County of Santa Cruz

PLANNING DEPARTMENT
701 OCEAN STREET, 4TH FLOOR, SANTA CRUZ, CA 95060
(831) 454-2580 FAX: (831) 454-2131 TDD: (831) 454-2123
KATHLEEN MOLLOY PREVISICH, PLANNING DIRECTOR
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NOTICE OF INTENT TO ADOPT A NEGATIVE DECLARATION

NOTICE OF PUBLIC REVIEW AND COMMENT PERIOD

Pursuant to the California Environmental Quality Act, the following project has been reviewed by the County Environmental Coordinator to determine if it has a potential to create significant impacts to the environment and, if so, how such impacts could be solved. A Negative Declaration is prepared in cases where the project is determined not to have any significant environmental impacts. Either a Mitigated Negative Declaration or Environmental Impact Report (EIR) is prepared for projects that may result in a significant impact to the environment.

Public review periods are provided for these Environmental Determinations according to the requirements of the County Environmental Review Guidelines. The environmental document is available for review at the County Planning Department located at 701 Ocean Street, in Santa Cruz. You may also view the environmental document on the web at www.sccoplanning.com under the Planning Department menu. If you have questions or comments about this Notice of Intent, please contact Matt Johnston of the Environmental Review staff at (831) 454-3201

The County of Santa Cruz does not discriminate on the basis of disability, and no person shall, by reason of a disability, be denied the benefits of its services, programs or activities. If you require special assistance in order to review this information, please contact Bernice Romero at (831) 454-3137 (TDD number (831) 454-2123 or (831) 763-8123) to make arrangements.

PROJECT: CHAMINADE LANE GRADING

APP #: 131108

APN(S): 025-013-43, -44, -45, -46

PROJECT DESCRIPTION: The proposed project a proposal to grade approximately 3,066 cubic yards in order to construct a single-family dwelling and associated driveway access on lot 4 of a four-lot development.

PROJECT LOCATION: Project is located on the east side of Chaminade Lane approximately 300 feet north of the intersection of Chaminade Lane and Paul Sweet Road.

EXISTING ZONE DISTRICT: Residential Agriculture (RA)
APPLICANT: Doug Locke
OWNER: Barry Swenson Builder / Green Valley Corporation
PROJECT PLANNER: Antonella Gentile, (831) 454-3164
EMAIL: Antonella.Gentile@santacruzcounty.us
ACTION: Negative Declaration with Mitigations
REVIEW PERIOD: February 27, 2014 through March 18, 2014
This project will be considered administratively by the Project Planner at the completion of the review period.

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MITIGATED NEGATIVE DECLARATION

Project: Chaminade Lane Grading **APN(S): 025-013-43, -44, -45, -46**

Project Description: Proposal to grade approximately 3,077 cubic yards in order to construct a single-family dwelling and associated driveway access on lot 4 of a four-lot development.

Project Location: The project is located on the east side of Chaminade Lane approximately 300 feet north of the intersection of Chaminade Lane and Paul Sweet Road.

Owner: Barry Swenson Builder / Green Valley Corporation

Applicant: Doug Locke

Staff Planner: Antonella Gentile, (831) 454-3164

Email: Antonella.Gentile@santacruzcounty.us

This project will be considered administratively by the Project Planner at the completion of the review period.

California Environmental Quality Act Mitigated Negative Declaration Findings:

Find, that this Mitigated Negative Declaration reflects the decision-making body's independent judgment and analysis, and; that the decision-making body has reviewed and considered the information contained in this Mitigated Negative Declaration and the comments received during the public review period; and, that revisions in the project plans or proposals made by or agreed to by the project applicant would avoid the effects or mitigate the effects to a point where clearly no significant effects would occur; and, on the basis of the whole record before the decision-making body (including this Mitigated Negative Declaration) that there is no substantial evidence that the project as revised will have a significant effect on the environment. The expected environmental impacts of the project are documented in the attached Initial Study on file with the County of Santa Cruz Clerk of the Board located at 701 Ocean Street, 5th Floor, Santa Cruz, California.

Review Period Ends: March 18, 2014

Note: This Document is considered Draft until it is Adopted by the Appropriate County of Santa Cruz Decision-Making Body

Date: 2/24/14

TODD SEXAUER, Environmental Coordinator
(831) 454-3511

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MITIGATION MONITORING AND REPORTING PROGRAM for the Application No. 131108, February 24, 2014

No.	Environmental Impact	Mitigation Measures	Responsibility for Compliance	Method of Compliance	Timing of Compliance
Biological Resources					
BIO-1	Have a substantial adverse effect on any riparian habitat or sensitive natural community identified in local or regional plans, policies, regulations (e.g., wetland, native grassland, special forests, intertidal zone, etc.) or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?	Some development would take place within oak woodland habitat. In order to mitigate for impacts to oak woodland on site, the following measures shall apply: • Remaining oak trees shall be protected to the maximum extent possible per the recommendations of the project arborist in his report dated June 7, 2013 and updated November 25, 2013 (Attachment 11). Prior to final approval of the project, the project arborist shall provide the Planning Department an Oak Protection Plan. The Plan shall include the location and method of protection measures for all oaks to be retained, construction details where disturbance or development activities may impact oak root zones, and an assessment of the potential for moving any of the oaks identified for removal to another location on the subject parcel. • A landscaping plan shall be provided that includes replacement oak trees for all oaks to be removed. Oaks under 6 inches DBH shall be replaced at a 1:1 ratio; oaks between 6 inches and12 inches shall be replaced at a 2:1 ratio; oaks larger than 12 inches shall be replaced at a 3:1 ratio. • All oak trees on the subject parcel shall be monitored for 5 years post project completion. Oaks that die during the 5-year period shall be replaced in kind. Annual status reports shall be submitted to the Planning Department Environmental Coordinator to ensure compliance.	Applicant	To be monitored by the County Planning Department and Applicant.	To be implemented during project design, construction and monitoring period.
BIO-2	Interfere substantially with the movement of any native resident or migratory fish or wildlife species, or with established native resident or migratory wildlife corridors, or impede the use of native or migratory wildlife nursery sites?	Removal of oak trees, discussed in C2, above, may affect nesting birds. In order to avoid impacts to raptors and migratory songbirds, tree removal activities shall be limited to the months between September 1 and February 1, if feasible. • If trees must be removed outside of the timeframe above, a qualified biologist shall conduct surveys for raptor or migratory songbird nests 3-4 weeks prior to site disturbance. • If active raptor or migratory bird nests are found in trees to be retained, the biologist shall be required to be on site during any initial vegetation or ground disturbance activities (e.g. vegetation clearing, grading, excavation, tree pruning/removal) that could potentially impact listed species. The biologist shall be responsible for setting and maintaining the disturbance buffers from active nests during construction activities, and buffers and exclusionary measures shall be implemented only after	Applicant	To be monitored by the County Planning Department and Applicant.	To be implemented during project design and construction.

No.	Environmental Impact	Mitigation Measures	Responsibility for Compliance	Method of Compliance	Timing of Compliance
		consultation with CDFG. • If no active nests are present on the subject parcel, tree removal can proceed at the project proponent's discretion.			

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CALIFORNIA ENVIRONMENTAL QUALITY ACT (CEQA) ENVIRONMENTAL REVIEW INITIAL STUDY

Date: February 3, 2014 **Application Number:** 131108

Staff Planner: Antonella Gentile

I. OVERVIEW AND ENVIRONMENTAL DETERMINATION

APPLICANT: Doug Locke **APN**: 025-013-43, -44, -45, -46

OWNER: Barry Swenson Builder/Green Valley Corporation **SUPERVISORAL DISTRICT**: 1

PROJECT LOCATION: The property is located on the east side of Chaminade Lane approximately 300 feet north of the intersection of Chaminade Lane and Paul Sweet Road. See Attachment 1 for location maps.

SUMMARY PROJECT DESCRIPTION: Proposal to grade approximately 3,066 cubic yards in order to construct a single-family dwelling and associated driveway access on lot 4 of a four-lot development. See Attachment 2 for project plans.

ENVIRONMENTAL FACTORS POTENTIALLY AFFECTED: All of the following potential environmental impacts are evaluated in this Initial Study. Categories that are marked have been analyzed in greater detail based on project specific information.

- ☒ Geology/Soils
- ☐ Hydrology/Water Supply/Water Quality
- ☒ Biological Resources
- ☐ Agriculture and Forestry Resources
- ☐ Mineral Resources
- ☐ Visual Resources & Aesthetics
- ☐ Cultural Resources
- ☐ Hazards & Hazardous Materials
- ☐ Transportation/Traffic
- ☐ Noise
- ☐ Air Quality
- ☐ Greenhouse Gas Emissions
- ☐ Public Services
- ☐ Recreation
- ☐ Utilities & Service Systems
- ☐ Land Use and Planning
- ☐ Population and Housing
- ☐ Mandatory Findings of Significance

DISCRETIONARY APPROVAL(S) BEING CONSIDERED:

- ☐ General Plan Amendment
- ☐ Land Division
- ☐ Rezoning
- ☒ Development Permit
- ☐ Coastal Development Permit
- ☒ Grading Permit
- ☐ Riparian Exception
- ☒ Other: Preliminary Grading Approval

NON-LOCAL APPROVALS

Other agencies that must issue permits or authorizations:

DETERMINATION: (To be completed by the lead agency)
On the basis of this initial evaluation:

- ☐ I find that the proposed project COULD NOT have a significant effect on the environment, and a NEGATIVE DECLARATION will be prepared.
- ☒ I find that although the proposed project could have a significant effect on the environment, there will not be a significant effect in this case because revisions in the project have been made or agreed to by the project proponent. A MITIGATED NEGATIVE DECLARATION will be prepared.
- ☐ I find that the proposed project MAY have a significant effect on the environment, and an ENVIRONMENTAL IMPACT REPORT is required.
- ☐ I find that the proposed project MAY have a "potentially significant impact" or "potentially significant unless mitigated" impact on the environment, but at least one effect 1) has been adequately analyzed in an earlier document pursuant to applicable legal standards, and 2) has been addressed by mitigation measures based on the earlier analysis as described on attached sheets. An ENVIRONMENTAL IMPACT REPORT is required, but it must analyze only the effects that remain to be addressed.
- ☐ I find that although the proposed project could have a significant effect on the environment, because all potentially significant effects (a) have been analyzed adequately in an earlier EIR or NEGATIVE DECLARATION pursuant to applicable standards, and (b) have been avoided or mitigated pursuant to that earlier EIR or NEGATIVE DECLARATION, including revisions or mitigation measures that are imposed upon the proposed project, nothing further is required.

Todd Sexauer
Environmental Coordinator

2/24/14
Date

II. BACKGROUND INFORMATION

EXISTING SITE CONDITIONS

Parcel Size: 1.49 acres (APN 025-013-45); the entire property (APNs 025-013-43, -44, -45 and -46) is approximately 5.3 acres.
Existing Land Use: vacant
Vegetation: Open grassland with scattered brush, and oak, bay and eucalyptus trees.
Slope in area affected by project: ☒ 0 - 30% ☒ 31 – 100%
Nearby Watercourse: unnamed tributary stream to Arana Gulch Creek along the south border of the property.
Distance To: 40 feet minimum between disturbance area and creek centerline

ENVIRONMENTAL RESOURCES AND CONSTRAINTS

Water Supply Watershed: Arana-Rodeo
Groundwater Recharge: n/a
Timber or Mineral: n/a
Agricultural Resource: no
Biologically Sensitive Habitat: yes
Fire Hazard: no
Floodplain: none mapped
Erosion: yes
Landslide: yes
Liquefaction: no
Fault Zone: no
Scenic Corridor: no
Historic: no
Archaeology: no
Noise Constraint: no
Electric Power Lines: no
Solar Access: mostly open
Solar Orientation: n/a
Hazardous Materials: no
Other: none

SERVICES

Fire Protection: Central Fire
School District: Pajaro Valley School District
Sewage Disposal: private
Drainage District: 5
Project Access: proposed private drive (Lupine Lane) off Dempsey Road
Water Supply: Santa Cruz Water

PLANNING POLICIES

Zone District: Residential Agriculture (RA)
General Plan: Suburban Residential (R-S)
Special Designation: none

Urban Services Line:	☐ Inside	☒ Outside
Coastal Zone:	☐ Inside	☒ Outside

ENVIRONMENTAL SETTING AND SURROUNDING LAND USES:

The 5.3 acre site is a hillside property vegetated with open grassland and groups of native coast live oak, coast redwood and California bay laurel trees. The property slopes steeply (with typical slope gradients ranging from 27-78%) down to the south and west, and is located on the north side of Dempsey Road, a private road off Chaminade Lane just north of its intersection with Paul Sweet Road.

The property is situated between Arana Gulch to the west and Rodeo Gulch to the east. It is part of an ancient sea cliff delineating the western marine terrace to the north and the Highway 1 marine terrace to the south. There are several sandstone outcrops with gradients over 100% along the eastern portion of the property. An unnamed tributary stream to Arana Gulch Creek borders the property to the south, paralleling Dempsey Road.

The site topography shows evidence of minor historic grading and terracing done many decades ago that appears to be remnant of the former use of the property for orchards and a former dwelling that is no longer on the now-vacant site.

Surrounding land uses include the 56.4 acre Chaminade Resort hotel property to the west and northwest, Residential Agriculture (RA) zoned land to the north and east that is primarily vacant, areas of more densely-settled single-family residential development to the southeast, and the Dominican Oaks retirement home property to the south.

PROJECT BACKGROUND:

In 2006, a Rural Density Matrix Determination (Application 06-0330) was conducted to establish the allowable density of a 5.3 acre property that includes the current project area. Lot Legality Determination 06-0708 then determined the legality of four individual parcels within the 5.3 acres property, and Certificates of Compliance were recorded. Application 07-0234 for a Lot Line Adjustment and buildability determination established the four subject parcels in their current configuration. Soils, geologic and biotic studies and septic feasibility were considered under that application.

Building application APP-131003 is currently in process for the Lot 4 (APN 025-013-45) house and retaining wall.

DETAILED PROJECT DESCRIPTION: The proposed project includes the construction of an access driveway to serve a proposed 3,225 square-foot single-family residence on Lot 4 of a 4-lot development, and associated grading for the Lot 4 residence building site and access, including a fire truck turnaround. The driveway (Lupine Lane) is designed to eventually serve up to three other parcels (APNs 025-013-43, -44, and -46) if future development is proposed. Construction of the driveway and Lot 4 building pad would require approximately 3,066 cubic yards of grading, and retaining walls where required. The total area of land disturbance is approximately 2.08 acres. Twenty-five Coast Live Oaks and two California Bay Laurel trees within the footprint of the drive and utility easement are proposed to be removed; these trees would be replaced with five-gallon Coast Live Oaks and Coast Redwoods on a 2:1 ratio. The proposed grading volume and tree removal reflects a revision to the plans that saved an additional 11 live oak trees and reduced the grading volume by over 1,000 cubic yards.

III. ENVIRONMENTAL REVIEW CHECKLIST

A. GEOLOGY AND SOILS

Would the project:

		Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
1.	Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:				
	A. Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42.	☐	☐	☒	☐
	B. Strong seismic ground shaking?	☐	☐	☒	☐
	C. Seismic-related ground failure, including liquefaction?	☐	☐	☒	☐
	D. Landslides?	☐	☐	☒	☐

Discussion (A through D): The project site is located outside of the limits of the State Alquist-Priolo Special Studies Zone (County of Santa Cruz GIS Mapping, California Division of Mines and Geology, 2001). However, the project site is located approximately 8.6 miles southwest of the San Andreas fault zone, and approximately 5.3 miles southwest of the Zayante-Vergeles fault zone. While the San Andreas fault is larger and considered more active, each fault is capable of generating moderate to severe ground shaking from a major earthquake. Consequently, large earthquakes can be expected in the future. The October 17, 1989 Loma Prieta earthquake (magnitude 7.1) was the second largest earthquake in central California history.

A geologic investigation for the project was prepared by Nolan Associates, dated December 20, 2007 and April 21, 2008, and updated June 13, 2013 (Attachment 3). The report has been reviewed and accepted by the Environmental Planning Section of the Planning Department (Attachment 4). A geotechnical investigation was prepared by Amso Consulting Engineers, dated June 15, 2012, (Attachment 5) and subsequently updated by Dees and Associates, Inc., who assumed responsibility for the proposed project in June 2013 and submitted an update to the Amso Geotechnical Investigation, dated November 21, 2012, and revised June 4, 2013 (Attachment 6).

	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact

The reports conclude that A) fault rupture would not be a potential threat to the proposed development; B) seismic shaking can be managed by constructing with conventional spread footings or pier and grade beam foundation systems; and C) landslide hazards can be managed by embedding the foundations in bedrock and with the recommended slough wall. Compliance with the recommendations of these reports is required by County Code Section 16.10.070.

2.	Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse?	☐	☐	☒	☐

Discussion: The geologic report cited above recommends a slough wall to protect from shallow landsliding and embedment of the foundations into bedrock to protect from soil creep. Compliance with the recommendations of this report is required by County Code Section 16.10.070.

3.	Develop land with a slope exceeding 30%?	☐	☐	☒	☐

Discussion: There are slopes that exceed 30% in the project area. However, the proposed access road has been designed and located to avoid the slope areas that are in excess of 30% to the greatest extent possible. The small portions that fall within >30% contours would be graded and engineered in accordance with the project geotechnical engineers' recommendations in a manner that would minimize grading quantities while also minimizing the risks of erosion and instability. Compliance with the recommendations of the geotechnical engineer is required by County Code Section 16.10.070.

4.	Result in substantial soil erosion or the loss of topsoil?	☐	☐	☒	☐

Discussion: Some potential for erosion exists during the construction phase of the project; however, this potential is minimal because standard erosion controls are a required condition of the project. Prior to approval of the grading and building permit, the project must have an approved Stormwater Pollution Control Plan that has been prepared by a Qualified SWPPP Developer, which would detail specific erosion and sedimentation control measures. The plan would include provisions for disturbed areas to be planted with ground cover or covered with erosion control blankets prior to project final inspection.

5.	Be located on expansive soil, as defined in Section 1802.3.2 of the California Building Code (2007), creating substantial risks to life or	☐	☐	☒	☐

	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact

property?

Discussion: The geotechnical report for the project did not identify any elevated risk associated with expansive soils.

6.	Place sewage disposal systems in areas dependent upon soils incapable of adequately supporting the use of septic tanks, leach fields, or alternative waste water disposal systems where sewers are not available?	☐	☐	☒	☐

Discussion: A new single-family residence would be built that would take its access from the proposed driveway. The residence would use an onsite sewage disposal system, and County Environmental Health Services has determined that site conditions are appropriate to support such a system (Attachment 7).

7.	Result in coastal cliff erosion?	☐	☐	☐	☒

Discussion: The proposed project is not located in the vicinity of a coastal cliff or bluff; and therefore, would not contribute to coastal cliff erosion.

B. HYDROLOGY, WATER SUPPLY, AND WATER QUALITY
Would the project:

1.	Place development within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map?	☐	☐	☐	☒

Discussion: According to the Federal Emergency Management Agency (FEMA) National Flood Insurance Rate Map, dated May 16, 2012, no portion of the project site lies within a 100-year flood hazard area.

2.	Place within a 100-year flood hazard area structures which would impede or redirect flood flows?	☐	☐	☐	☒

Discussion: According to the Federal Emergency Management Agency (FEMA) National Flood Insurance Rate Map, dated May 16, 2012, no portion of the project site lies within a 100-year flood hazard area.

3.	Be inundated by a seiche, tsunami, or mudflow?	☐	☐	☐	☒

Discussion: No portion of the project site is located in an area that would be subject to inundation by a seiche, tsunami or mudflow.

	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
4. Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted)?	☐	☐	☒	☐

Discussion: The project would obtain water from the City of Santa Cruz Water District, and would not rely on private well water. See Attachment 8 for confirmation from the City of Santa Cruz. The project is not located in a mapped groundwater recharge area.

5. Substantially degrade a public or private water supply? (Including the contribution of urban contaminants, nutrient enrichments, or other agricultural chemicals or seawater intrusion).	☐	☐	☒	☐

Discussion: The project would not discharge runoff either directly or indirectly into a public or private water supply. However, runoff from this project may contain small amounts of chemicals and other household contaminants. No commercial or industrial activities are proposed that would contribute contaminants. Potential siltation from the proposed project would be addressed through implementation of erosion control best management practices (BMPs).

6. Degrade septic system functioning?	☐	☐	☐	☒

Discussion: There is no indication that existing septic systems in the vicinity would be affected by the project.

7. Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding, on- or off-site?	☐	☐	☒	☐

Discussion: The proposed project does not include alteration to any watercourses,

	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact

and would be engineered so as to not alter the existing overall drainage pattern of the site. Department of Public Works (DPW) Drainage staff has reviewed and approved the proposed drainage plan.

8.	Create or contribute runoff water which would exceed the capacity of existing or planned storm water drainage systems, or provide substantial additional sources of polluted runoff?	☐	☐	☒	☐

Discussion: Drainage Calculations prepared by Ifland Engineers, dated September 2009 and revised June 2013 (Attachment 9) have been reviewed for potential drainage impacts and accepted by the DPW Drainage staff. The calculations show that the proposed stormwater management system would be sufficient to control flows from the proposed development, and that the stormwater drainage system, as designed, would be adequate and sufficient for the proposed development. The runoff rate from the property would be controlled by flow restrictor discharge pipes, a detention system, infiltration trenches and landscaping. DPW staff determined that existing storm water facilities are adequate to handle the increase in drainage associated with the project. Refer to response B-5 for discussion of urban contaminants and/or other polluting runoff.

9.	Expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam?	☐	☐	☐	☒

Discussion: There are no levees or damns in the project vicinity.

10.	Otherwise substantially degrade water quality?	☐	☐	☒	☐

Discussion: A stormwater management maintenance agreement is required by the DPW Drainage staff to maintain the drainage system. In addition, potential siltation from the proposed project would be addressed through implementation of erosion control BMPs.

C. BIOLOGICAL RESOURCES

Would the project:

1.	Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations,	☐	☐	☒	☐

	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact

or by the California Department of Fish and Game, or U.S. Fish and Wildlife Service?

Discussion: According to the California Natural Diversity Data Base (CNDDB), maintained by the California Department of Fish and Game, the site is mapped for the potential presence of the Ohlone tiger beetle, Zayante banded grasshopper, San Francisco popcorn flower, Santa Cruz tarplant and Santa Cruz clover. However, a July 2000 Biological Constraints Analysis and a 2002 follow-up survey for special-status plants and wildlife determined that no special-status species were present on the project site. Additional surveys were conducted in 2006 and 2008 for rare plants, as detailed in the Biological Survey Update (H.T. Harvey & Associates, 5/22/08, Attachment 10). The reports concluded that there were no special status species observed in the project area.

2.	Have a substantial adverse effect on any riparian habitat or sensitive natural community identified in local or regional plans, policies, regulations (e.g., wetland, native grassland, special forests, intertidal zone, etc.) or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?	☐	☒	☐	☐

Discussion: Four biotic habitats are present on the project site as identified in the Biological Survey Update referenced in C1, above: non-native grassland, coast live oak woodland, seasonal drainage and eucalyptus.

The seasonal drainage is located approximately 40 feet from the disturbance area at the closest point. Erosion and sediment controls and stormwater pollution control BMPs would be required during construction and at the completion of the Dempsey Road improvements to prevent impacts to the drainage.

Some development would take place within oak woodland habitat. In order to mitigate for impacts to oak woodland on site, the following measures shall apply:

- Remaining oak trees shall be protected to the maximum extent possible per the recommendations of the project arborist in his report dated June 7, 2013 and updated November 25, 2013 (Attachment 11). Prior to final approval of the project, the project arborist shall provide the Planning Department an Oak Protection Plan. The Plan shall include the location and method of protection measures for all oaks to be retained, construction details where disturbance or development activities may impact oak root zones, and an assessment of the potential for moving any of the oaks identified for removal to another location on the subject parcel.

- A landscaping plan shall be provided that includes replacement oak trees for

	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact

all oaks to be removed. Oaks under 6 inches DBH shall be replaced at a 1:1 ratio; oaks between 6 inches and12 inches shall be replaced at a 2:1 ratio; oaks larger than 12 inches shall be replaced at a 3:1 ratio.

- All oak trees on the subject parcel shall be monitored for 5 years post project completion. Oaks that die during the 5-year period shall be replaced in kind. Annual status reports shall be submitted to the Planning Department Environmental Coordinator to ensure compliance.

3.	Interfere substantially with the movement of any native resident or migratory fish or wildlife species, or with established native resident or migratory wildlife corridors, or impede the use of native or migratory wildlife nursery sites?	☐	☒	☐	☐

Discussion: The proposed project is set back a minimum of 40 feet from the seasonal drainage to the southeast of Dempsey Road. No activities are proposed that would interfere with the movements or migrations of fish or wildlife or impede use of a known wildlife nursery site.

Removal of oak trees, discussed in C2, above, may affect nesting birds. In order to avoid impacts to raptors and migratory songbirds, tree removal activities shall be limited to the months between September 1 and February 1, if feasible.

- If trees must be removed outside of the timeframe above, a qualified biologist shall conduct surveys for raptor or migratory songbird nests 3-4 weeks prior to site disturbance.

- If active raptor or migratory bird nests are found in trees to be retained, the biologist shall be required to be on site during any initial vegetation or ground disturbance activities (e.g. vegetation clearing, grading, excavation, tree pruning/removal) that could potentially impact listed species. The biologist shall be responsible for setting and maintaining the disturbance buffers from active nests during construction activities, and buffers and exclusionary measures shall be implemented only after consultation with CDFG.

- If no active nests are present on the subject parcel, tree removal can proceed at the project proponent's discretion.

4.	Produce nighttime lighting that would substantially illuminate wildlife habitats?	☐	☐	☒	☐

Discussion: The large subject property is currently undeveloped, but is surrounded by residential and commercial development in the general vicinity that currently generates a small amount of nighttime lighting. The proposed project is set back a minimum of 40 feet from the seasonal drainage to the southeast of Dempsey Road.

	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact

The access drive improvements for the new residential site would not produce new nighttime lighting impacts. However, the proposed residence, which is set back approximately 300 feet from the seasonal drainage, would generate a less-than-significant amount of new nighttime illumination.

5.	Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?	☐	☐	☐	☒

Discussion: The project is not near any federally-protected wetlands.

6.	Conflict with any local policies or ordinances protecting biological resources (such as the Sensitive Habitat Ordinance, Riparian and Wetland Protection Ordinance, and the Significant Tree Protection Ordinance)?	☐	☐	☐	☒

Discussion: The project would not conflict with any local policies or ordinances that protect biological resources.

7.	Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?	☐	☐	☐	☒

Discussion: The proposed project would not conflict with the provisions of any adopted Habitat Conservation Plan Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan. Therefore, no impact would occur.

D. AGRICULTURE AND FOREST RESOURCES

In determining whether impacts to agricultural resources are significant environmental effects, lead agencies may refer to the California Agricultural Land Evaluation and Site Assessment Model (1997) prepared by the California Department of Conservation as an optional model to use in assessing impacts on agriculture and farmland. In determining whether impacts to forest resources, including timberland, are significant environmental effects, lead agencies may refer to information compiled by the California Department of Forestry and Fire Protection regarding the state's inventory of forest land, including the Forest and Range Assessment Project and the Forest Legacy Assessment Project; and

	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact

forest carbon measurement methodology provided in Forest Protocols adopted by the California Air Resources Board. Would the project:

1.	Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?	☐	☐	☐	☒

Discussion: The project site does not contain any lands designated as Prime Farmland, Unique Farmland, or Farmland of Statewide Importance as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency. In addition, the project does not contain Farmland of Local Importance. Therefore, no Prime Farmland, Unique Farmland, Farmland of Statewide or Farmland of Local Importance would be converted to a non-agricultural use. No impact would occur from project implementation.

2.	Conflict with existing zoning for agricultural use, or a Williamson Act contract?	☐	☐	☐	☒

Discussion: The project site is zoned Residential Agriculture (RA), which is not considered to be an agricultural zone. Additionally, the project site is not under a Williamson Act Contract. Therefore, the project does not conflict with existing zoning for agricultural use, or a Williamson Act Contract. No impact is anticipated.

3.	Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code Section 12220(g)), timberland (as defined by Public Resources Code Section 4526), or timberland zoned Timberland Production (as defined by Government Code Section 51104(g))?	☐	☐	☐	☒

Discussion: The project is not adjacent to land designated as Timber Resource and would not affect the resource or access to harvest the resource in the future. The timber resource may only be harvested in accordance with California Department of Forestry timber harvest rules and regulations.

4.	Result in the loss of forest land or conversion of forest land to non-forest use?	☐	☐	☐	☒

Discussion: No forest land occurs on the project site or in the immediate vicinity. No

	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact

impact is anticipated.

5.	Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use or conversion of forest land to non-forest use?	☐	☐	☐	☒

Discussion: The project site and surrounding area does not contain any lands designated as Prime Farmland, Unique Farmland, Farmland of Statewide Importance or Farmland of Local Importance as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency. Therefore, no Prime Farmland, Unique Farmland, Farmland of Statewide, or Farmland of Local Importance would be converted to a non-agricultural use. In addition, the project site contains no forest land, and no forest land occurs within 2-3 miles of the proposed project site. Therefore, no impacts are anticipated.

E. MINERAL RESOURCES

Would the project:

1.	Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?	☐	☐	☐	☒

Discussion: The site does not contain any known mineral resources that would be of value to the region and the residents of the state. Therefore, no impact is anticipated from project implementation.

2.	Result in the loss of availability of a locally-important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan?	☐	☐	☐	☒

Discussion: The project site zoning is Residential Agriculture (RA), which is not considered to be an Extractive Use Zone (M-3) nor does it have a Land Use Designation with a Quarry Designation Overlay (Q) (County of Santa Cruz 1994). Therefore, no potentially significant loss of availability of a known mineral resource of locally important mineral resource recovery (extraction) site delineated on a local general plan, specific plan or other land use plan would occur as a result of this project.

F. VISUAL RESOURCES AND AESTHETICS

Would the project:

1.	Have an adverse effect on a scenic vista?	☐	☐	☐	☒

	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact

Discussion: The project would not directly impact any public scenic resources, as designated in the County's General Plan (1994), or obstruct any public views of these visual resources.

2.	Substantially damage scenic resources, within a designated scenic corridor or public view shed area including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?	☐	☐	☐	☒

Discussion: The project site is not located along a County designated scenic road, public viewshed area, scenic corridor, within a designated scenic resource area, or within a state scenic highway. Therefore, no impact is anticipated.

3.	Substantially degrade the existing visual character or quality of the site and its surroundings, including substantial change in topography or ground surface relief features, and/or development on a ridgeline?	☐	☐	☒	☐

Discussion: The existing visual setting is open grassland, shrubs, scattered trees and rock outcroppings on an undeveloped sloped site. The proposed project is designed and landscaped so as to fit into this setting.

4.	Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?	☐	☐	☒	☐

Discussion: The project would create an incremental increase in night lighting. However, this increase would be small, and would be similar in character to the lighting associated with the nearby existing uses.

G. CULTURAL RESOURCES

Would the project:

1.	Cause a substantial adverse change in the significance of a historical resource as defined in CEQA Guidelines Section 15064.5?	☐	☐	☐	☒

Discussion: There are no existing structures on the property, nor any features designated as a historic resource on any federal, state or local inventory.

2.	Cause a substantial adverse change in	☐	☐	☒	☐

	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact

the significance of an archaeological resource pursuant to CEQA Guidelines Section 15064.5?

Discussion: No archeological resources are mapped in the project area. Pursuant to County Code Section 16.40.040, if at any time in the preparation for or process of excavating or otherwise disturbing the ground, any human remains of any age, or any artifact or other evidence of a Native American cultural site which reasonably appears to exceed 100 years of age are discovered, the responsible persons shall immediately cease and desist from all further site excavation and comply with the notification procedures given in County Code Chapter 16.40.040.

3.	Disturb any human remains, including those interred outside of formal cemeteries?	☐	☐	☒	☐

Discussion: Pursuant to Section 16.40.040 of the Santa Cruz County Code, if at any time during site preparation, excavation, or other ground disturbance associated with this project, human remains are discovered, the responsible persons shall immediately cease and desist from all further site excavation and notify the sheriff-coroner and the Planning Director. If the coroner determines that the remains are not of recent origin, a full archeological report shall be prepared and representatives of the local Native California Indian group shall be contacted. Disturbance shall not resume until the significance of the archeological resource is determined and appropriate mitigations to preserve the resource on the site are established.

4.	Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?	☐	☐	☐	☒

Discussion: The project site does not contain any unique geologic features or known paleontological resources.

H. HAZARDS AND HAZARDOUS MATERIALS

Would the project:

1.	Create a significant hazard to the public or the environment as a result of the routine transport, use or disposal of hazardous materials?	☐	☐	☐	☒

Discussion: The proposed grading and access drive construction would not involve the transport, use or disposal of hazardous materials.

2.	Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the	☐	☐	☐	☒

	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact

release of hazardous materials into the environment?

Discussion: It is not anticipated that hazardous materials would be used, stored or transported to the project site in any significant quantities, so no accidents that would release such substances into the environment would occur.

3. Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?	☐	☐	☐	☒

Discussion: No hazardous materials or substances would be used, and there would be no hazardous emissions.

4. Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?	☐	☐	☐	☒

Discussion: The project site is not included on the Environmental Health Department's list of hazardous sites in Santa Cruz County, dated January 30, 2014, compiled pursuant to Government Code Section 65962.5.

5. For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard for people residing or working in the project area?	☐	☐	☐	☒

Discussion: The proposed project is not located within an airport land use plan area or within two miles of a public airport or public use airport.

6. For a project within the vicinity of a private airstrip, would the project result in a safety hazard for people residing or working in the project area?	☐	☐	☐	☒

Discussion: There are no private airstrips in the vicinity of the project.

7. Impair implementation of or physically interfere with an adopted emergency	☐	☐	☐	☒

	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
response plan or emergency evacuation plan?				

Discussion: The project would have no impact on any adopted emergency response or emergency evacuation plans.

8.	Expose people to electro-magnetic fields associated with electrical transmission lines?	☐	☐	☐	☒

Discussion: There are no high-power electrical transmission lines in the project vicinity.

9.	Expose people or structures to a significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands?	☐	☐	☐	☒

Discussion: The project design incorporates all applicable fire safety code requirements and includes fire protection devices as required by the local fire agency.

I. TRANSPORTATION/TRAFFIC

Would the project:

1.	Conflict with an applicable plan, ordinance or policy establishing measures of effectiveness for the performance of the circulation system, taking into account all modes of transportation including mass transit and non-motorized travel and relevant components of the circulation system, including but not limited to intersections, streets, highways and freeways, pedestrian and bicycle paths, and mass transit?	☐	☐	☒	☐

Discussion: The proposed project is for the development of an access driveway intended to serve one new single-family residence; the access drive could eventually serve up to a total of four new single-family residences. The new residences would create a small incremental increase in traffic on nearby roads and intersections. However, given the small number of new trips created by the project (four new peak trips per day), this increase is less than significant. Further, the increase would not cause the Level of Service at any nearby intersection to drop below Level of Service D.

	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
2. Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks?	☐	☐	☐	☒

Discussion: No air traffic patterns would be impacted by this project.

3. Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?	☐	☐	☐	☒

Discussion: There are no design features or incompatible uses that would predispose the proposed access drive and surrounding roads to an increase in traffic hazard potential.

4. Result in inadequate emergency access?	☐	☐	☐	☒

Discussion: The proposed access road meets County standards and the design has been reviewed and approved by the County Central Fire District. Fire trucks, ambulances and other emergency vehicles would not be blocked from using the road at any time, and adequate turnaround areas have been provided.

5. Cause an increase in parking demand which cannot be accommodated by existing parking facilities?	☐	☐	☐	☒

Discussion: The new residences to be served by the proposed access road would be required to have off-street parking that meets the code requirements for the required number of parking spaces, and therefore new parking demand would be accommodated on site.

6. Conflict with adopted policies, plans, or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities?	☐	☐	☐	☒

Discussion: The proposed project would comply with current road requirements to prevent potential hazards to motorists, bicyclists, and/or pedestrians.

7. Exceed, either individually (the project alone) or cumulatively (the project combined with other development), a level of service standard established by the County General Plan for	☐	☐	☒	☐

	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact

designated intersections, roads or highways?

Discussion: See response I-1 above.

J. NOISE

Would the project result in:

1. A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?	☐	☐	☒	☐

Discussion: The project would create a slight incremental increase in the existing noise environment. However, this increase would be small, and would be similar in character to noise generated by the surrounding existing uses.

2. Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels?	☐	☐	☐	☒

Discussion: The project would not result in groundborne vibration or noise.

3. Exposure of persons to or generation of noise levels in excess of standards established in the General Plan or noise ordinance, or applicable standards of other agencies?	☐	☐	☒	☐

Discussion: Per County policy, average hourly noise levels shall not exceed the General Plan threshold of 50 L_{eq} during the day and 45 L_{eq} during the nighttime. Impulsive noise levels shall not exceed 65 db during the day or 60 db at night. Typical noise levels generated by single-family residential uses of the subject property would not be anticipated to exceed these thresholds.

4. A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?	☐	☐	☒	☐

Discussion: Noise generated during construction would increase the ambient noise levels for adjoining areas. Construction would be temporary, however, and given the limited duration of this impact it is considered to be less than significant.

5. For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people	☐	☐	☐	☒

	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact

residing or working in the project area to excessive noise levels?

Discussion: The proposed project is not located within an airport land use plan area or within two miles of a public airport or public use airport.

6.	For a project within the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels?	☐	☐	☐	☒

Discussion: The proposed project is not located within the vicinity of a private airstrip.

K. AIR QUALITY

Where available, the significance criteria established by the Monterey Bay Unified Air Pollution Control District (MBUAPCD) may be relied upon to make the following determinations. Would the project:

1.	Violate any air quality standard or contribute substantially to an existing or projected air quality violation?	☐	☐	☒	☐

Discussion: The North Central Coast Air Basin does not meet state standards for ozone and particulate matter (PM_{10}). Therefore, the regional pollutants of concern that would be emitted by the project are ozone precursors (Volatile Organic Compounds [VOCs] and nitrogen oxides [NO_x]), and dust.

Given the modest amount of new traffic that would be generated by the project there is no indication that new emissions of VOCs or NO_x would exceed MBUAPCD thresholds for these pollutants and therefore there would not be a significant contribution to an existing air quality violation.

Project construction may result in a short-term, localized decrease in air quality due to generation of dust. However, standard dust control best management practices, such as periodic watering, would be implemented during construction to avoid impacts.

2.	Conflict with or obstruct implementation of the applicable air quality plan?	☐	☐	☐	☒

Discussion: The project would not conflict with or obstruct implementation of the regional air quality plan. See K-1 above.

3.	Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions which	☐	☐	☒	☐

	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact

exceed quantitative thresholds for ozone precursors)?

Discussion: See K-1 above. The project would not conflict with any applicable federal ambient air quality standards.

4.	Expose sensitive receptors to substantial pollutant concentrations?	☐	☐	☐	☒

Discussion: The project would not generate substantial pollutant concentrations.

5.	Create objectionable odors affecting a substantial number of people?	☐	☐	☐	☒

Discussion: The project would not generate any objectionable odors.

L. GREENHOUSE GAS EMISSIONS

Would the project:

1.	Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?	☐	☐	☒	☐

Discussion: The proposed project, like all development, would be responsible for an incremental increase in green house gas emissions by usage of fossil fuels during the site grading and construction. Santa Cruz County has recently adopted a Climate Action Strategy (CAS) intended to establish specific emission reduction goals and necessary actions to reduce greenhouse gas levels to pre-1990 levels as required under AB 32 legislation. The strategy intends to reduce greenhouse gas emissions and energy consumption by implementing measures such as reducing vehicle miles traveled through the County and regional long range planning efforts and increasing energy efficiency in new and existing buildings and facilities. All project construction equipment would be required to comply with the Regional Air Quality Control Board emissions requirements for construction equipment. As a result, impacts associated with the temporary increase in green house gas emissions are expected to be less than significant.

2.	Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?	☐	☐	☐	☒

Discussion: See the discussion under L-1 above. No impacts are anticipated.

M. PUBLIC SERVICES

Would the project:

1. Result in substantial adverse physical

	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times, or other performance objectives for any of the public services:				
a. Fire protection?	☐	☐	☐	☒
b. Police protection?	☐	☐	☐	☒
c. Schools?	☐	☐	☐	☒
d. Parks or other recreational activities?	☐	☐	☐	☒
e. Other public facilities; including the maintenance of roads?	☐	☐	☐	☒

Discussion (a through e): The proposed project is for the development of an access driveway intended to serve one new single-family residence, and which could eventually serve up to a total of four new single-family residences. The new residences, when built, would create a slight incremental contribution to the need for services. However, the new residences would be required to meet all of the standards and requirements identified by Central Fire, and school, park, and transportation fees to be paid by the applicant would be used to offset the incremental increase in demand for school and recreational facilities and public roads.

N. RECREATION

Would the project:

1. Would the project increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?	☐	☐	☐	☒

Discussion: Maximum potential build-out of the project site in conjunction with the proposed access roadway would be four new single-family residences. Cumulative

	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact

potential impacts on neighborhood or regional parks and recreational facilities by four families would be less than significant.

2.	Does the project include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment?	☐	☐	☐	☒

Discussion: The proposed project does not include recreational facilities or require their construction or expansion.

O. UTILITIES AND SERVICE SYSTEMS

Would the project:

1.	Require or result in the construction of new storm water drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?	☐	☐	☐	☒

Discussion: Drainage analysis of the project by Ifland Engineers, dated September 2009 and revised June 2013 (Attachment 8) concluded that the proposed development not only meets the County's Design Criteria, but would improve existing site drainage. The proposed drainage system includes two water quality treatment units which would treat runoff prior to entering the existing drainage channel. Drainage calculations provided in the analysis demonstrate that the proposed stormwater management system would be sufficient to control flows from the proposed development. Department of Public Works Drainage staff reviewed the drainage information and determined that downstream storm facilities are adequate to handle the increase in drainage associated with the project.

2.	Require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?	☐	☐	☒	☐

Discussion: The project would connect to an existing municipal water supply. The City of Santa Cruz Water Department has determined that adequate supplies are available to serve the project (Attachment 7).

3.	Exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board?	☐	☐	☐	☒

	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact

Discussion: The project would be served by a private septic system. The project's wastewater flows would not violate any wastewater treatment standards.

4.	Have sufficient water supplies available to serve the project from existing entitlements and resources, or are new or expanded entitlements needed?	☐	☐	☒	☐

Discussion: The City of Santa Cruz Water Department has issued a Will Serve letter dated April 20, 2013 (Attachment 7) indicating water availability for the next two years, subject to project compliance with the City's Landscape Water Conservation requirements.

5.	Result in determination by the wastewater treatment provider which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?	☐	☐	☐	☒

Discussion: The property would be served by a private septic system. A Septic Feasibility Investigation was completed and County Environmental Health has issued a clearance for the proposed development of a new single-family residence .

6.	Be served by a landfill with sufficient permitted capacity to accommodate the project's solid waste disposal needs?	☐	☐	☐	☒

Discussion: The proposed private access road would serve a maximum of four new single-family residences, and would not generate a significant amount of solid waste.

7.	Comply with federal, state, and local statutes and regulations related to solid waste?	☐	☐	☐	☒

Discussion: The proposed private access road would serve a maximum of four new single-family residences, and would not generate a significant amount of solid waste.

P. LAND USE AND PLANNING

Would the project:

1.	Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project	☐	☐	☐	☒

	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
(including, but not limited to the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect?				

Discussion: The proposed project does not conflict with any regulations or policies adopted for the purpose of avoiding or mitigating an environmental effect. It is in conformance with County Code Section 16.20.090 which requires that applications for grading approvals shall be submitted to the County Environmental Coordinator for review.

2.	Conflict with any applicable habitat conservation plan or natural community conservation plan?	☐	☐	☐	☒

Discussion: No habitat conservation plan or natural community conservation plan has been prepared for the project area.

3.	Physically divide an established community?	☐	☐	☐	☒

Discussion: The project would not include any element that would physically divide an established community.

Q. POPULATION AND HOUSING
Would the project:

1.	Induce substantial population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?	☐	☐	☐	☒

Discussion: The proposed project would not induce substantial population growth in an area because the project does not propose any physical or regulatory change that would remove a restriction to or encourage population growth in an area including, but limited to the following: new or extended infrastructure or public facilities; new commercial or industrial facilities; large-scale residential development; accelerated conversion of homes to commercial or multi-family use; or regulatory changes including General Plan amendments, specific plan amendments, zone reclassifications, sewer or water annexations; or LAFCO annexation actions.

The proposed project is designed at the density and intensity of development allowed by the General Plan and zoning designations for the parcel. Consequently, it is not expected to have a significant growth-inducing effect.

	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
2. Displace substantial numbers of existing housing, necessitating the construction of replacement housing elsewhere?	☐	☐	☐	☒

Discussion: The proposed project would not displace any existing housing since the site is currently vacant.

3. Displace substantial numbers of people, necessitating the construction of replacement housing elsewhere?	☐	☐	☐	☒

Discussion: The proposed project would not displace a substantial number of people since the site is currently vacant.

R. MANDATORY FINDINGS OF SIGNIFICANCE

	Potentially Significant Impact	Less than Significant with Mitigation	Less than Significant Impact	No Impact
1. Does the project have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?	☐	☐	☒	☐

Discussion: The potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory were considered in the response to each question in Section III of this Initial Study. As a result of this evaluation, there is no substantial evidence that, after mitigation, significant effects associated with this project would result. Therefore, this project has been determined not to meet this Mandatory Finding of Significance.

	Potentially Significant Impact	Less than Significant with Mitigation	Less than Significant Impact	No Impact
2. Does the project have impacts that are individually limited, but cumulatively considerable? ("cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects)?	☐	☐	☒	☐

Discussion: In addition to project specific impacts, this evaluation considered the projects potential for incremental effects that are cumulatively considerable. As a result of this evaluation, there is no substantial evidence that there are cumulative effects associated with this project that could reach a threshold of significance. Therefore, this project has been determined not to meet this Mandatory Finding of Significance.

	Potentially Significant Impact	Less than Significant with Mitigation	Less than Significant Impact	No Impact
3. Does the project have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?	☐	☐	☒	☐

Discussion: In the evaluation of environmental impacts in this Initial Study, the potential for adverse direct or indirect impacts to human beings were considered in the response to specific questions in Section III. As a result of this evaluation, there is no substantial evidence that there are adverse effects to human beings associated with this project. Therefore, this project has been determined not to meet this Mandatory Finding of Significance.

IV. REFERENCES USED IN THE COMPLETION OF THIS ENVIRONMENTAL REVIEW INITIAL STUDY

County of Santa Cruz 1994.
1994 General Plan and Local Coastal Program for the County of Santa Cruz, California. Adopted by the Board of Supervisors on May 24, 1994, and certified by the California Coastal Commission on December 15, 1994.

Tree Survey and Recommended Tree Protection Strategies, prepared by Nigel Belton for Arbor Art Tree Service, dated June 7, 2013

V. ATTACHMENTS

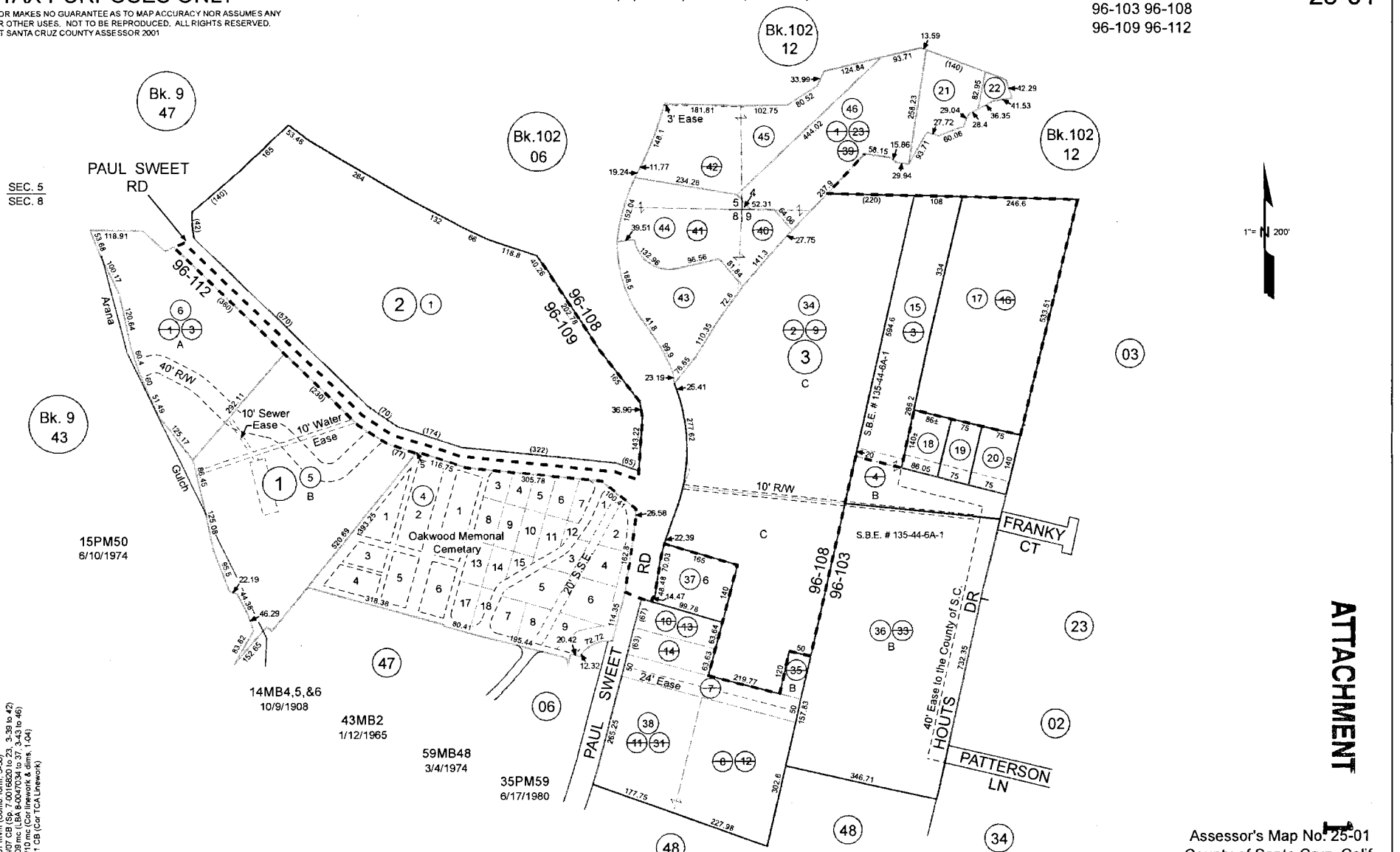
1. *Vicinity Map, Map of Zoning Districts; Map of General Plan Designations; and Assessor's Parcel Map*
2. Project Plans: *Lot #4, Lupine Lane and Dempsey Road Improvements*; Sheets C0-C11, EC1-EC2, Prepared by Ifland Engineers, dated 1/24/13 and revised 7/8/13 and 12/14/13.
3. *Geologic Investigation (Report Summary, Conclusions, Recommendations, Map & Cross Sections)*, prepared by Nolan Associates, dated December 20, 2007 and April 21, 2008 and updated June 13, 2013
4. Geology Review Letter, prepared by Joe Hanna, County Geologist, dated October 14, 2008
5. *Geotechnical Investigation (Conclusions and Recommendations)*, prepared by AMSO Consulting Engineers, dated March 1, 2006 and updated June 15, 2012
6. *Update to Geotechnical Investigation by AMSO Consulting Engineers* dated November 21, 2012 and revised June 4, 2013 and *Addendum to Update Geotechnical Investigation*, dated February 5, 2013 and revised May 30, 2013 by Dees and Associates, Inc.
7. *County of Santa Cruz Environmental Health* septic approval dated June 18, 2013
8. *City of Santa Cruz Water Department* will-serve letter dated April 20, 2012
9. *Drainage Study and Calculations*, prepared by Ifland Engineers, dated September 2009 and revised January 2013
10. *Biological Survey Update,* prepared by H.T. Harvey & Associates, dated May 22, 2008
11. *Tree Survey and Recommended Tree Protection Strategies*, prepared by Arbor Art Tree Service, dated June 7, 2013 and updated November 25, 2013

FOR TAX PURPOSES ONLY

POR. SECS. 4,5,8 & 9, T.11S., R.1W., M.D.B. & M.

Tax Area Code
96-103 96-108
96-109 96-112

25-01



Note - Assessor's Parcel & Block Numbers are Shown in Circles.

Electronically repositioned 12/18/01 KSA
Rev. Santa Cruz City Realignment 12/18/01 KSA
Rev. 5/12/05 mvm (Cor 1-05 & 06 per 15PM50)
Rev. 5/1/07 mvm (Comb. form, 3-36)
Rev. 5/23/07 CB (Sp. 7 0018820 to 23, 3-39 to 42)
Rev. 4/6/09 mc (LBA 8-0047034 to 37, 3-43 to 46)
Rev 6/22/10 mc (Cor linework & dims, 1-04)
Rev 5/3/11 CB (Cor TCA Linework)

ATTACHMENT 1

Assessor's Map No. 25-01
County of Santa Cruz, Calif.
Dec. 2001

Location Map

ATTACHMENT 1

LEGEND

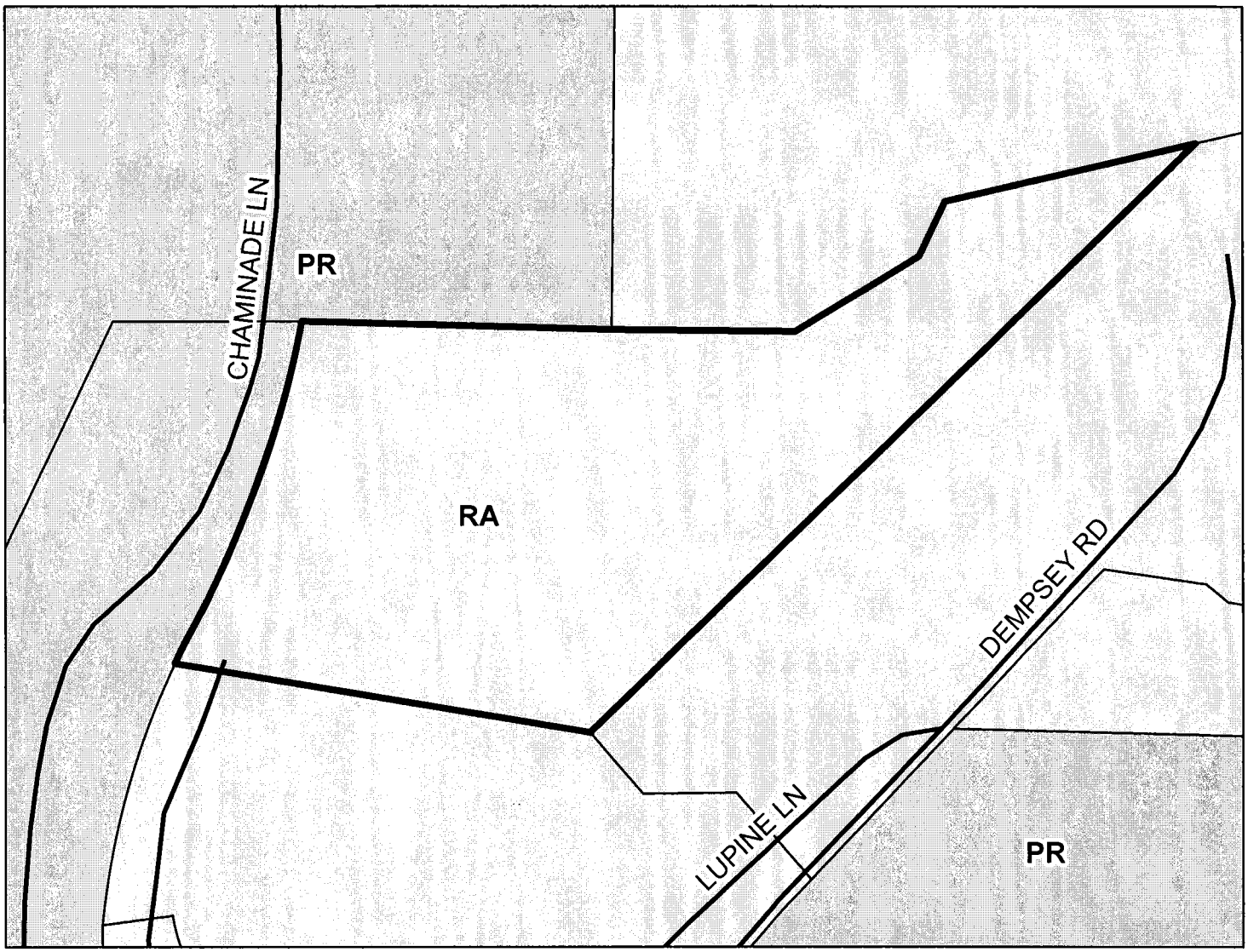
- APN: 025-013-45
- Assessors Parcels
- Street
- CITY OF SANTA CRUZ

N
W E
S

Map Created by
County of Santa Cruz
Planning Department
October 2013

Zoning Map

ATTACHMENT 1



0 80 160 320 480 640 Feet

LEGEND

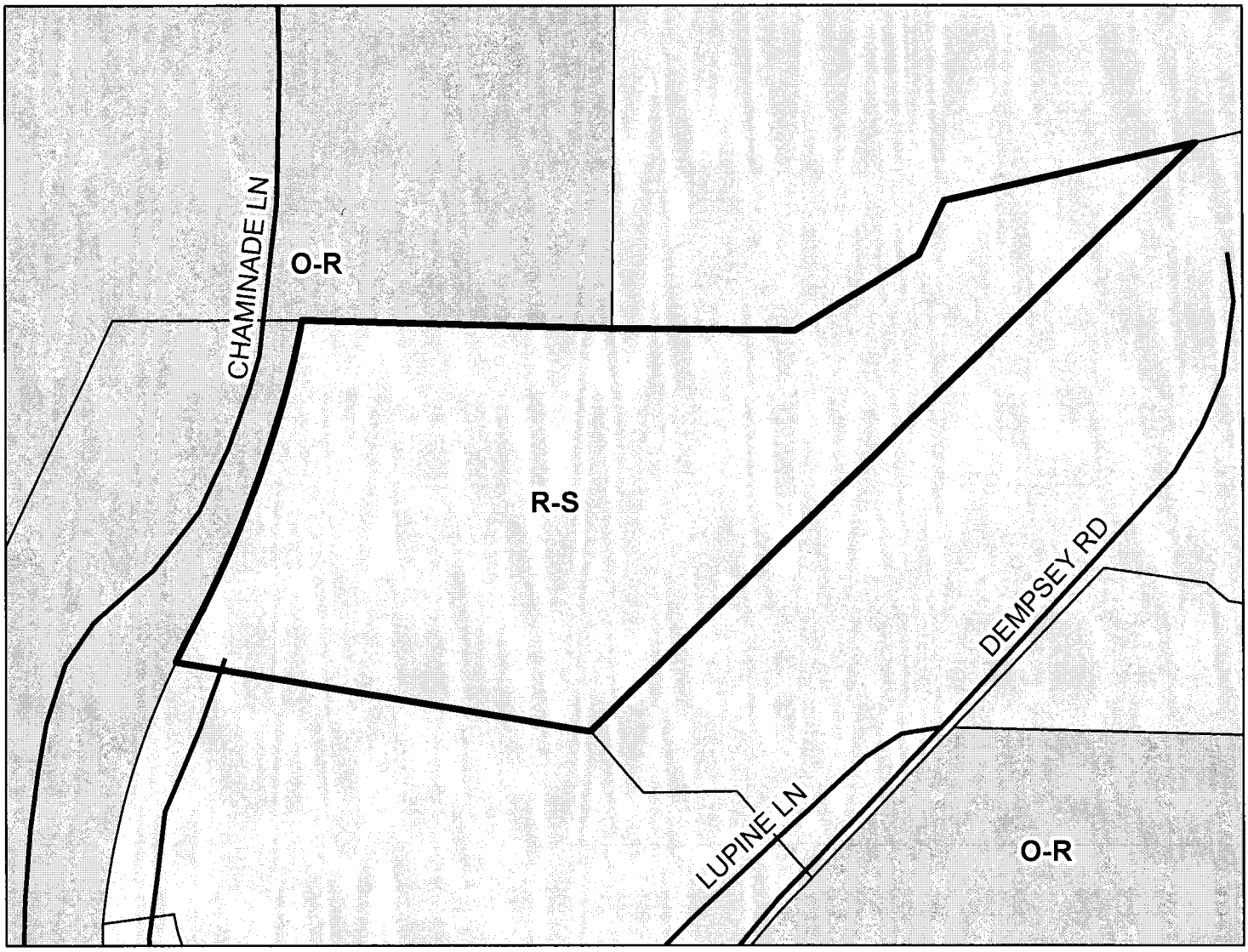
- APN: 025-013-45
- Assessors Parcels
- Street
- AGRICULTURE RESIDENTIAL
- PARK

N
W E
S

Map Created by
County of Santa Cruz
Planning Department
October 2013

ATTACHMENT 1

General Plan Designation Map



0 80 160 320 480 640 Feet

LEGEND

- APN: 025-013-45
- Assessors Parcels
- Street
- Residential-Suburban
- Parks and Recreation

N
W E
S

Map Created by
County of Santa Cruz
Planning Department
October 2013

ATTACHMENT 2

Lot #4, Lupine Lane & Dempsey Road Improvements

Santa Cruz Hills

Santa Cruz County, California

Approvals

DEPARTMENT OF PUBLIC WORKS
COUNTY OF SANTA CRUZ STATE OF CALIFORNIA

REMARKS:

DRAINAGE:

SANITATION:

SURVEY DEVELOPMENT REVIEW:

TRAFFIC AND ROAD PLANNING:

APPROVAL RECOMMENDED ________ ENGINEERING ________ DATE

APPROVED ________ DIRECTOR OF PUBLIC WORKS ________ DATE

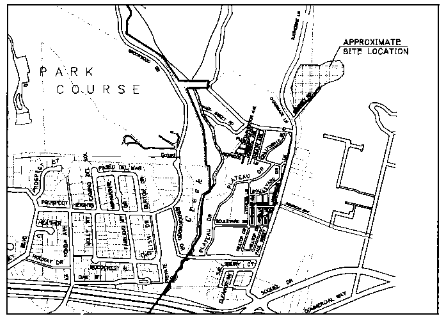
THE CENTRAL SANTA CRUZ FIRE DISTRICT
COUNTY OF SANTA CRUZ STATE OF CALIFORNIA

REMARKS:

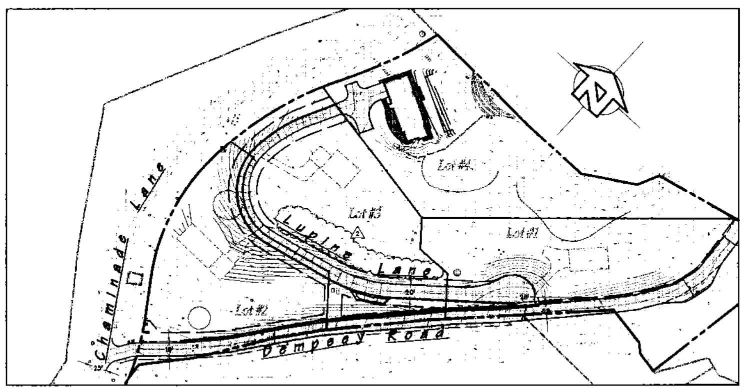
APPROVED ________ FIRE MARSHAL ________ DATE

Water System Acceptance
WATER SYSTEM DESIGN ACCEPTED BY CITY OF SANTA CRUZ. EXPIRES ONE YEAR AFTER DATE.

