TRAFFIC STUDY

George W. Nickelson, P.E.

Traffic Engineering • Transportation Planning

January 22, 2009

Mr. Duane Kanuha
Kohala Investment Works, LLC
101 Aupuni Street, Suite 206
Hilo, HI 96721

Subject: ***Focused Traffic Study for a Proposed Winery at #588 Zinfandel Lane in Napa County***

Dear Mr. Kanuha:

This letter report summarizes a focused traffic study for a proposed winery at #588 Zinfandel Lane in Napa County. This study reflects my discussions with you and our recent experience in the project area. This letter report has identified the existing traffic conditions, calculated the added traffic due to the proposed winery and evaluated the effects of that traffic.

1. Existing Traffic Conditions

Zinfandel Lane is essentially a two-lane rural road in the area of the winery site. At the winery site Zinfandel Lane does not have a left turn lane.

Based on Napa County records, Zinfandel Lane has daily traffic volumes of 2,205 vehicles west of Silverado Trail and 2,721 vehicles east of State Route 29 (SR 29).[1] It is likely that the volumes at the winery site are comparable to the volumes counted west of Silverado Trail. However, for the purposes of this analysis, it has been conservatively assumed that the Zinfandel Lane volumes at the winery site are the average of the two Napa County counts or 2,463 daily vehicles.

2. Traffic Effects of the Proposed Winery

a. Project Description

The proposed project would involve a new winery with an annual production of 50,000 gallons.[2] It is expected that about 125 persons would visit the winery weekly. During a typical weekday, about 15 persons would visit the winery and on a typical Saturday, 25 persons would visit the winery (by appointment only). The winery's employment is expected to include three persons full time with three additional persons on-site during the harvest season. Table 1 outlines the winery's expected daily traffic generation on a typical weekday (20 daily trips), a typical Saturday (26 daily trips) and a day during the harvest season (33 daily trips).

If it is conservatively assumed that 20% of the winery's daily trips are generated during a peak hour, the typical weekday or Saturday peak hour would experience 4-5 winery related vehicle trips. This level of traffic would be very low relative to the background traffic flows on Zinfandel Lane.

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b. Site Access Design Issues

The primary traffic design issue would be the need for a left-turn lane at the site access. Standards for left-turn lanes relate to the left-turn volume conflicting with the volume of opposing through traffic. Napa County has adopted a warrant methodology based on daily traffic volumes on the highway and daily traffic volumes on the access road or driveway. [3] As noted in this report (based on Napa County counts), our conservative estimate of the daily volume on Zinfandel Lane is 2,463 vehicles at the winery site. Napa County standards for left-turn lanes indicate that the volume on Zinfandel Lane and the daily volumes in/out of the proposed winery would be well below the levels at which a left-turn lane would be warranted (left turn lane graph is attached).

3. Summary and Conclusions

As outlined in the report, the project's trips would add minimally to traffic flows on Zinfandel Lane. The combination of volumes on Zinfandel Lane and volumes in/out of the winery would be well below Napa County thresholds for installation of a left-turn lane.

I trust that this study responds to your needs and the requirements of Napa County. Please let me know if there are any questions or if further input is required.

Sincerely,

George W. Nickelson, P.E.

copies: John Nees
Donna Oldford

References:

(1) Napa County Department of Public Works, traffic counts on Zinfandel lane conducted May 2003.

(2) Project information provided by Mr. Mark Phillips, Dickenson, Peatman & Fogarty, July 22, 2008.

(3) Napa County Department of Public Works, *Adopted Road & Street Standards*, Revised August 31, 2004.

TABLE 1
DAILY TRIP GENERATION FOR
A PROPOSED ZINFANDEL LANE WINERY

Daily Traffic During a Typical Weekday:

• 15 visitors/2.6 per vehicle x 2 one-way trips	=	12 daily trips
• 3 employees x 2 one-way trips per employee	=	6 daily trips
• 1 truck x 2 one-way trips per truck(1)	=	2 daily trips
		20 daily trips

Daily Traffic During a Typical Saturday:

• 25 visitors/2.8 per vehicle x 2 one-way trips	=	18 daily trips
• 3 employees x 2 one-way trips per employee	=	6 daily trips
• 1 truck x 2 one-way trips per truck(1)	=	2 daily trips
		26 daily trips

Daily Traffic During Harvest Season (7 weeks):

• 25 visitors/2.8 per vehicle x 2 one-way trips	=	18 daily trips
• 6 employees/1.1 per vehicle x 2 one-way trips	=	11 daily trips
• 2 trucks x 2 one-way trips per truck(2)	=	4 daily trips
		33 daily trips

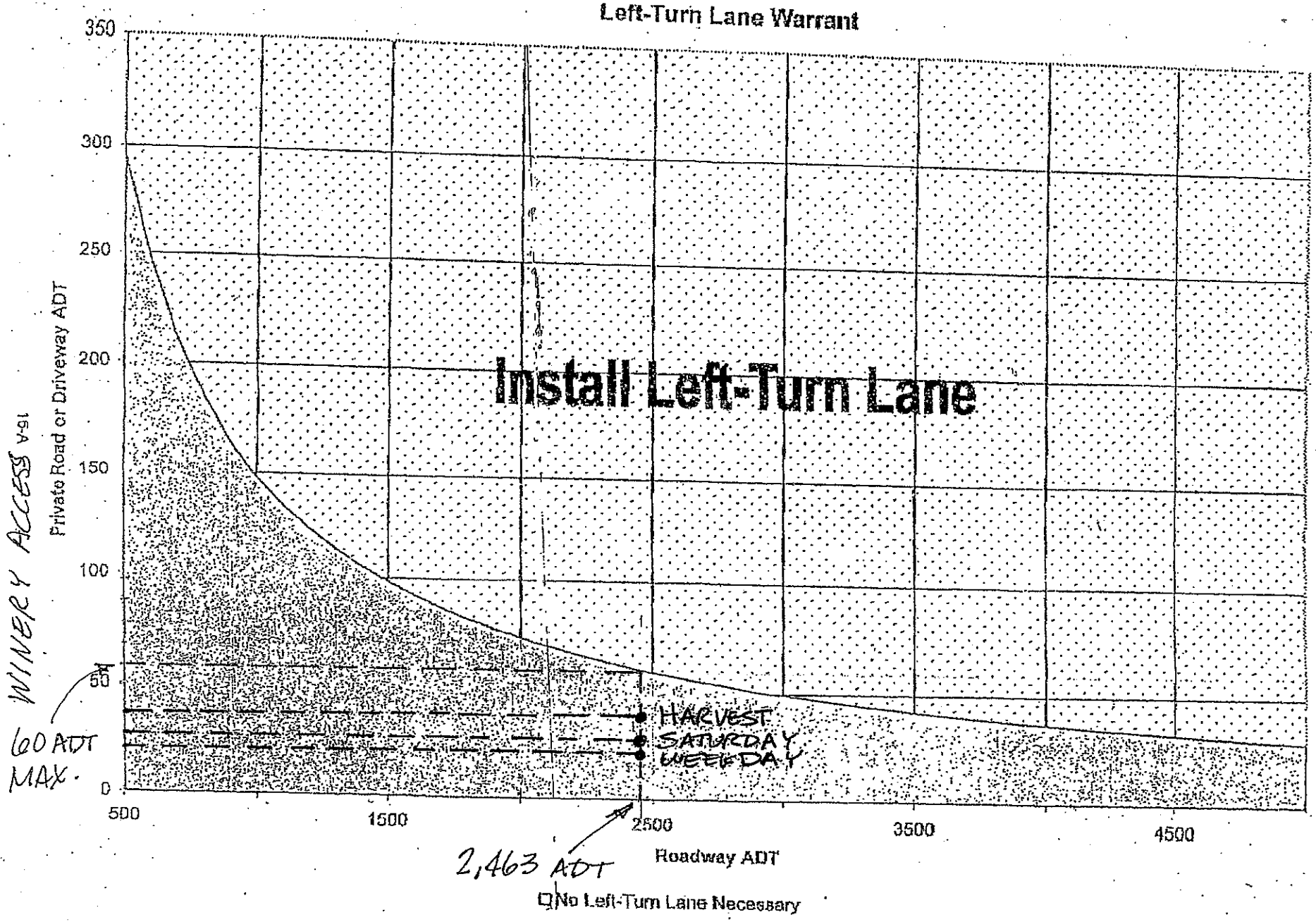
(1) During the 45-week non-harvest season, a maximum of 1 added daily truck would be generated related to routine deliveries associated with the winery production (50,000 gallons/2.38 gallons per case = 21,008 cases).

