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Staff:	Melissa B. Kraemer
Staff Report:	April 1, 2010
Hearing Date:	April 15, 2010
Commission Action:	

STAFF REPORT: APPEAL

DE NOVO

APPEAL NO.:	**A-1-TRN-08-046**
APPLICANT:	**JIM MARSHALL**
LOCAL GOVERNMENT:	City of Trinidad
DECISION:	Approval with Conditions
PROJECT LOCATION:	Corner of Edwards and Hector Streets, within the City of Trinidad, Humboldt County (APNs 042-042-05 and 042-042-13).
PROJECT DESCRIPTION:	Construction of a new 2,454-square-foot, 3-bedroom, one-story, single-family residence, garage, driveway, and septic system.
APPELLANT:	Michael Reinman
LUP DESIGNATION:	UR – Urban Residential
ZONING:	UR – Urban Residential
SUBSTANTIVE FILE: DOCUMENTS	1) City of Trinidad Coastal Development Permit Application No. 2007-12a; 2) City of Trinidad Lot Line Adjustment Permit No. 2008/02 3) City of Trinidad Local Coastal Program.

SUMMARY OF STAFF RECOMMENDATION *DE NOVO*: APPROVAL WITH CONDITIONS

Staff recommends that the Commission approve with conditions the coastal development permit for the proposed project. Staff believes that as conditioned, the proposed project is consistent with the City of Trinidad certified Local Coastal Program (LCP).

On December 12, 2008, the Commission found that the appeal (Exhibit No. 11) of the City of Trinidad's approval of Permit No. 2007-12a (Exhibit No. 10) for the subject development raised a substantial issue with respect to the grounds on which the appeal had been filed. For purposes of *de novo* review by the Commission, the applicant submitted additional information since the City originally approved the project including (1) supplemental geologic information involving a "quantitative slope stability analysis," which examined bluff retreat rate and the stability of the proposed project over the economic lifespan of the project (Exhibit No. 6), and (2) alternative septic system designs to determine which system will best ensure that discharge to substrate groundwater will not contribute to geologic instability (Exhibit No. 7).

The project site is a vacant 12,815-square-foot parcel located at the corner of Hector and Edwards Street in the City of Trinidad (see Exhibit Nos. 1-2). The subject property is relatively flat with a gentle slope, but is located approximately 30 feet north from a steep, approximately 180-foot high coastal bluff on the other side of Edwards Street. The property is bordered on the north by the Holy Trinity Church and an apartment building. Single-family residences are located to the east and west. The subject property is treeless and covered with grasses. No environmentally sensitive habitat exists on the property.

The approved project involves the construction of a new 2,454-square-foot, 3-bedroom, 1-story, single-family residence. In addition, to the house, the approved development includes a septic system with primary and reserve leach fields, a driveway, and landscaping (see Exhibit Nos. 3-5).

Staff believes that with the inclusion of various special conditions (listed below in part), the proposed project is consistent with (among others) the geologic hazard and visual resources protection policies of the certified LCP:

- **Special Condition No. 1** would minimize geologic hazards by requiring adherence to all recommendations in the geologic reports prepared for the project, including recommendations for grading, directing all surface run-off to the City's storm drain system, controlling erosion and sedimentation impacts, locating residential development within low to moderate geologic hazard zones, designing the residence to meet the UBC and California Seismic Code, utilizing native plants that do not require irrigation to reduce groundwater infiltration, septic system recommendations, and all other recommendations;
- **Special Condition No. 2** would impose certain landscaping restrictions on the property, including, in part, (a) only drought-tolerant native vegetation shall be

installed; (b) all proposed plantings shall be obtained from local genetic stocks within Humboldt County; (c) no plant species listed as problematic and/or invasive shall be employed or allowed to naturalize or persist on the site; and (d) no rodenticides containing anticoagulant compounds shall be used;

- **Special Condition No. 3** would prohibit the construction of shoreline protective devices on the parcel, require that the landowner provide a geotechnical investigation and remove the permitted development if bluff retreat reaches the point where the permitted development is threatened, and require that the landowners accept sole responsibility for the removal of any structural debris resulting from landslides, slope failures, or erosion of the site;
- **Special Condition No. 4** would require 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;
- **Special Condition No. 5** would require 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;
- **Special Condition No. 6** would require a coastal development permit or a permit amendment for all additions and improvements to the residence on the subject parcel that might otherwise be exempt from coastal permit requirements;
- **Special Condition No. 7** would require submittal of a design plan prior to permit issuance for the Executive Director's review and approval that demonstrates in part that (a) materials and colors used in construction are compatible both with the structural system of the building and with the appearance of the building's natural and man-made surroundings and are visually unobtrusive; and (b) all exterior materials, including roofs and windows, are non-reflective to minimize glare;
- **Special Condition No. 8** would impose certain restrictions on exterior lighting so that all exterior lights shall be the minimum necessary for the safe ingress and egress of the structures, and shall be low-wattage, non-reflective, shielded, and have a directional cast downward such that no light will shine beyond the boundaries of the subject parcel; and
- **Special Condition No. 9** would require submittal of a landscaping plan prior to permit issuance for the Executive Director's review and approval that demonstrates in part that any landscaping installed on the property shall not significantly block views of the harbor, Little Head, Trinidad Head, or the ocean from public roads, trails, and vista points.

Therefore, as conditioned, staff recommends that the Commission find that the project is consistent with all applicable policies of the City of Trinidad's certified LCP.

The motion to adopt the staff recommendation of <u>Approval with Conditions</u> is found on Page 5.

STAFF NOTES:

1. Procedure

On December 12, 2008, the Coastal Commission found that the appeal (Exhibit No. 11) of the City of Trinidad's approval of Permit No. 2007-12a (Exhibit No. 10) for the subject development raised a substantial issue with respect to the grounds on which the appeal was filed, pursuant to Section 30625 of the Coastal Act and Section 13115 of Title 14 of the California Code of Regulations. As a result, the City's approval is no longer effective, and the Commission must consider the project *de novo*. The Commission may approve, approve with conditions (including conditions different than those imposed by the City), or deny the application. Since the proposed project is within an area for which the Commission has certified a Local Coastal Program (LCP), the applicable standard of review for the Commission to consider is whether the development is consistent with City of Trinidad's certified LCP. Testimony may be taken from all interested persons at the *de novo* hearing.

2. Additional Information Submitted for *de novo* Review

For purposes of *de novo* review by the Commission, the applicant has submitted additional information since the City originally approved the project including, in part, additional geologic information, including a quantitative slope stability analysis, prepared by Busch Geotechnical Consultants titled *Results of Factor-of-Safety Analysis and Erosion-Rate Assessment for Proposed Marshall Residence, Edwards Street, Trinidad, Humboldt County, California [APN 042-042-005 and -013]*, dated November 20, 2009 (Exhibit No. 6). The additional information submitted by the applicant for the *de novo* review addresses issues raised by the appeal and provides additional project information that was not a part of the record when the City originally acted to approve the coastal development permit.

3. Transliteration of Zoning Code Citations

Throughout the City of Trinidad's *Notice of Final Local Action* (see Exhibit No. 10) and the *Appeal from Coastal Permit Decision of Local Government* filed by Michael Reinman (see Exhibit No. 11), references to various coastal zoning ordinance provisions are stated in terms of the numeration system of the Trinidad Municipal Code (i.e., Title 17, §§17.04.010 – 17.76.050) instead of the numeration of the City's certified zoning regulations (i.e., Ordinance No. 166, §§1.01 – 7.23 and Appendix A). With the exception of the differences in the numbering schema and the order in which the various zoning standards and development regulations appear in these two documents, the provisions of the zoning ordinance, as certified by the Commission on July 9, 1980, are duplicated verbatim within Title 17 of the municipal code, except in rare minor instances. For consistency with the requirements of the Coastal Act that only new development be approved that is consistent with the policies and standards of the certified LCP and that appeals only be based upon alleged inconsistency with the policies and standards of the certified LCP, in quoting the various findings adopted by the City in support of the

approved development staff and/or the appellants' contentions, staff has replaced the cited municipal code numbering with the numbering of the certified zoning ordinance.

I. MOTION, STAFF RECOMMENDATION *DE NOVO*, & RESOLUTION:

Motion:

I move that the Commission approve Coastal Development Permit No. A-1-TRN-08-046, subject to conditions.

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 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 certified City of Trinidad LCP. 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 Appendix A.

III. SPECIAL CONDITIONS:

1. Minimization of Geologic Hazards

A. All recommendations of the geologic hazard report titled *Preliminary geologic hazard report for APNs 042-042-05 and 042-042-013 Located on Hector Street, Trinidad, California*, prepared by Pacific Watershed Associates and dated April 10, 2008 and of the geologic report titled *Results of Factor-of-Safety Analysis and Erosion-Rate Assessment for Proposed Marshall Residence, Edwards Street, Trinidad, Humboldt County, California [APN 042-042-005 and -013]* prepared by Busch Geotechnical Consultants dated November 20, 2009 shall be adhered to including recommendations for grading, directing all surface run-off to the City's storm drain system, controlling erosion and sedimentation impacts, locating residential development within low to moderate geologic hazard zones, designing the residence to meet the UBC and California Seismic Code, utilizing native

plants that do not require irrigation to reduce groundwater infiltration, septic system recommendations, and all other recommendations. **PRIOR TO ISSUANCE OF THE COASTAL DEVELOPMENT PERMIT**, the applicant shall submit, for the Executive Director's review and approval, evidence that an appropriate licensed professional has reviewed and approved all final design, construction, grading, drainage, septic system, and erosion control plans and certified that each of those final plans is consistent with all of the recommendations specified in the above-referenced geologic reports.

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.

2. Landscaping Restrictions

A. Only drought-tolerant native vegetation shall be installed on the property to minimize the need for irrigation and the potential for geologic hazards. No permanent irrigation shall be installed on the property.

B. All proposed plantings shall be obtained from local genetic stocks within Humboldt County. If documentation is provided to the Executive Director that demonstrates that native vegetation from local genetic stock is not available, native vegetation obtained from genetic stock outside the local area, but from within the adjacent region of the floristic province, may be used.

C. No plant species listed as problematic and/or invasive by the California Native Plant Society, the California Invasive Plant Council, or as may be identified from time to time by the State of California, shall be employed or allowed to naturalize or persist on the site. No plant species listed as a "noxious weed" by the governments of the State of California or the United States shall be utilized within the property that is the subject of CDP No. A-1-MEN-07-047.

D. Rodenticides containing anticoagulant compounds, including but not limited to, Bromadiolone, Brodifacoum, or Diphacinone, shall not be used.

3. No Future Bluff or Shoreline Protective Device

A. By acceptance of this permit, the applicant agrees, on behalf of himself and all successors and assigns, that no bluff or shoreline protective device(s) shall ever be constructed to protect the new single-family residence, garage, porches, septic system, driveway, and other associated development authorized pursuant to Coastal Development Permit No. A-1-TRN-08-046, in the event that the single-family residence, garage, porches, septic system, driveway, and other associated development authorized by this permit are 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 applicant hereby waives, on behalf of himself and all successors and assigns, any rights to construct such devices to protect the single-family residence, garage,

porches, septic system, driveway, and other associated development authorized by this permit that may exist under Public Resources Code Section 30235 or under City of Trinidad Zoning Code Section 4.02(B)(4) and 4.03(C)(5).

B. By acceptance of this Permit, the applicant further agrees, on behalf of himself and all successors and assigns, that the landowner shall remove the single-family residence, garage, porches, septic system, driveway, and other associated development authorized by this permit 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 single-family residence, garage, porches, septic system, driveway, and other associated development authorized by this permit 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 single-family residence, garage, porches, septic system, driveway, and other associated development authorized by this permit 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 structures are threatened by waves, erosion, storm conditions, or other natural hazards. The report shall identify all those immediate or potential future measures that could stabilize the single-family residence, garage, porches, septic system, driveway, and other associated development authorized by this permit without shore or bluff protection, including but not limited to, removal or relocation of portions of the single-family residence, garage, porches, septic system, driveway, and other associated development authorized by this permit. The report shall be submitted to the Executive Director and the appropriate local government official. If the geotechnical report concludes that the single-family residence, garage, porches, septic system, driveway, and other associated development authorized by this permit is unsafe for use, 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 single-family residence, garage, porches, septic system, driveway, and other associated development authorized by this permit.

4. <u>Assumption of Risk, Waiver of Liability and Indemnity</u>

By acceptance of this permit, the applicant acknowledges and agrees: (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 applicant and the property that is the subject of this permit of injury and damage from such hazards in connection with this permitted development; (iii) to unconditionally waive any claim of damage or liability against the Commission, its officers, agents, and employees for injury or damage from such hazards; and (iv) to indemnify and hold harmless the Commission, its officers, agents, and employees with respect to the Commission's approval of the project against any and all

liability, claims, demands, damages, costs (including costs and fees incurred in defense of such claims), expenses, and amounts paid in settlement arising from any injury or damage due to such hazards.

5. 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.

6. Future Development Restriction

This permit is only for the development described in Coastal Development Permit (CDP) No. A-1-TRN-08-046. Pursuant to Title 14 California Code of Regulations (CCR) Section 13250(b)(6), the exemptions otherwise provided in Public Resources Code Section 30610(a) shall not apply to the development governed by CDP No. A-1-TRN-08-046. Accordingly, any future improvements to the single family house authorized by this permit, including but not limited to repair and maintenance identified as requiring a permit in Public Resources section 30610(d) and Title 14 CCR Sections 13252(a)-(b), shall require an amendment to CDP No. A-1-TRN-08-046 from the Commission or shall require an additional coastal development permit from the Commission or from the applicable certified local government.

7. Design Plan & Restrictions

A. **PRIOR TO ISSUANCE OF THE COASTAL DEVELOPMENT PERMIT**, the applicant shall submit, for the review and approval of the Executive Director, a design plan showing proposed materials and colors for the new single-family residence, including exterior body, trim, and siding.

1. The plan shall demonstrate that:

(a) Materials and colors used in construction are compatible both with the structural system of the building and with the appearance of the building's natural and man-made surroundings and are visually unobtrusive; and

(b) All exterior materials, including roofs and windows, are non-reflective to minimize glare.

2. The plan shall include, at a minimum, the following components:

(a) Building elevation drawings, photos, and/or artist's renderings of the authorized structures which illustrate the proposed colors for the trim and exterior body of the structures and indicate which architectural features would be painted with the base and trim colors;

(b) A color chip of the proposed color of the exterior trim and specific information identifying the color; and

(c) A sample of the proposed roof material with specifications for the hue, chroma, and reflectivity of the color of the roofing.

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

8. <u>Exterior Lighting Restrictions</u>

All exterior lights, including any lights attached to the outside of the buildings, shall be the minimum necessary for the safe ingress and egress of the structures, and shall be low-wattage, non-reflective, shielded, and have a directional cast downward such that no light will shine beyond the boundaries of the subject parcel.

9. <u>Landscaping Plan</u>

A. **PRIOR TO ISSUANCE OF THE COASTAL DEVELOPMENT PERMIT**, the applicant shall submit a final landscaping plan for the review and approval of the Executive Director. The plan shall be prepared by a qualified botanist or licensed landscape architect.

(1) The plan shall demonstrate that

i. Landscaping specifications shall conform to all provisions specified in Special Condition No. 2 of CDP No. A-1-TRN-08-046; and

ii. Landscaping shall not significantly block views of the harbor, Little Head, Trinidad Head, or the ocean from public roads, trails, and vista points.

(2) The plan shall include, at a minimum, the following components:

i. A final landscape site plan depicting the species, size, and location of all plant materials to be planted on the property, delineation of the approved development, and all other landscape features; and

ii. A schedule for the planting of the landscaping.

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

10. Area of Archaeological Significance

A. A cultural monitor of the Yurok Tribe or the Tsurai Ancestral Society and certified by the Yurok Tribal Historic Preservation Officer shall be present to oversee all activities in which there will be ground disturbance.

B. If an area of historic or prehistoric cultural resources or human remains are discovered during the course of the project, all construction shall cease and shall not recommence except as provided in subsection (C) hereof, and a qualified cultural resource specialist shall analyze the significance of the find in consultation with the cultural monitor.

C. A permittee seeking to recommence construction following discovery of the cultural deposits shall submit an archaeological plan prepared in consultation with the cultural monitor for the review and approval of the Executive Director.

1). If the Executive Director approves the archaeological plan and determines that the archaeological plan's recommended changes to the proposed development or mitigation measures are *de minimis* in nature and scope, construction may recommence after this determination is made by the Executive Director.

2). If the Executive Director approves the archaeological plan but determines that the changes therein are not *de minimis*, construction may not recommence until after an amendment to this permit is approved by the Commission.

11. Recorded Notice of Merger

PRIOR TO ISSUANCE OF THE COASTAL DEVELOPMENT PERMIT, the applicant shall submit to the Executive Director evidence that the Notice of Merger of the subject lots (APNs 042-042-05 and 042-042-13) has been recorded.

12. Underground Utility Extensions

All utility extensions connected to the authorized development shall be underground.

13. Conditions Imposed By Local Government

This action has no effect on conditions imposed by a local government pursuant to an authority other than the Coastal Act.

IV. FINDINGS & DECLARATIONS

The Commission hereby finds and declares as follows:

A. Incorporation of Substantial Issue Findings

The Commission hereby incorporates by reference the Substantial Issue Findings contained in the Commission staff report for Appeal No. A-1-TRN-08-046 dated November 21, 2008.

B. Project Setting & Background

The project site is a vacant 12,815-square-foot property located at the corner of Hector Street and Edwards Street in the City of Trinidad (see Exhibit Nos. 1-2). The subject property is relatively flat with a gentle (approximately 6 percent) southwesterly slope, but is located approximately 30 feet north of a steep, approximately 180-foot high coastal bluff on the other side of Edwards Street. The property is bordered on the north by the Holy Trinity Church and an apartment building and to the east and west by single-family residences. The property is treeless and covered with mowed grasses/lawn. No environmentally sensitive habitat exists on the property.

The property is planned and zoned "Urban Residential" under the certified Trinidad LCP. Single family residences are a principally permitted use for the zone district. The minimum lot size allowed in the UR zone is 8,000 square feet and the maximum density is one dwelling unit per 8,000 square feet. The City approved a lot line adjustment and merger of the two project parcels comprising the 12,815-square-foot subject site (APNs 042-042-05 and 042-042-13) on February 20, 2008 (Local Permit No. 2008-02).

On April 16, 2008, the City of Trinidad Planning Commission conditionally approved the coastal development permit for a new single-family residence on the property (Application No. 2007-12a) with 15 special conditions. The conditions required in part that (a) construction related activities occur in a manner that does not impact the integrity of the primary or reserve sewage disposal areas, (b) a grading permit be obtained from the Planning Commission prior to issuance of a building permit for the development, (c) the applicant demonstrate that the site can support a primary and reserve drain field by obtaining a sewage disposal system permit from the County Division of Environmental Health, (d) construction related activities occur in a manner that incorporates storm water runoff and erosion control measures to protect water quality, (e) the applicant submit a landscaping plan for review and approval of the City Planner, (f) roof drainage from downspouts be directed away from the septic system and into the City's stormwater system, (g) stormwater runoff from impermeable surfaces be routed to the City's stormwater drainage system such that infiltration is minimized and no runoff is directed toward the bluff, (h) excavation or ground disturbing activities be monitored by an elder of the Yurok tribe for discovery of cultural and archaeological resources and stopped in the event such materials are found and not resumed until the find is evaluated by a qualified archaeologist, (i) all recommendations of the geologic hazard report be adhered to including recommendations for grading, directing all surface run-off to the City's storm drain system, controlling erosion and sedimentation impacts, locating residential development within low to moderate geologic hazard zones, designing the residence to

meet the UBC and California Seismic Code, and utilize localized climate-tolerant plants that do not require irrigation to reduce groundwater infiltration.

The Planning Commission's approval was appealed to the City Council. On October 22, 2008, the City Council denied the appeal and approved the project as conditioned by the Planning Commission, with some project design amendments submitted to the Council by the applicant (e.g., the Council's approval reduced the size of the residence to a 2,454-square-foot one-story home with 160-square-foot covered patio and entry, 464-square-foot attached garage, and 19.1 percent floor to lot area ratio, down from the 3,172-square-foot two-story home with 298-square-foot covered patio and entry, 550-square-foot attached garage, and 22 percent floor to lot area ratio approved by the Planning Commission). The City's Notice of Final Action was received by the Commission staff on October 24, 2008 (Exhibit No. 10). The City's approval of the project was appealed to the Coastal Commission by Mr. Michael Reinman in a timely manner on November 7, 2008 (Exhibit No. 11), within 10-working days after receipt by the Commission of the Notice of Final Local Action.

A primary contention raised by the appellant for which the Commission found Substantial Issue involved geologic hazards. The Commission found that because the geotechnical investigation completed for the approved development did not clearly establish whether or not the approved development would be stable over the economic life of the project (presumed to be 75 years), as is required by Policy 3 of the certified Land Use Plan's *Constraints on Development* chapter and Zoning Code Sections 4.06(C)(6) and 4.03(C)(10). In its finding of Substantial Issue, the Commission determined that it needed to receive additional information from the applicant to determine if the project could be found to be consistent with the certified LCP. Specifically, the Commission requested (1) an evaluation of the bluff retreat rate and a "quantitative slope stability analysis" to determine that approved development will be stable over the life of the project; and (2) an analysis of the feasibility and relative groundwater contributions of alternative septic system designs to make the necessary findings that the septic system discharge to the groundwater of the substrate will not contribute to geologic instability.

Since the appeal of the project to the Commission on November 7, 2008, and since the Commission's finding of Substantial Issue on the project in December of 2008, the applicant has provided additional information for the Commission's consideration, including (1) additional geologic information, including a quantitative slope stability analysis, prepared by Busch Geotechnical Consultants titled "Results of Factor-of-Safety Analysis and Erosion-Rate Assessment for Proposed Marshall Residence, Edwards Street, Trinidad, Humboldt County, California [APN 042-042-005 and -013]," dated November 20, 2009 (Exhibit No. 6); and (2) a letter addressing, in part, alternative septic system designs provided by Pacific Watershed Associates dated December 9, 2008 (Exhibit No. 7). The Commission's geologist, Dr. Mark Johnsson, has reviewed the project documents related to geologic hazard issues and prepared a memorandum summarizing his findings, which is included as Exhibit No. 9.

C. Project Description

The approved project involves the construction of a new 2,454-square-foot, 16-foot-high, 3-bedroom, one-story, single-family residence with a 464-square-foot attached garage and a 160-square-foot covered patio and entry. In addition, the approved development includes a septic system with primary and reserve leach fields, a driveway (connected to Hector Street), and landscaping (see Exhibit Nos. 3-5).

D. Locating New Development

Summary of Applicable LCP Provisions:

Policy 37 of the LUP's *Development Options & Preferences* chapter states:

> *All new residences in the planning area should provide graveled or paved parking for at least two vehicles (in addition to any garage parking) so that residents and visitors are not required to park along the streets.*

Policy 47 of the LUP's *Development Options & Preferences* chapter states in applicable part the following:

> *Only single family residences should be permitted in the Urban Residential …categories….*

Section 4.06 of the Zoning Ordinance of the City of Trinidad (ZOCT) states, in applicable part, the following with regard to development on lands in the Urban Residential or UR zone:

A. Principal permitted uses
1. *Single family dwelling, subject to the requirements of Subsection C6.*
2. *Home occupation, as provided in Sec. 6.06.*

B. Uses permitted with a use permit
1. *Guest house; servant's quarters.*
2. *Removal of trees more than 12" DBH*

C. Other regulations
1. *Minimum lot area for new lots: When a septic tank is to be the means of wastewater disposal, new lots shall include sufficient area to accommodate required yards, the intended use, and primary and reserve septic leach fields as determined from requirements in the wastewater disposal regulations adopted by the city. In no case shall a lot be less than 8,000 sq. ft. area.*
2. *Maximum density: 8,000 sq. ft. of lot area per dwelling, guest house, or servants' quarters.*
3. *Minimum yards: Front—20 feet; rear—15 feet; side—5 feet, unless modified by the design assistance committee as provided in Sec. 6.19*
4. *Maximum building height: 25 feet, except that the design assistance committee may require a lesser height as provided in Sec. 6.19.*
5. *Vegetation removal: Trees may be removed if they are diseased or pose an imminent danger to people or structures…*
6. *Required geologic study. Structures, septic disposal systems, driveways, parking areas, pedestrian trails and other improvements permitted in the SR zone shall only be permitted on lands designated as unstable or of questionable stability on Plate 3 of the general plan if analysis by a registered geologist or engineering geologist, at the applicant's expense, demonstrates to the satisfaction of the planning commission that construction of the development will not significantly*

> *increase erosion and slope instability and that any potential adverse impacts have been mitigated to the maximum extent feasible. The geologist's report shall conform to the requirements of Section 4.03(C)(10)*

Project Consistency with Applicable LCP Provisions:

The subject parcel is located within a developed urban area, with single family residences to the east and west of the subject site, an apartment building and church to the north, and open space to the south across Edwards Street. The subject parcel is planned and zoned Urban Residential (UR) in the certified LCP with a maximum density of one dwelling unit per 8,000 square feet of lot area. The proposed single family residence is a principally permitted use in the zone district, and the subject lot area is over 12,800 square feet in size. The proposed development will conform to the prescribed minimum yard setbacks cited in Section 4.06(C)(3) of the ZOCT. Off-street parking for at least two vehicles will be available in the proposed driveway, as is required by Policy 37 of the LUP.

As discussed below, the proposed development has been conditioned to include mitigation measures, which will minimize all significant adverse environmental impacts. Therefore, the Commission finds that as conditioned, the proposed development is consistent with the LCP policies cited above because the development is a principally permitted use for the zone district that will not significantly contribute to adverse cumulative impacts on geologic hazards, visual resources, or other coastal resources as discussed in the Findings below.

E. Geologic Hazards

Section 30235 of the Coastal Act states as follows:

> *Revetments, breakwaters, groins, harbor channels, seawalls, cliff retaining walls, and other such construction that alters natural shoreline processes shall be permitted when required to serve coastal-dependent uses or to protect existing structures or public beaches in danger from erosion, and when designed to eliminate or mitigate adverse impacts on local shoreline sand supply. Existing marine structures causing water stagnation contributing to pollution problems and fishkills should be phased out or upgraded where feasible.*

Summary of Applicable LCP Provisions:

Policy 2 of the LUP's *Constraints on Development* chapter states:

> *Provisions in the Uniform Building Code (Chapter 70) regarding grading on slopes should be used to ensure that owners of unstable lands or lands of questionable stability do not create slope stability problems.*

Policy 3 of the LUP's *Constraints on Development* chapter states:

> *Structures, septic tank systems, and driveways should not be located on unstable lands. Structures, septic tank systems, and driveways should only be permitted on lands of questionable stability, or within 100 feet upslope of unstable lands or lands of questionable stability, if analysis by a registered geologist indicates that the proposed development will not significantly increase erosion, slope instability or sewage system*

> *failure. The area reserved for the backup leach field should be given equal consideration.*[1] [Emphasis added.]

Plate 3 of the LUP designates the area within which the project site is located as having "*questionable stability*."

Section 4.06(C)(6) of the Zoning Ordinance of the City of Trinidad (ZOCT) states the following with regard to development on lands in the Urban Residential or UR zone designated unstable or of "questionable stability" in the LUP:

> *Required geologic study. Structures, septic disposal systems, driveways, parking areas, pedestrian trails and other improvements permitted in the SR zone shall only be permitted on lands designated as unstable or of questionable stability on Plate 3 of the general plan if analysis by a registered geologist or engineering geologist, at the applicant's expense, demonstrates to the satisfaction of the planning commission that construction of the development will not significantly increase erosion and slope instability and that any potential adverse impacts have been mitigated to the maximum extent feasible. The geologist's report shall conform to the requirements of Section 4.03(C)(10)*

Section 4.03(C)(10) of the ZOCT states the following:

> *Determination of development feasibility: A report by a registered geologist or a certified engineering geologist shall be provided at the applicant's expense as part of an application for a permanent structure, septic disposal system, driveway, parking area, or other use permitted in the SE zone within the unstable and questionable stability areas shown on Plate 3 of the general plan. Before the planning commission approves a development, it shall determine that the proposed development will not significantly increase erosion and slope instability and that any potential adverse impacts have been mitigated to the maximum extent feasible.*
>
> *a) The report shall be based on an on-site inspection in addition to a review of the general character of the area using a currently acceptable engineering stability analysis method. The report shall take into consideration all potential impacts, including but not limited to impacts from construction activities such as grading, drainage (from septic leach fields, on-site water use, increased runoff from impervious surfaces), roadways, and vegetation disturbance.*
>
> *b) The report shall contain a professional opinion stating the following:*
>
> *1. The area covered in the report is sufficient to demonstrate the geotechnical hazards of the site consistent with the geologic, seismic, hydrologic and soil conditions at the site;*
>
> *2. The extent of potential damage that might be incurred by the development during all foreseeable normal and unusual conditions, including ground saturation and shaking caused by the maximum credible earthquake;*
>
> *3. The effect the project could have an the stability of the bluff;*

[1] The areas in the city where studies by a registered geologist are required by this policy are identified on Plate 3. Outside of the city limits the areas where such studies are necessary are identified by a boundary 100 feet upslope of the upland extent of unstable lands and lands of questionable stability as identified on the Geologic Limitations Map in the Environmental Conditions and Constraints Report.

> *4. How the project can be designed or located so that it will neither be subject to nor contribute to significant geologic instability through the lifespan of the project;*
>
> *5. A description of the degree of uncertainty of analytical results due to assumptions and unknowns. (Ord. 166 §4.03 (C) (10) , 1979)* [Emphasis added.]

Section 6.13 of the ZOCT states the following, in applicable part:

…

> *Before any dam, dike, fill, groin, revetment, breakwater, retaining wall or similar structure…shall be constructed or undertaken within the city, the applicant or lead agency shall provide the city with a project description, environmental analysis and evaluation of the potential impacts of the project on the character and function of the affected environment, the social and economic character and function of the city and its residents. Such uses shall be subject to a use permit. The use permit shall not be granted unless the Planning Commission determines that the project conforms with the General Plan and will not create undesired impacts on the environment or the community.*

Section 6.19 of the ZOCT, *Design review and view preservation regulations*, states the following, in applicable part:

> *The following regulations shall apply in all zones:*
>
> …
>
> *C. Design criteria. The design assistance committee shall be guided by the following criteria when evaluating the land form alterations and constructions of structures…*
>
> *1. The alteration of natural land forms caused by cutting, filling and grading shall be minimal. Structures should be designed to fit the site rather than altering the land form to accommodate the structure.*
>
> …

Section 4.02 of the ZOCT, [Regulations for the] Open Space or OS Zone, states the following, in applicable part:

> *B. Uses Permitted with a Use Permit*
>
> *1. Pedestrian trails, vista points, including improvements to existing facilities.*
>
> *2. Shoreline related recreation uses, including improvements to existing facilities.*
>
> *3. Removal of vegetation including timber.*
>
> *4. Structures and improvements, such as seawalls and revetments, related to the protection or maintenance of scenic and cultural resources, beaches, coastal bluffs and buildings threatened by natural processes.*
>
> *5. Structures accessory to uses and buildings existing within the open space zone at the time this ordinance is adopted.*
>
> *6. Wildlife habitat management and scientific research activities and related temporary structures.*

Section 4.03 of the ZOCT, [Regulations for the] Special Environment or SE Zone, states the following, in applicable part:

…

C. Other Regulations

…

5. Requirements for structures on ocean bluffs: No structure shall be placed on, or extended beyond the face of a bluff and no tunnel or shaft shall be sunk into the bluff face, except that the following structures may be placed on the bluff face, except that the following structures may be placed on the bluff face and alterations made thereto subject to obtaining a use permit:

a) Stairways, ramps and other structures or devices designed and intended to provide public access from the top of the bluff to the beach, provided that construction thereof shall not require excavation of the bluff face except to the extent necessary to accommodate placement of vertical or lateral support members;

b) Fences of non-view obscuring type along the bluff top, as reasonably necessary to deter trespassing or to discourage indiscriminate transverse upon the bluff face;

c) Bluff repair and erosion control measures such as retaining walls and other appropriate devices, provided, however, that such measures and devices shall be limited to those necessary to repair existing man-caused damage to the bluff face; provided further that no such measures or devices shall cause significant alteration in the natural character of the bluff face.

Project Consistency with Applicable LCP Provisions:

The above-cited provisions of the certified LCP require in part that structures, septic systems, and driveways should only be permitted on lands of questionable stability if an analysis by a registered geologist indicates that the proposed development will not significantly increase erosion, slope instability, or sewage system failure, and that any potential adverse impacts have been mitigated to the maximum extent feasible. In addition, the provisions require that projects be sited and designed to neither be subject to nor contribute to significant geologic instability throughout the lifespan of the project. Furthermore, the Open Space (OS) and Special Environment (SE) zoning districts that cover the bluff face seaward of the project site allow for seawalls and bluff retaining walls only in limited circumstances. In the SE zone, such devices can only be approved when necessary to repair existing man-caused damage to the bluff face and when the device will not cause significant alteration in the natural character of the bluff face. Reading Zoning Code Section 4.02(B)(4) consistent with Section 30235 of the Coastal Act, the provision only allows for the construction of shoreline protective devices for the protection of existing buildings. The construction of a shoreline protective device to protect new residential development is not permitted by the LCP.

The subject property is relatively flat with a gentle southwesterly slope, but is designated in the LUP as having "questionable stability," as it is located approximately 30 feet away from a steep coastal bluff to the south on the other side of Edwards Street. Section

4.06(C)(6) of the ZOCT requires development within the UR zone that also is within an unstable or questionably stable area to meet the requirements of Section 4.03(C)(10) of the code, which in turn requires the preparation of a geologic report meeting certain standards. Among these standards are requirements that the report address whether the development can be designed or located so that it will neither be subject to nor contribute to significant geologic instability through the lifespan of the project.

The Commission interprets Section 30235 of the Coastal Act and the above cited LCP policies 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. 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 and estimating changes in this rate that may be associated with continuing or accelerating sea level rise. Slope stability is a measure of the resistance of a slope to landsliding, and can be 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 Commission generally defines "stable" with respect to slope stability as a minimum factor of safety of 1.5 against landsliding.

In addition to the *Preliminary geologic hazard report for APNs 042-042-05 and 042-042-013 Located on Hector Street, Trinidad, California*, prepared by Pacific Watershed Associates and dated April 10, 2008 (Exhibit No. 8), the applicant subsequently commissioned a geologic investigation for purposes of de novo review by the Commission and to address information deficiencies raised by the appeal. The geologic investigation resulted in a report titled *Results of Factor-of-Safety Analysis and Erosion-Rate Assessment for Proposed Marshall Residence, Edwards Street, Trinidad, Humboldt County, California [APN 042-042-005 and -013]* prepared by Busch Geotechnical Consultants dated November 20, 2009 (Exhibit No. 6). The Busch report analyzed whether or not the proposed development would (1) contribute to slope instability (due to the addition of leachfield effluent to the groundwater) during its projected economic lifespan (75-years), and (2) be subject to bluff instability due to marine erosion of the base of the bluff or a failure of the marine terrace portion of the bluff. In addition, a letter provided by PWA (Exhibit No. 7) addressed whether or not there are any alternative septic system designs that may be appropriate for use on the site that would further minimize the potential for septic system discharge (to the groundwater) to contribute to geologic instability.

Regarding bluff retreat, the Busch report found no evidence of retreat of the bluff edge over the past 70 years, and thus concluded that it is difficult and somewhat arbitrary to

assign a predicted future bluff erosion rate. In fact, the base of the bluff appears to have prograded in recent years due to the existence of a landslide in the lower portion of the slope. Using a variety of assumed failure mechanisms and ground water table elevations, the report concludes that the existing landslide at the base of the slope is currently undergoing failure and will continue to move as its toe is eroded. Episodic failure of the bluff is likely. Regarding bluff stability, the report indicates the top of the slope is also unstable. However, the report indicates that a static factor of safety of 1.5, the industry standard for new development was reached in the middle of Edwards Street. Thus, the subject parcel lies landward of the 1.5 factor of safety line and the geologic investigation concludes that the site is geologically and geotechnically suitable for the proposed residence.

The PWA letter concludes that the proposed septic system design alternative is the only appropriate and feasible septic system alternative for the site due to lot size constraints, site environmental conditions, and types of systems permitted by the County Division of Environmental Health (DEH). The Busch report referenced above further addresses the proposed septic system and its effects on geologic stability and concludes that "the operation of the Marshall onsite sewage disposal system…is unlikely to cause a bluff failure due to a cumulative effect." The report recommends constructing the leachfield where planned and finds it "unnecessary to revise the existing footprint due to slope instability, erosion, or groundwater table considerations." Numerous recommendations for grading, directing all surface run-off to the City's storm drain system, controlling erosion and sedimentation impacts, locating residential development within low to moderate geologic hazard zones, designing the residence to meet the UBC and California Seismic Code, utilize native plants that do not require irrigation to reduce groundwater infiltration, and all other recommendations were included in the PWA geologic hazard report, and the Busch report recommends adherence to those recommendations.