________ WATER DEPARTMENT ________ DATE



Vicinity Map



Santa Cruz Hills Site Plan
Scale: 1"=80'

80' 0' 40' 80' 160'
GRAPHIC SCALE: 1 INCH = 80 FEET

Index of Sheets

SHEET NO.	DESCRIPTION
C0	TITLE SHEET
C1.1	LOT #4 SITE AND GRADING & DRAINAGE PLAN
C1.2	LOT #4 CROSS SECTIONS AND SITE DETAILS
C2	EXISTING CONDITIONS & DEMOLITION PLAN
C3	DEMPSEY ROAD PLAN & PROFILE
C4	LUPINE LANE PLAN & PROFILE
C5.1	RETAINING WALLS PROFILES & SECTIONS
C5.2	RETAINING WALL AT TURNOUT DETAILS & SECTIONS
C6	WATER LINE EXTENSION PLAN
C7	WATER LINE EXTENSION DETAILS
C8	STANDARD CONSTRUCTION DETAILS
C9	STANDARD CONSTRUCTION DETAILS
C10	STANDARD CONSTRUCTION DETAILS
C11	DRAINAGE SYSTEM DETAILS
EC1	EROSION CONTROL PLAN
EC2	EROSION CONTROL PLAN

ARCHITECTURAL PLAN SET FOR THE DEVELOPMENT OF LOT#4 (REFER TO ARCHITECTURAL COVER PAGE FOR INDEX OF SHEETS)

Basis of Bearings

THE BASIS OF BEARINGS FOR THIS PROPERTY IS N76°31'36.41"W BASED ON GPS OBSERVATIONS BETWEEN HPGN CA 0402 (DAVENPORT) & HPGN CA 04AJ (SOQUEL), BASED ON NAD83 (1991.35).

DMR	COUNTY REVIEW COMMENTS #2	7-8-15
DMR	COUNTY REVIEW COMMENTS	6-8-15
BY	REVISION	DATE

APPROVED

DAVID HENRICHSEN (RCE NO. 49167)

IFLAND ENGINEERS
CIVIL ENGINEERING • LAND PLANNING • STRUCTURAL DESIGN
5200 SOQUEL AVE, SUITE 101
SANTA CRUZ, CA 95062
TEL (831) 426-5313
FAX (831) 426-1763
www.iflandengineers.com

Title Sheet
Santa Cruz Hills - Lot #4
Dempsey Road, Santa Cruz, California

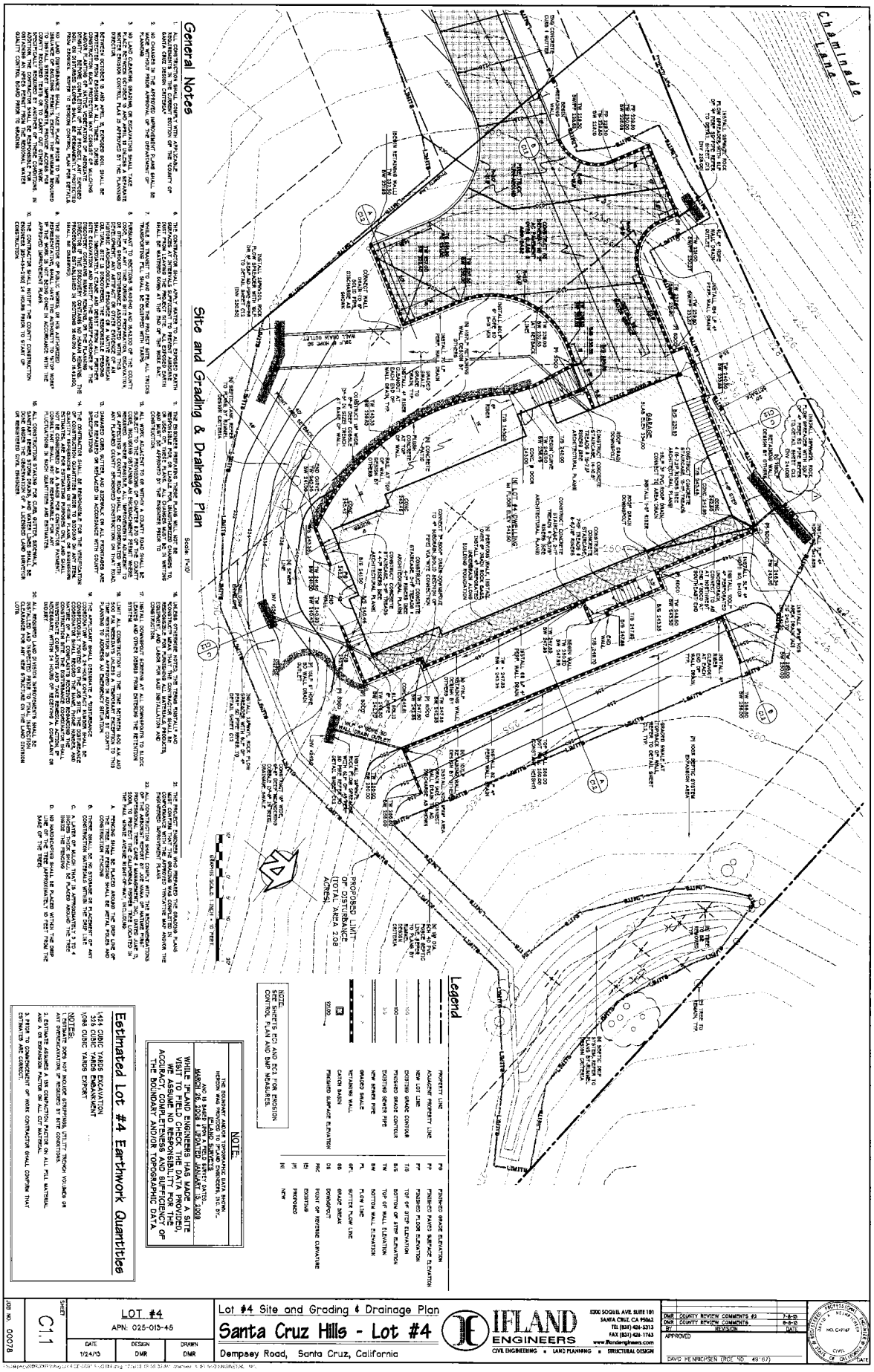
LOT #4
APN: 025-013-45

DATE	DESIGN	DRAWN
1/24/13	DMR	DMR

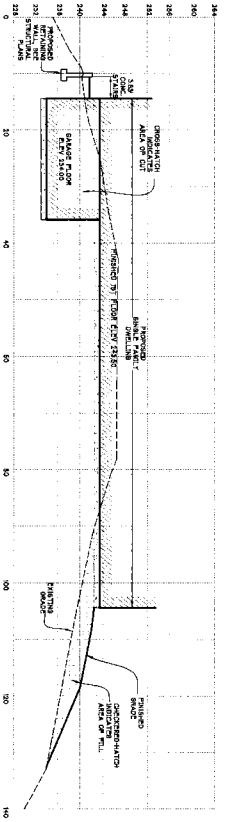
SHEET C0

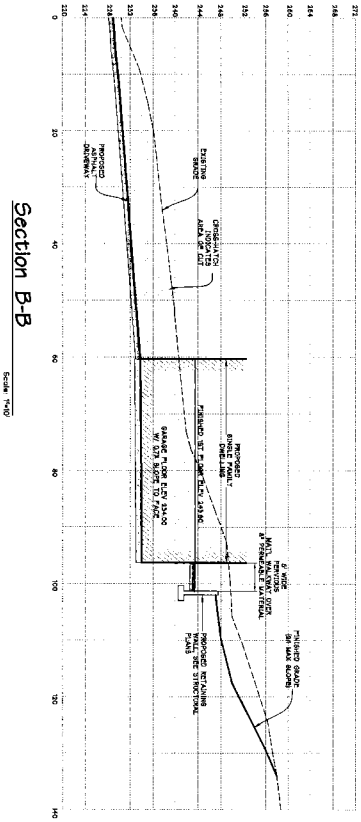
JOB NO. 00078

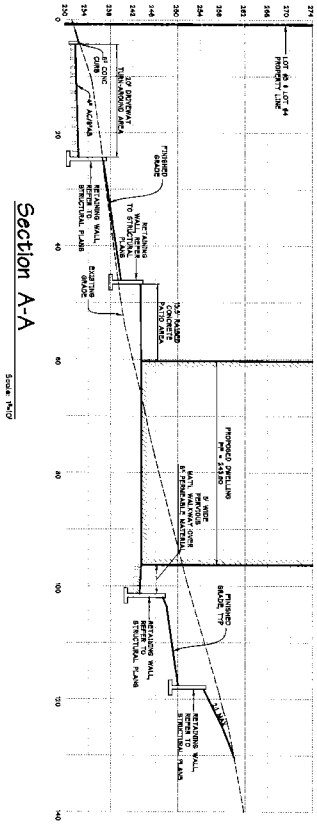
ATTACHMENT 2

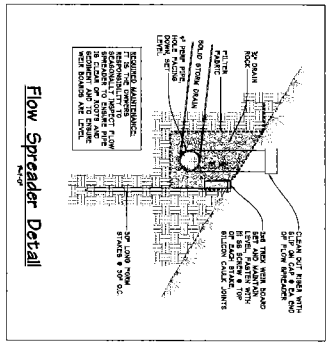


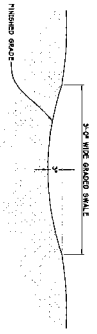
Lot #4 Cross Sections and Site Details











JOB NO. 00078	SHEET C1.2	LOT #4 APN: 025-013-45	Lot #4 Cross Sections & Site Details	IFLAND ENGINEERS	5200 SOQUEL AVE, SUITE 101 SANTA CRUZ, CA 95062 TEL (831) 426-3313 FAX (831) 426-1763 www.ifandengineers.com
		DATE 1/24/15	DESIGN DMR	DRAWN DMR	Santa Cruz Hills - Lot #4
					Dempsey Road, Santa Cruz, California

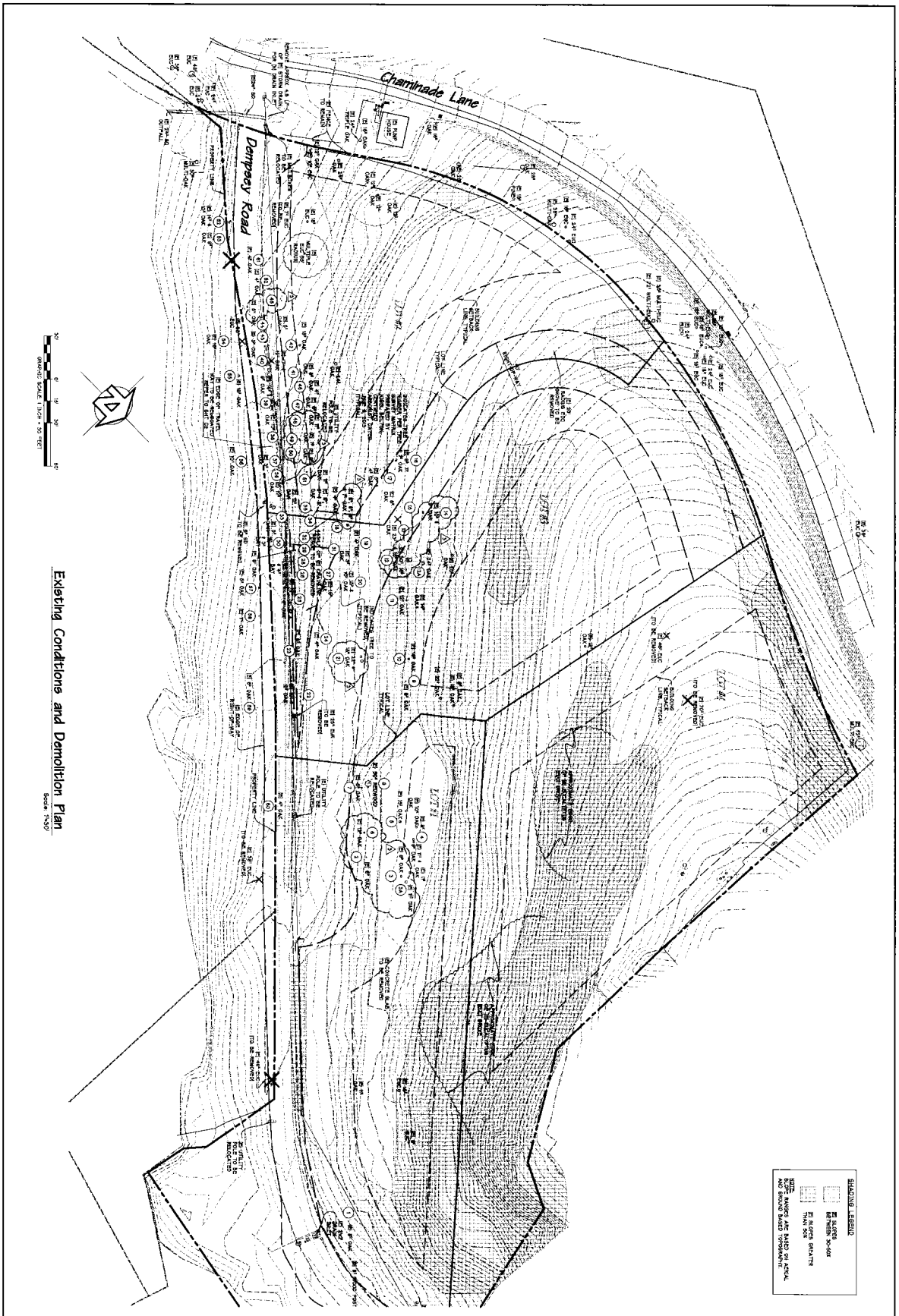
CIVIL ENGINEERING ■ LAND PLANNING ■ STRUCTURAL DESIGN

DMR	COUNTY REVIEW COMMENTS #2	7-8-15
DMR	COUNTY REVIEW COMMENTS	6-9-15
BY	REVISION	DATE

APPROVED

DAVID HEINRICHSEN (RCE NO. 49167)

REGISTERED PROFESSIONAL ENGINEER — No. C49167 — CIVIL — STATE OF CALIFORNIA — DATE



Existing Conditions and Demolition Plan

Scale: 1"=30'

JOB NO.	SHEET
00078	C2

LOT #4
APN: 025-013-45

DATE	DESIGN	DRAWN
1/24/15	DMR	DMR

Existing Conditions and Demolition Plan
Santa Cruz Hills - Lot #4
Dempsey Road, Santa Cruz, California

IFLAND ENGINEERS
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5200 SOQUEL AVE, SUITE 101
SANTA CRUZ, CA 95062
TEL (831) 426-5313
FAX (831) 426-1763
www.ifandengineers.com

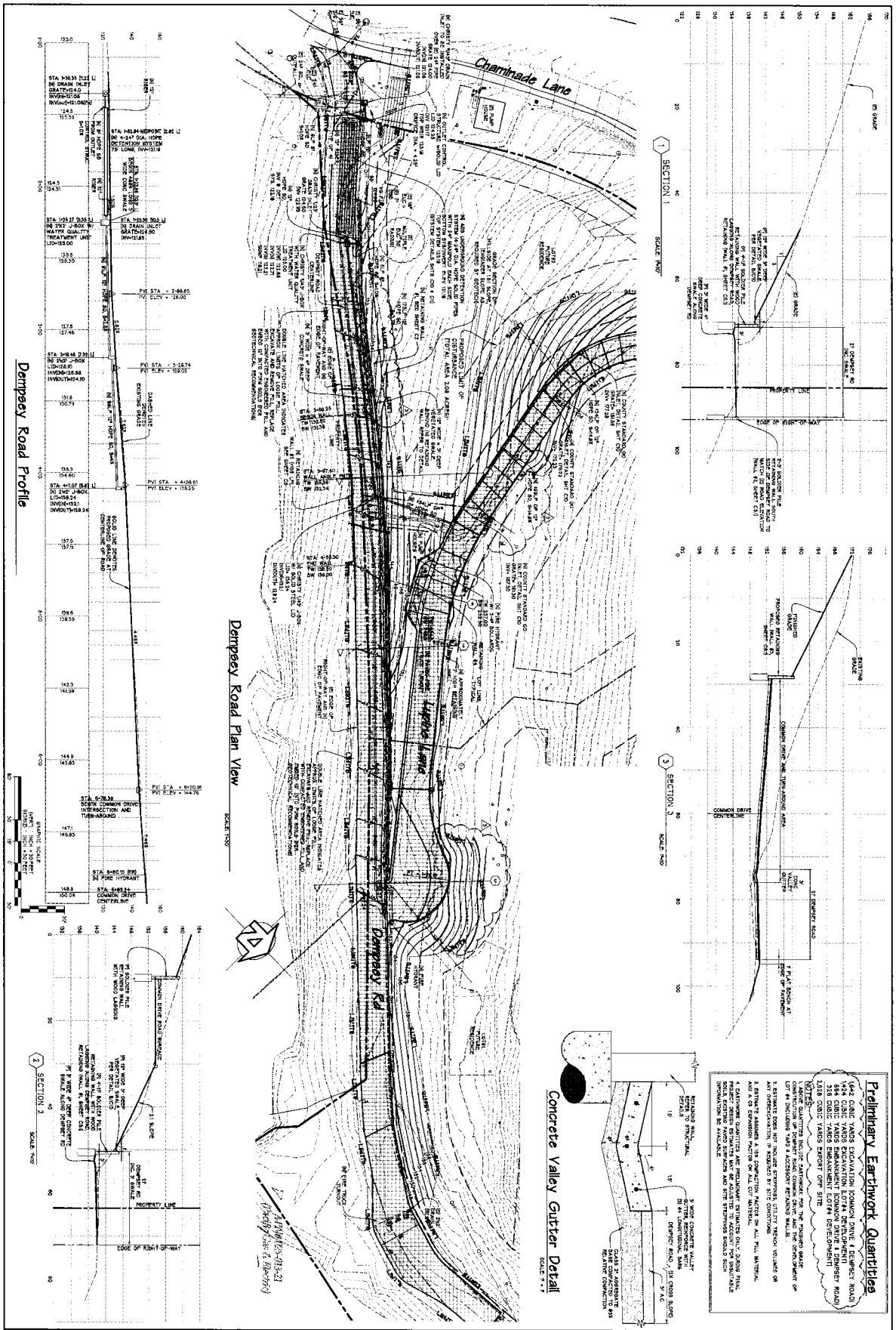
BY	REVISION	DATE
DMR	ENVIRONMENTAL PLANNING COMMENTS	12-14-15
DMR	COUNTY REVIEW COMMENTS #2	7-8-15
DMR	COUNTY REVIEW COMMENTS	6-9-15

APPROVED

DAVID HEINP.C.HSEN (RCE NO. 49'67)

NO. C49'67

DATE



JOB NO. 00078	SHEET C3	LOT #4 APN: 025-015-45	Dempsey Road Plan & Profile — Santa Cruz Hills - Lot #4 — Dempsey Road, Santa Cruz, California	FLAND ENGINEERS — CIVIL ENGINEERING ▪ LAND PLANNING ▪ STRUCTURAL DESIGN

DATE	DESIGN	DRAWN
1/24/15	DMR	DMR

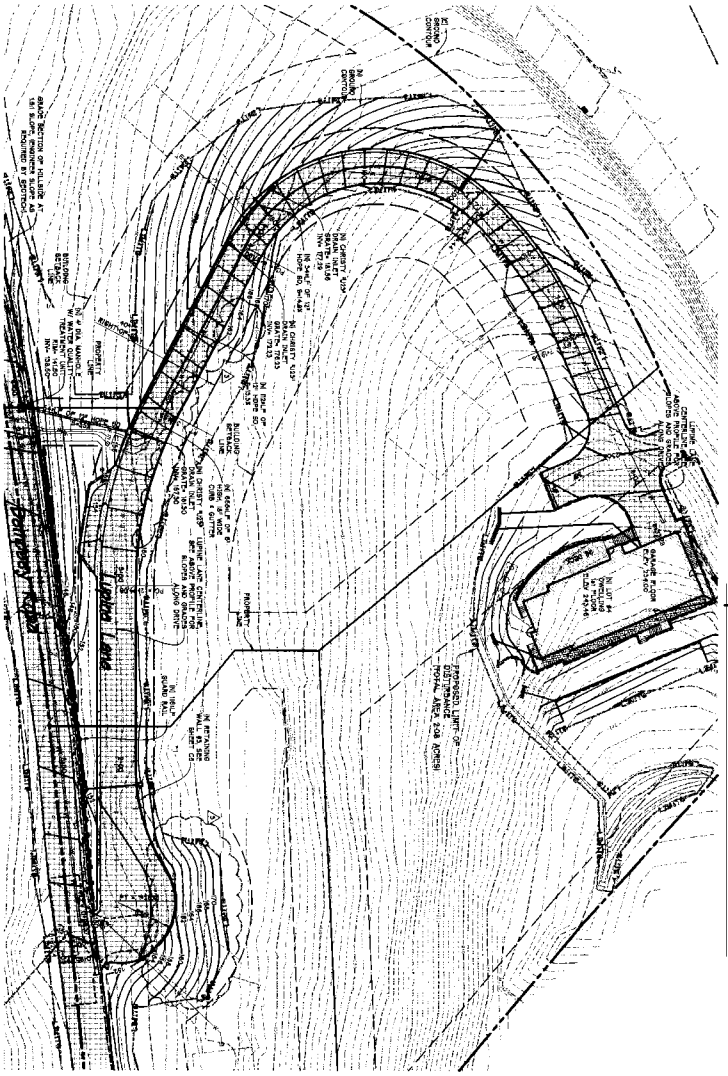
5280 SOQUEL AVE, SUITE 101
SANTA CRUZ, CA 95062
TEL (831) 426-5313
FAX (831) 426-1763
www.flandengineers.com

BY	REVISION	DATE
DMR	ENVIRONMENTAL PLANNING COMMENTS	12-16-15
DMR	COUNTY REVIEW COMMENTS #2	7-8-15
DMR	COUNTY REVIEW COMMENTS	6-5-15

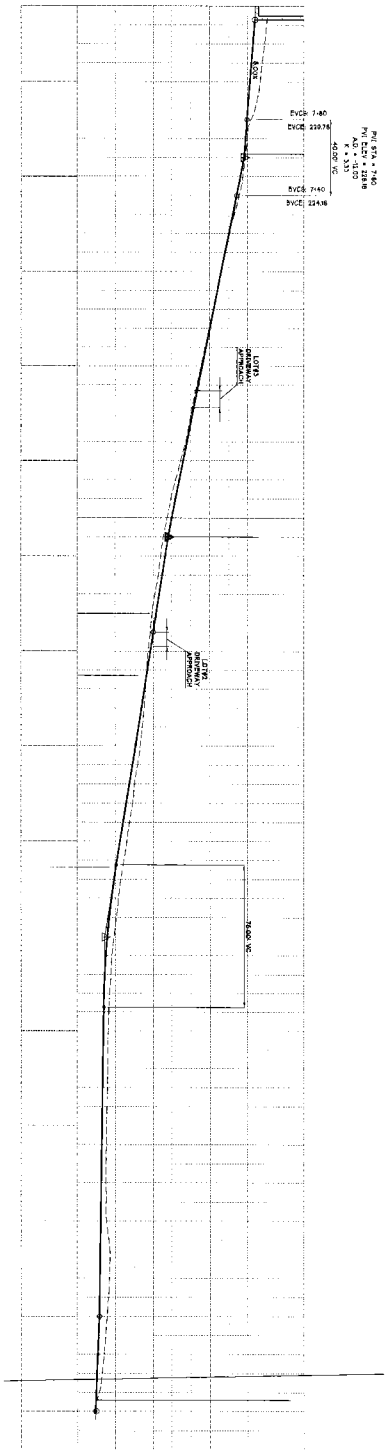
APPROVED

DAVID HEINRICHSEN (REG NO. 49157)

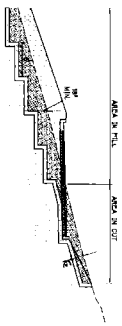
REGISTERED PROFESSIONAL ENGINEER — No. C49157 — CIVIL — STATE OF CALIFORNIA



Lupine Lane Plan View



Lupine Lane Profile



Typical Lupine Lane Cross Section
Scale 1"=10'

GRAPHIC SCALE 1 INCH = 30 FEET

GRAPHIC SCALE 1 INCH = 10 FEET

GRAPHIC SCALE 1 INCH = 30 FEET

JOB NO. 00078	SHEET C4	LOT #4 APN: 025-013-45	Plan & Profile - Lupine Lane
			Santa Cruz Hills - Lot #4
			Dempsey Road, Santa Cruz, California

DATE	DESIGN	DRAWN
1/24/15	DMR	DMR

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CIVIL ENGINEERING ■ LAND PLANNING ■ STRUCTURAL DESIGN

5200 SOQUEL AVE. SUITE 101
SANTA CRUZ, CA 95062
TEL (831) 426-5313
FAX (831) 426-1763
www.ifallengineers.com

BY	REVISION	DATE
DMR	ENVIRONMENTAL PLANNING COMMENTS	12-16-13
DMR	COUNTY REVIEW COMMENTS #2	7-9-13
DMR	COUNTY REVIEW COMMENTS	6-3-13

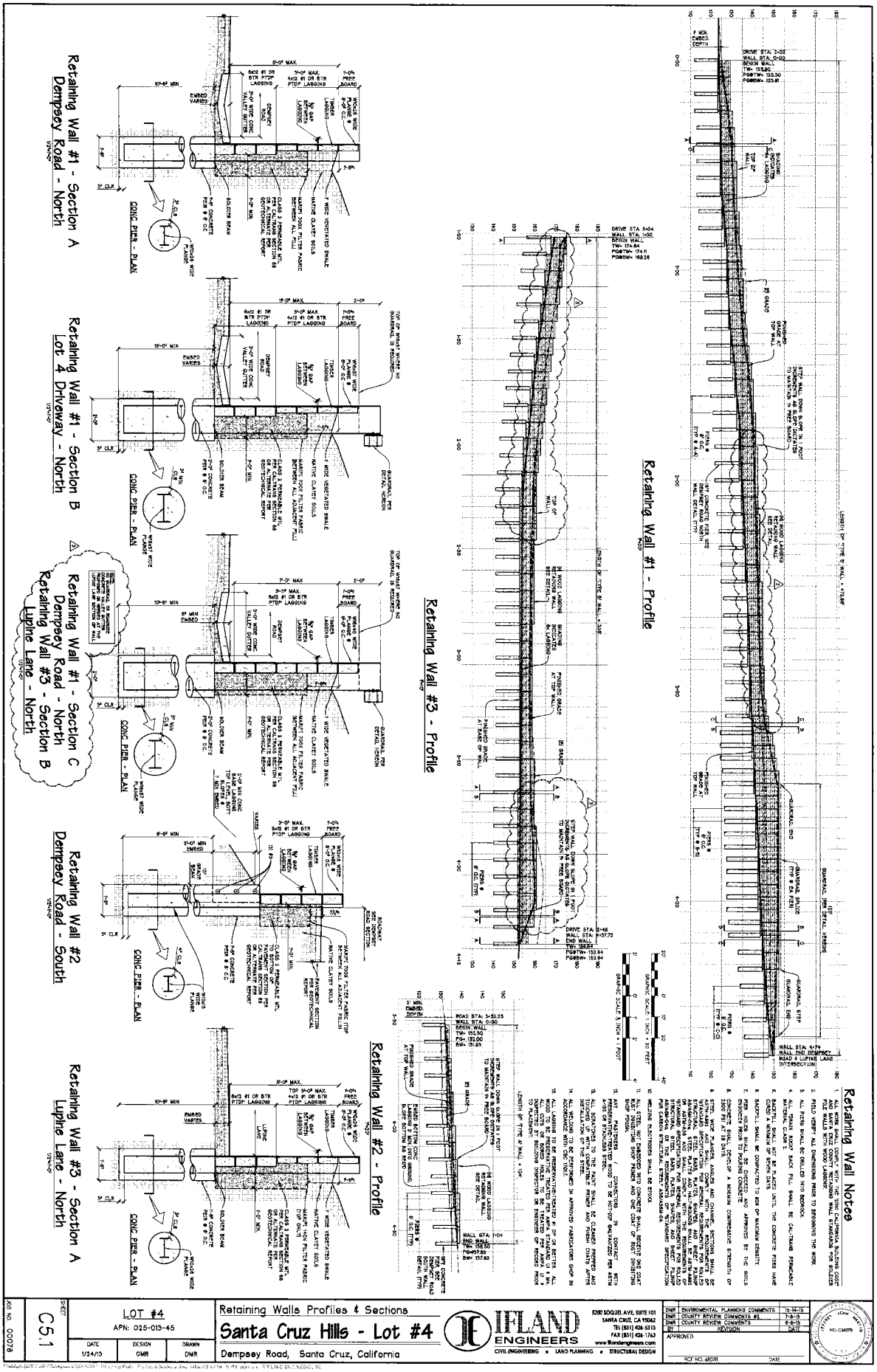
APPROVED

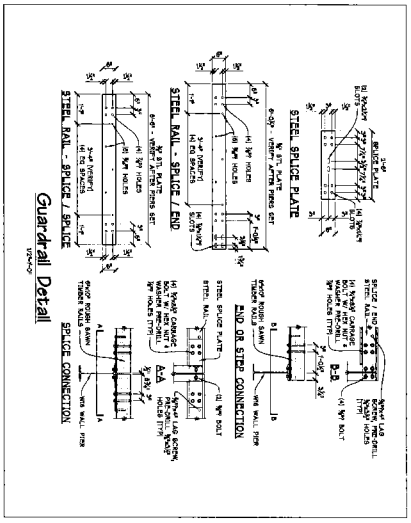
DAVID HENRICHSEN (RCE NO. 49167)

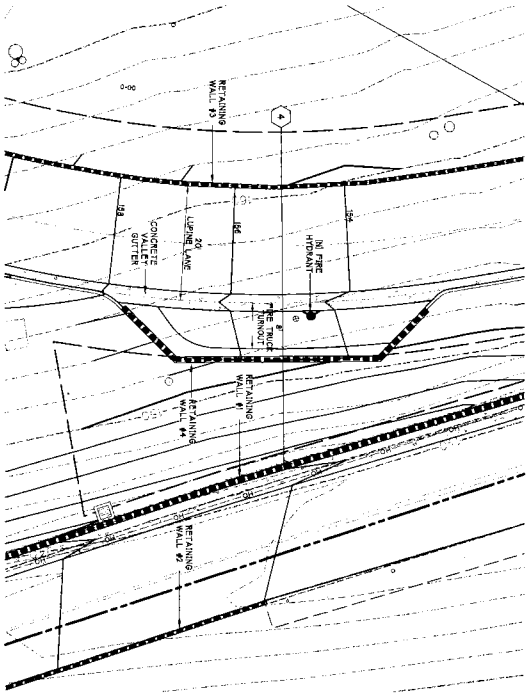
DATE

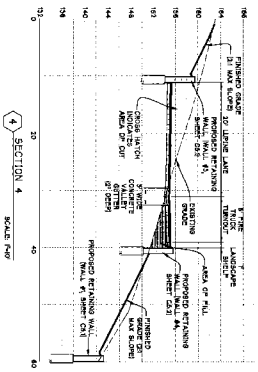
REGISTERED PROFESSIONAL ENGINEER — DAVID A. HENRICHSEN — No. C49167 — CIVIL — STATE OF CALIFORNIA

ATTACHMENT 2



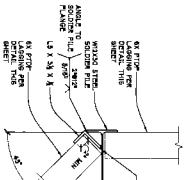


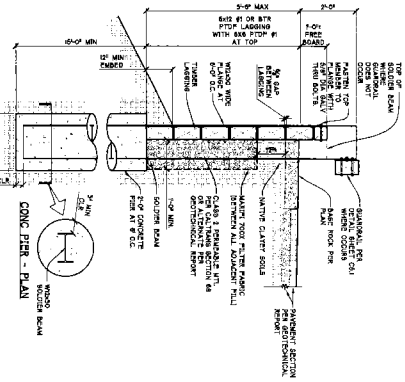




Retaining Wall Notes

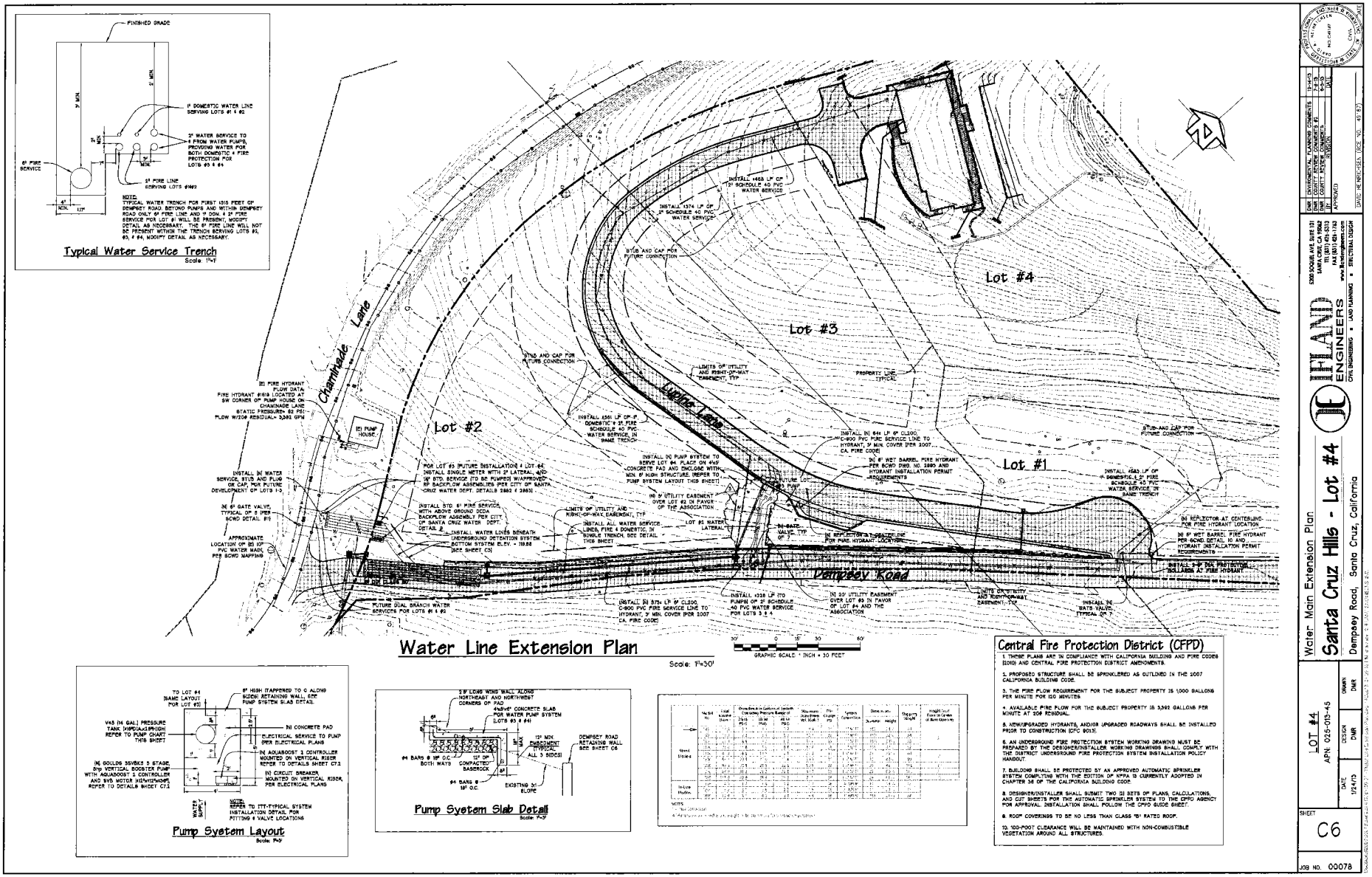
1. REFER TO SHEET C5 FOR RETAINING WALL NOTES AND SPECIFICATIONS NOT SHOWN HEREON.
2. ALL RETAINING WALLS OVER 4' IN HEIGHT SHALL BE FIELD TREATED TO MEET AMPA 97-A AND BE INSPECTED AND APPROVED BY A SOILS ENGINEER PRIOR TO PLACEMENT OF THE SOLDIER PILES. THE ENGINEER OF RECORD SHALL BE NOTIFIED 48 HOURS PRIOR TO BEGINNING THE SOLDIER PILE INSTALLATION.
3. PRIOR TO FINAL INSPECTION AND APPROVAL OF THE RETAINING WALL BY THE COUNTY, THE ENGINEER OF RECORD SHALL PROVIDE A FINAL LETTER TO THE BUILDING OFFICIAL STATING THAT THE WALLS WERE CONSTRUCTED IN CONFORMANCE WITH THE APPROVED PLANS AND SPECIFICALLY COMMENT ON THE FOLLOWING:
   A. ENGINEER OF RECORD SHALL PROVIDE WRITTEN REPORTS OF THE PLANS AND SPECIFICATIONS PRIOR TREATED AND VENTED BY THE ENGINEER OF RECORD TO BE IN COMPLIANCE WITH APPLICABLE CODES.
   B. ENGINEER OF RECORD SHALL PROVIDE WRITTEN REPORTS OF THE INSPECTIONS NOTED ABOVE INCLUDING VERIFIED BY COUNTY BUILDING INSPECTORS.
   C. THE FOLLOWING STATEMENT SHALL BE MADE AWARE OF THE ANY VIOLATIONS BY THE ENGINEER OF RECORD TO COMPLY WITH THE ABOVE REPORTS OR THE APPROVED PLANS SHALL BE MADE AWARE OF THE NONCOMPLIANCE AND MAINTENANCE REQUIRED FOR THE WALL AS DOCUMENTED ON THE APPROVED PLANS.



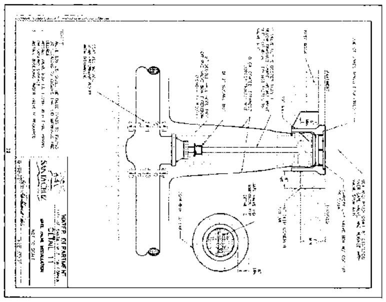


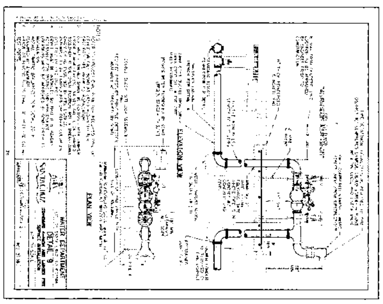
JOB NO. 00078	SHEET C5.2	LOT #4 APN: 025-013-45			Retaining Wall #4 at Turnout Details & Sections Santa Cruz Hills - Lot #4 Dempsey Road, Santa Cruz, California	ENGINEERS CIVIL ENGINEERING ▪ LAND PLANNING ▪ STRUCTURAL DESIGN	5200 SOQUEL AVE. SUITE 101 SANTA CRUZ, CA 95062 TEL (831) 426-5313 FAX (831) 426-1763 www.flanderengineers.com	DMR ENVIRONMENTAL PLANNING COMMENTS 12-16-13 DMR COUNTY REVIEW COMMENTS #2 7-9-13 DMR COUNTY REVIEW COMMENTS 6-5-13 REV REVISION DATE APPROVED	REGISTERED PROFESSIONAL ENGINEER DAVID M. RODERICK No. 29954 CIVIL STATE OF CALIFORNIA
		DATE 1/24/13	DESIGN DMR	DRAWN DMR					

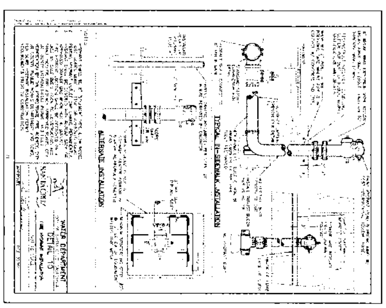
ATTACHMENT 2

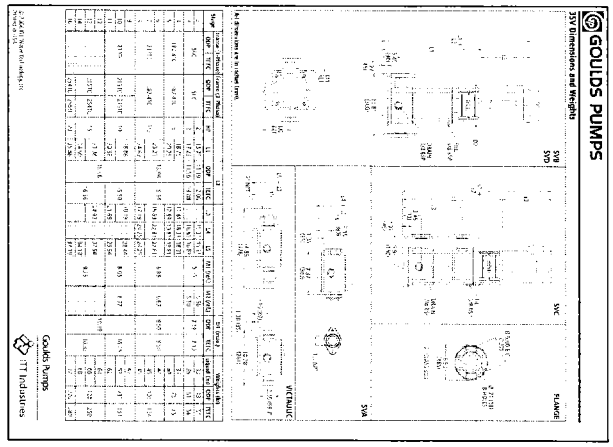


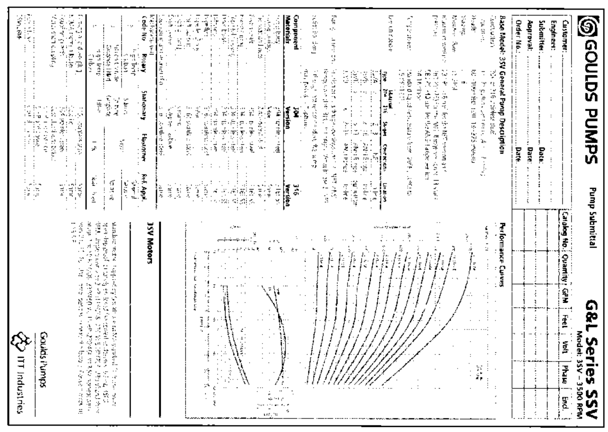
ATTACHMENT 2

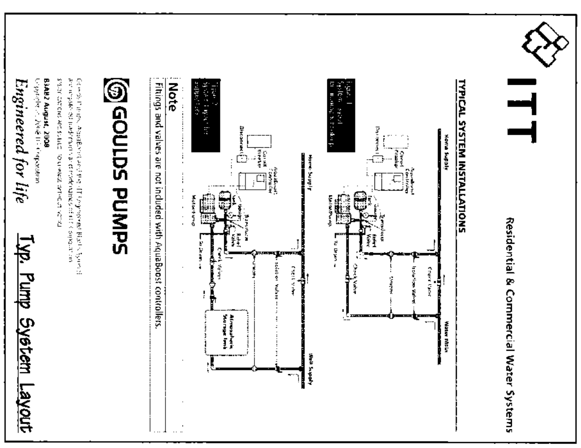


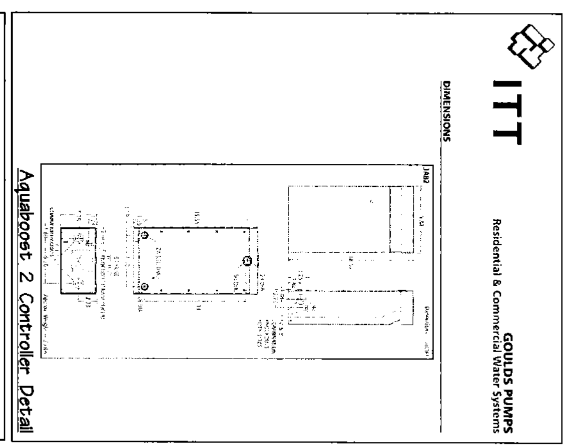












JOB NO. 00078	SHEET C7	LOT #4 APN: 025-013-45
DATE 1/24/13	DESIGN DMR	DRAWN DMR

Water System Details

Santa Cruz Hills - Lot #4

Dempsey Road, Santa Cruz, California

IFLAND ENGINEERS

CIVIL ENGINEERING ▪ LAND PLANNING ▪ STRUCTURAL DESIGN

5200 SOQUEL AVE. SUITE 101
SANTA CRUZ, CA 95062
TEL (831) 426-5313
FAX (831) 426-1763
www.iflandengineers.com

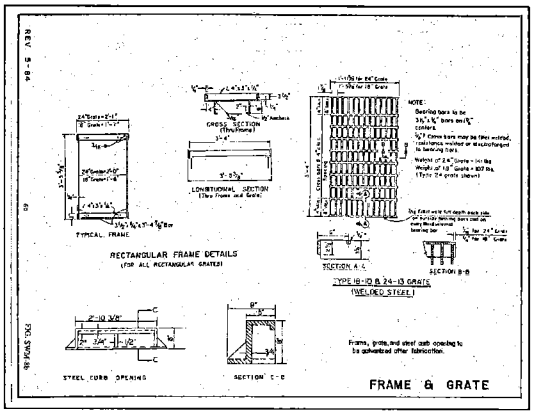
DMR	COUNTY REVIEW COMMENTS #2	7-8-13
DMR	COUNTY REVIEW COMMENTS	6-5-13
BY	REVISION	DATE

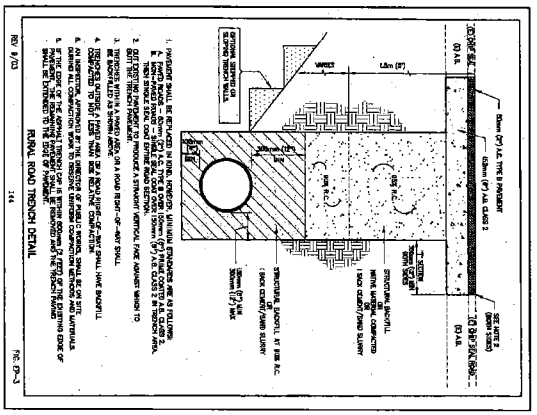
APPROVED

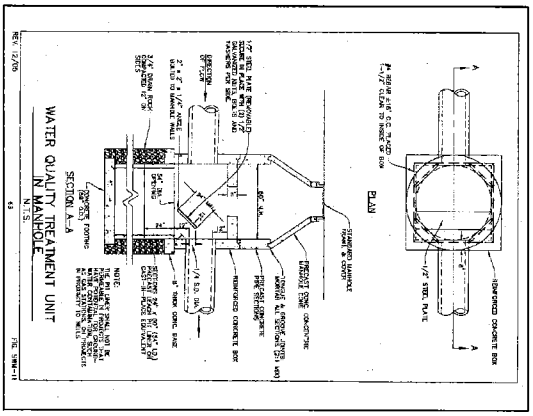
DAVID HENRICHSEN (RCE NO. 49167)

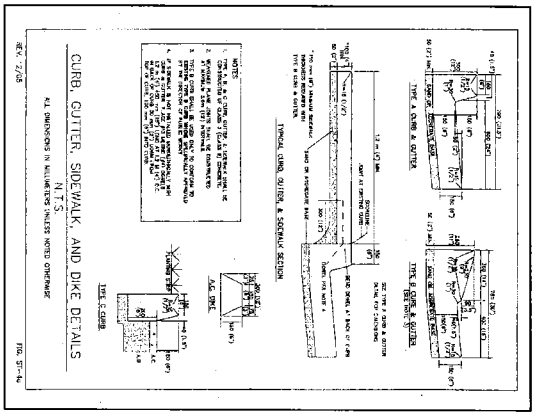
REGISTERED PROFESSIONAL ENGINEER · DAVID A. HENRICHSEN · NO. C49167 · CIVIL · STATE OF CALIFORNIA

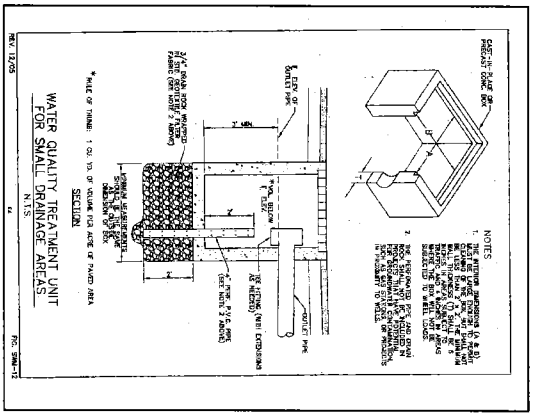
ATTACHMENT 2

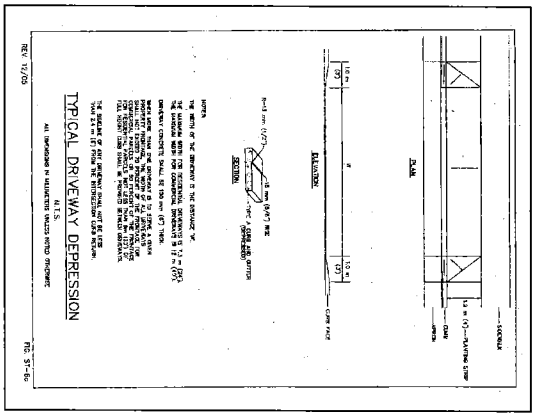


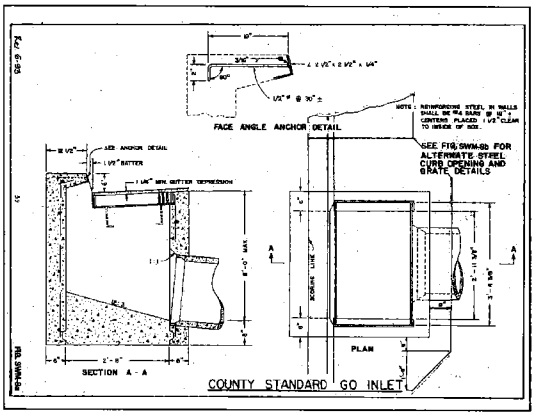












NOTE: THE STANDARD DETAILS ON THIS PAGE ARE PROVIDED FOR THE CONVENIENCE OF THE CONTRACTOR. THE ENGINEER DOES NOT ACCEPT RESPONSIBILITY FOR THE CURRENCY OF THE DATA CONTAINED ON SAID DETAILS AND ENCOURAGES THE CONTRACTOR TO OBTAIN CURRENT COPIES FOR USE ON THE PROJECT. SHOULD ANY DISCREPANCIES BECOME EVIDENT BETWEEN THESE PLANS AND THE CURRENT DETAIL, THE ENGINEER SHALL BE CONSULTED PRIOR TO CONSTRUCTION.

JOB NO. 00078 | SHEET C8

LOT #4
APN: 025-013-45

DATE	DESIGN	DRAWN
1/24/13		

Standard Construction Details

Santa Cruz Hills - Lot #4

Dempsey Road, Santa Cruz, California

IFLAND ENGINEERS
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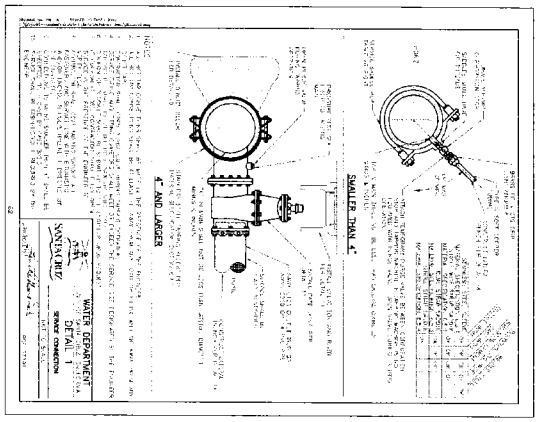
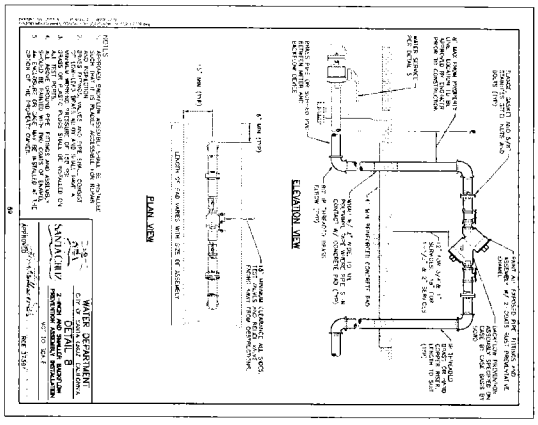
5200 SOQUEL AVE, SUITE 101
SANTA CRUZ, CA 95062
TEL (831) 426-5313
FAX (831) 426-1763
www.ifandengineers.com

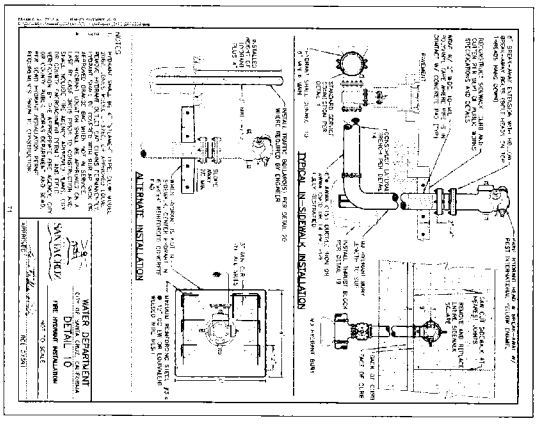
DWR	COUNTY REVIEW COMMENTS #2	7-8-13
DWR	COUNTY REVIEW COMMENTS	6-6-13
BY	REVISION	DATE

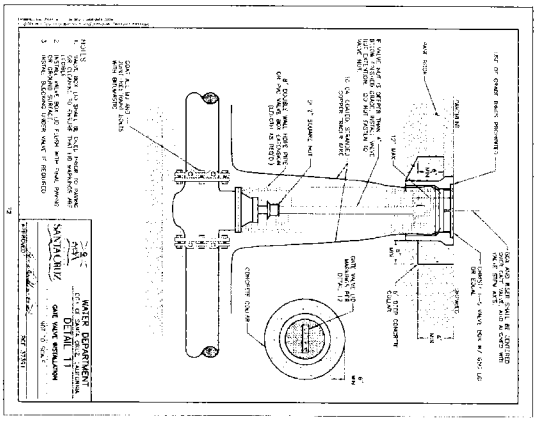
APPROVED

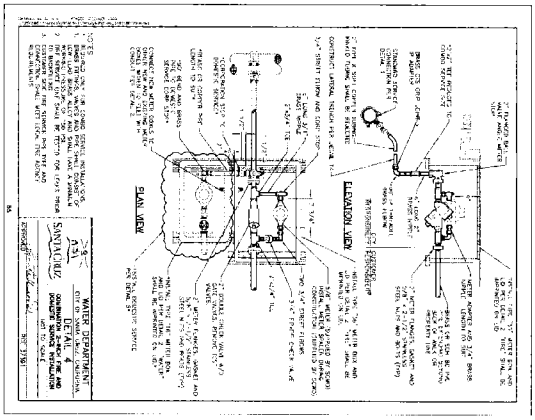
DAVID HENRICHSEN (RCE NO. 49187)

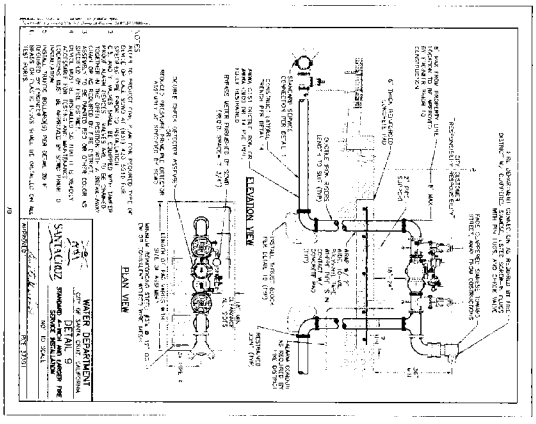


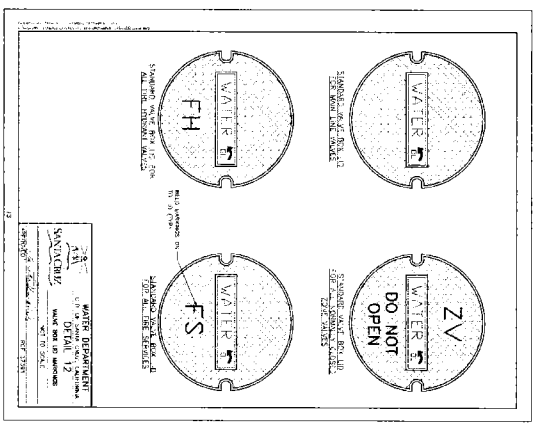












NOTE: THE STANDARD DETAILS ON THIS PAGE ARE PROVIDED FOR THE CONVENIENCE OF THE CONTRACTOR. THE ENGINEER DOES NOT ACCEPT RESPONSIBILITY FOR THE CURRENCY OF THE DATA CONTAINED ON SAID DETAILS AND ENCOURAGES THE CONTRACTOR TO OBTAIN CURRENT COPIES FOR USE ON THE PROJECT. SHOULD ANY DISCREPANCIES BECOME EVIDENT BETWEEN THESE PLANS AND THE CURRENT DETAIL, THE ENGINEER SHALL BE CONSULTED PRIOR TO CONSTRUCTION.

