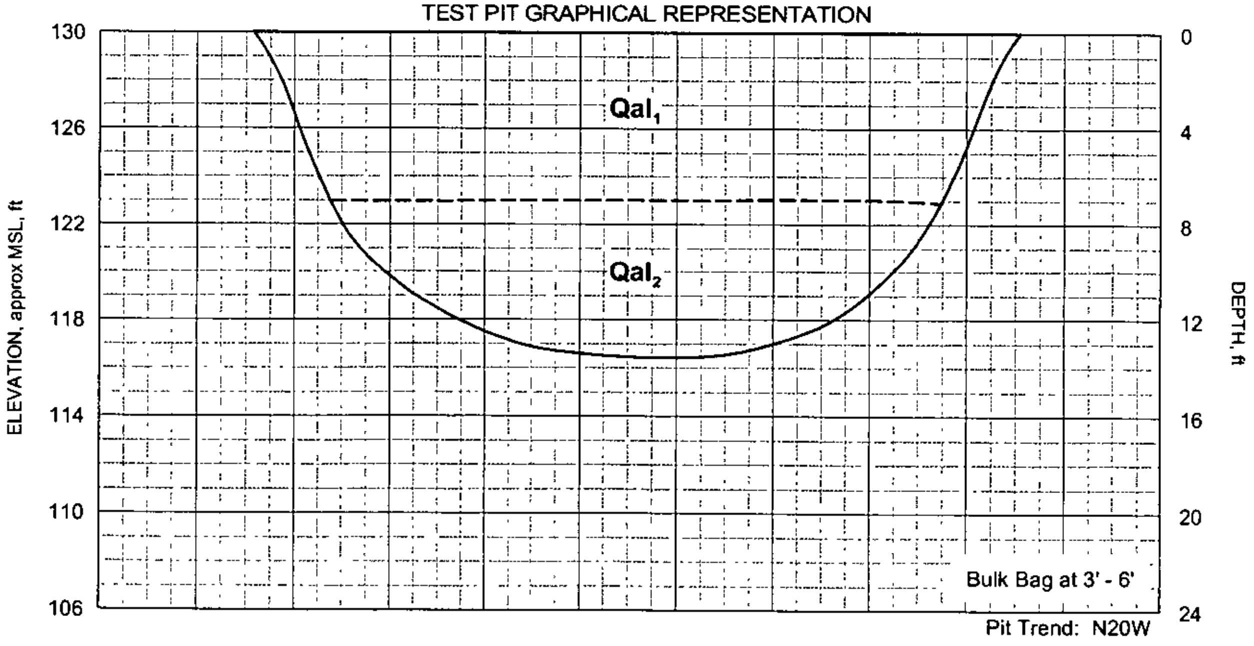
Cal State Channel Islands, East Campus Development
Camarillo Area of Ventura County

ELEVATION, ft	DEPTH, ft	GEOLOGIC UNIT	LOCATION: per Plate 3 SURFACE EL: 130 ft +/- (rel MSL datum) MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	Su, ksf PP, (TV), [uu]
	0	Qal_1	**ALLUVIUM (Qal)** Silty, clayey SAND with gravel (SC-SM). loose to medium dense, damp, channel deposits							
128	2									
126	4									
124	6									
122	8		- more gravel, at 7'							
120	10	Qal_2	Clayey SAND (SC): medium dense, grayish brown, moist							
118	12									
116	14									

The log and data presented are a simplification of actual conditions encountered at the time of excavating at the excavated location Subsurface conditions may differ at other locations and with the passage of time

COMPLETION DEPTH 13.5 ft
DEPTH TO WATER: Not encountered
EXPLORATION DATE: October 23, 2000

LOGGED BY: CWelke
BACKFILL Excavated Materials
CHECKED BY: CAWockner



LOG OF TEST PIT NO. BH-215

Cal State Channel Islands, East Campus Development
Camarillo Area of Ventura County

PLATE A-3.32

LOCATION: per Plate 3

SURFACE EL: 115 ft +/- (rel MSL datum)

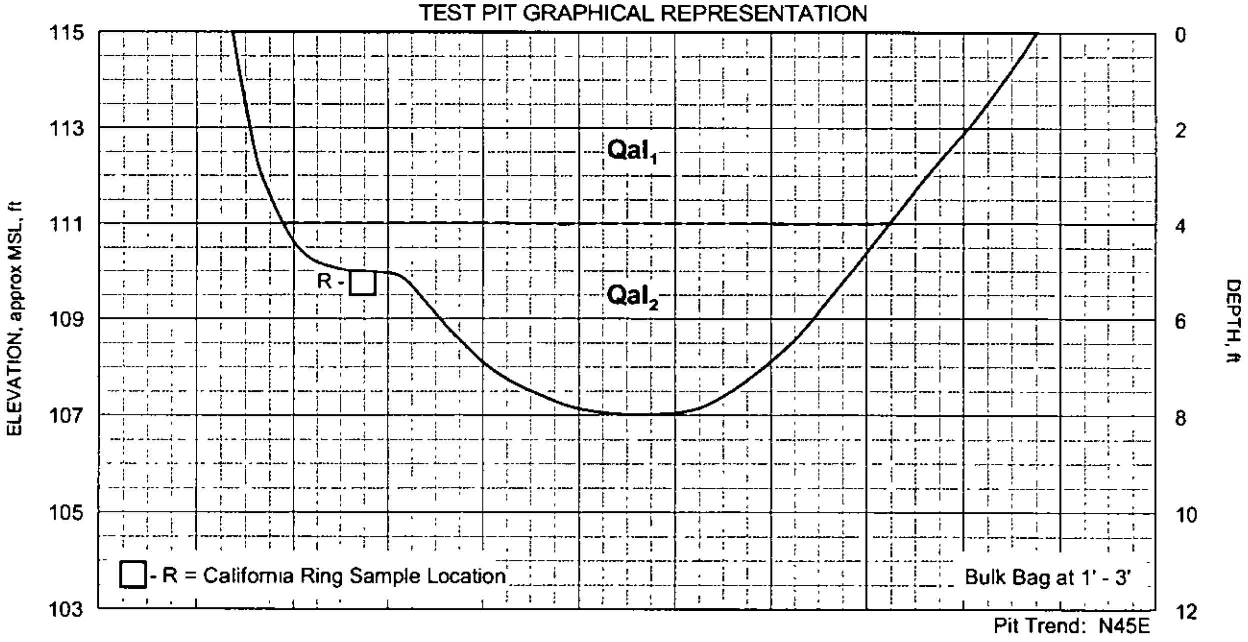
ELEVATION, ft	DEPTH, ft	GEOLOGIC UNIT	MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	Su, ksf PP, (TV), [uu]
	0	Qal$_1$	**ALLUVIUM (Qal)** Clayey SAND with gravel (SC). medium dense, moderate brown, moist, numerous voids							
114										
	2									
112										
	4	Qal$_2$	Sandy Lean CLAY (CL). soft to stiff, moderate brown, damp, some voids to numerous voids to approx. 7', trace gravel							
110				96	88	9				
	6									
108										
	8									
106										
	10									
104										
	12									
102										
	14									
100										

The log and data presented are a simplification of actual conditions encountered at the time of excavating at the excavated location Subsurface conditions may differ at other locations and with the passage of time

COMPLETION DEPTH 8.0 ft
DEPTH TO WATER Not encountered
EXPLORATION DATE: October 23, 2000

LOGGED BY: CWelke
BACKFILL: Excavated Materials
CHECKED BY. CAWockner

TEST PIT GRAPHICAL REPRESENTATION



LOG OF TEST PIT NO. BH-216

Cal State Channel Islands, East Campus Development
Camarillo Area of Ventura County

PLATE A-3.33

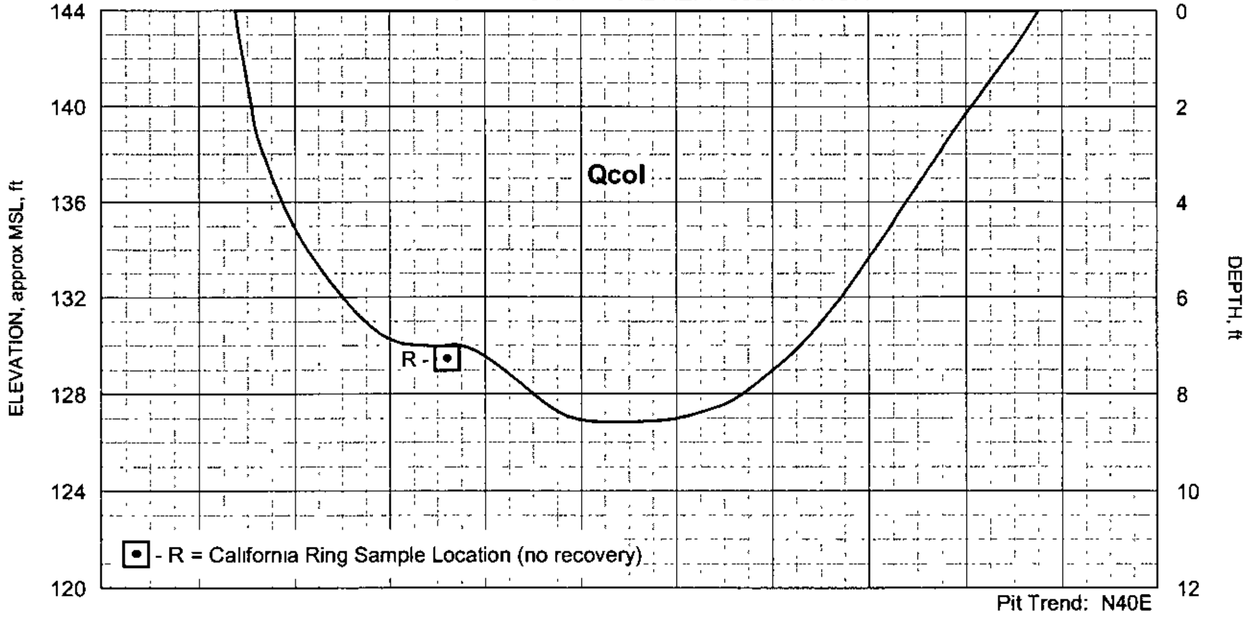
ELEVATION, ft	DEPTH, ft	GEOLOGIC UNIT	LOCATION. per Plate 3 SURFACE EL: 128 ft +/- (rel. MSL datum) MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	Su, ksf PP, (TV), [uu]
	0	Qcol	**COLLUVIUM (Qcol)** Clayey SAND with gravel (SC)· dense to very dense, pale yellowish brown, damp to moist, weak cementation (caliche), difficult excavating below 1'							
126	2									
124	4									
122	6		- slightly increase in gravel, at approx. 6'							
120	8									
118	10									
116	12									
114	14									

The log and data presented are a simplification of actual conditions encountered at the time of excavating at the excavated location Subsurface conditions may differ at other locations and with the passage of time

COMPLETION DEPTH: 8.5 ft
DEPTH TO WATER: Not encountered
EXPLORATION DATE: October 23, 2000

LOGGED BY CWelke
BACKFILL· Excavated Materials
CHECKED BY. CAWockner

TEST PIT GRAPHICAL REPRESENTATION



LOG OF TEST PIT NO. BH-217

Cal State Channel Islands, East Campus Development
Camarillo Area of Ventura County

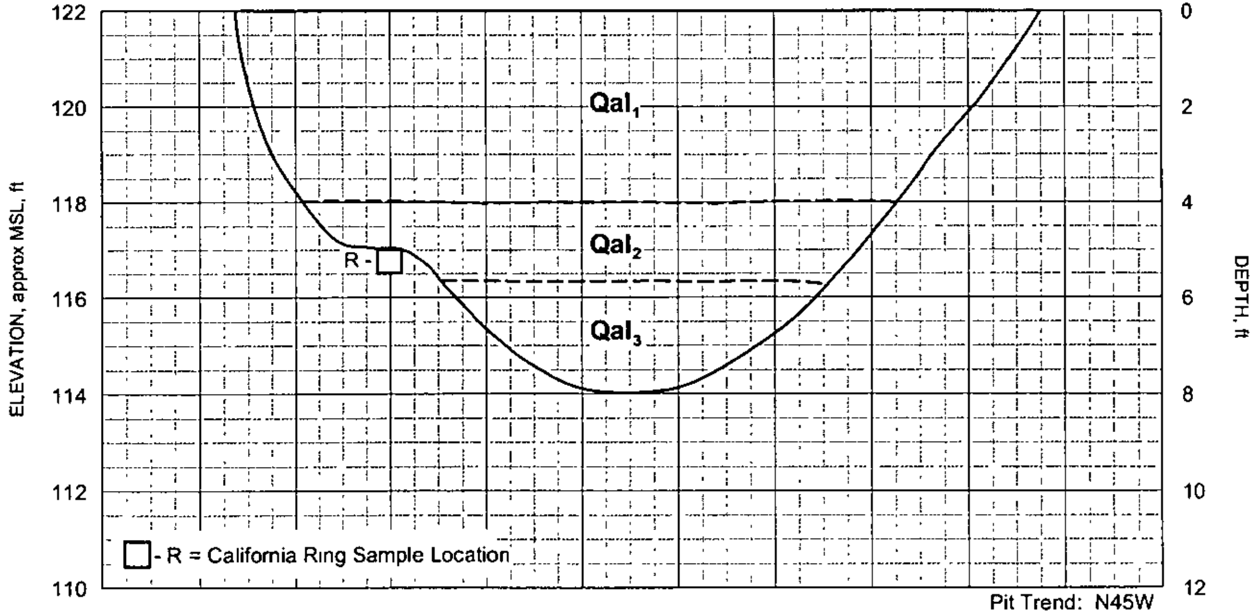
ELEVATION, ft	DEPTH, ft	GEOLOGIC UNIT	LOCATION: per Plate 3 SURFACE EL: 122 ft +/- (rel MSL datum) MATERIAL DESCRIPTION	UNIT WET WEIGHT, pcf	UNIT DRY WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX, %	Su, ksf PP, (TV), [uu]
	0	Qal$_1$	**ALLUVIUM (Qal)** Clayey SAND (SC): medium dense, dark grayish brown, damp, trace gravel, weak cementation (caliche) - moderate brown, at 2'							
120	2									
118	4	Qal$_2$	Sandy Lean CLAY (CL): very stiff, dark grayish brown, moist, slight voids							
116	6	Qal$_3$	Clayey SAND (SC): medium dense to dense, moderate brown, moist	117	99	18				
114	8									
112	10									
110	12									
108	14									

The log and data presented are a simplification of actual conditions encountered at the time of excavating at the excavated location Subsurface conditions may differ at other locations and with the passage of time

COMPLETION DEPTH: 8 0 ft
DEPTH TO WATER: Not encountered
EXPLORATION DATE October 23, 2000

LOGGED BY: CWelke
BACKFILL: Excavated Materials
CHECKED BY: CAWockner

TEST PIT GRAPHICAL REPRESENTATION



LOG OF TEST PIT NO. BH-218

Cal State Channel Islands, East Campus Development
Camarillo Area of Ventura County

APPENDIX B
LABORATORY TESTING

APPENDIX B
LABORATORY TESTING

Laboratory tests were performed on selected undisturbed and bulk soil samples to estimate engineering characteristics of the various earth materials encountered. Testing was performed in accordance with ASTM Standards for Soil Testing, latest revision on as noted otherwise. The results of the laboratory analyses are summarized on Plates B-1.1 through B-1.6 - Summary of Laboratory Test Results.

Laboratory Moisture and Density Determinations

Moisture content and dry density determinations were performed on selected undisturbed samples collected to evaluate the natural water content and dry density of the various soils encountered. The results are presented on Plates A-2.1 through A-2.23 and A-3.1 through A-3.35, and on Plates B-1.1 through B-1.6.

Grain-Size Distribution

Grain size distribution with hydrometer were determined for nine soil samples in accordance with standard test method ASTM D422. In addition, we performed tests to determine the amount of material in soils finer than the No. 200 Sieve in accordance with ASTM test method D1140. The grain-size curves are presented on Plate B-2 - Grain Size Curves, and the results of percent passing the No. 200 sieve (or fines content) are presented on Plates A-2.1 through A-2.23 and A-3.1 through A-3.35, and Plates B-1.1 through B-1.6.

Atterberg Limits Tests

Atterberg limits tests were performed a selected sample of fine-grained materials from drill hole DH-1. Liquid and plastic limits were determined in accordance with standard test methods ASTM D423 and D424. The test results are shown on Plates B-1.1 through B-1.6 and Plate B-3 - Plasticity Chart.

Expansion Index Test

An expansion index test was performed on a sample of near-surface soil to estimate the expansion characteristics. The test was performed in accordance with ASTM D4329. The result is presented on Plates B-1.1 through B-1.6.

Sand Equivalent Test

One sand equivalent test was performed on a bulk sample of near-surface material encountered behind (east of) the debris dam. The test was performed in accordance with ASTM D2419. The result is presented on Plate B-1.1.

Compaction Tests

Three compaction tests were performed on selected samples of near-surface soil to assess compaction characteristics. The tests were performed in accordance with ASTM D1557 and the results of maximum dry density and optimum moisture content are presented on Plates B-1.1 through B-1.6 and Plates B-4.1 through B-4.5 - Compaction Test Results.

Direct Shear Tests

One set of three single-stage direct shear tests was performed on three selected bulk near-surface samples to evaluate the shear strength of the compacted onsite surficial soil. The tests were performed on samples compacted to about 90 percent of maximum dry density at about optimum moisture content. The direct shear tests were performed in general accordance with standard test method ASTM D3080 using a constant horizontal displacement shear machine with automatic data acquisition equipment. Summary plots of the direct shear data are presented on Plates B-1.1 through B-1.6 and Plates B-5.1 through B-5.4 - Direct Shear Test Results.

Consolidation Tests

Nine consolidation tests were performed on selected samples of the clayey alluvial/colluvial soils. Samples were incrementally loaded to the approximate overburden pressure and then inundated, followed by incremental loading to the maximum consolidation pressure. The tests were conducted in accordance with ASTM D2435, Standard Test Method for One-Dimensional Consolidation Properties of Soils.

Additionally, six modified one-dimensional consolidation tests were performed to estimate the hydroconsolidation (collapse) potential of the topsoil. Six samples were loaded to the approximate overburden pressure and then inundated with water. The collapse potential was measured after each sample had come to equilibrium after inundation. The results of the consolidation and hydroconsolidation tests are presented on Plates B-6.1 through B-6.20 - Consolidation Test Results.

R-Value Test

Two R-value tests were performed on samples of near-surface soil excavated in the backhoe test pits along the proposed connector road alignment. The tests were performed by BTC Laboratories, Inc., in accordance with standard test method ASTM D2844 and results of the tests are presented on Plates B-1.1 through B-1.6 and Plates B-7.1 through B-7.10- Report of "R" Value Test (BTC's report).

Soil Chemistry Tests/Corrosion Tests

Three soil samples were tested for resistivity, pH, sulfate, and chloride, to assess corrosion potential by Health Science Associates, Inc., of Los Alamitos, California. The results of the tests are presented on Plates B-1.1 through B-1.6 and Plates B-8.1 and 8.4 - Laboratory Report (Health Science Associates' reports), and are discussed in the report text.

December 2000
Project No. 99-42-0384

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DRILL HOLE	DEPTH, ft	MATERIAL DESCRIPTION	UWW	UDW	MC%	FINES %	ATTERBURG LIMITS		COMPACTION TEST		DIRECT SHEAR		COMPRESSIVE STRENGTH TESTS		CORROSIVITY TESTS				R-VALUE	EXPANSION INDEX (SAND EQUIVELANT)	TEST LISTING
							LL	PI	MAX DD pcf	OPT MC %	C ksf	PHI deg	Q_u ksf	S_u Cell Prs ksf	R	pH	Cl	SO_4			
BH-1	2 0	Fat Sandy CLAY (CH)	117	110	6																T
BH-1	5 0	Fat Sandy CLAY (CH)	120	110	9										15609	7 6	248	2			T, Co
BH-1A	5.0	Sandy CLAY (CL)	95	78	21																T
BH-1B	5 0	Lean CLAY (CL)	108	103	5																T
BH-2	2 0	Sandy Lean CLAY (CL)	102	86	18																T
BH-2	5 0	Lean CLAY (CL)	119	95	25																T
BH-3	2.0	Lean CLAY (CL)	118	97	22																T
BH-3	5 0	Lean to Fat CLAY (CL)	119	90	33																T
BH-4	2.0	Lean CLAY (CL)	127	104	22																T
BH-4	5.0	Lean CLAY (CL)	126	106	19										4175	7.5	97	5			T, Co
BH-5	2.0	Lean CLAY (CL)	115	100	16																T
BH-5	5.0	Lean CLAY (CL)	116	100	16																T
BH-6	1 0	Sandy Lean CLAY (CL)				46													11		FC, R
BH-6	2 0	Sandy Lean CLAY (CL)	108	91	19																T
BH-6	5 0	Grades to Clayey SAND (SC)	67	61	11																T
BH-8	1.0	Lean CLAY (CL)																	11		R
BH-8	2 0	Lean CLAY (CL)	111	98	13																T
BH-8	5.0	Lean CLAY (CL)	116	103	13																T
BH-9	2 0	Clayey SAND (SC)	91	82	11																T
BH-9	5.0	Sandy SILT (ML)	70	61	14																T
BH-10	3 0	GRAVEL with SAND (SW)				6														(50)	SE, S
BH-11	3.0	Silty fine SAND (SM)				46															FC, S
BH-12	2.0	Lean CLAY (CL)	115	102	12																T
DH-1	3.0	Interlayered SAND (SP) and lean CLAY (CL)	114	89	29																T
DH-1	3.8	Lean to Fat CLAY (CL)	123	103	19																T, C
DH-1	6 0	Fat CLAY (CH)	121	98	24																T, C
DH-1	11.0	Interlayered Silty to Clayey SAND (SM/SC)	118	91	31																T, C
DH-1	16 0	Interlayered silty to clayey SAND (SM/SC)			32	65															M, FC
DH-1	21.0	Interlayered silty to clayey SAND (SM/SC)			32																M
DH-1	23 5	SAND (SP)			26																M

Classification Tests
UWW = Unit Wet Weight
UDW = Unit Dry Weight
MC = Moisture Content
Fines = % Passing #200 Sieve
LL = Liquid Limit
PI = Plasticity Index

Direct Shear Test
C = Assigned Cohesion, ksf
PHI = Assigned Friction Angle, degrees

Compaction Test
MAX DD = Maximum Dry Density
OPT MC = Optimum Moisture Content

Compressive Strength Tests
Qu = Unconfined Compression
Su = Undrained Shear Strength
u = Unsonsolidated Undrained
p = Pocket Penetrometer
t = Torvane
m = Miniature Vane

Corrosivity Tests
R = Resistivity, phm-cm, satur.
pH = pH
Cl = Chloride, ppm
SO_4 = Sulfate, ppm

Test Listing Abbreviations
M = Moisture Content
T = Total Dry & Density
S = Sieve Analysis
FC = % Passing #200 Sieve
H = Hydrometer Analysis
A = Atterberg Limits
P = Compaction Test
D = Direct Shear Test
C = Consolidation Test
Co = Corrosivity Tests
CU = CU Triaxial
U = UU Triaxial
R = R-Value (saturated)
SE = Sand Equivelant

SUMMARY OF LABORATORY TEST RESULTS

Cal State Channel Islands, East Campus Development, Camarillo Area of Ventura County

PLATE B-1.1

FUGRO

LABSUM 3(G:\GINT\99420384 GPJ) REB
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DRILL HOLE	DEPTH, ft	MATERIAL DESCRIPTION	UWW	UDW	MC%	FINES %	ATTERBURG LIMITS		COMPACTION TEST		DIRECT SHEAR		COMPRESSIVE STRENGTH TESTS		CORROSIVITY TESTS				R-VALUE	EXPANSION INDEX	TEST LISTING
							LL	Pt	MAX DD pcf	OPT MC %	C ksf	PHI deg	Q_u ksf	S_u Cell Prs ksf	R	pH	Cl	SO_4			
DH-1	26.0	Interlayered Sandy CLAY (CL) to Clayey SAND (CL)			36	43	48	24													M, A
DH-1	31.0	Sandy fat CLAY (CH) to clayey SAND (SC)			20	50															M, H
DH-1	36.0	Sandy fat CLAY (CH) to clayey SAND (SC)			28	55															M, H
DH-1	41 0	Silty SAND (SM)			27	44															M, H
DH-2	3.0	Sandy lean CLAY (CL)	112	91	23																T
DH-2	6.0	Fat CLAY (CH)	120	94	28																T
DH-2	11 0	Fat CLAY (CH)	113	89	28																T
DH-2	16 0	Fat CLAY (CH)	128	105	22																T
DH-2	21 0	Sandy fat CLAY (CH)			24																M
DH-2	26 0	Sandy lean CLAY (CL)			22																M
DH-2	31 0	Sandy lean CLAY (CL)			24																M
DH-2	36 0	Sandy lean CLAY (CL)			22																M
DH-2	41.0	Sandy CLAY (CL)			21	53															M, H
DH-3	1.0	Lean CLAY (CL)							119	15	0 73	32			3358	7.6	68	27		49	P, D, Co, E
DH-3	3 0	Lean CLAY (CL)	91	78	16																T
DH-3	6 0	Silty fine SAND (SM)	112	101	11	21															T, FC
DH-3	11 0	Lean CLAY (CL)	112	92	22																T, C
DH-3	16 0	Lean CLAY (CL)	124	104	20																T
DH-3	21 0	Lean CLAY (CL)			14																M
DH-3	26 0	Lean CLAY (CL)			24																M
DH-3	31 0	Lean CLAY (CL)			22																M
DH-4	3.0	Sandy CLAY (CL)	110	98	12																T
DH-4	6.0	Sandy lean CLAY (CL)	102	89	15	68															T, H, FC
DH-4	11.0	Lean CLAY (CL)	127	110	15																T
DH-4	16.0	Lean CLAY (CL)			14																M
DH-4	21.0	Lean CLAY (CL)			15																M
DH-4	26.0	Silty SAND (SM)			8																M
DH-4	31.0	Silty SAND (SM)			14	26															M, FC
DH-4	36 0	Silty SAND (SM) to clayey SAND (SC)			10	20															M, FC

Classification Tests
UWW = Unit Wet Weight
UDW = Unit Dry Weight
MC = Moisture Content
Fines = % Passing #200 Sieve
LL = Liquid Limit
Pt = Plasticity Index

Direct Shear Test
C = Assigned Cohesion, ksf
PHI = Assigned Friction Angle, degrees

Compaction Test
MAX DD = Maximum Dry Density
OPT MC = Optimum Moisture Content

Compressive Strength Tests
Qu = Unconfined Compression
Su = Undrained Shear Strength
u = Unsonsolidated Undrained
p = Pocket Penetrometer
t = Torvane
m = Miniature Vane

Corrosivity Tests
R = Resistivity, phm-cm, satur.
pH = pH
Cl = Chloride, ppm
SO_4 = Sulfate, ppm

Test Listing Abbreviations
M = Moisture Content
T = Total Dry & Density
S = Sieve Analysis
FC = % Passing #200 Sieve
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A = Atterberg Limits
P = Compaction Test
D = Direct Shear Test
C = Consolidation Test
Co = Corrosivity Tests
CU = CU Triaxial
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SE = Sand Equivelant

SUMMARY OF LABORATORY TEST RESULTS

Cal State Channel Islands, East Campus Development, Camarillo Area of Ventura County

