C. Geologic Bluff Stability Report

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Mr. Farrest Hyden
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778 Main Street
Cambria, CA 93428
Attn: Ms. Dee Bud

Project: Farrest Hyden Residence
Highway 1, APN 1305116
Cambria, California
Subject: Geologic Bluff Stability Report

I. Introduction

This Geologic Bluff Stability Study was performed at the request of Ms. Dee Bud of Century 21 in Cambria, California. The purpose of this geologic report was to evaluate the subject sea cliff (bluff) with respect to guidelines issued by the California State Coastal Commission.

Field work consisted of local reconnaissance mapping with emphasis on geologic structure within the sea cliff area of the subject site.

II. Site Description

The site is located approximately one-quarter (1/4) mile north of the San Simeon Creek terminal discharge point and west of Highway 1 in the Cambria area of San Luis Obispo County, California (see Site Plan, Figure 1). Access to the site is provided by an unimproved dirt road which branches off a paved frontage road that parallels Highway 1. The subject lot and driveway is enclosed by a perimeter barbed wire fence.

Topographically, the site is relatively flat. The western property boundary is terminated by a near vertical 35± foot high sea cliff, bounded by the Pacific Ocean. The three remaining property boundaries are bounded by undeveloped lots. Vegetation on-site consists of native brush and grasses.

II. Geology

A. Local Geologic Setting

The subject site is underlain by approximately twenty-five to thirty (25-30) feet of Marine Terrace deposits which overlies sandstone, claystone and metavolcanics of the Franciscan Melange Formation. Geomorphically, the site is part of a northwest trending wavecut terrace produced by sea wave erosion. The seaward edge of the terrace is called a sea cliff. The sea cliff on-site is approximately thirty-five (35) feet high.

B. Stratigraphy and Structure

1. Marine Terrace Deposits

The site is underlain by Pleistocene (11,000 - 1.5 million years) Marine Terrace deposits which are reddish brown to brown and consist of graded clayey sand materials. The presence of the graded bed structure indicates that each layer displays a gradual and progressive change in particle size, usually form coarse at the base of the bed to fine at the top. Characteristically, these deposits are generally moderately to well consolidated but are susceptible to rill and gully erosion, rotational slope failures, and mass wasting along the cliff face.

2. Franciscan Melange Formation

Locally, the terrace deposits are underlain by rocks of the Franciscan Melange Formation which include predominately metavolcanics and sandstone rocks. Both of these units are sheared and fractured. Approximately three to four (3-4) feet of the metavolanic and sandstone bedrock units are exposed at the toe of the sea cliff at the time of this field study, dated February, 1989.

III. Seismic

This site, like all other sites in the Cambria Area, can be affected by moderate to major earthquakes centered on one of the known large active faults listed in Table No. 1. The maximum credible Richter magnitudes are expressed although any events on these faults near the site could result in moderate to severe ground shaking at the

subject property. Peak ground accelerations would not be attenuated by the underlying terrace deposits. This is as per Ploessel and Slosson "Repeatable High Ground Acceleration from Earthwuakes", 1974, California Geology, Vol. 27, No. 9, pp. 195-199.

TABLE NO. 1

Fault	Approximate Distance	Maximum Credible Magnitude
Hosgri	3 km	7.5
Nacimiento	9 km	6.5
San Andreas	60 km	8.25

IV. Secondary Seismic Effects

Review of the geologic conditions on-site indicate that the site would not be affected by liquefaction or settlement during a seismic event. Possible innundation of the site due to a seismically induced tsunami or tidal wave should not be any lessor or more than other coastal areas in Coastal California.

V. Groundwater

Groundwater system consists of a number or components:

1) Source
2) Storage
3) Discharge

Principle source of available water in the site are is the natural rainfall, and that originating off-site. Natural water base elevations are the San Simeon Creek to the south and sea level to the west. Therefore, natural groundwater flow is towards these natural base elevations. Due to the nearness of these natural base levels and the high permeability of the natural underlying geologic units, groundwater conditions should not have a significant effect on site improvements.