The Commission's geologist reviewed the proposed project and the referenced geologic documents and summarized his findings in a memorandum attached as Exhibit No. 9. Dr. Johnsson agrees with the Busch report's conclusions that "the slope below the site is unstable to marginally stable, but the [subject] site itself meets industry standards for slope stability and likely will for many decades. Even when it no longer meets these standards, it is unlikely…to require protective devices for its economic life" (see Exhibit No. 9). Dr. Johnsson also agrees with the conclusion reached in the PWA letter (Exhibit No. 7) that the amount of effluent resulting from the proposed new septic system that will likely be discharged is approximately balanced by the amount of rainfall that will no longer infiltrate the subject site due to the creation of impervious surfaces. The runoff generated by impervious surfaces, if appropriately graded with appropriate drainage, will be carried to the west by the City's storm drain system and will not infiltrate the bluff below the proposed development.

To ensure that the proposed development conforms to the geologic recommendations and will not increase erosion, slope instability, or sewage system failure, the Commission attaches Special Condition Nos. 1-2. **Special Condition No. 1** requires geologic review and certification by an appropriate licensed professional of all final design, construction,

grading, drainage, septic system, and erosion control plans prior to permit issuance. The final plans shall conform to all recommendations included in the geologic hazard report titled *Preliminary geologic hazard report for APNs 042-042-05 and 042-042-013 Located on Hector Street, Trinidad, California*, prepared by Pacific Watershed Associates and dated April 10, 2008 and in the geologic report titled *Results of Factor-of-Safety Analysis and Erosion-Rate Assessment for Proposed Marshall Residence, Edwards Street, Trinidad, Humboldt County, California [APN 042-042-005 and -013]* prepared by Busch Geotechnical Consultants dated November 20, 2009 for grading, directing all surface run-off to the City's storm drain system, controlling erosion and sedimentation impacts, locating residential development within low to moderate geologic hazard zones, designing the residence to meet the UBC and California Seismic Code, utilizing native plants that do not require irrigation to reduce groundwater infiltration, septic system recommendations, and all other recommendations. The condition also requires that the permittee undertake development in accordance with the approved final plans.

Special Condition No. 2 imposes certain landscaping restrictions on the property to ensure that only native, regionally-appropriate, drought-tolerant plants are installed that will not require excessive irrigation, which would increase groundwater infiltration and could contribute to geologic instability. The condition requires in part that (a) only drought-tolerant native vegetation shall be installed on the property to minimize the need for irrigation and the potential for geologic hazards; (b) no plant species listed as problematic and/or invasive by the California Native Plant Society, the California Invasive Plant Council, or as may be identified from time to time by the State of California, shall be employed or allowed to naturalize or persist on the site; and (c) no rodenticides containing any anticoagulant compounds shall be used on the property.

Notwithstanding the relative degree of insulation of the proposed project improvements in their proposed locations from geologic hazards, the applicants are proposing to construct development that would be located on a high uplifted marine terrace bluff top that is actively eroding. Consequently, the development would be located in an area of geologic hazard. However, new development can only be found consistent with Zoning Code Section 4.03(C)(10) if the risks to life and property from the geologic hazards are minimized. The applicant has submitted information from a registered geologist, which indicates that the development as proposed, with a set back of approximately 64 feet from the bluff edge to the septic system leachfield, which is seaward of the proposed house, will be safe from erosion.

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 following:

- 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 (CDP No. 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 Niño storm event. The Executive Director issued a CDP waiver (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 (CDP No. 6-84-461) based on a positive geotechnical report. In 1993, the owners applied for a seawall to protect the home (CDP Application No. 6-93-135). The Commission denied the request. In 1996 (CDP Application No. 6-96-138) and again in 1997 (CDP Application No. 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 (CDP Application No. 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 Arnold project at 3820 Vista Blanca in San Clemente (Orange County). Coastal development permit (CDP No. 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 (CDP No. 5-93-254-G) later was issued to authorize bluff-top protective works.

The Commission emphasizes that the above examples 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 its opinion on the vagaries of geotechnical evaluations with regard to predicting bluff erosion rates.

Although the project has been evaluated and designed in a manner to minimize the risk of geologic hazards, and although the Commission is requiring with Special Condition Nos. 1 and 2 that the applicant adhere to all recommended specifications to minimize potential geologic hazards, some risk of geologic hazard still remains. This risk is reflected in the Busch slope stability analysis report (Exhibit No. 6), which references various "limitations" of the analysis, such as:

> "Although we have used standard engineering geologic practices and professional standards of care to provide an erosion-rate assessment, geologic hazards and risk analysis, and mathematical (FOS) stability analysis, no one should construe this report to state or imply a guarantee of absolute safety of the home for any specific duration of time. Bluff retreat is punctuated, and episodic failures will continue to occur in the Trinidad area as elsewhere in the Pacific Northwest.
>
> In conclusion, although we based our evaluation on a consideration of the geologic, geodetic, tectonic, and nearshore marine processes active at Trinidad, within the next 75 years a failure of the top-of-bluff could occur and extend farther into the Marshall lot than we predict on the basis of qualitative and quantitative considerations…" [p. 32]

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 bluff face is clearly eroding in some areas, and that the proposed new development will be subject to geologic hazard and could potentially someday require a bluff or shoreline protective device. The construction of such a device would be inconsistent with ZOCT Section 4.03(C)(5), which strictly limits the placement of bluff repair and erosion control devices such as retaining walls and seawalls in the Special Environment zone which extends over the lower portions of the bluff seaward of the development site. In this zone, such devices are limited to those necessary to repair existing man-caused damage to the bluff face and only when such devices would not cause significant alteration in the natural character of the bluff face. Development of a retaining wall or seawall in the future to protect the proposed house would not conform to these criteria. Damage to the bluff face from future retreat of the bluff would be caused by natural coastal erosion whether or not there is also man-caused damage. In addition, the development of a retaining wall or seawall along the bluff would cause significant alteration in the natural character of the bluff face, as the subject bluff face currently contains no significant shoreline or cliff retaining walls and is part of the scenic landscape formed by and surrounding Trinidad Bay. Zoning Code Section 4.02(B)(4) addresses the installation of bluff repair and erosion control devices within the Open Space zone. Reading ZOCT Section 4.02 consistent with Section 30235 of the Coastal Act, the provision only allows for the construction of shoreline protective devices for the protection of existing buildings. The construction of a shoreline protective device to protect new residential development is not permitted by the LCP. The Commission thus finds that the proposed development could not be approved as being consistent with ZOCT Sections 4.02(B)(4) and 4.03(C)(5), if projected bluff retreat would affect the proposed development and necessitate construction of a seawall to protect it.

The slope stability analysis prepared by the applicant's geologist indicates that the risks of geologic hazard are minimized if all recommendations on grading, directing all surface run-off to the City's storm drain system, controlling erosion and sedimentation impacts, locating residential development within low to moderate geologic hazard zones,

designing the residence to meet the UBC and California Seismic Code, utilizing native plants that do not require irrigation to reduce groundwater infiltration, septic system recommendations, and all other recommendations are adhered to. However, given that the risk cannot be completely eliminated and the geologic report cannot assure that shoreline protection will never be needed to protect the carport, the Commission finds that the proposed development is consistent with the certified LCP only if it is conditioned to provide that shoreline protection will not be constructed. Thus, the Commission further finds that (1) due to the inherently hazardous nature of this lot, (2) the fact that no geology report can conclude with any degree of certainty that a geologic hazard does not exist, (3) the fact that the approved development and its maintenance may cause future problems that were not anticipated, and (4) because development of a shoreline protective device to protect the bluff seaward of the approved house would not be consistent with the zoning code limitations on development of such devices in the Open Space and Special Environment zones, it is necessary to attach Special Condition No. 3 to ensure that no future shoreline protective device will be constructed.

Special Condition No. 3 prohibits the construction of shoreline protective devices on the parcel, requires that the landowner provide a geotechnical investigation and remove the permitted single-family residence, garage, porches, septic system, driveway, and other associated development authorized by this permit if bluff retreat reaches the point where the permitted development 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. Special Condition No. 3 also requires that the applicant acknowledge that by acceptance of this permit, the applicant hereby waives, on behalf of himself and all successors and assigns, any rights to construct such devices to protect the addition to the existing single-family residence, decking, garage, studio, or workshop that may exist under Coastal Act Section 30235 or under ZOCT Section 4.02(B)(4) and 4.03(C)(5).

These requirements are necessary for compliance with LUP Policy 3 of the LUP's Constraints on Development Chapter and ZOCT Section 4.06(C)(6), which states that structures, septic systems, and driveways should only be permitted on lands of questionable stability if an analysis by a registered geologist indicates that the proposed development will not significantly increase erosion, slope instability, or sewage system failure, and that any potential adverse impacts have been mitigated to the maximum extent feasible. In addition, these requirements are necessary for compliance with ZOCT Section 4.03(C)(10) which requires that projects be sited and designed to neither be subject to nor contribute to significant geologic instability throughout the lifespan of the project. Furthermore, these requirements are necessary for compliance with (1) ZOCT Section 4.02(B)(4) which, when read consistent with Section 30235 of the Coastal Act, requires that seawalls and bluff walls can only be approved in the Open Space zone when needed to protect existing buildings; and (2) ZOCT Section 4.03(C)(5) which requires that seawalls and bluff retaining walls can only be approved in the Special Environment zone when necessary to repair existing man-caused damage to the bluff face and when the device will not cause significant alteration in the natural character of the bluff face. The Commission finds that the proposed development could not be approved as being

consistent with the policies of the certified LCP if projected bluff retreat would affect the proposed development and necessitate construction of a seawall to protect it.

In addition, as noted above, some risks of an unforeseen natural disaster, such as massive slope failure, erosion, etc., could result in destruction or partial destruction of the single family residence or other development approved by the Commission. Furthermore, 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, **Special Condition No. 3(B)** 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 single-family residence, garage, and other permitted development should the bluff retreat reach the point where a government agency has ordered that the structures not be occupied.

Special Condition No. 4 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 applicant has chosen to implement the project despite these risks, the applicant must assume the risks. In this way, the applicant is notified that the Commission is not liable for damage as a result of approving the permit for development. The condition also requires the applicant 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, Special Condition No. 5 requires the applicants to record a deed restriction approved by the Executive Director against the property that to impose the special conditions of the permit as covenants, conditions and restrictions on the use and enjoyment of the property. This special condition is required, in part, to ensure that the development is consistent with the Coastal Act and 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 and will ensure that future owners of the property will be informed of the Commission's immunity from liability, and the indemnity afforded the Commission.

As conditioned, the proposed development will not contribute significantly to the creation of any geologic hazards and will not have adverse impacts on slope stability or cause erosion. However, the Commission notes that future minor incidental development normally associated with single family residences such as additions to the residence, construction of outbuildings, decks and patios, or installation of additional landscaped areas could be sited and designed in a manner that could compromise geologic stability, leading to significant adverse impacts to the site and surrounding area. Many of these kinds of development are normally exempt from the need to obtain a coastal development permit under Section 30610(a) of the Coastal Act. Thus, unless the Commission specifies

in advance, the Commission would not normally be able to review such development to ensure that geologic hazards are avoided.

The Commission further notes that Section 30610(a) of the Coastal Act and Section 7.12 of the ZOCT specifically exempt 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.

To avoid such impacts to coastal resources and geologic hazards from the development of otherwise exempt additions to existing homes, Section 30610(a) requires the Commission to specify by regulation those classes of development that 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 (CCR). 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, siting and development of certain additions or improvements to the approved residence could involve a risk of initiating significant adverse geologic hazards. Therefore, in accordance with provisions of Section 13250(b)(6) of Title 14 of the CCR, the Commission attaches **Special Condition No. 6**, which requires a coastal development permit or a permit amendment for all additions and improvements to the residence on the subject parcel that might otherwise be exempt from coastal permit requirements. 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 significant adverse geologic consequences. As discussed above, Special Condition No. 5 also 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. Special Condition No. 5 also will help assure that future owners are aware of these CDP requirements applicable to all future development.

The Commission thus finds that the proposed development, as conditioned, is consistent with the provisions of the certified LCP regarding geologic hazards, including LUP Policy 3 of the LUP's Constraints on Development Chapter, ZOCT Sections 4.06(C)(6), 4.02(B), 4.03(C)(5), 4.03(C)(10), and 4.06(C)(6), 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, and will not require the construction of shoreline protective works. Only as conditioned is the proposed development consistent with these LCP provisions on geologic hazards.

F. Visual Resources

Summary of Applicable LCP Provisions:

Policy 71 of the LUP's *Development Options & Preferences* chapter states:

> *The city shall establish a design assistance committee with responsibility for approving the design of all development proposals including signs and building relocation. The committee should not be concerned with construction of accessory structures, normal maintenance such as painting, or minor exterior remodeling.*

Policy 76 of the LUP's *Development Options & Preferences* chapter states (in reference in part to the historic Holy Trinity Church located adjacent to the subject property to the north):

> *The design assistance committee should ensure that any proposed development does not detract from these historical sites and structures.*

Section 6.19 of the ZOCT, *Design review and view preservation regulations*, states the following, in applicable part:

> *The following regulations shall apply in all zones:*
>
> *A. Purpose. The small scale of the community and its unique townsite, affording spectacular views of the coastline and ocean horizon, define the character of Trinidad. Maintaining this character is essential to the continued desirability and viability of the city. A design assistance committee, consisting of the Trinidad Planning Commission and one member of the City Council, is hereby established to review new developments to ensure their consistency with the character of the city and to minimize their impact on important vistas.*
>
> *B. Applicability. Relocation, construction, remodeling or additions to structures, and alteration of the natural contours of the land shall not be undertaken until approved by the design assistance committee…*
>
> *C. Design criteria. The design assistance committee shall be guided by the following criteria when evaluating the land form alterations and constructions of structures…*
>
> *1. The alteration of natural land forms caused by cutting, filling and grading shall be minimal. Structures should be designed to fit the site rather than altering the land form to accommodate the structure.*
>
> *2. Structures in, or adjacent to, open space areas should be constructed of materials that reproduce natural colors and textures as closely as possible.*
>
> *3. Materials and colors used in construction shall be selected for compatibility both with the structural system of the building and with the appearance of the building's natural and man-made surroundings…*
>
> *4. Plant materials should be used to integrate the man-made and natural environments, to screen or soften the visual impact of new development and to provide diversity in developed areas. Attractive vegetation common to the area shall be used.*
>
> *…*
>
> *6. New development should include underground service connections…*
>
> *…*
>
> *8. When reviewing the design of commercial or residential buildings, the committee shall ensure that the scale, bulk, orientation, architectural character of the structure and related improvements are compatible with the rural, uncrowded, rustic, unsophisticated, small casual, open character of*

the community. In particular, residences of more than 2,000 square feet in floor area…shall be considered out of scale with the community unless they are designed and situated in such a way that their bulk is not obtrusive…

D. View protection criteria. The design assistance committee shall be guided by the following criteria when evaluating the impact of new development…on public and private vistas of important scenic attractions.

1. Structures visible from the beach or a public trail in an open space area should be made as visually unobtrusive as possible.

2. Structures including fences over 3 feet high and signs, and landscaping of new development, shall not be allowed to significantly block views of the harbor, Little Head, Trinidad Head, or the ocean from public roads, trails, and vista points, except as provided in (3) below.

3. The committee shall recognize that the owners of vacant lots in the SR and UR zones, which are otherwise suitable for construction of a residence, are entitled to construct a residence of at least 15 feet in height and 1,500 square feet in floor area. Residences of greater height, as permitted in the applicable zone, or greater floor area shall not be allowed if such residence would significantly block the views identified in (2) above. Regardless of the height or floor area of the residence, the committee, in order to avoid significant obstruction of the important views, may require, where feasible, that the residence be limited to one story; be located anywhere on the lot even if this involves the reduction or elimination of required yards or the pumping of septic tank wastewater to an uphill leach field, or the use of some other type of wastewater treatment facility, and adjust the length-width-height relationship and orientation of the structure so that it presents the least possible view obstruction.

…

4. The Tsurai Village site, the Trinidad Cemetery, Holy Trinity Church and the Memorial Lighthouse are important historic resources. Any landform alteration or structural construction within 100 feet of the Tsurai Study Area as defined in the Trinidad General Plan or within 100 feet of the lots on which identified historical resources are located shall be reviewed to ensure that public views are not obstructed and that development does not crowd them and thereby reduce their distinctiveness or subject them to abuse or hazards.

…

Project Consistency with Applicable LCP Provisions:

The subject site is located within 100 feet of both the Holy Trinity Church and the Tsurai Study Area, both of which are given special consideration under the certified LCP as historic and significant resources. New development within the vicinity of these important resources is required (in applicable part) not to obstruct public views from the resource areas and is to be subordinate to the significant resource areas. In general, the LCP provisions cited above require (in applicable part) that development of the subject site shall be visually unobtrusive, compatible with the character of the community, and shall minimize the alteration of natural landforms.

The applicant proposes to construct a new 2,454-square-foot, 16-foot-high, 3-bedroom, one-story, single-family residence with a 464-square-foot attached garage and a 160-square-foot covered patio and entry. In addition, the approved development includes a septic system with primary and reserve leach fields, a driveway (connected to Hector Street), and landscaping (see Exhibit Nos. 3-5).

To be consistent with the design and view protection criteria enumerated in Sections 6.19(C) and (D) of the ZOCT, new construction in the City of Trinidad must (in part), (1) minimize the alteration of natural land forms; (2) use construction materials that reproduce natural colors and textures as closely as possible and are compatible with natural and man-made surroundings; (3) use "attractive vegetation common to the area" to integrate the man-made and natural environments, to screen or soften the visual impact of new development, and to provide diversity in developed areas; (4) include underground service connections where possible; (5) ensure the scale, bulk, orientation, and architectural character of the structure and related improvements are visually compatible with the area and designed and sited to be visually unobtrusive; and (6) protect public views to the ocean and scenic coastal areas.

The subject site is relatively flat to gently sloped, so no significant alteration of natural landforms is proposed. The applicant does propose to level the site as needed for construction and to cut into the slope to minimize the height of the structure (proposed to be at a maximum height of 16 feet). Therefore, the development is consistent with ZOCT Section 6.19(C)(1), as the alteration of natural landforms will be minimized. Limiting the structure to one-story and 16 feet high as proposed will help to ensure that the development is visually unobtrusive and compatible with the surrounding area and does not block public views, as is required by the above-cited LCP policies. In addition, because public vantage points to the ocean and scenic coastal areas are mostly seaward of the proposed development, the proposed development will not block views inconsistent with ZOCT Section 6.19(D)(1), (2) and (3). According to findings made by the City in its approval of the subject development, the gross floor area square footage of the proposed development (2,918 square feet, including house, garage, covered patio and entry) is compatible with the average gross floor area square footage of surrounding properties in the project vicinity. The subject site is adjacent to large buildings on either side, including an apartment building and a commercial structure. Thus, the proposed development is consistent with ZOCT 6.19(C)(8), even though its proposed size is larger than 2,000 square feet. Furthermore, although the proposed development is located within 100 feet of the Tsurai Study Area, the Holy Trinity Church, and the Memorial Lighthouse, it is situated and designed so as not to crowd the historic sites or impact their distinctness. Special Condition Nos. 7, 8, and 9, explained below, will help ensure that the proposed development will not adversely impact the character of the area or views to and from these historic sites.

The applicant has submitted floor plans and building elevations for the proposed development, but no details on colors of exterior body, trim, or roofing have been provided. To ensure that the construction materials and colors used for the proposed

development reproduce natural colors and textures as closely as possible, are compatible with natural and man-made surroundings, and are visually unobtrusive consistent with the above-cited LCP policies, the Commission attaches **Special Condition No. 7**. This condition requires that prior to permit issuance the applicant submit a design plan for the single-family residence for the Executive Director's review and approval. The plan shall demonstrate that (a) materials and colors used in construction are compatible both with the structural system of the building and with the appearance of the building's natural and man-made surroundings and are visually unobtrusive; and (b) all exterior materials, including roofs and windows, shall be non-reflective to minimize glare. As discussed above in Finding IV-E, Special Condition No. 5 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. Therefore, as conditioned, the Commission finds that the development will be consistent with the color and material requirements of ZOCT Sections 6.19(C)(2) and (3).

Furthermore, to ensure that the new development does not detract from public views with excessive exterior lighting inconsistent with ZOCT Section 6.19(D), the Commission attaches **Special Condition No. 8**. This condition requires that all exterior lights shall be the minimum necessary for the safe ingress and egress of the structures, and shall be low-wattage, non-reflective, shielded, and have a directional cast downward such that no light will shine beyond the boundaries of the subject parcel. These requirements will ensure that the proposed residence in this location will be visually compatible with the character of the surrounding area.

Finally, to ensure that any new landscaping installed on the property does not significantly block public views to the ocean and scenic coastal areas and is comprised of native, drought-tolerant plants that will soften the visual impact of the development consistent with ZOCT Section 6.19(C)(4), the Commission attaches **Special Condition No. 9** to require submittal of a landscaping plan for the property prior to permit issuance for the Executive Director's review and approval. The landscaping plan shall demonstrate that landscaping specifications shall conform to all provisions specified in Special Condition No. 2 (discussed above), and landscaping shall not significantly block views of the harbor, Little Head, Trinidad Head, or the ocean from public roads, trails, and vista points, as is required by the LCP.

Therefore, the Commission finds that the proposed development, as conditioned, is consistent with the visual resources protection provisions of the certified LCP.

G. Archaeological Resources

Summary of Applicable LCP Provisions:

Section 6.19 of the ZOCT, *Design review and view preservation regulations*, states the following, in applicable part:

> *The following regulations shall apply in all zones:*
>
> …

> *D.* *View protection criteria. The design assistance committee shall be guided by the following criteria when evaluating the impact of new development…on public and private vistas of important scenic attractions.*
>
> …
>
> *4.* *The Tsurai Village site, the Trinidad Cemetery, Holy Trinity Church and the Memorial Lighthouse are important historic resources. Any landform alteration or structural construction within 100 feet of the Tsurai Study Area as defined in the Trinidad General Plan or within 100 feet of the lots on which identified historical resources are located shall be reviewed to ensure that public views are not obstructed and that development does not crowd them and thereby reduce their distinctiveness or subject them to abuse or hazards.* [Emphasis added.]
>
> …

Project Consistency with Applicable LCP Provisions:

The proposed project area is located within the ethnographic territory of the Yurok peoples. The Yurok are known to have settled along the Humboldt County coast within the general vicinity of the subject property. The Yurok Tribe had settlements extending north from Little River State Beach, several miles to the south of the project site, to areas within southern Del Norte County, including over 50 named villages clustered along the Klamath River and coastal lagoons and creeks, including 17 villages on the coast.

The proposed development is located within 100 feet of the Tsurai Study Area, and the possibility exists that cultural or archaeological resources could be uncovered during grading activities. To ensure protection of any cultural resources that may be discovered during construction of the proposed project, the Commission attaches **Special Condition No. 10**, which requires that a cultural monitor of the Yurok Tribe or the Tsurai Ancestral Society and certified by the Yurok Tribal Historic Preservation Officer be present to oversee all activities in which there will be ground disturbance. In addition, if an area of cultural deposits is discovered during the course of the development, the condition requires that all construction cease and a qualified cultural resource specialist must analyze the significance of the find. To recommence construction following discovery of cultural deposits, the permittee is required to submit a supplementary archaeological plan for the review and approval of the Executive Director to determine whether the changes are *de minimis* in nature and scope, or whether an amendment Coastal Development Permit No. A-1-TRN-08-046 is required.

Therefore, the Commission finds that the proposed project, as conditioned, is consistent with Section 6.19(D)(4) of the certified LCP, as the development will not adversely impact archaeological resources within 100 feet of the Tsurai Study Area and subject them to abuse or hazards.

H. California Environmental Quality Act (CEQA)

The City of Trinidad served as the lead agency for the project for CEQA purposes. The City found the project to be categorically exempt pursuant to Section 15303(a) of CEQA.

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 Coastal Act policies 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 certified Trinidad LCP, the proposed project has been conditioned to be found consistent with the certified Trinidad LCP. 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.

V. EXHIBITS

1. Regional Location Map
2. Vicinity Map
3. Site Plan
4. Floor Plan
5. Exterior Elevations
6. Busch Geotechnical Report dated November 20, 2009
7. Pacific Watershed Associates letter December 9, 2008
8. Pacific Watershed Associates report dated April 10, 2008
9. Memo from Mark Johnsson dated March 29. 2010
10. Notice of Final Local Action & City Findings for Approval
11. Appeal

APPENDIX A

STANDARD CONDITIONS

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

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

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

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

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

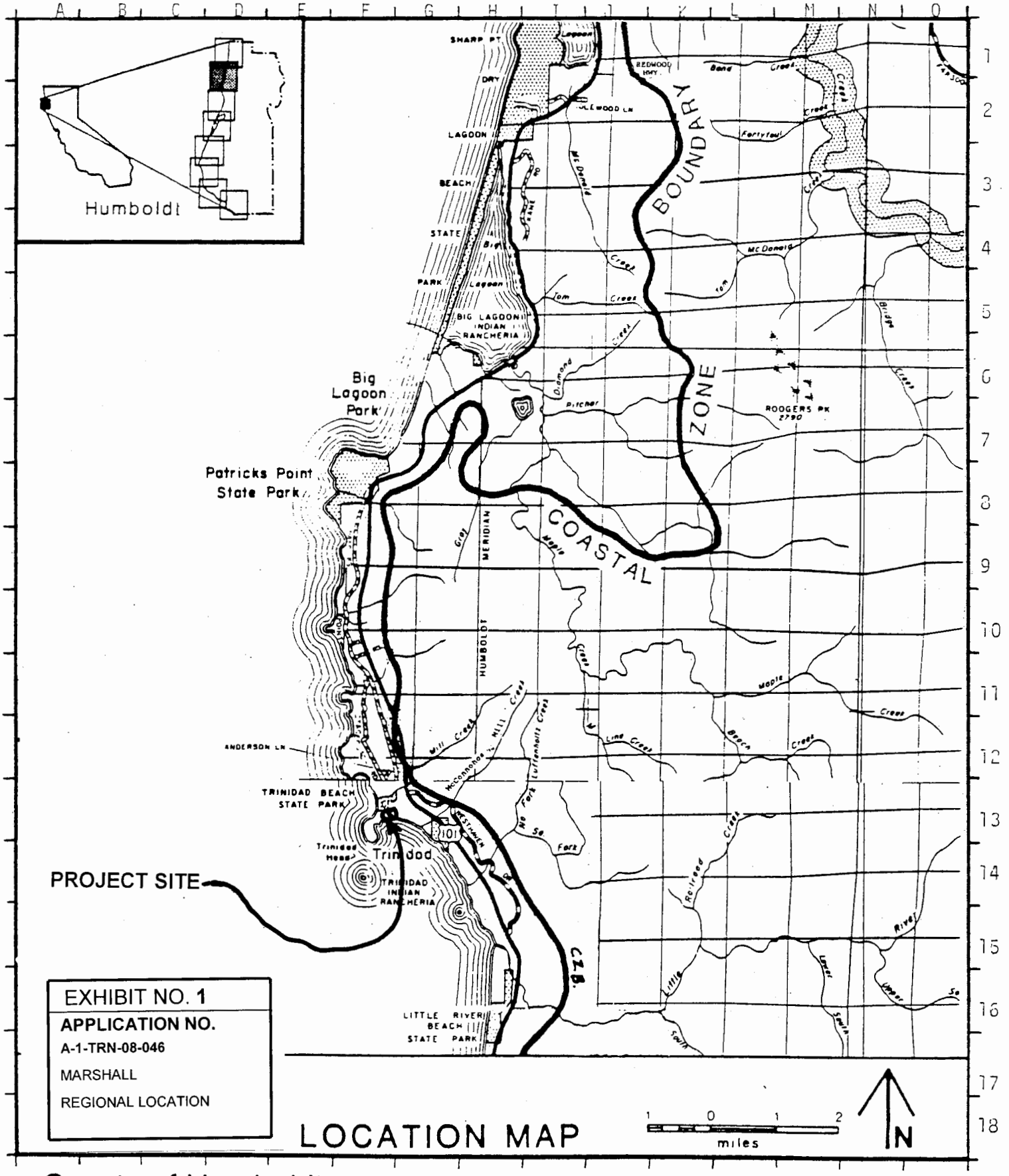


EXHIBIT NO. 1

APPLICATION NO.

A-1-TRN-08-046

MARSHALL

REGIONAL LOCATION

LOCATION MAP

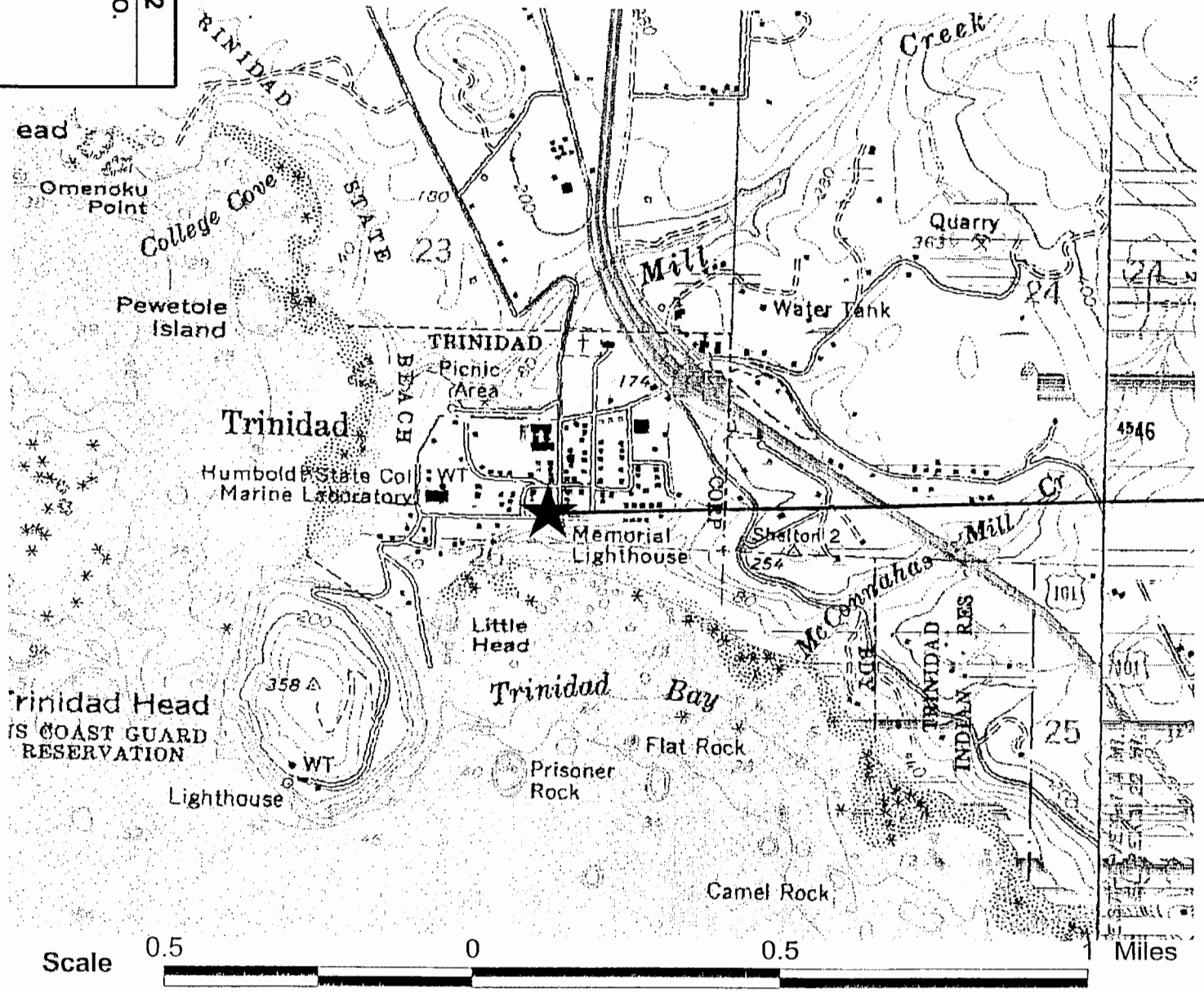
County of Humboldt

EXHIBIT NO. 2

APPLICATION NO.
A-1-TRN-08-046
MARSHALL
VICINITY MAP

General Location Map for Marshall

Marshall



APNs.:042-042-005 & 042-042-013

Hector Street
Trinidad, California

Approximate Project Loaction

N

Pacific Watershed ASsociates, Inc. P.O. Box 4433 Arcata, CA 95518, Ph: (707) 839-5130, Fx: (70

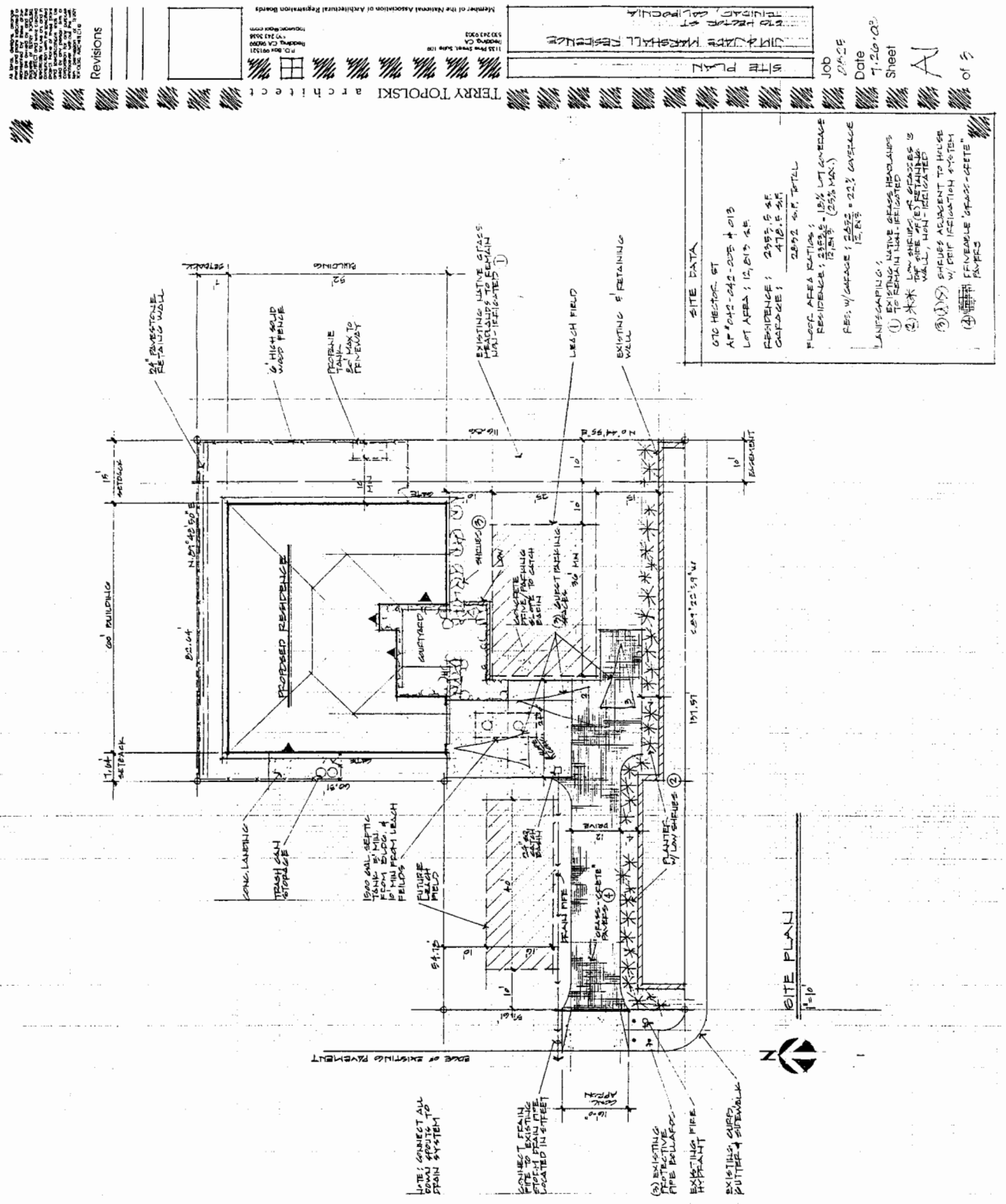


EXHIBIT NO. 3

APPLICATION NO.

