

CALIFORNIA COASTAL COMMISSION

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Th13b

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Staff:	Robert S. Merrill
Staff Report:	November 26, 2003
Hearing Date:	December 11, 2003
Commission Action:	

REVISED STAFF REPORT: REGULAR CALENDAR

APPLICATION NO.:	1-03-026
APPLICANTS:	Harritta Gaussoin & Richard Radcliffe
PROJECT LOCATION:	352 Roundhouse Creek Road, in the Big Lagoon area, Humboldt County (APN 517-251-10)
PROJECT DESCRIPTION:	Construct a 1,420 square foot, 16-foot-high single-family residence with a 440-square-foot detached garage, septic system, propane storage tank, driveway, and landscaping.
GENERAL PLAN DESIGNATION:	Residential Estates (RE)
ZONING DESIGNATION:	Residential Single Family with no further subdivision and design review requirements (RS-XD)

LOCAL APPROVALS RECEIVED: Humboldt County Special Permit for Design Review.

OTHER APPROVALS REQUIRED: None

SUBSTANTIVE FILE DOCUMENTS: (1) Humboldt County Local Coastal Program;
(2) The Geotechnical report entitled, "Recommended Setback for the Rohner Bluff-top Home Based on an Erosion -Rate Analysis and Factor-of Safety Considerations, 294 Roundhouse Creek Road, Big Lagoon Park Subdivision, Humboldt County, California (APNs 517-251-14 and 517-251-15)," dated October 6, 2003, prepared by Busch Geotechnical Consultants.

SUMMARY OF STAFF RECOMMENDATION:

Staff recommends approval with conditions of the coastal development permit application for the proposed project on the basis that, as conditioned by the Commission, the project is consistent with the Coastal Act.

The proposed project involves the construction of a 1,420-square-foot, 16-foot-high single-family residence with a 440-square-foot detached garage, septic system, propane storage tank, driveway, and landscaping. The project site is located at 352 Roundhouse Creek Road, in the Big Lagoon Park Subdivision, approximately 6.5 miles north of Trinidad in Humboldt County.

The project site is located near a shoreline that has experienced extraordinary bluff retreat. Anecdotal information indicates that other lots within the subdivision experienced more than 60 feet of bluff retreat during the winter of 1997 and 1998. The long-term bluff retreat rate is estimated at 1 foot per year. The applicants commissioned a geotechnical evaluation of the site that included an analysis of long term bluff retreat rate and a quantitative slope stability analysis. The geotechnical investigation recommended a setback for the proposed relocated residence of 170 feet to ensure its safety over the next 75 years. The Commission Staff Geologist has reviewed the geotechnical investigation and opines that geotechnical evaluation was adequate and that the recommended setback would assure geologic stability over the next 75 years. As proposed by the applicant, the development conforms to the recommended 170-foot setback. To ensure that (1) the development is actually setback sufficient distances as proposed to ensure its safety from bluff erosion and cliff retreat during the typical economic lifespan of a house and septic leach field, and (2) the setback would be of sufficient distance to eliminate the need for shoreline protection devices to protect the

structure in the future consistent with Section 30253 of the Coastal Act, staff recommends that the Commission attach Special Condition No. 3. This recommended special condition requires that all final design and construction plans, including site, foundation, grading, and drainage plans, shall be consistent with the recommendations contained in the geotechnical report, including recommendations concerning setbacks, site preparation, fill placement and compaction, foundation designs, and drainage.

Staff recommends that the Commission attach additional special conditions, including conditions to 1) require that all terms and conditions of the permit are recorded as deed restrictions; 2) prohibit future bluff or shoreline protective devices; 3) require the applicants to assume the risk of geologic hazard and waive liability for the Commission; and 4) require an erosion and runoff control plan and the removal of debris to control sedimentation and protect water quality.

Staff recommends that the Commission find the project, as conditioned, is consistent with the Chapter 3 policies of the Coastal Act.

STAFF NOTES:

1. Standard of Review

The proposed project is located on the west side of Roundhouse Creek Road, in the Big Lagoon Park Subdivision south of Big Lagoon in Humboldt County. Humboldt County has a certified LCP. However, the project is located in an area of deferred certification (ADC). Therefore, the standard of review that the Commission must apply to the project is the Chapter 3 policies of the Coastal Act.

2. Commission Action Necessary

The Commission must act on the application at the December 11, 2003 to meet the requirements of the Permit Streamlining Act

I. MOTION, STAFF RECOMMENDATION AND RESOLUTION:

The staff recommends that the Commission adopt the following resolution:

Motion:

I move that the Commission approve Coastal Development Permit No. 1-03-026 pursuant to the staff recommendation.

Staff Recommendation of Approval:

Staff recommends a **YES** vote. Passage of this motion will result in approval of the permit as conditioned and adoption of the following resolution and findings. The motion passes only by affirmative vote of a majority of the Commissioners present.

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. 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.

II. STANDARD CONDITIONS: See Attachment A.

III. SPECIAL CONDITIONS:

1. Construction Responsibilities and Debris Removal

The permittee shall comply with the following construction-related requirements:

- A. No construction materials, debris, or waste shall be placed or stored where it may be subject to entering coastal waters; and
- B. All construction debris shall be removed and disposed of in an upland location outside of the coastal zone or at an approved disposal facility.

2. Erosion and Runoff Control Plan

- A. **PRIOR TO ISSUANCE OF COASTAL DEVELOPMENT PERMIT NO. 1-03-026**, the applicant shall submit an Erosion and Runoff Control Plan for review and approval of the Executive Director. The Erosion and Runoff Control Plan shall incorporate design elements and/or Best Management Practices (BMPs)

which will serve to minimize the volume and velocity of stormwater runoff leaving the developed site, and to capture sediment and other pollutants contained in stormwater runoff from the development, by facilitating on-site infiltration and trapping of sediment generated from construction. The final drainage and runoff control plans shall at a minimum include the following provisions:

1. A physical barrier consisting of bales of straw placed end to end shall be installed between any construction and bluff edges that are downslope of the construction. The bales shall be composed of weed-free rice straw, and shall be maintained in place throughout the construction period.
 2. Vegetation at the site shall be maintained to the maximum extent possible and any disturbed areas shall be replanted or seeded with native vegetation immediately following project completion.
 3. All on-site debris stockpiles shall be covered and contained at all times.
 4. Provide that runoff from the roof, driveway and other impervious surfaces from the completed development shall be collected and directed into pervious areas on the site (landscaped areas) for infiltration to the maximum extent practicable in a non-erosive manner, prior to being conveyed off-site. Where gutters and downspouts are used, velocity reducers shall be incorporated, to prevent scour and erosion at the outlet.
- B. The permittee shall undertake development in accordance with the approved Erosion and Runoff Control plans. Any proposed changes to the approved plans shall be reported to the Executive Director. No changes to the approved plans shall occur without a Coastal Commission approved amendment to this coastal development permit unless the Executive Director determines that no amendment is legally required.

3. **Conformance of the Design and Construction Plans to the Geotechnical Investigation Report**

- A. All final design and construction plans, including site, foundation, grading, and drainage plans, shall be consistent with the recommendations contained in: (1) the geotechnical report entitled, "R-2 Soils Report, Proposed Residence, Roundhouse Creek Road, Trinidad, California, APN 517-251-10," dated June, 2003, prepared by LACO Associates; and (2) the geotechnical report entitled, "Slope Stability Analysis for Setback From Bluff Face, APN 517-251-10, Roundhouse Creek Road, Trinidad, California, dated November 7, 2003, prepared by LACO Associates. **PRIOR TO ISSUANCE OF THE COASTAL DEVELOPMENT PERMIT**, the applicant shall submit, for the Executive Director's review and approval, evidence that a licensed professional (Certified Engineering Geologist

or Geotechnical Engineer) has reviewed and approved all final design, construction, site, foundation, grading, and drainage plans and has certified that each of those plans is consistent with all of the recommendations specified in the above-referenced geotechnical reports approved by the California Coastal Commission for the project site.

- B. The permittee shall undertake development in accordance with the approved final plans. Any proposed changes to the approved final plans shall be reported to the Executive Director. No changes to the approved final plans shall occur without a Commission amendment to this coastal development permit unless the Executive Director determines that no amendment is legally required.

4. **Deed Restriction**

PRIOR TO ISSUANCE OF THE COASTAL DEVELOPMENT PERMIT, the applicant shall submit to the Executive Director for review and approval documentation demonstrating that the applicant has executed and recorded against the parcel(s) governed by this permit a deed restriction, in a form and content acceptable to the Executive Director: (1) indicating that, pursuant to this permit, the California Coastal Commission has authorized development on the subject property, subject to terms and conditions that restrict the use and enjoyment of that property; and (2) imposing the Special Conditions of this permit as covenants, conditions and restrictions on the use and enjoyment of the Property. The deed restriction shall include a legal description of the entire parcel or parcels governed by this permit. The deed restriction shall also indicate that, in the event of an extinguishment or termination of the deed restriction for any reason, the terms and conditions of this permit shall continue to restrict the use and enjoyment of the subject property so long as either this permit or the development it authorizes, or any part, modification, or amendment thereof, remains in existence on or with respect to the subject property.

5. **No Future Bluff or Shoreline Protective Device**

- A. By acceptance of this permit, the applicants agree, on behalf of themselves and all successors and assigns, that no bluff or shoreline protective device(s) shall ever be constructed to protect the development approved pursuant to Coastal Development Permit No. 1-03-026, including, but not limited to, the residence with the attached garage, foundations, septic system, utilities, driveway, or appurtenant residential development in the event that the development is threatened with damage or destruction from waves, erosion, storm conditions, bluff retreat, landslides, ground subsidence or other natural hazards in the future. By acceptance of this permit, the applicants hereby waive, on behalf of

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

- B. By acceptance of this Permit, the applicants further agree, on behalf of themselves and all successors and assigns, that the landowner(s) shall remove the development authorized by this permit, including the relocated residence, new foundations, new driveway, and other appurtenant residential development, 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.
- C. In the event the edge of the bluff recedes to within 10 feet of the principal residence but no government agency has ordered that the structures not be occupied, a geotechnical investigation shall be prepared by a licensed geologist or civil engineer with coastal experience retained by the applicant, that addresses whether any portions of the residence are threatened by wave, erosion, storm conditions, or other natural hazards. The report shall identify all those immediate or potential future measures that could stabilize the principal residence without shore or bluff protection, including but not limited to removal or relocation of portions of the residence. The report shall be submitted to the Executive Director and the appropriate local government official. If the geotechnical report concludes that the residence or any portion of the residence is unsafe for occupancy, the permittee shall, within 90 days of submitting the report, apply for a coastal development permit amendment to remedy the hazard which shall include removal of the threatened portion of the structure.

6. Assumption of Risk, Waiver of Liability and Indemnity

By acceptance of this permit, the applicants acknowledge and agree: (i) that the site may be subject to hazards from landslide, bluff retreat, erosion, subsidence, and earth movement; (ii) to assume the risks to the applicants 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.

7. Future Development Restriction

This permit is only for the development described in coastal development permit No. 1-03-026. Pursuant to Title 14 California Code of Regulations section 13250(b)(6), the exemptions otherwise provided in Public Resources Code section 30610(a) shall not apply to the development governed by the coastal development permit No. 1-03-026. Accordingly, any future improvements to this structure authorized by this permit shall require an amendment to permit no. 1-03-026 from the Commission or shall require an additional coastal permit from the Commission or from the applicable certified local government. In addition thereto, an amendment to permit no. 1-03-026 from the Commission or an additional coastal permit from the Commission or from the applicable certified local government shall be required for any repair or maintenance identified as requiring a permit in Public Resources Code Section 30610(d) and Title 14, California Code of Regulations Sections 13252(a)-(b).

IV. FINDINGS AND DECLARATIONS

The Commission hereby finds and declares:

1. Site & Project Description

The proposed project involves the construction of a 1,420-square-foot, 16-foot-high single-family residence with a 440-square-foot detached garage, septic system, propane storage tank, driveway, and landscaping. The residence would be served by the local community water system. The project site is located at 352 Roundhouse Creek Road, in the Big Lagoon Park Subdivision, approximately 6.5 miles north of Trinidad in Humboldt County (see Exhibits 1-6).

The subject property is a vacant, 15,000-square-foot lot located within a residential subdivision of approximately 1/3-acre lots partially developed with modest homes with built mostly since the early 1970s. The neighborhood is served by a community water system and individual septic systems.

The subject parcel is directly adjacent to Roundhouse Creek Road and separated from the bluff edge by an intervening parcel that is developed with a single-family residence. Additional houses exist on the adjoining properties to the north and south. The property is not within any County designated scenic or view area and no ocean views are afforded through the property. The property slopes gently to the west. The nearby bluff is approximately 126 feet high in this location, and is very steep. The subject property contains no known environmentally sensitive habitat area.

The subject parcel is vegetated with a large number of trees and shrubs, including Monterey pines, Sitka Spruce, blackberry bushes, and various native plants. The applicants propose to remove a total of 10 trees to make room for the proposed

development and to remove a safety hazard associated with trees that are dying because of vandalism (See Exhibit 6).

The proposed house and detached garage structures would be sited twenty feet back from Roundhouse Creek Road, consistent with the required front yard setback required by Humboldt County (see Exhibit 4). The propane storage tank would be located west of the garage and south of the proposed house. The septic system would occupy the western half of the parcel, with the primary leach field located in the easternmost approximately 50 feet of the parcel and the septic tank and reserve leach field area occupying the area between the primary leach field and the house.

Although Humboldt County has a certified local coastal program, the project site is located within the Big Lagoon Area of Deferred Certification. The area was not certified in part because of issues concerning protecting future development from the extraordinary bluff retreat that occurs along this section of the Humboldt County coastline.

2. Locating and Planning New Development

Section 30250(a) of the Coastal Act states that new development shall be located within or near existing developed areas able to accommodate it or in other areas with adequate public services and where it will not have significant adverse effects, either individually or cumulatively, on coastal resources. The intent of this policy is to channel development toward more urbanized areas where services are provided and potential impacts to resources are minimized.

The proposed development is located in a rural area where one single-family home per parcel is a principally permitted use. The site is served by a community water system. The Humboldt County Health Department has determined that suitable areas exist on the property to accommodate a septic system. As discussed in the findings below, the proposed development has been conditioned to ensure the protection of the relocated residence from geologic hazards and to avoid water quality impacts from runoff from the site.

Therefore, the Commission finds that the proposed development is consistent with Coastal Act Section 30250(a) to the extent that it is located in a developed area, it has adequate water and septic capability to accommodate it, and it will not cause significant adverse effects, either individually or cumulatively, to coastal resources.

3. Geologic Hazards

Section 30253 states in applicable part:

New development shall:

- (1) Minimize risks to life and property in areas of high geologic, flood, and fire hazard.*
- (2) Assure stability and structural integrity, and neither create nor contribute significantly to erosion, geologic instability, or destruction of the site or surrounding area or in any way require the construction of protective devices that would substantially alter natural landforms along bluffs and cliffs...*

The subject property is located on a bluff top situated approximately 126 feet above the ocean. The subject parcel is separated from the actual bluff edge by an intervening approximately 130-foot-long parcel. The Big Lagoon Subdivision was built on an uplifted marine terrace that has been subject to extraordinary rates of bluff retreat in the past. According to a geotechnical analysis prepared by Busch Geotechnical Consultants (BUSCH) for a proposed development located two parcels to the north of the applicants property that is the subject of Coastal Development Permit Application No. 1-03-028 (Rohner), the bluff in the vicinity of the project site is approximately 126 feet in height with a near vertical to slightly overhanging top. According to BUSCH, the Franciscan Complex bedrock which is exposed in the headlands of Patrick's Point State park and elsewhere along the coast, does not outcrop at the base of the bluff in the subdivision. In addition, the beach is unprotected by offshore rocks or a nearby headland. As a result, whenever winter storm waves strip the sand from the beach, the base of the bluffs with its erodible marine terraces begin to erode.