JOB NO. 00078

SHEET C9

LOT #4
APN: 025-013-45

DATE	DESIGN	DRAWN
1/24/13		

Standard Construction Details
Santa Cruz Hills - Lot #4
Dempsey Road, Santa Cruz, California

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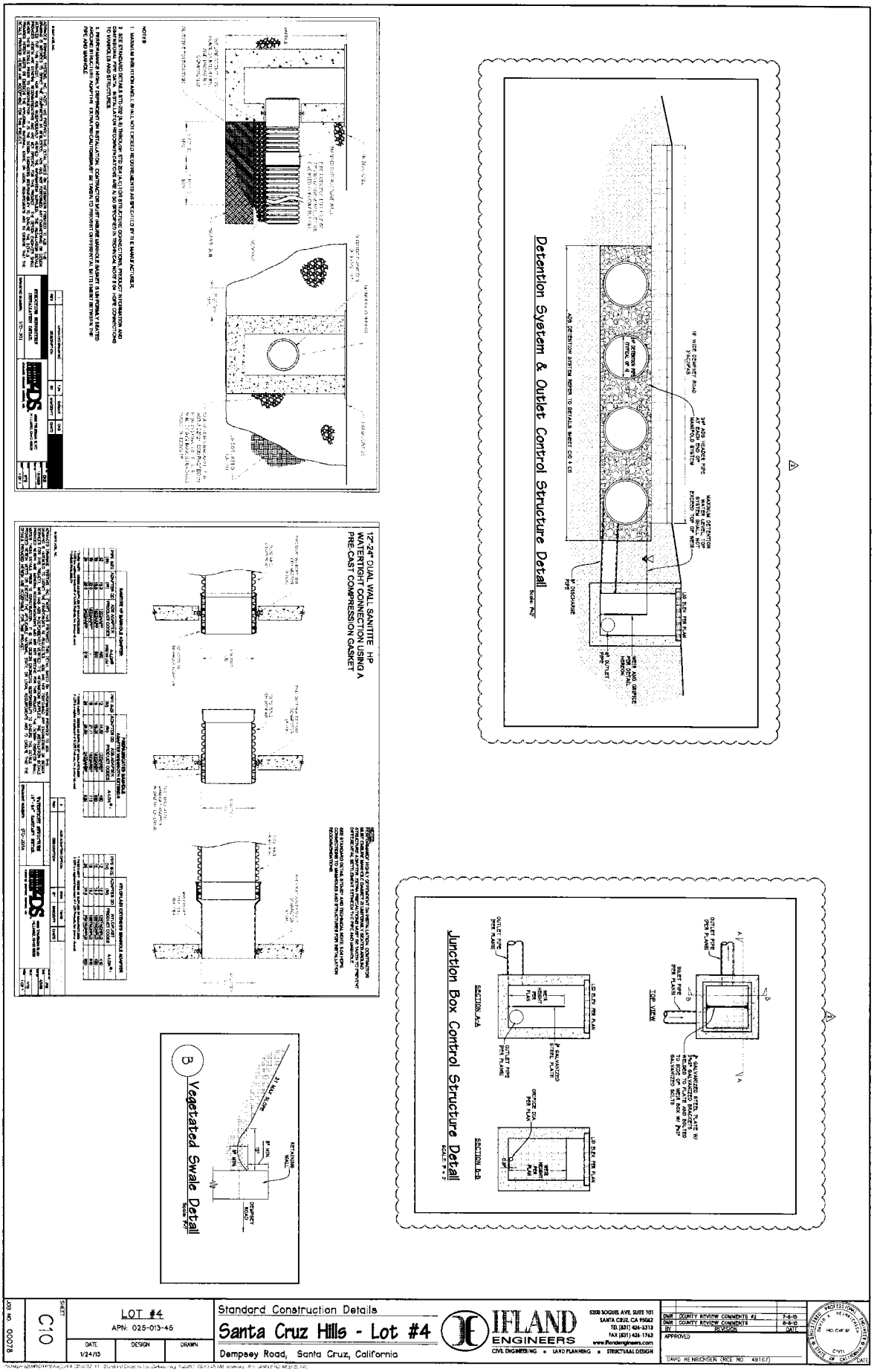
BY	REVISION	DATE
DMR	COUNTY REVIEW COMMENTS #2	7-9-13
DMR	COUNTY REVIEW COMMENTS	6-6-13
BY	REVISION	DATE

APPROVED

DAVID HEINRICHSEN (RCE NO. 49187)

Civil

ATTACHMENT 2



Standard Construction Details

Santa Cruz Hills - Lot #4

Dempsey Road, Santa Cruz, California

LOT #4

APN: 025-013-45

DATE 1/24/15 | DESIGN | DRAWN

SHEET C10

JOB NO. 00078

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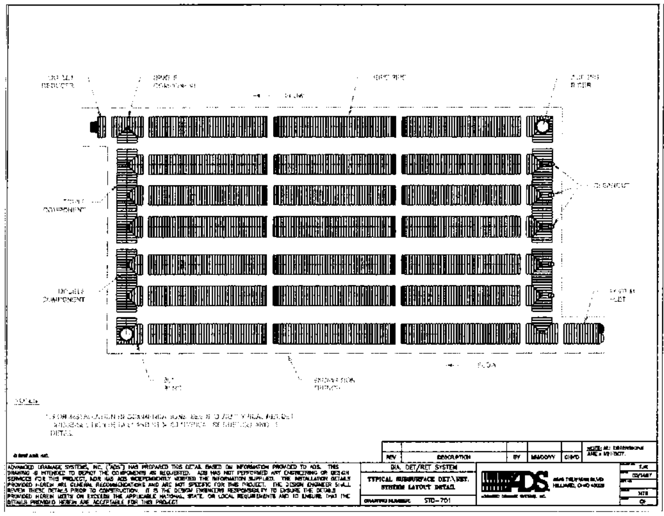
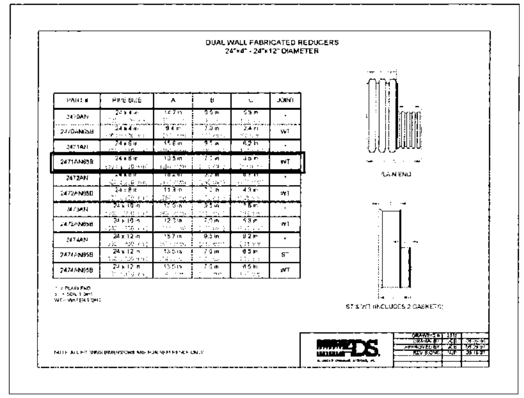
BY	REVISION	DATE
DMR	COUNTY REVIEW COMMENTS #2	7-6-15
DMR	COUNTY REVIEW COMMENTS	6-5-15
APPROVED		

DAVID MEINHOLDEN (RCE NO. 49167)

REGISTERED PROFESSIONAL ENGINEER — STATE OF CALIFORNIA — CIVIL — DATE

ATTACHMENT 2





Storm System Maintenance Notes

1. GENERAL
- ALL RETENTION/DETENTION SYSTEMS MUST BE CLEANED AND MAINTAINED.
- INSPECTION SHOULD BE PERFORMED AT A MINIMUM OF ONCE PER YEAR OR AFTER MAJOR RAIN EVENTS (RAIN EVENT EQUAL TO OR GREATER THAN A 10-YR EVENT) IF NECESSARY.
- CLEANING SHOULD BE DONE AT THE DISCRETION OF INDIVIDUALS RESPONSIBLE TO MAINTAIN PROPER STORAGE AND FLOW.

2. ADS SYSTEM

2.1. PRE-INSPECTION

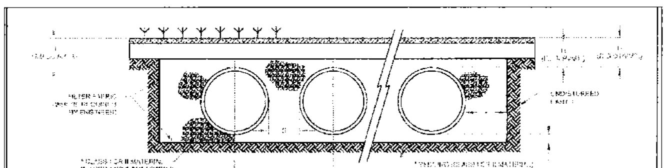
-A POST-INSTALLATION INSPECTION SHOULD BE PERFORMED TO ALLOW THE OWNER TO MEASURE THE INVERT PRIOR TO ACCUMULATION OF SEDIMENT. THIS SURVEY WILL ALLOW THE MONITORING OF SEDIMENT BUILD-UP WITHOUT REQUIRING ACCESS TO THE RETENTION SYSTEM.
-THE FOLLOWING IS THE RECOMMENDED PROCEDURE FOR PRE-INSPECTIONS:
1) LOCATE THE RISER SECTION OR CLEANOUTS OF THE DETENTION SYSTEM. THE RISERS ARE 18" IN DIAMETER AND THE CLEANOUTS ARE USUALLY 8" IN DIAMETER.
2) REMOVE THE LID OF THE RISER OR CLEAN OUTS.
3) INSERT A MEASURING DEVICE INTO THE OPENING AND MAKE NOTE TO A POINT OF REFERENCE ON THE STICK OR STRING. (THIS IS DONE SO THAT SEDIMENT BUILD UP CAN BE DETERMINED IN THE FUTURE WITHOUT HAVING TO ENTER THE SYSTEM.

2.2. INSPECTION/MAINTENANCE

THE FOLLOWING IS THE RECOMMENDED PROCEDURE TO INSPECT SYSTEM IN SERVICE:
1) LOCATE THE RISER SECTION OF THE DETENTION SYSTEM.
2) REMOVE THE LID FROM THE RISER.
3) MEASURE THE SEDIMENT BUILDUP AT EACH RISER AND CLEANOUT LOCATION. ONLY CERTIFIED CONFINED SPACE ENTRY PERSONNEL HAVING APPROPRIATE EQUIPMENT SHOULD BE PERMITTED TO ENTER THE RETENTION SYSTEM.
4) INSPECT EACH MANIFOLD, ALL LATERALS, AND OUTLET PIPES FOR SEDIMENT BUILD UP, OBSTRUCTIONS, OR OTHER PROBLEMS. OBSTRUCTIONS SHOULD BE REMOVED AT THIS TIME.
5) IF MEASURED SEDIMENT BUILD UP IS BETWEEN 5% - 20% OF THE PIPE DIAMETER, CLEANING SHOULD BE CONSIDERED; IF SEDIMENT BUILD UP EXCEEDS 20%, CLEANING SHOULD BE PERFORMED AT THE EARLIEST OPPORTUNITY. A THOROUGH CLEANING OF THE SYSTEM (MANIFOLDS AND LATERALS) SHALL BE PERFORMED BY EITHER MANUAL METHODS OR BY A VACUUM TRUCK.

3. OUTLET CONTROL STRUCTURES
- ALL OUTLET CONTROL STRUCTURES SHALL BE INSPECTED AS REQUIRED ABOVE, INCLUDING ADDITIONAL INPECTIONS AFTER MAJOR STORMS (SEE DEFINITION ABOVE)
- INSPECTIONS SHALL INCLUDE REMOVING GRATE OR LID AND ENSURING ORIFICE IS FREE OF DEBRIS AND SEDIMENT. REMOVE DEBRIS AND SEDIMENT AS NECESSARY TO ENSURE UNOBSTRUCTED FLOWS THROUGH ORIFICE.

4. INSPECT GRAVEL LEVEL SPREADERS AT ROOF DRAIN DISCHARGE POINTS AT LEAST ONCE PER YEAR FOR SEDIMENT BUILD UP AND LOOSE ROCKS. REPLACE AS NECESSARY TO MAINTAIN PROPER DISSIPATING AREA.



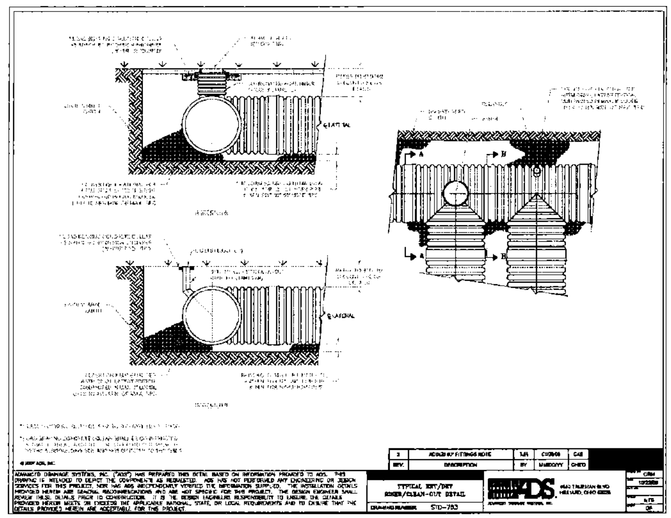
NOTES:

1. ALL REFERENCES TO CLASS I OR II MATERIAL ARE PER ASTM D2321 "STANDARD PRACTICE FOR UNDERGROUND INSTALLATION OF THERMOPLASTIC PIPE FOR SEWERS AND OTHER GRAVITY FLOW APPLICATIONS", LATEST EDITION.
2. ALL RETENTION AND DETENTION SYSTEMS SHALL BE INSTALLED IN ACCORDANCE WITH ASTM D2321, LATEST EDITION AND THE MANUFACTURER'S PUBLISHED INSTALLATION GUIDELINES.
3. MEASURES SHOULD BE TAKEN TO PREVENT THE MIGRATION OF NATIVE FINES INTO THE BACKFILL MATERIAL, WHEN REQUIRED. SEE ASTM D2321.
4. FILTER FABRIC: A GEOTEXTILE FABRIC MAY BE USED AS SPECIFIED BY THE ENGINEER TO PREVENT THE MIGRATION OF FINES FROM THE NATIVE SOIL INTO THE SELECT BACKFILL MATERIAL.
5. FOUNDATION: WHERE THE TRENCH BOTTOM IS UNSTABLE, THE CONTRACTOR SHALL EXCAVATE TO A DEPTH REQUIRED BY THE ENGINEER AND REPLACE WITH SUITABLE MATERIAL AS SPECIFIED BY THE ENGINEER. AS AN ALTERNATIVE AND AT THE DISCRETION OF THE DESIGN ENGINEER, THE TRENCH BOTTOM MAY BE STABILIZED USING A GEOTEXTILE MATERIAL.
6. BEDDING: SUITABLE MATERIAL SHALL BE CLASS I OR II. THE CONTRACTOR SHALL PROVIDE DOCUMENTATION FOR MATERIAL SPECIFICATION TO ENGINEER. UNLESS OTHERWISE NOTED BY THE ENGINEER, MINIMUM BEDDING THICKNESS SHALL BE 4" (100mm) FOR 4"-24" (100mm-600mm); 6" (150mm) FOR 30"-60" (750mm-900mm).
7. INITIAL BACKFILL: SUITABLE MATERIAL SHALL BE CLASS I OR II IN THE PIPE ZONE EXTENDING NOT LESS THAN 6" ABOVE CROWN OF PIPE. THE CONTRACTOR SHALL PROVIDE DOCUMENTATION FOR MATERIAL SPECIFICATION TO ENGINEER. MATERIAL SHALL BE INSTALLED AS REQUIRED IN ASTM D2321, LATEST EDITION.
8. MINIMUM COVER: MINIMUM COVER OVER ALL RETENTION/DETENTION SYSTEMS IN NON-TRAFFIC APPLICATIONS (GRASS OR LANDSCAPE AREAS) IS 12" FROM TOP OF PIPE TO GROUND SURFACE. ADDITIONAL COVER MAY BE REQUIRED TO PREVENT FLOATATION. FOR TRAFFIC APPLICATIONS, MINIMUM COVER IS 12" UP TO 36" DIAMETER PIPE AND 24" OF COVER FOR 42" - 60" DIAMETER PIPE, MEASURED FROM TOP OF PIPE TO BOTTOM OF FLEXIBLE PAVEMENT OR TO TOP OF RIGID PAVEMENT.

NOMINAL DIAMETER	NOMINAL O.D.	TYPICAL SPACING "S"	TYPICAL SPACING "C"	TYPICAL SIDE WALL "X"	H (NON-TRAFFIC)	H (TRAFFIC)
12" (300 MM)	14.5" (368 MM)	11" (279 MM)	25.4" (645 MM)	8" (203 MM)	12" (292 MM)	12" (292 MM)
15" (375 MM)	18" (457 MM)	12" (292 MM)	28.9" (734 MM)	8" (203 MM)	12" (292 MM)	12" (292 MM)
18" (450 MM)	21" (533 MM)	17" (434 MM)	33.9" (862 MM)	9" (229 MM)	12" (292 MM)	12" (292 MM)
24" (600 MM)	28" (711 MM)	13" (330 MM)	40.7" (1034 MM)	10" (254 MM)	12" (292 MM)	12" (292 MM)
30" (760 MM)	36" (914 MM)	18" (457 MM)	53.1" (1347 MM)	18" (457 MM)	12" (292 MM)	12" (292 MM)
36" (900 MM)	42" 1067 MM)	22" (559 MM)	68" (1600 MM)	18" (457 MM)	12" (292 MM)	12" (292 MM)
42" (1050 MM)	48" (1219 MM)	24" (610 MM)	71.9" (1826 MM)	18" (457 MM)	12" (292 MM)	24" (610 MM)
48" (1200 MM)	54" (1372 MM)	25" (635 MM)	78.5" (1994 MM)	18" (457 MM)	12" (292 MM)	24" (610 MM)
60" (1500 MM)	67" (1702 MM)	24" (610 MM)	90" (2286 MM)	18" (457 MM)	12" (292 MM)	24" (610 MM)

* CLASS I BACKFILL REQUIRED AROUND 60" DIAMETER FITTINGS.

TYPICAL RET/DET CROSS SECTION DETAIL — DRAWING NUMBER: STD-702



Standard Construction Details

Santa Cruz Hills - Lot #4

Dempsey Road, Santa Cruz, California

LOT #4
APN: 025-013-45

DATE	DESIGN	DRAWN
1/24/13		

SHEET C11

JOB NO. 00078

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DMR	COUNTY REVIEW COMMENTS #2	7-8-13
DMR	COUNTY REVIEW COMMENTS	6-6-13
BY	REVISION	DATE

APPROVED

DAVID HEINRICHSEN (RCE NO. 49167)

June 13, 2013 Job No. 09004

Mr. Doug Locke
Barry Swenson Builder
5200 Soquel Avenue, Suite 202
Santa Cruz, CA 95062

Subject: **Plan Review and Report Update:**
"Site and Grading and Drainage Plan
Santa Cruz Hills - Lot #4
Dempsey Road, Santa Cruz, California"
APN 025-013-45"
Sheet C1.1
Plan by Ifland Engineers
Dated January 24, 2013, Revision of June 5, 2013

Reference: *"**PRELIMINARY GEOLOGIC HAZARDS INVESTIGATION***
Property on Chaminade Lane
Santa Cruz County, California
APN 025-013-24, 25, 26, 27"
Report by Nolan Associates, Santa Cruz, CA
Dated December 20, 2007

Dear Mr. Locke:

At your request, we have visited the subject site and reviewed the above referenced plan sheets for conformance with recommendations made in our geologic report. Based on our site visit, the recommendations made in our December 20, 2007 report remain valid.

The proposed home location is slightly outside our geologically feasible building envelope. However, based on our site review, we are of the opinion that the proposed location is consistent with our hazards analysis and can be approved as shown on the referenced plan sheet. The proposed grading and drainage schemes for the development are in general

ATTACHMENT 3

conformance with our report recommendations. Please insure that no water is retained on slopes over 10% gradient.

Please note that we are not engineers and have not reviewed or approved any aspect of the engineering design. Do not hesitate to contact me if you have any questions on this matter.

Sincerely,
Nolan Associates

Jeffrey M. Nolan
C.E.G. No. 2247

• Engineering Geology
• Hydrogeology
• GIS Services

NOLAN ASSOCIATES

April 21, 2008 Job No. 07033

Santa Cruz Hills
c/o Owen Lawlor
612 Spring Street
Santa Cruz, CA 95060

Subject: Addendum to Preliminary Geologic Hazards Investigation

Project: Proposed Lot Line Adjustment and Development of
Four Single Family Residences
Dempsey Road and Chaminade Lane
Santa Cruz County, California
APN's 025-013-24,25,26,27

Reference: Preliminary Geologic Hazards Investigation
Prepared by Nolan Associates, dated December 20, 2007

Existing Topographic Map, Sheet C01
Prepared by Ifland Engineers, dated April 10, 2008

Existing Slope Map, Sheet C02
Prepared by Ifland Engineers, dated April 10, 2008

Dear Mr. Lawlor:

As requested, we have completed this addendum letter to our initial preliminary geologic investigation, referenced above. Specifically, this addendum letter addresses the location of the recommended slough wall and the labeling of the proposed Parcels.

In order to correlate our report and figures with the Existing Topographic Map, prepared by Ifland Engineering, dated 4-10-08, we have renamed the Parcels and corresponding Building Sites. Plate 1 on our original report was based on the Topographic Map, prepared by Ifland Engineers, dated 2-26-08. Subsequently, the parcel names and lot line configuration were revised. The changes are as follows: Lot and Building Site 4 has been renamed to Lot and Building Site 1; Lot and Building Site 2 has been renamed to Lot and Building Site 4; Lot and Building Site 1 has been renamed to Lot and Building Site 2; Building Site 4a has been renamed Building Site 2a. We have attached a revised Plate A1 to incorporate these changes (See Plate A1). Plate A1 also depicts the location of the recommended slough wall for revised Lot and Building Site 1 (See PlateA1). We have reconfigured the location of Building Site 1 to remove the need to build a slough wall for development of the single family residence. Any discrepancy between our slope gradients and those presented on the Ifland Slope Map may be attributed to the

fact that our slope gradients are based on point elevations which may not represent the surrounding area.

All the recommendations presented in our previous geologic report are still valid and should be implemented. We have included a revised copy of our recommendations which reference the name changes of the Parcels and Building Sites.

RECOMMENDATIONS

1 We recommend that all structures intended for human habitation, and any structurally attached appurtenances, be placed within the areas designated as "Geologically Feasible Building Envelope" on Plate A1. The designation of these building sites is based partially on the scope of the geologic investigation and is not meant to imply that these sites are the only geologically acceptable sites on the property. We reserve the right to amend or relocate the building envelopes where investigation shows such changes are consistent with sound geologic judgement. Building envelope configurations may also be modified based on site specific engineering design.

2. Building Site 1, situated on Lot 1, has been reconfigured to accommodate the development of a structure without a slough wall. Development beyond Building Site 1 may need to incorporate the construction of a slough wall designed to stop a sandstone block up to three feet in maximum dimension. The block is expected to be tabular in shape. We have depicted the location and area in need of a slough wall on Plate A1.

3. Building Sites 1 and 2a should be designed such that foundation support is derived directly from bedrock, to reduce the potential for soil creep. Foundations at these sites should also bear below a line projected upslope from the toe of any cut slope at an inclination of 2:1 (H:V)

4. The project geotechnical engineer should provide specific foundation recommendations for the proposed buildings foundation system

5. We recommend that any foundations or other site development constructed over non-engineered artificial fill or our backfilled test pits be designed to accommodate settlement of the fill. Fill materials include those marked as *"af"* on Plate 1. Alternatively, the project geotechnical engineer may specify that the fill be removed and re-compacted or foundations deepened to derive support from underlying earth materials. Engineering specifications for the re-compaction of the backfill should be provided by the project geotechnical engineer.

6. We recommend that the project engineers consider the findings of our seismic shaking analysis in project design. Given the potential for strong seismic shaking to occur during the design life span of the proposed structures, all structures should be designed to the most current standards of the California Building Code, at a minimum.

7. We recommend that all drainage from improved surfaces be captured by closed pipe or lined ditches and dispersed on site in such a way as to maintain the pre-development runoff patterns as much as possible. At no time should any concentrated discharge be allowed to spill directly onto the ground adjacent to structures or to fall directly onto steep slopes. The control of runoff is essential for erosion control and prevention of water ponding against foundations and other improvements.

8. An engineered drainage and erosion control plan should be prepared for the project by a qualified engineer or erosion control specialist.

9. This report is issued with the understanding that it is the duty and responsibility of the owner, or of his representative or agent, to ensure that this report is provided to and brought to the attention the architect, engineer(s) and general contractor for the project, and that all recommendations made in the report are incorporated into the plans and specifications, and that the necessary steps are taken to see that the contractor and subcontractors carry out the report's recommendations in the field.

10. We request the privilege of reviewing final project plans for conformance with our recommendations. If we are not permitted such a review, we cannot be held responsible for misinterpretation or omission of our recommendations.

11. If any unexpected variations in soil conditions, or if any unanticipated geologic conditions are encountered during construction, or if the proposed project will differ from that discussed or illustrated in this report, Nolan Associates should be notified so that supplemental recommendations can be given. Our conclusions and recommendations shall not be considered valid unless the changes are reviewed and the conclusions in this report are modified or verified in writing by a representative of Nolan Associates.

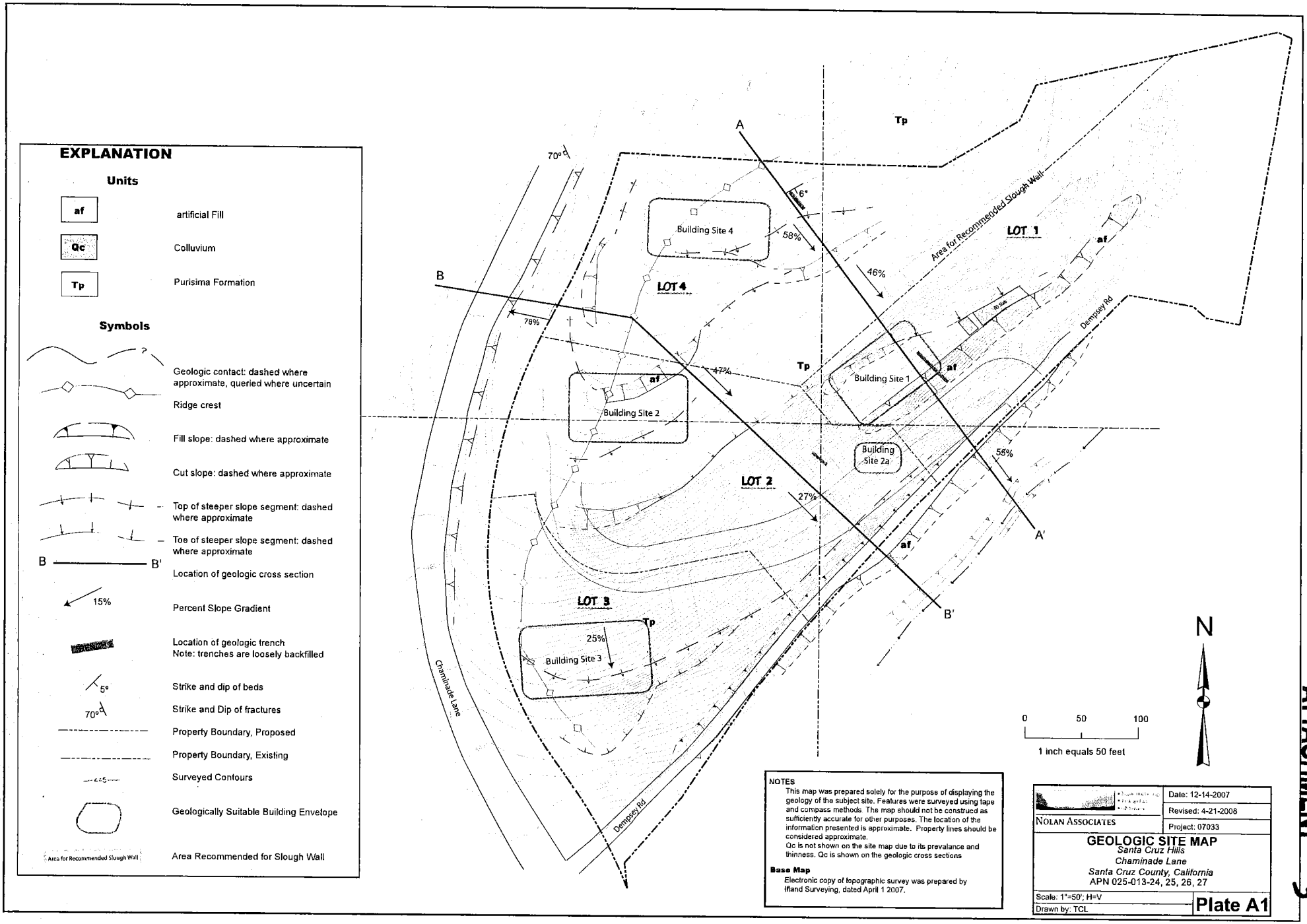
12. We recommend that home owners implement the simple safety procedures outlined by Peter Yanev in his book, *Peace of Mind in Earthquake Country*. This book contains a wealth of information regarding earthquakes, seismic design and precautions that the individual home owner can take to reduce the potential for loss of life, injury and property damage.

If you have any questions or comments regarding this report, please contact us at your earliest convenience.

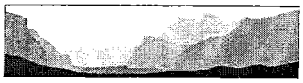
Sincerely,
Nolan Associates

Jeffrey M. Nolan
Principal Geologist
C.E.G. #2247

Tyler C. Ladinsky
Staff Geologist



ATTACHMENT 3



• Engineering Geology
• Hydrogeology
• GIS Services

NOLAN ASSOCIATES

PRELIMINARY GEOLOGIC HAZARDS INVESTIGATION
Property on Chaminade Lane
Santa Cruz County, California
APN 025-013-24, 25, 26, 27

Prepared for:
Owen Lawlor
612 Spring Street
Santa Cruz, CA 95060

Prepared by:
Nolan Associates
1509 Seabright Ave, Ste A2
Santa Cruz, CA 95062

Job No. 07033
December 20, 2007

• Engineering Geology
• Hydrogeology
• GIS Services

NOLAN ASSOCIATES

December 20, 2007 Job No. 07033

Santa Cruz Hills
c/o Owen Lawlor
612 Spring Street
Santa Cruz, CA 95060

Subject: Preliminary Geologic Hazards Investigation

Project: Proposed Lot Line Adjustment and Development of
Four Single Family Residences
Dempsey Road and Chaminade Lane
Santa Cruz County, California
APN 040-091-21

Dear Mr. Lawlor:

We have completed our preliminary geologic hazards investigation at the above-referenced project site. Our investigation addressed potential geologic hazards associated with permitting and developing four single family residences at the project site.

Geologic hazards that may affect the project within its design life include slope instability, erosion and seismic shaking. We have made engineering geologic recommendations to mitigate risks associated with these hazards to the level of "ordinary" risk. Ordinary risk is defined in Appendix A. Your project engineers and designers should carefully review and incorporate our conclusions and recommendations.

Our recommendations are intended principally to lower the risks posed to habitable structures by geologic hazards. This report in no way implies that the subject property will not be subject to earthquake shaking, landsliding, faulting or other acts of nature. Such events could damage the property and affect the property's value or its viability in ways other than damage to habitable structures. We have not attempted to investigate or mitigate all such risks and we do not warrant the project against them. We would be happy to discuss such risks with you, at your request.

We have attempted to mitigate recognized risks to the proposed home to the level of "ordinary" risk. Ordinary risk is defined qualitatively as the level of risk that is typical for comparable existing residential structures in similar settings. Ordinary risk is not meant to imply that the

project cannot or will not be damaged during an earthquake, landslide event, or other natural calamity, but that damage in most cases will be repairable. Please review the discussion of ordinary risks in Appendix A. If you determine that an ordinary level of risk is not acceptable, we would be happy to develop mitigation recommendations to provide a lower level of risk..

If you have any questions or comments regarding this report, please contact us at your earliest convenience.

Sincerely,
Nolan Associates

Jeffrey M. Nolan
Principal Geologist
C.E.G. #2247

Tyler C. Ladinsky
Staff Geologist

TABLE OF CONTENTS

NOTE: This report should not be considered complete without all listed figures and plates.

INTRODUCTION

This report presents the results of our preliminary geologic hazards investigation for four properties located at the intersection of Chaminade Lane and Dempsey Road, in Santa Cruz County, California The properties are identified as Assessor's Parcel Numbers (APN) 025-013-24,25,26,27. Figure 1, Topographic Index Map, depicts the location and topographic setting of the subject properties.

The proposed project consists of the reconfiguration of the existing parcels by adjusting parcel boundaries and development of four single family residences, one on each of the reconfigured parcels. The purpose of our geologic hazards investigation is to provide an assessment of geologic hazards relevant to development of a single family residence on each of the existing parcels and each of the four proposed parcels. The proposed home sites on lots 2, 3, and 4 (Plate 1) will be substantially the same before and after the lot line adjustment. The home site on lot 1 will be moved following the reconfiguration.

This report presents the results of our preliminary geologic hazards investigation for the referenced project. The parcels are currently undeveloped. It is our understanding that the project will be served by individual water systems and onsite septic disposal systems. We did not perform any services related to the water supply or septic systems.

PURPOSE AND SCOPE

The purpose of our investigation was to provide an assessment of geologic hazards at each of the proposed residential building sites. Where particular geologic hazards were found to present greater than acceptable risks to the project, we developed recommendations to reduce these risks. Our geologic hazards analysis was based on an assumed 50-year design life span for the project.

Work performed during this study included:

1. A review of geologic literature and maps pertinent to the project site.

2. Examination and interpretation of stereo pair vertical aerial photographs, to assess the recent geologic history of the project site.

3. Field reconnaissance and geologic mapping around the project site, completed on December 7, 2007.

4. Advancing and logging three backhoe test pits on December 11, 2007.

5. Preparation of a geologic map and geologic cross sections for the proposed home sites, to be used for the geologic and geotechnical evaluations.

6. Analysis and interpretation of the geologic data, and preparation of this report.

REGIONAL GEOLOGY AND SEISMICITY

The subject property is located within the central portion of the Coast Ranges Physiographic Province of California, a series of coastal mountain chains that parallel the pronounced northwest-southeast oriented structural grain of Central California geology. The property is located within the foothills of the Central Santa Cruz Mountains, which are mostly underlain by a large, elongate structural unit known as the Salinian Block. The Salinian Block is floored with granitic and metamorphic rocks of Mesozoic age, and is separated from contrasting basement rock of the Franciscan Complex to the northeast and southwest by the San Andreas and Nacimiento-San Gregorio-Sur faults, respectively. The granitic basement is overlain by a sequence of dominantly marine sedimentary rocks of Paleocene to Pliocene age and non-marine sediments of late Pliocene to Pleistocene age (Figure 2: Regional Geologic Map).

Throughout the later portion of the Cenozoic Era, this part of California has been dominated by tectonic forces associated with lateral or "transform" motion between the North American and Pacific lithospheric plates, producing long, northwest-trending faults such as the San Andreas and San Gregorio, with horizontal displacements measured in tens to hundreds of miles. Accompanying the horizontal (strike-slip) movement of the plates have been episodes of compressive stress, reflected by repeated episodes of uplift, deformation, erosion and deposition of sedimentary rocks. Near the crest of the Santa Cruz Mountains, this tectonic deformation is evidenced by steeply dipping folds, overturned bedding, faulting, jointing, and fracturing in the sedimentary rocks older than the middle Miocene. Along the coast, the on-going tectonic activity is most evident in the formation of a series of uplifted marine terraces.

The Quaternary history of the Santa Cruz Mountains includes abundant evidence for landslide related processes as an important factor shaping the evolution of the modern landscape. Historical accounts and geologic studies of the San Andreas earthquake of 1906 and the Loma Prieta earthquake of 1989 indicate that there is a strong correlation between major earthquakes and resulting landslides, earth flows and ground cracking in this region. The occurrence of landsliding is also strongly controlled by the amount of seasonal rainfall the area receives.

California's broad system of strike-slip faulting has a long and complex history. The region as a whole is subject to on-going seismicity. The most severe historic earthquakes to affect the subject property are the 1906 San Francisco Earthquake and the 1989 Loma Prieta Earthquake, both with hypocenters on the San Andreas Fault, with Richter magnitudes of about 8.3 and 7.1, respectively. Other historic earthquakes of note include two magnitude 6.1 earthquakes in Monterey Bay in 1926 and a host of smaller or more distant events.

Figure 3, Regional Seismicity Map, shows Quaternary faults (Bryant, 2005) and historic earthquake epicenters (California Geologic Survey, 2000) in the site region. Locally, the San Andreas and Zayante-Vergeles fault systems are considered to be active. These faults present the greatest seismic hazard to the project.

SITE GEOLOGIC SETTING

The Geologic Site Map (Plate 1) and Geologic Cross Section (Plate 2) depict relevant geologic information collected for the project site. Refer also to the Local Geologic Map (Figure 4) and Santa Cruz County Landslide Map (Figure 5) for additional geologic information for the subject property and surrounding region.

Physiographic Setting

The study area includes 4 parcels with a combined area of about 5.3 acres, situated on a moderately to steeply inclined, south facing slope between Arana Gulch to the west and Rodeo Gulch to the east (Figure 1, Topographic Index Map). Collectively, the properties are part of ancient sea cliff delineating the Western marine terrace to the north and the Highway 1 marine terrace to the south.

Elevations in the study area range 100 and 250 feet above mean sea level (msl), with typcial slope gradients ranging from 27-78% (Plate 1). The eastern portion of the property has several near-vertical sandstone outcrops with gradients over 100%. An unnamed tributary to Arana Gulch borders the property to the south, paralleling Dempsey Road (Plate 1). This drainage is a narrow incised channel, with exposed sandstone along the creek banks .

The site topography shows evidence of minor grading associated with previous development and agricultural use of the property, consisting of terracing of the site slopes. This grading is old, probably many decades in age, and appears to be due to use of the property for orchards and a dwelling, no longer present. The approximate boundaries of fills associated with this past grading are shown on Plate 1.

The property is vegetated open grassland with scattered oaks, and bay trees, and some brush adjacent to local drainages. The upper portion of the lot is vegetated with Eucalyptus groves.

Drainage

Site drainage is primarily sheetflow to the southeast, towards the unnamed drainage. Runoff along Dempsey Road is collected along a inboard v-ditch and diverted into the unnamed drainage via a drainage inlet. The drainage was dry with isolated pockets of ponded water at the time of our mapping. No natural springs or any other evidence of high groundwater levels were noted during our site visits. It should be noted groundwater levels can fluctuate depending on rainfall and other factors not evident during our investigation.

Earth Materials

We identified Purisima Formation bedrock, locally overlain by colluvial deposits underlying the proposed building sites. Minor pedogenic soils have developed on the bedrock and colluvium. Artificial fill was noted along an Dempsey Road and on lot 2 and 4. Detailed descriptions of each geologic unit are included below.

Purisima Formation (Tp)

We observed exposures of Purisima Formation sandstone in trenches 1, 2, and 3 (see Plate 3, Geologic Trench Logs), within Dempsey Road and Chaminade Lane road cuts, and in local drainage channels. The observed Purisima Formation consists predominantly of fine- meduim grained sandstone. Color ranged from tan in unweathered rock found in our borings, to light yellowish brown in weathered rock exposed near the ground surface. Our observations were consistent with the mapped extent and description of the Purisima Formation by Brabb (1989; see Figure 4).

Artificial Fill (af)

Fill was encountered in Trench 1 along the outer edge of an preciously graded building site(see Plate 1) and was observed along the outboard edge of Dempsey Road. We did not evaluate the nature of the fill.

Local Geologic Structure and Faulting

Bedding within the Purisima Formation near the subject property is mapped as dipping 3° south-to southeast. No faults are depicted on or near the subject property on published maps (Brabb, 1989; Hall et al., 1975; see Figure 4). We did not observe any distinctive evidence for faulting on the property in our aerial photo reconnaissance, during our ground mapping, or within any subsurface exposures.

Table 1 contains a list of active faults nearest the subject property. The distances and directions shown on Table 1 were measured using the most recent available database of Quaternary-active faults (Bryant, 2005). See Figure 3 for locations of these faults, and Appendix B for discussions of each fault. The Zayante-Vergeles, San Andreas, Monterey Bay-Tularcitos, and San Gregorio fault systems are considered active seismic sources (Cao et al., 2003).

TABLE 1: Distances and Directions to Local Faults

Fault	Distance from site (km)	Distance from site (miles)	Direction from site
Zayante-Vergeles	8.5	5.3	northeast
San Andreas	13.8	8.6	northeast
Monterey Bay-Tularcitos	15.0	9.3	southwest
San Gregorio	20.6	12.8	southwest

Landsliding

The Santa Cruz County landslide map, prepared by Cooper-Clark and Associates (1975; Figure 5) does not depict any landslides on the subject property. We did not see any surficial evidence for landsliding on the subject property during our site reconnaissance. We did, however, observe a large, fractured sandstone clast intercalated with the B-soil horizon in Trench T-1 that appeared to be evidence for a minor topple or rock fall from the near vertical sandstone outcrops located upslope (see note N–1, Trench 1, Plate 1).

GEOLOGIC HAZARDS

Potential geologic hazards relevant to the subject property include the effects of strong seismic shaking, slope instability and erosion hazards. These hazards are discussed in the following sections. We have included recommendations for mitigating geologic hazards to acceptable levels in a following section. Risk levels to habitable structures from geologic hazards are defined in Appendix A.

Seismic Shaking Hazards

Seismic shaking at the subject site will be intense during the next major earthquake along one of the local fault systems. Modified Mercalli Intensities (see Appendix B, Table B1) of VII to VIII are expected at the site, based on the intensities reported by Lawson et al. (1908) for the 1906 earthquake and by Stover et al. (1990) for the 1989 Loma Prieta earthquake. It is important that our recommendations regarding seismic shaking be considered in the design for habitable structures and site improvements.

We have estimated expected deterministic seismic shaking intensities for the site. A deterministic assessment considers only the effects of the largest ground motion that can be expected at a given site, regardless of how likely it is to occur within the typical 50-year design life of a single family residence.

For comparison, we have included the results of a statewide probabilistic assessment, applied to the project site. A probabilistic seismic analysis differs from a deterministic analysis in that it evaluates the probability for shaking of a certain intensity to occur at a particular site within a given time frame (50 years for residential development).

The intensity of seismic ground shaking is typically characterized as the peak acceleration that a point on the ground experiences during the shaking. Acceleration is measured as a proportion of the acceleration of the Earth's gravity, g. Both the deterministic and probabilistic ground shaking estimates are for generic site conditions (soft rock). Seismic shaking intensity can be affected by site specific conditions, such as rock or soil type or topography. Consequently, the seismic shaking parameters listed below should be adjusted for site specific conditions, as necessary, before being used in design.

Deterministic Seismic Shaking Analysis

For the purpose of evaluating deterministic peak ground accelerations for the site, we have considered the faults listed in Table 1 as potential seismic sources. The San Andreas, San Gregorio, Monterey Bay-Tularcitos, and Zayante-Vergeles fault systems are considered to be active seismic sources by the State of California (Peterson et al., 1996; Cao et al., 2003). While other faults in this region may be active, their potential contribution to deterministic seismic hazards at the site is overshadowed by these closer and/or larger faults.

Table 2 shows estimated magnitudes ($M_{W(MAX)}$) and rupture geometries for the maximum expected earthquakes on each of the above-listed fault systems (Cao et al., 2003). Estimated mean peak (PGA) and mean peak plus one dispersion (PGA + ∂) horizontal ground acceleration values for the site are calculated using these magnitudes and geometries, and the fault distances shown in Table 1. These accelerations are based on an attenuation relationship derived from the analysis of historical earthquakes (Sadigh et al., 1997), and are for sites founded on soft rock. We caution that the listed values are approximations, based on theoretical curves fit to a relatively small data set: actual measured accelerations may be larger. The PGA + ∂ value is a conservative design value that is intended to compensate for the uncertainty in the attenuation relationships.

Table 2: Deterministic Ground Motions

Fault	$M_{W(MAX)}$	Rupture Geometry	PGA (g)	PGA + ∂ (g)	Duration D_{05}-D_{95} (sec)	Recurrence Interval (years)	Seismic Source Type
Zayante-Vergeles	7.0	Reverse	0.53	0.77	14	8,821	B
San Andreas (1906 rupture)	7.9	Strike-slip	0.41	0.59	31	210	A
Monterey Bay-Tularcitos	7.1	Strike-slip	0.32	0.46	17	2841	B
San Gregorio	7.5	Strike-slip	0.24	0.36	24	400	B

$M_{W(MAX)}$: Moment magnitude of maximum credible earthquake.
San Andreas 1906 rupture after Peterson et al., 1996; Zayante-Vergeles, San Gregorio after Cao et al., 2003.
Rupture Geometry and Recurrence Interval after Peterson et al., 1996.
PGA: Mean peak horizontal ground acceleration. After Sadigh et al., 1997.
PGA + ∂: Mean peak horizontal ground acceleration plus one dispersion. After Sadigh et al., 1997.
Duration: Abrahamson and Silva, 1996
Seismic Source Type from CBSC, 2002

The duration of strong seismic shaking shown in Table 2 is calculated from a magnitude-dependent formula proposed by Abrahamson and Silva (1996). Expected recurrence interval (RI) (Peterson et al., 1996) is the expected time between major earthquakes on each fault. The UBC

Seismic Source Type (California Building Standards Commission (CBSC), 2002; Cao et al., 2003) is also listed.

In summary, the Zayante-Vergeles fault zone, passing within 5.3 miles (8.5 km) of the site, is expected to generate the largest earthquake ground motion at the site. The characteristic earthquake on this fault ($M_{W(MAX)}$ = 7.0) is expected to result in estimated mean peak horizontal ground accelerations of about 0.53g, with an upper level design ground motion (mean plus one dispersion value) of 0.77g. Duration of strong seismic shaking from this event will be about 14 seconds. The recurrence interval for this earthquake is relatively long (RI = 8,821 years); therefore, the likelihood of this earthquake occurring within the project lifespan is considered to be relatively low

The maximum event on the San Andreas Fault ($M_{W(MAX)}$ = 7.9; RI = 210 years) is much more likely to occur within the project lifespan. Expected mean peak horizontal ground motion at the site from this event is 0.41 g. The mean plus one dispersion value is 0.59g. The duration of strong shaking from the San Andreas earthquake (31 seconds) is significantly longer than that of the Zayante-Vergeles earthquake. The duration of strong seismic shaking may have a more critical impact on structures than the peak acceleration.

Probabilistic Ground Motion Estimates

The U.S. Geological Survey and the California Geological Survey together produced a probabilistic seismic hazards assessment for the state of California (Petersen et al., 1996; Cao et al., 2003). The study used a model that explicitly considered faults that are capable of generating moment magnitude 6.5 or greater earthquakes. The San Francisco Bay Area, Monterey Bay Area and Santa Cruz Mountains are traversed by numerous minor faults and splays, many of which may be capable of generating smaller earthquakes: to account for these seismic sources, a background magnitude of 6.5 was applied in the probabilistic model.

Probabilistic ground motions based on that study for the proposed building site are listed in Table 3. These estimated ground motions assume a soil profile type Sc (soft rock), per the 2001 California Building Code (CBSC, 2002). We caution that these values are not based on a site-specific probabilistic assessment, which is normally required for critical structures such as schools and hospitals.

Table 3: Probabilistic Ground Motions (10% probability of being exceeded in 50 years)

Ground Motion Measure	Acceleration in Soft Rock (g)
Peak Ground Acceleration (g)	0.43
Spectral Acceleration (g) at 0.2 sec.	1.0
Spectral Acceleration (g) at 1.0 sec.	0.51

The ground motion intensities shown in Table 3 are the seismic shaking intensities that have only a 10% chance of being exceeded in 50 years. The "10% in 50 year" ground motion cited in Table 3 is considered appropriate for a residential structure. In our opinion, either a deterministic assessment, as described in the preceding section, or the state-wide probabilistic assessment is adequate for residential structures, provided that site specific conditions are considered when selecting design ground motions.

Slope Stability

Potential slope stability hazards on the site are landsliding, and soil creep. These will be discussed separately, below.

Landsliding

The geologic evaluation of landslide hazard is based on a qualitative assessment of geologic conditions around the proposed building site. Among the factors considered are the distribution, ages, and types of landsliding in the area surrounding the proposed development site; the steepness of slopes; and the occurrence of geologic conditions in the area that would favor landslide formation, such as weak bedrock. In this type of assessment, often the best indicator of landslide hazard is the past behavior of slopes in the area. Consequently, the type and location of past landsliding is heavily relied upon as an indicator of possible future occurrence of landsliding. It should be pointed out, however, that there is always some potential for landsliding in areas of steep slopes or mountainous terrain, regardless of past conditions, and anyone building in such areas must be prepared to assume some risk due to landsliding. No amount of qualitative or quantitative analysis can be expected to identify every factor that might cause landsliding to occur.

For the purposes of discussion, we have separated landslide hazards into two categories: deep-seated landsliding and shallow landsliding. These two categories will be discussed separately, below.

Deep-Seated Landsliding Hazard

Deep-seated landsliding refers to large, rotational-style landslides that may be tens to hundreds of feet deep and acres to hundreds of acres in size. Because of their size, these large landslides are the type of landslide that is identified most often on the County landslide map. In most cases, these landslides formed many thousands to tens of thousands of years ago. Despite their age, however, many of these landslides continue to move during extreme seismic or climatic events, as was demonstrated by the 1989 Loma Prieta earthquake and the 1982-83 el Niño winter rains.

The Santa Cruz County landslide map, prepared by Cooper-Clark and Associates (1975; Figure 5) does not depict any landslides on the subject property. Our investigation confirms the subject property is situated on intact Purisima Formation bedrock. In addition, the property is in an area where bedding within the underlying Purisima Formation bedrock is very gently dipping to the south. Therefore, the potential for deep-seated dip-slope bedrock landsliding is considered to be

low. Risks to development from deep-seated landsliding for development within the Geologically Suitable Building Envelope are ordinary (Appendix A).

Shallow Landslide Hazard

Shallow landslides originate mostly from weathered bedrock and/or surficial materials adjacent to steep slopes. Shallow landslides can occur through a combination of factors, including; naturally weak earth materials, such as deeply weathered soil or pre-existing landslide deposits; discontinuities in rock such as fractures or bedding surfaces; or the over-steepening of slopes due to stream erosion or human activity.

We did observe evidence within Trench 1 to indicate the potential for minor topples or falls of rock from steep sandstone outcrops. Steeply dipping fracture sets were also noted in bedrock outcrops (see representative fracture attitudes on Plate 1, adjacent to Chaminade Lane). Consequently, we consider there to be some potential for rock falls and toppling to affect proposed structures directly downslope from very steep sandstone outcrops.

In order to reduce risks from toppling or rock fall hazard to an ordinary level, we have made design recommendations for a slough wall along portions of the building site on lot 4 that are located down slope from steep sandstone outcrops. Provided that habitable structures are sited within the Geologically Suitable Building Envelopes depicted on Plate 1 and that our recommendation for a slough wall at building site 4 is implemented, risks from shallow landsliding are to be considered ordinary (Appendix A).

Soil Creep

Moderately steep to steep slopes may be subject to creep hazards. Creep occurs where loose surficial materials, including loose colluvium, soil and deeply weathered rock, mantle harder bedrock on steep slopes. In soil creep, this loose surficial layer gradually creeps downslope, at rates of a fraction of an inch to several inches per year. This process can damage improperly designed foundations.

In our opinion, soils underlying gentle to moderate slopes on the site have low potential to creep downslope, while steep slopes (greater than 50 % gradient) have a moderate potential for soil creep. Residential development sited on gentle slopes (less than 30% gradient) within our Geologically Suitable Building Envelopes should be subject to ordinary risks from soil creep provided that foundations are embedded at least 18" below existing grade (Appendix A). However, Trench T-1 (building site 4) showed a thick soil deposit with a very sharp contact with the underlying sandstone. This situation may promote downslope soil creep. Therefore, for building sites 4 and 4a, we recommend that all foundations be designed to derive support from the sandstone bedrock to mitigate the potential effects of soil creep or differential settlement.

Provided our recommendations are followed, we consider the risks posed by soil creep to be ordinary.

Erosion Hazard

The subject site is characterized by a thin mantle of relatively soft, erodable, surficial soil overlying harder bedrock. Erosion potential can be exacerbated where relatively impervious shallow bedrock creates high groundwater during periods of intense or prolonged rainfall.

To protect against erosion, all drainage from impermeable surfaces on the site must be carefully controlled. All areas of exposed soil created during construction should be protected from erosion by erosion resistant blankets and immediate re-seeding. Risks to the project due to erosion are ordinary provided that adequate erosion control measures are instituted as part of the plan.

Co-seismic Ground Cracking Hazards

Earth materials atop ridge lines or at the crest of very steep slopes can be prone to displacement and extensional cracking in response to strong seismic shaking because they are not laterally buttressed by additional earth materials. This phenomenon is expressed by landslides along the flanks of ridges, and uphill-facing escarpments bounding ridge-parallel grabens at the crests of very steep slopes. Structures may be detrimentally affected by lateral heave or offsets within surficial earth materials due to ground cracking, or by landsliding that develops as a result of the ground cracking.

We excavated trench T-3 at the crest of the steepest slope on the subject properties to look for evidence of past co-seismic ground cracking (located on Plate 1, trench log shown on Plate 3). We found no evidence of previous ground cracking in our trench and therefore conclude that the risks posed to development at this site due to coseismic ground cracking or associated landsliding are ordinary.

CONCLUSIONS

Based on our investigation, it is our opinion that the primary hazards on the subject properties are landsliding (including rock falls and toppling) soil creep, and strong seismic shaking. Our recommendations include measures to reduce risks to habitable structures from these hazards to ordinary levels, as defined in Appendix A.

Our recommendations are intended principally to lower the risks posed to habitable structures by geologic hazards. This report in no way implies that the subject property will not be subject to earthquake shaking, landsliding, faulting or other acts of nature. Such events could damage the property and affect the property's value or its viability in ways other than damage to habitable structures. We have not attempted to investigate or mitigate all such risks and we do not warrant the project against them. We would be happy to discuss such risks with you, at your request.

RECOMMENDATIONS

1 We recommend that all structures intended for human habitation, and any structurally attached appurtenances, be placed within the areas designated as "Geologically Feasible Building Envelope" on Plate 1. The designation of these building sites is based partially on the scope of the geologic investigation and is not meant to imply that these sites are the only geologically acceptable sites on the property. We reserve the right to amend or relocate the building envelopes where investigation shows such changes are consistent with sound geologic judgement. Building envelope configurations may also be modified based on site specific engineering design.

2. Building Site 4, situated on Lot 4 (Plate1,) should incorporate the construction of a slough wall designed to stop a sandstone block up to three feet in maximum dimension. The block is expected to be tabular in shape.

3. Building Sites 4 and 4a should be designed such that foundation support is derived directly from bedrock, to reduce the potential for soil creep. Foundations at these sites should also bear below a line projected upslope from the toe of any cut slope at an inclination of 2:1 (H:V)

4. The project geotechnical engineer should provide specific foundation recommendations for the proposed buildings foundation system

5. We recommend that any foundations or other site development constructed over non-engineered artificial fill or our backfilled test pits be designed to accommodate settlement of the fill. Fill materials include those marked as *"af"* on Plate 1. Alternatively, the project geotechnical engineer may specify that the fill be removed and re-compacted or foundations deepened to derive support from underlying earth materials. Engineering specifications for the re-compaction of the backfill should be provided by the project geotechnical engineer.

6. We recommend that the project engineers consider the findings of our seismic shaking analysis in project design. Given the potential for strong seismic shaking to occur during the design life span of the proposed structures, all structures should be designed to the most current standards of the California Building Code, at a minimum.

7. We recommend that all drainage from improved surfaces be captured by closed pipe or lined ditches and dispersed on site in such a way as to maintain the pre-development runoff patterns as much as possible. At no time should any concentrated discharge be allowed to spill directly onto the ground adjacent to structures or to fall directly onto steep slopes. The control of runoff is essential for erosion control and prevention of water ponding against foundations and other improvements.

8. An engineered drainage and erosion control plan should be prepared for the project by a qualified engineer or erosion control specialist.

9. This report is issued with the understanding that it is the duty and responsibility of the owner, or of his representative or agent, to ensure that this report is provided to and brought to the attention the architect, engineer(s) and general contractor for the project, and that all recommendations made in the report are incorporated into the plans and specifications, and that the necessary steps are taken to see that the contractor and subcontractors carry out the report's recommendations in the field.

10. We request the privilege of reviewing final project plans for conformance with our recommendations. If we are not permitted such a review, we cannot be held responsible for misinterpretation or omission of our recommendations.

11. If any unexpected variations in soil conditions, or if any unanticipated geologic conditions are encountered during construction, or if the proposed project will differ from that discussed or illustrated in this report, Nolan Associates should be notified so that supplemental recommendations can be given. Our conclusions and recommendations shall not be considered valid unless the changes are reviewed and the conclusions in this report are modified or verified in writing by a representative of Nolan Associates.

12. We recommend that home owners implement the simple safety procedures outlined by Peter Yanev in his book, *Peace of Mind in Earthquake Country*. This book contains a wealth of information regarding earthquakes, seismic design and precautions that the individual home owner can take to reduce the potential for loss of life, injury and property damage.

INVESTIGATIVE LIMITATIONS

1. The conclusions and recommendations noted in this report are based on probability and in no way imply the site will not possibly be subjected to ground failure or seismic shaking so intense that structures will be severely damaged or destroyed. The report does suggest that implementation of the recommendations contained within will reduce the risks posed by geologic hazards.

2. This report is issued with the understanding that it is the duty and responsibility of the owner or his representative or agent to ensure that the recommendations contained in this report are brought to the attention of the architect and engineer for the project, incorporated into the plans and specifications, and that the necessary steps are taken to see that the contractor and subcontractors carry out such recommendations in the field.

3. If any unexpected variations in soil conditions or if any undesirable conditions are encountered during construction or if the proposed construction will differ from that planned at the present time, Nolan Associates should be notified so that supplemental recommendations can be given.

4. The findings of this report are valid as of the present date. However, changes in the conditions of the property and its environs can occur with the passage of time, whether

they be due to natural processes of the works of man. In addition, changes in applicable or appropriate standards occur whether they result from legislation or the broadening of knowledge. Accordingly, the findings of this report may be invalidated, wholly or partially, by changes outside our control. Therefore, the conclusions and recommendations contained in this report cannot be considered valid beyond a period of two years from the date of this report without review by a representative of this firm.

5. Our services consist of professional opinions and recommendations made in accordance with generally accepted engineering geology principles and practices. No warranty, expressed or implied, including any implied warranty of merchantability or fitness for the purpose is made or intended in connection with our services or by the proposal for consulting or other services, or by the furnishing of oral or written reports or findings.

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FIGURES

APPENDIX A: SCALE OF ACCEPTABLE RISKS FROM GEOLOGIC HAZARDS

SCALE OF ACCEPTABLE RISKS FROM SEISMIC GEOLOGIC HAZARDS

Level of Acceptable Risk	Kinds of Structure	Extra Project Cost Probably Required to Reduce Risk to an Acceptable Level
Extremely low[1]	Structures whose continued functioning is critical, or whose failure might be catastrophic: nuclear reactors, large dams, power intake systems, plants manufacturing or storing explosives or toxic materials.	No set percentage (whatever is required for maximum attainable safety).
Slightly higher than under "Extremely low" level.[1]	Structures whose use is critically needed after a disaster: important utility centers; hospitals; fire, police and emergency communication facilities; fire station; and critical transportation elements such as bridges and overpasses; also dams.	5 to 25 percent of project cost.[2]
Lowest possible risk to occupants of the structure.[3]	Structures of high occupancy, or whose use after a disaster would be particularly convenient: schools, churches, theaters, large hotels, and other high rise buildings housing large numbers of people, other places normally attracting large concentrations of people, civic buildings such as fire stations, secondary utility structures, extremely large commercial enterprises, most roads, alternative or non-critical bridges and overpasses.	5 to 15 percent of project cost.[4]
An "ordinary" level of risk to occupants of the structure.[3,5]	The vast majority of structures: most commercial and industrial buildings, small hotels and apartment buildings, and single family residences.	1 to 2 percent of project cost, in most cases (2 to 10 percent of project cost in a minority of cases).[4]

[1] Failure of a single structure may affect substantial populations.

