COUNTY OF SANTA CRUZ
PLANNING DEPARTMENT

Date: February 20,2004
Agenda Item: # 2
Time: After 10 30am

STAFF REPORT TO THE ZONING ADMINISTRATOR

APPLICATION NO.: 00-0701 **APN:** 043-161-42
APPLICANT: Roy Horn
OWNER: Steven Gamer

PROJECT DESCRIPTION: Proposal to construct a three-story single-family dwelling of approximately 3,500 square feet including a 3 car garage on the lower level. Requires a Coastal Development Permit and Variances to exceed two stories, to exceed 40% lot coverage, to exceed 50% Floor Area Ratio, to increase height above 25 feet, to reduce the required front yard setback for the garage from 20 feet to 10 feet, to increase the amount of the front yard devoted to parking above 50%, and to decrease the required side yard setback to permit lattice covered patios.

LOCATION: Property located at the south end of Beach Drive on the bluff side (approximately one mile from the Rio del Mar Esplanade and 1,500 feet beyond the private gate), across the street from 646 Beach Drive. Property is undeveloped.

PERMITS REQUIRED: Coastal Development Permit and Variance Permits
ENVIRONMENTAL DETERMINATION: Not applicable- reccomendation for denial
COASTAL ZONE: ✓ Yes ___ No APPEALABLE TO CCC: ✓ Yes ___ No

PARCEL INFORMATION

PARCEL SIZE:	5,000 square feet
EXISTING LAND USES	
PARCEL:	Undeveloped
SURROUNDING:	Single-family dwellings and undeveloped parcels
PROJECT ACCESS:	Beach Drive (a private road).
PLANNING AREA:	Aptos
LAND USE DESIGNATION:	R-UL (Urban Low Density Residential)
ZONING DISTRICT:	RB (Ocean Beach Residential)
SUPERVISORIAL DISTRICT:	Second District, Supervisor Ellen Pirie

ENVIRONMENTAL INFORMATION

a. Geologic Hazards	a.	FEMA Flood Zone **V** (Wave run-up hazard zone), potential landsliding from coastal bluff.
b. Soils	b.	Beach sand (Soils Index No. 109)
c. Fire Hazard	C	Not a mapped constraint
d. Slopes	d.	55% to 125% (bluff face)
e. Env. Sen. Habitat	e.	Not mapped/no physical evidence on site
f. Grading	f.	990 cubic yards according to plans
g. Tree Removal	g.	No trees proposed to be removed
h. Scenic	h.	Within a scenic resource area (visible from public beach)

i. Drainage	i.	Drainage to street
j. Traffic	j.	No significant increase in traffic
k. Roads	k.	Existing roads adequate
1. Parks	1.	Existing park facilities adequate
m. Sewer Availability	m.	Sewer service available
n. Water Availability	n.	Water service available
o. Archeology	o.	Not mapped/no physical evidence on site

SERVICES INFORMATION

Inside Urban/Rural Services Line: ✓ Yes ___ No
Water Supply: Soquel Creek Water District
Sewage Disposal: Santa Cruz County Sanitation District
Fire District: Aptos/ La Selva Fire Protection District
Drainage District: Zone 6 Flood Control/ Water Conservation District

ANALYSIS AND DISCUSSION

Project Description and Background

The owner proposes to construct a single-family dwelling of roughly 3,500 square feet consisting of four bedrooms and 3 ½ bathrooms above an attached garage. The proposal calls for the house to "step up" the coastal bluff on four levels, although the house is technically three stones since the uppermost story (the master bedroom) does not overlap the lowest *two* stones. Due to the 21-foot high FEMA elevation requirements, when measured from the finished grade at the rear of the garage, the height of the structure appears to be 37 ½ feet.

The subject property is zoned RB (Ocean Beach Residential) with a General Plan/ Local Coastal Program Land Use Designation of R-UL (Urban Low Density Residential). The parcel is 5,000 square feet in size, above the 4,000 square foot minimum parcel size for the RB zone district.

Geologic Hazards-Landslides

The subject parcel is located entirely on the toe of a coastal bluff, therefore any structure will be vulnerable to damage or destruction from expected landsliding. Consequently, Engineering Geologic and Geotechnical Reports have been prepared addressing the proposed development, geologic hazards and site conditions. The project soils engineer and geologist recommend construction of a dwelling with reinforced concrete, designed to withstand the impact of any expected landslides. The Geotechnical Investigation (Haro, Kasunich & Associates, July 2000) projects a 'worst case' landslide that would deposit up to 500 cubic yards of earth on the roof of the residence. The depth of this material could be up to 21 feet at the rear of the residence. To withstand such an impact, the Geotechnical Investigation recommends a flat roof constructed of reinforced concrete and the side walls to be designed as retaining walls to prevent damage by landslide flows along the side yards.

The proposed design does not incorporate the soils engineer's and geologist's recommendations. Specifically, the roof is sloped and unreinforced. Also, the design incorporates exposed decks,

patios, and stairways, which may endanger inhabitants. In addition to providing inadequate protection to the inhabitants of the dwelling, the sloped roof would potentially deflect landslide debris onto neighboring properties.

Geologic Hazards-Coastal Flooding

The subject site is located within a 100-year flood zone due to potential wave run-up and storm surges, and is subject to FEMA (Federal Emergency Management Agency) flood elevation requirements for habitable space. According to the Engineering Geologic Investigation (prepared by Foxx, Nielsen, and Associates in December 2000) the 100-year flood level is 21 feet above the National Geodetic Vertical Datum (NGVD) for the project site. To satisfy FEMA requirements, the lower level will be non-habitable with the exception of the stairwell and elevator shaft, with all habitable space located above 21 feet above NGVD.

Variances

The proposed single-family dwelling appears to require seven variances from the RB zone district site standards (over two stories, lot coverage above 40%, Floor Area Ratio above 50%, front yard setbacks to the garage less than **20** feet, trellises over ***6*** feet encroaching into side yard setbacks, more than 50% of front yard devoted to parking, and maximum height greater than 25 feet). State Law and Section 13.10.230(c) of the Count Code require specific findings to grant a variance, including the presence of special circumstances intrinsic to the property (shape, size, topography, and constraints) and evidence that the variances, if approved, would not constitute a special privilege in relation to other similar lots in the vicinity.

Staff could not make the required findings to justify granting all requested variances. Special circumstances do not exist on the property with regards to size and shape of the parcel, as the parcel size (5,000 square feet) is over the minimum 4,000 square foot minimum lot size for the RB zone district and the shape is the same as other parcels on Beach Drive. The FEMA flood elevation requirements and the steep topography of the site do constitute special circumstances, **but** do not justify all requested variances **to** the RB zone district site standards as the number and scope of the variances exceed reasonable accommodation for a single-family dwelling on a legal lot of record. The number and scope of variances are more intrinsic to the proposed four-level design than to the physical constraints of the lot. For instance, from the plans the dwelling appears to approach 70% Floor Area Ratio, exceeding the scope and size of past Floor Area Ratio variances on Beach Drive. Granting all variances would result in a single-family dwelling that is out of proportion to the size of the lot, and would constitute granting a special privilege to the property owner (see Variance Findings).

Neighborhood Compatibility Issues

The proposed single-family dwelling has been reviewed by the County's Urban Designer, Larry Kasparowitz, for conformity with Sections 13.20.130 (Design Criteria for Coastal Zone Developments) and 13.11.072- 13.11.073 (Site, Architectural, and Landscape Design Review). Due to the bulk, mass, and scale resulting from the height and increased Floor Area Ratio, the proposal does not conform to provisions in these sections relating to neighborhood compatibility and impacts to the public viewshed. When viewed from the street and the beach, the proposal

would have the visual impact of a four-story structure of approximately **42** feet in height, significantly taller than any surrounding development. Furthermore, the sloped roof would be out of place compared to neighboring houses with flat roofs (the **only** houses with sloped roofs on the bluff side of Beach Drive were constructed prior to current regulations regarding geologic hazards).

