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CENTRAL COAST DISTRICT OFFICE
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STAFF REPORT: APPEAL SUBSTANTIAL ISSUE AND DE NOVO HEARING

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Appeal Number A-3-PSB-01-097

Applicant ..... Antone and Katherine Zaninovich

Appellants ..... Commissioners Wan and Nava

Local Government ..... City of Pismo Beach

Local Decision ..... On September 11, 2001, the Planning Commission approved with conditions the demolition of an existing single-family dwelling and the construction of a new single family dwelling on the same lot.

Project Location ..... 307 Indio Drive, Pismo Beach, San Luis Obispo County (APN: 010-192-008). See Exhibit 1.

Project Description ..... Demolition of an existing single family residence and subsequent construction of a new 5,128 square foot residence.

File Documents ..... City of Pismo Beach Permit Numbers 98-120 and 01-0147; Commission Appeal A-3-PSB-99-026; City of Pismo Beach certified Local Coastal Program

Staff Recommendation ..... **Approval with Conditions**

Staff Summary

The Commission received a Final Local Action Notice on September 17, 2001 from the City of Pismo Beach approving the demolition of an existing single-family residence and the construction of a new single-family residence in the Sunset Palisades planning area of the City. Based on a Geologic Bluff Study prepared by Earth Systems Pacific, which estimated a bluff retreat rate of 2.5 inches per year at the site, the proposed development will be set back at the LCP minimum 25 feet. The Earth Systems report did not evaluate recent observed bluff retreat from 1990 to the preset, which included the 1997-98 El Nino winter of high sea and above normal rainfall. As a consequence, the estimated annual rate of bluff retreat is underestimated.

Further definition of the bluff line performed by Earth Systems and reviewed by staff geologist, Mark Johnsson, including the most recent time periods (1990 to the present) provides evidence for establishing a rate of retreat on the order of 4 inches per year.

This is not the first time the Commission has appealed and found substantial issue with proposed development for this site. On July 14, 1999, the Commission found substantial issue on appeal and approved with conditions a coastal development permit for the demolition of an existing 2,982 square foot single family residence and construction of a new 5,169 square foot single family residence, set back a minimum of 33' from the bluff edge to account for the estimated erosion over a 100 year period. Conditions of the permit also required the applicant to submit a site-specific geological report to establish a setback buffer ensuring that the development approved by the permit would not require any shoreline protection for a period of 100 years as required by the City's LCP. The permit also required the applicant to record a deed restriction agreeing to an assumption of risk and prohibiting the construction of any shoreline protection at the site. Development did not commence construction of the project within the allotted two years from the approval of the permit and no application for extension was received prior to the expiration date.

The project is located on an ocean fronting lot near the northern end of the City of Pismo Beach. The existing house is approximately eight to ten feet from the edge of the bluff. As approved by the Planning Commission, the proposed new house would be located 25 feet from the bluff edge (approximately 21 feet from the landward margin of an undercut portion of the bluff). The City's LCP requires that new houses be set back "a safe distance from the top of the bluff in order to retain the structures for a minimum of 100 years." Based on the original geologic report's estimated erosion rate of four inches per year, and the 100-year requirement, the house should be setback a minimum of 33 feet. In contrast, the Planning Commission's decision was apparently based on the Earth Systems Pacific report wherein the geologist recommended changing the average erosion rate from four inches per year to two and one-half inches per year. Based on an assumed 100 year lifespan for the structure, an erosion rate of 2.5 inches per year would equal a setback of 20.8 feet. However, the supplemental Earth Systems analysis does not adequately support a reduction in the erosion rate as originally established. Based on a review of the supplied geologic information and the conditions on site, staff geologist, Mark Johnsson, concluded that the four inches per year erosion rate is an appropriate conservative value. To address the shoreline hazard policy requirements of the LCP, particularly the requirement that new development not be allowed if it would require future shoreline protection, the development setback should be based on at least a four inch per year erosion rate. Moreover, simply setting the new structure back to the projected 100 year erosion line does not necessarily guarantee structural stability for 100 years. **Staff recommends, therefore, that the Commission find that substantial Issue exists, and the coastal development permit be approved with conditions that (1) require the house to be set back a minimum of 40 feet from the bluff edge (33 feet erosion setback and 7 foot buffer) to account for the estimated erosion over a 100 year period and ensure that the residential development approved under this permit will not need any shoreline protection for a 100-year lifespan, as required by the LCP; and (2) that future shoreline protection for the project be prohibited.**

Staff Report Contents

I. SUMMARY OF APPELLANT'S CONTENTIONS

Appellants Wan and Nava contend that the City's approval is inconsistent with the certified LCP for the following reasons (refer to Exhibit 2 for the full text):

Land Use Plan Safety Element Policy S-3 and Section 17.078.050(1) of the Zoning Ordinance together require 1) that structures be set back a safe distance from the blufftop in order to retain the structures for a minimum of 100 years and 2) a minimum setback of 25 feet from the blufftop with the possibility of a greater setback based on a geologic investigation. Based on a bluff retreat rate of 2.5 inches per year, the City-approval recommended the minimum bluff set back of 25 feet. In its findings, the City determined this amount would also satisfy the safe-for-100-years prerequisite.

Section17.078.060(5) of the certified Zoning Ordinance does not permit new development where it is determined that shoreline protection will be necessary for protection of the new structures now or in the future based on a 100 year geologic projection. Given evidence suggesting that bluff retreat had accelerated to nearly 4 inches per year, the current location of the City-approved bluff setback would only suffice for a period of 75 years, meaning that shoreline protection would be necessary 25 years sooner than if the structure's location was based on the more conservative bluff retreat estimate.

The applicant's representative calculated the erosion rate based on an analysis of aerial photograph's between 1955 and 1990. Section 17.078.050(3) of the certified Zoning Ordinance requires that historic, current, and foreseeable cliff erosion, including using available source material, be included in the analysis in geologic studies. At a minimum the erosion rate calculation should have extended to the present (i.e., from 1990 to 2000). Additionally, the City should have heeded the Commission's previous recommendation that there should be some room for error so that in 100 years the house would not be overhanging the bluff. Finally, since the City chose to use a different erosion rate, it should have included an analysis and findings as to why the different rate was used, especially given the Commission's previous findings.

II. LOCAL GOVERNMENT ACTION

Two coastal development permits for this site have been issued recently. On February 9, 1999, the City of Pismo Beach Planning Commission granted a coastal development permit for the demolition of a 2,982 square foot single family residence and the construction of a new 5,169 square foot single family residence on a bluff top lot in the northern portion of the City. A geologic investigation was performed that concluded that the average annual erosion rate at the site is 4 inches per year. The investigation recommended a setback of 25 feet from the bluff top and 25 feet from the landward end of the four foot depth of the undercut part of the bluff, sufficient to protect the structure for a period of 75 years (4 inches x 75yrs = 300 inches; 300 ÷ 12 inches = 25 feet).

A subsequent addendum letter from the geologist recommended changing the erosion rate from four inches to three inches per year. Based on that addendum letter, the Planning Commission accepted the reduced erosion rate and established a setback based on three inches per year rather than four inches per year and required that the house be set back 25 feet from the most landward portion of the bluff. The Coastal Commission appealed that action and a coastal development permit was ultimately issued requiring the bluff setback be established at 33 feet from the bluff edge. See Exhibit 3.

On September 11, 2001, the City of Pismo Beach Planning Commission granted a second coastal development permit for the same project on the same bluff top lot –the subject of this appeal. In 1992, a Geologic Bluff Study was performed by Earth Systems Pacific concluding that the average annual erosion rate at the site is 3 - 4 inches per year. Additional analysis of the harder bedrock formations suggested that bluff retreat of this material was on the order of 1 – 2

inches per year. Based on these ranges of retreat, Earth Systems Pacific recommended that a bluff retreat rate of 2.5 inches per year be used for the site. The investigation recommended a *minimum* setback of 25 feet from the bluff top, which includes a 4-foot buffer sufficient to protect the structure for a period of 100 years (2.5 inches x 100yrs = 250 inches; 250 ÷ 12 inches = 21 feet; 21 + 4 = 25 feet).

III. STANDARD OF REVIEW FOR APPEALS

Coastal Act section 30603 provides for the appeal of approved coastal development permits in jurisdictions with certified local coastal programs for development that is (1) between the sea and the first public road paralleling the sea or within 300 feet of the inland extent of any beach or of the mean high tideline of the sea where there is no beach, whichever is the greater distance; (2) on tidelands, submerged lands, public trust lands, within 100 feet of any wetland, estuary, or stream, or within 300 feet of the top of the seaward face of any coastal bluff; (3) in a sensitive coastal resource area; (4) for counties, not designated as the principal permitted use under the zoning ordinance or zoning district map; and (5) any action on a major public works project or energy facility. This project is appealable because the lot is between the sea and the first public road paralleling the sea.

The grounds for appeal under section 30603 are limited to allegations that the development does not conform to the standards set forth in the certified local coastal program or the public access policies of the Coastal Act. Section 30625(b) of the Coastal Act requires the Commission to conduct a de novo coastal development permit hearing on an appealed project unless a majority of the Commission finds that "no substantial issue" is raised by such allegations. Under section 30604(b), if the Commission conducts a de novo hearing, the Commission must find that the proposed development is in conformity with the certified local coastal program. Section 30604(c) also requires an additional specific finding that the development is in conformity with the public access and recreation policies of Chapter Three of the Coastal Act, if the project is located between the nearest public road and the sea or the shoreline of any body of water located within the coastal zone. This project is located between the nearest public road and the sea and thus, this additional finding must be made in a de novo review in this case.

The only persons qualified to testify before the Commission on the substantial issue question are the applicant, persons who made their views known before the local government (or their representatives), and the local government. Testimony from other persons regarding substantial issue must be submitted in writing. Any person may testify during the de novo stage of an appeal.

IV. STAFF RECOMMENDATION ON SUBSTANTIAL ISSUE AND COASTAL DEVELOPMENT PERMIT

A. STAFF RECOMMENDATION ON SUBSTANTIAL ISSUE:

Staff recommends that the Commission, after public hearing, determine that **a substantial issue exists** with respect to the grounds on which the appeal has been filed, because the City has approved the project in a manner that is inconsistent with the certified Local Coastal Program.

MOTION: *I move that the Commission determine that Appeal No. A-3-PSB-01-097 raises **NO** substantial issue with respect to the grounds on which the appeal has been filed under § 30603 of the Coastal Act.*

STAFF RECOMMENDATION: Staff recommends a **NO** vote. Failure of this motion will result in a de novo hearing on the application, and adoption of the following resolution and findings. Passage of this motion will result in a finding of No Substantial Issue and the local action will become final and effective. The motion passes only by an affirmative vote of the majority of the appointed Commissioners present.

RESOLUTION TO FIND SUBSTANTIAL ISSUE: The Commission hereby finds that Appeal No. *A-3-PSB-01-097* presents a substantial issue with respect to the grounds on which the appeal has been filed under § 30603 of the Coastal Act regarding consistency with the Certified Local Coastal Plan and/or the public access and recreation policies of the Coastal Act.

B. STAFF RECOMMENDATION ON COASTAL DEVELOPMENT PERMIT:

Staff recommends that the Commission, after public hearing, **approve** the proposal as conditioned.

MOTION: *I move that the Commission approve Coastal Development Permit Number A-3-PSB-01-097 subject to the conditions below and that the Commission adopt the resolution of Approval with Conditions.*

STAFF RECOMMENDATION: Staff recommends a **YES** vote on the preceding motion. This would result in approval of the project as conditioned. A majority of the Commissioners present is required to pass the motion and adopt the following resolution:

RESOLUTION TO APPROVE THE PERMIT: The Commission hereby approves a coastal development permit for the proposed development and adopts the findings set forth below on grounds that the development as conditioned will be in conformity with the policies of Chapter 3 of the Coastal Act and will not prejudice the ability of the local government having jurisdiction over the area to prepare a Local Coastal Program conforming to the provisions of Chapter 3. Approval of the permit complies with the California Environmental Quality Act because either 1) feasible mitigation measures and/or alternatives have been incorporated to substantially lessen any significant adverse

effects of the development on the environment, or 2) there are no further feasible mitigation measures or alternatives that would substantially lessen any significant adverse impacts of the development on the environment.

V. RECOMMENDED CONDITIONS

A. STANDARD CONDITIONS

1. Notice of Receipt and Acknowledgment. The permit is not valid and development shall not commence until a copy of the permit, signed by the permitee or authorized agent, acknowledging receipt of the permit and acceptance of the terms and conditions, is returned to the Commission office.

2. Expiration. If development has not commenced, the permit will expire two years from the date this permit is voted on by the Commission. Development shall be pursued in a diligent manner and completed in a reasonable period of time. Application for extension of the permit must be made prior to the expiration date.

3. Interpretation. Any questions of intent or interpretation of any condition will be resolved by the Executive Director or the Commission.

4. Assignment. The permit may be assigned to any qualified person, provided assignee files with the Commission an affidavit accepting all terms and conditions of the permit.

5. Terms and Conditions Run with the Land. These terms and conditions shall be perpetual, and it is the intention of the Commission and the permittee to bind all future owners and possessors of the subject property to the terms and conditions.

B. SPECIAL CONDITIONS

1. Project Authorized

This permit authorizes the demolition of an existing single family dwelling and the construction of a new single family dwelling consistent with the revised plans required by Special Condition No. 2, below.

2. Revised Plans

PRIOR TO ISSUANCE OF THE COASTAL DEVELOPMENT PERMIT, permittee shall submit to the Executive Director for review and approval two copies of revised plans showing all proposed structures setback a minimum of 40 feet from the bluff edge or the landward extent of the undercut portion of the bluff, whichever is more landward.

3. City Approval

PRIOR TO ISSUANCE OF THE COASTAL DEVELOPMENT PERMIT, permittee shall provide the Executive Director with evidence that the revised plans have been reviewed and approved by the City of Pismo Beach.

4. Effect on City Conditions

This Coastal Commission action has no effect on conditions imposed on the project by the City of Pismo Beach pursuant to an authority other than the California Coastal Act.

5. Assumption of Risk, Waiver of Liability and Indemnity

A. By acceptance of this permit, the applicant acknowledges and agrees (i) that the site may be subject to hazards from *waves, storm waves, bluff retreat, erosion, and earth movement*; (ii) to assume the risks to the applicant and the property that is the subject of this permit of injury and damage from such hazards in connection with this permitted development; (iii) to unconditionally waive any claim of damage or liability against the Commission, its officers, agents, and employees for injury or damage from such hazards; and (iv) to indemnify and hold harmless the Commission, its officers, agents, and employees with respect to the Commission's approval of the project against any and all liability, claims, demands, damages, costs (including costs and fees incurred in defense of such claims), expenses, and amounts paid in settlement arising from any injury or damage due to such hazards.

B. **PRIOR TO ISSUANCE OF THE COASTAL DEVELOPMENT PERMIT,** the applicant shall execute and record a deed restriction, in a form and content acceptable to the Executive Director incorporating all of the above terms of this condition. The deed restriction shall include a legal description of the applicant's entire parcel. The deed restriction shall run with the land, binding all successors and assigns, and shall be recorded free of prior liens that the Executive Director determines may affect the enforceability of the restriction. This deed restriction shall not be removed or changed without a Commission amendment to this coastal development permit.

6. No Future Bluff or Shoreline Protective Device

A.1 By acceptance of this Permit, the applicant agrees, on behalf of itself (or himself or herself, as applicable) and all successors and assigns, that no bluff or shoreline protective device(s) shall be constructed to protect the development approved pursuant to Coastal Development Permit No. A-3-PSB-01-097 during its projected 100 year life, including, but not limited to, (describe the development, e.g., the residence, foundations, decks, driveways, or the septic system) in the event that the development is threatened with damage or destruction from waves, erosion, storm conditions, bluff retreat, landslides, or other natural hazards in the future. By acceptance of this Permit, the applicant hereby waives, on behalf of itself (or himself or herself, as

applicable) and all successors and assigns, any rights to construct such devices that may exist under Public Resources Code Section 30235.

A.2 By acceptance of this Permit, the applicant further agrees, on behalf of itself (or himself or herself, as applicable) and all successors and assigns, that the landowner shall remove the development authorized by this Permit, including (describe the development, e.g., the house, garage, foundations, and septic system), if any government agency has ordered that the structures are not to be occupied due to any of the hazards identified above. In the event that portions of the development fall to the beach before they are removed, the landowner shall remove all recoverable debris associated with the development from the beach and ocean and lawfully dispose of the material in an approved disposal site. Such removal shall require a coastal development permit.

B. **PRIOR TO THE ISSUANCE OF COASTAL DEVELOPMENT PERMIT** No. A-3-PSB-01-097, the applicant shall execute and record a deed restriction, in a form and content acceptable to the Executive Director, which reflects the above restrictions on development. The deed restriction shall include a legal description of the applicant's entire parcel(s). The deed restriction shall run with the land binding all successors and assigns, and shall be recorded free of prior liens that the Executive Director determines may affect the enforceability of the restriction. This deed restriction shall not be removed or changed without a Commission amendment to this coastal development permit."

VI. FINDINGS AND DECLARATIONS

A. LCP BACKGROUND

The City's LCP is composed of two documents, the Land Use Plan and the Zoning Ordinance. The Land Use Plan was comprehensively revised in 1992, Coastal Commission modifications were adopted in May 1993. In 1998, the City submitted to the Commission the first comprehensive Zoning Ordinance revision since certification in 1983. Commission and City staffs were unable to reach a consensus on suggested modifications and thus, the 1983 Zoning Ordinance remains as the standard of review.

B. SUBSTANTIAL ISSUE FINDINGS

Appellants Wan and Nava contend that the City's approval is inconsistent with the geological setback policies of the LCP. Please see Exhibit 2 for the complete text of the appellants' contentions.

Land Use Plan Safety Element Policy S-3 and Section 17.078.050(1) of the Zoning Ordinance each contain bluff top setback standards that apply to this lot.

S-3 Bluff Set-Backs
All structures shall be set back a safe distance from the top of the bluff in order to retain the structures for a minimum of 100 years, and to neither create nor contribute significantly to erosion, geologic instability or destruction of the site or require construction of protective devices that would substantially alter natural landforms along bluffs and cliffs.

The City shall determine the required setback based on the following criteria:

a. For development on single family residential lots subdivided prior to January 23, 1981, the minimum bluff setback shall be 25 feet from the top of the bluff (blufftop is defined as the point at which the slope begins to change from near horizontal to more vertical). A geologic investigation may be required at the discretion of the City Engineer, and a greater setback may be applied, as the geologic study would warrant.
b. For all other development, a geologic study shall be required for any development proposed.

17.078.050 Bluff Hazard, Erosion, and Bluff Retreat Criteria and Standards
1. New structures shall be set back a sufficient distance from the bluff edge to be safe from the threat of bluff erosion for a minimum of 100 years. The City shall determine the required setback based on the following criteria:

a. For development on single family residential lots subdivided prior to January 23, 1981, the minimum bluff setback shall be 25 feet from the top of the bluff (blufftop is defined as the point at which the slope begins to change from near horizontal to more vertical). A geologic investigation may be required at the discretion of the City Engineer, and a greater setback may be applied if local conditions warrant.

Section17.078.060(5) of the certified Zoning Ordinance does not permit new development where it is determined that shoreline protection will be necessary within 100 years.

17.078.060 Shoreline Protection Criteria and Standards
5. New development shall not be permitted where it is determined that shoreline protection will be necessary for protection of the new structures now or in the future based on a 100 year geologic projection.

Analysis
The applicant's lot was subdivided prior to January 23, 1981 and so requires a minimum setback of 25 feet, with the possibility of a greater setback based on a geologic investigation. A geologic investigation, which was performed in November 1997 by Gary Mann and Ron Church of Geo Source Incorporated, established a bluff setback based on an average erosion rate of four inches per year (see Exhibit 4 for the entire report).

Based upon field observation, pertinent literature, and other bluff stability studies

> in the area, a bluff retreat rate of 6 to 12 inches per year is assumed for the marine terrace deposits, and 4 inches for the shaley beds of the Monterey Formation. It should be noted that the assumed bluff retreat rates are considered an "average," whereas in nature, erosional process (sic) are often episodic and irregular. Short-term (yearly) bluff retreat rates may vary significantly from the long-term average. Due to the predominance of the interbedded opaline siltstone, sandstone, and hard porcelanite of unit Tmp of the Monterey Formation in the tidal zone of the bluff, which are somewhat harder than the more shaley units in the formation, and the anticipated wave run-up height, a bluff setback was established using a retreat rate of four inches per year.

The report concluded that:

> The bluff at the site appears to be actively retreating at an average rate of 4 inches per year. This information is based on our review of a San Luis Obispo County Parcel Map of Lot 5, Block 16, Tract Number 57, El Pismo Manor Number 1, dated August, 1950, and from the geologic reconnaissance. Based on a typical 75-year lifespan of use of the residence, and a retreat rate of four inches per year, a 25-foot setback measured from the top-of-bluff, and depth of undercutting landward of the top-of-bluff is required for this property. The top of the marine terrace deposits should be considered as the top-of-bluff for planning purposes at the present time, with a slight additional setback measure from the landward margin of the undercut.

The undercut portion of the bluff lies midway between the side lot lines. The landward margin of the undercut portion of the bluff is about four feet landward of the edge of the bluff. Measuring from that point would result in a setback of 29 feet from the edge of the blufftop for structures located midway between the side lot lines (blufftop erosion based setback of 25 feet plus four feet for depth of undercut portion), while structures nearer the side lot lines would only have to setback 25 feet from the edge of the blufftop. Assuming that the four inches per year erosion rate holds over time, this would protect the structure for a period of 75 years.

A subsequent addendum letter from Geo Source, dated September 29, 1998, (see Exhibit 5) for clarification of the retreat rate and setback distance stated:

> The rates measured varied from less than 3 inches to approximately 4 inches per year depending on the materials encountered and the wave action. We selected the more liberal rate of 4-inches per year to reflect the erosional characteristics of the surface Quaternary [Marine] Terrace deposits. However, these Quaternary Terrace deposits are of minor thickness and are covered with vegetation indicating they are stable. In addition, the rate was calculated from the base of the undercut rather than the seaward edge of the top of the bluff. If the rate was recalculated using the seaward edge, the retreat rate would be less than 3-inches per year.

> "In conclusion, since the site has only a minor amount (sic) of the higher retreat rate materials and the majority of the bluff is composed of erosion resistant units of the Monterey Formation a bluff retreat rate of 3-inches per year would be a more applicable rate to establish the setback distance.

In its approval of Coastal Development Permit 01-0147, the City relied upon more recent geologic analysis submitted by Earth Systems Pacific in March 2001. See Exhibit 6. The Earth Systems analysis used photogrammetric techniques (aerial photos), to define the bluff edge at various time intervals. Comparing the changes in the bluff edge, Earth Systems was able to estimate the amount of bluff retreat and develop an annual rate of retreat. The applicant has stated that this technique yields a more accurate estimate and that the earlier geological reports did not employ this methodology but rather were based upon field observation and other bluff studies in the area. In contrast to the four to six inches per year estimated in earlier analyses, the consultant's review of aerial photos projected an annual average rate of bluff retreat of 2.5 inches per year.

However, the Earth Systems analysis which led to the downward-revised bluff retreat rate only covered the period from 1955 to 1990 and did not include the most recent decade (1990 to 2000), a period highlighted by strong El Nino pattern winters. The appeal of the City-approved CDP was based, in part, on this omission. In its October 2001 response to the Commission's appeal, Earth Systems consultants stated that the time frame was chosen based upon availability of aerial photos. However, upon request, Earth Systems Pacific was able to supplement its analysis by expanding the scope of its examination to include the recent 10-year timeline (1990 – 2000).

On December 11, 2001, Earth Systems submitted additional analysis comparing the 1990 bluff edge to the 2000 bluff top and surmised that the 2.5 inches per year were still valid for the project site. (Exhibit 7) Staff Geologist, Mark Johnsson, examined the evidence submitted by Earth Systems and reached a somewhat different conclusion: that the bluff was retreating at a rate on the order of 3.6 inches per year. Noting that the property also exhibits a significant cliff undercut and no documented episodic failure of the bluff, staff's geologist concludes that the Earth Systems estimate of 2.5 inches per year should be considered a minimum value. In the following memo, Mr. Johnsson maintains that a bluff retreat rate of 4 inches per year is an appropriate conservative value to establish the bluff setback.

> The most recent evidence of bluff retreat comes in the form of a Geology report submitted by Earth Systems Pacific on December 11, 2001. Earth Systems Geologists updated the Historical Bluff Retreat Map to further define the bluff top retreat rate at the project site. The additional analysis is needed to capture bluff retreat rates over the past ten years (1990 – 2000). This time interval includes the strong El Niño winter of 1997-1998, which was marked by high seas and above normal rainfall. The bluff edge was found by the same photogrammetric techniques used for the 1955-1990 analysis, which corrects for photographic distortion and yields precise and accurate determinations. Examining these

> results, there was very little evidence of bluff retreat on the southeast portion of the property over this 10-year period. However, the estimated bluff retreat on the southwest corner of the parcel is on the order of 3' over the past 10 years (or about 3.6 inches per year). In this area of the bluff, retreat is attributed to slumping of terrace deposits as opposed to erosion of the bedrock making up the lower part of the sea cliff.
>
> The current bluff configuration is overhanging past vertical on the subject lot. Further, there has been no documented episodic failure of the bedrock part of the bluff between 1955 and 2000. In the event of episodic failure, it is highly probable that greater amounts of retreat will occur. Thus, the bluff retreat rate of 0.5-2 inches per year reported in the 22 March 2001 Earth Systems Pacific Report should be considered a minimum value. Accordingly, a bluff retreat rate of 4 inches per year is an appropriate conservative value.
>
> Based on this information, an erosion rate of 4 inches per year is appropriate. Over a 100-year period, an erosion rate of four inches a year would result in 33 feet of erosion. Thus, the new structure on this site should be setback a minimum of 33 feet from the bluff edge. Because of the undercutting of a portion of the bluff, the setback should be measured from either the top of the bluff or the landward edge of the undercut portion whichever is further landward. Additionally, a 7-foot buffer should be added to the setback requirement to assure that the foundation elements will not actually be undermined at the end of the projected economic life, and to allow for uncertainties in predicting geologic processes into the future, especially in light of rising sea level. The total building setback, then, should be 40 feet.

The Planning Commission required a setback of 25 feet across the entire width of the property. Based on a retreat rate of 2.5 inches per year, a 100-year setback would equal 21 feet. Rather than choosing a more conservative estimate, the Planning Commission ignored historical evidence and based its decision on the most recent bluff retreat rate estimated by Earth Systems in March 2001. The City overlooked a 1992 Earth Systems report, which estimated bluff retreat in the general area of three to four inches per year, reflecting the erosional characteristics of the surface material. However, it is this very surface material that would support the house and through which water, sewer, and gas lines would be placed. Thus, it seems imperative to establish an erosion rate based on this most erosion-prone material.

In addition, as discussed in more detail in the de novo findings below, there is a considerable uncertainty associated with the geological analyses in the vicinity of the project. Previous geologic reports established an overall average erosion rate of four inches per year based on the particular rates of 6 to 12 inches per year for the marine terrace deposits and 4 inches for the shaley beds of the Monterey Formation. The Earth Systems estimates (averages of averages) is not convincing in its attempt to establish a lesser overall estimated erosion rate, and it is not clear why the 4 inch per year rate, already a low estimate according to the original geologic report, should be further reduced. Thus, it is not clear that the "best case" assumption of a 2.5

inches per year erosion rate is appropriate. Moreover, even if this rate were correct, setting the new structure exactly on the projected 100 year erosion line does not necessarily guarantee structural stability for 100 years. Damage to structures typically occurs, and shoreline protection devices are typically approved, well before a bluff edge has retreated right up to a structure. Based on the original geological report and these other considerations, the City's action raises a substantial issue with the certified LCP. Policy S-3 states that the minimum setback for blufftop development is 25 feet but that "a greater setback may be applied as the geologic study would warrant." Section 17.078.050(1) similarly requires a minimum 25 foot setback but that "a greater setback may be applied if local conditions warrant." To be consistent with Policy S-3 and Section 17.078.050(1), the minimum required development setback with a 4 inch per year erosion rate is 33 feet (100 years x .33 feet [4 inches] = 33 feet), rather than 25 feet. The City-approved location of the house 25 feet from the current bluff edge at the estimated erosion rate would give the house only 76 years of protection (25 feet ÷ .33 = 75.75). Thus, this action would also allow new development where a geologic projection indicates that shoreline protection may be necessary to protect the development in 76 years. In addition, there is no discussion of or permit condition prohibiting future shoreline protection or otherwise requiring use of non-shoreline structure alternatives for protecting the proposed house from future potential bluff erosion. This is inconsistent with the requirement of Section 17.078.060(5) that no new development be allowed where a geologic projection indicates that shoreline protection will be necessary within 100 years to protect the development.