[2] These additional percentages are based on the assumptions that the base cost is the total cost of the building or other facility when ready for occupancy. In addition, it is assumed that the structure would have been designed and built in accordance with current California practice. Moreover, the estimated additional cost presumes that structures in this acceptable risk category are to embody sufficient safety to remain functional following an earthquake.

[3] Failure of a single structure would affect primarily only the occupants.

[4] These additional percentages are based on the assumption that the base cost is the total cost of the building or facility when ready for occupancy. In addition, it is assumed that the structures would have been designed and built in accordance with current California practice. Moreover the estimated additional cost presumes that structures in this acceptable-risk category are to be sufficiently safe to give reasonable assurance of preventing injury or loss of life during and following an earthquake, but otherwise not necessarily to remain functional.

[5] "Ordinary risk": Resist minor earthquakes without damage: resist moderate earthquakes without structural damage, but with some non-structural damage; resist major earthquakes of the intensity or severity of the strongest experienced in California, without collapse, but with some structural damage as well as non-structural damage. In most structures it is expected that structural damage, even in a major earthquake, could be limited to repairable damage. (Structural Engineers Association of California)

Source: Meeting the Earthquake, Joint Committee on Seismic Safety of the California Legislature, Jan. 1974, p.9.

SCALE OF ACCEPTABLE RISKS FROM NON-SEISMIC GEOLOGIC HAZARDS[6]

Risk Level	Structure Type	Risk Characteristics
Extremely low risks	Structures whose continued functioning is critical, or whose failure might be catastrophic: nuclear reactors, large dams, power intake systems, plants manufacturing or storing explosives or toxic materials.	1. Failure affects substantial populations, risk nearly equals nearly zero.
Very low risks	Structures whose use is critically needed after a disaster: important utility centers; hospitals; fire, police and emergency communication facilities; fire station; and critical transportation elements such as bridges and overpasses; also dams.	1. Failure affects substantial populations. Risk slightly higher than 1 above.
Low risks	Structures of high occupancy, or whose use after a disaster would be particularly convenient: schools, churches, theaters, large hotels, and other high rise buildings housing large numbers of people, other places normally attracting large concentrations of people, civic buildings such as fire stations, secondary utility structures, extremely large commercial enterprises, most roads, alternative or non-critical bridges and overpasses.	1. Failure of a single structure would affect primarily only the occupants.
"Ordinary" risks	The vast majority of structures: most commercial and industrial buildings, small hotels and apartment buildings, and single family residences.	1. Failure only affects owners /occupants of a structure rather than a substantial population. 2. No significant potential for loss of life or serious physical injury. 3. Risk level is similar or comparable to other ordinary risks (including seismic risks) to citizens in a similar setting. 4. No collapse of structures; structural damage limited to repairable damage in most cases. This degree of damage is unlikely as a result of storms with a repeat time of 50 years or less.
Moderate risks	Fences, driveways, non-habitable structures, detached retaining walls, sanitary landfills, recreation areas and open space.	1. Structure is not occupied or occupied infrequently. 2. Low probability of physical injury. 3. Moderate probability of collapse.

[6] Non-seismic geologic hazards include flooding, landslides, erosion, wave runup and sinkhole collapse

APPENDIX B: FAULTS OF SIGNIFICANCE IN THE SITE REGION

San Andreas Fault

The San Andreas fault is active and represents the major seismic hazard in northern California (Jennings, 1994). The main trace of the San Andreas fault trends northwest-southeast and extends over 700 miles from the Gulf of California through the Coast Ranges to Point Arena, where the fault passes offshore and merges with the Mendocino triple junction.

Geologic evidence suggests that the San Andreas fault has experienced right-lateral, strike-slip movement throughout the latter portion of Cenozoic time, with cumulative offset of hundreds of miles. Surface rupture during historical earthquakes, fault creep, and historical seismicity confirm that the San Andreas fault and its branches, the Hayward, Calaveras, and San Gregorio faults, are all active today.

Historical earthquakes along the San Andreas fault and its branches have caused substantial seismic shaking in Santa Cruz County. The two largest historical earthquakes on the San Andreas to affect the area were the moment magnitude (M_w) 7.9 San Francisco earthquake of 18 April 1906 and the M_w 6.9 Loma Prieta earthquake of 17 October 1989. The San Francisco earthquake caused severe seismic shaking and structural damage to many buildings in the Santa Cruz Mountains. The Loma Prieta earthquake may have caused more intense seismic shaking than the 1906 event in localized areas of the Santa Cruz Mountains, even though its regional effects were not as extensive. There were also major earthquakes in northern California along or near the San Andreas fault in 1838, 1865, and possibly 1890 (Sykes and Nishenko, 1984; Working Group On Northern California Earthquake Potential (WGONCEP, 1996).

Geologists have recognized that the San Andreas fault system can be divided into segments with "characteristic" earthquakes of different magnitudes and recurrence intervals (Working Group on California Earthquake Potential (WGCEP), 1988 and 1990; WGONCEP, 1996). Two overlapping segments of the San Andreas fault system represent the greatest potential hazard to the subject property. The first segment is defined by the rupture that occurred from the Mendocino triple junction to San Juan Bautista along the San Andreas fault during the great M_w 7.9 San Francisco earthquake of 1906. The WGONCEP (1996) has hypothesized that this "1906 rupture" segment experiences earthquakes with comparable magnitudes about every 200 years.

The second segment is defined approximately by the rupture zone of the M_w 6.9 Loma Prieta earthquake. The WGONCEP (1996) has posited earthquakes of M_w 7.0 on this segment of the fault, with an independent segment recurrence interval of 138 years.

Modified Mercalli Intensities (see Table B1) of up to VIII (8) are considered possible at the site, based on the intensities reported by Lawson et al. (1908) for the 1906 earthquake and by Stover et al. (1990) for the 1989 Loma Prieta earthquake.

Zayante-Vergeles Fault

The Zayante fault lies west of the San Andreas fault and trends about 50 miles northwest from the Watsonville lowlands into the Santa Cruz Mountains. The postulated southern extension of

the Zayante fault, known as the Vergeles fault, merges with the San Andreas fault south of San Juan Bautista.

The Zayante-Vergeles fault has a long, well-documented history of vertical movement (Clark and Reitman, 1973), probably accompanied by some right-lateral, strike-slip movement (Hall et al., 1974; Ross and Brabb, 1973). Stratigraphic and geomorphic evidence indicates that the Zayante-Vergeles fault has undergone late Pleistocene and Holocene movement and is potentially active (Coppersmith, 1979).

Some historical seismicity may be related to the Zayante-Vergeles fault (Griggs, 1973). The Zayante-Vergeles fault may have undergone sympathetic fault movement during the 1906 earthquake centered on the San Andreas fault, although this evidence is equivocal (Coppersmith, 1979). Gallardo et al. (1999) concluded that a magnitude 4.0 earthquake in 1998 in the Santa Cruz Mountains occurred on the Zayante fault.

In summary, the Zayante-Vergeles fault should be considered active for design purposes. Cao et al. (2003) concluded that the Zayante-Vergeles fault is capable of generating a magnitude 6.8 earthquake, with a recurrence interval of almost 9,000 years.

San Gregorio Fault

The San Gregorio fault skirts Santa Cruz County seaward of Monterey Bay and intersects the coast at Point Año Nuevo. North of Año Nuevo it passes offshore, intersecting the coast again at Half Moon Bay. North of Half Moon Bay, the San Gregorio fault lies offshore until it connects with the San Andreas fault near Bolinas. Southward from Monterey Bay, the San Gregorio fault intersects the coast at Point Sur and eventually connects with the Hosgri fault in south-central California (Dickinson et al., 2005).

The onshore segments of the San Gregorio fault at Point Año Nuevo and at Half Moon Bay show evidence of late Pleistocene and Holocene displacement (Weber and Cotton, 1981; Weber et al., 1995; Simpson et al., 1997). In addition to Stratigraphic evidence for Holocene activity, the historical seismicity in the region is partially attributed to the San Gregorio fault. Due to inaccuracies of epicenter locations, the magnitude 6+ earthquakes of 1926, tentatively assigned to the Monterey Bay fault zone, may have actually occurred on the San Gregorio fault (Greene, 1977). Recent stratigraphic studies of the fault document 97 miles of horizontal offset on the fault (Dickinson et al., 2005).

Petersen et al. (1996) divided the San Gregorio fault into the "San Gregorio" and "San Gregorio, Sur Region" segments. The segmentation boundary is located west of Monterey Bay, where the fault appears to have a right step-over. Petersen et al. (1996) assigned the San Gregorio fault in the study area a recurrence interval of 400 years. Cao et al. (2003) consider the fault capable of a magnitude 7.2.

Monterey Bay-Tularcitos Fault Zone

The Monterey Bay-Tularcitos fault zone is 6 to 9 miles wide, about 25 miles long, and consists of many en échelon faults identified during shipboard seismic reflection surveys (Greene, 1977). The fault zone trends northwest-southeast and intersects the coast in the vicinity of Seaside and Ford Ord. At this point, several onshore fault traces have been tentatively correlated with offshore traces in the heart of the Monterey Bay-Tularcitos fault zone (Greene, 1977; Clark et al., 1974; Burkland and Associates, 1975). These onshore faults are, from southwest to northeast, the Tularcitos-Navy, Berwick Canyon, Chupines, Seaside, and Ord Terrace faults. Only the larger of these faults, the Tularcitos-Navy and Chupines, are shown on Figure 4. It must be emphasized that these correlations between onshore and offshore portions of the Monterey Bay-Tularcitos fault zone are only tentative; for example, no concrete geologic evidence for connecting the Navy and Tularcitos faults under the Carmel Valley alluvium has been observed, nor has a direct connection between these two faults and any offshore trace been found.

Outcrop evidence indicates a variety of strike-slip and dip-slip movement associated with onshore and offshore traces. Earthquake studies suggest the Monterey Bay-Tularcitos fault zone is predominantly right-lateral, strike-slip in character (Greene, 1977). Stratigraphically, both offshore and onshore fault traces in this zone have displaced Quaternary beds and, therefore, are considered potentially active. One offshore trace, which aligns with the trend of the Navy fault, has displaced Holocene beds and is therefore active by definition.

Seismically, the Monterey Bay-Tularcitos fault zone may be historically active. The largest historical earthquake *tentatively* located in the Monterey Bay-Tularcitos fault zone are two events, estimated at 6.2 on the Richter Scale, in October 1926 (Greene, 1977). Because of possible inaccuracies in locating the epicenter of these earthquakes, it is possible that they actually occurred on the nearby San Gregorio fault zone (Greene, 1977).

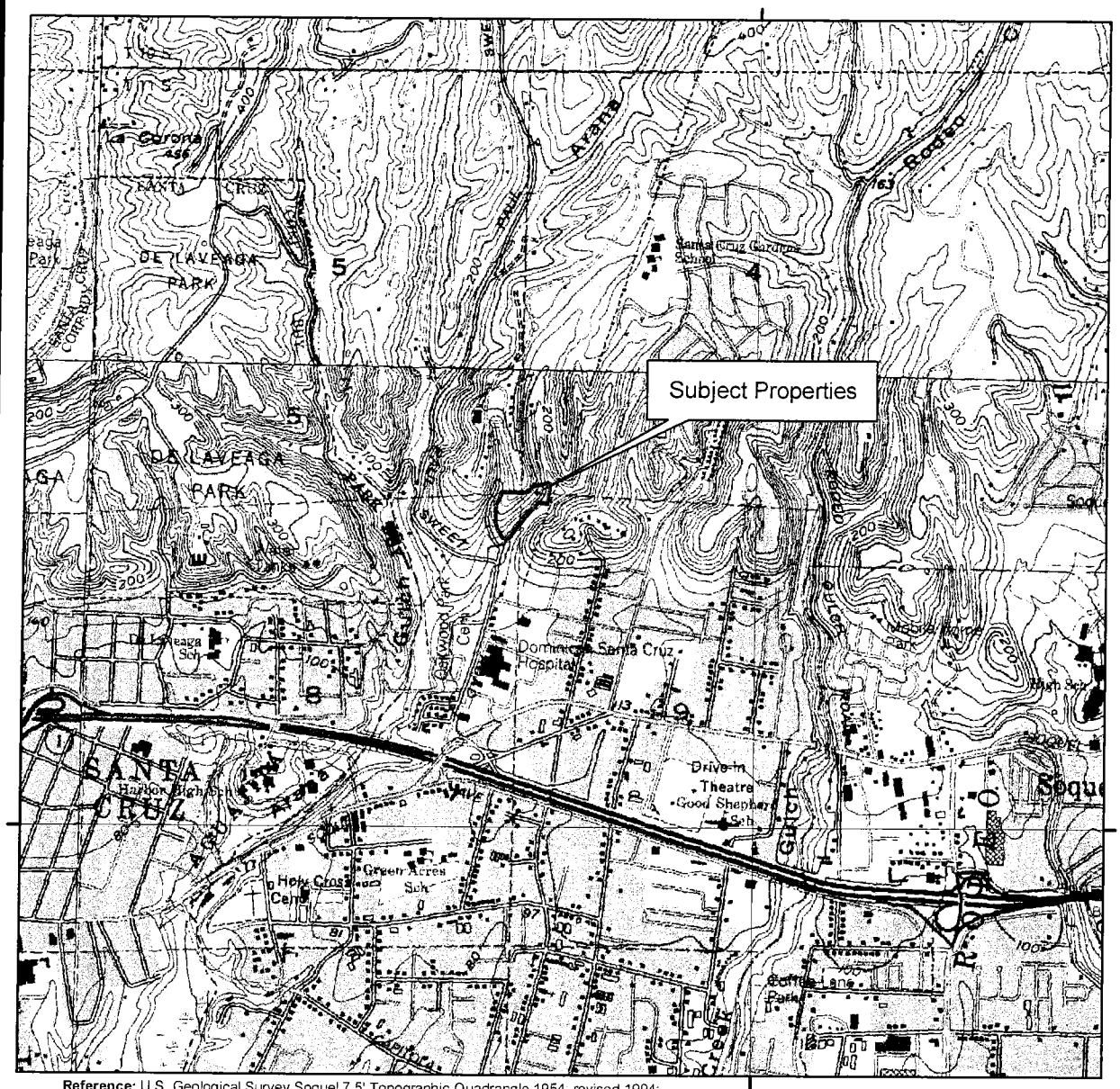
Another earthquake in April 1890 might be attributed to the Monterey Bay-Tularcitos fault zone (Burkland and Associates, 1975); this earthquake had an estimated Modified Mercalli Intensity of VII (Table B1) for Monterey County on a whole.

The WGONCEP (1996) has assigned an earthquake of M_w 7.1 with an effective recurrence interval of 2,600 years to the Monterey Bay-Tularcitos fault zone, based on Holocene offshore offsets. Petersen et al. (1996) have a similar earthquake magnitude, but for a recurrence interval of 2,841 years. Their earthquake is based on a composite slip rate of 0.5 millimeters per year (after Rosenberg and Clark, 1994)

TABLE B1
Modified Mercalli Intensity Scale

The modified Mercalli scale measures the intensity of ground shaking as determined from observations of an earthquake's effect on people, structures, and the Earth's surface. This scale assigns to an earthquake event a Roman numeral from I to XII as follows:

I	Not felt by people, except rarely under especially favorable circumstances.
II	Felt indoors only by persons at rest, especially on upper floors. Some hanging objects may swing.
III	Felt indoors by several. Hanging objects may swing slightly. Vibration like passing of light trucks. Duration estimated. May not be recognized as an earthquake.
IV	Felt indoors by many, outdoors by few. Hanging objects swing. Vibration like passing of heavy trucks; or sensation of a jolt like a heavy ball striking the walls. Standing automobiles rock. Windows, dishes, doors rattle. Wooden walls and frame may creak.
V	Felt indoors and outdoors by nearly everyone; direction estimated. Sleepers wakened. Liquids disturbed, some spilled. Small unstable objects displaced or upset; some dishes and glassware broken. Doors swing; shutters, pictures move. Pendulum clocks stop, start, change rate. Swaying of tall trees and poles sometimes noticed.
VI	Felt by all. Damage slight. Many frightened and run outdoors. Persons walk unsteadily. Windows, dishes, glassware broken. Knickknacks and books fall off shelves; pictures off walls. Furniture moved or overturned. Weak plaster and masonry cracked.
VII	Difficult to stand. Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary buildings; considerable in badly designed or poorly built buildings. Noticed by drivers of automobiles. Hanging objects quiver. Furniture broken. Weak chimneys broken. Damage to masonry; fall of plaster, loose bricks, stones, tiles, and unbraced parapets. Small slides and caving in along sand or gravel banks. Large bells ring.
VIII	People frightened. Damage slight in specially designed structures; considerable in ordinary substantial buildings, partial collapse; great in poorly built structures. Steering of automobiles affected. Damage or partial collapse to some masonry and stucco. Failure of some chimneys, factory stacks, monuments, towers, elevated tanks. Frame houses moved on foundations if not bolted down; loose panel walls thrown out. Decayed pilings broken off. Branches broken from trees. Changes in flow or temperature of springs and wells. Cracks in wet ground and on steep slopes.
IX	General panic. Damage considerable in specially designed structures; great in substantial buildings, with some collapse. General damage to foundations; frame structures, if not bolted, shifted off foundations and thrown out of plumb. Serious damage to reservoirs. Underground pipes broken. Conspicuous cracks in ground; liquefaction.
X	Most masonry and frame structures destroyed with their foundations. Some well-built wooden structures and bridges destroyed. Serious damage to dams, dikes, embankments. Landslides on river banks and steep slopes considerable. Water splashed onto banks of canals, rivers, lakes. Sand and mud shifted horizontally on beaches and flat land. Rails bent slightly.
XI	Few, if any masonry structures remain standing. Bridges destroyed. Broad fissures in ground; earth slumps and landslides widespread. Underground pipelines completely out of service. Rails bent greatly.
XII	Damage nearly total. Waves seen on ground surfaces. Large rock masses displaced. Lines of sight and level distorted. Objects thrown upward into the air.



Reference: U.S. Geological Survey Soquel 7 5' Topographic Quadrangle 1954, revised 1994; U.S. Geological Survey Laurel 7.5' Topographic Quadrangle 1955: revised 1994

N

3

1 inch equals 2,000 feet

Feet

0 1,000 2,000 4,000 6,000

SCALE 1:24,000

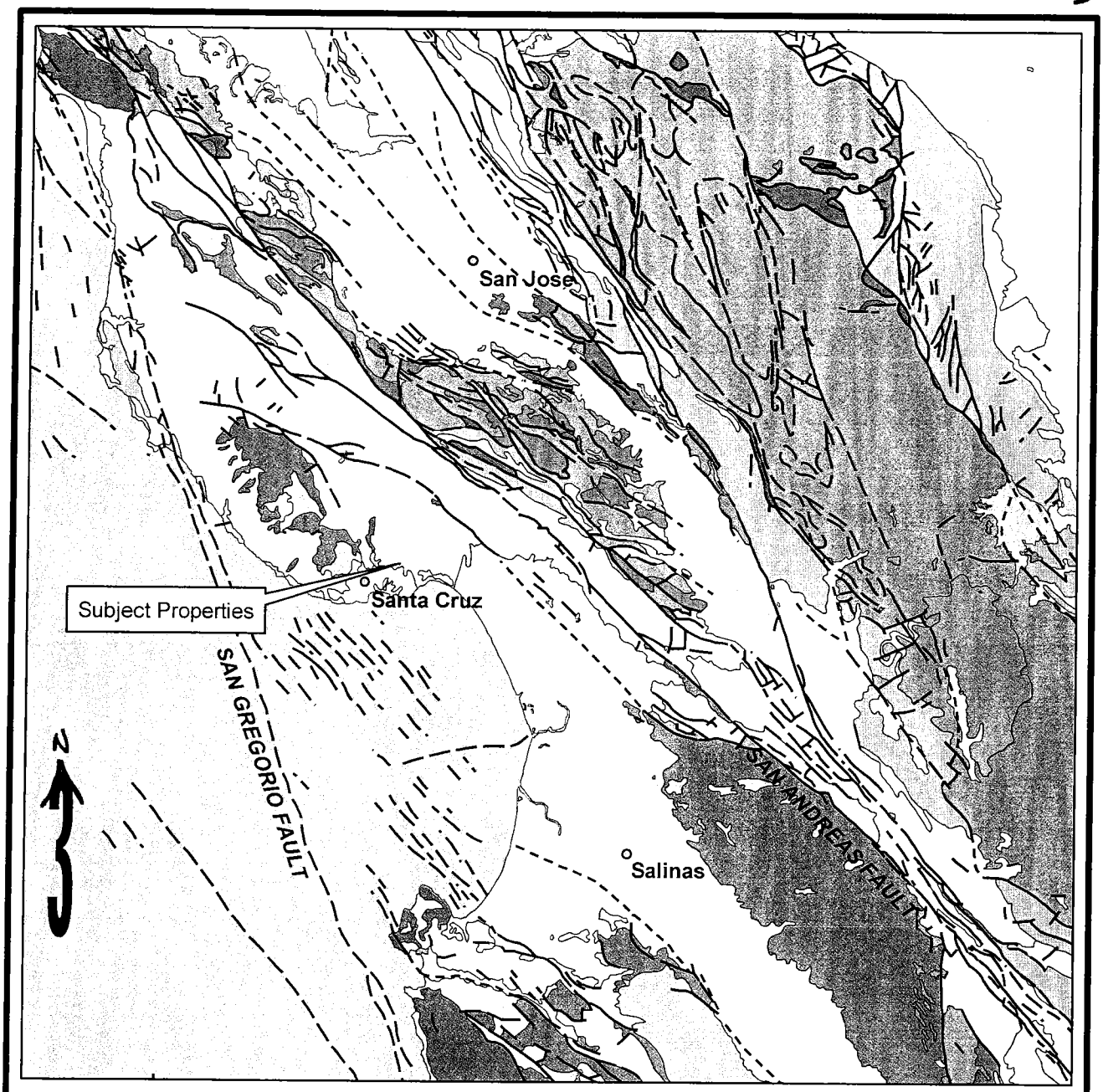
• Engineering Geology
• Hydrogeology
• GIS Services

NOLAN ASSOCIATES

Topographic Index Map
Santa Cruz Hills
Chaminade Lane,
Santa Cruz County, California
APN 025-013-24, 25, 26, 27

FIGURE # **1**

JOB # **07033**



References: Jennings, 1977; Saucedo et al., 2000

Symbols

- fault, certain
- fault, approximate
- fault, concealed or inferred
- contact, certain

Geologic Units

- Quaternary Deposits
- Quaternary Volcanics
- Tertiary Sedimentary Rocks
- Tertiary Volcanic Rocks
- Pre-Tertiary Sedimentary Rocks
- Granitic Intrusive Rocks
- Pre-Tertiary Volcanic Rocks
- Pre-Tertiary Metamorphic Rocks
- Franciscan Complex
- Ultramafic Rocks
- Pre-Cambrian Metamorphic and Igneous Rocks

SCALE 1:750,000

10 0 10 20 Miles

• Engineering Geology
• Hydrogeology
• GIS Services

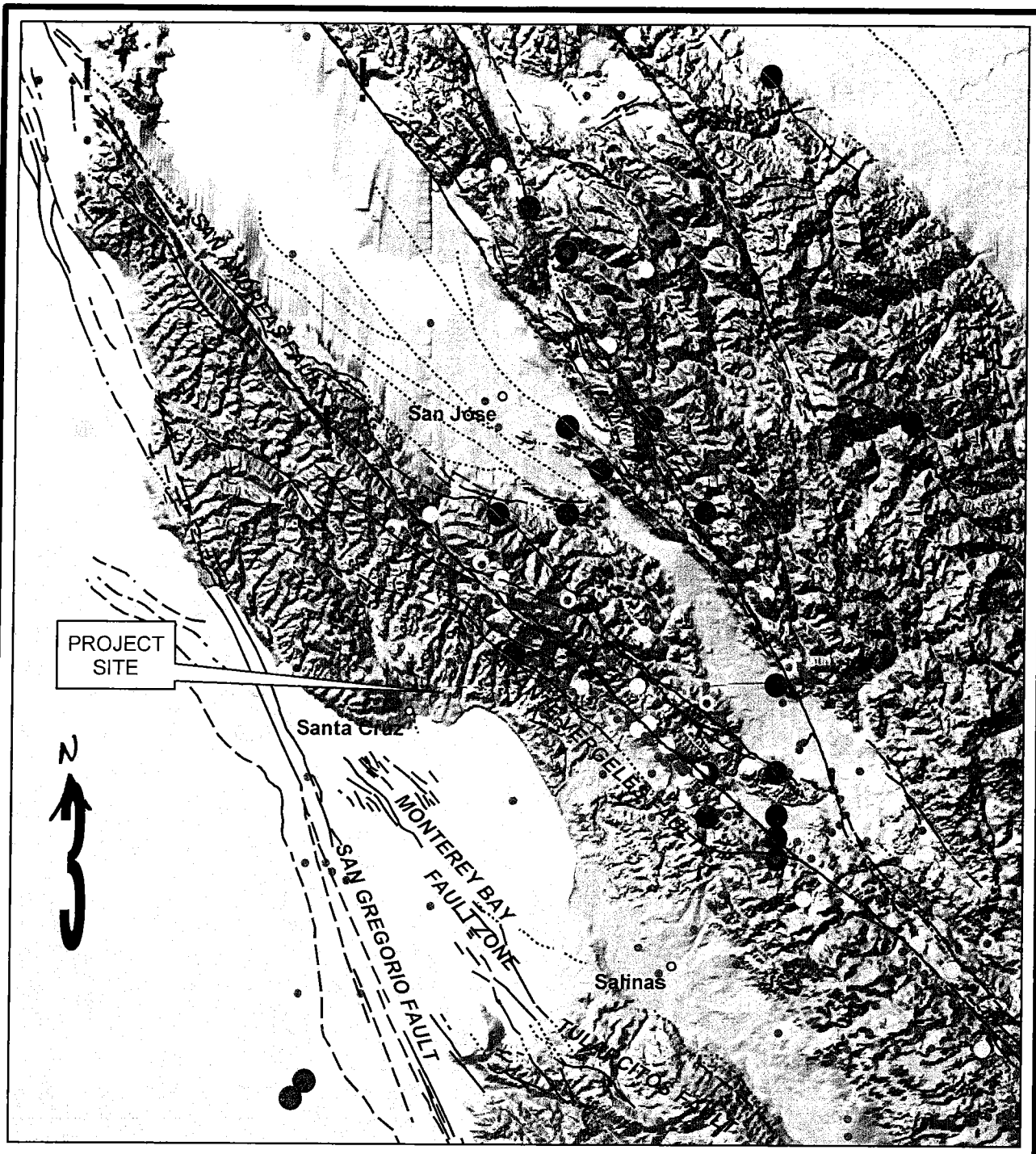
NOLAN ASSOCIATES

Regional Geologic Map
Santa Cruz Hills
Chaminade Lane
Santa Cruz county, California
APN 025-013-24, 25, 26, 27

FIGURE # **2**

JOB # **07033**

ATTACHMENT 3



Quaternary Faults

- fault, certain
- fault, approximate
- fault, concealed

Earthquake Magnitude

- 4.0 to 4.99
- 5.0 to 5.99
- 6.0 to 6.99
- 7.0 +

References: CGS, 2000; Bryant, 2005

SCALE 1:750,000

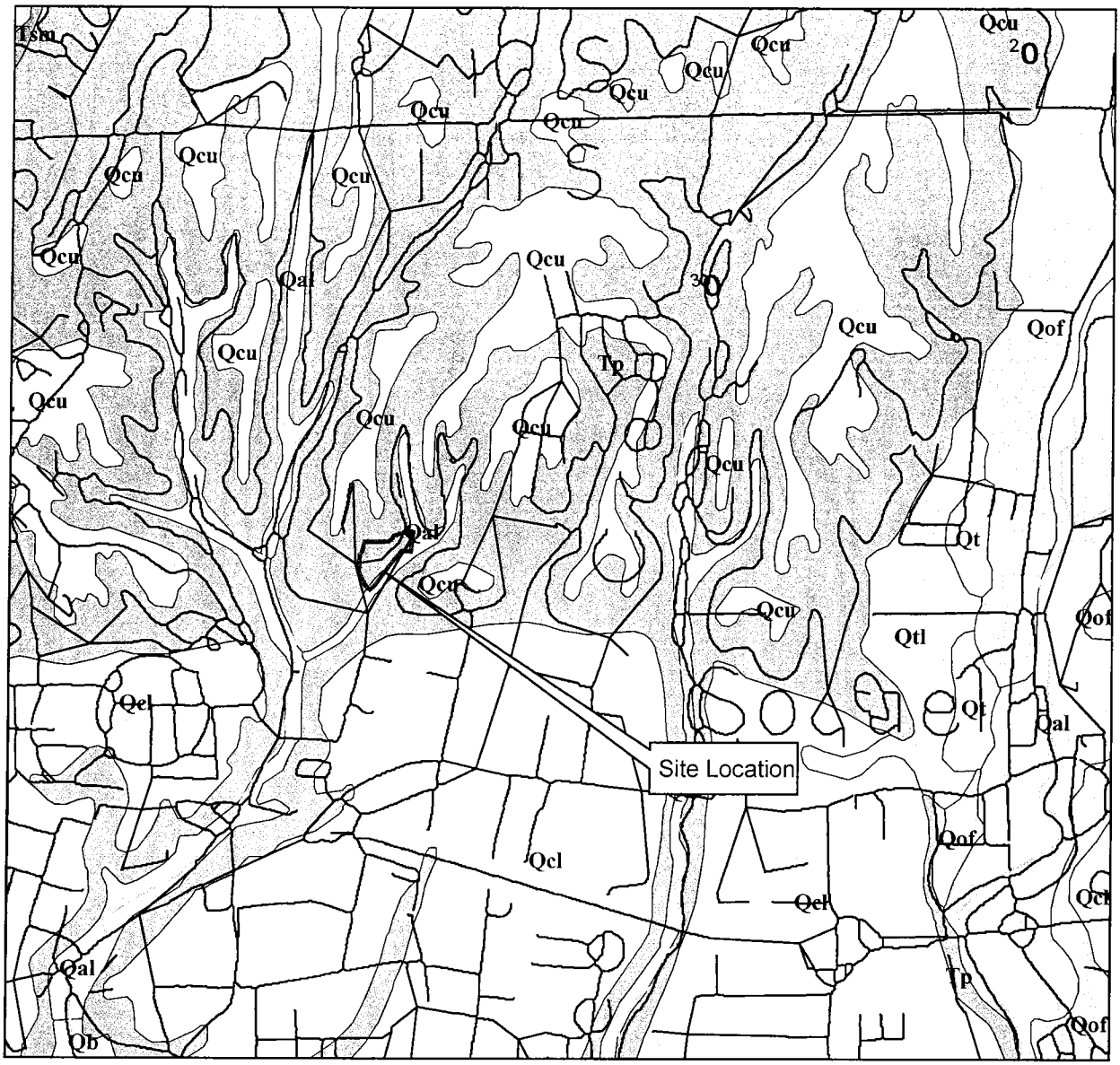
10 0 10 20 Miles

• Engineering Geology
• Hydrogeology
• GIS Services

NOLAN ASSOCIATES

Regional Seismicity Map
Santa Cruz Hills
Chaminade Lane
Santa Cruz County, California
APN 025-13-24,25,26,27

FIGURE **3**
JOB NO. **07033**



Reference: E.E. Brabb, 1989, Geologic Map of Santa Cruz County, California: USGS Miscellaneous Investigations Series map I-1905, scale 1.62,500
Digital Compilation: S. Graham, C. Wentworth, D. Knifong, R. Graymer, and J. Blissenbach, 1997: USGS Open-File Report 97-489

EXPLANATION

SYMBOLS

- bedding, certain
- bedding, approximate
- contact, certain
- contact, approximate
- contact, inferred

UNITS

- Qtl: Colluvium
- Qal: Alluvial deposits
- Qof: Older floodplain deposits
- Qds: Dune sand deposits
- Qt: Terrace deposits
- Qcu: Coastal terrace deposits, undifferentiated
- Qcl: Lowest emergent coastal terrace deposits
- Tp: Purisma Formation
- Tsm: Santa Margarita Sandstone
- qd

N

SCALE 1:24,000

1,000 0 1,000 2,000 Feet

• Engineering Geology
• Hydrogeology
• GIS Services

NOLAN ASSOCIATES

Local Geologic Map
Santa Cruz Hills
Chaminade Lane
Santa Cruz County, Califorina
APN 025-013-24, 25, 26, 27

FIGURE # **4**
JOB # **07033**

Reference: Roberts et al., 1998, Digital Compilation of "Preliminary Map of Landslide Deposits in Santa Cruz County, California, by Cooper-Clark and Associates, 1975"

3

EXPLANATION

SYMBOLS

- contact, certain
- topographic escarpment
- ? Small landslide deposit, queried where uncertain

LANDSLIDE DEPOSITS

- DR: Definite, recent movement
- D: Definite
- P: Probable
- ?: Uncertain
- Unclassified

SCALE 1:24,000

1,000 0 1,000 2,000 Feet

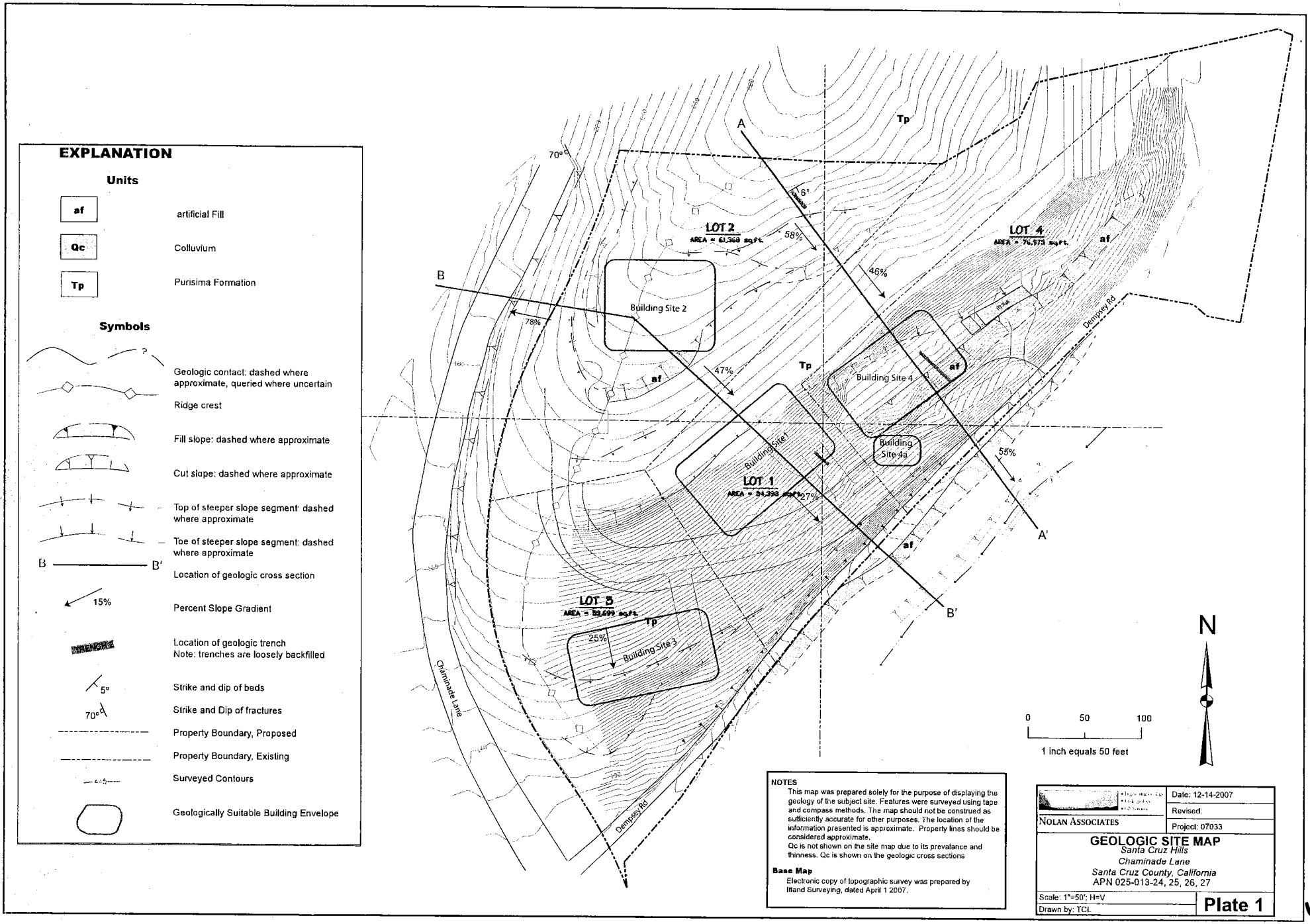
• Engineering Geology
• Hydrogeology
• GIS Services

NOLAN ASSOCIATES

Santa Cruz County Landslide Map
Santa Cruz Hills
Chaminade Lane
Santa Cruz County, California
APN 025-013-24, 25, 26, 27

FIGURE # **5**

JOB # **07033**



NOTES

This map was prepared solely for the purpose of displaying the geology of the subject site. Features were surveyed using tape and compass methods. The map should not be construed as sufficiently accurate for other purposes. The location of the information presented is approximate. Property lines should be considered approximate.

Qc is not shown on the site map due to its prevalance and thinness. Qc is shown on the geologic cross sections

Base Map

Electronic copy of topographic survey was prepared by Ifland Surveying, dated April 1 2007.

NOLAN ASSOCIATES

Date: 12-14-2007

Revised:

Project: 07033

GEOLOGIC SITE MAP

Santa Cruz Hills

Chaminade Lane

Santa Cruz County, California

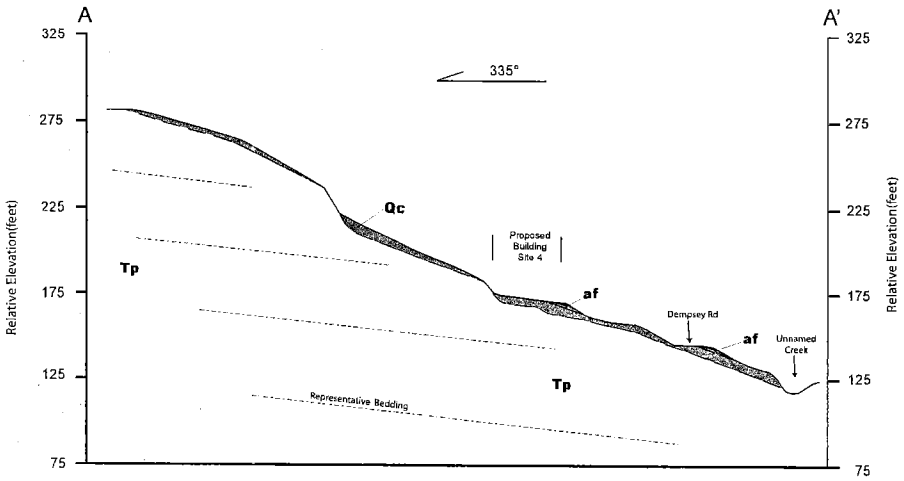
APN 025-013-24, 25, 26, 27

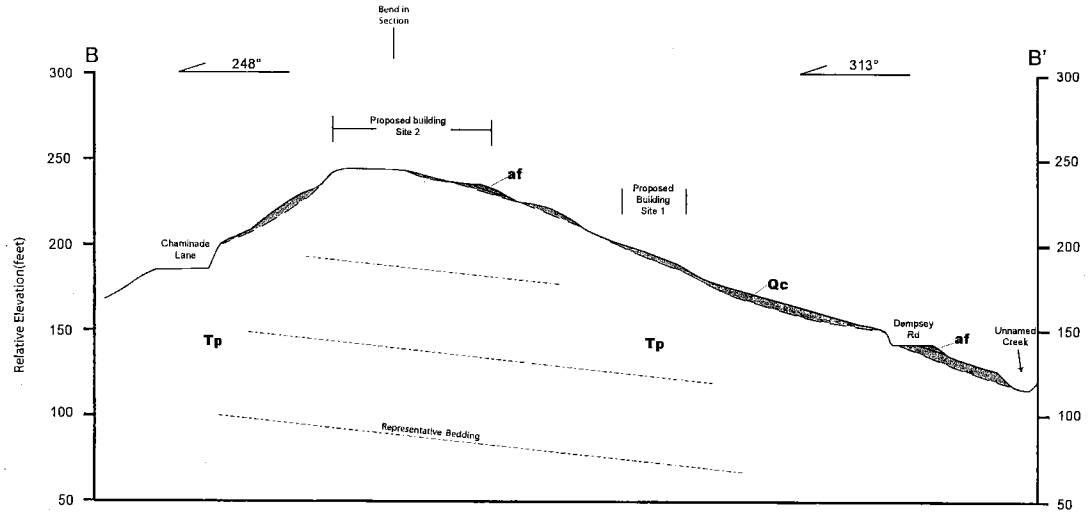
Scale: 1"=50'; H=V

Drawn by: TCL

Plate 1

ATTACHMENT 3





1 inch = 50 feet

0 50 100

Horizontal=Vertical

NOTE
Elevations shown are relative to survey by Nolan Associates, 2007

Refer to Plate 1, Geologic Site Map, for explanation of units and symbols.

NOLAN ASSOCIATES

Date: 12-19-2007
Revised:
Project: 07033

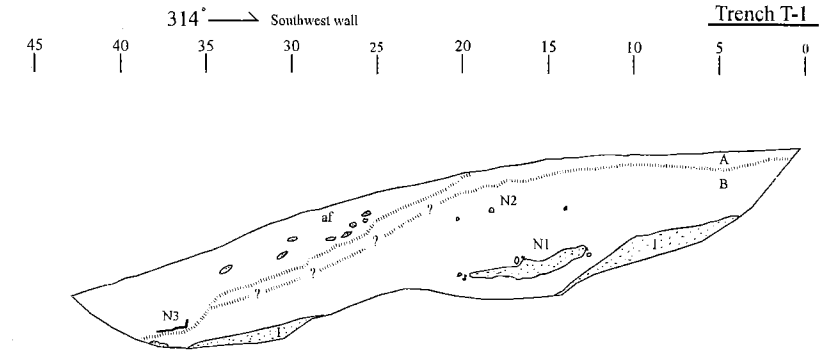
GEOLOGIC CROSS SECTIONS
Santa Cruz Hills
Chaminade Lane
Santa Cruz County, CA
APN 025-013-24, 25, 26, 27

Scale: 1"=50'
Drawn by: TCL

Plate 2

ATTACHMENT 3

Trench T-1



Units T-1

af - Sandy silt , dark brown, soft, dry to damp, abundant roots, isolated sandstone clasts, lower contact gradual over 2"- 3", marked by increase in soil structure and clay content. [artificial fill]
A - Silt with very fine grained sand, dark brown, common macropores, abundant roots, lower contact gradual over 1"- 2", marked by increase in clay content.
B - Clayey silt, dark brown with common grey areas, dry, firm, thin clay films on ped surfaces, isolated roots, lower contact sharp and planar.
I - Sandstone, very fine grained, tan, varigated with iron oxide staining, moderately indurated, massive, no apparent bedding.

Notes T-1

N1 - Large sandstone clast and associated pebble size sandstone clasts, highly fractured.
N2 - Rounded to subrounded 1" - 3" cobbles.
N3 - Old septic system, bottom old wood flooring.

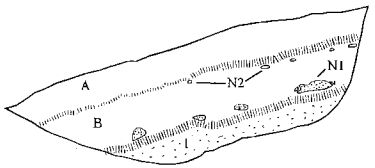
Legend

Sharp contact, dashed where approximate or indistict

Gradual contact (length of vertical lines represent zone of gradation)

Sandstone clast

Trench T-2



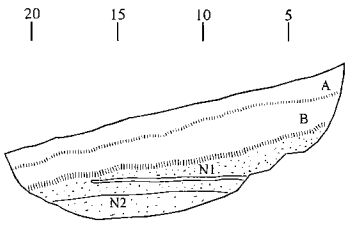
Units T-2

A - Clayey sand, dark brown to black, damp, crumb structure, abundant roots, lower contact gradual over over 3"- 6" and marked by increase in ped structure.
B - Sandy silt, brown, clay films on ped faces, blocky structure, hard, dry, isolated roots, lower contact gradual over ~ 8" and marked by sandstone clasts.
I - Sandstone, very fine grained, tan, varigated with iron oxide staining, moderately indurated, massive, commonly friable, no apparent bedding.

Notes T-2

N1 - Weathered sandstone clasts
N2 - 1"- 3" subrounded to rounded cobbles

Trench T-3



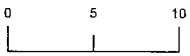
Units T-3

A - Sand and silt, very fine grained, dark to very dark greyish brown, soft to firm, dry to slightly moist, moderately developed crumb structure, abundant roots, macropores, lower contact gradual over ~ 2" and marked by ped structure and increasing clay content.
B - Sand with clay, medium to yellowish brown, firm to hard, slightly moist, large well developed blocky peds, 0% - 5% secondary clays, few to common thin clay films on ped faces and as bridges between grains, clay content decreases with depth, lower contact gradual over ~ 6", marked by disappearance of peds and secondary clays.
I - Sandstone, light yellowish brown, fine to medium grained,dense, slightly moist, friable, laminated layers of fine sand and granules, minor caliche layers forming along bedding.

Notes T-3

N1 - 240° / 6° South, attitude on contact between fine gravel layer and laminated fine sand layer
N2 - Thin (1/4") caliche layer

Horizontal = Vertical



1 inch equals 5 feet

• Engineering Geology
• Hydrogeology
• GIS Services

NOLAN ASSOCIATES

Date:12-12-2007
Revised:
Project: 07033

Geologic Trench Logs

Santa Cruz Hills
Santa Cruz County, California
APNs 025-013-39, -40, -41, & -42

Scale: 1"=5'; H=V
Drawn by: AP

Plate 3

ATTACHMENT 3

ATTACHMENT 4

COUNTY OF SANTA CRUZ

PLANNING DEPARTMENT
701 OCEAN STREET, 4TH FLOOR, SANTA CRUZ, CA 95060
(831) 454-2580 FAX: (831) 454-2131 TDD: (831) 454-2123
TOM BURNS, PLANNING DIRECTOR

October 14, 2008

Green Valley Corporation
C/o Lawlor Land Use
612 Spring Street
Santa Cruz, CA 95060

Subject: **Review of Engineering Geology Report by Nolan Associates Dated December 20,2007 AND April 21, 2008, Project No. 07033;**
APN: 025-013-22,23, Application No's: 07-0234

Dear Applicant:

The purpose of this letter is to inform you that the Planning Department has accepted the subject report and the following items shall be required:

1. All construction shall comply with the recommendations of the report.

2. Final plans shall reference the report and include a statement that the project shall conform to the report's recommendations. Plans shall also provide a thorough and realistic representation of all grading necessary to complete this project.

3. Prior to building permit application, a geotechnical engineering investigation and report must be submitted to the County of Santa Cruz with the appropriate review fee.

4. Prior to building permit issuance, a *plan review letter* shall be submitted to Environmental Planning. The author of the report shall write the *plan review letter*. The letter shall state that the project plans conform to the report's recommendations.

5. Prior to final lot line approval, an electronic copy (PDF file) of the Report file must be submitted to Environmental Planning. It can also be emailed to pln829@co.santa-cruz.ca.us. Please note that the electronic file must include the soils engineer's stamp and signature.

Our acceptance of the report is limited to its technical content. Other project issues such as zoning, fire safety, septic or sewer approval, etc. may require resolution by other agencies.

Please call the undersigned at 454-(3175) if we can be of any further assistance.

Sincerely,

Joe Hanna
County Geologist CEG 1313

Cc: Nolan Associates

ACE

AMSO CONSULTING ENGINEERS
SOILS, FOUNDATIONS & ENVIRONMENTAL ENGINEERING

731 SYCAMORE AVENUE, HAYWARD, CALIFORNIA 94544
Phone (510) 690-0714, Fax: (510) 690-0721, email: basil@amsoconsulting.com

June 15, 2012
Project 3360

Mr. Doug Locke
Barry Swenson Builder
777 North First Street, 5th Floor
San Jose, California 95112

Subject: Geotechnical Investigation Report Update
Four Lots Subdivision, Single Family Homes Near
Dempsey Road and Chaminade Lane
Santa Cruz, California

Dear Mr. Locke:

This letter presents our updated geotechnical investigation report for the four lots subdivision proposed along the north side of Dempsey Road at its intersection with Chaminade Lane in Santa Cruze, California.

In June of 2006, Amso Consulting Engineers prepared a geotechnical investigation report for a two lots subdivision proposed for this property. It is now subdivided into four lots. The purpose of this update is to collect subsurface information for the two additional two home sites.

SCOPE OF WORK

We propose to perform the following scope of work for this geotechnical investigation.

1. Reviewed geologic and geotechnical information in our files pertinent to the site and the surrounding area. We reviewed the following documents that were previously prepared by us.

   - A geotechnical investigation report entitled "Geotechnical Investigation for Two New Single Family Homes Near Paul Sweet Road and Chaminade Lane, Santa Cruz, California" and dated March 1, 2006.

   - A letter entitled "Geotechnical Assessment of Four Lots Subdivision Near Paul Sweet Road and Chaminade Lane, Santa Cruz, California" and dated June 26, 2007.

- A letter entitled "Review Geotechnical Elements of Design Drawings, Four Lots Subdivision (APN 025-013-23) Near Paul Sweet Road and Chaminade Lane, Santa Cruz, California" and dated August 22, 2008.

- A letter entitled "Review Geotechnical Elements of Design Drawings, Proposed Fire Truck Turnaround, Santa Cruz, California" and dated September 29, 2008.

2. Explored, sampled and classified foundation soils by means of three small diameter exploration drill holes. At the end of drilling, all holes will be backfilled with cement grout. The exploration holes were located within lots two and three.

3. Performed laboratory test on selected soil samples obtained from the exploration holes to determine their pertinent index and engineering characteristics.

4. Developed site seismic characteristics in accordance with the new California Building Code (CBC).

5. Reviewed and analyzed information collected from our literature review, subsurface exploration and laboratory testing.

Prepared this updated report summarizing our findings, conclusions, and geotechnical recommendations.

FINDINGS

Surface Conditions

Surface conditions at the project site have not changed since our initial geotechnical investigation performed in June of 2006.

Subsurface Conditions

Figure 4 shows a portion of a published geologic map of the site and vicinity. This map shows the site to be underlain by Tp, Purisma Formation (Pleistocene and Upper Miocene). This was confirmed by all of our nine exploration borings.

Subsurface conditions under the proposed building were explored by means of additional three small diameter exploration borings. The exploration borings were drilled to between 15 feet and 20 feet below existing ground surface. Within the depths of our exploration, the native soils at the site consist of sand, silt and clay.

June 15, 2012
Project 3360

The property is predominantly underlain by silty and clayey sand (SM/SC) of dense to hard consistency that extends to the maximum depth of our exploration.

No ground water was encountered in any of our borings at the time of our subsurface exploration.

The descriptions given above pertain only to the subsurface conditions found at the site at the time of our subsurface exploration in February of 2006 and May of 2012. Subsurface conditions, particularly ground water levels and the consistency of the near-surface soils will vary with the seasons.

Detailed descriptions of the materials encountered in the borings are given on the appended boring and cone penetration test logs together with the results of some of the laboratory tests performed on selected samples obtained from the drill holes.

Seismic Considerations

This site is located within a seismically active region but outside any of the Alquist-Priolo Earthquake Fault Zones. The following known faults are closest to the site.

Fault	Distance to Fault		Maximum Moment Magnitude
	Miles	Kilometers	
SAN ANDREAS (1906)	8	13	7.9
MONTEREY BAY – TULARCITOS	9	15	7.1
ZAYANTE-VERGELES	5	8	6.8
SAN GREGORIO	13	20	7.3
SARGENT	10	16	6.8
PALO COLORADO – SUR	17	27	7
MONTE VISTA - SHANNON	16	26	6.8

Seismic hazards can be divided into two general categories, hazards due to ground rupture and hazards due to ground shaking. Since no active faults are known to cross this property, the risk of earthquake-induced ground rupture occurring across the project site appears to be remote. Based on historic records and on the known general seismicity of the San Francisco Bay region, we consider it probable that during the next 50 years the site will be shaken by at least one

earthquake of Richter Magnitude 6.5 or greater, and by numerous earthquakes of lesser Magnitude, all having epicentral locations within about 20 miles of the site.

Should a major earthquake occur with an epicentral location close to the site, ground shaking at the site will undoubtedly be severe, as it will for other property in the general area. Even under the influence of severe ground shaking, the clayey soils that underlie the area proposed for development are unlikely to liquefy.

The following general site seismic parameters may be used for design in accordance with the California Building Code.

Site Class: **C** (Very Dense Soil and Soft Rock)

Mapped Acceleration Parameters: S_s (for short periods) = 1.50g
S_1 (for 1-second period) = 0.60g

Site Coefficient: F_a (for short periods) = 1.0
F_v (for 1-second period) = 1.3

Adjusted Maximum Considered EQ Spectral Response Acceleration Parameters:
$S_{MS} = F_a * S_s = 1.50g$
$S_{M1} = F_v * S_1 = 0.78g$

Design Spectral Response Acceleration Parameters:
$S_{DS} = 2/3 * S_{MS} = 1.000g$
$S_{D1} = 2/3 * S_{M1} = 0.52g$

Seismic Design Category: **D**

We should point out that the structural seismic design is not intended to eliminate damage to a structure. The goal of the design system is to minimize the loss of human life. It is unlikely that any structure can be designed to withstand the forces of a great earthquake without any damage at all.

June 15, 2012
Project 3360

Potential Geologic and Geotechnical Hazards

There are several potential geologic and geotechnical hazards that can affect any given site. They are discussed below, along with any required mitigation measures.

Ground Rupture:	Since no faults are believed to cross the site, it is our opinion that this is not a significant hazard to this site. No mitigation is required.
Ground Shaking:	This hazard is common to all properties in California. Mitigate by proper structural design and by following the recommendations presented in this report.
Lurching and Lateral Spreading:	Such seismically generated movements are induced in areas with weak soils near open cuts or slopes. Such conditions do not exist on this site. No mitigation is required.
Liquefaction:	Soils that underlie the site consists mainly of dense to hard silty sands that have no potential for liquefaction. No potentially liquefiable sands were found at this site. No mitigation is required.
Landsliding:	The site is underlain by very dense to hard very silty and clayey sand. Site slopes will remain stable under static and seismic loading conditions provided that the recommendations presented in our report are followed.
Compressible Soils:	Compressible soils are not present at this site. Recommendations for site preparations grading and compaction should be followed to minimize the potential compression of structural fills.
Expansive Soils:	No potentially expansive clays were encountered at this site.
Erosion:	The site soils have high potential for erosion. Mitigate by controlling the discharge of concentrated water, both during and after construction.

June 15, 2012
Project 3360

CONCLUSIONS AND RECOMMENDATIONS

Recommendations presented in our 2006 geotechnical investigation report are valid for the proposed single family homes proposed for construction on this property. The site is suitable for the proposed construction provided that the recommendations presented in our geotechnical investigation reports are followed during the design and construction phases.

Follow-up Geotechnical Services

Our recommendations are based on the assumption that **AMSO CONSULTING ENGINEERS** will be commissioned to perform the following services.

1. Review final grading and foundation plans prior to construction.
2. Observe and advise during clearing and stripping of the site.
3. Observe, test and advise during grading and placement of structural fill.
4. Test proposed capillary break material that will be used beneath concrete slabs-on-grade and advise on suitability.
5. Observe and advise during foundation and slab construction.
6. Observe, test and advise during utility trench backfilling.
7. Observe, test and advise during construction of pavements.

LIMITATIONS

The recommendations contained in this report are based on certain plans, information and data that have been provided to us. Any change in those plans, information and data will render our recommendations invalid unless we are commissioned to review the change and to make any necessary modifications and/or additions to our recommendations.

Subsurface exploration of any site is necessarily confined to selected locations. Conditions may, and often do, vary between and around such locations. Should conditions different from those encountered in our explorations come to light during project development, additional exploration, testing and analysis may be necessary; changes in project design and construction may also be necessary.

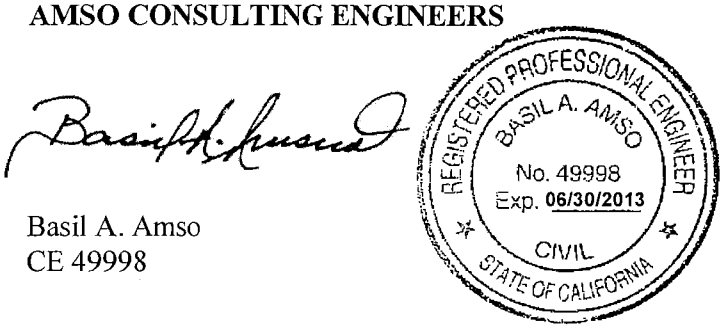
June 15, 2012
Project 3360

Our recommendations have been made in accordance with the principles and practices generally employed by the geotechnical engineering profession. This is in lieu of all other warranties, express or implied.

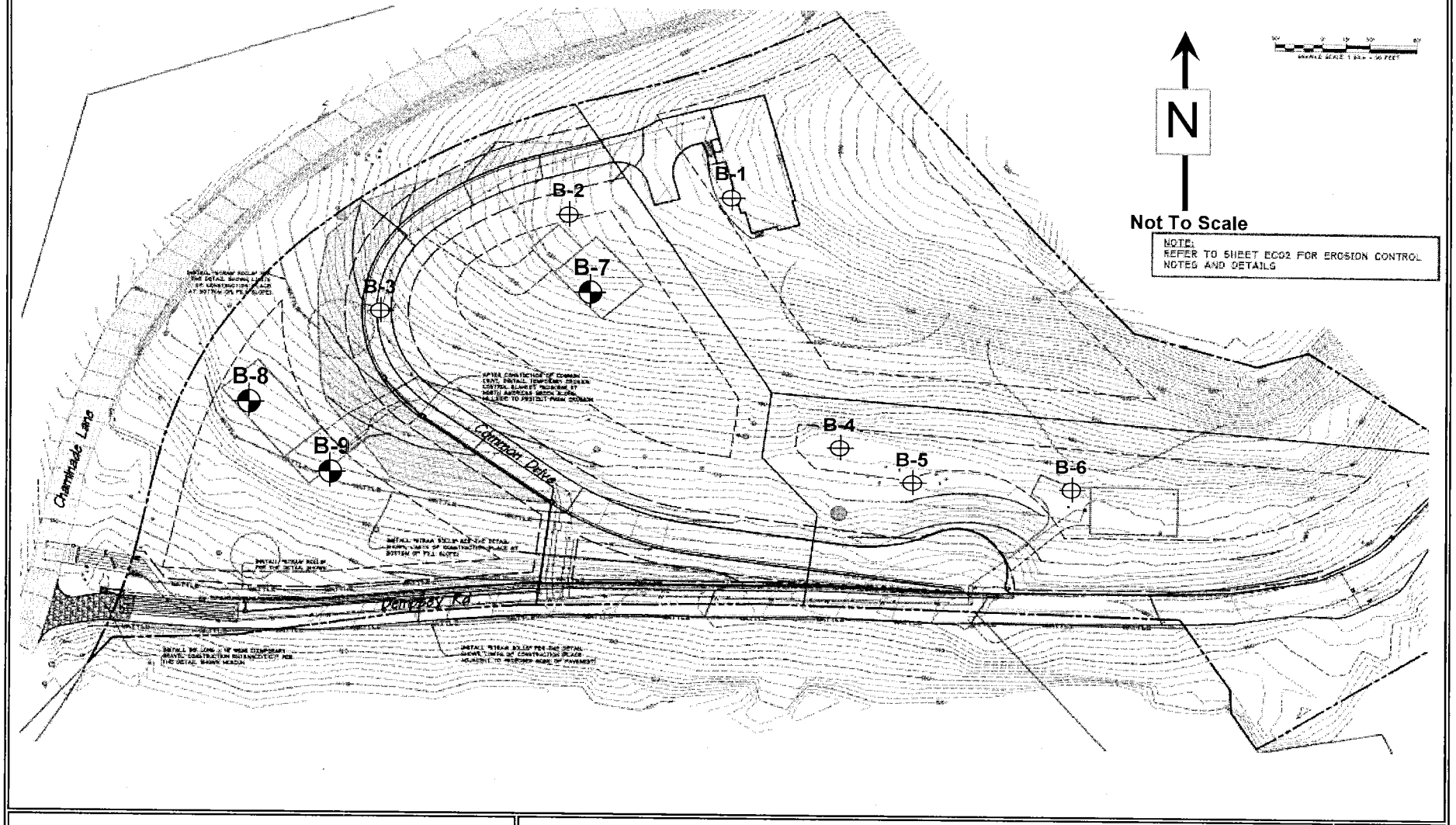
All earthwork and associated construction should be observed by our field representative, and tested where necessary, to compare the generalized site conditions assumed in this report with those found at the site at the time of construction, and to verify that construction complies with the intent of our recommendations.