A-1-TRN-08-046

MARSHALL

SITE PLAN

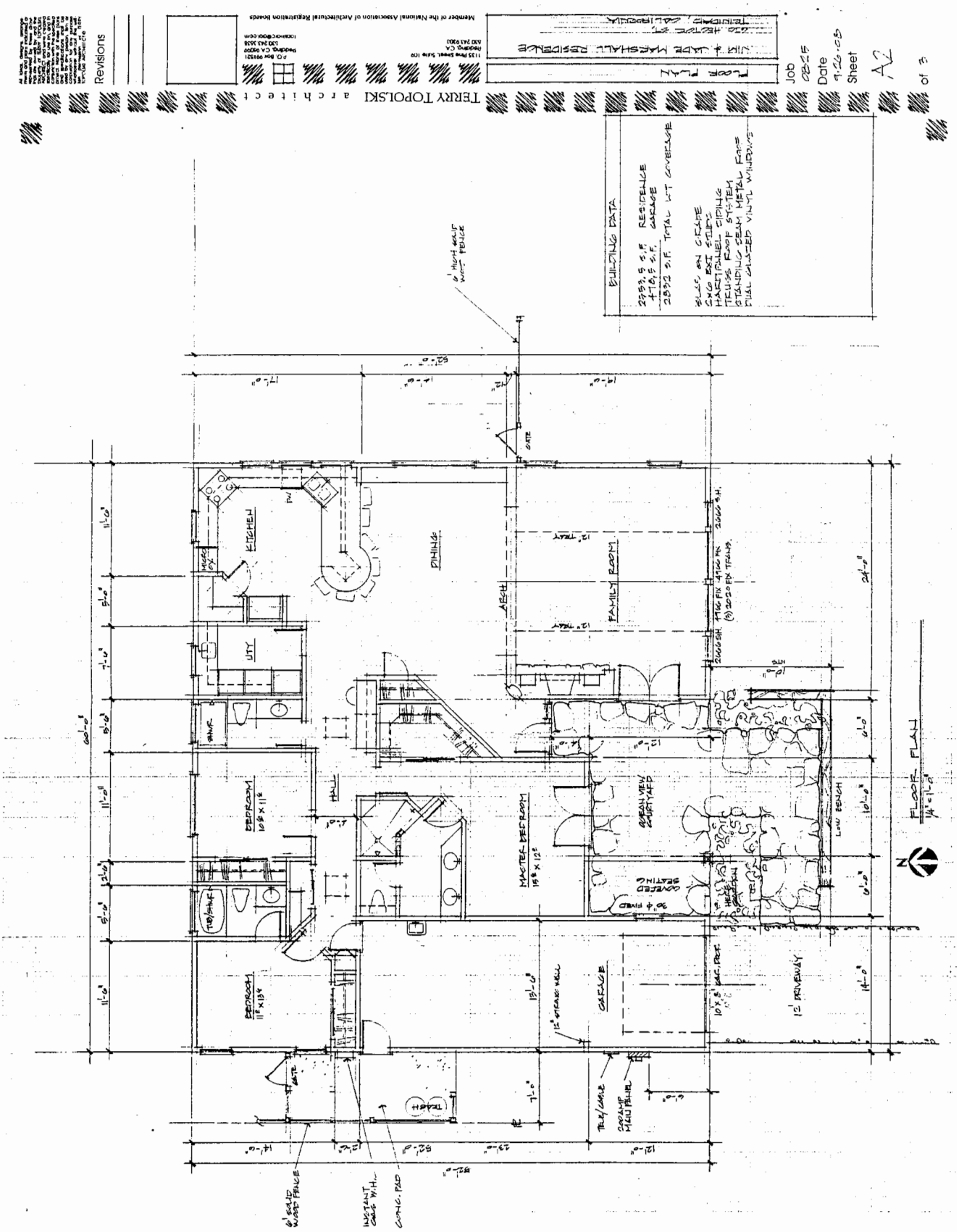


EXHIBIT NO. **4**

APPLICATION NO.

A-1-TRN-08-046

MARSHALL

FLOOR PLAN

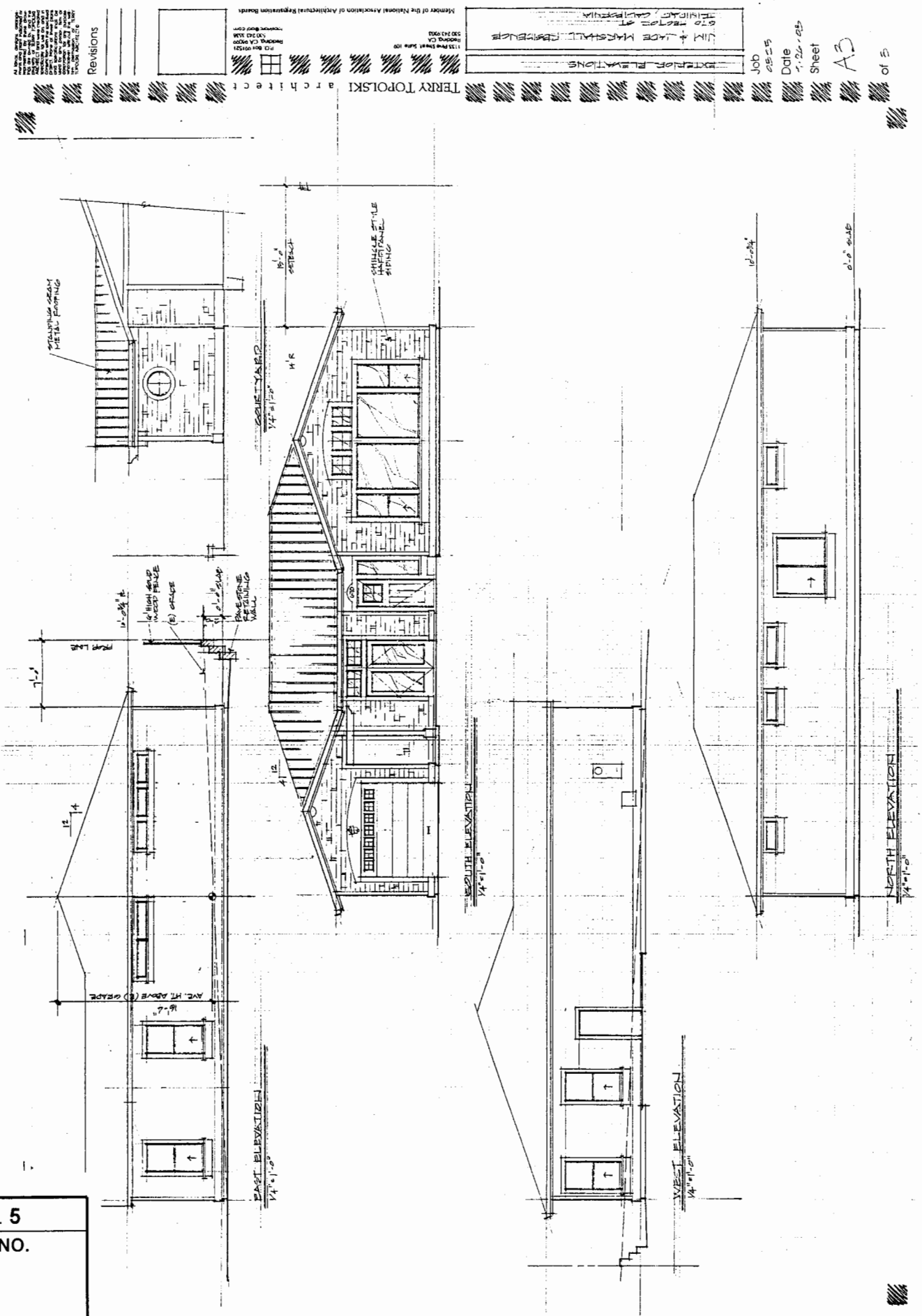


EXHIBIT NO. **5**

APPLICATION NO.

A-1-TRN-08-046

MARSHALL

EXTERIOR ELEVATIONS

BUSCH GEOTECHNICAL CONSULTANTS

EXHIBIT NO. 6
APPLICATION NO.
A-1-TRN-08-046
MARSHALL
BUSCH GEOTECHNICAL REPORT DATED 11/20/09 (EXCERPTS) (1 of 36)

P.O. BOX 222 • ARCATA, CA 95518-0222 • 707-822-7300 • FAX 707-822-9011

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BUSCH GEOTECHNICAL CONSULTANTS

November 20, 2009

Results of Factor-of-Safety Analysis and Erosion-Rate Assessment for Proposed Marshall Residence, Edwards Street, Trinidad, Humboldt County, California [APN 042-042-005 and -013]

2-936

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BUSCH GEOTECHNICAL CONSULTANTS

November 20, 2009

Jim and Jade Marshall
19595 San Vincente Drive
Redding, CA 96003

Results of Factor-of-Safety Analysis and Erosion-Rate Assessment for Proposed Marshall Residence, Edwards Street, Trinidad, Humboldt County, California [APN 042-042-005 and -013]

EXECUTIVE SUMMARY

This report provides discussion and the results of our analysis of the past and possible future erosion rate of the base-of-bluff and top-of-bluff south of the Marshall residential lot in Trinidad, California, of the stability of the bluff and proposed homesite under different conditions (different groundwater table elevations, a seismic load, etc.), and of the potential for future bluff retreat to affect the site. We completed our work based on a general methodology recommended by the California Coastal Commission (CCC).

This is a limited-scope report because another firm prepared an initial report that contains much of the information required by the present City of Trinidad ordinance and requested by the CCC. The additional information in this report includes a characterization of the geologic site conditions and failure modes of the bluff between the proposed residence footprint and Trinidad Bay beach below, and a mathematical (Factor-of-Safety) analysis of the bluff using a survey-controlled profile with stratigraphy, soil strength parameters, and water levels. We chose the

parameters based on subsurface data collected in the bluff top about one block away to the east, from a previous study of a portion of the Tsurai Village site below the bluff face, from a review of area-specific reports by us and other firms, from professional papers, and from our overall experience with coeval (same-age) marine terrace settings (applicable references herein).

The report also reviews published erosion rate information and provides a prediction about future erosion rates based on current global sea-level rise estimates. **The report evaluates the risk to the proposed homesite location in terms of multiple factors. They are:**

- **a 75-yr project lifespan;**
- **its proposed setback from the top-of-bluff (functionally, the south edge of the south shoulder of Edwards Street);**
- **an average long-term (~70-yrs) erosion rate <u>of this part of the bluff top</u> of 0.0 ft/yr;**
- **our knowledge about bluff face failure modes as they apply to the site-specific geology; and**
- **the results of our mathematical (Factor-of-Safety) evaluation of the stability of a survey-controlled critical profile through the lot, across Edwards Street, down the bluff face, and onto the beach.**

Pertinent data follow. The proposed footprint of the Marshall home is about 170 feet above mean sea level (MSL). The closest edge of the proposed footprint is ~100 ft north of the south edge of the shoulder of Edwards Street, which functionally is the top-of-bluff. The closest edge of the proposed leachfield is about 64 ft north of the edge of the top of bluff. The elevation of the south edge of Edwards Street is about 157 ft MSL and elevation of the top-of-bluff (the south edge of the shoulder) is about 154 ft MSL. The nearest active scarp (ground break) is about 190 ft south of the street in plan view and 210 ft as a slope distance. This scarp is about 310 ft south (slope distance) of the closest edge of the proposed home footprint. The top of the scarp is about elevation 68 ft MSL. The top of the bare face of the bedrock at the back-beach is about 36 ft MSL, and the bottom of that bare face (which is the edge of the back berm at the bedrock) is about 16 ft MSL. The proposed home footprint, at its nearest, is about 390 feet north of the actively eroding toe of the bluff (slope distance).

Our summary conclusions are:

1. The absence of boulders on the beach at, and laterally near to, the critical profile indicates that here the Late Cretaceous to Late Jurassic Franciscan Complex central belt mélange bedrock (map unit cm2 of McLaughlin et al., 2000) contains a small portion (0 to <25%) of "blocks" (in this sense, rocks larger than cobbles). Mélange is a "bimrock" or "block-in-matrix rock" in which the volume of blocks (over a threshold amount) and their orientation and spacing within the clay matrix control the strength parameters cohesion (c) and internal angle of friction (ϕ). Because the mélange functionally is clay, we used generally accepted Franciscan mélange clay parameters (c= 200 pcf, $\phi = 25^{o}$), rather than gravel or rock parameters to model the strength of the bedrock.

2. Based on two boreholes drilled by others in 1999 about one block to the east at the same approximate elevation as the home footprint (~170 ft MSL), we infer that the late Pleistocene marine terrace sediments are about 62-67 ft thick at the Marshall lots. They are primarily medium dense silty fine-grained sands (with minor other sands) that become less silty and dense at about 40 feet in depth.

3. Based on the boreholes drilled in Wagner Street and near the bluff top in mid-August, the mid-year groundwater table is about 52 to 54 feet deep beneath the Marshall lots, deepening toward the bluff. An analysis of the color of the borehole samples, which is an index to the depth of year-around wetness, suggests that the water table rises seasonally, but only to about 40 feet below ground (within about 120 feet of the bluff top).

4. The most likely static failure of the bluff is the <u>continued</u> slumping and translational sliding of an <u>existing</u> failure above the beach. That is, there is a 100% probability that an existing 10-feet-high scarp will grow higher and that the mass of bedrock below it will slide down onto the beach (causing the shoreline to prograde).

5. The second most likely static failure of the bluff is a <u>new</u> slump / slide above the existing failure. For a new failure to form, the existing scarp must grow as the block below it slides downslope, thus removing the lateral support from the bedrock higher up on the slope. Marine erosion of the toe of the bluff ultimately must remove most of the existing failing block in order to trigger sliding farther upslope.

6. The third most likely static failure of the bluff is a thin "flake" failure (planar landslide) of the outermost few feet of the top-of-bluff. Such a failure would damage or undermine Edwards Street, triggering a City decision about rebuilding the road or not. Although we conclude this as experienced geologists, neither the results of our Factor-of-Safety modeling nor a consideration of the likely highest groundwater table suggests this failure is probable under static conditions.

7. During the design-basis earthquake (an earthquake with a 10% chance of exceeding specific accelerations [see Table 1 herein] within the next 50 years), the most likely scenario would be increased sliding of the existing bedrock failure with or without progressive growth. During a great (M>8.0) Cascadia subduction zone earthquake, simultaneous slope failures of the lower portion of the bluff and the top-of-bluff to an uncertain distance inboard of the south edge of Edwards Street are possible.

8. Because there is no anecdotal or photogrammetric evidence to indicate that Edwards Street has been shifted to the north over the past ~70 years, there has been no erosion (back-wasting) of the top-of-bluff south of the site. (We define the top-of-bluff as the break-in-slope between the shoulder of Edwards Street and the bluff face below, rather than the top of the retaining wall.) That is, the average long-term erosion rate of the top-of-bluff, in terms of planning, effectively is zero inches per year.

9. Our FOS modeling work indicates the static FOS_s = 1.5 line plots about 12 feet into the south edge of Edwards Street, but the dynamic FOS_d = 1.1 line plots ~5 feet north of the street. Because it is more northerly, the FOSd = 1.1 line is the minimum top-of-bluff setback. Because the documented bluff-top erosion rate is 0 inches/yr, an additional setback from the bluff top is unnecessary.

10. Subsurface data from a nearby same elevation site that is only slightly closer to the bluff edge suggest that the groundwater table (GWT) remains ~40 ft deep beneath the Marshall lots all year. Our FOS modeling indicates that even with the GWT set at the surface, the lots (but not the south edge of Edwards Street) remain "stable." With the GWT at 10 ft, the lots and street have FOS_s >1.0. Because we do not believe the GWT can rise to within 10 ft of the surface within the lots, even with a contribution from an onsite septic system, development can proceed as planned.

INTRODUCTION

Contract Information, Site Location, and Purpose of the Report

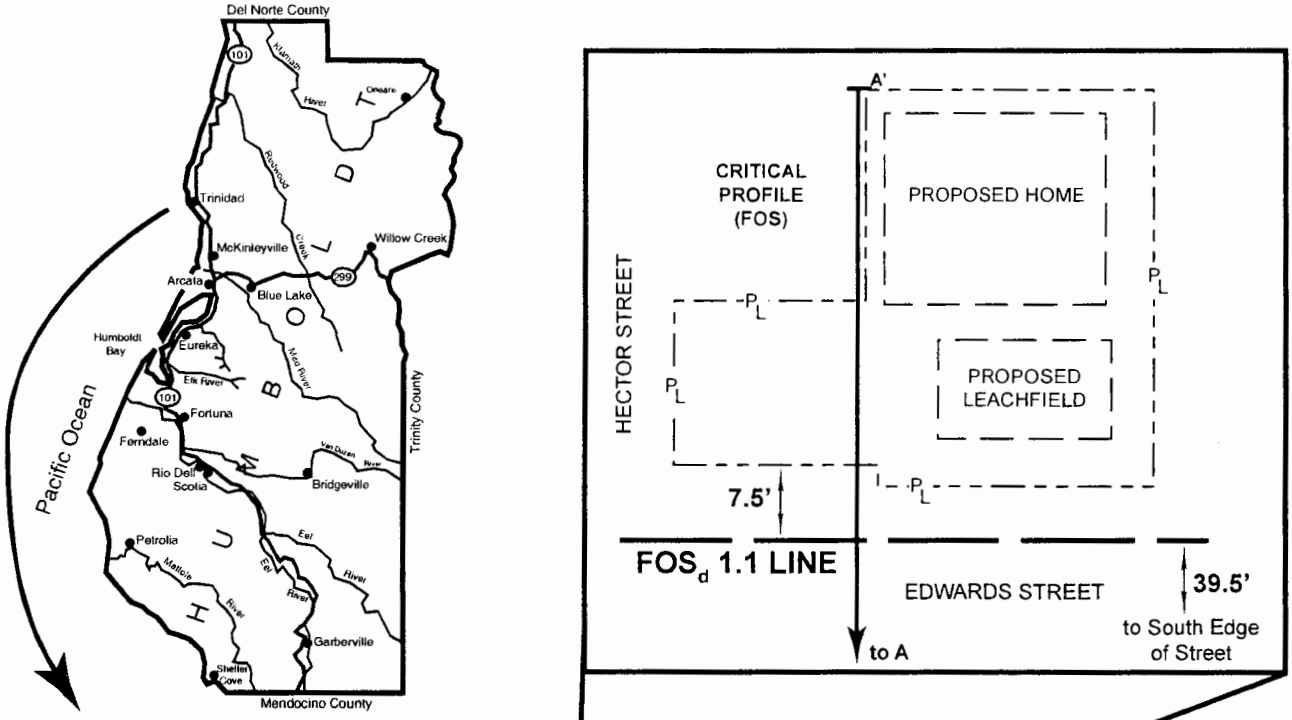
We are delivering this document under the terms of BGC contract #09-046 dated September 9, 2009. The report provides site-specific geologic information to supplement that previously provided for the site by others (PWA, 2008b).

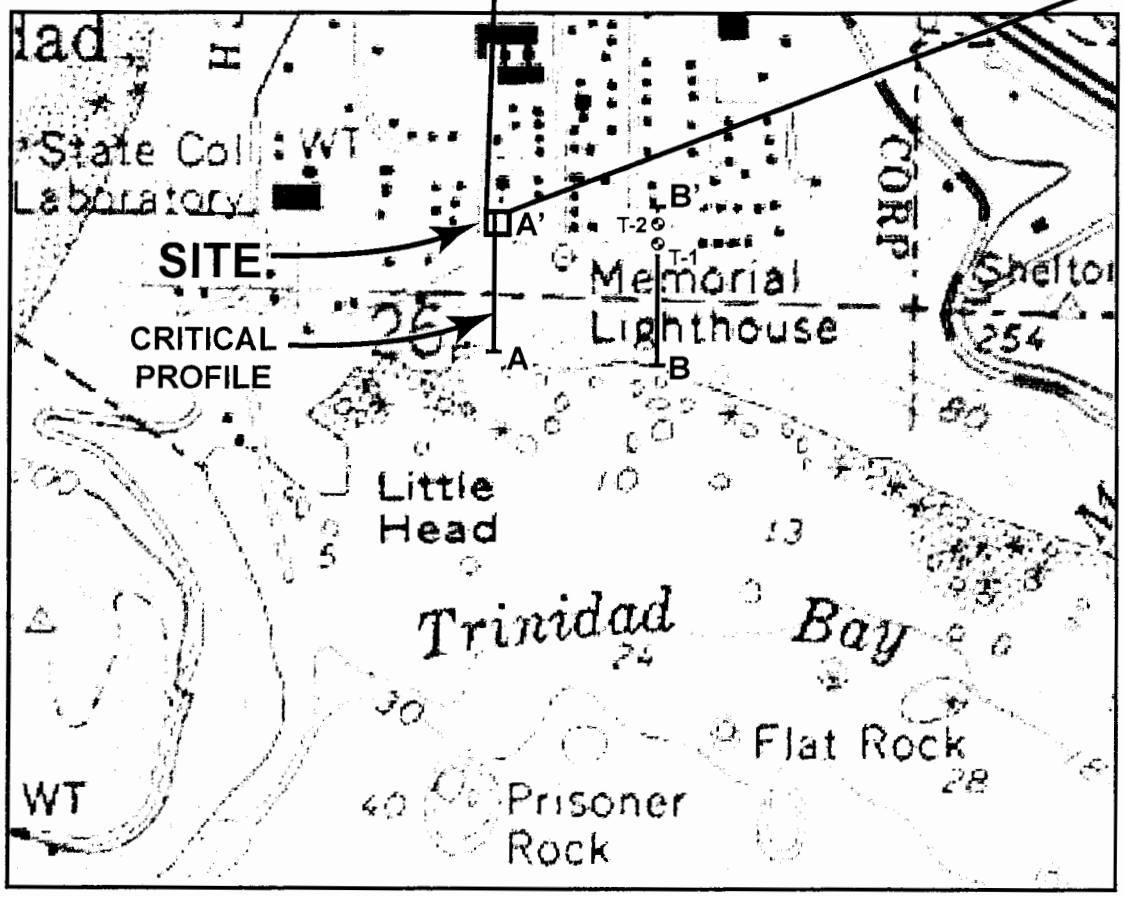
The Marshalls own the two lots located on the corner of Edwards Street and Hector Street in Trinidad, Humboldt County, California (see Figure 1). The lots are on the north side Edwards Street, east of Hector Street. The south edge of Edwards Street functionally is the top-of-bluff above Trinidad Bay beach. The area between the street and the beach is an ancestral Tsurai Indian village site now monitored and protected by the Tsurai Ancestral Society (TSA). A city sidewalk, narrow landscaped area, and a stone-faced concrete retaining wall border the north side of Edwards Street. The Marshal lots are Humboldt County Assessor Parcel Numbers (APNs) 042-042-005 and -013.

The Marshalls proposed to construct a single-story wood-frame home on the eastern lot (APN 042-042-13) using an onsite sewage disposal system located south of the home. PWA (2008a) completed a system design, but others have questioned whether the addition of effluent to the groundwater table would cause a cumulative effect of consequence to the ancient Tsurai village site (CCC, 2008). If constructed where proposed, the home, at its closest, would be ~100 ft from the top-of-bluff (TOB) (functionally, the edge of the shoulder along the south edge of Edwards Street) and the closest edge of the sewage disposal system (SDS) primary leachfield would be ~64 feet from the TOB.

The ultimate purpose of this report is to provide assurance that during the next 75-year period, as much as anyone can predict, the proposed project will not cause bluff instability (through the addition of leachfield effluent to the groundwater) nor be subject to bluff instability (due to marine erosion of the base of bluff or a failure of the marine terrace portion of the bluff).

Figure 1. Nested maps of the site showing its location in Humboldt County. Base map is a portion of the USGS Trinidad 7.5' quadrangle map. Various scales. The topographic map shows the location of the critical profile we used for FOS modeling, the boreholes (T-1 & T-2) we discuss in text, and a second critical profile we analyzed and discuss herein (BGC, 1990, 1999).





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To make our determination we followed the general methodology recommended by the California Coastal Commission (CCC) (Johnsson, 2005). That is, in addition to characterizing the geology of the site and the probable stratigraphy of the marine terrace sediments, we provide a factor-of-safety (FOS) analysis of a critical profile between the back edge of the lot and Trinidad Bay beach below. Because of the subtleties inherent in FOS modeling, we also provide discussion about the site-specific bluff failure modes and erosion of the toe-of-bluff and top-of-bluff. We also estimate the seasonal range in the groundwater table on the lots and discuss its possible effects on the bluff stability.

Scope of Work and Methods

Generally speaking, and to simplify, our scope-of-work called for us to determine the stability of the bluff face and top using a mathematical procedure and to calculate or estimate the long-term erosion rate of the top-of-bluff south of the Marshall property. That is, we had to review erosion-rate data and predict a future erosion rate (over the next 75 years) in light of rising global sea level. We also had to complete a quantitative slope stability analysis (a risk assessment) based on measured and assumed site-specific slope, soils, and groundwater conditions. We also had to evaluate the potential for high groundwater to occur and to lead to instability. Finally, we had to issue any recommendations necessary to reduce the risk of damage to the residence or failure of the top-of-bluff due to the construction of the project. Specific tasks in our scope-of-work included:

- Reviewing selected pertinent professional papers and maps, consultant's reports, and in-house reports;
- Making a survey-controlled "critical profile" through the lot, down the bluff across the ancestral Tsurai Village grounds, down the bare, eroded toe of the bluff, and onto the Trinidad Bay beach;
  Characterizing the geology and stratigraphy of the site by describing the bluff face based on site-specific observations and nearby subsurface data, and selecting appropriate soil parameters for the various identified lithostratigraphic units based on these observations and data and on established values for mélange bedrock;

- Completing a mathematical (Factor-of-Safety or FOS) analysis of the bluff face and top to determine the relative risk of failure and the approximate location of the static FOS_s = 1.5 line or dynamic FOS_d = 1.1 line on the critical profile and a project base map;
- Providing a brief discussion of historic long-term erosion-rates based on professional literature and/or our own work;
- Commenting on the setback of the home based on the long-term erosion rate (of the top of bluff) and the results of our FOS calculations;
- Providing a risk assessment for the proposed homesite assuming a 75-year project lifespan;
- Interacting with the client, his representatives, and key staff of involved regulatory agencies (notably, Dr. Mark Johnsson of the California Coastal Commission); and
- Providing this report.

On August 24th, 2009, BGC Principal, Bob Busch, C.E.G., and Staff Engineering Geologist Beau Whitney, P.G., surveyed a critical profile line from the lot down the bluff face to the beach and made geologic observations. Kelly Lingren, a representative of the Tsurai Ancestral Society (TAS), monitored the work. Previously we contacted the TAS for approval (BGC, 2009) and received it (TAS, 2009).

We use standard practices and professional standards of care for all of our geotechnical studies, and we follow American Society of Testing and Materials (ASTM) procedures for all sampling and lab testing. We also follow the recommendations provided by Southern California Earthquake Center (SCEC) for implementation of DMG Special Publication 117 (SCEC, 2002). For this job, to evaluate the project proposal, we followed the methods described in Johnsson (2005). This report contains field data, lab data from equivalent offsite locations, the results of a factor-of-safety (FOS) analysis of a complex slope, a summary of observations and conclusions, and hazard and risk assessment.

Staff Geologists working under the direction of our Principal provide our survey control and produce our topographic geohazards maps. We use a Nikon NPL-352 total station with an internal data recorder. In the office, we complete CADD work and print the map or profile on a HP linear plotter.

For this job, we did not bring in control from some nearby geodetic or other benchmark. Instead, we set our initial survey location (sta. 1) at an arbitrary elevation of 500 feet. Later, in the office, we set the elevation of the northernmost portion of the lot as 170 feet MSL, which is within a few feet of the actual elevation of this part of the site. We did this because we had elevation control on boreholes and a slope profile we did nearby in the past, ones to which we refer in this report, and Google Earth 2009 identified the two locations as having the same elevation. When we did our FOS modeling runs, we altered the site elevation to 270 ft MSL in order to allow the computer to include failure arcs that passed slightly below sea level.

Because PWA (2008b), others, and we have reviewed stereographic pairs (and single) aerial photographs of Edwards Street and the vicinity numerous times in the past, we did not redo or even review any of that work to document any of the minute changes that have or might have occurred along the bluff. One reason for making this decision is the knowledge that in 1949, persons lost to time (at least to us) logged and graded areas of the bluff below Wagner and Edwards Street (BGC, 1995, 2003b). This grading activity left localized "flats" and benches on the bluff face and unquestionably affected the overall stability of the bluff, at least in localized areas, but in undocumented ways and locations.

ENGINEERING GEOLOGY OF THE SITE

Encapsulation of the Site Geology

General Geology

The town of Trinidad occupies a portion of an uplifted late Pleistocene marine terrace, the 64,000-year-old Patricks Point terrace (Carver and Burke, 1992) (map and cross-section symbol Qt). The southern edge of the terrace ends at a break-in-slope above a bluff overlooking Trinidad Bay. The western edge of the terrace ends at a generally lower bluff overlooking the Pacific Ocean. That is, the surface of the terrace slopes toward the west. This study focuses exclusively on a small portion of the southern edge of the terrace.

For the last ~20,000 years or more, as global sea level rose (Emery and Garrison, 1967), marine waves eroded into the margin of the terrace creating a bluff-backed shoreline. Below the site the waves are eroding into the regional bedrock, here the Late Jurassic to Late Cretaceous Franciscan Complex central belt mélange (map unit cm2) of McLaughlin et al. (2000). From a stratigraphic, compositional, and engineering geologic perspective, mélange is highly variable, ranging from nearly pure clay or claystone to a mixture of blocks of exotic rock types of many sizes within a gravelly clay matrix to variably deformed thick-bedded mappable layers.

Below the southern edge of the terrace as a whole, the mélange consists of pervasively sheared and weathered argillite and siltstone containing isolated erosion-resistant rocks such as greenstone, sandstone, and conglomerate. That is, in places the unit is matrix supported (is mostly clay) and in others it is clast-supported (is mostly gravel, boulders, or larger blocks of erosion-resistant rock). In the area, erosion-resistant rocks are present as seastacks and boulders in the nearshore and on the beach, and outcrops ("knockers") in places protrude from the bluff face. At several distinct locations along the Trinidad Bay Beach, headlands composed of a many large boulders protrude from the bluff face, or smaller rounded boulders litter the beach. For example, there is an incipient headland about 200 feet west of the beach below the site, a small group of boulders is visible in the water (in the subtidal part of the beach profile) about 100 feet east of the site beach, and a second incipient headland is located about 2000 feet to the east-southeast of the site beach.

Coastal northern California is located within an active tectonic regime. The most likely source of an earthquake that could affect this site is the southern part of the offshore Gorda plate. The previous geologic report discussed the regional seismic hazard and associated risk (PWA, 2008b), and we will not reiterate it here. However, see Table 1 in the report recommendations for the design seismic parameters required by the 2007 edition of the California Building Code (ICBO, 2007).

Trinidad is located in the northern part of the Mad River fault zone (MRfz) of Carver et al. (1982). The MRfz is the onland portion of the Cascadia fault and fold belt (ibid.). The fault and fold belt is an expressional of the regional

compressional tectonics caused by the impingement of North America and the offshore Gorda oceanic plate. The northern part of the belt includes the Big Lagoon fault (at the north side of Big Lagoon) and the Trinidad fault (which passes through the town near the Chevron station). Past thrusting events on the Big Lagoon fault have brought bedrock up and over the marine terrace sediments and caused the marine terrace surface between Patricks Point and the north side of Big Lagoon to tilt strongly to the northeast (Carver, 1987). Because of this dip, the bluff height varies from ~175 ft at Patrick's Point State Park above Agate Beach to zero at the south edge of Big Lagoon where the terrace surface dives beneath the water. In Trinidad, in contrast, past movements on the Trinidad fault have warped the terrace surface only slightly, raising the eastern side. Past fault studies in the Trinidad area have demonstrated that the configuration of the fault is complex (e.g., BGC, 1988).

The trace of the Trinidad fault passes about 1400 feet northeast of the site, dipping to the northeast, and the traces of the McKinleyville fault and other MRfz faults are offshore to the southwest, dipping to the northeast. The slip planes of the McKinleyville, Mad River, and other MRfz faults pass beneath the Marshall site at depth. The recurrence interval of individual faults within the Mad River fault zone is two thousand years or less (Petersen et al., 1996). The date of the last rupture of the Trinidad fault is unknown.

In summary, although it is theoretically possible that a new propagating tip of the McKinleyville fault could rupture the site, the risk is NEGLIGIBLE.

Site-Specific Geology

We assume that the upper surface of the mélange bedrock is a subhorizontal, subplanar abrasion platform. Is so, then the borehole data collected ~650 ft east of the Marshall lots within Wagner Street and off a driveway that intersects it (Taber, 1999) suggests that there are about 62 to 67 feet of marine terrace deposits (including capping soils) at the Marshall site (see Appendix IA for Taber soil logs). Based on those two boreholes, the terrace deposits—technically, poorly consolidated rocks—are primarily silty, fine-grained nearshore marine sands. Based on regional information and onsite subsurface excavations by others, mixed fill soils, disturbed soils, topsoils, and eolian (wind-blown) soils are present to maximally

about 7 feet in depth on the lot (PWA, 2008a). By extension, the borehole logs suggest that medium dense silty sands (with localized less dense zones of other types of sands) extend to about 40 feet in depth (yielding a total thickness of variably weathered to fresh marine sediments of about 33 feet). Again based on the logs, these medium dense silty sands overlie about 22 to 27 feet of dense slightly silty to clean medium to fine-grained sands (USCS, SM, SP). The basal few feet of the terrace deposit—the layer directly on top of the abrasion platform—probably contains well-graded gravelly sands (SW) and sandy gravels (GW) with occasional cobbles and and/or larger clasts. Based on the Taber boreholes (ibid.), the bedrock surface is about 62 to 67 feet below ground (at elevation ~108 to 103 ft MSL).

That is, in rock terms, and "lumping" rather than "splitting," we envision the marine terrace unit as composed of intercalated lenses of poorly consolidated silty fine- and fine- to medium-grained sandstone with pebbly well-graded sandstone and sandy conglomerate as basal members. Lenses presumably vary in thickness from a few inches to a few feet and in length from a few feet to hundreds of feet. We would expect the pebbles to be well-graded subangular to well-rounded (mostly well-rounded) clasts derived from Franciscan Complex sources and older marine terraces.

We cannot exclude the possibility that the marine terrace unit contains more gravel than we model. Aalto (1989) described an "upper Agate Beach deposit" in the bluffs above Agate beach. He interprets the gravel lenses in that sequence as recording storm events in a high-energy shallow-water environment.

Based on Taber borehole no. 2 drilled in Wagner Street about 115 ft north of the bluff top (Taber, ibid.), the groundwater table (GWT) below the Marshall building site presumably is about 50 feet deep (at about elevation 120 ft MSL) within the terrace sediments during the summer, fall, and early winter months. The oxidation / reduction colors of the soils recorded on the Taber boring no. 2 log suggest that the groundwater table is unlikely to rise seasonally to above about 40 feet below ground (~130 ft MSL) within about 100 feet of the top-of-bluff. (Oxidation colors...yellows, oranges, and reds...indicate alternating wetting and drying conditions that will cause iron-rich minerals to oxidize. Reducing colors...grays, blues, and greens...indicate permanent to semi-permanent saturation.)

There is a pronounced absence of boulders on the site beach. This is a critically important observation because it indicates that the mélange seacliff is primarily clay and that the mélange eroded over the past few thousand years has been too. Those conclusions suggest that here the bedrock is primarily mélange matrix. A second observation supports this inference: there are no boulders or knockers protruding from the mélange on or near to the critical profile.

That is, although mélange is a "bimrock" (block-in-matrix rock) that can contain sand-sized particles to Trinidad Head-sized (or bigger) blocks within a clay, shale, argillite, or mudstone matrix, below the Marshall site the mélange varies from a soft (where wet) to stiff blue-gray clay to gravely clay. It therefore is appropriate to model the two fundamental bedrock strength parameters, cohesion (c) and effective stress angle of internal friction (ϕ'), as those of a clay (Lindquist, 1994). Based on extensive work by others studying Franciscan mélange terrane or working with Franciscan mélange samples, it is appropriate to use a maximum cohesion value (c) of 350 psf (pounds per square foot) and a maximum ϕ of 28° (Lindquist, ibid.) for mélange matrix with a block content of up to about 25% by volume. Others suggest that minimum values should be c = 200 psf and ϕ = 25° (Medley and Rehermann, 2004). At 25% blocks, ϕ can be ~32° (Lindquist, ibid.).

Previously we prepared a critical profile of the marine terrace bluff face below the Taber borehole locations (BGC, 1990; see Figure 1). Later we completed factor-of-safety stability analysis of the upper (marine terrace) part of that profile (BGC, 1999). For those jobs, we used tape and compass methods (rather than survey-control) to profile the slope.