• 21,008 cases/2,310 cases per truck	=	9 glass delivery trucks
• 21,008 cases/1,232 cases per truck	=	17 wine shipment trucks
• 5 miscellaneous weekly deliveries	=	225 miscellaneous trucks
		251 annual trucks

251 trucks/45 weeks = 5-6 weekly trucks or 1 truck per day.

(2) During the 7-week harvest season, a maximum of 2 daily grape delivery trucks would be generated, calculated as follows:

- 50,000 gallons/165 gallons per ton = 303 tons of off-site grapes
- 303 tons of off-site grapes/10 tons per truck/7 weeks = 4 trucks/week or a maximum of one truck per day; and
- pick-up of empty bins = one truck per day



16-A

WINERY ACCESS

60 ADT MAX.

2,463 ADT

2 INFANDEL LANE

PHASE I
WATER AVAILABILITY ANALYSIS

✓ COPY TO PW & EM 8/7

BARTELT engineering

August 5, 2009 – Second Revision
#08-16

RECEIVED
AUG 7 2009
NAPA CO. CONSERVATION DEVELOPMENT & PLANNING DEPT.

Hillary Gitelman, Director
Napa County Conservation, Development and Planning Department
1195 Third Street, Room 210
Napa, CA 94559

Re: Revised Phase One Water Availability Analysis for the proposed Wheeler Winery at 588 Zinfandel Lane, Napa County, CA, APN 030-260-016

Dear Ms. Gitelman:

As required by the County of Napa Public Works Department, and the Interim Policy approved by the Planning Commission on March 6, 1991, this letter outlines a Phase One Water Availability Analysis for the new winery Use Permit application.

As outlined in the Interim Policy a reconnaissance level report for this site has been prepared with the following items being pertinent to the study:

Site Plan

A USGS site map showing the site and approximate property line locations is attached. Information regarding the locations of the existing wells and proposed structures is shown on the enclosed Wheeler Winery Conceptual Site Plan prepared by Bartelt Engineering, dated May 2009. Information regarding the location of the existing wells on adjacent properties was obtained from field observations and review of Napa County records. Based on our review of the available Napa County records, Bartelt Engineering was unable to determine if there are any additional wells located on the adjacent parcels.

Project Description

The Owners of 588 Zinfandel Lane are proposing to construct a full crush winery facility with a production of 50,000 gallons of wine per year. The proposed winery's staff will consist of 2 full-time and 2 part-time / harvest employees. The Applicant intends to establish a private tasting room with tours and tastings; additionally, the Applicant plans to hold food & wine pairings and other special events at the winery.

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napa, california 94559
(707) 258-1301
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The following is a summary of the proposed marketing plan:

Description	Frequency	Number of Visitors
Private Tours & Tastings	4 per day	6 to 8 per tour
Food & Wine Pairings	4 per month	24 per event
Industry Open House Events	4 per year	75 per event
Auction Related Events	2 per year	150 per event

It is planned that Private Tours & Tastings, Food & Wine Pairings, Industry Open House Events and Auction Related Events will not be held on the same day. Furthermore, all events with more than 75 guests in attendance (Auction Related Events) will be catered with all food preparation, washing of tableware and serving dishes performed by an offsite catering service and portable sanitary facilities available for guests to use.

Currently, the 11.719± acre subject parcel, APN 030-260-016, is planted with 9.67± acres of vineyard of which 0.31± will be removed as part of the proposed development. In additional there are currently four residential structures (1 single family and 3 second units) and one garage on the parcel. It is our understanding that all but one of the existing residential structures will be demolished.

Projected Water Consumption

The total water requirements for the existing and proposed usage on the parcel are calculated below using quantities provided in the staff report from the County of Napa Public Works Department.

Current Water Use Using Napa County Interim Policy

Existing Vineyard Irrigation, Heat & Frost Protection (see Attachment D):

9.7 acres x 1.0 acre-foot/acre/year — 9.7 ± acre-feet/year

Existing Landscape Irrigation (see Attachment D):

0.1 acre x 1.5 ± acre-feet/year — 0.15 ± acre-feet/year

Single Family Residence (see Attachment D): — 0.5 ± acre-feet/year

Three Second Units (see Attachment D):

3 x 0.4 acre-foot/year — 1.2 ± acre-feet/year

Total Current Water Use = vineyard irrigation, heat & frost protection + landscape irrigation + single family residence + second units:

Total Current Water Use = 9.7 ac-ft/year + 0.15 ac-ft/year + 0.5 ac-ft/year + 1.2 ac-ft/year

Total = 11.55 acre-feet/year

Projected Water Use Calculations Using the Bartelt Engineering Wastewater Disposal Feasibility Study and Napa County Interim Policy

Winery Process Water (see Attachment D):

(50,000 gal wine/year) x (2.15 acre-foot/year per 100,000 gal wine) = 1.08 acre-foot/year

Winery Domestic and Landscaping see Attachment D):

(50,000 gal wine/year) x (0.5 acre-foot/year per 100,000 gal wine) = 0.25 acre-foot/year

Existing Vineyard Irrigation, Heat & Frost Protection (see Attachment D):

9.4 acres x 1.0 acre-foot/acre/year 9.4 ± acre-feet/year

Single Family City of St. Helena water service

Total Projected Water Use = annual winery process water use + annual winery domestic and irrigation + vineyard irrigation, heat & frost protection:

Total Projected Water Use = 1.08 ac-ft/year + 0.25 ac-ft/year + 9.4 ac-ft/year

Total = 10.73 acre-feet/year

Acceptable Threshold Water Use
(Calculated using Napa County Interim Policy for water usage in valley floor areas)

1.0 acre-feet/acre of site - valley floor

The following calculation assumes that the entire 11.719 acre parcel lies in an area designated as valley floor.

Acceptable water use = 11.719 acres x 1.0 acre-feet/year = 11.719 acre-feet/year

The above analysis shows that the projected water usage will be less than the current water usage and less than the acceptable threshold water usage for the subject parcel.

Existing Water Source and Storage Capacity

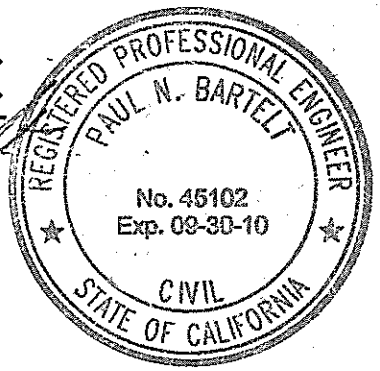
According to the Property Owner, the onsite well is capable of producing approximately 250 gallons per minute. Based on our understanding of the proposed project the existing

well will continue to be used for vineyard and landscape irrigation and to maintain the fire protection tank at full capacity. Ground water is currently pumped from the existing well into two (2) onsite 60,000 gallon storage tanks (one of which is proposed to be removed as part of the development). Residential water use will be provided by the City of Saint Helena water system located in Zinfandel Lane. It is also our understanding that based on the limited amount of information on the condition of the existing well a new well will need to be drilled in a location and with a 50-foot minimum annular sanitary seal that meets the requirements of Title 22. The new well will be used for all stages of the winery making process including but not limited to equipment cleaning and rinsing. A water treatment system will be required by Napa County Environmental Management as the winery is proposing a commercial kitchen. At the time of this letter the location of the proposed new well has yet to be determined, we are proposing that the installation of the well be a condition of approval for final occupancy of the winery.