Report prepared by:

AMSO CONSULTING ENGINEERS



Basil A. Amso
CE 49998



AMSO CONSULTING ENGINEERS	SITE PLAN AND LOCATION OF EXPLORATION HOLES	FIGURE 1
JUNE 2012	SANTA CRUZ HILLS SUBDIVISION DEMPSEY ROAD & CHAMINADE LANE SANTA CRUZ, CALIFORNIA	PROJECT 3360

ATTACHMENT 5

ATTACHMENT 5

APPENDIX A

Key to Exploration Logs and Boring Logs

ATTACHMENT 5

KEY TO EXPLORATORY BORING LOGS

SOIL CLASSIFICATIONS

PRIMARY DIVISIONS			GROUP1 SYMBOL	SECONDARY DIVISIONS
COARSE GRAINED SOILS More than half of material is larger than No. 200 sieve size	GRAVELS More than half coarse fraction is larger than No.4 sieve	Clean Gravels (less than5% fines*)	GW	Well graded gravels, gravel-sand mixtures, little or no fines
			GP	Poorly graded gravels, gravel-sand mixtures, little or no fines
		Gravel with fines*	GM	Silty gravels, gravel-sand-silt mixtures, non-plastic fines
			GC	Clayey gravels, gravel-sand-clay mixtures, plastic fines
	SANDS More than half coarse fraction is smaller than No.4 sieve	Clean Sands (less than 5%fines*)	SW	Well graded sands, gravelly sands, little or no fines
			SP	Poorly graded sands or gravelly sands, little or no fines
		Sands with fines*	SM	Silty sands, silt-sand mixtures, non-plastic fines
			SC	Clayey sand, sand-clay mixtures, plastic fines
FINE GRAINED SOILS More than half of material is smaller than No. 200 sieve size	SILTS AND CLAYS Liquid limit is less than 35		ML	Inorganic silts, clayey silts, rock flour, silty very fine sands
			CL	Inorganic clays of low plasticity, gravelly clay of low plasticity
			OL	Organic silts and organic silty clays of low plasticity
	SILTS AND CLAYS Liquid limit is between35 and 50		MI	Inorganic silts, clayey silts and silty fine sand with intermediate plasticity
			CI	Inorganic clays, gravely clays, sandy clays and silty clays of intermediate plasticity
			OI	Inorganic clays and silty clays of intermediate plasticity
	SILTS AND CLAYS Liquid limit is greater than 50		MH	Inorganic silts, clayey silts, elastic silts, micaceous or diatomaceous silty or fine sandy soil
			CH	Inorganic clays of high plasticity
			OH	Organic clays and silts of high plasticity
HIGHLY ORGANIC SOILS			Pt	Peat, meadow mat, highly organic soils

GRAIN SIZES

U.S. STANDARD SERIES SIEVE				CLEAR SQUARE SIEVE OPENINGS			
200	40	10	4	¾"	3"	12"	
Silts and Clays	Fine	Medium	Coarse	Fine	Coarse	Cobbles	Boulders
	SAND			GRAVEL			

RELATIVE DENSITY

SANDS, GRAVELS AND NON-PLASTIC SILTS	BLOWS/FOOT*
VERY LOOSE	0 – 4
LOOSE	4 – 10
MEDIUM DENSE	10 – 30
DENSE	30 – 50
VERY DENSE	OVER 50

CONSISTENCY

CLAYS AND PLASTIC SILTS	UNCONFINED SHEAR STRENGTH (PSF)	BLOWS/FOOT*
VERY SOFT	0 – 250	0 – 2
SOFT	250-500	2 – 4
FIRM	500-1000	4 – 8
STIFF	1000-2000	8 – 16
VERY STIFF	2 000– 4000	16 – 32
HARD	>4000	OVER 32

SYMBOLS

▽	Initial Ground Water Level
▽	Final Ground Water Level
*	Standard Penetration Sampler
X	Modified California Sampler
D	Dames & Moore Sampler

NOTES

*BLOWS per FOOT – Resistance to advance the soil sampler in number of blows of a 140-pound hammer falling 30 inches to drive a split spoon sampler.

Stratification lines on the logs represent the approximate boundary between soil types, and the transition may be gradual.

Modified California Sampler – 2 ½ O.D. (1 7/8 Inch I.D.) sampler

Standard Penetration Sampler – 2 inch O.D. (1 3/8 Inch I.D.) split spoon sampler (ASTM D1586).

Dames & Moore Sampler – 3 inch O.D. (2.5 inch I.D.) sampler

BORING LOG

No. B-7

PROJECT Santa Cruz Hills | DATE 05/29/2012 | LOGGED BY BAA

DRILL RIG Track Mounted, Continuous Flight | HOLE DIA. 4" | SAMPLER X - Modified California; * - S.P.T

GROUND WATER DEPTH INITIAL --- | FINAL --- | HOLE ELEVATION

DESCRIPTION	SOIL TYPE	DEPTH	SAMPLE	BLOWS PER FOOT	POCKET PEN (tsf)	TORVANE (tsf)	LIQUID LIMIT (%)	WATER CONTENT (%)	PLASTIC LIMIT (%)	DRY DENSITY (pcf)	FAILURE STRAIN (%)	UNCONFINED COMPRESSIVE STRENGTH (psf)
Sandy Clay to Clayey Sand; brown, damp, medium dense	SC/ CL	1										
Clayey Sand, tan and brown, damp to dry, very dense to hard	SC	2	x	50/7"				16		99		
		3										
		4										
		5	*	50/9"				17				
		6										
		7										
		8										
		9										
		10	*	72								
		11										
		12										
		13										
		14										
		15	*	50/6"								
hard drilling		16										
		17										
		18										
		19										
Bottom of Hole at 20 feet No ground water encountered		20	*	50/4"								

BORING LOG

No. B-8

PROJECT Santa Cruz Hills | DATE 05/29/2012 | LOGGED BY BAA

DRILL RIG Track Mounted, Continuous Flight | HOLE DIA. 4" | SAMPLER X - Modified California; * - S.P.T

GROUND WATER DEPTH INITIAL --- | FINAL --- | HOLE ELEVATION

DESCRIPTION	SOIL TYPE	DEPTH	SAMPLE	BLOWS PER FOOT	POCKET PEN (tsf)	TORVANE (tsf)	LIQUID LIMIT (%)	WATER CONTENT (%)	PLASTIC LIMIT (%)	DRY DENSITY (pcf)	FAILURE STRAIN (%)	UNCONFINED COMPRESSIVE STRENGTH (psf)
Silty Sand to Clayey Sand; brown, damp, medium dense	SC	1										
Silty Sand; light brown, damp, very dense to hard	SM	2										
		3	*	48				17				
		4										
hard drilling		5	*	50/4"				14				
		6										
		7										
		8										
		9										
		10	*	50/8"								
		11										
		12										
		13										
		14										
		15	*	74								
		16										
		17										
		18										
		19										
Bottom of hole at 20 feet No ground water encountered		20	*	50/8"								

Project # 3360 **AMSO CONSULTING ENGINEERS** Page 1 of 1

ATTACHMENT 5

BORING LOG

No. B-9

PROJECT Santa Cruz Hills | DATE 05/29/2012 | LOGGED BY BAA

DRILL RIG Track Mounted, Continuous Flight | HOLE DIA. 4" | SAMPLER X - Modified California; * - S.P.T

GROUND WATER DEPTH INITIAL --- | FINAL --- | HOLE ELEVATION

DESCRIPTION	SOIL TYPE	DEPTH	SAMPLE	BLOWS PER FOOT	POCKET PEN (tsf)	TORVANE (tsf)	LIQUID LIMIT (%)	WATER CONTENT (%)	PLASTIC LIMIT (%)	DRY DENSITY (pcf)	FAILURE STRAIN (%)	UNCONFINED COMPRESSIVE STRENGTH (psf)
Silty Sand; brown, damp, medium dense	SC	1										
Silty Sand; light brown, damp, very dense to hard	SM	2	*	48				14				
		3										
		4										
hard drilling		5	*	50/4"								
		6										
		7										
		8										
		9										
		10	*	50/8"								
		11										
		12										
		13										
		14										
		15	*	68								
Bottom of hole at 15 feet No ground water encountered		16										
		17										
		18										
		19										
		20										

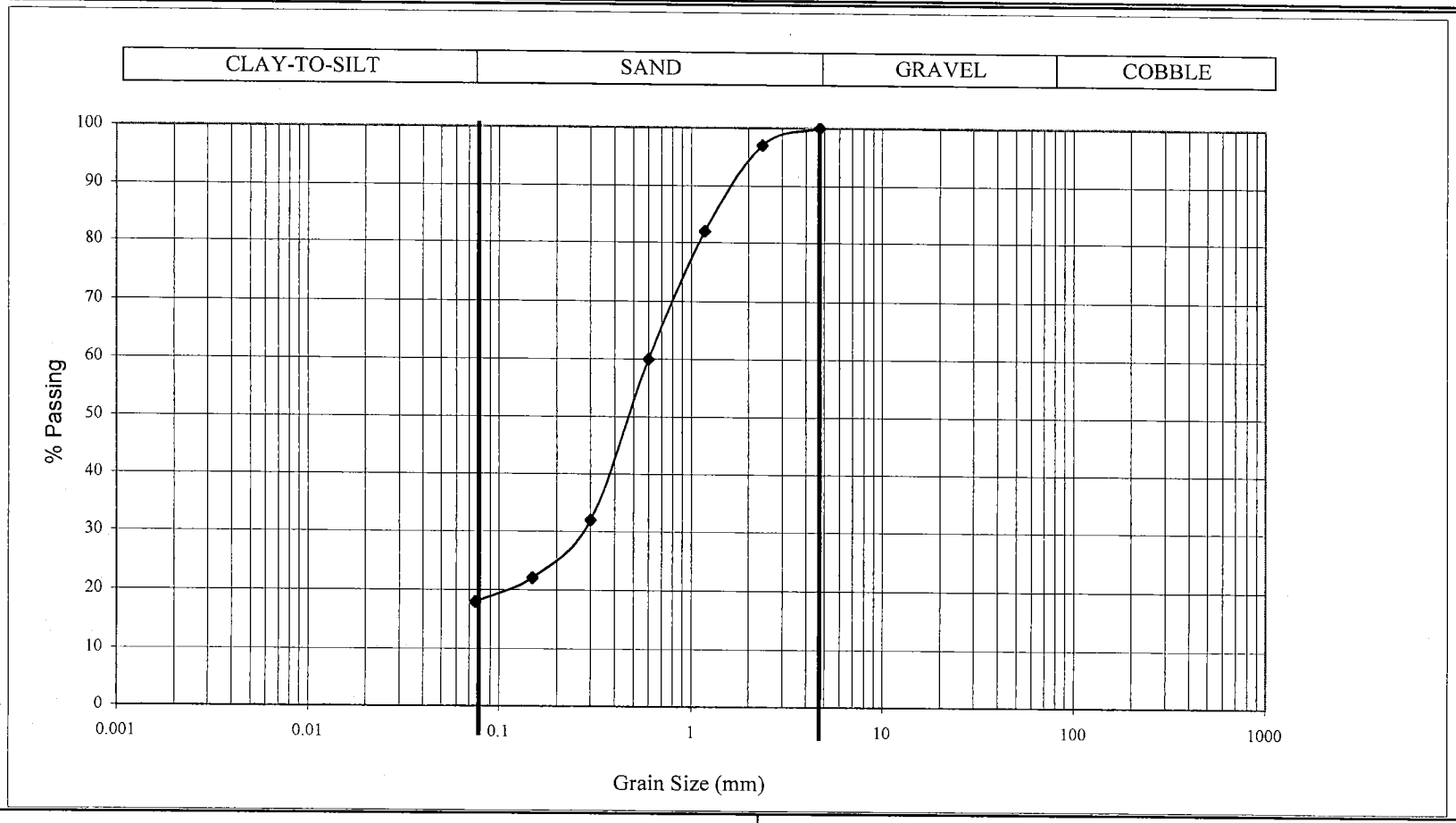
ATTACHMENT 5

APPENDIX B

Laboratory Test Results

GRAIN SIZE DISTRIBUTION

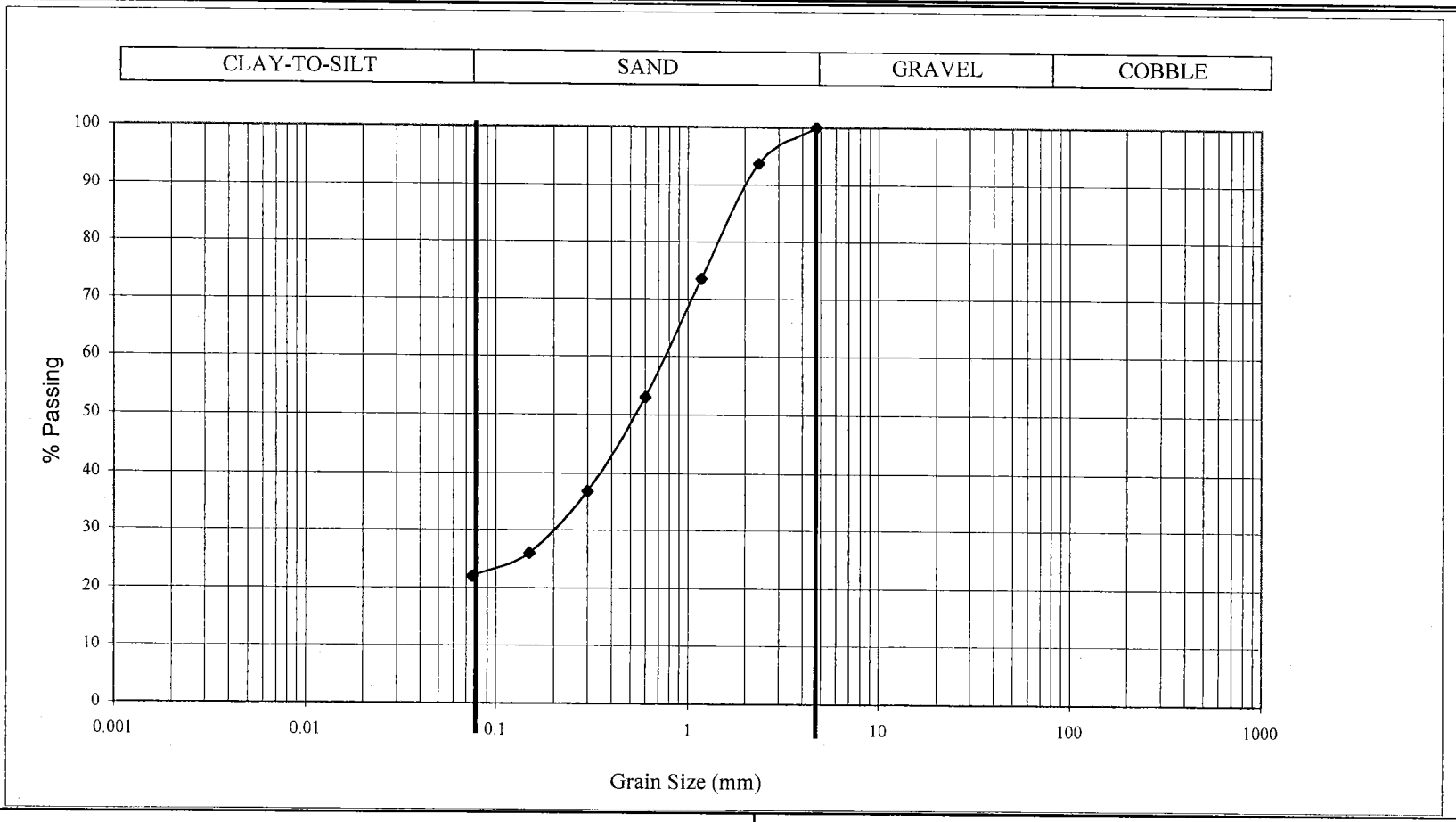
Project:	SANTA CRUZ HILLS	Date:	06/10/2012
Sample	B-7 @ 5 FT	Project #:	3360
		Lab # :	
Material Description:	SILTY SAND	Date Tested:	06/07/2012



ATTACHMENT 5

GRAIN SIZE DISTRIBUTION

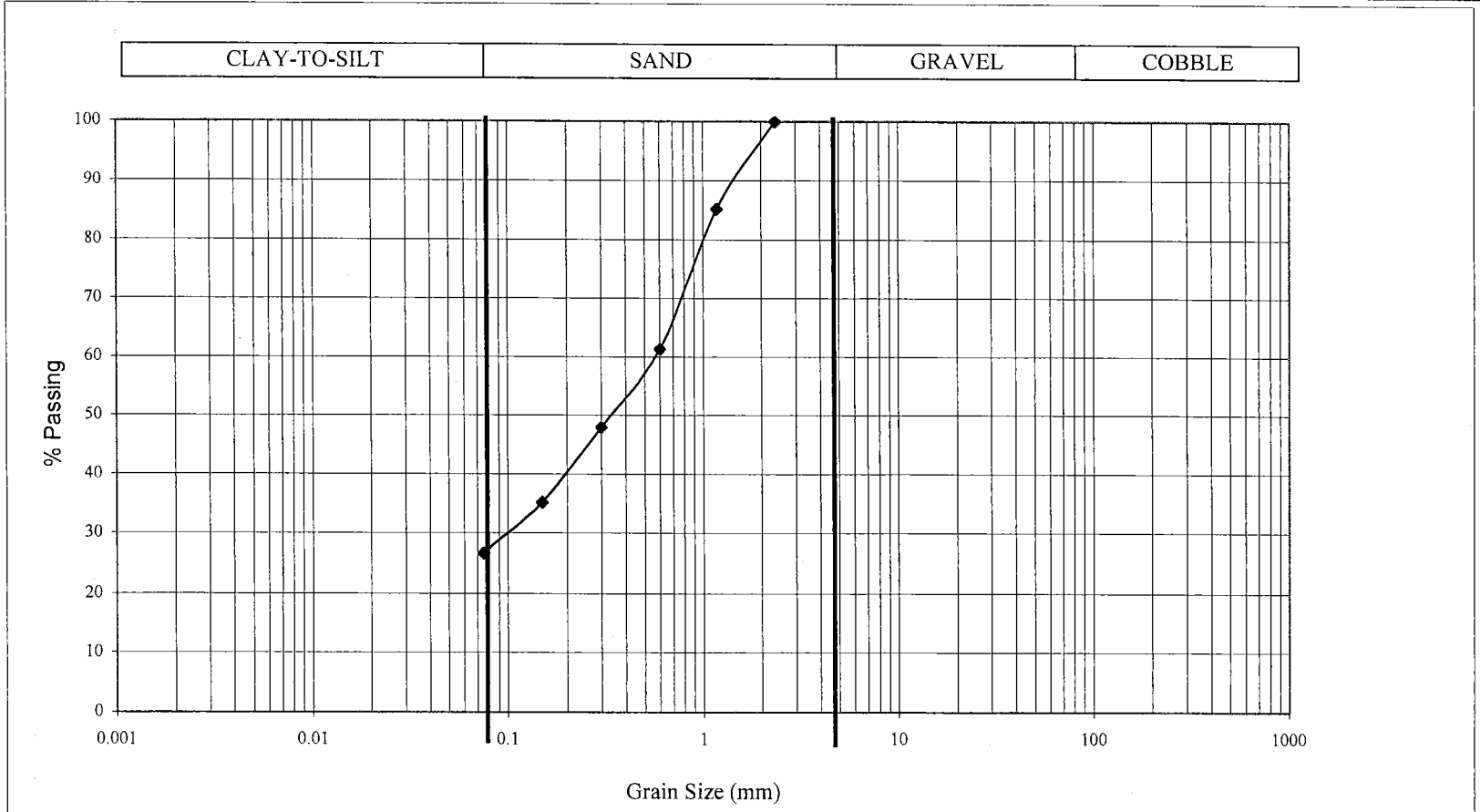
Project:	SANTA CRUZ HILLS	Date:	06/10/2012
Sample	B-8 @ 10 FT	Project #:	3360
		Lab # :	
Material Description:	SILTY SAND	Date Tested:	06/07/2012



ATTACHMENT 5

GRAIN SIZE DISTRIBUTION

Project:	SANTA CRUZ HILLS	Date:	06/10/2012
Sample	B-9 @ 2 FT	Project #:	3360
		Lab # :	
Material Description:	SILTY SAND	Date Tested:	06/07/2012



ATTACHMENT 5

ATTACHMENT 5

Previous Geotechnical Reports

ACE
AMSO CONSULTING ENGINEERS
SOILS, FOUNDATIONS & ENVIRONMENTAL ENGINEERING
1478 B STREET, SUITE 1C, HAYWARD, CALIFORNIA 94541
Phone (510) 690-0714, Fax: (510) 690-0721, email: basil@amsoconsulting.com

March 1, 2006
Project 3360

Mr. Doug Locke
Barry Swenson Builder
777 North First Street, 5th Floor
San Jose, California 95112

Subject: Geotechnical Investigation for
Two New Single Family Homes Near
Paul Sweet Road and Chaminade Lane
Santa Cruz, California

Dear Mr. Locke:

This report presents our geotechnical investigation for the two home sites located along the north side of a private road off of Chaminade Lane few feet north of its intersection with Paul Sweet Road in Santa Cruz, California.

As now planned, two single family homes are proposed for construction on this property. One house is proposed for construction along the higher portion of the property and the second on the lower portion of the property. We understand that access to both houses will be provided through a paved driveway from the private road. The purpose of this investigation is to provide generalized geotechnical recommendation for site development.

SCOPE OF WORK

We performed the following scope of work for this geotechnical investigation.

1. Reviewed geologic and geotechnical information in our files pertinent to the site and the surrounding area.

2. Explored, sampled and classified foundation soils by means of six exploration borings. All holes were advanced to at least 10 feet into competent soil or to drilling refusal. At the end of drilling, all holes will be backfilled with soil cutting.

3. Performed laboratory test on selected soil samples obtained from the exploration holes to determine their index and engineering characteristics.

4. Reviewed and analyzed the information collected above.

5. Developed site seismic characteristics, zone factor (Z) and seismic near-source factors (N_a and N_v) for site structure resonance in accordance with the 1997 Uniform Building Code.

6. Prepared this report summarizing our findings, conclusions, and geotechnical recommendations.

FINDINGS

Surface Conditions

The property is located in the City of Santa Cruz, California along north side of a private road from Chaminade Lane just north of its intersection with Paul Sweet Road (see Figure 1, Vicinity Map). The property slopes down to the south and west at gradients of between 2.5 and 3.5 to 1 (horizontal to vertical). Ground elevations at the property range from about 140 to 250 feet (Based on the USGS Topographic Maps).

At the time of our subsurface exploration, the site was vacant of any structure. The majority of the site was covered with native trees, eucalyptus trees, bushes and grass. Remnants of what appears to be old foundations were found within the area of the lower lot. Old concrete wall was found along the uphill side of what appears to be a driveway that leads to the building pad for the lower lot. This level pad was created by cutting and filling along the hillside. A man made cave was also found near the northwest end of this pad at the lower parcel.

Subsurface Conditions

Subsurface conditions at the site were explored by means of six exploration drill holes extended to a depth of between 10 and 15 feet. Within the depth of our exploration, the native soils at the site consist of clay, silt, sand and weathered sandstone.

A surficial layer of sandy clay (CL) of low plasticity and low potential for expansion was encountered in all exploration holes. This layer of sandy clay varies in thickness between 2 and 3 feet below existing ground surface and is underlain by very dense to hard and slightly cemented clayey sand (weathered sandstone). This layer of sandstone extends to the maximum depth of our exploration.

A layer of loose fill was found along the downhill side of the almost level building pad at the lower parcel. This layer of fill consists of sandy clay (CL) of low plasticity and low potential for expansion and is about 7 feet thick.

No ground water was encountered in any of our borings at the time of our subsurface exploration.

The descriptions given above pertain only to the subsurface conditions found at the site at the time of our subsurface exploration in February of 2006. Subsurface conditions, particularly

ground water levels and the consistency of the near-surface soils will vary with the seasons.

Detailed descriptions of the materials encountered in the borings are given on the appended boring log together with the results of some of the laboratory tests performed on selected samples obtained from the boring.

Seismic Considerations

This site is located within a seismically active region but outside any of the Alquist-Priolo Earthquake Fault Zones. Type A and Type B faults as defined in the UBC 1997 that are close to the site are listed in the following table.

TABLE 1 – TYPES A AND B FAULTS CLOSE TO THE SITE

Fault	Type	Maximum Moment Magnitude	Slip Rate (mm/yr)	Distance (miles)	(km)	Peak Site Acceleration (g)
SAN ANDREAS (1906)	A	7.9	24	8	13	0.44
SAN GREGORIO	A	7.3	5	13	20	0.26
ZAYANTE-VERGELES	B	6.8	0.1	5	8	0.41
MONTEREY BAY - TULARCITOS	B	7.1	0.5	9	15	0.36
SARGENT	B	6.8	3	10	16	0.25
MONTE VISTA - SHANNON	B	6.8	0.4	16	26	0.16
PALO COLORADO - SUR	B	7	3	17	27	0.16

Seismic hazards can be divided into two general categories, hazards due to ground rupture and hazards due to ground shaking. Since no active faults are known to cross this property, the risk of earthquake-induced ground rupture occurring across the project site appears to be remote.

Should a major earthquake occur with an epicentral location close to the site, ground shaking at the site will undoubtedly be severe, as it will for other property in the general area. Even under the influence of severe ground shaking, the soils that underlie the area proposed for development are unlikely to liquefy.

The following general site seismic parameters may be used for design in accordance with the 1997 Uniform Building Code.

Seismic Zone:	4
Soil Type:	S_C: Very Dense Soil and Soft Rock
Seismic Source:	**Type A**; (San Andreas); 13 km **Type B**; (Zayante – Vergeles); 8 km
Near Source Factors:	Consistent with source type **A** of distance 13 km and for source type **B** of distance less than 8 km
	$\mathbf{N_a}$: 1.00 $\mathbf{N_v}$: 1.08

We should point out that the structural seismic design is not intended to eliminate damage to a structure. The goal of the design system is to minimize the loss of human life. It is unlikely that any structure can be designed to withstand the forces of a great earthquake without any damage at all.

Potential Geologic and Geotechnical Hazards

There are several potential geologic and geotechnical hazards that can affect any given site. They are discussed below, along with any required mitigation measures.

Ground Rupture: In our opinion, this is not a significant hazard to this site. No mitigation is required.

Ground Shaking: This hazard is common to all properties in California. Mitigate by proper structural design and by following the recommendations presented in this report.

Lurching and Lateral Spreading: Such seismically generated movements are induced in areas with weak soils near open cuts or slopes. Such conditions do not exist on this site. No mitigation is required.

Liquefaction: In our opinion, liquefiable soils are not a hazard to this property. No mitigation is required.

Landsliding: Slope stability analysis was beyond the scope of this investigation. Based on the consistency and strength of the shallow sandstone at this site, it is our opinion that landsliding is not a potential hazard to this property. No mitigation is required.

Compressible Soils: Except for the loose fill soils found along the downhill side of the level pad at the lower lot, the site is underlain by hard weathered sandstone. To mitigate against compression of the wedge of loose fill, it is recommended that all fill should be subexcavated and placed as recommended in the section for site preparation, grading and compaction.

Expansive Soils: Such soils do not exist on this site. No mitigation is required.

Erosion: The site soils are easily eroded. Mitigate by controlling the discharge of concentrated water, both during and after construction.

Flooding: Flooding is not a potential hazard to this site. No mitigation is required.

CONCLUSIONS AND RECOMMENDATIONS

In our opinion, the site is suitable for the proposed new houses provided the recommendations presented in this report are followed. Considering the sloping nature of the ground, however, the houses should be supported on reinforced concrete piers and beam foundation.

The following recommendations, which are presented as guidelines to be used by project planners and designers, have been prepared assuming AMSO CONSULTING ENGINEERS will be commissioned to review the grading and foundation plans prior to construction, and to observe and test during site grading and foundation construction. This additional opportunity to inspect the project site will allow us to compare subsurface conditions exposed during construction with those that were observed during this investigation.

Site Preparation, Grading and Compaction

Existing structures designated for removal on the Project Plans should be demolished and their foundations and associated substructures should be dug out and removed. The man-made cave should be excavated and backfilled with structural soil. Any utility lines, leach lines, sanitary sewers and storm drains designated for abandonment on the Project Plans, should be either dug out and removed or filled sold with lean concrete. All debris and materials arising from demolition and removal operations should be wasted off-site.

Areas of the site that will be built on or paved should be stripped to remove surface vegetation and organics. Soils containing more than 2% by weight of organic matter should be considered organic.

Fill soils within the lower parcel should be excavated and placed with proper keying and compaction. The depth and horizontal limits of these excavations should be determined in the field by the Soils Engineer at the time of excavation. For planning purposes, however, it may be assumed that these excavations will extend to an average depth of about 5 feet below existing grade under proposed buildings. Subexcavation of loose soils should extend at least 5 feet horizontally beyond building lines. Soil from these excavations may be stockpiled for subsequent use as structural fill otherwise the excavated soil should be wasted off-site.

Any loose soils below areas of the site to be paved should also be excavated. The depth and horizontal limits of these excavations should be determined in the field by the Soils Engineer at the time of excavation. For planning purposes, however, it may be assumed that these excavations will extend to an average depth of about 18 inches below existing grade. Subexcavation of loose soils should extend at least 3 feet horizontally beyond edge of pavements. Soil from these excavations may be stockpiled for subsequent use as structural fill otherwise the excavated soil should be wasted off-site.

Soil surfaces exposed by removal of loose soils should be scarified to a depth of 8 inches, conditioned with water (or allowed to dry, as necessary) to produce a soil water content of about 2 percent above the optimum value and then compacted to at least 90 percent relative compaction based on ASTM Test D1557-91.

Structural fill may then be placed up to design grades in the proposed building and pavement areas. Structural fill using on-site inorganic soil, or approved import, should be placed in layers, each not exceeding 8 inches thick (before compaction), conditioned with water (or allowed to dry, as necessary) to produce a soil water content of about 2 percent above the optimum value, and then compacted to at least 90 percent relative compaction based of ASTM Test D1557-91. The upper 8 inches of pavement subgrades should be compacted to about 95 percent relative compaction based on ASTM Test D1557-91.

Structural fill placed on sloping ground should be keyed in accordance with the CALTRANS STANDARD SPECIFICATIONS, latest edition. The following excerpt from subsection 19-6.01 of those specifications is pertinent:

> "When embankment is to be made and compacted on hillsides....the slopes of original hillsides....shall be cut into a minimum of 6 feet horizontally as the work is brought up in layers. Material thus cut out shall be compacted along with the new embankment material....."

The toe key for structural fill placed on sloping ground should be at least 8 feet wide with its base horizontal or gently sloping back into the hillside.

Cut and fill slopes should be constructed no steeper than 2:1 (horizontal to vertical).

On-site soils proposed for use as structural fill should be inorganic, free from deleterious materials, and should contain no more than 15% by weight of rocks larger than 3 inches (largest dimension) and no rocks larger than 6 inches. The suitability of existing soil for reuse as a structural fill should be determined by a member of our staff at the time of grading. We expect that most of the existing soil will be suitable for reuse as structural fill. If import is required for use as structural fill, it should be inorganic, should preferably have a low expansion potential and should be free from clods or rocks larger than 4 inches in largest dimension. Prior to delivery to the site, proposed import should be tested in our laboratory to verify its suitability for use as structural fill and, if found to be suitable, further tested to estimate the water content and density at which it should be placed.

Building Foundation

The two proposed houses should be supported on reinforced concrete "pier and beam" foundations with the piers deriving their vertical support from "skin friction" or adhesion. Piers should extend to a depth of at least 10 feet below the bottom of grade beams and should penetrate at least 6 feet into native undisturbed soil. Piers along the downhill side of the house proposed for construction along the lower parcel should extend to a depth of at least 12 feet below the bottom of the grade beams.

Piers should be spaced at least 3 diameters apart (center to center) but no more than 8 feet apart. The allowable load-carrying capacity (dead plus normal live loads) of each pier may be calculated assuming "skin friction" or adhesion of 400 psf between the shaft of the pier and the adjacent soil. "End bearing" of the pier should also be ignored. For lateral resistance, a passive pressure of 350 pounds per cubic foot acting across 1.5 pier diameter may be used.

The allowable foundation pressures given previously may be increased by one-third when considering additional short-term wind or seismic loading.

Perimeter reinforced concrete foundation beams should be designed to safely transmit all imposed loads to the supporting piers.

During foundation construction, care should be taken to minimize evaporation of water from foundation and floor subgrades. Scheduling the construction sequence to minimize the time interval between foundation excavation and concrete placement is important. Concrete should be placed only in foundation excavations that have been kept moist, are free from drying cracks and contain no loose or soft soil or debris.

Concrete Slabs-On-Grade

Concrete floor slabs should be constructed on compacted soil subgrades prepared as described in the section on Site Preparation, Grading and Compaction.

To minimize floor dampness, a section of capillary break material at least five inches thick and covered with a membrane vapor barrier should be placed between the floor slab and the compacted soil subgrade. The capillary break should be a free-draining material, such as 3/8" pea gravel or a permeable aggregate complying with CALTRANS Standard Specifications, Section 68, Class 1, Type A or Type B. The material proposed for use as a capillary break should be tested in our laboratory to verify its effectiveness as a capillary break. The membrane vapor barrier should be a high quality membrane such as Moistop (by Fortifiber Corporation) or similar. A protective cushion of sand or capillary break material at least two inches thick should be placed between the membrane vapor barrier and the floor slab.

If floor dampness is not objectionable, concrete slabs may be constructed directly on the water-conditioned and compacted soil subgrade.

Retaining Walls and Basement Walls

The following may be used in the design calculations for any reinforced concrete retaining walls that may be needed at this site.

1. The average bulk density of material placed on the backfill side of the wall will be 120 pcf.

2. The vertical plane extending down from the ground surface to the bottom of the heel of the wall will be subject to pressure that increases linearly with depth as follows.

Condition	Design Pressure
Active, drained	45 pcf
At-rest, drained	65 pcf

The above values are non-seismic conditions. Active pressures should only be used for walls that are not restrained to move. At-rest pressures should be used for the design of the basement walls.

3. The effects of earthquakes may be simulated by applying a horizontal line load surcharge to the stem of the wall at a rate of 14 H^2 lb/horizontal foot of wall, where H is the height of the surface of the backfill above the base of the wall. This surcharge should be applied at a height of 0.6H above the base of the wall.

4. A coefficient of "friction" of 0.35 may be used to calculate the ultimate resistance to horizontal sliding of the wall base over the ground beneath the base.

5. An equivalent fluid pressure of 350 psf/ft may be used to calculate the ultimate passive resistance to lateral movement of the ground in front of the toe of the wall and in front of any "key" beneath the toe or stem of the wall.

6. 2000 psf may be used as the maximum allowable bearing pressure for the ground beneath the toe of the wall. This value is for non-seismic conditions and may be increased to 3000 psf when considering additional loads on the wall resulting from earthquakes.

A zone of drainage material at least 18 inches wide should be placed on the backfill side of walls designed for drained condition. This zone should extend up the back of the wall to about 18 inches down from the proposed ground surface above. The upper 18 inches or so of material above the drainage material should consist of native, clayey soil.

The drainage material and the clayey soil cap should be placed in layers about 6 inches thick and moderately compacted by hand-operated equipment to eliminate voids and to minimize post-construction settlement. Heavy compaction should not be applied; otherwise, the design pressure on the wall may be exceeded.

The drainage material should consist of either Class 2 Permeable Material complying with Section 68 of the CALTRANS Standard Specifications, latest edition, or 3/4 to 1½ inch clean, durable coarse aggregate. If the coarse aggregate is chosen as the drainage material, it should be separated from all adjacent soil by Mirafi 700X or a similar filter fabric approved by the project Soil Engineer.

Any water that may accumulate in the drainage material should be collected and discharged by a 4-inch-diameter, perforated pipe placed "holes down" near the bottom of the drainage material. The perforated pipe should have holes no larger that 1/4-inch diameter.

Utility Trenches

The attention of contractors, particularly the underground contractor, should be drawn to the requirements of California Code of Regulations regarding Safety Orders for "Excavations, Trenches, Earthwork".

For purposes of this section of the report, bedding is defined as material placed in a trench up to 1 foot above a utility pipe and backfill is all material placed in the trench above the bedding.

Unless concrete bedding is required around utility pipes, free-draining sand should be used as bedding. Sand proposed for use in bedding should be tested in our laboratory to verify its suitability and to measure its compaction characteristics. Sand bedding should be compacted by mechanical

means to achieve at least 90 percent compaction density based on ASTM Tests D1557-91.

Approved, on-site, inorganic soil, or imported material may be used as utility trench backfill. Proper compaction of trench backfill will be necessary under and adjacent to structural fill, building foundations, concrete slabs and vehicle pavements. In these areas, backfill should be conditioned with water (or allowed to dry) to produce a soil-water content of about 3 percent above the optimum value and placed in horizontal layers not exceeding 6 inches in thickness (before compaction). Each layer should be compacted to 90 percent relative compaction based of ASTM Test D1557-91.

Where any trench crosses the perimeter foundation line of any building, the trench should be completely plugged and sealed with compacted clay soil for a horizontal distance of at least 2 feet on either side of the foundation.

Surface Drainage

Surface drainage gradients should be planned to prevent ponding and to promote drainage of surface water away from building foundations, slabs, edges of pavements and sidewalks, and towards suitable collection and discharge facilities.

Water seepage or the spread of extensive root systems into the soil subgrades of foundations, slabs, or pavements, could cause differential movements and consequent distress in these structural elements. This potential risk should be given due consideration in the design and construction of landscaping.

Providing adequate surface and subsurface drainage is of great importance, as most structures constructed on a hillside and/or with raised floors are generally prone to drainage problems. All site drainage waters should be handled and discharged in a legal, prudent, reasonable and proper manner so as not to create a nuisance, risk or hazard to this property or adjoining properties.

We generally recommend that structures be equipped with roof gutters and downspouts. All runoff waters including all downspouts, patio, parking, and driveway drainage, and all other drainage should be collected in closed solid pipes with periodic cleanouts and discharged into legal approved area storm drain system.

If the above is not totally practical or feasible, then all site drainage waters should be discharged well away from edge of pavements and all building and foundation areas. Care should be used so that drainage waters are not concentrated and discharged on adjacent properties. Site drainage waters should be well dispersed in as natural a manner as possible and should not be discharged in a concentrated manner if a legally-approved storm drain system is not present.

It should be noted that moisture is usually present under most structures, as surface and subsurface waters flow from higher surrounding elevations. To minimize the amount of moisture under a

structure, a sub-surface drainage system may be constructed around the perimeter of the structure. The building designer and contractor should very carefully consider and provide for drainage waters that might flow into and be trapped in the foundation crawl space area and also consider potential higher humidity and very good cross-ventilation.

The above site drainage recommendations are general in nature and should be carried out by the house designer, contractor, owner, and future owners to the fullest possible extent. However, from many years of soil engineering experience within Northern California, we have found that water and moisture below most structures is relatively common. Therefore, we suggest that if the owner desires assurance with respect to site drainage, an expert in the field of hydrology and drainage should be retained to prepare specific recommendations.

Follow-up Geotechnical Services

Our recommendations are based on the assumption that AMSO CONSULTING ENGINEERS will be commissioned to perform the following services.

1. Review final grading and foundation plans prior to construction.
2. Observe, test and advise during grading and placement of structural fill.
3. Observe and advise during foundation construction.
4. Observe, test and advise during utility trench backfilling

LIMITATIONS

The recommendations contained in this report are based on certain plans, information and data that have been provided to us. Any change in those plans, information and data will render our recommendations invalid unless we are commissioned to review the change and to make any necessary modifications and/or additions to our recommendations.

Subsurface exploration of any site is necessarily confined to selected locations. Conditions may, and often do, vary between and around such locations. Should conditions different from those encountered in our explorations come to light during project development, additional exploration, testing and analysis may be necessary; changes in project design and construction may also be necessary.

March 1, 2006 Project 3360

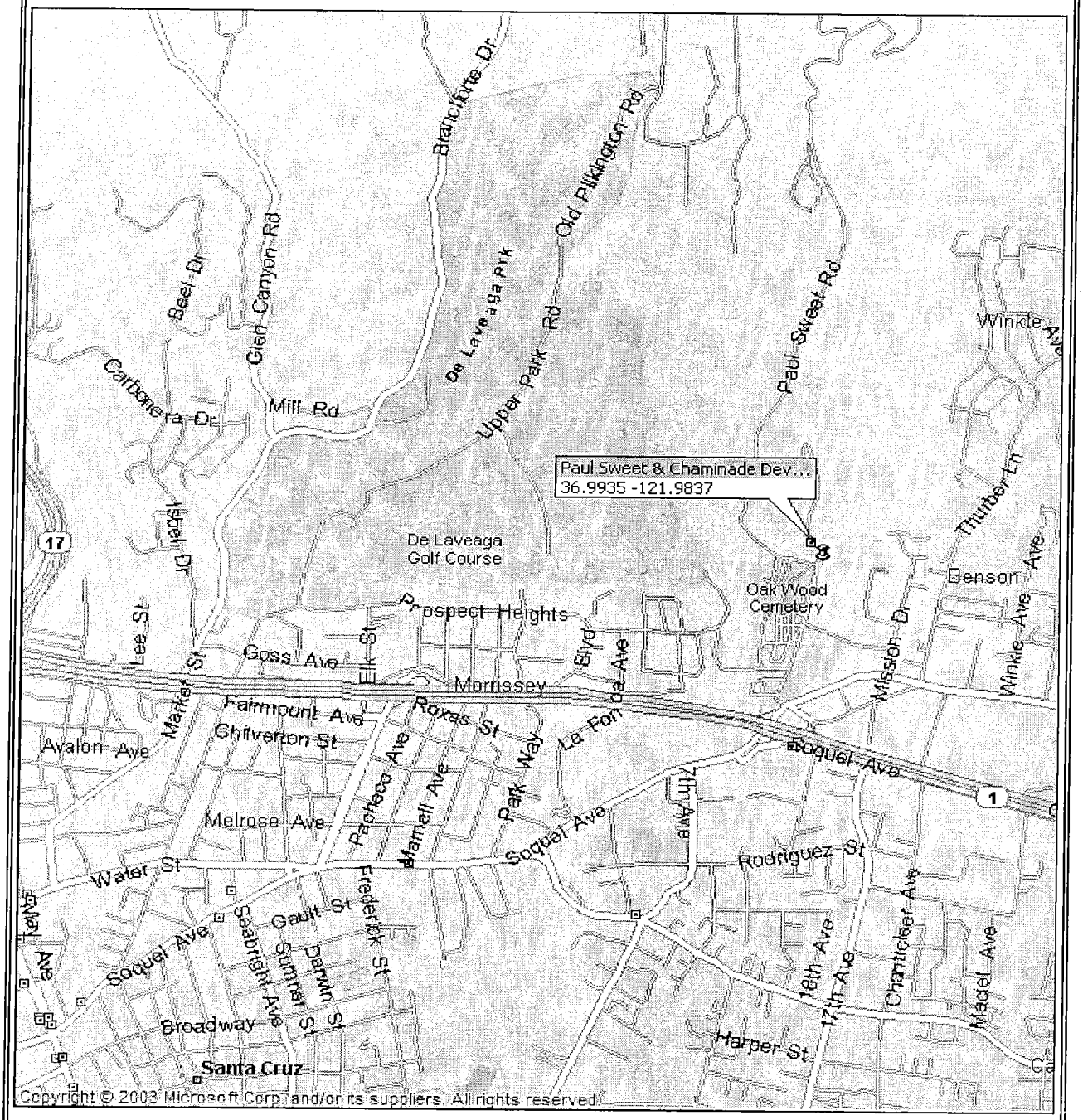
Our recommendations have been made in accordance with the principles and practices generally employed by the geotechnical engineering profession. This is in lieu of all other warranties, express or implied.

All earthwork and associated construction should be observed by our field representative, and tested where necessary, to compare the generalized site conditions assumed in this report with those found at the site at the time of construction, and to verify that construction complies with the intent of our recommendations.

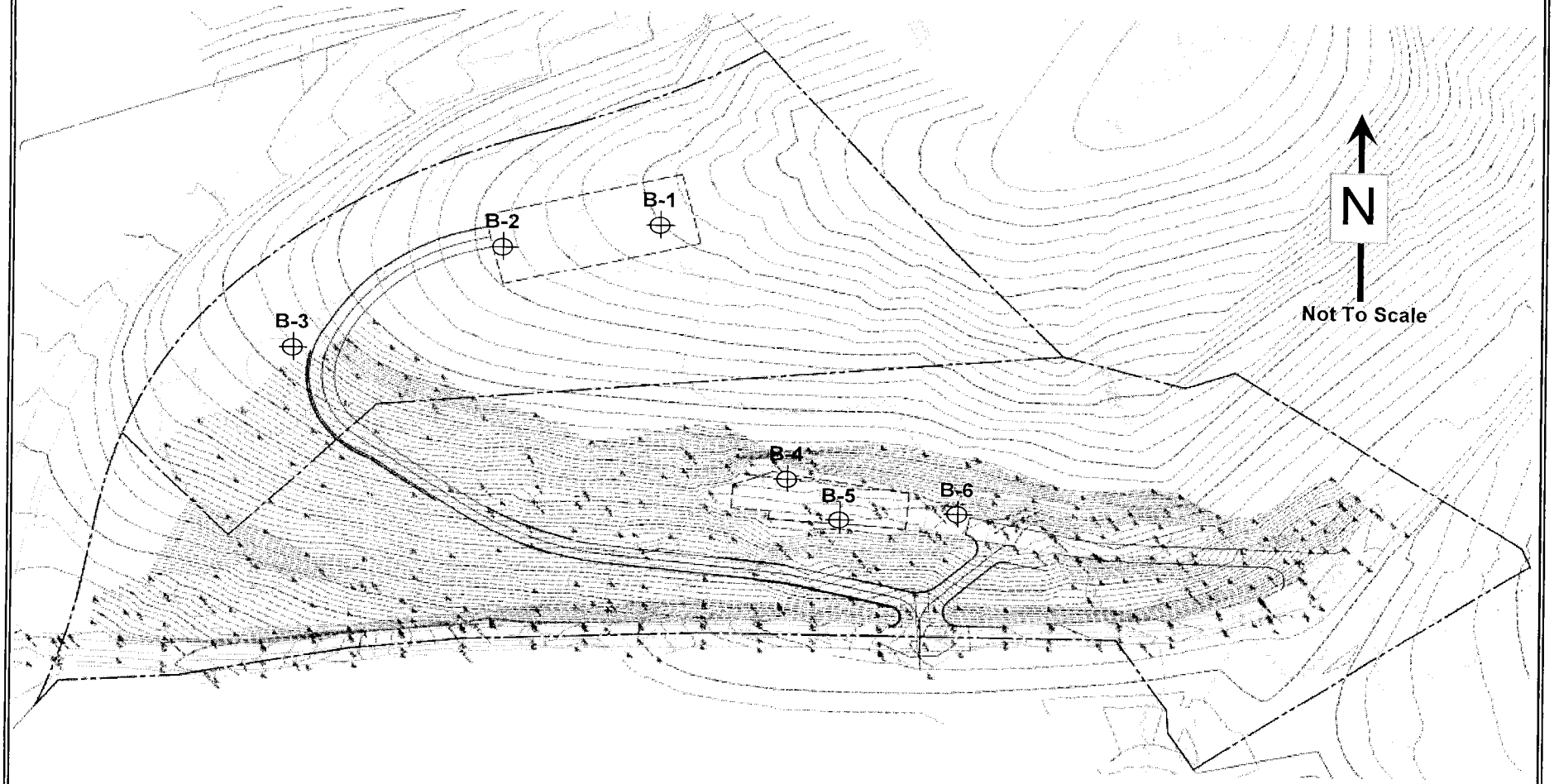
Report prepared by:

AMSO CONSULTING ENGINEERS

Basil A. Amso
CE 49998

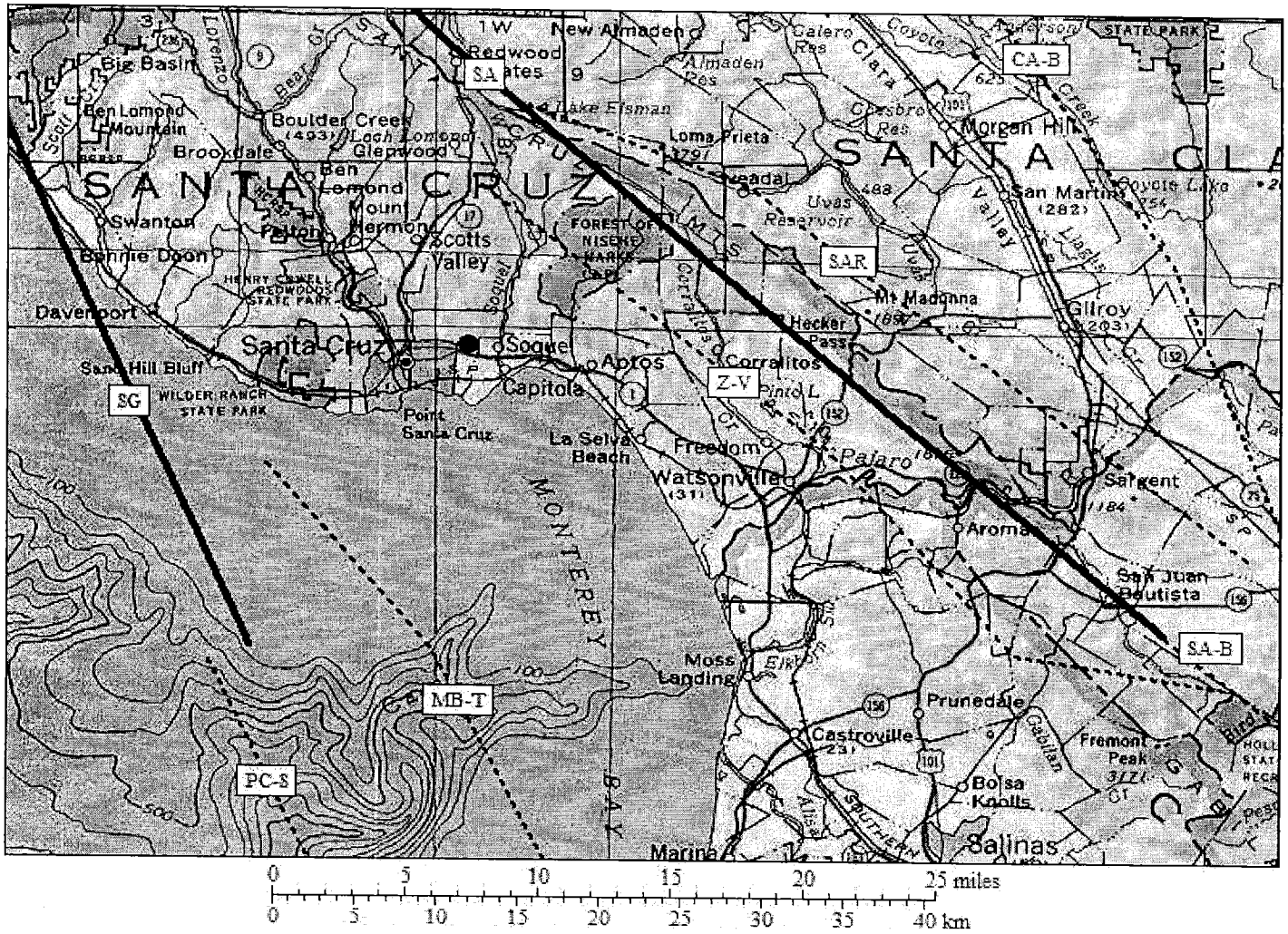


AMSO CONSULTING ENGINEERS	**VICINITY MAP**	**FIGURE 1**
FEBRUARY 2006	**TWO SINGLE FAMILY HOMES PAUL SWEET ROAD & CHAMINADE LANE SANTA CRUZ, CALIFORNIA**	**PROJECT 3360**



AMSO CONSULTING ENGINEERS	SITE PLAN AND LOCATION OF EXPLORATION HOLES	FIGURE 2
FEBRUARY 2006	TWO SINGLE FAMILY HOMES PAUL SWEET ROAD & CHAMINADE LANE SANTA CRUZ, CALIFORNIA	PROJECT 3360

ATTACHMENT 5



LEGEND

———	Type "A" Faults
SA	San Andreas
SG	San Gregorio
H-A	Hayward
C-A	Calaveras
·····	Type "B" Faults
MV-S	Monte Vista - Shannon
CA-B	Calaveras (So. Of Reser)
H-B	Hayward (South Ext.)
SAR	Sargent
Z-V	Zatante-Vergeles
●	Site Location

This map should not be used to determine whether or not a given property lies on a fault line. Its only purpose is to give the reader of this report a feel of aprox. distances to Types A & B fault.
Faults other than Types A & B are not shown on this map.

AMSO CONSULTING ENGINEERS	APPROXIMATE LOCATION OF TYPES "A" AND "B" FAULTS	FIGURE 3
FEBRUARY 2006	TWO SINGLE FAMILY HOMES PAUL SWEET ROAD & CHAMINADE LANE SANTA CRUZ, CALIFORNIA	PROJECT 3360

ATTACHMENT 5

ATTACHMENT 5

APPENDIX A

Key to Exploration Logs and Boring Logs

KEY TO EXPLORATORY BORING LOGS

SOIL CLASSIFICATIONS

PRIMARY DIVISIONS			GROUP1 SYMBOL	SECONDARY DIVISIONS
COARSE GRAINED SOILS More than half of material is larger than No. 200 sieve size	GRAVELS More than half coarse fraction is larger than No.4 sieve	Clean Gravels (less than5% fines*)	GW	Well graded gravels, gravel-sand mixtures, little or no fines
			GP	Poorly graded gravels, gravel-sand mixtures, little or no fines
		Gravel with fines*	GM	Silty gravels, gravel-sand-silt mixtures, non-plastio fines
			GC	Clayey gravels, gravel-sand-clay mixtures, plastio fines
	SANDS More than half coarse fraction is smaller than No.4 sieve	Clean Sands (less than 5%fines*)	SW	Well graded sands, gravelly sands, little or no fines
			SP	Poorly graded sands or gravelly sands, little or no fines
		Sands with fines*	SM	Silty sands, silt-sand mixtures, non-plastio fines
			SC	Clayey sand, sand-clay mixtures, plastio fines
FINE GRAINED SOILS More than half of material is smaller than No. 200 sieve size	SILTS AND CLAYS Liquid limit is less than 35		ML	Inorganic silts, clayey silts, rock flour, silty very fine sands
			CL	Inorganic clays of low plasticity, gravelly clay of low plasticity
			OL	Organic silts and organic silty clays of low plasticity
	SILTS AND CLAYS Liquid limit is between35 and 50		MI	Inorganic silts, clayey silts and silty fine sand with intermediate plasticity
			CI	Inorganic clays, gravely clays, sandy clays and silty clays of intermediate plasticity
			OI	Inorganic clays and silty clays of intermediate plasticity
	SILTS AND CLAYS Liquid limit is greater than 50		MH	Inorganic silts, clayey silts, elastic silts, micaceous or diatomaceous silty or fine sandy soil
			CH	Inorganic clays of high plasticity
			OH	Organic clays and silts of high plasticity
HIGHLY ORGANIC SOILS			Pt	Peat, meadow mat, highly organic soils

GRAIN SIZES

U.S. STANDARD SERIES SIEVE				CLEAR SQUARE SIEVE OPENINGS			
200	40	10	4	¾"	3"	12"	
Silts and Clays	Fine	Medium	Coarse	Fine	Coarse	Cobbles	Boulders
	SAND			GRAVEL			

RELATIVE DENSITY

SANDS, GRAVELS AND NON-PLASTIC SILTS	BLOWS/FOOT*
VERY LOOSE	0 – 4
LOOSE	4 – 10
MEDIUM DENSE	10 – 30
DENSE	30 – 50
VERY DENSE	OVER 50

CONSISTENCY

CLAYS AND PLASTIC SILTS	UNCONFINED SHEAR STRENGTH (PSF)	BLOWS/FOOT*
VERY SOFT	0 – 250	0 – 2
SOFT	250-500	2 – 4
FIRM	500-1000	4 – 8
STIFF	1000-2000	8 – 16
VERY STIFF	2 000– 4000	16 – 32
HARD	>4000	OVER 32

SYMBOLS

▽	Initial Ground Water Level
▽	Final Ground Water Level
*	Standard Penetration Sampler
X	Modified California Sampler
D	Dames & Moore Sampler

NOTES

*BLOWS per FOOT – Resistance to advance the soil sampler in number of blows of a 140-pound hammer falling 30 inches to drive a split spoon sampler.

Stratification lines on the logs represent the approximate boundary between soil types, and the transition may be gradual.

Modified California Sampler – 2 ½ O.D. (1 7/8 Inch I.D.) sampler

Standard Penetration Sampler – 2 inch O.D. (1 3/8 Inch I.D.) split spoon sampler (ASTM D1586).