That critical profile off Wagner Street contains the same geomorphic landforms that are present on the Marshall critical profile. These include:

(1) the negligibly sloping developed marine terrace surface;

(2, 3) the grass- to brush-covered upper reaches of the bluff face within late Pleistocene marine terrace deposits;

(4) colluvium-mantled, hummocky, tree-covered slump-earthflow terrain in bedrock (geomorphically, a transportational midslope and toeslope), containing microtopographic features (e.g., scarps and "flats" of uncertain origin);

(5) a variably steep, bare to sparsely covered, toe-of-bluff subject to marine undercutting; and

(6) Trinidad Bay beach.

On that profile, the colluvium-covered marine terrace deposits maintain a relatively planar, vegetated, 60% (~31°) slope gradient. (This slope magnitude is approximately the angle of repose of loose fine-grained sands, and it is the approximate angle of internal friction of poorly consolidated fine-grained sandstone.) Below the sand-bedrock contact, the hummocky soil-covered bedrock surface slopes from about 23% (~13°) at the base of the terrace sediments, to 8% (4.5°) on "flats" of uncertain origin, to 47% (25°) in the toe region, to ~130% (52.5°) in the bare or sparsely vegetated over-steepened sea cliff at the back of the beach. When we did the profile (after the 1982-83 El Niño but before the 1997-98 El Niño), the profile did not contain visible scarps or rotated blocks.

The Marshall critical profile (Figure 2) is subtly different but essentially equivalent. From north to south, a geologic profile line run through the Marshall lot down to Trinidad Bay drops down off the lot, crosses Edwards Street, drops down the concave-up top-of-bluff area, crosses the hummocky moderate to gentle slopes of the ancient Tsurai Village, and drops down a low seacliff onto the back edge of the beach, (see Figure 2). The upper ~35 feet of the bluff face has a nominal slope of 73% (36°), which is slightly over-steepened for a silty fine-grained sand, rounding to 26% (14.5°) over the next 40 horizontal feet (by the tree line below the Himalaya berries). This area is colluvium-covered (and possibly fill-covered) marine terrace deposits. The hummocky earthflow terrain (bedrock terrane) just below appears to be ever-so-slightly convex up with a mean slope gradient of ~38% (21°). These slopes also are colluvium-covered. An active 10-ft-high scarp cuts across this hummocky terrain, and the rotated, now translating block below it has a mean slope gradient of 24% (13.5°). The bottom of this block steepens to 47% (25°) and the bare to sparsely covered toe averages about 90% (42°) above the beach. The top of the scarp is about 105 ft north of the beach in map view, and 130 ft north as a slope distance. At the closest, the colluvium-hidden sand-bedrock contact is about 95 ft (slope distance) upslope of the top of the scarp.

In map or aerial view, the top edge of the bluff south of Wagner Street between roughly Parker Creek and the Trinidad lighthouse is relatively linear, trending roughly N80°W. It does not contain deep cusps or "bites" caused by recent large bluff failures.

However, just west of the lighthouse, the character of the top-of-bluff is different. There, the edge-of-bluff is much "softer," the elevation of the break-in-slope at the top-of-bluff is slightly lower (about 10 ft), and the bluff is best described as concave to the south (and up) except for a short section that Edwards Street crosses. In this area, the terrace surface slopes southwestward rather than south, long ago people logged and graded the top of the bluff face, and Edwards Street crosses the head of the slope. For all appearances, the 200 or so liner feet of bluff top west of the Marshall property appears to have failed long ago (because of its concavity). We surveyed our critical profile across the west-central part of the Marshall lots and down this slope to the beach (see Figure 1). We say, "...appears to have failed..." because there is not a large mound of debris on the transportational hillslope below, nor a jumbled mass of decaying trees. However, there is a slight convex-up slope there, indicating that colluvium (or grading spoil) has accumulated just below the terrace-bedrock contact. Although PWA (2008b), based on an analysis of aerial photographs that date back to the late 1940s, notes that the photos record changes in vegetation and a possible gully or slope failure west of Edwards Street, there is no photographic evidence that any failure extended into the road.

In conclusion, if a large slope failure had occurred in the top-of-bluff across from the Marshall lots recently, the debris would be readily visible on the slope below. If the failure was long-ago (>300 yrs or so), then bioturbation, sheet wash, and other processes (such as the 1949 grading operations of unknown extent) have smoothed out or eroded most of the debris away, leaving only the hint of a convex-up slope profile. Alternatively, perhaps there was no slope failure but past citizens simply logged and graded the bare top-of-bluff area below Edwards Street to provide building areas south of Edwards Street (anecdotal information confirms this), and then more recently others demolished the old buildings to provide a better view of the bay for tourists and residents.

Results of Quantitative Slope Stability Analysis: Factor-of-Safety (FOS) Models

General Description of FOS Modeling

The mathematical analysis called a "factor-of-safety" (FOS) analysis assesses the stability of a slope by comparing the forces resisting failure to the forces driving failure. In a stable slope, the forces resisting failure exceed the forces driving failure, so the FOS is > 1.0. When the two forces are equal, the FOS = 1.0 and slope failure is imminent. The higher the FOS is above 1.0, the greater the theoretical likelihood that the slope is "stable." (The stable slope might be subject to soil creep or consolidation-induced settlement, but these are soil hazards, not types of slope instability.)

The minimum allowable value for the static factor-of-safety (FOSs) of a slope depends on the following (Duncan and Buchignani, 1975; SCEC, 2002):

(1) The degree of uncertainty in the shear strength measurements, slope geometry, and other conditions;

(2) The cost of flattening or lowering the slope to make it more stable;

(3) The cost and consequence of a slope failure; and

(4) Whether the slope is temporary (e.g., a construction cutbank) or permanent.

Typical practice is to recommend that the minimum static stability of an area of concern be FOS_s = 1.2 (Fang and Mikroudis, 1991) to 1.25 (Duncan and Buchignani, 1975), or greater (ibid.; Huang, 1983; SCEC, 2002; Johnsson, 2005). The better the investigator knows the soil stratigraphy and strength parameters, the lower the FOS can be because there is greater certainty in the "truthfulness" of the FOS analysis. The CCC requests that all new structures be set back behind the FOS_s (static) = 1.5 line or the FOS_d (dynamic) = 1.1 line, whichever is further inland (Johnson, 2005).

Prologue

Our factor-of-safety (FOS) modeling for this job was more difficult than it was for any of our recent jobs for bluff-top properties simply because the slope profile is complex and includes two fundamentally different lithologic units. The basal ~110 vertical feet of the critical profile (~230 ft of slope distance) records slope gradients and landforms within the regional bedrock, which here functionally is clay. In contrast, the upper ~60 vertical feet of the slope profile records slope characteristics within the edge of the uplifted Ice Age marine terrace the City of Trinidad occupies. In this area of Trinidad, the mélange bedrock fails both plastically (the way melting butter deforms) and as brittle slumps followed by translational landsliding. Sandy marine terrace deposits, on the other hand, fail only as wedge or planar landslides, which are types of brittle failure.

Because of the complexity of the slope, by the time we were ready to write this text-section, we had modeled far more scenarios and run several times more reiterations than we usually do. This is partially because the solutions for some reiterations were not realistic.

As one example, with the failure arc's initiation and termination points unconstrained, so the computer was free to model the entire beach to back-of-lot profile, the program (using a two-layer model) drew a failure arc that extended deep into the bedrock and far into the lots, and then printed a FOS of ~0.7 for the arc. Although this arc—at the limits of credulity—conceivably could model a failure caused by a five-minute-long, 2 g.-shaking, M9.0 Cascadia subduction zone earthquake, it is NOT credible as a modeling solution. That is because the FOS number is too low (it indicates failure has already occurred, which it has not); because the failure arc extends too deep into the bedrock (mélange matrix bedrock fails as shallow slump-earthflow or slump-translational slides, not as deep, giant rotational landslides); and, last, because we did the modeling run under static, not dynamic, conditions. When we assigned greater strength parameters, a second unconstrained modeling run drew the critical failure arc between the base-of-bluff and centerline of Edwards Street, but assigned a FOS of ~0.9, again indicating that the failure had already occurred.

In summary, the initial types and sizes of slope failures that the computer offered to us for consideration were not credible to us as engineering geologists.

To generate the solutions we present herein we switched to a three-layer model to better characterize the marine terrace sands, and we controlled the initiation and termination zones of the failure arcs in order to analyze failures respectively confined to the bedrock and to the terrace sands. We believe that the results we present on Figure 2 (as insets) are representative of the types and sizes of slope failures that are possible at the site and that we have recorded from the bedrock and marine terrace bluffs of the region.

We estimate that we did approximately 50 reiterations using a range of parameters that most experienced engineering geologists presumably would consider within the realm of possibility. That is, we did not model internal angles of friction that were impossibly high or low, etc.

Details of Our Site-Specific FOS Models

For various modeling runs on the Marshall site we used the simplified Bishop method and the Janbu method; the computer program XSTABL, version 4; 2- and 3-layer models; various soil parameters; and a water table that varied from the surface to ~55 feet below ground. Based on our qualitative understanding of the geology of the site, initially we divided the bluff into two simplified soil units and modeled the characteristics of each. Subsequently we broke the upper unit in two based on the density increase with depth, creating a three-layer model. For most runs, we set the groundwater table (GWT) to the approximate elevation recorded on the logs of the two mid-August boreholes drilled nearby (Taber, 1999). For some runs, to model a hypothetical "worst-case" condition, we saturated the profile to the surface. **However, in our opinion, because the terrace soils are granular and the bluff face facilitates rapid drainage and a much-lowered water table near it, it is improbable that the soils within even 100 feet of the bluff face could become saturated above 10 to 30 feet in depth.** Consequently, a FOS generated by a reiteration with the GWT set at the surface is ultra-conservative (it is much lower than the true FOS). To better estimate the maximum high GWT under the lots, it would be necessary to drill deep boreholes, set wells, and monitor the GWT over a wetter-than-typical winter; this would be inappropriately expensive to do for a single-family residence. Finally, we applied a seismic load to some runs, using a seismic coefficient of 0.15 per the recommendations of the GGLA (2002).

For our preliminary modeling runs of the critical profile, we used a simplified stratigraphic model consisting of two (2) lithostratigraphic units: mélange bedrock (symbol cm2 on Figure 2) and marine terrace sands (Qt). We selected the elevation of the bedrock surface and groundwater table based on the empirical data provided by the two Taber (1999) boreholes (see Figure 1 and Appendix IA). We selected average soil parameters (dry density, saturated density, cohesion, and internal angle of friction) of the marine terrace unit (Unit 1) based on our recent experience modeling similar marine terrace bluffs (e.g., BGC, 2003a), reviewing work by others (e.g., Galli, 2004), and on recommended parameters in a technical manual (Hunt, 2005). Although loose soils cover the marine sediments, and the terrace sediments change from medium dense silty sands to dense, less silty sands at about 40 ft in depth, our two-layer model simplifies the marine terrace sands by ignoring the soil cap and combining the sands of two different densities into one unit with averaged densities and strength parameters.

Specifically, in our two-layer model (no graphics included herein) we characterize the upper layer, Unit 1, as 65 feet of medium dense silty fine sand (SM). Our soil parameters are: moist density (γ_m) = 110 pcf, saturated density (γ_{sat}) = 135 pcf, effective cohesion (c') = 280 psf, and effective internal angle of friction (ϕ') = 31°. For modeling simplicity we include within this unit genetically and descriptively variable soils including mixed fill soils, native topsoils, and aeolian silts (older topsoils) on the Marshall lots; assumed medium dense road fill beneath Edwards Street; loose to medium dense sandy colluvium (disturbed soil) that mantles the upper part of the bluff face; and the main body of marine terrace sediments. As noted, based on the Taber (1999) borehole logs, these sediments are primarily silty fine sands (SM) with minor well-graded sands (SW) and poorly graded sands (SP).

(On the Marshall lots, the native topsoil is loose, organic, dark brown, fine sandy silt (USCS, ML) and the older, deeper topsoil is soft to medium stiff, yellow-brown or olive-brown fine sandy silt (ML) to silty fine sand (USCS, SM). The colluvial soils on the bluff face have moved to their present position from upslope sources due to ravel, sheet wash, bioturbation by plants and animals, soil creep, human activities, and possibly piping, sapping, and shallow landsliding.)

Unit 2 of our two-layer model is weathered Franciscan Complex mélange bedrock (unit cm2 of McLaughlin et al., 2000). As discussed under Site-Specific Geology, below the Marshall lots the mélange contains a volumetrically small portion (zero to <25%) of "blocks" so functionally it is clay. Consequently, we model the strength of the unit using an effective cohesion value (c') of 350 psf (pounds per square foot) and an effective ϕ' of 28° (Lindquist, ibid.). We also did reiterations using a c' of 200 psf and a ϕ' of 25° (based on Medley and Rehermann, 2004). We set the moist density at 130 pcf, the saturated density at 145 pcf.

Our three-layer model divides the marine terrace sands into two units and assigns different parameters to each layer (see Figure 2, pocket, insets A, B, and C). We model the upper 40 feet of the sands as layer 1 composed of medium dense silty sands (SM) and the lower 25 feet as layer 2 composed of dense sands. For layer 1 we set the moist density (γ_m) = 100 pcf, the saturated density (γ_{sat}) = 110 pcf, the cohesion (c') = 40 psf, and the internal angle of friction (ϕ') = 32°. For layer 2 we assume clean sands (SP rather than SM) and accordingly set the moist density (γ_m) = 110 pcf, the saturated density (γ_{sat}) = 130 pcf, the cohesion (c') = 0 psf, and the internal angle of friction (ϕ') = 36°. Unit 3 is the bedrock with parameters γ_m = 142 pcf, γ_{sat} = 152 pcf, (c') = 300 psf, and ϕ' = 28°.

In all efforts, we ignored the beach sand mantling the present-day abrasion platform and we modeled the paleo-bedrock abrasion platform as planar with a ~4° slope to the south. As noted, we varied the GWT from 55 feet in depth to the surface, although we do not believe it is possible for the GWT to rise higher than 10 to 30 feet below ground beneath the lots (we show the GWT at 40 ft in depth on the Figure 2 insets).

Conclusions about Slope Stability from the FOS Analysis

Figure 2 (pocket) presents the critical profile, labeled with geologic terms, observations, and inferences. The figure also includes the three insets that illustrate selected results of our FOS analysis of the critical profile using the stratigraphy, GWT, and parameters shown on the inset. We do not show or discuss constraints (such as failure segment length) that we used. Each inset figure illustrates the 10 most probable failure surfaces for the conditions and parameters we evaluated during that reiteration. The failure surface with the asterisks is the surface with the

lowest FOS, which we report on the figure. A noted, before selecting the particular printouts we show, we did many other reiterations to model slightly different soil parameters and conditions. **We selected these insets as most representative of probable future slope-failure scenarios based on the site conditions as we understand them.**

Our analyses indicate that the minimum static FOS for the critical profile is FOS_s = 0.896 within the mélange bedrock and FOS_s = 1.141 and FOS_d = 0.863 within the marine terrace sediments. These FOS values would be slightly different using different soil parameters and water table depths. **In our opinion, these models and FOS values nicely characterize the actual site conditions for several reasons.** First, there is an existing slope failure within the bedrock, and the critical arc passes through the actual scarp. Second, because there is that existing failure, the FOS_s must be less than 1.0 in the lower part of the bluff, and the program appropriately generated a FOS_s <1.0. Third, when the initiation – termination limits were confined to the marine terrace sediments, the program selected a critical failure arc with FOS_s = 1.141, a value that indicates that a sliver or "flake" of sands is at risk of failing. Because the top-of-bluff is slightly over-steepened here relative to the more typical (and stable) top-of-bluff steepness we measured on a transect off Wagner Street (BGC, 1990, 1999), a failure of the outboard (south) edge of Edwards Street is probable at some time in the future. The dynamic factor-of-safety for this same slope position is lower (0.863 vs 1.141), as expected.

The Bluff-top Setback Derived from the FOS Analysis

Per Johnsson (2005), the portion of the total bluff-top setback distance due to the results of the FOS analysis is determined by comparing the location of the static FOS_s = 1.5 failure arc-ground intercept with the location of the FOS_d = 1.1 line intercept. The line farthest inland determines the setback. On Figure 2, inset B, all of the failure arcs clustered within Edwards Street (the unlabeled lower flat) except the southernmost one (in the shoulder) and the northernmost one have a FOS_s of 1.5 or greater. Figure 2, inset C, modeled with a seismic coefficient, shows a failure arc labeled FOS_d = 1.1. This arc is inboard of (closer to the lots than any of) the FOS_s = 1.5 lines, so controls. We also show the location of this line on the Figure 1 inset.

Summary of Site-Specific Slope Stability

In plain English, our site-specific observations, review of the literature, personal experience, and factor-of-safety analysis all indicate that the most likely static scenario is the continued slumping and translational sliding of the existing bedrock failure above the beach. It is virtually certain that the existing scarp will grow higher and that the mass of Franciscan bedrock below it will slide down onto the beach either gradually or catastrophically.

The second most likely static failure of the bluff is the formation of a new slump / translational landslide above the existing one. By comparing the slope distance from the top of the existing scarp to the beach (~130 ft) and the existing scarp to the inferred bedrock-marine terrace contact (~100 feet), we infer that this future slide might be confined to the bedrock or it might "bite" a few tens of feet (slope distance) into the basal marine terrace sands. This slide would form as the block below the existing scar slides downslope, thus removing lateral support from the bedrock higher up on the slope. As marine erosion of the toe of the bluff removes the failing mass, landsliding eventually will progress farther upslope. In our opinion, the formation of a low scarp in the toe of the marine terrace sands would not trigger immediately trigger landsliding of the slope above. We believe that it most likely would require a third mélange failure to trigger terrace sliding.

The third most likely static failure of the bluff is a thin "flake" failure (planar landslide) of the slightly over-steepened outermost edge of the top-of-bluff (see inset B of Figure 2). If such a failure occurred, it might damage Edwards Street, triggering a City decision about rebuilding the road or not. This failure is possible because the uppermost part of the top-of-bluff is over-steepened slightly, perhaps due to the past road construction.

During the design-basis earthquake (an earthquake with a 10% chance of exceeding the specific accelerations of Table 1 herein within the next 50 years), the most likely scenario would be increased sliding of the existing bedrock failure with or without progressive growth and a "flake" failure of the top-of-bluff.

During a great (M>8.0) Cascadia subduction zone earthquake, simultaneous slope failures of the lower portion of the bluff and the top-of-bluff to an uncertain distance inboard of the south edge of Edwards Street are likely.

Bluff-failure Mechanics, El Niños, Global Sea-Level Rise, and Geodesy

Bluff-failure Mechanics

In coastal areas of the Pacific Northwest, bluff failures are caused primarily by marine under-cutting of the base of the bluff, whether it is erodible marine terrace sediments (such as along Agate Beach) or erodible mélange (such as at the site). A second main failure mode occurs when high pore water pressures occur in terrace sediments because of prolonged, intense storms. This phenomenon occurs most often in sands interlayered with cemented zones or silt layers that can perch groundwater into overlying layers; the Nesika Beach area of Curry County, Oregon, is a classic Pacific Northwest example.

Where the base of the bluff is marine terrace sediments, a failure of the top-of-bluff generally occurs only after the base of the bluff erodes to an over-steepened slope angle (typically, greater than ~60° to undercut). With the toe support removed from the bluff, the overlying sediments fail as planar slides, wedge failures, debris slides, and "flake" failures of coherent but thin blocks of sediment. Typical failure angles are 60° or steeper. Over time, these failures cause the top-of-bluff to "back-waste" or erode back. A large failure can "bite" an arcuate or irregular notch out of the top-of-bluff, over time creating a serrated bluff top in plan view. In contrast, when the base-of-bluff is erodible mélange, bluff failures typically occur as the mélange slumps or plastically deforms seaward. Both types of failure ultimately cause brittle failures (typically, planar slides or wedge failures) of coherent blocks of marine terrace sediments. Sometimes the blocks back-tilt (the surface rotates landward) and then slide down a failure plane on the exposed bedrock surface.

In addition, groundwater emerging from the bluff face can cause subsurface erosion and bluff instability. This process can cause certain areas of the bluff top to experience larger-than-typical failures. **In the Trinidad area, individuals expressed concern that the cumulative effect of the Marshall's onsite sewage disposal system (SDS) might cause the groundwater table to rise enough to trigger bluff failure (due to increased pore-water pressures).** We address this issue in a following text-section (**Implications of GWT FOS Modeling**).

El Niños

In the Pacific Northwest in general, undercutting by winter waves historically has caused dramatic, rapid, episodic shoreline retreat, especially during and following strong El Niño years. An El Niño is a climatic perturbation that affects the entire Pacific Ocean basin and the surrounding landmasses. Atmospheric and oceanic scientists use a strongly negative value of the June-November Southern Oscillation Index [SOI] to classify a year as a strong El Niño year (per the logic of Redmond and Koch, 1991). Typically, stronger-than-typical storms occur during an "El Niño winter." Based on the SOI, an El Niño winter occurred in 1940-41, 1941-42, 1946-47, 1951-52, 1965-66, 1972-73, 1977-78, 1982-83, 1987-88, 1993-94, 1994-1995, and 1997-98 (WRCC, 2003). Ranked by their SOI, the El Niños of 1982-83 (-2.42), 1940 (-1.80), 1941 (-1.73), 1997 (-1.67), 1965 (-1.58), and 1977 (-1.52) were the strongest (ibid.). Of these, the Pacific Northwest was most affected by the 1982-83 event, which Quinn et al. (1987) classify as a very strong El Niño. Very strong El Niños have an average recurrence interval of ~50 years, but a range of 13 to 150 years (ibid.). The previous very strong El Niño occurred in 1925-26 (ibid.).

In the Pacific Northwest, coastal erosion typically is greater (more rapid, more significant) during strong El Niños because the winter water height is higher than average, large storms tend to be more frequent, and storm swells tend to be larger. In addition, wave trains may arrive from a different direction than usual. During an El Niño winter, after a few weeks of exceptionally adverse conditions, waves and currents have moved most of the sands and fine gravels on an affected beach offshore into deeper-than-usual water. When the protective beach is gone, marine undercutting of the base of the bluff begins, followed by rapid-rate bluff back-wasting. Furthermore, erosion remains more rapid afterwards, at least at sites where erodible bluffs have lost their beach, until the beach profile regains its "normal" configuration. Unfortunately, the transport of the sand farther offshore prevents the sand from returning to the beach the following summer.

Although the effects of past strong El Niños on the beach below the Marshall site are undocumented (to our knowledge), at least three of the five past strong El Niños (1940-41, 1941-42, and 1997-98) have triggered an episode of rapid-rate erosion in the Big Lagoon bluffs. We base this conclusion on aerial photo research and a review of reports including Tuttle (1981), Falls (1998), BGC (1998, 2003a)

and SHN (1998, 2003a, b). Surprisingly, the 1982-83 "Very Strong El Niño" winter that did so much damage to southern coastal Oregon (Komar, 1986) did not trigger a significant episode of erosion of the Big Lagoon bluffs.

When El Niño winter waves and the associated longshore currents redistribute beach sands, a multi-year episode of sea cliff erosion begins and does not abate until a beach is present again. This phenomenon was widespread in the Pacific Northwest following the 1982-83 El Niño (Komar, 1986; Tuttle, 1987; Peterson et al., 1990).

Global Sea-level Rise

Until recently, report authors cited the eustatic global sea-level rise rate as 1.8 +/- 0.2 mm/yr (Douglas, 1991). However, this rate is accelerating. Currently, estimates by the Intergovernmental Panel on Climate Change (IPCC, 2007) are that eustatic sea level will rise between 0.18 m and 0.59 m (0.59 ft and 1.95 ft) by 2100 (or a ~1.9 to ~6.3 mm/yr average sea-level rise rate). However, hazard / risk modeling and economic evaluations by the State of California assume a 1.4 m (4.62 ft) rise by 2100, or a ~15 mm/yr rate of sea-level rise (Heberger et al., 2009). In addition, the authors acknowledge that this predicted rise is not a worst-case scenario (ibid.).

One result of rising sea level is increased erosion rates. In Oregon, where the beaches have been studied in greater detail than in northern Humboldt County, many beaches have a 50:1 (H:V) slope (Peterson et al., 1991). Theoretically, and with other things held equal (e.g., without offsetting geodetic uplift or an erosion-resistant bedrock bluff), a 2 mm/yr rise of sea level each year could lead to a long-term retreat rate of an erodible bluff of ~10 cm/yr (3.9" or 0.33 ft/yr). A 15 mm/yr rise could trigger a retreat of ~75 cm/yr (29.5" or 2.46 ft/yr).

For Trinidad, the rapid-rate erosion resulting from higher global sea levels theoretically could lead to widespread bluff-failures. For example, one projection places the landward limit of the "erosion high hazard zone" in 2100 over one block north of Edwards Street (i.e., north of Parker Street) (PI, 2009). Although we do not know the modeling basis for this mapping, we do not believe that such catastrophic erosion is likely. This is because of the punctuated (episodic) nature

of the bluff failures of the mélange bedrock and the relatively high degree of protection Trinidad Head and the beach aspect (south) confer on Trinidad Bay beach (as we discuss under **Erosion Rates**, following). Another factor in our disbelief is that the same mapping effort places the landward limit of the line less far inland on the western, more exposed side of Trinidad (Pl, ibid.).

Geodesy

Despite the seeming high existing potential for retreat, many Oregon bluffs have shown little or no retreat over a 50-year time span, probably because roughly equivalent tectonic uplift is occurring (Peterson et al., 1992). The uplift occurs because the subducting Gorda and Juan de Fuca plates are locked (are not sliding past one another) to a depth of 10 km or more (Flueck et al., 1997).

A similar situation exists for Humboldt County and Del Norte County beaches. That is, tectonic uplift roughly offsets global sea-level rise by raising the land at about the same rate as sea level is rising. Current estimates are that the Trinidad area is rising ~3 mm/yr (Williams, 2002) to ~4 to 5 mm/yr (Mitchell et al., 1994; Burgette et al., 2009). Until the global sea-level rise rate matches the tectonic uplift rate, the risk of marine erosion theoretically is less each year.

Erosion Rates

Trinidad Head, Pilot Rock, several smaller offshore rocks, and the more westerly longitude of Clam Beach and the shoreline to its south collectively protect the part of Trinidad Bay beach below the Marshall site from direct impact by winter waves arriving from essentially any direction except, perhaps, due south. However, large arriving waves can refract around Trinidad Head, strike the beach with diminished but effective energy, and strip off the sand veneer. In summary, whenever winter storm waves strip the sand from the Trinidad Bay beach, or when the water level is higher than usual and the storm waves are bigger (during a strong El Niño winter storm, for example), the base of the mélange seacliff begins to erode. At times, undoubtedly, the result is rapid-rate erosion of the toe of bluff.

We know of no published professional paper that attempts to document the erosion rate (or seaward progradation of) the base of the bluff. Griggs and Savoy (1985) documented erosion rates along the California coast, and to the east of the Trinidad Bay beach they record bluffs that have advanced seaward (due to slope instability), but they offer no rate for the Trinidad Bay beach (ibid., p. 91). However, they characterize the shoreline as an "unprotected cliff." Rust (1982) completed detailed mapping of the Trinidad Bay beach shoreline up into the city and east about to US 101, but he did not estimate erosion rates. He did record slump-earthflow terrane below the Marshall site, but he did not map an active slump where we discovered one on our critical profile. He maps many other slumps off-profile at about the same elevation, however, which leads us to believe that he mapped carefully and that the failure we show on Figure 2 began sometime after 1982.

Don Tuttle (formerly of the Humboldt County Department of Public Works) compiled coastal bluff erosion data for much of the Humboldt County coastline (Tuttle, 1981). His data came from historic photographs, aerial photographs, maps, survey notes, highway plans, historical letters and journals, archaeological reports, and interviews with long-time residents.

In the Trinidad Bay area, Tuttle compared the distance between offshore rocks and onland features measured on 1942 and 1974 aerial photographs (his Table 9). Unfortunately, he presents no map to document the precise location of his measurement stations. However, his records indicate that between Little Trinidad Head (at the westernmost end of Trinidad Bay) and about McConnahas Mill Creek to the east, the shoreline typically prograded (advanced seaward). (He used the word "aggraded" and did not speculate on the cause. We infer that the cause is the translational landsliding of masses of mélange onto the beach.)

Students of northern California's coastal erosion know Tuttle best for his work at Big Lagoon (Tuttle, 1987). Although Tuttle's bluff retreat measurements were subject to intrinsic inaccuracies, one of his bottom line conclusions is valid: bluff retreat at Big Lagoon (and by extension, at other bluff-backed northern California coastal sites) occurs in episodes of rapid-rate erosion following decades-long periods during which essentially no erosion occurs. In the Big Lagoon area, the most recent dramatic erosion episode occurred in response to the El Niño winter of 1997-98 (Tuttle, 2003, personal commun.).

In summary, although there is no published "long term" erosion rate (e.g., ~1942-2008) for the Trinidad Bay beach below the Marshall site (and we did not attempt to determine one), it is likely, based on the geology of the critical profile in light of Tuttle's (1981) and Rust's (1982) past observations, that for the past ~70 years the position of the shoreline (base-of-bluff) has either remained in stasis or has prograded seaward as slumps of mélange translated down onto the beach. The existence of Edwards Street at the same location since prior to 1942 suggests that the top of bluff also is not experiencing erosion at this location, at least erosion due to slope instability. To us, the existing elongate cracks in the asphalt in the west end of the Trinidad Memorial Lighthouse parking area (photographs in PWA, 2008b), suggest that the causal mechanism of the pavement damage is soil creep and / or the consolidation of inadequately compacted fill soils (and / or loose native soils), not shallow- or deep-seated slope instability.

To us, the probable stasis of the base of bluff raises a fundamental question about how and when the existing critical profile actually formed. For example, is it a relic of the 1700 Cascadia earthquake or that one and several earlier Csz events? An answer to this question is beyond the scope of this report.

In conclusion, we believe that an episodic or punctuated bluff failure model is the only reasonable model to apply when evaluating the erosion potential of the Marshall site due to potential slope instability. Regional work by others (e.g., Tuttle, 1981; BGC, 2000, 2003a, 2007; Priest et al., 2004) confirms that bluff erosion in the Pacific Northwest is episodic. We believe that punctuated erosion characterizes both the base-of-bluff and top-of-bluff south of the Marshall site. In the absence of a strong earthquake, decades must pass before a mélange block or unit translates downslope far enough to trigger a new slump / earthflow failure upslope of the scarp that defines the upslope limit of the lower, sliding block. Furthermore, we believe that it will be decades (assuming static conditions) before a future failure within the bedrock will trigger a brittle failure of the top-of-bluff. In effect, many failures must occur within the bedrock before instability within the base of the marine terrace sediments will over-steepen the face and trigger a failure that "bites back" into Edwards Street. To wit, it will require bedrock instability to advance landward approximately 175 feet upslope of the existing scarp before the terrace sands in the bluff below the shoulder of Edwards Street would reach a slope angle of ~60°.)

There is no doubt that as global sea level rises, the percent of time that the base of the seacliff is under attack will increase. Rising sea level due to the addition of glacial meltwater and the thermal expansion of seawater, higher sea levels and swells due to lower barometric pressures during storms will collectively increase the erosion rate, despite the protection Trinidad Head and the south beach aspect confer to the base-of-bluff. At present, however, we are unaware of any method that could predict the time that might pass between linked (progressive) bedrock slope failure events such as those we model.

For the preceding reasons, we believe that at present it is appropriate to ignore the base-of-bluff erosion rate (whatever it is) and use a top-of-bluff-top retreat rate of 0 inches per year when evaluating risk to the Marshall lots. Decades from now, this rationale probably will not apply.

Implications of GWT FOS Modeling

As noted repeatedly herein, the Taber boreholes drilled about 650 ft to the east and up to ~115 feet north of the top-of-bluff along Wagner Street suggest that in late summer the groundwater table (GWT) is about 52 to 54 feet depth beneath the same-elevation Marshall lots. The soil colors recorded on one of the two borehole logs (the better-logged one) suggest that the GWT often rises to about 40 feet in depth. Above this depth, oxidized rather than reduced soil colors are present, indicating that the soils experience alternate wetting and drying.

After we selected the three-layer model and soil parameters that best model the marine terrace sands, we ran FOS reiterations with the GWT at 40 and 10 feet in depth, and at the surface. Using these values, the static FOS of the critical failure arc (of inset B of Figure 2) dropped from 1.141 to 1.008 to 0.680, respectively. That is, with the GWT roughly 30 feet higher than the inferred maximum high based on the drill logs, the top-of-bluff between the break-in-slope and back of the Marshall lots remained "stable." We conclude that the risk of an adverse cumulative effect due to the operation of the Marshall's leachfield is NEGLIGIBLE (per Appendix IV).

FUNDAMENTAL CONCLUSIONS

1. A qualitative geologic evaluation of the critical profile indicates that the Franciscan mélange bedrock fails episodically as slumps followed by translational failure of the decoupled mass onto the beach. The mélange also fails as earthflow.

2. Bedrock failures can cause the shoreline to prograde (advance) onto Trinidad Bay beach so that shoreline advancement rather than retreat occurs. That is, a dynamic equilibrium exists between marine undercutting and bedrock slope failure. At times the coastline retreats; at others, it advances.

3. Bedrock failures progress upslope only when the scarp height of an existing failure low on the hillslope is sufficient to remove the lateral support from the mélange above the scarp.

4. The top-of-bluff and Edwards Street south of the Marshall lots is composed primarily of silty fine-grained marine sands that become dense at about 40 ft in depth. The bluff and street have not failed for at least 70 years. Although shallow soil processes such as bioturbation and creep are active, we know of no historical or anecdotal evidence that indicates that a natural moderate to large-scale slope failure has occurred.

5. The configuration of the slope within the marine terrace sands (concave up and in plan view) is anomalous, probably because of past human activities (logging and grading).

6. If a strong earthquake does not strike Trinidad in the near future, it is likely to be many decades before a series of two or three more progressive failures of the bedrock eat enough into the toe of the marine terrace sands to produce a marginally stable 60° bluff face and consequent slope failure. We estimate that new bedrock failures must advance 175 ft upslope of the existing scarp (at that elevation) to produce this configuration. This 60° plane of intersection would be about 350 feet north of the present bedrock-beach interface.

7. Our FOS analysis confirms that the most likely slope failure on the critical profile is a failure of the existing slump block. That is, our model of the mélange bedrock portion of the profile has a static FOS <1.0, indicating instability (Figure 2, inset A).

8. Our FOS work also indicates that under static conditions only the south edge of the shoulder of Edwards Street is at risk of failing (Figure 2, inset B). Edwards Street and the Marshal lots are geologically stable. (However, the edge of the street could deform due to soils hazards.)

9. During the modeled earthquake, only a portion of the street is at risk. The FOS_d = 1.1 line, which for the Marshall project is the minimum setback from the bluff-top due to FOS considerations, plots within the landscaping between the lots and the street. That is, our modeling indicates that a seismogenic slope failure is unlikely to affect the Marshall lots.

10. Our FOS modeling of the stability of the top-of-bluff under various groundwater table (GWT) conditions indicates that with the GWT as high as 10 feet in depth, which is about 30 feet above the probable near-maximum depth, Edwards Street and the Marshall lots are "stable." We conclude that the operation of the Marshall onsite sewage disposal system (designed by others) is unlikely to cause a bluff failure due to a cumulative effect.

RECOMMENDATIONS

REC 1. Construct the Marshall home and leachfield where planned. It is unnecessary to revise the existing footprint due to slope instability, erosion, or groundwater table considerations.

REC 2. Per the requirements of the 2007 California Building Code (ICBO, 2007), design the home using the appropriate seismic parameters (see Table 1).

Table 1. Marshall Residence Seismic Design Parameters
(2003 NEHRP Seismic Design Provisions)

Site Location (Footprint Centroid):	Lat/Long: 40.8629°, -124.0789°	
Site Class:	C	
Occupancy Category	III	
Seismic Design Category:	E	
Site Coefficients:	F_a = 1.0	F_v = 1.3
Seismic Response Acceleration:	S_s = 2.783 g	S_1 = 1.198 g
Spectral Response Accelerations:	SM_s = 2.783 g SD_s = 1.855 g	SM_1 = 1.557 g SD_1 = 1.038 g

LIMITATIONS, CLOSURE, and AUTHENTICATION

Although we have used standard engineering geologic practices and professional standards of care to provide an erosion-rate assessment, geologic hazards and risk analysis, and mathematical (FOS) stability analysis, no one should construe this report to state or imply a guarantee of absolute safety of the home for any specific duration of time. Bluff retreat is punctuated, and episodic failures will continue to occur in the Trinidad area as elsewhere in the Pacific Northwest.