Therefore, a substantial issue is raised regarding the consistency of the City's approval with LUP Policy S-3 and Zoning Ordinance Sections 17.078.050(1) and 17.078.060(5).

C. FINDINGS FOR DE NOVO HEARING AND APPROVAL OF A REVISED PROJECT

By finding a substantial issue in terms of the project's conformance with the certified LCP, the Commission takes jurisdiction over the CDP for the proposed project. The standard of review for these CDP determinations is the City LCP and the Coastal Act access and recreation policies. The substantial issue findings above, including all citations and analysis, are incorporated directly herein by reference.

1. GEOLOGY AND SETBACK FROM BLUFF

The certified Local Coastal Program (LCP) of the City of Pismo Beach contains specific policies and standards for the purpose of ensuring the safety of structures built on ocean fronting lots. These LCP requirements were adopted in response to the Coastal Act's policies for the protection of the marine environment and policies regarding general development. Coastal Act Section 30235 permits "seawalls. . .when required to. . .protect existing structures. . .in danger from erosion. . . ." Section 30253 requires that new development not "in any way require the construction of protective devices that would substantially alter natural landforms along bluffs and cliffs." The City's LCP narrows the requirements of Section 30253 by requiring new structures to be set back a sufficient distance so that they won't be endangered by erosion for a minimum of 100 years.

Geologic studies are critical to the implementation of the LCP geological hazards requirements. In this case, an initial investigation was prepared that established a four inch per year erosion rate, followed by a supplemental letter that adjusted the projected erosion rate to three inches per year. Although an initial professional judgment or recommendation may often be modified if further information becomes available, the history of geologic reports and recommendations regarding erosion rates and bluff setbacks in the Pismo Beach area encourages a cautious approach to acceptance of estimated erosion rates and established setbacks because past recommendations have proven to be overly optimistic in many cases.

For example, in 1983 the Commission approved an addition on the bluff side of the Gustafson house at 107 Indio Drive, 14 lots downcoast from the Zaninovich parcel (4-83-479). That file indicates that the addition would be located within 25 feet of the bluff edge but "would not extend seaward of the existing porch." Although there is no geological report in the file, correspondence to the applicant states:

> We would note that with the recent storms the past few years the bluff retreat in Pismo Beach has exceeded the rates projected by geologists and as a result homes which were constructed utilizing the recommended 25 foot bluff set-back have had to be protected with emergency and permanent seawall and retaining devices.

In 1997 a geology report was prepared by Tom Wooley for a proposed seawall at this same site (Gustafson, A-3-PSB-98-062, denied). That report stated that "[t]he marine bluff below Lot 6 is presently eroding at an estimated rate of 6 to 12 inches per year. This rate will hazard the residence in 20 years or less." Marine terrace deposits make up the upper part of the bluff at the Gustafson site as at the Zaninovich site. The lower part of the bluff subject to wave attack at the Gustafson site is the Obispo formation while at the Zaninovich site the lower part of the buff is the Monterey formation, so the erosion rates for the lower part of the bluffs are not directly comparable. The important point, though, is the level of uncertainty regarding erosion rates in the geological reports.

The 1975 geology report by Monte Ray for the Shelter Cove Lodge three miles downcoast from the Zaninovich parcel stated

> Based on the investigations and data reviewed to date, it appears that an average rate of cliff erosion. . .would be about 2 inches per year in the resistant bedrock materials. Extending this indicates a period of 60 years would be required for waves to erode 10 feet into the base of the cliff.

The Shelter Cove Lodge was constructed in 1986. Yet in 1998, a mere 12 years later, erosion of a sea cave near the southern end of the property had reached a point where the structures there were becoming endangered and the Commission issued a permit (A-3-PSB-98-097) for the construction of a seawall.

Approximately one mile downcoast from the Zaninovich parcel is the Cliffs Hotel. The erosion

rate estimated at the time of the hotel application in 1983 (4-83-490) was three inches per year. In a 1996 appeal of a City-approved permit for a revetment (A-3-PSB-96-100, denied), the erosion rate was estimated at between 4.5 inches (northern section of bluff) to 13 inches (southern section of bluff). In 1998, a geotechnical report for the Cliffs Hotel estimated erosion at 4 **feet** per year (A-3-PSB-98-049 and 4-83-490-A1).

Finally, approximately two blocks down-coast of the project site at 125 Indio, a recent development permit was issued for the construction of a new single-family residence. The erosion rate estimated at the time of the application in 1997 was 3 inches per year. The City Council is currently evaluating an appeal of a City-approved permit for shoreline protection just four years after construction, in which the revised bluff retreat rate has been accelerated to 24 inches per year. In this case, more than five feet of bluff has been lost and the 100-year setback has been reduced by 20%.

Thus, there are a wide variety of estimated erosion rates and a large inherent uncertainty about "safe" setbacks in geology reports prepared at different times for the same sites along a three mile section of the northern coast of Pismo Beach. Some of the variety may be due to differing geological formations or review of erosion over differing time periods. At the same time, the Commission is increasingly confronting situations where earlier geological studies that established "safe" setbacks, are being substantially revised upwards to support the need for shoreline protection. Some of these changes may be based on new information, or increased experience. Regardless, this experience highlights the considerable uncertainty embedded in these geological studies. In light of this, the Commission does not find the conclusion of the recent Earth Systems analysis, that the erosion rate on the subject site should be reduced from four to 2.5 inches per year, to be convincing. The Commission finds that the setback on this parcel must be based at a minimum on an estimated average retreat rate of four inches per year. This is particularly true in light of the Commission's own geologic review of the evidence in this case.

As discussed in the Substantial Issue findings above, LUP policy S-3 and IP ordinance 17.078.050 require that new development be setback a safe distance from the bluff edge to ensure the integrity of the development for a period of 100 years. Staff's geologist Mark Johnsson, determined that 4 inches per year was an appropriate erosion rate to allow for historic slumping of terrace materials and account for future episodic failure of the bedrock. Based on an average annual rate of retreat of 4 inches per year, over a 100-year period, cumulative bluff retreat would result in 33 feet of erosion. Thus, development on this site should be set back a minimum of 33 feet from the bluff edge. Furthermore, because of undercutting on portion of the bluff, the 33 foot setback should be measured from the landward edge of the undercut portion; otherwise the setback would be less than the projected amount of erosion over a 100 year period. The City-approved project is setback only 25 feet from the upper bluff. At an average rate of retreat of 4 inches per year (4 / 12 = .33), the development will be undermined within 75 years (25 / .33 = 75). This is inconsistent with LUP and IP policies (S-3 and 17.078.050) requiring that bluff setbacks be adequate to ensure structural integrity for a period of 100 years.

Even the minimum setback of 33 feet, though, is also probably not enough to ensure the safety

of a new house on this site for 100 years worth of erosion, as required by the LCP. The house will become endangered by erosion well before 100 years have passed (or the equivalent amount of erosion has occurred). This is because by the time 100 years of erosion has occurred, the seaward edge of the house will be at the bluff edge. Almost assuredly damage to the house would have already occurred (e.g., cracking of foundation and skewing of the frame resulting in breakage of water, sewer, and gas pipes, and inability to open and close doors and windows) and/or the Building Official would have "red-tagged" the house indicating its uninhabitable status due to the damage and/or because of the danger of parts or all of it falling to the beach. Thus it is necessary to set back the house a somewhat greater distance than the 33 feet projected by the geological information in order to ensure its safety for 100 years. In the Substantial Issue finding above, staff geologist, Mark Johnsson, recommends that a minimum buffer distance of 7 feet be established to " assure that the foundation elements will not actually be undermined at the end of the projected economic life, and to allow for uncertainties in predicting geologic processes into the future, especially in light of rising sea level."

At present, the existing house is no more than 10 feet back from the bluff edge and apparently has as yet suffered no damage. Thus, seven feet is probably a reasonable buffer amount to set back from the 100-year setback, to truly allow for 100 years worth of erosion that does not endanger the structure. Therefore, this permit is conditioned to require a seven foot buffer to be added to the 33 foot bluff edge/bluff undercut setback in order to ensure that after 100 years worth of erosion, a new structure on this lot will still be safe from erosion.

Finally, Section 17.078.060(5) states:

> New development shall not be permitted where it is determined that shoreline protection will be necessary for protection of the new structures now or in the future based on a 100 year geologic projection.

The purpose of this section is to insure that new development will not require the installation of shoreline protection for the its economic life (in this case assumed to be 100 years) and, more broadly, to effectuate the Coastal Act section 30253 policy goal of avoiding shoreline protection construction for new development. Given the inherent geologic uncertainty as well as significant risks associated with blufftop development, further assurance that no future shoreline protection will be required on this site is needed to meet the requirement of section 17.078.060(5). The subject lot is one of 33 blufftop lots along Indio Drive in Pismo Beach. At least six of these lots have seawalls, generally south of this project, and at least two were approved by the Commission (see Hudson, A-3-PSB-93-070; Conroy, A-3-PSB-97-015). The Commission recently denied a seawall proposed for Gustafson (A-3-PSB-98-062). There are no seawalls on the parcels adjacent to the subject lot. Thus, although the shoreline in this area is generally retreating, it is not a case where the majority of the developed coast is already armored, such as portions of the City of Capitola or the Live Oak section of Santa Cruz County. Rather, existing seawalls are limited and far between. In contrast to areas where armoring is extensive, and completion or filling of gaps of existing shoreline protective works could possibly make sense under certain circumstances (e.g., to mitigate erosional end effects), a compelling need for a future seawall at this location is not foreseeable for the life of the project if it is setback

appropriately. In light of this fact, and the need to assure structural stability without future shoreline protection, this permit is conditioned to require the applicant to record a deed restriction that (1) addresses the assumption of risk from hazards associated with waves and erosion and that (2) prohibits construction of any shoreline protective device(s) for the purpose of protecting the development authorized by this permit for a period of 100 years. Therefore, the Commission finds that the project, as conditioned, is consistent with the City of Pismo Beach certified Local Coastal Program.

2. ACCESS

Coastal Act Section 30212 states that

> (a) Public access from the nearest public roadway to the shoreline and along the coast shall be provided in new development projects except where:
> (1) it is inconsistent with public safety, military security needs, or the protection of fragile coastal resources, ...

LUP Policy PR-22 states that

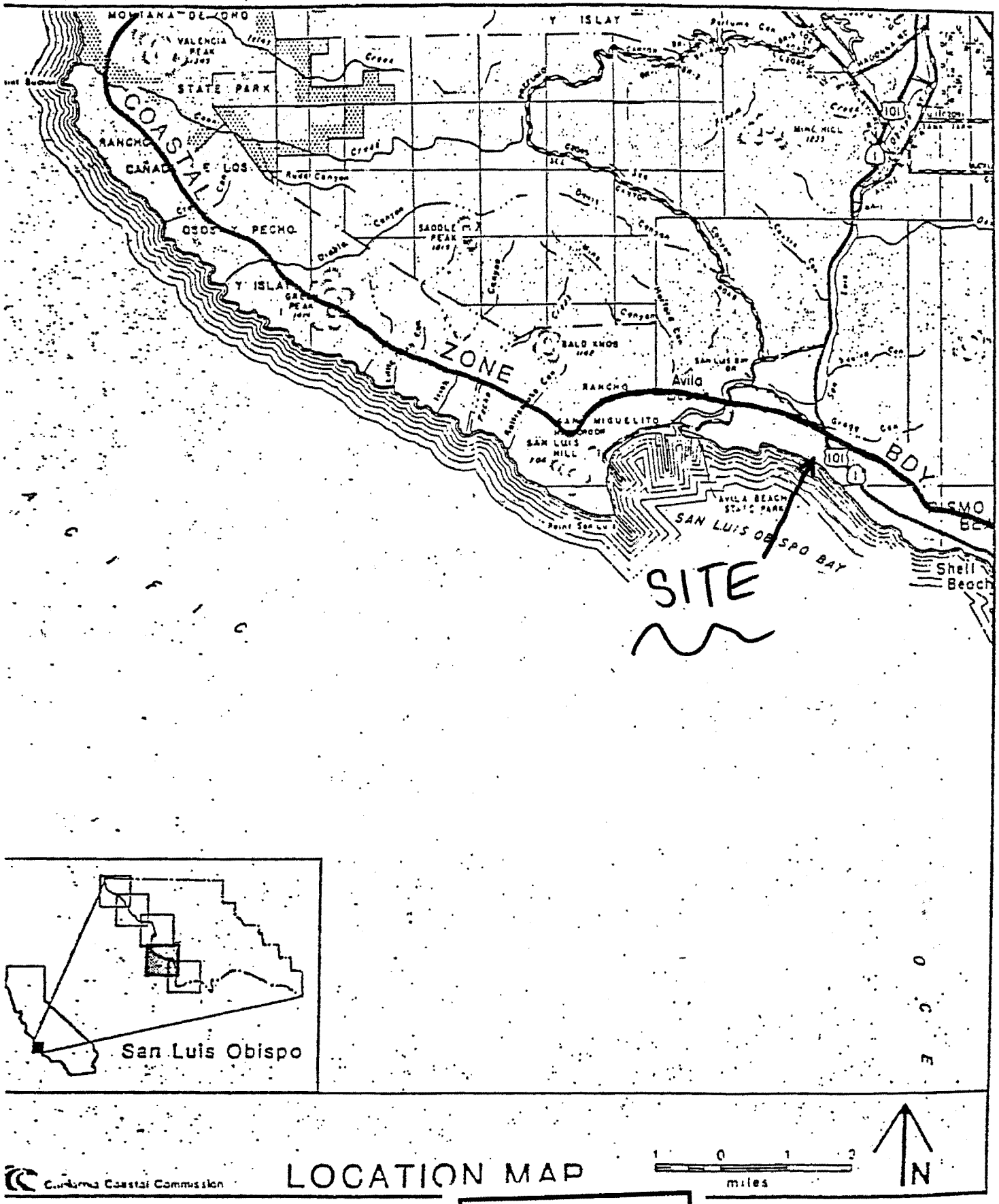
> For all developments on parcels located along the shoreline, a lateral public access easement in perpetuity extending from the oceanside parcel boundary to the top of the bluff shall be required for the purpose of allowing public use and enjoyment of dry sandy and rocky beaches, intertidal and subtidal areas.

The City's staff report includes a prior to issuance condition (A10) requiring the applicant to record an offer to dedicate lateral public access easement extending from the ocean-side parcel boundary to the top of the bluff in accordance with LUP policy PR-22. Notwithstanding the City's LCP access requirement, lateral access was dedicated to the County of San Luis Obispo in the 1950's when the area was subdivided, as indicated on the Assessor's Parcel Maps for the area. The area of dedication includes the mean high tide to the toe of the bluff. Therefore, the City's action relative to public access is consistent with LUP Policy PR-22 and Coastal Act Section 30212.

VII. CALIFORNIA ENVIRONMENTAL QUALITY ACT (CEQA)

Section 13096 of the California Code of Regulations requires that a specific finding be made in conjunction with coastal development permit applications showing the application to be consistent with any applicable requirements of CEQA. Section 21080.5(d)(2)(A) of CEQA prohibits a proposed development from being approved if there are feasible alternatives or feasible mitigation measures available which would substantially lessen any significant adverse effects which the activity may have on the environment. The Coastal Commission's review and analysis of land use proposals has been certified by the Secretary for Resources as being the functional equivalent of environmental review under CEQA. The findings, incorporated by reference herein have discussed the relevant coastal resource issues with the proposal and has recommended appropriate mitigation to address adverse impacts to said resources. Accordingly,

the project is being approved subject to conditions which implement the mitigating actions required of the Applicant by the Commission (see Special Conditions). Any public comments regarding this project have been addressed in these findings. As such, the Commission finds that only as modified and conditioned by this permit will the proposed project not have any significant adverse effects on the environment within the meaning of CEQA.



California Coastal Commission

LOCATION MAP

County of San Luis Obispo

EXHIBIT NO. 1
APPLICATION NO.
A-3-PSO-01-097
Location Map

EXHIBIT NO.	1
APPLICATION NO.	A-3-PSB-01-097
	Location Map

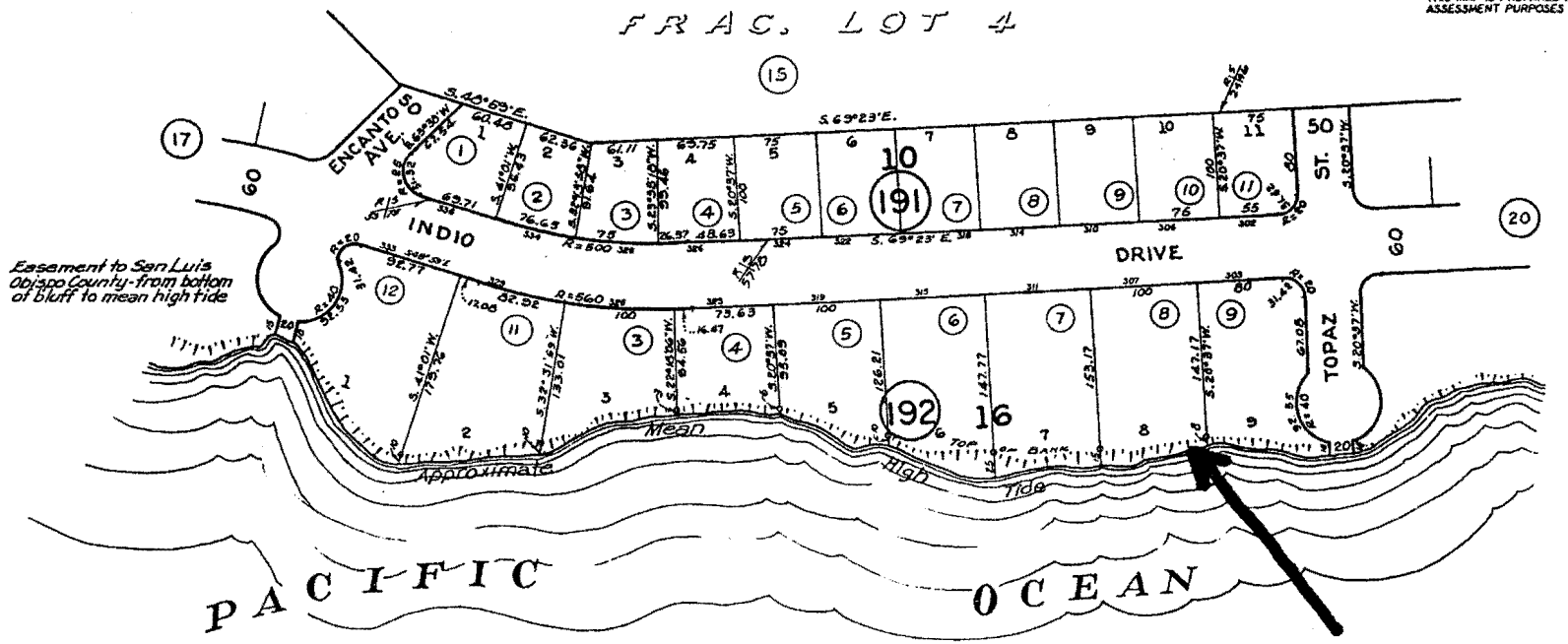
SCALE IN 1/10 OF AN INCH

TAX AREA CODE NO.

RANCHOS EL PISMO AND SAN MIGUELITO FRAC. LOT 4

1" = 100'

THIS MAP IS PREPARED FOR ASSESSMENT PURPOSES ONLY



CITY OF PISMO BEACH
TRACT NO. 57
EL PISMO MANOR NO. 1
SAN LUIS OBISPO COUNTY
CALIFORNIA

REV. 12/24/68

NOTE—ASSESSOR'S BLOCK & LOT NUMBERS SHOW IN CIRCLES

CALIFORNIA COASTAL COMMISSION
CENTRAL COAST AREA OFFICE
725 FRONT STREET, SUITE 300
SANTA CRUZ, CA 95060
(831) 427-4863

COMMISSION NOTIFICATION OF APPEAL

DATE: October 1, 2001

TO: Scott Graham, Assistant Planner
City of Pismo Beach, Community Development Department
760 Mattie Road
Pismo Beach, CA 93449

FROM: Rick Hyman, District Chief Planner

RE: **Commission Appeal No. A-3-PSB-01-097**

Please be advised that the coastal development permit decision described below has been appealed to the California Coastal Commission pursuant to Public Resources Code Section 30602 or 30625. Therefore, the decision has been stayed pending Commission action on the appeal pursuant to Public Resources Code Section 30623.

Local Permit #:	01-0147
Applicant(s):	Av & Km Zaninovich
Description:	To allow demolition of an existing single-family residence and subsequent construction of a new 5,128 square foot residence. The project site is zoned Single-Family Residential (R-1) and is located in the Sunset Palisades Planning Area.
Location:	307 Indio (The project site is located in the Sunset Palisades Planning Area), San Luis Obispo County (APN(s) 010-192-008)
Local Decision:	Approved w/ Conditions
Appellant(s):	California Coastal Commission, Attn: Commissioner Sara Wan, Chair; California Coastal Commission, Attn: Commissioner Pedro Nava
Date Appeal Filed:	10/01/2001

The Commission appeal number assigned to this appeal is A-3-PSB-01-097. The Commission hearing date has been tentatively set for November 13-16, 2001 in Valencia. Within 5 working days of receipt of this Commission Notification of Appeal, copies of all relevant documents and materials used in the City of Pismo Beach's consideration of this coastal development permit must be delivered to the Central Coast Area office of the Coastal Commission (California Administrative Code Section 13112). Please include copies of plans, relevant photographs, staff reports and related documents, findings (if not already forwarded), all correspondence, and a list, with addresses, of all who provided verbal testimony.

A Commission staff report and notice of the hearing will be forwarded to you prior to the hearing. If you have any questions, please contact Mike Watson at the Central Cc office.

EXHIBIT NO. 2
APPLICATION NO. A-3-PSB-01-097
Appeal
p 1 of 6

CALIFORNIA COASTAL COMMISSION
CENTRAL COAST DISTRICT OFFICE
,725 FRONT STREET, SUITE 300
TA CRUZ, CA 95060
427-4863

APPEAL FROM COASTAL PERMIT DECISION OF LOCAL GOVERNMENT

Please review attached appeal information sheet prior to completing this form.

SECTION I. Appellant(s):

Name, mailing address and telephone number of appellant(s):

Commissioner Sara Wan, Chairperson	**Commissioner Pedro Nava**
California Coastal Commission	**California Coastal Commission**
45 Fremont Street, Suite 2000	**45 Fremont Street, Suite 2000**
San Francisco, CA 94105-2219	**San Francisco, CA 94105-2219**
(415) 904-5200	**(415) 904-5200**

SECTION II. Decision Being Appealed

1. Name of local/port government: **Monterey County**

2. Brief description of development being appealed:
Demolition of an existing single family residence and subsequent construction of a new 5,128 square foot residence.

3. Development's location (street address, assessor's parcel number, cross street, etc.:
307 Indio , Pismo Beach, San Luis Obispo County APN 010-192-008

4. Description of decision being appealed:

   a. Approval; no special conditions: ____
   b. Approval with special conditions: XX
   c. Denial: ____

Note: For jurisdictions with a total LCP, denial decisions by a local government cannot be appealed unless the development is a major energy or public works project. Denial decisions by port governments are not appealable.

TO BE COMPLETED BY COMMISSION:

APPEAL NO: A-3-PSB-01-097
DATE FILED: October 1, 2001
DISTRICT: Central

RECEIVED
OCT 0 1 2001
CAL COASTAL CENTRAL

EXHIBIT NO. 2
APPLICATION NO. A-3-PSB-01-097
Appeal
p 2 of 6

APPEAL FROM COASTAL PERMIT DECISION OF LOCAL GOVERNMENT (PAGE 2)

5. Decision being appealed was made by (check one):

a. ___ Planning Director/Zoning Administrator

c. XX Planning Commission

b. ___ City Council/Board of Supervisors

d. ___ Other: _____

6. Date of local government's decision: **September 11, 2001**

7. Local government's file number: **Resolution No. 01-0147**

SECTION III Identification of Other Interested Persons

Give the names and addresses of the following parties: (Use additional paper as necessary.)

a. Name and mailing address of permit applicant:
Av & Km Zaninovich
311 Rd 148
Delano, CA 93215

b. Names and mailing addresses as available of those who testified (either verbally or in writing) at the city/county/port hearings (s). Include other parties which you know to be interested and should receive notice of this appeal.

(1) **Scot Graham, Associate Planner**
City of Pismo Beach
760 Mattie Road
Pismo Beach, CA 93449

(2) _____

(3) _____

SECTION IV. Reasons Supporting This Appeal

Note: Appeals of local government coastal permit decisions are limited by a variety of factors and requirements of the Coastal Act. Please review the appeal information sheet for assistance in completing this section, which continues on the next page.

EXHIBIT NO. 2
APPLICATION NO. A-3-PSB-01-017
Appeal
p 3 of 6

APPEAL FROM COASTAL PERMIT DECISION OF LOCAL GOVERNMENT (PAGE 3)

State briefly your reasons for this appeal. Include a summary description of Local Coastal Program, Land Use Plan, or Port Master Plan policies and requirements in which you believe the project is inconsistent and the reasons the decision warrants a new hearing. (Use additional paper as necessary.)

SEE ATTACHED REASONS FOR APPEAL.

Note: The above description need not be a complete or exhaustive statement of your reasons of appeal; however, there must be sufficient discussion for staff to determine that the appeal is allowed by law. The appellant, subsequent to filing the appeal, may submit additional information to the staff and/or Commission to support the appeal request.

SECTION V. Certification

The information and facts stated above are correct to the best of my/our knowledge.

Signature of Appellant(s) or Authorized Agent

Date 10/1/01

NOTE: If signed by agent, appellant(s) must also sign below.

SECTION VI. Agent Authorization

I/We hereby authorize _____ to act as my/our representative and to bind me/us in all matters concerning this appeal.

Signature of Appellant(s)

Date _____

EXHIBIT NO. 2
APPLICATION NO. A-3-PSB-01-097
Appeal
p 4 of 6

State briefly your reasons for this appeal. Include a summary description of Local Coastal Program, Land Use Plan, or Port Master Plan policies and requirements in which you believe the project is inconsistent and the reasons the decision warrants a new hearing. (Use additional paper as necessary.)

SEE ATTACHED REASONS FOR APPEAL.

Note: The above description need not be a complete or exhaustive statement of your reasons of appeal; however, there must be sufficient discussion for staff to determine that the appeal is allowed by law. The appellant, subsequent to filing the appeal, may submit additional information to the staff and/or Commission to support the appeal request.

SECTION V. Certification

The information and facts stated above are correct to the best of my/our knowledge.

Signed: _____
Appellant or Agent

Date: OCTOBER 1, 2001

Agent Authorization: I designate the above identified person(s) to act as my agent in all matters pertaining to this appeal.

Signed: _____

Date: _____

(Document2)

EXHIBIT NO. 2
APPLICATION NO. A-3-PSB-01-097
Appeal
p5 of 6

REASONS FOR APPEAL OF COASTAL PERMIT 01-147 TO ZANINOVICH

The City of Pismo Beach has approved this coastal permit for a demolition and subsequent new house construction with a 25 foot setback from the bluff overlooking Shell Beach.