Conclusion

Staff cannot make all the required findings for the proposed single-family dwelling due to the health and safety hazards it would pose to its occupants and to neighboring development. In addition to safety issues, the design is not proportional to the parcel and is out of scale with development in the surrounding neighborhood. The proposed design requires seven variances ***to*** the RB zone district site standards, most of which exceed the scope of variances required for the reasonable accommodation of a single-family dwelling and **are** primarily the result of the design of the dwelling rather than any physical constraint unique to the site.

RECOMMENDATION

Staff recommends:

1. **DENIAL of Application Number 00-0701 without prejudice,** based on the attached findings.

EXHIBITS

A. Project plans
B. Findings
C. Assessor's parcel map
D. Zoning map
E. Comments from Larry Kasparowitz, Urban Designer, dated December **15, 2003.**
F. Conclusion and recommendations from Engineering Geologic Investigaton (prepared by Foxx, Neilsen, and Associates)
G. Conclusion and recommendations from Geotechnical Investigation (prepared by Haro, Kasunich, and Associates).
H. Engineering Geologic Investigation and Geotechnical Investigation (on file with Planning)

SUPPLEMENTARY REPORTS AND INFORMATION REFERRED TO IN THIS REPORT ARE ON FILE AND AVAILABLE FOR VIEWING AT THE SANTA CRUZ COUNTY PLANNING DEPARTMENT, AND ARE HEREBY MADE A PART OF THE ADMINISTRATIVE RECORD FOR THE PROPOSED PROJECT.

Report Prepared By: David Keyon
Santa Cruz County Planning Department
701 Ocean Street, 4th Floor
Santa Cruz CA **95060**
Phone Number: **(831)454-3561** (or, **david.keyon@co.santa-cruz.ca.us**)

COASTAL DEVELOPMENT PERMIT FINDINGS:

1. THAT THE PROJECT IS A USE ALLOWED IN ONE OF THE BASIC ZONE DISTRICTS, OTHER THAN THE SPECIAL USE (SU) DISTRICT, LISTED IN SECTION 13.10.170(d) AS CONSISTENT WITH THE GENERAL PLAN AND LOCAL COASTAL PROGRAM LUP DESIGNATION.

A single-family dwelling is a principal permitted use in the RB (Ocean Beach Residential) zone district with approval of a Coastal Development Permit. The RB zone district implements the R-UL (Urban Low Density Residential) General Plan/ Local Coastal Program designation.

2. THAT THE PROJECT DOES NOT CONFLICT WITH ANY EXISTING EASEMENT OR DEVELOPMENT RESTRICTIONS SUCH AS PUBLIC ACCESS, UTILITY, OR OPEN SPACE EASEMENTS.

The parcel is not governed by an open space easement or similar land use contract. The project will not conflict with any existing right-of-way easement or development restriction, as none exist. The proposed dwelling will not affect public access, as none exists down the cliff face.

3. THAT THE PROJECT IS CONSISTENT WITH THE DESIGN CRITERIA AND SPECIAL USE STANDARDS AND CONDITIONS OF THIS CHAPTER PURSUANT TO SECTION 13.20.130 et seq.

This fmding cannot be made. As proposed, the single-family dwelling will have the appearance of a 42-foot high, four-story dwelling when viewed from the street and the beach due to the four-level design. Therefore, the proposed design does not comply with Section 13.20.130(b)(1) as the overall height and the appearance of a four-story dwelling will not be visually compatible with existing and proposed houses on Beach Drive. Furthermore, the design is inconsistent with Section 13.20.130(d)(2)(ii) since the single-family dwelling will be visually obtrusive due to the perceived height, bulk, and scale which will make the proposed dwelling appear to be significantly larger than surrounding homes on Beach Drive, and therefore having a larger visual impact on the beach, a designated scenic resource.

4. THAT THE PROJECT CONFORMS WITH THE PUBLIC ACCESS, RECREATION, AND VISITOR-SERVING POLICIES, STANDARDS AND MAPS OF THE GENERAL PLAN AND LOCAL COASTAL PROGRAM LAND USE PLAN, SPECIFICALLY CHAPTER 2: FIGURE 2.5 AND CHAPTER 7, AND, AS TO ANY DEVELOPMENT BETWEEN AND NEAREST PUBLIC ROAD AND THE SEA OR THE SHORELINE OF ANY BODY OF WATER LOCATED WITHIN THE COASTAL ZONE, SUCH DEVELOPMENT IS IN CONFORMITY WITH THE PUBLIC ACCESS AND PUBLIC RECREATION POLICIES OF CHAPTER 3 OF THE COASTAL ACT COMMENCING WITH SECTION 30200.

The project site is located in the appealable area between the shoreline and the first through public road. Public access to the beach is located 1,500 feet up Beach Drive at the State Parks parking lot

(northwest of the proposed dwelling). The proposed dwelling will not interfere with public access to the beach, ocean, or any nearby body of water. The project site is not identified as a priority acquisition site in the County Local Coastal Program, and is not designated for public recreation or visitor serving facilities.

5. THAT THE PROPOSED DEVELOPMENT IS IN CONFORMITY WITH THE CERTIFIED LOCAL COASTAL PROGRAM.

This fmding **cannot be** made. The proposed single-family dwelling does not comply with Policy 6.2.10 of the County General Plan (Site Development to Minimize Hazards) as the design does not conform to the recommendations in the Geotechnical and Engineering Geologic Reports pertaining to avoiding or minimizing hazards related to coastal bluff erosion (see Residential Development Finding 1 for more discussion).

The proposed single-family dwelling does not meet the intent of General Plan Policies 5.10.2, 5.10.3, and 5.10.7 in that it will have the visual impact of a 42 foot high, four-story structure within a County designated visual resource area (the beach). The overall height, bulk, mass, and scale of the proposed design is inappropriate within the context of the existing one, two, and three-story dwellings along Beach Drive, as the proposed structure will be considerably taller than any existing or proposed structures. If built, the proposed design would be readily visible from the beach and would impact the public viewed to a greater extent than existing development in the vicinity.

The proposed design does not conform with General Plan Policies 8.6.1 and 8.6.5 (Maintaining a Relationship Between Structure and Parcel Sizes and Designing with the Environment) in that a single-family dwelling with the visual impact of a four-story, 42 foot high structure with a peaked roof and a Floor Area Ratio approaching 70% will result in a structure which is disproportional to the size of the parcel. The design steps up the hillside, but due to the overall height and visual impact will not be low-profile in relation to surrounding structures.

DEVELOPMENT PERMIT FINDINGS:

1. THAT THE PROPOSED LOCATION OF THE PROJECT AND THE CONDITIONS UNDER WHICH IT WOULD BE OPERATED OR MAINTAINED WILL NOT BE DETRIMENTAL TO THE HEALTH, SAFETY, OR WELFARE OF PERSONS RESIDING OR WORKING IN THE NEIGHBORHOOD OR THE GENERAL PUBLIC, AND WILL NOT RESULT IN INEFFICIENT OR WASTEFUL USE OF ENERGY, AND WILL NOT BE MATERIALLY INJURIOUS TO PROPERTIES OR IMPROVEMENTS IN THE VICINITY.

This fmding cannot be made. The proposed design does not incorporate the recommendations of the Geotechnical Investigation by Haro, Kasunich, and Associates (February 2001) and the Geologic Investigation prepared by Foxx, Nielsen, and Associates (December 2000) for a reinforced structure with a flat roof and side supports. The proposed design incorporates a peaked roof with terra-cotta tiles and shows no reinforcement to adequately hold the projected loads of anticipated landslides. The peaked roof may deflect landslide debris onto neighboring residences, resulting in physical and/or material injury. For these reasons, the health and safety of the neighbors and the residents of the proposed dwelling cannot be guaranteed with this proposal, as the recommendations of the approved soils Geotechnical and Geologic investigations have not been followed and the County Geologist has not approved the proposed roof design. Furthermore, the design incorporates exposed decks, stairs, and patios that would potentially pose a hazard to residents during a landslide event.