LABSUM 3(G:\GINT\99420384.GPJ) REB
12/14/00\06 14 PM

DRILL HOLE	DEPTH, ft	MATERIAL DESCRIPTION	UWW	UDW	MC%	FINES %	ATTERBURG LIMITS		COMPACTION TEST		DIRECT SHEAR		COMPRESSIVE STRENGTH TESTS		CORROSIVITY TESTS				R-VALUE	EXPANSION INDEX	TEST LISTING
							LL	PI	MAX DD pcf	OPT MC %	C ksf	PHI deg	Q_u ksf	S_u Cell Prs. ksf	R	pH	Cl	SO_4			
DH-4	41.0	Fat to lean CLAY (CH/CL)			23	58															M, FC
DH-4	46.0	Lean CLAY (CL)			25																M
DH-4	51.0	Lean CLAY (CL)			19																M
DH-5	1.0	Fat CLAY (CH)													4175	7.5	5	97			Co
DH-5	3.0	Fat CLAY (CH)	93	79	17																T
DH-5	6.0	Fat CLAY (CH)	116	93	25																T
DH-5	11.0	Fat CLAY (CH)	111	86	29																T
DH-5	21.0	Fat CLAY (CH)			29																M
DH-5	26.0	Fat CLAY (CH)			18																M
DH-5	31.0	Fat CLAY (CH)			22																M
DH-5	36.0	Lean CLAY with sand (CL)			26																M
DH-5	41.0	Lean CLAY with sand to fat CLAY (CL/CH)			31																M
DH-6	1.0	Sandy fat CLAY (CH) to sandy SILT (ML)							115	15	0.60	32								88	P, D, E
DH-6	3.0	Sandy fat CLAY (CH) to sandy SILT (ML)	98	89	11																T
DH-6	6.0	Sandy Fat CLAY (CH) to Sandy SILT (ML)	114	97	18																T, C
DH-6	11.0	Lean CLAY (CL) to Sandy SILT (ML)	128	106	20																T, C
DH-6	16.0	Lean CLAY (CL) to sandy SILT (ML)	121	100	21	70															T, H
DH-6	21.0	Lean CLAY (CL) to sandy SILT (ML)			20																M
DH-6	26.0	Clayey SAND (SC) and sandy CLAY (CL)			16	28															M, FC
DH-6	31.0	Clayey SAND (SC) and sandy CLAY (CL)			10																M
DH-7	3.0	Fat CLAY (CH)	112	95	17																T
DH-7	6.0	Silty SAND (SM)	122	103	19	33															T, C, FC
DH-7	11.0	Lean CLAY (CL)	118	98	21																T
DH-7	16.0	Lean CLAY (CL)	129	105	23																T
DH-7	21.0	Lean CLAY (CL)			24																M
DH-7	26.0	Lean CLAY (CL)	123	98	25																T, C
DH-7	31.0	Lean CLAY (CL)			23																M
DH-8	2.0	Fat CLAY (CH)							113	17	1.01	26								131	P, D, E
DH-8	3.0	Fat CLAY (CH)	104	86	21																T
DH-8	6.0	Fat CLAY (CH)	110	89	24																T, C

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Compressive Strength Tests
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t = Torvane
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Corrosivity Tests
R = Resistivity, phm-cm, satur.
pH = pH
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Test Listing Abbreviations
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SUMMARY OF LABORATORY TEST RESULTS

Cal State Channel Islands, East Campus Development, Camarillo Area of Ventura County

LABSUM 3(G:\GINT\99420384 GPJ) REB
12/14/00\06 14 PM

DRILL HOLE	DEPTH, ft	MATERIAL DESCRIPTION	UWW	UDW	MC%	FINES %	ATTERBURG LIMITS		COMPACTION TEST		DIRECT SHEAR		COMPRESSIVE STRENGTH TESTS		CORROSIVITY TESTS				R-VALUE	EXPANSION INDEX	TEST LISTING
							LL	PI	MAX DD pcf	OPT MC %	C ksf	PHI deg	Q_u ksf	S_u Cell Prs. ksf	R	pH	Cl	SO_4			
DH-8	11.0	Fat CLAY (CH)	125	109	15																T
DH-8	16.0	Silty fine SAND (SM)	103	87	18																T, C
DH-8	20 5	Silty SAND (SM)	115	90	29	46															T, C, H
DH-8	26.0	Lean CLAY (CL)	121	98	24																T
DH-8	30.0	Lean CLAY (CL)	124	100	23																T
DH-101	6 0	Lean to fat CLAY (CL/CH)	127	105	21																T, C
DH-101	11 0	Lean CLAY (CL)	118	95	25																T
DH-102	0.0	Lean CLAY (CL)																		51	E
DH-103	1.0	Lean CLAY (CL)													3358	7 6	27	68			Co
DH-103	6.0	Interlayered Lean CLAY (CL) and Silty SAND to SAND (SM/SP)	109	83	31																T
DH-103	11 0	Interlayered Lean CLAY (CL) and Silty SAND to SAND (SM/SP)			29	37															M, FC
DH-104	6 0	SAND (SP) to SAND with SILT (SP-SM)	97	93	5																T
DH-104	11 0	SAND (SP) to SAND with SILT (SP-SM)			25	10															M, FC
DH-104	21 0	SAND (SP) to SAND with SILT (SP-SM)				10															FC
DH-105	3 5	Lean to Fat CLAY (CL/CH)	112	88	28																T
DH-105	5 5	Lean to Fat CLAY (CL/CH)	125	101	24																T, C
DH-105	9 0	Lean to Fat CLAY (CL/CH)	122	94	30																T
DH-105	14.0	Lean to Fat CLAY (CL/CH)			36																M
DH-106	3 5	Lean CLAY (CL)	127	107	19																T
DH-106	6.0	Lean CLAY (CL)	128	106	21																T
DH-106	7.5	Sandy CLAY (CL)	135	114	18																T, C
DH-106	13 0	Sandy CLAY (CL)			36																M
DH-107	3 0	Sandy CLAY (CL)																		58	E
DH-107	3 5	Sandy CLAY (CL)	119	100	18																T
DH-107	6.0	Sandy CLAY (CL)	118	94	25																T
DH-107	8.5	Fat CLAY (CH)	112	78	44																T
DH-107	9 5	Fat CLAY (CH)	120	94	29																T, C
DH-107	16 0	Clayey SAND (SC) to Silty SAND (SM)			26	33															M

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t = Torvane
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R = Resistivity, ohm-cm, satur.
pH = pH
Cl = Chloride, ppm
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PLATE B-1.4

SUMMARY OF LABORATORY TEST RESULTS

Cal State Channel Islands, East Campus Development, Camarillo Area of Ventura County

DRILL HOLE	DEPTH, ft	MATERIAL DESCRIPTION	UWW	UDW	MC%	FINES %	ATTERBURG LIMITS		COMPACTION TEST		DIRECT SHEAR		COMPRESSIVE STRENGTH TESTS			CORROSIVITY TESTS				R-VALUE	EXPANSION INDEX	TEST LISTING
							LL	PI	MAX DD pcf	OPT MC %	C ksf	PHI deg	Q_u ksf	S_u	Cell Prs. ksf	R	pH	Cl	SO_4			
DH-107	20 0	Fat CLAY (CH)			32																	M
DH-107	25.0	SAND (SP)			19																	M
DH-107	26.0	SAND (SP)				8																FC
DH-201	1.0	Sandy Lean CLAY (CL)																		16		R
DH-201	4.0	Clayey SAND with gravel (SC)	117	101	16																	T
DH-201	6 0	Clayey SAND with gravel (SC)	132	115	15																	T
DH-203	4 0	Sandy Lean CLAY (CL)	119	104	14																	T
DH-204	0 5	Sandy Lean CLAY (CL)																		17		R
DH-204	5 0	Sandy Lean CLAY (CL)	109	95	15																	T
BH-201	1 0	Sandy Lean CLAY (CL)																		18		R
BH-202	4.5	Sandy Lean CLAY (CL)	159	140	14																	T
BH-203	4 0	Sandy Lean CLAY (CL)	110	96	14																	T
BH-204	1 0	Sandy Lean CLAY (CL)																		5		R
BH-204	4.0	Sandy Lean CLAY (CL)	111	95	17																	T
BH-204	4.5	Sandy Lean CLAY (CL)	107	95	13																	T, C
BH-205	1 0	Sandy Lean CLAY (CL)							107	20												P
BH-205	3 0	Sandy Lean CLAY (CL)	115	102	13																	T
BH-205	3 5	Sandy Lean CLAY (CL)	115	102	13						0.10	37										T, C, D
BH-206	4.0	Clayey SAND (SC)	114	99	15																	T
BH-207	1.0	Sandy Lean CLAY (CL)																			62	E
BH-207	4.0	Sandy Lean CLAY (CL)	114	98	17																	T
BH-208	4.0	Clayey SAND (SC)																			65	E
BH-208	6 0	Clayey SAND (SC)	103	88	18																	T
BH-209	1 0	Clayey SAND (SC)														26499	7.0	108	51	5		Co, R
BH-209	4 5	Clayey SAND (SC)	117	96	22																	T
BH-210	5 0	Clayey SAND with gravel (SC)	100	87	15																	T
BH-210	5.5	Clayey SAND with gravel (SC)	100	87	15																	T, C
BH-212	1 0	Clayey SAND with gravel (SC)														17424	7 3	145	60	11		Co, R
BH-214	5.5	Clayey SAND with gravel (SC)	102	89	14																	T
BH-214	7.0	Clayey SAND with gravel (SC)	119	102	17																	T

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SUMMARY OF LABORATORY TEST RESULTS

Cal State Channel Islands, East Campus Development, Camarillo Area of Ventura County

DRILL HOLE	DEPTH, ft	MATERIAL DESCRIPTION	UWW	UDW	MC%	FINES %	ATTERBERG LIMITS		COMPACTION TEST		DIRECT SHEAR		COMPRESSIVE STRENGTH TESTS		CORROSIVITY TESTS				R-VALUE	EXPANSION INDEX	TEST LISTING
							LL	PI	MAX DD pcf	OPT MC %	C ksf	PHI deg	Q_u ksf	S_u Cell Prs. ksf	R	pH	Cl	SO_4			
BH-214	7.5	Sandy Lean CLAY (CL)	119	102	17																T, C
BH-215	3.0	Clayey SAND (SC)																	72		R
BH-216	1.0	Clayey SAND with gravel (SC)																	14		R
BH-216	5.0	Sandy CLAY with gravel (CL)	96	88	9																T, C
BH-218	5.5	Sandy Lean CLAY (CL)	117	99	18																T

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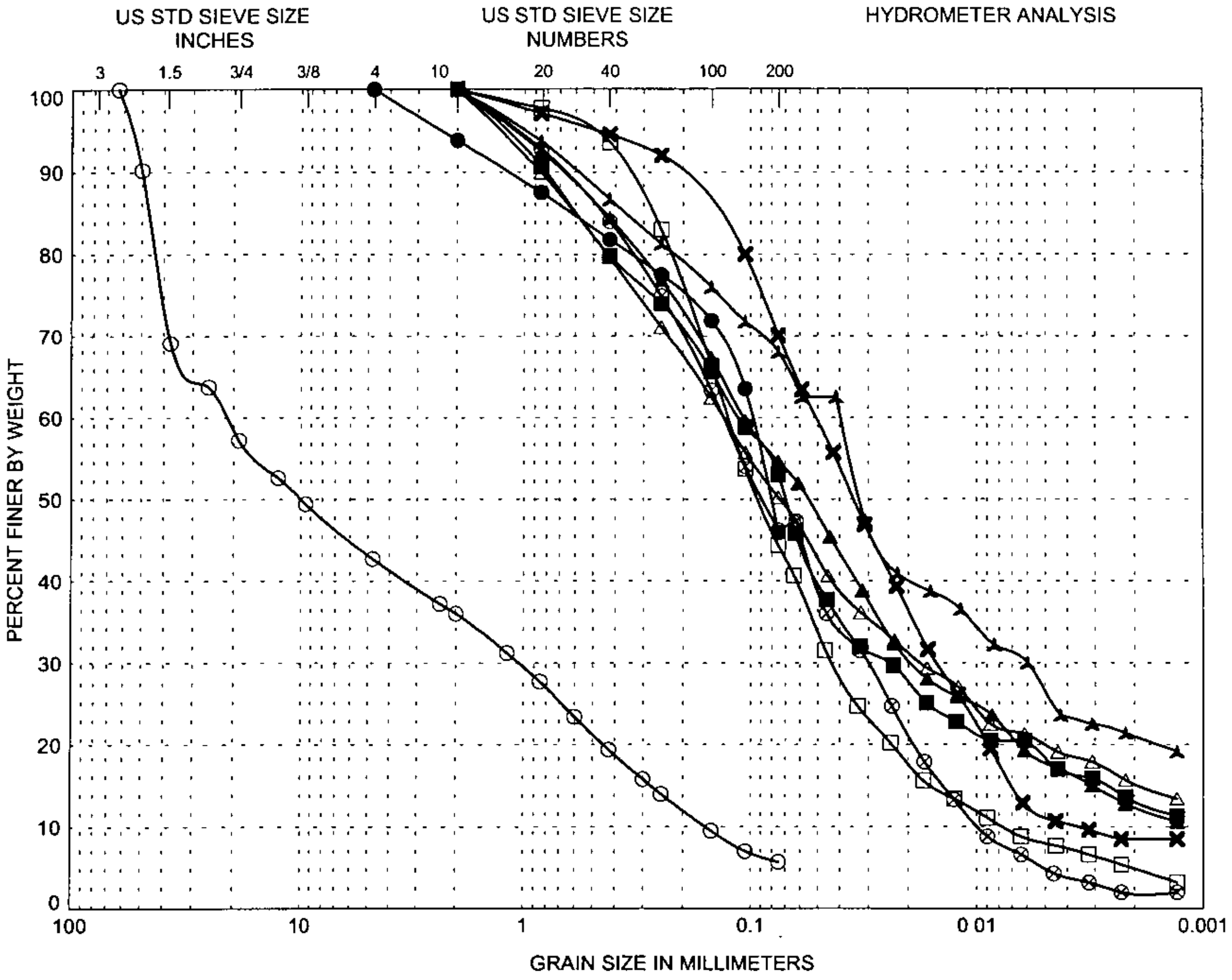
SUMMARY OF LABORATORY TEST RESULTS

Cal State Channel Islands, East Campus Development, Camarillo Area of Ventura County

FUGRO



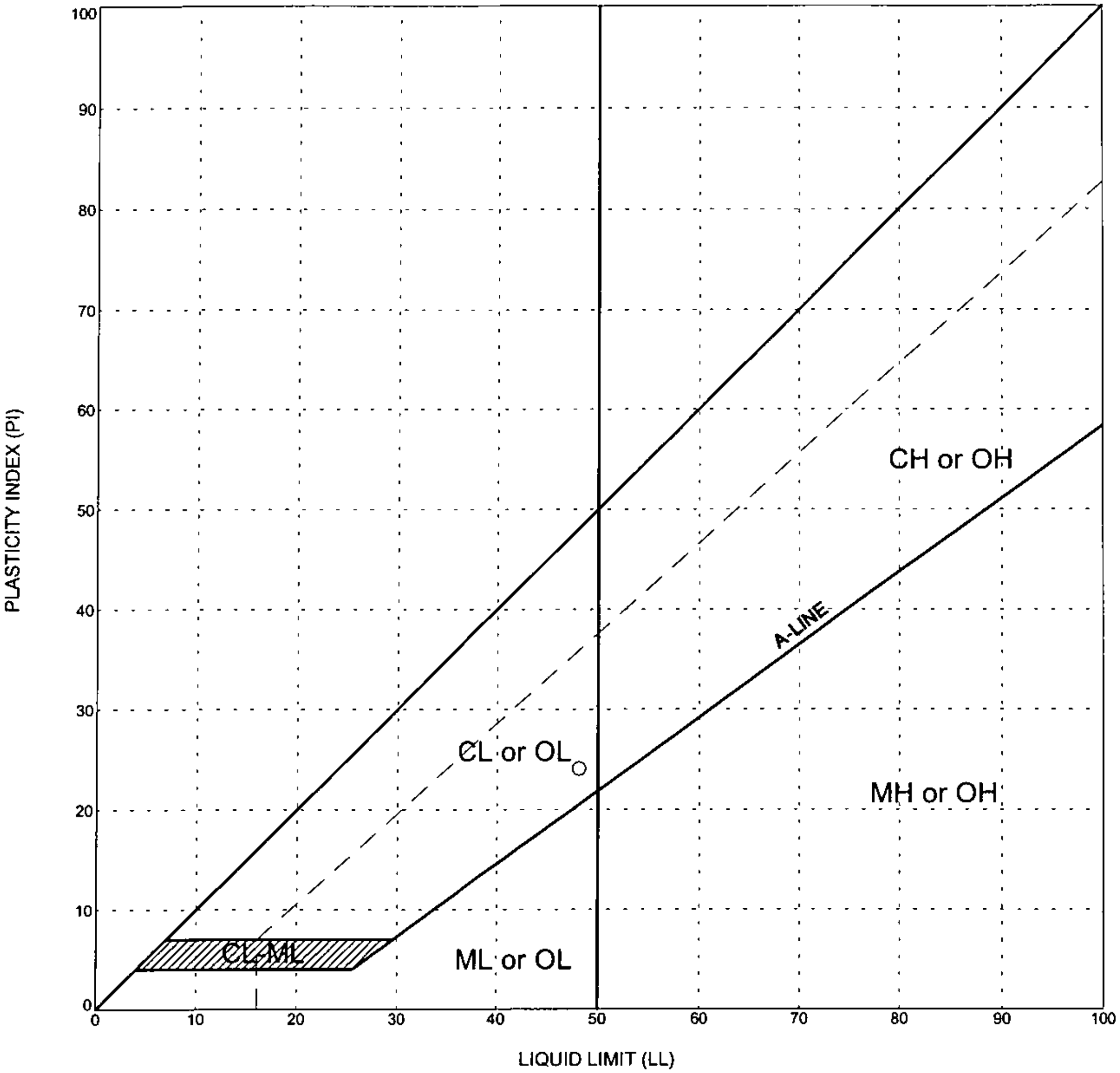
GRAVEL		SAND			SILT or CLAY
Coarse	Fine	Coarse	Medium	Fine	

LEGEND			CLASSIFICATION	Cc	Cu
	(location)	(depth,ft)			
○	BH-10	3.0	GRAVEL with SAND (SW)	0.3	136.3
●	BH-11	3.0	Silty fine SAND (SM)		
△	DH-1	31.0	Sandy fat CLAY (CH) to clayey SAND (SC)		
▲	DH-1	36.0	Sandy fat CLAY (CH) to clayey SAND (SC)		
□	DH-1	41.0	Silty SAND (SM)	1.9	16.5
■	DH-2	41.0	Sandy CLAY (CL)		
⅄	DH-4	6.0	Sandy lean CLAY (CL)		
✖	DH-6	16.0	Lean CLAY (CL) to sandy SILT (ML)	1 2	14.1
⊗	DH-8	20 5	Silty SAND (SM)	0.7	13.5

GRAIN SIZE CURVES

Cal State Channel Islands, East Campus Development
Camarillo Area of Ventura County

PLATE B-2

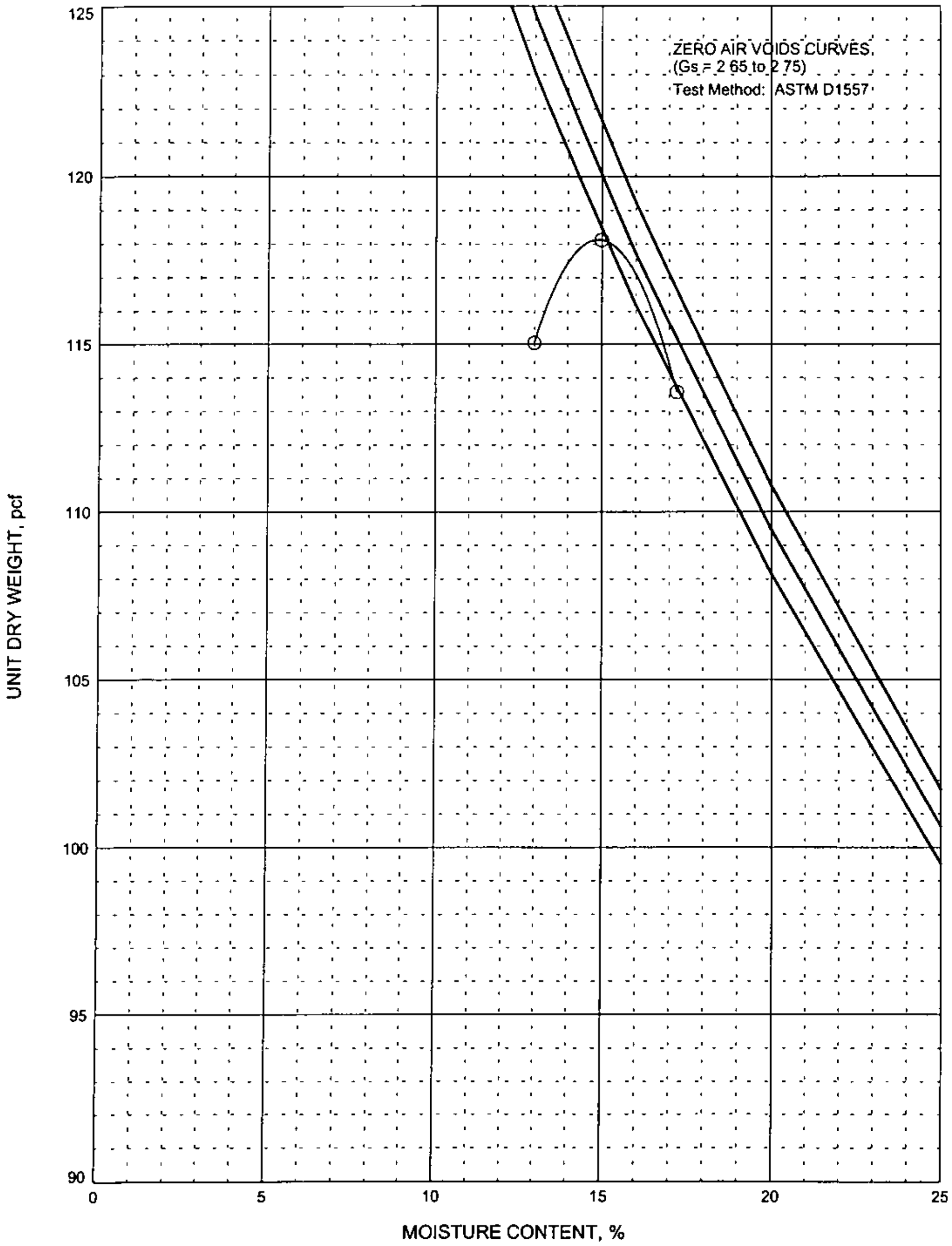


LEGEND			CLASSIFICATION	ATTERBERG LIMITS TEST RESULTS		
	(location)	(depth,ft)		LIQUID LIMIT(LL)	PLASTIC LIMIT(PL)	PLASTICITY INDEX (PI)
○	DH-1	26.0	Interlayered Sandy CLAY (CL) to Clayey SAND (CL)	48	24	24

PLASTICITY CHART

Cal State Channel Islands, East Campus Development
Camarillo Area of Ventura County

PLATE B-3

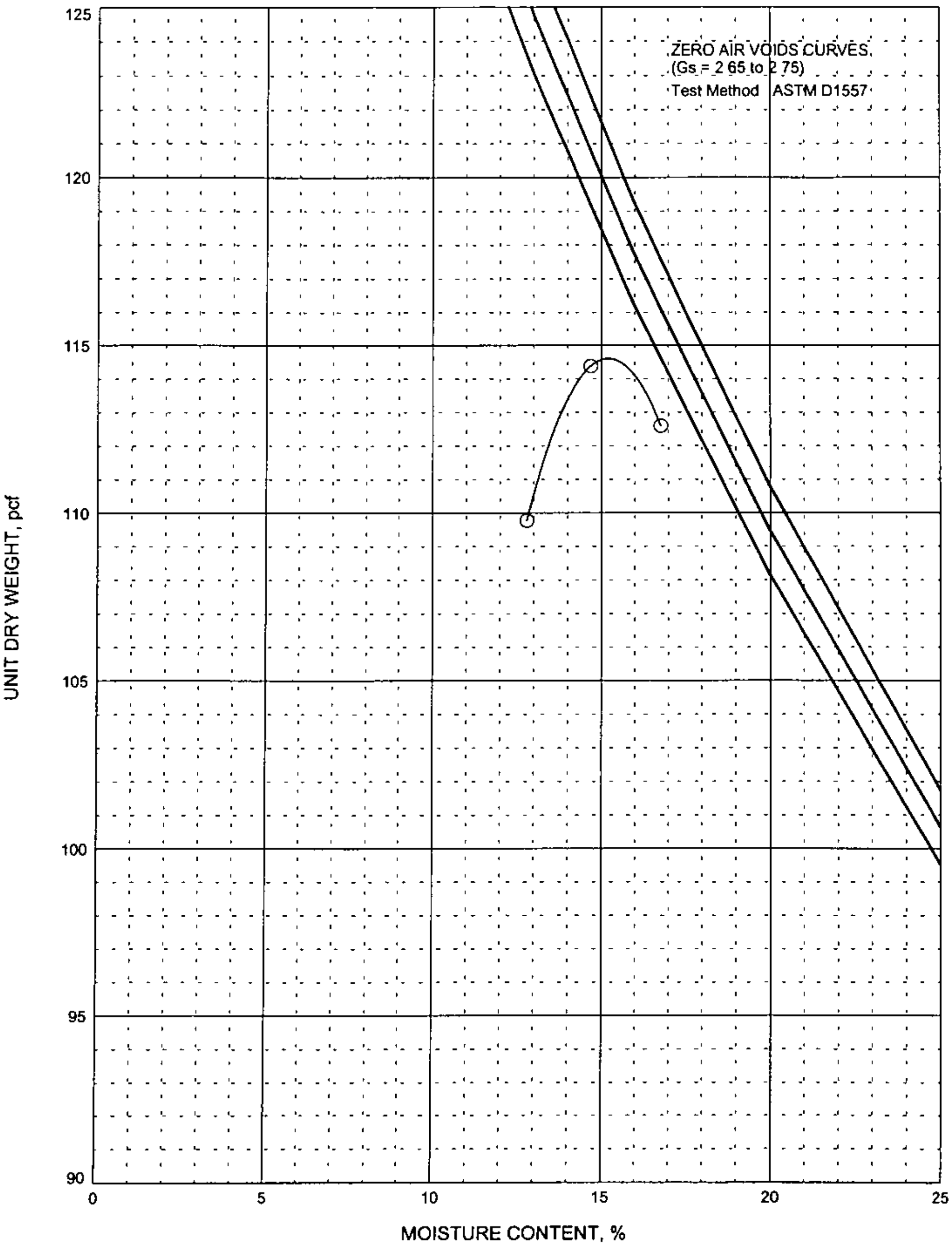


LEGEND			CLASSIFICATION	MAXIMUM UNIT DRY WEIGHT, pcf	OPTIMUM WATER CONTENT, %
	(location)	(depth,ft)			
○	DH-3	1-5	Lean CLAY (CL)	118.5	15.0

COMPACTION TEST RESULTS

Cal State Channel Islands, East Campus Development
Camarillo Area of Ventura County

PLATE B-4.1

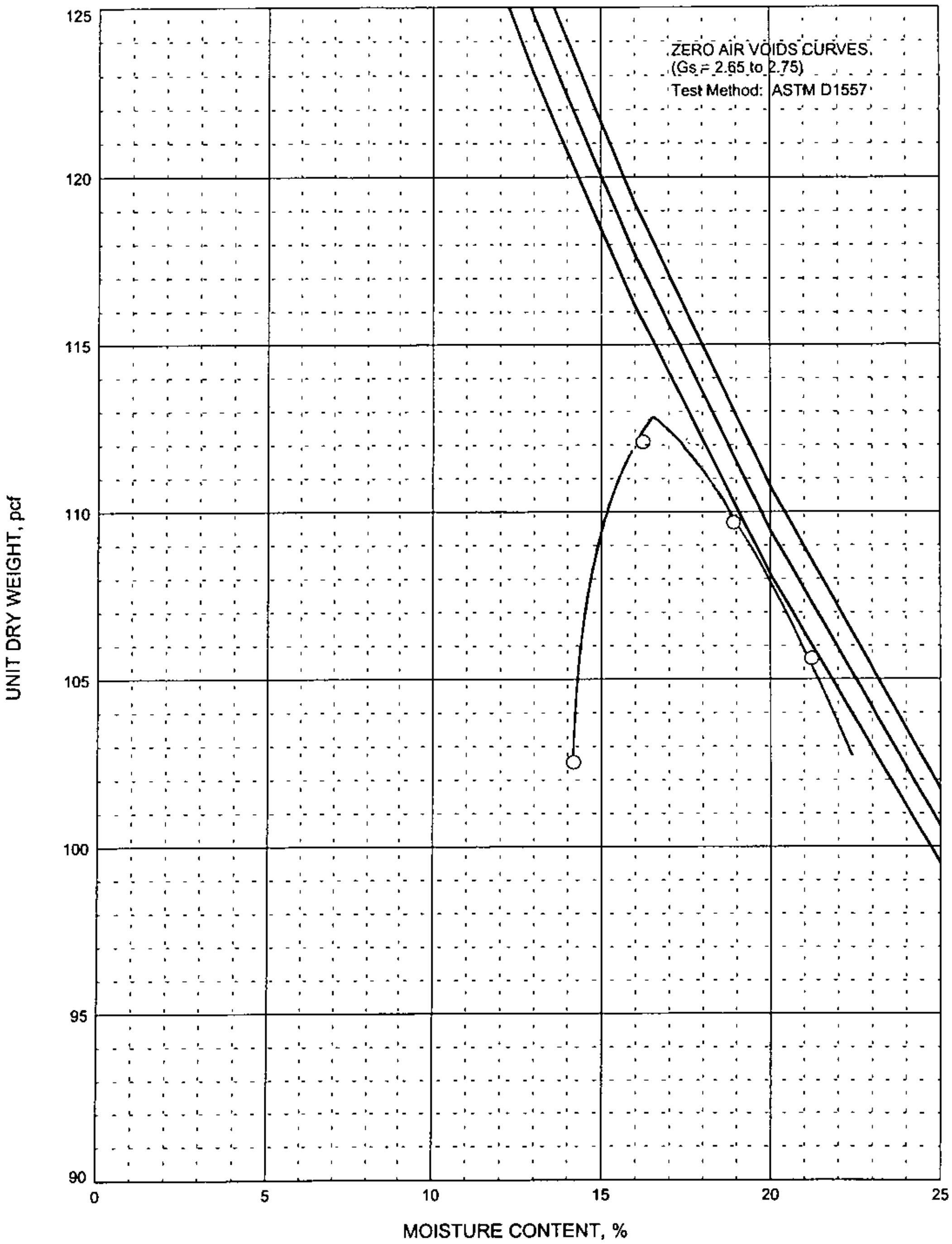


LEGEND	(location)	(depth,ft)	CLASSIFICATION	MAXIMUM UNIT DRY WEIGHT, pcf	OPTIMUM WATER CONTENT, %
○	DH-6	1-5	Sandy fat CLAY (CH) to sandy SILT (ML)	115 0	15.0