Summary and Conclusions

The water use requirements for the proposed improvements at 588 Zinfandel Lane are projected to be less than the acceptable threshold water usage level in accordance with the Interim Water Availability Policy; therefore, it is not necessary to perform a Phase Two and/or Phase Three Analysis. The above information and the attached plans should assist you in processing the subject Use Permit. If you have any questions regarding the information provided, please feel free to call me.

Sincerely,



Paul N. Bartelt, P.E.
Principal Engineer

PNB:sd

Enclosures

cc: John Nees
Duane Kanuha, Kohala Investment Works
Donna Oldford

Attachment D

PHASE I WATER AVAILABILITY ANALYSIS

File #:__ __-__ __ __ Owner: Kohala Investment Works Parcel #: 030-260-016

This form is intended to help those who must prepare a Phase I Water Availability Analysis. **The Department will not accept an analysis that is not on this form.**

BACKGROUND: A Phase I Water Availability Analysis is done in order to determine what changes in water use will occur on a property as a result of the a conversion. Staff uses this information to determine whether the project may have a detrimental effect on groundwater levels. If it may, additional information will be required. You will be advised if additional information is needed.

PERSONS QUALIFIED TO PREPARE: Any person that can provide the needed information

PROCEDURE:

STEP 1: *Prepare and attach to this form an 8-1/2"x11" site plan of your parcel(s) with the locations of all structures, gardens, vineyards, etc in which well water will be used shown*

STEP 2: *Determine the allowable groundwater use allotment for your parcel(s).*

Total size of parcel(s)	11.719 ±	acre(s) = Total acreage
Multiply by parcel location factor	x 1.0	acre-foot per acre per year
Allowable groundwater allotment	= 11.719 ±	acre-foot per year

STEP 3: *Determine the estimated water use for all vineyards on your parcel(s) currently and after the planned conversion; actual water usage figures may be substituted for the current usage estimate (please indicate if this is done). Estimate future use for both the vineyard establishment period and thereafter*

Current Usage:

Number of *planted* acres	9.7 ±	acres
Multiply by acre-feet/acre/year	x 1.0	acre-feet of water per acre per year
	= 9.7 ±	af of water per yr used for vineyard irrigation

Future Additional Usage:

Number of *planted* acres	-0-	acres
Multiply by number of vines/acre	x -0-	vines per acre
Multiply by gallons/vine/year	x -0-	gallons of water per vine per year (long-term)
	-0-	gallons of water per vine per year (establish)
Divide by 325,851 gallons/af	= -0-	of later per yr used (vineyard long-term)
	-0-	af of water per yr used (vineyard establish)

STEP 4: *Using the guidelines on the next page, actual water usage figures, and/or detailed water use projections, tabulate the existing and projected future water usage on the parcel(s) in acre-foot per year (af/yr) {1 af = 325,851 gallons}.*

Existing Usage:

Residential	1.7	af/yr
Farm Labor Dwelling	-0-	af/yr
Winery	-0-	af/yr
Commercial	-0-	af/yr
Vineyard(long-term)	9.7 ±	af/yr
" (establish)	-0-	af/yr
Other Agriculture	-0-	af/yr
Landscaping	0.15 ±	af/yr

Future Usage:

Residential	-0-	af/yr
Farm Labor Dwelling	-0-	af/yr
Winery	1.33 ±	af/yr
Commercial	-0-	af/yr
Vineyard(long-term)	9.4 ±	af/yr
" (establish)	N/A	af/yr
Other Agriculture	-0-	af/yr
Landscaping	-0-	af/yr

Other Usage	-0- af/yr	Other Usage	-0- af/yr
TOTAL	11.55 ± af/yr	TOTAL	10.73 ± af/yr

STEP 5: *Attach all supporting information that may be significant to this analysis including but not limited to all water use calculations for the various uses listed*

Parcel Location Factors

The allowable allotment of water is based on the location of your parcel. Valley floor areas include all locations on the floor of the Napa Valley and Carneros Basin except for groundwater deficient areas. Groundwater deficient areas are areas that have been determined by the Department of Public Works as having a history of problems with groundwater. All other areas are classified as Mountain Areas. Public Works can assist you in determining your classification.

Parcel Location Factors	
Valley Floor	1.0 acre foot per acre per year
Mountain Areas	0.5 acre foot per acre per year
Groundwater Deficient Area (MST)	0.3 acre foot per acre per year

Guidelines For Estimating Water Usage:

Residential:	
Single Family Residence	0.5 acre-foot per year
Farm Labor Dwelling	1.0 acre-foot per year (6 people)
Second Unit	0.4 acre-foot per year
Guest Cottage	0.1 acre-foot per year
Winery:	
Process Water	2.15 acre-foot per 100,000 gal. of wine
Domestic and Landscaping	0.50 acre-foot per 100,000 gal. of wine
Commercial:	
Office Space	0.01 acre-foot per employee per year
Warehouse	0.05 acre-foot per employee per year
Agricultural:	
Vineyards	
Irrigation only	0.2 to 0.5 acre-foot per acre per year
Heat Protection	0.25 acre foot per acre per year
Frost Protection	0.25 acre foot per acre per year
Irrigated Pasture	4.0 acre-foot per acre per year
Orchards	4.0 acre-foot per acre per year
Livestock (sheep or cows)	0.01 acre-foot per acre per year
Landscaping:	
Landscaping	1.5 acre-foot per acre per year

July 7, 2009
Job# 08-16

NEW COMMUNITY AND NON-COMMUNITY WATER SYSTEMS

REVISED

Technical, Managerial and Financial Capacity Worksheet

(Use Permit Applications and Financial Capacity Worksheet)

1. **Water System Name:** Wheeler Winery Water System located at 588 Zinfandel Lane, Napa County, CA, APN 030-260-016

2. **Name of person(s) who prepared the report:** Paul N. Bartelt, P.E., Principal Engineer, Bartelt Engineering

3. **Technical Capacity**

(A) **System Description:** The water source for the project is a **new** groundwater well which will be used as a potable water source, should the County find that a Public Water System is a requirement under the proposed Use Permit. Water will be drawn from the **new** well, treated at the source to the required level for potable water, then stored in onsite water storage tanks before being conveyed to the service connections onsite. The existing well will continue to provide untreated water for vineyard irrigation, landscape irrigation and emergency fire protection purposes. Vineyard irrigation, landscape irrigation and fire protection water will be separate from the proposed potable water source and if necessary isolated from the treated water by a backflow preventer.

Treated water service connections will be at the proposed winery building, proposed commercial kitchen, the proposed office/winery building and the tasting room located onsite. The water treatment equipment will most likely include two 5-micron filters in parallel, a calcite filter, a water softener, ultraviolet radiation treatment, pH analyzer and a storage tank. Equipment requirements may vary based on water sampling report. All proposed winery structures are reflected on the conceptual site plan associated with the winery Use Permit.

The operations plan for the system may include the following components and tasks:

- Routine Operational Procedures for each component of the system:

    A. Visual inspection of **WELL HEAD** (daily).
        1. Check for the following; leaks, openings, lubricants, electrical hazards, chemical hazards, etc. (record observations and correct problem).