2. THAT THE PROPOSED LOCATION OF THE PROJECT AND THE CONDITIONS UNDER WHICH IT WOULD BE OPERATED OR MAINTAINED WILL BE CONSISTENT WITH ALL PERTINENT COUNTY ORDINANCES AND THE PURPOSE OF THE ZONE DISTRICT IN WHICH THE SITE **IS** LOCATED.

This fmding cannot be made. The proposed design does not comply with Section 16.10.070 of the County Code (Geologic Hazards Ordinance) in that the recommendations of the Geotechnical and Engineering Geologic reports have not been followed ***(see*** Residential Development Finding 1 for more discussion).

Based on the submitted plans for a four-level house, the applicant requires seven variances to the RB zone district site standards outlined in Section 13.10.323 of the County Code (number of stories, lot coverage, Floor Area Ratio, front yard setbacks to the garage, side yard setbacks, percentage of front yard devoted to parking, and height). Special circumstances do not exist on the property to warrant the number and scope of site standard variances requested (see Variance Findings 1, 2, and **3** for more discussion).

3. THAT THE PROPOSED USE **IS** CONSISTENT WITH ALL ELEMENTS OF THE COUNTY GENERAL PLAN AND WITH ANY SPECIFIC PLAN WHICH HAS BEEN ADOPTED FOR THE AREA.

This fmding cannot be made. The project design is inconsistent with General Plan policies relating to minimizing geologic hazards, conformity to site standards, visual impacts, and relationship to parcel size. For discussion of General Plan/ Local Coastal program policies, see Coastal Development

A specific plan has not been adopted for this portion of the Rio Del Mar.

4. THAT THE PROPOSED USE WILL NOT OVERLOAD UTILITIES AND WILL NOT GENERATE MORE THAN THE ACCEPTABLE LEVEL OF TRAFFIC ON THE STREETS IN THE VICINITY.

The proposed single-family dwelling would not overload utilities as adequate utility service exists to the site, and the increase in traffic generated by the four-bedroom dwelling ***can*** easily be absorbed into the existing road system.

5. THAT THE PROPOSED PROJECT WILL COMPLEMENT AND HARMONIZE WITH THE EXISTING AND PROPOSED LAND USES IN THE VICINITY AND WILL BE COMPATIBLE WITH THE PHYSICAL DESIGN ASPECTS, LAND USE INTENSITIES, AND DWELLING UNIT DENSITIES OF THE NEIGHBORHOOD.

This finding cannot be made. While technically three-stories (due to the fact that the master bedroom does not overlap the bottom two floors), the proposed single-family dwelling will have the visual appearance of a four-story, 42-foot high structure. No four-story structures exist on Beach Drive, **so** the proposal would have the appearance of being significantly taller than any existing development in the vicinity.

6. THE PROPOSED DEVELOPMENT PROJECT IS CONSISTENT WITH THE DESIGN STANDARDS AND GUIDELINES (SECTIONS 13.11.070 THROUGH 13.11.076), AND ANY OTHER APPLICABLE REQUIREMENTS OF THIS CHAPTER.

This fmding cannot be made. The Urban Designer has reviewed the proposed design in terms of the guidelines ***set*** forth in Sections 13.11.070 **through** 13.11.076 of the County code and has determined that the single-family dwelling does not meet the required criteria for building bulk, massing, scale, and protection of the public viewshed.

The proposal does not comply with Section 13.11.072(a)(1) with regards **to** site design, **as** the visual appearance of a four-story, 42-foot high structure with a Floor Area Ratio approaching **70%** is too bulky and massive for the site. The design of the structure bears no relationship **to** existing structures in the vicinity in that the proposal incorporates four levels, a peaked roof, and is larger than surrounding development on similarly sized lots.

Due to the size of the proposed dwelling in relation to surrounding structures, the proposed design fails to comply with Section 13.11.072(b)(2) with regards to protecting the public viewshed. For more discussion on visual impacts, see Coastal Development Permit Finding **5.**

In conclusion, the Urban Designer notes that the visual appearance of a four-story dwelling on beach drive is out of character with the surrounding neighborhood, and other proposals for single-family dwellings on Beach Drive have been designed with less visual impact while mitigating hazards.

VARIANCE FINDINGS

1. THAT BECAUSE OF SPECIAL CIRCUMSTANCES APPLICABLE TO THE PROPERTY, INCLUDING SIZE, SHAPE, TOPOGRAPHY, LOCATION, AND SURROUNDING EXISTING STRUCTURES, THE STRICT APPLICATION OF THE ZONING ORDINANCE DEPRIVES SUCH PROPERTY OF PRIVILEGES ENJOYED BY OTHER PROPERTY IN THE VICINITY AND UNDER IDENTICAL ZONING CLASSIFICATION.

This finding cannot be made. No special circumstances exist relating to the size and shape of parcel 043-161-42 that would deprive the property owner the privileges enjoyed by other property owners on the bluff side of Beach Drive. Special circumstances do exist due to the required FEMA flood elevation and the steep topography of the site. However, the scope and number of the variances requested exceeds reasonable accommodation for these constraints. Increasing the Floor Area Ratio from 50% to 70% is disproportionate to the amount of floor area lost due to flood elevation requirements and the lot coverage and side yard setback variances are design driven and not related to specific constraints on the site, as the dwelling *can* easily be re-designed to comply with these requirements. Finally, a height variance permitting an increase in height of 12 feet above the zone district site standards (from *25* feet to about **37** feet) cannot be justified as such a disparity is more driven by design than by the necessity for flood elevation requirements. Other recently approved single-family dwellings on the bluff side of Beach Drive have required fewer variances to site standards to satisfy flood elevation requirements and the topographical constraints of the site. If approved, the proposal would require no less than seven variances, and would constitute a special privilege over other bluff lots on Beach Drive.

2. THAT THE GRANTING OF THE VARIANCE WILL BE IN *HARMONY* WITH THE GENERAL INTENT AND PURPOSE OF ZONING OBJECTIVES AND WILL NOT BE MATERIALLY DETRIMENTAL TO PUBLIC HEALTH, SAFETY, OR WELFARE OR INJURIOUS TO PROPERTY OR IMPROVEMENTS IN THE VICINITY.