COMPACTION TEST RESULTS

Cal State Channel Islands, East Campus Development
Camarillo Area of Ventura County

PLATE B-4.2

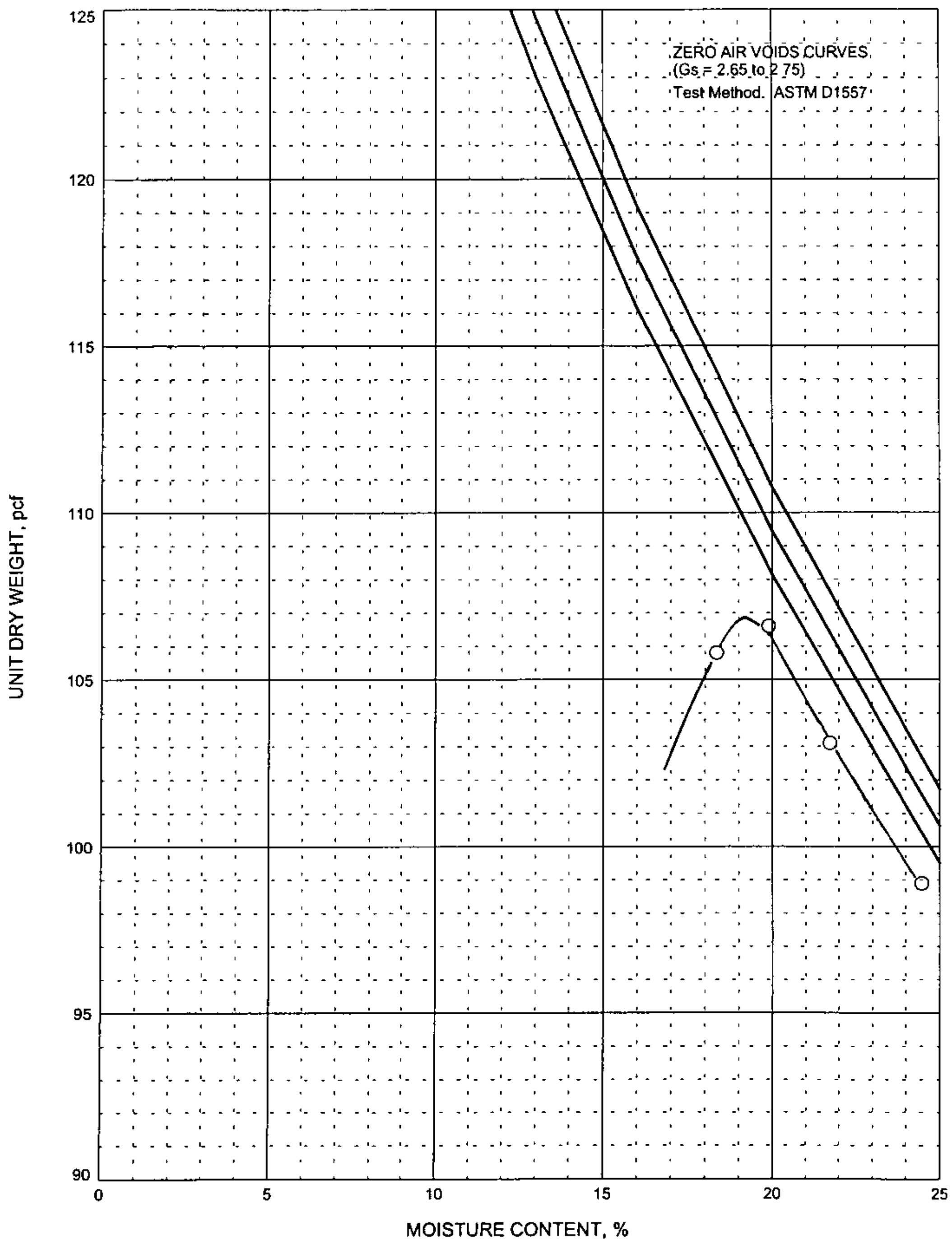


LEGEND (location)	(depth,ft)	CLASSIFICATION	MAXIMUM UNIT DRY WEIGHT, pcf	OPTIMUM WATER CONTENT, %
○ DH-8	2-7	Fat CLAY (CH)	113.0	16.5

COMPACTION TEST RESULTS

Cal State Channel Islands, East Campus Development
Camarillo Area of Ventura County

PLATE B-4.3

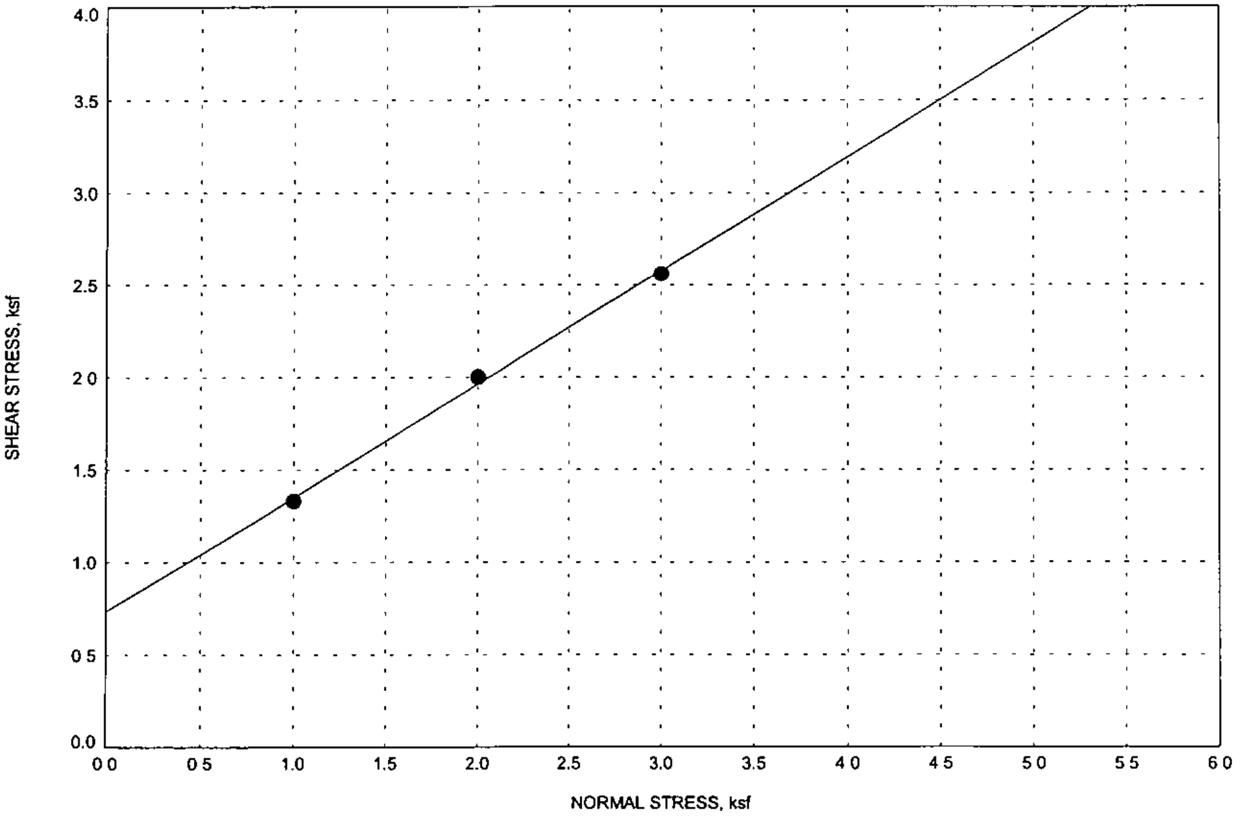


LEGEND (location)	(depth,ft)	CLASSIFICATION	MAXIMUM UNIT DRY WEIGHT, pcf	OPTIMUM WATER CONTENT, %
○ BH-205	1-4	Sandy Lean CLAY (CL)	106.5	20.0

COMPACTION TEST RESULTS
Cal State Channel Islands, East Campus Development
Camarillo Area of Ventura County

PLATE B-4.4

COMPACTION_ENGLISH G:\GINT\99420384 GPJ\TP-205 REB VTA
12/14/00/4 48:07 PM

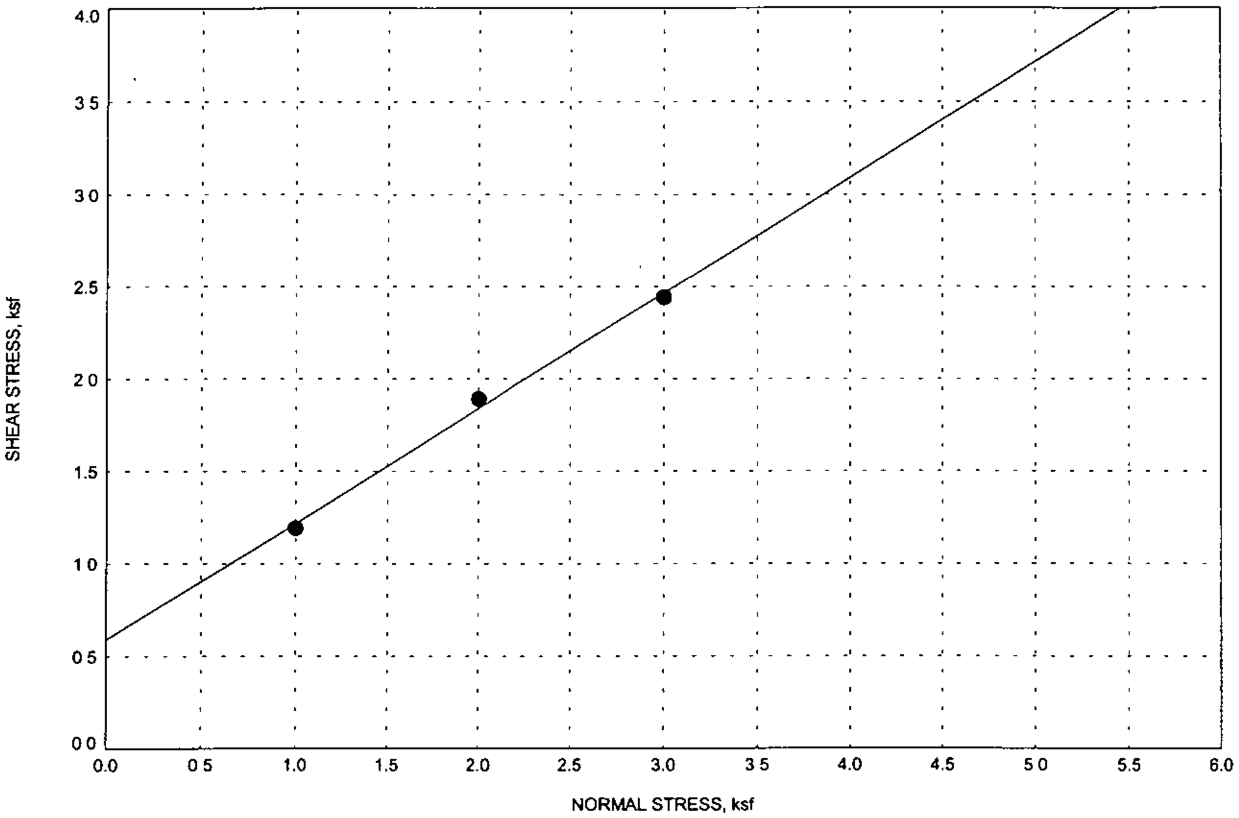


EFFECTIVE COHESION, ksf	0.73
EFFECTIVE ANGLE OF INTERNAL FRICTION, deg	32
LOCATION	DH-3
DEPTH, ft	1-5
MOISTURE CONTENT, %	23.1
UNIT DRY WEIGHT, pcf	101.2
MATERIAL DESCRIPTION	Lean CLAY (CL)
SAMPLE CONDITION	Sample compacted to 90% of maximum dry density at 12% moisture content

DIRECT SHEAR TEST RESULTS

Cal State Channel Islands, East Campus Development
Camarillo Area of Ventura County

PLATE B-5.1

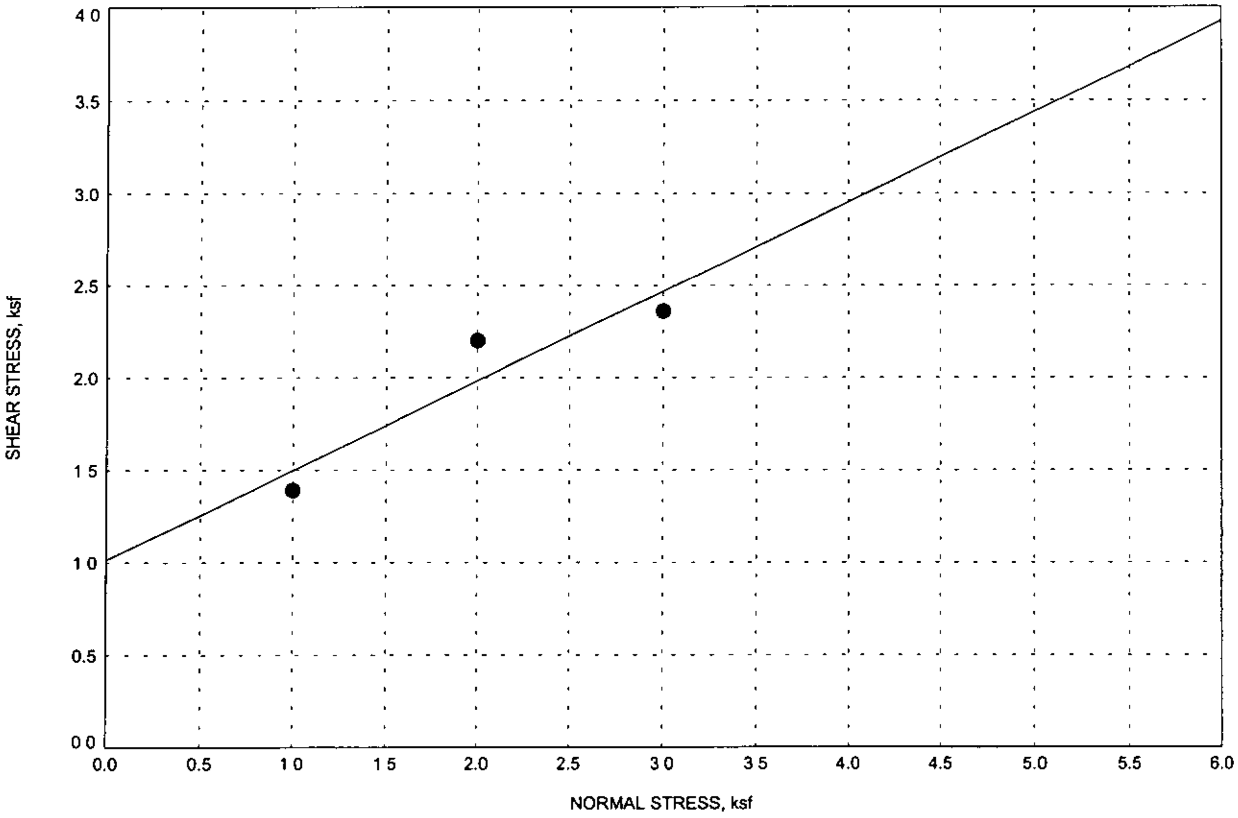


EFFECTIVE COHESION, ksf	0.60
EFFECTIVE ANGLE OF INTERNAL FRICTION, deg	32
LOCATION	DH-6
DEPTH, ft	1-5
MOISTURE CONTENT, %	23.0
UNIT DRY WEIGHT, pcf	97.8
MATERIAL DESCRIPTION	Sandy fat CLAY (CH) to sandy SILT (ML)
SAMPLE CONDITION	Sample compacted to 90% of maximum dry density at about optimum moisture content

DIRECT SHEAR TEST RESULTS

Cal State Channel Islands, East Campus Development
Camarillo Area of Ventura County

DIRECT SHEAR G:\GINT\99420384 GPJ/DH-06 REB VTA
12/14/00/4 45 26 PM

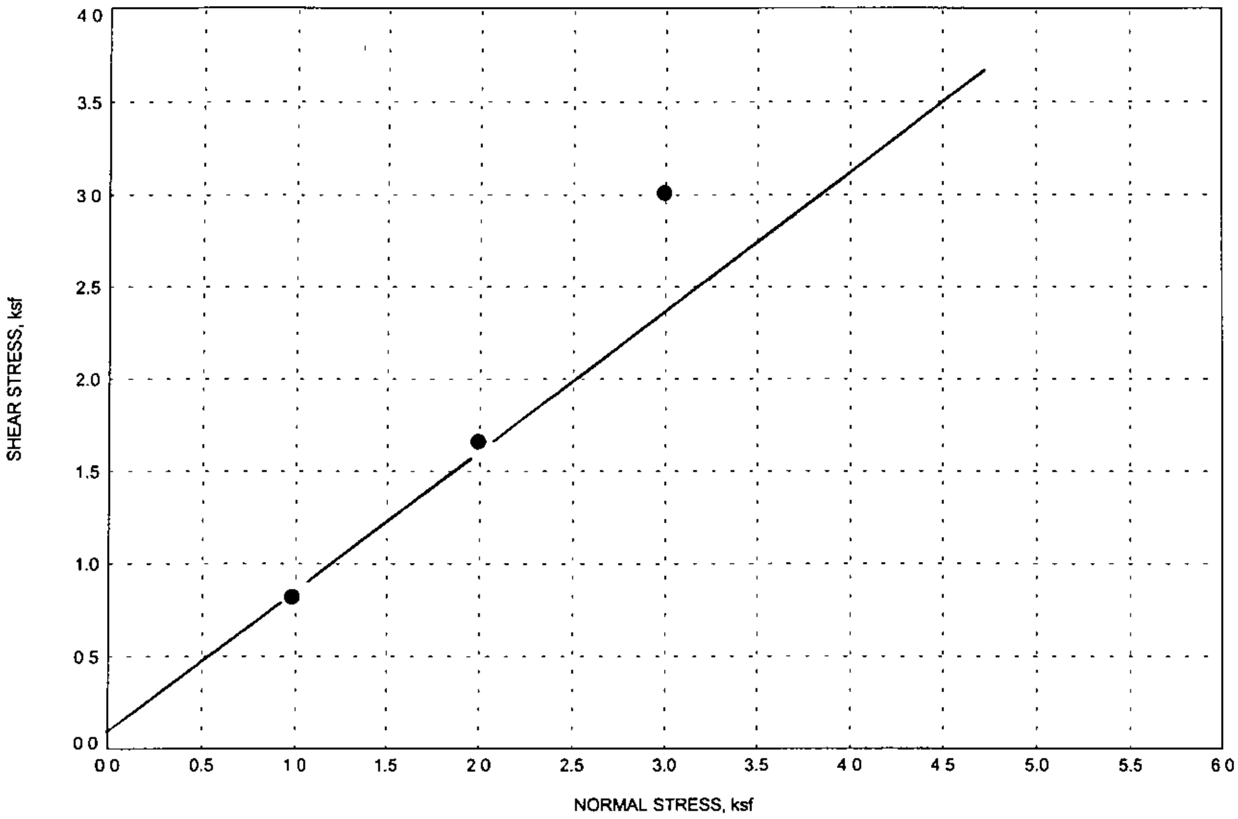


EFFECTIVE COHESION, ksf	1.01
EFFECTIVE ANGLE OF INTERNAL FRICTION, deg	26
LOCATION	DH-8
DEPTH, ft	2-7
MOISTURE CONTENT, %	26.5
UNIT DRY WEIGHT, pcf	93.9
MATERIAL DESCRIPTION	Fat CLAY (CH)
SAMPLE CONDITION	Sample compacted to 90% of maximum dry density at about optimum moisture content

DIRECT SHEAR TEST RESULTS

Cal State Channel Islands, East Campus Development
Camarillo Area of Ventura County

DIRECT SHEAR G:\GINT\99420384 GPJ\DH-08 REB VTA
12/14/00/4 45 27 PM



EFFECTIVE COHESION, ksf	0.10
EFFECTIVE ANGLE OF INTERNAL FRICTION, deg	37

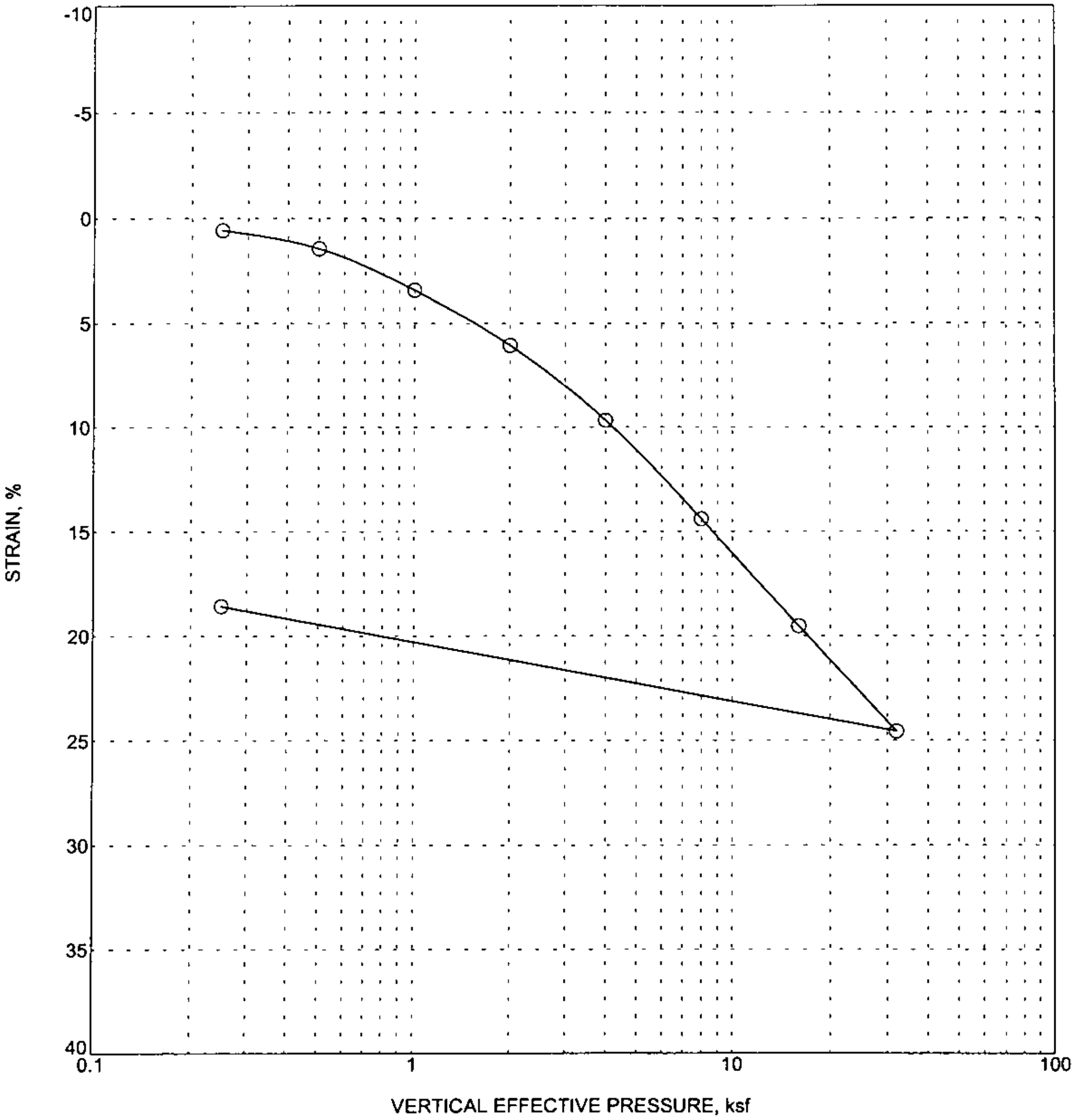
LOCATION	BH-205
DEPTH, ft	3.5
MOISTURE CONTENT, %	20
UNIT DRY WEIGHT, pcf	93
MATERIAL DESCRIPTION	Sandy Lean CLAY (CL)
SAMPLE CONDITION	Liner Sample

DIRECT SHEAR TEST RESULTS

Cal State Channel Islands, East Campus Development
Camarillo Area of Ventura County

PLATE B-5.4

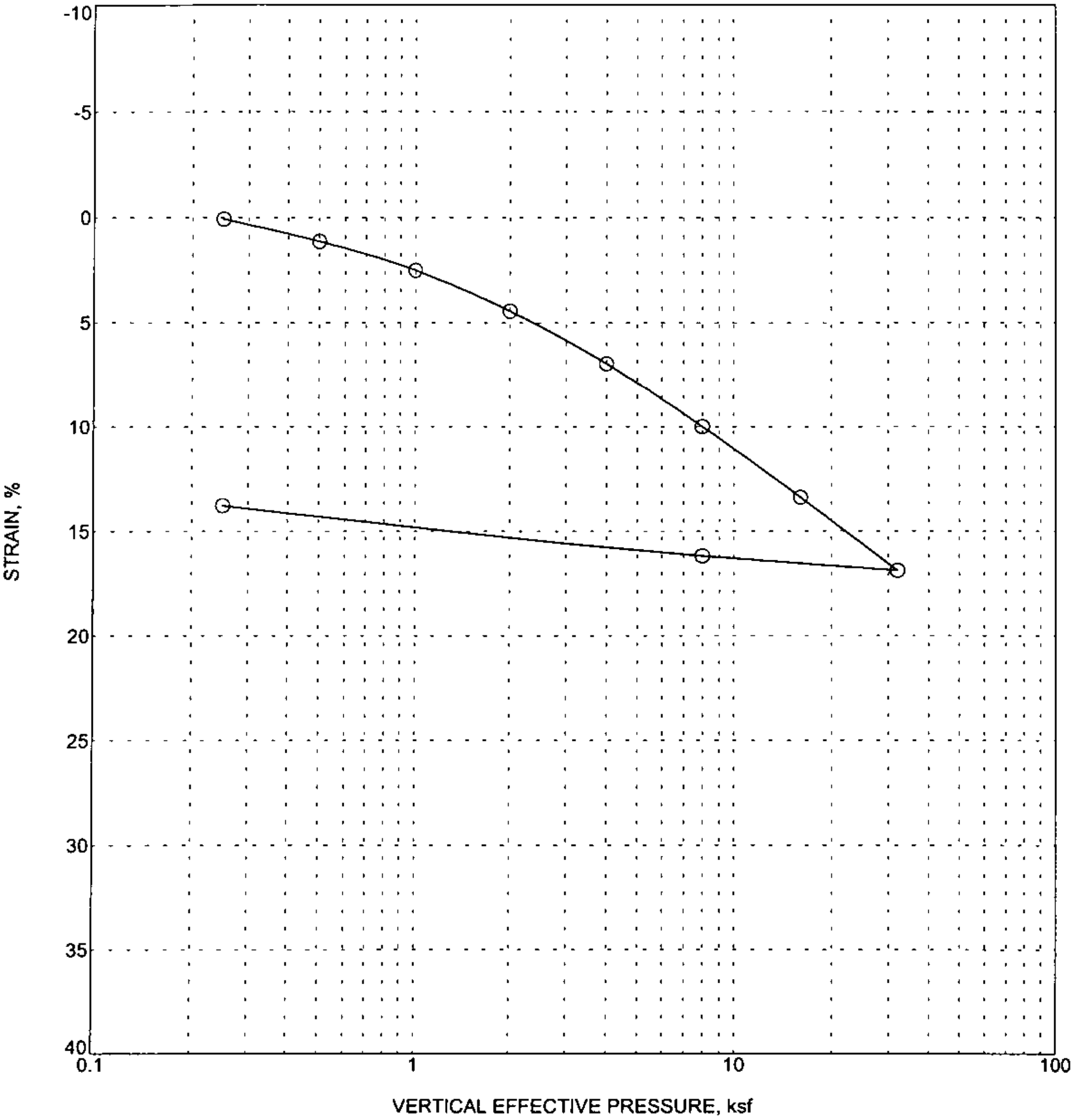
DIRECT SHEAR G \GINT\99420384 GPJ/TP-205 REB VTA
12/14/00/4 45 29 PM