B. Visual inspection of the **STORAGE TANK** (daily).
   1. Inspect for any leaks or damage (record observations and repair as needed).
   2. Check the **PUMP** for proper operation.
   3. Check **PRESSURE GAUGE**, record system pressure. Record the pressure the pump turns on, the pressure the pump turns off and the duration of the run time.
   4. Cleaning of **STORAGE TANK** (semi-annually). Record date cleaned and observations.

C. Maintenance of **GAUGES and METERS.**
   1. Inspect all gauges and meters for leaks and proper function daily. Repair or replace as needed (keep record of date).

D. Inspection and exercising of the **VALVES.**
   1. Inspect valves for leaks (record observations, repair or replace if leaking).
   2. Exercise valves (semi-annually, record date).

E. Operation and maintenance of **DISTRIBUTION** facilities.
   1. Visually inspect the distribution system for leaks on a regular basis. Record date and observations.
   2. Flush dead end mains (semi-annually, record date and observations).

- Monitoring and Reporting.

A. **BACTERIOLOGICAL MONITORING**; As per approved Sample Siting Plan, required monthly, report to the Department by the 10th of each month, following the sample.
   1. If sample positive, take four repeat samples at once.
   2. Take five routine samples the month following a positive sample.
   3. Keep bacteriological results for five years.
   4. Keep any corrective action for sampling for three years.

B. **CHEMICAL MONITORING**; as required by the Department, forward results to the Department.
   1. Keep chemical results for ten years.
   2. Keep variance and exemptions for five years.

- Response to violations.

A. **PUBLIC NOTIFICATION** of violation required.
   1. Notification shall be given as per "Emergency public notification" method on record with the Department, or in a manner directed by the Department.
   2. State problem and what has been done to correct it.
   3. Send a copy of the notification to the Department.

- Consumer complaint response procedures.

A. **CONSUMER COMPLAINT** procedures.

1. Record in complaint log (name, address and nature of the problem).
2. Investigate the complaint.
3. Verify or dismiss the complaint.
4. Record the steps taken to address or correct the problem.
5. Notify complainant of action taken.
6. Keep complaint records with corrective action for five years.

(B) **Ten Year Projection:** The ten year projection for water demand is feasible. Based on the current water availability from the existing well at 60 gallons per minute, we feel that a new well will be equally capable of producing simular flowrates and supply sufficient capacity to meet the demands of the proposed project. A water feasibility study based on the existing well has been filed with the Applicant's Use Permit concludes that there is adequate water available to meet the needs of the winery and associated water use, as proposed.

Source Adequacy

- **Groundwater:** At the time of this report, the sanitary seal of the existing well is unknown and will need to be determined. Based on the limited amount of available information on the existing well it is believed that the sanitary seal of the existing well is inadequate and that a new well will need to be drilled onsite.

- **Surface Water Treatment:** All water sources are groundwater from wells, so no surface water treatment is anticipated.

- **Water Supply Capacity:** The proposed water system will be capable of supplying a minimum of 3 gallons per minute for at least 24 hours for each service connection. As the existing well delivers 250 gallons per minute, we feel that the new well will have equal capacity and sufficient to meet the demands of the proposed project; in addition, treated water will be stored in tanks to provide additional water during peak demands.

- **Water Quality:** At the time of this report the proposed new well has not been located or installed and no water quality tests have been performed on the existing or proposed new water well.

- **Consolidation with Other Water Systems:** The closest water system would be that of the City of St. Helena. The Applicant has been approved for limited water service by the City of St. Helena. Water service provided by the City of St. Helena will be utilized for residential use only.

4. **Managerial**

(A) **Organizational Ability:** The water system will be managed by an employee(s) of the winery that has received the requisite training and certification required to oversee the system. Management of the water system will be part of the job description of the winery employee(s) so assigned. The employee(s) working with the system will attend classes in distribution systems for certification at Solano Community College (or other suitable school) and will maintain a working knowledge of changes in codes and requirements associated with the water system. A certified operator will be retained to oversee the water system, either through hiring of winery personnel or retention of a private firm with the appropriate credentials. Routine water testing of the system will be conducted twice yearly or as required by Napa County and/or the State of California.

In the event that routine testing (or by other method) provides evidence of contamination in the water system, all guests, visitors and employees served by the system will be notified immediately in several ways. The first method will be by verbal communication and the second will be by signage at all distribution points. Remedial measures will be taken immediately upon receipt of evidence of contamination. This will be followed by testing and follow up to confirm that the contamination problem has been rectified and the water determined safe for human consumption. Potential users onsite will be verbally notified and all signage removed only when the water quality has been restored to required levels and confirmed via follow up test results.

(B) **Water Rights:** The water rights of the existing and proposed wells belong exclusively to the Property Owner. There are no additional water rights or rights to water from existing streams or rivers.

5. **Financial:** It is estimated that the total operating and installation costs associated with the water system for the first year will be approximately $90,000 including the installation of a new well, employee allocated time, training, facilities and maintenance.

The water company will generate no revenue of its own. Its expenses are covered as part of the general fund for winery operations. Most of the capital expenditures over a 10 year period will be minor. Annual maintenance and repair will be accomplished by onsite winery personnel, assisted by a private operation (such as Oakville Pump) and will be covered in the winery general fund. The expenses associated with water testing will also be covered as part of the general fund. Tests will be conducted by a private testing company (such as CalTest or Brelje and Race Laboratory).

Line item costs associated with the water system are estimated as follows:

Sampling and testing: $200 per month (twice annual testing spread over one year)

Contractors (as needed): Average $500 per month.

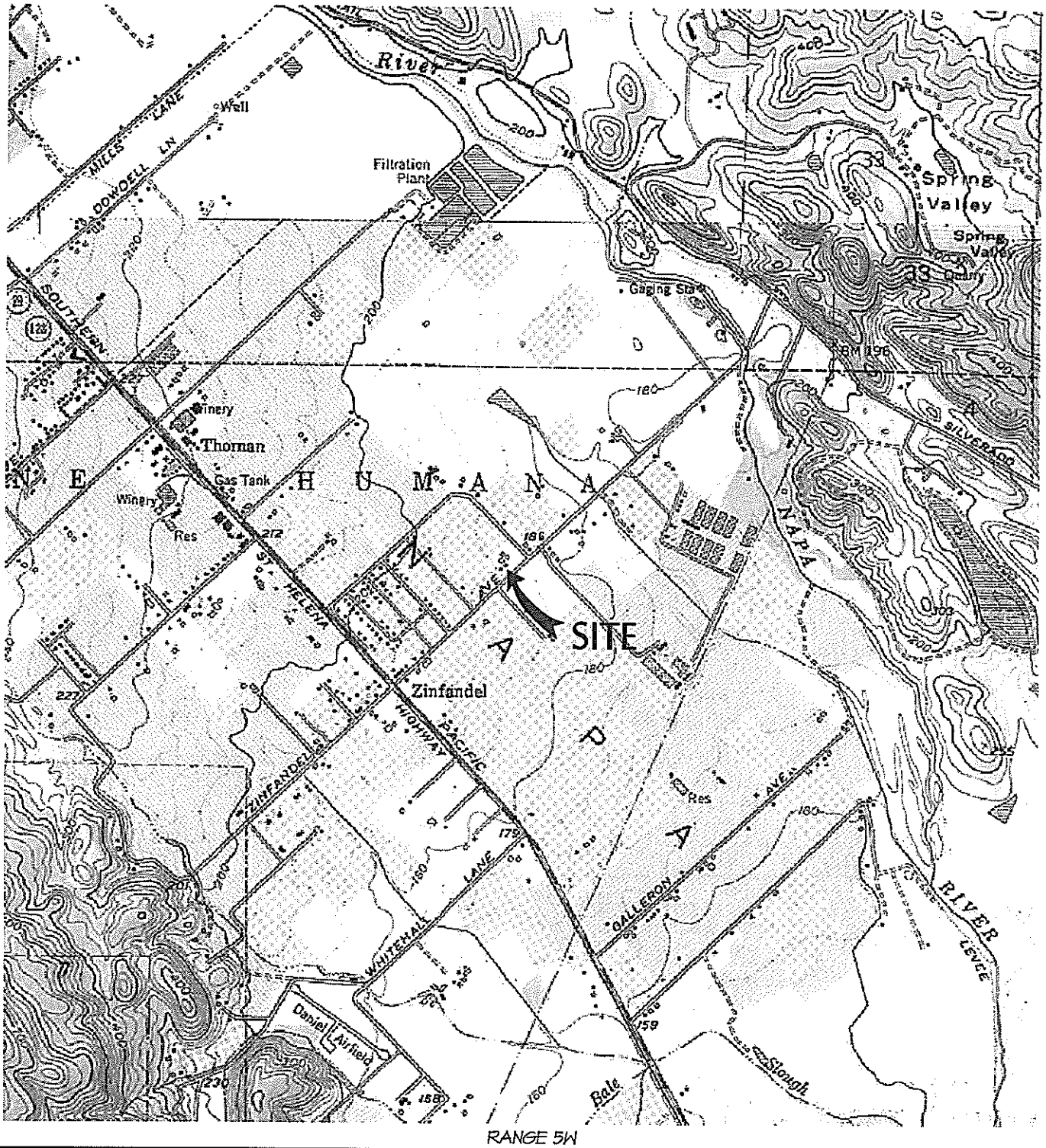
Hourly breakdown per month for onsite staff time: $ 800 or average 10 hrs/week = 40 hrs/mo.