Although the subject parcel is separated from the bluff edge by an intervening parcel, the intervening parcel is subject to bluff retreat that will likely extend back through the intervening parcel to the applicants' parcel at some point in the future. No significant shoreline protective work has been constructed or reasonably can be expected to be constructed along the bluff because of the engineering challenges posed by the geologic conditions of the bluff and the great cost that would be associated with building such a protective work. Thus, bluff retreat poses a significant hazard to development of the subject parcel despite the presence of the intervening parcel.

In previous actions on Coastal Development permits, the Commission has interpreted Section 30253 of the Coastal Act to require that coastal development be sited a sufficient distance landward of coastal bluffs that it will neither be endangered by erosion nor lead to the construction of protective coastal armoring during the assumed economic life of the development. The Commission has generally assumed the economic life of a new house to be 75 to 100 years. A setback adequate to protect development over the economic life of a development must account both for the expected bluff retreat during that time period and the existing slope stability. Long-term bluff retreat is measured by examining historic data including vertical aerial photographs and any surveys conducted that identified the bluff edge. Slope stability is a measure of the resistance of a slope to land sliding, and is assessed by a quantitative slope stability analysis. In such an analysis, the forces resisting a potential landslide are first determined. These are essentially the strength of the rocks or soils making up the bluff. Next, the forces driving a potential landslide are determined. These forces are the weight of the rocks as projected along a

potential slide surface. The resisting forces are divided by the driving forces to determine the "factor of safety." The process involves determining a setback from the bluff edge where a factor of safety of 1.5 is achieved. The quantitative slope stability analysis needs to be prepared by licensed geotechnical professional familiar with the process.

The applicant commissioned LACO Associates to perform a geotechnical investigation of the site. The geotechnical investigation of the site is documented in two separate reports including: (1) the geotechnical report entitled, "R-2 Soils Report, Proposed Residence, Roundhouse Creek Road, Trinidad, California, APN 517-251-10," dated June, 2003; and (2) the geotechnical report entitled, "Slope Stability Analysis for Setback From Bluff Face, APN 517-251-10, Roundhouse Creek Road, Trinidad, California, dated November 7, 2003 (See Exhibit 7).

The LACO reports state that "the generally accepted erosion rate for the bluffs at Big Lagoon is 1 foot per year," but no supporting evidence is provided. As noted above, a separate geotechnical has recently been performed for a proposed development two parcels away (BUSCH). In assessing the long-term bluff retreat rate at the site, the BUSCH investigation utilized 14 aerial photographs spanning 61 years. The report documents anecdotally short-term erosion events in the nearby area resulting in up to 60 feet of bluff retreat in a single winter season (1997-1998). The report indicates a long-term average erosion rate for the 61 year period is .74 feet per year, but recommends that the calculated rate be rounded up to 1 foot per year to account for higher erosion rates determined by other studies.

The LACO investigation includes a quantitative slope stability analysis. The slope stability analysis shows that the current bluff is stable, but with a relatively low factor of safety of 1.24. The factor of safety increases with distance from the bluff edge, and the point corresponding to a factor of safety of 1.5, the industry standard for new development, is achieved 95 feet from the bluff edge.

Based on the results of the analysis of long term bluff retreat and slope stability, LACO recommends a minimum setback line from the present bluff edge of 170 feet to protect the relocated house over its assumed 75-year lifespan. The 170-foot setback would extend from the bluff to a line approximately 35 feet from the western edge of the parcel. This setback consists of the 95-foot slope stability setback plus 75 additional feet to account for the 1-foot per year bluff retreat rate. LACO also recommends a number of additional measures to ensure the safety of the proposed development from geologic hazards including recommendations concerning site preparation, fill placement and compaction, foundation designs, and drainage.

Coastal Commission staff geologist Dr. Mark Johnsson has reviewed the LACO and BUSCH reports and conferred with the applicants' geologists. Dr. Johnsson has opined in a memo to staff dated November 19, 2003 attached as Exhibit 8 that he believes the long-term erosion rate of 1.0 foot is an appropriate site-specific long-term erosion rate for the site." With

regard to the quantitative slope stability analysis, Dr. Johnsson indicates that the shear strength and unit weight values adopted in this analysis are appropriate. In conclusion, Dr. Johnsson states that he concurs that the applicant's geologist's recommended setback of 170 feet would "assure the stability of the proposed development for an expected life of 75 years."

As proposed by the applicant, all of the proposed development except for the septic system would be set back at least 200 feet from the bluff edge, or 30 feet inland of the recommended geologic setback line. The septic system is designed such that the primary leach field is located seaward of the reserve leach field area. Portions of the primary leach field area are within the most inland portions of the recommended geologic setback line, although the reserve leach field area is inland of the geologic setback line. The fact that the primary leach field would be located within the setback line does not create unacceptable risks of geologic hazard, however, as the design life of a leach field system is on the order of 20 to 30 years, as opposed to the 75-year design life for the house itself. Reserve leach fields are usually designated at the time primary leach fields are designed because of the short design life of leach fields. Based on the projected rate of retreat of the bluff, the primary leach field would not be threatened until long after the primary leach field has surpassed its design life and the septic waste has been directed to the reserve leach field. Therefore, the proposed development as conditioned will be set back sufficient distances from the bluff edge to provide for the economic life span for all elements of the development consistent with Section 30253 of the Coastal Act.

To ensure that (1) the development is actually setback sufficient distances as proposed to ensure its safety from bluff erosion and cliff retreat during the typical economic lifespan of a house and septic leach field, and (2) the setback would be of sufficient distance to eliminate the need for shoreline protection devices to protect the structure in the future consistent with Section 30253 of the Coastal Act, the Commission attaches Special Condition No. 3. This special condition requires that all final design and construction plans, including site, foundation, grading, and drainage plans, shall be consistent with the recommendations contained in the LACO Geotechnical report, and reviewed and approved by the Executive Director. As conditioned, the house must be relocated to provide for the 170-foot bluff setback recommended by LACO. In addition, the condition will require the applicants to construct the development consistent with the additional recommendations of LACO to ensure the safety of the proposed development from geologic hazards including recommendations concerning site preparation, fill placement and compaction, foundation designs, and drainage. The Commission finds that the proposed development as conditioned will be set back a sufficient distance from the bluff edge to provide for the economic design life of each element of the development and eliminate the need for shoreline protection devices to protect the development consistent with Section 30253 of the Coastal Act.

The Commission also attaches Special Condition No. 5, which prohibits the construction of shoreline protective devices on the parcel, requires that the landowner provide a geotechnical investigation and remove the house and its foundation if bluff retreat

reaches the point where the structure is threatened, and requires that the landowners accept sole responsibility for the removal of any structural debris resulting from landslides, slope failures, or erosion of the site. These requirements are consistent with Section 30253 of the Coastal Act, which states that new development shall minimize risk to life and property in areas of high geologic, flood, and fire hazard, assure structural integrity and stability, and neither create nor contribute significantly to erosion, geologic instability, or destruction of the site or surrounding areas, nor in any way require the construction of protective devices that would substantially alter natural landforms along bluffs and cliffs. The Commission finds that the proposed development could not be approved as being consistent with Section 30253 of the Coastal Act if projected bluff retreat would affect the proposed development and necessitate construction of a seawall to protect it.

As conditioned, portions of the development would be as close as approximately 138 feet to a bluff that is gradually eroding. Thus, the proposed development would be located in an area of high geologic hazard. The proposed development can only be found consistent with the above-referenced LCP provisions if the risks to life and property from the geologic hazards are minimized and if a protective device will not be needed in the future. The applicant has submitted information from a registered engineering geologist which states that if the new residence is set back 170 feet from the bluff edge, it will be safe from erosion and will not require any devices to protect the proposed development during its useful economic life.

Although a comprehensive geotechnical evaluation is a necessary and useful tool that the Commission relies on to determine if proposed development is permissible at all on any given bluff top site, the Commission finds that a geotechnical evaluation alone is not a guarantee that a development will be safe from bluff retreat. It has been the experience of the Commission that in some instances, even when a thorough professional geotechnical analysis of a site has concluded that a proposed development will be safe from bluff retreat hazards, unexpected bluff retreat episodes that threaten development during the life of the structure sometimes still do occur. Examples of this situation include:

- The Kavich Home at 176 Roundhouse Creek Road in the Big Lagoon Area north of Trinidad (Humboldt County). In 1989, the Commission approved the construction of a new house on a vacant bluff top parcel (Permit 1-87-230). Based on the geotechnical report prepared for the project it was estimated that bluff retreat would jeopardize the approved structure in about 40 to 50 years. In 1999 the owners applied for a coastal development permit to move the approved house from the bluff top parcel to a landward parcel because the house was threatened by 40 to 60 feet of unexpected bluff retreat that occurred during a 1998 El Nino storm event. The Executive Director issued a waiver of coastal development permit (1-99-066-W) to authorize moving the house in September of 1999.
- The Denver/Canter home at 164/172 Neptune Avenue in Encinitas (San Diego County). In 1984, the Commission approved construction of a new house on a vacant bluff top lot (Permit 6-84-461) based on a positive geotechnical report. In 1993, the owners applied for a seawall to protect the home (Permit Application 6-93-135). The Commission

denied the request. In 1996 (Permit Application 6-96-138), and again in 1997 (Permit Application 6-97-90) the owners again applied for a seawall to protect the home. The Commission denied the requests. In 1998, the owners again requested a seawall (Permit Application 6-98-39) and submitted a geotechnical report that documented the extent of the threat to the home. The Commission approved the request on November 5, 1998.

- The Bennett home at 265 Pacific Avenue, Solana Beach (San Diego County). In 1995, the Commission approved a request to construct a substantial addition to an existing bluff top home (Permit 6-95-23). The minimum setback for the area is normally 40 feet. However, the applicants agreed to waive future rights to shore/bluff protection if they were allowed to construct 25 feet from bluff edge based on a favorable geotechnical report. The Commission approved the request on May 11, 1995. In 1998, a substantial bluff failure occurred, and an emergency permit was issued for a seawall. The follow-up regular permit (#6-99-56) was approved by Commission on May 12, 1999. On August 18, 1999, the Commission approved additional seawall and upper bluff work on this and several other properties (Permit #6-99-100).
- The Arnold project at 3820 Vista Blanca in San Clemente (Orange County). Coastal development permit (Permit # 5-88-177) for a bluff top project required protection from bluff top erosion, despite geotechnical information submitted with the permit application that suggested no such protection would be required if the project conformed to 25-foot bluff top setback. An emergency coastal development permit (Permit #5-93-254-G) was later issued to authorize bluff top protective works.

The Commission notes that the examples above are not intended to be absolute indicators of bluff erosion on the subject parcel, as coastal geology can vary significantly from location to location. However, these examples do illustrate that site-specific geotechnical evaluations cannot always accurately account for the spatial and temporal variability associated with coastal processes and therefore cannot always absolutely predict bluff erosion rates. Collectively, these examples have helped the Commission form it's opinion on the vagaries of geotechnical evaluations with regard to predicting bluff erosion rates.

The LACO geotechnical investigation report states the following:

“The analyses and recommendations contained in this report are based on data obtained from surface and subsurface exploration at and near the site. The methods used indicate subsurface conditions only at specific locations where samples were obtained, only at the time they were obtained, and only to the depths penetrated. Samples can not always be relied on to accurately reflect stratigraphic variations that commonly exist between sampling locations, nor to they necessarily represent conditions at any other time.”

This language in the report itself is indicative of the underlying uncertainties of this and any geotechnical evaluation and supports the notion that no guarantees can be made regarding the safety of the proposed development with respect to bluff retreat.

Geologic hazards are episodic, and bluffs that may seem stable now may not be so in the future. Therefore, the Commission finds that the subject lot is an inherently hazardous piece of property, that the bluffs are clearly eroding, and that the proposed new development will be subject to geologic hazard and could potentially someday require a bluff or shoreline protective device, inconsistent with Section 30253 of the Coastal Act. The Commission finds that the proposed development could not be approved as being consistent with Section 30253 of the Coastal Act if projected bluff retreat would affect the proposed development and necessitate construction of a seawall to protect it.

Based upon the geologic report prepared by the applicants geologist and the evaluation of the project by the Commission's staff geologist, the Commission finds that the risks of geologic hazard are minimized if the residence is set back approximately 170 feet or more from the bluff edge as proposed. However, given that the risk cannot be eliminated and the geologic report cannot assure that shoreline protection will never be needed to protect the residence, the Commission finds that the proposed development is consistent with the Coastal Act only if it is conditioned to provide that shoreline protection will not be constructed. Thus, the Commission further finds that due to the inherently hazardous nature of this lot, the fact that no geology report can conclude with any degree of certainty that a geologic hazard does not exist, the fact that the approved development and its maintenance may cause future problems that were not anticipated, and because new development shall not engender the need for shoreline protective devices, it is necessary to attach Special Condition No. 5 prohibiting the construction of seawalls and Special Condition No. 6 requiring the waiver of liability.

In addition, as noted above, some risks of an unforeseen natural disaster, such as an unexpected landslide, massive slope failure, erosion, etc. could result in destruction or partial destruction of the house or other development approved by the Commission. In addition, the development itself and its maintenance may cause future problems that were not anticipated. When such an event takes place, public funds are often sought for the clean-up of structural debris that winds up on the beach or on an adjacent property. As a precaution, in case such an unexpected event occurs on the subject property, the Commission attaches Special Condition No. 5, which requires the landowner to accept sole responsibility for the removal of any structural debris resulting from landslides, slope failures, or erosion on the site, and agree to remove the house should the bluff retreat reach the point where a government agency has ordered that the structure not be occupied.

The Commission finds that Special Condition No. 4 is required to ensure that the proposed development is consistent with the Coastal Act. Special Condition No. 4 is required to provide notice of potential hazards of the property and help eliminate false expectations on the part of potential buyers of the property, lending institutions, and

insurance agencies that the property is safe for an indefinite period of time and for further development indefinitely into the future, or that a protective device could be constructed to protect the approved development. The condition requires that the applicant record and execute a deed restriction approved by the Executive Director against the property that imposes the special conditions of this permit as covenants, conditions and restrictions on the use and enjoyment of the property.

Additionally, the Commission attaches Special Condition No. 6, which requires the landowner to assume the risks of extraordinary erosion and geologic hazards of the property and waive any claim of liability on the part of the Commission. Given that the applicants have chosen to implement the project despite these risks, the applicants must assume the risks. In this way, the applicants are notified that the Commission is not liable for damage as a result of approving the permit for development. The condition also requires the applicants to indemnify the Commission in the event that third parties bring an action against the Commission as a result of the failure of the development to withstand hazards. In addition, the requirement of Special Condition No. 4 that a deed restriction be recorded will ensure that future owners of the property will be informed of the risks, the Commission's immunity from liability, and the indemnity afforded the Commission.

The Commission notes that Section 30610(a) of the Coastal Act exempts certain additions to existing single-family residential structures from coastal development permit requirements. Pursuant to this exemption, once a house has been constructed, certain additions and accessory buildings that the applicant might propose in the future are normally exempt from the need for a permit or permit amendment.

Section 30610(a) of the Coastal Act exempts certain additions to existing single family residential structures from coastal development permit requirements. Pursuant to this exemption, once the house has been constructed, certain additions and accessory buildings that the applicant might propose in the future could be exempt from the need for a permit or permit amendment. Depending on its nature, extent, and location, such an addition or accessory structure could contribute to geologic hazards at the site. For example, installing a landscape irrigation system on the property in a manner that leads to saturation of the bluff could increase the potential for landslides or catastrophic bluff failure. Another example would be installing a sizable accessory structure for additional parking, storage, or other uses normally associated with a single family home in a manner that does not provide for the recommended setback from the bluff edge.