In conclusion, although we based our evaluation on a consideration of the geologic, geodetic, tectonic, and nearshore marine processes active at Trinidad, within the next 75 years a failure of the top-of-bluff could occur and extend farther into the Marshall lot that we predict on the basis of qualitative and quantitative considerations. The most likely causative event would be a great Cascadia subduction zone (Csz) earthquake. However, a Csz earthquake is a low- to medium-probability event (it has a probability of 1 to 45% in the next 50 years based on Mazzotti and Adams, 2004).

We thank you for hiring us to complete the last of the technical analysis required for your project. Please call if you have questions or we can help you in some other way.

Respectfully submitted,

Busch Geotechnical Consultants

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Distribution: Client, CCC, City of Trinidad, Tsurai Ancestral Society
Attached: Appendix IA. Taber (1999) Boring Logs No. 1 and No. 2 (4 pp.)
Appendix IB. Unified Soils Classification System (1 p.)
Appendix III. BGC's Slope Stability Classification System (1 p.)
Appendix IV. BGC's Risk Terminology (1 p.)

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PACIFIC WATERSHED ASSOCIATES

Date: December 9, 2008

To: California Coastal Commission
Robert Merrill - North District Office
710 E Street, Suite 200
Eureka, California 95501 - 1865

From: Kathy Moley, PG #9475
Pacific Watershed Associates Inc.
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Arcata CA, 95518-4433
kathym@pacificwatershed.com

Re: Marshall Property, A.P. No.: 042-042-05 and 042-042-13, located on the corner of Hector Street and Edwards Street, Trinidad, California.

We are writing in response to an appeal of the approval granted by the City of Trinidad for the construction of a single family residence on these lots. We understand that this project has been appealed to the California Coastal Commission (the Commission) by the appellant, Mr. Michael Reinman. We also understand that the Commission's Staff has recommended upholding this appeal, and re-evaluating the approval issued by the City of Trinidad. As the consulting geologists on this site, Pacific Watershed Associates Inc., (PWA) wishes to address some of the issues and discussions located within the Commission's Staff Report.

When the most recent General Plan for the City of Trinidad was completed in 1980, any lot that was not developed was highlighted as being of questionable stability and required a geologic evaluation (See Attached). However, any developed sites, such as those surrounding the subject property, were excluded from requiring geologic evaluations during any future development, remodeling/rebuilding.

The additional scrutiny for geologic stability is a positive step toward insuring the safety of the structure on the subject property and the surrounding bluffs. However, it is inappropriate to declare that development on this site will be the "straw the breaks the camels back" as the threshold site which contributes to the cumulative effects of building a coastal community.

The Commission's Staff Report raises two main concerns on this project 1) the fact that the existing geologic report does not present a "quantitative slope stability analysis" which provides a bluff retreat rate and an assessment of the effect of rising sea level in the future, and 2) and alternate analysis of septic system design.

It is not the purpose of this letter to present quantitative analysis and scientific data. However, the purpose is to address the concerns and briefly highlight some of the positive features of this project so that the commissioners can have a base of information to make their decision as to either uphold or reject the approval process undertaken by the City of Trinidad.

Geology

As noted in the Preliminary Geologic Report dated April 10, 2008, this site, in conjunction with the majority of Humboldt County is located within an extremely geologically active area. This site is located on an uplifting marine terrace which is estimated to be approximately 64,000 years old. This site is also located within ¼ mile of the Trinidad fault which runs through the north east of town and if it were to rupture would affects all residences location both within town and the surrounding areas.

However, of most importance to the Coastal Commission and to the City of Trinidad is that this property is located north of the coastal bluff. While some workers have noted that slope instability results from increased ground water resulting from the onsite wastewater systems located within the City (LACO, 2004). Other workers have sited the undercutting of the slopes due to wave action at the toe as contributing to the slope instability (SHN, 1996; Busch, 1987). Regardless, while it is a combination of factors that contribute to the slope stability, and that bluff retreat continues to exist, over 60 years of aerial photographs have not demonstrated great levels of bluff retreat such as that seen within the vicinity of Big Lagoon or the mouth of the Mad River.

In the recent past, there have been some failures that can be recognized on aerial photos. While one slope failure was attributed to human error other erosional features appear to be a result of uncontrolled storm water run-off directed down Hector Street and over the bluff face. In recent times the City's storm water system has been improved and drainage from the site is now directed to the west, away from the bluffs

Wastewater

The Commission's Staff Report also discusses an analysis of "alternative septic system designs". Because the City of Trinidad does not have a community wastewater system, all residential and commercial structures are on individual wastewater systems, including the Community Church, the Appellant's apartment complex/vacation rentals, and the Eatery Restaurant and rental, all of which are adjoining parcels to the subject site (See Attached).

As part of the wastewater discussion, Staff recommends the analysis of the wastewater design should consider such alternatives as a Wisconsin Mound, sand filter or other potential alternatives. PWA submitted the report entitled "Onsite Wastewater Treatment Evaluation of A.P. Nos.: 042-042-005 and 042-042-013, located on Hector Street, Trinidad, California, dated January 22, 2008"; therefore, we feel qualified to comment on this matter.

- The most important aspect of onsite wastewater design is the design flow rate. The design flow rate is determined by the number of bedrooms in a residence and the State Water Quality Control Board and the USEPA provide a design flow rate of 150-gallons per bedroom. Therefore, a wastewater treatment system for a 3-betroom would be based on a daily wastewater load of 450-gallons of wastewater per day. Any system design (mound, sand filter, or other) would require a system designed for that daily wastewater load. It is erroneous to look at variable system designs for the purpose of reducing wastewater volumes.

- Different distribution systems (trench, mound, or drip) are based on site constraints and the protection of sensitive receptors (creeks, stream, ground water).

- The addition of a sand filter or other pre-treatment system does not reduce the volume of effluent, but rather pre-treats, makes it cleaner, prior to distribution.

From the perspective of designing an onsite wastewater treatment system, this site posed certain challenges.

- Like most of the sited located within the City of Trinidad, the lots are small. In order to make this site viable, two parcels were merged.

- During the construction of the adjoining lot to the east, this site was utilized as a staging area and a gravel base was added to the site for the purpose of parking trucks and equipment. Post construction, a retaining wall was constructed paralleling the southern property line and varying amounts of fill were imported to the site as backfill.

- Humboldt County Division of Environmental Health (DEH) does not permit distribution systems in fill. Therefore, this system was designed with the leach pipe located below the base of the fill. See attachments for the current site map and leachfield construction details.

Below is a brief analysis of why alternative methods were not chosen for this site.

Wisconsin Mound Construction
The purpose of utilizing a mounded leachfield is typically because there is a ground water issue or some impermeable layer at a shallow depth, typically between 2 and 3 feet below the ground surface (bgs).

Mounds tend to be long and linear. A 3-bedroom mound typically ranges between 80 and 100 feet in length. Mounds must run parallel to the contour, perpendicular to the slope. This would take up a large portion of the site.

Sand Filter
Sand filters are open to the air and may enhance evapotransporation during the summer months when ground water is deepest and the bluffs at their lowest risk. However, because they are open to the air during the winter months they are vulnerable to rainfall intake, thereby increasing flow when the bluffs are at higher risk.

Drip Irrigation and Alternate Pre-treatments
While drip may be useful in dispersing effluent throughout the property, Humboldt County DEH currently does not permit drip irrigation for new construction. Additionally, any pre-treatment system other than a sand filter is not permitted by Humboldt County DEH for new construction.

Conclusion
While it has not been the intension to provide new analytical data for the Commissioners to consider, the goal of this letter was to provide a written response to the appeal of the actions taken by the City of Trinidad. We hope that you recognize the merits of this project and do not hold it responsible for the cumulative effects of an entire community. We urge you not to follow staff recommendations on this project.

Enclosures

cc: Jim Marshall

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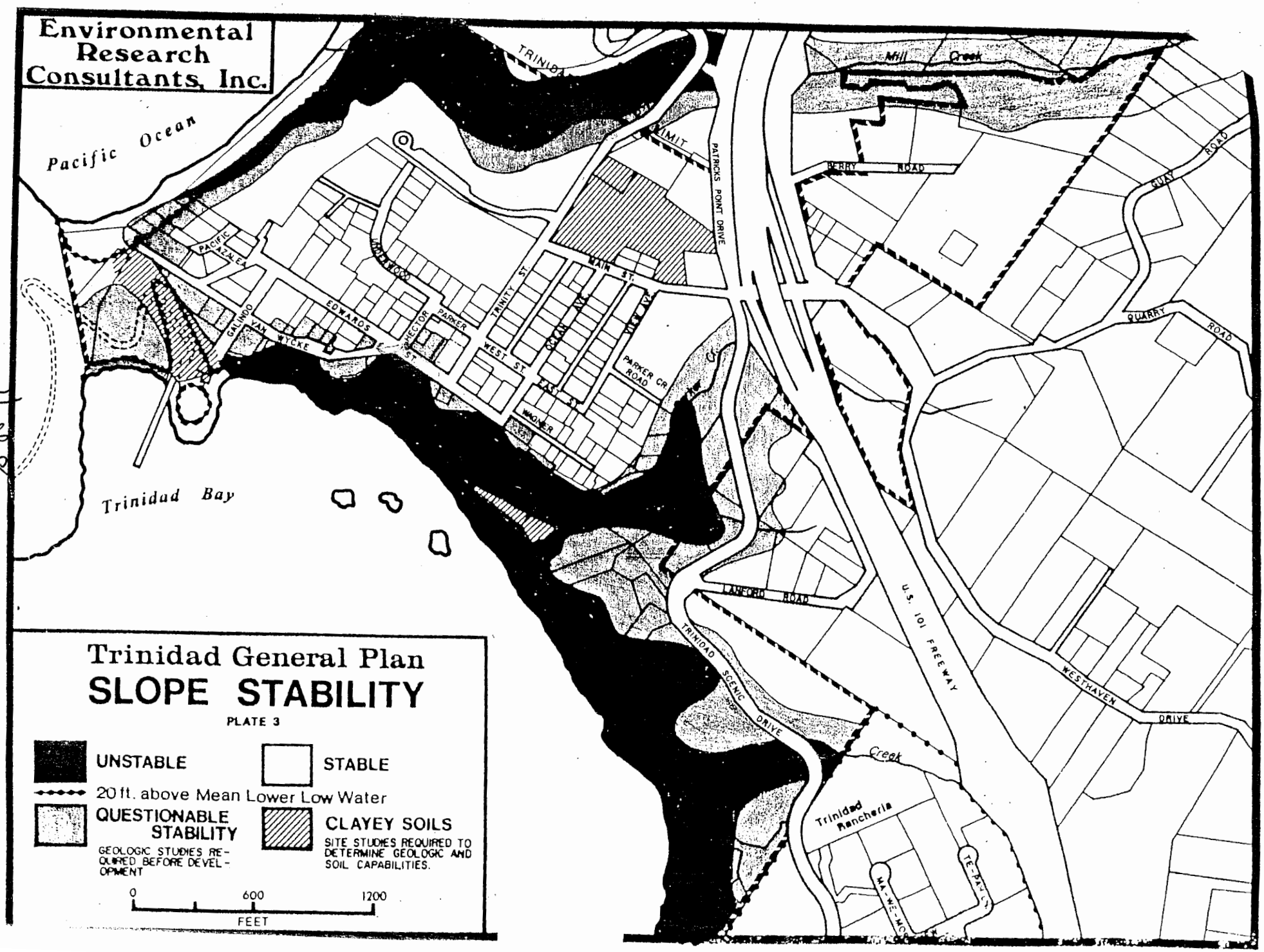
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Pacific Ocean
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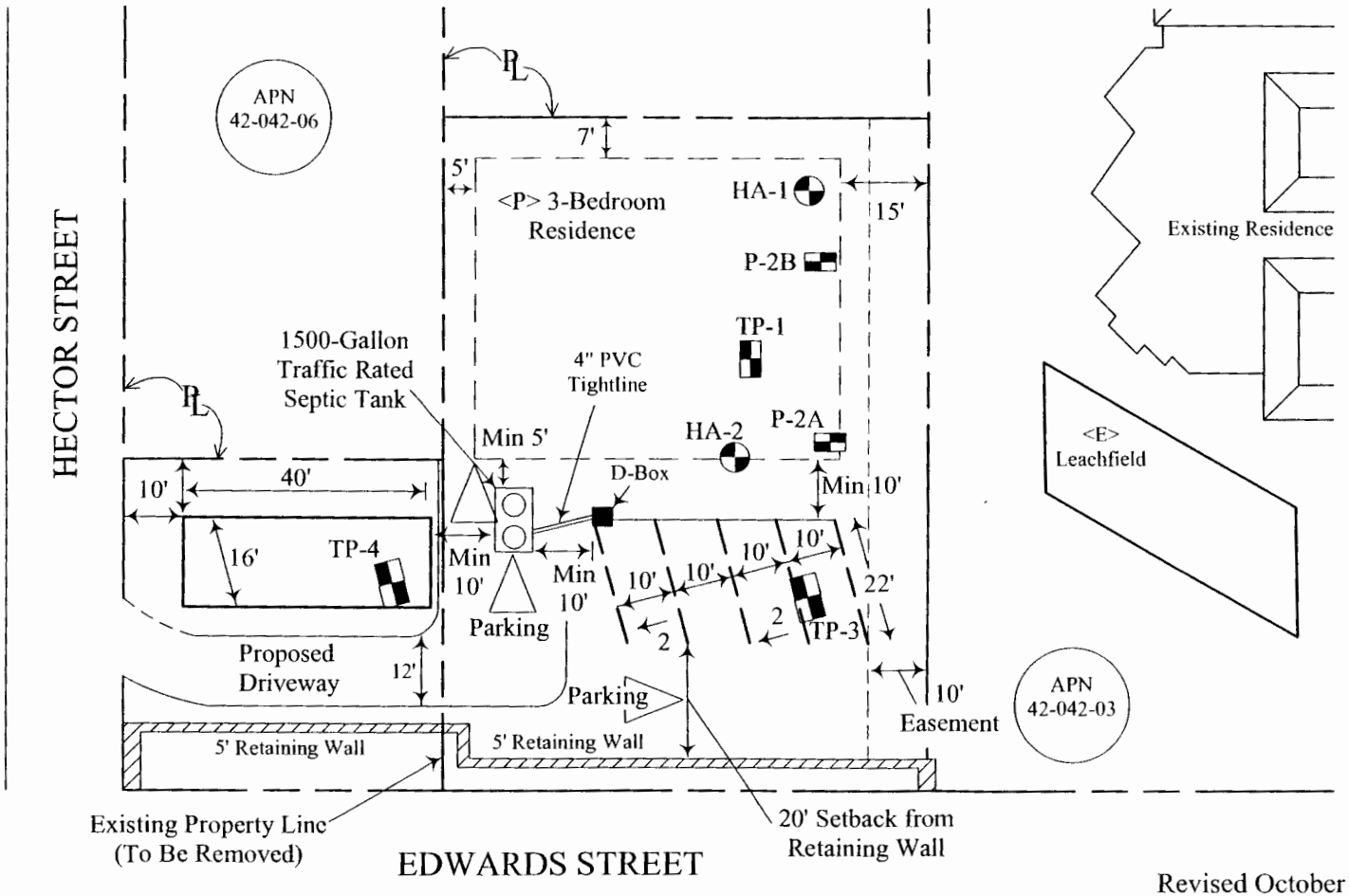
MAIN ST.
TRINITY ST.
WEST ST.
PARKER CR.
PARKER ROAD
EDWARDS
GALINDO
VAN WYCKE
PACIFIC AZALEA
WAGNER
LANFORD ROAD
U.S. 101 FREEWAY
TRINIDAD SCENIC DRIVE
WESTHAVEN DRIVE
Trinidad Rancheria
Trinidad General Plan
SLOPE STABILITY
PLATE 3
UNSTABLE
STABLE
20 ft. above Mean Lower Low Water
QUESTIONABLE STABILITY
GEOLOGIC STUDIES REQUIRED BEFORE DEVELOPMENT
CLAYEY SOILS
SITE STUDIES REQUIRED TO DETERMINE GEOLOGIC AND SOIL CAPABILITIES.
0
600
1200
FEET


Community Church
Appellant's Commercial Property
Proposed Building Site
Reserve Leachfield
Slope 2%-6%
Proposed Leachfield
Slope
Stormwater Collection
40'
Edwards Street

NOTES: 1) THE BOTTOM OF THE LEACH TRENCHES SHOULD BE LEVEL.
2) LEACHLINES MUST FOLLOW LAND SURFACE CONTOURS.
3) DO NOT DISTURB SOIL OR CONDUCT GRADING DOWNSLOPE OF LEACHFIELD.
4) DIRECT ALL SURFACE DRAINAGE AWAY FROM LEACHFIELD.
5) CONSTRUCTION OF THE SYSTEM SHOULD BE DURING DRY WEATHER.
6) SMEARED SOIL ON TRENCH SIDEWALL SHOULD BE RAKED.
7) DISTRIBUTION BOX (D-BOX) SHALL BE PLACED ON STABLE GROUND.
8) IF THE SEPTIC TANK IS LOCATED UNDER ANY PAVED SURFACE, IT MUST BE TRAFFIC RATED.
9) THE TOP OF THE LEACH TRENCH SHALL BE INSTALLED BELOW ANY EXISTING FILL.

ALL LOCATIONS APPROXIMATE



Explanation

- TP-2 / P-2A — Backhoe Test Pit & Percolation Test Location (2002)
- HA-1 — Hand Augered Observation Well (2001)
- TP-3 — Backhoe Test Pit Location (2007)
- 2 — Slope Direction and Gradient in Percent
- Leachline with Observation Tube
- Distribution Box (D-Box)
- Reserve Leachfield Area
- 1500-Gallon Septic Tank
- Property Line

Approximate Scale
1 Inch = 20 Feet

0 10 20 40

N

Site Map
for
Marshall
Hector Street
Trinidad, California

APNs 042-042-005 & 013

Revised October 2008

ONSITE WASTEWATER TREATMENT EVALUATION

SITE MAP PREPARED BY:
TARA ZUROWESTE AND KATHY MOLEY
PACIFIC WATERSHED ASSOCIATES, P.O. Box 4433, Arcata, California 95518
Ph: (707) 839-5130, Fx (707) 839-8168

January 2008

Figure 3

Final Humboldt County DEH Approval
Signature ____ Stamp

5 & 8

NOTES: 1) THE BOTTOM OF THE LEACH TRENCHES SHOULD BE LEVEL.
2) LEACHLINES MUST FOLLOW LAND SURFACE CONTOURS.
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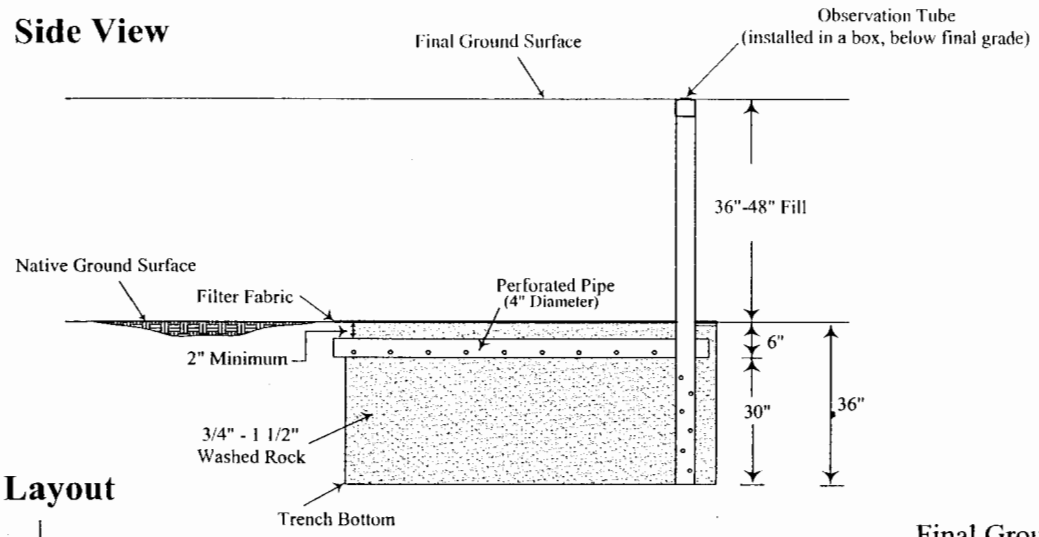
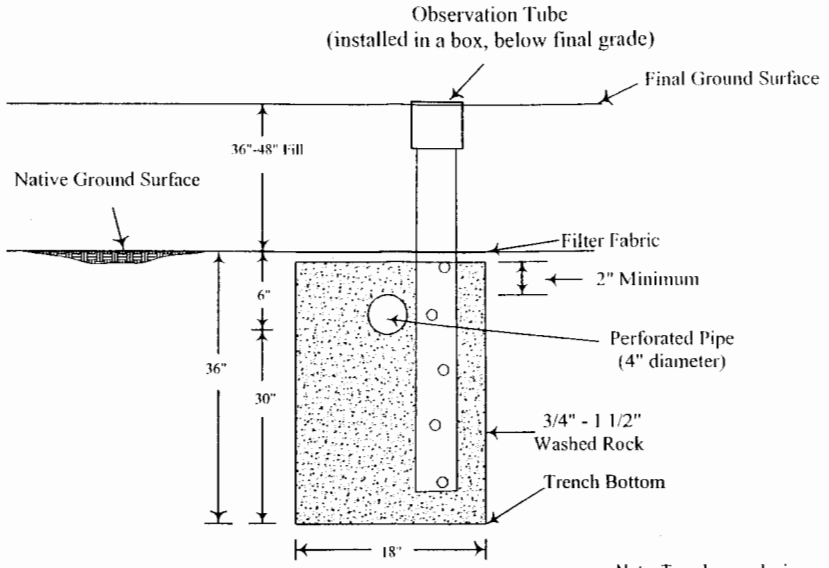
Side View

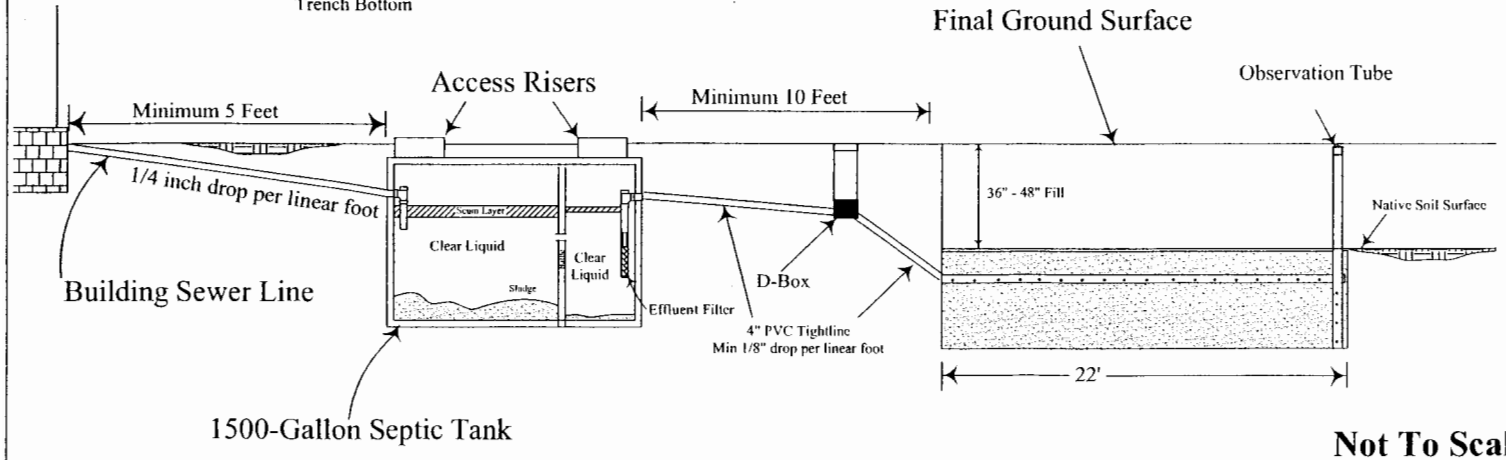


Cross Section



Note: Trenches on sloping ground shall follow surface contours

Layout



Not To Scale

Leachfield Layout and Trench Details for Marshall

Hector Street
Trinidad, CA

APNs 042-042-005 & 013

ONSITE WASTEWATER TREATMENT EVALUATION

FIGURE PREPARED BY:
TARA ZUROWESTE
PACIFIC WATERSHED ASSOCIATES, P.O. Box 4433, Arcata, California 95518
Ph: (707) 839-5130, Fx (707) 839- 8168

January 2008

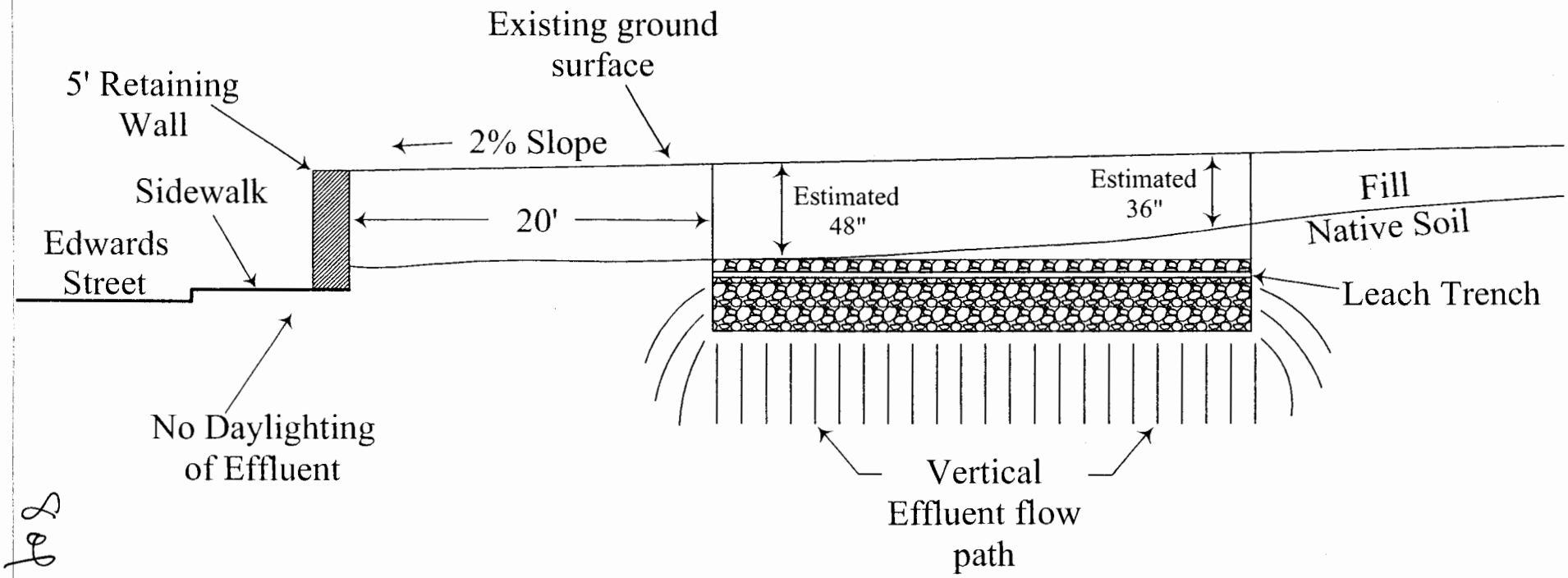
Figure 4

Final Humboldt County DEH Approval
Signature _____ Stamp

1 of 8

Pacific Watershed Associates, P.O. Box 4433, Arcata, California 95518 Ph:(707) 839-5130, Fx: (707) 839-8168

RETAINING WALL and LEACHFIELD SCHEMATIC
for
MARSHALL
APNs 042-042-005 & 042-042-013



****Leach Trenches Must be in Native Soils and Trench Bottoms Must Remain Level****

2 of 2

Figure 5

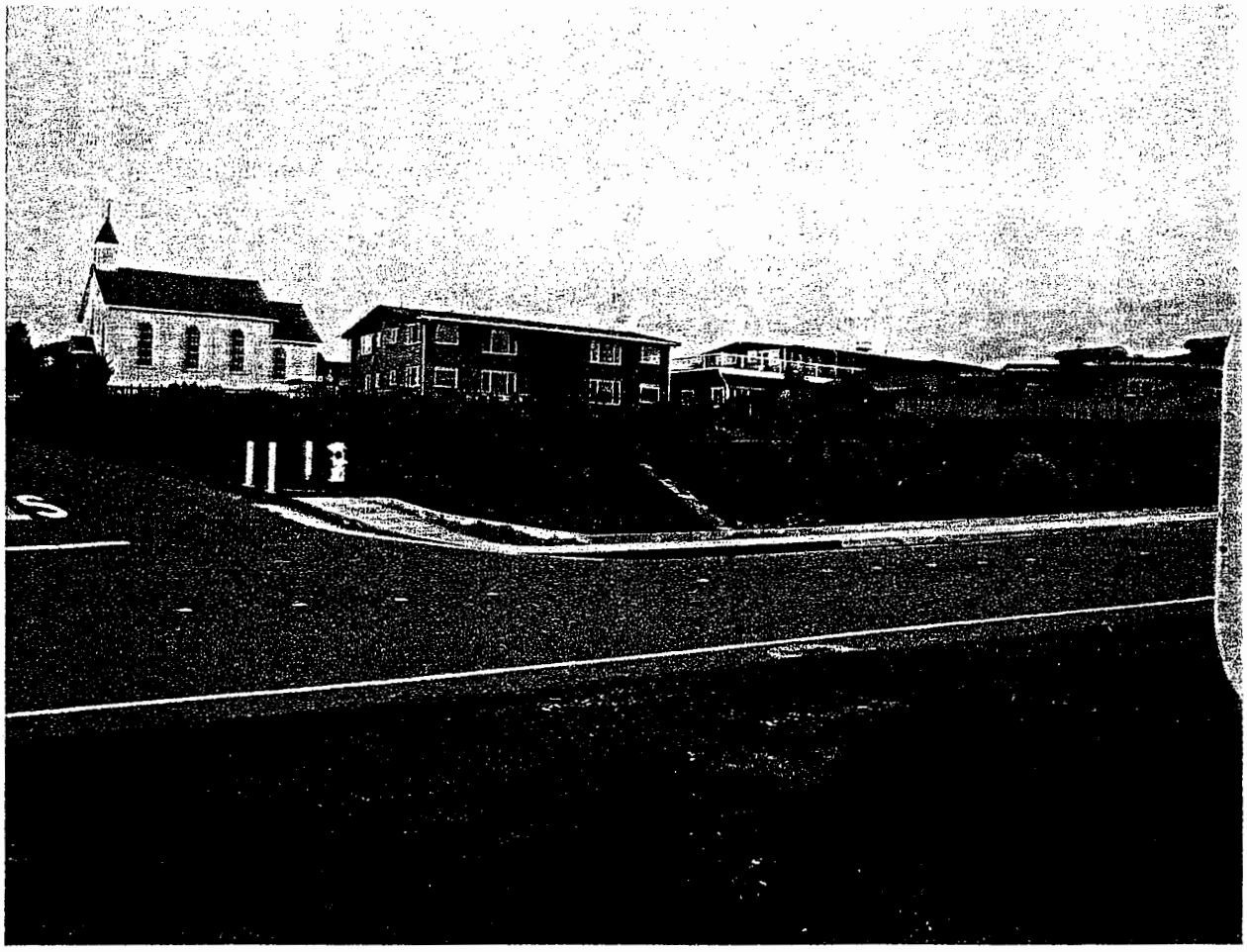
PACIFIC WATERSHED ASSOCIATES

Preliminary Geologic Hazard Report

For

A.P. Nos.: 042-042-005 and 042-042-013

Located on Hector Street
Trinidad, California



Submitted to

Jim and Jade Marshall

By

Pacific Watershed Associates, Inc.

April 10, 2008

EXHIBIT NO. **8**
APPLICATION NO.
A-1-TRN-08-046
MARSHALL
PWA REPORT DATED 4/10/08
(1 of 24)

Geologic and Geomorphic Studies • Wildland Hydrology • Erosion Control • Septic Evaluation • Environmental Services
P.O. Box 4433 • Arcata, California 95518 • Ph 707-839-5130 • Fax 707-839-8168 • pwa@northcoast.com

PACIFIC WATERSHED ASSOCIATES

Jim and Jade Marshall
19595 San Vincente Drive
Redding, California 96003

April 10, 2008

RE: Preliminary Geologic Hazard Report for A.P. Nos.: 042-042-005 and 042-042-013, located on Hector Street, Trinidad, California.

At your request, Pacific Watershed Associates, Inc. (PWA) has prepared a report entitled "Preliminary Geologic Hazard Report for A.P. Nos.: 042-042-005 and 042-042-013, located on Hector Street, Trinidad, California", dated April 10, 2008. This report documents PWA's geologic hazard assessment investigations of the "subject property" and the surrounding vicinity.

We understand that you intend to construct a single family residence on this parcel. We also understand that based on the City of Trinidad's 1980 General Plan, the City requires a geologic report that discusses the impact any future development on this site might have on the geologic stability of the project site and surrounding vicinity. Therefore, at your request we have prepared this preliminary geologic report for proposed residential development on this site.

Evaluations by PWA indicate that the proposed development of the "subject property" will not create, nor enhance any existing, geologic hazards to the project area or surrounding vicinity provided that recommendations provided in the report are followed.

If you have any questions regarding the information provided in this report, or need further assistance, please contact us.

Sincerely,
Pacific Watershed Associates, Inc.

Kathy Moley
Professional Geologist #7594

Enclosure

2 of 24

PACIFIC WATERSHED ASSOCIATES

Jim and Jade Marshall
19595 San Vincente Drive
Redding, California, 96003

April 10, 2008

RE: Preliminary Geologic Hazard Report for A.P. Nos.: 042-042-005 and 042-042-013, located on Hector Street, Trinidad, California.

Dear Jim and Jade,

INTRODUCTION

This report presents results of preliminary geologic hazard investigations for the proposed development of a 3-bedroom residence within A.P. Nos.: 042-042-005 and 042-042-013, located on Hector Street, Trinidad, California (Figure 1). At your request, the purpose of this report is to discuss potential geologic hazards resulting from residential development on this site to the surrounding environment. Of most concern are the coastal bluffs located on the south side of Edwards Street, immediately south of the property.

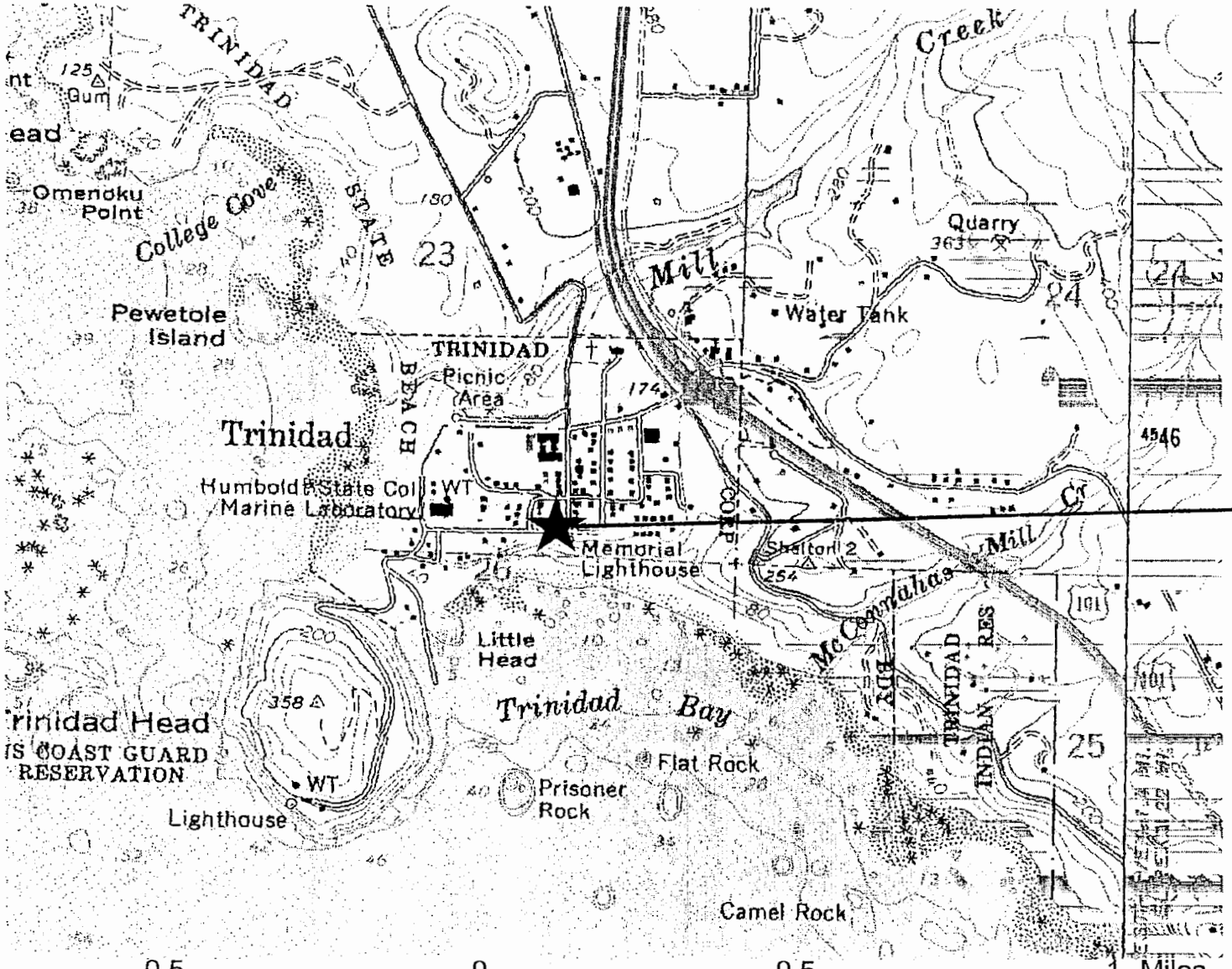
We understand that according to the City of Trinidad's 1980 General Plan this property has been classified as being within an area of questionable stability. As a result, the City of Trinidad requires a geologic report that discusses the impact any future development this site might have on the geologic stability of the site, and the coastal bluffs to the south of the project site. Therefore, investigations focused on identifying geologic hazards that would be affected by the proposed residential development on this parcel.