Dames & Moore Sampler – 3 inch O.D. (2.5 inch I.D.) sampler

BORING LOG

No. B-1

PROJECT TWO LOTS AT SWEET PAUL & CHAMINADE | DATE 02/08/2006 | LOGGED BY BAA

DRILL RIG Track Mounted - Cont. Flight Auger | HOLE DIA. 4" | SAMPLER X - Modified California; * - S.P.T

GROUND WATER DEPTH INITIAL --- | FINAL --- | HOLE ELEVATION

DESCRIPTION	SOIL TYPE	DEPTH	SAMPLE	BLOWS PER FOOT	POCKET PEN (tsf)	TORVANE (tsf)	LIQUID LIMIT (%)	WATER CONTENT (%)	PLASTIC LIMIT (%)	DRY DENSITY (pcf)	FAILURE STRAIN (%)	UNCONFINED COMPRESSIVE STRENGTH (psf)
SANDY CLAY; brown, damp, firm to stiff.	CL	1										
			x					17		98		
		2	x	50/8"								
SANDY CLAY; light brown, damp, very dense to hard; weathered sandstone.	SC/ SS	3										
		4										
hard		5	*	50/6"								
		6										
		7										
		8										
		9										
hard drilling		10	*	50/4"								
		11										
Refusal to drilling.		12										
Bottom of hole at 12 feet. No ground water encountered.		13										
		14										
		15										
		16										
		17										
		18										
		19										
		20										

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ATTACHMENT 5

BORING LOG

No. B-2

PROJECT TWO LOTS AT SWEET PAUL & CHAMINADE DATE 02/08/2006 LOGGED BY BAA

DRILL RIG Track Mounted - Cont. Flight Auger HOLE DIA. 4" SAMPLER X - Modified California; * - S.P.T

GROUND WATER DEPTH INITIAL --- FINAL --- HOLE ELEVATION

DESCRIPTION	SOIL TYPE	DEPTH	SAMPLE	BLOWS PER FOOT	POCKET PEN (tsf)	TORVANE (tsf)	LIQUID LIMIT (%)	WATER CONTENT (%)	PLASTIC LIMIT (%)	DRY DENSITY (pcf)	FAILURE STRAIN (%)	UNCONFINED COMPRESSIVE STRENGTH (psf)
SANDY CLAY; brown, moist, firm to stiff.	SC	1										
		2	*	42								
SILTY SAND; light brown, damp, very dense to hard	SM	3										
		4										
CLAYEY SAND; light brown, damp, hard; cemented; weathered sandstone.	SC/ SS	5	*	50/8"								
		6										
		7										
		8										
		9										
		10	*	50/7"								
		11										
		12										
		13										
		14										
		15	*	50/2"								
Bottom of hole at 15 feet No ground water encountered		16										
		17										
		18										
		19										
		20										

BORING LOG

No. B-3

PROJECT TWO LOTS AT SWEET PAUL & CHAMINADE | DATE 02/08/2006 | LOGGED BY BAA

DRILL RIG Track Mounted - Cont. Flight Auger | HOLE DIA. 4" | SAMPLER X - Modified California; * - S.P.T

GROUND WATER DEPTH INITIAL --- | FINAL --- | HOLE ELEVATION

DESCRIPTION	SOIL TYPE	DEPTH	SAMPLE	BLOWS PER FOOT	POCKET PEN (tsf)	TORVANE (tsf)	LIQUID LIMIT (%)	WATER CONTENT (%)	PLASTIC LIMIT (%)	DRY DENSITY (pcf)	FAILURE STRAIN (%)	UNCONFINED COMPRESSIVE STRENGTH (psf)
SANDY SILTY CLAY; brown, damp to moist, stiff.	CL	1										
		2	x	20	2.3			17		98	2	1760
CLAYEY SAND; light brown, dampt, very dense to hard; cemented; slightly weathered sandstone.	SS	3										
		4										
		5	*	50/7"								
		6										
		7										
		8										
		9										
		10	*	50/3"								
		11										
		12										
		13										
		14										
		15	*	50/5"								
Bottom of hole at 15 feet No ground water encountered		16										
		17										
		18										
		19										
		20										

Project # 3360 **AMSO CONSULTING ENGINEERS** Page 1 of 1

ATTACHMENT 5

BORING LOG

No. B-4

PROJECT TWO LOTS AT SWEET PAUL & CHAMINADE DATE 02/08/2006 LOGGED BY BAA

DRILL RIG Track Mounted - Cont. Flight Auger HOLE DIA. 4" SAMPLER X - Modified California; * - S.P.T

GROUND WATER DEPTH INITIAL --- FINAL --- HOLE ELEVATION

DESCRIPTION	SOIL TYPE	DEPTH	SAMPLE	BLOWS PER FOOT	POCKET PEN (tsf)	TORVANE (tsf)	LIQUID LIMIT (%)	WATER CONTENT (%)	PLASTIC LIMIT (%)	DRY DENSITY (pcf)	FAILURE STRAIN (%)	UNCONFINED COMPRESSIVE STRENGTH (psf)
SANDY CLAY; light brown, damp, very dense to hard	CL	1										
		2	x	42	3.1			13		101		
CLAYEY SAND; light brown, damp, very dense to hard; slightly weathered sandstone	SS		x	50/4"								
		3										
		4										
		5	*	50/3"								
		6										
		7										
		8										
		9										
		10	*	50/4"								
		11										
		12										
		13										
		14										
		15	*	50/6"								
Bottom of hole at 15 feet No ground water encountered		16										
		17										
		18										
		19										
		20										

BORING LOG

No. B-5

PROJECT TWO LOTS AT SWEET PAUL & CHAMINADE | DATE 02/08/2006 | LOGGED BY BAA

DRILL RIG Track Mounted - Cont. Flight Auger | HOLE DIA. 4" | SAMPLER X - Modified California; * - S.P.T

GROUND WATER DEPTH INITIAL --- | FINAL --- | HOLE ELEVATION

DESCRIPTION	SOIL TYPE	DEPTH	SAMPLE	BLOWS PER FOOT	POCKET PEN (tsf)	TORVANE (tsf)	LIQUID LIMIT (%)	WATER CONTENT (%)	PLASTIC LIMIT (%)	DRY DENSITY (pcf)	FAILURE STRAIN (%)	UNCONFINED COMPRESSIVE STRENGTH (psf)
SANDY SILTY CLAY; brown, moist, firm; Fill	CL	1										
		2	x	12	1.0			16		99		
		3										
		4										
		5	x	14	1.1			17		100	3	1305
stiff soil		6										
		7										
		8										
CLAYEY SAND; light brown, damp, very dense to hard; weathered sandstone	SC SS	9										
		10	*	63								
		11										
		12										
		13										
		14										
		15	*	50/9"								
Bottom of hole at 15 feet No ground water encountered		16										
		17										
		18										
		19										
		20										

BORING LOG

No. B-6

PROJECT TWO LOTS AT SWEET PAUL & CHAMINADE | DATE 02/08/2006 | LOGGED BY BAA

DRILL RIG Track Mounted - Cont. Flight Auger | HOLE DIA. 4" | SAMPLER X - Modified California; * - S.P.T

GROUND WATER DEPTH INITIAL --- | FINAL --- | HOLE ELEVATION

DESCRIPTION	SOIL TYPE	DEPTH	SAMPLE	BLOWS PER FOOT	POCKET PEN (tsf)	TORVANE (tsf)	LIQUID LIMIT (%)	WATER CONTENT (%)	PLASTIC LIMIT (%)	DRY DENSITY (pcf)	FAILURE STRAIN (%)	UNCONFINED COMPRESSIVE STRENGTH (psf)
SANDY SILTY CLAY; brown, damp, firm.	CL	1										
		2	x	18	1.7			17		98		
CLAYEY SAND; light brown, damp, very dense to hard; weathered sandstone	SC SS	3										
		4										
		5	*	50/11"								
		6										
		7										
		8										
		9										
		10	*	73								
Bottom of hole at 10 feet No ground water encountered.		11										
		12										
		13										
		14										
		15										
		16										
		17										
		18										
		19										
		20										

Project # 3360 **AMSO CONSULTING ENGINEERS** Page 1 of 1

Dees & Associates, Inc.
Geotechnical Engineers
501 Mission Street, Suite 8A Santa Cruz, CA 95060 Phone (831) 427-1770 Fax (831) 427-1794

ATTACHMENT 6

November 21, 2012
Revised June 4, 2013

Project No. SCR-0609

MR. DOUG LOCKE
Barry Swenson Builder
2400 Chanticleer Avenue, Suite H
Santa Cruz, California 95062

Subject: Update to Geotechnical Investigation by AMSO Consulting Engineers, Dated June 15, 2012

Reference: Proposed Single Family Residence
Dempsey Road, Lot 4
APN 020-013-45
Santa Cruz County, California

Dear Mr. Locke:

As requested, our firm has assumed geotechnical responsibility for the referenced project. The project consists of constructing a new single family residence on Lot 4 of a four lot subdivision. Lot 4 is located at the top of the subdivision, furthest from Dempsey Road.

The original geotechnical report for the site was prepared by AMSO Consulting Engineers for a 2 lot subdivision in March 1, 2006. The project was changed to a 4 lot subdivision and an update report was prepared in June 15, 2012. Our firm has recently drilled an additional boring and performed additional laboratory testing on Lot 4 and this report provides an update to the June 2012 report.

Field and Laboratory Testing

Our firm drilled one exploratory boring on November 7, 2012, at the proposed homesite on Lot 4. Our boring was drilled with 6-inch diameter continuous flight auger equipment mounted on a tractor. Our boring was drilled to a depth of 15.5 feet. The approximate location of the exploratory boring is indicated on Figure 1.

The soils observed in the test boring were logged in the field and described in accordance with the Unified Soil Classification System (D2487 and D2488), Figures 2. The Test Boring Log denotes subsurface conditions at the locations and times observed, and it is not warranted it is representative of subsurface conditions at other locations or times.

Representative soil samples were obtained from the exploratory borings at selected depths, or at major strata changes. These samples were recovered using the 3.0-inch O.D. Modified California Sampler (L) or the Standard Terzaghi Sampler (T). The penetration resistance blow counts for the (L) and (T) noted on the boring logs were obtained as the sampler was dynamically driven into the in situ soil. The process was performed by dropping a 140-pound hammer a 30-inch free fall distance and driving the sampler 6 to 18 inches and recording the number of blows for each 6-inch penetration interval. The blows recorded on the boring logs present the accumulated number of blows that were required to drive the last 12 inches. The

blow counts indicated on the logs have been converted to equivalent standard penetration test (SPT) values.

Subsurface Soil Conditions

The soils encountered in our boring consisted of weathered sandstone at a depth of 4 inches. The sandstone is comprised of very dense clayey sands of low plasticity.

Laboratory Testing

The laboratory testing program was directed toward a determination of the physical and engineering properties of the soils underlying the site. Moisture content and dry densities were performed on representative soil samples to determine the consistency of the soil and the moisture variation throughout the explored soil profile. Direct shear testing was performed to evaluate the shear strength properties of the foundation zone soils and a grain size analysis was performed to aid in soil classification. The results of our field and laboratory testing appear on the "Log of Test Boring," opposite the sample tested.

Discussions and Conclusions

In general, the recommendations presented in the AMSO report are appropriate for the proposed residence. However, based on the boring drilled at the proposed homesite and the resulting laboratory results, we recommend the following amendments to the AMSO reports.

Conventional spread footings may be used to support foundations located on slopes no steeper than 20 percent. End bearing pier and grade beam foundations may be used for foundations located on slopes steeper than 20 percent. A combination of spread footings and drilled piers may be used to support structures as long as all foundations are embedded into similar sandstone bedrock.

Foundation and retaining wall design criteria has been amended based on the results of our laboratory testing and are provided in the following sections of this report.

We are also recommending amendments to the capillary break below slabs-on-grade and site drainage based on the 2012 California Building Code.

Conventional Spread Footing Foundations

2. Spread footing foundations may be used to support structures located on slopes no steeper than 20 percent.

3. Footings should be a minimum of 12 inches deep for one-story structures and at least 18 inches deep for two-story structures, measured from the lowest adjacent grade.
4. Footings may be embedded entirely into weathered sandstone or engineered fill, but not both. If the structure will be supported on a combination of spread footings and drilled piers, all footings and piers should be embedded into sandstone bedrock.

5. Footings should be a minimum of 12 inches wide for one story structures and 15 inches wide for two story structures.

6. Footings located adjacent to other footings or utility trenches should have their bearing surfaces founded below an imaginary 1.5:1 plane projected upward from the bottom edge of the adjacent footings or utility trenches.

7. Foundations designed in accordance with the above may be designed for an allowable soil bearing pressure of 5,000 psf. The allowable bearing capacity may be increased by 1/3 for short term seismic and wind loads.

8. Total and differential settlements under the proposed light building loads are anticipated to be less than 1 inch and 1/2 inch respectively.

9. Lateral load resistance for structures supported on footings may be developed in friction between the foundation bottom and the supporting subgrade. A friction coefficient of 0.5 psf may be used along the base of footings. Where footings are poured neat against native sandstone, a passive lateral earth pressure of 400 pcf may be used. The top 12 inches of soil should be neglected in passive design.

10. Prior to placing concrete in any new foundation excavations, foundation excavations should be cleaned of soil and observed by the soils engineer.

Concrete Pier and Grade Beam Foundations

11. Concrete piers should be embedded at least 4 feet into sandstone bedrock and be at least 4 feet below the ground surface.

12. Piers should be at least 12 inches in diameter and be spaced at least 3 pier diameters apart.

13. Piers embedded into weathered sandstone may be designed using an allowable end bearing of 10,000 psf. This value may be increased by one-third under wind or seismic loads.

14. A passive soil resistance of 400 pcf, equivalent fluid weight, times 15 pier diameters may be used for piers. The top foot of soil should be neglected in passive design for piers located on slopes less than 20 percent and the top 2 feet of soil should be neglected in passive design for piers located on slopes greater than 20 percent.

15. Prior to placing concrete, pier excavations should be thoroughly cleaned and observed by the soils engineer.

Retaining Wall Lateral Pressures

16. Retaining structures should be designed to resist both lateral earth pressures and any additional surcharge loads.

17. Unrestrained retaining walls retaining sandstone bedrock may be designed to resist an active equivalent fluid pressure of 30 pcf for level backslopes, 35 pcf for backslopes inclined to 3:1 (horizontal to vertical) and 45 for backfills inclined to 2:1 (horizontal to vertical).

18. Unrestrained retaining walls retaining engineered fill may be designed to resist an active equivalent fluid pressure of 35 pcf for level backslopes, 40 pcf for backslopes inclined to 3:1 (horizontal to vertical) and 50 for backfills inclined to 2:1 (horizontal to vertical).

19. Retaining walls should include an added seismic component of 14 pcf, equivalent fluid weight. Dynamic surcharges should be added to the above active lateral earth pressures. The

resultant dynamic pressure should be applied at a point 0.3 H above the base of the wall for retaining wall supporting sandstone bedrock and at a point 0.6 H above the base of the wall for retaining wall supporting engineered fill.

20. The above lateral pressures assume that the walls are fully drained to prevent hydrostatic pressure behind the walls. Drainage materials behind the wall should consist of Class 1, Type A permeable material (Caltrans Specification 68-1.025) or an approved equivalent. The drainage material should be at least 12 inches thick. The drains should extend from the base of the walls to within 12 inches of the top of the backfill. A perforated pipe should be placed (holes down) about 2 inches above the bottom of the wall and be tied to a suitable drain outlet. Wall backdrains should be plugged at the surface with clayey material to prevent infiltration of surface runoff into the backdrains.

21. Retaining wall foundations should be designed in accordance with the foundation recommendations presented in this report.

Capillary Breaks Below Concrete Floor Slabs

22. The capillary break below floor slabs may be constructed in accordance with the AMSO report with the exception of the 2 inch sand layer proposed on top of the impermeable membrane. The 2012 CBC recommends against using a sand layer on top of the membrane. However, we can determine if the use of sand is appropriate for interior floor slabs on a case by case basis once the project plans have been developed.

Site Drainage

23. Where bare soil or pervious surfaces are located next to foundations, the ground surface within 10 feet of structures should be sloped at least 5 percent away from the foundation. Where impervious surfaces are used within 10 feet of foundations, the impervious surface within 10 feet of structures should be sloped at least 2 percent away from the foundation. Swales should be used to collect and remove surface runoff where the ground cannot be sloped the full 10 foot width away from the structure. Swales should be sloped at least 2 percent towards the discharge point.

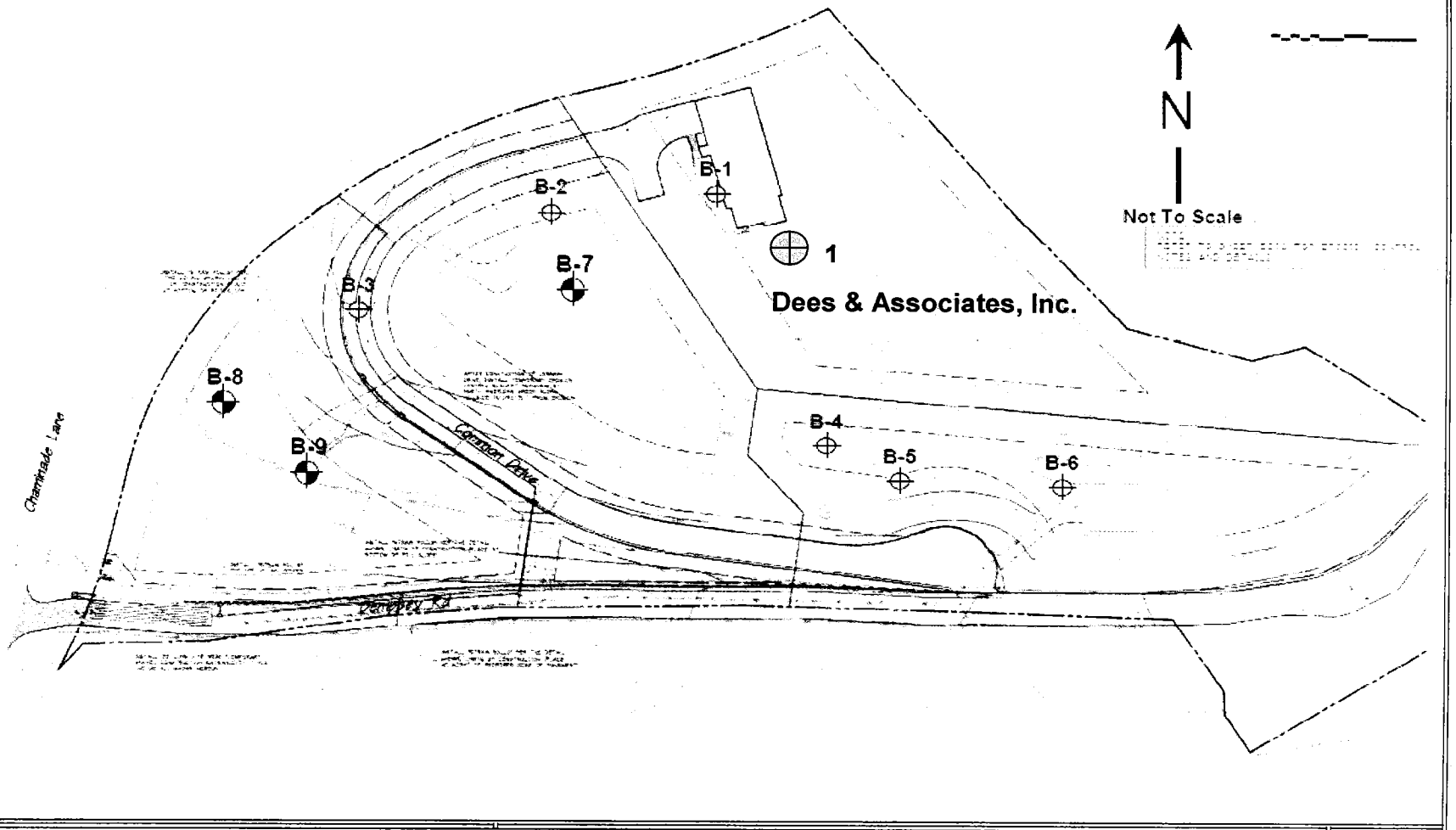
Very truly yours,

DEES & ASSOCIATES, INC.

Rebecca L. Dees
Geotechnical Engineer
G.E. 2623

REGISTERED PROFESSIONAL ENGINEER
REBECCA LYNN DEES
No. 2623
EXP 12/13
GEOTECHNICAL
STATE OF CALIFORNIA

Copies: 4 to Addressee



Base Map by AMSO Engineers, June 2012
Borings B-1 to B-9 by AMSO

Boring 1 By Dees & Associates, Inc.

SCR-0609
Dempsey Road Lot 4
Santa Cruz, California

ATTACHMENT 6

TEST BORING LOGS

LOGGED BY: CL DATE DRILLED: 11/7/12 BORING TYPE: 6" Solid Stem BORING NO. 1

DEPTH (FT.)	SAMPLE NO.	USC SYMBOL	SOIL DESCRIPTION	USC SOIL TYPE	BLOW COUNT	DRY DENSITY (PCF)	MOISTURE IN-SITU	MOISTURE SATURATED	COHESION (PSF)	PHI ANGLE	% PASSING 200 SIEVE		MISC. LAB RESULTS
1	1-1-1		SANDSTONE at 4 inches		50/5"	79.6	17.2	27.9	300	45			
2	1-2 T		Mottled yellow brown with orange Clayey SAND. SANDSTONE, moist, very dense	SM	50/6"						25.3		
3													
4													
5	1-3-2 T				50/6"								
6													
7													
8													
9													
10													
11													
12													
13													
14													
15	1-4 T				50/6"								
16			Boring Terminated at 15.5 feet No Groundwater Encountered										
17													
18													
19													
20													
21													
22													
23													
24													
25													
26													

DEES & ASSOCIATES, INC
701 OCEAN ST, STE 6A
SANTA CRUZ, CA 95060
Phone: (831) 427-1772 Fax: (831) 427-1734

Project No. SCR-0151

* Blow count converted to equivalent SPT blow

T = SPT L = Field Blow Count

Dees & Associates, Inc.
Geotechnical Engineers
501 Mission Street, Suite 8A, Santa Cruz, CA 95060

Phone: 831 427-1770
Fax: 831 427-1794

ATTACHMENT 6

February 5, 2013
Revised May 30, 2013

Project No. SCR-0609

MR. DOUG LOCKE
Barry Swenson Builder
2400 Chanticleer Avenue, Suite H
Santa Cruz, California 95062

Subject: Addendum to Update Geotechnical Investigation
Dated November 21, 2012

Reference: Proposed Dempsey Road Improvements
APN 020-013-44
Santa Cruz County, California

Dear Mr. Locke:

The original reports and update letters prepared for the project did not address the improvements proposed for Dempsey Road itself. In order to provide recommendations for the Dempsey Road improvements we excavated four (4) test pits along the outboard edge of the road and observed the soils exposed in the cutslope along the inboard side of the road. See Figure 1.

Subsurface Soil Conditions

The soils encountered in our test pits consisted of 2.5 to 5 feet of fill over native soil. The fill consisted of very loose, brown to dark brown silty sand. The native soil was weathered sandstone that consisted of orange to olive brown silty sand with a thin layer of sandy clay on top. The clay layer was up to 12 inches thick. See Figures 2 and 3.

Based on the topography and the presence of large oak and eucalyptus trees that do not have fill at the base, the fill extends 6 to 10 feet onto the slope below the road. Based on the presence of exposed sandstone in the roadbed, the fill extends to about the middle of the road except in the vicinity of Test Pit 2 and Test Pit 4. In the vicinity of Test Pit 2, the fill extends about 14 feet into the road from the top edge of the slope and the fill extends all the way across the road in the vicinity of Test Pit 4. The fill in the vicinity of Test Pit 4 was used to fill in a depression in the road adjacent to Chaminade Lane as well as fill the downslope side of the road.

The soils exposed in the cutslope above the road consisted of dense sandstone bedrock with a thin layer of topsoil.

Stability of Slope below Dempsey Road

The slope below Dempsey Road is comprised of sandstone bedrock with a thin layer of topsoil and fill. The underlying sandstone is dense and there is a low potential for landslides to occur within the sandstone.

The proposed roadway will be drained towards the inboard side of the road and the only water expected on the slope will be from direct rainfall. There were no signs of slope instability observed during our investigation, however, the topsoil and fill are loose and erosion and shallow slump sliding should be anticipated during heavy or prolonged rainfall.

Discussions and Conclusions

The existing fill along the outboard edge of Dempsey Road is very loose and full of roots and should be removed and replaced as compacted engineered fill under the proposed roadbed. Our test pits indicate loose fill extends the entire length of the proposed road improvements.

To protect the proposed road improvements from erosion and slumping, the fill along the edge of the road should be retained or removed and replaced as compacted engineered fill. The re-compacted fill zone should extend at least 3 feet beyond the edge of the proposed pavement except in the vicinity of test Pit 2, where the re-compacted zone should extend at least 5 feet beyond the edge of the road. The base of the excavation should be keyed into firm, native soil with a 2 percent slope towards the uphill side of the road. The key will need to be 4 to 5 feet in depth.

The soils exposed during site grading should be protected from erosion until a permanent vegetative cover can be established.

Once the fill is re-compacted per our recommendations provide in this letter, the proposed roadway will be protected from erosion and slumping.

The retaining wall proposed along the upslope side of Dempsey Road may be designed using the recommendations of the original soil report. The retaining wall proposed along the downslope side of Dempsey Road should be designed using the following design criteria.

Retaining Walls along Downslope Side of Dempsey Road

1. Retaining structures should be designed to resist both lateral earth pressures and any additional surcharge loads.

2 Unrestrained retaining walls may be designed to resist an active equivalent fluid pressure of 35 pcf for level backslopes.

3. Retaining walls should include an added seismic component of 14 pcf, equivalent fluid weight. Dynamic surcharges should be added to the above active lateral earth pressures. The resultant dynamic pressure should be applied at a point 0.6 H above the base of the wall.

4. The above lateral pressures assume that the walls are fully drained to prevent hydrostatic pressure behind the walls. Drainage materials behind the wall should consist of Class 1, Type A permeable material (Caltrans Specification 68-1.025) or an approved equivalent. The drainage material should be at least 12 inches thick. The drains should extend from the base of the walls to within 12 inches of the top of the backfill. A perforated pipe should be placed (holes down) about 2 inches above the bottom of the wall and be tied to a suitable drain outlet. Wall backdrains should be plugged at the surface with clayey material to prevent infiltration of surface runoff into the backdrains.

Dees & Associates, Inc.
Geotechnical Engineers
501 Mission Street, Suite 8A, Santa Cruz, CA 95060
Phone: 831 427-1770
Fax: 831 427-1794

ATTACHMENT 6

Retaining Wall Foundations

5. The retaining wall proposed along the downslope side of Dempsey Road should be supported on drilled piers.

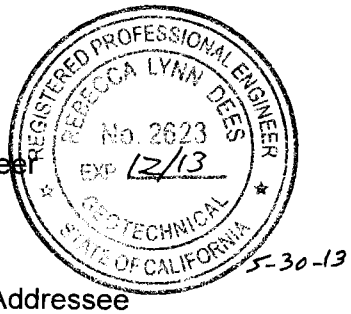
6. Concrete piers should be embedded at least 8 feet below the ground surface, be at least 12 inches in diameter and spaced at least 3 pier diameters apart.

7. A passive soil resistance of 300 pcf, equivalent fluid weight, times 1.5 pier diameters may be used below 4 feet. The top 4 feet of soil should be neglected in passive design.

8. Prior to placing concrete, foundation excavations should be thoroughly cleaned and observed by the soils engineer.

Very truly yours,

DEES & ASSOCIATES, INC.



Rebecca L. Dees
Geotechnical Engineer
G.E. 2623

Copies: 4 to Addressee

ATTACHMENT 6

FIGURE 1

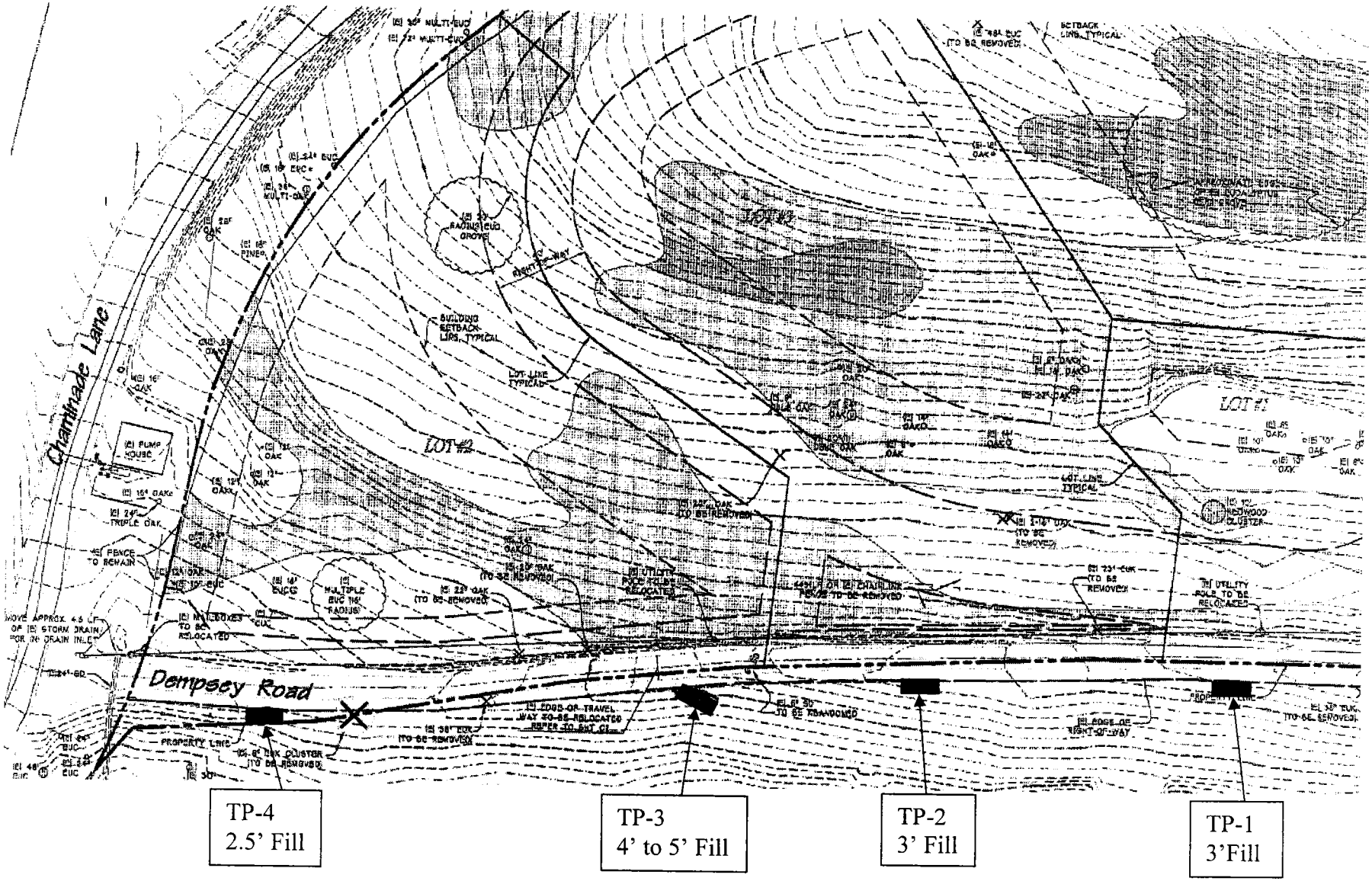
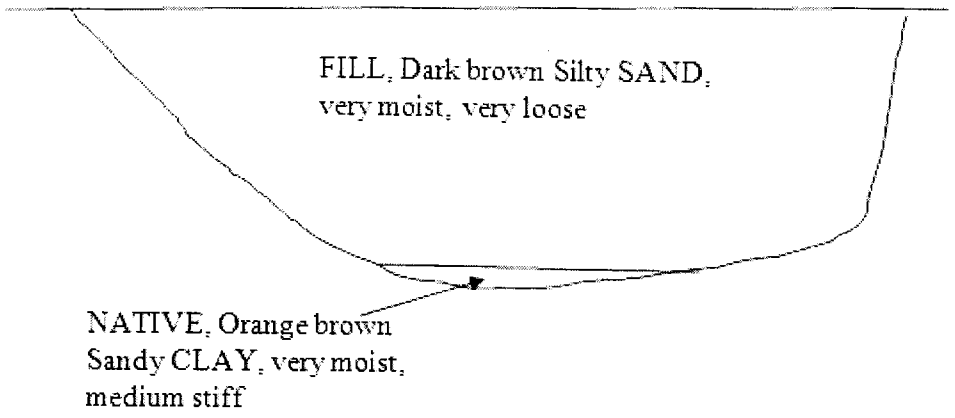


FIGURE 2

ATTACHMENT 6

Test Pit 1
1"=2'



Test Pit 2
1"=2'

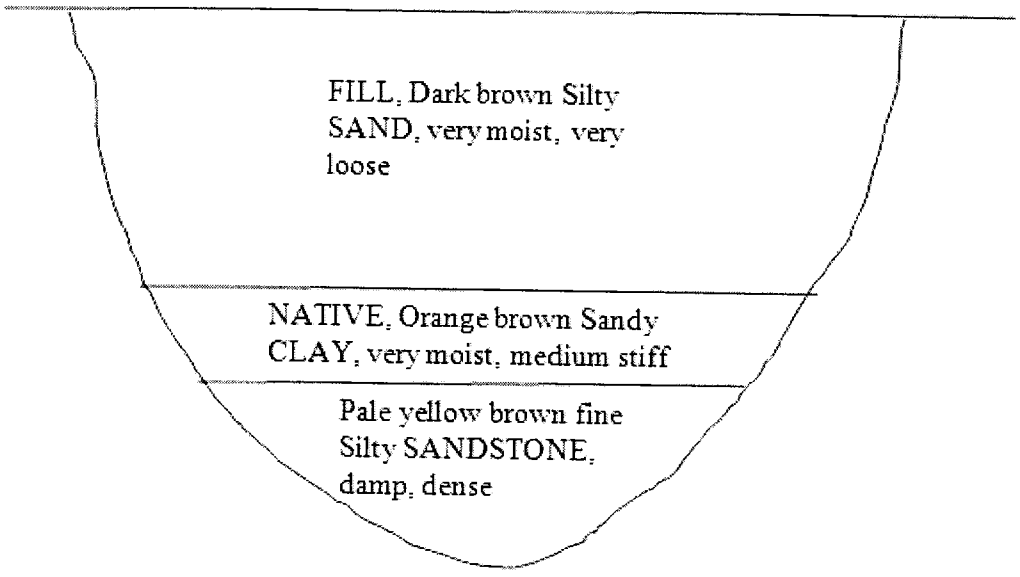
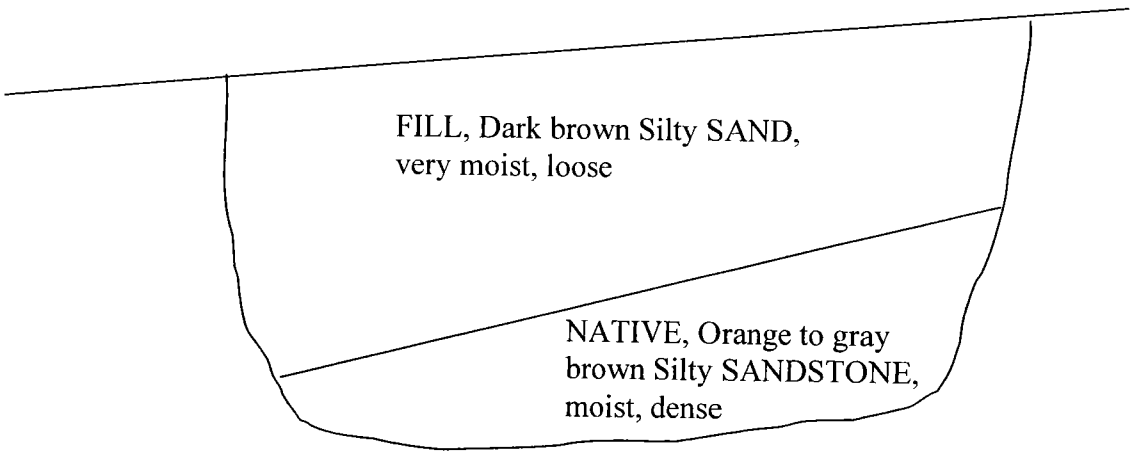


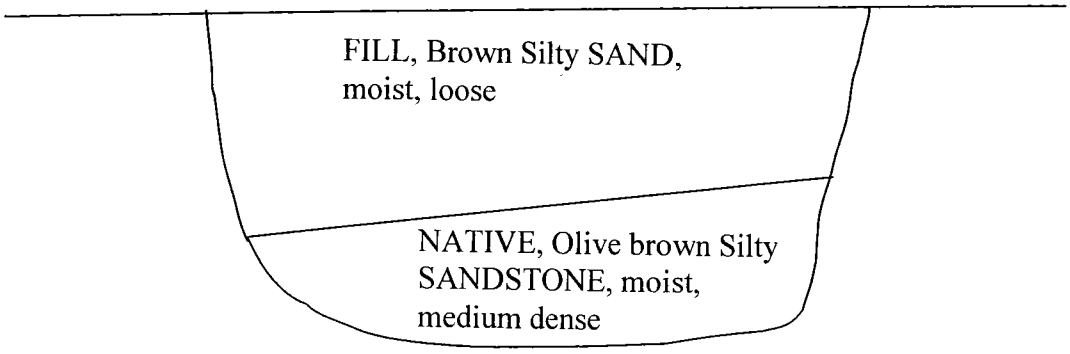
FIGURE 3

ATTACHMENT 6

Test Pit 3
1"=2'



Test Pit 4
1"=2'



ATTACHMENT 6

COUNTY OF SANTA CRUZ

PLANNING DEPARTMENT
701 OCEAN STREET, 4TH FLOOR, SANTA CRUZ, CA 95060
(831) 454-2580 FAX: (831) 454-2131 TDD: (831) 454-2123
KATHLEEN MOLLOY PREVISICH, PLANNING DIRECTOR

SOILS ENGINEER TRANSFER OF RESPONSIBILTY

APN: 020 - 013 - 45 DATE: 6-5-13
OWNER: Barry Swenson Builder
PROJECT LOCATION: Dempsey Road

PROJECT DESCRIPTION:
New single family residence and driveway.

Our firm is taking over the above referenced project as the project soils engineer of record.

We have reviewed the original geotechnical work for this project. Completed work reviewed to date is as follows (detail all reports including author, title, date and project number):
AMSO Consulting Engineers, Geotechnical Investigation for Two New Single Family Homes, dated March 1, 2006, Project No. 3360
AMSO Consulting Engineers, Geotechnical Investigation Report Update, dated June 15, 2012, Project No. 3360

Based upon our review, we offer our professional opinions as follows (check where applicable):

____ We concur with all of the technical conclusions and recommendations.

X
____ We do not agree with or support geotechnical conclusions or recommendations as detailed on the attached report (attach new conclusions and recommendations and all new supporting data and reasoning).

Please read prior to signature
By signing below, we agree to accept responsibility within our area of technical competence for approval of this project upon completion of the work.

REGISTERED PROFESSIONAL ENGINEER
REBECCA LYNN DEEDER
2627
EXP 12/13
GEOTECHNICAL
STATE OF CALIFORNIA

SIGNED: _____
(Applicable California State registered civil or soils engineer's signature and wet stamp here)

RETURN TO:

ENVIRONMENTAL HEALTH
BUILDING/GRADING APPLICATION REVIEW FORM

ATTACHMENT 7

APP. #: 131003 APN: 025-013-45 ADDRESS: _____

6/18/13 - Charged fee in Hansen.

_____ FEE: (Circle One) $118-HPR $949-HDA $1,686-HAP $181-HSR X ___hrs OTHER: _____

Date Received 6/10/13 Staff: Ruben

LAND USE

X APPROVED _____NOT APPROVED _____NOT REQUIRED

X HOLD REASON: septic info

X No construction, grading, or fill over the septic system or expansion area.

_____ Building Plans require details: septic tank, leachlines, expansion area, other: _____

_____ Submit a current licensed pumper's report for review and approval.

_____ Submit application / obtain approval for a New Sewage Disposal Permit.

_____ Submit application / obtain approval for permit to upgrade/repair sewage disposal system.

_____ Applicant needs to submit an Individual Water System Permit.

X No future increase in square footage allowed w/o septic upgrade; one time addition up to 500 square feet completed.

_____ Applicant may not increase square footage or add bedrooms; one time addition up to 500 sq. ft. already completed and sewage system is a non-standard system.

_____ Notification sent to: _____

_____ Comments: _____

Staff: _____ Date: 6/18/13

CONSUMER PROTECTION Date received: _____ Staff: _____

_____ APPROVED _____NOT APPROVED _____NOT REQUIRED

_____ HOLD REASON: _____

_____ Applicant must submit food facility or pool/spa (circle)

_____ Plan Check Application with fee / Facility Checklist / ____sets of plans that meet all checklist parameters.

_____ Applicant must submit completed Zoning Clearance Form.

_____ Comments: _____

Staff: _____ Date: _____

HAZARDOUS MATERIALS Date received: _____ Staff _____

_____ APPROVED _____NOT APPROVED _____NOT REQUIRED

_____ HOLD REASON: _____

_____ Applicant must submit a Hazardous Materials Management Plan packet if hazardous materials or wastes will be stored.

_____ Applicant must submit a completed Underground Storage Tank installation packet.

_____ Comments: _____

Staff: _____ Date: _____

ENVIRONMENTAL HEALTH SERVICE HEALTH SERVICES AGENCY - COUNTY OF SANTA CRUZ
701 OCEAN ST., ROOM 312, SANTA CRUZ, CA 95060 (831) 454-2022

SEP 21 2012

APPLICATION FOR SEWAGE DISPOSAL PERMIT

PE 4270

ATTACHMENT 7

To Be Completed By Applicant:

Owner's Name GREEN VALLEY CORP Assessor's Parcel Number 025-013-45

Mailing Address 777 N 1ST ST ~~SUITE~~ 5th FL City SAN JOSE State CA Zip 95112

Job Address If Different Than Above DEMPSEY LN LOT 4 Owner's Phone: (H)(831) 475-7100 (W)(831) 901 1576

Directions to Site PAUL SWEET RD TO CHAMINADE LN 1ST RIGHT ON DEMPSEY LN

Mail Correspondence to: BARRY SWENSON BUILDER 2400 CHANTICLEER SUITE H SANTA CRUZ, CA 95062 Applicant's Phone: (831) 475-7100

The Proposed Sewage Disposal System Will Serve:

☒ Single Residence: Number of Bedrooms including dens, offices, guest houses, etc.):
Existing : ______ Proposed (or legalizing) ______ Total: 4

☐ Multiple Residences --Total No. of Units (with kitchens): ______ Total No. of Bedrooms: ______

☐ Commercial/Institutional Facility -- Describe: ______

Peak daily wastewater flow: ______ GPD (Attach meter records and calculations)

List any other uses on the property: ______

(Must also be shown on plot plan)

Validation 09/24/2012 ... 000000 ... E-Batch 0008 ... $2093.00 ... $2093.00

PE 4270 $3000 - credit $907 8/14/07 (07-037)

This Application Is For:

☒ New sewage disposal system to serve new development -- Parcel Size: 1.73 A Date Recorded: 2009

☐ Repair/Replacement of system that serves existing development

☐ Upgrade of system that serves existing development for addition/remodel purposes

☐ Septic Tank Only ☐ Greywater Sump Only ☐ Curtain Drain Only ☐ Grease Trap ☐ Distribution Device

CONTRACTOR: by bid SEWAGE DISPOSAL CONSULTANT: Rummel Design Criteria

Contractor's License Law Certificate (Complete A or B)

☐ A. The applicant is licensed under the provisions of the Calif. Contractors License Law under license number ______ which is in full force and effect.

☒ B. The applicant is exempt from the provisions of the Calif. Contractors License Law for the following reason: ☐ Owner/Builder ☐ Other ______

9/17/12 X Douglas Lela
Date Applicant Signature

Worker's Compensation Certificate (Complete A or B)

☐ A. A currently effective certificate of Worker's Compensation Insurance coverage is on file with Santa Cruz County Environmental Health Service

☒ B. I certify that in the performance of the work for which this permit is issued I shall not employ any person in any so as to become subject to the worker's comp. laws of Calif.

9/17/12 X Douglas Lela
Date Applicant Signature

I understand that issuance of a permit by Santa Cruz Environmental Health Service implies no guarantee of septic system function. Any subsequent septic system failure will require the owner to have the septic tank pumped and make repairs as necessary to confine sewage below ground surface. I hereby acknowledge that I have read this application and the **instructions on the reverse side,** and state that the formation on this page and the following page is correct, and agree to comply with all County Ordinances and State laws regulating construction of private sewage disposal systems.

Incomplete application for sewage disposal permits will become null and void if all required information is not submitted within one year of date of application. I understand that this permit shall expire: in 24 months after approval if a building permit is not applied for in that time period.

I agree to comply with additional conditions which may be imposed by Staff as listed on the following page to ensure that the system meets standards.

I agree to provide 24-hour notice directly to the Inspector during office hours the morning of the day before an inspection is requested.

I understand that County approval of the Sewage Disposal Permit does not constitute County approval of any illegal building or land use activities that may be present on this site.

I certify that the information contained in this application, particularly pertaining to bedrooms and uses on this site, is accurate.

Date: 9/17/12 Applicant Signature: Douglas Lela Owner Signature Douglas Lela Date: 9-17-2012

PERMIT NUMBER: 12-2237 **EHS USE ONLY**

The design for the sewage disposal system presented herein meets the standards for: ☐ Not Applicable ☐ Standard System

☒ Special Operating System: Fee Level: [__] 1 [__] 2 [__] 3 [__] 4 [__] 5 Type: 6 Boot

Application Approved by: ______ Date: ______ Supervisor: ______ Date: ______

THIS PERMIT EXPIRES ON ______ OR WILL BE VALID AS LONG AS THE BUILDING APPLICATION IS VALID.

APPLICATION FOR SEWAGE DISPOSAL PERMIT - PROPOSED DESIGN FOR SEWAGE DISPOSAL SYSTEM

moved AT tank site/ Reroutes pressure lines + Details 100% exp.

Plan Revised ☒ **Date** 2/25/13 Permit # 12-221

The Following Is To Be Completed By The Applicant: 10-14-12, Assessor Parcel Number 025-013-45

System # ____ (If multiple systems on property)

ATTACHMENT 7

Water Supply: Public(Company Name): City of Santa Cruz Shared (Source APN)____ Individual ___

My Proposal Is For (check one):

☐ 1. A new septic system for new development (standard septic system requirements and water supply requirements).
☐ 2. A repair or upgrade of a system that serves existing development (must meet standard system requirements including expansion area). **Future expansion trenches must be shown on plot plan.**
☐ 3. A nonconforming system to serve existing development (cannot meet standard system requirements).
☐ 4. A haulaway system (parcel can only accommodate less than 50% of leachfield requirements).
☒ 5. A specific alternative system design: (attach diagram and specifications) ____.

For system types 3, 4, 5, owner or agent must sign an Acknowledgment of Onsite Sewage Disposal System with Special Operating Conditions, and must comply with the requirements specified in the Acknowledgment, which is made a part of this permit). (EHS Staff: If necessary, change category above to match completed permit).

RECEIVED SANTA CRUZ COUNTY ENVIRONMENTAL HEALTH 2013 FEB 28 AM 10 28

My Proposed System Design Is:

☐ **Gravity Flow** ☐ **Pump Up** ☒ **Pressure-Distribution**

Septic Tank

Septic Tank ☒ **New** ☐ **Existing** Size (gallons): 2600 Material: conc. Brand: HoDT-600 AN

If Pump Chamber ☐ **New** ☐ **Existing** Size (gallons): ____ Material: ____ Brand: ____

Design soil percolation rate range (minutes per inch) (circle choice): <1 (1-5) 6-30 31 - 60 61 - 120

☐ **Conventional Leaching Device Specifications:** ☐ **Leachfield** ☐ **Greywater Sump**

Number lines 8 Total linear feet 62.5 width (ft) 1½" Effective Depth (ft) 6"-12" Proposed Area (sq.ft.) 500

Maximum Trench Depth: 6"-12" **Existing functional leachfield that meets standards (sq.ft.)** ____

☐ **Distribution Device type** See Plan details for Geoflow **Leachfield grand total** ____

☐ **Chamber Leaching: Brand / Model** ____ **No. Chambers** ____ **Linear Feet** ____

☐ **Seepage Pit(s): (allowed only for certain Repair/Upgrade)**

Number: ____ Diameter: ____ Flow depth: ____ Total square feet: 500

Draw & attach two copies of a plot plan that clearly describes the design (turn page over for plot plan requirements).

EHS USE ONLY

Permit conditions to be satisfied: ____

(Note: Failure to comply with conditions may result in recordation of Notice of Violation.)

INSTALLER ____

INSPECTIONS:	INSPECTOR	DATE		INSPECTOR	DATE
TANK:			Building ELECTRICAL PERMIT		
LEACHING:			IWS CONDITIONS:		
DIST. BOX:			OTHER: OSSP	AST	9-17-12
INSP. RISERS:			OTHER: Consultant Final:		
ALT. SYSTEM			AS BUILT RECEIVED		
WATER CONSERVATION:			FINAL:		

NOTES: ____

SHOULD THIS SYSTEM BE RECHECKED? ____ WHEN? ____ DESCRIBE WHAT TO CHECK FOR: ____

ATTACHMENT 8

CITY OF SANTA CRUZ

WATER DEPARTMENT

212 Locust Street, Suite C, Santa Cruz CA 95060 Phone (831) 420-5210 Fax (831) 420-5201

April 20, 2012

Owen Lawlor
612 Spring Street
Santa Cruz, CA 95060

Re: **APNS: 025-013-43, 025-013-44, 025-013-45, AND 025-013-46; PROPOSED SINGLE-FAMILY DWELLING ON EACH UNDEVELOPED PARCEL LOCATED NEAR THE INTERSECTION OF PAUL SWEET ROAD AND CHAMINADE LANE**

Dear Mr. Lawlor:

This letter is to advise you that the subject parcel is located within the service area of the Santa Cruz Water Department and potable water is currently available for normal domestic use and fire protection. Service will be provided to each parcel upon payment of the fees and charges in effect at the time of service application and upon completion of the installation, at developer expense, of any water mains, service connections, fire hydrants and other facilities required for the development under the rules and regulations of the Santa Cruz Water Department. The development will also be subject to the City's Landscape Water Conservation requirements.

At the present time:

- the required water system improvements are not complete; and
- financial arrangements have not been made to the satisfaction of the City to guarantee payment of all unpaid claims.

This letter will remain in effect for a period of two years from the above date. It should be noted, however, that City Council may elect to declare a moratorium on new service connections due to drought conditions or other water emergency. Such a declaration would supersede this statement of water availability.

If you have any questions regarding service requirements, please call the Engineering Division at (831) 420-5210. If you have questions regarding landscape water conservation requirements, please contact the Water Conservation Office at (831) 420-5230.

Sincerely,

Bill Kocher
Director

ATTACHMENT 9

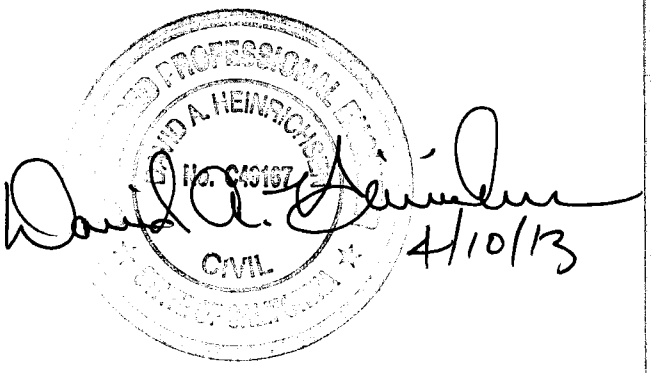
DRAINAGE STUDY

FOR

Santa Cruz Hills
Lot #4

Dempsey Road
Santa Cruz, California

September, 2009
Revised: January, 2013



Job 00078

IFLAND ENGINEERS
Civil Engineering ▪ Structural Design ▪ Land Development

5200 Soquel Avenue Suite 102
Santa Cruz, CA 95062
(831) 426-5313 FAX (831) 426-1763
www.iflandengineers.com

Introduction

ATTACHMENT 9

This drainage study addresses the issue of detention for the post development increases in stormwater runoff resulting from the changes in land cover associated with the proposed development for Lot #4 of the Santa Cruz Hills Subdivision. The analysis includes the redevelopment of Dempsey Road, the addition of the Common Drive, and the impervious surfaces associated with the structure. For design purposes the impervious areas for lots #1-#3, have been overestimated and incorporated into the detention/release calculations. The entire property is approximately 5.6 Acres in size with approximately 1 acre being developed. The purpose of the report is to determine the change in storm water runoff resulting from the proposed site improvements and its effect on this property.

The subject parcel is located off Dempsey Road near Chaminade Lane, and is currently undeveloped except for the unimproved Dempsey Road. There is 1 drain inlet located on the site, approximately 913 feet from the intersection of Dempsey Road and Chaminade Lane, along the north side of Dempsey. Furthermore, there are 3 storm drain pipes along Dempsey, a 24" pipe at beginning of Dempsey, a 6" pipe approximately 400 feet up Dempsey, and a 12" pipe associated with the single drain inlet. Currently, runoff from the site sheet flows towards the south and southeast of the subject parcel, to an unimproved valley gutter along the north side of Dempsey Road. The valley gutter is directed to the existing 24" CMP pipe which crosses under Dempsey Road and into the adjacent drainage channel. The proposed plans include removing the 6" storm pipe and installing a drain inlet above the existing 24" storm pipe.

The 24" storm pipe is conveyed to a 40" storm pipe, through a drainage channel, approximately 66 feet down slope. The 40" pipe then crosses under Chaminade Lane and flows are conveyed through another shorter drainage channel, approximately 45 feet in length, to another 24" storm drain, prior to entering the county system within Paul Sweet Road.

The Existing 24" pipe at Dempsey Road, is installed at an approximately 35% slope, and therefore has a large capacity, approximately 134 cfs, for storm water flows. The drainage channel, in which it outlets into, has a trapezoidal shape, with nearly vertical side slopes, and is approximately 4' wide and 4' high at the flow line. The point of discharge appears to be stable in its current state, and adequately conveys water to the downstream pipe. There are no signs of flooding within the channel or prior to entering the 24" storm drain. The dimensions of the channel yield a 75% capacity of approximately 174 cubic feet per second (see calculations below for existing conditions.)

Per the Geotechnical Report and the Soils Survey of Santa Cruz County, see Appendix A, the property is made up primarily of Aptos Loam (Soils Group "C") which typically have a slow infiltration rate and impede the downward movement of water. Together with the Aptos Loam, rocky outcrops were observed throughout the site, proving the soils to be typically impervious throughout the parcel. Therefore, a high existing runoff coefficient can be assumed for the below calculations.

Site development will necessitate compliance with drainage regulations as mandated by the County of Santa Cruz Design Criteria.

ATTACHMENT 9

Existing Condition

The following calculations provide analysis of the existing conditions on and off site.

The runoff coefficient (C) and the rainfall intensity (I_{10}) are assumed values taken from figures SWM-1 and SWM-2 & SWM-3 (Appendix B), respectively, of the County of Santa Cruz Design Criteria dated June 2006.

- Total area to be developed = 5.57 AC
- Impervious area = 0.00 AC
- Semi-Pervious = 5.57 AC

$$Q=CIA$$

Assumed C-Value for site conditions = 0.50

I_{10} @ T_c = 15 min, = 1.8"/hr.

$Q_{10} = (0.5)(1.8)(5.57)$ = 5.01 c.f.s.

$Q_{100} = (1.5)(1.25)(Q_{10})$ = 9.40 c.f.s.

→Capacity calculations of downstream storm drain measures

- Existing 24" CMP

Given Input Data:	Computed Results:
Shape ..... Circular	Flowrate ..... 43.4967 cfs
Solving for ..... Flowrate	Area 3.1416 ft2
Diameter ..... 2.0000 ft	Wetted Area 1.5708 ft2
Depth ..... 1.0000 ft	Wetted Perimeter ..... 3.1416 ft
Slope ..... 0.3500 ft/ft	Perimeter ..... 6.2832 ft
Manning's n 0.0200	Velocity ..... 27.6908 fps
	Hydraulic Radius ..... 0.5000 ft
**Note: Capacity is calculated at 50% full*	Percent Full ..... 50.0000 %
	Full flow Flowrate ..... 86.9933 cfs
	Full flow velocity ..... 27.6908 fps

→Capacity calculations of downstream storm drain measures

- Existing drainage channel

Given Input Data:	Computed Results:	Critical Information:
Shape ..... Rectangular	Flowrate .....174.3886 cfs	Critical depth ..... 3.8947 ft
Solving for .....Flowrate	Velocity .....14.5324 fps	Critical slope .....0157 ft/ft
Slope ..... 0.0300 ft/ft	Full Flowrate .....249.4376 cfs	Critical velocity .....11.1941 fps
Manning's n 0.0200	Flow area 12.0000 ft2	Critical area 15.5787 ft2
Depth ..... 3.0000 ft	Flow perimeter ..10.0000 ft	Critical perimeter .....11.7893 ft
Height .....4.0000 ft	Hydraulic radius .1.2000 ft	Critical hydraulic radius 1.3214 ft
Bottom width ..... 4.0000 ft	Top width ..... 4.0000 ft	Critical top width ..... 4.0000 ft
	Area 16.0000 ft2	Specific energy ..... 6.2820 ft
**Note: Capacity is calculated at 75% full*	Perimeter ..... 12.0000 ft	Minimum energy ..... 5.8420 ft
	Percent full .....75.0000 %	Froude number 1.4792
		Flow condition ..... Supercritical

Proposed Conditions

ATTACHMENT 9

*The existing runoff for a 10-year storm event, over the entire site, is approximately 5.01 cubic feet per second (cfs). According to the County of Santa Cruz "Runoff Detention by the Modified Rational Method" (Appendix C) and the proposed impervious surfaces, the 5-year pre-development release rate for a 10-year design storm is $Q_{pre(5)}$ = 0.725 cfs. Therefore, proposed conditions shall be designed to release at or below this rate. The specified storage volume based on the above method, and existing versus proposed conditions is approximately 950 cubic feet, which will be detained on-site and released as stated above.

The following calculations provide analysis of the proposed conditions.

- Total area = 5.57 AC
- Impervious area = 0.98 AC
- Pervious = 4.59 AC

$C_{10} = \frac{(0.9)(0.98) + (0.5)(4.59)}{5.57}$ = 0.57

I_{10} @ T_c = 10 min, = 2.1"/hr.

$Q_{10} = (0.57)(2.1)(5.57)$ = 6.67 c.f.s.

$Q_{100} = (1.5)(1.25)(Q_{10})$ = 12.50 c.f.s.

Detention will be required to mitigate the increased runoff. It will be achieved by utilizing underground detention near the intersection of Dempsey Road and Chaminade Lane (Refer to the Civil Plans for locations). The underground system shall be designed for a 10-year storm event with a 5-year pre-development allowable release rate.

According to the Zone 5 Master Drainage Plan, Arana Gulch Basin, the downstream 24" RCP drain pipe has a 5-yr design discharge of 54 cfs. The proposed system has been designed based on the 5 year release rate for a 10 year storm event. Therefore, the total proposed discharge is below the available pipe capacity of 55 cfs. The proposed development will not impact downstream waters nor will it impact the receiving water body, and the Pacific Ocean.

Sheets C3 and C4 depict the proposed drainage system for new roads, and sheet C1 depicts that of Lot #4. The addition of the concrete swale along Dempsey road and the storm drain inlets along the Common Drive, as well as the proposed underground detention system, will capture runoff and release flows off-site via a controlled release discharge pipe. The pipe and detention system are designed to capture and store the proposed increase in runoff prior to reaching the downstream drainage system.

Outlet Control Device

Pipe Flow Calculator:

Given Input Data:	Computed Results:
Shape ..... Circular	Area 0.2535 ft2
Solving for ..... Diameter Full	Wetted Area 0.2535 ft2
Diameter ..... 0.5681 ft	Wetted Perimeter ..... 1.7847 ft
Depth ..... 0.5681 ft	Perimeter ..... 1.7847 ft
Flowrate ..... 0.7250 cfs	Velocity ..... 2.8603 fps
Slope ..... 0.0050 ft/ft	Hydraulic Radius ..... 0.1420 ft
Manning's n 0.0100	Percent Full ..... 100.0000 %
	Full flow Flowrate ..... 0.7250 cfs
Use 6" PVC Pipe = Q < 0.725 cfs	Full flow velocity ..... 2.8603 fps

ATTACHMENT 9

Detention System

The proposed detention system is sized to capture and store the increased volume of runoff due to the new development, approximately 950 cubic feet. This will be achieved by using 4- 24" diameter HDPE Solid storm drain pipes with 24" manifold each side. Refer to product details, sheet C8 and Appendix E for design and construction information.

Water Quality Treatment

One County standard Water Quality Treatment Units (Fig SWM-12) will be used for water quality purposes. The treatment unit will be equipped with a 3' sump and snout to capture debris and pollutants prior to entering the underground detention system and drainage channel. Said unit is located immediately upstream of the detention system inlet.