To avoid such impacts to coastal resources from the development of otherwise exempt additions to existing homes, Section 30610(a) requires the Commission to specify by regulation those classes of development which involve a risk of adverse environmental effects and require that a permit be obtained for such improvements. Pursuant to Section 30610(a) of the Coastal Act, the Commission adopted Section 13250 of Title 14 of the California Code of regulations. Section 13250(b)(6) specifically authorizes the Commission to require a permit for additions to existing single-family residences that could involve a risk of adverse environmental effect by indicating in the development permit issued for the original structure that any future improvements would require a development permit. As

noted above, certain additions or improvements to the approved structure could involve a risk of creating geologic hazards at the site. Therefore, in accordance with provisions of Section 13250 (b)(6) of Title 14 of the California Code of Regulations, the Commission attaches Special Condition No. 7 which requires that all future development on the subject parcel that might otherwise be exempt from coastal permit requirements requires an amendment or coastal development permit. This condition will allow future development to be reviewed by the Commission to ensure that future improvements will not be sited or designed in a manner that would result in a geologic hazard. Special Condition No. 4 also requires recordation of a deed restriction to ensure that all future owners of the property are aware of the requirement to obtain a permit for development that would otherwise be exempt. This will reduce the potential for future landowners to make improvements to the residence without first obtaining a permit as required by this condition.

The Commission thus finds that the proposed development, as conditioned, is consistent Section 30253 of the Coastal Act, since the development as conditioned will not contribute significantly to the creation of any geologic hazards, will not have adverse impacts on the stability of the coastal bluff or on erosion, will not require the construction of shoreline protective works, and the Commission will be able to review any future additions to ensure that development will not be located where it might result in the creation of a geologic hazard. Only as conditioned is the proposed development consistent with Section 30253 of the Coastal Act.

4. Water Quality

Coastal Act Section 30230 states as follows:

Marine resources shall be maintained, enhanced, and where feasible, restored. Special protection shall be given to areas and species of special biological or economic significance. Uses of the marine environment shall be carried out in a manner that will sustain the biological productivity of coastal waters and that will maintain healthy populations of all species of marine organisms adequate for long-term commercial, recreational, scientific, and educational purposes.

Coastal Act Section 30231 states as follows:

The biological productivity and the quality of coastal waters, streams, wetlands, estuaries, and lakes appropriate to maintain optimum populations of marine organisms and for the protection of human health shall be maintained and, where feasible, restored through, among other means, minimizing adverse effects of waste water discharges and entrainment, controlling runoff, preventing depletion of ground water supplies and substantial interference with surface water flow, encouraging

waste water reclamation, maintaining natural vegetation buffer areas that protect riparian habitats, and minimizing alteration of natural streams.

Storm water runoff from new residential development can adversely affect the biological productivity of coastal waters by degrading water quality. Section 30230 and 30231 of the Coastal Act require the protection of the biological productivity and quality of coastal waters.

As discussed above, the subject parcel is located on a coastal terrace atop a steep coastal bluff. Runoff originating from the development site that is allowed to drain over the bluff edge would contain entrained sediment and other pollutants in the runoff that would contribute to degradation of the quality of marine waters.

Consistent with Coastal Act Sections 30230 and 30231, the Commission attaches Special Condition Nos. 1 and 2 to minimize erosion and sedimentation impacts from the proposed construction of the residence. Special Condition No. 1 requires that efforts be taken to ensure that in the handling and storage of construction materials, debris, and other wastes, no such materials be allowed to fall to the ocean. Special Condition No. 1 further requires that all debris and waste be removed from the project site and disposed of in an upland location outside of the coastal zone or at an approved disposal facility.

Special Condition No. 2 requires that the applicants submit for the review and approval of the Executive Director an Erosion and Runoff Control Plan that would provide that (1) straw bales be installed to contain runoff from construction areas, (2) on-site vegetation be maintained to the maximum extent possible during construction, (3) any disturbed areas be replanted or seeded with native vegetation following project completion, (4) all on-site stockpiles of construction debris be covered and contained to prevent polluted water runoff, and (5) runoff from the roof, driveway, and other impervious surfaces of the development be collected and directed into pervious areas on the site for infiltration and that velocity reducers be used on roof downspouts.

The Commission finds that as conditioned, the proposed development is consistent with Sections 30230 and 30231 of the Coastal Act because erosion and sedimentation will be controlled and minimized by (1) maintaining on-site vegetation to the maximum extent possible; (2) replanting or seeding any disturbed areas with native vegetation following project completion; (3) covering and containing debris stockpiles at all times; (4) using straw bales to control runoff during construction; and (5) directing runoff from the completed development in a manner that would provide for infiltration into the ground. Furthermore, the Commission finds that the proposed development as conditioned is consistent with the provisions of Coastal Act Sections 30230 and 30231 requiring that the biological productivity of coastal waters be sustained because storm water runoff from the proposed development would be directed away from the coastal bluff and would be controlled on site by infiltration into vegetated areas.

5. Public Access

Coastal Act Sections 30210, 30211, and 30212 require the provision of maximum public access opportunities, with limited exceptions. Section 30210 states that maximum access and recreational opportunities shall be provided consistent with public safety needs and the need to protect public rights, rights of private property owners, and natural resource areas from overuse. Section 30211 states that development shall not interfere with the public's right of access to the sea where acquired through use or legislative authorization, including, but not limited to, the use of dry sand and rocky coastal beaches to the first line of terrestrial vegetation. Section 30212 states that public access from the nearest public roadway to the shoreline and along the coast shall be provided in new development projects except where it is inconsistent with public safety, military security needs, or the protection of fragile coastal resources, adequate access exists nearby, or agriculture would be adversely affected.

In its application of these policies, the Commission is limited by the need to show that any denial of a permit application based on these sections, or any decision to grant a permit subject to special conditions requiring public access, is necessary to offset a project's adverse impact on existing or potential public access.

There is no evidence of trails on the site and no indication from the public that the site has been used for public access purposes in the past. Furthermore, the proposed development will not significantly increase the demand for public access to the shoreline and will otherwise have no significant impact on existing or potential public access. Therefore, the Commission finds that the proposed project, which does not include provision of public access, is consistent with the public access policies of the Coastal Act.

7. California Environmental Quality Act.

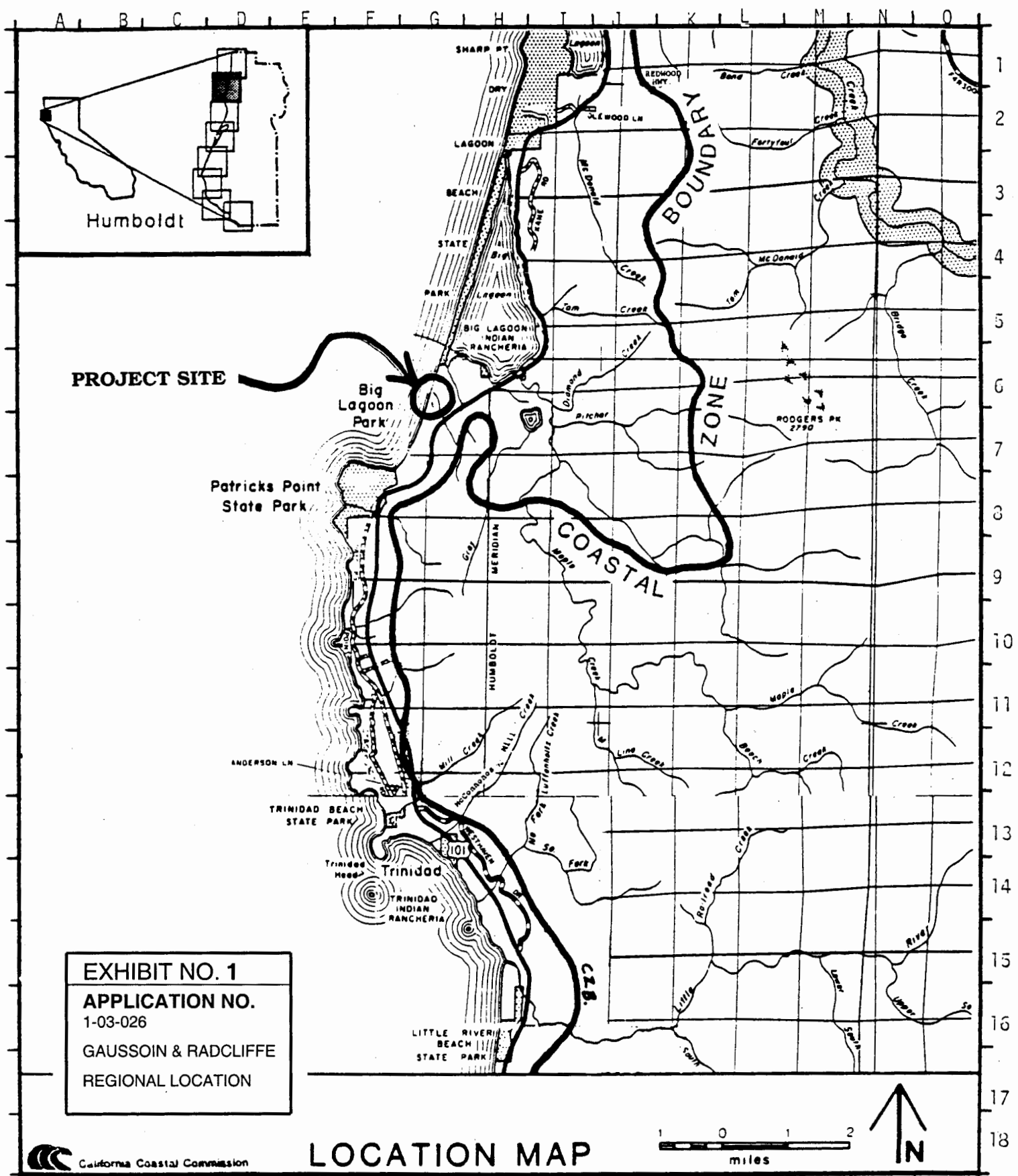
Section 13096 of the Commission's administrative regulations requires Commission approval of coastal development permit applications to be supported by a finding showing the application, as modified by any conditions of approval, to be consistent with any applicable requirement of the California Environmental Quality Act (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 effect the proposed development may have on the environment.

The Commission incorporates its findings on conformity with the Chapter 3 policies of the Coastal Act at this point as if set forth in full. These findings address and respond to all public comments regarding potential significant adverse environmental effects of the project that were received prior to preparation of the staff report. As discussed herein, in the findings addressing the consistency of the proposed project with the Chapter 3 policies of the Coastal Act, the proposed project has been conditioned to be found consistent with the Coastal Act. Mitigation measures, which will minimize all adverse environmental impacts have been required. As conditioned, there are no feasible alternatives or feasible mitigation measures available, beyond those required, which would substantially lessen any significant adverse

impact that the activity may have on the environment. Therefore, the Commission finds that the proposed project can be found to be consistent with the requirements of the Coastal Act to conform to CEQA.

Exhibits

1. Regional Location Map
2. Vicinity Map
3. Parcel Map
4. Site Plan
5. Rendering of House
6. Landscape Plan
7. Excerpts of Geotechnical Reports
8. Staff Geologist's Memorandum



PROJECT SITE

EXHIBIT NO. 1
APPLICATION NO.
 1-03-026
GAUSSOIN & RADCLIFFE
REGIONAL LOCATION

Humboldt

LOCATION MAP



PACIFIC

Lagoon S

Humboldt

Big Lagoon

101

24

- ① Beach Road
- ② Shore Lane
- ③ Surf Road
- ④ C Road
- ⑤ Huckleberry Lane
- ⑥ A Street
- ⑦ B Street
- ⑧ Big Lagoon Park Road
- ⑨ Devils Canyon Road

25 Big Lagoon County Park

Big Lagoon Indian Reservation

PROJECT SITE

26

Patrick's Point State Park

Humboldt Lagoons State Park

101

Roundhouse Creek Road

Roundhouse Creek

Roundhouse

Roundhouse

Roundhouse

Roundhouse

Roundhouse

Roundhouse

Roundhouse

Roundhouse

Roundhouse

Roundhouse

Roundhouse

Roundhouse

Roundhouse

To Trinidad

N 21/2 Mile

EXHIBIT NO. 2
APPLICATION NO.
 1-03-026
 GAUSSOIN & RADCLIFFE
 VICINITY MAP

EXHIBIT NO. 3
 APPLICATION NO.
 1-03-026
 GAUSSOIN & RADCLIFFE
 PARCEL MAP

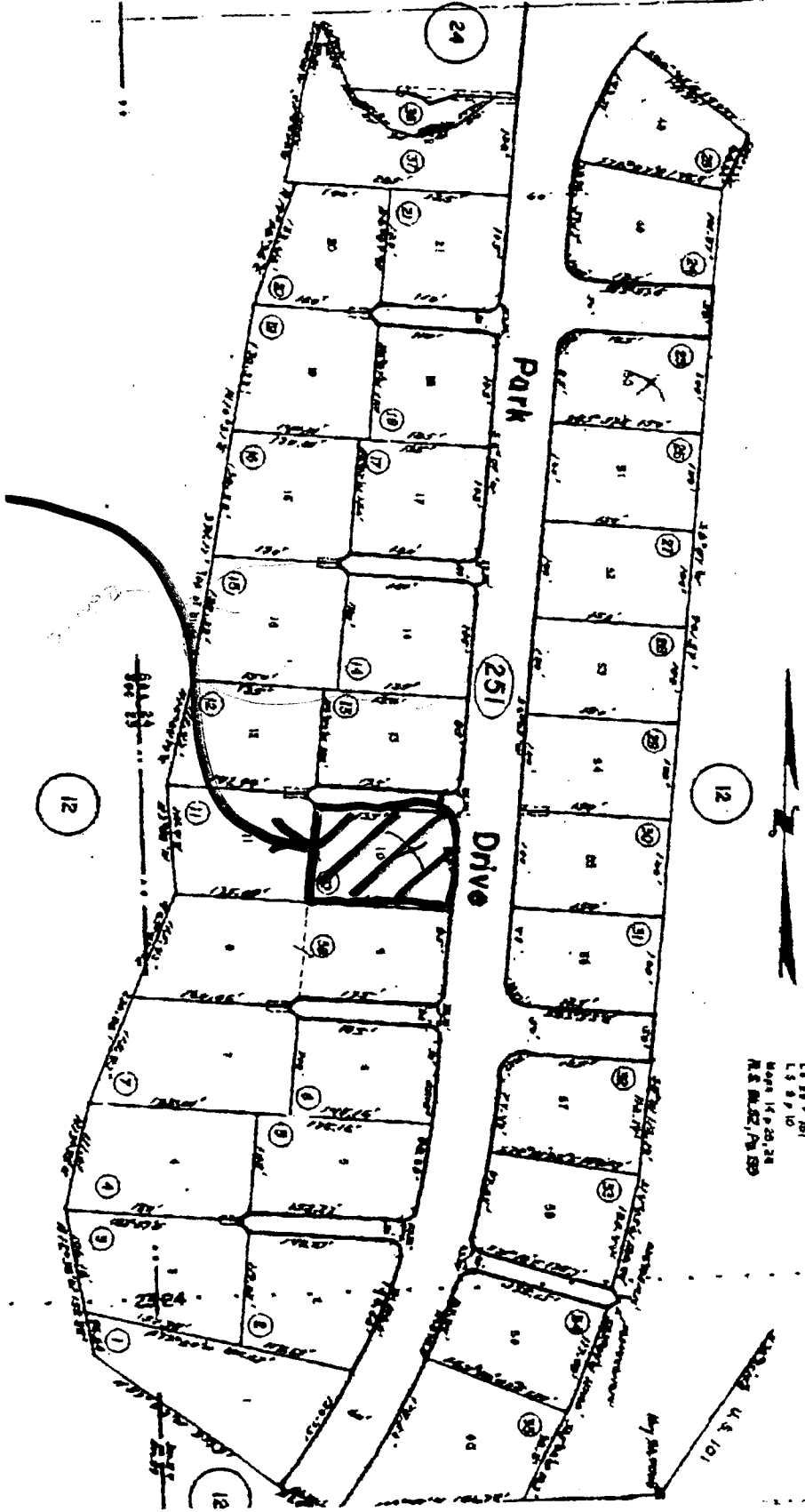
SECS 23 & 24, 9N 1W
 (BIG LAGOON PARK SUBDVN., TRACT 22, BLK. A)