LOCATION	DH-1
DEPTH, ft	3.8
INITIAL MOISTURE CONTENT, %	19
UNIT DRY WEIGHT, pcf	103
MATERIAL DESCRIPTION	Lean to Fat CLAY (CL)
SAMPLE CONDITION	Shelby Tube Sample

CONSOLIDATION TEST RESULTS

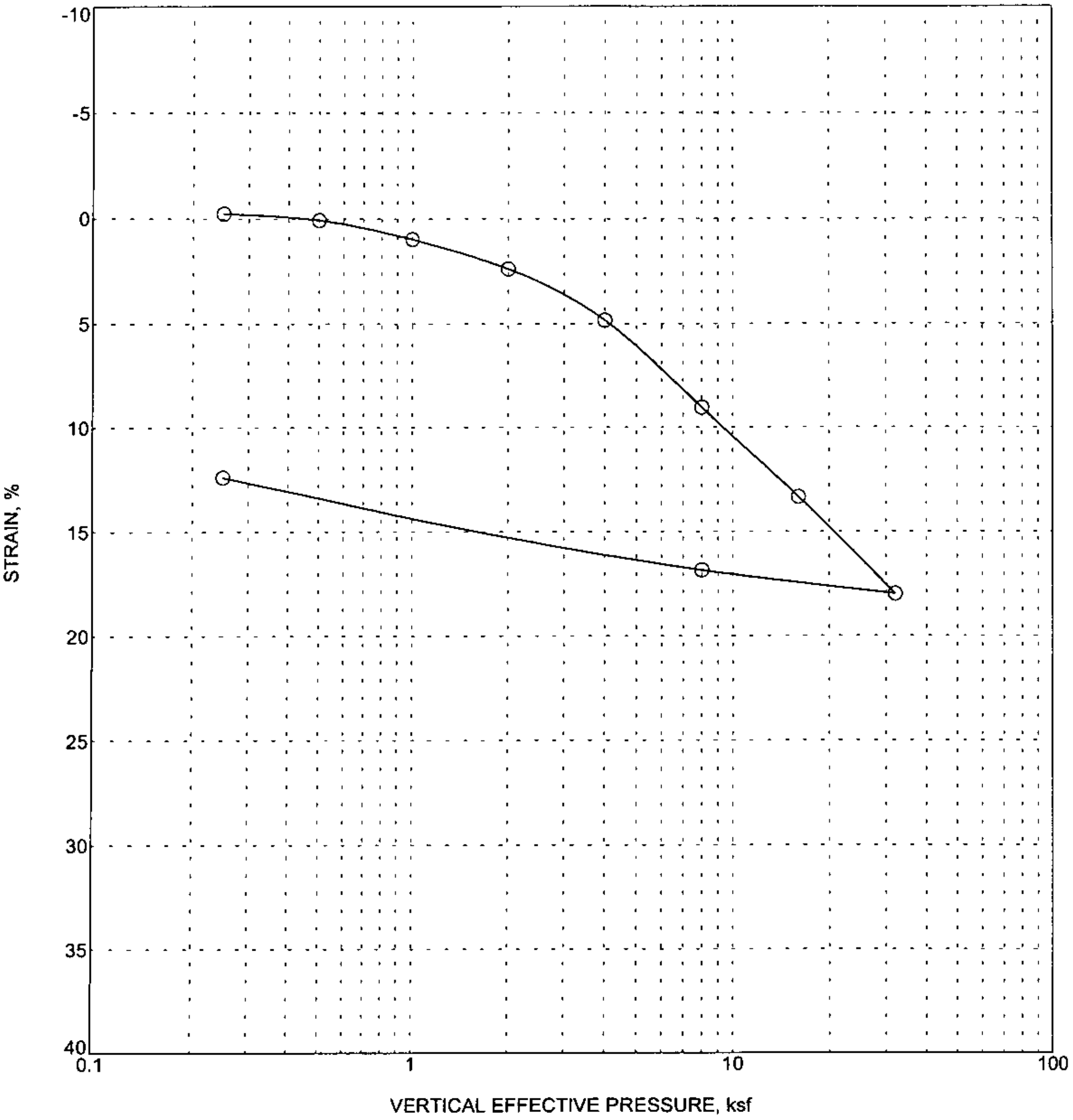
Cal State Channel Islands, East Campus Development
Camarillo Area of Ventura County



LOCATION	DH-1
DEPTH, ft	6.0
INITIAL MOISTURE CONTENT, %	24
UNIT DRY WEIGHT, pcf	98
MATERIAL DESCRIPTION	Fat CLAY (CH)
SAMPLE CONDITION	Liner Sample

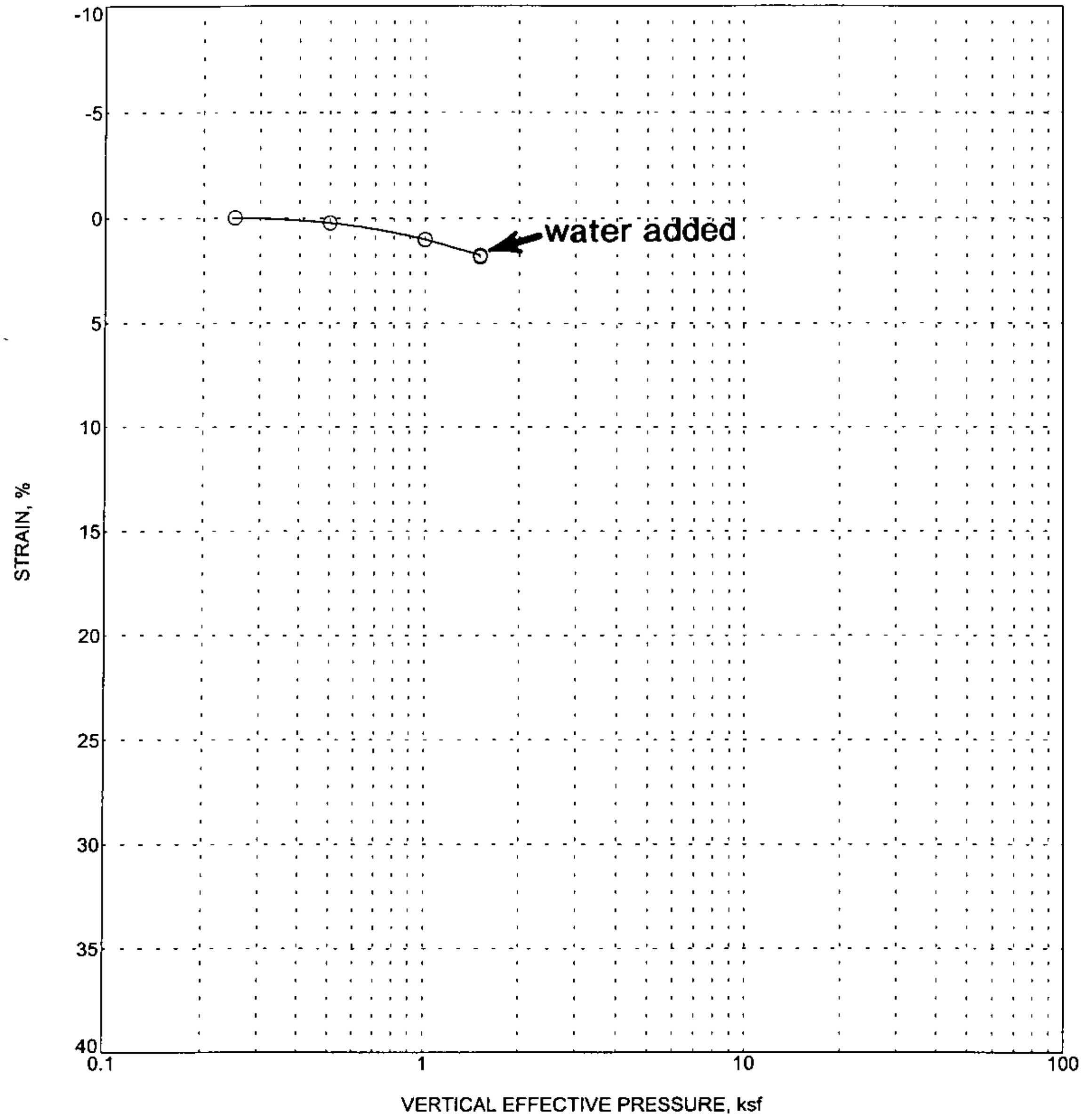
CONSOLIDATION TEST RESULTS

Cal State Channel Islands, East Campus Development
Camarillo Area of Ventura County



LOCATION	DH-1
DEPTH, ft	11.0
INITIAL MOISTURE CONTENT, %	31
UNIT DRY WEIGHT, pcf	91
MATERIAL DESCRIPTION	Interlayered Silty to Clayey SAND (SM/SC)
SAMPLE CONDITION	Liner Sample

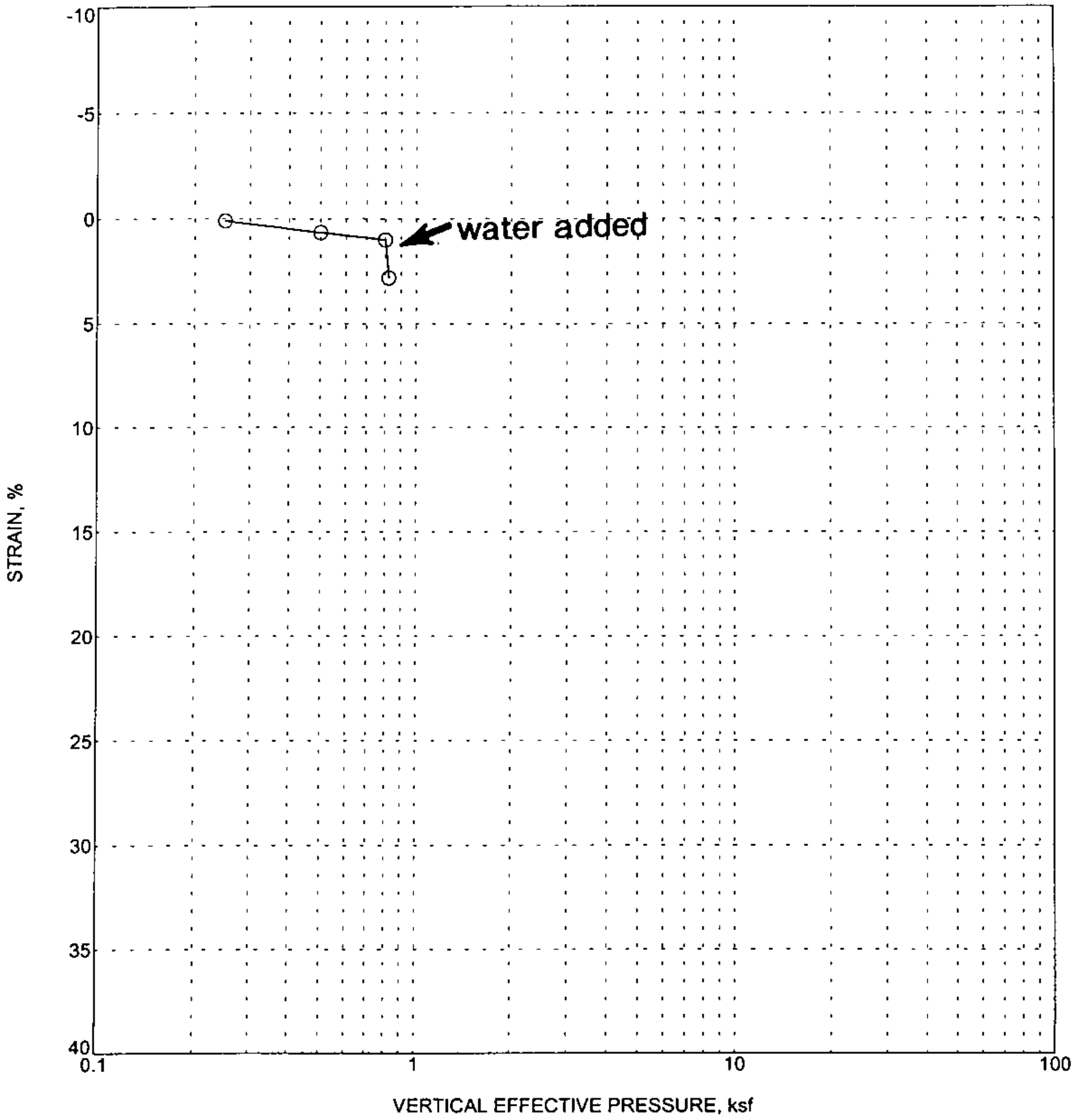
CONSOLIDATION TEST RESULTS
Cal State Channel Islands, East Campus Development
Camarillo Area of Ventura County



LOCATION	DH-3
DEPTH, ft	11.0
INITIAL MOISTURE CONTENT, %	22
UNIT DRY WEIGHT, pcf	92
MATERIAL DESCRIPTION	Lean CLAY (CL)
SAMPLE CONDITION	Liner Sample

HYDROCONSOLIDATION TEST RESULTS

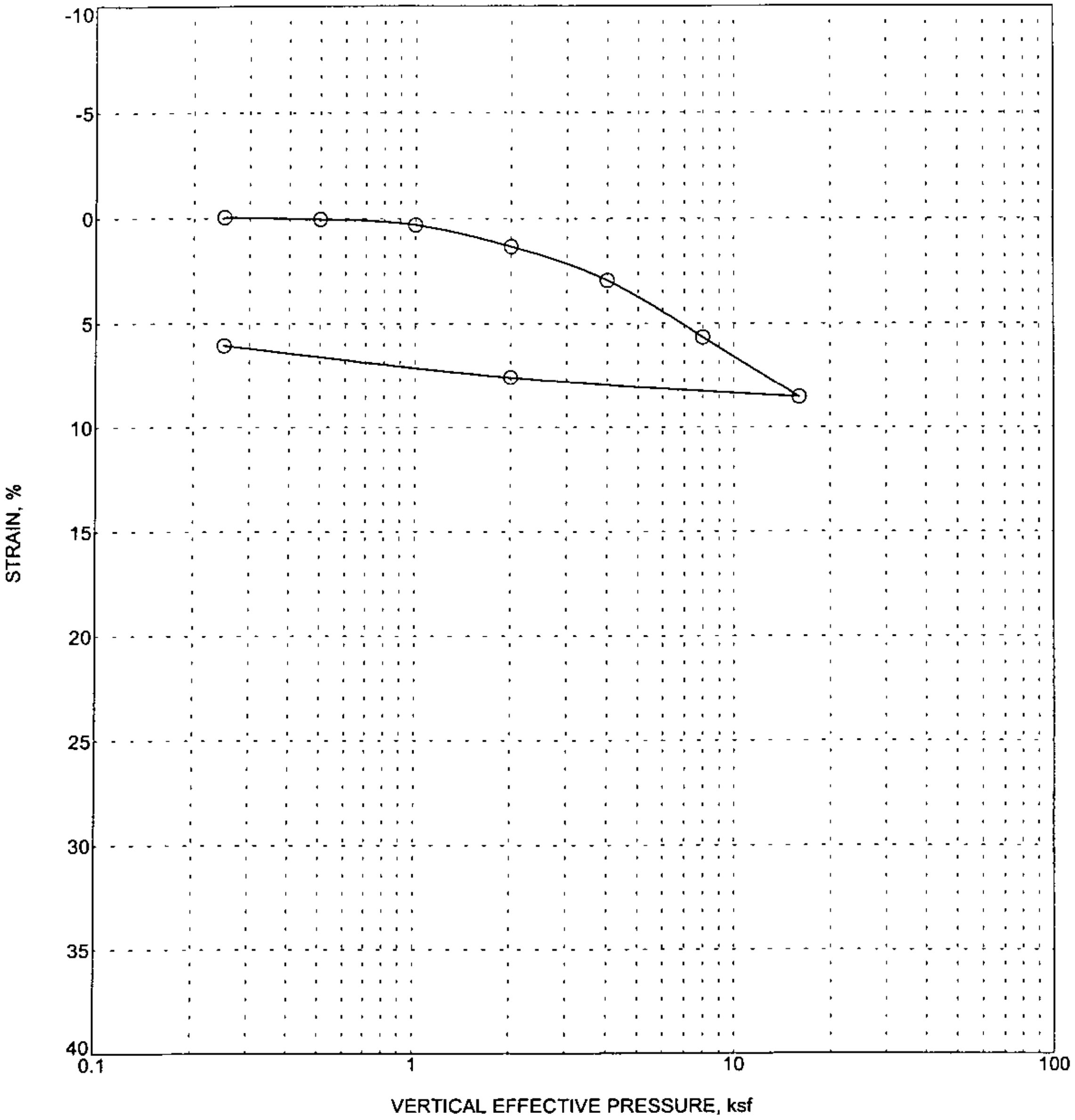
Cal State Channel Islands, East Campus Development
Camarillo Area of Ventura County



LOCATION	DH-6
DEPTH, ft	6.0
INITIAL MOISTURE CONTENT, %	18
UNIT DRY WEIGHT, pcf	97
MATERIAL DESCRIPTION	Sandy Fat CLAY (CH) to Sandy SILT (ML)
SAMPLE CONDITION	Liner Sample

HYDROCONSOLIDATION TEST RESULTS

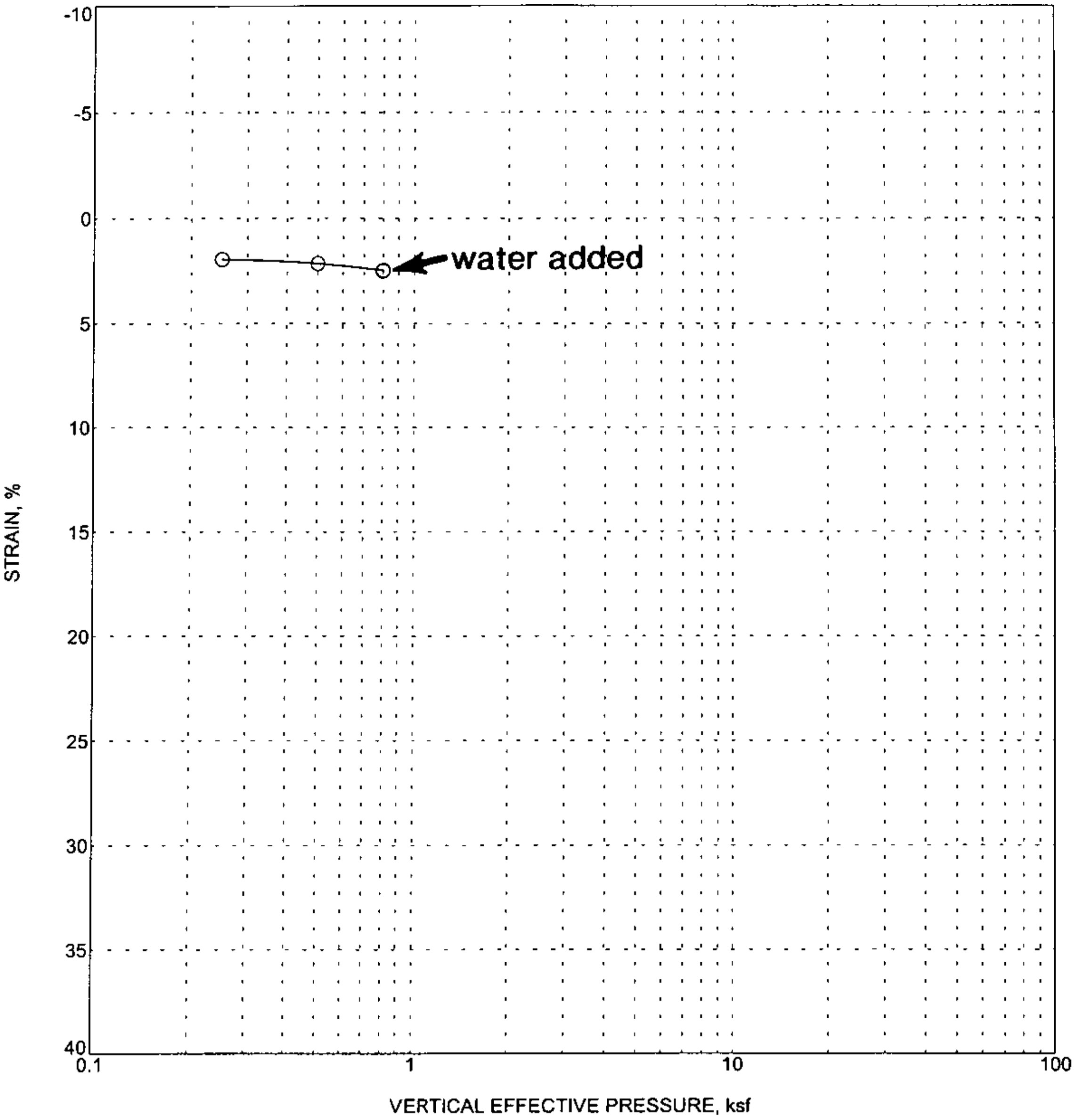
Cal State Channel Islands, East Campus Development
Camarillo Area of Ventura County



LOCATION	DH-6
DEPTH, ft	11.0
INITIAL MOISTURE CONTENT, %	20
UNIT DRY WEIGHT, pcf	106
MATERIAL DESCRIPTION	Lean CLAY (CL) to Sandy SILT (ML)
SAMPLE CONDITION	Liner Sample

CONSOLIDATION TEST RESULTS

Cal State Channel Islands, East Campus Development
Camarillo Area of Ventura County

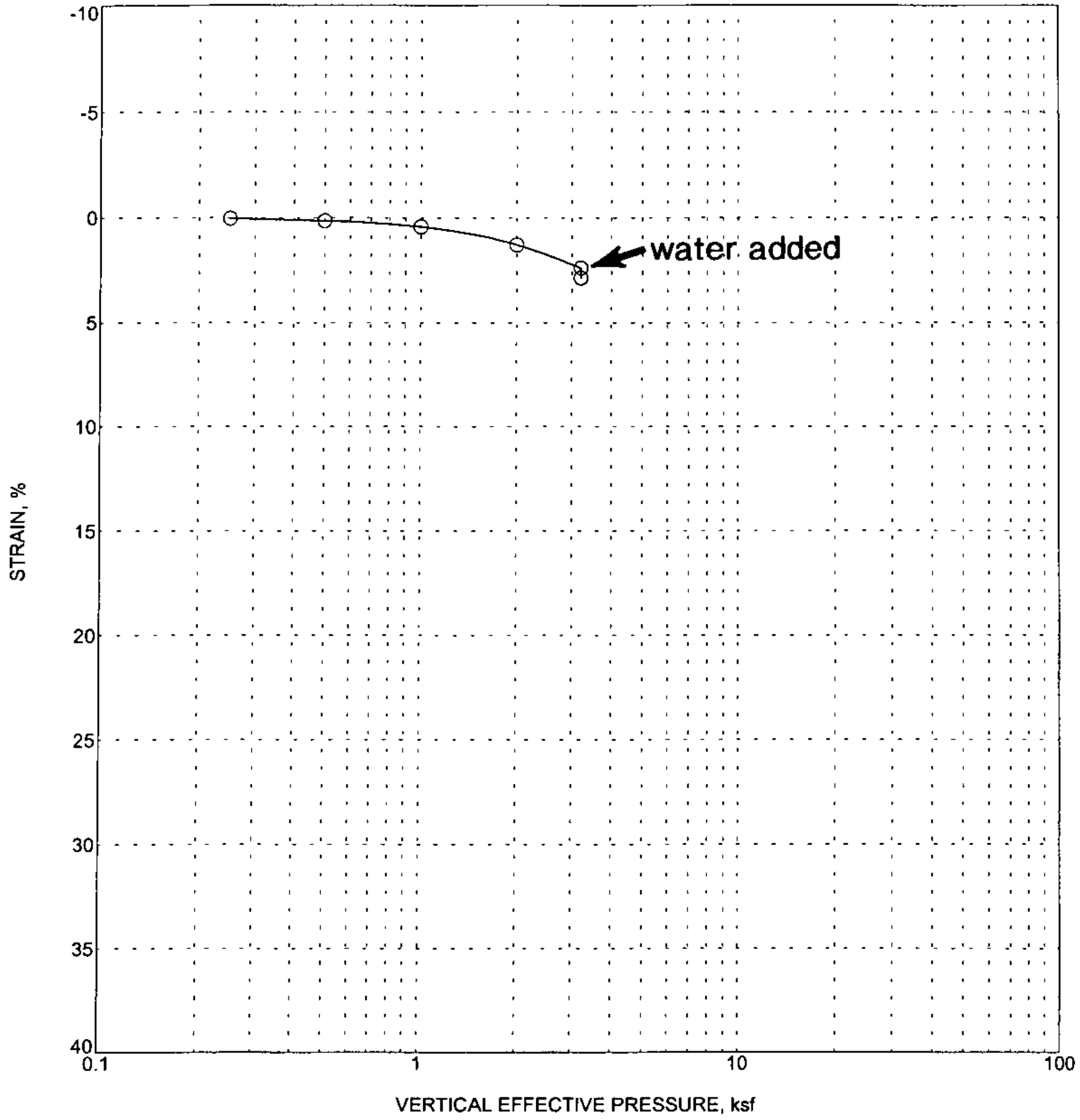


LOCATION	DH-7
DEPTH, ft	6.0
INITIAL MOISTURE CONTENT, %	19
UNIT DRY WEIGHT, pcf	103
MATERIAL DESCRIPTION	Silty SAND (SM)
SAMPLE CONDITION	Liner Sample

HYDROCONSOLIDATION TEST RESULTS

Cal State Channel Islands, East Campus Development
Camarillo Area of Ventura County

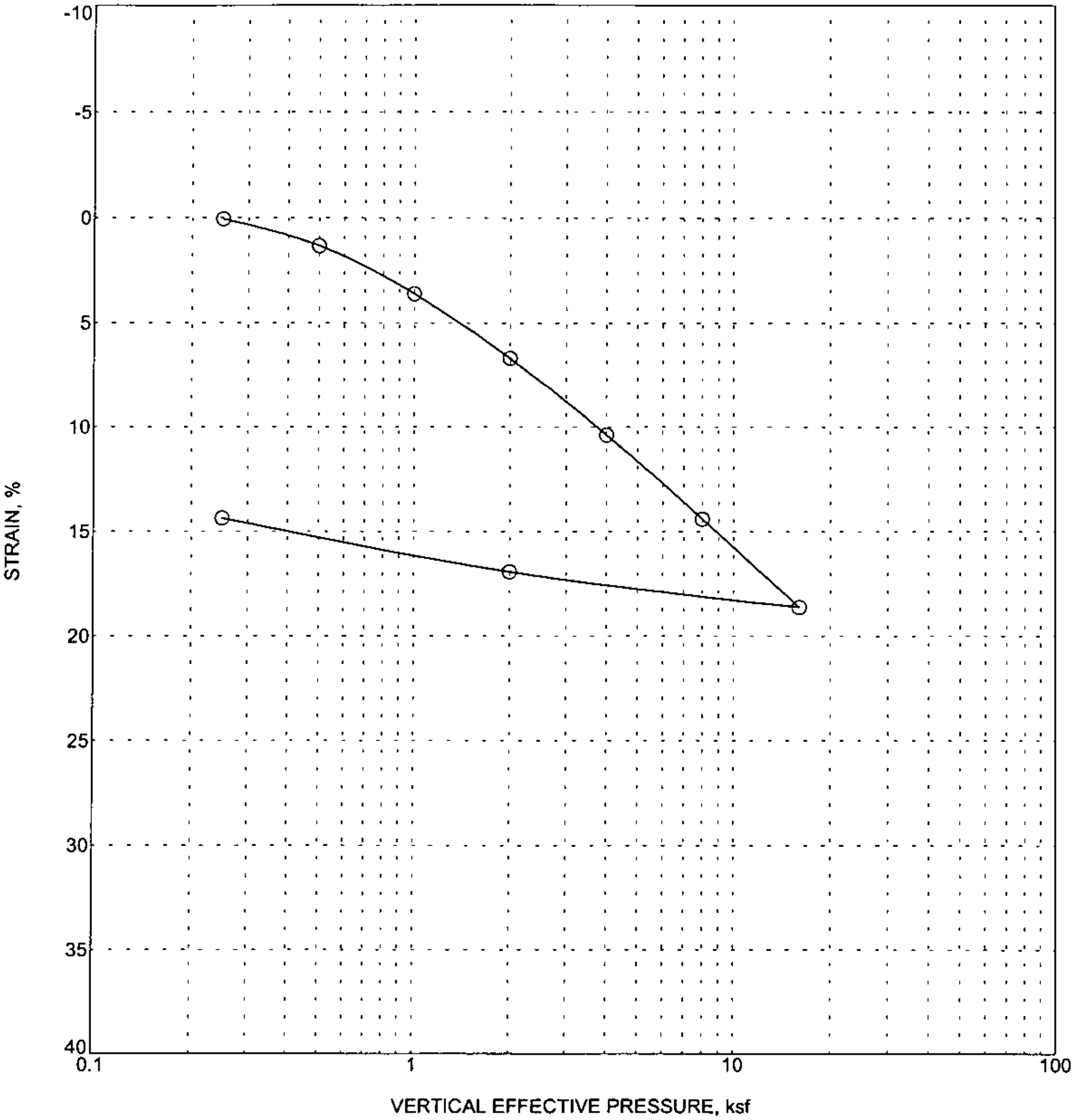
CONSOLIDATION G:\GINT\99420384.GPJ/DH-07 REB VTA
12/14/00/4:46 51 PM