Methods of study used to evaluate the geologic suitability of the site for residential development included: a review of available published and unpublished geologic literature and maps; aerial photographs for years 1947/48, 1962, 1965, 1988 and 1996; a surficial reconnaissance of the project site; and subsurface investigations conducted during Pacific Watershed Associates (PWA) onsite wastewater treatment evaluation for this site and adjoining parcels.

In general, providing recommendations detailed in the RECOMMENDATIONS section of this report are followed, the residential development of this site will not trigger any new, or enhance any existing, geologic hazards to this site or to the surrounding vicinity. The geologic hazards which currently exist for the coastal bluffs south of Edwards Street will continue to exist if this parcel were not to be developed.

3 of 24

General Location Map for Marshall



APNs.:042-042-005 & 042-042-013

Hector Street
Trinidad, California

Approximate Project Loaction

N

Figure 1

7) 839-5130, Fx: (707) 839-8168
Pacific Watershed ASsociates, Inc. P.O. Bo

PHYSICAL SETTING

The physical setting of the project site is characterized by the physical location, land use, hydrology, slope stability, bedrock and surficial geology, and local faults. Each of these attributes is discussed below.

Physical Location

This property is located in the NE 1/4, of Section 26, T8N, R1W, Humboldt Meridian, Humboldt County, within the town of Trinidad, California. This parcel is bound on the north and east by developed residential property, on the west by undeveloped property and by Hector Street, and to the south by Edwards Street (Figure 2). Immediately south of Edwards Street is the Tsurai Study Area.

Land Use

Surficial investigations of the property indicate that this property has remained undeveloped for the last number of decades and groundcover is currently primarily restricted to grasses. Land use practices within the surrounding parcels are: single family residential, multi-family residential (apartments), commercial (The Eatery), historic (Trinity Church) and tourism (the Trinidad Lighthouse). Of additional concern to this project is the Tsurai Study Area immediately south of Edwards Street. The Tsurai Study Area has considerable historical and spiritual significance to the Tsurai Ancestral Society and includes, but may is not be limited to: sacred burial sites, middens, and the Axel Lindgren Memorial Trail. Additionally, the property is surrounded on both the south and the west by city roadways.

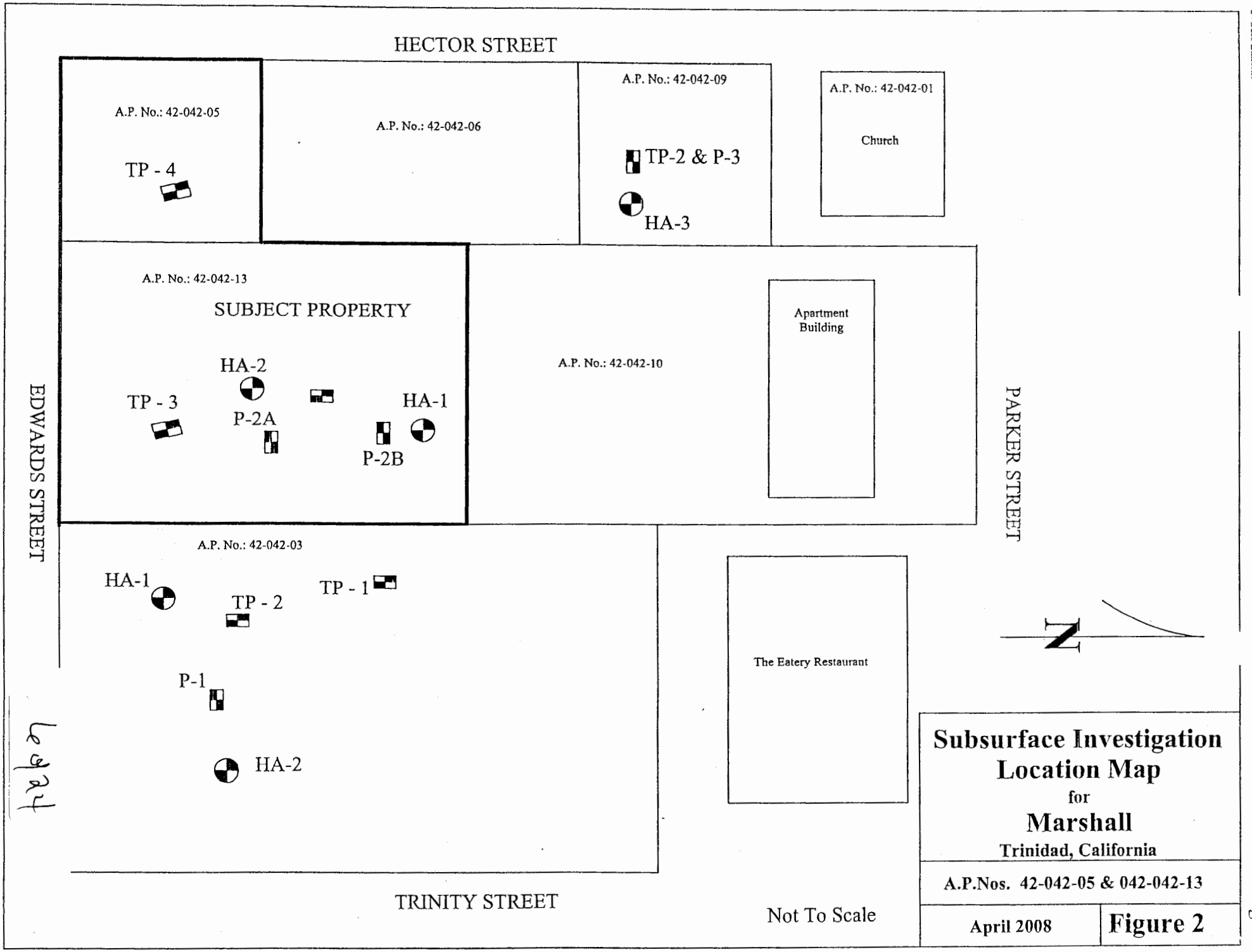
During the construction of the property immediately to the east of this site, the subject parcel was utilized as a staging area for construction. During that period of time between 2 to 4 feet of fill was imported to the site and a five (5) foot retaining wall was constructed along the south side of the property.

Slope Stability

Preliminary geologic review of this site reveals that slope stability of the coastal bluffs poses the most important geologic hazard of the project. In recent years portions of this bluff have experienced slope failure. Most recently, in 2005 while flushing the fire hydrant, a water line diverted flow over the coastal bluff. This resulted in an over saturation of the bluff and portions of the bluff and Van Wyke Road failed. This portion of Van Wyke Road has been rebuilt and the fire hydrant location moved to the north side of Edwards Street.

Directly across Edwards Street from the project site the coastal bluff drops off steeply (<65%). The large arcuate nature of the top of the bank is indicative of there having been a previous landslide in this location. Upon further inspection of the top of the slope and the edge of the roadway on the south side of Edwards Street, the hillside continues to experience downward motion. Subtle to prominent arcuate cracks are currently forming at the top of the slope. These cracks are showing enechelon side stepping pattern, indicative of active slope movement (Photo 1 and Photo 2). Indeed, the parking area for the Trinidad Lighthouse Monument which was recently upgraded and paved (circa 2005) at approximately the same time as the lighthouse trail was installed is showing signs of slope movement.

5 of 24



Pacific Watershed Associates, P.O. Box 4433, Arcata, California 95518 Ph:(707) 839-5130, Fx: (707) 839-8168

Photo 1. Enechelon arcuate cracks within the parking area adjacent to the Trinidad Lighthouse and the Axel Lindgren Memorial Trail. Arcuate cracks are indicative of slope movement. View looking toward the west.

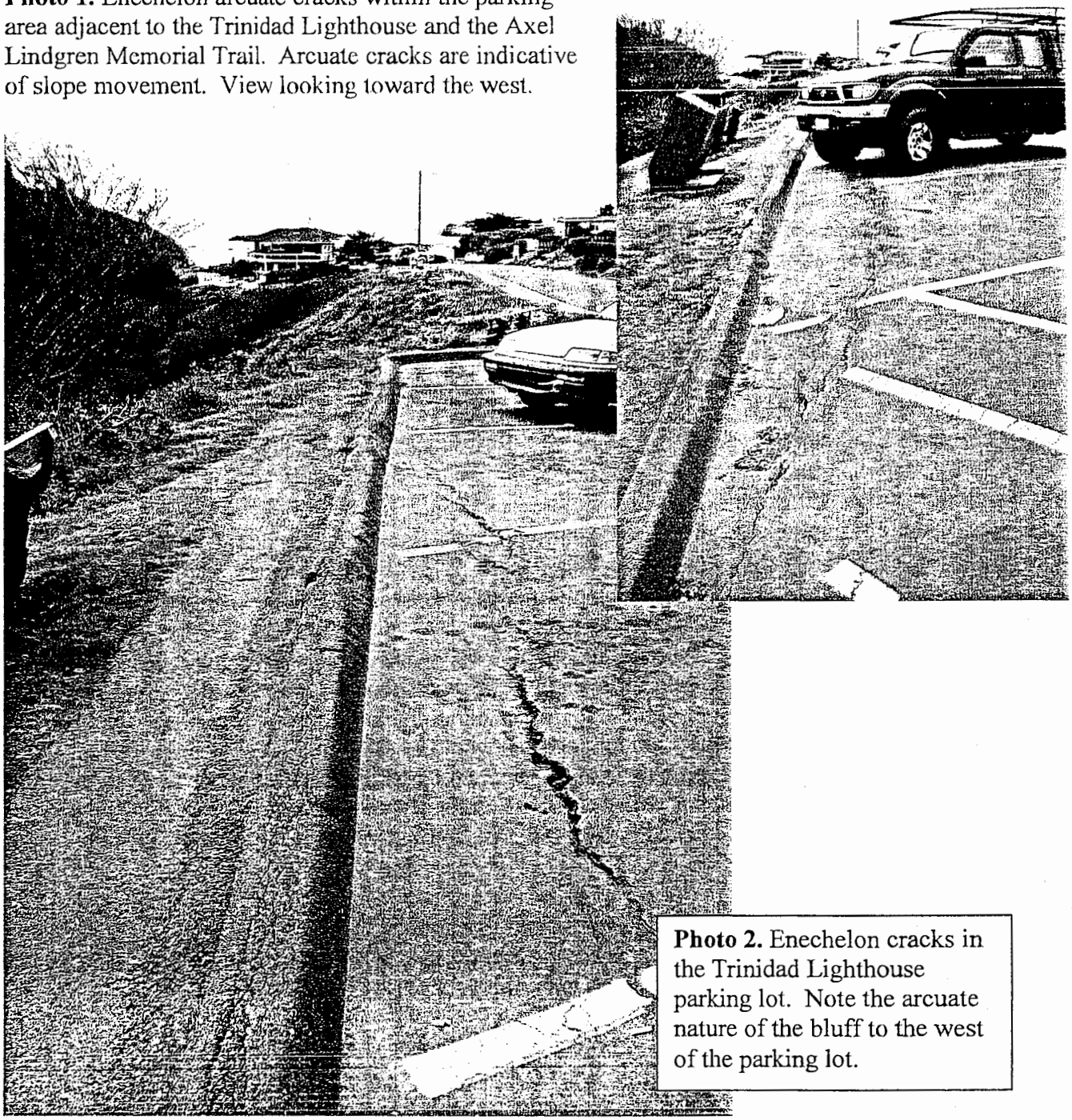


Photo 2. Enechelon cracks in the Trinidad Lighthouse parking lot. Note the arcuate nature of the bluff to the west of the parking lot.

Furthermore, a review of aerial photographs from the previous six decades indicates that slope stability in this location has been an ongoing problem. While the aerial photographs are at varying scales the site is still visible. In the late 1940's the slope on the south side of Edwards Street, directly south of project site, appears well vegetated. However, by the early 1960's there is a distinct arcuate pattern and there appears to be a drainage area developed on the west side of the slope. This drainage is possibly a gully or a location of slope failure that failed all the way

down to the beach and is in line with Hector Street. This drainage feature remains visible through the sixties; however, by the late 1980's, became vegetated.

Hydrology

The project site is approximately 180 feet above sea level and averages about 65 - 70-inches of rainfall annually (Western Region Climate Center). There are no natural drainages within the immediate vicinity of the project area. The major contributors to the local hydrology from this site will be run-off from the site due to development improvements and from the onsite wastewater treatment system for the proposed residence. These two contributing sources will be discussed separately below.

Streamline Planning indicates that based on the proposed footprint of the house (2,918 ft^2) and 2,388 ft^2 of parking and driveway there will be more than 5,000 ft^2 of impermeable surface area resulting from this development. As part of the condition of approval for this project all run-off from these surfaces must be captured and routed directly into the City's storm drain system at the corner of Edwards Street and Hector Street. Based on 5,000 ft^2 of impermeable surface area and an average of 8-inches of rainfall per month during the raining season, capturing run-off would divert over 26,000 gallons of water that otherwise would have landed on the ground surface, infiltrated through the soil profile, and contribute to an already impacted ground water.

The onsite wastewater treatment system for this site is designed to handle a wastewater flow from a three-bedroom residence, or 450-gallons per day. Unlike many of the older leachfield systems which were installed during the 1970's and 1980's this system will be composed of 110 linear feet of leachfield with a calculated 529 ft^2 of absorption area within the trenches. Compared to many of the very small leachfields and leach pits within the community of Trinidad, this leachfield will spread effluent throughout a larger area. Based on a maximum use of 450-gallons per day, this proposed development will contribute a approximately 13,500-gallons of effluent per month to the site. However, given the amount of meteoric water (rainwater) which will be diverted from the site (26;000 gallons), a net decrease of 12,500 gallons of water per month will result from the proposed development of this property.

Bedrock and Surficial Geology

The earth materials encountered on this site are represented by the underlying bedrock and overlying surficial deposits. These earth materials are briefly described below.

Bedrock - Geologic maps of this region indicate that the local bedrock consists of Cretaceous/Jurassic age Central Belt of the Franciscan Complex (KJf) (Wagner and Saucedo, 1987; Aalto, 1992). The Franciscan Complex is characterized by highly sheared massive sandstone with interbedded siltstone or sandstone/siltstone. Boulders of metagraywacke, greenstone, chert, blueschist, greenschist, amphibolite schist may be present (Jenkins, 1962).

Surficial Geology - Surficial deposits encountered on this site are typically composed of uplifted Patrick's Point marine terrace. The Patrick's Point marine terrace is estimated to be 64,000 years in age (Carver and Burke, 1992) and has been deposited upon the Cretaceous/Jurassic Franciscan Complex. Within the project area the surficial geology includes the soils which have developed upon the marine terrace and any fill material that has been imported to the site.

8424

Soil - Soils encountered in test pits underlying the proposed development area were logged during multiple site investigations by PWA on this site. Subsurface investigations throughout the property revealed consistent native soil conditions partially overlain by fill. Investigations conducted in 2001 and 2002 revealed 2 to 3 feet of LOAM underlain by SANDY CLAY LOAM, SANDY LOAM, and LOAMY SAND. Refer to Figure 2 for the approximate location of test pits on the "subject property" and adjacent parcels. For soil profiles logged within test pits throughout the project area, and for details regarding additional subsurface properties see previous reports submitted by PWA regarding the project site and the surrounding parcels.

Fill – Investigations conducted in 2007 within test pits underlying the proposed leachfield areas revealed approximately 18 to 48-inches of mixed fill brought onsite during construction activities on the neighboring parcel.

Local Faults

The project site is located approximately ¼ mile from the Trinidad Fault. The Trinidad Fault has been deemed by the State of California as having been active within the last 11,000 years (Holocene time). Additionally, the Trinidad Fault is estimated to have an average slip rate over the last 700,000 years of 1.9 mm/yr (Carver and Burke, 1992). Depending on the size and location of an earthquake originating on the Trinidad fault, this site would experience moderate to severe ground shaking.

SEISMITIY AND FAULTING

The project site is in a high seismic zone (Zone 4) as defined by the Uniform Building Code. Although no faults have been documented within the immediate vicinity (50 feet) of the building site that displays surface fault rupture during Holocene time, the north coastal region of California, and in particular Humboldt County, is subject to frequent seismic ground motion resulting in moderate to strong ground shaking (Figure 3). Over sixty earthquakes within the region have produced damage and over twenty-five earthquakes of magnitude 6 or greater have originated in the north coastal region since the mid-1800's (Dengler, *et al.*, 1992b).

Strong seismic shaking during saturated soil conditions could produce slope instabilities within the project site. The Humboldt County Seismic Safety Map (1979) depicts the project area is within the D1 slope stability zone. Zone D is representative of relatively shallow sedimentary deposits. The seismic characteristics of these sediments during an earthquake typically produce moderately high accelerations of short to intermediate periods with intermediate duration of shaking. The numerical value represents the relative slope stability. A numerical value of one (1) is indicative of an area of low instability.

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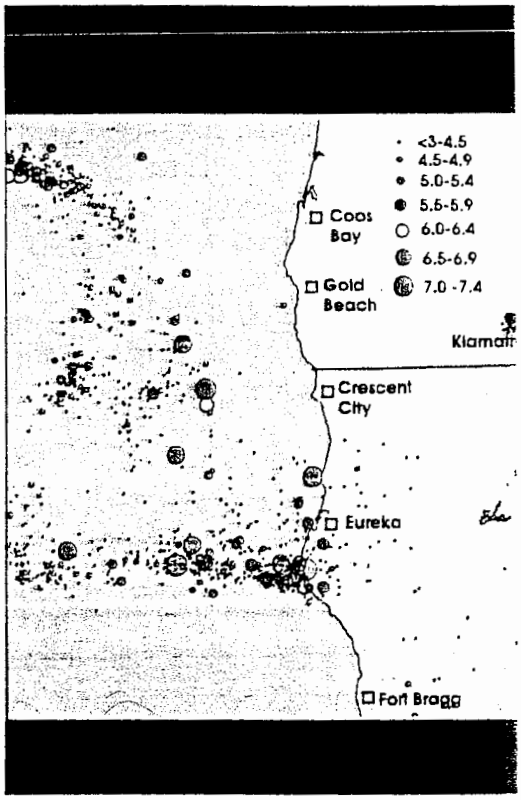

Figure 3. Earthquakes of magnitude 3.0 and higher, January 1975 through July 1995. (Data compiled from U.S. Geological Society. Figure from Dengler and Moley, 1995).

Earthquake sources on the north coast primarily originate from interactions and internal deformation of the North American plate, the Pacific plate and the Gorda plate. Specifically, the sources of earthquakes that affect the project site include: the Mad River fault zone (MRFZ), the Little Salmon fault zone (LSFZ), the subducting Gorda plate, the Mendocino fault, the Mendocino triple junction (MTJ), the Cascadia Subduction Zone (CSZ), and the San Andreas fault (Dengler, *et al.*, 1992a) (Figures 4 and 5).

Based on distance from known active faults, this project site is expected to experience light to strong damage to well built structures (Dengler and Moley, 1995). Based on ground shaking intensity data, this project site should have experienced very strong ground shaking (Modified Mercalli Intensity VI, (Figure 6) between three and nine times since the year 1900 (Dengler *et al.*, 1992a & b).

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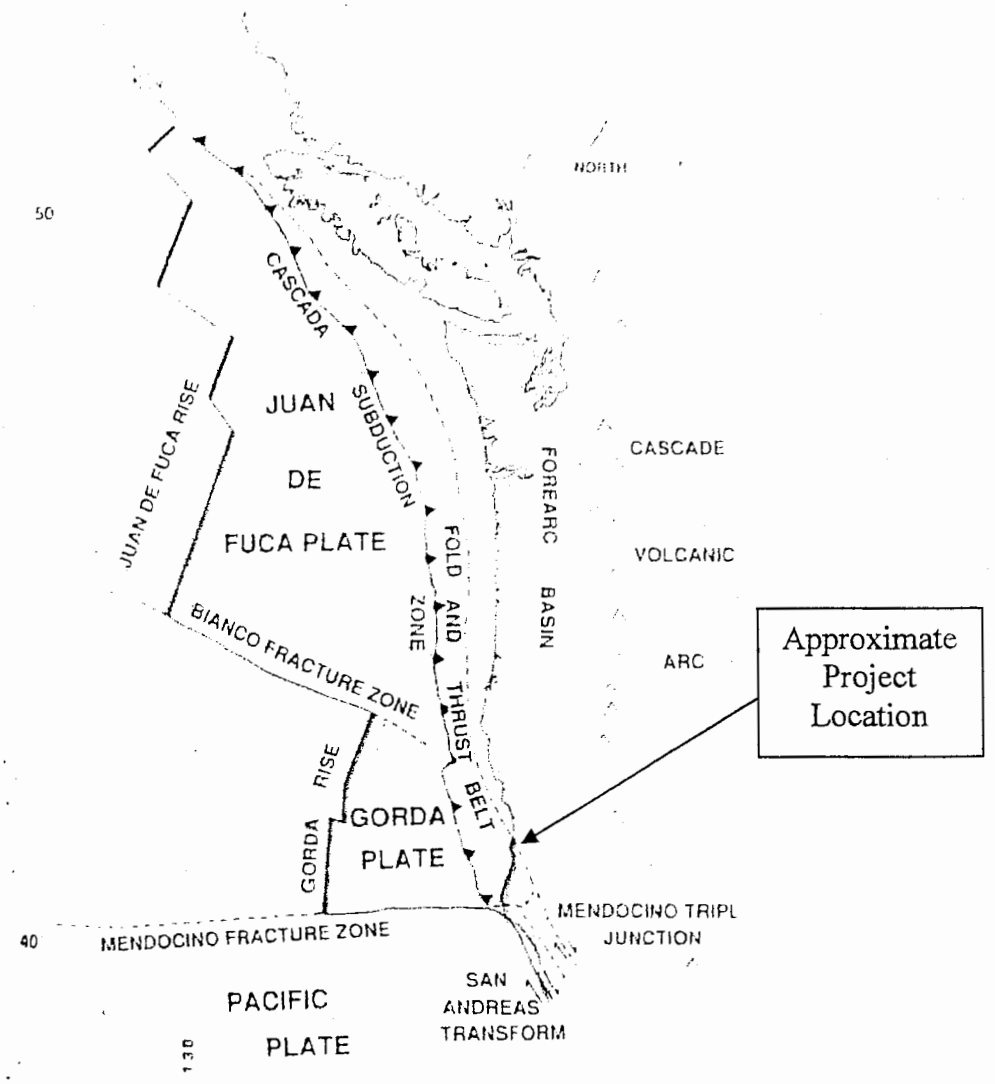

Figure 4. Three geologic plates intersect at the Mendocino triple junction. The San Andreas fault separates the Pacific and North American plates; Mendocino fault separates Gorda and Pacific plates; and the Cascadia subduction zone separates the Gorda/Juan de Fuca plates offshore and the North American plate (unpublished document of Carver, 1989).

The Mad River and Little Salmon Fault Zones -Large to very large magnitude earthquakes can originate from compressional faults located within the North American plate such as faults within the Mad River fault zone (MRFZ) and the Little Salmon fault zone (LSFZ) (Figure 5). The MRFZ is generally considered to consist of the Fickle Hill fault, Mad River fault, McKinleyville fault, Blue Lake fault, Trinidad fault, Big Lagoon fault, and numerous smaller faults within the area. Strong levels of seismic shaking can be produced from these North American plate faults. This site is located within the northern span of the Mad River Fault Zone.

The site is slightly northeast of the McKinleyville Fault and southwest of the Trinidad Fault. Moderate to very strong ground shaking should be expected due to earthquakes originating from these sources.

Present research indicates the recurrence intervals of earthquakes originating within the North American plate is on the order of hundreds or thousands of years which is much longer than the recurrence intervals of earthquakes originating from the CSZ, the Mendocino fault or faults located within the Gorda plate (Carver and Burke, 1992; Clarke, S.H., Jr., and McLaughlin, R.J., 1992; McPherson, 1992; and Dengler, *et al.*, 1992b). Although earthquakes originating within the North American plate can produce greater degrees of damage due to the potentially high magnitude as well as the proximity of the earthquake to residential development (Dengler, *et al.*, 1992b).

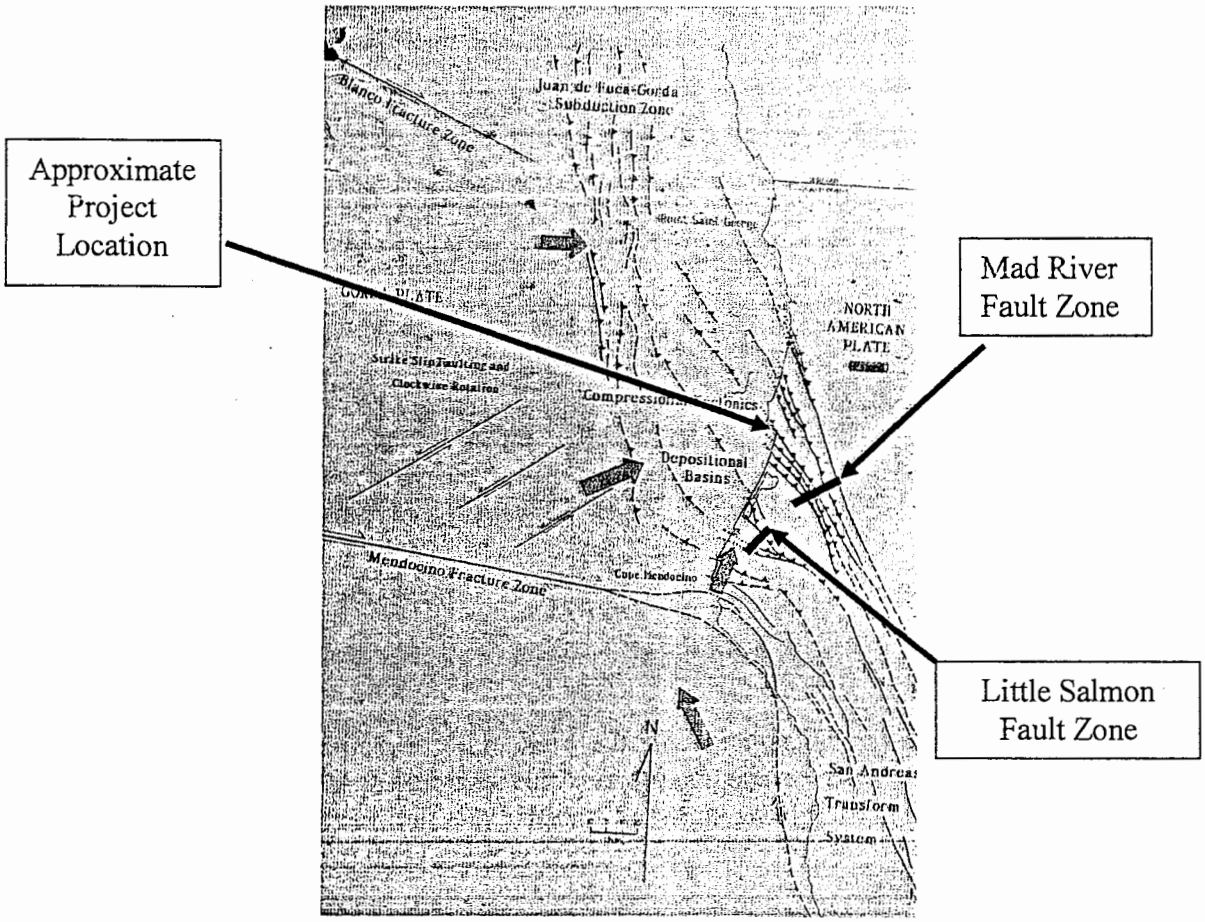

Figure 5. Cartoon depiction of compressional tectonics of the southern Cascadia Subduction Zone displaying the numerous unnamed faults within the subducting Gorda plate as well as upper plate faults within the North American plate. Red arrows indicate relative Plate Motion. (Personal Comm., unpublished documents of Gary Carver, 1989).

Modified Mercalli Intensity Scale

Intensity Value	Description (with approximate ground acceleration (g))
I.	Not felt. Marginal and long-period effects of large earthquakes (0.002 g).
II.	Felt by persons at rest, on upper floors, or favorably placed.
III.	Felt indoors. Hanging objects swing. Vibration like passing of light trucks. Duration estimated. May not be recognized as an earthquake (0.004 g).
IV.	Hanging objects swing. Vibration like passing of heavy trucks; or sensation of a jolt like a heavy ball striking the walls. Standing cars rock. Windows, dishes, doors rattle. Glasses clink. Crockery clashes. In the upper range of IV, wooden walls and frame creak (0.008 g).
V.	Felt outdoors; direction estimated. Sleepers awakened. Liquids disturbed, some spilled. Small unstable objects displaced or upset. Doors swing, close, open. Shutters, pictures move. Pendulum clocks stop, start, change rate (0.02 g).
VI.	Felt by all. Many frightened and run outdoors. Persons walk unsteadily. Windows, dishes, glassware broken. Knickknacks, books, etc., off shelves. Pictures off walls. Furniture moved or overturned. Weak plaster and masonry D cracked. Small bells ring (church, school). Trees, bushes shaken visibly, or heard to rustle (0.04 g).
VII.	Difficult to stand. Noticed by drivers. Hanging objects quiver. Furniture broken. Damage to masonry D, including cracks. Weak chimneys broken at roof line. Fall of plaster, loose bricks, stones, tiles, cornices, also un-braced parapets and architectural ornaments. Some cracks in masonry C. Waves on ponds, water turbid with mud. Small slides and caving in along sand or gravel banks. Large bells ring. Concrete irrigation ditches damaged (0.1 g).
VIII.	Steering of cars affected. Damage to masonry C; partial collapse. Some damage to masonry B; none to masonry' A. Fall of stucco and some masonry walls. Twisting, fall of chimneys, factory stacks, monuments, towers, elevated tanks. Frame houses moved on foundations if not bolted down; loose panel walls thrown out. Decayed piling broken off. Branches broken from trees. Changes in flow or temperature of springs and wells. Cracks in wet ground and on steep slopes (0.2 g-0.3 g).
IX.	General panic. Masonry D destroyed; masonry C heavily damaged, some-times with complete collapse; masonry B seriously damaged. General damage to foundations. Frame structures, if not bolted, shifted off foundations. Frames racked. Serious damage to reservoirs. Underground pipes broken. Conspicuous cracks in ground. In alluviated areas, sand and mud ejected, earthquake fountains, sand craters (0.4g–0.5g).
X.	Most masonry and frame structures destroyed with their foundations. Some well-built wooden structures and bridges destroyed. Serious damage to dams, dikes, embankments. Large landslides. Water thrown on banks of canals, rivers, lakes, etc. Sand and mud shifted horizontally on beaches and flat land. Rails bent slightly (0.6 g – 1.0 g).
XI.	Rails bent greatly. Underground pipelines completely out of service (2.0 g).
XII.	Damage nearly total. Large rock masses displaced. Lines of sight and level distorted. Objects thrown into the air (+3.0 g).

Figure 6. Modified Mercalli Intensity Scale (Bolt, 1988).

The Gorda Plate - The most common source of seismic shaking in the project area is the Gorda plate (McPherson, 1992; Dengler, *et al.*, 1992a & b). Seismicity from this source is thought to be from internal deformation of the subducting oceanic plate beneath the North American plate and offshore west of the coast of the Northern California (McPherson, 1992). Moderate to strong levels of seismic shaking can be expected from this source. The Gorda plate produces multiple earthquakes per year, few of which are damaging. The November 8, 1980 (M7.1), April 26, 1992 (M6.9 & M6.7) and December 26, 1994 (M5.4) earthquakes are examples of damaging earthquakes that originated from this source (McPherson, 1992; Dengler, *et al.*, 1992c). While not a damaging earthquake, primarily due to its distance from residential communities, the June 14, 2005 (M7.2) earthquake was the largest earthquake recorded on the Gorda plate in recent decades and demonstrates the Gorda plate's ability to generate large earthquakes.

The Mendocino Fault - Another common source of earthquake shaking is the Mendocino fault located offshore, west of Cape Mendocino. The Mendocino fault is the plate boundary between the Pacific plate and the Gorda plate. The September 1, 1994 (M6.9) earthquake originated from the Mendocino fault. This earthquake caused slight ground shaking at the project site (Dengler and Moley, 1995). Earthquake events of large magnitudes producing strong levels of seismic shaking can be anticipated from this source. The recurrence interval of earthquakes originating from this source is poorly understood (Clarke and McLaughlin, 1992; Carver and Burke, 1992; McPherson, 1992; Dengler, *et al.*, 1992a; and Merritts, *et al.*, 1992).

The San Andreas Fault - Large to great magnitude earthquakes originating from the San Andreas fault system produce very strong levels of seismic shaking as occurred in 1906 during the Great San Francisco earthquake (M8.3) causing damage in the residential areas of Humboldt County (Toppozada and Parke, 1982). The San Andreas fault marks the boundary between the Pacific plate and the North American plate. The recurrence interval of large events on this fault has been estimated to be between 200 to 400 years (Prentice, 1989).

The Cascadia Subduction Zone (CSZ) - The Cascadia Subduction Zone (CSZ) is the plate boundary that separates the offshore Gorda/Juan de Fuca oceanic plates from the continental North American plate, extending from Cape Mendocino, California northward to the Queen Charlotte Islands, British Columbia. During historic times, the CSZ has been less active than other nearby north coast seismic sources. However, on April 25, 1992 a magnitude 7.1 earthquake shook the north coast. While moderately felt in the project area this earthquake originated near this major plate boundary and may have been a CSZ event. The CSZ is a seismic source that is capable of producing very large to great magnitude earthquake events. The recurrence interval for great earthquakes on the CSZ (M8.5+) has been estimated to be between 200 to 500 years (Carver and Burke, 1992). The last known great earthquake originating from the CSZ occurred on January 26, 1700 and has an estimated magnitude of ~M9 (Satake *et al.*, 1996).

Earthquakes originating from the CSZ pose the potential for major damage (Carver and Burke, 1992; Dengler *et al.*, 1992a & b). However, according to published document *"Planning Scenario in Humboldt and Del Notre Counties, California for a Great Earthquake on the Cascadia Subduction Zone"* (Toppazada *et al.*, 1995), the project site is expected to receive damage that is slight structures (brick) build especially to withstand earthquakes, considerable in

ordinary substantial buildings; with partial collapse, racked, and tumbled down wooden houses in some cases. Fall of walls, twisting and or falling of chimneys, columns and monuments are also expected. This planning scenario is for a M8.5 Earthquake on the CZS.

The Mendocino Triple Junction (MTJ) - Mendocino triple junction (MTJ) marks the junction of the Pacific plate, the North American plate and the Gorda plate. Additionally, the MTJ is where the San Andreas fault, the Mendocino fault and the CSZ come together. Earthquakes originating from this source are generally shallow and onshore in the immediate vicinity of the MTJ. The August 17, 1991 (M6.0 – 6.2) and the March 7, 1992 (M5.6) earthquakes, which produced moderate to strong seismic shaking in southern Humboldt County and northern Mendocino County are examples of earthquakes originating from this source. While potentially damaging, the project area is not expected to experience strong ground shaking by earthquakes originating from this source. The recurrence intervals of earthquakes from this source are not well understood (Carver and Burke, 1992; Clarke, S.H., Jr., and McLaughlin, R.J., 1992; McPherson, 1992; and Dengler, *et al.*, 1992a & b).