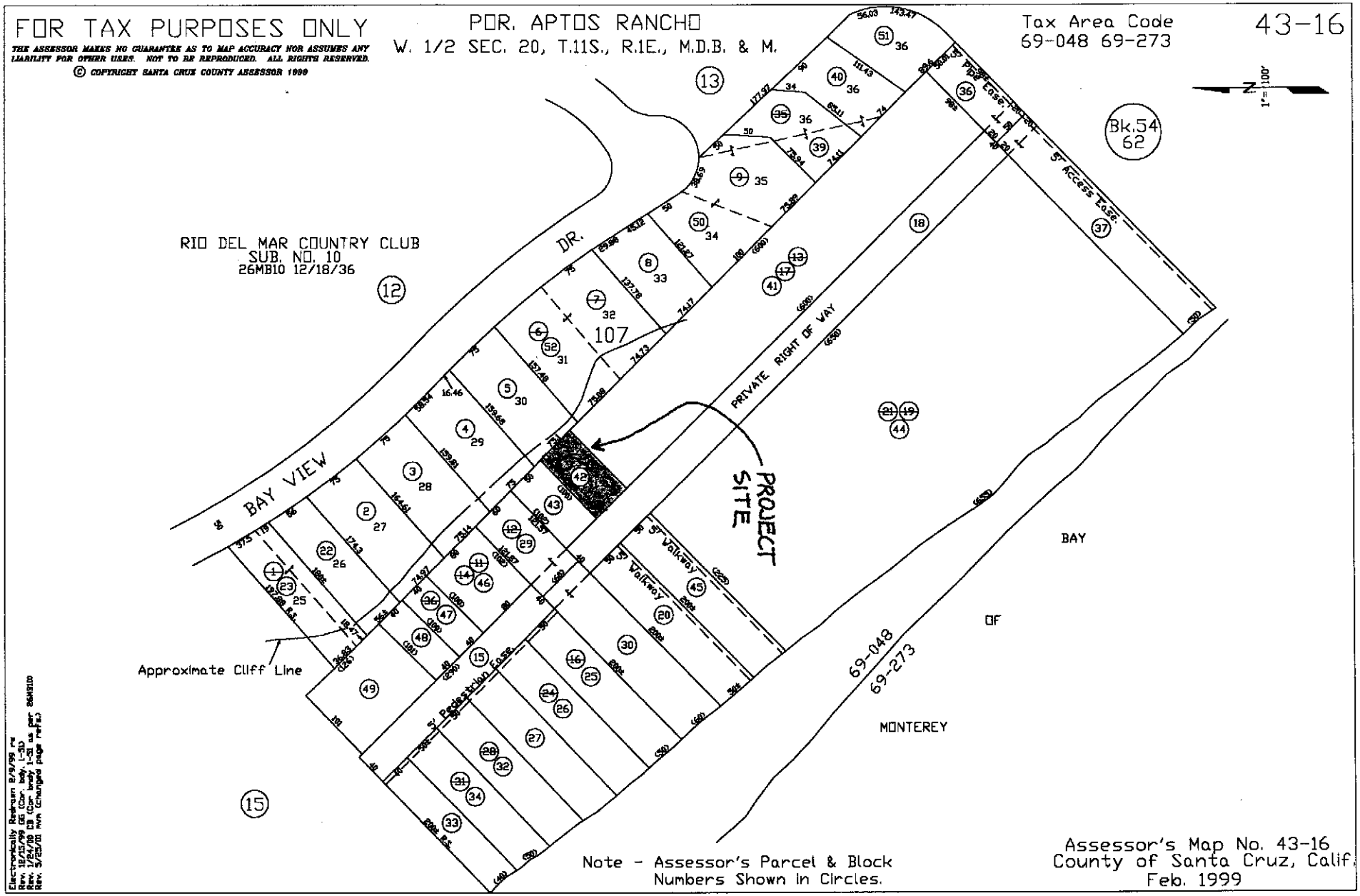
This finding cannot be made. Granting of all requested variances would not be in harmony with the general intent and purpose of RB (Ocean Beach Residential) zone district in that the proposed single-family dwelling will be out of scale with surrounding and proposed development in terms of number of stories, bulk, massing and scale. Furthermore, the proposed design will have a significant visual impact on the beach (a County designated scenic resource), and has potential to be materially injurious to neighboring properties due to deflection of landslide debris from the peaked roof.

3. THAT THE GRANTING OF SUCH VARIANCES SHALL NOT CONSTITUTE A GRANT OF SPECIAL PRIVILEGES INCONSISTENT WITH THE LIMITATIONS UPON OTHER PROPERTIES IN THE VICINITY AND ZONE IN WHICH SUCH IS SITUATED.

This finding cannot be made. The seven requested variances (to exceed height, number of stories, floor area ratio, lot coverage, parking in the front yard setback, and to reduce setbacks at the front and one side yard) together are special circumstances, which are self imposed by the applicant. The granting of all requested variances would constitute a special privilege of a substantially larger dwelling than is allowed for a 5,000 square foot residential lot. Recently granted permits for single-

family dwellings on the bluff side of Beach Drive have required fewer variances to satisfy FEMA flood elevation requirements and the topographical constraints of the site. Consequently, the granting of variances to increase the maximum Floor Area Ratio to about 70% **from** 50%, increase the lot coverage above 40%, increase the maximum height to around 37 feet, and reduce the side yard setbacks together would constitute a special privilege which is inconsistent with the limitations placed upon other RB zoned properites on the bluff side of Beach Drive.

EXHIBIT B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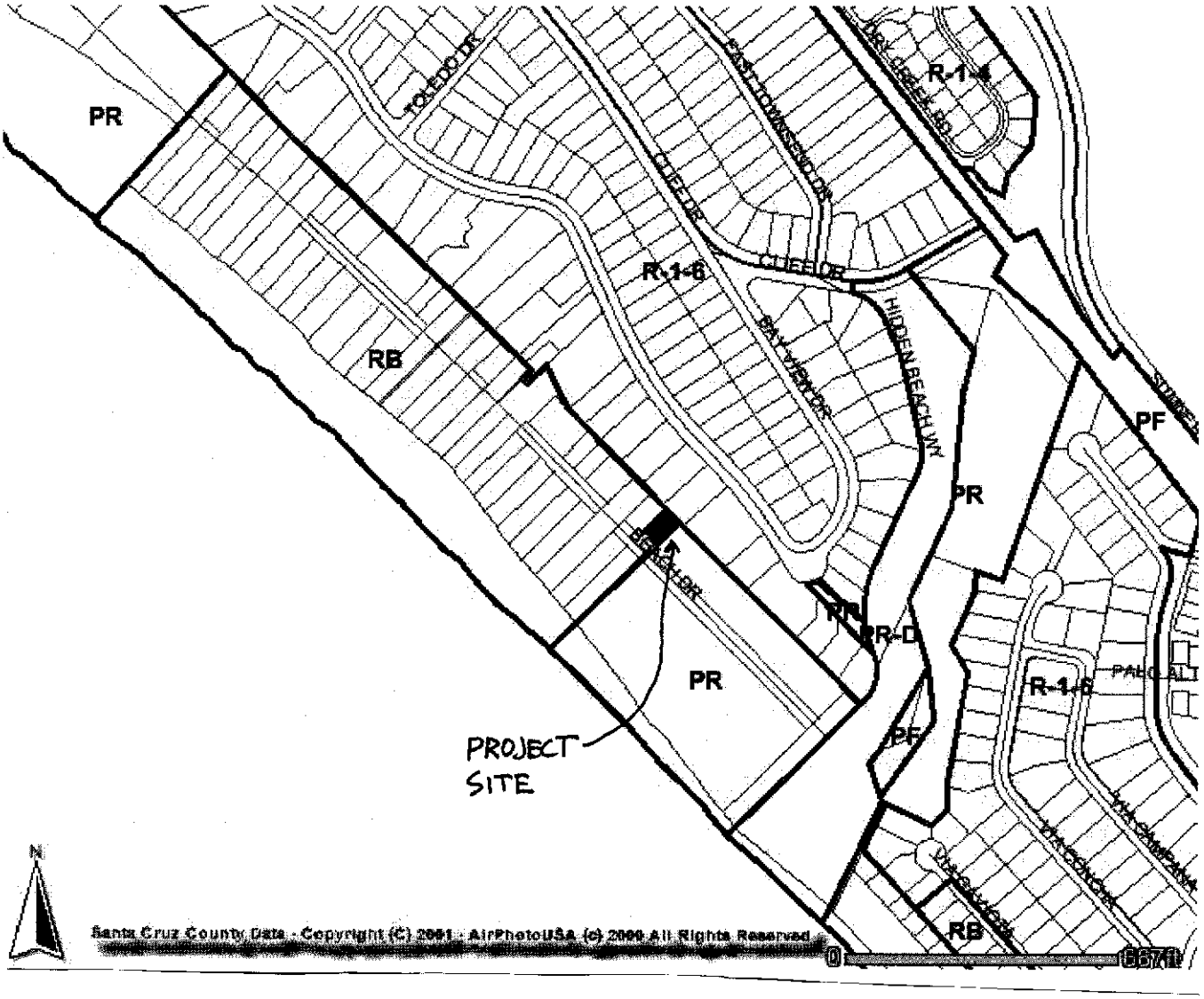
POR. APTOS RANCHO
W. 1/2 SEC. 20, T.11S., R.1E., M.D.B. & M.
Tax Area Code
69-048 69-273
43-16
RIO DEL MAR COUNTRY CLUB
SUB. NO. 10
26MB10 12/18/36
DR.
BAY VIEW
PRIVATE RIGHT OF WAY
PROJECT SITE
107
Bk.54
62
5' Access Easement
5' Walkway
5' Pedestrian Easement
Approximate Cliff Line
BAY
OF
MONTEREY
69-048
69-273
Note - Assessor's Parcel & Block Numbers Shown In Circles.
Assessor's Map No. 43-16
County of Santa Cruz, Calif.
Feb. 1999