LOCATION	DH-7
DEPTH, ft	26.0
INITIAL MOISTURE CONTENT, %	25
UNIT DRY WEIGHT, pcf	98
MATERIAL DESCRIPTION	Lean CLAY (CL)
SAMPLE CONDITION	Liner Sample

CONSOLIDATION TEST RESULTS

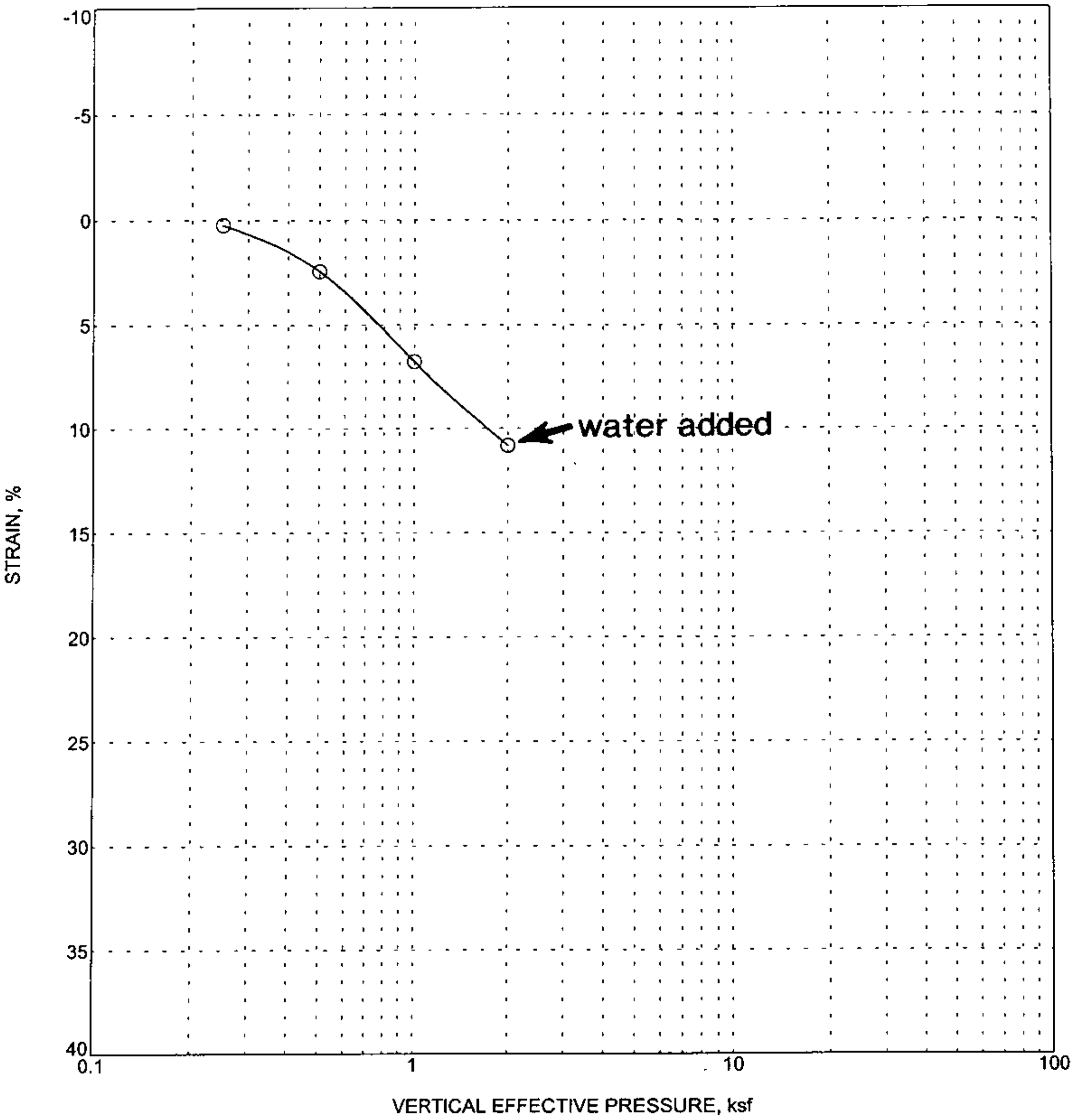
Cal State Channel Islands, East Campus Development
Camarillo Area of Ventura County



LOCATION	DH-8
DEPTH, ft	6.0
INITIAL MOISTURE CONTENT, %	24
UNIT DRY WEIGHT, pcf	89
MATERIAL DESCRIPTION	Fat CLAY (CH)
SAMPLE CONDITION	Liner Sample

CONSOLIDATION TEST RESULTS

Cal State Channel Islands, East Campus Development
Camarillo Area of Ventura County

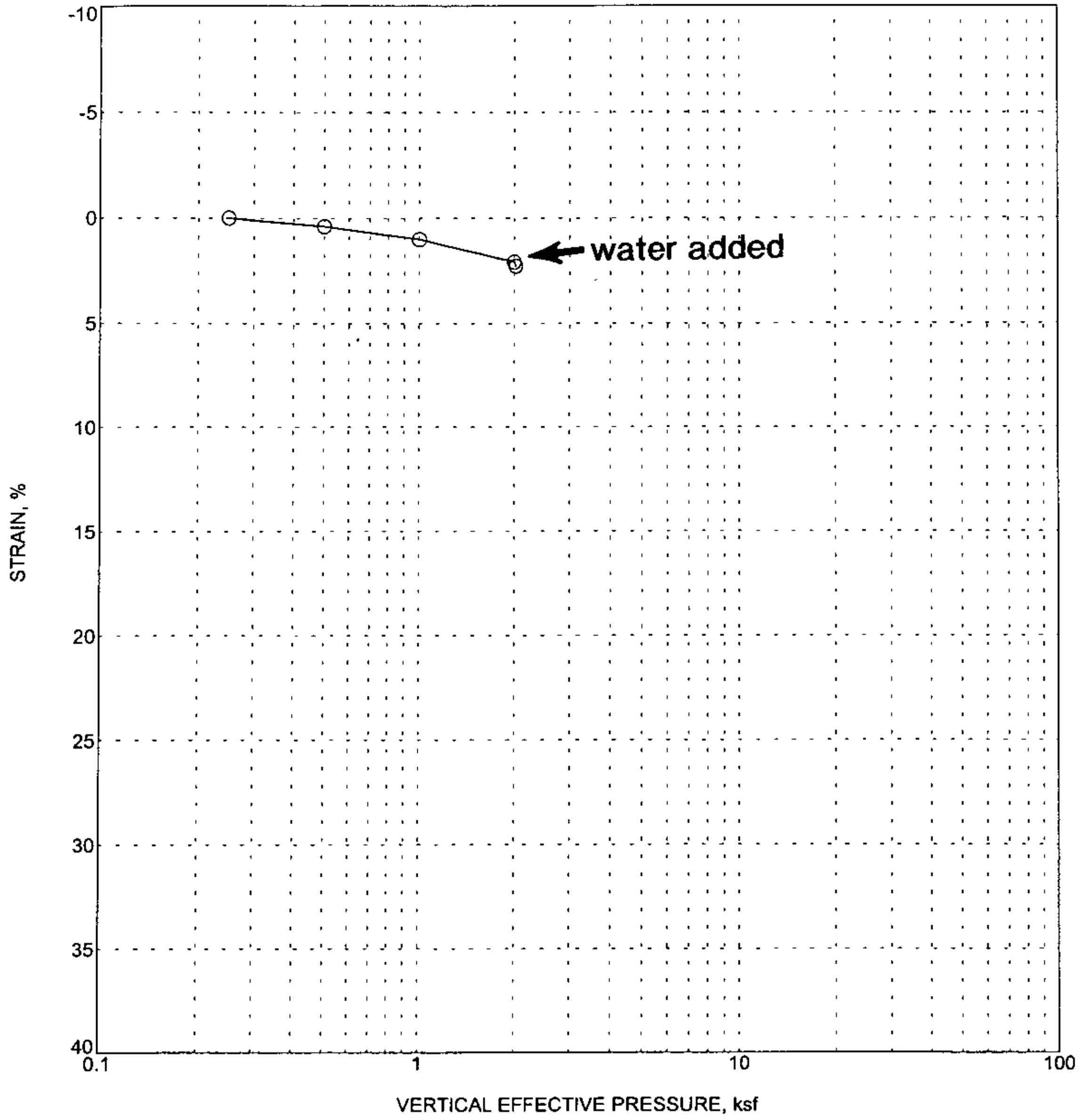


LOCATION	DH-8
DEPTH, ft	16.0
INITIAL MOISTURE CONTENT, %	18
UNIT DRY WEIGHT, pcf	87
MATERIAL DESCRIPTION	Silty fine SAND (SM)
SAMPLE CONDITION	Liner Sample

HYDROCONSOLIDATION TEST RESULTS

Cal State Channel Islands, East Campus Development
Camarillo Area of Ventura County

PLATE B-6.10

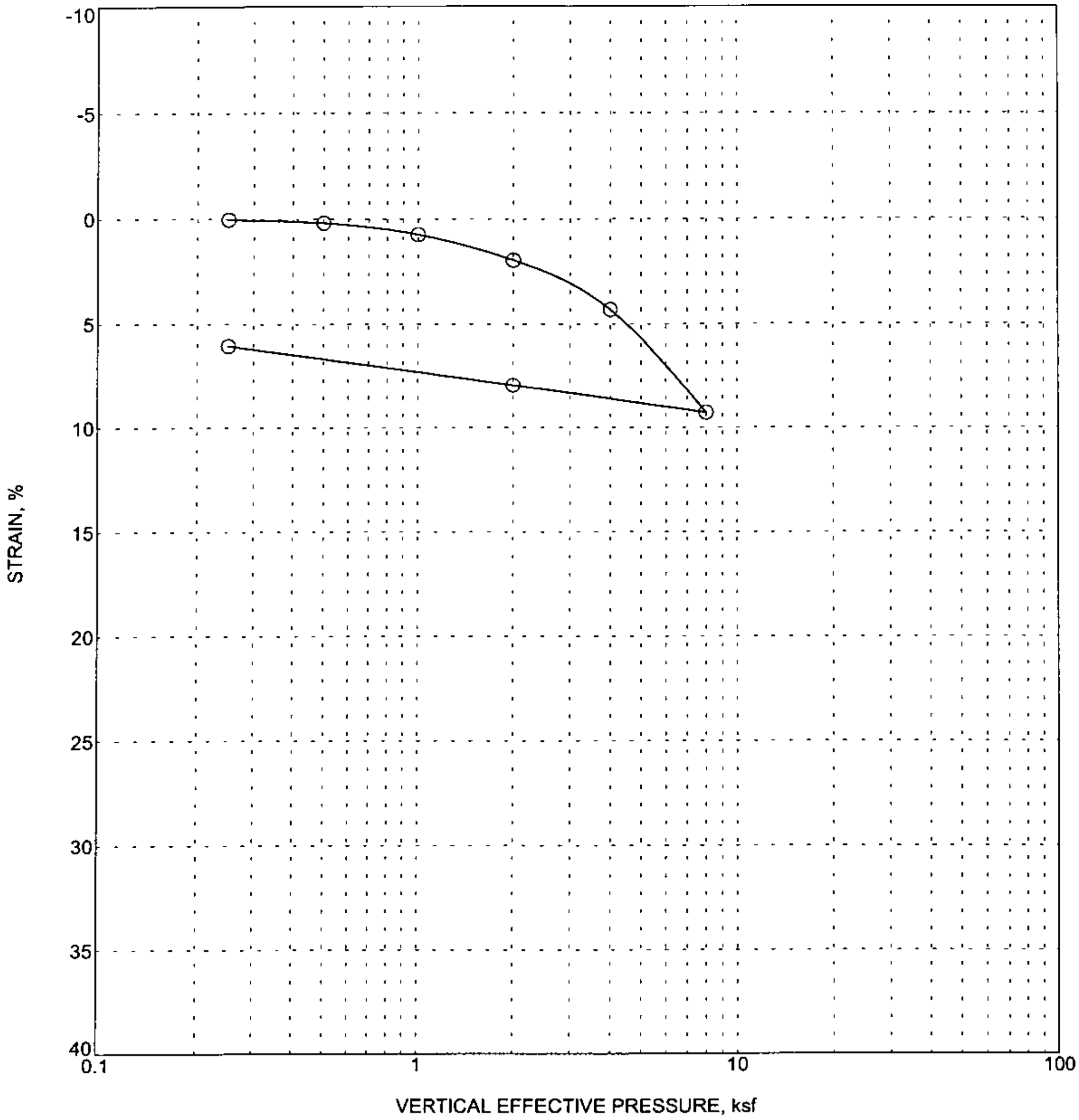


LOCATION	DH-8
DEPTH, ft	20.5
INITIAL MOISTURE CONTENT, %	29
UNIT DRY WEIGHT, pcf	90
MATERIAL DESCRIPTION	Silty SAND (SM)
SAMPLE CONDITION	Liner Sample

HYDROCONSOLIDATION TEST RESULTS

Cal State Channel Islands, East Campus Development
Camarillo Area of Ventura County

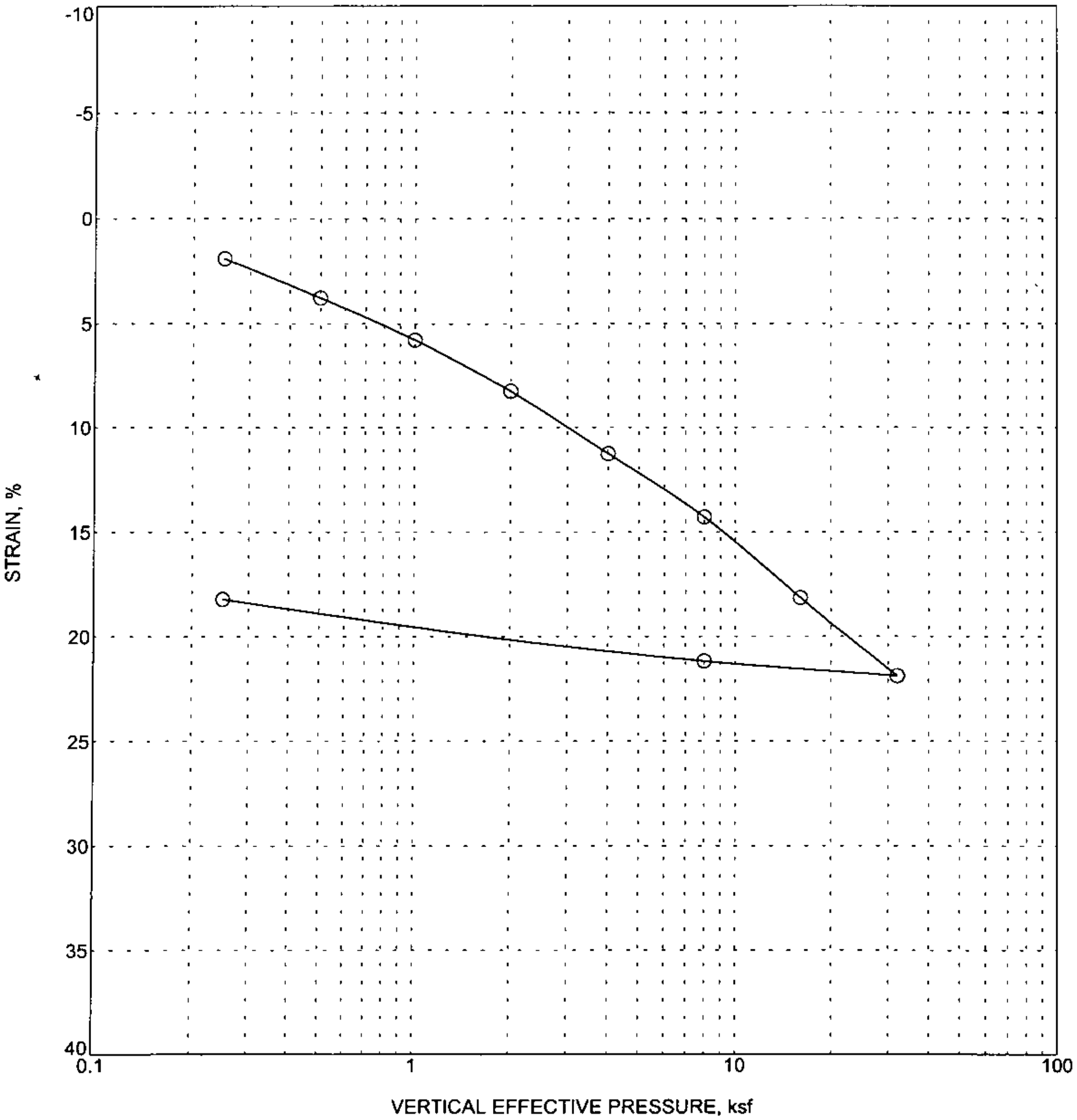
CONSOLIDATION G:\GINT\99420384 GPJ/DH-08 REB VTA
12/14/00/4 46.57 PM



LOCATION	DH-101
DEPTH, ft	6.0
INITIAL MOISTURE CONTENT, %	21
UNIT DRY WEIGHT, pcf	105
MATERIAL DESCRIPTION	Lean to fat CLAY (CL/CH)
SAMPLE CONDITION	Liner Sample

CONSOLIDATION TEST RESULTS

Cal State Channel Islands, East Campus Development
Camarillo Area of Ventura County

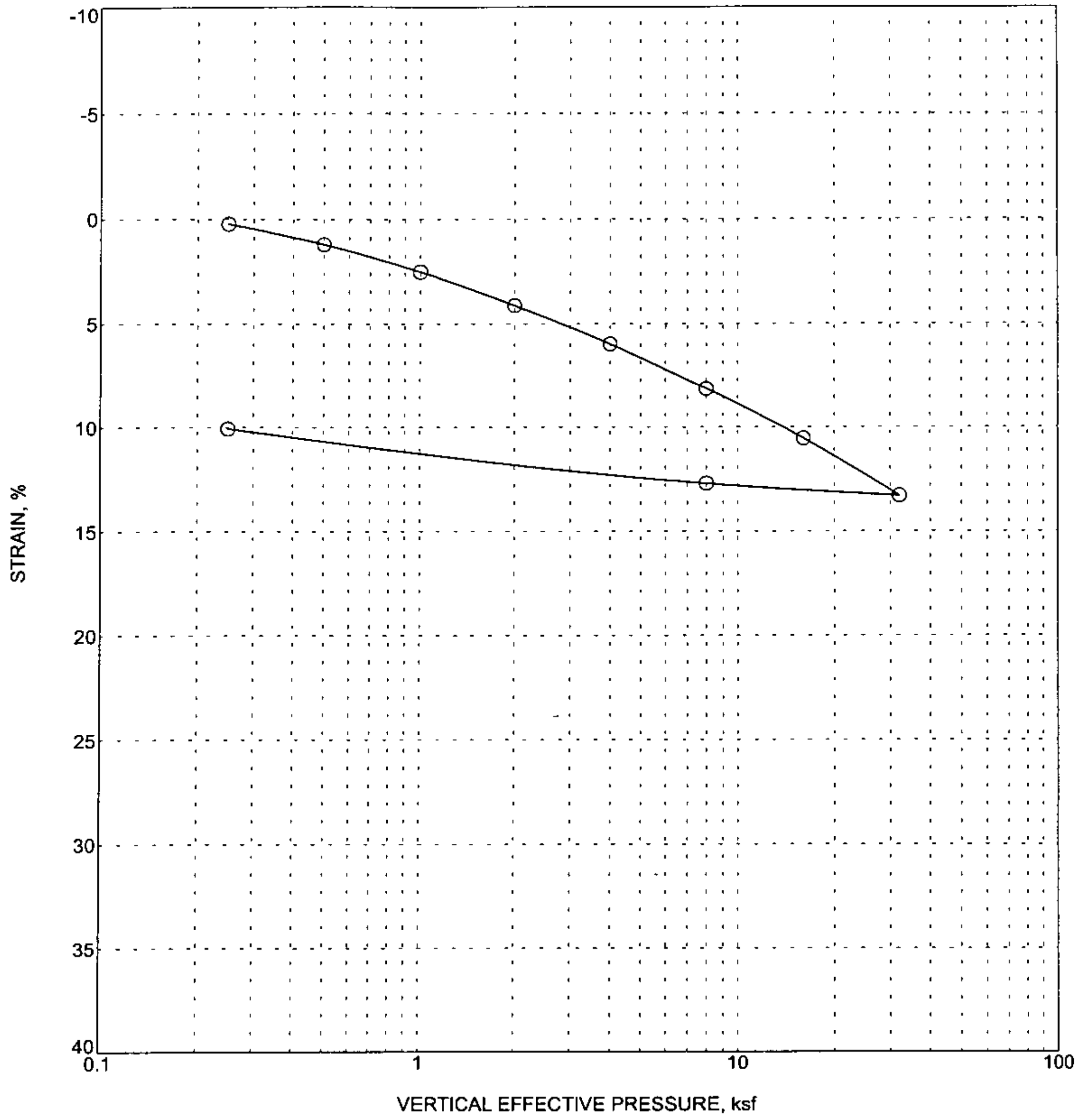


LOCATION	DH-105
DEPTH, ft	5.5
INITIAL MOISTURE CONTENT, %	24
UNIT DRY WEIGHT, pcf	101
MATERIAL DESCRIPTION	Lean to Fat CLAY (CL/CH)
SAMPLE CONDITION	Shelby Tube Sample

CONSOLIDATION TEST RESULTS

Cal State Channel Islands, East Campus Development
Camarillo Area of Ventura County

CONSOLIDATION G:\GINT\99420384.GPJ/DH-105 REB VTA
12/14/00/4 47:00 PM

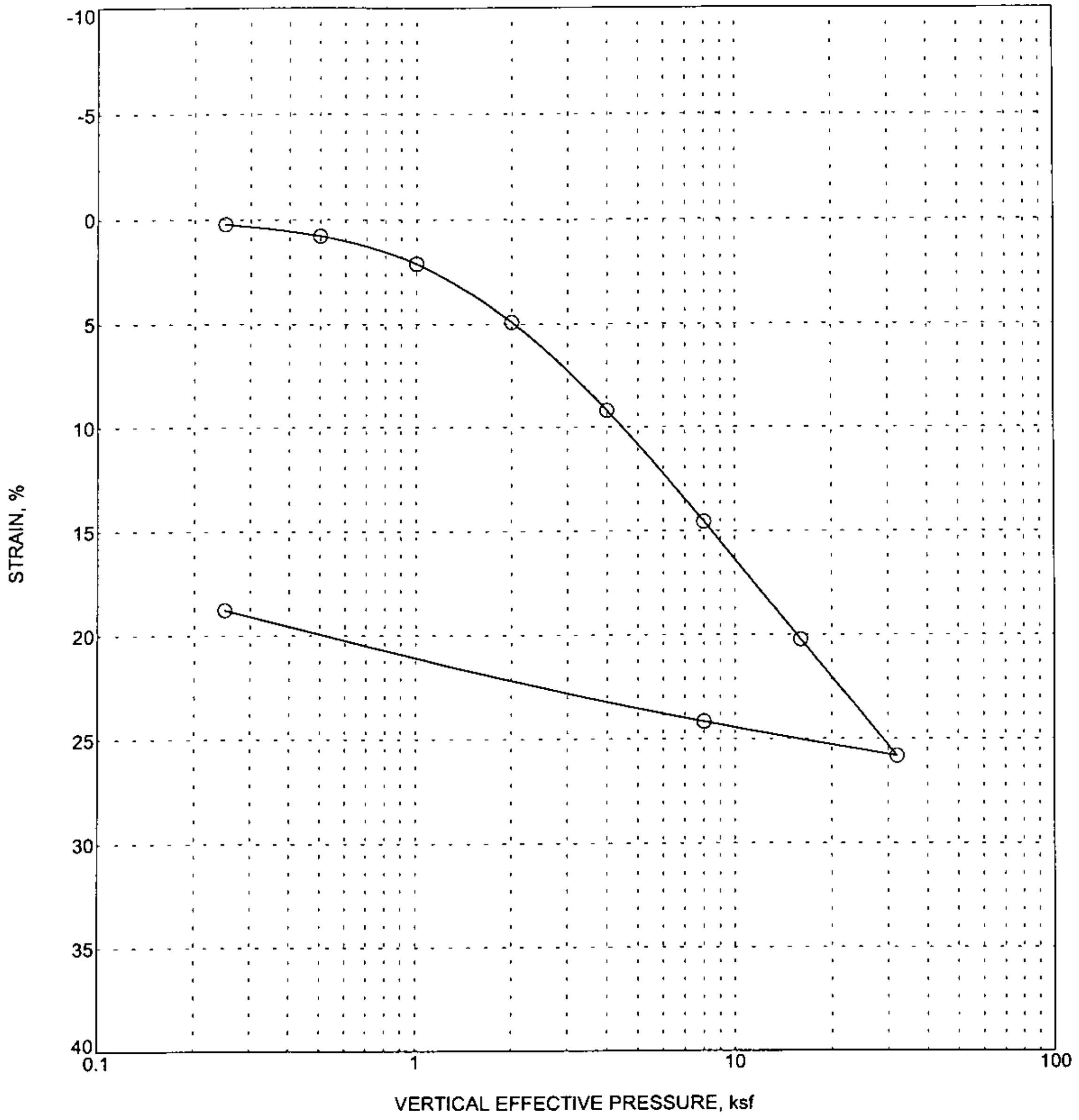


LOCATION	DH-106
DEPTH, ft	7.5
INITIAL MOISTURE CONTENT, %	18
UNIT DRY WEIGHT, pcf	114
MATERIAL DESCRIPTION	Sandy CLAY (CL)
SAMPLE CONDITION	Shelby Tube Sample

CONSOLIDATION TEST RESULTS

Cal State Channel Islands, East Campus Development
Camarillo Area of Ventura County

PLATE B-6.14

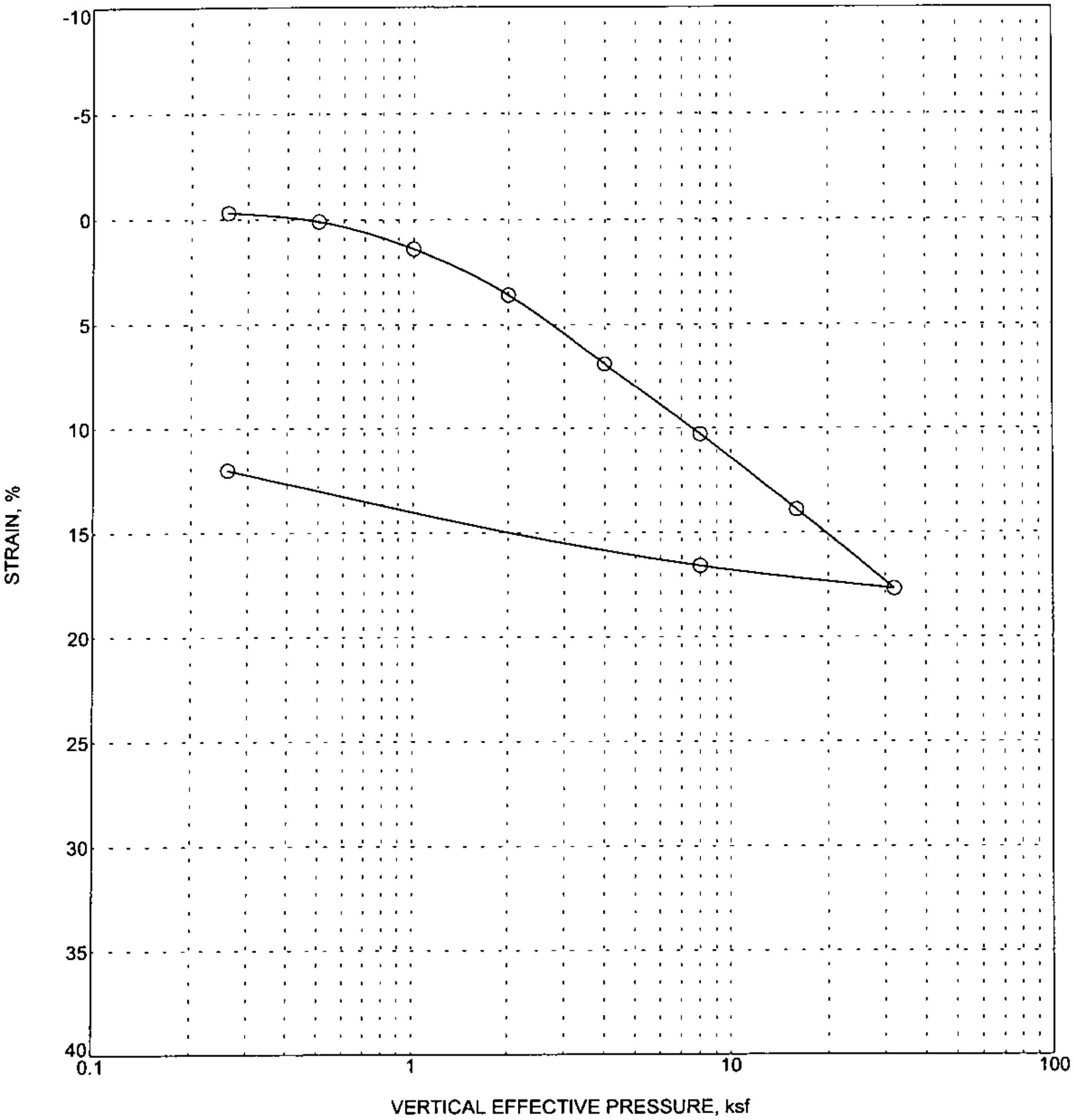


LOCATION	DH-107
DEPTH, ft	9.5
INITIAL MOISTURE CONTENT, %	29
UNIT DRY WEIGHT, pcf	94
MATERIAL DESCRIPTION	Fat CLAY (CH)
SAMPLE CONDITION	Shelby Tube Sample