Total Operating Costs: Approximately $1,450 per month or $17,000 per year

Following approval of the winery Use Permit request, the Applicant understands that the Napa County Department of Environmental Management may require a Public Water System Plan, including emergency plans, to be filed and approved by NCDEM prior to issuance of any building permits associated with the winery.

TOPOGRAPHIC SITE LOCATION INFORMATION

USGS 7.5 MINUTE QUADRANGLE "RUTHERFORD" Scale: 1" = 2000'



BARTELT engineering
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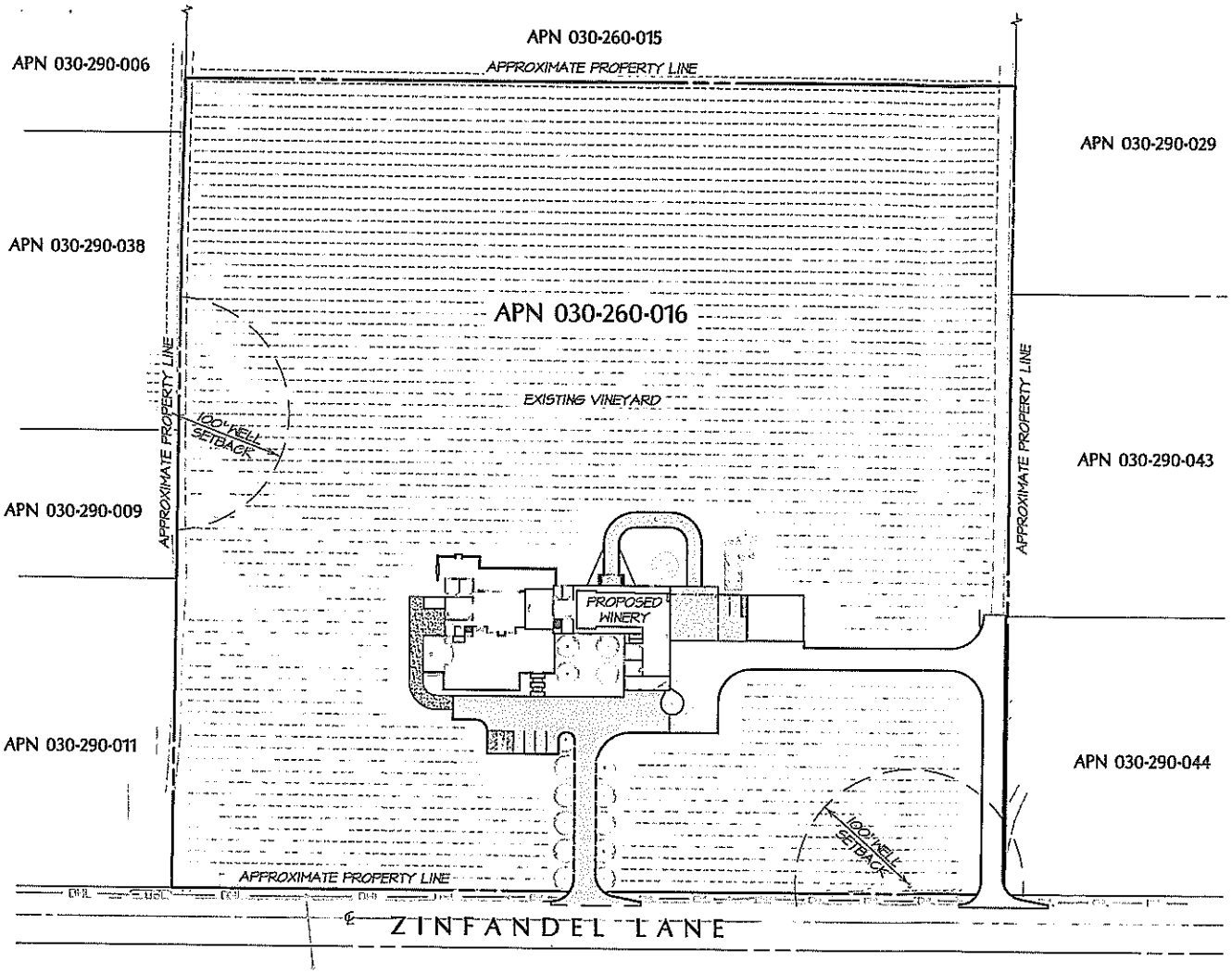
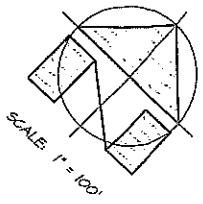
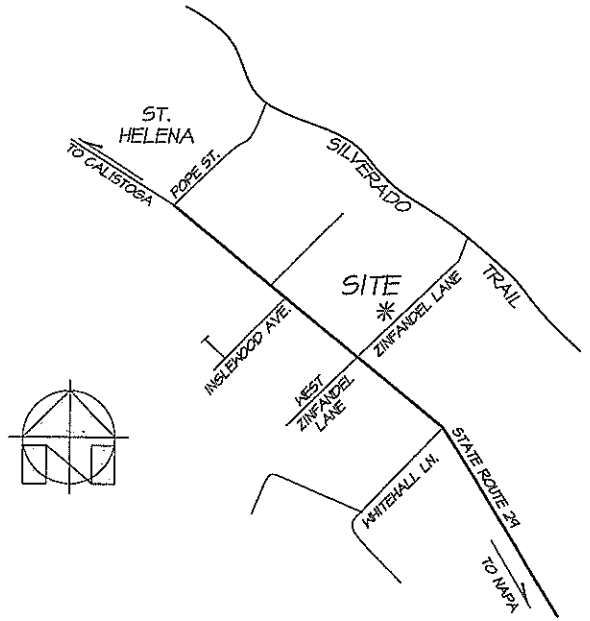
NEW WINERY
588 Zinfandel Lane
St. Helena, CA
APN APN 030-260-016
Job no. 08-16 December 2008







LOCATION MAP

NO SCALE

BARTELT engineering

civil engineering · land planning
1303 jefferson street, 200 B, napa, ca 94559
(707) 258-1301 · fax (707) 258-2926

OVERALL SITE MAP

SCALE: 1" = 100'

588 Zinfandel Lane
St. Helena, CA
APN 030-260-016
Job No. 08-16
December 2008
Sheet 1 of 1

WASTEWATER FEASIBILITY STUDY

FINAL
✓ Scanned 8/7

August 5, 2009 – Second Revision
#08-16

BARTELT engineering

RECEIVED
AUG 7 2009
NAPA CO. CONSERVATION
DEVELOPMENT & PLANNING DEPT.