EXHIBIT C

ZONING MAP



KEY

RB: Ocean Beach Residential
R-1-X Single-family residential, X,000 square feet minimum lot size (R-1-6 = 6,000 sq. ft. min. lot size.
P R Parks, recreation, and open space
PF: Public facilities

EXHIBIT

COUNTY OF SANTA CRUZ | Planning Department

INTEROFFICE MEMO

APPLICATION N O 00-0701

Date: December 15,2003

To: David Keyon, Project Planner

From: Larry Kasparowitz, Urban Designer

Re: Design Review for a new single family residence at Beach Drive, Aptos (Garner / owner, Horn / applicant)

GENERAL PLAN / ZONING CODE ISSUES

Design Review Authority

13.20.130 The Coastal Zone Design Critena are applicable to any development requiring a Coastal Zone Approval

Desian Review Standards

13.20.130 Design criteria for coastal zone developments

ivaluation Criteria	Meets criteria In code (✔)	Does not meet criteria (✔)	Urban Designer's Evaluation
/isual Compatibility			
All new development shall be sited, designed and landscaped to be visually compatible and integrated with the character of surrounding neighborhoods or areas		✔	
Uinimum Site Disturbance			
Grading, earth moving, and removal of major vegetation shall be minimized.	✔		
Developers shall be encouraged to maintain all mature trees over **6** inches in diameter except where circumstances require their removal, such as obstruction of the building site, dead or diseased **trees,** or nuisance species.	✔		
Special landscape features (rock outcroppings, prominent natural landforms, tree groupings) shall be retained.	✔		

EXHIBIT E

Ridgeline Development			
Structures located near ridges shall be sited and designed not to project above the ridgeline or tree canopy at			**N/A**
Land divisions which would create parcels whose only building site would be exposed on a ridgetop shall not be			**NIA**
New or replacement vegetation shall be compatible with surrounding vegetation and shall be suitable to the climate, soil, and ecological characteristics of the area	✔		
Development shall be located, if possible, on parts of the site not visible or least visible from the public view.			**NIA**
Development shall not block views of the shoreline from scenic road turnouts, rest stops or vista points			**N/A**
Site Planning			
Develooment shall be sited and designed to fit the physical setting carefully so that its presence is subordinate to the natural character of the site, maintaining the natural features (streams, major drainage, mature trees, dominant vegetative communities)			**N/A**
Screening and landscaping suitable to the site shall be used to soften the visual impact of development in the viewshed			**NIA**
Structures shall be designed to fit the topography of the site with minimal cutting, grading, or filling for construction			**NIA**
Pitched, rather than flat roofs, which are surfaced with non-reflective materials except for solar energy devices shall be encouraged			**NIA**
Natural materials and colors which blend with the vegetative cover of the site shall be used, or if the structure is located in an existing cluster of buildings, colors and materials shall repeat or harmonize with those in the cluster			**NIA**

EXHIBIT E

The visual impact of large agricultural structures shall be minimized by locating the structure within or near an existing group of buildings			**N/A**
The visual impact of large agricultural structures shall be minimized by using materials and colors which blend with the building cluster or the natural vegetative cover of the site (except for greenhouses).			**NIA**
The visual impact of large agricultural structures shall be minimized by using landscaping to screen or soften the appearance of the structure			**N/A**
Restoration			
Feasible elimination or mitigation of unsightly, visually disruptive or degrading elements such as junk heaps, unnatural obstructions, grading scars, or structures incompatible with the area shall be included in site development			**NIA**
The requirement for restoration of visually blighted areas shall be in scale with the size of the proposed project			**NIA**
Signs			
Materials, scale, location and orientation of signs shall harmonize with surrounding elements			**NIA**
Directly lighted, brightly colored, rotating, reflective, blinking, flashing or moving signs are prohibited			**NIA**
Illumination of signs shall be permitted only for state and county directional and informational signs, except in designated commercial and visitor serving zone districts			**N/A**
In the Highway 1 viewshed, except within the Davenport commercial area, only CALTRANS standard signs and public parks, or parking lot identification signs, shall be permitted to be visible from the highway. These signs shall be of natural unobtrusive materials and colors			**N/A**

EXHIBIT E

Blufftop development and landscaping (e.g., decks, patios, structures, trees, shrubs, etc.) in rural areas shall be set back from the bluff edge a sufficient distance to be out of sight from the shoreline, or if infeasible, not visually intrusive			N/A
No new permanent structures on open beaches shall be allowed, except where permitted pursuant to Chapter 16.10 (Geologic Hazards) or Chapter 16.20 (Grading Regulations)			N/A
The design of permitted structures shall minimize visual intrusion, and shall incorpwate materials and finishes which harmonize with the character of the area. Natural materials are preferred		✔	

EXHIBIT E

Desinn Review Authority

13.11.040 Projects requiring design review,

(a) Single home construction, and associated additions involving 500 square feet or more, within coastal special communities and sensitive sites as defined in this Chapter.

13.11.030 Definitions

(u) 'Sensitive Site" shall mean any property located adjacent to a scenic road or within the viewshed of a scenic road as recognized in the General Plan; or located on ***a coastal bluff,*** or on a ridgeline.

Evaluation Criteria	Meets criteria In code (✔)	Does not meet criteria (✔)	Urban Designer? Evaluation
Location and type of access to the site	✔		
Building siting in terms of its location and orientation	✔		
Building bulk, massing and scale		✔	
Parking location and layout	✔		
Relationship to natural site features	✔		
Landscaping	✔		
Streetscape relationship		✔	
Street design and transit facilities		✔	NIA
Relationship to existing structures		✔	
Natural Site Amenities and Features			
Relate to surrounding topography	✔		
Retention of natural amenities	✔		
Siting and orientation which takes	✔		
Ridgeline protection			NIA
Minimize impact on private views	✔		

EXHIBIT E

Reasonable protection for adjacent properties	✔		
Reasonable protection for currently occupied buildings using a Solar	✔		
Reasonable protection for adjacent properties	✔		

13.11.073 Building design.

Evaluation Criteria	Meets criteria In code (✔)	Does not meet criteria (✔)	Urban Designer's Evaluation
Massing of building form		✔	
Building silhouette	✔		
Spacing between buildings	✔		
Street face setbacks	✔		
Character of architecture	✔		
Building scale		✔	
Proportion and composition of projections and recesses, doors and windows, and other features	✔		
Location and treatment of entryways	✔		
Finish material, texture and color	✔		
Scale			
Scale is addressed on appropriate levels	✔		
Design elements create a sense of human Scale and pedestrian	✔		
Building Articulation			
Variation in wall plane, roof line, detailing, materials and siting	✔		
Solar Design			
Building design provides solar access that is reasonably protected for adjacent properties	✔		
Building walls and major window areas are oriented for passive solar and natural lighting			NIA

EXHIBIT E

URBAN DESIGNERS COMMENTS

- *A four story home is out of character with the other homes on this side of Beach Drive. Othm developers with similar site conditions have designed three story homes*

EXHIBIT E

Another potential hazard created by severe ground shaking from earthquakes is liquefaction and lateral spreading. The loose, unconsolidated, and saturated beach sands below the base of the property may de-stabilize when influenced by strong ground motions generated by an earthquake. Therefore, the design of the foundation should take into account the potential for the beach sand to liquefy, and for the talus material and beach sand to shift laterally thereby generating an active lateral force. Due to the higher relative density of the Purisima Formation which underlies the beach sand, it is our professional opinion that there is a low liquefaction potential of the Purisima Formation.