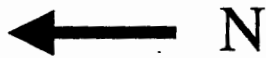
517 - 25

LS 88' 101
 LS 87' 10
 MAP 14, 20, 28
 N.E. 88, 82, 78, 59

1" = 100'
 8/31/82

SUBJECT PARCEL





Plot Plan

Roundhouse Road
Grass Area 8'

38' Blacktop Width

Distance to
corner
marker to
Blacktop of
Roundhouse
Road is 12'

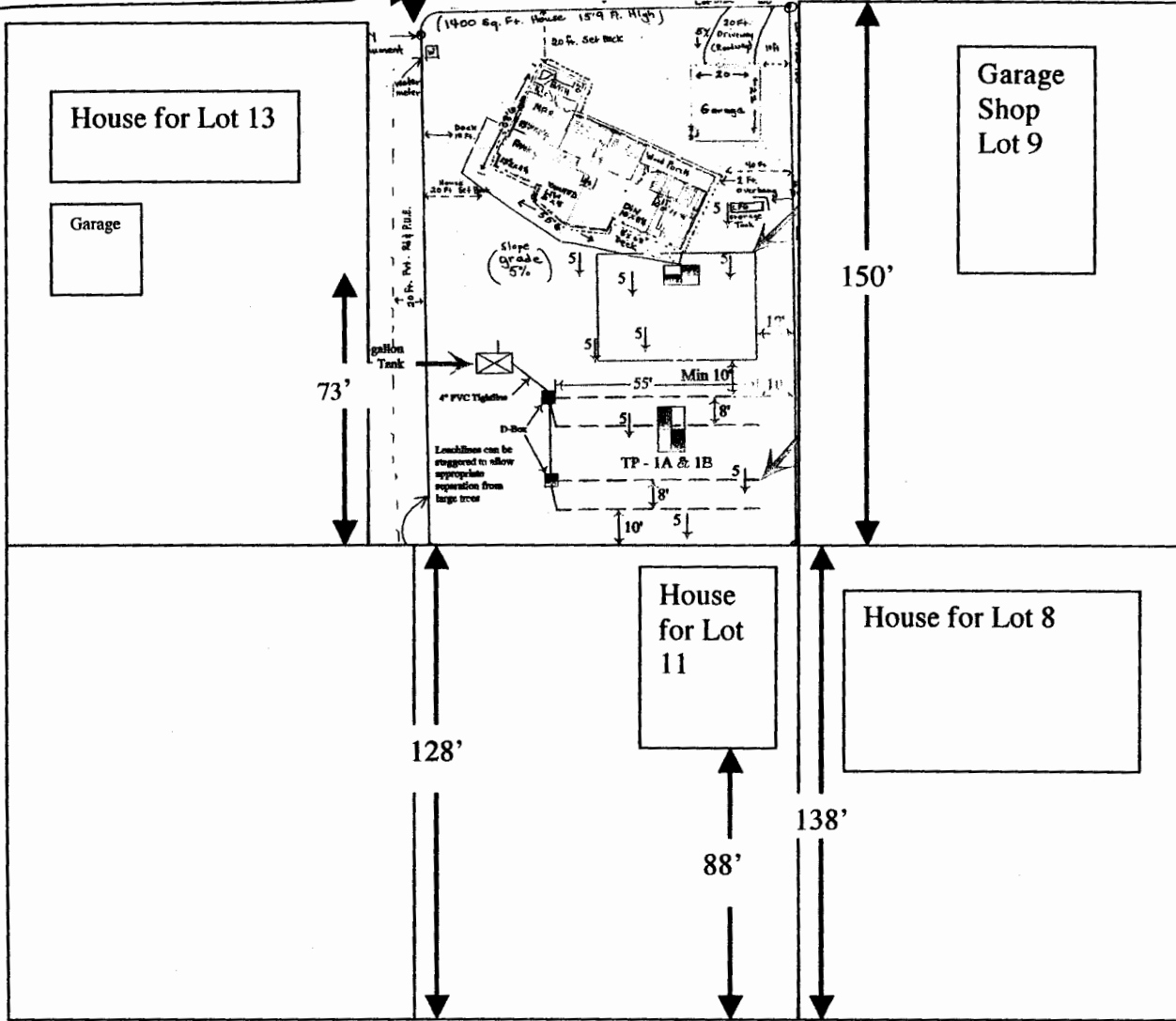


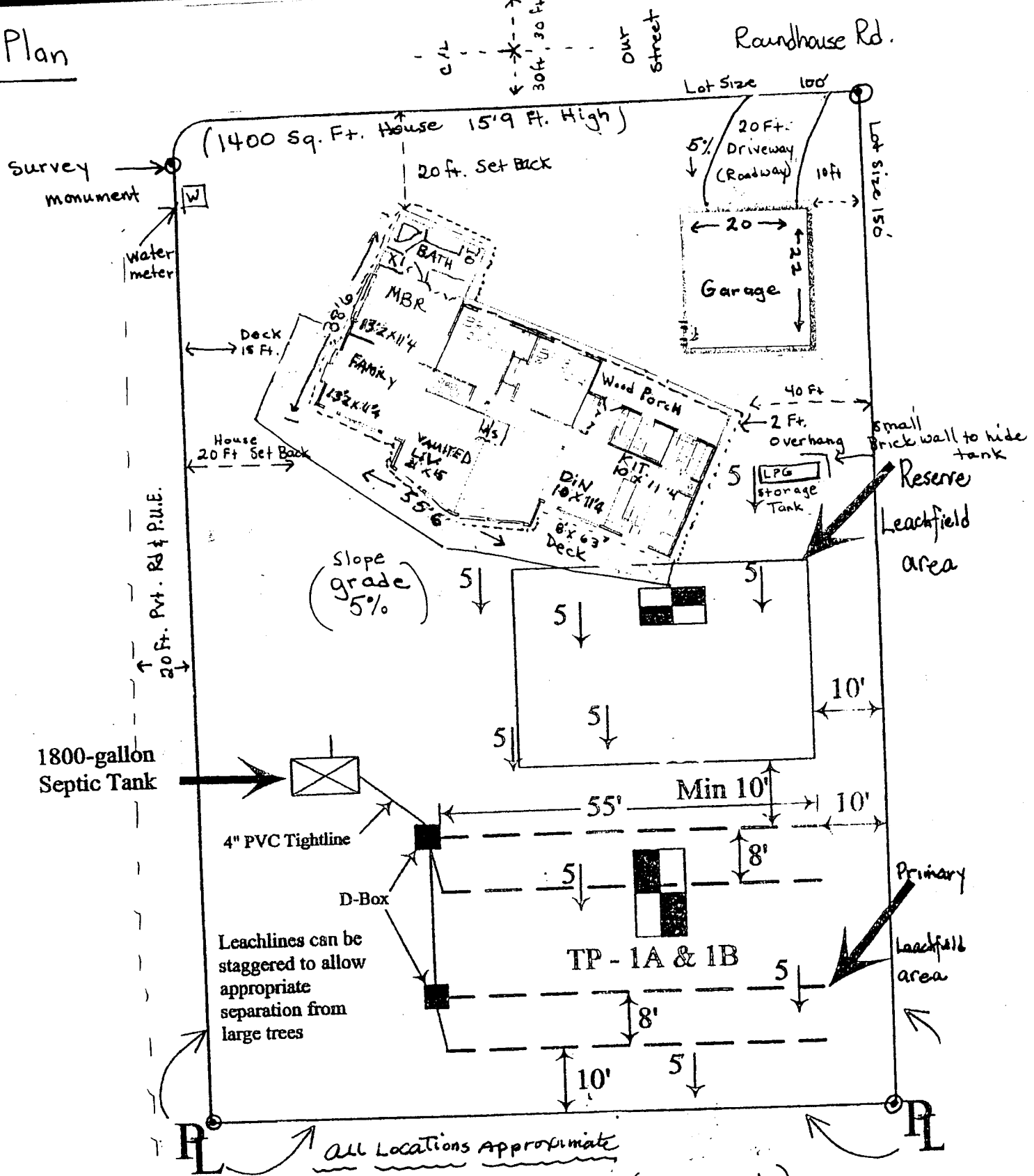
EXHIBIT NO. 4
 APPLICATION NO.
 1-03-026
 GAUSSOIN & RADCLIFFE
 SITE PLAN (1 of 2)

Distance from
property marker
to new
proposed house
on lot 10 is 73'

Cliff Edge

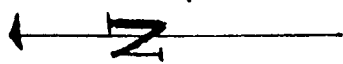
APN # 517-251-10
 Richard Radcliffe
 352 Roundhouse Rd.
 Big Lagoon, CA
 530-345-6529

lot Plan



- Not to Scale
- No proposed grading

APN # 517-251-10
Richard Radcliffe
352 Roundhouse Rd.
Big Lagoon, Ca.
(330) 345-6529



Proposed
352 RoundHouse Road
AP # 517-251-10



Specifications

Style: A-Frame
Recreation/Vacation
Bedrooms: 3
Baths: 2
Floors: 1
Unattached Garage: 2 Car 440 Sq. Ft.
Foundation: Crawlspace
Roof Height 15' 10"

Master Suite: First
Laundry: First
Finished sq. ft

First 1420
Total: 1420

EXHIBIT NO. 5

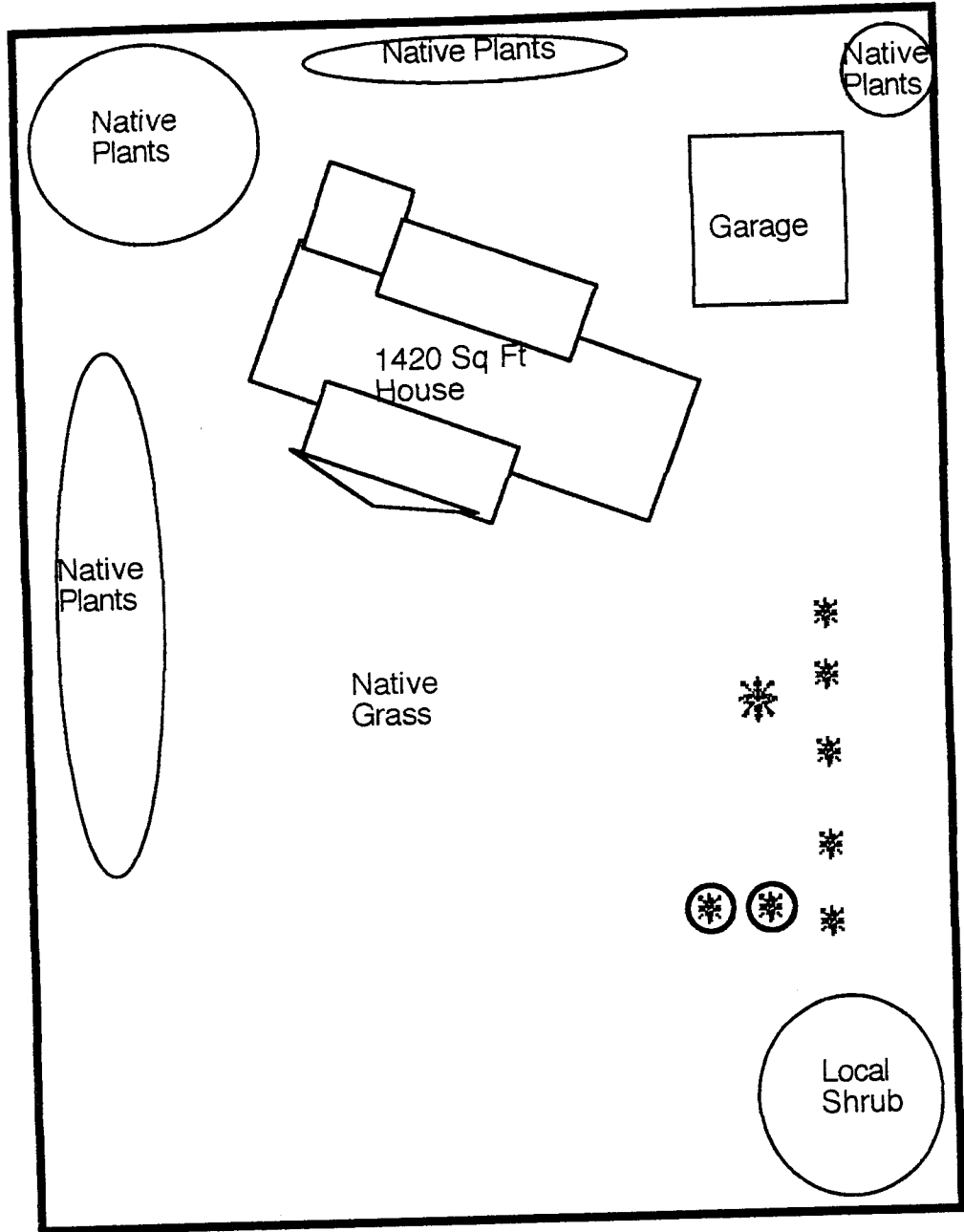
APPLICATION NO.

1-03-026

GAUSSOIN & RADCLIFFE

RENDERING

Roundhouse Road



Landscape Plan

EXHIBIT NO. 6
APPLICATION NO.
1-03-026
GAUSSOIN & RADCLIFFE
LANDSCAPE PLAN
(1 of 2)

Plant native grass on most of property

Leave native shrubs and plants on perimeter of property.