CONSOLIDATION TEST RESULTS

Cal State Channel Islands, East Campus Development
Camarillo Area of Ventura County

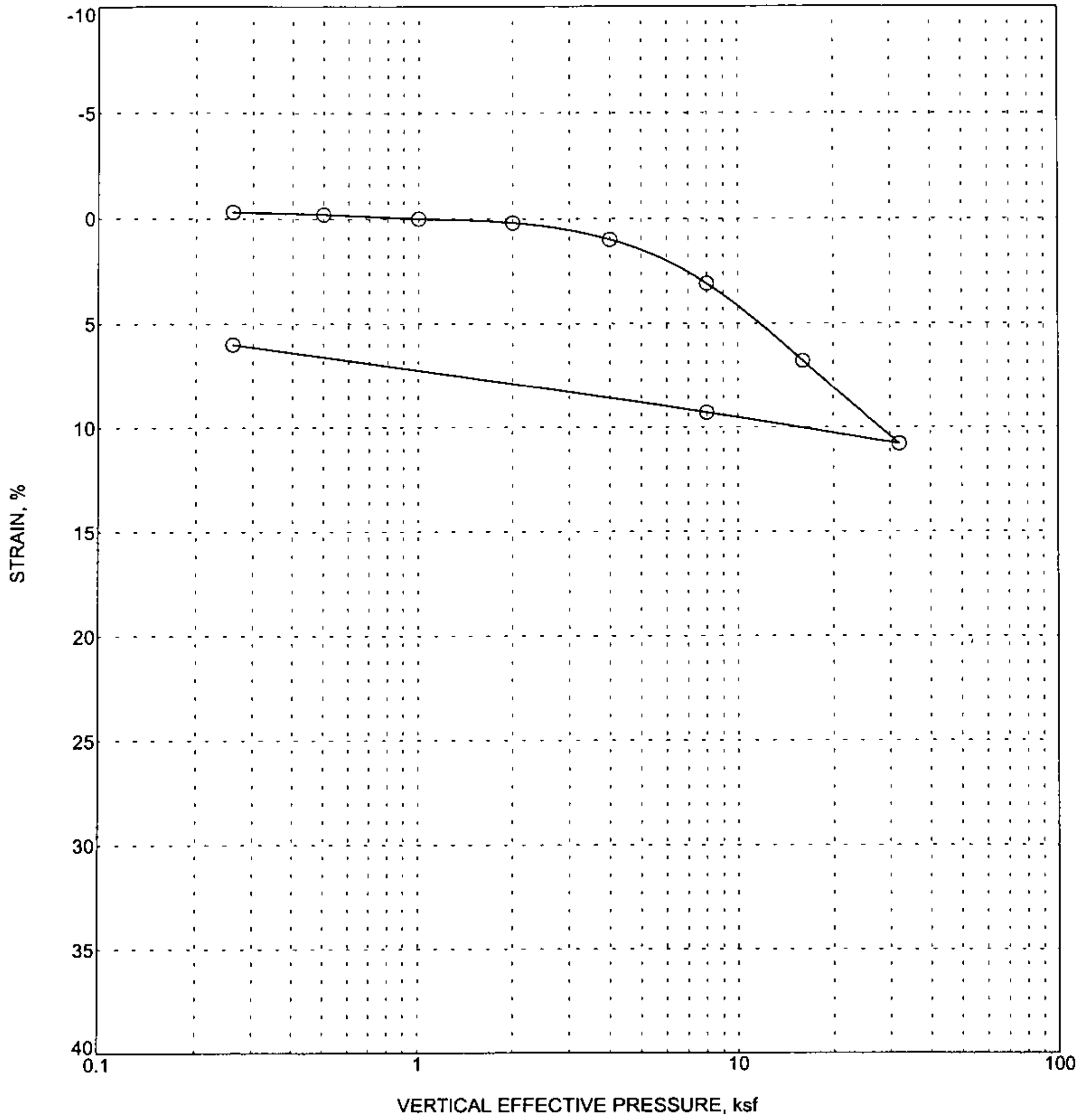
PLATE B-6.15



LOCATION	BH-204
DEPTH, ft	4.5
INITIAL MOISTURE CONTENT, %	13
UNIT DRY WEIGHT, pcf	95
MATERIAL DESCRIPTION	Sandy Lean CLAY (CL)
SAMPLE CONDITION	Liner Sample

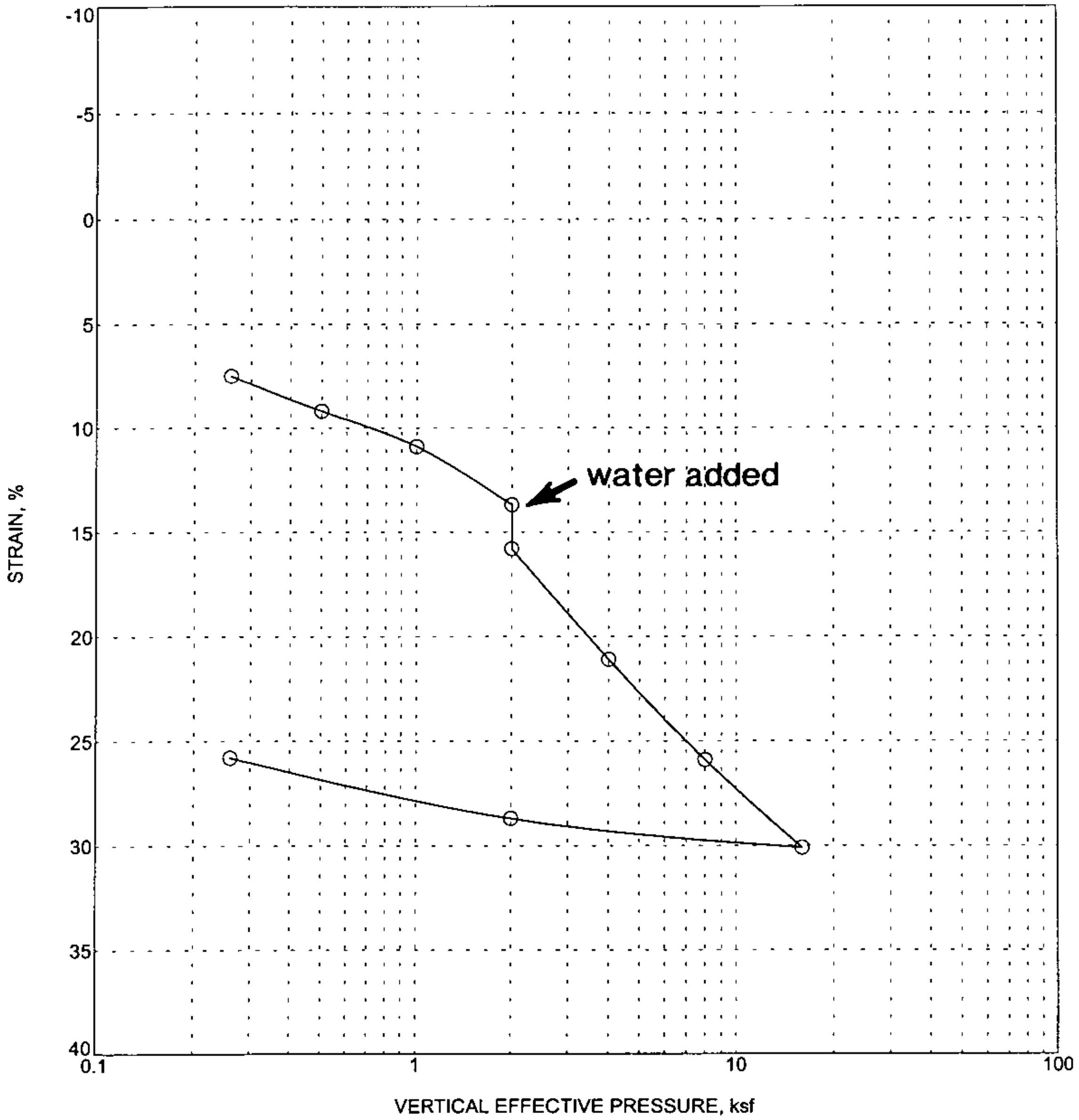
CONSOLIDATION TEST RESULTS

Cal State Channel Islands, East Campus Development
Camarillo Area of Ventura County



LOCATION	BH-205
DEPTH, ft	3.5
INITIAL MOISTURE CONTENT, %	13
UNIT DRY WEIGHT, pcf	102
MATERIAL DESCRIPTION	Sandy Lean CLAY (CL)
SAMPLE CONDITION	Liner Sample

CONSOLIDATION TEST RESULTS
Cal State Channel Islands, East Campus Development
Camarillo Area of Ventura County

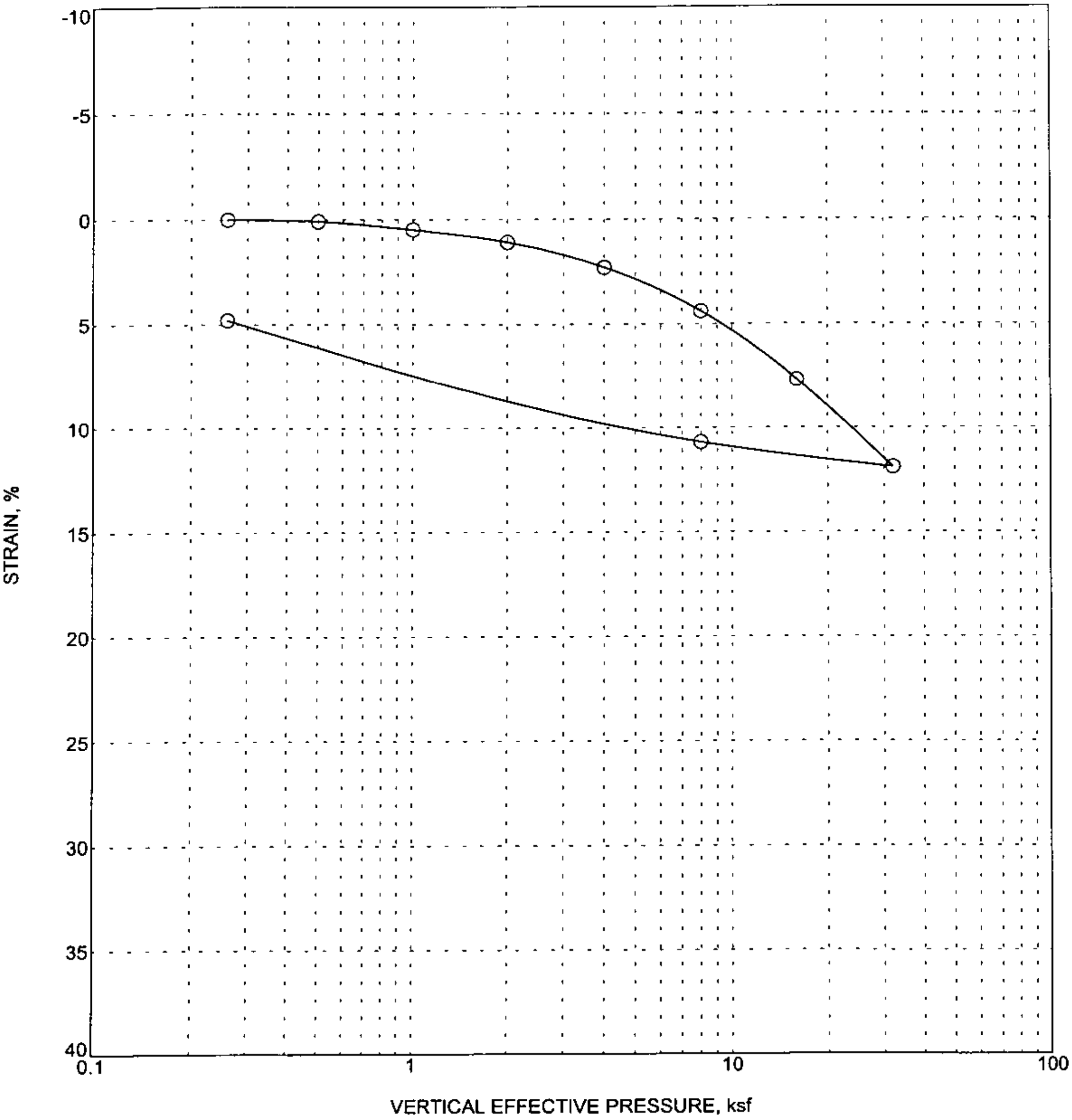


LOCATION	BH-210
DEPTH, ft	5.5
INITIAL MOISTURE CONTENT, %	15
UNIT DRY WEIGHT, pcf	87
MATERIAL DESCRIPTION	Clayey SAND with gravel (SC)
SAMPLE CONDITION	Liner Sample

CONSOLIDATION TEST RESULTS

Cal State Channel Islands, East Campus Development
Camarillo Area of Ventura County

PLATE B-6.18

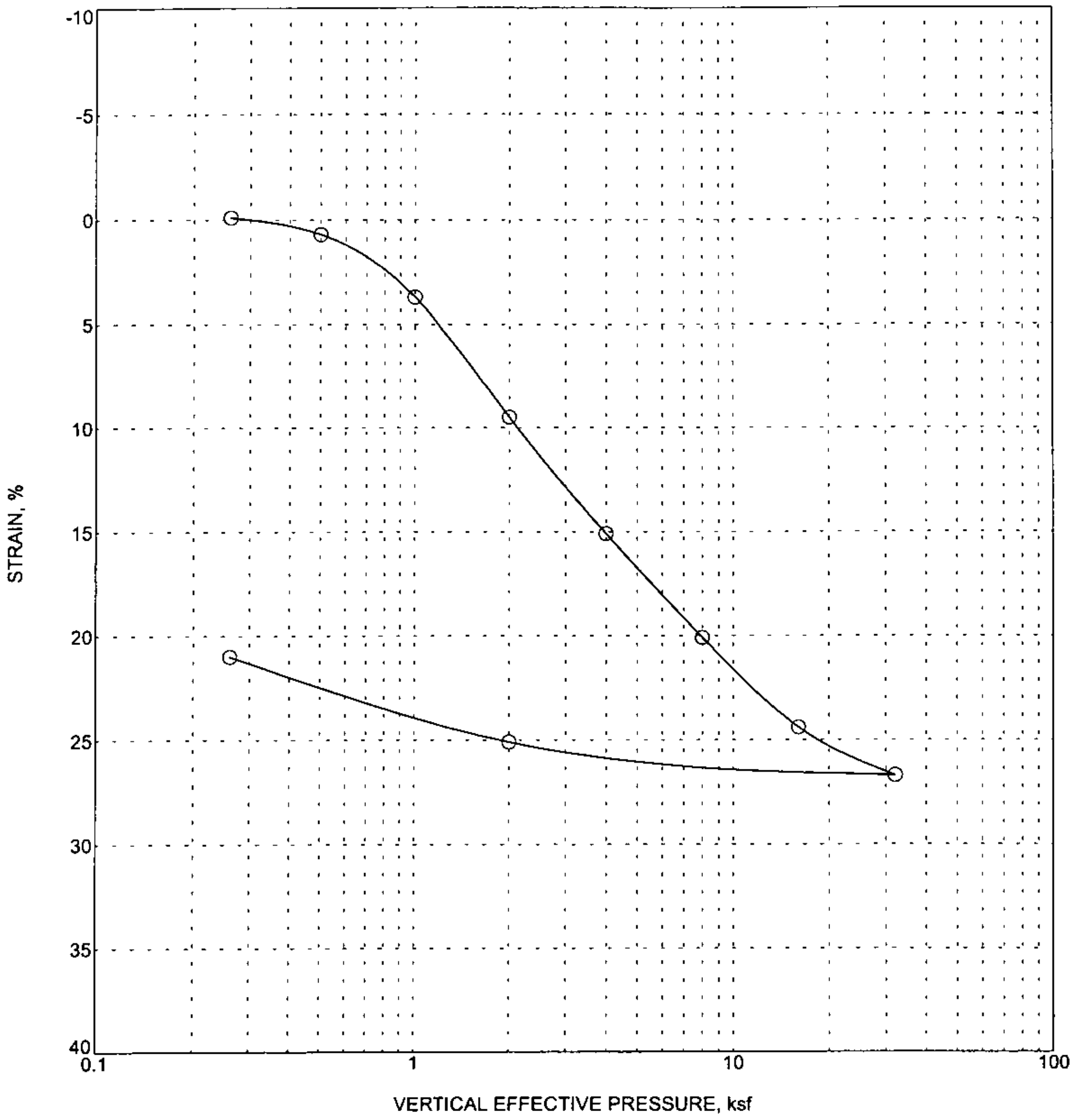


LOCATION	BH-214
DEPTH, ft	7.5
INITIAL MOISTURE CONTENT, %	17
UNIT DRY WEIGHT, pcf	102
MATERIAL DESCRIPTION	Sandy Lean CLAY (CL)
SAMPLE CONDITION	Liner Sample

CONSOLIDATION TEST RESULTS

Cal State Channel Islands, East Campus Development
Camarillo Area of Ventura County

PLATE B-6.19



LOCATION	BH-216
DEPTH, ft	5.0
INITIAL MOISTURE CONTENT, %	9
UNIT DRY WEIGHT, pcf	88
MATERIAL DESCRIPTION	Sandy CLAY with gravel (CL)
SAMPLE CONDITION	Liner Sample

CONSOLIDATION TEST RESULTS

Cal State Channel Islands, East Campus Development
Camarillo Area of Ventura County

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BtC Laboratories Incorporated
2978 SEABORG AVENUE, VENTURA, CA 93003-7686 • 805·656·6074 • F[illegible]

REPORT OF "R" VALUE TEST
(California 301)

DATE: July 28, 1999

JOB NUMBER: 99-7000-VO1
LAB NUMBER: 990398

PROJECT: CSU Channel Islands (#99-42-0381)
OWNER:
SAMPLE OF: Soil
SAMPLED BY: Client
SAMPLED FROM: BH 6
DATE RECEIVED: July 13, 1999
MATERIAL FOR USE IN:
DEPTH: 2'

(California 202)
GRADING ANALYSIS

SIEVE	AS REC'D	AS USED	SPEC'S
3"			
2 1/2"			
2"			
1 1/2"			
1"			
3/4"			
1/2"			
3/8"			
#4	100		
#8	97.2		
#16	89.5		
#30	73.9		
#50	60.9		
#100	53.0		
#200	47.3		(washed)

TEST SPECIMEN	A	B	C	D
COMP. FOOT PRESSURE PSI	260	170	120	
INITIAL MOISTURE %	14.0	14.0	14.0	
MOISTURE @ COMPACTION %	18.0	19.0	19.5	
DRY DENS. OF BRIQ. #/CF	105.6	101.8	100.0	
STABILOMETER VALUE "R"	24	15	11	
EXUDATION PRESSURE PSI	717	597	284	
THICKNESS IND. BY STAB.				
THICK. IND. BY EXP. PRESS.	0	0	0	

L.L.	P.L.	P.I.	SPEC MAX

SAND EQUIVALENT:
DURABILITY, COARSE:
DURABILITY, FINE:
DURABILITY INDEX:

L.A. RATTLER
100 REV:
500 REV:

SUBASE:
BASE:
SURFACE:
COHESION VALUE:
TRAFFIC INDEX:
"R" BY EXUD. PRESSURE: 11
"R" BY EXPAN. PRESSURE:
"R" @ EQUILIBRIUM: 11

INDICATED MINIMUM THICKNESS OF COVER FOR ABOVE CONDITION:

REMARKS:

Reviewed By:

M.B. (Ben) Lo, P.E.

Respectfully submitted,
BTC LABORATORIES, INC.

Charles N. Dunn, Lab Supervisor

Copies: 1-Fugro West
1-File

dw/RV6

PLATE B-7.1

OXNARD / CAMARILLO
(805) 656-6074

THOUSAND OAKS
(805) 497-2401

BtC Laboratories Incorporated

2978 SEABORG AVENUE, VENTURA, CA 93003-7686 • 805·656·6074 • FAX 805·656·1263

REPORT OF "R" VALUE TEST
(California 301)

DATE: July 28, 1999.

JOB NUMBER: 99-7000-VO1
LAB NUMBER: 990398

PROJECT: CSU Channel Islands (#99-42-0381)
OWNER:
SAMPLE OF: Soil
SAMPLED BY: Client
SAMPLED FROM: BH 8
DATE RECEIVED: July 13, 1999
MATERIAL FOR USE IN:
DEPTH: 1' - 2'

(California 202) GRADING ANALYSIS				TEST SPECIMEN	A	B	C	D
SIEVE	AS REC'D	AS USED	SPEC'S	COMP. FOOT PRESSURE PSI	290	250	170	
				INITIAL MOISTURE %	9.8	9.8	9.8	
				MOISTURE @ COMPACTION %	16.3	16.8	17.3	
				DRY DENS. OF BRIQ. #/CF	109.5	107.9	102.7	
3"				STABILOMETER VALUE "R"	30	21	11	
2 1/2"				EXUDATION PRESSURE PSI	756	541	292	
2"				THICKNESS IND. BY STAB.				
1 1/2"				THICK. IND. BY EXP. PRESS.	0.60	0.30	0.07	
1"				L.L. P.L. P.I. SPEC MAX	SUBASE:			
3/4"					BASE:			
1/2"					SURFACE:			
3/8"				SAND EQUIVALENT:	COHESION VALUE:			
#4	100			DURABILITY, COARSE:	TRAFFIC INDEX:			
#8	94.4			DURABILITY, FINE:	"R" BY EXUD. PRESSURE: 11			
#16	88.7			DURABILITY INDEX:	"R" BY EXPAN. PRESSURE:			
#30	82.9				"R" @ EQUILIBRIUM: 11			
#50	76.8			L.A. RATTLER				
#100	69.2			100 REV:	INDICATED MINIMUM THICKNESS OF			
#200	60.6		(washed)	500 REV:	COVER FOR ABOVE CONDITION:			

REMARKS:

Reviewed By:

M.B. (Ben) Lo, P.E.

Respectfully submitted,
BTC LABORATORIES, INC.

Charles N. Dunn, Lab Supervisor

Copies: 1-Fugro West
1-File

dw/RV6

PLATE B-7.2

BTC LABORATORIES, INC.
Established 1959
2978 Seaborg Ave., Ventura, CA 93003 ■ (805) 656-6074 ■ (805) 656-1263 Fax

REPORT OF "R" VALUE TEST
(California 301)

November 22, 2000

JOB NUMBER: 00-7000-VO1
LAB NUMBER: 000767

PROJECT: CSUC I Supplemental Study (99-42-0384-510)
OWNER:
SAMPLE OF: Soil
SAMPLED BY: Client
SAMPLED FROM: DH201-1
MATERIAL FOR USE IN:

DATE RECEIVED: Nov. 16, 2000
DEPTH: 0.5'-2.5'

(California 202)
GRADING ANALYSIS

SIEVE	AS REC'D	AS USED	SPEC'S
3"			
2 ½"			
2"			
1 ½"			
1"			
¾"		100	
½"		98.5	
3/8"		97.0	
#4		89.6	
#8		80.6	
#16		72.6	
#30		64.8	
#50		56.1	
#100		45.6	
#200		38.2	(washed)

TEST SPECIMEN	A	B	C	D
COMP. FOOT PRESSURE PSI	350	350	350	
INITIAL MOISTURE %	11.3	11.3	11.3	
MOISTURE @ COMPACTION %	16.3	16.8	17.3	
DRY DENS. OF BRIQ. #/CF	110.1	108.6	106.6	
STABILOMETER VALUE "R"	21	16	13	
EXUDATION PRESSURE PSI	525	315	175	
THICKNESS IND. BY STAB				
THICK. IND. BY EXP. PRESS.	0	0	0	

L.L.	P.L.	P.I.	SPEC.

SAND EQUIVALENT:
DURABILITY, COARSE:
DURABILITY FINE:
DURABILITY INDEX:

L.A. RATTLER
100 REV:
500 REV:

SUBASE
BASE:
SURFACE:
COHESION VALUE:
TRAFFIC INDEX:
"R" BY EXUD. PRESSURE: 16
"R" BY EXPAN. PRESSURE:
"R" @ EQUILIBRIUM: 16

INDICATED MINIMUM THICKNESS OF COVER FOR ABOVE CONDITION:

REMARKS:

Reviewed by:

M.B. (Ben) Lo, P.E.

Respectfully submitted,
BTC LABORATORIES, INC.

Charles N. Dunn, Lab Supervisor

CND:hra

Copies: 1-Fugro West, Ventura
1-File

PLATE B-7.3

BTC LABORATORIES, INC. Established 1959
2978 Seaborg Ave., Ventura, CA 93003 ■ (805) 656-6074 ■ (805) 656-1263 Fax

REPORT OF "R" VALUE TEST
(California 301)

November 22, 2000

JOB NUMBER: 00-7000-VO1
LAB NUMBER: 000767

PROJECT: CSUC I Supplemental Study (99-42-0384-510)
OWNER:
SAMPLE OF: Soil
SAMPLED BY: Client
SAMPLED FROM: DH 204-1
MATERIAL FOR USE IN:

DATE RECEIVED: Nov. 16, 2000
DEPTH: 0.5'-2'

(California 202)
GRADING ANALYSIS

SIEVE	AS REC'D	AS USED	SPEC'S
3"			
2 ½"			
2"			
1 ½"			
1"			
¾"	100		
½"	98.2		
3/8"	96.9		
#4	87.9		
#8	79.4		
#16	71.5		
#30	63.8		
#50	56.8		
#100	49.1		
#200	41.7		(washed)

TEST SPECIMEN	A	B	C	D
COMP. FOOT PRESSURE PSI	350	350	350	
INITIAL MOISTURE %	9.6	9.6	9.6	
MOISTURE @ COMPACTION %	16.1	16.6	17.1	
DRY DENS. OF BRIO. #/CF	110.9	109.4	108.5	
STABILOMETER VALUE "R"	23	18	14	
EXUDATION PRESSURE PSI	553	337	162	
THICKNESS IND. BY STAB				
THICK. IND. BY EXP. PRESS.	0.23	0.17	0.33	

L.L.	P.L.	P.I.	SPEC.

SAND EQUIVALENT:
DURABILITY, COARSE:
DURABILITY FINE:
DURABILITY INDEX:

L.A. RATTLER
100 REV:
500 REV:

SUBASE
BASE:
SURFACE:
COHESION VALUE:
TRAFFIC INDEX:
"R" BY EXUD. PRESSURE: 17
"R" BY EXPAN. PRESSURE:
"R" @ EQUILIBRIUM: 17

INDICATED MINIMUM THICKNESS OF COVER FOR ABOVE CONDITION:

REMARKS:

RECEIVED
NOV 30 2000
FUGRO WEST, INC.

Reviewed by:

M.B. (Ben) Lo, P.E.

Respectfully submitted,
BTC LABORATORIES, INC.