DRAINAGE AND EROSION W A R D S

There should be a drainage system installed at the property to convey possible surface runoff from the steep slope behind the house. It is best to accommodate this potential flow in a shallow surface depression such as a shallow drain trough because of the possibility that a significant amount of sediment could erode from the hill and fill or block subsurface drain pipes or inlets.

All areas on the slope that are stripped of vegetation during construction of the retaining wall must be revegetated prior to the onset of the next rainfall season.

CONCLUSIONS

1. The subject property occupies a steep hillside that rises above Beach Drive. **A** single family home is proposed on the hillside rising up from its approximate base. **A** conceptual configuration of this home is shown the geologic cross section, Plate 2.

2. Four different earth materials occur at the subject property. These are: 1) marine terrace deposits, 2) Purisima Formation sands, **3)** talus, and 4) beach sands. Marine terrace deposits comprise the top fifteen feet of the coastal bluff. These terrace deposits lie mostly above the upper property line. Beneath the marine terrace deposits lie the Purisima Formation sands and gravels which make up most of the hillside above the homesite. The Purisima Formation consists of thick bedded sands with frequent lenses of pebbles and cobbles. These earth materials are lightly to poorly cemented at the property: **A** talus cone or wedge occurs on the bottom half of the hillside. This talus deposit is an accumulation of slope wash and landslide debris from higher on the slope. The talus deposit is underlain by beach sand near the toe of the slope and by Purisima Formation sand a short distance up the slope. The base of the subject property as well as Beach Drive are underlain by unconsolidated beach sand. Purisima Formation sand and cobbly sand underlie the beach sand about **15** feet below Beach Drive.

3. The steep coastal bluff face in the vicinity of the property and along the entire length of Beach Drive has experienced numerous landslides in historic time, particularly during the

past 17 years. The most recent episodes of landsliding occurred during the winter of 2000 on the hillside just east of the subject property (Plate 1). Landslides will occur on the bluff above the home in the future, most likely during rainstorms but also as a result of strong ground shaking from earthquakes.

4. A slope stability analysis conducted during this study by the project geotechnical engineers indicates a significant potential for both debris flow landslides occurring during intense and/or prolonged rainfall and larger landslides generated by severe ground shaking caused by an earthquake. The results of the slope stability analysis and the geologic conditions indicate a need to develop landslide mitigation measures at the proposed homesite.

5. There is a potential for erosion at the toe of the coastal bluff. We have shown a projected erosion boundary on the accompanying geologic cross section (Plate 2) and discussed our reasoning for developing this boundary in this report. This boundary should be used for foundation design purposes

6. There is a potential flood hazard on the lowermost portion of the property. The 100-year flood elevation has been determined by FEMA as 21 feet above NGVD from 1929.

7. Moderate to severe ground shaking is likely at the subject property if a large magnitude earthquake occurs on a nearby fault. Refer to the body of the report for specific seismic criteria and fault information.

8. The beach sand under the lowermost part of the property is typically saturated, at least below a depth of 10 feet; the groundwater level probably rises during high tides and winter rainfall periods.

9. The proposed home is feasible if the recommendations presented in this report and those in the accompanying geotechnical report being prepared by Haro, Kasunich and Associates are adhered to during design, implemented during construction, and maintained for the lifetime of the dwelling. In this event, the occupants within the dwelling should not be subject to risks beyond an ordinary level of risk as defined in the Scales of Acceptable **Risk** presented in Appendix B of this report.

RECOMMENDATIONS

1. The following landslide mitigation measures (or approved equivalent) must be implemented into the design of the homesite:

   A. Construct the home into the hillside. This requires that the rear walls act as engineered retaining walls, and portions of the side walls act as engineered retaining walls. It is anticipated that homesite will be excavated as needed.

B. The excavation should be prevented from failing into adjacent properties. It is anticipated that temporary shoring will be needed to support the cutslopes during construction. It is anticipated that appropriate engineered shoring will be designed and used along the sides of the excavation as well as along the back of the excavation.

C. The rear wall of the dwelling and the roof line should coincide with the slope at the rear of the house so that there is no potential for landslides originating above the home to impact the rear wall of the dwelling. In concept, landslide debris will flow onto and over the home. The calculated seismic failures are very large masses of earth. **A** smaller failure such as the calculated saturation landslide has a moderate to perhaps high probability of occumng on the bluff face above the proposed home. Either of these landslides could deposit earth and debris on the roof of the proposed home. We anticipate that the earth and debris may impact the rooftop at a velocity of 32 feet per second and pile **up** on the roof of the home with the pile having slopes on the sides and front of about 1½: 1 (H:V). The loads on the roof from the potential slide masses will probably require concrete and steel frame building methods.

D. The foundations of the home should be designed against slope failure on the sides of the home since it is assumed that the side yard will not be protected by retaining walls.

2 The foundation along the southeast side of the house should be designed for the estimated scour and erosion boundaries shown on Plate 2 of this report Foundation piers should penetrate a sufficient distance into the Purisima Formation sandstone to obtain adequate bearing and lateral support in the event that they are exposed to the scour level indicated on Plate 2. We also recommend the construction of a subterranean wall along the southeast side of the house that extends to the depth of scour and the projected erosion line shown on Plate *2.* This wall will prevent the erosion and failure of earth materials from beneath the house in the event that the bluff retreats to the depth of projected scour and landward to the projected erosion line.

3. The home should be designed and constructed to account for the designated 100-year flood elevation of 21 feet above sea level based on the National Geodetic Vertical Datum of 1929

4. The structure should be designed to withstand moderate to severe seismic shaking. Refer to the body of the report for seismic criteria.

5. The project geotechnical engineer should evaluate the liquefaction potential of the beach sand underlying the homesite or develop mitigation measures for liquefaction hazards if

the analysis indicates a susceptibility. We anticipate that a deep pier and grade beam foundation will be used that penetrates below the beach sand and talus deposits into the more competent Purisima Formation sands and gravels, not only for liquefaction potential but for potential instability in the talus and beach sand deposits.

6. A surface drain system shall he developed for the property which accommodates potential surface flow off the steep hillsides above the property. It is best to accommodate this potential flow in a shallow surface depression such as a shallow drain trough because of the possibility that a significant amount of sediment could erode from the hill and fill or block subsurface drain pipes or inlets. All roof and driveway runoff should be conveyed to Beach Drive where there is a storm drain system.

7. All areas where vegetation is stripped during construction should be revegetated with appropriate erosion resistant vegetation prior to the next rainfall season.

8. This report should be reviewed in conjunction with the forthcoming soils report by Haro, Kasunich and Associates. The recommendations of the soils engineer should be closely followed.

9. We shall be afforded an opportunity to review the final design plans to ensure that our recommendations have been incorporated. If we are not afforded this opportunity, we will assume no responsibility for the misinterpretation of our recommendations.