The relevant Pismo Beach local coastal program policies include the following:

> Land Use Plan Safety Element Policy S-3 and Section 17.078.050(1) of the Zoning Ordinance each contain two bluff top setback standards that apply to this lot. First, all structures are to be set back a safe distance from the top of the bluff in order to retain the structures for a minimum of 100 years. Second, the minimum bluff setback for lots subdivided prior to January 23, 1981, is 25 feet, and a geologic investigation may be required that could result in a setback greater than 25 feet. Section17.078.060(5) of the certified Zoning Ordinance does not permit new development where it is determined that shoreline protection will be necessary for protection of new structures now or in the future based on a 100 year geologic projection.

The Commission appealed a project proposed for this site in 1999 (A-3-PSB-99-026) and found that any new house should be setback at least 33 feet from the bluff edge, and probably more. This finding was based on geologic evidence available at the time, including a calculated erosion rate. The City's current approval is based on a new geologic study that suggests a lesser erosion rate and corresponding setback of 21 feet. Therefore, the City applied the 25 foot minimum setback because the lot was created prior to 1981. However, the new geologic conclusion is based on an aerial photography analysis using only the years between 1955 and 1990 to determine the erosion rate. We contend that this selective erosion rate calculation has a high potential to subvert the intent of the policy which calls for the setback to be a **safe** distance.

Also, Section 17.078.050(3) of the zoning ordinance requires that geologic reports consider a variety of source material in describing and analyzing historic, current, and foreseeable cliff erosion. At a minimum, the erosion rate calculation followed by the City should have extended to the present. Additionally, in light of the previous geologic information and the Commission's analysis, the City should have included an analysis and findings as to why it chose to approve the project using a different erosion rate and how the differences between the two rates could be scientifically accounted for, particularly given the Commission's previous finding that discussed a likely range of error.

EXHIBIT NO. 2
APPLICATION NO. A-3-PSB-01-097
Appeal
p 6 of 6

CALIFORNIA COASTAL COMMISSION
CENTRAL COAST DISTRICT OFFICE
725 FRONT STREET, SUITE 300
SANTA CRUZ, CA 95060
(831) 427-4863

ADOPTED

W12b

STAFF REPORT: APPEAL SUBSTANTIAL ISSUE AND DE NOVO HEARING

Filed:	03/25/99
49th day:	05/13/99
180th day:	09/21/99
Staff:	SG
Staff report:	06/22/99
Hearing date:	07/14/99
Previous Commission Action:	
Open & continue:	05/13/99

Appeal Number A-3-PSB-99-026

Applicant ..... Antone and Katherine Zaninovich

Appellants ..... Commissioners Wan and Nava

Local Government ..... City of Pismo Beach

Local Decision ..... On February 9, 1999, the Planning Commission approved with conditions the demolition of an existing single family dwelling and the construction of a new single family dwelling on the same lot.

Project Location ..... 307 Indio Drive, Pismo Beach, San Luis Obispo County (APN 010-192-06

Project Description ..... 1) Demolition of a 2982 square foot single family residence located approximately eight to ten feet from the bluff edge of an ocean fronting lot and 2) the construction of a new 5169 square foot single family residence on the lot set back 29 feet from the bluff edge.

File Documents ..... City of Pismo Beach Permit 98-120, City of Pismo Beach certified Local Coastal Program

Staff Recommendation ..... **Approval with Conditions**

Staff Summary

On May 13, 1999, the Commission opened and continued the hearing on this appeal because the applicant had additional geologic information that had not been included with the file and that staff had not yet received in time to include it in an analysis of the project. The substantial issue hearing has been postponed at the request of the applicant pending staff's receipt of the additional geologic information. The information, in the form of a letter from the engineering

CCC Exhibit 3
(page 1 **of** 15 **pages)**
A-3-PSB-01-097

geologist to the project architect, and dated September 29, 1998, was received by Commission staff on June 14, 1999.

The project is located on an ocean fronting lot near the northern end of the City of Pismo Beach. The existing house is approximately eight to ten feet from the edge of the bluff. As approved by the Planning Commission, the proposed new house would be located 29 feet from the bluff edge (25 feet from the landward margin of an undercut portion of the bluff). The City's LCP requires that new houses be set back "a safe distance from the top of the bluff in order to retain the structures for a minimum of 100 years." Based on the original geologic report's estimated erosion rate of four inches per year, and the 100-year requirement, the house should be setback a minimum of 33 feet. The Planning Commission's decision was apparently based on the geologist's addendum letter wherein the geologist recommended changing the average erosion rate from four inches per year to three inches per year. Based on a structure's 100 year lifespan, an erosion rate of three inches per year would equal a setback of 25 feet. However, the supplemental geological analysis does not adequately support a reduction in the erosion rate as originally established. In addition, an evaluation of other projects in the vicinity of this project reveals that even the four inch/year erosion rate is likely a best case scenario. To address the shoreline hazard policy requirements of the LCP, particularly the requirement that new development not be allowed if it would require future shoreline protection, the development setback should be based on at least the original four inch per year erosion rate. Moreover, simply setting the new structure back to the projected 100 year erosion line does not necessarily guarantee structural stability for 100 years. **Staff recommends, therefore, that the Commission find that substantial exists, and the coastal development permit be approved with conditions that (1) require the house to be set back a minimum of 33 feet from the bluff edge to account for the estimated erosion over a 100 year period, plus an additional buffer, based on a supplemental site-specific geological report, of a sufficient distance to ensure that the residential development approved under this permit will not need any shoreline protection for a 100-year lifespan, as required by the LCP; and (2) that future shoreline protection for the project approved herein be prohibited.**

Staff Report Contents

I. SUMMARY OF APPELLANT'S CONTENTIONS

Appellants Wan and Nava contend that the City's approval is inconsistent with the certified LCP for the following reasons (refer to Exhibit 1 for the full text):

Land Use Plan Safety Element Policy S-3 and Section 17.078.050(1) of the Zoning Ordinance together require 1) that structures be set back a safe distance from the blufftop in order to retain the structures for a minimum of 100 years and 2) a minimum setback of 25 feet from the blufftop with the possibility of a greater setback based on a geologic investigation. The City-approved project would be set back 29 feet, based on a time span of 75 years rather than 100 years as required by the LCP.

Section17.078.060(5) of the certified Zoning Ordinance does not permit new development where it is determined that shoreline protection will be necessary for protection of the new structures now or in the future based on a 100 year geologic projection. The location of the City-approved project was based on a 75 year geologic projection, meaning that shoreline protection would be

necessary 25 years sooner than if the structure's location was based on a 100 year geologic projection.

II. LOCAL GOVERNMENT ACTION

On February 9, 1999, the City of Pismo Beach Planning Commission granted a coastal development permit for the demolition of a 2982 square foot single family residence and the construction of a new 5169 square foot single family residence on a bluff top lot in the northern portion of the City. A geologic investigation was performed that concluded that the average annual erosion rate at the site is 4 inches per year. The investigation recommended a setback of 25 feet from the bluff top and 25 feet from the landward end of the four foot depth of the undercut part of the bluff, sufficient to protect the structure for a period of 75 years (4 inches x 75yrs = 300 inches; 300 ÷ 12 inches = 25 feet).

A subsequent addendum letter from the geologist recommended changing the erosion rate from four inches to three inches per year. Based on that addendum letter, the Planning Commission accepted the reduced erosion rate and established a setback based on three inches per year rather than four inches per year and required that the house be set back 25 feet from the most landward portion of the bluff.

III. STANDARD OF REVIEW FOR APPEALS

Coastal Act section 30603 provides for the appeal of approved coastal development permits in jurisdictions with certified local coastal programs for development that is (1) between the sea and the first public road paralleling the sea or within 300 feet of the inland extent of any beach or of the mean high tideline of the sea where there is no beach, whichever is the greater distance; (2) on tidelands, submerged lands, public trust lands, within 100 feet of any wetland, estuary, or stream, or within 300 feet of the top of the seaward face of any coastal bluff; (3) in a sensitive coastal resource area; (4) for counties, not designated as the principal permitted use under the zoning ordinance or zoning district map; and (5) any action on a major public works project or energy facility. This project is appealable because the lot is between the sea and the first public road paralleling the sea.

The grounds for appeal under section 30603 are limited to allegations that the development does not conform to the standards set forth in the certified local coastal program or the public access policies of the Coastal Act. Section 30625(b) of the Coastal Act requires the Commission to conduct a de novo coastal development permit hearing on an appealed project unless a majority of the Commission finds that "no substantial issue" is raised by such allegations. Under section 30604(b), if the Commission conducts a de novo hearing, the Commission must find that the proposed development is in conformity with the certified local coastal program. Section 30604(c) also requires an additional specific finding that the development is in conformity with the public access and recreation policies of Chapter Three of the Coastal Act, if the project is located between the nearest public road and the sea or the shoreline of any body of water located within the coastal zone. This project is located between

the nearest public road and the sea and thus, this additional finding must be made in a de novo review in this case.

The only persons qualified to testify before the Commission on the substantial issue question are the applicant, persons who made their views known before the local government (or their representatives), and the local government. Testimony from other persons regarding substantial issue must be submitted in writing. Any person may testify during the de novo stage of an appeal.

IV. STAFF RECOMMENDATION ON SUBSTANTIAL ISSUE AND COASTAL DEVELOPMENT PERMIT

A. Staff recommendation on Substantial Issue:

Staff recommends that the Commission, after public hearing, determine that **a substantial issue exists** with respect to the grounds on which the appeal has been filed, because the City has approved the project in a manner that is inconsistent with the certified Local Coastal Program.

MOTION: *I move that the Commission determine that Appeal No. A-3-PSB-99-026 raises **NO** substantial issue with respect to the grounds on which the appeal has been filed.*

Staff recommends a **NO** vote on the preceding motion. This would result in a finding of substantial issue and bring the project under the jurisdiction of the Commission for hearing and action. To pass the motion, a majority of the Commissioners present is required.

B. Staff Recommendation on Coastal Development Permit:

Staff recommends that the Commission, after public hearing, **approve** the proposal as conditioned.

MOTION: *I move that the Commission approve Coastal Development Permit Number A-3-PSB-99-026 subject to the conditions below and that the Commission adopt the resolution of Approval with Conditions.*

Staff recommends a **YES** vote on the preceding motion. This would result in approval of the project as conditioned. A majority of the Commissioners present is required to pass the motion and adopt the following resolution:

Approval with Conditions

The Commission hereby grants a permit for the proposed development, subject to the conditions below, on the grounds that, as conditioned, the development will be in

conformity with the certified Local Coastal Program of the City of Pismo Beach, will be consistent with the public access and recreation policies of Chapter 3 of the Coastal Act, and will not have any significant adverse impacts on the environment within the meaning of the California Environmental Quality Act.

V. RECOMMENDED CONDITIONS

A. Standard Conditions

1. Notice of Receipt and Acknowledgment. The permit is not valid and development shall not commence until a copy of the permit, signed by the permitee or authorized agent, acknowledging receipt of the permit and acceptance of the terms and conditions, is returned to the Commission office.

2. Expiration. If development has not commenced, the permit will expire two years from the date this permit is voted on by the Commission. Development shall be pursued in a diligent manner and completed in a reasonable period of time. Application for extension of the permit must be made prior to the expiration date.

3. Compliance. All development must occur in strict compliance with the proposal as set forth in the application for permit, subject to any special conditions set forth below. Any deviation from the approved plans must be reviewed and approved by the staff and may require Commission approval.

4. Interpretation. Any questions of intent or interpretation of any condition will be resolved by the Executive Director or the Commission.

5. Inspections. The Commission staff shall be allowed to inspect the site and the project during its development, subject to 24-hour advance notice.

6. Assignment. The permit may be assigned to any qualified person, provided assignee files with the Commission an affidavit accepting all terms and conditions of the permit.

7. Terms and Conditions Run with the Land. These terms and conditions shall be perpetual, and it is the intention of the Commission and the permittee to bind all future owners and possessors of the subject property to the terms and conditions.

B. Special Conditions

1. Project Authorized

This permit authorizes the demolition of an existing single family dwelling and the construction of a new single family dwelling consistent with the revised plans required by Special Condition No. 3, below.

2. Development Setback Buffer

PRIOR TO ISSUANCE OF THE COASTAL DEVELOPMENT PERMIT, permittee shall submit to the Executive Director for review and approval two copies of a supplemental site-specific geological report that shall establish a development setback buffer landward of the minimum 100 year erosion setback for the purpose of assuring structural stability for a minimum of 100 years as required by LUP Policy S-3 and Zoning Ordinance Sections 17.078.050(1) and 17.078.060(5).

3. Revised Plans

PRIOR TO ISSUANCE OF THE COASTAL DEVELOPMENT PERMIT, permittee shall submit to the Executive Director for review and approval two copies of revised plans showing all proposed structures setback a minimum of 33 feet from the bluff edge or the landward extent of the undercut portion of the bluff, whichever is more landward, plus the buffer distance established by the supplemental geological report required by Special Condition No. 2 above.

4. City Approval

PRIOR TO ISSUANCE OF THE COASTAL DEVELOPMENT PERMIT, permittee shall provide the Executive Director with evidence that the revised plans have been reviewed and approved by the City of Pismo Beach.

5. Effect on City Conditions

This Coastal Commission action has no effect on conditions imposed on the project by the City of Pismo Beach pursuant to an authority other than the California Coastal Act.

6. Assumption of Risk/Shoreline Protection Prohibition

PRIOR TO THE ISSUANCE OF THE COASTAL DEVELOPMENT PERMIT, the applicant as landowner shall execute and record a deed restriction, in a form and content acceptable to the Executive Director, which shall provide that:

a) the applicant acknowledges and agrees that the site may be subject to hazards from waves and erosion;

b) the applicant acknowledges and agrees to assume the risks to the applicant and the property that is the subject of this permit of injury and damage from such hazards in connection with this permitted development;

c) the applicant unconditionally waives any claim of damage or liability against the Commission, its officers, agents, and employees for injury or damage from such hazards;

d) the applicant agrees to indemnify and hold harmless the Commission, its officers, agents, and employees with respect to the Commission's approval of the project against any and all liability, claims, demands, damages, costs (including costs and fees incurred in defense of such claims), expenses, and amounts paid in settlement arising from any injury or damage due to such hazards;

e) the applicant agrees that any adverse impacts to property or life caused by the permitted project shall be fully the responsibility of the landowner;

f) the applicant shall be responsible for removal of debris from the beach in the event of structures collapsing or falling onto the beach.

g) the applicant expressly waives the provisions of Public Resources Code Section 30235,

h) the applicant shall not construct, now or in the future, any shoreline protective device(s) for the purpose of protecting the residential development approved pursuant to coastal development permit A-3-PSB-99-026, including, but not limited to, foundations, at-grade patios, planters, fences, or decks, in the event that these structures are threatened with imminent damage or destruction from waves, erosion, storm conditions, or other natural hazards.

The document shall run with the land, binding all successors and assigns, and shall be recorded free of prior liens that the Executive Director determines may affect the enforceability of the restriction. This deed restriction shall not be removed or changed without a Coastal Commission-approved amendment to this coastal development permit unless the Executive Director determines that no amendment is required.

VI. FINDINGS AND DECLARATIONS

A. LCP Background

The City's LCP is composed of two documents, the Land Use Plan and the Zoning Ordinance. The Land Use Plan was comprehensively revised in 1992. Last year, the City submitted to the Commission the first comprehensive Zoning Ordinance revision since certification in 1983. Commission and City staffs have and are continuing to discuss suggested changes to the submitted document and it is expected that the revised Zoning Ordinance will come before the Commission in July.

B. Substantial Issue Findings

Appellants Wan and Nava contend that the City's approval is inconsistent with the geological setback policies of the LCP. Please see Exhibit 1 for the complete text of the appellants' contentions.

Land Use Plan Safety Element Policy S-3 and Section 17.078.050(1) of the Zoning Ordinance each contain two bluff top setback standards that apply to this lot. First, all structures are to be set back a safe distance from the top of the bluff in order to retain the structures for a minimum of 100 years. Second, the minimum bluff setback for lots subdivided prior to January 23, 1981, is 25 feet, and a geologic investigation may be required that could result in a setback greater than 25 feet. Section17.078.060(5) of the certified Zoning Ordinance does not permit new development where it is determined that shoreline protection will be necessary for protection of new structures now or in the future based on a 100 year geologic projection.

The subject lot was subdivided prior to January 23, 1981 and so requires a minimum setback of 25 feet, with the possibility of a greater setback based on a geologic investigation. A geologic investigation, which was performed in November 1997 by Gary Mann and Ron Church of Geo Source Incorporated, established a bluff setback based on an average erosion rate of four inches per year (see Exhibit 3 for the entire report).

> Based upon field observation, pertinent literature, and other bluff stability studies in the area, a bluff retreat rate of 6 to 12 inches per year is assumed for the marine terrace deposits, and 4 inches for the shaley beds of the Monterey Formation. It should be noted that the assumed bluff retreat rates are considered an "average," whereas in nature, erosional process (sic) are often episodic and irregular. Short-term (yearly) bluff retreat rates may vary significantly from the long-term average. Due to the predominance of the interbedded opaline siltstone, sandstone, and hard porcelanite of unit Tmp of the Monterey Formation in the tidal zone of the bluff, which are somewhat harder than the more shaley units in the formation, and the anticipated wave run-up height, a bluff setback was established using a retreat rate of four inches per year.

The report concluded that

> The bluff at the site appears to be actively retreating at an average rate of 4 inches per year. This information is based on our review of a San Luis Obispo County Parcel Map of Lot 5, Block 16, Tract Number 57, El Pismo Manor Number 1, dated August, 1950, and from the geologic reconnaissance. Based on a typical 75-year lifespan of use of the residence, and a retreat rate of four inches per year, a 25-foot setback measured from the top-of-bluff, and depth of undercutting landward of the top-of-bluff is required for this property. The top of the marine terrace deposits should be considered as the top-of-bluff for planning purposes at the present time, with a slight additional setback measure from the landward margin of the undercut.

The undercut portion of the bluff lies midway between the side lot lines. The landward margin of the undercut portion of the bluff is about four feet landward of the edge of the bluff. Measuring from that point would result in a setback of 29 feet from the edge of the blufftop for structures located midway between the side lot lines (blufftop erosion based setback of 25 feet plus four feet for depth of undercut portion), while structures nearer the side lot lines would only have to setback 25 feet from the edge of the blufftop. Assuming that the four inches per year erosion rate holds over time, this would protect the structure for a period of 75 years.

A subsequent addendum letter from Geo Source, dated September 29, 1998, (see Exhibit 4) for "clarification of the retreat rate and setback distance" stated:

> The rates measured varied from less than 3 inches to approximately 4 inches per year depending on the materials encountered and the wave action. We selected the more liberal rate of 4-inches per year to reflect the erosional characteristics of the surface Quaternary Terrace deposits. However, these Quaternary Terrace deposits are of minor thickness and are covered with vegetation indicating they are stable. In addition, the rate was calculated from the base of the undercut rather than the seaward edge of the top of the bluff. If the rate was recalculated using the seaward edge, the retreat rate would be less than 3-inches per year.
>
> In conclusion, since the site has only a minor amount (sic) the higher retreat rate materials and the majority of the bluff is composed of erosion resistant units of the Monterey Formation a bluff retreat rate of 3-inches per year would be a more applicable rate to establish the setback distance.

The Planning Commission required a setback of 29 feet across the entire width of the property. Based on a retreat rate of three inches per year, a 100 year setback would equal 25 feet. The Planning Commission's action apparently was based on the retreat rate of three inches as recommended in the geologist's addendum letter, rather than the four inches originally used, and was measured from the landward margin of the undercut portion of the bluff, approximately four feet landward of the bluff face.

The addendum letter states that the more liberal four inch per year rate reflects the erosional characteristics of the surface material, which is of minor thickness and apparently stable because it is vegetated and indicates that partly because of that and because the lower bluff materials are more erosion resistant, a retreat rate of only three inches is "a more applicable rate to establish the setback distance. However, it is this very surface material that would support the house and through which water, sewer, and gas lines would be placed. It seems imperative to establish an erosion rate based on this most erosion-prone material. Additionally, while the presence of vegetation may indicate that the terrace deposits are relatively stable, they are also relatively easily erodible.

In addition, as discussed in more detail in the de novo findings, there is a considerable uncertainty associated with the geological analyses in the vicinity of the project. Here, the

geologic report established an overall average erosion rate of four inches per year based on the particular rates "of 6 to 12 inches per year. . .for the marine terrace deposits, and 4 inches for the shaley beds of the Monterey Formation." The addendum letter is not convincing in its attempt to establish a lesser overall estimated erosion rate. Thus, it is not clear that the "best case" assumption of a three inch per year erosion rate is appropriate. Moreover, even if this rate were correct, setting the new structure exactly on the projected 100 year erosion line does not necessarily guarantee structural stability for 100 years. Damage to structures typically occurs, and shoreline protection devices are typically approved, well before a bluff edge has retreated right up to a structure. Based on the original geological report and these other considerations, the City's action raises a substantial issue with the certified LCP. Policy S-3 states that the minimum setback for blufftop development is 25 feet but that "a greater setback may be applied as the geologic study would warrant." Section 17.078.050(1) similarly requires a minimum 25 foot setback but that "a greater setback may be applied if local conditions warrant." To be consistent with Policy S-3 and Section 17.078.050(1), the minimum required development setback with a 4 inch per year erosion rate is 33 feet (100 years x .33 feet [4 inches] = 33 feet), rather than 25 feet or 29 feet. The City-approved location of the house 29 feet from the current bluff edge at the estimated erosion rate would give the house only 88 years of protection (29 feet ÷ .33 = 87.8). Thus, this action would also allow new development where a geologic projection indicates that shoreline protection may be necessary to protect the development in 88 years. In addition, there is no discussion of or permit condition prohibiting future shoreline protection or otherwise requiring use of non-shoreline structure alternatives for protecting the proposed house from future potential bluff erosion. This is inconsistent with the requirement of Section 17.078.060(5) that no new development be allowed where a geologic projection indicates that shoreline protection will be necessary within 100 years to protect the development.

Therefore, a substantial issue is raised regarding the consistency of the City's approval with LUP Policy S-3 and Zoning Ordinance Sections 17.078.050(1) and 17.078.060(5).

C. Findings for De Novo Hearing and Approval of a Revised Project

1. Geology and Setback from Bluff

The certified Local Coastal Program (LCP) of the City of Pismo Beach contains specific policies and standards for the purpose of ensuring the safety of structures built on ocean fronting lots. These LCP requirements were adopted in response to the Coastal Act's policies for the protection of the marine environment and policies regarding general development. Coastal Act Section 30235 permits "seawalls. . .when required to. . .protect existing structures. . .in danger from erosion. . . ." Section 30253 requires that new development not "in any way require the construction of protective devices that would substantially alter natural landforms along bluffs and cliffs." The City's LCP narrows the requirements of Section 30253 by requiring new structures to be set back a sufficient distance so that they won't be endangered by erosion for a minimum of 100 years.

Geologic studies are critical to the implementation of the LCP geological hazards requirements. In this case, an initial investigation was prepared that established a four inch per year erosion

rate, followed by a supplemental letter that adjusted the projected erosion rate to three inches per year. Although an initial professional judgment or recommendation may often be modified if further information becomes available, the history of geologic reports and recommendations regarding erosion rates and bluff setbacks in the Pismo Beach area encourages a cautious approach to acceptance of estimated erosion rates and established setbacks.

For example, in 1983 the Commission approved an addition on the bluff side of the Gustafson house at 107 Indio Drive, 14 lots downcoast from the Zaninovich parcel (4-83-479). That file indicates that the addition would be located within 25 feet of the bluff edge but "would not extend seaward of the existing porch." Although there is no geological report in the file, correspondence to the applicant states

> We would note that with the recent storms the past few years the bluff retreat in Pismo Beach has exceeded the rates projected by geologists and as a result homes which were constructed utilizing the recommended 25 foot bluff set-back have had to be protected with emergency and permanent seawall and retaining devices.

In 1997 a geology report was prepared by Tom Wooley for a proposed seawall at this same site (Gustafson, A-3-PSB-98-062, denied). That report stated that "[t]he marine bluff below Lot 6 is presently eroding at an estimated rate of 6 to 12 inches per year. This rate will hazard the residence in 20 years or less." Marine terrace deposits make up the upper part of the bluff at the Gustafson site as at the Zaninovich site. The lower part of the bluff subject to wave attack at the Gustafson site is the Obispo formation while at the Zaninovich site the lower part of the buff is the Monterey formation, so the erosion rates for the lower part of the bluffs are not directly comparable. The important point, though, is the level of uncertainty regarding erosion rates in the geological reports.

The 1975 geology report by Monte Ray for the Shelter Cove Lodge three miles downcoast from the Zaninovich parcel stated

> Based on the investigations and data reviewed to date, it appears that an average rate of cliff erosion. . .would be about 2 inches per year in the resistant bedrock materials. Extending this indicates a period of 60 years would be required for waves to erode 10 feet into the base of the cliff.

The Shelter Cove Lodge was constructed in 1986. Yet in 1998, a mere 12 years later, erosion of a sea cave near the southern end of the property had reached a point where the structures there were becoming endangered and the Commission issued a permit (A-3-PSB-98-097) for the construction of a seawall.

Approximately one mile downcoast from the Zaninovich parcel is the Cliffs Hotel. The erosion rate estimated at the time of the hotel application in 1983 (4-83-490) was three inches per year. In a 1996 appeal of a City-approved permit for a revetment (A-3-PSB-96-100, denied), the erosion rate was estimated at between 4.5 inches (northern section of bluff) to 13 inches

(southern section of bluff). In 1998, a geotechnical report for the Cliffs Hotel estimated erosion at 4 **feet** per year (A-3-PSB-98-049 and 4-83-490-A1).

Another, non-Pismo Beach, example is the recent seawall proposal on the northern coast of San Luis Obispo County, at San Simeon Acres (La Playa San Simeon Homeowner's Assn., A-3-SLO-99-019, pending). The staff report for the original apartment development (4-86-236) states

> The applicant's geotechnical consultant indicates that the subject parcel experiences an average bluff retreat of 4 inches per year. . . With the assumed 4 inch per year retreat rate for the bluff, the proposed 25 ft. blufftop development setback would yield a life span for the structure of 75 years. The consultant concludes that bluff protection devices, i.e., rip-rap, seawalls, etc., will not be necessary in the foreseeable future.

Yet, in 1998, only 12 years after the geology report concluded that a setback based on a retreat rate of four inches per year was adequate to assure the safety of the structure, the County approved a seawall on the same site to protect the structure from continuing bluff erosion. The March 19, 1998 geologic bluff study by Earth Systems Consultants states that the average bluff retreat rate is "almost five inches per year" or an inch more than the earlier estimate.

Thus there is a wide variety of estimated erosion rates and a large inherent uncertainty about "safe" setbacks in geology reports prepared at different times for the same sites along a three mile section of the northern coast of Pismo Beach and for the one site mentioned on the northern coast of San Luis Obispo County. Some of the variety may be due to differing geological formations or review of erosion over differing time periods. At the same time, the Commission is increasingly confronting situations where earlier geological studies that established "safe" setbacks, are being revised upwards to support the need for shoreline protection. Some of these changes may be based on new information, or increased experience. Regardless, this experience highlights the considerable uncertainty embedded in these geological studies. In light of this, the Commission does not find the conclusion of the addendum letter, that the erosion rate on the subject site should be reduced from four to three inches per year, to be convincing. The Commission finds that the setback on this parcel must be based at a minimum on an estimated average retreat rate of four inches per year.

As discussed above in the Substantial Issue findings, the erosion rate initially established for this site is four inches per year. Over a 100 year period, an erosion rate of four inches per year would result in 33 feet of erosion. Thus, a new structure on this site should be set back a minimum of 33 feet from the bluff edge. Because of the undercutting of a potion of the bluff, the 33 foot setback should be measured from the landward edge of the undercut portion; otherwise the setback would be less than the projected amount of erosion over a 100 year period. However, the City approved the proposal with a setback of only 25 feet from the undercut portion of the bluff (29 feet from the bluff top edge). This is inconsistent with Policy S-3 which requires a setback based on 100 years.