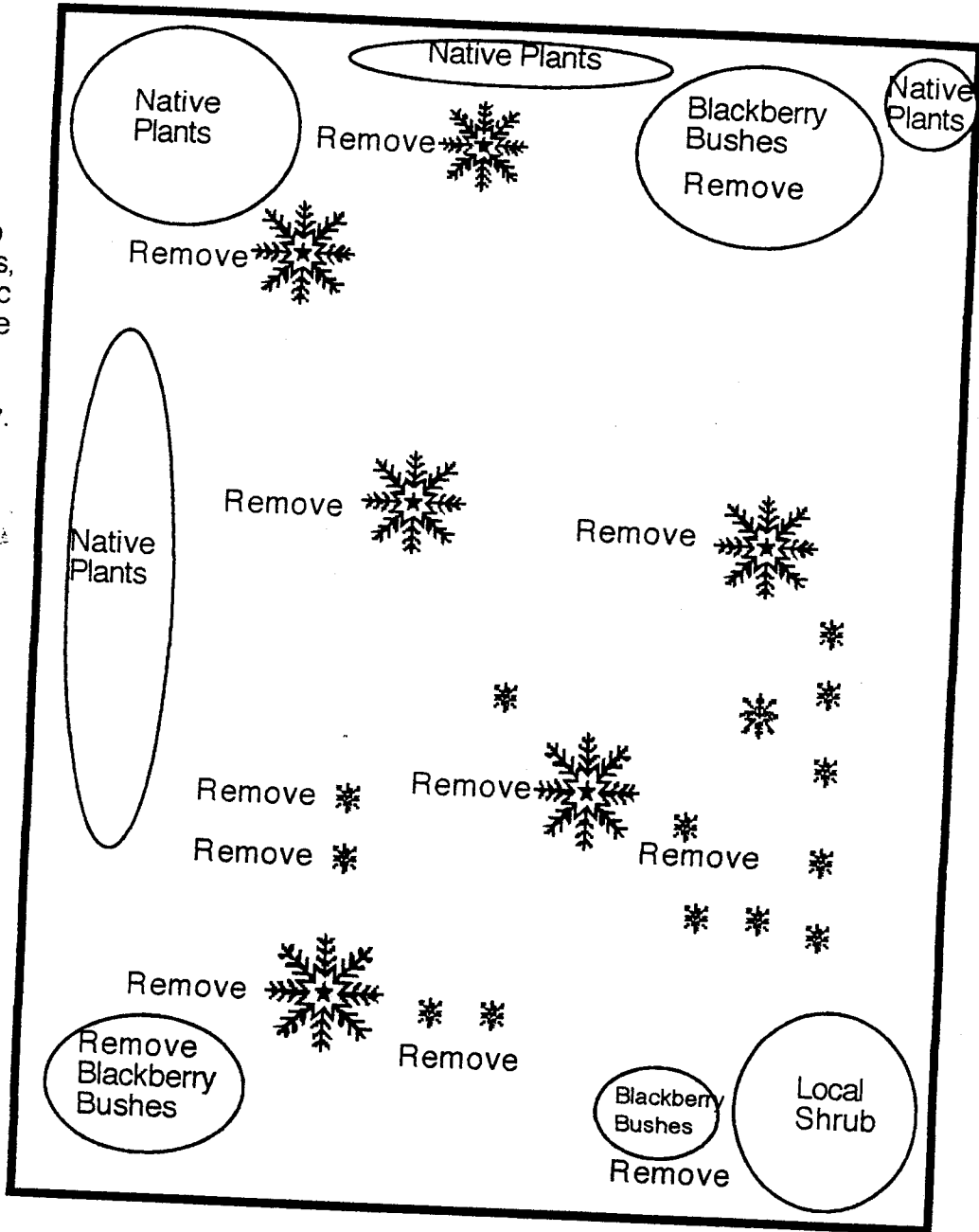
*Map not to Scale

APN # 517-251-10
Richard Radcliffe
352 Roundhouse Rd.
Big Lagoon, CA
530-345-6529

← N

Roundhouse Road

The removal of these trees is necessary due to building structures, leach fields, septic tank, and because many of these trees have been damaged severely. (The damaged trees are injured due to vandalizism. Some cuts are almost clear through the individual trunks.)



Tree Removal Plan

Remove 6 Monterey Pines



Remove 4 Sitka Spruce *

Remove Black Berry Bushes Front/Back Side

APN* 517-251-10
 Richard Radcliffe
 352 Roundhouse Rd.
 Big Lagoon, Ca.
 (580) 345-6529

*Not to scale (Map) 2 of 2

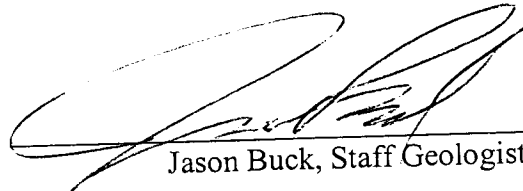
EXHIBIT NO. 7
APPLICATION NO.
1-03-026
GAUSSOIN & RADCLIFFE
EXCERPTS OF
GEOTECHNICAL REPORTS
(1 of 25)

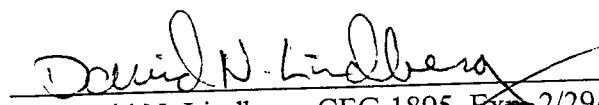
R-2 SOILS REPORT

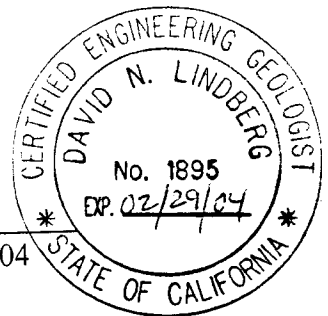
Proposed Residence
Roundhouse Creek Road, Trinidad, California

APN 517-251-10

Prepared for:
Richard Radcliffe
2278 Burlingame Drive
Chico, California 95928


Jason Buck, Staff Geologist


David N. Lindberg, CEG 1895, Exp. 2/29/04



LACO ASSOCIATES
CONSULTING ENGINEERS
21 W. 4th St. • PO 1023 • Eureka, CA 95502 • 707.443.5054

June 2003
Project No. 5463.00

R-2 SOILS REPORT

Proposed Residence

Roundhouse Creek Road, Trinidad, California

APN 517-251-10; LACO Project No. 5463.00

INTRODUCTION

Presented in this report are the results of our geologic/soils investigations conducted at the site of the proposed residential construction on Roundhouse Creek Road in Trinidad, Humboldt County, California (Figure 1). The project site is located in the west side of Section 24, T9N, R1W, HBM. The project location is shown on the attached location map (Figure 1) and site plan map (Figure 2).

PROPOSED PROJECT

The proposed project consists of a single family three-bedroom wood-frame home with an accompanying septic leach field. The project site is located 135 to 145 feet back from the bluff edge overlooking Agate beach. The proposed project site has an area of approximately 14,220 square feet. The property is bordered by Roundhouse Creek Road to the east and residences in the north, west and south directions. The proposed building will be served by an onsite septic system and community water.

SCOPE OF THIS INVESTIGATION

LACO ASSOCIATES (LACO) was retained to conduct a limited-scope soils investigation for the proposed residence to assess site drainage and to prepare this geologic/soils report evaluating the suitability of the site for the proposed construction.

GEOLOGIC SETTING

The project site is located within the northern Coast Ranges Geologic Province. The northern Coast Ranges Geologic Province in northwestern California is a seismically active area in which large earthquakes are expected to occur during the economic life span (70 years) of any development on the subject property. On the Geologic Map of California, Weed Sheet, the project area is mapped as being underlain by Pleistocene non-marine sediments. We have examined these materials in the field and we have reviewed published geologic mapping by the California Division of Mines and Geology. Based on our field work and literature review, we determined the geologic materials underlying the site to be deposits of Pleistocene-aged marine terrace sediments consisting of interbedded near-shore silts and sands.

2.9.25

FIELD INVESTIGATION

To assess the in-situ soil conditions at this site, two geotechnical hand borings (GHB-1 and GHB-2) were installed to five feet on June 2, 2003 by a registered geologist from LACO. Locations are noted on Figure 2. The hand borings were located to provide a representative assessment of the soil profile and subsurface conditions at the proposed building site. Geotechnical boring logs are included as Figures 3 and 4. An evaluation of the site drainage was also conducted.

IN-SITU SOIL CONDITIONS

Soils on the subject property are derived from deposits of Pleistocene marine terrace sediments. Since deposition, subsequent uplift and emergence of these marine terrace sediments, weathering and soil-forming processes have produced a 2 to 3 foot layer of organic rich topsoil. As observed in the two geotechnical hand borings (Figures 3 and 4), the native soils consist of dark brown native topsoil composed of sandy silt (ML) in the upper 2.5 feet below ground surface (bgs), yellowish brown silty sand (SM) to 4 feet bgs, grading down into a poorly graded sand (SP) with small amounts of silt to 5 feet bgs. A soil sample was taken from GHB-1 at a depth of 3 to 3.5 feet. Laboratory analysis indicated a dry density of 87 pounds per cubic foot and a moisture content of 23 percent (by weight). Laboratory results are included as Attachment 1. Soil profiles in both borings were essentially identical indicating a laterally homogeneous profile throughout the site.

SLOPE STABILITY FEATURES AND CONDITIONS

The proposed building site is on a gentle slope falling to the west with a maximum slope of 5 percent on the eastern half of the site. Slope stability maps of Humboldt County (Humboldt County General Plan Map, 1984) show the site to be within a zone of "moderate instability." No obvious undercutting or slope movement was observed during the site investigation.

Events of the recent past indicate the coastal bluffs in the vicinity of the project area to be susceptible to slope failure. Evidence of past slope failure is observable to varying degrees along the coastal bluff from Patrick's Point to Big Lagoon. Analysis and interpretation of aerial photos from 1942 to 1998 indicate major bluff retreat has occurred along this section of coast. A list of photo-pairs examined is included in the reference section of this report.

Many of the slopes in coastal Humboldt County, particularly the coastal bluffs west of the project site, show evidence of active coastal retreat. Slope failure has occurred along much of the coastal bluff during recent wetter-than-average winters when coupled with storm surf and high tides. The

3425

coastal bluff area from Agate Beach to Big Lagoon has a higher potential for slope failure, in general, than many areas of Humboldt County due to (among other factors) the over-steepened bluff and erodible marine terrace deposits that comprise it, high annual precipitation, and direct exposure to northwest winter swells coupled with a steep wave slope.

Along the bluff fronting the Big Lagoon community (north of the project site), about 100 feet of bluff retreat was documented between 1942 and 1998. Most of this retreat occurred near the southern end of Big Lagoon and it appears that the long-term average retreat rate decreases to the south toward Patrick's Point. It is noteworthy that of this total, 60 feet of bluff retreat occurred during February 1998 during a month-long episode of storm surf coupled with high tides. The average annual rate of bluff retreat at Big Lagoon between 1942 and 1998, based on the total combined amount, is estimated to range between 1.5 and 1.8 feet per year. However, as observed in February 1998 and in past storm events, coastal bluff retreat occurs episodically whereby tens of feet of bluff retreat take place in a short time. At present, the section of bluff north of the project site along Ocean View Road that was most affected by the recent episode of coastal retreat appears to remain unstable. Fresh colluvial aprons are present along much of the toe of the bluff. Densely spaced ground cracks, oriented parallel to the bluff edge, are observable along several sections. Apparently when significant bluff retreat occurs, the bluffs take some time to stabilize.

The subject property lies approximately 135 to 145 feet back from the bluff edge. Historically, many properties located along the bluff edge have been forced to relocate or be removed. Due to the episodic nature of the bluff retreat, failures can occur with little or no warning. Based on maximum calculated values of bluff retreat (1.8 ft/yr), the bluff edge can be expected to reach the western edge of the property in about 75 years. This is a general guideline based on the average rate of bluff retreat seen in the vicinity within the last 60 years. As observed in February of 1998, bluff retreat rates are intermittent and episodic, and are dependent on the frequency and conditions of severe weather episodes.

EXISTING FILLS

No fill was observed at the proposed building site during our investigation.

GROUNDWATER CONDITIONS

Groundwater was not encountered in the hand borings, but was measured in one of four observation wells previously installed as part of a leachfield suitability investigation (by others). Water was

observed at a depth of 12 feet bgs in the northwest observation well. The other three wells were shallower than 10 feet and were consequently dry. Locations of the observation wells are noted in Figure 2. During wet periods such as late winter or early spring, the groundwater surface, or water table, is probably at its highest elevation. Groundwater is not expected to rise to an elevation that would have a detrimental effect on the proposed development.

SURFACE DRAINAGE HAZARDS

The proposed building site appears to be generally well drained at depth. Gentle topography onsite transfers surface water as sheet flows that infiltrate down easily into the subsurface. There are no incised water courses (i.e., rills and gullies) onsite. Provided that our recommendations are adhered to, surface drainage does not appear to be a hazard to the proposed development of this property.

FLOODING

The site is not within a flood prone area and the hazard of flooding is considered low.

SEISMIC HAZARDS

There are two primary areas of concern for evaluating seismic hazards for a site. These are: (1) the potential for ground rupture due to placement of a structure on or near an active fault; and (2) the anticipated magnitude and peak acceleration of the postulated seismic event. In response to the first area of concern, the site is not located within a Fault Hazard (Special Studies) Zone (CDMG, 1983), although there is such a zone (Trinidad Fault) approximately six miles to the south. The level of anticipated shaking at the site is a function of the following factors: (1) the magnitude of the postulated earthquake on a given fault system; and (2) the closest distance from that fault system to the site. A detailed discussion of this process has been presented by Seed and Idriss (1982).

The project area is located on the northeast dipping backlimb of the Trinidad anticline. The Trinidad fault is an active northwest striking, northeast dipping, reverse (or thrust) fault located approximately six miles south-southwest of the project area, and is recognized to be the fault responsible for the active growth of the Trinidad anticline. The offshore trace of the Trinidad fault may be as proximal as four miles from the project site. The upper-bound earthquake considered likely to occur on the Trinidad fault has an estimated moment magnitude (MG Max) of 7.3 with a reported slip rate of 2.5 mm/yr. (CDMG, 1998). Ground accelerations of 0.70 g to 0.80 g (70 to 80 percent of the force of gravity), or more, may be expected to occur on this site as a result of the regional design base earthquake (Petersen et al, 1999).

The Cascadia Subduction Zone is another significant regional seismic source that marks the boundary between the North American Plate and the subducting Gorda and Juan De Fuca plates. Recent and ongoing research into the seismicity of the Pacific Northwest has shown that the Cascadia Subduction Zone is capable of generating major earthquakes that will affect this site. The Cascadia Subduction Zone extends from Cape Mendocino in Humboldt County, California, to Victoria Island in British Columbia, and is considered capable of generating an upper-bound earthquake of M_0 8.3 on its southern, or Gorda segment.

LIQUEFACTION HAZARD

Liquefaction is the loss of soil strength, resulting in fluid mobility through the soil. Liquefaction typically occurs when uniformly-sized, loose, saturated sands or silts are subjected to repeated shaking in areas where the groundwater is less than 30 feet below the surface. In addition to the necessary soil and groundwater conditions, the ground acceleration must be high enough, and the duration of the shaking must be sufficient for liquefaction to occur. Based on our limited-scope field investigation, we estimate a low potential for liquefaction-related damage to occur at this site due to the age and density of the native soils present.

DISCUSSIONS AND CONCLUSIONS

Our investigation and evaluation of this property suggests that a minimum of 2 to 3 feet of relatively undisturbed native topsoil overlies the site. The native soils consist of sandy silt and silty sand and grades into poorly graded sands at depth. The native soils on this site were developed by in-place weathering of Pleistocene nearshore, shallow-water marine terrace deposits (silt, sand, and gravel).

The level of peak acceleration at this site for a Design Basis Earthquake is estimated to range from 0.7g to 0.8 g. Due to the silty nature of the underlying soils, the potential for liquefaction is expected to be low. Detrimental total or differential settlement is not expected to occur, provided our foundation design recommendations are adhered to.

The subject property is located within 135 to 145 feet of an actively eroding coastal bluff. Eventually the bluff edge will reach the property, at which time the structures will need to be removed or relocated. The estimates for this threat are dependent on conditions that contribute to bluff erosion (storm activity, wave action, steepness of bluff, precipitation, etc.), and these conditions vary from year to year. Seventy five years is the expected time of bluff edge contact with the property based on bluff retreat rates averaged over the last 60 years.

6 of 25

The subject property is within a seismically active region and is likely to experience significant ground shaking during the design life of the proposed buildings. Our recommendations, which follow, are intended to reduce, but may not eliminate completely, the risks associated with the geologic hazards of the site and this region. Therefore, our recommendations should be carefully adhered to.