In addition to the above recommendations, we suggest that you purchase a copy of Peter Yanev's Peace of Mind in Earthquake Country. This book contains a wealth of information regarding seismic design and precautions the home builder can take to reduce the possibility of loss of life and property during an earthquake In addition, we suggest that the occupants of the homes be familiar with emergency procedures in the event of an earthquake

DISCUSSIONS, CONCLUSIONS AND RECOMMENDATIONS

Based on the results of our investigation, the proposed project appears compatible with the site, provided the following recommendations are incorporated into the design and construction of a single family residence at the base of the coastal bluff located on the landward side of Beach Drive in Aptos, California.

The proposed residence will be set into the hillside, with the landward wall and portions of the upcoast and downcoast walls, constructed as retaining walls.

Beach Drive was constructed upon a wave cut platform, infilled with beach sand and soil materials. The proposed residence will span the wave cut platform with the landward portion of the foundation system cutting into undisturbed native soil.

The primary geotechnical considerations at the site include inevitable landsliding and slope failure of the coastal bluff above the proposed residence, embedding the foundation system into undisturbed native soil, potential seismic shaking and mitigating erosion of the downcoast parcel boundary.

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A quantitative slope stability analysis was performed to evaluate the probable mechanisms of slope failure, to develop worst case potential debris loads and to determine lateral earth forces for design of the residential structure.

The residence, with a tied back retaining wall and a drilled pier foundation system, will buttress the bottom of slope, forcing any slope failures above the top of the retaining wall system.

The coastal bluff will continue to faillrecede whether the residence is constructed or not.

We recommend the residence be constructed to withstand impact and debris loads from the inevitable future slope failures. It is our opinion a concrete roof supported by a steel frame will be necessary to protect the residence. In order to prevent landslide debris from being deflected onto the adjacent upcoast and downcoast parcels, the roof should be flat.

Due to the transition from infilled wave cut platform to undisturbed, dense native soil within the building envelope and the erosion of a portion of the building envelope projected by the project engineering geologist, it will be necessary to support the structure on a drilled pier foundation system. The piers will penetrate the beach sand and fill materials. Drilled piers should be embedded such that the bases are at least 10 feet horizontally from the surface of the projected erosion boundary. The geologic cross section can be utilized to estimate

EXHIBIT G

the minimum pier depths. The piers should be designed to mitigate hydrodynamic loading and the potential impact from waterborne debris.

During construction of the residence, it will be necessary to temporarily shore the excavated backslope as well as portions of the side yard talus slopes during construction.

If all recommendations in the geologic and geotechnical reports are closely followed and properly implemented during design and construction, and maintained for the lifetime of the proposed residence, then in our opinion, the occupants within the residence should not be subject to risks from geologic hazards beyond the "Ordinary Risks Level," in the "Scale of Acceptable Risks" contained in Appendix C of this report.

The following recommendations should be used as guidelines for preparing project plans and specifications:

Site Grading

1. The geotechnical engineer should be notified **at least** four **(4)** working days **prior to** any **site** clearing **or** grading so that the work in the field can be coordinated with the grading contractor, and arrangements for testing and observation can be made. The recommendations of this report are based on the assumption that the geotechnical engineer will perform the required testing and observation during grading and construction.

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It is the owner's responsibility to make the necessary arrangements for these required services.

2. Where referenced in this report, Percent Relative Compaction and Optimum Moisture Content shall be based on ASTM Test Designation D1557-78.

3. Areas to be graded should be cleared of all obstructions including loose **fill,** building foundations, trees not designated to remain, or other unsuitable material. Existing depressions or voids created during site clearing should be backfilled with engineered **fill.**

4. Cleared areas should then be stripped of organic-laden topsoil. Stripping depth should be from 2 to **4** inches. Actual depth of stripping should be determined in the field by the geotechnical engineer. Strippings should be wasted off-site or stockpiled for use in landscaped areas if desired.

5. Areas to receive engineered **fill** should be scarified to a depth of 6 inches, moisture conditioned, and compacted to at least 90 percent relative compaction. Portions of the site may need to be moisture conditioned **to** achieve a suitable moisture content for compaction. These areas may then be brought to design grade with engineered **fill.**

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6. Engineered fill should be placed in thin lifts not exceeding 8 inches in loose thickness, moisture conditioned, and compacted to at least 90 percent relative compaction. The upper 12 inches of entry driveway pavement and exterior slab subgrades should be compacted to at least 95 percent relative compaction. If engineered fill is utilized upslope of the residence to fill voids between the structure and the hillside, engineered fill requirements will be prepared on a specific basis during the final structural engineering design process.

The aggregate base below pavements should likewise be compacted to at least 95 percent relative cornpaction.

7. The on-site soils generally appear suitable for use as engineered fill. Materials used for engineered fill should be free of organic material, and contain no rocks or clods greater than 6 inches in diameter, with no more than 15 percent larger than 4 inches.

8. We estimate shrinkage factors of about 20 percent for the on-site materials when used in engineered fills.

9. All permanent cut and fill slopes should be inclined no steeper than 2:1 (horizontal to vertical).

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10. Following grading, all exposed slopes should be planted as soon as possible with erosion-resistant vegetation.

11. After the earthwork operations have been completed and the geotechnical engineer has finished his observation of the work, no further earthwork operations shall be performed except with the approval of and under the observation of the geotechnical engineer.

Foundations

12. The residential proposed structure may be supported on a drilled pier foundation system. Drilled piers should penetrate fill materials and beach sand and be embedded into undisturbed native soil.

Drilled Piers

13. Drilled piers should be at least 18 inches in diameter and be embedded at least 8 feet into undisturbed Purisima sandstone. Drilled piers should be embedded such that the bases are at least 10 feet horizontally from the surface of the projected erosion boundary delineated on the Geologic Cross Section.

14. Piers constructed in accordance with the above may be designed for an allowable end bearing capacity of 20 ksf. This value may be increased by one third for short term

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seismic and wind loading. The bottom of the excavation should be clear of debris. Due to the loose nature of the talus deposits and groundwater at about +2 feet, NGVD, we anticipate the pier holes will need to be cased, shielded or maintained with weighted drilling mud.

15. For passive lateral resistance, all fill materials, beach sand and the top 1 foot of the cut Purisima Formation should be neglected in pier design. A horizontal setback of 5 feet between the top of the passive zone and the surface of the engineering geologist's projected erosion boundary should also be maintained. From -1 foot to 4 feet below the aforementioned horizontal setback, a lateral passive lateral resistance of 500 pcf (efw) times 2 pier diameters may be used. Below 4 feet, a passive lateral resistance of 600 pcf (efw) times 3 pier diameters may be used for structural design.

16. To resist uplift forces, an allowable skin friction value of 315 psf of pier sidewall may be used within the Purisima formation. The uplift skin friction requires a horizontal setback of at least 5 feet from surface of the projected erosion boundary delineated on the Geologic Cross-Section.

17. During the projected erosion of the soil materials beneath the proposed residence, the drilled piers will be subject *to* active pressures as the piers are exposed above the projected erosion boundary. An active pressure of 30 pcf acting on two piers diameters

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should be utilized to design the buried portion of the pier foundation, above the projected erosion boundary.

Hydrodynamic Loads

18. During the design scour condition, the pier system supporting the proposed residence will be impacted by coastal flooding. Due to the site configuration, it is our opinion the residence will be impacted by surging floodwaters broken waves, not breaking waves within the building envelope. Using methodology outlined in the FEMA 2000-Coastal Construction Manual and the 1984 - ACES - Shore Protection Manual, we recommend the drilled piers be designed to withstand an equivalent hydrostatic force of 1,340 pounds per foot of pier width, acting at an elevation of **4.5** feet NGVD.

Dynamic Loading - Waterborne Debris

19. During the design scour condition, the pier system supporting the residence may be impacted by waveborne debris during its design life of 100 year. Impact loading is a function of: The size, shape and weight of the object; the flood velocity; the velocity of the object compared to the flood velocity; and the duration of impact.