The minimum setback of 33 feet, though, is also probably not enough to ensure the safety of a new house on this site for 100 years worth of erosion, as required by the LCP. The house will become endangered by erosion well before 100 years have passed (or the equivalent amount of erosion has occurred). This is because by the time 100 years of erosion has occurred, the seaward edge of the house will be at the bluff edge. Almost assuredly damage to the house would have already occurred (e.g., cracking of foundation and skewing of the frame resulting in breakage of water, sewer, and gas pipes, and inability to open and close doors and windows) and/or the Building Official would have "red-tagged" the house indicating its uninhabitable status due to the damage and/or because of the danger of parts or all of it falling to the beach. Thus it is necessary to set back the house a somewhat greater distance than the 33 feet projected by the geological information in order to ensure its safety for 100 years.

At present it is unknown just how much more beyond 33 feet landward a new house on this site ought to be located to ensure its safety for 100 years. The existing house is no more than 10 feet back from the bluff edge and apparently has as yet suffered no damage. In other cases, signs of damage may be seen where the distance from an existing structure to the bluff edge is somewhat more. Fifteen feet is probably a reasonable buffer amount to set back from the 100 year setback, to truly allow for 100 years worth of erosion that does not endanger the structure. However, just as the 100 year setback is a site-specific figure based on site-specific geology, the buffer amount will also be based on site-specific geology.

Therefore this permit is conditioned to require a site-specific, geologically based estimate of a buffer amount to be added to the 33 foot bluff edge/bluff undercut setback in order to ensure that after 100 years worth of erosion, a new structure on this lot will still be safe from erosion.

Finally, Section 17.078.060(4) states:

> Seawalls shall not be permitted, unless the city has determined that there are no other less environmentally damaging alternatives for protection of existing development or coastal dependent uses.

As further assurance that no future shoreline protection will be required on this site, this permit is conditioned to require the applicant to record a deed restriction assuming risk from hazards associated with waves and erosion and to prohibit construction of any shoreline protective device(s) for the purpose of protecting the development authorized by this permit.

Therefore, the Commission finds that the project, as conditioned, is consistent with the City of Pismo Beach certified Local Coastal Program.

2. Access

Coastal Act Section 30212 states that

(a) Public access from the nearest public roadway to the shoreline and along the coast shall be provided in new development projects except where:

(1) it is inconsistent with public safety, military security needs, or the protection of fragile coastal resources, ...

LUP Policy PR-22 states that

> For all developments on parcels located along the shoreline, a lateral public access easement in perpetuity extending from the oceanside parcel boundary to the top of the bluff shall be required for the purpose of allowing public use and enjoyment of dry sandy and rocky beaches, intertidal and subtidal areas.

The City's staff report says that City Condition A.6 implements Policy PR-22. However, Condition A.6 is shown struck through, indicating it was deleted and is followed by a parenthetical note that the condition was amended by the Planning Commission on 2/9/99. This appears to be inconsistent with the LCP.

Notwithstanding the LCP access requirement, none is needed here because when this area was subdivided in the 1950s, it was in unincorporated San Luis Obispo County and lateral access was dedicated to the County, as indicated on the Assessor's Parcel Maps for the area.

Therefore, the City's action relative to public access is consistent with LUP Policy PR-22 and Coastal Act Section 30212.

If in the future a structure or a part thereof constructed on this site under this permit collapses onto the beach, access could be impeded by debris. Therefore, this permit is conditioned to require the applicant to remove any such debris. This requirement will ensure that any development is consistent with continuing public access.

VII. CALIFORNIA ENVIRONMENTAL QUALITY ACT (CEQA)

Section 13096 of the California Code of Regulations requires that a specific finding be made in conjunction with coastal development permit applications showing the application to be consistent with any applicable requirements of CEQA. Section 21080.5(d)(2)(A) of CEQA prohibits a proposed development from being approved if there are feasible alternatives or feasible mitigation measures available which would substantially lessen any significant adverse effects which the activity may have on the environment. The Coastal Commission's review and analysis of land use proposals has been certified by the Secretary for Resources as being the functional equivalent of environmental review under CEQA. Accordingly, the Commission finds that the project as proposed could have significant adverse effects on the environment within the meaning of CEQA; that there are feasible alternatives which would significantly reduce the project's adverse effects; and, accordingly, only as conditioned can a finding of conformance with CEQA requirements be made.

EXHIBIT 2(1)

RECEIVED
JUL 17 1998
CITY OF PISMO BEACH
PLANNING DEPT.

EO SOURCE INC

GEOLOGIC BLUFF STUDY
ZANINOVICH RESIDENCE
307 INDIO DRIVE
SHELL BEACH, CALIFORNIA

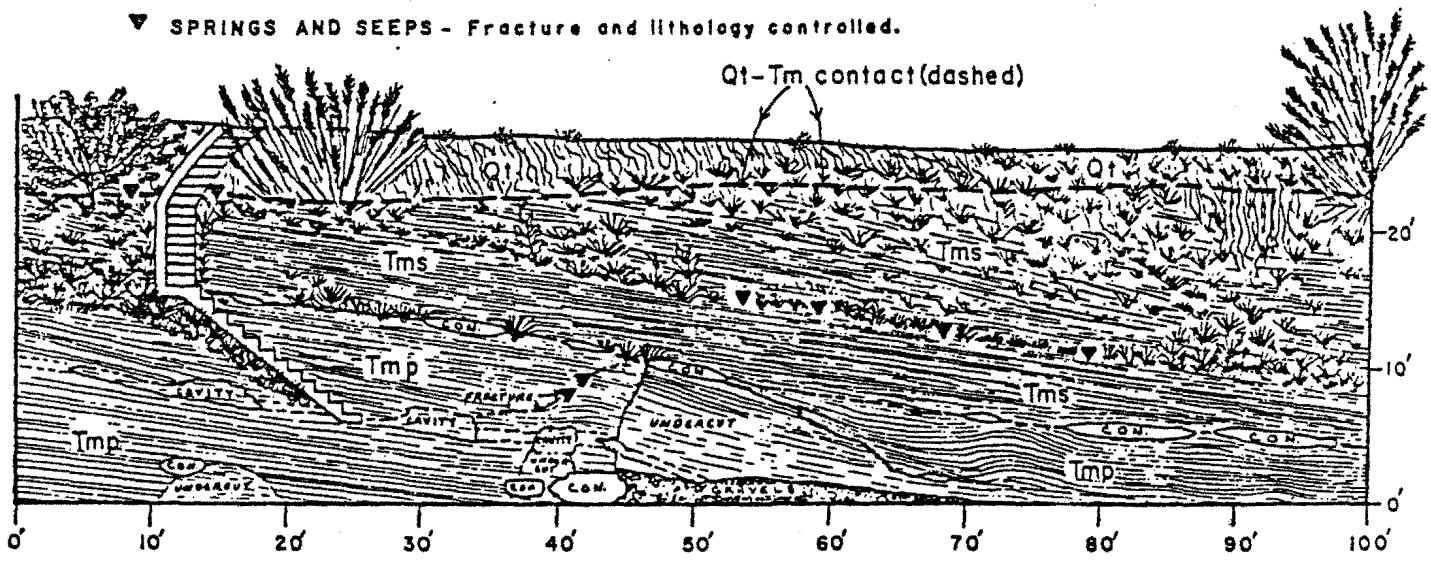
NOVEMBER 1997

LEGEND

Qt - QUATERNARY AGE MARINE TERRACE - Clayey sand with gravels near base.

Tm - TERTIARY (MIOCENE) AGE MONTEREY FORMATION - Tms — interbedded opaline shale and siltstone, 1/2"-2" thick. Tmp — interbedded opaline siltstone, sandstone, and porcelanite, 1"-4" thick. Contains resistant dolomitic lenticular concretions (con.).

▼ SPRINGS AND SEEPS - Fracture and lithology controlled.



PREPARED BY:

GEO SOURCE INC
141 SUBURBAN ROAD, SUITE D-1
SAN LUIS OBISPO, CA 93401

EXHIBIT NO. 4
APPLICATION NO. A-3-PSB-01-097
Geo Study 11/97
p 1 of 11

RECEIVED
JUL 17 1998
CITY OF PISMO BEACH
PLANNING DEPT.

GEOLOGIC BLUFF STUDY
307 INDIO DRIVE
SHELL BEACH, CALIFORNIA

1.0 INTRODUCTION

In accordance with your request, we have performed a geologic study of the bluff located along the southwestern boundary of the project site in the Shell Beach area of the city of Pismo Beach, California. The primary purpose of this geologic bluff study is to establish a building setback with respect to geologic structure, rock lithology, and anticipated future bluff retreat, and to compile available information relevant to local bluff conditions. This report is in accordance with requirements outlined in the State of California Coastal Commission "Statewide Interpretive Guidelines", adopted May 5, 1981.

2.0 SITE DESCRIPTION

The project site is located at 307 Indio Drive at the north end of Shell Beach as shown on the site vicinity map, Figure 1. The configuration of the site and bluff edge is shown on the site plan, Figure 2. The site is currently occupied by an existing residence. The residence is presently located on the southwest part of the lot, with a patio area and retaining wall located between the residence and the bluff. A small avocado orchard is located on the northeast corner of the lot. A driveway located on the north side provides access to the residence from Indio Drive. The site slopes gently to the southwest towards the top of the bluff at an average grade of approximately 5 percent to 7 percent.

The southwest property boundary occupies 100 feet of ocean view bluff frontage. The northwest margin of the bluff is approximately 28 feet high, and slopes slightly down to an approximate height of 26 feet at the southwest end. The upper three to five feet of the bluff slopes back towards the site at grades of 20 percent to 30 percent, with the patio area being approximately 30 feet in elevation. The remainder of the bluff maintains near vertical relief, with a small undercut occurring near the center of the bluff face. A narrow, gravelly-cobble beach, and a bedrock-outcrop tidal zone is located along the base of the bluff. The bedrock-outcrop tidal zone offers good protection from direct wave action on the bluff during low and intermediate level tidal stages. The base of the bluff may experience direct wave action during high tides. The beach is only accessible during times of low tide.

3.0 FIELD STUDY

The field study consisted of a detailed site reconnaissance to observe and map bluff geologic structure and conditions on site. The reconnaissance was conducted on November 21, and November 24, 1997. The bluff geology was mapped at a scale of 1 inch = 10 feet, and photo mosaics were acquired that cover the entire bluff face from multiple perspectives. A geologic map, Figure 3, of the bluff along the project site was prepared from data collected during the reconnaissance (see Appendix A). The key (top of figure 3) identifies the geologic units shown on the bluff geologic map.

4.0 REGIONAL GEOLOGY

The site is located in the Coast Range Geon [illegible]. The province consists of northwest-trending mountains an[illegible] Great Valley of

EXHIBIT NO. 4
APPLICATION NO. A-3-PSB-01-097
Geo Study 11/97
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2B-16

California and the Pacific Ocean. The project site is situated near the north terminus of a northwest-trending, wave-cut, marine terrace, which lies southeast of the San Luis Mountain Range, locally referred to as the Irish Hills. The seaward edge of the terrace is called a sea cliff or bluff. The bedrock part of the bluff along the site consists of interbedded opaline (or porcelaneous) shale, siltstone, and sandstone of the Miocene age Monterey Formation (Tm), which is capped by a thin veneer of Quaternary age marine terrace deposits (Qt) (Figure 3).

The marine terrace deposits consist of a dark brown to reddish brown clayey sand with occasional gravel beds occurring near the base. These deposits are generally poorly consolidated and are prone to slump or wedge type slope failures. They constitute the upper four to six feet of the bluff. The terrace deposits are less resistant to weathering and erosion than the underlying shale of the Monterey formation, however, because of the thin soil cover and stabilization by vegetation, the terrace deposits are fairly stable at this location.

5.0 BLUFF EROSION AND GEOLOGY

Bluff erosion and retreat primarily occurs because of direct wave action during winter and astronomical high tides, traffic (animal, human, etc.) on the bluff edge and face, uncontrolled surface drainage, bluff geometry (height, steepness), geologic units and structure (hardness of rock, presence of fractures, folds), and coastal configuration. The following is a brief discussion of these aspects and how they affect the subject site.

5.1 Site Geology and Geologic Units

The configuration of the bluff is primarily a function of the geologic structure and geologic units (lithology) of which it is composed. The opaline (porcelaneous) shale, siltstone, and sandstone beds of the Monterey Formation in this area are relatively competent (hard) and resistant to erosion. The near vertical grade of the bluff is a reflection of the mature stages of retreat in this type of rock. Erosion along the bluff is occurring by fracturing and weathering of the thinly interbedded rock units by direct wave impact and impact of rock (cobble, boulder) projectiles against the base of the bluff. When wave energy is focused along weak rock areas, such as fractures, joints, or bedding planes, portions of the bluff are eroded and undercut. Eventually the undercut areas fail and a block or wedge shaped portion of the bluff falls on to the beach. Incipient undercutting is occurring near the center of the bluff, although there is currently no threat of failure of large blocks.

The Tertiary (Miocene) age Monterey Formation (Tm) is informally divided into two units, Tms and Tmp for the purposes of this study (Figure 3). Unit Tms overlies unit Tmp and is composed of finely interbeded opaline shales and siltstones that have an average thickness of less than ½ to approximately 2 inches (Figure 3). Unit Tms is less resistant to erosion than the lower unit Tmp, however, only unit Tmp is subjected to direct wave action at this site. Unit Tmp occupies the basal part of the bluff and is composed of interbedded opaline siltstones with some opaline sandstone, and porcelanite. The porcelanite has a vitreous and glassy appearance and contains many fine fractures. The porcelanite is a hard, amorphous, siliceous rock with disseminated silt and clay that was formed by the accumulation of diatom skeletons on the sea floor. The interbedded porcelanite, opaline siltstones, and minor sandstones are approximately one to four inches thick in unit Tmp.

A few small amplitude folds occur in unit Tn t gravitational

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deformation when the rocks were still soft sea-floor sediments. These two small anticlinal folds are located at position 42 feet and position 73 feet (Figure 3). The small fold at position 42 feet is associated with a small fracture that localizes small seeps of groundwater at positions 38 - 43 feet. The folds are slightly more prone to erosion than adjacent rock because of increased microfracturing within the fold-axis area, however these structures are not currently localizing more erosion than adjacent areas, and represent no significant erosion problems to the bluff.

Units Tms and Tmp are separated by a zone of lenticular, dolomitic concretions that dip to the southwest (Figure 3). The formation dip is measured at approximately 12 to 14 degrees southeast, and the strike is approximately N 24 degrees W. The Monterey Formation therefore dips back into the bluff and to the southeast. This concretionary zone forms the roof of a small undercut that slopes from approximately 8 feet to 3 feet in height toward the southeast, from a position of 45 to 70 feet respectively along the bluff (Figure 3). The maximum penetration of the undercut is approximately 6 to 7 feet at the northeast end, and shallows to about 2 feet towards the southeast. The vertical datum is approximately mean high tide. The penetration of the undercut is measured from the outer, northwest, seaward edge of the bluff. The remaining southeast part of the bluff between 70 to 100 feet is approximately vertical in grade, with slight undercuts of one to two feet occurring between 70 to 100 feet in position (Figure 3).

The northwest part of the bluff between 0 an 45 feet slopes steeply to the east (about 75 to 85 percent), with a recessed bench occupying the northwest, lower margin of the bluff between 10 and 5 feet in elevation, and coincident with an eroded, shaley interbed within unit Tmp. The eroded shaley interbed localizes a few cavities, or small voids along the northwest part of the bluff, and localizes the undercut section of the bluff (Figures 3 and 4). Photo mosaic Figure 4 shows the relationship of the eroded interbed to the position of the recessed bench (at base of the staircase), and to the localization of the undercut area where the eroded, and mechanically weak, shaley interbed intersects the tidal zone (approximately mean high tide line). Photo mosaic Figure 4 also shows the relationship of the resistant concretionary zone to formation of a relatively stable roof of the undercut. Photo mosaic Figure 5 is a pan across the entire 100 feet of bluff with a perspective looking southeast from the northwest corner of the bluff. This perspective shows that most of the eroded shaley interbed within unit Tmp lies above wave base.

Photo mosaic Figure 6 is a pan across the entire bluff with a perspective looking northwest from the southeast corner of the bluff. This perspective shows that the southwest (near) part of the bluff is approximately vertical in grade, with the undercut area deepening gradually from the southwest to the northeast. The scalloped and relatively shallow penetration of the undercut indicates that it is a fairly youthful, or incipient bluff erosion feature. Because the erosion that causes the undercut is focused along the thin (about 10 inches thick) zone of opaline shales within unit Tmp, and the formation dips into the bluff at about 12 to 14 degrees, the erosion is mostly progressing northeastward. The presence of a few, hard, dolomitic concretions are now protecting the northeast part of the undercut from advancing unimpeded.

The overlying marine terrace deposits (Qt) are very susceptible to surface water erosion and wave erosion because of their poorly to moderately consolidated nature. Indications of springs both in these deposits and along bedding planes within units Tms contribute to weathering of the terrace materials and contribute slightly to the process of erosion along the

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bluff face. A bedding plane controlled zone of seeps and springs occurs within unit Tms at the 8 foot elevation at the southeast end, and slopes upward to the 22 foot elevation at the intersection with the staircase (horizontal positions 10 - 15 feet) where it intersects the overlying marine terrace deposits (Qt). Springs are localized along the edges of the staircase where the water-bearing zone in Tms intersects the terrace deposits. This zone of springs and seeps do not contribute significantly to erosion and do not otherwise destabilize the bluff.

5.2 Bluff Geometry

As described above, the bluff along the site predominantly reflects a configuration characteristic of later, mature stages of bluff retreat. In addition, an undercut area currently exists along the sites central area. This is the most important feature identified in this project study, and the configuration of the proposed building setback reflects the mapped geometry of this feature.

This undercut feature indicates that primary or intermediary stages of bluff retreat are occurring on a small scale. The undercut measures about 25 linear feet along the base of the bluff. The northern portion of the corresponding overhang extends out approximately six to seven feet (horizontal position 48 feet) and narrows to about 2 feet at the southern end (horizontal position 70 feet) (Figure 3). The roof of the undercut ranges in elevation from approximately 8 to 3 feet above mean high tide. It is anticipated that failure of this portion of the bluff would result in bluff retreat into an area somewhere between the landward edge and seaward edge of the top-of-bluff, but it would be difficult to determine the time period for this occurrence. No bluff failure is imminent, and it is noted that the overhang is underlain by the competent zone of concretions. The configuration of the building setback (Figure 2) accommodates the measured position of the undercut under the seaward edge of the top-of-bluff, and the anticipated narrow-width (about six to seven feet) of bluff failure that may impact the bluff in future decades.

A secondary small undercut (three feet deep) occurs under the base of the staircase. Above this small undercut, a line of small cavities along the eroded shaley interbed in unit Tmp could result in future failure of a small part of the bluff along the lower reaches of the staircase. Such a failure would not result in an undercut of the northwest part of the bluff because the bluff is not vertical in this area and slopes eastward at between 70 to 80 percent. This consideration does not affect the computation of the building setback, but access to the beach could be affected if erosion of the lower part of the bluff results in undermining and failure of the lower part of the staircase.

5.3 Wave Action

Erosion from direct wave action is the primary mechanism of bluff retreat for sites with rock bluffs and thin or absent alluvial cover. In addition, impact from wave-borne projectiles such as cobbles and small boulders strike the base of the bluff during strong storms and high tides, fracturing and dislodging materials from the bluff. Under normal conditions, the primary zone affected by the wave action will be the base of the bluff in the tidal zone up to a vertical height of 5 to a maximum of 10 feet above sea level. The anticipated maximum wave height would be 8 to 10 feet above the base of the bluff. Therefore, the interbedded opaline siltstones, sandstones, and porcelanite of unit Tmp of the Monterey Formation would be the primary geologic unit impacted by wave action. Occaisional high waves may erode unit Tms

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near the south part of the bluff during winter storms, although this area currently shows little or no undercutting. Wave action would have maximum impact when periods of highest tides and large storms were coincident.

The marine terrace deposits on the bluff are relatively thin and at a sufficient elevation above the beach grade, such that wave run-up will not have a significant impact on these materials.

5.4 Coastal Configuration

The predominant wave direction along the Central California coastline is from the northwest. These waves are generated by storms in the North Pacific from winds occurring within the "Aleutian Low". These waves generally have the greatest amplitude and impact on the coastal region of the site when compared to waves from the south.

The coastline in the vicinity of the site faces west-southwest. The waves coming from the northwest are partially refracted from Point Buchon and Point San Luis in this vicinity. The existing outcrops of the Monterey Formation extend out in to the ocean in a stepped configuration and act to function as a natural barrier to dissipate wave energy. The refracted waves would strike of break over these barriers in an oblique direction and oblique to the bluff. However, it is likely that these outcrops would also be submerged at times when high tides and winter storms are coincident.

Waves generated from infrequent tropical storms in the South Pacific Ocean will have minimal to moderate impact on the site. The coastline trends east-west from Point San Luis towards the Shell Beach area. The area between these locations, known as Avila Bay, is significantly impacted by waves originating in the south. The site, however is located in a transitional area between this portion of the coast and where the coastline maintains a northwest-southwest direction along the southern Shell Beach and Pismo Beach areas. From a regional standpoint, the natural barriers provided by Point Sal and Point Conception generally refract and absorb the impact of swells generated by the storms in the South Pacific Ocean. The natural barrier formed by dipping beds of the Monterey Formation could also provide protection, but waves would impact at an angle close to perpendicular to the trend of the bedrock and could be directed nearly perpendicular to the bluff. It is therefore likely that the infrequent, subtropical-generated, southwest swell impacts the sites bluff and causes erosion. A small gap in the protective tidal rock outcrops facing southwest probably allows the southwest swell and infrequent storm waves to impact the bluff. Otherwise, the bluff is well protected from the more frequent and typically larger northwest storm waves.

6.0 BLUFF RETREAT

Based upon field observation, pertinent literature, and other bluff stability studies in the area, a bluff retreat rate of 6 to 12 inches per year is assumed for the marine terrace deposits, and 4 inches for the shaley beds of the Monterey Formation. It should be noted that the assumed bluff retreat rates are considered an "average," whereas in nature, erosional process are often episodic and irregular. Short- term (yearly) bluff retreat rates may vary significantly from the long-term average. Due to the predominance of the interbedded opaline siltstone, sandstone, and hard porcelanite of unit Tmp of the Monterey Formation in the tidal zone of the bluff, which are somewhat harder than the more shaley units in the formation, and the anticipated wave run-up height, a bluff

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setback was established using a retreat rate of four inches per year.

7.0 CONCLUSIONS

In its present condition, the bluff at the site appears to be actively retreating at an average rate of 4 inches per year. This information is based on our review of a San Luis Obispo County Parcel Map of Lot 5, Block 16, Tract Number 57, El Pismo Manor Number 1, dated August, 1950, and from the geologic reconnaissance. Based on a typical 75-year lifespan of use for the residence, and a retreat rate of four inches per year, a 25-foot setback measured from the top-of -bluff, and depth of undercutting landward of the top-of-bluff is required for this property. The top of the marine terrace deposits should be considered as the top-of-bluff for planning purposes at the present time, with a slight additional setback measured from the landward margin of the undercut. The locations of the top-of- bluff, as well as the undercut section are shown on Figure 2. Additionally, building foundation setbacks from the top of the bluff should be in accordance with soils engineering criteria.

In order to reduce bluff retreat, foot traffic should be directed away from the bluff. Any man-made coastal access structures, such as stairways, should be designed and built to maintain the stability of the bluff, as is currently the case.

8.0 CLOSURE

This report is valid for conditions as they exist at this time for the type of development described herein. The investigation was performed in a manner consistent with the level of care and skill ordinarily exercised by members of the profession currently practicing in the locality of this project under similar conditions. No other representation, warranty, or guarantee, either expressed or implied, is made.

If changes with respect to development type or location become necessary, if items not addressed in this report are incorporated into plans, or if any of the assumptions stated in this report are not correct, this firm shall be notified for modifications to this report.