RECOMMENDATIONS

Seismic Recommendations

The Seismic Shaking Hazard Map of California (CDMG, 1999) shows the Big Lagoon area to have a 10 percent probability of exceeding 0.7 g to 0.8 g peak ground acceleration within 50 years. The 1997 edition of the California Building Code (CBC) shows these sites to be in CBC Seismic Zone 4. For design purposes, and based on our investigation of the sites, we characterize the soil profile as a "stiff soil profile" (S_D , Table 16-J, and Section 1629.3.1 2001 CBC). The Seismic Coefficient C_a is 0.44 N_a (CBC Table 16-Q) and Seismic Coefficient C_v is 0.64 N_v (CBC Table 16-R) based on the site being underlain by a stiff soil profile and the location of the site in Seismic Zone 4.

The Near-Source Factor N_a (CBC Table 16-S) is 1.3, due to the location of this site, inside of the near-source area of a Type B fault, as presented in Map A-4 in the *Maps of Known Active Fault Near-Source Zones in California and Adjacent Portions of Nevada* (ICBO, 1998). Near-Source factor N_v (CBC Table 16-T) is 1.6, again because the site is in the near-source area of a Type B Seismic Source (fault).

The Trinidad fault is a Type B fault and is within proximity (4 miles) of the subject property. Table 16-U (CBC, 2001) defines Type B seismic sources. To be classified as a Type B fault, a fault either must be considered capable of generating an earthquake with a maximum moment magnitude (M_o) of greater than 6.5 and have a slip rate generally between 2 and 5 millimeters per year.

General Recommendations

Site Preparation: Earthwork (grading and excavations) should proceed during the dry season. In the winter-wet season, generally mid-October to mid-April, excessive surface runoff may be encountered and excessive sediment may be entrained in runoff. Grading of building sites should be such that all runoff is diverted away from the foundations. We recommend that ground surface surrounding the building be sloped a minimum of 2 percent away from the foundation to help assure positive drainage.

7 of 25

Setbacks: Setbacks should be in accordance with the CBC and local regulations.

Fills: With the exception of landscaping fills, which should in general be select topsoil, all fill materials should be well-graded, imported granular material, such as crushed quarry rock or river-run gravels (100 percent passing 3-inch sieve). Native soils on the site may not be suitable for use as structural fill, but may be usable if analyzed in the LACO materials testing laboratory prior to use. Structural fill should be placed in loose lifts not exceeding 8 inches on a suitably-prepared "benched" subgrade surface, and should be compacted mechanically so that no settlement will occur. We recommend compaction to a minimum of 90 percent relative compaction (RC) under sidewalks and landscaped areas.

Structural fills should be compacted as specified in "Compaction Standard" below to at least 90 percent RC for depths below 2 feet from finished grade, and 93 percent RC above the 2-foot depth under all footings, foundations, driveways, decks, and porches. Fill materials should be placed at a uniform moisture content at or near optimum. Samples of proposed native or imported fill should be submitted to LACO's materials testing laboratory for assessment at least 48 hours prior to placement, or importing to the site (whichever is soonest).

Compaction Standard: Materials processed in-place and utilized as compacted fill under footings, foundations, driveways, sidewalks, and parking areas, should be based on ASTM D-2922 in-situ measurement of dry unit weight. Maximum dry unit weight should be determined using ASTM Laboratory Test Method D-1557.

Utility Trench Backfill: Backfill and compaction of utility trenches in and immediately adjacent to the building pad, driveway, parking, and other flat-work areas, should be such that no settlement will occur. Backfill materials for all trenches should be placed in loose lifts not exceeding 8 inches and should be compacted to at least 90 percent RC for depths below 2 feet from finished grade, and 93 percent RC above the 2-foot depth. Sufficient testing should be performed by the LACO project engineer or his designated representative to confirm compliance with the compaction recommendations. Concrete sand, or other approved granular material used for backfill, should only be placed at near-optimum moisture content and compacted mechanically. Flooding of granular material should never be employed to consolidate backfill in any trench.

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Foundation Design Criteria

We understand that a residential structure of typical wood-frame construction is proposed for construction on this site. We recommend that the foundation system for this structure consist of continuous perimeter and interior spread footings, or concrete slab-on-grade with thickened edge.

Conventional Perimeter Spread Footings

We recommend that the footings be embedded a minimum of 12 inches into the medium dense, yellowish brown, silty sand (SM), below the topsoil. Anticipated footing depth is approximately 2.5 to 3.5 feet below existing grade as of the date of our investigation. Spread footings should be designed in accordance with the 2001 CBC. To assure that foundations are adequately supported, the footing excavations should be inspected and approved by the LACO project engineer prior to placement of any fill, forms, or reinforcing steel. If site conditions vary from those described herein, LACO should be contacted for inspection prior to construction of any work.

Slab on Grade

All topsoil material within the building footprint, and 5 feet beyond, should be excavated down to the medium dense native silty sand (SM) at a depth of approximately 2 to 3 feet as observed on our test borings. The excavation should be observed by LACO upon completion to ensure applicability of, and compliance with, our recommendations. If site conditions vary from those described herein, LACO should be contacted for inspection prior to construction of any work. Structural fill may be used to bring the excavations to suitable grade. Garage and any other concrete slab-on-grade floors should have a minimum thickness of 3.5 inches, and should be reinforced and underlain by at least 8 inches of compacted select fill consisting of 6 inches of Caltrans class-2 permeable material to act as a capillary moisture break. To reduce the possibility of moisture migration through any floor slab-on-grade, a plastic membrane (vapor retarder) should be placed on the compacted base. To protect the membrane during steel and concrete placement, and to provide for a better concrete finish, cover the membrane with 2 inches of clean sand. Joints between the sheets and utility piping openings should be lapped and taped. Care should be taken during construction to protect the plastic membrane against punctures. The 8 inches of sand and gravel may be considered part of the recommended thickness of compacted select fill under the floor slab.

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Bearing Values and Lateral Support

The allowable bearing pressures for continuous spread footings or grade beams, founded on the subgrade prepared as recommended, is 1,000 pounds per square foot (psf) in accordance with the 2001 CBC (dead load plus long-term live load). Bearing pressures may be increased to 1,300 pounds psf for short-term live loads due to wind and seismic shaking. Lateral bearing pressures in accordance with table 18 I-A (CBC), for class 5 materials may be used.

Settlement

Settlement is expected to be minimal for foundation elements bearing on firm, undisturbed native soils and embedded as recommended. Settlement is expected to occur closely with the application of structural loads. If our recommendations are adhered to, settlement is not anticipated to have detrimental effects on the structure. Foundation elements at this site should never be placed on non-engineered fill, or on engineered fill which has not been tested and approved by a qualified professional.

General Landscaping

Drainage: The grading for landscaping design and construction should be such that rain and roof runoff water are directed away from the structure foundations and no water is allowed to migrate beneath the structure or to pond anywhere on the site. Options for the discharge of runoff are limited because the roadway is located 5 to 6 feet above the proposed footprint of the residence and the site is bordered by residences on the other three sides. Roof storm drainage should be controlled with the installation of gutters and downspouts. Downspouts should discharge runoff to the surface in such a way that no erosion will occur and water will infiltrate into the subsurface before reaching any neighboring properties. Provided that our recommendations are adhered to, surface drainage does not appear to be a hazard to the proposed development of this property.

REVIEW OF FOUNDATION AND LANDSCAPE PLANS

The conclusions and recommendations provided in this report are based on the assumption that soil conditions encountered during excavation and/or foundation construction will be essentially as exposed during our evaluation and that the general nature and use of the property will be as described above. We recommend that the final drafts of grading, landscape plans, and the preliminary foundation design drawings be reviewed by LACO ASSOCIATES prior to their finalization, approval, and implementation.

OBSERVATION AND TESTING

Excavation and construction at the site should be performed in accordance with the requirements of the County of Humboldt, the currently in-force edition of the CBC, and the recommendations contained within this report.

LIMITATIONS

This report has been prepared for the exclusive use of Mr. Radcliffe, his consultants, and the appropriate public authorities for specific application to the proposed residential building. LACO ASSOCIATES has endeavored to comply with generally accepted geotechnical engineering practice common to the local area. LACO ASSOCIATES makes no other warranty, express or implied.

The analyses and recommendations contained in this report are based on data obtained from subsurface exploration. The methods used indicate subsurface conditions only at specific locations where samples were obtained, only at the time they were obtained, and only to the depths penetrated. Samples can not always be relied on to accurately reflect stratigraphic variations that commonly exist between sampling locations, nor do they necessarily represent conditions at any other time. Results of any analyses of samples obtained during this project will be retained on file in our office.

The recommendations included in this report are based in part on assumptions about subsurface conditions that may only be tested during earthwork. Accordingly, the validity of these recommendations is contingent upon LACO ASSOCIATES being retained to provide a complete professional service. LACO ASSOCIATES can not assume responsibility or liability for the adequacy of the recommendations when they are applied in the field unless LACO ASSOCIATES is retained to observe construction. We will be glad to discuss the extent of such observation required to provide assurance of the validity of our recommendations.

Do not apply any of this report's conclusions or recommendations if nature, design, or location of any of the facilities are changed. If changes are contemplated, LACO ASSOCIATES should be consulted to review their impact on the applicability of the recommendations in this report. Also note that LACO ASSOCIATES is not responsible for any claims, damages, or liability associated with any other party's interpretation of the subsurface data or reuse of this report for other projects or at other locations without our express written authorization.

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The scope of our services did not include environmental assessment or an investigation for the presence or absence of hazardous, toxic, or corrosive materials. Although we have explored subsurface conditions as part of this investigation, we have not conducted any analytical laboratory testing of samples obtained for the presence of hazardous material.

ADDITIONAL SERVICES

LACO ASSOCIATES should be retained during construction to provide the engineering, testing, and inspection services necessary to assure that the quality of materials and compaction of fill are in accordance with the plans and specifications.

REFERENCES

CDMG, 1983, Special Studies Zone Map; Trinidad 7.5' Quadrangle, Humboldt County, California:
California Division of Mines and Geology, Scale 1:24,000

ICBO (International Conference of Building Officials), 1998, Maps of Known Active Fault Near-Source Zones in California and Adjacent Portions of Nevada

Humboldt County General Plan Map, Map Sheet 2 of 5, 1984

Petersen, M. D., Beeby, D. J., Bryant, W. A., Cao, C., Cramer, C. H., Davis, J. F., Reichle, M. S., Saucedo, G. J., Tan, S. S., Taylor, G. C., Topozada, T. L., Tremain, J. A., and Wills, C. J., (1999), Seismic Shaking Hazard Maps of California: California Division of Mines and Geology, Map Sheet 48

Seed, H. B. and Idriss, I. M., (1982), Ground Motions and Soil Liquefaction During Earthquakes. Earthquake Engineering Research Institute

CBC (California Building Code), 2001 edition

AIR PHOTO REFERENCES

USDA (1942), CVL-9B-134 TO CVL-9B-136, 1:20,000

CDF (1948), CDF 2-14-131 to 2-14-133, 1:20,000

HUMCO (1962), HCN-2 10B-8 to 10B-11, HCN-2 11B-10 to 11B-12, 1:12,000

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HUMCO (1966), HC-66 14B-57 to 14B-59, 1:12,000

HUMCO (1970), CH-66 13C-12 to 13C-14, 14C-11 to 14C-13, 1:12,000

HUMCO (1985), 6-8 to 6-11, 1:12,000

1996, 1-14-22 to 1-14-23, 1-14-25 to 1-14-26, 1:12,000

RICHARD B. DAVIS (1998), SPOT 1-SPOT 2, 1:4,000

LIST OF FIGURES AND ATTACHMENTS

Figure 1: Location Map

Figure 2: Site Plan Map

Figures 3, 4: Logs of the Geotechnical Hand Borings

Attachment 1: Laboratory Results from Selected Soil Samples

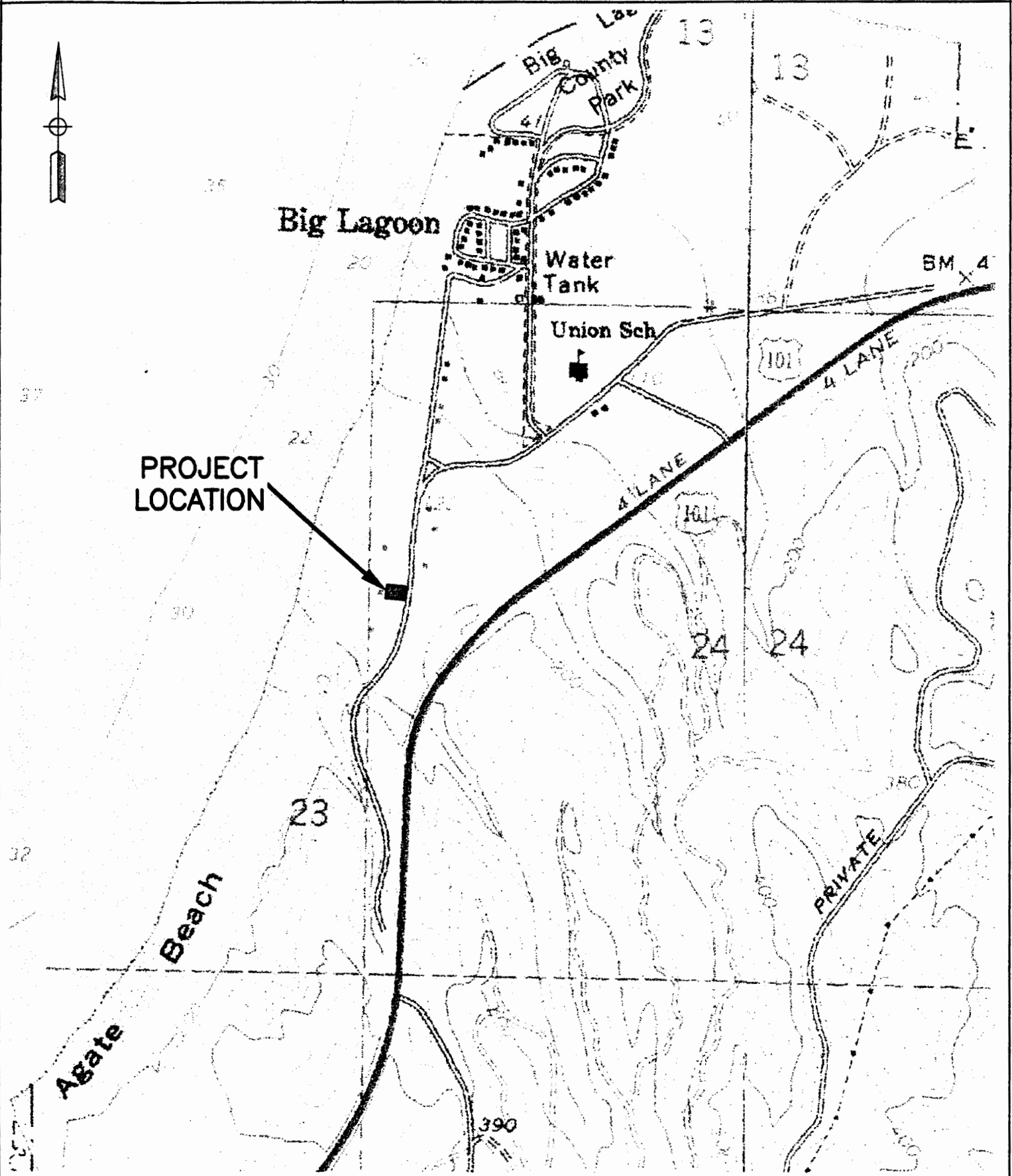
P:\Projects\5400\5463_RichardRadcliffe\5463_R2 Soils Report.doc

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LACO ASSOCIATES
 CONSULTING ENGINEERS
 21 W 4TH ST. EUREKA, CA 95501 (707)443-8054

PROJECT	R-2 SOILS REPORT	BY	BAB	FIGURE	1
CLIENT	RICHARD RADCLIFFE	DATE	6/9/03		
LOCATION	BIG LAGOON RESIDENCE	CHECK	DNL	JOB NO.	5463.00
	LOCATION MAP	SCALE	1"=1000'		