Lot #4 Specific Drainage Calculations

Although the new impervious surfaces from the development of Lot #4 have been factored into the overall detention system along Dempsey Road, Slope Infiltration Calculations have also been performed, for the roof and wall drain discharge points. See following pages. The wall drains will discharge through the minimum required length of perforated pipe, six linear feet, while the roof drain system will outlet at two different points, through 15' of perforated pipe per County Figure SWM-22.

Conclusion

The proposed development not only meets the County's design criteria's but also improves an existing site. The water which currently flows into the adjacent drainage channel is not treated for debris or pollutants. The proposed drainage system includes two water quality treatment units, which will treat runoff prior to entering the existing channel. This will greatly enhance the quality of the riparian area both at the channel and downstream.

The above calculations demonstrate that the proposed stormwater management system will be sufficient to control flows from the proposed development. The flow restrictor pipe calculations prove that the discharge pipe will release stormwater flows at the same rate as existing conditions allow. The detention system is also adequate in storing the necessary runoff to conform to county standards.

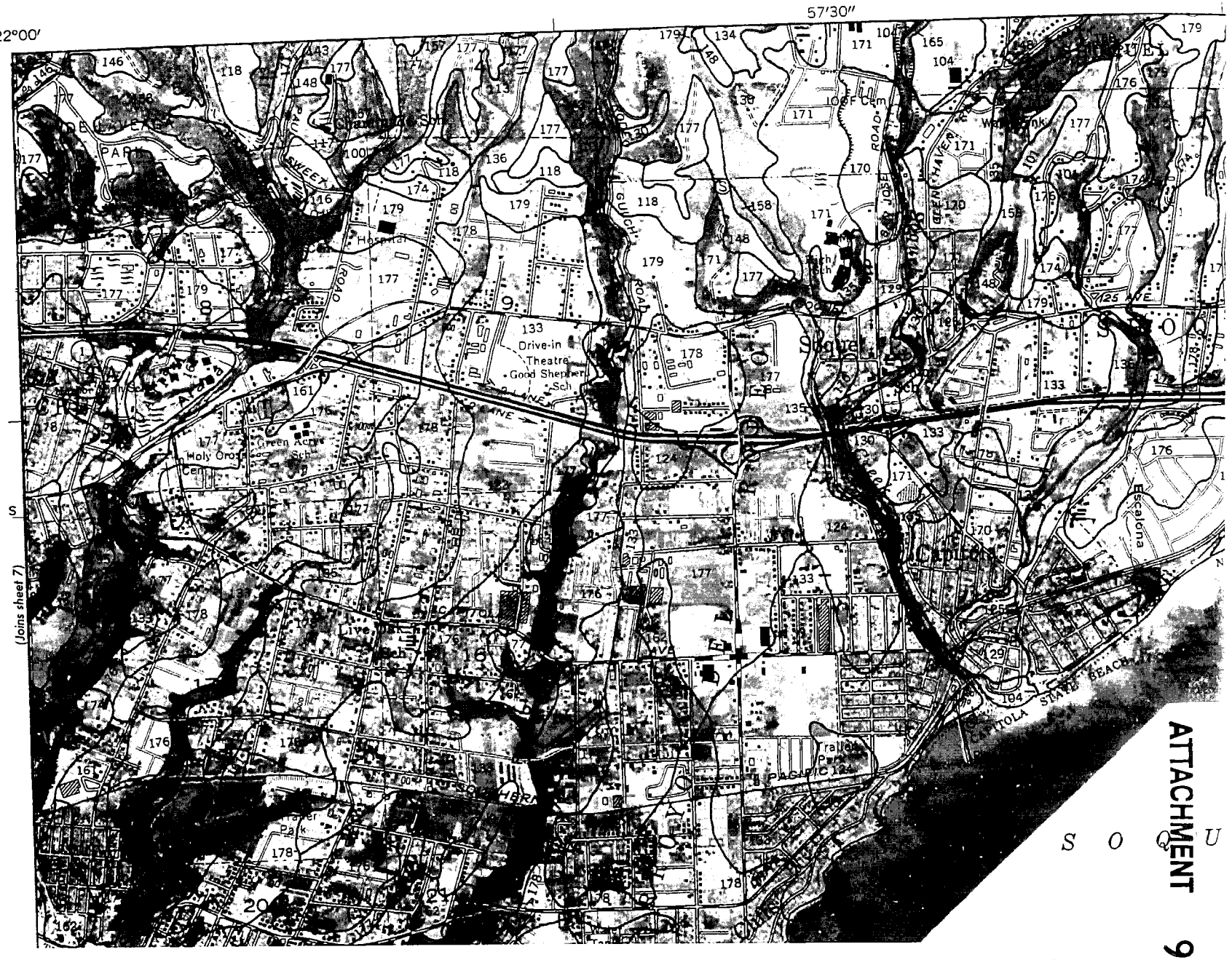
Furthermore, there is an 8" overflow pipe connected to the drain inlet at the existing 24" pipe designed to convey larger storms in excess of the detention system design to the existing 24" pipe. This will allow for a safe discharge for storms greater than the 10-yr event.

Lastly, the storm water runoff from lot #4 will be contained on-site for small storms, via infiltration trenches and landscaping throughout. Runoff will be treated through the proposed stone trenches and the landscaping before reaching either the new drainage system down slope or dissipating out into the underlying soils.

In all, this drainage study proves that the stormwater drainage system, as designed, will be adequate and sufficient for the proposed development.

Appendix A
(Soils Information)

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE



ATTACHMENT 9

S O Q U

TABLE 12.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS

[The symbol < means less than; > means greater than. The erosion tolerance factor (T) is for the entire profile. Absence of an entry means data were not available or were not estimated]

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors	
						K	T
	In	In/hr	In/in	pH			
100, 101, 102----	0-18	0.6-2.0	0.13-0.16	5.6-7.3	Low----------	0.28	2
Aptos	18-24	0.6-2.0	0.13-0.18	4.5-6.5	Moderate-------	0.20	
	24-36	0.6-2.0	0.09-0.12	4.5-6.5	Moderate-------	0.17	
	36	---	---	---	----------	---	
103.							
Aquents.							
104----------	0-17	6.0-20	0.07-0.10	5.6-7.3	Low----------	0.15	5
Baywood	17-61	6.0-20	0.06-0.09	5.6-7.3	Low----------	---	
105, 106, 107----	0-17	6.0-20	0.07-0.10	5.6-7.3	Low----------	0.15	5
Baywood	17-56	6.0-20	0.06-0.09	5.6-7.3	Low----------	---	
	56-61	6.0-20	0.04-0.05	5.6-7.3	Low----------	0.15	
108----------	0-10	6.0-20	0.06-0.08	6.1-7.3	Low----------	0.17	5
Baywood Variant	10-38	6.0-20	0.06-0.08	6.6-8.4	Low----------	0.17	
	38-55	0.06-0.2	0.17-0.19	7.9-8.4	Moderate-------	0.37	
	55-70	0.6-2.0	0.09-0.11	6.6-7.3	Low----------	0.28	
109.							
Beaches.							
110, 111, 112----	0-19	2.0-6.0	0.10-0.12	5.6-7.3	Low----------	0.17	3
Ben Lomond	19-46	2.0-6.0	0.09-0.15	5.1-6.0	Low----------	0.17	
	46	---	---	---	----------	---	
113*:							
Ben Lomond------	0-19	2.0-6.0	0.10-0.12	5.6-7.3	Low----------	0.17	3
	19-46	2.0-6.0	0.09-0.15	5.1-6.0	Low----------	0.17	
	46	---	---	---	----------	---	
Catelli---------	0-7	2.0-6.0	0.10-0.13	5.6-7.3	Low----------	0.20	2
	7-37	2.0-6.0	0.10-0.13	5.6-6.5	Low----------	0.20	
	37	---	---	---	----------	---	
Sur----------	0-18	2.0-6.0	0.05-0.10	6.1-7.3	Low----------	0.10	1
	18-35	2.0-6.0	0.05-0.08	5.1-7.3	Low----------	0.10	
	35	---	---	---	----------	---	
114*, 115*:							
Ben Lomond------	0-19	2.0-6.0	0.10-0.12	5.6-7.3	Low----------	0.17	3
	19-46	2.0-6.0	0.09-0.15	5.1-6.0	Low----------	0.17	
	46	---	---	---	----------	---	
Felton----------	0-11	2.0-6.0	0.11-0.13	5.1-6.5	Low----------	0.17	2
	11-43	0.2-0.6	0.15-0.19	5.1-6.5	Moderate-------	0.28	
	43-63	0.6-2.0	0.12-0.14	5.1-6.0	Low----------	0.37	
	63	---	---	---	----------	---	
116, 117---------	0-11	0.6-2.0	0.14-0.18	5.6-7.3	Moderate-------	0.32	1
Bonnydoon	11	---	---	---	----------	---	
118*:							
Bonnydoon-------	0-11	0.6-2.0	0.14-0.18	5.6-7.3	Moderate-------	0.32	1
	11	---	---	---	----------	---	
Rock outcrop.							
119----------	0-7	0.06-0.2	0.12-0.16	6.6-8.4	High----------	0.24	5
Clear Lake	7-62	0.06-0.2	0.12-0.16	7.4-8.4	High----------	0.24	

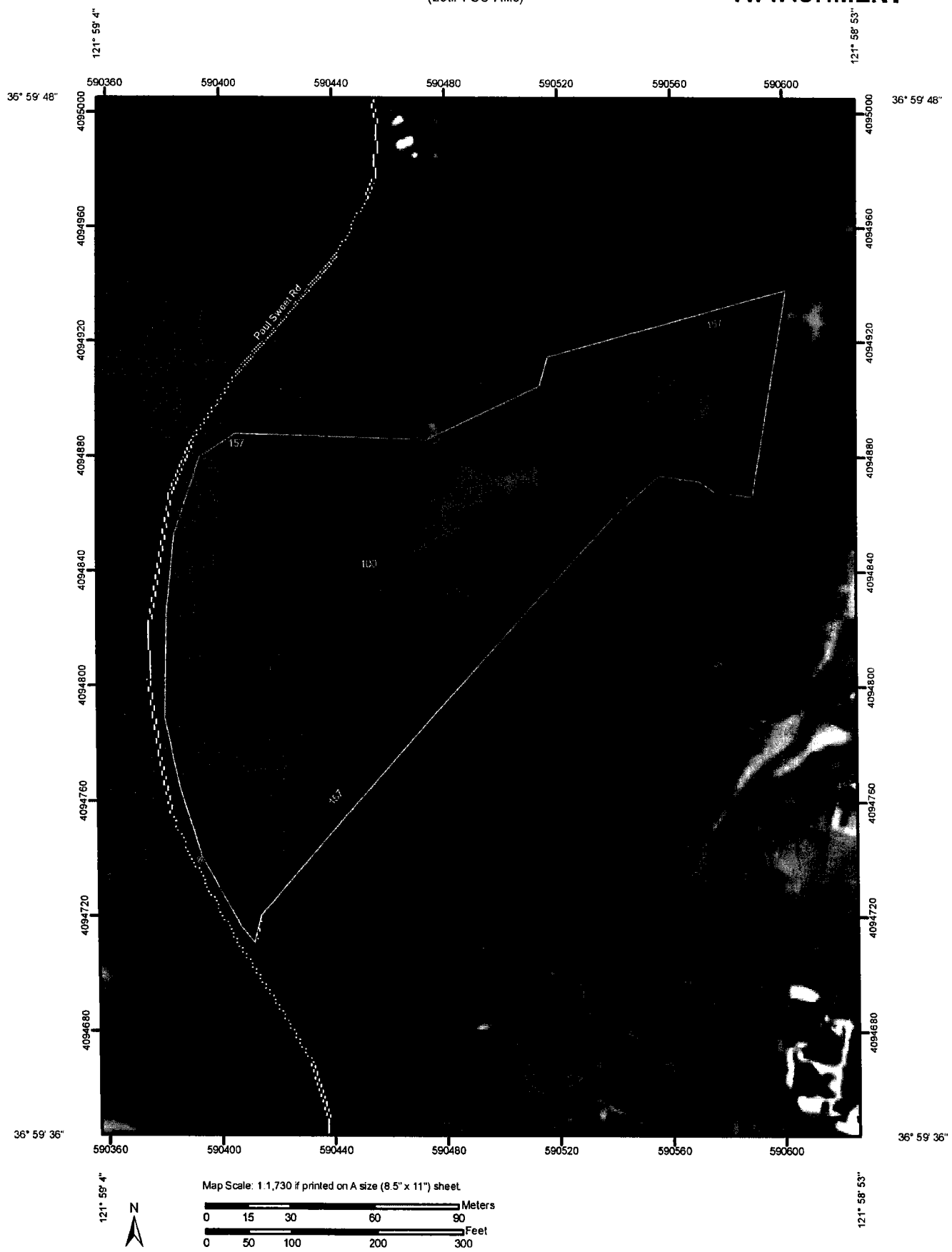
See footnote at end of table.

TABLE 12.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors	
						K	T
	In	In/hr	In/in	pH			
145----------	0-10	0.6-2.0	0.13-0.15	5.6-7.3	Moderate-------	0.37	2
Lompico Variant	10-14	0.2-0.6	0.16-0.18	4.5-6.0	Moderate-------	0.28	
	14-28	0.06-0.2	0.14-0.16	4.5-6.0	High----------	0.20	
	28	---	---	---	----------	---	
146, 147, 148----	0-19	0.6-2.0	0.14-0.17	5.6-6.5	Moderate-------	0.37	2
Los Osos	19-36	0.06-0.2	0.12-0.16	5.6-7.3	High----------	0.28	
	36	---	---	---	----------	---	
149----------	0-16	2.0-6.0	0.11-0.14	5.1-6.5	Low-----------	0.28	2
Madonna	16-23	0.6-2.0	0.11-0.14	5.1-6.0	Low-----------	0.37	
	23	---	---	---	----------	---	
150, 151---------	0-6	0.6-2.0	0.08-0.12	5.1-6.5	Low-----------	0.20	1
Maymen	6-14	0.6-2.0	0.11-0.13	4.5-6.5	Moderate-------	0.24	
	14	---	---	---	----------	---	
152*:							
Maymen----------	0-6	0.6-2.0	0.08-0.12	5.1-6.5	Low-----------	0.20	1
	6-14	0.6-2.0	0.11-0.13	4.5-6.5	Moderate-------	0.24	
	14	---	---	---	----------	---	
Madonna---------	0-16	2.0-6.0	0.11-0.14	5.1-6.5	Low-----------	0.28	2
	16-23	0.6-2.0	0.11-0.14	5.1-6.0	Low-----------	0.37	
	23	---	---	---	----------	---	
153*:							
Maymen----------	0-6	0.6-2.0	0.08-0.12	5.1-6.5	Low-----------	0.20	1
	6-14	0.6-2.0	0.11-0.13	4.5-6.5	Moderate-------	0.24	
	14	---	---	---	----------	---	
Rock outcrop.							
154----------	0-9	2.0-6.0	0.10-0.13	5.6-6.5	Low-----------	0.24	2
Maymen Variant	9-19	2.0-6.0	0.08-0.11	5.1-6.0	Low-----------	0.20	
	19	---	---	---	----------	---	
155----------	0-16	0.6-2.0	0.14-0.17	7.4-8.4	Moderate-------	0.37	5
Mocho	16-60	0.2-0.6	0.14-0.18	7.4-8.4	Moderate-------	0.43	
156*, 157*, 158*:							
Nisene----------	0-10	2.0-6.0	0.09-0.13	6.1-7.3	Low-----------	0.20	3
	10-58	0.6-2.0	0.15-0.18	5.6-6.5	Moderate-------	0.20	
	58	---	---	---	----------	---	
Aptos----------	0-23	0.6-2.0	0.13-0.16	5.6-7.3	Low-----------	0.28	2
	23-29	0.6-2.0	0.13-0.18	4.5-6.5	Moderate-------	0.20	
	29	---	---	---	----------	---	
159, 160---------	0-38	2.0-6.0	0.07-0.10	6.1-7.3	Low-----------	0.17	3
Pfeiffer	38-66	2.0-6.0	0.07-0.10	6.1-7.3	Low-----------	0.17	
	66	---	---	---	----------	---	
161, 162, 163----	0-21	0.6-2.0	0.14-0.17	5.6-7.3	Low-----------	0.28	4
Pinto	21-65	0.06-0.2	0.09-0.11	5.1-7.3	Moderate-------	0.17	
164*:							
Pits.							
Dumps.							
165.							
Riverwash.							
166----------	0-8	2.0-6.0	0.13-0.15	7.4-8.4	Low-----------	0.32	5
San Emigdio	8-26	2.0-6.0	0.11-0.13	7.9-8.4	Low-----------	0.32	
Variant	26-60	2.0-6.0	0.12-0.14	7.9-8.4	Low-----------	0.32	

See footnote at end of table.

ATTACHMENT 9



MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Map Units

Soil Ratings

<= 9

> 9 AND <= 12.2313

Not rated or not available

Political Features

Cities

Water Features

Oceans

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

MAP INFORMATION

Map Scale: 1:1,720 if printed on A size (8.5" × 11") sheet.

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for accurate map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: UTM Zone 10N NAD83

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Santa Cruz County, California
Survey Area Data: Version 5, Dec 12, 2007

Date(s) aerial images were photographed: 6/13/2005

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

ATTACHMENT 9

Hydrologic Soil Group

Hydrologic Soil Group— Summary by Map Unit — Santa Cruz County, California				
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
100	Aptos loam, warm, 15 to 30 percent slopes	C	4.8	90.9%
157	Nisene-Aptos complex, 30 to 50 percent slopes	B	0.5	9.1%
Totals for Area of Interest			5.2	100.0%

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

ATTACHMENT 9

Saturated Hydraulic Conductivity (Ksat)

Saturated Hydraulic Conductivity (Ksat)— Summary by Map Unit — Santa Cruz County, California				
Map unit symbol	Map unit name	Rating (micrometers per second)	Acres in AOI	Percent of AOI
100	Aptos loam, warm, 15 to 30 percent slopes	9.0000	4.8	90.9%
157	Nisene-Aptos complex, 30 to 50 percent slopes	12.2313	0.5	9.1%
Totals for Area of Interest			5.2	100.0%

Description

Saturated hydraulic conductivity (Ksat) refers to the ease with which pores in a saturated soil transmit water. The estimates are expressed in terms of micrometers per second. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Saturated hydraulic conductivity is considered in the design of soil drainage systems and septic tank absorption fields.

For each soil layer, this attribute is actually recorded as three separate values in the database. A low value and a high value indicate the range of this attribute for the soil component. A "representative" value indicates the expected value of this attribute for the component. For this soil property, only the representative value is used.

The numeric Ksat values have been grouped according to standard Ksat class limits.

Rating Options

Units of Measure: micrometers per second

Aggregation Method: Dominant Component

Component Percent Cutoff: *None Specified*

Tie-break Rule: Fastest

Interpret Nulls as Zero: No

Layer Options: Depth Range

Top Depth: 0

Bottom Depth: 96

Units of Measure: Inches

ATTACHMENT 9

Water Features

This table gives estimates of various soil water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas.

Surface runoff refers to the loss of water from an area by flow over the land surface. Surface runoff classes are based on slope, climate, and vegetative cover. The concept indicates relative runoff for very specific conditions. It is assumed that the surface of the soil is bare and that the retention of surface water resulting from irregularities in the ground surface is minimal. The classes are negligible, very low, low, medium, high, and very high.

The *months* in the table indicate the portion of the year in which a water table, ponding, and/or flooding is most likely to be a concern.

Water table refers to a saturated zone in the soil. The water features table indicates, by month, depth to the top (*upper limit*) and base (*lower limit*) of the saturated zone in most years. Estimates of the upper and lower limits are based mainly on observations of the water table at selected sites and on evidence of a saturated zone, namely grayish colors or mottles (redoximorphic features) in the soil. A saturated zone that lasts for less than a month is not considered a water table.

ATTACHMENT 9

Ponding is standing water in a closed depression. Unless a drainage system is installed, the water is removed only by percolation, transpiration, or evaporation. The table indicates *surface water depth* and the *duration* and *frequency* of ponding. Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, *long* if 7 to 30 days, and *very long* if more than 30 days. Frequency is expressed as none, rare, occasional, and frequent. *None* means that ponding is not probable; *rare* that it is unlikely but possible under unusual weather conditions (the chance of ponding is nearly 0 percent to 5 percent in any year); *occasional* that it occurs, on the average, once or less in 2 years (the chance of ponding is 5 to 50 percent in any year); and *frequent* that it occurs, on the average, more than once in 2 years (the chance of ponding is more than 50 percent in any year).

Flooding is the temporary inundation of an area caused by overflowing streams, by runoff from adjacent slopes, or by tides. Water standing for short periods after rainfall or snowmelt is not considered flooding, and water standing in swamps and marshes is considered ponding rather than flooding.

Duration and *frequency* are estimated. Duration is expressed as *extremely brief* if 0.1 hour to 4 hours, *very brief* if 4 hours to 2 days, *brief* if 2 to 7 days, *long* if 7 to 30 days, and *very long* if more than 30 days. Frequency is expressed as none, very rare, rare, occasional, frequent, and very frequent. *None* means that flooding is not probable; *very rare* that it is very unlikely but possible under extremely unusual weather conditions (the chance of flooding is less than 1 percent in any year); *rare* that it is unlikely but possible under unusual weather conditions (the chance of flooding is 1 to 5 percent in any year); *occasional* that it occurs infrequently under normal weather conditions (the chance of flooding is 5 to 50 percent in any year); *frequent* that it is likely to occur often under normal weather conditions (the chance of flooding is more than 50 percent in any year but is less than 50 percent in all months in any year); and *very frequent* that it is likely to occur very often under normal weather conditions (the chance of flooding is more than 50 percent in all months of any year).

The information is based on evidence in the soil profile, namely thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and little or no horizon development.

Also considered are local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

Report—Water Features

Water Features– Santa Cruz County, California										
Map unit symbol and soil name	Hydrologic group	Surface runoff	Month	Water table		Ponding			Flooding	
				Upper limit	Lower limit	Surface depth	Duration	Frequency	Duration	Frequency
				Ft	*Ft*	*Ft*				
100—Aptos loam, warm, 15 to 30 percent slopes										
Aptos	C	High	Jan-Dec	—	—	—	—	None	—	—
157—Nisene-Aptos complex, 30 to 50 percent slopes										
Aptos	C	—	Jan-Dec	—	—	—	—	None	—	—
Nisene	B	—	Jan-Dec	—	—	—	—	None	—	—

Data Source Information

Soil Survey Area: Santa Cruz County, California
Survey Area Data: Version 5, Dec 12, 2007

ATTACHMENT 9

Exhibit B

(County of Santa Cruz Stormwater Figures & Charts)

TYPE OF AREA	10- YEAR RUNOFF COEFFICIENTS
Rural, park, forested, agricultural	0.10 - 0.30
Low residential (Single family dwellings)	0.45 - 0.60
High residential (Multiple family dwellings)	0.65 - 0.75
Business and commercial	0.80
Industrial	0.70
Impervious	0.90

REQUIRED ANTECEDENT MOISTURE FACTORS (Ca) FOR THE RATIONAL METHOD*

Recurrence Interval (Years)	Ca
2 to 10	1.0
25	1.1
50	1.2
100	1.25

Note: Application of antecedent moisture factors (Ca) should not result in an adjusted runoff coefficient (C) exceeding a value of 1.00

*APWA Publication "Practices in Detention of Stormwater Runoff"

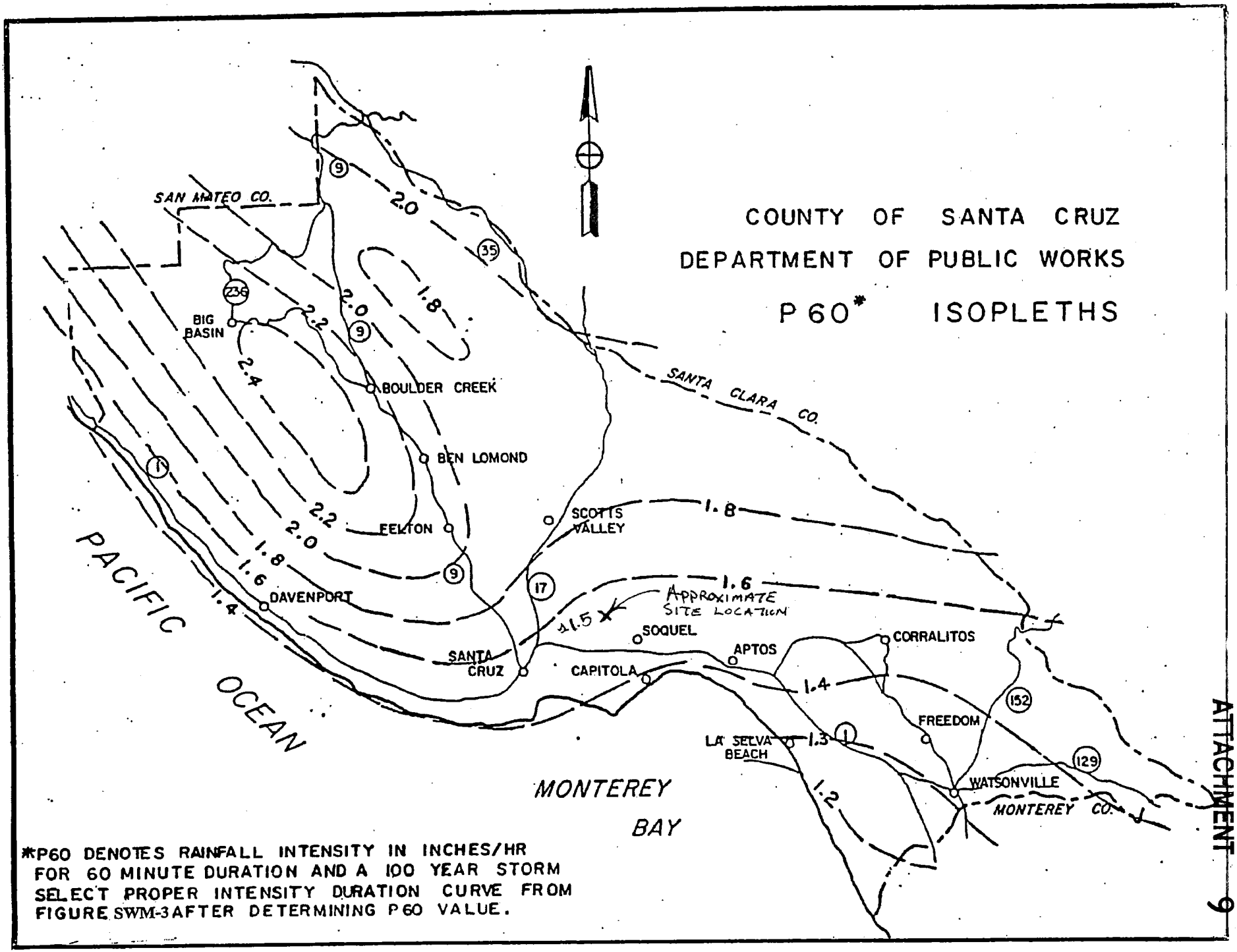


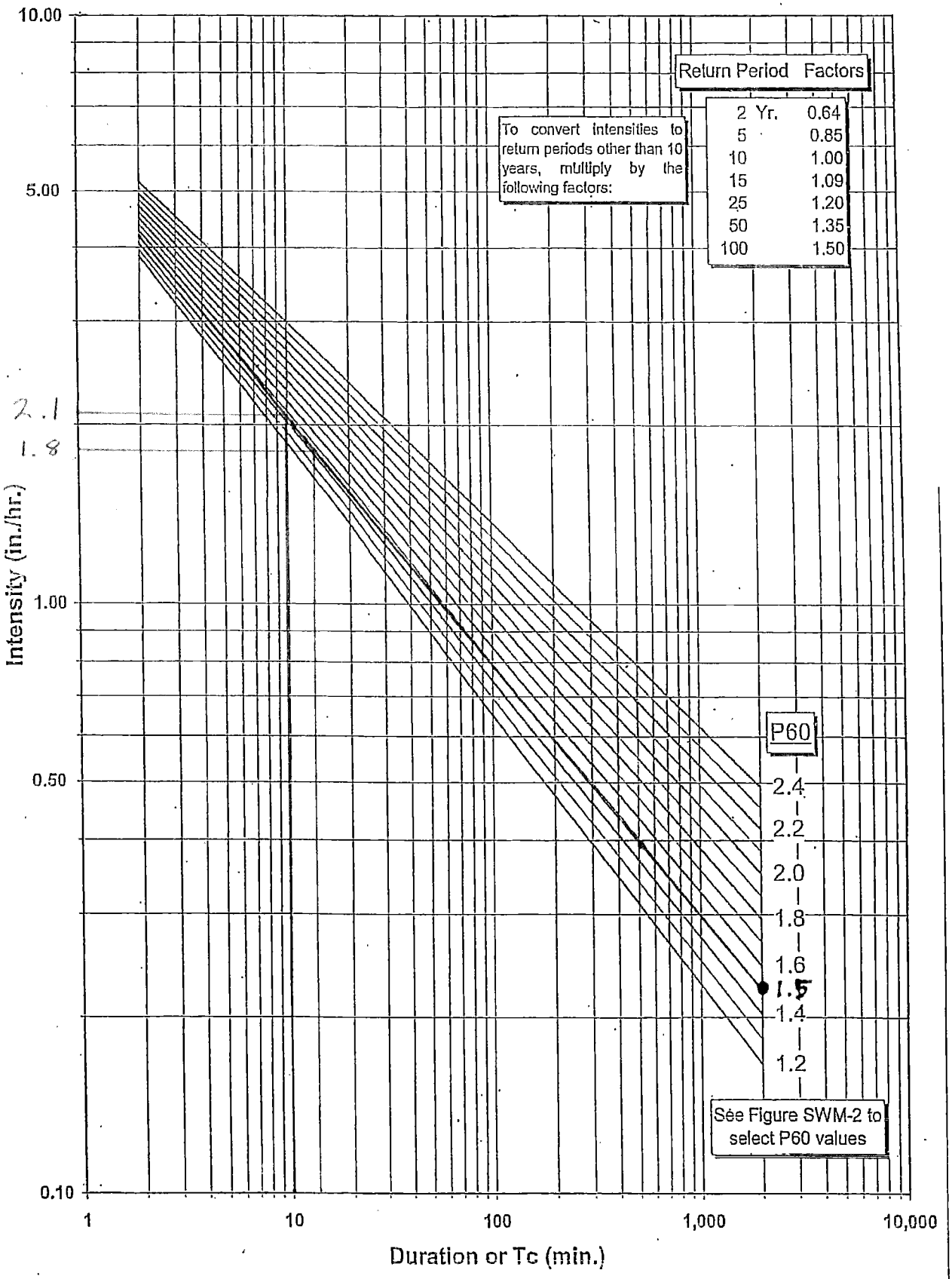
FIG. SWM-2

ATTACHMENT 9

Rainfall Intensity - Duration Curves

10 Yr. Return Period

((4.29112)*(1.1952)^P60_VALUE)/(DURATION^((0.60924)*(0.78522)^P60_VALUE))



Rev. 11-05

FIG. SWM-3

Exhibit C

(Runoff Detention by the Modified Rational Method)
(Runoff Retention by the Slope Infiltration Method)

PROJECT: Santa Cruz Hills - Lot #4 **Calc by:** DMR **Date:** 5/8/2012

RUNOFF DETENTION BY THE MODIFIED RATIONAL METHOD

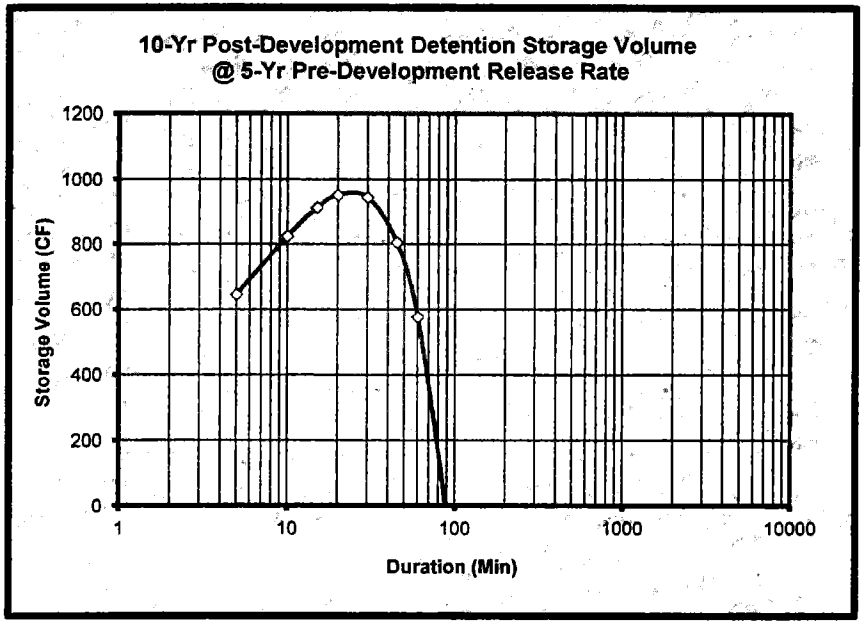
Data Entry: PRESS TAB & ENTER DESIGN VALUES SS Ver: 1.0

Site Location P60 Isopleth:	1.50		Fig. SWM-2 in County Design Criteria
Rational Coefficients Cpre:	0.50		See note # 2
Cpost:	0.90		See note # 2
Impervious Area:	41400	ft^2	See note # 2 and # 4

STRUCTURE DIMENSIONS FOR DETENTION

950	ft^3 storage volume calculated			
100	% void space assumed			
950	ft^3 excavated volume needed			
Structure	Length	Width*	Depth*	*For pipe, use the square
Ratios	305.00	1.77	1.77	root of the sectional area
Dimen. (ft)	**304.46**	**1.77**	**1.77**	

10 - YEAR DESIGN STORM				DETENTION @ 15 MIN.	
Storm Duration (min)	10 - Year Intensity (in/hr)	5 - Yr. Release Qpre (cfs)	10 - Year Qpost (cfs)	Detention Rate To Storage (cfs)	Specified Storage Volume (cf)
1440	0.26	0.105	0.222	-0.503	-54317
1200	0.28	0.113	0.239	-0.485	-43662
960	0.31	0.124	0.263	-0.461	-33219
720	0.34	0.140	0.297	-0.427	-23071
480	0.41	0.167	0.353	-0.371	-13373
360	0.46	0.188	0.399	-0.326	-8793
240	0.55	0.224	0.474	-0.251	-4516
180	0.62	0.253	0.535	-0.189	-2557
120	0.74	0.300	0.635	-0.089	-802
90	0.83	0.339	0.718	-0.007	-45
60	0.99	0.403	0.853	0.128	576
45	1.12	0.455	0.963	0.239	805
30	1.33	0.540	1.144	0.419	943
20	1.57	0.641	1.358	0.634	950
15	1.78	**0.725**	1.534	0.810	911
10	2.11	0.860	1.822	1.098	823
5	2.83	1.154	2.444	1.720	645



Notes & Limitations on Use:

1) The modified rational method, and therefore the standard calculations are applicable in watersheds up to 20 acres in size.
2) Required detention volume determinations shall be based on all net new impervious area both on and off-site, resulting from the proposed project. Pervious areas shall not be included in detention volume sizing; an exception may be made for incidental pervious areas less than 10% of the total area.
3) Gravel packed detention chambers shall specify on the plans, aggregate that is washed, angular, and uniformly graded (of single size), assuring void space not less than 35%.
4) A map showing boundaries of both regulated impervious areas and actual drainage areas routed to the hydraulic control structure of the detention facility is to be provided, clearly distinguishing between the two areas, and noting the square footage.
5) The EPA defines a class V injection well as any bored, drilled, or driven shaft, or dug hole that is deeper than its widest surface dimension, or an improved sinkhole, or a subsurface fluid distribution system. Such storm water drainage wells are "authorized by rule". For more information on these rules, contact the EPA. A web site link is provided from the County DPW Stormwater Management web page.
6) Refer to the County of Santa Cruz Design Criteria, for complete method criteria.

ATTACHMENT 9

PROJECT: SC Hills Lot #4 APN: 025-013-45 Calc by: DMR Date: 1/4/2013

RUNOFF RETENTION BY THE SLOPE INFILTRATION METHOD

Notes & Limitations on Use:

Saturated soil permeability values may be used conservatively from the USDA-NRCS soil survey, or use actual test values.
Projects with saturated soil permeability less than 120% of the design storm intensity should consider storage methods to percolate runoff.
Maximum sheet flow length is 100 ft., with 30 ft. typical. This requires site observation by the designer to determine.
Minimum length of perforated pipe is 6 ft., maximum length 40 ft., or 60 ft. if tee'd, per outfall.
Minimum perforated pipe diameter is 3 inches.
Perforated pipe is to be laid parallel to the slope contour, preferably secured at the surface, or with minimal burial and protective cover. *
This method may be used on smooth and uniform vegetated or mulched slopes under 15%, without special provisions.
Slopes greater than 15%, or that are irregular, require site specific erosion consideration, and possibly surface improvements.
For any slopes greater than 25% occurring nearby at lower elevation, consult a geotechnical engineer.
A 75% efficiency factor is applied to the determined infiltration surface area.
Table is based on computations using the Rational Equation for a 2-yr. return, 2-hr. duration storm.
Refer to the County of Santa Cruz Design Criteria, Stormwater Management - Section H, for complete method criteria and example calculations.

Data Entry: PRESS TAB KEY & ENTER DESIGN VALUES SS Ver: 1.0

Mitigation Area

Saturated Soil Permeability:	1.00	in/hr
Estimated Distance for Sheet Flow:	70	ft

Development Area

Site Location P60 Isopleth:		1.50	Fig. SWM-2
Rational Coefficients	Pre:	0.30	
	Post:	0.90	

Table Value to Interpolate

Design Storm Intensity:	0.47	in/hr

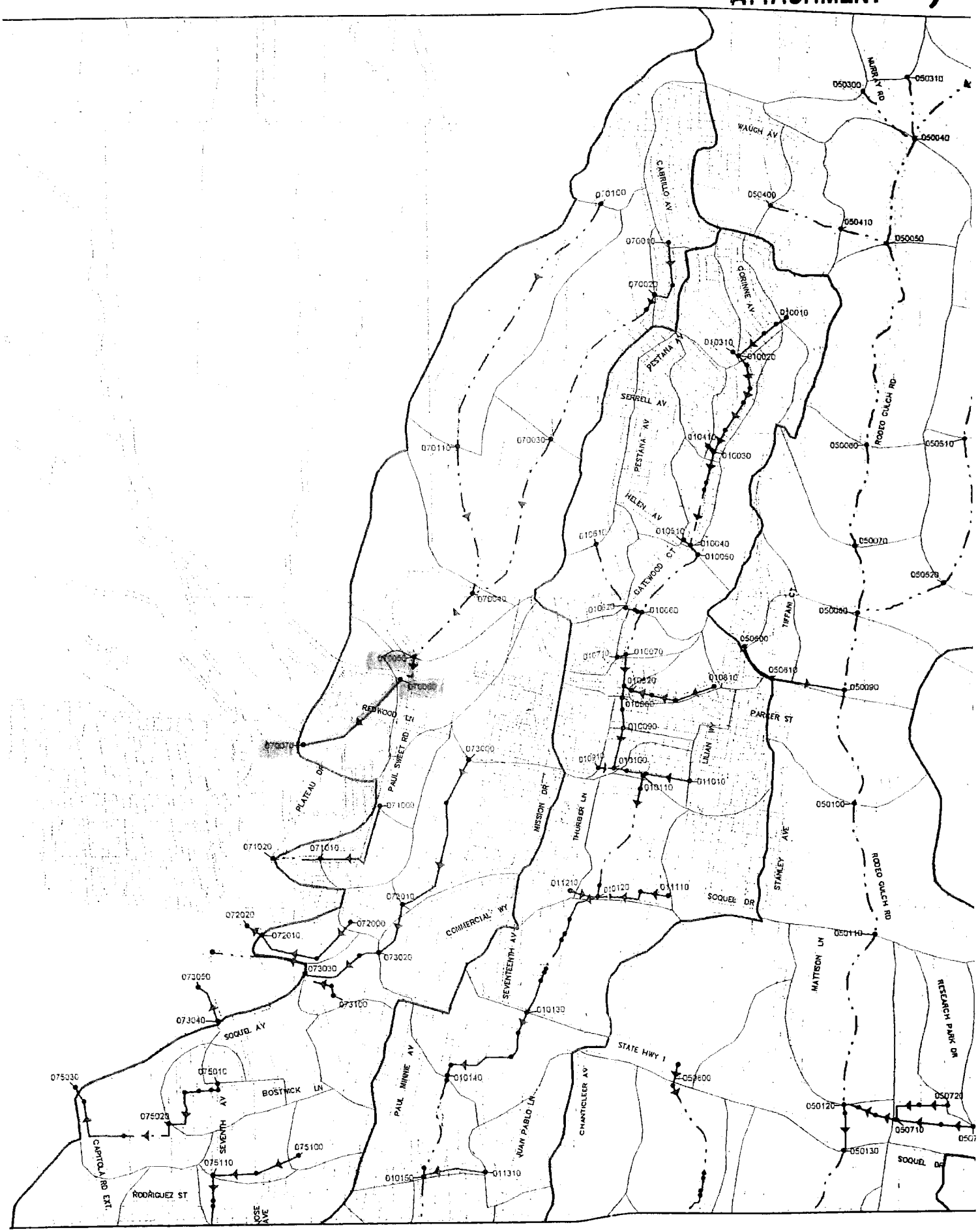
Required Length of Perforated Pipe (ft)

Impervious Area $(ft)^2$	Design Storm Intensity (in/hr) 0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90
500	2	2	3	4	5	6	7	9	11	13	17	23	32	51
750	3	4	5	6	7	9	10	13	16	20	26	34	49	77
1000	4	5	6	8	9	11	14	17	21	27	34	46	65	103
1250	5	6	8	10	12	14	17	21	27	33	43	57	81	129
1500	6	7	9	11	14	17	21	26	32	40	51	69	97	154
1750	7	9	11	13	16	20	24	30	37	47	60	80	113	180
2000	8	10	12	15	19	23	28	34	42	53	69	91	130	206
2250	9	11	14	17	21	26	31	39	48	60	77	103	146	231
2500	10	12	15	19	23	29	35	43	53	67	86	114	162	257
2750	10	13	17	21	26	31	38	47	58	73	94	126	178	283
3000	11	15	18	23	28	34	42	51	64	80	103	137	194	309
3250	12	16	20	25	30	37	45	56	69	87	111	149	210	334
3500	13	17	22	27	33	40	49	60	74	93	120	160	227	360
3750	14	18	23	29	35	43	52	64	80	100	129	171	243	386
4000	15	20	25	30	37	46	56	69	85	107	137	183	259	411
4250	16	21	26	32	40	49	59	73	90	113	146	194	275	437
4500	17	22	28	34	42	51	63	77	96	120	154	206	291	463
4750	18	23	29	36	44	54	66	81	101	127	163	217	308	489
5000	19	24	31	38	47	57	70	86	106	133	171	229	324	514

Exhibit D

(Excerpts from County of Santa Cruz Storm Water Master Plan and Management Program, Volume 1, Zone 5 Master Drainage Plan)

ATTACHMENT 9



County of Santa Cruz
Stormwater Facilities Management System
Conveyance Facilities
07 - Arana Gulch Basin

10/20/98

ID	LOCATION Comments	Type	EXISTING SECTION USIE	DSIE	USGE	DSGE	Length	Slope	Man N	No	Size*	Base*	DESIGN DISCHARGE (cfs) 2	5	10	25	50	100	Section Capacity
070010-070012		Pipe	321.36	310.00	327	314	355	.0320	.013		18.0		3	6	8	12	15	18	19
070012-070020		Pipe	310.00	309.00			217	.0046	.013		24.0		3	6	8	12	15	18	15
070020-070022		Pipe	305.74	303.00	313	310	140	.0196	.013		24.0		3	7	11	17	20	25	32
070022-070030		Natural Channel			310	200	1371	.0802	.035		16.5	24.5	3	7	11	17	20	25	152
070030-070040		Natural Channel			200	140	1531	.0392	.035	1	16.5	24.5	9	21	32	46	57	69	107
070040-070050		Natural Channel			140	120	729	.0274	.035		16.5	24.5	17	40	62	97	123	152	89
070050-070060		Roadway		99.60	110	105	304	.0164	.020				21	49	75	117	148	183	
070060-070070		Pipe			114	54	1029	.0583	.013	1	24.0		23	54	84	131	166	205	55
070100-070110		Natural Channel			290	200	2387	.0377	.035		16.5	24.5	2	4	7	10	12	15	105
070110-070040		Natural Channel			200	140	1252	.0479	.035		16.5	24.5	6	14	21	31	39	48	118
071000-071010		Pipe	106.40	65.00	113		872	.0475	.013		18.0		4	7	9	12	14	16	23
071010-071020	Ditch	Natural Channel					400		.035	1			8	14	19	25	29	34	
072000-072005		Pipe	92.00	74.50	100	81	423	.0414	.013	1	18.0		3	6	7	10	11	13	21
072005-072010		Pipe	74.50	63.40	81		525	.0211	.013		24.0		3	6	7	10	11	13	33
072010-072020		Pipe	63.40				150	.4227	.013		18.0		7	12	16	21	24	28	68
073000-073005		Pipe	119.00	112.35			409	.0163	.013	1	15.0		10	18	24	32	37	43	8
073005-073010		Pipe	112.35	94.00	118	98	1019	.0180	.013		24.0		10	18	24	32	37	43	30
073010-073020		Pipe	92.75	85.00	97		479	.0162	.013		30.0		31	52	68	88	101	118	52
073020-073025	Ditch	Natural Channel					171		.035	1			46	76	99	129	147	169	
073025-073030		Pipe	81.00	63.00			529	.0340	.013	1	30.0		46	76	99	129	147	169	76
073030-073040		Natural Channel			76	40	862	.0418	.035		18.8	26.4	58	97	126	162	186	216	130
073100-073105		Pipe	88.43	87.00			82	.0174	.013	1	18.0		8	14	18	23	26	30	14
073105-073030		Natural Channel			94	82	247	.0486	.035		10.1	21.6	8	14	18	23	26	30	57
075010-075011		Pipe	82.22	81.89	85	85	51	.0065	.013		15.0		2	3	3	4	5	6	5
075011-075012		Pipe	81.89	81.45			54	.0081	.013		24.0		2	3	3	4	5	6	20

*NOTE: Size = diameter in inches for pipes, depth in feet for boxes and improved channels, and area in square feet for natural channels.
Base = Base width in feet for boxes and improved channels, and wetted perimeter in feet for natural channels.

ATTACHMENT 9

County of Santa Cruz
Stormwater Facilities Management System
Drainage Area Factors
07 - Arana Gulch Basin

10/21/98

ID: 070010 Area: 0.022 Pervious CN: 84 Impervious CN:

	Length	Slope	Rough's	Pct	ROUTING:	Length	Slope	Rough's	Shape	Width	S/S
OVERLAND FLOW:											
Pervious:	300	0.0100	0.275		Collector:	371	0.0146	0.020	TRAP	20.00	1.0
Impervious:					Main:						

ID: 070020 Area: 0.006 Pervious CN: 89 Impervious CN:

	Length	Slope	Rough's	Pct	ROUTING:	Length	Slope	Rough's	Shape	Width	S/S
OVERLAND FLOW:											
Pervious:	233	0.0100	0.233		Collector:	185	0.0541	0.020	TRAP	20.00	1.0
Impervious:					Main:						

ID: 070030 Area: 0.047 Pervious CN: 84 Impervious CN:

	Length	Slope	Rough's	Pct	ROUTING:	Length	Slope	Rough's	Shape	Width	S/S
OVERLAND FLOW:											
Pervious:	233	0.0100	0.233		Collector:	605	0.0413	0.020	TRAP	20.00	1.0
Impervious:					Main:						

ID: 070040 Area: 0.057 Pervious CN: 79 Impervious CN:

	Length	Slope	Rough's	Pct	ROUTING:	Length	Slope	Rough's	Shape	Width	S/S
OVERLAND FLOW:											
Pervious:	300	0.0100	0.300		Collector:	397	0.1259	0.020	TRAP	20.00	1.0
Impervious:					Main:						

ID: 070050 Area: 0.042 Pervious CN: 81 Impervious CN:

	Length	Slope	Rough's	Pct	ROUTING:	Length	Slope	Rough's	Shape	Width	S/S
OVERLAND FLOW:											
Pervious:	256	0.0100	0.289		Collector:	646	0.0365	0.020	TRAP	20.00	1.0
Impervious:					Main:						

ID: 070050 Area: 0.022 Pervious CN: 86 Impervious CN:

	Length	Slope	Rough's	Pct	ROUTING:	Length	Slope	Rough's	Shape	Width	S/S
OVERLAND FLOW:											
Pervious:	200	0.0100	0.278		Collector:	300	0.1538	0.020	TRAP	20.00	1.0
Impervious:					Main:						

ID: 070070 Area: 0.026 Pervious CN: 83 Impervious CN:

	Length	Slope	Rough's	Pct	ROUTING:	Length	Slope	Rough's	Shape	Width	S/S
OVERLAND FLOW:											
Pervious:	233	0.0100	0.300		Collector:	695	0.0432	0.020	TRAP	20.00	1.0
Impervious:					Main:						

ID: 070100 Area: 0.019 Pervious CN: 83 Impervious CN:

	Length	Slope	Rough's	Pct	ROUTING:	Length	Slope	Rough's	Shape	Width	S/S
OVERLAND FLOW:											
Pervious:	267	0.0100	0.317		Collector:	475	0.0203	0.020	TRAP	20.00	1.0
Impervious:					Main:						

ID: 070110 Area: 0.050 Pervious CN: 80 Impervious CN:

	Length	Slope	Rough's	Pct	ROUTING:	Length	Slope	Rough's	Shape	Width	S/S
OVERLAND FLOW:											
Pervious:	267	0.0100	0.333		Collector:	463	0.0648	0.020	TRAP	20.00	1.0
Impervious:					Main:						

ID: 071000 Area: 0.009 Pervious CN: 93 Impervious CN:

	Length	Slope	Rough's	Pct	ROUTING:	Length	Slope	Rough's	Shape	Width	S/S
OVERLAND FLOW:											
Pervious:	75	0.0100	0.200		Collector:	705	0.0142	0.020	TRAP	20.00	1.0
Impervious:					Main:						

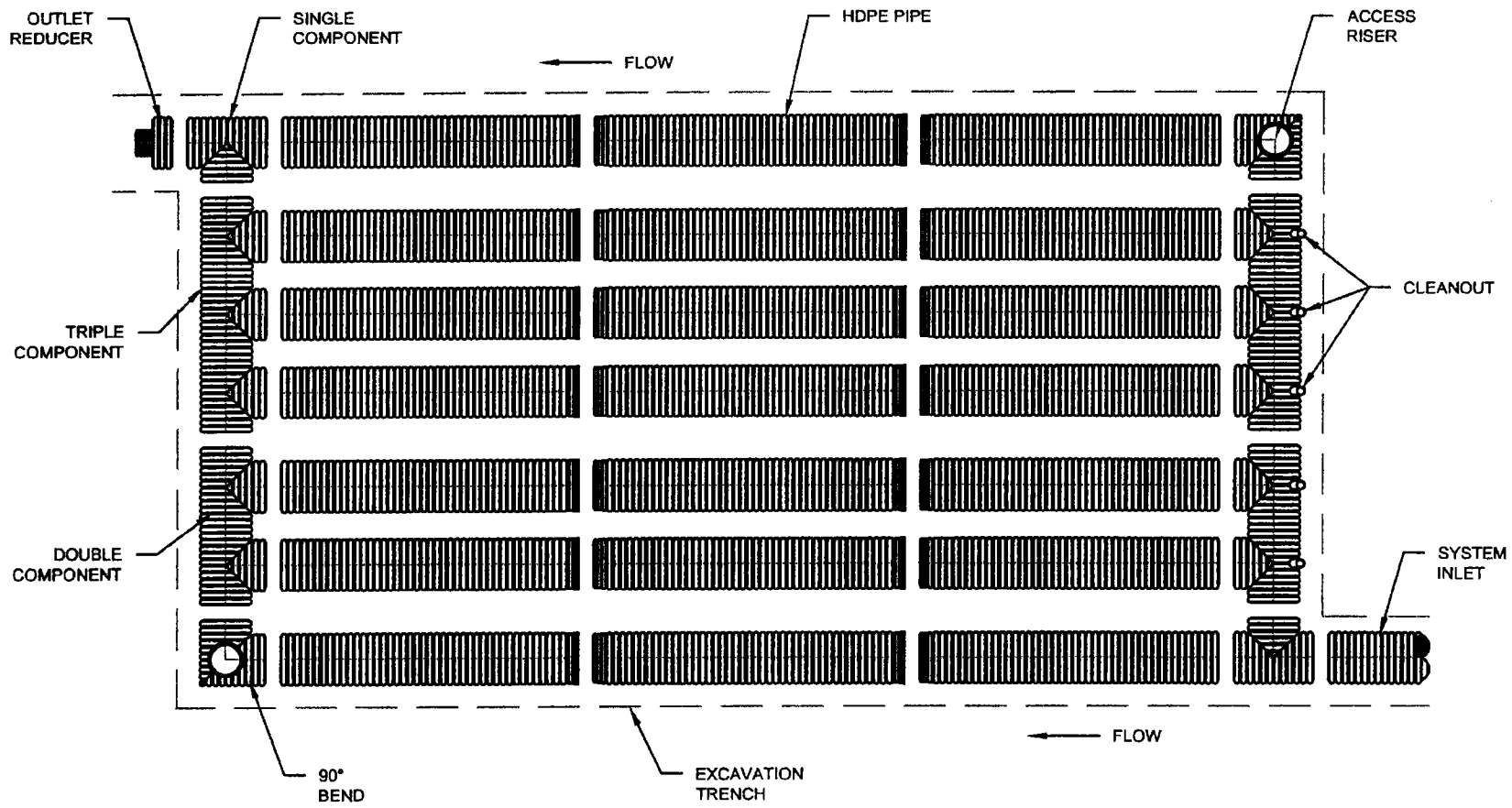
ID: 071010 Area: 0.013 Pervious CN: 90 Impervious CN:

	Length	Slope	Rough's	Pct	ROUTING:	Length	Slope	Rough's	Shape	Width	S/S
OVERLAND FLOW:											
Pervious:	130	0.0100	0.240		Collector:	334	0.0210	0.020	TRAP	20.00	1.0
Impervious:					Main:						

E 6128,000
E 84.2
E 99.6
E 100.72
30"x 78" RCP
E 57.95
110
E 110.42
110-18" RCP
102"x 72" RCP
E 126.20
168"x 72" RCP
E 129.90
48"x 72" RCP
E 129.55
78"x 72" RCP
E 118.43
x 113.0

Exhibit E

(ADS Product & Design Information)



NOTES:

1. FOR INSTALLATION RECOMMENDATIONS, SEE STD-702 "TYPICAL RET/DET CROSS-SECTION DETAIL" AND STD-703 "TYPICAL RET/DET/CLEANOUT DETAIL"

REV.	DESCRIPTION	BY	MM/DD/YY	CHK'D

NOTE: ALL DIMENSIONS ARE ± 1/2 FOOT.

DIA. DET/RET SYSTEM

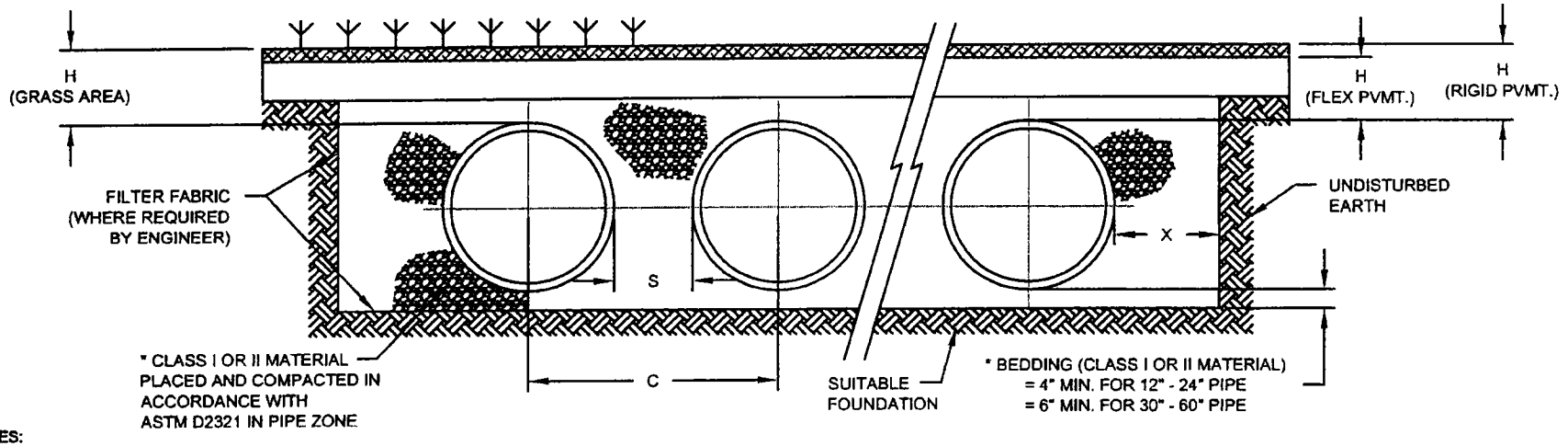
TYPICAL SUBSURFACE DET.\RET. SYSTEM LAYOUT DETAIL

DRAWING NUMBER: STD-701

4640 TRUEMAN BLVD
HILLIARD, OHIO 43026

	TJR
	03/14/07
	NTS
	OF

ATTACHMENT 9



NOTES:

1. ALL REFERENCES TO CLASS I OR II MATERIAL ARE PER ASTM D2321 "STANDARD PRACTICE FOR UNDERGROUND INSTALLATION OF THERMOPLASTIC PIPE FOR SEWERS AND OTHER GRAVITY FLOW APPLICATIONS", LATEST EDITION.

2. ALL RETENTION AND DETENTION SYSTEMS SHALL BE INSTALLED IN ACCORDANCE WITH ASTM D2321, LATEST EDITION AND THE MANUFACTURER'S PUBLISHED INSTALLATION GUIDELINES.

3. MEASURES SHOULD BE TAKEN TO PREVENT THE MIGRATION OF NATIVE FINES INTO THE BACKFILL MATERIAL, WHEN REQUIRED. SEE ASTM D2321.

4. FILTER FABRIC: A GEOTEXTILE FABRIC MAY BE USED AS SPECIFIED BY THE ENGINEER TO PREVENT THE MIGRATION OF FINES FROM THE NATIVE SOIL INTO THE SELECT BACKFILL MATERIAL.

5. FOUNDATION: WHERE THE TRENCH BOTTOM IS UNSTABLE, THE CONTRACTOR SHALL EXCAVATE TO A DEPTH REQUIRED BY THE ENGINEER AND REPLACE WITH SUITABLE MATERIAL AS SPECIFIED BY THE ENGINEER. AS AN ALTERNATIVE AND AT THE DISCRETION OF THE DESIGN ENGINEER, THE TRENCH BOTTOM MAY BE STABILIZED USING A GEOTEXTILE MATERIAL.

6. BEDDING: SUITABLE MATERIAL SHALL BE CLASS I OR II. THE CONTRACTOR SHALL PROVIDE DOCUMENTATION FOR MATERIAL SPECIFICATION TO ENGINEER. UNLESS OTHERWISE NOTED BY THE ENGINEER, MINIMUM BEDDING THICKNESS SHALL BE 4" (100mm) FOR 4"-24" (100mm-600mm); 6" (150mm) FOR 30"-60" (750mm-900mm).