Christine Secheli
Napa County Department of Environmental Management
1195 Third Street, Room 101
Napa, CA 94559

Re: Revised Onsite Wastewater Disposal Feasibility Study for the proposed Wheeler Winery at 588 Zinfandel Lane, Napa County, CA, APN 030-260-016

Dear Ms. Secheli:

At the request of our client, we have evaluated the feasibility of providing onsite wastewater disposal for a new winery facility located at 588 Zinfandel Lane in Napa County, California. It is our understanding that the winery will have a full crushing production of 50,000 gallons of wine per year.

This feasibility study is based on an A.L.T.A. / A.C.S.M. Land Title Survey map "Lands of Vieira, Jensvold, Morgan and O'Brian," prepared by Albion Surveys, Inc. dated August 2008 and the site evaluations performed on November 14, 2008 and April 3, 2009 by Bartelt Engineering and witnessed by a representative of the Napa County Department of Environmental Management (see attached site evaluations). As part of our work we have reviewed the files at Napa County Environmental Health Department as well as performed a reconnaissance of the site to view existing conditions. Based on our review of the files and observations made in the field, it is our opinion that a pressure distribution type disposal field can be constructed on this property to accommodate the proposed wastewater flow generated by the new winery facility and the existing residence that will remain.

The owners of Wheeler Winery are proposing to construct a full crush winery facility with a production of 50,000 gallons of wine per year. The proposed winery's staff will consist of 2 full-time and 2 part-time / harvest employees. The Applicant intends to establish a private tasting room with tours and tastings; additionally, the Applicant plans to hold food & wine pairings and other special events at the winery.

The following is a summary of the proposed marketing plan for the winery:

Description	Frequency	Number of Visitors
Private Tours & Tastings	4 per day	6 to 8 per tour
Food & Wine Pairings	4 per month	24 per event
Industry Open House Events	4 per year	75 per event
Auction Related Events	2 per year	150 per event

civil engineering
land planning
1303 jefferson street, 200 B
napa, california 94559
(707) 258-1301
(707) 258-2926 fax

It is planned that Private Tours & Tastings, Food & Wine Pairings, Industry Open House Events and Auction Related Events will not be held on the same day. Furthermore, all events with more than 75 guests in attendance (Auction Related Events) will be catered with all food preparation, washing of tableware and serving dishes performed by an offsite catering service and portable sanitary facilities available for guests to use.

The existing septic systems that serve the existing residential structures are conventional gravity type onsite wastewater disposal systems. It is our understanding that all but one of the existing residential structures will be demolished and all of the existing wastewater disposal systems will be demolished or abandoned in place as part of the proposed development.

The following calculations are the basis for our recommendations:

Winery Process Wastewater Flow

Peak Winery Process Wastewater Flow =

$$\frac{(50{,}000 \text{ gallons of wine per year})(1.5 \text{ gallons of water per 1 gallon of wine})}{45 \text{ days of crush per year}} = 1{,}667 \text{ gpd}$$

Average Winery Process Wastewater Flow:

$$\frac{(50{,}000 \text{ gallons of wine per year})(6 \text{ gallons of water per 1 gallon of wine})}{365 \text{ days per year}} = 822 \text{ gpd}$$

Winery Sanitary Wastewater Flow

All plumbing fixtures in the proposed winery will be low flow, water saving fixtures per the Uniform Plumbing Code as adopted by the Napa County Building Department.

Sanitary wastewater flows at the proposed winery can be itemized as follows:

Employees:

(2 full-time employees) x (15 gpd per employee) = 30 gpd
(2 part-time employees) x (15 gpd per employee) = 30 gpd

Private Tours & Tastings:

(32 visitors per day) x (3 gallons per visitor) = 96 gpd.

Food & Wine Pairings:

(24 visitors per event) x (5 gallons per visitor) = 120 gpd

Industry Open House Events:

(75 visitors per event) x (5 gallons per visitor) = 375 gpd

(75 meals per event) x (3 gallons per meal) = 225 gpd

Auction Related Events:

(150 visitors per event) x (5 gallons per visitor) = 750 gpd

The peak winery sanitary wastewater flow is the total peak flow for full & part-time winery employees and guests of industry open house events with food preparation for the event prepared by the winery in an onsite commercial kitchen and is calculated as follows:

Peak Winery Sanitary Wastewater Flow = 30 gpd + 30 gpd + 375 gpd + 225 gpd

Peak Winery Sanitary Wastewater Flow = 660 gpd

Residence Sanitary Wastewater Flow

All plumbing fixtures in the retained single family residence will be retrofitted with low flow, water saving fixtures per the Uniform Plumbing Code as adopted by the Napa County Building Department.

Peak sanitary wastewater flow from the existing residence is calculated based on three bedrooms and a design flow of 150 gallons per day per bedroom.

(3 bedrooms) x (150 gallons per day per bedroom) = 450 gpd

Peak Residential Sanitary Wastewater Flow = 450 gpd

Design Flow:

Total peak wastewater produced = 1,667 gpd + 660 gpd + 450 gpd = 2,777 gpd

Septic Tank Requirements

In order to maintain a minimum 3-day septic tank retention time the following tanks are recommended: three 2,000 gallon process waste septic tanks, two 1,500 gallon sanitary sewer septic tanks for the winery with one 2,000 gallon grease interceptor for the commercial kitchen and one 1,500 gallon septic tank for the existing residential structure. The septic tanks should be installed near the proposed winery and residence to allow for gravity flow from the proposed winery and residential buildings into the septic tanks.

PRESSURE DISTRIBUTION TYPE DISPOSAL FIELD

Required Length of Trench

The pressure distribution laterals would be installed in 18 inch wide by 18 inch deep trenches with 10 inches of ¾ to 1½ Clear Lake lava rock under the invert of the distribution laterals, 4 inches of ¾ to 1½ inch Clear Lake lava rock over the inverts of the distribution laterals and 4 inches of soil to match original grade. The entire disposal field area will be covered with 8 inches of native soil to cap the field and divert surface water away from the disposal field. The proposed trench section provides 1.67 square feet of sidewall per lineal foot of trench. For this calculation, we have used an application rate of 0.8 gallons per day per square foot of sidewall per gallon per day based on the loam type soils found at this site. (See attached site evaluations and laboratory test results on soil texture analysis).

$$\text{Required length of trench} = \frac{2{,}777 \text{ gpd}}{(1.67 \text{sf/lf})(0.8 \text{ gal/sf/lf})} = 2{,}079 \text{ lf, use } 2{,}100 \text{ lf}$$

Assuming seven and one-half (7.5) feet spacing between each leach line equates to approximately 15,000 square feet of disposal area.

Available Disposal Field Area

There is adequate area available in the vicinity of test pits #2 thru #5 and #1B thru #4B to install 2,200 lineal feet of pressure distribution trench as described above. See Wheeler Winery Conceptual Site Plan prepared by Bartelt Engineering dated July 2009 (attached).

100% Reserve Area

There is adequate area available in the vicinity of test pits #6 thru #13 and #5B thru #10B for the 100% reserve area. See Wheeler Winery Conceptual Site Plan prepared by Bartelt Engineering dated July 2009 (attached).