If you have any questions please contact the undersigned at (805) 543-5493

Sincerely

GEO SOURCE INC

Gary Mann
Project Geologist
RG 6589

Gary M. Mann

REGISTERED GEOLOGIST
GARY M. MANN
No. 6589
exp. 5/98
STATE OF CALIFORNIA

Ron Church
Senior Engineer
GE 2184

REGISTERED PROFESSIONAL ENGINEER
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STATE OF CALIFORNIA

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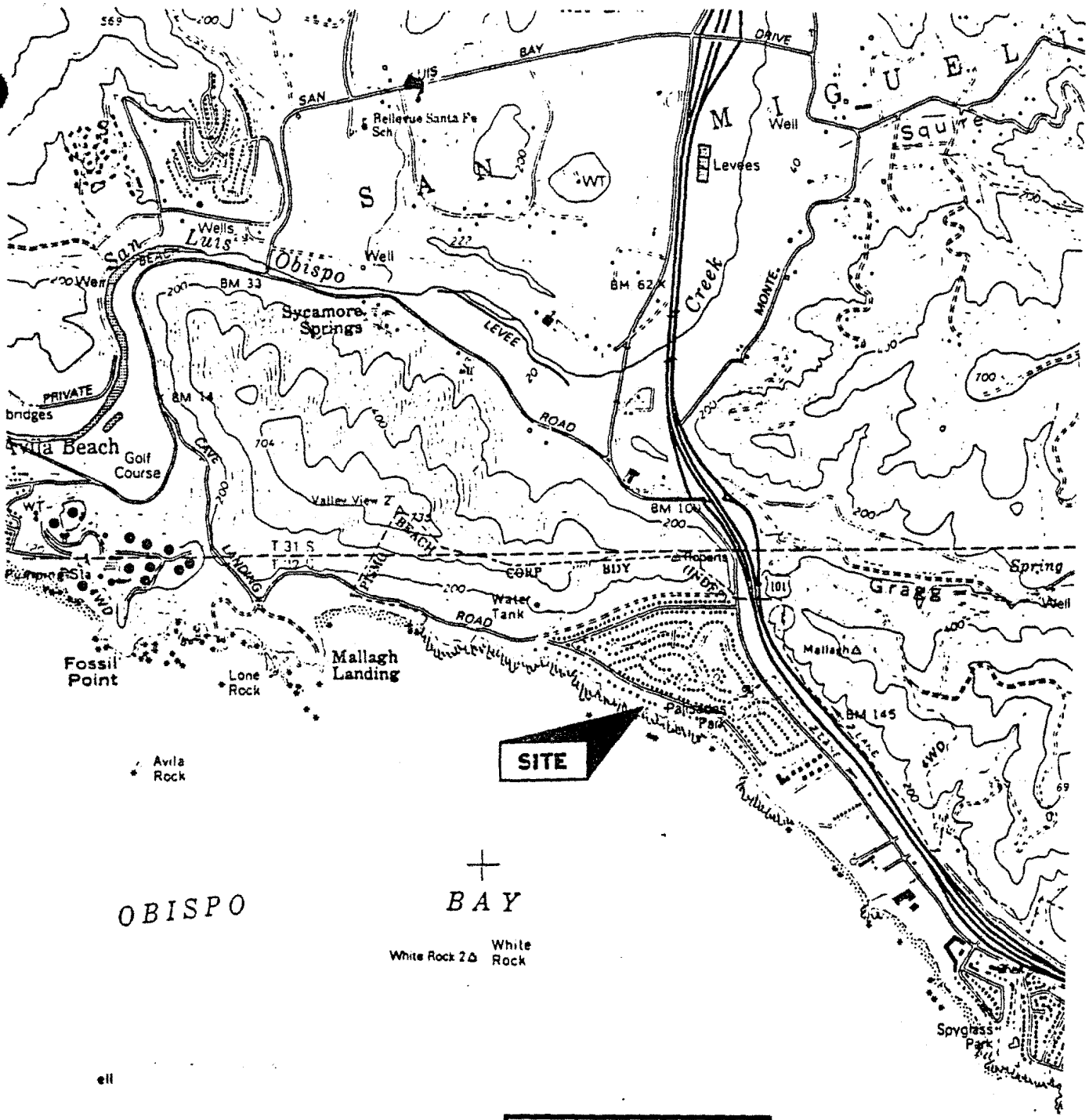

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GEO SOURCE INC

SITE LOCATION MAP
ZANINOVICH RESIDENCE
307 INDIO DRIVE
SHELL BEACH, CALIFORNIA

Project No.	Figure No.
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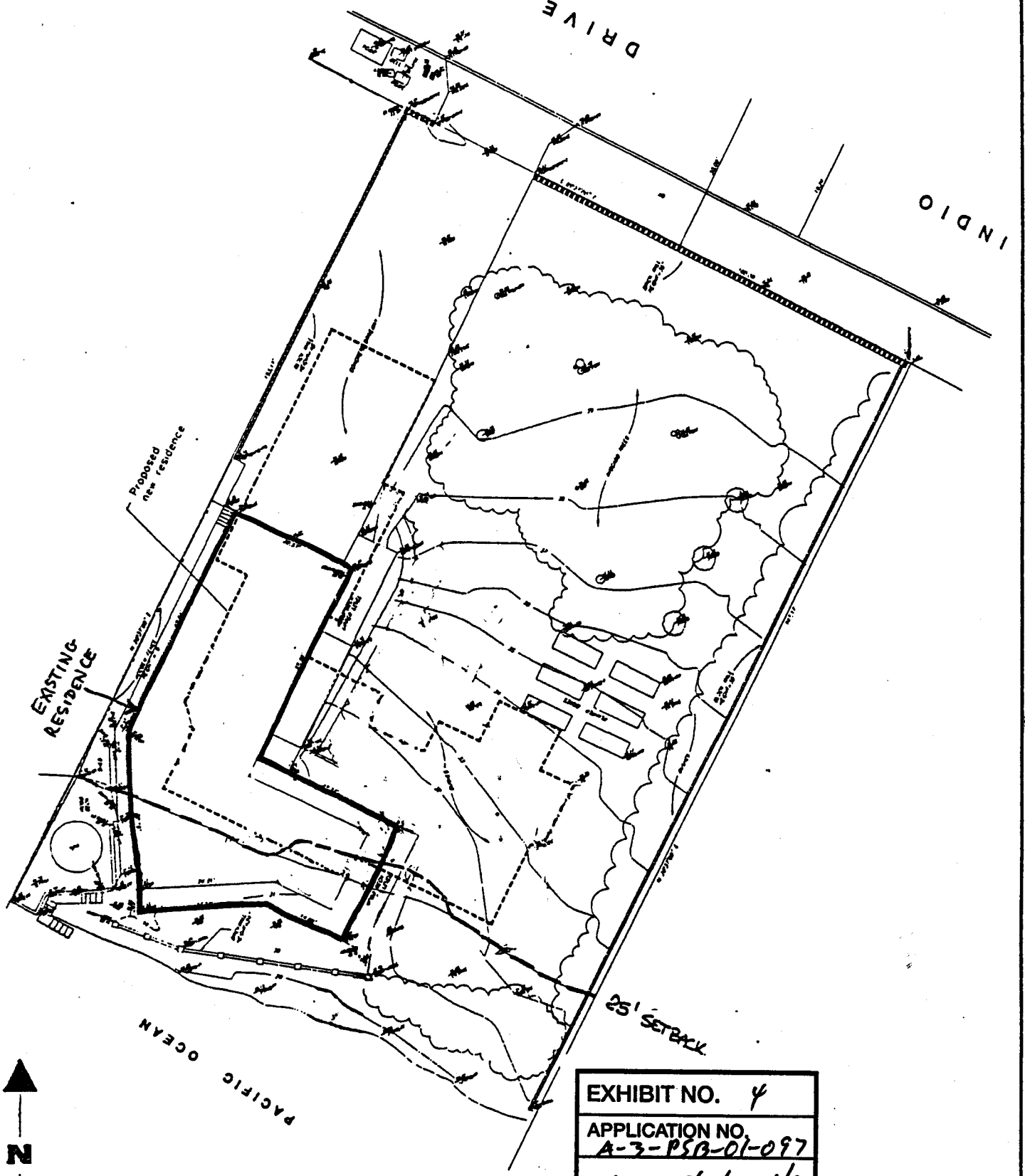

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GEO SOURCE INC

SITE PLAN
ZANINOVICH RESIDENCE
307 INDIO DRIVE
SHELL BEACH, CALIFORNIA

Project No.	Figure No.
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LEGEND

Qt - QUATERNARY AGE MARINE TERRACE - Clayey sand with gravels near base.

Tm - TERTIARY (MIOCENE) AGE MONTEREY FORMATION - Tms — Interbedded opaline shale and siltstone, 1/2"-2" thick. Tmp — Interbedded opaline siltstone, sandstone, and porcelanite, 1"-4" thick. Contains resistant dolomitic lenticular concretions (con.).

▼ SPRINGS AND SEEPS - Fracture and lithology controlled.

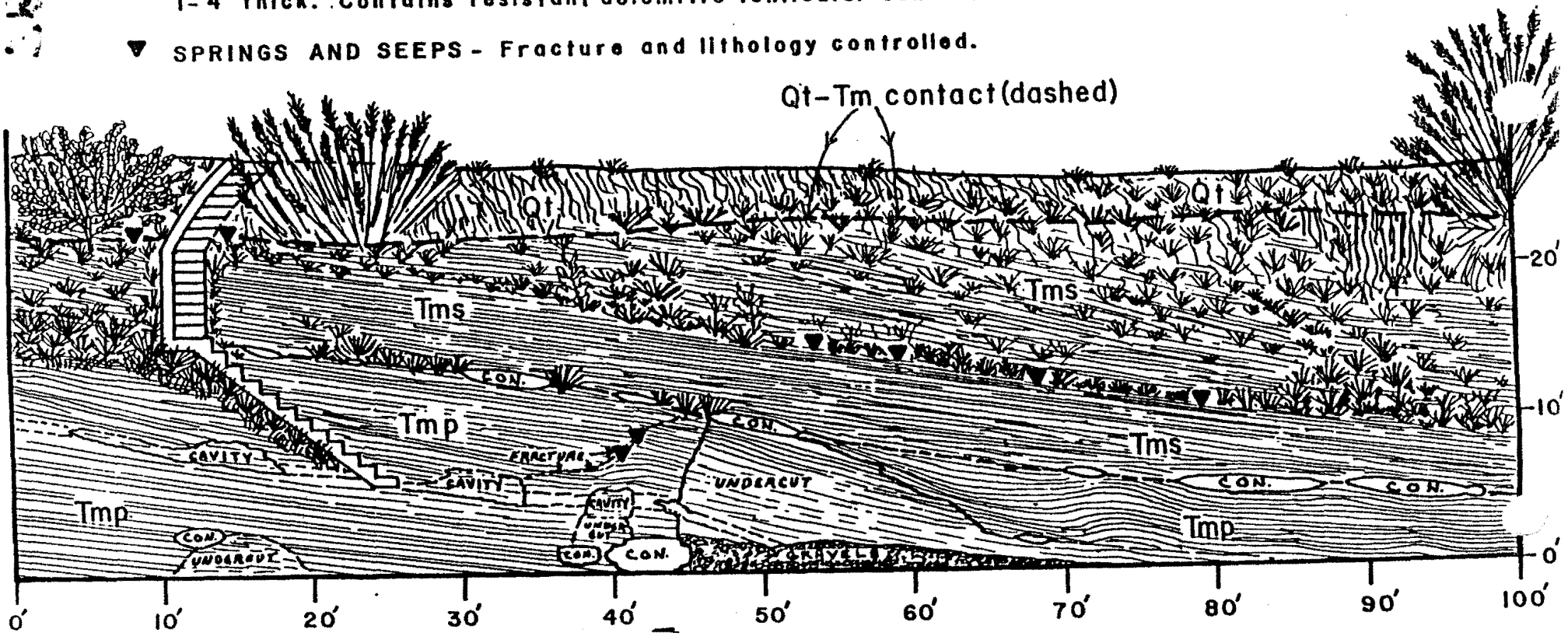

FIGURE 3
GEOLOGIC MAP OF BLUFF
ZANINOVICH RESIDENCE
307 INDIO DRIVE
PISMO BEACH, CALIFORNIA

SCALE: 1 INCH = 10 FEET

GEO SOURCE, INC.

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GEO SOURCE INC

Santa Maria Office: 2320-D Thompson Way, Santa Maria, Ca 93455, ph 349-0140, fax 349-8861
SLO Office: 141 Suburban Road, Suite D-1, San Luis Obispo, Ca 93401, ph 543-5493, fax 543-2748

September 29, 1998
Project 97-S032

Antone Zaninovich
c/o Tom Reay - Architect
780 Caudill
San Luis Obispo, California 93401

Subject: Bluff Setback
307 Indio Drive
Shell Beach, California

Ref: 1) Geologic Bluff Study, 307 Indio Drive, Shell Beach, California by Geo Source Inc., dated November 29, 1997, Project 97-S032.

2) Application Completeness/Review - Project #98-120, Coastal Development Permit & Architectural Review (307 Indio Drive) by Cannon & Associates, dated August 14, 1998.

Dear Antone:

This addendum provides clarification of the retreat rate and setback distance at the above noted project. The retreat rate provided in Reference 1 was presented as a specific value when a range of values would have been more representative. The rates measured varied from less than 3 inches to approximately 4 inches per year depending on the materials encountered and the wave action. We selected the more liberal rate of 4-inches per year to reflect the erosional characteristics of the surface Quaternary Terrace deposits. However, these Quaternary Terrace deposits are of minor thickness and are covered with vegetation indicating they are stable. In addition, the rate was calculated from the base of the undercut rather than the seaward edge of the top of the bluff. If the rate was recalculated using the seaward edge, the retreat rate would be less than 3-inches per year.

In conclusion, since the site has only a minor amount the higher retreat rate materials and the majority of the bluff is composed of erosion resistant units of the Monterey Formation a bluff retreat rate of 3-inches per year would be a more applicable rate to establish the setback distance.

We appreciate the opportunity to have been of service. If you require additional assistance, please do not hesitate to contact me at (805) 543-5493.

Sincerely,
GEO SOURCE INC.

R. J. Church

Ron J. Church
Senior Engineer
GE #2184

EXHIBIT NO. 5
APPLICATION NO. A-3-PSB-01-09
Geology Addendum
September 1998

Earth Systems Pacific

4378 Santa Fe Road
San Luis Obispo, CA 93401-8116
(805) 544-3276 • FAX (805) 544-1786
E-mail: esc@earthsys.com

March 23, 2001

FILE NO.: SL-12242-SA

Antoine and Katharine Zaninovich
311 Road 148
Delano, CA 93215

PROJECT: ZANOVICH RESIDENCE
301 INDIO DRIVE
SHELL BEACH, CALIFORNIA

SUBJECT: Soils Engineering Report

REF: Proposal for a Soils Engineering Investigation and Bluff Retreat Report, Zaninovich Residence, 307 Indio Drive, Shell Beach, California, by Earth Systems Pacific, dated August 17, 2000, Doc. No.: 0008-202.PRP

Dear Mr. and Mrs. Zaninovich:

In accordance with your authorization of the referenced proposal, this soils engineering report has been prepared for use in the design of the project and in the development of plans and specifications. Preliminary geotechnical recommendations for site preparation, grading, utility trenches, foundations, slabs-on-grade and exterior flatwork, retaining walls, and drainage around improvements are presented herein. Two copies of this report are provided for your use; per your request, four additional copies have been forwarded to Mr. Steve Puglisi, Architect.

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

Sincerely,

Earth Systems Pacific

Dennis Shallenberger, G.E.

REGISTERED PROFESSIONAL ENGINEER
DENNIS C. SHALLENBERGER
No. GE 2158
Exp. 12/31/01
GEOTECHNICAL
STATE OF CALIFORNIA

3/23/01
Date Signed

Copy to: Steve Puglisi, Architect (4)

Doc. No.: 0101-005.SER

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(page 1 **of** 53 **pages)**
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Appendices

1.0 INTRODUCTION

The construction of a multi-level single-family residence is proposed for 307 Indio Drive in Shell Beach, California. The residence that currently occupies the property will be demolished, and a new residence constructed in approximately the same location. The portion of the residence adjacent to the ocean bluff will be two stories, with the lower level at approximately the same finish floor elevation as the existing residence. A retaining wall will be constructed, and the remainder of the residence will be single story, constructed at grade behind the retaining wall. It is our understanding that the structure will be primarily of conventional stud construction, with continuous and spread footings in combination with drilled caissons, and concrete slabs-on-grade and/or raised wood floors. Poured-in-place concrete or masonry will be used for the retaining wall that will be part of the structure. Minor site walls, also assumed to be of masonry construction, may be constructed as part of the project. Except for wall backfill and removal of large trees, grading is anticipated to be minimal.

For the purposes of this report, maximum loads on continuous foundations of 2 klf and maximum loads on isolated footings of 15 kips were assumed. The maximum height of the retaining wall is expected to be 8 feet. The residence will be served by the local utilities.

A bluff setback study was prepared for the site by this firm, the report of which is presented under separate cover.

2.0 SCOPE OF SERVICES

The scope of work for the soils engineering report included a general site reconnaissance, field exploration, laboratory testing of soil samples, and geotechnical analysis of data. The

analysis and subsequent recommendations were based upon preliminary information provided by the client's representative, Mr. Steve Puglisi, Architect.

This report and recommendations are intended to comply with the considerations of Sections 1804.2 through 1804.5, and 3309.5 of the Uniform Building Code (UBC), 1997 edition as amended by pertinent sections of Title 24 of the California Code of Regulations, and standard soils engineering practice. The test procedures were accomplished in general conformance with the standards noted, as modified by standard soils engineering practice in this area.

Preliminary geotechnical recommendations for site preparation, grading, utility trenches foundations, slabs-on-grade and exterior flat work, retaining walls, and drainage around improvements are presented to guide the design of the project and the development of project plans and specifications. As there are many geotechnical issues yet to be resolved on this project, this firm should be retained to provide consultation during the design phase, and to review final project plans to assist in verifying that pertinent geotechnical issues have been addressed and to aid in conformance with the intent of this report.

It is our intent that this report be used exclusively by the client to form the geotechnical basis of the design of the project and in the preparation of plans and specifications. Application beyond this intent is strictly at the user's risk. If future property owners wish to use this report, such use will be allowed to the extent the report is applicable, only if the user agrees to be bound by the same contractual conditions as the original client, or contractual conditions that may be applicable at the time of the report use.

This report does not address issues in the domain of contractors such as, but not limited to, site safety, loss of volume due to stripping of the site, shrinkage of fill soils during compaction, excavatability, dewatering, shoring, temporary slope angles, construction methods, etc. Analyses of the site's geology and soil for corrosivity, radioisotopes, hydrocarbons, or chemical properties are beyond the scope of this report. Ancillary structures

such as access roads, fences, flagpoles, signage, and nonstructural fills are not within our scope and are also not addressed.

The preliminary geotechnical recommendations contained in this report are based on the premise that irrigated landscaping or flatwork will be installed for a zone of at least 5 feet around the structure to ensure that the foundation soils remain in a moist condition throughout the life of the project. If xeroscaping or other forms of drought tolerant landscaping, or if open, non-irrigated areas will lie near the structure, the recommendations contained in this report may require modification.

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

3.0 SITE DESCRIPTION

The site is on the southwest side of Indio Drive, in the community of Shell Beach, California. The surrounding district is residential. The property lies on a bluff, with the Pacific Ocean lying to the southwest. The ground surface slopes gently toward the bluff at a grade of about 5 percent. The bluff is approximately 26 to 28 feet high. At the time of investigation, the 100-foot by 150-foot property was occupied by a residence and a driveway that provided access from Indio Drive. A patio was present between the residence and the edge of the bluff. Vegetation consisted of shrubs, and a stand of avocado trees in the northeast portion of the site.

4.0 FIELD AND LABORATORY INVESTIGATION

On November 1, 2000, three borings were drilled at the site using a Mobile Drill rig, Model B-24, equipped with a 4-inch diameter solid stem auger. The approximate locations of the borings are shown on the Boring Location Map in Appendix A.

Soils encountered in the borings were categorized and logged in general accordance with the Unified Soil Classification System and ASTM D 2488-93. Logs of the borings can also be found in Appendix A. As the borings were drilled, standard penetration tests were performed (ASTM D 1586-84/92) and soil sampling was by means of a ring-lined barrel sampler (ASTM D 3550-84/95 with shoe similar to D 2937-94). Bulk soil samples were also obtained from the auger cuttings.

The ring samples were tested for unit weight and moisture (ASTM D 2973-94, as modified for ring liners). The maximum density and optimum moisture content (ASTM D 1557-91) and the expansion index (ASTM D 4829-95) of a sample were determined. Two samples were tested to assess their unconfined compression strength (ASTM D 2166-91). Results of the laboratory tests are presented in Appendix B.

5.0 GENERAL SOIL PROFILE

The overburden soil in the locations drilled consisted of black sandy fat clay. The sandy fat clay contained abundant fine to coarse-grained shale fragments. The soil was generally of a stiff consistency, although soft conditions were observed below a depth of 2 feet in Boring 2. Caliche deposits were observed at a depth of 5 feet in Boring 1, and a zone of wet, gravelly soil was encountered at depths of 6 and 5 feet in Borings 1 and 2 respectively. At depths of 3.5 to 7 feet, shale bedrock of the Monterey formation was encountered.. The highly weathered shale was light gray and in a soft to moderately hard condition.

At the time of drilling, the upper soils were in a moist to very moist condition. As mentioned above, free subsurface water was encountered in Borings 1 and 2, perched above the bedrock at depths of 6 and 5 feet, respectively.

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6.0 CONCLUSIONS

In our opinion, the site is suitable, from a geotechnical standpoint, for the proposed residence, provided the recommendations contained herein are implemented in the design and construction.

From a geotechnical standpoint, the primary concerns at the site are the potential for differential settlement, the expansive nature of the soil, and the potential for subsurface water seepage.

Shale (rock) was encountered at depths of 3.5 to 7 feet. This creates a potential for differential settlement. Differential settlement occurs when a foundation of a building spans two materials having different settlement characteristics, such as soil and rock. The soil-supported portion of the building will settle more than the rock-supported portion. This situation that can stress and possibly damage foundations, often resulting in severe cracks and displacement. To reduce this potential, it is necessary for all foundations to bear in sufficiently uniform material. This may involve: 1) extending all foundations to bear in rock, or 2) overexcavating the rock beneath footings and replacing it with compacted soil. For this project, foundations bearing entirely in rock are recommended. Rock will provide firmer and more uniform support for the residence, and this type of foundation system will not involve significant disturbance of the soil, which is not desirable near an ocean bluff. In addition, conducting an earthwork program could be difficult due to the subsurface water, and from a construction standpoint, extending foundations to rock would probably be easier. Deepened footings should be anticipated for the lower level as the rock is estimated to lie at a depth of 3 to 4 feet below pad elevation. For the upper level, caissons drilled into the rock should be used as the rock is estimated to lie at about elevation 31, which is assumed to be approximately 8 feet below proposed grade.

An expansion index test performed upon a sample of the upper sandy fat clay soil produced a value of 79. This value places the soil in the "medium" expansion category, per UBC Table 18-I-B. Expansive soils tend to swell with seasonal increases in soil moisture and shrink during the dry season as soil moisture decreases. The volume changes that the soils undergo

in this cyclical pattern can stress and damage slabs and foundations if precautionary measures are not incorporated in design and in the construction procedure.

Methods commonly used for slab protection include placement of nonexpansive material beneath the slab or premoistening of subslab soils. Premoistening is not recommended for this site due to its bluff-top location. Also, use of nonexpansive material generally results in a more uniform slab with less tendency toward random cracking.

The recommendations for mitigation of expansive soils as described above reflect methods that are commonly used in this area at this time. There are a number of other options available, including use of post-tensioned slab foundations, conventionally reinforced mat foundations, or use of deep, nonexpansive pads. As these solutions are typically not as cost-effective at this time as the methods discussed above, they are not addressed in this report. The economics of these options may, however, change with time, or specific solutions may be applicable for specific situations at the subject site. If discussion of other options is desired, this firm can be retained for additional consultation.

Another concern is the potential for subsurface water. Free subsurface water was encountered in two of the borings, perched above the bedrock. The site was drilled in November, however, following several months of little or no rainfall. It is assumed that a slab with a minimum 8-inch thickened edge will abut the bottom of the planned retaining wall between the floors, and that the retaining wall drain will extend about 8 inches below slab elevation. Provided that the retaining wall drain extends to approximately this level, no subslab drain should be necessary. Provisions should be made, however, to allow free drainage of accumulated water from behind retaining walls.

The soils are highly erodible and caution must be exercised to control surface runoff. Soils should be graded to properly drain away from improvements and should be stabilized during and after construction, by vegetation or other means. No runoff should be allowed to flow over the bluff top in an uncontrolled manner.

In view of the shallow depth to bedrock and the clayey nature of the overburden soil, the potential for liquefaction is considered to be negligible.

7.0 PRELIMINARY GEOTECHNICAL RECOMMENDATIONS

The preliminary recommendations contained in this report are based on the premise that irrigated landscaping or flatwork will be installed for a zone of at least 5 feet around the structure to ensure that the foundation soils remain in a moist condition throughout the life of the project. If xeroscaping or other forms of drought tolerant landscaping, or if open, non-irrigated areas will lie within 5 feet of the structure, the preliminary recommendations contained in this report may require modification.

Site Preparation

1. The ground surface should be prepared for grading by removing all vegetation, large roots, existing foundations, debris, and other deleterious materials. Existing utility lines that will not be serving the new structure should be either removed or properly abandoned. The appropriate method of utility abandonment will depend upon the type and depth of the utility and location relative to the bluff face. Recommendations for abandonment can be made as necessary.

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

Grading

1. Where soil is exposed in the slab areas, it should be removed to allow for the placement of a minimum of 18 inches of nonexpansive material. The upper 18-inch zone below bottom of slabs overlying should consist entirely of nonexpansive imported material. If rock is exposed at the surface in slab areas, it should be removed to allow for the placement of a minimum of 12 inches of nonexpansive material. The

upper 12-inch zone below bottom of slabs overlying in situ rock should consist entirely of nonexpansive imported material.

2. Nonexpansive materials are defined as being coarse grained (ASTM D 2488-93) and having an expansion index of 10 or less (ASTM D 4829-95). The nonexpansive imported material soil should be placed in level lifts not exceeding 8 inches, moisture conditioned and compacted. Prior to placing nonexpansive materials, in situ soil moisture should be at least optimum, and no desiccation cracks should be present. Nonexpansive soil should be moisture conditioned to at least optimum moisture content prior to compaction.

3. Prior to placing nonexpansive material, and in other areas where fill is to be placed or where surface improvements are to be constructed, the *soil* should be scarified to a minimum depth of 1 foot, moisture conditioned to at least optimum moisture content and recompacted. Scarification of in situ rock is not necessary.

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

5. All materials used as fill should be cleaned of any rocks, debris, and irreducible material larger than 3 inches in diameter. When fill material includes rocks, the rocks should be placed in a sufficient soil matrix to ensure that voids caused by nesting of the rocks will not occur and that the fill can be properly compacted.

6. Fill soils should be placed in level lifts not exceeding 8-inches, moisture conditioned to at least optimum moisture content and compacted to a minimum of 90 percent of maximum dry density. The upper 1-foot of subgrade and all aggregate base in areas to be paved with asphalt concrete (AC) or Portland cement concrete (PCC) pavement

should be compacted to a minimum of 95 percent of the maximum dry density. Subgrade and aggregate base should be firm and unyielding when proofrolled with heavy, rubber-tired grading equipment prior to continuing construction. The standard test used to define maximum dry density and field density should be ASTM D 1557-91, ASTM D 2922-91, respectively, or other methods acceptable to the soils engineer and jurisdiction.

Utility Trenches

1. A select, noncorrosive, granular, easily compacted material should be used as bedding and shading immediately around utilities. With the exception of large rocks, the soil found at the site may be used for trench backfill above the select material. If obtaining compaction is difficult with the site soils, use of a well graded sand may be desirable as trench backfill.

2. In general, trench backfill should be compacted to a minimum of 90 percent of maximum dry density. A minimum of 95 percent of maximum dry density, however, should be obtained where trench backfill comprises the upper 1 foot of subgrade beneath AC or PCC, and in all aggregate base. A minimum of 85 percent of maximum dry density will generally be sufficient where trench backfill is located in landscaped or other unimproved areas.

3. Jetting of the trench backfill should not be allowed due to the presence of bedrock, the clayey nature of the soil, and the slope of the site.

Foundations

Conventional Footings

1. Continuous and spread footings should penetrate rock a minimum of 12 inches, with minimum overall depths per UBC requirements for the number of stories supported. Spread footings should be 24 inches square. For vertically loaded footings, a 2-sack sand cement slurry may be used to extend from planned bottom of footing elevation

into the rock. Slurry should not be used beneath retaining wall footings or other footings with long-term lateral loads. The slurry should be lightly vibrated as it is placed.

2. Continuous footings should be reinforced, at a minimum, by one No. 4 bar top and bottom, or as required by the architect/engineer. Reinforcing for spread footings is left to the discretion of the architect/engineer.

3. Footings should be designed using maximum allowable bearing capacities of 2,000 psf dead load and 3,000 psf dead plus live loads.

Caisson Foundations

1. Where the rock is deeper relative to proposed grade, it may be more cost effective to utilize caissons rather than conventional footings to extend foundations into the rock (e.g. the single story part of the residence above the main retaining wall). In this area, drilled, cast-in-place caissons connected by grade beams may be used.

2. The caissons should have a minimum diameter of 18 inches and should extend a minimum depth of 4 feet into sound rock. They should not be constructed closer than three diameters (clear span) to each other without approval from this firm.

3. An allowable skin friction value of 1,000 psf should be assumed for the rock; no end bearing capacity should be used in the calculations.

4. The caissons should be connected by grade beams so that the foundation acts as an integral unit. The grade beams should have a minimum depth of 21 inches below lowest adjacent grade.

5. The upper soils may not stand vertically during the caisson construction operations. Casing, drill fluid, or other means of keeping the holes open could be necessary.

6. Depending on the location of the caissons and the weather conditions at and preceding the time of construction, subsurface water could be encountered during the caisson drilling operation. Therefore, caisson reinforcing should be designed to accommodate a minimum 5-inch diameter tremie pipe. Any water encountered should be removed from the hole prior to placing concrete, or the concrete should be tremied. Appendix C contains a description of the recommended tremie method.

7. As caissons will utilize skin friction for support, it is not necessary to thoroughly clean the bottoms of the excavations, although excessive loose debris and slough material should be removed. As stated earlier, use of end-bearing capacity is not recommended.

8. Concrete used in caissons should be placed at a slump between 4 and 6 inches in dry excavations and between 6 and 8 inches when placed under water.

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

10. Caisson excavations should be observed by this firm during drilling operations. Special inspection should be provided during reinforcing steel and concrete placement if water is encountered in the excavations.

Foundations, General

1. Using the above criteria, maximum total and differential settlement of foundations are expected to be minimal.

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

Seismic Source	San Luis Range (South Margin)
Distance to Seismic Source	<2 km
Seismic Zone	4
Seismic Zone Factor (UBC Table 16-I)	0.4
Seismic Source Type (UBC Table 16-U)	B
Soil Profile Type (UBC Table 16-J)	S_c
Seismic Coefficient-C_a (UBC Table 16-Q)	0.52
Seismic Coefficient-C_v (UBC Table 16-R)	0.90
Near Source Factor-N_a (UBC Table 16-S)	1.3
Near Source Factor-N_v (UBC Table 16-T)	1.6

5. Lateral loads may be resisted by friction and by passive resistance of the soil and rock acting on foundations. Lateral capacity is based on the assumption that backfill adjacent to foundations is properly compacted. A passive equivalent fluid pressure of 300 pcf for *soil* and 500 pcf for *rock* may be used. A coefficient of friction of 0.50 may be used for the rock.