Charles N. Dunn, Lab Supervisor

Copies: 1-Fugro West, Ventura
1-File

CND:hra

PLATE B-7.4

BTC LABORATORIES, INC. Established 1959
2978 Seaborg Ave., Ventura, CA 93003 ■ (805) 656-6074 ■ (805) 656-1263 Fax

REPORT OF "R" VALUE TEST
(California 301)

November 9, 2000

JOB NUMBER: 00-7000-VO1
LAB NUMBER: 000724

PROJECT: Fugro-West (99-42-0384-488)
OWNER:
SAMPLE OF: Soil
SAMPLED BY: Client
SAMPLED FROM: BH 201-1
MATERIAL FOR USE IN:

DATE RECEIVED: Oct. 24, 2000
DEPTH: 1'-2 ½'

(California 202)

GRADING ANALYSIS

SIEVE	AS REC'D	AS USED	SPEC'S
3"			
2 ½"			
2"			
1 ½"			
1"			
¾"	100		
½"	96.6		
3/8"	94.2		
#4	89.1		
#8	84.5		
#16	80.4		
#30	76.5		
#50	71.6		
#100	65.3		
#200	57.1		(washed)

TEST SPECIMEN	A	B	C	D
COMP. FOOT PRESSURE PSI	350	350	350	
INITIAL MOISTURE %	14.0	14.0	14.0	
MOISTURE @ COMPACTION %	18.0	18.5	19.0	
DRY DENS. OF BRIQ. #/CF	101.9	101.1	101.0	
STABILOMETER VALUE "R"	29	20	17	
EXUDATION PRESSURE PSI	669	378	271	
THICKNESS IND. BY STAB				
THICK. IND. BY EXP. PRESS.	0.20	0.13	0.03	

L.L.	P.L.	P.I.	SPEC.

SAND EQUIVALENT:
DURABILITY, COARSE:
DURABILITY FINE:
DURABILITY INDEX:

L.A. RATTLER
100 REV:
500 REV:

SUBASE
BASE:
SURFACE:
COHESION VALUE:
TRAFFIC INDEX:
"R" BY EXUD. PRESSURE: 18
"R" BY EXPAN. PRESSURE:
"R" @ EQUILIBRIUM: 18

INDICATED MINIMUM THICKNESS OF COVER FOR ABOVE CONDITION:

REMARKS:

Reviewed by:

M.B. (Ben) Lo, P.E.

Respectfully submitted,
BTC LABORATORIES, INC.

Charles N. Dunn, Lab Supervisor

CND:hra

Copies: 1-Fugro West, Ventura
1-File

BTC LABORATORIES, INC.
Established 1959
2978 Seaborg Ave., Ventura, CA 93003 ■ (805) 656-6074 ■ (805) 656-1263 Fax

REPORT OF "R" VALUE TEST
(California 301)

November 9, 2000

JOB NUMBER: 00-7000-VO1
LAB NUMBER: 000724

PROJECT: Fugro-West (99-42-384-488)
OWNER:
SAMPLE OF: Soil
SAMPLED BY: Client
SAMPLED FROM: BH 204-1
MATERIAL FOR USE IN:

DATE RECEIVED: Oct. 24, 2000
DEPTH: 1/2'-2'

(California 202)
GRADING ANALYSIS

SIEVE	AS REC'D	AS USED	SPEC'S
3"			
2 ½"			
1 ½"			
1"			
¾"	100		
½"	97.6		
3/8"	96.5		
#4	95.2		
#8	93.4		
#16	91.4		
#30	89.4		
#50	85.6		
#100	77.8		
#200	70.5		(washed)

TEST SPECIMEN	A	B	C	D
COMP. FOOT PRESSURE PSI	350	350	350	
INITIAL MOISTURE %	16.9	16.9	16.9	
MOISTURE @ COMPACTION %	25.4	25.9	26.4	
DRY DENS. OF BRIO. #/CF	91.9	91.7	91.5	
STABILOMETER VALUE "R"	1	0	0	
EXUDATION PRESSURE PSI	677	374	271	
THICK. IND. BY EXP. PRESS.	0.40	0.67	0.47	

L.L.	P.L.	P.I.	SPEC.

SUBASE
BASE:
SURFACE:

SAND EQUIVALENT:
DURABILITY, COARSE:
DURABILITY FINE:
DURABILITY INDEX:

L.A. RATTLER
100 REV:
500 REV:

COHESION VALUE:
TRAFFIC INDEX:
"R" BY EXUD. PRESSURE: 5
"R" BY EXPAN. PRESSURE:
"R" @ EQUILIBRIUM: 5

INDICATED MINIMUM THICKNESS OF COVER FOR ABOVE CONDITION:

REMARKS:

Reviewed by:

M.B. (Ben) Lo, P.E.

Copies: 1-Fugro West, Ventura
1-File

Respectfully submitted,
BTC LABORATORIES, INC.

Charles N. Dunn, Lab Supervisor

CND:hra

BTC LABORATORIES, INC.
2978 Seaborg Ave., Ventura, CA 93003 ■ (805) 656-6074 ■ (805) 656-1263 Fax

Established 1959

REPORT OF "R" VALUE TEST
(California 301)

October 31, 2000

JOB NUMBER: 00-7000-VO1
LAB NUMBER: 000723

PROJECT: CSUCI Supplemental Study (99-42-0384-487)
OWNER:
SAMPLE OF: Soil
SAMPLED BY: Client
SAMPLED FROM: BH 209
MATERIAL FOR USE IN:

DATE RECEIVED: Oct. 24, 2000
DEPTH: 1' – 4'

(California 202)
GRADING ANALYSIS

SIEVE	AS REC'D	AS USED	SPEC'S
3"			
2 ½"			
2"			
1 ½"			
1"			
¾"	100		
½"	97.1		
3/8"	93.8		
#4	88.3		
#8	81.7		
#16	75.1		
#30	68.1		
#50	60.9		
#100	52.6		
#200	44.9		(washed)

TEST SPECIMEN	A	B	C	D
COMP. FOOT PRESSURE PSI	350	350	350	
INITIAL MOISTURE %	14.3	14.3	14.3	
MOISTURE @ COMPACTION %	19.3	20.3	21.3	
DRY DENS. OF BRIO. #/CF	104.9	103.7	102.3	
STABILOMETER VALUE "R"	2	1	0	
EXUDATION PRESSURE PSI	669	435	271	
THICKNESS IND. BY STAB				
THICK. IND. BY EXP. PRESS.	0.37	0.17	0.03	

L.L.	P.L.	P.I.	SPEC.

SAND EQUIVALENT:
DURABILITY, COARSE:
DURABILITY FINE:
DURABILITY INDEX:

L.A. RATTLER
100 REV:
500 REV:

SUBASE
BASE:
SURFACE:
COHESION VALUE:
TRAFFIC INDEX:
"R" BY EXUD. PRESSURE: 5
"R" BY EXPAN. PRESSURE:
"R" @ EQUILIBRIUM: 5

INDICATED MINIMUM THICKNESS OF COVER FOR ABOVE CONDITION:

REMARKS:

Reviewed by:

M.B. (Ben) Lo, P.E.

Respectfully submitted,
BTC LABORATORIES, INC.

Charles N. Dunn, Lab Supervisor

Copies: 1-Fugro West, Ventura
1-File

CND:hra

BTC LABORATORIES, INC. Established 1959
2978 Seaborg Ave., Ventura, CA 93003 ■ (805) 656-6074 ■ (805) 656-1263 Fax

REPORT OF "R" VALUE TEST
(California 301)

October 31, 2000

JOB NUMBER: 00-7000-VO1
LAB NUMBER: 000723

PROJECT: CSUCI Supplemental Study (99-42-0384-487)
OWNER:
SAMPLE OF: Soil
SAMPLED BY: Client
SAMPLED FROM: BH 212
MATERIAL FOR USE IN:

DATE RECEIVED: Oct. 24, 2000
DEPTH: 1' – 3'

(California 202)
GRADING ANALYSIS

SIEVE	AS REC'D	AS USED	SPEC'S
3"			
2 ½"			
2"			
1 ½"			
1"			
¾"	100		
½"	96.7		
3/8"	94.6		
#4	88.4		
#8	80.8		
#16	75.0		
#30	70.2		
#50	65.6		
#100	60.0		
#200	52.8		(washed)

TEST SPECIMEN	A	B	C	D
COMP. FOOT PRESSURE PSI	350	350	350	
INITIAL MOISTURE %	13.7	13.7	13.7	
MOISTURE @ COMPACTION %	17.2	17.7	18.2	
DRY DENS. OF BRIO. #/CF	105.8	104.1	103.7	
STABILOMETER VALUE "R"	25	17	6	
EXUDATION PRESSURE PSI	661	458	167	
THICKNESS IND. BY STAB				
THICK. IND. BY EXP. PRESS.	0.33	0.17	0.07	

L.L.	P.L.	P.I.	SPEC.

SAND EQUIVALENT:
DURABILITY, COARSE:
DURABILITY FINE:
DURABILITY INDEX:

L.A. RATTLER
100 REV:
500 REV:

SUBASE
BASE:
SURFACE:
COHESION VALUE:
TRAFFIC INDEX:
"R" BY EXUD. PRESSURE: 11
"R" BY EXPAN. PRESSURE:
"R" @ EQUILIBRIUM: 11

INDICATED MINIMUM THICKNESS OF COVER FOR ABOVE CONDITION:

REMARKS:

Reviewed by:

M.B. (Ben) Lo, P.E.

Copies: 1-Fugro West, Ventura
1-File

Respectfully submitted,
BTC LABORATORIES, INC.

Charles N. Dunn, Lab Supervisor

CND:hra

PLATE B-7.8

BTC LABORATORIES, INC.
Established 1959
2978 Seaborg Ave., Ventura, CA 93003 ■ (805) 656-6074 ■ (805) 656-1263 Fax

REPORT OF "R" VALUE TEST
(California 301)

October 31, 2000

JOB NUMBER: 00-7000-VO1
LAB NUMBER: 000723

PROJECT:	CSUCI Supplemental Study (99-42-0384-487)
OWNER:	
SAMPLE OF:	Soil
SAMPLED BY:	Client
SAMPLED FROM:	BH 215
MATERIAL FOR USE IN:	

DATE RECEIVED: Oct. 24, 2000
DEPTH: 3' – 6'

(California 202)

GRADING ANALYSIS			
SIEVE	AS REC'D	AS USED	SPEC'S
3"			
2 ½"			
2"			
1 ½"			
1"			
¾"		100	
½"		97.1	
3/8"		94.7	
#4		87.7	
#8		74.2	
#16		57.0	
#30		42.2	
#50		29.5	
#100		17.5	
#200		10.8	(washed)

TEST SPECIMEN	A	B	C	D
COMP. FOOT PRESSURE PSI	350	350	350	
INITIAL MOISTURE %	7.2	7.2	7.2	
MOISTURE @ COMPACTION %	11.7	12.2	12.7	
DRY DENS. OF BRIO. #/CF	118.4	118.4	117.3	
STABILOMETER VALUE "R"	77	75	71	
EXUDATION PRESSURE PSI	685	400	268	
THICKNESS IND. BY STAB				
THICK. IND. BY EXP. PRESS.	0	0	0	

L.L.	P.L.	P.I.	SPEC.

SAND EQUIVALENT:
DURABILITY, COARSE:
DURABILITY FINE:
DURABILITY INDEX:

L.A. RATTLER
100 REV:
500 REV:

SUBASE
BASE:
SURFACE:
COHESION VALUE:
TRAFFIC INDEX:
"R" BY EXUD. PRESSURE: 72
"R" BY EXPAN. PRESSURE:
"R" @ EQUILIBRIUM: 72

INDICATED MINIMUM THICKNESS OF COVER FOR ABOVE CONDITION:

REMARKS:

Reviewed by:

M.B. (Ben) Lo, P.E.

Respectfully submitted,
BTC LABORATORIES, INC.

Charles N. Dunn, Lab Supervisor

CND:hra

Copies: 1-Fugro West, Ventura
1-File

PLATE B-7.9

BTC LABORATORIES, INC. Established 1959
2978 Seaborg Ave., Ventura, CA 93003 ■ (805) 656-6074 ■ (805) 656-1263 Fax

REPORT OF "R" VALUE TEST
(California 301)

October 31, 2000

JOB NUMBER: 00-7000-VO1
LAB NUMBER: 000723

PROJECT: CSUCI Supplemental Study (99-42-0384-487)
OWNER:
SAMPLE OF: Soil
SAMPLED BY: Client
SAMPLED FROM: BH 216
MATERIAL FOR USE IN:

DATE RECEIVED: Oct. 24, 2000
DEPTH: 1' – 3'

(California 202)

GRADING ANALYSIS				TEST SPECIMEN	A	B	C	D
SIEVE	AS REC'D	AS USED	SPEC'S	COMP. FOOT PRESSURE PSI	350	350	350	
				INITIAL MOISTURE %	12.4	12.4	12.4	
				MOISTURE @ COMPACTION %	15.9	16.4	16.9	
				DRY DENS. OF BRIO. #/CF	108.5	107.0	107.1	
3"				STABILOMETER VALUE "R"	25	18	13	
2 ½"				EXUDATION PRESSURE PSI	605	414	272	
2"				THICKNESS IND. BY STAB				
1 ½"				THICK. IND. BY EXP. PRESS.	0.60	0.40	0.40	
1"				L.L. P.L. P.I. SPEC.	SUBASE			
¾"		100			BASE:			
½"		97.1			SURFACE:			
3/8"		94.6		SAND EQUIVALENT:	COHESION VALUE:			
#4		89.6		DURABILITY, COARSE:	TRAFFIC INDEX:			
#8		84.2		DURABILITY FINE:	"R" BY EXUD. PRESSURE:	14		
#16		78.6		DURABILITY INDEX:	"R" BY EXPAN. PRESSURE:			
#30		72.5			"R" @ EQUILIBRIUM:	14		
#50		65.8		L.A. RATTLER				
#100		56.6		100 REV:	INDICATED MINIMUM THICKNESS OF COVER FOR ABOVE CONDITION:			
#200		45.1	(washed)	500 REV:				

REMARKS:

Reviewed by:

M.B. (Ben) Lo, P.E.

Respectfully submitted,
BTC LABORATORIES, INC.

Charles N. Dunn, Lab Supervisor

CND:hra

Copies: 1-Fugro West, Ventura
1-File

PLATE B-7.10

Health
Science
Associates

LABORATORY REPORT

Report Number : 994250
Purchase Order :
Job No. 99-42-0381

MATHEW BALLMER
FUGRO WEST INC.
5855 OLIVAS PARK DRIVE
VENTURA, CA. 93003-7672

Date Received : 06-JUL-99
Date Completed : 20-JUL-99
Date Sent : 20-JUL-99
Page # 1 of 1

Sample Description : 1 - Bulk Soil
Project : Cal State Channel Islands

California Test Methods : 532,643

Auto No.	Submitter Sample Number	Resistivity ohms/cm	pH Units	Chloride ppm	Sulfate ppm
196051	DH-3 B 1-5'	3358	7.62	67.8	27.3

Milliliters Water Added	50	100	150	200	250	300	350	400
	Resistivity Ohm-cm							
Sample No.								
3 B 1-5'	3358	3630	3993	4083	4175	4356	4447	4447

Remarks : Sample(s) and sampling data as provided :
by : Mathew Ballmer

Analyst(s) : TWS
Ref :

California ELAP No.: 1406
AIHA Accreditation No.: 172
NVLAP Accreditation No.: 101384
AIHA ELLAP Accreditation No.: 10985
LACSD Lab No.: 10125

Reviewed by: Thomas Shultz
Thomas Shultz

Technical Approval:
Laboratory Director, Jamie Steedman-Lyde

PLATE B-8.1

Health Science Associates

LABORATORY REPORT

Report Number : 994361
Purchase Order :
Job No. 99-42-0381

MATHEW BALLMER
FUGRO WEST INC.
5855 OLIVAS PARK DRIVE
VENTURA, CA. 93003-7672

Date Received : 14-JUL-99
Date Completed : 20-JUL-99
Date Sent : 20-JUL-99
Page # 1 of 1

Sample Description : 2 - Bulk Soils
Project : Cal State Channel Islands

California Test Methods : 532,643

Auto No.	Submitter Sample Number	Resistivity ohms/cm	pH Units	Chloride ppm	Sulfate ppm
196745	BH# 5 1 2' B	4175	7.47	97.1	4.91
196746	BH# 1 2 2' B	15609	7.61	248	<2.0

Milliliters Water Added	50	100	150	200	250	300	350	400
	Resistivity Ohm-cm							
Sample No.								
5 1 2' B	4175	4900	5445	6171	6353	7260	7260	
1 2 2' B	16336	15609	15609	15609	15972	15972		

Remarks : Sample(s) and sampling data as provided :
by : Mathew Ballmer

Analyst(s) : TWS

Ref :

California ELAP No.: 1406
AIHA Accreditation No.: 172
NVLAP Accreditation No.: 101384
AIHA ELLAP Accreditation No.: 10985
LACSD Lab No.: 10125

Reviewed by: Thomas Shultz
Thomas Shultz

Technical Approval:
Laboratory Director, Jamie Steedman-Lyde

PLATE B-8.2

Health
Science
Associates

LABORATORY REPORT

Report Number : 110440
Purchase Order :
Job No. 99-42-0384

CAROL WOLKNER
FUGRO WEST INC.
5855 OLIVAS PARK DR.
VENTURA, CA. 93003

Date Received : 25-OCT-00
Date Completed : 02-NOV-00
Date Sent : 02-NOV-00
Page # 1 of 1

Sample Description : 1 - Bulk Soil
Project : CSUCI Supplemental Study

California Test Methods : 532,643

Auto No.	Submitter Sample Number	Resistivity ohms/cm	pH Units	Chloride ppm	Sulfate ppm
232402	BH-209 1-4' B	26,499	6.98	108.3	51.4

Milliliters Water Added	50	100	150	200	250	300	350	400
	Resistivity Ohm-cm							
Sample No.								
232402	55450	41745	32670	26499	26499	26499	27225	28314

Remarks : Sample(s) and sampling data as provided :
by : Carol Wolkner

Analyst(s) : ED/TWS

Ref :

California ELAP No.: 1406
AIHA Accreditation No.: 172
NVLAP Accreditation No.: 101384
AIHA ELLAP Accreditation No.: 10985
LACSD Lab No.: 10125

Reviewed by: Thomas Shultz
Thomas Shultz

Technical Approval:
Laboratory Director, Jamie Steedman-Lyde

Health Science Associates

LABORATORY REPORT

Report Number : 110441
Purchase Order :
Job No. 99-42-0384

CAROL WOLKNER
FUGRO WEST INC.
5855 OLIVAS PARK DR.
VENTURA, CA. 93003

Date Received : 25-OCT-00
Date Completed : 02-NOV-00
Date Sent : 02-NOV-00
Page # 1 of 1

Sample Description : 1 - Bulk Soil
Project : CSUCI Supplemental Study

California Test Methods : 532,643

Auto No.	Submitter Sample Number	Resistivity ohms/cm	pH Units	Chloride ppm	Sulfate ppm
232403	BH-212 1-3' B	17,424	7.26	145.0	59.9

Milliliters Water Added	50	100	150	200	250	300	350	400
	Resistivity Ohm-cm							
Sample No.								
232403	28314	26499	20328	18513	17424	17424	17787	18150

Remarks : Sample(s) and sampling data as provided :
by : Carol Wolkner

Analyst(s) : ED/TWS

Ref :

California ELAP No.: 1406
AIHA Accreditation No.: 172
NVLAP Accreditation No.: 101384
AIHA ELLAP Accreditation No.: 10985
LACSD Lab No.: 10125

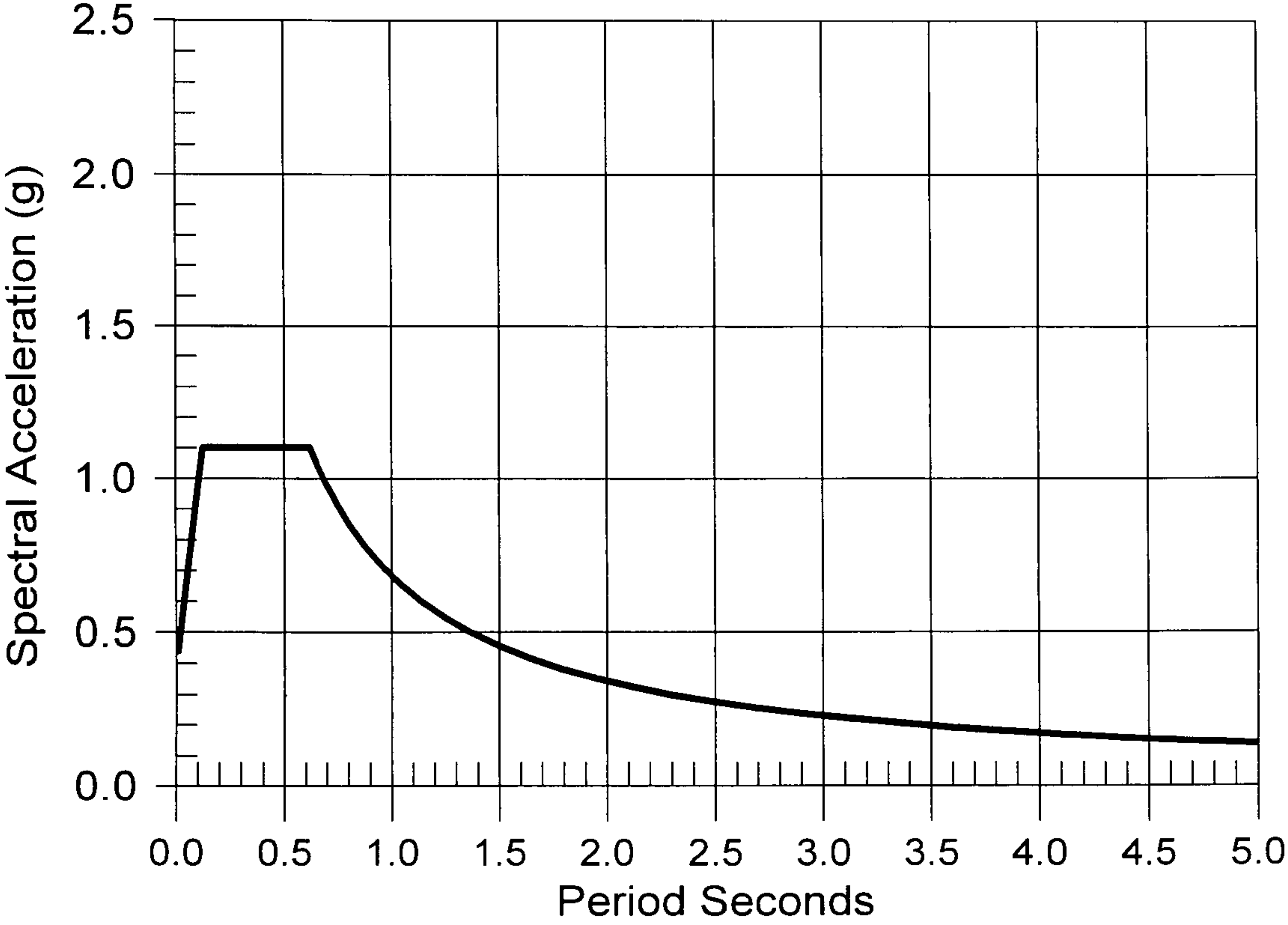
Reviewed by: Thomas Shult
Thomas Shultz

Technical Approval:
Laboratory Director, Jamie Steedman-Lyde

APPENDIX C
DESIGN RESPONSE SPECTRUM

DESIGN RESPONSE SPECTRUM

Seismic Zone: 0.4 Soil Profile: SD



December 2000
Project No. 99-42-0384

PLATE C-1

FUGRO WEST, INC.

4820 McGrath Street, Suite 100
Ventura, California 93003-7778
Tel: (805) 650-7000
Fax: (805) 650-7010

August 17, 2007
Project No. 3133.017.8B

California State University, Channel Islands Site Authority
401 Golden Shore, 2nd Floor
Long Beach, California 90802

Attention: Mr. Jim Corsar
Chief of Construction

Subject: Addendum to Geotechnical Study, Phase 2A/2B East Campus Housing, Inspiration Point Bridge, California State University Channel Islands, Camarillo, California

Dear Mr. Corsar:

INTRODUCTION

This addendum geotechnical study for the East Campus Development at the California State University Channel Islands (CSUCI) in Camarillo, California (Fugro, 2000) presents revised recommendations for the Inspiration Point Bridge and Drainage Culvert. The bridge site is located as shown on Plate 1 - Vicinity Plan. The work was performed in general accordance with our proposal (Fugro, 2007a), which was prepared in response to design concepts presented on Sheets B-1, B-2, and B-3 of the Inspiration Point Bridge Plans (Huitt-Zollars, 2006), to assess unexplored subsurface conditions at the project location.

Revised recommendations presented herein supersede recommendations for site development, grading, and overexcavation, and foundation design recommendations presented on Sheet GP-0 of the East Campus Housing Phase 2A/2B Rough Grading Plans (Huitt-Zollars, 2007) and in Fugro (2000).

Services for this addendum were authorized by a pending task order to be executed by Ms. Valerie Patscheck with CSUCI, as part of our blanket Task Order Service Agreement No. 5179, dated July 3, 2007.

PROJECT DESCRIPTION

The layout of the proposed Inspiration Point Bridge and Drainage Culvert is presented on Plate 2 - Site Layout and Exploration Plan. An existing crossing and drainage culvert traverses an unnamed creek as part of an old, unpaved, perimeter road. This crossing will soon provide service to several residences being constructed as part of the Phase 2A/2B East Campus Housing Development.

Based on conversations with Mr. Marc Haslinger with Huitt-Zollars and Mr. Merlin Snider with Snider Construction Services, we understand that the proposed project will include demolition of the existing crossing and culvert, and construction of a new crossing and new culvert. Although the existing alignment is not shown relative to the new alignment on the plans (Huitt-Zollars, 2006), based on conversation with Mr. Haslinger, in combination with observations during our field exploration, the location of the proposed alignment appear very similar to the existing crossing.

Based on the Huitt-Zollars (2006) bridge plans, the proposed Inspiration Point Bridge crossing will be about 75 feet long and 30 feet wide with two reinforced concrete retaining walls supporting the sides. The crossing road pavement will be asphalt, flanked by concrete sidewalks. The tops of the retaining walls extend 3 to 6 feet above the road surface, acting as a guard rail. Above-grade portions of the wall will have a brick façade covering the concrete. The corrugated steel drainage culvert, roughly 11-1/2 feet wide and 7-1/4 feet tall, will be located towards the base of the retaining walls, running perpendicular to the walls and road surface. Retaining wall foundations will consist of stepped, shear key footings; however, actual footing depths and dimensions are not shown on Huitt-Zollars (2006).

SITE CONDITIONS

The existing crossing and drainage culvert consists of two parallel retaining walls, each about 20 feet long and about 25 to 30 feet apart. A dirt road is located between the walls about 1 foot below the top of the walls, with a metal gate bounding the southern end of the crossing. A 5-foot-diameter corrugated steel circular drainage culvert runs perpendicular underneath the road at the creek level. Since the existing crossing is roughly 60 feet long, concrete and/or grout in combination with plastic sheeting and sand bags have been placed beyond the limits of the retaining walls on the slopes, likely to mitigate erosion. Concrete and/or grout has also been placed in the creek bottom at the inlet and outlet of the culvert.

At the time of our field exploration, the creek bed and side banks were overgrown with dense vegetation including bushes, cacti, and trees. The upstream (eastern) culvert inlet was mostly blocked by tree trunks and dense vegetation. Creek flow appears to have been restricted by the blockage, causing debris and sediments to accumulate at the inlet; thus, the creek bed elevation on the upstream side of the crossing was several feet higher than the creek bed elevation downstream at the culvert outlet. Also the vegetation was much denser upstream of the existing culvert crossing.

FIELD EXPLORATION AND LABORATORY TESTING

The supplemental field exploration program consisted of excavating three test pits in the vicinity of the proposed bridge and culvert crossing. The test pits are located as shown on Plate 2. Test pits were excavated by Granite Construction Company on July 27, 2007 using a CAT 330L excavator. Two test pits were excavated on the western (downstream) side of the existing crossing, and due to the thick brush and difficult access, only one test pit was excavated on the eastern (upstream) side. The test pits excavated as part of this exploration program ranged from 6 to 12 feet deep. Selected soil and bedrock formation samples were obtained from the tests pits for classification.

SUBSURFACE CONDITIONS

EARTH MATERIALS

Descriptions of soil conditions presented herein are based on visual classification of samples obtained from our field exploration and similar data reported in Fugro (2000). Logs of the test pits are presented in Appendix A.

Subsurface conditions encountered generally consisted of several feet of debris laden fill underlain by colluvium, and bedrock of the Conejo Volcanics. Elevations presented herein were estimated based on survey stakes provided by Granite Construction Company.

Artificial Fill (af)

Artificial fill was encountered in all three test pits, to depths ranging from 3 to 9 feet, with a corresponding basal contact elevations of +102 feet to +99 feet MSL (Appendix A). Fill consisted of clayey sand with gravel (SC), loosely intermixed with abundant trash and debris. The debris laden fill was easily excavated. Trash and debris encountered in the test pits consisted of roots, bricks, plastic and metal pipe sections, wires, bicycle and automobile tires, concrete and asphalt chunks, rebar pieces, glass bottles, and other miscellaneous trash/debris.