7. INITIAL BACKFILL: SUITABLE MATERIAL SHALL BE CLASS I OR II IN THE PIPE ZONE EXTENDING NOT LESS THAN 6" ABOVE CROWN OF PIPE. THE CONTRACTOR SHALL PROVIDE DOCUMENTATION FOR MATERIAL SPECIFICATION TO ENGINEER. MATERIAL SHALL BE INSTALLED AS REQUIRED IN ASTM D2321, LATEST EDITION.

8. MINIMUM COVER: MINIMUM COVER OVER ALL RETNETION/DETENTION SYSTEMS IN NON-TRAFFIC APPLICATIONS (GRASS OR LANDSCAPE AREAS) IS 12" FROM TOP OF PIPE TO GROUND SURFACE. ADDITIONAL COVER MAY BE REQUIRED TO PREVENT FLOATATION. FOR TRAFFIC APPLICATIONS, MINIMUM COVER IS 12" UP TO 36" DIAMETER PIPE AND 24" OF COVER FOR 42" - 60" DIAMETER PIPE, MEASURED FROM TOP OF PIPE TO BOTTOM OF FLEXIBLE PAVEMENT OR TO TOP OF RIGID PAVEMENT.

NOMINAL DIAMETER	NOMINAL O.D.	TYPICAL SPACING "S"	TYPICAL SPACING "C"	TYPICAL SIDE WALL "X"	H (NON-TRAFFIC)	H (TRAFFIC)
12" (300 MM)	14.5" (368 MM)	11" (279 MM)	25.4" (645 MM)	8" (203 MM)	12" (292 MM)	12" (292 MM)
15" (375 MM)	18" (457 MM)	12" (292 MM)	28.9" (734 MM)	8" (203 MM)	12" (292 MM)	12" (292 MM)
18" (450 MM)	21" (533 MM)	17" (434 MM)	33.9" (862 MM)	9" (229 MM)	12" (292 MM)	12" (292 MM)
24" (600 MM)	28" (711 MM)	13" (330 MM)	40.7" (1034 MM)	10" (254 MM)	12" (292 MM)	12" (292 MM)
30" (750 MM)	36" (914 MM)	18" (457 MM)	53.1" (1347 MM)	18" (457 MM)	12" (292 MM)	12" (292 MM)
36" (900 MM)	42" 1067 MM)	22" (559 MM)	63" (1600 MM)	18" (457 MM)	12" (292 MM)	12" (292 MM)
42" (1050 MM)	48" (1219 MM)	24" (610 MM)	71.9" (1826 MM)	18" (457 MM)	12" (292 MM)	24" (610 MM)
48" (1200 MM)	54" (1372 MM)	25" (635 MM)	78.5" (1994 MM)	18" (457 MM)	12" (292 MM)	24" (610 MM)
60" (1500 MM)	67" (1702 MM)	24" (610 MM)	90" (2286 MM)	18" (457 MM)	12" (292 MM)	24" (610 MM)

* CLASS I BACKFILL REQUIRED AROUND 60" DIAMETER FITTINGS.

REV.	DESCRIPTION	BY	MM/DD/YY	CHK'D
3	REVISED 18" SPACING	TJR	01/05/09	CKS

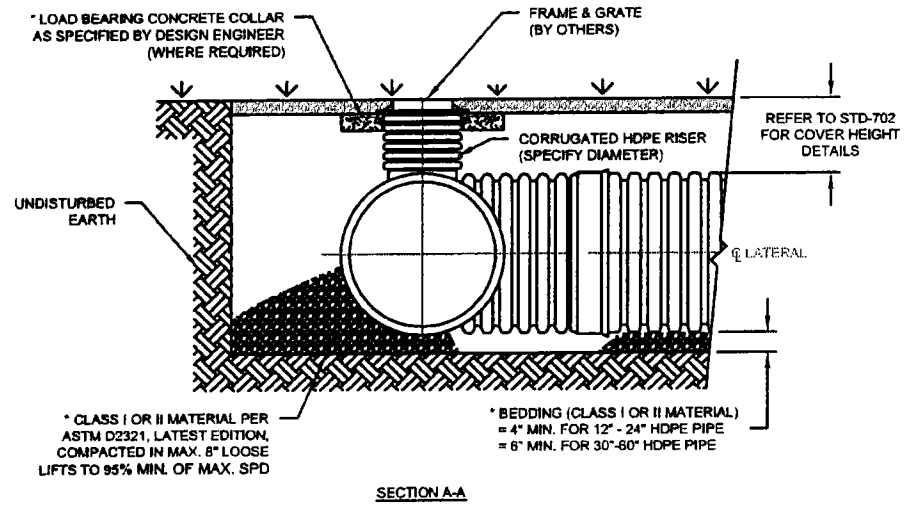
TYPICAL RET/DET
CROSS SECTION DETAIL

DRAWING NUMBER: STD-702

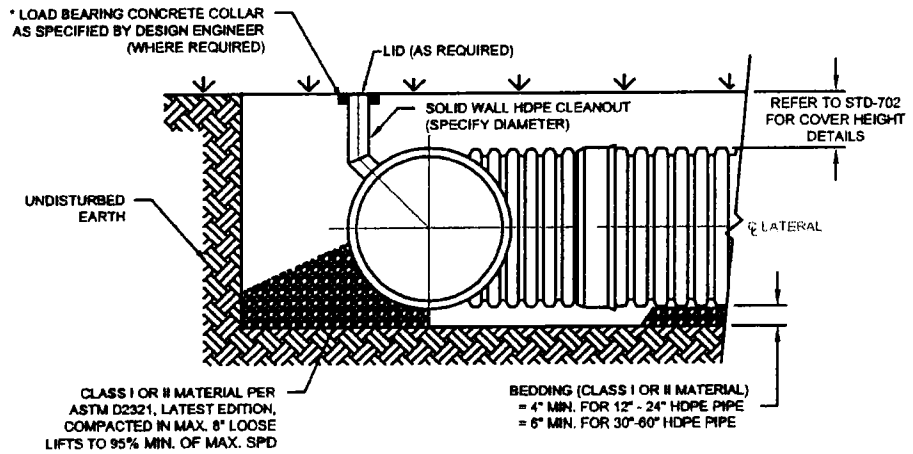
ADS
ADVANCED DRAINAGE SYSTEMS, INC.
4640 TRUEMAN BLVD
HILLIARD, OHIO 43026

DRN BY	AWM
DATE	07.25.06
SCALE	NTS
SHEET	OF

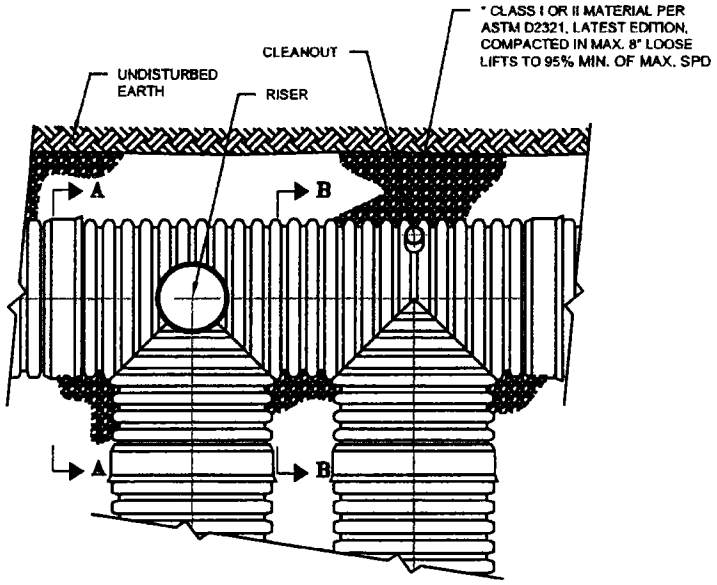
ATTACHMENT 9



SECTION A-A



SECTION B-B



* CLASS I BACKFILL REQUIRED AROUND 60" DIAMETER FITTINGS

* LOAD BEARING CONCRETE COLLAR SHALL BE CONSTRUCTED IN TRAFFIC AREAS SUCH THAT THE LIVE LOAD IS TRANSMITTED TO THE SURROUNDING SOIL AND NOT DIRECTLY TO THE RISER.

REV.	DESCRIPTION	BY	MM/DD/YY	CK'D
2	ADDED 60" FITTINGS NOTE	TJR	07/25/06	CKS

TYPICAL RET/DET RISER/CLEAN-OUT DETAIL

DRAWING NUMBER: STD-703

ADS
ADVANCED DRAINAGE SYSTEMS, INC.
4640 TRUEMAN BLVD
HILLIARD, OHIO 43026

CRM	
10/23/06	
NTS	
OF	

ATTACHMENT 9

TECHNICAL NOTE

Retention/Detention System Maintenance

TN 6.01
February 2007

This document is provided for informational purposes only and is meant only to be a guide. Individuals using this information should make their own decisions as to suitability of this guideline for their individual projects and adjust accordingly.

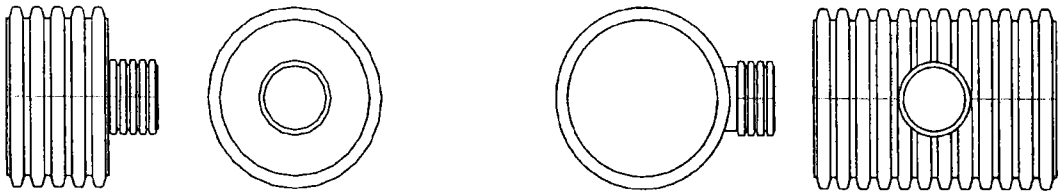
Introduction

A retention/detention system is comprised of a series of pipes and fittings that form an underground storage area, which retains or detains storm water runoff from a given area. As sediment and debris settle out of the detained stormwater, build up occurs that requires the system to be regularly inspected and cleaned in order for the system to perform as originally designed. The following provides the available fittings and guidelines for inspection and maintenance of an HDPE underground storage system.

System Accessories and Fittings

Concentric Reducers

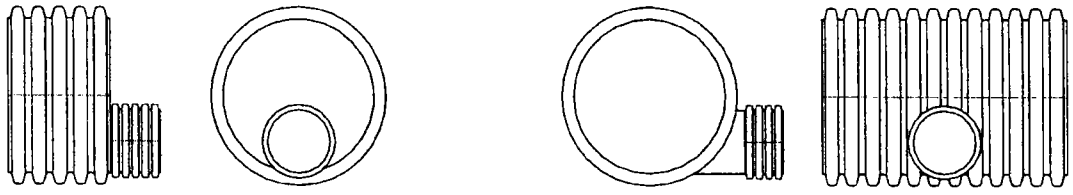
Concentric Reducers are fittings that transition between two pipes, either in line with one another or at perpendicular angles. The centerlines of the two pipes are at the same elevation. When a concentric reducer is used to connect the manifold pipe to the lateral pipes, most debris will be trapped in the manifold pipe.



SIDE VIEW SECTION VIEW SIDE VIEW SECTION VIEW

Eccentric Reducers

Eccentric Reducers are fittings that transition between two pipes, either in line with one another or at perpendicular angles. The inverts of the two pipes are at the same elevations. When an eccentric reducer is used to connect the manifold pipe to the lateral pipes, most debris will follow the flow of the storm water into the lateral pipes.



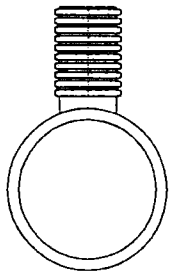
SIDE VIEW SECTION VIEW SIDE VIEW SECTION VIEW

Riser

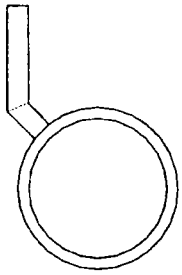
Each retention/detention system typically has risers strategically placed for maintenance and inspection of the system. These risers are typically 24" in diameter or larger and are placed on the manifold fittings.

Cleanouts

Cleanout ports are usually 4-, 6-, or 8-in diameter pipe and are placed on the manifold fittings. They are used for entrance of a pipe from a vacuum truck or a water-jetting device.



RISER
CROSS-SECTION VIEW



CLEANOUT
CROSS-SECTION VIEW

For a complete listing of available fittings and components please refer to the *ADS Fittings Manual.*

Maintenance Overview of a Retention/Detention System

Maintaining a clean and obstruction-free retention/detention system helps to ensure the system performs the intended function of the primary design. Build up of debris may obstruct flow through the laterals in a retention system or block the entranceway of the outlet pipe in a detention system. This may result in ineffective operation or complete failure of the system . Additionally, surrounding areas may potentially run the risk of damage due to flooding or other similar issues.

Inspection/Maintenance Frequency

All retention/detention systems must be cleaned and maintained. Underground systems may be maintained more cost effectively if these simple guidelines are followed. Inspection should be performed at a minimum of once per year. Cleaning should be done at the discretion of individuals responsible to maintain proper storage and flow. While maintenance can generally be performed year round, it should be scheduled during a relatively dry season.

Pre-Inspection

A post-installation inspection should be performed to allow the owner to measure the invert prior to accumulation of sediment. This survey will allow the monitoring of sediment build-up without requiring access to the retention/detention system.

The following is the recommended procedure for pre-inspections:

1) Locate the riser section or cleanouts of the retention/detention system. The riser will typically be 24" in diameter or larger and the cleanouts are usually 4", 6" or 8" in diameter.
2) Remove the lid of the riser or clean outs.
3) Insert a measuring device into the opening and make note to a point of reference on the stick or string. (This is done so that sediment build up can be determined in the future without having to enter the system.)

H. T. HARVEY & ASSOCIATES
ECOLOGICAL CONSULTANTS

22 May 2008

Mr. Doug Locke
Barry Swenson Builders
829 Front Street
Santa Cruz, CA 95060

Subject: Biological Survey Update, Santa Cruz Hills Project Parcel 024-013-23 (HTH 1795-04)

Dear Mr. Locke:

Per your request, H.T. Harvey & Associates has conducted rare plant surveys for the San Francisco popcorn flower and the Santa Cruz clover and created a habitat map after field verifying the tree survey provided to us for a portion of the Santa Cruz Hills Project, Parcel 025-013-23. H.T. Harvey & Associates prepared a Biological Constraints Analysis for the entire Santa Cruz Hills Project, which included this parcel, in July 2000. In addition, follow-up surveys for special-status plants and wildlife were conducted in 2002. This letter reports the results of additional biological surveys conducted in April 2008.

Rare Plant Surveys. Reconnaissance-level surveys were conducted on 21 September 2006 by plant ecologist Amanda Breen, Ph.D., for habitats capable of supporting special-status plant species. No Santa Cruz tarplants, which bloom from June through November, were observed during the 21 September survey, and thus no further surveys for this species were warranted. Although previous surveys conducted by H.T. Harvey & Associates in 2002 determined all 3 of these species to be absent from the project site, the San Francisco popcorn flower and the Santa Cruz clover are annual plant species, and, as such, could be present within the parcel boundaries during good rainfall years. Focused surveys were conducted 28 April 2008 for both the San Francisco popcorn flower (blooms March to June) and the Santa Cruz clover (blooms April to October) by walking 15 ft-wide linear transects across the entire project site. This survey was conducted after an average rainfall year towards the end of the rainy season, when vegetation on-site had begun to dry and many annual species on-site continued to flower and had produced fruit on older stems. No individuals of the San Francisco popcorn flower or the Santa Cruz clover were observed during these focused surveys. Due to the large distance to any potential seed source of these species, and the conclusion of absence from the site for these species in 2002, 2006, and 2008, we do not believe that the species will occur on-site within the near future. However, because these are annual plant species, after a period of 3 years, additional surveys should be conducted to confirm absence of these annual species.

Biotic Habitat Map. Habitat conditions on the site have not changed appreciably since 2000, and 4 biotic habitats described in the 2000 Constraints Analysis are present on the parcel: non-native grassland, coast live oak forest, seasonal drainage, and eucalyptus stand. A seasonal drainage, also described in the 2000 Constraints Analysis, runs along the eastern boundary of the parcel. In addition, a drainage runs adjacent to Chaminade Lane west of the parcel. A habitat

map prepared for the project site during the 28 April 2008 site visit in enclosed (Figure 2). Detailed descriptions of these habitat types can be found within the 2000 Constraints Analysis.

Verification of Tree Survey. The tree survey forwarded to us by Ifland Survey in March 2008 was field verified. The only trees found to be missing from this tree survey occurred east of the road (mapped as developed) in the northern portion of the parcel that are unlikely to be developed due to their proximity to the seasonal drainage (Figure 2).

Please contact me at jklingmann@harveyecology.com or (408) 458-3225 if you have any questions regarding our report. Thank you for contacting H.T. Harvey & Associates regarding this project.

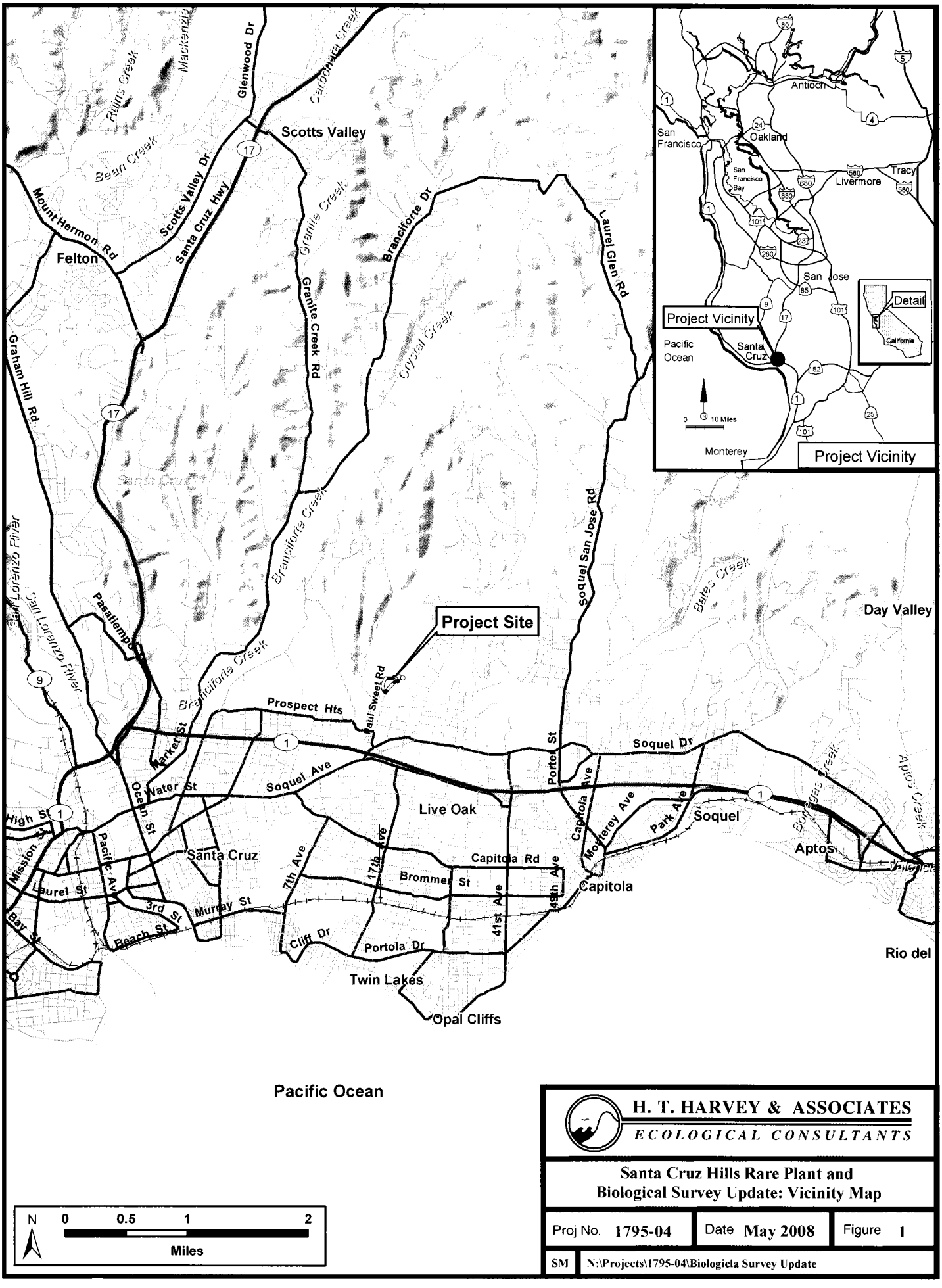
Sincerely,

Julie Klingmann, M.S.
Project Manager, Wildlife Ecologist

Attachments: Figure 1. Site Detail Map
Figure 2. Biotic Habitat Map

cc: DDS/SCR, H.T. Harvey & Associates

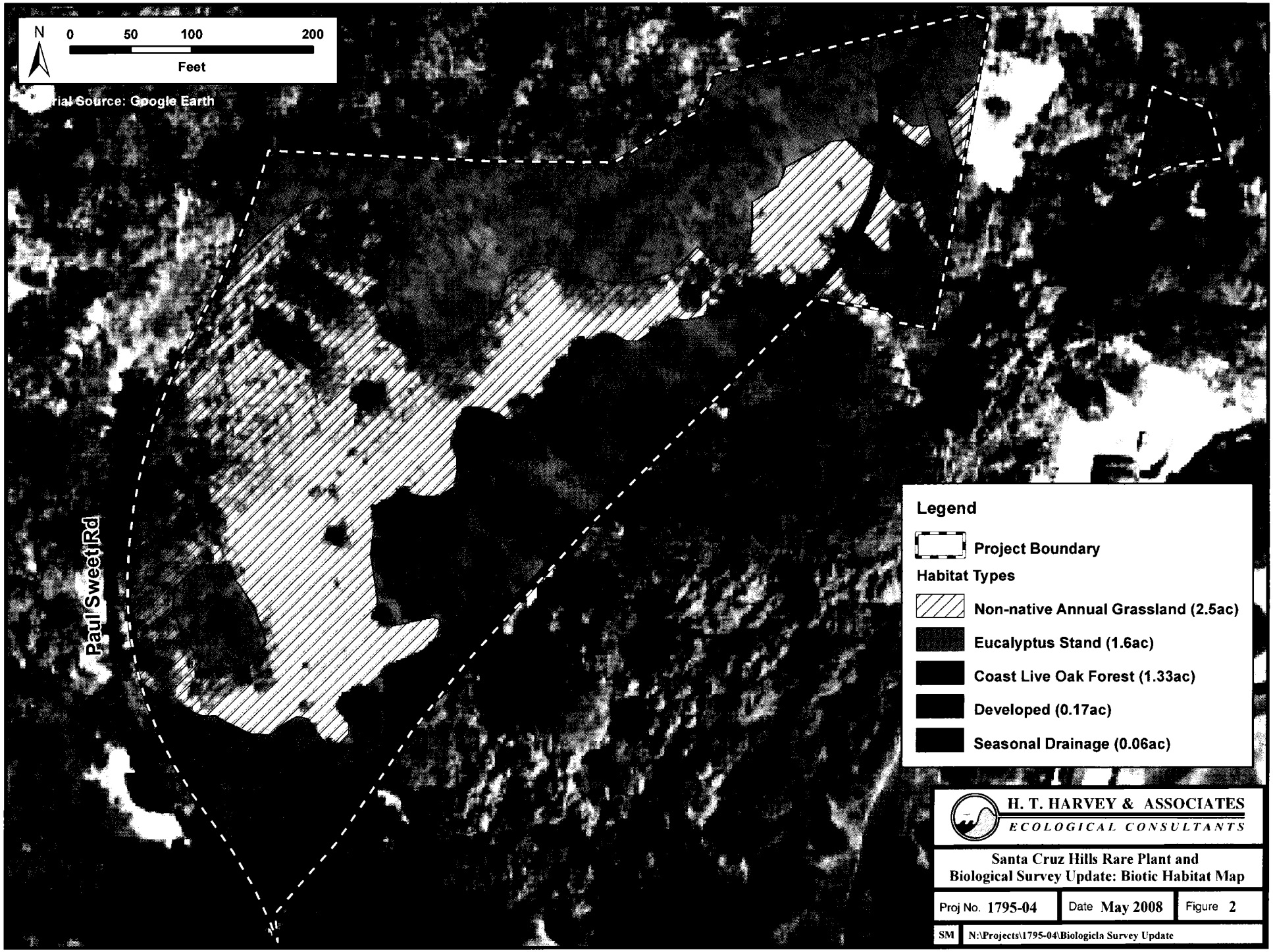
ATTACHMENT 10



H. T. HARVEY & ASSOCIATES
ECOLOGICAL CONSULTANTS

Santa Cruz Hills Rare Plant and Biological Survey Update: Vicinity Map

Proj No. 1795-04	Date May 2008	Figure 1
SM	N:\Projects\1795-04\Biologicla Survey Update	



ATTACHMENT 10

ATTACHMENT 11

ARBOR ART

Tree Service

- THE ADDENDUM TO THE INITIAL REPORT -
TREE SURVEY AND RECOMMENDED TREE PROTECTION STRATEGIES
PERTAINING TO THE NATIVE OAKS AT THE LOT 4 AND DEMPSEY ROAD DEVELOPMENT SITE
SANTA CRUZ - APN 205-013-45

Prepared at the Request of:
Doug Locke
Senior Project Manager - Barry Swenson Builder
5200 Soquel Avenue, Suite202
Santa Cruz, CA 95062
dlocke@barryswensonbuilder.ccom

Initial Site Inspection By:
Nigel Belton
ISA Certified Arborist WE410A
June 7, 2013
(Addendum Site Inspection - November 25, 2013)

Job: - Barry Swenson Bdr - 6 13

WE-410A

Ph / Fax (831) 688-1239
P.O. Box 1744 ~ Aptos, CA 95001 ~ CCL # 657930 ~ beltonnigel@gmail.com

- THE ADDENDUM TO THE INITIAL REPORT -
THE TREE SURVEY AND RECOMMENDED TREE PROTECTION STRATEGIES
PERTAINING TO THE NATIVE OAKS AT THE LOT 4 AND DEMPSEY ROAD DEVELOPMENT SITE
SANTA CRUZ - APN 205-013-45

Background and Assignment:

Doug Locke, Project Manager for Barry Swenson Builder, requested that I re-visit the project site with him and David Ramsey, Civil Engineer (Ifland Engineers) to review the original recommendations in arborist's report regarding the proposed housing development at Dempsey Road, Santa Cruz. Mr. Locke had been notified by County of Santa Cruz Environmental Planning that more trees need to be preserved as a condition for the approval of a building permit. We met on site on November 25 and discussed changes to the design that will allow for more trees to be preserved.

The changes are noted in this report addendum and the attached revised tree evaluation matrix. Thirty seven trees out of a total of 64 trees surveyed on this site are now recommended for preservation.

Discussion and Recommendations:

Ten Coast Live Oak Trees have been re-designated as being suitable for preservation:

These trees are - #3, 12, #14, #18, #21, #31, #45, #48, #49 and #50.

Note that the tree protection notes made in the initial arborist's report still stand in regards to those trees that were identified for preservation. Those notes include Tree Protection Zone Fencing (TPZ) and root pruning recommendations.

1. The Coast Live Oaks above the driveway entrance and graded slope:

The required Tree Protection Zone fence will now incorporate Tree #3 (Approximately a six foot set back from the trunk to the edge of grading).

Install a length of TPZ fencing that commences at the north east edge of the canopy drip line of Tree #3A. The fence should follow the canopy drip line of this tree to within 24 inches of the top of the grading work and then parallel the profile of the entire edge of grading line to continue south west along the slope to also protect Trees #3, #4, #5, and #8 (The 50 inch Coast Redwood). The fence should encircle the drip line of the Redwood to terminate on the south west side of the tree canopy.

Note that any significant roots two inches and larger exposed by grading work must be cut cleanly with a sharp saw. The project arborist must be on site at the time of the grading work to determine if any significant roots require pruning in proximity to tree's #2, #3, #3A and #8.

2. – Tree's #12 and #14 and #21 are situated above the proposed driveway (Lupine Lane):

The trunks of these trees will be set back approximately 15, 8 and 8 feet respectively from the new retaining wall below. This wall will extend uphill to terminate above Tree #14.

It is most likely that root pruning work will be required at the time of the grading work for road preparation due to the size of these trees and their proximity to the driveway footprint. The project arborist must be on site when the work proceeds near these trees to ensure that all significant roots (over two inches diameter) are not torn and are cut cleanly at the back of the excavation line. Note that the bank near these trees must initially be cut back 16 inches out from the final back of excavation line to identify any significant roots in the face of the cut. These roots will then be hand excavated carefully to the back of excavation line where they will be pruned cleanly with a saw. A TPZ fence must be installed within 24 inches of the wall excavation before any grading work proceeds.

3. – Tree's #18 and #31 are located in the utility easement:

The trunk of Tree #18 will be set back from the storm drain trench by five feet. Any significant roots found within this trench must be pruned with a saw. Tree #31 will be four feet from the utility trench and no root pruning will be required due to its small size.

A section of TPZ fencing must parallel the trench (18 inch set back) under the tree drip line from edge to edge. This fence must then proceed around the outside of the remainder of the canopy drip line to fully encircle the tree.

4. – Tree's #45, #48, #49 and #50 are located above Dempsey Road:

These trees will be impacted by grading work on the slope next to the road. This work will encroach between four and eight feet from tree trunks. All significant roots exposed by grading must be pruned with a saw. The project arborist must check the site when this work proceeds (see the notes in the original report regarding mulching and other recommendations).

A TPZ fence must be installed adjacent to these trees starting at eight feet beyond the south west edge of the canopy drip line of Tree #42 and set back 24 inches from the edge of the grading line. This fence must extend parallel to the edge of the grading line to terminate eight feet beyond the north side of the canopy of Tree #51. This protection zone will incorporate a total of eight numbered trees that span the slope above the area of grading work.

5. – Tree planting recommendations:

It is my understanding that the County Environmental Planner has requested that a higher number of replacement trees are planted as mitigations. I recommend a two to one replacement ratio utilizing five gallon size Coast Live Oaks and Coast Redwoods (see the notes in the original report regarding tree planting).

Please contact me if you have any questions.

Respectfully submitted

Nigel Belton

Attachment:
- Revised Tree Evaluation Matrix

Revised Tree Survey Matrix – December 3, 2013
Dempsey Road – Lot 4 Development – Santa Cruz
APN 205-013-45

#	TREE NAME	DBH	HEIGHT	SPREAD	HEALTH	STRUCTURE	PRESERVE	REMOVE	NOTES AND COMMENTS
1.	Coast Live Oak (Quercus agrifolia)	8	27	22	1	1	X		Above the planned fire turnout.
2	Coast Live Oak	6	25	18	1	1		X	Above the drive entrance.
3	Coast Live Oak	9	45	22	1	2	X		Above the drive entrance.
3A	Coast Live Oak	11	40	28	1	2	X		Above the drive entrance.
4	Coast Live Oak	11-9	45	30	2	2	X		Above the drive entrance.
5	Coast Live Oak	15	45	32	2	2	X		Above the drive entrance.
6	Coast Live Oak	12	36	24	1	1	X		Above the drive entrance.
7	Coast Live Oak	5	15	10	1	2	X		Above the drive entrance.
8	Coast Redwood (Sequoia sempervirens)	50	70	45	1	2	X		A large tree with eight basal stems in Addition to the main trunk.
9	Coast Live Oak	8	28	18	1	2	X		Above the driveway.
10	Coast Live Oak	16	30	22	2	2	X		Above the driveway.
11	Coast Live Oak	12	27	17	1	2	X		Above the driveway.
12	Coast Live Oak	30-16-15	45	60	1	3	X		Above the driveway.
12A	Coast Live Oak	24	45	40	1	2	X		Above the driveway.
13	Coast Live Oak	23	40	42	1	3		X	In the driveway.
14	Coast Live Oak	10-9	28	18	1	3	X		In the driveway.
15	Coast Live Oak	8	30	16	1	3		X	Above the driveway.
16	Coast Live Oak	7-7-8	20	27	1	2	X		Below the driveway.
17	Coast Live Oak	4-5	15	15	1	3	X		Below the driveway.
18	Coast Live Oak	8-7-8-8	32	28	1	3	X		Located in utility easement.
19	Coast Live Oak	4	20	10	1	2		X	Located in utility easement.
20	Coast Live Oak	10-15	30	30	1	2		X	Below the driveway.
21	Coast Live Oak	18-22	38	45	1	3	X		Above the road.
22	Coast Live Oak	12-12	40	32	1	2		X	Above the road.
23	Coast Live Oak	8	24	15	1	2		X	Above the road.
24	Coast Live Oak	4	15	12	1	2		X	Below the driveway.
25	Coast Live Oak	5-4	14	16	1	2		X	Above the road.

> Note – DBH = Trunk diameter measurement at 54 inches above grade:
> Note - Health and Structure Ratings -_1 = Best rating - 5 = Worst rating:
Prepared By Nigel Belton
ISA Certified Arborist – WE410A
December 3, 2013

Revised Tree Survey Matrix – December 3, 2013
Dempsey Road – Lot 4 Development – Santa Cruz
APN 205-013-45

#	TREE NAME	DBH	HEIGHT	SPREAD	HEALTH	STRUCTURE	PRESERVE	REMOVE	NOTES AND COMMENTS
26	Coast Live Oak	10	28	18	1	2		X	Above the road.
27	Coast Live Oak	16	40	33	1	2	X		Below the driveway.
28	California Bay Laurel (Umbellularia californica)	4-4	28	20	1	2		X	Located in the utility easement.
29	Coast Live Oak	9	30	15	1	2		X	Above the road.
30	California Bay Laurel	3-3	27	12	1	2		X	Above the road.
31	Coast Live Oak	3	9	15	1	3	X		Below the driveway.
32	Coast Live Oak	4	18	10	1	2		X	Located in utility easement.
33	Coast Live Oak	5	21	11	1	1		X	Located in utility easement.
34	Coast Live Oak	5-8-8	30	30	1	3		X	Located in utility easement.
35	Coast Live Oak	13	34	30	1	1		X	Located in utility easement.
36	Coast Live Oak	12	40	28	1	1		X	Above the road.
37	Coast Live Oak	3	16	12	2	2		X	Above the road.
38	Coast Live Oak	10	40	18	1	2		X	Above the road.
39	Coast Live Oak	9-14	40	36	1	2		X	Above the road.
40	Coast Live Oak	12-17	40	33	1	2		X	Above the road.
41	Coast Live Oak	8	35	20	2	2	X		Above the road.
42	Coast Live Oak	18	30	20	1	2	X		Above the road.
43	Coast Live Oak	3	10	15	2	3		X	Above the road.
44	Coast Live Oak	5	16	15	1	2		X	Above the road.
45	Coast Live Oak	6	20	16	1	2	X		Above the road.
46	Coast Live Oak	4	22	8	1	2	X		Above the road.
47	Coast Live Oak	6	22	8	1	2	X		Above the road.
48	Coast Live Oak	11	30	115	2	2	X		Above the road.
49	Coast Live Oak	7	30	12	2	2	X		Above the road.
50	Coast Live Oak	9	30	20	2	1	X		Above the road.

> Note – DBH = Trunk diameter measurement at 54 inches above grade:
> Note - Health and Structure Ratings -_1 = Best rating - 5 = Worst rating:

Prepared By Nigel Belton
ISA Certified Arborist – WE410A
December 3, 2013

Revised Tree Survey Matrix – December 3, 2013
Dempsey Road – Lot 4 Development – Santa Cruz
APN 205-013-45

#	TREE NAME	DBH	HEIGHT	SPREAD	HEALTH	STRUCTURE	PRESERVE	REMOVE	NOTES AND COMMENTS
51	Coast Live Oak	11	24	22	1	2	X		Above the road.
52	Coast Live Oak	10-14	28	28	1	2	X		Below Dempsey Rd entrance.
53	Coast Live Oak	9	30	116	1	2	X		Below Dempsey Rd entrance.
54	Coast Live Oak	16	40	40	3	3		X	Below Dempsey Rd.
55	Coast Live Oak	18	44	30	2	3	X		Below Dempsey Rd.
56	Coast Live Oak	10	40	18	2	3		X	Below Dempsey Rd.
57	Coast Live Oak	5	18	6	1	2	X		Below Dempsey Rd.
58	Coast Live Oak	7	22	8	2	2	X		Below Dempsey Rd.
59	Coast Live Oak	6	20	12	2	3	X		Below Dempsey Rd.
60	Coast Live Oak	4	3	16	14		X		Below Dempsey Rd.
61	Coast Live Oak	4	16	15	1	1		X	Above Dempsey Rd entrance.
62	Coast Live Oak	4	18	16	1	1	X		Above Dempsey Rd entrance.

> Note – DBH = Trunk diameter measurement at 54 inches above grade:
> Note - Health and Structure Ratings -_1 = Best rating - 5 = Worst rating:

Prepared By Nigel Belton
ISA Certified Arborist – WE410A
December 3, 2013

ATTACHMENT 11

ARBOR ART

Tree Service

THE TREE SURVEY AND RECOMMENDED TREE PROTECTION STRATEGIES PERTAINING TO THE NATIVE OAKS AT THE LOT 4 AND DEMPSEY ROAD DEVELOPMENT SITE SANTA CRUZ - APN 205-013-45

Prepared at the Request of:
Doug Locke
Senior Project Manager - Barry Swenson Builder
2400 Chanticleer Avenue Santa Cruz, CA 95062
dlocke@barryswensonbuilder.ccom

Site Inspection By:
Nigel Belton
ISA Certified Arborist WE410A
June 7, 2013

Job: Barry Swenson Bdr - 6 13

WE-410A

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THE TREE SURVEY AND RECOMMENDED TREE PROTECTION STRATEGIES PERTAINING TO THE NATIVE OAKS AT THE LOT 4 AND DEMPSEY ROAD DEVELOPMENT SITE SANTA CRUZ - APN 205-013-45

Background:

Doug Locke, Project Manager for Barry Swenson Builder, contacted me regarding the provision of an arborist's report concerning the proposed housing development at Dempsey Road, Santa Cruz. Mr. Locke requested this report as it is a requirement of the County of Santa Cruz Planning Department for the approval of the building permit. The County Planning Department stipulated that this report should make recommendations pertaining to the protection of oak trees during and after the construction period and that the report must also ensure that tree removal is minimized. The report must also make recommendations pertaining to the replacement of trees that cannot be retained on the development site.

Assignment:

This assignment entails the inspection of the site and the preparation of a tree inventory and report concerning all of the native trees that will be impacted by the proposed development work. The proposed development areas included in this report concern the locations of the trees that will be affected by the installation of a driveway and utility easement to the house site on building Lot 4 and the required improvement work on Dempsey Drive. The plans for development work and improvements referenced for this report were prepared by Ifland Engineers – (Sheets C3 and C4 – dated 6/5/13 and 5/29/13 respectively).

This report notes the locations of individual trees on a tree location map which was prepared on a copy of the Existing Conditions and Demolition Plan prepared by Ifland Engineers. These trees have been identified with numbered aluminum tags which have been affixed to their trunks. These numbers correlate to the tree evaluation matrix and text of the report. The majority of the marked tree locations on this map were not identified in the original survey or noted on the Existing Conditions and Demolition Plan. The locations of the trees that have been added to the tree location map must be considered as being approximate, although I have endeavored to be as accurate as possible. The report also notes tree conditions pertaining to their health and structure on a tree evaluation matrix. The evaluation matrix identifies those trees that cannot be retained due to their locations within or adjacent to areas of disturbance. The report makes recommendations regarding tree protection strategies to be undertaken during the construction period. This report also makes recommendations concerning the size and number of replacement trees required as mitigations for those trees that will be removed.

THE TREE SURVEY AND RECOMMENDED TREE PROTECTION STRATEGIES PERTAINING TO THE NATIVE OAKS AT THE LOT 4 AND DEMPSEY ROAD DEVELOPMENT SITE SANTA CRUZ - APN 205-013-45
Prepared by: Nigel Belton, Consulting Arborist - June 9, 2013

Summary:

Thirty six Coast Live Oaks and two California Bay Laurel trees will have to be removed in order to install the driveway that will service the building site on Lot 4 and make improvements to Dempsey Road. These trees include specimens located within the footprints of the driveway and the utility easement to the street. The balance of the trees designated for removal will be directly impacted by the formation of graded slopes required behind the retaining walls for both the new driveway area and the Dempsey Road improvements.

The balance of 26 Coast Live Oaks and one Coast Redwood on the site can be preserved due to their distance from the areas of disturbance. These trees will have to be protected during the entire grading and construction period with Tree Protection Zone fencing in order to minimize damage to critical root areas. This fencing must not be removed during this period without the consent of the project arborist. Other procedures recommended to reduce construction related damage include the pruning of larger roots exposed by grading work and the careful removal of loose fill soil under tree canopies below Dempsey Road.

I recommend that the trees that are removed are replaced at a one to one ratio with five gallon sized Coast Live Oaks and Coast Redwoods. The locations of replacement trees should be determined by a Landscape Designer. The optimal time for planting is in the fall. The newly planted trees will require a weekly irrigation program over their first four years of establishment to ensure that optimal root development into the native soil.

Observations:

The development site consists of a hillside property which is vegetated by open grassland and groups of native trees. The subject trees primarily consist of Coast Live Oak (Quercus agrifolia) and include a Coast Redwood (Sequoia sempervirens) and California Bay Laurel (Umbellularia californica). The proposed driveway and utility installation work will impact a significant number of the oaks on the lower hillside. The road improvement below the development site will also impact oak trees in its proximity.

Recommendations - Area 1 - Trees in the Proximity of the Driveway and Utility Easement:

Twenty two Coast Live Oak Trees have been identified for removal in the attached Tree Survey Matrix. These trees are situated within the footprints of the proposed driveway and utility easement or are in such close proximity, they will be irreparably damaged during the construction process.

Fifteen Trees that have been identified as being suitable for preservation in this area are noted below.

All of these trees are Coast Live Oaks with the exception of Tree #8 which is a large Coast Redwood.

Tree Protection Zone Fencing (TPZ) Specifications:

TPZ fencing must consist of orange plastic snow fencing attached to steel standards driven into the native soil. These fences must be installed before any demolition or grading work begins (with the exception of the trees specified below Dempsey Road).

Note that these fences must remain in place throughout the entire construction period and during that time can only be removed with the permission of the project arborist. No grading, trenching or material storage can occur within the TPZ, nor can any vehicles or equipment enter these areas.

Tree #1 – 8 inch DBH Coast Live Oak:

This tree is located adjacent to the area of grading required for the planned fire truck turn around area on Dempsey Road. The graded slope will encroach to the proximity of the canopy drip line.

- Install a TPZ fence that encircles 50% of the canopy drip line that faces the work area.

Trees: #3A, #4, #5, #7 and #8 (Coast Redwood):

Tree #3A is located within six feet of the top of the planned graded slope above the common driveway and turn around area at the entrance off Dempsey Road.

- Install a length of TPZ fencing that commences at the north east edge of the canopy drip line of this tree. The fence should follow the canopy drip line to within 24 inches of the top of the grading work and then parallel the profile of the entire edge of grading line to continue south west along the slope to also protect Trees #4, #5, and #8 (The 50 inch Coast Redwood). The fence should encircle the drip line of the Redwood to terminate on the south west side of the tree canopy.

- Note that any significant roots two inches and larger exposed by grading work must be cut cleanly with a sharp saw. The project arborist must be on site at the time of the grading work to determine if any significant roots require pruning in proximity to tree's #3A and #8. This procedure will entail careful grading in co-ordination with the arborist concerning the work near the top of the slope.

- Note that the lower canopy of Tree #8 encroaches into the proposed driveway footprint and requires pruning to raise it to above 13.5 feet above the road bed to comply with fire code. The limbs in this area should be pruned back to the main trunk and co-dominant stems.

Trees #9 through #11:

These trees will be well set back up the slope from construction activity. Install a section of TPZ fencing at the canopy drip lines of these trees starting on the north east side of Tree #9 and proceeding along the slope to terminate on the on the south west side of the drip line of Tree #11.

Tree #12A:

The grading plan shows that the trunk of this tree will be located within four feet of the edge of top of a graded slope that will slope back from the retaining wall at the road edge below. This area of disturbance is in very close proximity to the root collar and significant roots will have to be pruned as prescribed in the notes on Page 3.

A TPZ fence must be installed at the top edge of the grading work under the canopy of this tree. The fence should extend eight feet beyond the edge of the drip line on either side of this tree.

Trees #16 & #17:

These trees are located below the driveway footprint and will be surrounded by approximately 12 inches of fill soil around their trunks.

- Wooden boxing or stone retaining walls must be installed around the trunks of both of these trees to maintain a set back from the tree root collars at natural grade and the fill soil in order to prevent the establishment of root collar diseases. These retaining walls must be installed to allow for a minimum set back distance of five feet from all sides of the tree root collars at grade.

- Note that both of these trees require pruning work:
Tree #17 has a large basal limb that emanates from the trunk from within 12 inches above grade. This limb extends northward towards the driveway foot print and should be removed to the parent trunk. Tree #18 has been damaged and the broken limbs should be removed.

A TPZ fence must be installed around the perimeter of the canopy drip lines of both of these trees.

Tree #27:

This tree is located in very close proximity to the planned gravel Fire Truck Turnout area on the lower side of the driveway. The oak should be preserved if its trunk does not encroach within three feet of the wooden retaining wall that will support this area.

- Care will have to be taken to avoid damage to the critical root zone under the balance of the tree canopy on the slope below the wall. A TPZ fence line must be installed to be set back three feet from the retaining wall and terminate where it intersects the canopy drip line on both sides of the tree. The balance of this fence must then encircle the remaining edge of drip line below. The canopy of this tree that faces the driveway must be raised to allow for a 13 .5 foot clearance above the level of the turnout surface.

Recommendations – Area 2 - Trees #36 Through #51 and #61 and #62 - Above Dempsey Road:

Twelve trees are designated for removal in this area because they are located within or in very close proximity to the area of disturbance between the planned wooden retaining wall at the road edge and the graded slope behind it.

The balance of nine trees recommended for preservation should be set back far enough from the edge of graded slope to survive the impacts of these construction activities.

Trees #41, #42, #46 and #47:

These trees will be located approximately four and seven feet beyond the edge of the graded slope above the retaining wall.

- All significant roots over two inches diameter that are exposed during grading work must be cut back cleanly with a sharp saw. The project arborist must be on site at the time of this work to ensure that damage to significant roots is minimized.

- A TPZ fence must be installed adjacent to these trees starting at eight feet beyond the south west edge of the canopy drip line of Tree #41 and set back 24 inches from the edge of the grading line. This fence must extend along the edge of the grading line to terminate eight feet beyond the south west side of the canopy of Tree #47.

Tree #62:

This tree located above Dempsey Road closer to Chaminade Lane is located within three feet of the edge of the planned grading work.

- Prune any significant roots exposed by grading work.

- install a TPZ fence adjacent to the edge of the disturbance area in front of this tree. The fence must extend five feet beyond the edge of the drip line on either side of this tree.

Recommendations – Area 3 – Trees #52 Through #60 – Below Dempsey Road:

Three trees are designated for removal on the downhill side of the proposed road improvement area. Two of these trees encroach into the footprint of the roadway. One decayed oak (Tree #54) adjacent to a large Eucalyptus tree designated for removal will also have to be removed as it will be significantly damaged during the necessary stump removal procedure.

The balance of the trees that are recommended for preservation are located near the top of the slope. The root collars of the majority of these trees have been buried by loose fill dirt which will require careful removal to avoid damage to tree trunks and root structures. It is my understanding that the fill soil will be removed back to near original grade in these areas. The fill soil must be carefully removed under the canopy drip line area of each affected tree. The project arborist must be present at the time of the initial soil removal procedures on the first few trees to establish a work procedure with the equipment operator and workers on site. Note that fill soil within 36 inches of tree trunks/root collars must be dug out with hand tools.

Trees #52 and #53:

- These trees require care work to remove the fill soil within their canopy drip lines.

- Install a TPZ fence immediately after the removal of the fill material. This fence should extend along the slope 24 inches below the new road edge starting and terminating at eight feet either side of each tree.

Tree #55:

- This tree requires careful removal off fill soils in proximity to the trunk and within the drip line. The project arborist should be present at the time this work proceeds.

- A TPZ fence must be installed 24 inches below the new road edge immediately after the soil removal work is completed. This fence must extend eight feet either side of the canopy drip line.

Trees #57 and #58:

- Loose fill soil must be removed carefully under the canopies of these trees.

- A TPZ fence must be installed 24 inches below the new road edge immediately after the soil removal work is complete. This fence should extend along the slope and terminate six feet either side of each tree.

- Note that a heavily leaning large oak located down the slope between Trees #58 and #59 encroaches into the road area. I recommend that a low stubbed limb is removed back to the parent stem to reduce the encroachment into the road area.

Tree #59:

- Loose fill soil must be removed carefully under the canopy of this tree.

- Install a TPZ fence 24 inches below the new road edge that extends six feet to either side of the canopy drip line.

Tree #60:

- Install a TPZ fence at the edge of the canopy drip line that faces the road.

Recommendations for Tree Replacement:

All of the trees that are removed must be replaced at a one to one ratio with five gallon sized Coast Live Oaks and Coast Redwoods. The locations of these trees and an irrigation plan will be determined by a landscape designer who must forward plans to me for review. The trees should be planted in the fall. The newly planted trees will require a weekly irrigation program over their first four years of establishment to ensure that optimal root development into the native soil.

Recommendations for the Care of Trees After the Construction Period:

Install a wood chip mulch under all trees where grading work encroaches within their canopy drip lines. The installation of a wood chip mulch under the canopies of the trees that will likely incur root loss at the time of grading work will help reduce moisture loss in adjacent root zone areas.

The wood chip mulch must be installed within five days of the completion grading work and be spread at a depth of four inches thick and be set back 12 inches from the bases of the tree trunks. This mulch must extend back 12 feet starting from the top edge of the grading line. It may be necessary to cut away existing grasses, weeds and vines on the soil surface before the application.

Inspection Schedule:

The project arborist must inspect the site at the following times during this project:

- When the TPZ fencing is installed before demolition and grading commences
- When grading work commences in close proximity to Tree #3A (regarding root pruning)
- When the grading commences on the upper bank above Dempsey Rd (regarding root pruning)
- When the loose fill soil is removed around trees #52, #53 and #55 to outline work procedures
- After grading is completed to inspect the mulching under affected trees
- After the planting of replacement trees has been completed

Please contact me if you require further information.

Respectfully submitted

Nigel Belton

Attachments:

- Statement of Assumptions and Limiting Conditions
- Tree Matrix Chart
– Tree Survey Plan
– Sample Tree Protection Zone Sign

Assumptions and limiting Conditions

1. Any legal description given by the appraiser/consultant is assumed to be correct. No responsibility is assumed for matters legal in character nor is any opinion rendered as to the quality of any title.

2. The appraiser /consultant can neither guarantee nor be responsible for accuracy of information provided by others.

3. The appraiser/consultant shall not be required to give testimony or to attend court by reason of this appraisal unless subsequent written arrangements are made, including payment of an additional fee for services.

4. Loss or removal of any part of this report invalidates the entire appraisal/evaluation.

5. Possession of this report or a copy thereof does not imply right of publication or use for any purpose by any other than the person(s) to whom it is addressed without written consent of the appraiser/consultant.

6. This report and the values expressed herein represent the opinion of the appraiser/consultant, and the appraiser's/consultant's fee is in no way contingent upon the reporting of a specified value nor upon any finding to be reported.

7. Sketches, diagrams, graphs, photos, etc in this report, being intended as visual aids, are not necessarily to scale and should not be construed as engineering reports or surveys.

8. This report has been made in conformity with acceptable appraisal/evaluation/diagnostic reporting techniques and procedures, as recommended by the International Society of Arboriculture.

9. When applying any pesticide, fungicide, or herbicide, always follow label instructions.

10. No tree described in this report was climbed, unless otherwise stated. We cannot take responsibility for any defects which only could have been discovered by climbing. A full root collar inspection, consisting of excavating the soil around the tree to uncover the root collar and major buttress roots was not performed, unless otherwise stated. We cannot take responsibility for any root defects which could only have been discovered by such an inspection.

Consulting Arborist Disclosure Statement

Arborists are tree specialists who use their education, knowledge, training, and experience to examine trees, recommend measures to enhance the beauty and health of trees, and attempt to reduce risk of living near trees. Clients may choose to accept or disregard the recommendations of the arborist, or to seek additional advice.

Arborists cannot detect every condition that could possibly lead to the structural failure of a tree. Trees are living organisms that fail in ways we do not fully understand. Conditions are often hidden within the trees and below ground. Arborists cannot guarantee that a tree will be healthy or safe under all circumstances, or for a specified period of time. Likewise, remedial treatments, like medicine, cannot be guaranteed.

Trees can be managed, but they cannot be controlled. To live near trees is to accept some degree of risk. The only way to eliminate all risk associated with trees is to eliminate all trees.

Nigel Belton
ISA Certified Arborist – WE 410A

ATTACHMENT 11

Tree Survey Matrix
Dempsey Road – Lot 4 Development – Santa Cruz
APN 205-013-45

#	TREE NAME	DBH	HEIGHT	SPREAD	HEALTH	STRUCTURE	PRESERVE	REMOVE	NOTES AND COMMENTS
1.	Coast Live Oak (Quercus agrifolia)	8	27	22	1	1	X		Above the planned fire turnout.
2	Coast Live Oak	6	25	18	1	1		X	Above the drive entrance.
3	Coast Live Oak	9	45	22	1	2		X	Above the drive entrance.
3A	Coast Live Oak	11	40	28	1	2	X		Above the drive entrance.
4	Coast Live Oak	11-9	45	30	2	2	X		Above the drive entrance.
5	Coast Live Oak	15	45	32	2	2	X		Above the drive entrance.
6	Coast Live Oak	12	36	24	1	1	X		Above the drive entrance.
7	Coast Live Oak	5	15	10	1	2	X		Above the drive entrance.
8	Coast Redwood (Sequoia sempervirens)	50	70	45	1	2	X		A large tree with eight basal stems in addition to the main trunk.
9	Coast Live Oak	8	28	18	1	2	X		Above the driveway.
10	Coast Live Oak	16	30	22	2	2	X		Above the driveway.
11	Coast Live Oak	12	27	17	1	2	X		Above the driveway.
12	Coast Live Oak	30-16-15	45	60	1	3		X	Above the driveway.
12A	Coast Live Oak	24	45	40	1	2	X		Above the driveway.
13	Coast Live Oak	23	40	42	1	3		X	In the driveway.
14	Coast Live Oak	10-9	28	18	1	3		X	In the driveway.
15	Coast Live Oak	8	30	16	1	3		X	Above the driveway.
16	Coast Live Oak	7-7-8	20	27	1	2	X		Below the driveway.
17	Coast Live Oak	4-5	15	15	1	3	X		Below the driveway.
18	Coast Live Oak	8-7-8-8	32	28	1	3		X	Located in utility easement.
19	Coast Live Oak	4	20	10	1	2		X	Located in utility easement.
20	Coast Live Oak	10-15	30	30	1	2		X	Below the driveway.
21	Coast Live Oak	18-22	38	45	1	3		X	Above the road.
22	Coast Live Oak	12-12	40	32	1	2		X	Above the road.
23	Coast Live Oak	8	24	15	1	2		X	Above the road.
24	Coast Live Oak	4	15	12	1	2		X	Below the driveway.
25	Coast Live Oak	5-4	14	16	1	2		X	Above the road.

> Note – DBH = Trunk diameter measurement at 54 inches above grade:
> Note - Health and Structure Ratings -_1 = Best rating - 5 = Worst rating:
Prepared By Nigel Belton
ISA Certified Arborist – WE410A
June 9, 2013

ATTACHMENT 11

Tree Survey Matrix
Dempsey Road – Lot 4 Development – Santa Cruz
APN 205-013-45

#	TREE NAME	DBH	HEIGHT	SPREAD	HEALTH	STRUCTURE	PRESERVE	REMOVE	NOTES AND COMMENTS
26	Coast Live Oak	10	28	18	1	2		X	Above the road.
27	Coast Live Oak	16	40	33	1	2	X		Below the driveway.
28	California Bay Laurel (Umbellularia californica)	4-4	28	20	1	2		X	Located in the utility easement.
29	Coast Live Oak	9	30	15	1	2		X	Above the road.
30	California Bay Laurel	3-3	27	12	1	2		X	Above the road.
31	Coast Live Oak	3	9	15	1	3		X	Below the driveway.
32	Coast Live Oak	4	18	10	1	2		X	Located in utility easement.
33	Coast Live Oak	5	21	11	1	1		X	Located in utility easement.
34	Coast Live Oak	5-8-8	30	30	1	3		X	Located in utility easement.
35	Coast Live Oak	13	34	30	1	1		X	Located in utility easement.
36	Coast Live Oak	12	40	28	1	1		X	Above the road.
37	Coast Live Oak	3	16	12	2	2		X	Above the road.
38	Coast Live Oak	10	40	18	1	2		X	Above the road.
39	Coast Live Oak	9-14	40	36	1	2		X	Above the road.
40	Coast Live Oak	12-17	40	33	1	2		X	Above the road.
41	Coast Live Oak	8	35	20	2	2	X		Above the road.
42	Coast Live Oak	18	30	20	1	2	X		Above the road.
43	Coast Live Oak	3	10	15	2	3		X	Above the road.
44	Coast Live Oak	5	16	15	1	2		X	Above the road.
45	Coast Live Oak	6	20	16	1	2		X	Above the road.
46	Coast Live Oak	4	22	8	1	2	X		Above the road.
47	Coast Live Oak	6	22	8	1	2	X		Above the road.
48	Coast Live Oak	11	30	115	2	2		X	Above the road.
49	Coast Live Oak	7	30	12	2	2		X	Above the road.
50	Coast Live Oak	9	30	20	2	1		X	Above the road.

> Note – DBH = Trunk diameter measurement at 54 inches above grade:
> Note - Health and Structure Ratings -_1 = Best rating - 5 = Worst rating:

Prepared By Nigel Belton
ISA Certified Arborist – WE410A
June 9, 2013

Tree Survey Matrix
Dempsey Road – Lot 4 Development – Santa Cruz
APN 205-013-45

#	TREE NAME	DBH	HEIGHT	SPREAD	HEALTH	STRUCTURE	PRESERVE	REMOVE	NOTES AND COMMENTS
51	Coast Live Oak	11	24	22	1	2	X		Above the road.
52	Coast Live Oak	10-14	28	28	1	2	X		Below Dempsey Rd entrance.
53	Coast Live Oak	9	30	116	1	2	X		Below Dempsey Rd entrance.
54	Coast Live Oak	16	40	40	3	3		X	Below Dempsey Rd.
55	Coast Live Oak	18	44	30	2	3	X		Below Dempsey Rd.
56	Coast Live Oak	10	40	18	2	3		X	Below Dempsey Rd.
57	Coast Live Oak	5	18	6	1	2	X		Below Dempsey Rd.
58	Coast Live Oak	7	22	8	2	2	X		Below Dempsey Rd.
59	Coast Live Oak	6	20	12	2	3	X		Below Dempsey Rd.
60	Coast Live Oak	4	3	16	14		X		Below Dempsey Rd.
61	Coast Live Oak	4	16	15	1	1		X	Above Dempsey Rd entrance.
62	Coast Live Oak	4	18	16	1	1	X		Above Dempsey Rd entrance.

> Note – DBH = Trunk diameter measurement at 54 inches above grade:
> Note - Health and Structure Ratings -_1 = Best rating - 5 = Worst rating:

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WARNING

TREE PRESERVATION AREA

KEEP OUT

NOTICE: PROTECTIVE TREE FENCING IS REQUIRED ON THIS JOB SITE. ITS REMOVAL OR DAMAGE MAY RESULT IN A FINE.

This card must be posted on the protective fencing on 10 foot centers for each protected tree on the job site, and remain up during the entire construction period. Fencing may not be removed without written permission of the Town Arborist.

During demolition and construction all reasonable steps necessary to prevent damage, or the destruction of protected trees is required. Failure to comply with all precautions may result in a STOP WORK order being issued by the Town.

Call _____ for information