6. Foundation excavations, including caisson excavations, should be observed by this firm during excavation, and prior to placing reinforcing steel or formwork. Rock exposed in continuous and spread foundation excavations should be lightly moistened prior to concrete placement.

Slabs-on-Grade and Exterior Flatwork

1. Slabs should have a minimum thickness of 4 full inches and should be reinforced, at a minimum, with No. 3 bars at 24 inches on center each way. At a minimum, slabs should be doweled to the footings and gradebeams by No. 3 bars at 24 inch spacing, or as per the requirements of the architect/engineer.

2. The lower level slab should be thickened to at least 8 inches where it abuts the main retaining wall. This will allow the top of the slab to be a minimum of 8 inches above the top of the heal of the wall footing so that proper drainage can be maintained.

3. A minimum of 4 inches of clean sand should be provided as a cushion directly beneath all slabs where moisture vapor transmitted from the soil would be undesirable. Clean sand is defined as a sand (ASTM D 2488-93) of which less than 3 percent passes the No. 200 sieve. The clean sand is considered to be part of the 12- or 18-inch layer of nonexpansive material recommended under Grading, not in addition to it.

4. A vapor barrier placed at the middle of the clean sand is recommended to reduce the potential for infiltration of subsurface moisture vapor through the slab. Specification of the type and thickness of the vapor barrier is left to the architect/engineer.

5. The vapor barrier should be placed a minimum of 1 inch higher than the flow line of the drainage path surrounding the structure, or 1 inch higher than the area drain grates if area drains are used to collect runoff around the structure. Where a slab will abut a retaining wall, the vapor barrier should be placed a minimum of 2 inches higher than the invert of the retaining wall drain. Care should be taken to properly lap and seal the barrier, particularly around utilities, and to protect it from damage during construction.

6. If desired, vapor-inhibiting admixtures to the concrete may be used in lieu of a vapor barrier, provided that they are used in accordance with the manufacturer's recommendations.

7. In conventional construction, it is common to use 4 to 6 inches of sand beneath exterior flatwork. At this site, however, due to the expansive soil, there is a risk of

movement and damage to such flatwork if conventional measures are used. Heaving and cracking are likely to occur. This movement could be reduced by the placement of a minimum 12- to 18-inch thick layer of compacted, nonexpansive material over any exposed clay soils. The thicker the nonexpansive layer, the better the protection from damage to the flatwork. Prior to placement of the nonexpansive material, the soil in the flatwork area should be moistened to at least optimum moisture content and no desiccation cracks should be present. The flatwork should be designed to be independent of building foundations. The flatwork should not be doweled to the foundations and a felt or other separator should be placed between the two.

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

9. The slab cushion (or nonexpansive material) beneath all slabs (exterior flatwork) should be lightly moistened prior to concrete placement.

Retaining Walls

1. Retaining walls that are part of or are rigidly connected to the residence should be founded in undisturbed rock; site walls may be founded in rock or soil. Footings should penetrate the rock a minimum of 12 inches or soil a minimum of 24 inches (not including keyways). If the foundation for a site wall will span from soil to rock, a construction joint should be placed in the wall at the transition point.

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

Active equivalent fluid pressure (native soil backfill)	60 pcf
Active equivalent fluid pressure (imported sand or gravel backfill)	35 pcf
At rest equivalent fluid pressure (native soil backfill)	75 pcf
At-rest equivalent fluid pressure (imported sand or gravel backfill)	50 pcf
Passive equivalent fluid pressure (soil)	300 pcf
Passive equivalent fluid pressure (undisturbed rock)	500 pcf
Maximum toe pressure (soil)	1,000 psf
Maximum toe pressure (undisturbed rock)	3,000 psf
Coefficient of sliding friction (soil)	0.35
Coefficient of sliding friction (undisturbed rock)	0.50

3. No surcharges are taken into consideration in the above values. The maximum toe pressures are *allowable* values; all others are ultimate values that will require application of appropriate factors of safety by the architect/engineer.

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

5. If the equivalent fluid pressures for sand or gravel backfill are used in the design, sand or gravel backfill should be exclusively utilized above a 1:1 plane from the base of the wall to 1 foot from daylight. The upper foot of backfill should be native soil, except in areas where PCC or AC will abut the top of the wall. In such cases, the sand or gravel backfill should extend to the sand cushion or the aggregate base.

6. All retaining walls should be drained with perforated pipe encased in a free draining gravel blanket. The pipe should be placed perforations downward and should discharge in a nonerosive manner away from foundations and other improvements. The gravel blanket should have a width of approximately 1 foot and should extend upward to approximately 1 foot from the top of the wall. The upper foot should be

backfilled with native soil, except in areas where PCC or AC will abut the top of the wall. In such cases, the gravel should extend to the sand cushion or the aggregate base. To reduce infiltration of the soil into the gravel, a permeable synthetic fabric conforming to Caltrans Standard Specifications, Section 88-1.03 for under drains, should be placed between the gravel and backfill or native soil. Manufactured synthetic drains such as Miradrain or Enkadrain are acceptable alternatives to the use of gravel, provided that they are installed in accordance with the recommendations of the manufacturer.

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

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

9. It is assumed that retaining walls that form part of the residence will not exceed 8 feet in height; site walls will not exceed 5 feet in height.

Drainage Around Improvements

1. Unpaved ground surfaces should be *graded during construction,* and *finish graded* to direct surface runoff away from the bluff top, foundations, retaining walls, and other improvements at a minimum 2 percent grade for a minimum distance of 5 feet. Where this is not practicable due to terrain, proximity to existing improvements, etc., swales

with improved surfaces, area drains, etc., should be used to collect and discharge runoff.

2. Subfloor areas (beneath raised wood floors) should be graded to slope to a series of low points. Area drains should be installed at the low points to collect and discharge water that accumulates in the subfloor area.

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

4. The eaves of all structures should be fitted with roof gutters. Runoff from driveways, roof gutters, downspouts, planter drains and other improvements should discharge in a nonerosive manner away from improvements in accordance with the requirements of the governing agencies.

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

8.0 OBSERVATION AND TESTING

It must be recognized that the preliminary recommendations contained in this report are based on a limited number of borings and rely on continuity of the subsurface conditions encountered. It is assumed that this firm will be retained to provide consultation during the design phase, to review final plans once they are available, to interpret this report during construction, and to provide construction monitoring in the form of testing and observation. At a minimum, the following items should be reviewed, tested, or observed by this firm:

- Final plans
- Stripping and clearing of vegetation, foundations debris,
- Recompaction of scarified soil,
- Fill quality, placement and compaction, including nonexpansive material,
- Retaining wall drains and backfill,
- Foundation excavations, including caisson excavations,
- Special inspection of caisson rebar and concrete placement (if water encountered).

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

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

9.0 CLOSURE

Our intent was to perform the investigation in a manner consistent with the level of care and skill ordinarily exercised by members of the profession currently practicing in the locality of this project under and under the same time constraints and similar conditions. No representation, warranty, or guarantee is either expressed or implied. This report is intended for the exclusive use by the client as discussed in the Scope of Services section. Application beyond the stated intent is strictly at the user's risk.

This report is valid for conditions as they exist at this time for the type of project described herein. The conclusions and recommendations contained in this report could be rendered invalid, either in whole or in part, due to changes in building codes, regulations, standards of

geotechnical or construction practice; changes in physical conditions, or the broadening of knowledge.

If changes with respect to development type or location become necessary, if items not addressed in this report are incorporated into plans, or if any of the assumptions used in the preparation of this report are not correct, this firm shall be notified for modifications to this report. Any items not specifically addressed in this report should comply with the Uniform Building Code and the requirements of the governing jurisdiction.

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

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

End of Text

APPENDIX A

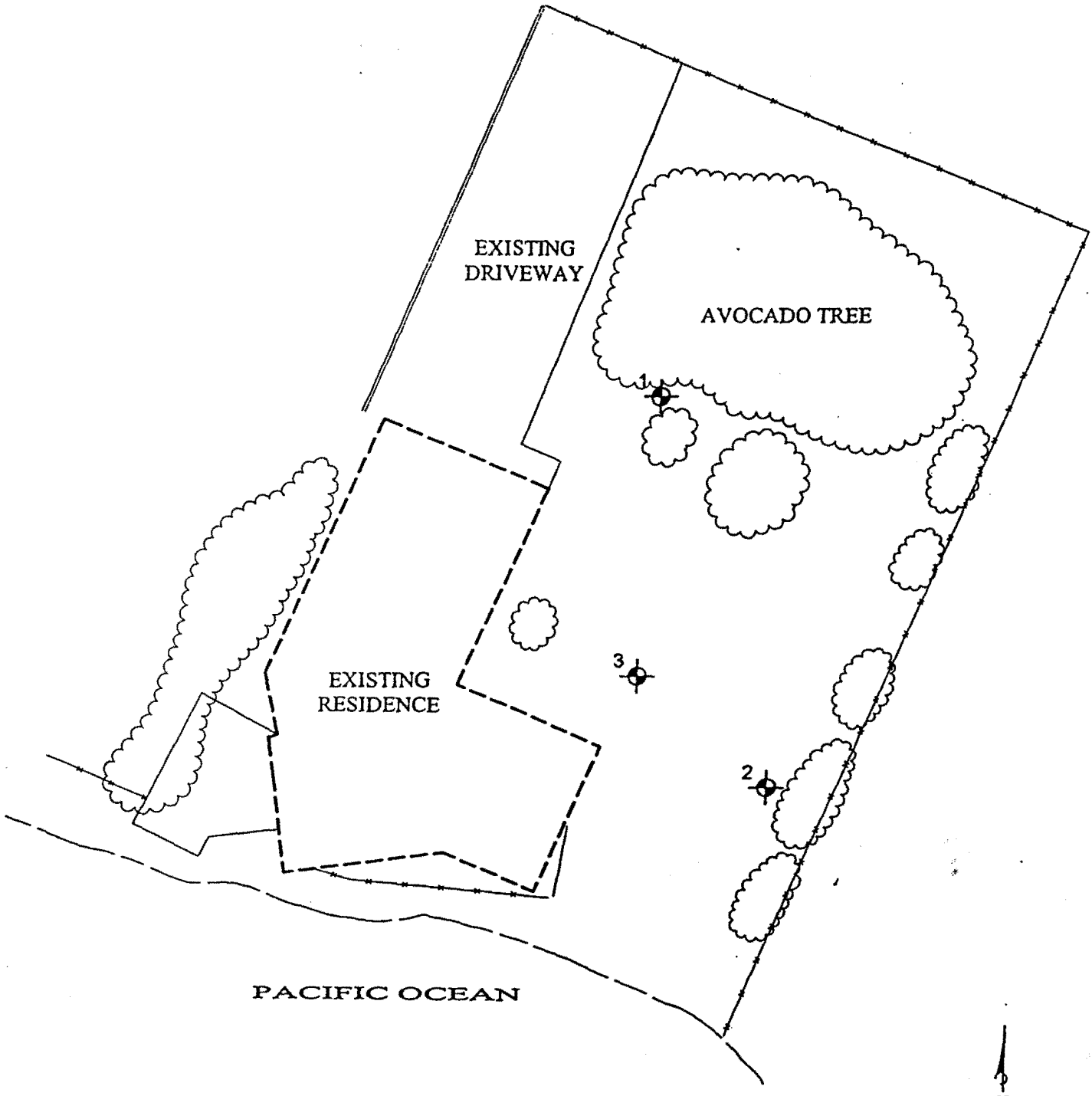
Boring Location Map

Boring Logs

BORING LOCATION MAP

ZANINOVICH RESIDENCE

307 Indio Drive
Shell Beach, California



CCC Exhibit 6
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2C-47

SCALE: 1" = 25'

Earth Systems Pacific
4378 Santa Fe Road
San Luis Obispo, CA 93401-8116
(805) 544-3276 • FAX (805) 544-1786
E-mail: esc@earthsys.com

March 3, 2001

EC

SL-12242-SA

Earth Systems Pacific

Boring No. 1
PAGE 1 OF 1

LOGGED BY: R. Gorman
DRILL RIG: Mobile B-24
AUGER TYPE: 4" Solid Stem
Surface Elev. 38'+/- *

JOB NO.: SL-12242-SA
DATE: 11/01/00

ZANINOVICH RESIDENCE
307 Indio Drive
Shell Beach, California

DEPTH (feet)	USCS CLASS	SYMBOL	SOIL DESCRIPTION	SAMPLE DATA: INTERVAL (feet)	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.
0	CH		SANDY FAT CLAY: stiff, black, moist, abundant fine to coarse grained shale fragments (Native)	0.0–4.0	○			
2				2.0–3.5	■	95.0	22.6	7, 9, 11
5			caliche deposits	5.0–6.5	■	107.0	20.1	8, 11, 18
6			wet, with gravel ▼					
7			SHALE: soft, light gray, moist, highly weathered (Monterey Formation)					
9			moderately hard					
10			End of Boring @ 10.0'	10.0–10.1	●			50–1"
			Subsurface water encountered @ 6.0'					

CCC Exhibit 6
(page 29 of 53 pages)

* BASED ON TOPOGRAPHIC MAP BY EDA, JULY 1998

LEGEND: ■ Ring Sample ○ Grab Sample ▭ Shelby Tube Sample ● SPT

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

2C-48

Earth Systems Pacific

Boring No. 2
PAGE 1 OF 1
JOB NO.: SL-12242-SA
DATE: 11/01/00

LOGGED BY: R. Gorman
DRILL RIG: Mobile B-24
AUGER TYPE: 4" Solid Stem
Surface Elev. 33'+/- *

ZANINOVICH RESIDENCE
307 Indio Drive
Shell Beach, California

DEPTH (feet)	USCS CLASS	SYMBOL	SOIL DESCRIPTION	SAMPLE DATA: INTERVAL (feet)	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.
0	CH		SANDY FAT CLAY: stiff, black, moist, few fine to coarse grained shale fragments (Native)					6
1								
2				2.0–3.5	■	NO RETURN		5 5
3			soft, very moist					
4								4
5			wet, with gravel	5.0–6.5	■	81.2	41.0	4 20
6			SHALE: soft, light gray, moist, highly weathered (Monterey Formation)					
7			End of Boring @ 6.5'					
8			Subsurface water encountered @ 5.0'					
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
21								
22								
23								
24								
25								
26			* BASED ON TOPOGRAPHIC MAP BY EDA, JULY 1998					

CCC Exhibit 6
(page 25 of 53 pages)

LEGEND: ■ Ring Sample ○ Grab Sample ▭ Shelby Tube Sample ● SPT

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

2C-49

Earth Systems Pacific

Boring No. 3
PAGE 1 OF 1

LOGGED BY: R. Gorman
DRILL RIG: Mobile B-24
AUGER TYPE: 4" Solid Stem
Surface Elev. 34'+/- *

JOB NO.: SL-12242-SA
DATE: 11/01/00

ZANINOVICH RESIDENCE
307 Indio Drive
Shell Beach, California

DEPTH (feet)	USCS CLASS	SYMBOL	SOIL DESCRIPTION	SAMPLE DATA: INTERVAL (feet)	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.
0	CH		SANDY FAT CLAY: stiff, black, moist, few fine to coarse grained shale fragments (Native)	2.0–3.5	●			3, 6, 8
4			SHALE: soft, light gray, moist, highly weathered (Monterey Formation)	4.0–5.0	●			10, 11, 11
6			End of Boring @ 5.5' No subsurface water encountered					

CCC Exhibit 6
(page 26 of 53 pages)

* BASED ON TOPOGRAPHIC MAP BY EDA, JULY 1998

LEGEND: ■ Ring Sample ○ Grab Sample ▭ Shelby Tube Sample ● SPT

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

2-5c

APPENDIX B

Laboratory Test Results

BULK DENSITY TEST RESULTS

ASTM D 2937-94 (modified for ring liners)

November 9, 2000

BORING NO.	DEPTH feet	MOISTURE CONTENT, %	WET DENSITY, pcf	DRY DENSITY, pcf
1	3.0 - 3.5	22.6	116.4	95.0
1	6.0 - 6.5	20.1	128.5	107.0
2	6.0 - 6.5	41.0	114.4	81.2

EXPANSION INDEX TEST RESULTS

ASTM D 4829-95

BORING NO.	DEPTH feet	EXPANSION INDEX
1	0.0 - 4.0	79

ZANINOVICH RESIDENCE

SL-12242-SA

MAXIMUM DENSITY / OPTIMUM MOISTURE

ASTM D 1557-91 (Modified)

November 9, 2000

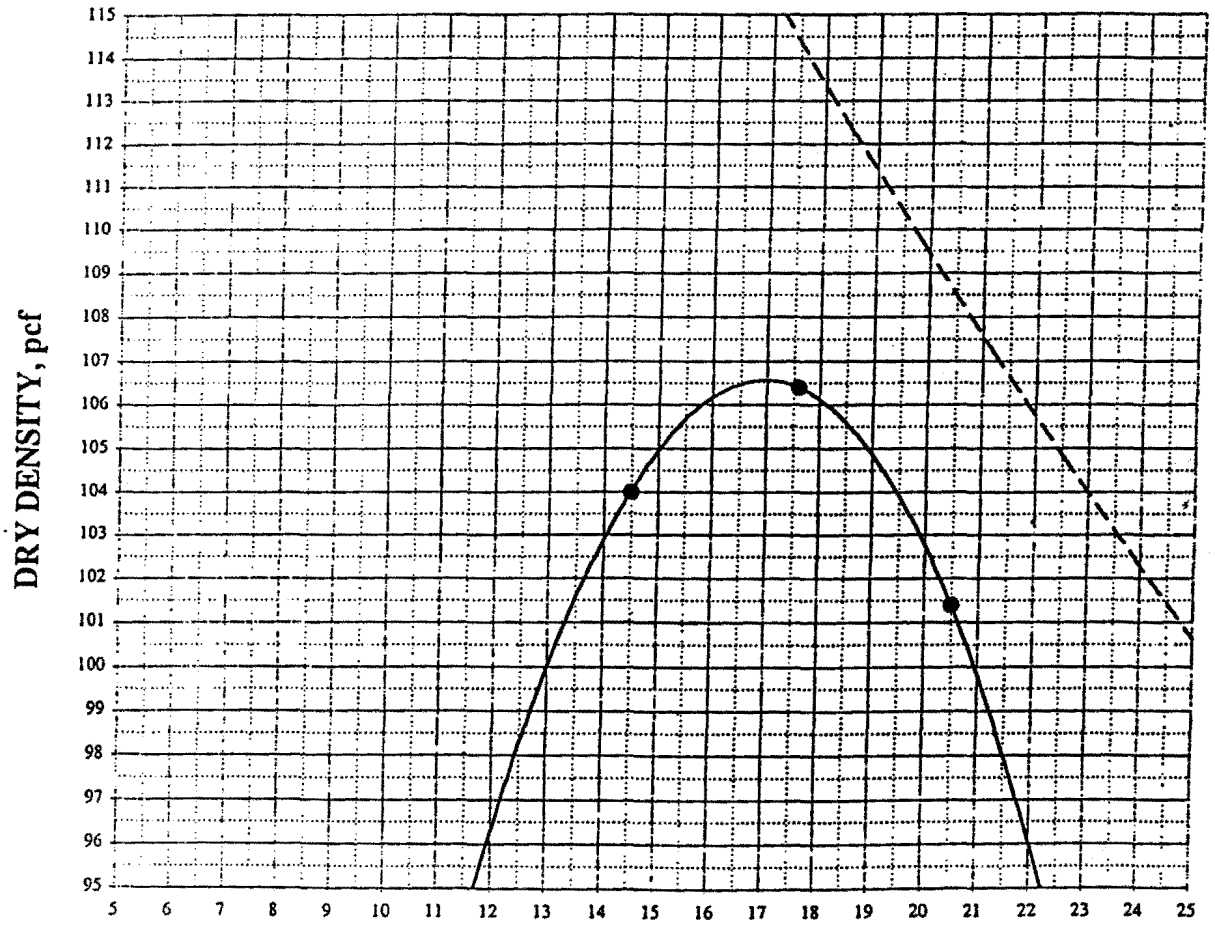
Boring #1 @ 0.0 - 4.0'
Black Sandy Fat Clay (CH)

MAXIMUM DENSITY: 106.5 pcf
OPTIMUM MOISTURE: 17.0%

SIEVE DATA:

Sieve Size	% Retained
3/4"	0
3/8"	0
#4	1

PROCEDURE USED: A
PREPARATION METHOD: Dry
RAMMER TYPE: Mechanical
SPECIFIC GRAVITY: 2.70 (assumed)



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2C-53

ZANINOVICH RESIDENCE

SL-12242-S

UNCONFINED COMPRESSION ON COHESIVE SOIL

ASTM D 2166-91

November 9, 2000

Boring #1 @ 3.0 - 3.5'
Black Sandy Fat Clay (CH)
Ring Sample
COMPRESSIVE STRENGTH: 39 psi (5,566 psf)

Dry Density: 95.0 pcf
Moisture Content: 22.6%
Degree Saturation: 78.9%
Specific Gravity: 2.70 (assumed)
H/D Ratio: 1.68

TIME (MINUTES)	DEFORM, in (X 1000)	AXIAL STRAIN	AREA (SQ. IN.)	APPLIED LOAD (LBS)	STRENGTH (PSI)	STRENGTH (PSF)
0.5	32	0.0080	4.47	37	8	1,193
1.0	70	0.0175	4.51	99	22	3,162
1.5	96	0.0240	4.54	120	26	3,807
2.0	128	0.0320	4.58	144	31	4,531
2.5	160	0.0400	4.61	158	34	4,930
3.0	194	0.0485	4.66	169	36	5,227
3.5	226	0.0565	4.70	177	38	5,428
4.0	257	0.0643	4.73	183	39	5,566
4.5	291	0.0728	4.78	184	39	5,546
5.0	232	0.0580	4.70	181	38	5,542
5.5	355	0.0888	4.86	167	34	4,947
6.0	390	0.0975	4.91	136	28	3,990
6.5	420	0.1050	4.95	122	25	3,549
7.0	453	0.1133	5.00	117	23	3,372
7.5	484	0.1210	5.04	114	23	3,257
8.0						
8.5						
9.0						
9.5						
10.0						
10.5						
11.0						
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12.0						
12.5						
13.0						
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ZANINOVICH RESIDENCE

SL-12242-SA

UNCONFINED COMPRESSION ON COHESIVE SOIL

ASTM D 2166-91

November 9, 2000

Boring #1 @ 6.0 - 6.5'
Black Sandy Fat Clay (CH)
Ring Sample
COMPRESSIVE STRENGTH: 13 psi (1,913 psf)

Dry Density: 107.0 pcf
Moisture Content: 20.1%
Degree Saturation: 94.5%
Specific Gravity: 2.70 (assumed)
H/D Ratio: 1.68

TIME (MINUTES)	DEFORM, in (X 1000)	AXIAL STRAIN	AREA (SQ. IN.)	APPLIED LOAD (LBS)	STRENGTH (PSI)	STRENGTH (PSF)
0.5	44	0.0110	4.48	36	8	1,157
1.0	92	0.0230	4.53	58	13	1,842
1.5	140	0.0350	4.59	61	13	1,913
2.0	188	0.0470	4.65	59	13	1,828
2.5	222	0.0555	4.69	54	12	1,658
3.0	250	0.0625	4.73	51	11	1,554
3.5	280	0.0700	4.76	45	9	1,360
4.0	310	0.0775	4.80	39	8	1,169
4.5	340	0.0850	4.84	37	8	1,100
5.0	370	0.0925	4.88	33	7	973
5.5						
6.0						
6.5						
7.0						
7.5						
8.0						
8.5						
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9.5						
10.0						
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11.0						
11.5						
12.0						
12.5						
13.0						
13.5						

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APPENDIX C

Tremie Method

TREMIE METHOD FOR CAISSON (DRILLED SHAFT) FOUNDATION CONSTRUCTION

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

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

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

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

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

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

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

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

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

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

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

EXHIBIT 9

GEOLOGIC BLUFF STUDY
ZANINOVICH RESIDENCE
307 INDIO DRIVE
SHELL BEACH, CALIFORNIA

March 22, 2001

Prepared for

Antoine and Katharine Zaninovich

Prepared by

Earth Systems Pacific
4378 Santa Fe Road
San Luis Obispo, California 93401

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(page 34 of 53 pages)

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Earth Systems Pacific

4378 Santa Fe Road
San Luis Obispo, CA 93401-8116
(805) 544-3276 • FAX (805) 544-1786
E-mail: esc@earthsys.com

March 22, 2001

FILE NO.: SL-12242-SA

Antoine and Katharine Zaninovich
311 Road 148
Delano, CA 93215

PROJECT: ZANINOVICH RESIDENCE
307 INDIO DRIVE
SHELL BEACH, CALIFORNIA

SUBJECT: Geologic Bluff Study

REF: Proposal for Soils Engineering Report and Bluff Retreat by Earth Systems Pacific, dated August 17, 2000, Doc. No.: 0008-0202.PRP

Dear Mr. & Mrs. Zaninovich:

In accordance with your authorization of the referenced proposal, this study has been prepared to evaluate the geologic bluff conditions and to recommend a bluff top building setback for the above project site. This study includes the results of our site reconnaissance and research, and our conclusions and recommendations. We are including two copies of this report for your use, and, per your request, we have sent four additional copies to Steve Puglisi, Architect.

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

Sincerely,

Earth Systems Pacific

Richard T. Gorman
Certified Engineering Geologist

REGISTERED GEOLOGIST
RICHARD T. GORMAN
No. CEG 1325
CERTIFIED
ENGINEERING
GEOLOGIST
STATE OF CALIFORNIA

mr

Copy to: Mr. Steve Puglisi, Architect (4)

Doc. No.: 0103-013.RPT

CCC Exhibit 6
(page 35 of 53 pages)

2C-59

Earth Systems Pacific
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1.0 INTRODUCTION

Planned Development

The construction of a single-family residence is proposed for 307 Indio Drive in Shell Beach, California. The residence that currently occupies the property will be demolished, and a new residence constructed in approximately the same location. The portion of the residence adjacent to the bluff will be two stories, with the lower level at approximately the same finish floor elevation as the existing residence. A retaining wall will be constructed, and the remainder of the residence will be single story, constructed at grade.

Purpose and Scope of Work

The purpose of this study was to evaluate the on-site geologic structure, stratigraphy, and geomorphology (landforms) that would influence bluff retreat and stability, and to recommend a bluff top building setback for a 100-year design life. This study encompassed the following work:

1. Review of geologic maps and reports pertinent to the area.

2. Geologic reconnaissance and mapping of features observable at the ground surface across the subject site.

3. Analysis of the accumulated data.

4. Bluff Top Retreat Photograph Analysis by Golden State Aerial Surveys, Inc. (November, 2000).

5. Preparation of this report with associated graphics. This report is intended to be in accordance with the requirements of the City of Pismo Beach, as presented in Section 17.078.050, Bluff Hazard, Erosion and Bluff Retreat Criteria and Standards.

2.0 SITE CONDITIONS

The site is located on the southwestern side of Indio Drive in Shell Beach, California. It is rectangular shaped and approximately 150 feet long and 100 feet wide, see Site Vicinity Map in Appendix A. The site is bounded to the southeast and northwest by existing residences, to southwest by an ocean bluff and to the northeast by Indio Drive. A two-story residence occupies the southwestern part of the site. A patio and retaining wall lie between the bluff top and residence. A stairway providing access to the beach is present on the northwestern part of the site. The site slopes gently to the southwest (toward the bluff top) at an approximate slope of 5 percent. Mature avocado trees are present in the northeastern part of the site.