Estimated Peak Ground Acceleration - Recent investigations indicate that strong levels of seismic shaking can be expected at the project site due to a significant event produced from the seismic sources mentioned above. Ground shaking should be anticipated at the site and during the design life of residential structures. At the site, the estimated peak ground acceleration with a ten percent probability of being exceeded in 50 years (the design life recommended by the Uniform Building Code) assuming uniform soft rock site conditions is approximately >0.7g (Figure 7, MMI VIII+; USGS, 1996).

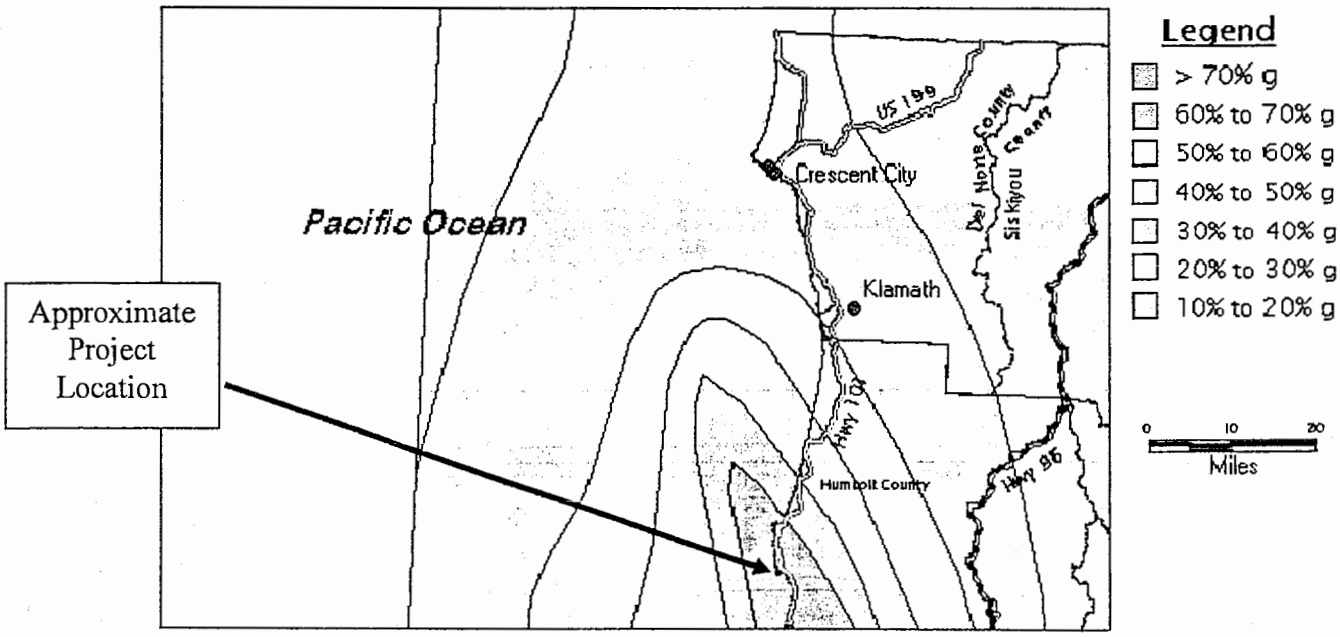

Figure 7. Probabilistic ground shaking map (PGS) peak ground acceleration with 10% probability of being exceeded in 50 years, assuming uniform soft rock site conditions (California Geological Society, 2003).

It should be emphasized that the ground shaking intensities presented above are estimates based upon field studies of the effects of past earthquakes in areas similar to that of the project site. Since these are estimates they should be used only as a general guide, which may reflect probable future ground shaking intensities. Nevertheless, we believe that it is reasonable to conclude that any residential structure constructed on the subject property should be expected to experience strong ground shaking during the lifetime of the structure.

Strong ground shaking can have a detrimental effect on a residential structure, its contents, and the people inside. However, much can be done in order to properly prepare your house and family for a large earthquake and mitigate some of its consequences. The front pages of your local telephone book contain much useful information regarding first aid and survival techniques before, during and after an earthquake. Also, the Humboldt Earthquake Education Center has published "Living on Shaky Ground, How to Survive Earthquakes and Tsunamis on the North Coast". Copies of this publication are available for free downloading on the internet as at http://www.humboldt.edu/~geology/earthquakes/shaky2.html.

PREVIOUS STUDIES

Numerous studies have been performed both on and within the vicinity of this project site. PWA has performed onsite wastewater investigations for the project site, for three of the surrounding parcels and on numerous parcels throughout the community of Trinidad. Additionally, numerous geologic evaluations have been conducted within the vicinity of the project site assessing the general stability of the coastal bluff above Tsurai Village, particularly in the vicinity of the Wagner Street Trail and the Trinidad Lighthouse (Bush Geotechnical Consultants, 1990, 1995, 2002, 2003a, 2003b; LACO ASSOCIATES, 1994a, 1994b, 2004; SHN, 1996; Taber Consultants, 2003: Chaney et al, 2004). A few key points of some of these previous studies are highlighted below.

Pacific Watershed Associates (PWA)

PWA conducted subsurface investigations on the project site and adjoining parcels in 2001 and 2002 for the purpose of evaluating the subsurface conditions and suitability for an onsite wastewater treatment system. On 12/19/01, five subsurface exploration holes were advanced by hand auger to depths ranging between 114-inches and 120-inches below the ground surface (bgs). Ground water observation wells were installed in test pits and were monitored between 1/03/02 and 2/08/02. All wells remained dry during ground water monitoring events. On both 3/29/01 and on 2/08/02 a total of four backhoe dug test pits were advanced within the surrounding area to depths ranging between 10 feet and 12 feet bgs. On 2/08/02 soil percolation testing was also performed on these sites. See Figure 2 for test pit locations.

During the years between 2002 and 2005, the parcel immediately to the east of the project site was built upon and the project site was used as a staging area during construction. During that time a variable amount of fill was placed on the project site. Additionally, a retaining wall approximately five (5) feet in height was constructed along the southern property line. We

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understand that inboard of this retaining wall a French drain was installed. Fluids captured by the French drain empty out onto a concrete drainage ditch along the north side of Edwards Street via drain lines located beneath the sidewalk. We also understand that roof run-off from some of the neighboring parcels are plumbed into this French drain.

In October of 2007, subsurface investigations were again conducted on the project site. On 10/02/07, multiple hand augered test holes were advanced on the property and were met with auger refusal between 18"-24" bgs due to the imported fill on this site. On 10/03/07, two additional test pits (TP-3 and TP-4) were advanced by backhoe to depths of 10 feet bgs. Investigations revealed previous construction activities on this site added 2 to 4 feet of fill placed on top of native soils.

Testing on this site and adjacent sites deemed the soils sufficient for the treatment of wastewater onsite. As a result of these investigations, PWA designed onsite wastewater treatment systems for the parcel on the corner of Trinity and Edwards and for the project site. All subsurface investigations, test results and system designs can be found in the Humboldt County Division of Environmental Health files located in Eureka, California.

LACO and Associates (LACO)

In 2004, LACO presented the Tsurai Ancestral Society with their "Engineering Geologic Assessment of Tsurai Village". The purpose of that report was to provide an engineering geologic assessment of the general stability of the Tsurai village and surrounding areas. In their report they state that the potential primary hazards affecting the Tsurai Villiage and surrounding management area include, but may not be limited to *"slope instability due to coastal erosion, surface erosion due to uncontrolled runoff emanating from upslope residential hardscaped areas and bare areas resulting from vegetation removal, slope failure induced by strong ground earthquake shaking, tsunami inundation, and year round high ground water conditions resulting from densely spaced residential septic systems and diversion of runoff from neighboring properties"*. In their report LACO recognizes numerous existing slope instabilities and geomorphic signals that coastal bluffs may fail again in the future.

Based on a review of rates of beach and bluff migration investigations conducted by Tuttle (1981), LACO concluded that apparently at the Tsurai Village site, which has been occupied for centuries, the coastal bluffs at the village site has not changed significantly and has therefore been relatively stable over the past 150 years. However, recent winter storms had freshly exposed shell middens and ancestral remains.

Noting that there are a series of ongoing issues contributing to the overall instability of the coastal bluffs in the vicinity of the Tsurai Village and surrounding management area, LACO states *"The single greatest factor that could adversely affect slopes at the Tsurai Village is an increase in the groundwater surface elevation"* and that *"Increases in groundwater surface elevations . . . are primarily related to the densely spaced network of private on-site waste water disposal fields (leachfields)"*.

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SHN Consulting Engineers and Geologist (SHN)

In 1995 SHN contracted by the City of Trinidad to conduct a surficial geologic investigation and assess the general geologic conditions relative to erosion and slope instability impacts of trail development. This was presented to the City of Trinidad in a report entitled "Geologic Report for Two Trail Alternatives South of Edwards Street, Trinidad California" dated February 21, 1996. In their discussion of the coastal bluffs located south of Edwards Street SHN states:

> *"It has been well established that the coastal bluff slope south of Edwards and Wagner Streets is not a stable landform. The entire bluff slope and top edge is subject to chronic slow colluvial soil creep with localized intermittent shallow landslide occurrences. Most of the slope is mantled by loose silty sand soils that are highly erodable when exposed to direct rainfall or concentrated runoff. Springs are common along lower portions of the bluff slope. The resulting emergent groundwater aggravates slope failure and erosion processes. The toe of the bluff is subject to direct ocean wave erosion that slowly undercuts the slope. Most of the bluff toe is slowly sliding onto upper reaches of the beach, and as long as this continues the slope above will continue to remain unstable. It is important to note that large scale bluff failure has not occurred in this area for over 50 years, but the risk of large scale failure is significant and should not be ignored".*

Busch Geotechnical Consultants (Busch)

In a report for the City of Trinidad Busch performed a limited-scope geotechnical investigation for a proposed walkway which would have extended from the area adjacent to the Trinidad Lighthouse west towards the ocean, down Van Wyke Street. After a review of aerial photographs of the area that they had flown for another project in 1987, Busch indicated that there was a moderate to large scale landslide within the coastal bluff on the south side of Edwards Street, across the street from this project site. Busch mapped this feature as a slump earth flow and indicated that this failure was initiated when *"marine waves undercut the toe of the bluff face, the mélange bedrock in the base of the bluff plastically deformed (crept or flowed) downslope, and the overlying terrace rocks experienced brittle rotational failure (a slump) down onto the earthflow"*. At the time of Busch's investigations they did not encounter any cracks within the headwall areas of this slide and Busch indicated that *"the head region of this slide has not settled since the street was last paved"*. Busch did indicate that the area above the head of the scarp now had a risk level higher than Moderate.

CONCLUSIONS

Based on geologic hazard investigations conducted for the proposed development area, aerial photograph analysis and a literature review of selected geotechnical reports for sites within the vicinity of the project area, it is PWA's conclusion that construction of a single family residence on this site will present no added instability to the site itself, or its surrounding area, provided recommendations in this report are adhered to.

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Slope Stability and Geologic Hazard Zones

The level of rating of the geologic hazard zones pertain to probability of slope failure occurring and the consequences of the failure on site improvements or the degree to which site improvements would have on the surrounding area. The geologic hazard designations discussed in this report are based on geologic processes on and around the site in the past 50 years and it is assumed that these processes will continue in the future in a similar manner. Based on the gentle slope on this site and the distance from the coastal bluff, the proposed development area is interpreted to be in a low or low to medium geologic hazard zone.

However, slopes on the south side of Edwards Street are very steep (>65%), show indications of large slump block failure and slow downward creep in recent decades, and actively growing cracks can be seen in the recently upgraded Trinidad Lighthouse parking lot. Unanticipated and unforeseen events, such as strong seismic shaking during saturated soil conditions, could cause considerable slope failures affecting the entire slope south of Edwards Street. Additionally, strong seismic shaking on the coast, particularly if associated with the Cascadia Subduction Zone, may also result in a tsunami. Tsunami waves could have detrimental effects, largely due to their potential for undercutting coastal bluffs. If such an event were to occur, the bluff retreat at this site could be substantial.

However, these "acts of nature" such as large scale seismic shaking, seismically induced landslides, tsunami induced landslides, or severe winter storms which undercut slopes creating an inherent instability of the slopes, exist regardless of the development of this project site.

Ground Water

As stated by LACO and discussed earlier in this report, LACO considers the abundance of fluid that percolates through the soil throughout the community of Trinidad, elevating or mounding the ground water surface due to densely spaced leachfields within this small community, to be the single most contributing factor to destabilizing the coastal bluffs. They further conclude that high ground water conditions coupled with strong seismic shaking has the highest probability of producing a landslide event.

However, high ground water conditions currently exist within the coastal community of Trinidad. As discussed earlier, proposed development of this site will include the capture and redirection of meteoric waters into existing storm drains. Even though an appropriately sized leachfield will contribute additional flow to the subsurface, development will result in a net loss of ground water contribution from this site. In other words, left undeveloped, this site contributes more to the already elevated ground water than it would if this site were to be developed.

The onsite wastewater treatment system for this site is designed for a three-bedroom residence with an estimated 450-gallons a day flow. Based on soil properties at this site, PWA considers effluent flow to be primarily vertical. During site investigations by PWA on this site and on adjoining properties soils become increasingly sandy with depth.

Based on the slope of the ground surface within the community of Trinidad, and in particular at the project site, subsurface flow below this site is projected to flow in a southwest direction,

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mimicking the ground surface. If this is the case, additional flows from this site might daylight west of any previous developed slope instability located directly south of the project site.

While it may be more obvious on some parcels within the Trinidad area which direction run-off and ground water may travel, without some rather extensive hydrologic investigations it is difficult to determine, from this project site how much ground water will flow south verse west.

Geologic Hazards

Geologic hazards that will affect development of the property include seismically induced ground shaking and the potential for small scale landsliding to occur under either aseismic or seismic conditions to the coastal bluffs south of Edwards Street, south of the property. PWA does not consider the construction of this project to enhance the slope instability to the bluff due to seismic shaking.

A substantial geologic hazard to the project site during the economic life span of residential development is seismic shaking produced by earthquakes within the Gorda plate, the North American plate, the San Andreas fault, the Mendocino fault, the Mendocino triple junction, and Cascadia Subduction Zone or other seismically active sources in the North Coast region.

Residential structures developed on the site should be designed and constructed to withstand very strong levels of ground shaking. Since there are several earthquake sources that can affect the project site, wood-frame construction is generally recommended for residential structures. Construction should be in accordance with the current edition of the Uniform Building Code for Zone 4, the highest seismic zone.

No engineering recommendations are specified by PWA in this report. If required by the Humboldt County Building Department, footing excavations can be observed by a qualified professional. Driveways, parking areas, and small-scale cut and/or fill operations can generally be located in areas designated as low to moderate and moderate geologic hazard.

Grading, Drainage, and Soil Erosion

Grading, drainage and soil erosion control plans have not been prepared by PWA and are not included in this report. However, they are briefly discussed below.

Grading - Guidelines of the Uniform Building Code as well as current Humboldt County Grading Ordinance should be followed when grading operations are performed on a project site. Grading activities resulting in cuts over 3 feet high or fills over 3 feet thick should not be initiated without soils engineering evaluations. All fills should be appropriately compacted and fill slopes constructed no steeper than 50% gradient.

Drainage - All surface run-off from impermeable surfaces shall be directed to, and captured by, the City of Trinidad's storm drain system. Any concentration of surface run-off should be avoided. Additionally, a French drain located along the retaining wall near the southern property line will capture additional surface waters and direct them to the City's storm drain.

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Soil Erosion

All means to control sediment and erosion during construction must comply with *Title III Land Use and Development Division 3, Building Regulations Section 331-12 Grading, Excavation, Erosion, and Sedimentation Control Planning (HCC Section 331-12, H-6-d).* Planting vegetation and installing appropriate erosion control measures can protect construction areas and graded slope surfaces.

RECOMMENDATIONS

The following recommendations are provided for subsequent stages of project development. They shall be included in the overall development plan. These recommendations shall be reviewed by the project engineer, architect, structural engineer, and any prospective buyer of the property. Upon request, observation of construction activities may be provided.

1. Proposed Building Area – Residential development and construction, including leachfields, driveways, and parking areas, may be located within low, low to moderate, and moderate geologic hazard zones.

2. Seismic Design – The risk of damage due to very strong ground shaking can be significantly mitigated with proper structural design, sufficient lateral bracing, an adequate foundation system, and good construction techniques. The proposed residence should be designed to withstand seismically induced ground shaking of Modified Mercalli Intensities of VII or greater from a large magnitude earthquake centered on the Cascadia Subduction Zone. At a minimum, the appropriate sections of the most current issue (at the time of construction) of the UBC and California Seismic Code should be utilized.

3. Control of Run-off – Storm-water run-off shall be carefully controlled. Run-off from impervious surfaces (roofs, gutters, downspouts, and driveways) must be directed into the City's storm drain system.

4. Native Vegetation – Landscaping utilizing native, localized climate-tolerant plants shall be used. Lawns that require irrigation will contribute large amounts of water to the site and could in conjunction with strong seismic shaking result in triggering slope instability on local slopes.

5. Onsite Wastewater Treatment System (OWTS) – The site specific onsite wastewater treatment system designed for the proposed 3-bedroom residence must be installed by a qualified professional and constructed to the design specifications provided in PWA's report entitled: "Onsite Wastewater Treatment Evaluation of A.P. Nos.: 042-042-005 and 042-042-013, located on Hector Street, Trinidad, California", dated January 22, 2008.

6. Minimizing Wastewater Flow – Appropriate low-flow plumbing fixtures shall be installed in the proposed residence and any leaky fixtures or other plumbing problems shall be repaired as soon as possible.

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INVESTIGATION LIMITATIONS

Our services consist of professional opinions and recommendations made in accordance with generally accepted geologic principles and practices. No warranty, express or implied, or merchantability or fitness, is made or intended in connection with our work, by the proposal for consulting or other services, or by the furnishing of oral or written reports or findings. If the client desires assurances against project failures, he agrees to obtain appropriate insurance through his own insurance broker.

The analysis and recommendations submitted in this report are based on our site reconnaissance and the information derived from natural and artificial exposures. Unanticipated field conditions are commonly encountered during construction and cannot be fully determined from existing exposures and may require that additional expenditures be made during construction to obtain a properly constructed project. Some contingency fund is recommended to accommodate these possible extra costs.

This report is issued with the understanding that it is the responsibility of the owner of the property, or their representatives, to ensure that the information and recommendations contained herein are called to the attention of the geotechnical (soils and foundation) engineer, the project architect and structural engineer, and are incorporated into the plans, and that the necessary steps are taken to see that the contractor(s) and subcontractors carry out such recommendations in the field. This report and associated recommendations can not be used by third parties without written approval of Pacific Watershed Associates, Inc.

If this project is not completed with three (3) years the conclusions and recommendations in this report should be re-evaluated prior to further development. Additionally, the client may wish to have portions of this site re-evaluated as the project proceeds and/or if site conditions change.

Any plan review or construction observations that may be necessary as called for in the RECOMMENDATIONS section above are separate tasks from the preparation of this report and are not a part of the contract under which this report was prepared. If requested, plan review and construction observation services will be preformed on a time-and-materials basis. We will require a minimum of at least 72 hours advance notice for field review or construction observation services.

This report has been prepared to evaluate the geologic conditions of A.P. Nos.: 042-042-005 and 042-042-013, located on Hector Street, Trinidad, California, as shown on Figures 1 and 2 and discussed in the INTRODUCTION section of this report. In the event that any new information pertaining to changes in plans is formulated, our conclusions and recommendations shall not be considered valid unless the changes are reviewed and the conclusions in this report modified or verified in writing by a representative of Pacific Watershed Associates, Inc.

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29 March 2010

EXHIBIT NO. 9
APPLICATION NO.
A-1-TRN-08-046
MARSHALL
MEMO FROM MARK JOHNSSON, DATED 3/29/10
(1 of 3)

GEOTECHNICAL REVIEW MEMORANDUM

To: Melissa Kraemer, Coastal Program Analyst
From: Mark Johnsson, Staff Geologist
Re: Appeal A-1-TRN-08-046 (Marshall)

In connection with the above-referenced appeals, I have reviewed the following documents:

1) Pacific Watershed Associates, 2008, "Preliminary geologic hazard report for A.P. Nos.: 042-042-005 and 042-042-013, located on Hector Street, Trinidad, California", 24 p. geologic report dated 10 April 2008 and signed by K. Moley (PG 7594).

2) Pacific Watershed Associates, 2008, "Marshall Property, A.P. Nos.: 042-042-005 and 042-042-013, located on the corner of Hector Street and Edwards Street, Trinidad, California", 3 p. letter report dated 9 December 2008 and signed by K. Moley (PG 7594).

3) Busch Geotechnical Consultants, 2009, "Results of factor-of-safety analysis and erosion-rate assessment for proposed Marshall Residence, Edwards Street, Trinidad, Humboldt County, California [APN 042-042-005 and -013]", 37 p. geologic report dated 30 November 2009 and signed by R. Busch (CEG 1448), and B.B. Whitney (PG 8364).

4) Tsurai Ancestral Society, 2010, "Busch Geotechnical Consultants November 2009 results of factor-of-safety analysis and erosion-rate assessment for proposed Marshall Residence, Edwards Street, Trinidad, Humboldt County, California [APN 042-042-005 and -013]", 2 p. letter to Bob Merrill dated 1 February 2010 and signed by K. Lindgren.

5) Busch Geotechnical Consultants, 2010, "Comments on Tsurai Ancestral Society letter of February 1 2010, to California Coastal Commission, Eureka, CA, regarding the Busch Geotechnical Consultants report for the proposed Marshall residence, Edwards Street, Trinidad, Humboldt County, California", 3 p. letter report dated 23 March 2010 and signed by R. Busch (CEG 1448).

6) Busch Geotechnical Consultants, 2010, "Transmittal of soil log from 20-foot-deep hand-auger borehole completed on the Marshall property, Edwards Street, Trinidad, Humboldt County, California [APN 042-042-005 and -013]", 2 p. letter report dated 23 March 2010 and signed by R. Busch (CEG 1448).

As you know, the Commission found that a substantial issue exists regarding the grounds on which the appeal was made at their hearing on 12 December 2008. From a geotechnical perspective two issues were found to exist. The preliminary geologic hazard report (reference 1)

did not contain the information necessary to find that the development as proposed would be stable for its economic life. Specifically, it did not contain an estimate of the rate of coastal erosion to be expected for its 75 year expected life nor did it contain a quantitative slope stability analysis for the adjacent coastal bluff. Second, the effects of septic system effluent on the stability of the adjacent coastal bluff and possible alternative septic systems that minimize infiltration were not addressed. Reference (2), dealing with these latter issues, was received by Commission staff on 9 December 2008, but could not be reviewed by me before the hearing.

Slope stability and coastal erosion

Reference (3) was prepared to address these questions. Defining the bluff edge as the southern edge of the shoulder of Edwards Street, no evidence could be found for any retreat of the bluff edge over the past ~70 years. Accordingly it is difficult and somewhat arbitrary to assign a predicted future bluff erosion rate. In fact, the base of the bluff appears to have prograded in recent years due to the existence of a landslide in the lower portion of the slope. The bluff as a whole averages less than 30 degrees in steepness, although near the top it is as steep as 73%, and the landslide scarp and toe also are very steep. Using a variety of assumed failure mechanisms and ground water table elevations, the authors conclude that the existing landslide at the base of the slope is currently undergoing failure and will continue to move as its toe is eroded. Reference (3) does a good job of evaluating the effects of major storms and sea level rise on the slope, and concludes that continued episodic failure is likely, and may increase over historic rates due to sea level rise.

The top of the slope also is unstable, possessing a static factor of safety of only 1.14. Indeed cracks in the parking area for the nearby Trinidad Lighthouse indicate shallow slope movement, or possible soil creep. Assuming a failure of the upper bluff, both static and pseudostatic (seismic) analyses were performed. It was found that a static factor of safety of 1.5, the industry standard for new development, was reached in the middle of Edwards Street; that is, both parcels lie landward of the 1.5 factor of safety line. The pseudostatic slope analysis yielded a factor of safety of 0.86, indicating that it would probably fail in the design earthquake. However, the factor of safety rises to 1.1, the industry standard for new development, 39 feet from the south edge of the street, and seaward of the parcels. In other words, the development should be stable in the design earthquake (although the slope may fail in a Cascadia Subduction Zone event). How long it would take before continued failure at the base of the bluff and successive failures of the upper bluff place the proposed home in danger is difficult to predict. Reference (3) concludes, and I agree, that the time scale for the home to be in danger during the design earthquake is likely on the order of at least several decades.

In conclusion, the slope below the site is unstable to marginally stable, but the site itself meets industry standards for slope stability and likely will for many decades. Even when it no longer meets these standards, it is unlikely, in my opinion, to require protective devices for its economic life.

Effects of septic system on slope stability

The possible effects of an increase in the elevation of the ground water table due to septic effluent is especially of concern at this site because of the ancestral Tsurai village at the base of the slope (reference 4). Reference (2) points out, in my view correctly, that the amount of

effluent that will likely be discharged is approximately balanced by the amount of rainfall that will no longer infiltrate due to the creation of impervious surfaces. The runoff generated by impervious surfaces will be carried to the west by the City's storm drain system and does not infiltrate the bluff below the proposed development. The report also contains an alternatives analysis, as had been requested by staff, but concludes that a conventional septic system is the most practical type for this site. Reference (3) includes modeling of slope stability under various groundwater scenarios. The factors of safety quoted above used a groundwater level 40 feet below the ground surface. This corresponds to a color change noted in borings on a nearby parcel, which is taken to correspond to the usual level of the water table. Indeed, when those borings were logged (mid August of 1999), the level of ground water observed was 53 feet below the ground surface. At my request, an additional boring was taken, this time on the Marshall property (reference 6) and near the end of the rainy season (18 March 2010). This boring was advanced to 20 feet below ground surface without encountering water. Reference (5) addresses the concerns raised in the Tsurai letter (reference 4) and concludes that the addition of septic effluent will not raise the ground water table any significant amount, and I concur. The ancestral village site *is* unstable, however, as indicated by the referenced management plan (in reference 4). However, and to conclude, the development of the subject parcels should not increase the amount or nature of that instability.

I hope that this review is useful. Please feel free to contact me at any time if you have any questions.

Sincerely,

Mark Johnsson, Ph.D., CEG, CHG
Staff Geologist

FROM: CITY OF TRINIDAD, PO BOX 390, TRINIDAD, CA 95570

TO: CALIFORNIA COASTAL COMMISSION
CITY ENGINEER / BUILDING OFFICIAL
APPLICANT

EXHIBIT NO. **10**
APPLICATION NO.
A-1-TRN-08-046
MARSHALL
NOTICE OF FINAL LOCAL ACTION (1 of 17)

NOTICE OF ACTION TAKEN

LOCAL PERMIT # 2007-12 (appeal)

APPLICANT: Jim Marshall
19595 San Vincent Dr., Redding, CA 96003

AGENT: NA

AP # APN: 042-042-05 & -13 (lot merger previously approved)

PROJECT LOCATION: Corner of Edwards and Hector Streets, Trinidad, CA

THE CITY COUNCIL TOOK ACTION FOR THE FOLLOWING PROJECT AT THEIR SECOND REGULARLY SCHEDULED MEETING OF OCTOBER 22, 2008:

Marshall 2007-12: Appeal of the Planning Commission approval of Jim Marshall's application No. 2007-12 for Design Review and a Coastal Development Permit to construct a new 2,454 sq. ft., 3-bdrm, 1-story, single-family residence on a vacant 12,820 sq. ft. property. (merger previously approved)

THE CITY
_____ APPROVED
___X___ CONDITIONALLY APPROVED
_____ DENIED

The final staff report, required findings, maps and any conditions placed on the project approval are attached as needed.

City Council action on a Coastal Development Permit, Design Review, Conditional Use Permit or a Variance will become final 10 working days after the date that the Coastal Commission receives this "Notice of Action Taken" from the City, unless an appeal to the City Council is filed in the office of the City Clerk within the time.

Furthermore, this project ~~is~~___ / **is not _X_** appealable to the Coastal Commission per the City's certified LCP, but may be appealable per the requirements of Section 30603 of the Coastal Act.

TREVER PARKER
CITY PLANNER, CITY OF TRINIDAD
DATE: October 23, 2008

RECEIVED
OCT 2 4 2008
CALIFORNIA
COASTAL COMMISSION

MARSHALL 2007-12 APPEAL STAFF REPORT:
SUMMARY OF THE PROJECT & IMPORTANT ISSUES

Applicant: Jim Marshall
Agent: Mike Pigg

Project Status: Conditionally approved by the Planning Commission by a 3-2 vote. The Planning Commission approved the following motion: *"Based on information submitted in the application, and included in the staff report and public testimony, I move to adopt the findings in this staff report and approved the project as conditioned* [in the staff report]." Please see the April staff report for the findings and final list of conditions.

Appellant: Mike and Hope Reinman

Basis for Appeal: *"Based on the application materials and previous public comment, the proposed project is not consistent with the City's General Plan, Zoning Ordinance, Local Coastal Plan, the Coastal Act, and the Northcoast Regional* [Water] *Quality* [Control Board] *Basin Plan, and ignores recommendations and findings of the Tsurai Study Area report. Also, the planning commission appears to be in violation of government code section 8920 in regards to ethical conduct."*

Staff Response to Appeal: The staff reports and supporting materials provide a detailed analysis of the project in terms of all the regulations and documents listed as applicable. The project was found to be in compliance by staff and a majority of the Planning Commission. The ethical issue has been addressed by the City Attorney.

Coastal Commission Appeal Status: The project site is shown to be outside the area that is appealable to the Coastal Commission as mapped in the City's certified LCP due to the fact that Edwards Street, a public road, is located between the project and the sea. However, current Coastal Act provisions (§30603) allow appeals for projects within 300 feet of a bluff. Therefore, the Coastal Commission would accept an appeal of an approval or conditional approval (denial of the appeal). However, a denial of the project, upholding the appeal, would not be appealable. Only major public works projects or major energy facilities can be appealed if denied by a local agency.

CEQA Status: Categorically exempt from CEQA per §15303(a) of the CEQA Guidelines exempting construction of a single-family residence in a residential zone. No substantial evidence has been submitted that this project falls under an exception to the exemptions under §15300.2 due to unusual circumstances including its proximity to the Tsurai Study Area. See 'Staff Response to CEQA Concerns' on age 60 of your background materials.

Zoning: Urban Residential – Single-family dwellings are a principally permitted use. Principally permitted uses are allowed by right, and normally do not require City approvals other than a building permit if it meets zoning requirements. In Trinidad, Design Review is always required. These requirements are discussed in more detail in the April staff report pages 3-7.

Issue	Zoning Requirement	Proposed Project
Lot Size	Minimum 8,000 sq. ft. (although smaller lots that were legally created are generally developable)	12,815 sq. ft. (after merger of two legal lots)
Setbacks	Front: 20 ft. Side: 5 ft. Street Side: 15 ft. Rear: 15 ft.	Front (Hector): 58 ft. Front side (west): 5 ft. Side (north): 7 ft. Street side (south): 50 ft. Rear (east): 15.5 ft.
Density	1 unit per 8,000 sq. ft.	1 unit on 12,815 sq. ft.
Height	Maximum: 25 ft. Minimum (guaranteed): 15 ft.	Maximum: 16 ft. (measured from ave. ground elev.)
Size	Maximum (guideline): 2,000 sq. ft. Minimum (guaranteed): 1,500 sq. ft. Floor to lot area ratio (FAR) (PC guideline) 25% Average house size approved in the last 10 years: 2,251 sq. ft. Average FAR: 25.2%	House size: 2,454 sq. ft. FAR: 19%
Parking	2 spaces in addition to garage	5 spaces in addition to garage

Special Concerns:

The following is a brief description of the primary concerns highlighted during the Planning Commission hearings, all of which were satisfactorily addressed to those Commissioners approving the project.

Historic Resources

General Plan Policy 76 – *"The design assistance committee should ensure that any proposed development does not detract from these* [Holy Trinity Church, Memorial Lighthouse, Tsurai Village, Trinidad Cemetery] *historical sites and structures."* The Zoning Ordinance implements this policy through View Protection finding E for projects within 100 ft. of these sites. Although the project property is within 100 ft. of these sites, the house itself will be at or more than 100 ft. from them. This issue is discussed further on page 6 of the April staff report.

Grading and Drainage

A separate grading permit in accordance with the City's Grading Ordinance (Chapter 15.16) will be required to be approved by the City Engineer and Planning Commission prior to project construction. Drainage impacts on the bluff have been minimized by requiring all hardscape (roof and driveway) drainage to be tied into the City's existing storm system, directing it away from the bluff and resulting in a net decrease in water infiltrating near the bluff. These issues are discussed in more detail on page 6 and 7 of the April staff report.

Slope Stability / Geologic Report

A geologic report was prepared for this project in accordance with Zoning Ordinance §17.32.090 and §17.20.130. The report met the requirements of the City's certified LCP and the Planning Commission made the five required findings listed on page 7 of the April staff report. The

overall conclusion of the report was that: *"Based on geologic hazard investigations conducted for the proposed development area, aerial photograph analysis and a literature review of a selected few geotechnical reports for sites within the vicinity of the project area, it is PWA's* [Pacific Watershed Associates] *opinion that construction of a single-family residence on the site will present no added instability to the site itself, or its surrounding area, provided recommendations in this report are adhered to."* All the recommendations were included as conditions of the project approval. Please see page 7 of the April staff report for additional information.

Sewage Disposal
The project proposal includes a design for a new 3-bedroom septic system that meets all the current requirements of the Humboldt County Health Department and the Regional Water Quality Control Board Basin Plan. The Health Department may grant a reduced setback from the retaining wall for the system due to the shape of the lot, but this is fairly common. An approved permit is required prior to construction as a condition of project approval. More stormwater will be diverted from new hardscapes than will be input through the septic system. Also see page 7 of the April staff report for more details.

Design Review and View Protection Findings
The majority of the Planning Commission agreed that all the necessary findings could be made. The main concern was for the size of the project in relation to the nearby historic sites and structures listed above. Other reasons for dissent included environmental concerns and lack of neighborhood support. The findings and responses can be found on pages 8-11 of the April staff report.

Conditions
Fifteen conditions were placed on this project in order to minimize impacts, respond to public comments and comply with all City regulations. These conditions are listed on pages 13 – 16 of the April staff report.

City Council Action:
There are four possible actions that the City Council may take, and these are described below along with sample motions below.

Motion for Denial of the Appeal and Approval of the Project – Staff Recommendation
Based on the application materials and previous public comment, the proposed project can be found to be consistent with the City's General Plan and Zoning Ordinance. Therefore, staff recommends that the City Council deny the appeal and approve the project. If the City Council agrees with the findings in the staff report, the proposed motion might be similar to the following:

> Based on the information submitted in the application, and included in the staff report and public testimony, I move to adopt the information and findings in the April staff report and approve the project as conditioned in the April staff report with the project design amendments submitted to the Council by the applicant:

Filed:	December 4, 2007
Staff:	Trever Parker
Staff Report:	December 31, 2007
Commission Hearing Date:	January 16, 2007
Commission Action:	Conditionally Approved

STAFF REPORT: CITY OF TRINIDAD

APPLICATION NO:	2007-12a
APPLICANT (S):	Jim Marshall
AGENT:	Mike Pigg
PROJECT LOCATION:	NE Corner of Edwards and Hector Streets
PROJECT DESCRIPTION:	Design Review and Coastal Development Permit to construct a new 2,454 sq. ft., 3-bdrm, 1-story, single-family residence on a vacant 12,815 sq. ft. property (after lot merger).
ASSESSOR'S PARCEL NUMBER:	042-042-05 & -13 (lots to be merged)
ZONING:	UR – Urban Residential
GENERAL PLAN DESIGNATION:	UR – Urban Residential
ENVIRONMENTAL REVIEW:	Categorically Exempt from CEQA per §15303(a) of the CEQA Guidelines exempting construction of a single-family residence in a residential zone.

APPEAL STATUS:

Planning Commission action on a coastal development permit, a variance or a conditional use permit, and Design Assistance Committee approval of a design review application will become final 10 working days after the date that the Coastal Commission receives a "Notice of Action Taken" from the City unless an appeal to the City Council is filed in the office of the City Clerk within that time. Furthermore, this project ~~is~~ ___ / **is not _X_** appealable to the Coastal Commission per the City's certified LCP, but may be appealable per Section 30603 of the Coastal Act.

****New Notes:**
The project has not changed since the February hearing. Therefore, I have not made many changes to the staff report. I included some additional information in the Geology and Slope Stability section regarding the geologic report. I also included a second table showing house and lot sizes of recently approved projects and others that I had already compiled for previous projects. Finally, I included two new conditions of approval, one requiring a cultural monitor to be present during ground disturbance and a condition requiring all the recommendations of the geologic report to be part of the project.