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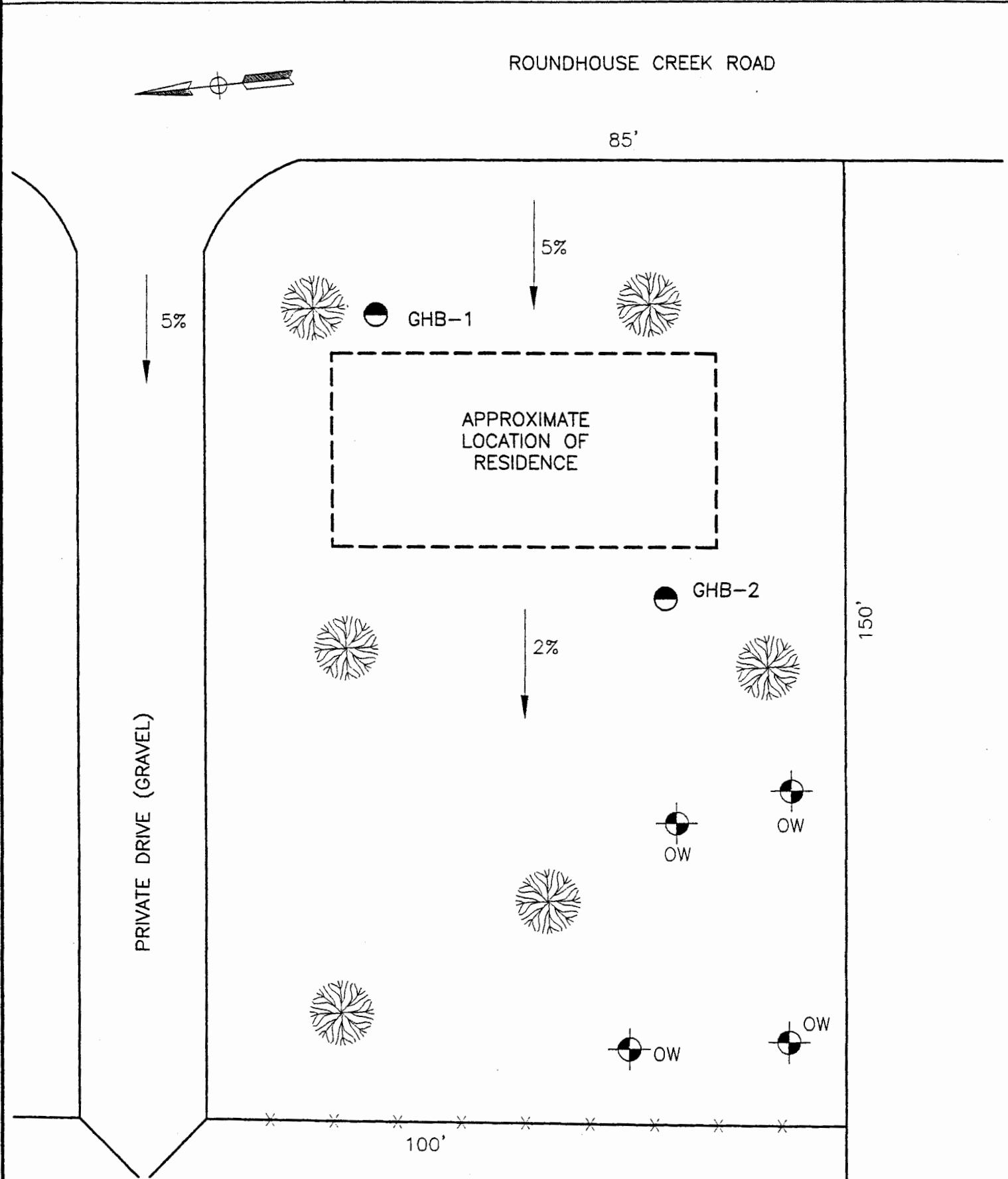


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CONSULTING ENGINEERS
21 W 4TH ST. EUREKA, CA 95501 (707)443-5054

PROJECT R-2 SOILS REPORT
CLIENT RICHARD RADCLIFFE
LOCATION BIG LAGOON RESIDENCE
SITE MAP

BY BAB
DATE 6/9/03
CHECK DNC
SCALE 1"=20'

FIGURE 2
JOB NO. 5463.00



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GEOTECHNICAL BORING LOG

Boring No. GHB-2

PROJECT: R-2 SOILS INVESTIGATION
 BORING LOCATION: PROPOSED RESIDENCE
 DRILLING METHOD: 4" HAND AUGER
 DRILLER: LACO ASSOCIATES
 DEPTH TO WATER: INITIAL ∇ : NONE
 SITE GEOLOGY: Uplifted Pleistocene Marine Terrace Deposits

PROJECT NO.: 5463.00
 DATE: 6/2/03
 ELEVATION: 160 FEET
 LOGGED BY: GAV

COMPLETION ∇ : NONE

ELEVATION/ DEPTH	SOIL SYMBOLS, SAMPLERS AND TEST DATA	USCS	Description	Water Content %	Dry Density pcf	STANDARD PENETRATION TEST		
						DEPTH	N	CURVE
								10 30 50
160 — 0		ML	SANDY SILT; Dark Brown, dry, soft, non-sticky, non-plastic, single grain; Estimated in the field, 10% clay, 50% silt, 40% fine sand.					
159 — 1								
158 — 2								
157 — 3		SM	SILTY SAND; Yellowish Brown, loose to medium dense, non-sticky, slightly plastic, granular; approximately 15% clay, 25% silt, 60% fine sand.					
156 — 4		SP	POORLY GRADED SAND w/SILT; Yellowish Brown, medium dense, moist, non-sticky, non-plastic, single grain; about 10% clay, 15% silt, 75% fine/medium sand.					
155 — 5			HALT					
154 — 6								
153 — 7								

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ATTACHMENT 1

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LACO ASSOCIATES

CONSULTING ENGINEERS

21 W. 4TH STREET, EUREKA, CALIFORNIA 9501

PROJECT NAME: RADCLIFFE
PROJECT NO. 5463.00
SAMPLE LOCATION: GHB1@3.0'-3.5'
SAMPLE ID: 03-070

Tested by DLR
Date 6/6/03
Checked by RNL
Date 6.6.03

MOISTURE DENSITY WORKSHEET

SAMPLE WEIGHT (WET)

$W_{SOIL} + \text{Tube} + \text{Pan}$ 609.4 grams
 $D_{SOIL} + \text{Tube} + \text{Pan}$ 558.9 grams
Tube & Pan (177.6+161.2) 339.7 grams
 W_{SOIL} 269.7 grams

Water 50.5 grams
Dry Soil 219.2 grams

MOISTURE CONTENT (ASTM D-2216)

Water(g) / Dry Soil(g) 23.04%

DENSITY BY DRIVE CYLINDER METHOD

(Thin wall 2" sampler)

Wet Density = $W_{WET\ SOIL} / V_{VOL.\ TUBE}$ 1.72 g/cm³ = 107.6 pcf
Dry Density = $W_{DRY\ SOIL} / V_{VOL.\ TUBE}$ 1.40 g/cm³ = 87.4 pcf

DIAMETER = 49mm
HEIGHT = 151-54-14=83mm

<u>TUBE DIMENSIONS</u>	
RADIUS	<u>2.45</u> cm
HEIGHT	<u>8.30</u> cm
<u>VOLUME CALCULATIONS</u>	
A=AREA= πr^2	<u>18.86</u> cm ²
V=VOLUME= AREA X HEIGHT	<u>156.52</u> cm ³

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November 7, 2003

RECEIVED

5463.01

NOV 07 2003

CALIFORNIA
COASTAL COMMISSION

Richard Radcliffe
2278 Burlingame Drive
Chico, California 95928

Subject: Slope Stability Analysis for Setback from Bluff Face
APN 517-251-10, Roundhouse Creek Road, Trinidad, California

Dear Mr. Radcliffe:

A slope stability analysis and determination of setback from the bluff edge was required by Mark Johnson of the California Coastal Commission. Methods employed to determine the setback are as outlined in the guidance document by Mr. Johnson, **Establishing Development Setbacks from Coastal Bluffs**. Presented in this report are the results of our geologic investigations conducted at and near the site of the proposed residential construction on Roundhouse Creek Road in Trinidad, Humboldt County, California (Figure 1). The project site is located in the west side of Section 24, T9N, R1W, HBM. The project location is shown on the attached location map (Figure 1) and site plan map (Figure 2).

SLOPE STABILITY FEATURES AND CONDITIONS

The bluff was modeled as a series of horizontal stratigraphic horizons as shown in Figure 3. This idealized model was developed based on data obtained from geotechnical boring and stratigraphic logging of the bluff face, previously presented by LACO ASSOCIATES (LACO) in reports for the State of California, State Parks dated January 2, 2001, and May 21, 2002. The values of the various material properties used are based on a combination of laboratory test results and engineering judgment.

A limit equilibrium slope stability analysis using modified Bishop Method was conducted using the computer program STABLE. Results of the static analysis indicated the overall bluff stability Factor of Safety (FS) is approximately 1.24 (Attachment 1). The failure planes for a 1.5 FS extend back from the existing bluff face approximately 95 feet. For distances greater than 95 feet the FS increases.

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Seismic stability of the bluff was also modeled using a seismic coefficient of 0.15. Results of the pseudo-static slope stability analysis to investigate seismic effects were generated for a FS of approximately 1.1. The failure planes for this FS extend back from the existing bluff face approximately 85 feet. For distances greater than 85 feet the FS increases. The set back distance was less than the static analysis; therefore, the non seismic case governs. The critical failure surface with a factor of safety of approximately 1.5 is indicated by an arrow (Figure 3).

Figure 2 presents the estimated maximum setback distance D for a factor of safety of 1.5 as a function of the amount of erosion and type of loading (i.e., static loading or earthquake loading). The generally accepted erosion rate for the bluffs at Big Lagoon is 1 foot per year. The design life of the residence is estimated to be 75 years; therefore, the erosion setback distance is 75 feet. Combining the erosion rate with the slope stability set-back the projected set back from the bluff edge shall be 170 feet which is approximately 35 feet from the western property edge.

LIMITATIONS

This report has been prepared for the exclusive use of Mr. Radcliffe, his consultants, and the appropriate public authorities for specific application to the proposed residential building. LACO ASSOCIATES has endeavored to comply with generally accepted geotechnical engineering practice common to the local area. LACO ASSOCIATES makes no other warranty, express or implied.

The analyses and recommendations contained in this report are based on data obtained from surface and subsurface exploration at and near the site. The methods used indicate subsurface conditions only at specific locations where samples were obtained, only at the time they were obtained, and only to the depths penetrated. Samples can not always be relied on to accurately reflect stratigraphic variations that commonly exist between sampling locations, nor do they necessarily represent conditions at any other time. Results of any analyses of samples obtained during this project will be retained on file in our office.

Do not apply any of this report's conclusions or recommendations if nature, design, or location of any of the facilities are changed. If changes are contemplated, LACO ASSOCIATES should be consulted to review their impact on the applicability of the recommendations in this report. Also note that LACO ASSOCIATES is not responsible for any claims, damages, or liability associated with any other party's interpretation of the


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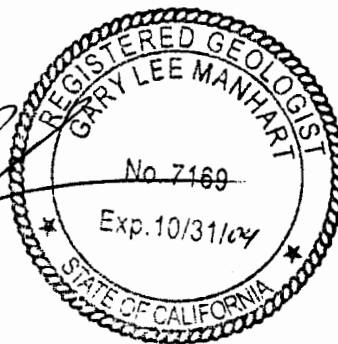
subsurface data or reuse of this report for other projects or at other locations without our express written authorization.

The scope of our services did not include environmental assessment or an investigation for the presence or absence of hazardous, toxic, or corrosive materials. Although we have explored subsurface conditions as part of this investigation, we have not conducted any analytical laboratory testing of samples obtained for the presence of hazardous material.

Please call me at 443-5054 if you have any questions.

Sincerely,
LACO ASSOCIATES


Gary L. Manhart, Senior Geologist
RG 7169, Exp 10/31/04



GLM: cs

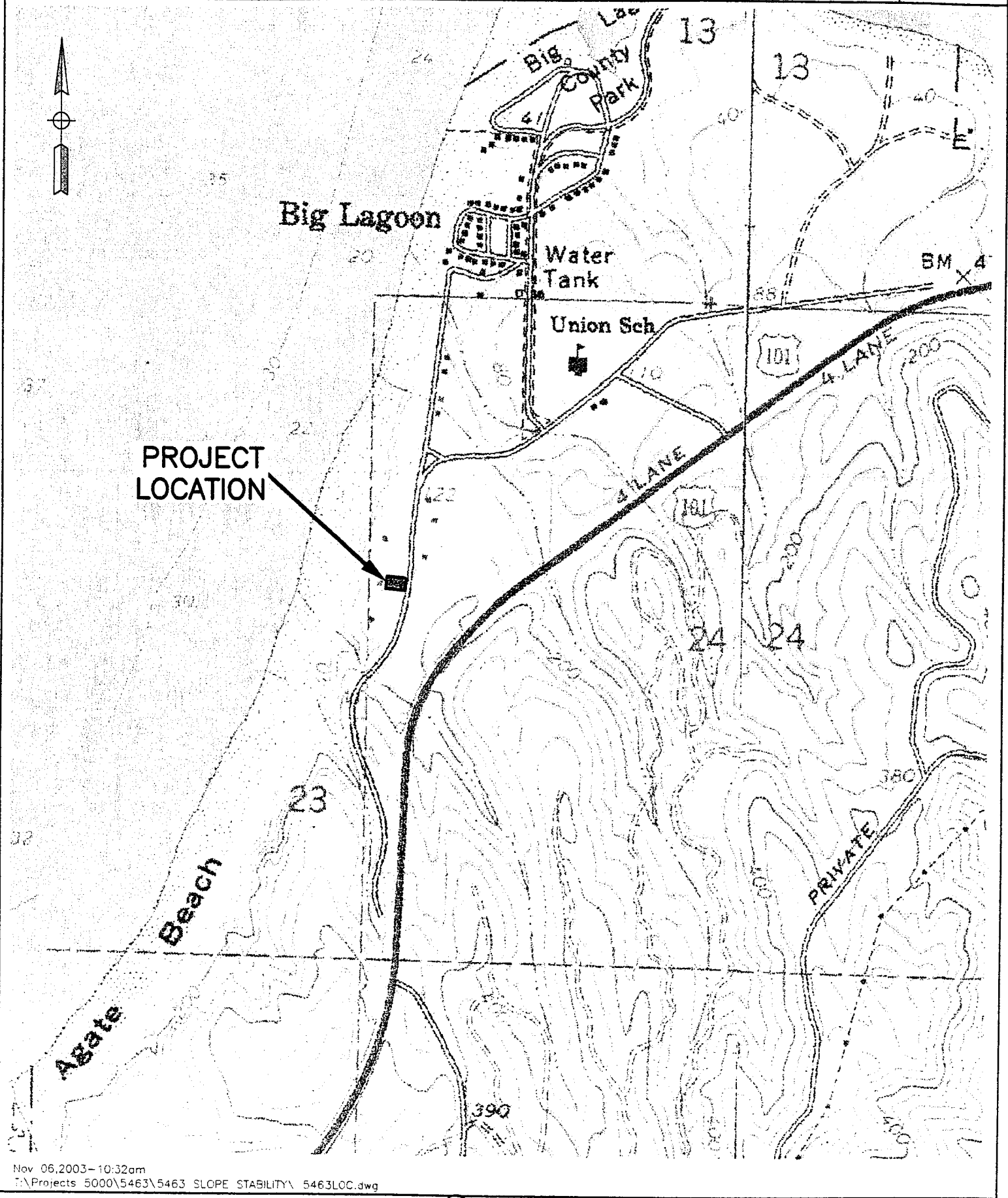
cc: Robert S. Merrill, California Coastal Commission, Eureka, California
Mark Johnson, California Coastal Commission, San Francisco, California