In addition to hydrodynamic loading, the pier foundation should be design *to* withstand the impact of an object traveling at 9.0 feet per second, weighing 1,000 pounds with a duration of impact of 0.3 seconds. The Debris Impact Load Formula (11.9) from the 2000 - FEMA -

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Coastal Construction Manual be used to calculate the debris impact loading. We also recommend the impact loading be applied at 7.5 feet NGVD along the southeast and southwest perimeters of the proposed structure.

Retainina Walls and Lateral Pressures

20. Retaining walls should be designed to resist both lateral earth pressures and any additional surcharge loads. Cantilever or unrestrained walls up to 30 feet high should be designed to resist an active equivalent fluid pressure of 70 pcf for sloping backfills inclined up to 1:1 (horizontal to vertical). Restrained walls should be designed to resist uniformly applied rectangular wall pressures of **45H** psf where H **is** the height of the wall.

21. Within the active zone, a seismic surcharge of 16H/ft should be utilized in design of the retaining walls. The resultant of the seismic loading should act at 0.6H, where H is the height of the wall.

22. In addition, the walls should be designed for any adjacent live or dead loads which will exert a force on them.

23. Retaining walls that act as interior house walls should be thoroughly waterproofed.

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24. For fully drained conditions as delineated above, we recommend that permeable material meeting the State of California Standard Specifications, Section **68-1.025,** Class **1,** Type A or an approved equivalent be placed behind the wall, with a minimum continuous width of 1 foot and extending the full height of the wall to within 1 foot of the ground surface. A **4** inch diameter perforated drain pipe (with perforations placed downward) should be installed within **4** inches of the bottom of the granular backfill and be discharged to a suitable location. We do not recommend that this or any drain pipe be discharged into dry wells. They should be designed to discharge at adequate points that pick **up** accumulated surface and subsurface water in lined ditches, closed conduit, catch basins or similar facilities that carry the accumulated water away from the foundation system. A geotextile drainage blanket equivalent to Miradrain 6000 may be substituted for the gravel blanket drain provided the design active pressures are increased by **15** percent.

25. If engineered **fill** is utilized upslope of the residence to **fill** voids between the structure and the hillside, engineered fill requirements will be prepared on a specific basis during the final structural engineering design process.

Tieback Anchors

26. For design of the tieback anchors, the helix screw plates or the pressure grouted anchor bulb (bonded zone) should be at least 25 feet from the face of the retaining wall.

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27. Tieback loading is dependent upon anchor tendon strength. The small diameter anchor shafts should be designed for tension in the direction of the axis of the anchor.

28. Non-pressure grouted tieback anchors should have a minimum overburden cover of 20 feet and extend approximately 30 feet back from the face of the bluff. Tiebacks will require an unbonded length of 20 feet.

29. A working shaft bond friction of 1,800 psf between soil and non-pressure grouted anchor diameters may be considered for design of small diameter **(4** to 8 inch) tieback anchors where building envelope/property boundaries allow the use of a longer bonded zone tieback.

30. The maximum bond strength/design load should not exceed 100,000 pounds.

31. The tieback anchors may be installed up to a maximum angle of 20 degrees from horizontal.

32. Upon completion of the backfill behind the walls, all tiebacks must be permanently stressed to 85 percent of their design load. In addition, all tiebacks must be tested by the contractor in the presence of the geotechnical engineer to 100 percent of their design load. Any tiebacks that fail during testing must be replaced and re-tested by the contractor.

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33. All tiedback anchor systems must be corrosion protected and reviewed by the geotechnical engineer before the contractor purchases and installs them.

Slabs-on-Grade

34. Parking and structural concrete slabs/mats below the BFE should be supported by the drilled pier system.

35. These slabs may be expected to be undermined during the 100 year design life of the project.

36. Exterior concrete slabs-on-grade should be founded at least 12 inches of engineered fill (redensified site soils) compacted to at least 95 percent relative compaction. Reinforcing should be provided in accordance with the anticipated use and loading of the slab. The reinforcement should not be tied to the building foundations. These exterior slabs can be expected to undermined and then replaced during the design life of the project.

Landslide Debris - Dead Loads

37. The December 2000 Geology Report states landslide debris may pile up on the flat roof with the pile having slopes on the sides and front of about 1.5:1 (horizontal to vertical). If the "worst case" slide occurs before the slope has a chance to recede due to shallow

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sliding, we estimate the soil pile in the center of the structure would be a maximum height of 21 feet.

38. We estimate a total of 500 yd^3 will come to rest on a 35 foot deep by 40 foot wide flat roof. A maximum load of 2,310 psf may be anticipated at the back of the roof with zero dead loading along the roof sides and front edge.

39, The future side yards may only be 10 feet wide (including neighbor's sideyard setback), This narrow space will fill up with potential slide material which comes to rest at a 1.5:1 gradient. This failure condition may require the sidewalls of the house to act as retaining structures right after failure and before clean up. We recommend designing the sidewalls and windows to accommodate static active earth pressures of 30 pcf for a non-restrained condition or **19.5 H** psf/ft if the floor and roof between the sidewalls act to restrain the walls.

Debris **Flow-Impact Force** Criteria

40. Debris flows and slump slides on the slope above the proposed residence will impact the roof of the structure. It is our opinion the roof will need to be constructed of reinforced concrete and designed to withstand the temporary, short term impact loads. To prevent deflection of landslide debris onto the adjacent sideyard parcels, the roof should be flat. Based upon recommendations from the Geology Report, an initial impact velocity

of 32 fps second was used. The existing slope above the proposed residence is about 1:1 (horizontal to vertical) in slope gradient. Our slope stability analysis indicates a long term slope gradient of about 2:1 (horizontal to vertical) at a Factor of Safety = 1.2. The highest impact pressure results when the debris strikes the roof and **stops,** transferring all of its kinetic energy to the roof. After the initial impact the debris material will flow over the front and sides of the roof. The flowing mass would then impart both a vertical and horizontal load to the structure.

39. For design purposes based upon a level, flat roof, we estimate the back (landward) 20 foot width of roof/structural fill, will be subjected to the initial slide mass impact force. For design purposes a normal (vertical) impact load of 1175 psf should be considered for a **45** foot wide structure. Utilizing a coefficient of friction, between formed concrete and the debris mass of 0.35 we recommend a uniform horizontal force of 410 psf across the back 20 foot width of roof/structural fill.

40. Beyond the 20 foot wide impact zone the debris material will spread itself over the roof with material falling to the front and sides of the residence. Dynamic debris forces may be neglected beyond the impact zone with dead loads only being used for the highest elevation roof design. If decks or lower story roofs project out from the uppermost roof system, dynamic loads will need to be evaluated for specific final design configurations.

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Site Drainaae

41. An erosion control and drainage plan should be prepared for the project. The plan should be reviewed and approved by the project geotechnical engineer and engineering geologist. Because *of* the potential slope instability at the site, erosion control and drainage systems will need to be maintained, repaired and replaced in the future after instability occurs.

42. We recommend a concrete v-ditch be constructed at the top of the uppermost retaining wall that will collect surface water which flows downslope as a result of direct rainfall or surface water spilling onto the top of the bluff from above.

Plan Review, Construction Observation and Testing

43. Our firm should be provided the opportunity for a general review of the final project plans prior to construction so that our geotechnical recommendations may be properly interpreted and implemented. If our firm is not accorded the opportunity of making the recommended review, we can assume no responsibility for misinterpretation of our recommendations. We recommend that our office review the project plans prior to submittal to public agencies, to expedite project review. The recommendations presented in this report require our review of final plans and specifications prior to construction and upon our observation and, where necessary, testing of the earthwork and foundation

EXHIBIT G

excavations. Observation ***of*** grading and foundation excavations allows anticipated soil conditions to be correlated to those actually encountered in the field during construction.

EXHIBIT G