VI. General Site Sea Cliff Observations

The following is a general summary of the on-site field mapping observations for the subject sea cliff.

A. Scattered animal burrows of various diameters are present throughout the terrace deposits.
B. Minor surficial slumps or rotational failures were observed near the lower elevations of the terrace deposits. No recent episodes of mass wasting was noted on-site. However, they are present in adjacent nearby areas.
C. Slight seepage was observed within the fractured metavolcanic and sandstone bedrock and also along unit contacts.
D. Vegetation along the sea cliff consists of scattered patches of shallow rooted ice plant and native grasses and brush.

VII. Sea Cliff Retreat and Stability

Primary mechanisms contributing to the erosion and retreat of sea cliffs are as follows:

A. Wave action against the sea cliff toe.
B. Traffic (animal, mechanical, human, etc.) on cliff face.
C. Groundwater discharge along the face of the sea cliff.
D. Over accumulation of shallow rooted vegetation.
E. Uncontrolled surface drainage.
F. Mass Wastage as the cliff restores itself after an unstable condition was produced by any or a combination of the previously mentioned mechanisms.

Generally the thirty-five (35) feet of bluff face reflects influences of all the above factors. Small debris deposits on the beach demonstrate the existence of groundwater seepage during the wet winter months. It is anticipated that greater concentration occurs near the lower contracts of the Marine Terrace/Franciscan Melange Formation. Uncontrolled surface drainage enhanced by roof drains should be addressed to prevent ponding and insure proper discharge away from the sea cliff face. When soil strength is reduced by groundwater saturation, slumping and/or rotational failures would then occur from the excess weight. Mass wasting generally occurs from a combination

of saturated conditions and undermining or oversteepened slope conditions caused by erosion.

Periodic wave action against the base of sea cliff during winter months would be attenuated by offshore outcrops of resilient metavolcanics and sandstone. Natural accumulation of the beach sand during summer months generally reduces the influence of wave activity during that time period.

Actual rate of retreat would depend on a combination of mechanisms influencing erosion processes. Mechanisms which would significantly affect the subject site sea cliff consist of the degree of fracturing and shearing within the bedrock, direction of in-coming waves and the type of geologic unit as related to resistance to weathering. Rates of retreat for the Franciscan Melange bedrock units will vary from 1 to 6 inches per year depending on the above site conditions. Based upon data from previous projects and field data from geologic field mapping, we estimate that the sea cliff retreat may vary from 2.0 to 4.0 inches per year which reflects the variation of retreat mechanisms for the Franciscan Melange Formation on the subject site. The Marine Terrace deposit, in our opinion, may vary from four to ten (4-10) inches a year depending upon the previously mentioned contributing erosional mechanisms.

VIII. Conclusions

At the present time, the sea cliff face is retreating at a rate consistent with the present geologic conditions observed. The terrace deposits exhibit minor rill and gully erosion which is generally from surface water runoff. The occurence of erosion, surficial failures and mass wasting on-site within the terrace deposits are related to the number of winter storms that occur per year and their intensities. Therefore, the retreat rate within the terrace deposits during a dry winter year may experience very minor erosional sea cliff retreat, while a wet, intense winter year could produce a sea cliff erosion retreat of several feet. Sea cliff retreat rates presented in the Sea Cliff Retreat and Stability Section of this

report are average retreat rates for the last 100± years and do not represent seasonal fluctuations in sea cliff retreat. Assuming proper drainage control over an estimated 75 year structure lifespan, a retreat rate of four (4) inches per year may be assumed.

The Franciscan Melange Formation will erode and retreat primarily from wave action. This bedrock unit should add durability to the toe of sea cliff. However, the fractured condition of the bedrock will contribute to a higher rate of sea cliff retreat.

If there are any questions concerning this report, please do not hesitate to contact the undersigned. Unless we are directed otherwise, submission of all reports to the appropriate governing agency is the responsibility of the client.

Respectfully submitted,
BUENA ENGINEERS, INC.