SITE CHARACTERISTICS:

The site is on the northeast corner of Hector and Edwards Streets; access is from Hector Street. The property is bordered on the north by the Catholic Church and an apartment building. Single-family residences are located to the east and west with only open space to the south of Edwards Street. The property currently consists of two parcels that will be merged (application being prepared); one lot is approximately 3,125 sq. ft. and the other is approximately 9,690 for a total of 12,815 sq. ft. The property slopes gently (approx. 6%) to the southwest, is currently vacant and vegetated mostly by grasses.

STAFF COMMENTS:

This project was continued from the regular January meeting in order to give the applicant a chance to work the neighbors to create a more amendable design. The applicant has submitted a short letter explaining his efforts both before and after that meeting to create a house that met City standards and addressed community concerns. Although the applicant did not get much response to holding a community meeting, he has redesigned the house so that it is only one-story and has a smaller floor area. I have amended this staff report so that it is consistent with the current submittal. Other than the redesign of the house, it was also noted belatedly that the project parcels are mapped as being of "questionable stability" in the City's General Plan; there is a discussion of this in the staff report below. Also, along with the staff report, I did a preliminary CEQA / environmental analysis of the project. It is more detailed than it might have otherwise been, but we are also working on the environmental document for the General Plan update, so the information was available.

This project also requires a lot merger of parcels 042-042-05 and -13 in order to provide access from Hector Street, as access from Edwards would require significant earth excavation. The building site is also limited by a variety of setbacks that encumber the lot. A significant limiting factor is the septic system, which requires large setbacks from the retaining wall along Edwards Street and careful placement of the driveway. Please see further discussion under the section on 'sewage disposal' below. Another important note is that the heights are about 1.5 ft. shorter than indicated on the submitted drawings due to grading that will occur; there is more discussion of the building heights below. The applicant has been requested and agreed to place story-poles / string lines

to delineate the new outline of the proposed structure by the weekend before the meeting.

Any requirements of the Building Official will be addressed during the building permit review process. The application will be required to get an approved Sewage Disposal Permit from the Health Department for a 3-bedroom system prior to building permits being issued. The designers for the septic system have been working with the Environmental Health Department. The Engineer has been forwarded copies of the site plan, and may have specific requirements for street frontage and drainage improvements. The City may also be considering potential street improvements along Hector Street including additional parking area for future improvements. Any requirements for this project should be coordinated with those efforts. The Engineer will also review the grading and drainage plan when that is submitted.

ZONING ORDINANCE/GENERAL PLAN CONSISTENCY

This project is proposed for a lot that will be approximately 12,815 sq. ft after approval of the proposed lot merger. The applicant has submitted a plot plan showing the building envelope, floor plans and elevations. Zoning Ordinance Sec. 17.08.310, defines floor area as the enclosed area of a building, excluding garages and covered balconies, but not excluding covered patios. According to this definition, the total square footage of the proposed residence is approximately 2454 sq. ft. The following table summarizes the project square footages.

Table 1 – Project square footages.

	Previous Proposal*	Current Proposal*
LOT AREA	**12,815 sf**	**12,815 sf**
TOTAL FLOOR AREA		
Residence (1st Floor)	1,962 sf	2,294 sf
Residence (2nd Floor)	912 sf	0 sf
Covered Patio and Entry	298 sf	160 sf
Total Residence Floor Area	**3,172 sf**	**2,454 sf**
Garage	550	464
Total Proposed Building Floor Area w/ Garages/Shop/Carport	3,722 s.f	2,918
FOOTPRINT & LOT COVERAGE		
Total Footprint (w/ Garage)	2,823 sf	2,918 sf
Lot Coverage (w/out driveway, uncovered patio, balcony)	22%	22.7%
Floor to Lot Area Ratio	**24.8%**	**19.1%**

*After Lot Merger

6a 9 17

Table 2- Lot and house sizes of recent projects, neighboring properties and others that I had already compiled.

Name of Owner	Street Address	Gross. Floor Area (sq.ft)	Gross. Parcel Area (sq.ft)	% of Floor to Parcel Area
Bahr	730 Edwards St	2,653 sq. ft.	8,690 sq. ft.	30.5%
Heller	570 Trinity St	3,664 sq. ft.	17,147 sq. ft.	21.4%
Davies	435 Ocean Ave	1,754 sq. ft.	8,360 sq. ft.	21%
Sterling	381 Ocean Ave	2,276 sq. ft.	6,000 sq. ft.	38%
Fraser	774 Edwards St	1,528 sq. ft.	9,130 sq. ft.	16.7%
Becker	732 Underwood	1,735 sq. ft	7,740 sq. ft.	22.4%
Jacolick	789 Underwood	2,677 sq. ft.	13,970 sq. ft.	19.2%
Binnie	487 View	1,550 sq. ft.	9,900 sq. ft.	15.7%
Halkides	550 Galindo	2,178 sq. ft.	8,286 sq. ft.	26.3%
Penissi	351 Wagner	3,170 sq. ft.	7,200 sq. ft.	44%
Evans	898 Underwood	2,175 sq. ft.	9,050 sq. ft.	24%
Rowe	797 Edwards	2,380 sq. ft.	8,530 sq. ft.	28%
Biddle	749 Edwards	2,326 sq. ft.	12,000 sq. ft.	19.5%
Lake	740 Edwards	1,567 sq. ft.	11,200 sq. ft.	14%
Talkington	860 Van Wycke	2,320 sq. ft.	8,400 sq. ft.	29%
Berresford	520 Pacific	2,320 sq. ft.	8,000 sq. ft.	29%
Lin	514 Ewing	2,300 sq. ft.	6,700 sq. ft.	34%
Spinas	851 Edwards	1,950 sq. ft.	9,600 sq. ft.	20.3%
Average	**NA**	**2,251 sq. ft.**	**9,439 sq. ft.**	**25.2%**

The property where the project is located is zoned UR – Urban Residential, although it is surrounded by mixed use development, including a church, apartments, a restaurant and residences. The purpose of the UR zone is to allow relatively dense residential development; single-family residences are a principally permitted use. The minimum lot size allowed in the UR zone is 8,000 s.f. and the maximum density is one dwelling per 8,000 s.f.

The Urban Residential zone (§17.32.060) requires minimum yards of front 20', rear 15', and side 5' (§ 17.36.060); a street side-yard is always 15' (§ 17.56.110). The setbacks should be considered in terms of what would be required after the lots are merged. Zoning Ordinance § 17.08.410 defines lot frontage for corner lots as the narrowest street frontage; therefore the parcel faces Hector Street to the west. Because of the irregular shape of the lot, setbacks had to be carefully considered. The reason for the large 20 ft. front setback is for safety purposes related to the street. Therefore, staff determined that only the western side of the property adjacent to Hector Street needed the 20 ft. setback. The western property line adjacent to parcel 042-042-06 was given a 5 ft. setback since it does not have street frontage, which is the same as is required for an interior side yard. The north property lines also have 5 ft. setbacks. There is a 15 ft. setback from the eastern / rear property line and a 15 ft. setback from the side (south) property line adjacent to Edwards Street. Due to the required setbacks for the septic system, the building envelope is limited to an approximately 55 ft. by 62 ft. area on the northern portion of the property.

The building footprint as shown on the site plan indicates that all the setbacks will be met. Section 17.56.110 allows eaves and overhangs to extend 2.5' into side yards and 4' into front, street-side and rear yards. The 18 inch overhangs would not encroach into setbacks more than 2.5'. Decks and stairways are allowed to extend up to eight feet into front, rear or street-side yards and three feet into side yards. None of these proposed features encroach into setbacks. The uncovered patio area that was shown along the east side of the residence in the previous plans is no longer shown. Such a structure would not require Design Review, but would not be allowed to be covered, and must maintain a minimum of a 7 ft. setback from the east property line, encroaching 8 ft into the rear setback as allowed if eventually constructed.

The maximum height allowed in the UR zone, by Zoning Ordinance § 17.36.06 (average ground level elevation covered by the structure to the highest point of the roof), is 25 feet. The Commission may require a lesser height in order to protect views, but a property owner is guaranteed at least 15 ft. in height and 1,500 sq. ft. regardless of view blockage (§17.60.050). Zoning Ordinance §17.56.100 states that height shall be measured from the average ground elevation covered by the structure, and for previous projects, staff and the Planning Commission have agreed that height should be measured from the native or existing ground elevation prior to construction. In this way, the height of a house could be reduced by digging it lower into the ground without actually decreasing the interior height (although this is discouraged by one Design Review finding). In this case, because of the slope of the lot, it will be dug out approximately three feet on the north side of the house, and daylight (no excavation) on

the south side. If the elevation is measured from the average original ground elevation covered by the residence, then the height should be reduced by 1.5 ft. from what is stated on the plans, which was measured from the foundation. The maximum height of the proposed structure as shown on the plans is 17.5 ft., which, as described, will actually be about 16 ft. as defined in the Zoning Ordinance.

The proposed garage is large enough for two vehicles. Zoning Ordinance §17.56.180 requires 2 off-street parking spaces other than any garage spaces. There is no prohibition in Trinidad ordinances against tandem parking. There is ample room within the long driveway area to provide for the two required parking spaces. The parking spaces would meet the size specifications required by the zoning ordinance (8.5' x 18'). Materials for the driveway are proposed to be concrete, which meets the Zoning Ordinance requirement for providing an all-weather surface.

Some grading will be required for the proposed project due to the slope of the lot. A more detailed grading plan and specifications for any retaining wall will be required prior to final approval of the project. A drainage plan will also have to be specified. Services and utilities have not yet been extended to this site, and are not shown on the plot plan, but will have to be approved by the Engineer once building plans are drawn. A more detailed plot plan has been submitted for this project that includes the proposed location of the propane tank. Although the tank will be located in the front of the house so as to be accessible, it is well away from the Church and will be screened with similar material to the siding of the house. The siding is proposed to be Hardi Lap horizontal siding, but the colors have yet to be determined. It will be most likely earth tones of tans or grays.

The Holy Trinity Church, the Memorial Lighthouse and Tsurai Village site have been identified by the General Plan as historic sites and accordingly need special consideration for projects that might affect them. General Plan Policy 76 recommends that ... *"The design assistance committee should ensure that any proposed development does not detract from these historical sites and structures."* There is no additional guidance provided in the General Plan for how to protect these resources. During a 2002 lot line adjustment involving several of the properties on this block, a small parcel to the south of the Church was required to be merged with the parcel with the apartment building which helps protect some of the open space around the church. The house itself will be located approximately 100 ft. from the Church. Because people are generally facing south when viewing the lighthouse, this project should not interfere with the use of that resource.

The project is also within 100 ft. of the Tsurai Study Area. The main concern with this area a would be the impact of additional development on the hydrology of the bluff – increasing stormwater runoff and septic effluent. A condition of approval has been included that stormwater shall be routed directly from all impervious surfaces, including the driveway, directly into the City's drainage system on Edwards Street. As described in the environmental review, this will more than offset the additional water from the leachfields. Details should be specified on the final grading and drainage. Although the City can not require more than is required by the Uniform Building Code without

adopting an enabling ordinance, the applicant is strongly encouraged to consider using water saving fixtures within the house wherever feasible. The septic system has been designed to current standards, and will not pose a risk to ground water quality.

SLOPE STABILITY:

The property where the proposed project is located is within an area designated as having "questionable stability" based on Plate 3 of the Trinidad General Plan. The site is fairly flat with a gentle slope (approx. 6%) to the southwest, and the new retaining wall has stabilized the site significantly. Zoning Ordinance §17.32.090 requires projects within the UR zone that are also within an unstable or questionably stable area to meet the requirements of §17.20.130, which sets forth specifications for a geologic feasibility determination. This section requires that a registered geologist or certified engineering geologist visit the site and write a report that addressed 5 key findings or issues (listed below). The report that was prepared is comprehensive and includes all the information required in the list below. It covers not only the site itself, but the nearby bluff area and contains a review of previous geologic studies that have been done. The report discusses potential hazards and provides recommendations to minimize them. The overall conclusion of the report was that: *"Based on geologic hazard investigations conducted for the proposed development area, aerial photograph analysis and a literature review of a selected few geotechnical reports for sites within the vicinity of the project area, it is PWA's* [Pacific Watershed Associates] *opinion that construction of a single-family residence on the site will present no added instability to the site itself, or its surrounding area, provided recommendations in this report are adhered to."*

Geologic Report Requirements from Zoning Ordinance §17.32.090

1. *The area covered in the report is sufficient to demonstrate the geotechnical hazards of the site consistent with the geologic, seismic, hydrologic and soil conditions at the site;*
2. *The extent of potential damage that might be incurred by the development during all foreseeable normal and unusual conditions, including ground saturation and shaking caused by the maximum credible earthquake;*
3. *The effect the project could have an the stability of the bluff;*
4. *How the project can be designed or located so that it will neither be subject to nor contribute to significant geologic instability through the lifespan of the project;*
5. *A description of the degree of uncertainty of analytical results due to assumptions and unknowns.*

SEWAGE DISPOSAL:

The project will require the installation of a new 3-bedroom septic system approved by the Humboldt County Division of Environmental Health (DEH). The applicant has retained a consultant to conduct the necessary soil testing and design the new system. A preliminary plot plan showing the proposed location of the system has been provided. The tank and risers, if located under the driveway, will have to be rated for traffic. A large setback from the retaining wall along Edwards Street and the long driveway limit the potential locations for placing a standard system. The applicant's agent has stated that The DEH has verbally agreed to a reduced setback from 20 ft. to 15 ft. from the

retaining wall, but this will have to be obtained in writing as part of the permit approval. Soil testing has also been completed on the northern portion of the property, so there is a potential to construct a pressure distribution (pump) system to the north with the house on the southern portion of the lot. In any case, a condition of approval has been included that an appropriate permit must be secured from DEH prior to construction.

LANDSCAPING AND FENCING:

No landscaping or fencing is proposed at this time. The applicant does have plans to landscape the unbuilt portions of the property with mostly grasses and shrubs, but no trees. This parcel falls within the Views and Vegetation Overlay Zone. Although there are no specific regulations restricting the planting of vegetation within this zone, property owners are not allowed to "unreasonably" block public or private views with vegetation within this zone.

DESIGN REVIEW / VIEW PROTECTION FINDINGS:

Because the project is located within the Coastal Zone and constitutes new construction, §17.60.030 of the Zoning Ordinance requires Design Review and View Protection Findings to be made. The applicant submitted application materials on December 4, 2007. Application materials show the project location and include a plot plan with the buildable area and septic system shown, elevations and a summary of the project. Recommended Design Review / View Preservation Findings are written in a manner to allow approval, without endorsing the project. However, if public hearing information is submitted or public comment received indicating that views may be significantly impacted for example, the findings should be reworded accordingly.

Additional external details have been provided with this design as opposed to the last one, and are still an important consideration in some of the Design Review findings that must be made. Particularly since this is such a prominently located property, the Planning Commission may consider discussing and giving suggestions for improving the aesthetics of the residence. This could include such things as size, shape, placement and congruity of the windows and other details. The Planning Commission should give the applicant specific comments for any changes the Commission feel are necessary for making any of the Design Review or View Protection findings. The applicant still wants to get the preliminary design approved prior to finalizing the grading and building plans.

Design Criteria

A. *The alteration of natural landforms caused by cutting, filling, and grading shall be minimal. Structures should be designed to fit the site rather than altering the landform to accommodate the structure.* Response: The alteration of natural landforms caused by cutting, filling, and grading is minimal. The lot is fairly flat and suitable for development. The site will only be leveled as needed for the construction of the house with some cut into the slope to minimize the height of the structure.

B. *Structures in, or adjacent to, open space areas should be constructed of materials that reproduce natural colors and textures as closely as possible.* Response: The area across Edwards Street, to the south of the project site is zoned open space. Hardi Lap siding is proposed to be used, but the colors are not specified. Colors should consist of earth tones as much as possible. The side facing Edwards has some unifying themes such as the arched glass in the garage doors and entryway and matching windows in the master bedroom and great room.

C. *Materials and colors used in construction shall be selected for the compatibility both with the structural system of the building and with the appearance of the building's natural and man-made surroundings. Preset architectural styles (e.g. standard fast food restaurant designs) shall be avoided.* Response: Materials used in construction can be found compatible with both the structural system of the building and the appearance of the building's natural and man-made surroundings; colors have not been specified. Surrounding development consists of variable materials and colors. Also see finding 'B'.

D. *Plant materials should be used to integrate the manmade and natural environments to screen or soften the visual impact of new development, and to provide diversity in developed areas. Attractive vegetation common to the area shall be used.* Response: Landscaping is not necessary to soften the visual impact of this project, but the applicant does intend to landscape the property with low vegetation. Screening will be necessary for any proposed propane tank.

E. *On-premise signs should be designed as an integral part of the structure and should complement or enhance the appearance of new development.* Response: No on-premise signs are proposed for this project.

F. *New development should include underground utility service connections. When above ground facilities are the only alternative, they should follow the least visible route, be well designed, simple and unobtrusive in appearance, have a minimum of bulk and make use of compatible colors and materials.* Response: The neighborhood already has underground utilities. New underground utility extensions will be required as part of construction.

G. *Off-premise signs needed to direct visitors to commercial establishments, as allowed herein, should be well designed and be clustered at appropriate locations. Sign clusters should be a single design theme.* Response: No off-premise signs are proposed as part of the project.

H. *When reviewing the design of commercial or residential buildings, the committee shall ensure that the scale, bulk, orientation, architectural character of the structure and related improvements are compatible with the rural, uncrowded, rustic, unsophisticated, small, casual open character of the community. In particular:*
   1. *Residences of more than two thousand square feet in floor area and multiple family dwellings or commercial buildings of more than four thousand square feet*

in floor area shall be considered out of scale with the community unless they are designed and situated in such a way that their bulk is not obtrusive.

2. *Residential and commercial developments involving multiple dwelling or business units should utilize clusters of smaller structures with sufficient open space between them instead of a consolidated structure.*

Response: The applicant has proposed a residence that will be approximately 2,454 sq. ft., larger than the 2,000 sq. ft. maximum guideline. This maximum is only a guideline and other factors may be considered. Another guideline that the Planning Commission uses is a 25% maximum floor-to-lot area ratio. This guideline is used in order to provide flexibility for varying lot sizes – the larger the lot, the larger the appropriate house, and vice-versa. In this case, the floor-to-area ratio is 19%, which is well within the guideline due to the large lot size.

Design considerations have been given to compatibility with surrounding development and reducing view blockage. There are several large structures nearby to this proposed residence, including the apartment building, the Eatery and the residence to the east. The bulk of the house has been broken up with several roof lines so that its size could be considered unobtrusive. The Planning Commission has recently approved development well in exceedance of one or the other of the above guidelines for various reasons.

View Protection

A. *Structures visible from the beach or a public trail in an open space area should be made as visually unobtrusive as possible.* Response: The proposed project is not in an area designated as open space, and due to its height and setback from the bluff, is generally not visible from nearby beaches. The residence will be visible from some public trail areas, including the head of the Axel Lindgren III Memorial Trail, the walkway along Edwards Street and Trinidad Head trails. However, the proposed residence has been designed to fit in with the surrounding development and minimize its obtrusiveness.

B. *Structures, including fences over three feet high and signs, and landscaping of new development, shall not be allowed to significantly block views of the harbor, Little Trinidad Head, Trinidad Head or the ocean from public roads, trails, and vista points, except as provided in subdivision 3 of this subsection.* Response: Most public viewing points are located seaward of the proposed residence, so public views will not be affected. Some views from outside the Catholic Church and Hector and Parker Streets could be affected, but would be similarly affected even if the proposed residence was the minimum guaranteed size.

C. *The committee shall recognize that owners of vacant lots in the SR and UR zones, which are otherwise suitable for construction of a residence, are entitled to construct a residence of at least fifteen feet in height and one thousand five hundred square feet in floor area, residences of greater height as permitted in the applicable zone, or greater floor area shall not be allowed if such residence would significantly block views identified in subdivision 2 of this subsection.*

Regardless of the height or floor area of the residence, the committee, in order to avoid significant obstruction of the important views, may require, where feasible, that the residence be limited to one story; be located anywhere on the lot even if this involves the reduction or elimination of required yards or the pumping of septic tank wastewater to an uphill leach field, or the use of some other type of wastewater treatment facility: and adjust the length-width-height relationship and orientation of the structure so that it prevents the least possible view obstruction. Response: Any new development in this area will impact some views, mainly the apartment building, but any development on this parcel will block views. The Lot Merger decreases potential development in this area and serves to help protect views. The redesign is only one story and 1 ft. above the guaranteed minimum of 15 ft. No one other than the owner of the apartments has provided information that their views will be significantly blocked.

D. *If a residence is removed or destroyed by fire or other means on a lot that is otherwise usable, the owner shall be entitled to construct a residence in the same location with an exterior profile not exceeding that of the previous residence even if such a structure would again significantly obstruct public views of important scenes, provided any other nonconforming conditions are corrected.* Response: No previous residence was removed or destroyed by fire.

E. *The Tsurai Village site, the Trinidad Cemetery, the Holy Trinity Church and the Memorial Lighthouse are important historic resources. Any landform alterations or structural construction within one hundred feet of the Tsurai Study Area, as defined in the Trinidad general plan, or within one hundred feet of the lots on which identified historical resources are located shall be reviewed to ensure that public views are not obstructed and that development does not crowd them and thereby reduce their distinctiveness or subject them to abuse or hazards.* Response: The proposed development site is located within 100' of the Tsurai Study area, the Catholic Church, and the Memorial Lighthouse, but not within 100' of the Trinidad cemetery. As discussed above under 'Zoning Ordinance/General Plan Consistency,' the proposed development is situated and designs, so it does not significantly crowd these sites and does not impact their distinctiveness. In general this project is designed, and far enough away from the sites in question that it can be found that it will not negatively impact their character or views to and from them.

STAFF RECOMMENDATION

Based on the above analysis, the proposed project can generally be found to meet the Design Review / View Protection requirements and sewage disposal requirements. Provisions of the Zoning Ordinance and General Plan can be met. However, there still needs to be a complete grading permit application prior to the project moving forward. If no additional public comment regarding views or design or other ordinance provisions is received at or before the hearing, the Planning Commission should approve the design with the added condition that the following missing elements come back to the Planning

Commission for final approval: detailed plot plan showing all project elements in relation to the property lines including utilities and drainage, a grading plan, the retaining wall design and final exterior details, colors and materials for the residence. After the hearing, I will transmit a letter or memo to the applicant detailing the items that are still required for final approval as well as a summary of public comments and any Planning Commission recommendations. The Planning Commission also has other options as listed below.

PLANNING COMMISSION ACTION:

Motion for Approval – Staff Recommendation
Based on the application materials and previous public comment, the proposed project can be found to be consistent with the City's General Plan and Zoning Ordinance. Therefore, the staff recommends that the Planning Commission approve the project. If the Planning Commission agrees with the findings in the staff report, the proposed motion might be similar to the following:

> Based on the information submitted in the application, and included in the staff report and public testimony, I move to adopt the information and findings in this staff report and approve the project as conditioned below:

CONDITIONS OF APPROVAL

1. The applicant is responsible for reimbursing the City for all costs associated with processing the application. *Responsibility: City Clerk to place receipt in conditions compliance folder prior to building permits being issued.*

2. Based on the findings that community values may change in a year's time, design review approval is for a one-year period starting at the effective date and expiring thereafter unless an extension is requested from the Planning Commission prior to that time. *Responsibility: City Clerk to verify prior to building permits being issued.*

3. Construction related activities are to occur in a manner that does not impact the integrity of the primary or reserve sewage disposal areas. The leachfield area shall be staked and flagged to keep equipment off the area. Alternatively, a written description of techniques/timing to be utilized to protect the system will be required from the contractor. If the existing system area is impacted by construction activities, an immediate Stop-Work Order will be placed on the project. The builder will be required to file a mitigation report for approval by the City and County Health Department prior to permitting additional work to occur. A Copy of the report is to go to the building official and into the conditions compliance folder. *Responsibility: Building Official to verify prior to building permits being issued and during construction.*

4. Recommended conditions of the City Building Official shall be required to be met as part of the building permit application submittal. Grading, drainage and street improvements will need to be specifically addressed at the time of building permit application. A grading permit must be approved by the Planning Commission. *Responsibility: Building Official prior to building permits being issued.*

5. Applicant shall demonstrate that the site can support a primary and reserve drainfield by obtaining a sewage disposal system permit from the Humboldt County Division of Environmental Health. The system must include risers and an in-line filter. If located within the driveway area, the tank and risers must be rated for traffic capability and the risers should be sealed to ensure no runoff enters the tank. *Responsibility: Building Official to verify prior to building permits being issued and during construction.*

6. The applicant is responsible for submitting proof that a statement on the deed, in a form approved by the City Attorney, has been recorded indicating that any increase in the number of bedrooms above a total of three bedrooms or use of the property in excess of a single unit will require City approval of adequate sewage disposal capabilities and other applicable standards. *Responsibility: Building Official to verify prior to building permits being issued.*

6. Construction related activities are to occur in a manner that incorporates storm water runoff and erosion control measures in order to account for water quality considerations near the bluffs. Specific water quality goals include, but are not limited to:
    a. Limiting sediment loss resulting from construction
    b. Limiting the extent and duration of land disturbing activities
    c. Replacing vegetation as soon as possible
    d. Maintaining natural drainage conditions

    Responsibility: Building Official to Confirm at time building permits are issued.

7. Applicant is required to obtain approval from the City Planner for the landscaping plan. *Responsibility: Building Official to Confirm at time building permits are issued.*

8. Applicant to provide method for City to verify height measurements (such as a reference stake) before and during the roof framing inspection and upon project completion. *Responsibility: Building Official to confirm at time building permits are issued and during construction inspections.*

10. Lot line adjustment must be finalized and recorded prior to issuance of building permits. *Responsibility: City Building Official prior to permits being issued.*

11. Applicant shall direct roof drainage downspouts away from the septic system tank and leachfields and into the City's stormwater system. *Responsibility: Building Official to confirm at time building permits are issued.*

12. Stormwater runoff from impermeable surfaces will be routed to the City's stormwater drainage system on Edwards Street such that infiltration is minimized and no runoff is directed towards the bluff. *Responsibility: Building Official to confirm at time building permits are issued.*

13. The application shall submit a final design that includes any details requested by the Planning Commission or City Planner as well as a complete grading permit application that includes drainage details to be approved by the Planning Commission. *Responsibility: Building Official to confirm prior to issuing building permits.*

14. a. Applicant will employ an elder of the Yurok Tribe certified by the Yurok Tribal Historical Preservation Officer to monitor the construction site for cultural and archeological resources. The monitor will be present during excavation or ground disturbing activities.

    b. Should archaeological materials be encountered during construction or grading operations, all ground-disturbing work shall be temporarily halted or shifted to another area. Work near the archeological finds shall not be resumed until a qualified archeologist has evaluated the materials and offered recommendations for further action. Prehistoric materials which could be encountered include: obsidian or chert flakes or tools, locally darkened midden, groundstone artifacts, depositions of shell, dietary bone, and human burials.

    c. Should human remains be uncovered, State law requires that the County Coroner be contacted immediately. Should the Coroner determine that the remains are likely those of a Native American, the California Native Heritage Commission must be contacted. The Heritage Commission consults with the most likely Native American descendants to determine the appropriate treatment of the remains.

15. All recommendation of the Geologic Hazard Report prepared by Pacific Watershed Associates, Inc. dated April 10, 2008 shall be adhered to as follows:

    Grading - Guidelines of the Uniform Building Code as well as current Humboldt County Grading Ordinance should be followed when grading operations are performed on the project site. Grading activities resulting in cuts over 3 feet high or fills over 3 feet thick should not be initiated without soils engineering evaluations. All fills should be appropriately compacted and fill slopes constructed no steeper than 50% gradient.

    Drainage - All surface run-off from impermeable surfaces shall be directed to, and captured by, the City of Trinidad's storm drain system. Any concentration of surface runoff should be avoided. Additionally, a French drain located along the

retaining wall near the southern property line will capture additional surface waters and direct them to the City's storm drain.

Soil Erosion
All means to control sediment and erosion design construction must comply with Title III building regulations (HCC Section 331-12, H-6-d). Planting vegetation and installing appropriate erosion control measures can protect construction areas and graded slope surfaces.

They shall be included in the overall development plan. These recommendations shall be reviewed by the project engineer, architect, structural engineer, and any prospective buyer of the property. Upon request, observation of construction activities may be provided.

1. Proposed Building Area – Residential development and construction, including leachfields, driveways, and parking areas, may be located within low, low to moderate, and moderate geologic hazard zones.

2. Seismic Design – The risk of damage due to very strong ground shaking can be significantly mitigated with proper structural design, sufficient lateral bracing, an adequate foundation system, and good construction techniques. The proposed residence should be designed to withstand seismically induced ground shaking of Modified Mercalli Intensities of VII or greater from a large magnitude earthquake centered on the Cascadia Subduction Zone. At a minimum, the appropriate sections of the most current issue (at the time of construction) of the UBC and California Seismic Code should be utilized.

3. Control of Run Off – Storm-water run-off shall be carefully controlled. Run-off from impervious surfaces (roofs, gutters, downspouts, and driveways) must be directed into the City's Stormwater system.

4. Native Vegetation – Landscaping utilizing native, localized climate-tolerant plants shall be used. Lawns that require irrigation will contribute large amounts of water to the site and could in conjuction with strong seismic shaking result in triggering slope instability on local slopes.

Attn: Bob Merrill

STATE OF CALIFORNIA -- THE RESOURCES AGENCY ARNOLD SCHWARZENEGGER, Governor

CALIFORNIA COASTAL COMMISSION
NORTH COAST DISTRICT OFFICE
710 E STREET, SUITE 200
EUREKA, CA 95501
VOICE (707) 445-7833 FAX (707) 445-7877

APPEAL FROM COASTAL PERMIT DECISION OF LOCAL GOVERNMENT

Please Review Attached Appeal Information Sheet Prior To Completing This Form.

SECTION I. Appellant(s)

Name: Michael Reinman
Mailing Address: PO Box 465
City: Trinidad Zip Code: 95570 Phone: 707-677-3630

SECTION II. Decision Being Appealed

RECEIVED
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COASTAL COMMISSION

1. Name of local/port government:
   Trinidad
2. Brief description of development being appealed:
   2,900 Sq. Ft Single Family Residence
3. Development's location (street address, assessor's parcel no., cross street, etc.):
   NE Corner of Edwards and Hector Street
   APN 042-042-05
4. Description of decision being appealed (check one.):

EXHIBIT NO. 11
APPLICATION NO.
A-1-TRN-08-046
MARSHALL
APPEAL (1 of 6)

- ☑ Approval; no special conditions
- ☐ Approval with special conditions:
- ☐ Denial

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

TO BE COMPLETED BY COMMISSION:

APPEAL NO: A-1-TRN-08-046
DATE FILED: 11/7/08
DISTRICT: North Coast

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

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

- ☐ Planning Director/Zoning Administrator
- ☑ City Council/Board of Supervisors
- ☐ Planning Commission
- ☐ Other

6. Date of local government's decision: October 22, 2003

7. Local government's file number (if any): _____

SECTION III. Identification of Other Interested Persons

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

a. Name and mailing address of permit applicant:

Jim Marshall
19595 San Vicente Dr
Redding, CA 96003

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

(1) John Rotter
961 Ocean Ave
Trinidad 95570

(2) Sam Phillips
12087 E. Mercer Ln
Scottsdale, AZ 85259

(3)

(4)

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

SECTION IV. Reasons Supporting This Appeal

PLEASE NOTE:

- Appeals of local government coastal permit decisions are limited by a variety of factors and requirements of the Coastal Act. Please review the appeal information sheet for assistance in completing this section.
- State briefly **your reasons for this appeal**. Include a summary description of Local Coastal Program, Land Use Plan, or Port Master Plan policies and requirements in which you believe the project is inconsistent and the reasons the decision warrants a new hearing. (Use additional paper as necessary.)
- This need not be a complete or exhaustive statement of your reasons of appeal; however, there must be sufficient discussion for staff to determine that the appeal is allowed by law. The appellant, subsequent to filing the appeal, may submit additional information to the staff and/or Commission to support the appeal request.

Please See attached

APPEAL FROM COASTAL PERMIT DECISION OF LOCAL GOVERNMENT (Page 4)

SECTION V. Certification

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

Signature on File

Signature of Appellant(s) or Authorized Agent

Date: 11-4-08

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

Section VI. Agent Authorization

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

_____
Signature of Appellant(s)

Date: _____

Subject: Appeal of Planning Commission decision of APPLICATION NO: 2007-12a
APPLICANT (S): Jim Marshall
PROJECT LOCATION: NE Corner of Edwards and Hector Streets
PROJECT DESCRIPTION: Design Review and Coastal Development
Permit to construct a new 2,400 sq. ft., 3-bdrm,
1-story, single-family residence & 500 foot garage on a vacant lot
ASSESSOR'S PARCEL NUMBER: 042-042-05 & -13

Appeal Issues

1. **The project as approved is inconsistent with section 30253 of the Coastal Act**

It has not been demonstrated that the Bluff is stable enough for more development. The Geological Report presented by the applicant does not comply with the required Johnsson Bluff Stability Analysis, nor has the impact on the Environmentally Sensitive Area and Tsurai Ancestral Land and burial grounds been evaluated under section 30253 (2).

The stability of the bluff for additional new development has not been demonstrated by the Geological Report presented by the applicant, per section 30253 of the California Coastal Act. The Geological Report that was prepared lacks the scientific detail and depth required by the Bluff Stability Analysis **establishing development setbacks from coastal bluffs**, presented in the Mark Johnsson Memo of January 16, 2003.

Per the LCP, "The Tsurai Village site, the Trinidad Cemetery, the Holy Trinity Church and the Memorial Lighthouse are important historic resources. Any landform alterations or structural construction within one hundred feet of the Tsurai Study Area, shall be reviewed to ensure that development does not subject them to abuse or hazards."

This review has not been done by an unbiased third party expert. Also, per the City Staff Report, *"The property where the proposed project is located is within an area designated as having "questionable stability"*. This building site sits directly above the only road in Trinidad going down to the Harbor and right on the top of an already unstable bluff and it is critical that the appropriate tests be done to ensure the stability of the bluff as it stands and with the cumulative impact of this development.

2. **The project as approved is inconsistent with the Design and Review/ View Protections findings of the TLCP:**

Because the project is located within the Coastal Zone and constitutes new construction, §17.60.030 of the Zoning Ordinance requires Design Review and View Protection Findings to be made. The applicant submitted application materials on December 4, 2007. The design Review / View Preservation Findings were written in a manner to allow approval, without adhering to provisions of Section 6.191 the City s primary regulation on the protection of scenic resources where new development is occurring.

Reiman P. 6

The introduction of a 35% ration formula for determining the design Review / View Preservation Findings was an illegitimate change of the TLCP by adding new guidelines to the TLCP, thereby updating it, without the benefit of a public hearing and Coastal Commission Certification to the new guidelines.

This fact was brought to the attention of the DRC and project planner by two commissioners, who specifically stated that no ratio formula for determining size exists in the TLCP or anywhere in the building ordinance. Both had to reject the project on that issue.

3. **The project as approved was not reviewed by the design assistance committee as required by Section 6.19 of the Trinidad Zoning Ordinance**

Section 6.19 of the Trinidad Zoning Ordinance is amended to read; Section 6.19. Design Review and View Preservation Regulations : The following regulations shall apply to all zones; Purpose. The small scale of the community and its unique townsite, affording spectacular views of the coastline and ocean horizon, define the character of Trinidad. Maintaining this character is essential to the continued desirability and viability of the City. A design assistance committee., consisting of the Trinidad Planning Commission and one member of the City Council, is hereby established to review new developments to ensure their consistency with the character of the City.and to minimize their impact on important vistas.

The new project design was not submitted to the Design Review Committee (DRC), which in the case of Trinidad is the Planning Commission, as required by the Local Coastal Plan (LCP). Attached you will find the original design as approved by the Planning Commission, and the subsequent design which was presented to the City Council five months later. The redesign was done with a new architect and includes significant changes, which you will see. This is not the project that was approved by the DRC, and nowhere in the LCP is it stated that certain changes would not require the project to go back to the DRC for review. In essence, the actions of the city have given the DRC responsibilities to the City Council

4. **Per the California Fair Practices Act, two members of the Planning Commission were required to reccuse themselves from the proceedings, but did not.**

Please see the attachment in regards to this matter. Both members own real property less than 300 feet from the building site (small town clause reduces it from 500 feet to 300 feet per the city attorney), but did not reccuse themselves. One of them asked the City Planning Staff about this and they were told, per their testimony, that that only applied if they lived within 100 feet of the site. The two members that did not reccuse themselves were two of the three members who voted to approve the project, with the vote being 3-2 for approval.