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LACO ASSOCIATES
CONSULTING ENGINEERS
21 W 4TH ST. EUREKA, CA 95501 (707)443-5054

PROJECT	SLOPE STABILITY & SETBACKS	BY	RJM	FIGURE	1
CLIENT	RICHARD RADCLIFFE	DATE	11/06/03		
LOCATION	ROUNDHOUSE CREEK DR. BIG LAGOON, CA	CHECK		JOB NO.	5463.01
	LOCATION MAP	SCALE	1"=1000'		

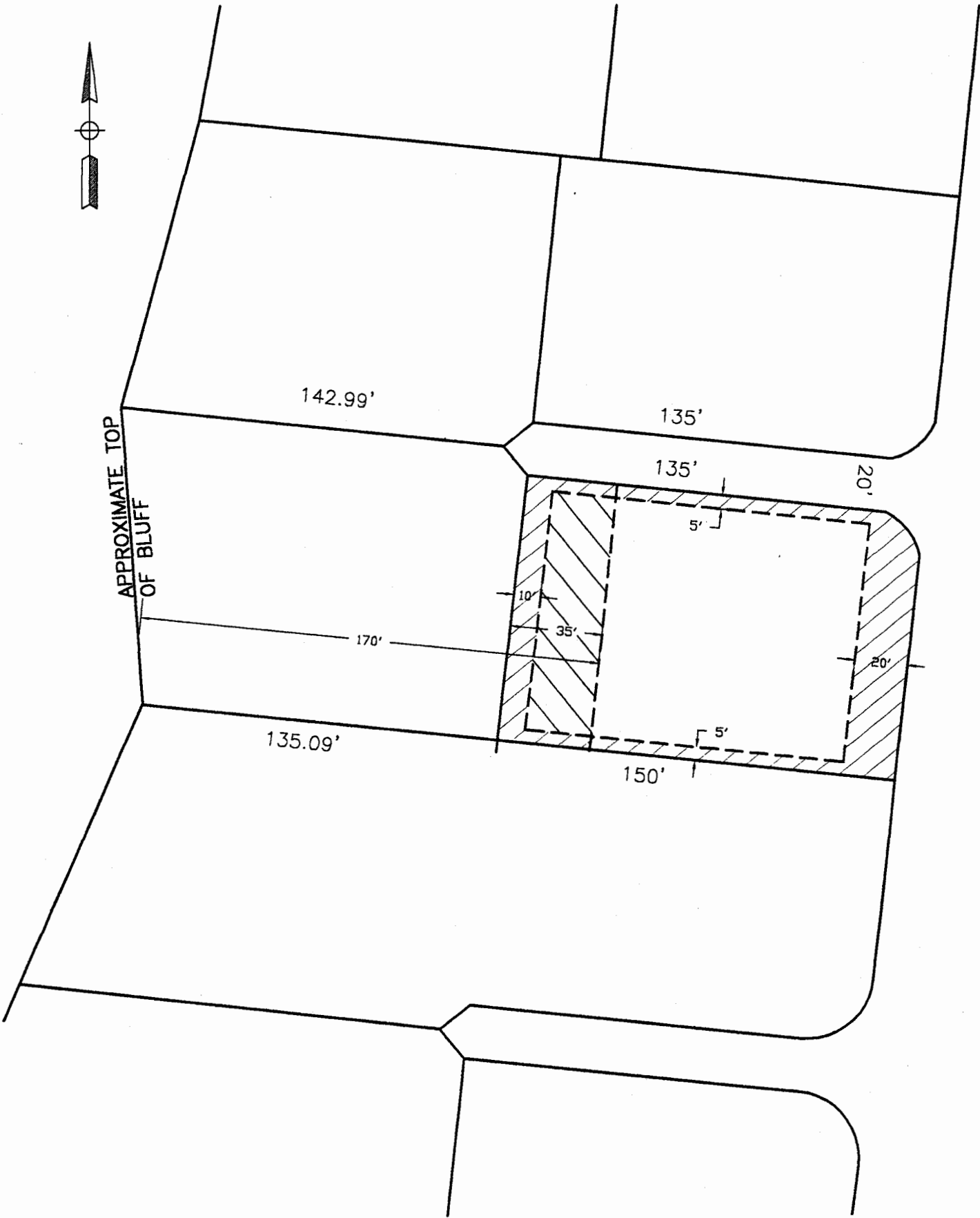


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LACO ASSOCIATES
CONSULTING ENGINEERS
21 W 4TH ST. EUREKA, CA 95501 (707)443-5054

PROJECT	SLOPE STABILITY & SETBACKS	BY	RJM	FIGURE	2
CLIENT	RICHARD RADCLIFFE	DATE	11/06/03		
LOCATION	ROUNDHOUSE CREEK DR. BIG LAGOON, CA	CHECK		JOB NO.	5463.01
	SITE MAP w/ SETBACK LOCATION	SCALE	1"=50'		



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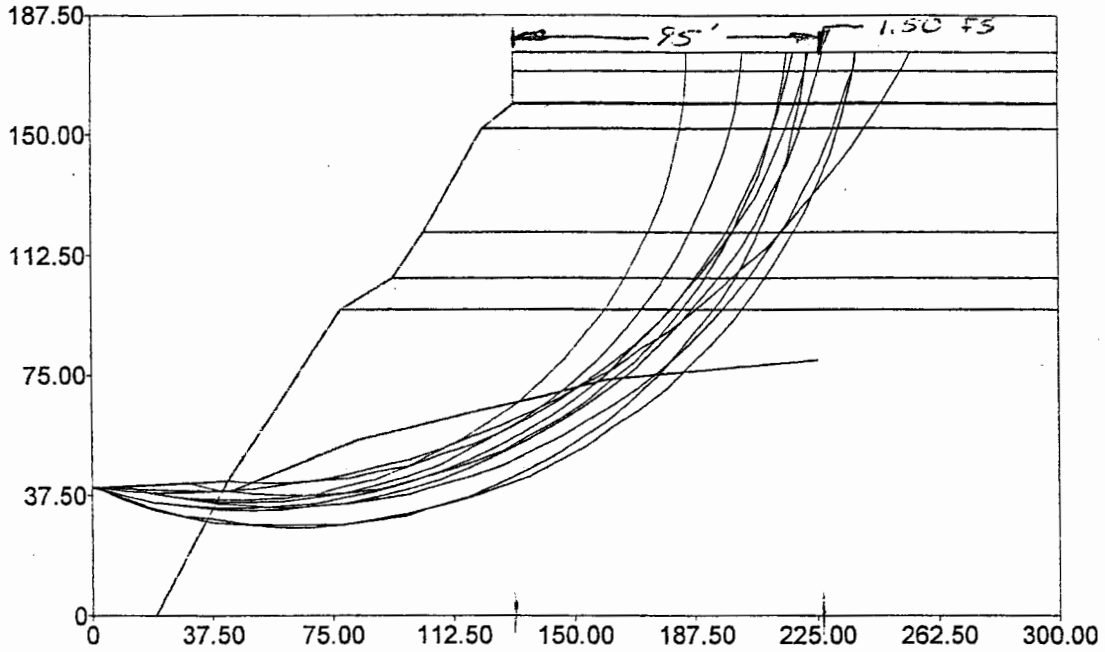


LACO ASSOCIATES
 CONSULTING ENGINEERS
 21 W 4TH ST. EUREKA, CA 95501 (707)443-5054

PROJECT	SLOPE STABILITY & SETBACKS	BY	RJM	FIGURE	3
CLIENT	RICHARD RADCLIFFE	DATE	11/06/03		
LOCATION	ROUNDHOUSE CREEK DR. BIG LAGOON, CA	CHECK		JOB NO.	5463.01
	MODIFIED BISHOP METHOD	SCALE	1" = 60'		

Radcliffe Slope Stability Analysis

Safety Factors



1.24
1.33
1.37
1.42
1.47
1.48
1.50
1.50
1.52
1.54

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CALIFORNIA COASTAL COMMISSION

45 FREMONT, SUITE 2000
SAN FRANCISCO, CA 94105-2219
VOICE AND TDD (415) 904-5200
FAX (415) 904-5400



19 November 2003

GEOTECHNICAL REVIEW MEMORANDUM

To: Bob Merrill, Coastal Program Manager
From: Mark Johnsson, Staff Geologist
Re: 1-03-026 (Radcliffe)

EXHIBIT NO. 8**APPLICATION NO.**

1-03-026

GAUSSOIN & RADCLIFFE

STAFF GEOLOGIST

MEMORANDUM (1 of 3)

In regard to the above referenced permit application, I have reviewed the following documents:

- 1) LACO Associates 2003, "R-2 Soils Report, Proposed Residence, Roundhouse Creek Road, Trinidad, California, APN 517-251-10", 12 p. R-2 soils report dated June 2003 and signed by J. Buck and D. N. Lindberg (CEG 1895).
- 2) LACO Associates 2003, "Slope stability analysis for setback from bluff face, APN 517-251-10, Roundhouse Creek Road, Trinidad, California", 16 p. geotechnical report dated 7 November 2003 and signed by G. L. Manhart (RG 7169).
- 3) LACO Associates 2003, "Letter of Transmittal: Sheer Stress Data", 5 p. of data dated 13 November 2003 and signed by G. L. Manhart (RG 7169).

In addition, I have discussed the site with Mr. Gary Manhart, geotechnical consultant for the project, on several occasions.

As you know, the proposal is for a new bluff-top residence on a parcel not immediately adjacent to the coastal bluff. Given the instability of the cliffs in the area and the high rate of bluff retreat, especially episodic retreat, in the area, a geologic setback from the coastal bluff edge, located on the adjacent parcel to the west, may nevertheless be necessary in order to assure stability of the proposed development for its useful economic life. The purpose of this review is to assess the adequacy of the proposed setback.

Reference (1) was undertaken to provide general geologic information concerning the site, and to assess long-term coastal bluff retreat. It does not contain quantitative information on slope stability. As outlined in Johnsson (in press) a quantitative slope stability analysis is needed to assure that the proposed location will be sufficiently stable to assure the integrity of the structure for its useful economic life. Accordingly, the applicant commissioned reference (2) to assess slope stability at the site. I found that this reference did not contain sufficient data to justify the analysis put forth, and reference (3) was provided to complete these data needs.

Reference (1), reports that as much as 60 feet of bluff retreat occurred over a single month-long episode of high surf during February 1998. A long-term estimate of bluff retreat for the period 1942 to 1998 was estimated to be 1.5 to 1.8 feet, but no supporting data were provided. In reference (2), it is stated that "the generally accepted erosion rate for the bluffs at Big Lagoon is

1 foot per year." Again, no supporting evidence is provided. In light of this lack of supporting data, it would be difficult to accept either of these values if I was not in possession of nearby, well-supported bluff retreat rates that can be applied to the site. Busch Geotechnical (2003) provided an especially detailed analysis for a site only a few parcels downcoast which makes use of 14 aerial photographs spanning 61 years. As in reference (1), this report also documents anecdotally short-term erosion events resulting in up to 60 feet of bluff retreat in a single winter season (1997-98). Intermediate-term erosion rates vary between 0.03 feet per year and 2.44 feet per year. The calculated long-term average erosion rate for the 61 year period is 0.74 feet per year. This rate is somewhat lower than the rate of ~1.5 feet per year reported in another independent reference (Tuttle, 1981). Accordingly, Busch Geotechnical (2003) recommends that the calculated rate be rounded up to 1 foot per year. Although this is less than the rate reported in Tuttle (1981), it is reasoned that it is appropriate because, in part, it is based on a longer time interval and on more data. I feel that the rate reported in Busch Geotechnical (2003) is based on the largest data set of any available, is relatively careful work (the only superior methodology would have involved photogrammetric analysis), and conservatively rounds the calculated rate upwards from 0.74 feet per year to 1.0 feet per year. Therefore, I feel that the value of 1.0 feet per year is an appropriate site-specific long-term erosion rate for this site.

Reference (2) includes a quantitative slope stability analysis, based on an eight-layer model for the stratigraphy of the coastal bluff. I have not examined the bluff or its stratigraphy, and note that it is distinctly different in many ways than the stratigraphy reported in Busch Geotechnical (2003) only a few parcels downcoast. I am prepared to accept the LACO geologist's seal and approval that this configuration accurately represents the bluff conditions, however. The shear strength parameters and unit weight data for these eight layers were not justified in reference (2). Upon speaking with Mr. Manhart, he explained that these values were taken from a "nearby" project that he felt was similar geologically. He provided the shear test data (reference 3) to support the values, and stipulated to me verbally that he felt that the conditions at this nearby project site could be applied to this project. Although I would have preferred that these soil engineering properties were better documented, and were attested to by a Certified Engineering Geologist, which Mr. Manhart is not, upon further discussion with Mr. Manhart and review of relevant literature I feel that the shear strength and unit weight values adopted in this analysis are appropriate. The slope stability analysis shows that the current bluff is stable, but with a relatively low factor of safety of 1.24. The factor of safety increases with distance from the bluff edge, and the point corresponding to a factor of safety of 1.5, the industry standard for new development, is located 95 feet from the bluff edge.

As explained in detail in Johnsson (in press), in order to assure stability for the expected economic life of the development, a setback must account both for existing slope stability and for the expected bluff retreat for the assumed economic life of the development. The Commission typically assumes an economic life of 75 to 100 years for new development. The long-term erosion rate of 1.0 feet per year therefore results in a 75-100 year bluff-erosion setback. In order to assure that at the end of this time the development still has an adequate factor of safety against landsliding, the 95 foot slope stability setback must be added. Thus, the minimal setback to assure stability for 100 years would be 195 feet, or 170 feet for 75 years. See Johnsson (in press) for a discussion of other assumptions that go into this analysis. Reference (2) recommends a 170 foot setback for the new development, which is approximately 35 feet from the western edge of

the subject parcel. I concur that this should be adequate to assure the stability of the proposed development for an expected economic life of 75 years.

Note that there is no need for a "buffer," commonly added to a setback based solely on long-term erosion rates in order to allow for uncertainty in all aspects of the analysis, to allow for any future increase in bluff retreat rate due, for example, to an increase in the rate of sea level rise, to assure that at the end of the design life of the structure the foundations are not actually being undermined, and to allow access so that remedial measures can be taken as erosion approaches the foundations, because the slope-stability setback added to the long-term bluff retreat setback can do "double duty" as that buffer.

I hope that this review is helpful. Please do not hesitate to contact me if you have additional questions.

Sincerely,

Mark Johnsson, Ph.D., CEG

Additional References Cited:

- Busch Geotechnical Consultants 2003, "Recommended setback for the Rohner bluff-top home based on an erosion-rate analysis and factor-of-safety considerations, 294 Roundhouse Creek Road, Big Lagoon Park Subdivision, Humboldt County, California [APNs 517-251-14 and 517-251-15]", 32 p. geologic report dated 6 October 2003 and signed by J. C. Busch, R.E. and B. Dussell.
- Johnsson, Mark J., *in press*, Establishing Development Setbacks from Coastal Bluffs, *in* Magoon, Orville et al. (eds.) *Proceedings, California and the World Ocean '02*. Reston, Virginia: American Society of Civil Engineers.
- Tuttle, D.C., 1981, Investigation and methods for determining coastal bluff erosion, historical section. Unpublished report prepared under Sea Grant, p. 161.