The southwest property boundary occupies 100 feet of ocean bluff frontage. The northwest margin of the bluff is approximately 28 feet high, sloping slightly to an approximate height of 26 feet at the southwest corner of the property. The patio lies at approximately elevation 30. The lower 20 to 25 feet or so of the bluff maintains near vertical relief, with a small undercut occurring near the center of the bluff face; the upper three to five feet of the bluff slopes back at angles of 11 to 60 degrees. The area at the base of the bluff consists of a narrow, gravelly-cobble beach. Scattered bedrock-outcrops are present in the tidal zone southwest of the site.

3.0 GEOLOGY

The site is located in the Coast Range Geomorphic Province of California. The province consists of northwest-trending mountains and valleys between the Great Valley of California and the Pacific Ocean. The project site is situated near the north terminus of a northwest-trending, wave-cut, marine terrace, which lies southeast of the San Luis Mountain Range, locally referred to as the Irish Hills. The seaward edge of the terrace is a sea cliff or bluff. The bedrock part of the bluff along the site consists of interbedded opaline (or porcelaneous) shale, siltstone, and sandstone of the Miocene age Monterey formation, which is capped by a thin veneer of Quaternary age marine terrace deposits.

The marine terrace deposits consist of black to reddish brown clay and clayey sand with occasional gravel beds occurring near the base. These deposits are generally poorly consolidated and are prone to slump or shallow planar type slope failures. They represent the upper four to six feet of the bluff. The terrace deposits are less resistant to weathering and erosion than the underlying bedrock of the Monterey formation.

Two different bedrock units within the Monterey formation were noted in the bluff face. A finely interbedded opaline shale and siltstone with an average thickness of less than 1/2 to approximately 2 inches overlies an interbedded opaline siltstone with some opaline sandstone, and porcelanite. The porcelanite is a hard, siliceous rock that was formed by the accumulation of diatom skeletons on the sea floor. The bedding dips back into the bluff approximately 12 to 14 degrees northeast, and the strike is approximately north 24 degrees west.

4.0 GEOLOGIC BLUFF CONDITIONS AND EROSION

The configuration of the bluff is primarily a function of the geologic structure and geologic units (lithology) of which it is composed. The opaline shale, siltstone, and sandstone beds of the Monterey formation in this area are relatively hard and resistant to erosion. The near vertical attitude of the bluff is a reflection of the mature stages of retreat in this type of rock. Erosion along the bluff is occurring by sloughing of the fractured and weathered, thinly interbedded rock units, and by sea wave impact. The erosion at the base of the bluff is somewhat accelerated due to the scouring affect from the gravel and cobbles carried within the sea waves as they impact the bottom of the bluff. There is an undercut area along the bottom of the bluff that has developed due to wave action and gravel and cobble scouring action, see Appendix A, Photograph. The undercut is near the center of the subject bluff, measuring about 25 linear feet along the base of the bluff. The roof of the undercut is varies from 3 to 8 feet above mean high tide, and is 6 to 7 feet deep. Eventually this undercut area will fail as a block or wedge shaped failure.

The overlying marine terrace deposits are susceptible to surface water erosion because of

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their poorly to moderately consolidated nature. Due to the elevation the terrace deposits are above sea level, it is unlikely that they would be eroded by sea waves. Springs in these deposits contribute to weathering of the terrace materials and contribute slightly to the process of erosion along the bluff face.

5.0 COASTAL CONFIGURATION

The predominant wave direction along the Central California coastline is from the northwest. These waves are generated by storms in the North Pacific from winds occurring within the Gulf of Alaska. These waves generally have a greater amplitude and impact on the region of the site than waves from the south or west.

The coastline in the vicinity of the site faces west-southwest. The waves coming from the northwest are partially refracted by Point Buchon and Point San Luis in this vicinity. Outcrops of the Monterey formation extend out in to the ocean in a stepped configuration, acting to function as a natural barrier to dissipate wave energy under most circumstances. Under most circumstances, the refracted waves strike or break on these barriers in an oblique direction and oblique to the bluff. However, it is likely that these outcrops would also be submerged at times when high tides and winter storms are coincident.

Waves generated from infrequent tropical storms in the South Pacific Ocean will have minimal to moderate impact on the site. The coastline trends east-west from Point San Luis toward the Shell Beach area. The area between these locations, known as Avila Bay, is significantly impacted by waves originating in the south. The site, however is in a transitional area between this portion of the coast and the coastline that maintains a northwest-southeast direction along the southern Shell Beach and Pismo Beach areas. From a regional standpoint, the natural barriers provided by Point Sal and Point Conception generally refract and absorb the impact of swells generated by the storms in the South Pacific Ocean. The natural barrier formed by dipping beds of the Monterey

formation could also provide protection. It is therefore likely that the infrequent, subtropical-generated, southwest swell impacts the site bluff and causes erosion.

6.0 BLUFF STABILITY

The bedrock of the Monterey formation at the site is grossly stable due to its favorable strength characteristics and bedding orientations. However, there is a potential for shallow wedge failures and sloughing due to the fractured and weathered condition of the bedrock. The undercut area appears to be in a stable condition at the present time. The undercut area will, however, eventually fail. When it does fail, it will probably result in an estimated bluff top retreat of about 5 feet. It is impossible to determine when this failure will occur. The established bluff top line and the recommended building setback have been modified to accommodate the impact to the bluff top that may occur within the next few decades, see Appendix A, Bluff Top Building Setback Map.

The terrace deposits are also considered to be grossly stable but have a potential for shallow soil slumps if the face of the bluff becomes saturated. An increase in spring flow can also decrease the surficial stability of the terrace deposits. In addition, small planar type failures may occur within the terrace deposits due to expansion cracking and erosion.

7.0 BLUFF RETREAT

It was noted during the site reconnaissance that the lower part of the bluff, where the bedrock is exposed, appears to be retreating at a normal rate compared with the adjacent bluff areas to the north and south. The large undercut feature near the center part of the subject bluff is a localized erosional condition that is mainly due to the impact of the gravel and cobbles that are contained in the sea waves that hit the base of the bluff. A secondary cause of the undercut may be the west-southwest orientation of the bluff that allows sub-tropical South Pacific storms to impact the site.

The Bluff Erosion Study for the City of Pismo Beach, prepared by Earth Systems Consultants Northern California (1992) presented an estimated bluff erosion rate in the

general area of 3 to 4 inches per year. Earth Systems Consultants Northern California (1999), also prepared a geologic bluff study for 99 Indio Drive in Shell Beach. In this study, it was estimated that a bluff retreat rate of 1 inch per year was applicable to the Monterey formation. This estimate was based on topographic survey maps that covered a 20-year period. For the current project, Golden State Aerial estimated the bluff retreat rate using air stereo photographs that covered a 35-year period from 1955 to 1990, see Appendix B. The photographs were interpreted using an IMA Analytical Stereoplotter. The results of their study indicated that the bluff retreat ranged from ½ inch per year at the western property boundary to 2 inches per year in the vicinity of the existing residence and the undercut feature. The bluff retreat rate near the eastern property boundary was estimated at 1 inch to 1.5 inches per year. Based of the Historical Bluff Top Retreat map prepared by Golden State Aerial Surveys, Inc., the top of bluff does not appear to have significantly changed during the last 10 years.

8.0 FAULTING

The Los Osos fault is the closest *active* fault to the site, located approximately 4 miles northeast. This fault is considered to be a west-northwest-trending reverse fault located on the south side of the Los Osos Valley. The Los Osos fault is divided into four segments. The most westerly segment is the Estero Bay segment that is mostly offshore. The Irish Hills segment starts in the vicinity of Los Osos and extends to just past San Luis Obispo Creek. A two-mile part of this segment west of Laguna Lake is considered to be active (Treiman, 1989), and it is designated as an Earthquake Fault Zone (Hart, 1997, revised). The subject site is located approximately 9 miles southeast of this active segment of the fault. To the southeast of the Irish Hills segment, the Los Osos fault may die out along the southwestern margin of Laguna Lake or it may bend or step right to join the Edna fault (PG&E, 1988). PG&E (1988) has renamed the Edna fault as the southeastern two segments of the Los Osos fault: the Lopez Reservoir segment and the Newsome Ridge segment. The Los Osos fault is capable of generating a maximum credible earthquake of magnitude 6.75. The recurrence interval for an earthquake of this magnitude is approximately 3,300 years (PG&E, 1988).

The offshore Hosgri fault is also an active fault, located about 14.5 miles west of the site. This fault system extends from San Simeon to an ocean shelf 2 miles east of Point Buchon, and then trends toward the Point Sal area. The Hosgri fault is a northwest trending strike-slip fault which is considered active by the U.S. Geological Survey, based on Hall's claims of recent offset terrace deposits along San Simeon Cove and also by a relocation of the 1927 "Lompoc" earthquake to the southern end of the fault (Hall, 1974, 1975, 1976, 1977). In addition, PG&E (1988) suggested that the Hosgri fault is active after reviewing seismic reflection survey data.

9.0 SEISMICITY

The site is located in a region of generally high seismicity, as is all of Central and Southern California. The site is expected to experience ground shaking from earthquakes on regional and/or local faults. Ground shaking can cause secondary seismic hazards such as seismically induced landsliding and liquefaction.

Seismically Induced Landsliding

Due to the fractured condition of the bedrock in the bluff face, there is a potential for seismically induced small wedge failures to occur. These failures would generally be confined to the bedrock part of the bluff. There is a moderate potential for soil slumps to occur in the terrace deposits of the upper part of the bluff face if the soils are saturated during a strong earthquake.

Liquefaction and Lateral Spreading

Soil liquefaction is the loss of soil strength during a significant seismic event. It occurs primarily in saturated, loose to medium-dense, fine to medium grained sands and sandy silts. Liquefaction of the soil can also induce instability of the soils on the slopes, resulting in the lateral "spreading" of the soil. Due to the presence of shallow bedrock in the bluff and adjacent to and underlying the site, the potential for liquefaction and lateral spreading to occur is essentially non-existent.

Tsunamis

Submarine faulting or submarine landsliding occurring offshore from the site may cause hazardous tsunamis along the San Luis Obispo County coastline. The historical record for San Luis Obispo County, however, does not indicate that any tsunamis have occurred which exceeded the normal tidal range (Envicom, 1975).

10.0 CONCLUSIONS AND RECOMMENDATIONS

The central part of the bluff where the existing residence and undercut feature are located appears to be eroding and retreating at a slightly faster rate than the adjacent bluff areas. This bluff area is probably experiencing more direct wave impact and erosion at the base of the bluff compared to the adjacent bluff. The undercut feature appears to be stable at this time, however, it is difficult predict when the roof of the undercut may collapse, particularly since the primary factors of erosion are related to the frequency and severity of winter storms. If the roof of the undercut did collapse within the next 5 to 10 years, it is estimated that 15 linear feet of bluff top would probably retreat about 5 feet. Therefore, we recommend that 15 feet of the established top of bluff line above the undercut be placed 5 feet landward of the more traditionally established bluff top line (see Bluff Top Building Setback Map, Appendix A).

The bluff retreat study prepared by Golden State Aerial Surveys, Inc. (November, 2000) estimated the average bluff retreat to range from ½ to 2 inches per year during the 35 year time period from 1955 to 1990. At a nearby bluff site, Earth System Consultants Northern California (1999) estimated a bluff retreat rate of 1 inch per year for the Monterey formation, while the Bluff Erosion Study for the City of Pismo Beach, also prepared by Earth Systems Consultants Northern California (1992) presented an estimated bluff erosion rate in the general area of 3 to 4 inches per year. Based on the geologic conditions observed on the bluff face of this site and the referenced bluff studies, we believe that 3 to 4 inches per year is too high for the site, and because of the presence of the undercut feature, 1 to 2 inches is probably too low. Therefore, we recommend that a bluff retreat rate of 2.5 inches per year be used for the site. For a 100-year building

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design life we recommend a minimum building setback of 25 feet from the established (modified) top of bluff, see Appendix A, Bluff Top Building Setback Map. The 25-foot setback includes a 4.2 foot buffer zone from the back edge of the setback to the proposed residence.

11.0 CLOSURE

This report is valid for conditions as they exist at this time for the type of development described herein. The study was intended to be performed in a manner consistent with the level of care and skill ordinarily exercised by members of the profession currently practicing in the locality of this project under similar conditions. No other representation, warranty, or guarantee, is either expressed or implied.

If changes with respect to project type or location become necessary, or if items not addressed in this report are incorporated into plans, this firm shall be notified for modifications to this report.

If future property owners wish to use this report, such use will be allowed to the extent the report is applicable, only if the user agrees to be bound by the same contractual conditions as the original client, or contractual conditions that may be applicable at the time of the report use.

End of Text.

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(page 45 of 53 pages)

REFERENCES

Earth Systems Consultants Northern California, Bluff Erosion Study, City of Pismo Beach, California, 1992.

Envicom, *Seismic Safety Element,* San Luis Obispo County, California, 1975.

E.W. Hart, *Fault-Rupture Hazard Zones in California,* California Division of Mines and Geology Special Publication 42, Revised 1997

C. A. Hall, "Geology of the Arroyo Grande 15' Quadrangle, San Luis Obispo County, California," *California Division of Mines and Geology, Map Sheet 24,* 1973.

PG&E, *Diablo Canyon Power Plant Long Term Seismic Program,* Pacific Gas & Electric Company (U.S. Government Document), 1988.

Golden State Aerial Surveys, Inc., Indio Drive Bluff Top, Shell Beach, November 30, 2000.

J.A. Treiman, "Fault Evaluation Report FER-200, Los Osos Fault Zone, San Luis Obispo County, California," *California Division of Mines and Geology,* 1989.

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Appendix A

Photograph

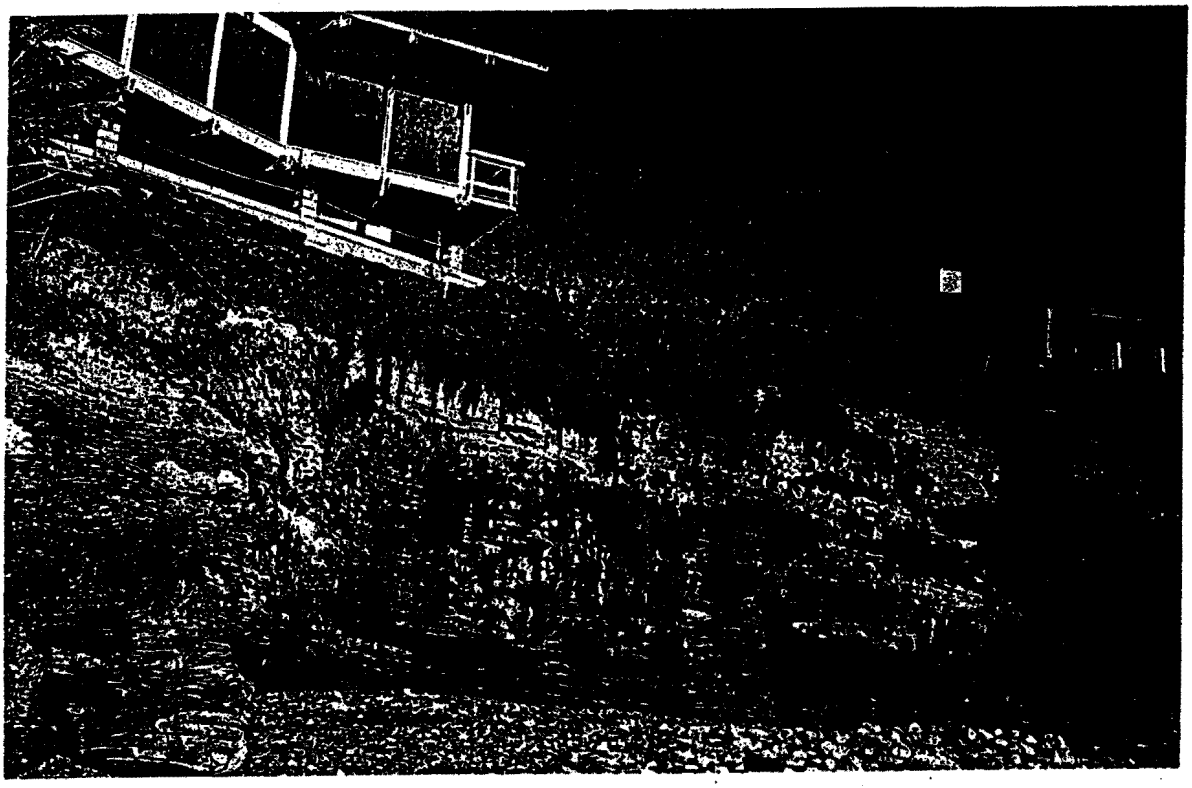
Vicinity Map

Bluff Top Building Setback Map

PHOTOGRAPH

ZANINOVICH RESIDENCE

307 Indio Drive
Shell Beach, California



Photograph: Site bluff and scalloped shaped undercut feature.

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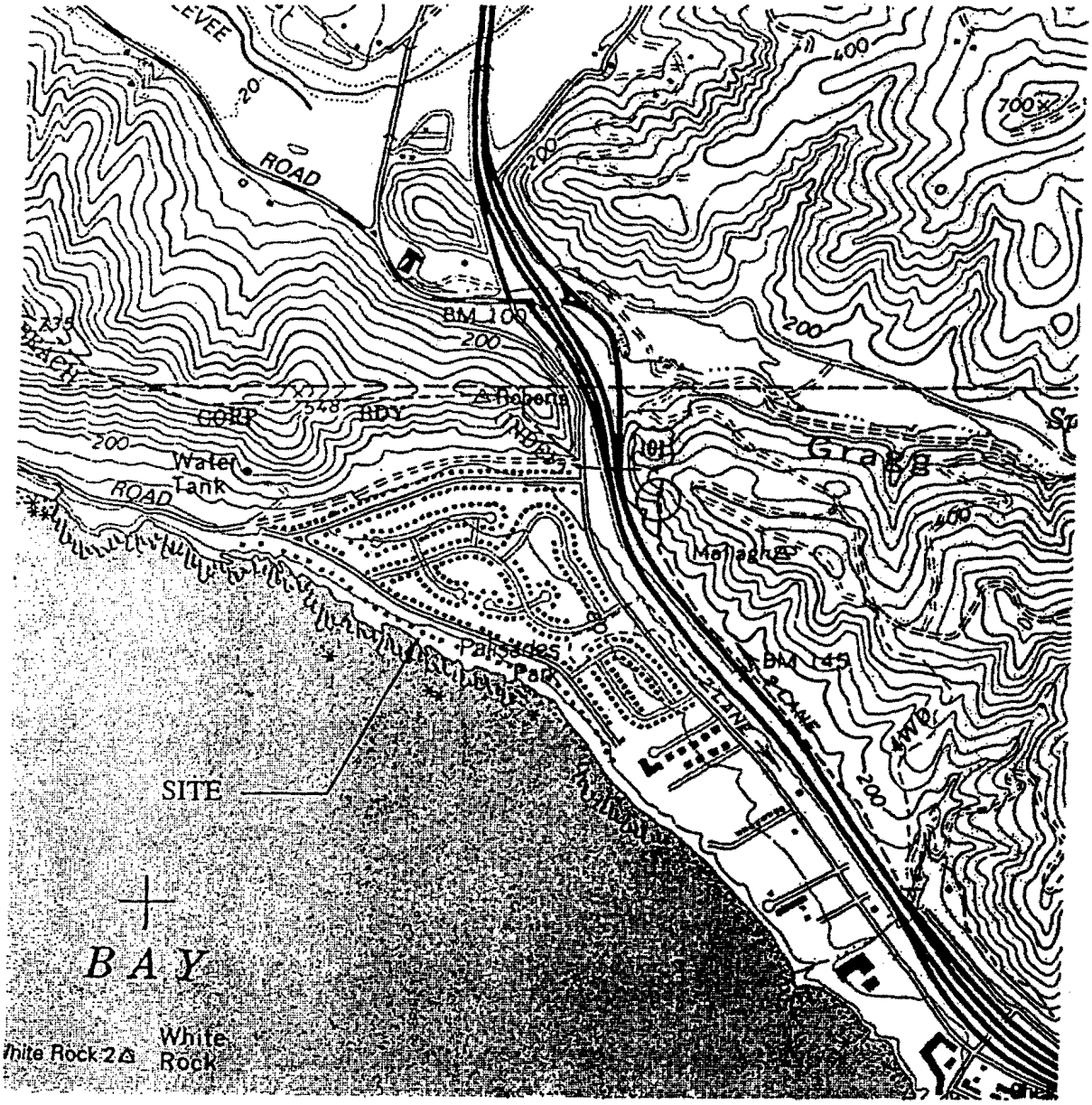
March 12, 2001 LR SL-12242-SA

VICINITY MAP

ZANINOVICH RESIDENCE

307 Indio Drive
Shell Beach, California



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NOT TO SCALE

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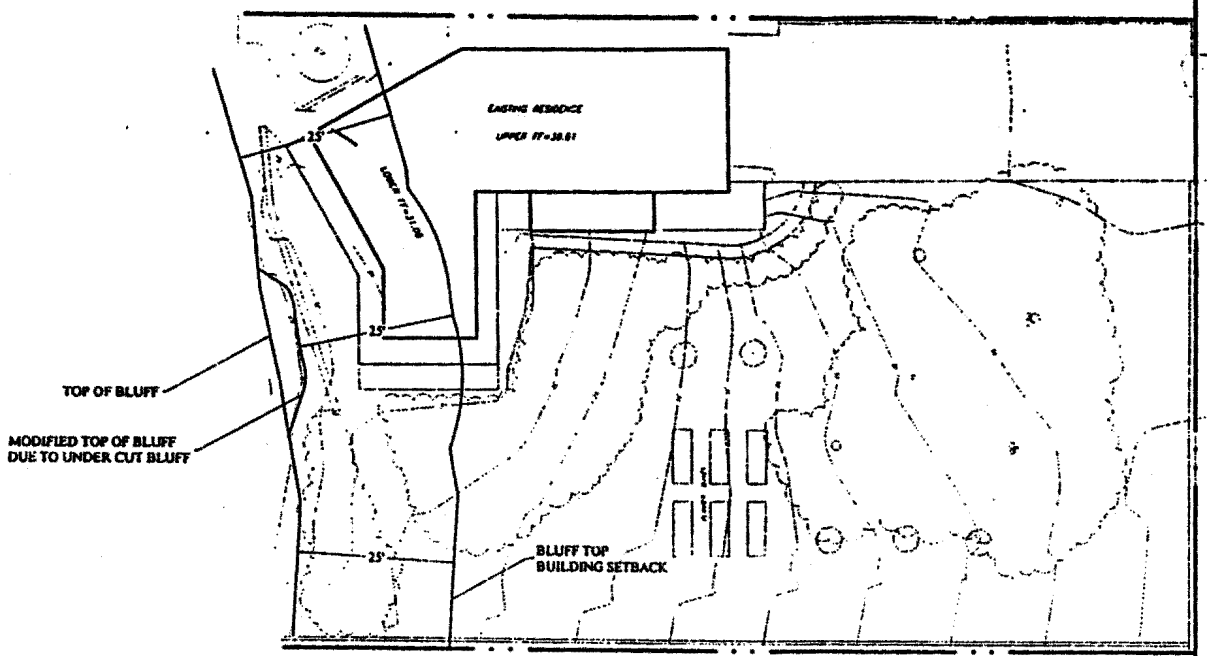
2C-7b-4



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(page 20 of 53 pages)

SCALE: 1" = 20'

BLUFFTOP BUILDING SETBACK MAP

ZANINOVICH RESIDENCE

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Shell Beach, California

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March 1, 2001 EC SL-12242-SA

Appendix B

Historical Bluff Top Retreat Map

Bluff Top Retreat Photograph Analysis Letter
by Golden State Aerial Surveys, Inc.

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(page 51 **of** 53 **pages)**

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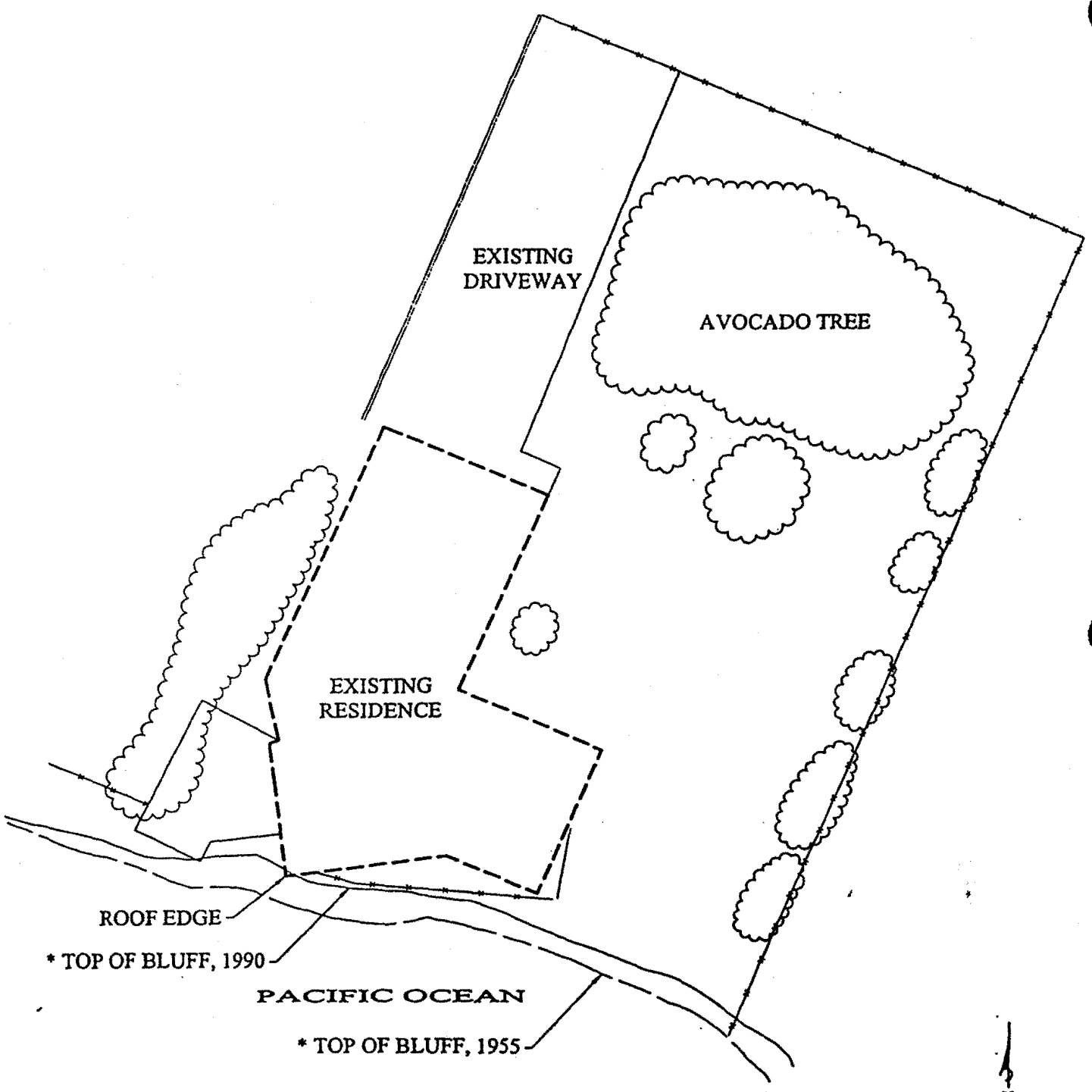
HISTORICAL BLUFF TOP RETREAT MAP

ZANINOVICH RESIDENCE

307 Indio Drive
Shell Beach, California



* TOP OF BLUFF PLOTTED BY GOLDEN STATE SURVEYS

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SCALE: 1" = 25'

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San Luis Obispo, CA 93401-8116
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E-mail: esc@earthsys.com

March 3, 2001 EC SL-12242-SA

GOLDEN STATE AERIAL SURVEYS, INC.
3195 McMillan Road, Suite E
San Luis Obispo, CA 93401
(805) 549-0399
(805) 549-8327 FAX

November 30, 2000

To: Rick Gorman
Earth Systems Consultants
5846 Santa Fe Road
San Luis Obispo, CA 93401

Subject: Indio Drive Bluff Top, Shell Beach

To determine the top of the bluff for the subject property, aerial photography taken in June of 1990 was used. The 1990 photography was taken from an altitude of approximately 1,500' above ground as part of a topographic mapping project commissioned by John L. Wallace and Associates. The photos were interpreted using an IMA Analytical Stereoplotter and the stereo model was adjusted to the ground control that was provided as part of the original project. The stereoplotter operator then plotted his interpretation of the top of the bluff.