Pretreatment of Effluent

As indicated in the April 3, 2009 Site Evaluation Report, groundwater was observed at a depth of 54 inches below existing grade, but was not observed during the November 14, 2008 Site Evaluation. The presence of groundwater introduces a limiting condition that has a direct effect to the depth of the leach line trenches and effective surface area of each trench to which effluent can be applied. The final wastewater disposal design should consider the possibility of pretreating the effluent to reduce the minimum required separation between the bottom of the leach field trenches and the limiting condition from 36 inches to 24 inches. By increasing the depth of the leach field trenches the effective surface area can be increased from 1.67 to 3.0 square feet of sidewall per lineal foot of trench and thus reduce the total required length of trench by approximately 1,000 lineal feet. The decision of pretreatment should take into consideration the cost of additional leach line installation for non-pretreated effluent and the cost of the pretreatment equipment, additional required tank, pumps and annual operating expenses.

The above calculations should be adequate for your review of the Use Permit application being considered by Napa County. Detailed design calculations and plans will be submitted for your review upon approval of the Use Permit. If you have any questions regarding our recommendations please feel free to call us.

Sincerely,

Paul N. Bartelt, P.E.
Principal Engineer

PNB:rp

enclosures

cc: John Nees
Duane Kanuha, Kohala Investment Works
Donna Oldford

Napa County Department of
Environmental Management

SITE EVALUATION REPORT

Please attach an 8.5" x 11" plot map showing the locations of all test pits triangulated from permanent landmarks or known property corners. The map must be drawn to scale and include a North arrow, surrounding geographic and topographic features, direction and % slope, distance to drainages, water bodies, potential areas for flooding, unstable landforms, existing or proposed roads, structures, utilities, domestic water supplies, wells, ponds, existing wastewater treatment systems and facilities.

Permit #: E09-00029
APN: 030-260-016
(County Use Only) Reviewed by: Date:

PLEASE PRINT OR TYPE ALL INFORMATION

Property Owner Kohala Investment Works, LLC c/o Duane Kanuha	☒ New Construction ☐ Addition ☒ Remodel ☐ Relocation ☐ Other:
Property Owner Mailing Address 101 Aupuni Street	☒ Residential - # of Bedrooms: 5 Design Flow : 750 gpd
City State Zip Hilo Hawaii 96721	☒ Commercial – Type: Winery Sanitary Waste: 720 gpd Process Waste: 1,667 gpd
Site Address/Location 588 Zinfandel Lane, St. Helena, CA	☐ Other: Sanitary Waste: gpd Process Waste: gpd

Evaluation Conducted By:

Company Name Bartelt Engineering	Evaluator's Name Paul N. Bartelt, P.E.	Signature (Civil Engineer, R.E.H.S., Geologist, Soil Scientist)
Mailing Address: 1303 Jefferson Street, 200 B		Telephone Number (707) 258-1301
City State Zip Napa CA 94559		Date Evaluation Conducted April 3, 2009

Primary Area See below	Expansion Area See below
Acceptable Soil Depth: 54 in. Test pit #'s: 1B, 2B, 3B & 4B Soil Application Rate (gal. /sq. ft. /day): STE 0.8	Acceptable Soil Depth: 54 in. Test pit #' : 5B, 6B, 7B, 8B, 9B & 10B Soil Application Rate (gal. /sq. ft. /day): STE 0.8
System Type(s) Recommended: Pressure Distribution	System Type(s) Recommended: Pressure Distribution
Slope: 0-2 %. Distance to nearest water source: 100 ft.+	Slope: 0-2 %. Distance to nearest water source: 100 ft. +
Hydrometer test performed? No ☐ Yes ☒ (attach results)	Hydrometer test performed? No ☐ Yes ☒ (attach results)
Bulk Density test performed? No ☒ Yes ☐ (attach results)	Bulk Density test performed? No ☒ Yes ☐ (attach results)
Groundwater Monitoring Performed? No ☒ Yes ☐ (attach results)	Groundwater Monitoring Performed? No ☒ Yes ☐ (attach results)

Site constraints/Recommendations:

See Septic System Feasibility Study prepared by Bartelt Engineering dated April 24, 2009 for septic system recommendations.

Test Pit # 1B * Hydrometer Test Performed

Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure	Consistence			Pores	Roots	Mottling
					Side Wall	Ped	Wet			
0-36		<15	L	SSB	SH	FRB	SS	MVF/FM	FC/MM/ MF	None
36-64	D	<15	L	SSB	SH	FRB	SS	MVF/MF	FVF	None
Slope = 0-2 %. Acceptable soil depth to limiting condition: 54 inches; Assigned soil application rate = STE 0.8 / PTE 1.0 gal /sf/day for an alternative sewage treatment system.										
Groundwater observed at 54 inches (10" of water). *See attached Soil Texture Analysis by Bouyoucos Hydrometry Method prepared by RGH Consultants, Inc. dated April 8, 2009.										

Test Pit # 2B

Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure	Consistence			Pores	Roots	Mottling
					Side Wall	Ped	Wet			
0-29		<15	L	SSB	SH	FRB	SS	MVF/FM	FC/MM/ MF	None
29-70	D	<15	L	SSB	SH	FRB	SS	MVF/MF	FVF	None
Slope = 0-2 %. Acceptable soil depth to limiting condition: 59 inches; Assigned soil application rate = STE 0.8 / PTE 1.0 gal /sf/day for an alternative sewage treatment system.										
Groundwater observed at 59 inches (11" of water).										

Test Pit # 3B

Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure	Consistence			Pores	Roots	Mottling
					Side Wall	Ped	Wet			
0-28		<15	L	SSB	SH	FRB	SS	MVF/FM	FC/MM/ MF	None
28-68	D	<15	L	SSB	SH	FRB	SS	MVF/MF	FVF	None
Slope = 0-2 %. Acceptable soil depth to limiting condition: 59 inches; Assigned soil application rate = STE 0.8 / PTE 1.0 gal /sf/day for an alternative sewage treatment system.										
Groundwater observed at 59 inches (9" of water).										

Test Pit # 4B *Hydrometer Test Performed

Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure	Consistence			Pores	Roots	Mottling
					Side Wall	Ped	Wet			
0-38		<15	SL/SCL	SSB	SH	FRB	SS	MVF/FM	FC/MM/ MF	None
38-65	D	<15	SL	SSB	SH	FRB	SS	MVF/MF	FVF	None

Slope = 0-2 %. Acceptable soil depth to limiting condition: 54 inches;
Assigned soil application rate = STE 0.8 / PTE 1.0 gal /sf/day for an alternative sewage treatment system.

Groundwater observed at 54 inches (11" of water). *See attached Soil Texture Analysis by Bouyoucos Hydrometry Method prepared by RGH Consultants, Inc. dated April 8, 2009.

Test Pit # 5B

Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure	Consistence			Pores	Roots	Mottling
					Side Wall	Ped	Wet			
0-37		<15	L	SSB	SH	FRB	SS	MVF/FM	FC/MM/ MF	None
37-69	D	<15	L	SSB	SH	FRB	SS	MVF/MF	FVF	None

Slope = 0-2 %. Acceptable soil depth to limiting condition: 54 inches;
Assigned soil application rate = STE 0.8 / PTE 1.0 gal /sf/day for an alternative sewage treatment system.

Groundwater observed at 54 inches (15" of water).

Test Pit # 6B * Hydrometer Test Performed

Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure	Consistence			Pores	Roots	Mottling
					Side Wall	Ped	Wet			
0-32		<15	L	SSB	SH	FRB	SS	MVF/FM	FC/MM/ MF	None
32-67	D	<15	L	SSB	SH	FRB	SS	MVF/MF	FVF	None

Slope = 0-2 %. Acceptable soil depth to limiting condition: 55 inches;
Assigned soil application rate = STE 08/ PTE 1.0 gal /sf/day for an alternative sewage treatment system.