Richard T. Gorman
Engineering Geologist

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CERTIFIED ENGINEERING GEOLOGIST
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RTG/slf
File 70

Copies: 2 - Farrest Hyden
2 - SLO File
1 - VTA File

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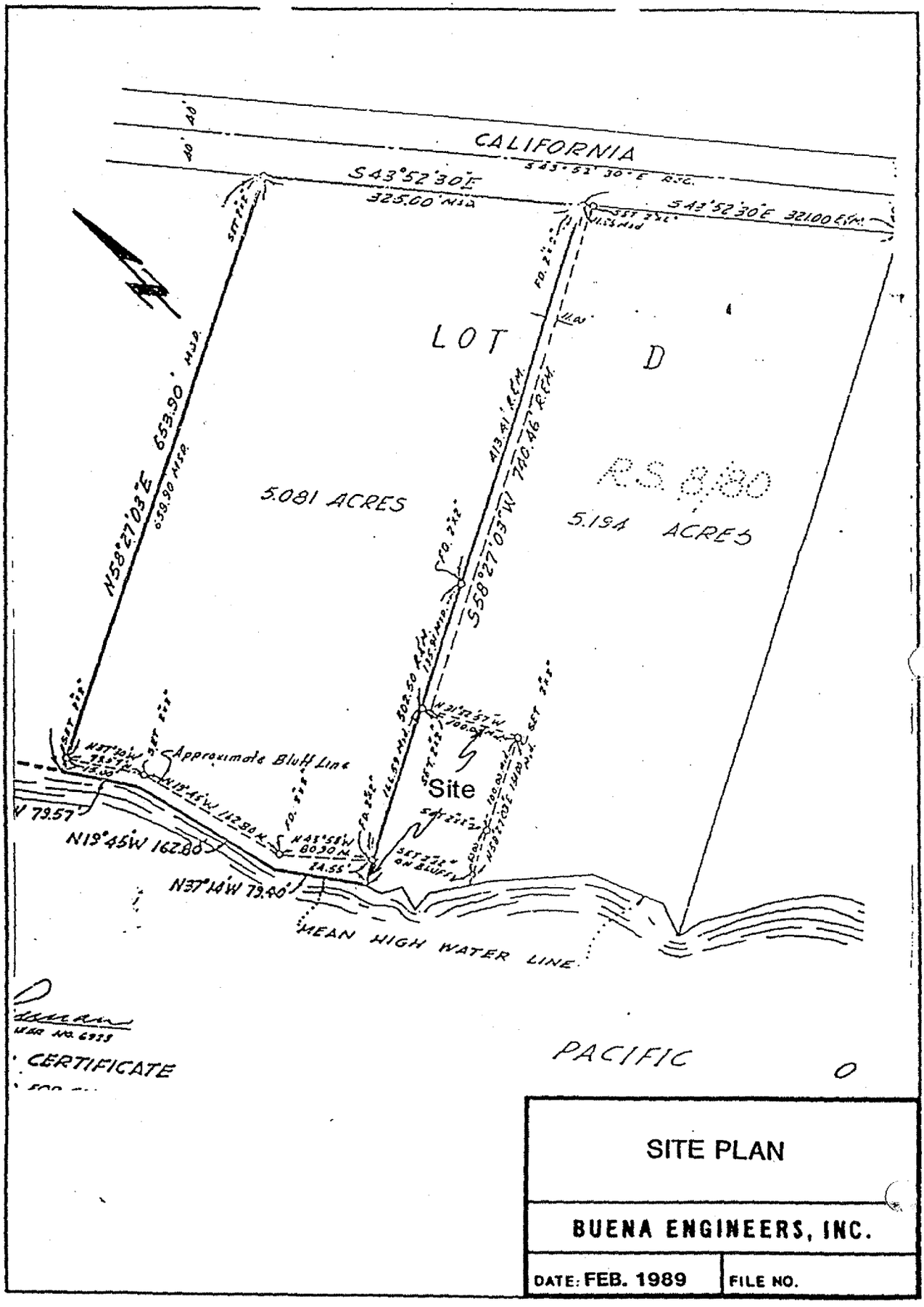

SITE PLAN	
BUENA ENGINEERS, INC.	
DATE: FEB. 1989	FILE NO.