The usage of the 1955 photography was problematic in that there was no ground control or camera calibration information available. Control was established by using the 1990 photography and identifying and plotting, in three dimensions, points in common to the two sets of photography. The average residual horizontal error (xy) for the 1955 photography was 1.27', as good as could be expected given the photogrammetric limitations of the 1955 photos. Again, the stereoplotter operator plotted his interpretation of the top of the bluff and overlaid the line on the 1990 map to show the differences, which ranged from about 2' to nearly 6' of retreat.

Sincerely,

Paul Baragona
President

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(page 53 of 53 pages)

C:\Golden State Aerial\Word Documents\earthsys - indio dr.doc

2C-78

Earth Systems Pacific

4378 Santa Fe Road
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October 22, 2001

FILE NO.: SL-12242-SA

Mr. Mike Watson
California Coastal Commission
725 Front Street
Santa Cruz, CA 95060

PROJECT: ZANINOVICH RESIDENCE
307 INDIO DRIVE
SHELL BEACH, CALIFORNIA

SUBJECT: Response to California Coastal Commission Appeal A-3-PSB-01-097

Dear Mr. Watson:

Enclosed please find a letter from our firm that was prepared in response to the California Coastal Commission Appeal A-3-PSB-01-097. We believe that the letter contains the additional information requested by the Commission, and addresses the concerns raised in the appeal. If, after review of the letter, you or your staff geologist have any questions or wish further discussion of any of the issues, we would be pleased to meet or teleconference with you at your convenience. Please feel free to contact me at (805) 544-3276.

Sincerely,

Earth Systems Pacific

REGISTERED PROFESSIONAL ENGINEER
DENNIS C. SHALLENBERGER
No. GE 2158
Exp. 12/31/01
GEOTECHNICAL
STATE OF CALIFORNIA

Dennis Shallenberger, Executive Vice President

mr

Enclosure: Earth Systems Pacific letter dated October 16, 2001

Copies to: Scott Graham, City of Pismo Beach
Steve Puglisi, Shell Beach, CA

Doc. No.: 0110-154.LTR

CCC Exhibit 7
(page 1 of 5 pages)
A-3-PSB-01-097

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OCT 2 9 2001
CALIFORNIA
COASTAL COMMISSION
CENTRAL COAST AREA

Earth Systems Pacific

4378 Santa Fe Road
San Luis Obispo, CA 93401-8116
(805) 544-3276 • FAX (805) 544-1786
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October 16, 2001

FILE NO.: SL-12242-SA

Antoine and Katharine Zaninovich
311 Road 148
Delano, CA 93215

PROJECT: ZANINOVICH RESIDENCE
307 INDIO DRIVE
SHELL BEACH, CALIFORNIA

SUBJECT: Response to California Coastal Commission Appeal A-3-PSB-01-097

REF:
1. Geologic Bluff Study, Zaninovich Residence, 307 Indio Drive, Shell Beach, California, by Earth Systems Pacific, dated March 22, 2001, Document No. 0103-013.RPT
2. Geologic Bluff Study, 307 Indio Drive, Shell Beach, California, by GeoSource, Inc., dated November 29, 1997

Dear Mr. And Mrs. Zaninovich:

At the request of Mr. Steve Puglisi, this letter has been prepared to address the issues raised in the Coastal Commission Notification of Appeal No. A-3-PSB-01-097, dated October 1, 2001. The appeal notes that the City of Pismo Beach's approval of the project was based upon a new geologic study (Reference 1, above) that presented a lesser erosion rate than a previously issued report (Reference 2), and contends that the aerial photography analysis cited in the report "has a high potential to subvert the intent of the [Land Use Plan Safety Element] policy" by using a "selective erosion rate." The appeal further states that geologic reports must consider a variety of source materials, that the erosion rate calculation should extend to the present, and questions how the differences between the two erosion rates could be scientifically accounted for.

The 1997 report was prepared by Registered Geologist Gary Mann, working in conjunction with GeoSource, Inc. Mr. Mann conducted a site reconnaissance and performed geologic mapping of the geologic units exposed in the bluff. The report states that the bluff rates indicated for the marine terrace deposits and the "shaley [sic] beds" of the Monterey formation were "assumed", based upon field observation, pertinent literature, and other bluff stability studies in the area. No study or comparison of aerial photographs was performed, no surveying was performed, and no evaluation of topographic data was conducted. The only maps cited in the list of references were a

Geologic Map of California, and a San Luis Obispo County Parcel Map dating to 1950. Parcel Maps of this type (commonly known as assessor's parcel maps) do not show topography or landmarks. Without topographic references or landmarks, the location of the top of the bluff cannot be determined. This type of map is therefore inappropriate for use in assessing bluff retreat. In short, there is no basis of comparison cited in Mr. Mann's report between the location or configuration of the blufftop at any given point in time versus another point in time. Therefore, it does not appear that an accurate, site-specific rate of bluff retreat at the subject site could possibly have been determined by Mr. Mann.

The 1997 report indicates that the bluff is composed of sedimentary rock of the Monterey formation, capped by a thin veneer of marine terrace deposits. The Monterey formation exposed in the bluff is further divided into two units. These units consist of Tms (finely interbedded opaline shales and siltstones) and Tmp (interbedded opaline siltstone, sandstone, and hard porcelanite). The Tmp unit is identified as being significantly harder and more resistant to erosion than the Tms unit. On page 4 of the report, Mr. Mann identifies direct wave action as the primary mechanism of bluff retreat at the site. He states that the harder Tmp unit would be the primary geologic unit impacted by wave action, and that only occasional high waves might erode the softer overlying Tms unit. On page 5, he states that the retreat rate for the "shaley [sic] beds" of the Monterey formation (Tms unit) is assumed to be 4 inches per year; but "due to the predominance of the interbedded opaline siltstone, sandstone, and hard porcelanite of unit Tmp of the Monterey formation in the tidal zone of the bluff, *which are somewhat harder* [emphasis added] than the more "shaley [sic]" (Tms) units in the formation, a bluff setback was established using a retreat rate of 4 inches per year." Based upon this predominance of harder rock units within the zone of wave action, it would be reasonable to conclude that a lesser retreat rate would result from these conditions, rather than the same retreat rate as what was assumed for the softer overlying unit of the formation.

The study by Earth Systems Pacific (Reference 1) was performed by Richard Gorman. In addition to being a Registered Geologist, Mr. Gorman holds the additional license of Certified Engineering Geologist. The Registered Geologist license indicates proficiency in the field of general geology. The title of Certified Engineering Geologist is conferred upon those who have demonstrated additional competence in the more specialized field of Engineering Geology, by a combination of education, work experience, and examination.

The appeal notes that Section 17.078.050(3) of the zoning ordinance requires that geologic reports must consider a variety of source material in describing and analyzing historic, current, and foreseeable cliff erosion. As stated in the 2001 report and presented in the list of References, Mr. Gorman's study utilized a number of sources that addressed

erosion in the immediate vicinity of the site, including the City of Pismo Beach's Bluff Erosion Study, an unpublished study of a nearby bluff-top property, and review of geologic maps, as well as aerial photography evaluation and field reconnaissance. To determine the history of bluff retreat at the specific project site, Golden State Aerial Surveys was retained. For this study, aerial photographs taken in 1955 were compared to aerial photographs taken in 1990. Photographs from 1955 were utilized as these were the oldest air stereo photographs known to exist that contained information *specific to the project site*. Even if older photographs were available, aerial photography prior to 1955 was in a relatively rudimentary state and the accuracy of measurements based on such photographs would be questionable. The aerial photographs taken in 1990 were used as these photographs were taken at a low altitude (1500') for the purposes of developing topographic maps. As such, they were fully ground controlled. A ground controlled aerial survey is a study for which surveyors set aerial targets at known locations to allow the aerial photographs to be scaled and positioned accurately in three dimensions. This allows the production of topographic maps with the highest degree of accuracy. To our knowledge, no additional aerial surveys of this type were conducted in this area between 1990 and the time the referenced report was produced. Locations common to the two sets of photographs were compared using a state-of-the-art IMA Analytical Stereoplotter to determine the rate of bluff retreat. The conclusions drawn from the aerial photographs were consistent with the rates of bluff retreat determined for nearby properties; and the variations from those rates and the reasons for those variations were discussed in detail in Mr. Gorman's report. The results were field checked to verify accuracy and, as stated by Mr. Gorman in the report, no significant changes in the configuration of the bluff top appeared to have occurred since the 1990 photographs were taken.

To summarize, the Coastal Commissions contends that by utilizing aerial photographs only from 1955 to 1990, a "selective erosion rate" resulted. As detailed in the previous paragraph, this time frame was selected based upon the availability of the oldest historical air stereo photographs known to exist, studied in conjunction with the most accurate recent aerial photographs available, using state-of-the-art technology; the erosion rate determined was based upon thorough research and the most advanced and accurate technology available.

With respect to extending the timeframe to the present, this was accomplished by a site reconnaissance during which the conditions shown in the 1990 photographs were compared to the current condition of the property and, as stated in the report, no significant changes were found.

A variety of sources were used in the study, including published and unpublished geologic literature, geologic maps, aerial photographs, and a field reconnaissance.

Finally, the appeal indicates that the differences in the rates presented in the two reports should be scientifically accounted for. It is our opinion that this is not necessary or even possible, as the erosion rate established by Mr. Mann does not appear to have any scientific foundation. He relies entirely upon general geologic reports prepared for the general area, and does not appear to have conducted any kind of an evaluation of erosion rates at this particular property. The rates presented are reported as "assumed" rates. His final statement about the harder rock beds suggests that he is about to conclude that a lesser erosion rate should apply, but he then establishes a bluff setback using the same rate of erosion as what was assumed for the softer rock unit, despite the fact that he has stated that the harder rock units within the Tmp member are the only geologic units subject to consistent direct wave action. In fact, a lesser erosion rate was determined by Mr. Gorman to be more appropriate for the site, based upon a comprehensive, site-specific analysis.

We hope that this letter clarifies the differences between the two studies performed, and addresses the concerns raised by the Coastal Commission in the referenced appeal.

Sincerely,

Earth Systems Pacific

REGISTERED PROFESSIONAL ENGINEER DENNIS C. SHALLENBERGER No. GE 2158 Exp. 12/31/01 GEOTECHNICAL STATE OF CALIFORNIA

Dennis Shallenberger, G.E.
Executive Vice-President
Date Signed: 10/16/01

Richard Gorman, C.E.G.
Date Signed: 10/16/01

REGISTERED GEOLOGIST RICHARD GORMAN No. CEG 1325 CERTIFIED ENGINEERING GEOLOGIST STATE OF CALIFORNIA

mr

Doc. No.: 0110-084.LTR

CCC Exhibit 7
(page 5 of 5 pages)
A-3-PSB-01-097

Earth Systems Pacific

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E-mail: esc@earthsys.com

December 11, 2001

FILE NO.: SL-12242-SA

Mr. Mark Johnson
California Coastal Commission
45 Fremont Street, Suite 2000
San Francisco, CA 94105-2219

PROJECT: ZANINOVICH RESIDENCE
307 INDIO DRIVE
SHELL BEACH, CALIFORNIA

SUBJECT: Addendum to Geologic Bluff Study

REF.: Geologic Bluff Study, Zaninovich Residence, 307 Indio Drive, Shell Beach, California, by Earth Systems Pacific, dated March 22, 2001, Doc. No.: 0103-013.RPT

Dear Mr. Johnson:

In response to a request you made during a meeting at the project site on December 4, 2001, we have updated the Historical Bluff Top Retreat Map presented in the referenced geologic report. To further define the bluff top retreat rate at the project site, we have added a bluff top location on the Map for the year 2000 (scale 1"= 600'). The Bluff Top Map in the referenced report used photographs from 1955 (scale 1" =400') and 1990 (scale 1"= 600'). We had also planned to used photographs from 1974, however due to the high altitude of these photographs, they were not used (see attached letter by Golden State Aerial Surveys). The previous and new bluff top locations were plotted by Golden State Aerial Surveys using a IMA analytical stereo plotter (see attached letter and graphic).

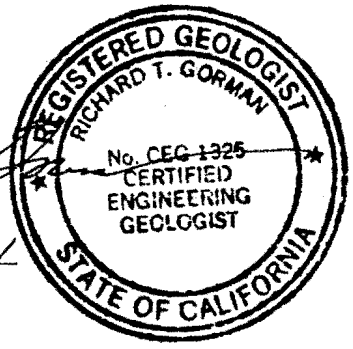
Comparing the 1990 bluff top to the 2000 bluff top, there appears to have been little change in the bluff top retreat in the last 10 years. Therefore, the bluff retreat rate of 2.5 inches per year and the recommendations presented in the referenced report, in our opinion, are still considered valid for the project site.

CCC Exhibit 8
(page 1 **of** 4 **pages)**
A-3-PSB-01-097

Thank you for this opportunity to have been of service. If you have any questions or require additional information, please contact this office at your convenience.

Sincerely,

Earth Systems Pacific



Richard T. Gorman, C.E.G.
Date Signed: 12/12/01

mr

Attachment: Letter by Golden State Aerial Surveys, dated November 10, 2000
Historic Bluff Top Retreat Map

Copies to: Mike Watson, California Coastal Commission
Steve Puglisi
Antoine Zaninovich

Doc. No.: 0112-032.LTR

CCC Exhibit 8
(page 2 of 4 pages)
A-3-PSB-01-097

GOLDEN STATE AERIAL SURVEYS, INC.
3195 McMillan Road, Suite E
San Luis Obispo, CA 93401
(805) 549-0399
(805) 549-8327 FAX

November 10, 2000

To: Rick Gorman
Earth Systems Consultants
5846 Santa Fe Road
San Luis Obispo, CA 93401

Subject: Indio Drive Bluff Top, Shell Beach

To determine the top of the bluff for the subject property, aerial photography taken in June of 1990 was used. The 1990 photography was taken from an altitude of approximately 1,500' above ground as part of a topographic mapping project commissioned by John L. Wallace and Associates. The photos were interpreted using an IMA Analytical Stereoplotter and the stereo model was adjusted to the ground control that was provided as part of the original project. The stereoplotter operator then plotted his interpretation of the top of the bluff.

The usage of the 1955 photography was problematic in that there was no ground control or camera calibration information available. Control was established by using the 1990 photography and identifying and plotting, in three dimensions, points in common to the two sets of photography. The average residual horizontal error (xy) for the 1955 photography was 1.27', as good as could be expected given the photogrammetric limitations of the 1955 photos. Again, the stereoplotter operator plotted his interpretation of the top of the bluff and overlaid the line on the 1990 map to show the differences, which ranged from about 2' to nearly 6' of retreat.

Sincerely,

Paul Baragona
President

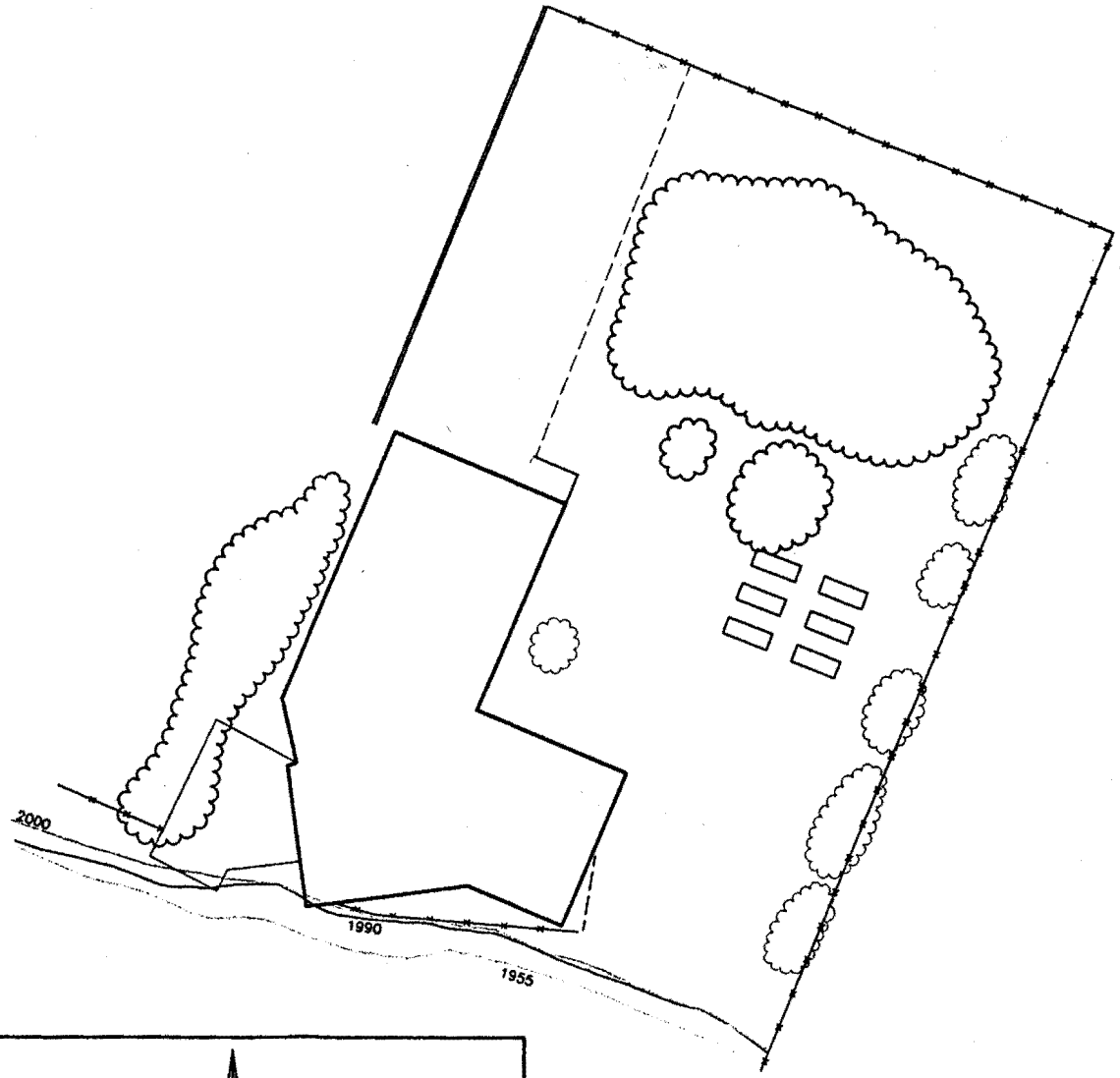
December 10, 2001 Addendum:
Additional photo dates were compiled on December 10, 2001, the first, provided by Earth Systems Consultants, was dated April 4, 1974 and had a photo scale of approximately 1"=1000', the second set of photos were dated December 15, 2000 and had a photo scale of approximately 1"=600'. The 1974 photography was not included in the report because the expected accuracy from the photo scale(± 5' horizontally) was not sufficient for the purposes of this study.

CCC Exhibit 8
(page 3 of 4 pages)
A-3-PSB-01-097

8

CCC Exhibit (page 4 of 7 pages)

A-3-PSB-02-097



LEGEND:

TOP OF BLUFF – 2000:

TOP OF BLUFF – 1990:

TOE OF BLUFF – 1955:

INDIO DRIVE

SHELL BEACH, CALIFORNIA

TOPOGRAPHY PREPARED BY:

Golden State Aerial Surveys

3195 Mc Millan Road, Suite E
San Luis Obispo, CA 93401
(805) 549-0399

GS 4864

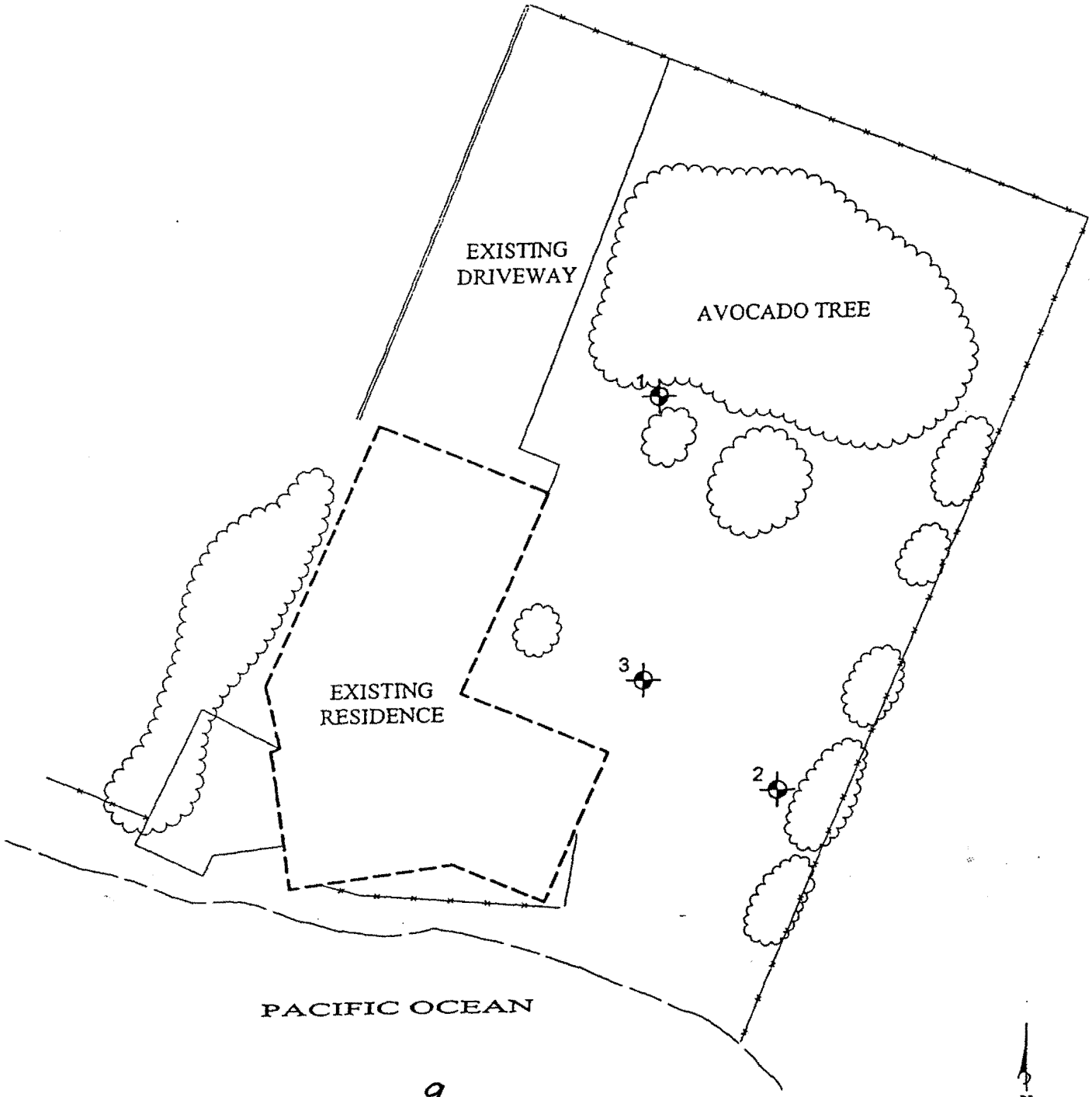
SCALE : 1"=20'

0 20 40 60 80

BORING LOCATION MAP

ZANINOVICH RESIDENCE

307 Indio Drive
Shell Beach, California



CCC Exhibit 9
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2C-47

SCALE: 1" = 25'

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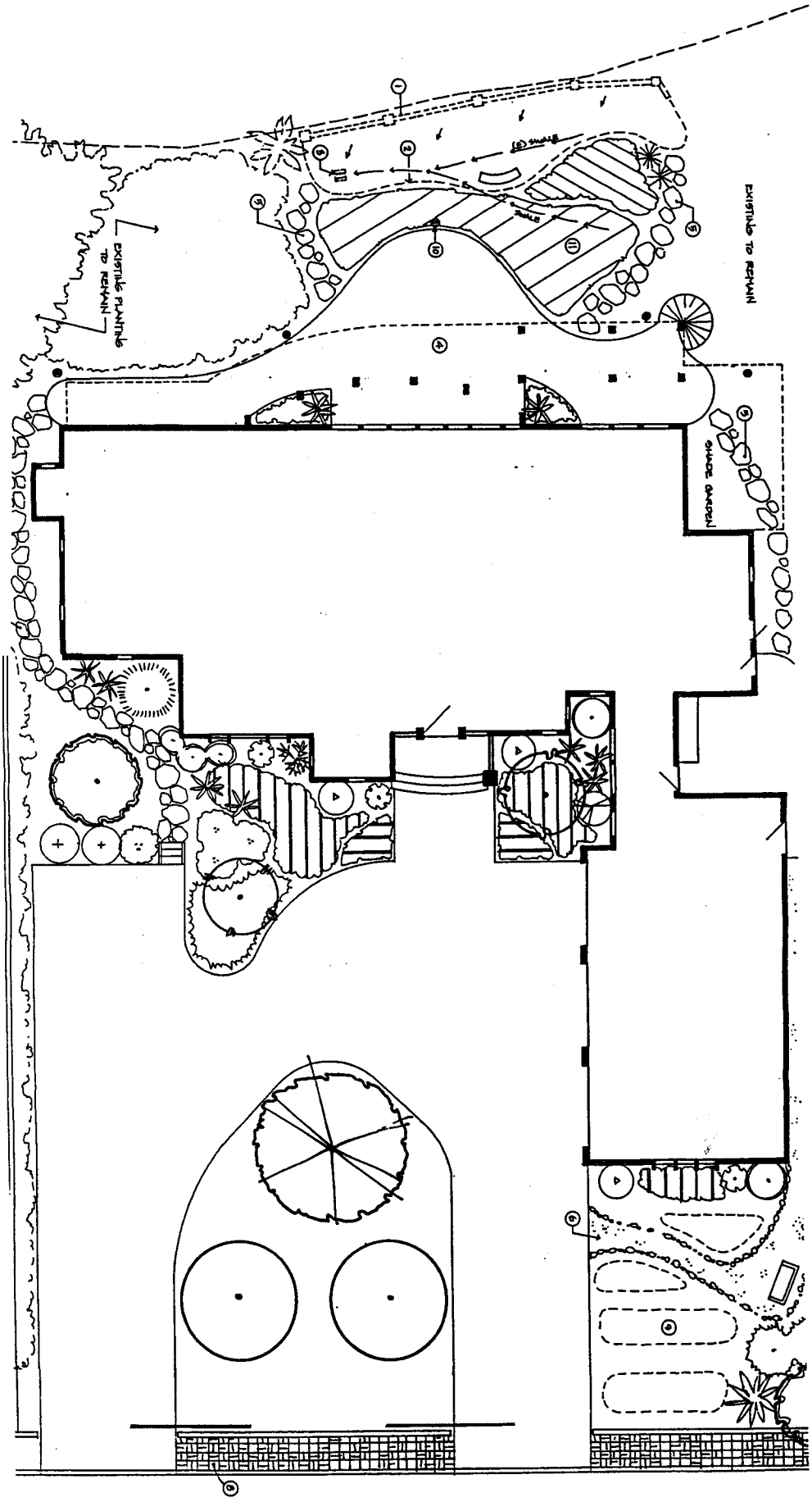
E-mail: esc@earthsys.com

SL-12242-SA

March 3, 2001

EC



Proposed Site Plan

CCC Exhibit 9
(page 2 **of** 2 **pages)**
A-3-PSB-01-097