Colluvium (Qcol)

Colluvium encountered in test pits TP-2 and TP-3 consisted of clay with gravel and rock fragments. The layer of colluvium ranged from about 2 to 3 feet thick, corresponding to depths between elevations +96 feet and +100 feet MSL.

Conejo Volcanics (Tcvb)

The bedrock encountered in the test pits is composed of basalt, andesitic basalt, and dacitic breccia of the Conejo Volcanics Formation. The Conejo Volcanics were encountered in the backhoe test pits at depths ranging from 5 to 12 feet, corresponding to approximate elevations of +100 feet to +96 feet MSL. Based on subsurface conditions encountered in the test pits, the bedrock surface appears to dip from west to east.

GROUNDWATER

At the time of our field exploration, the creek bed was dry, and no groundwater was encountered in the test pit excavations. However, seasonal fluctuations in groundwater and runoff should be anticipated. If dewatering is required during demolition of the existing crossing and/or construction of the new crossing, applicable recommendations are presented in Fugro (2000).

SITE DEVELOPMENT AND GRADING RECOMMENDATIONS

Demolition of Existing Crossing

The existing bridge and culvert crossing and its associated foundations are to be demolished prior to construction of the new crossing. Old foundations, any below-grade structures, and soils disturbed during the demolition process should be removed in their entirety prior to commencing grading operations for new structures. All debris laden fill should be removed from the bridge crossing area to expose either bedrock materials or firm colluvium.

The geotechnical engineer or his representative should observe excavated areas and assess whether addition materials need to be removed. Since foundation plans for the existing crossing are not available, removal depths during demolition are unknown and can only be estimated from the nearby test pits. Excavation depths may be increased based on conditions encountered.

Excavation for New Crossing

Excavation depths described below are based on top-of-footing elevations presented in Huitt-Zollars (2006) and assuming wall footing depths of 2 feet. Because test pits were excavated 15 to 20 feet beyond the existing retaining walls, actual subsurface conditions are unknown at the exact locations of the proposed footings.

Areas beneath the proposed retaining wall footings should be overexcavated to expose competent Conejo Formation Bedrock. As noted above, all fill and debris should be removed from the bridge crossing. Excavation depths below the bottom of the retaining wall footings may be on the order of about 1 to 2 feet for the west retaining wall, and about 4 to 5 feet for the east retaining wall. Excavation for the culvert should expose bedrock or firm colluvium but should extend at least 1 foot below the bottom of the culvert pipe into competent material. Estimated overexcavation depths may need to be deepened based on actual conditions encountered in the field.

Excavation to bedrock or firm colluvium should extend to a distance of at least 5 feet beyond the outside edges of the wall footings, then back up to the creek bottom at a slope no steeper than 1h:1v. Excavations beneath new foundations should be completely inclusive of the space between the retaining walls. Since the excavation depths for the east and west retaining wall footings are likely to be different, excavation depths between the retaining walls should not exceed a slope of 3h:1v. Excavation bottoms should be fairly even without steep steps. Exposed bedrock materials do not have to be scarified and recompacted but colluvium materials should be scarified to a depth of 12 inches and moisture-conditioned to within 2 percent of optimum and compacted to a relative density of at least 92 percent.

Observation of Excavation Bottoms

Excavation bottoms should be observed by Fugro in accordance with our recommendations presented in Fugro (2000). Excavation bottoms may be deepened based on conditions encountered in the field.

Backfilling Below Wall Foundations

Backfill in overexcavations below footing bottoms should consist of Class II Aggregate Base or Processed Miscellaneous Base (PMB). Aggregate base should consist of imported material conforming to Caltrans (2006) Standard Specifications for Class II aggregate base, Section 26-1.02A or Section 200-2.5 of the Greenbook (2006) for PMB. Backfill below the footing and culvert bottoms should be compacted to at least 95 percent relative compaction as determined by ASTM D1557. Fill placement and compaction should conform to recommendations presented in Fugro (2000).

General Backfill

On-site material consisting of fill and debris excavated during the existing bridge demolition and during excavation for the new crossing should not be used as backfill. Based on laboratory testing performed during rough grading for the Phase 2A/2B East Campus Housing Project, excess on-site material from the Phase 2A/2B site should be suitable material to use as general fill. All imported fill, from the Phase 2A/2B site or elsewhere, should be observed by our representative and tested for compliance prior to transporting it to the site.

CLOSURE

This addendum is bound by the same terms, condition, and limitations as Fugro (2000) and should be attached to Fugro (2000). Please call if you questions about this addendum.

Sincerely,

FUGRO WEST, INC.

Samuel M Bryant

Samuel M. Bryant, P.E., G.E.
Associate Engineer

Attachments: Plate 1 - Vicinity Map
Plate 2 - Site Layout and Exploration Plan
Appendix A - Test Pit Logs

Copies Submitted: (1-Pdf) Addressee
(1-Pdf) Mr. Merlin Snider, Snider Construction Services

REFERENCES

Caltrans (2006), "Standard Specification," May.

Fugro West, Inc (2000), *Geotechnical Study, Cal State University Channel Islands East Campus Development, Camarillo area of Ventura, California,* prepared for California State University Channel Islands Site Authority, FWI Job No. 99-42-0384 , December 14.

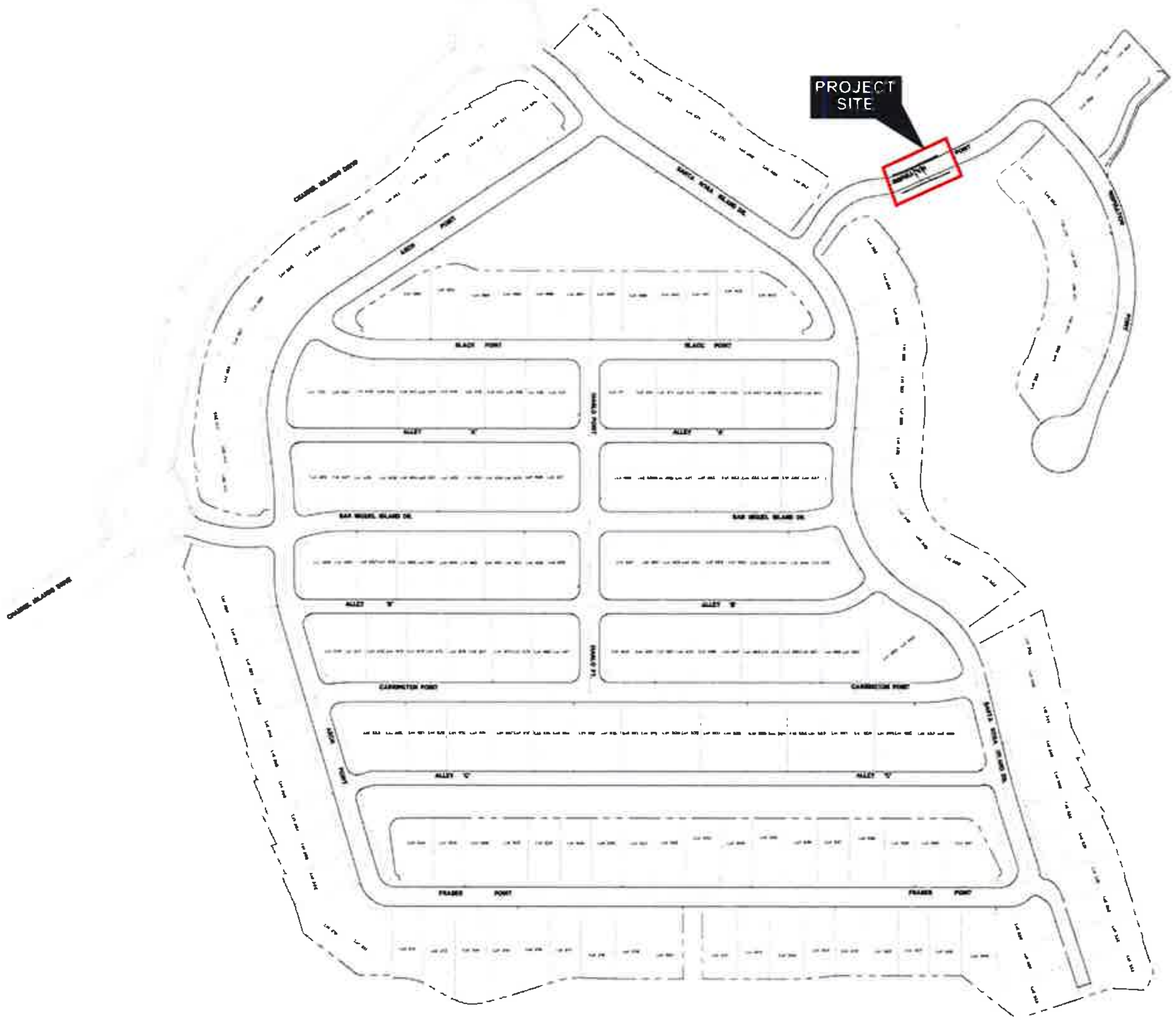
Fugro West, Inc. (2007a), *Proposal for Addendum to Geotechnical Study, Phase 2A/2B East Campus Housing, California State University Channel Islands, Camarillo, California,* prepared for Snider Construction, FWI Proposal No. 2007.233, July 23.

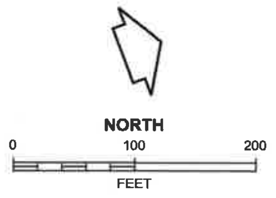
Fugro West, Inc. (2007b), *Results of Supplementary Corrosion Testing, Phase 2A/2B East Campus Housing, California State University Channel Islands, Camarillo, California,* prepared for California State University Channel Islands, FWI Project No. 3133.017, June 27 (revised July 26).

Greenbook (2006), "Standard Specification for Public Works Construction.

Huitt-Zollars (2006), Grading Sheet GP-0.

PLATES





Base map source: Lot Numbering Map, CSUCI Phase 2A/2B East Campus Residential Development. Huitt-Zollars.

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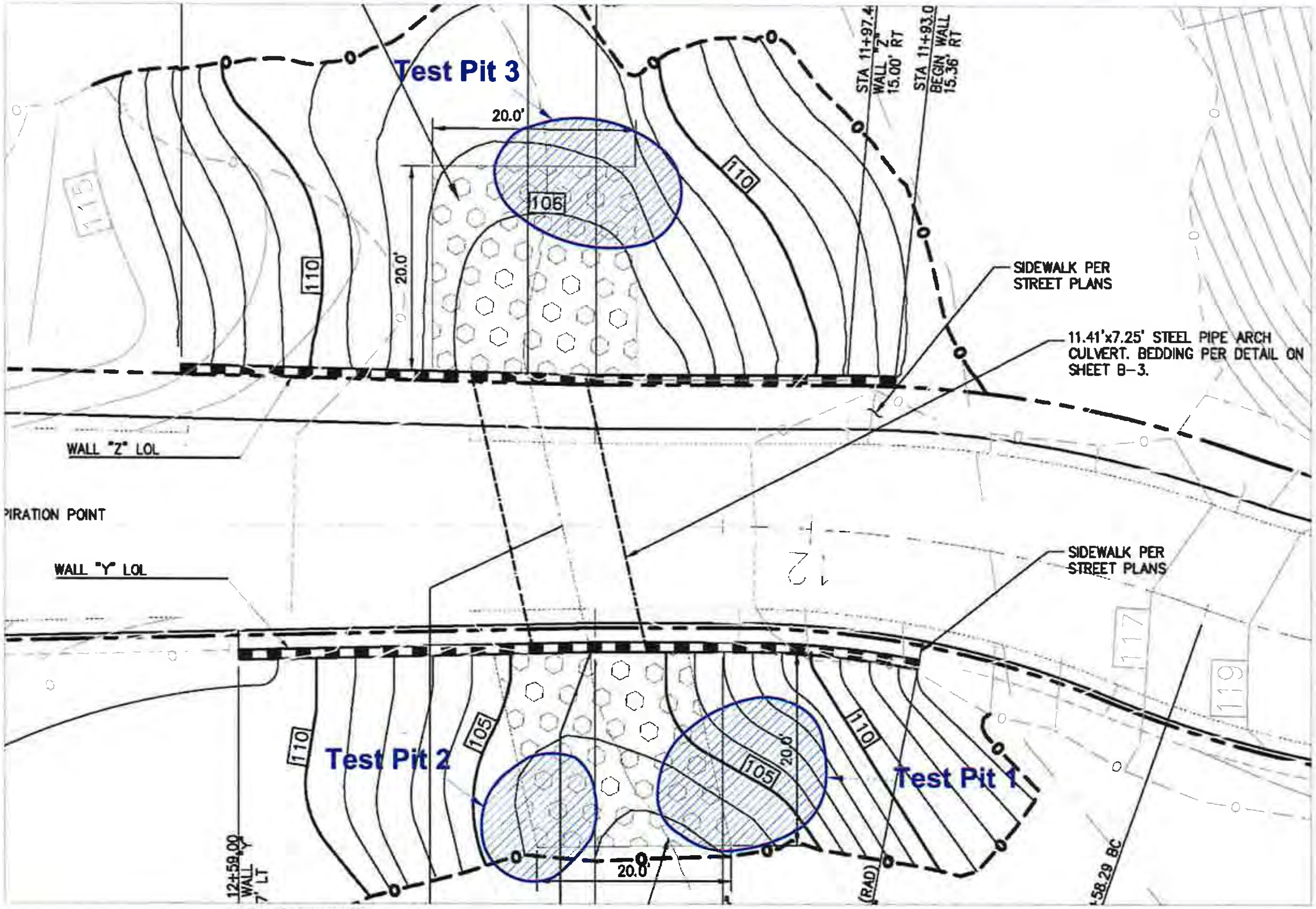
VICINITY MAP
CSUCI Phase 2A/2B
East Campus Development
Inspiration Point Bridge
Camarillo, California

PLATE 1



Base map source: General Plan, Inspiration Pt. Bridge, B-1 Sheet 56 of 59.
Huitt-Zollars (5-11-06)

M:\Drafting\Jobfiles\2007\3133.017\Bridge Plans\CSUCI Inspiration Point Bridge.dwg 8-13-07

LEGEND

▨ Approximate Test Pit Location

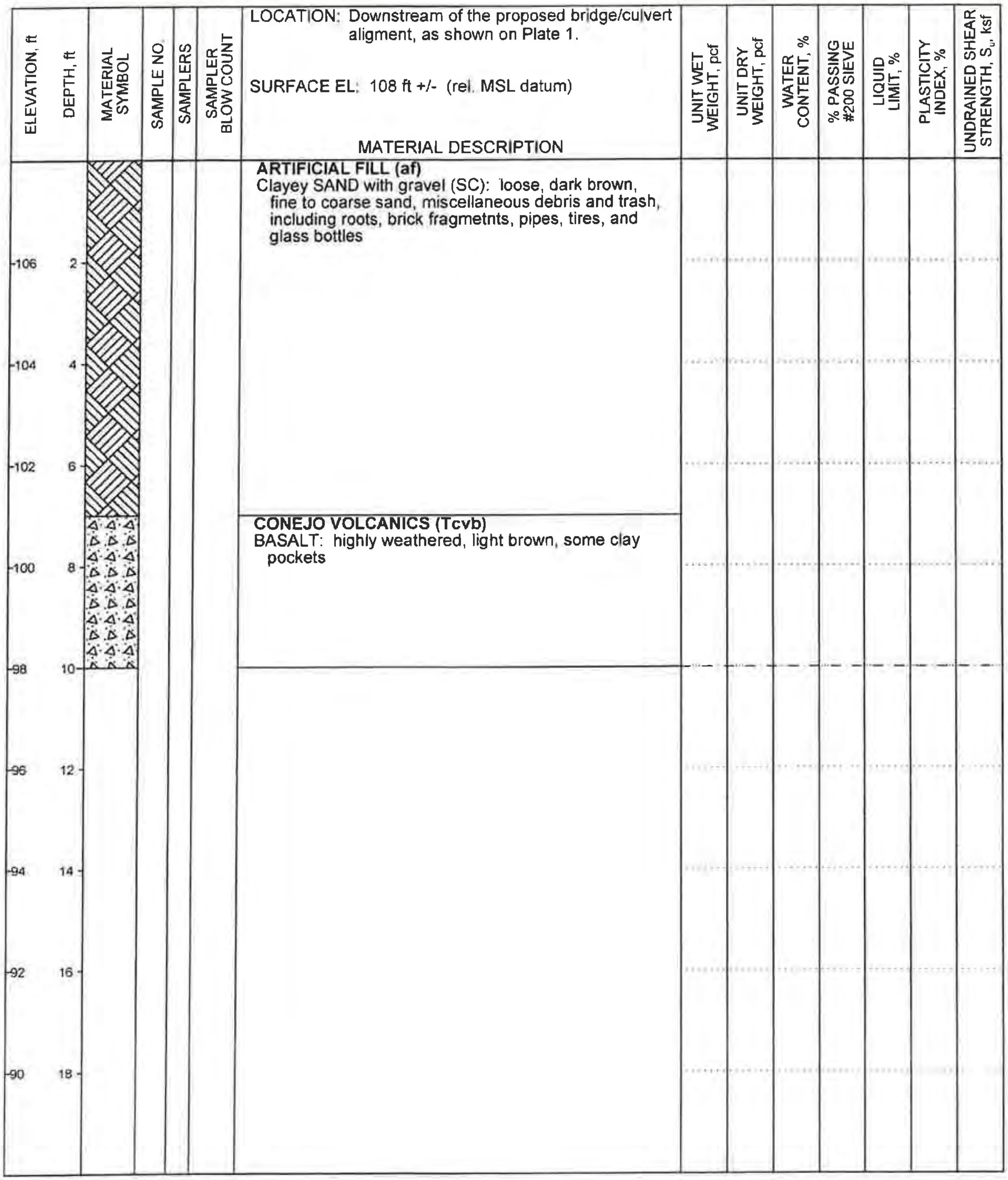
NORTH

0 10 20
FEET

Site Layout and Exploration Plan
CSUCI Phase 2A/2B
East Campus Development
Inspiration Point Bridge
Camarillo, California

PLATE 2

APPENDIX A



LOCATION: Downstream of the proposed bridge/culvert aligment, as shown on Plate 1.

SURFACE EL: 108 ft +/- (rel. MSL datum)

ARTIFICIAL FILL (af)
Clayey SAND with gravel (SC): loose, dark brown, fine to coarse sand, miscellaneous debris and trash, including roots, brick fragmetnts, pipes, tires, and glass bottles

CONEJO VOLCANICS (Tcvb)
BASALT: highly weathered, light brown, some clay pockets

COMPLETION DEPTH: 10.0 ft
DEPTH TO WATER: Not Encountered

DRILLING DATE: July 27, 2007

DRILLING METHOD: CAT 330L Excavator
DRILLED BY: Granite Construction Company
LOGGED BY: J. Hutchins
CHECKED BY: S M Bryant P.E.

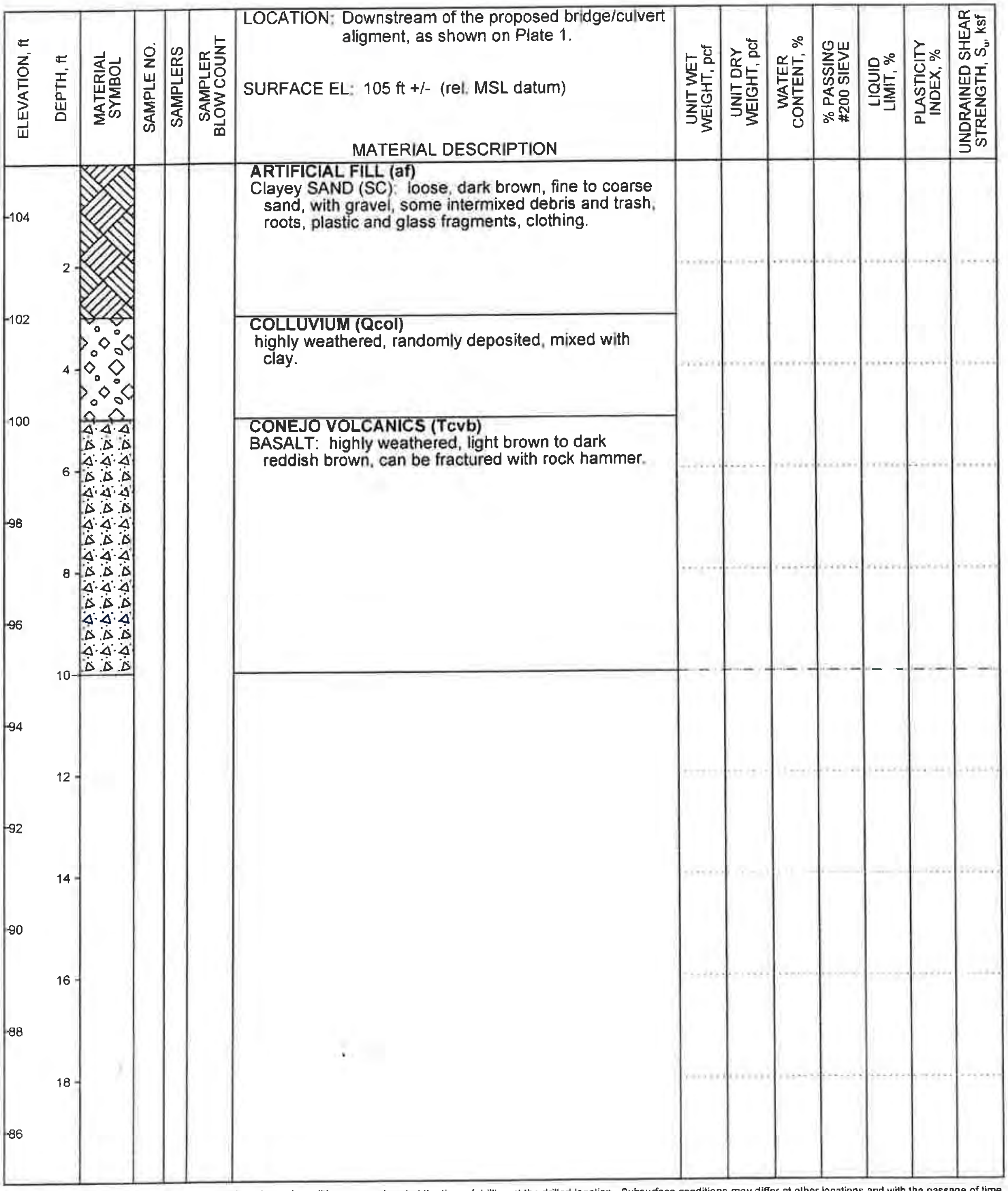
LOG OF NO. TP-1

CSUCI Phase 2A/2B Inspiration Point Bridge
Camarillo, California

PLATE A-1

LOCATION: Downstream of the proposed bridge/culvert alignment, as shown on Plate 1.

SURFACE EL: 105 ft +/- (rel. MSL datum)



ARTIFICIAL FILL (af)
Clayey SAND (SC): loose, dark brown, fine to coarse sand, with gravel, some intermixed debris and trash, roots, plastic and glass fragments, clothing.

COLLUVIUM (Qcol)
highly weathered, randomly deposited, mixed with clay.

CONEJO VOLCANICS (Tcvb)
BASALT: highly weathered, light brown to dark reddish brown, can be fractured with rock hammer.

The log and data presented are a simplification of actual conditions encountered at the time of drilling at the drilled location. Subsurface conditions may differ at other locations and with the passage of time.

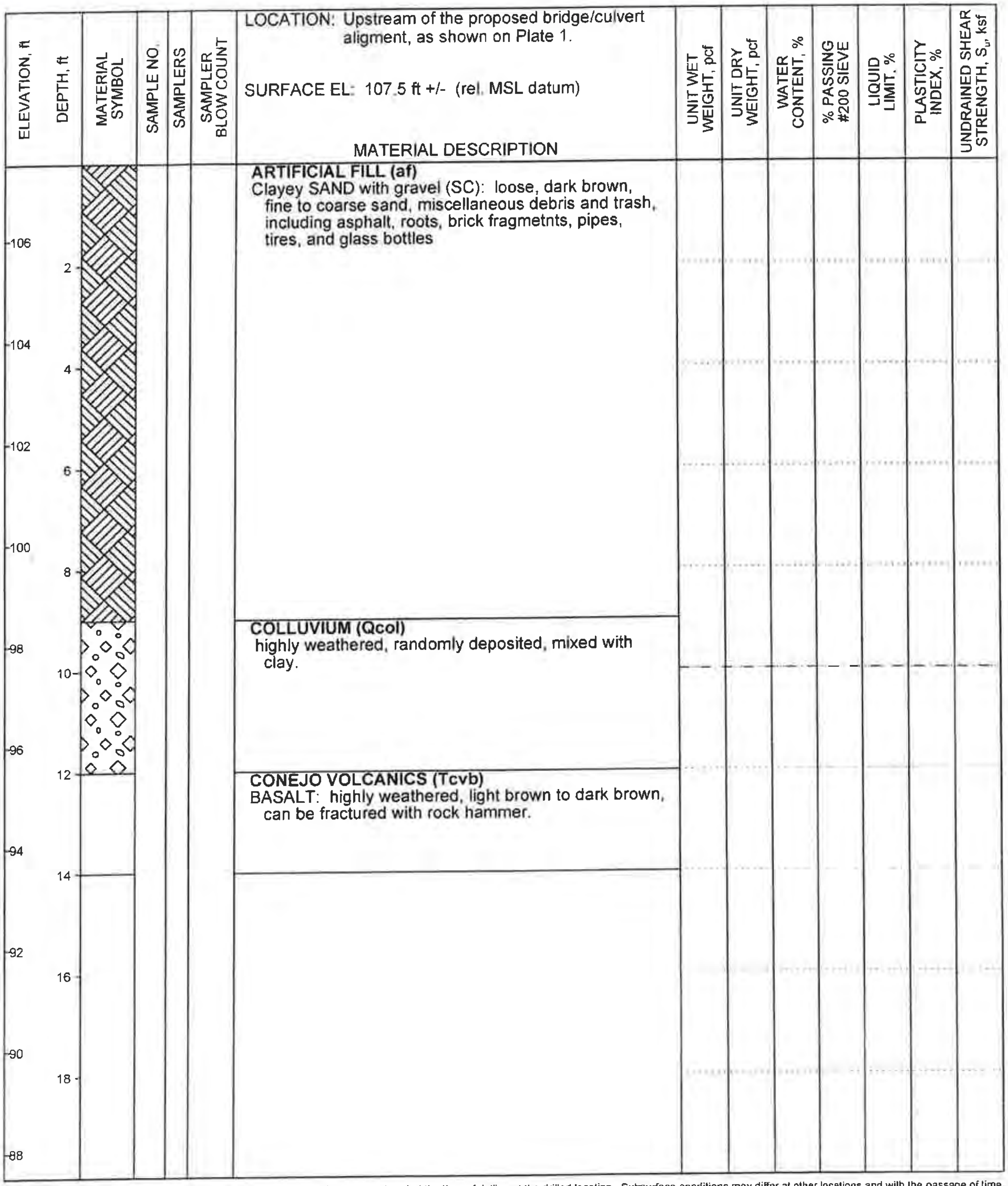
COMPLETION DEPTH: 10.0 ft
DEPTH TO WATER: Not Encountered

DRILLING DATE: July 27, 2007

DRILLING METHOD: CAT 330L Excavator
DRILLED BY: Granite Construction Company
LOGGED BY: J. Hutchins
CHECKED BY: S M Bryant P.E.

LOG OF NO. TP-2

CSUCI Phase 2A/2B Inspiration Point Bridge
Camarillo, California



LOCATION: Upstream of the proposed bridge/culvert aligment, as shown on Plate 1.

SURFACE EL: 107.5 ft +/- (rel. MSL datum)

ARTIFICIAL FILL (af)
Clayey SAND with gravel (SC): loose, dark brown, fine to coarse sand, miscellaneous debris and trash, including asphalt, roots, brick fragmetnts, pipes, tires, and glass bottles

COLLUVIUM (Qcol)
highly weathered, randomly deposited, mixed with clay.

CONEJO VOLCANICS (Tcvb)
BASALT: highly weathered, light brown to dark brown, can be fractured with rock hammer.

The log and data presented are a simplification of actual conditions encountered at the time of drilling at the drilled location. Subsurface conditions may differ at other locations and with the passage of time.

COMPLETION DEPTH: 14.0 ft
DEPTH TO WATER: Not Encountered

DRILLING DATE: July 27, 2007

DRILLING METHOD: CAT 330L Excavator
DRILLED BY: Granite Construction Company
LOGGED BY: J. Hutchins
CHECKED BY: S M Bryant P.E.

LOG OF NO. TP-3

CSUCI Phase 2A/2B Inspiration Point Bridge
Camarillo, California