Groundwater observed at 55 inches (12" of water). *See attached Soil Texture Analysis by Bouyoucos Hydrometry Method prepared by RGH Consultants, Inc. dated April 8, 2009.

Test Pit # 7B * Hydrometer Test Performed

Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure	Consistence			Pores	Roots	Mottling
					Side Wall	Ped	Wet			
0-28		<15	L	SSB	SH	FRB	SS	MVF/FM	FC/MM/ MF	None
28-35	G	15-30	LS	G	S	FRB	SS	MF	FF/FM	None
35-67	G	<15	L	SSB	SH	FRB	SS	MVF/MF	FVF	None

Slope = 0-2 %. Acceptable soil depth to limiting condition: 56 inches;
Assigned soil application rate = STE 0.8 / PTE 1.0 gal /sf/day for an alternative sewage treatment system.

Groundwater observed at 56 inches (11" of water). *See attached Soil Texture Analysis by Bouyoucos Hydrometry Method prepared by RGH Consultants, Inc. dated April 8, 2009.

Test Pit # 8B * Hydrometer Test Performed

Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure	Consistence			Pores	Roots	Mottling
					Side Wall	Ped	Wet			
0-29		<15	SCL	SSB	SH	FRB	SS	MVF/FM	FC/MM/ MF	None
29-68	D	<15	L	SSB	SH	FRB	SS	MVF/MF	FVF	None

Slope = 0-2 %. Acceptable soil depth to limiting condition: 55 inches;
Assigned soil application rate = STE 0.8 / PTE 1.0 gal /sf/day for an alternative sewage treatment system.

Groundwater observed at 55 inches (13" of water). *See attached Soil Texture Analysis by Bouyoucos Hydrometry Method prepared by RGH Consultants, Inc. dated April 8, 2009.

Test Pit # 9B * Hydrometer Test Performed

Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure	Consistence			Pores	Roots	Mottling
					Side Wall	Ped	Wet			
0-21		<15	SL	SSB	SH	FRB	SS	MVF/FM	FC/MM/ MF	None
21-38	D	15-30	LS	G	S	FRB	SS	MF	FF/FM	None
38-70		<15	SL	SSB	SH	FRB	SS	MVF/MF	FVF	None

Slope = 0-2 %. Acceptable soil depth to limiting condition: 56 inches;
Assigned soil application rate = STE 0.8 / PTE 1.0 gal /sf/day for an alternative sewage treatment system.

Groundwater observed at 56 inches (14" of water). *See attached Soil Texture Analysis by Bouyoucos Hydrometry Method prepared by RGH Consultants, Inc. dated April 8, 2009.

Test Pit # 10B * Hydrometer Test Performed

Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure	Consistence			Pores	Roots	Mottling
					Side Wall	Ped	Wet			
0-23		<15	SL	SSB	SH	FRB	SS	MVF/FM	FC/MM/ MF	None
23-72	D	<15	L	SSB	SH	FRB	SS	MVF/MF	FVF	None

Slope = 0-2 %. Acceptable soil depth to limiting condition: 56 inches;
Assigned soil application rate = STE 0.8 / PTE 1.0 gal /sf/day for an alternative sewage treatment system.

Groundwater observed at 56 inches (16" of water). *See attached Soil Texture Analysis by Bouyoucos Hydrometry Method prepared by RGH Consultants, Inc. dated April 8, 2009.

Table of Abbreviations

Boundary	Texture	Structure	Consistence			Pores	Roots	Mottling
			Side Wall	Ped	Wet			
A=Abrupt <1" C=Clear 1"-2.5" G=Gradual 2.5"-5" D=Difuse >5"	S=Sand LS=Loamy Sand SL=Sandy Loam SCL=Sandy Clay Loam SC=Sandy Clay CL=Clay Loam L=Loam C=Clay SiC=Silty Clay SiCL=Silty Clay Loam SiL=Silt Loam Si=Silt	W=Weak M=Moderate S=Strong G=Granular PL=Platy Pr=Prismatic C=Columnar AB=Angular Blocky SB=Subangular Blocky M=Massive C=Cemented	L=Loose S=Soft SH=Slighty Hard H=Hard VH=Very Hard ExH=Extremely Hard	L=Loose VFRB=Very Friable FRB=Friable F=Firm VF=Very Firm ExF=Extremely Firm	NS=NonSticky SS=Slightly Sticky S=Sticky VS=Very Sticky NP=NonPlastic SP=Slightly Plastic P=Plastic VP=Very Plastic	**Quantity:** F=Few C=Common M=Many **Size:** VF=Very Fine F=Fine M=Medium C=Coarse	**Quantity:** F=Few C=Common M=Many **Size:** VF=Very Fine F=Fine M=Medium C=Coarse VC=Very Course	**Quantity:** F=Few C=Common M=Many **Size:** F=Fine M=Medium C=Coarse VC=Very Course ExC=Extremely Coarse **Contrast:** Ft=Faint D=Distinct P=Prominent

Attach additional sheets as needed

Alternative Sewage Treatment System Soil Application Rates

TEXTURE	STRUCTURE		APPLICATION RATE (Gal/ft^2 /day)	
	Shape	Grade	STE[1]	PTE[1,2]
Coarse Sand, Sand, Loamy Coarse Sand	Single grain	Structureless	1.0	1.2
Fine Sand, Loamy Fine Sand	Single grain	Structureless	0.6	1.0
Sandy Loam, Loamy Sand	Massive	Structureless	0.35	0.5
	Platy	Weak	0.35	0.5
	Prismatic, blocky, granular	Weak	0.5	0.75
		Moderate, Strong	0.8	1.0
Loam, Silt Loam, Sandy Clay Loam, Fine Sandy Loam	Massive	Structureless		
	Platy	Weak, moderate, strong		
	Prismatic, blocky, granular	Weak, moderate	0.5	0.75
		Strong	0.8	1.0
Sandy Clay, Silty Clay Loam, Clay Loam	Massive	Structureless		
	Platy	Weak, moderate, strong		
	Prismatic, blocky, granular	Weak, moderate	0.35	0.5
		Strong	0.6	0.75
Clay, Silty Clay	Massive	Structureless		
	Platy	Weak, moderate, strong		
	Prismatic, blocky, granular	Weak		
		Moderate, strong	0.2	0.25

1. See Table 1 in the Design, Construction and Installation of Alternative Sewage Treatment Systems.
2. A higher application rate for pretreated effluent may only be used when pretreatment is not used for one foot of vertical separation credit.

MINIMUM SURFACE AREA GUIDELINES TO DISPOSE OF 100 GPD OF SECONDARY TREATED EFFLUENT FOR SUBSURFACE DRIP DISPERSAL SYSTEMS

		Soil Absorption Rates		Design Application Rate (Gal/ft^2/day)	Total Area Required Sq. ft./100 gallons per day
Soil Class	Soil Type	Est. Soil Perc. Rate minutes/inch	Hydraulic Conductivity inches/hour		
I	Coarse sand	1 – 5	>2	1.400	71.5
I	Fine sand	5 – 10	1.5 – 2	1.200	83.3
II	Sandy loam	10 – 20	1.0 – 1.5	1.000	100.0
II	Loam	20 – 30	0.75 – 1.0	0.700	143.0
III	Clay loam	30 – 45	0.5 – 0.75	0.600	167.0
III	Silt - clay loam	45 – 60	0.3 – 0.5	0.400	250.0
IV	Clay non-swell	60 – 90	0.2 – 0.3	0.200	500.0
IV	Clay - swell	90 – 120	0.1 – 0.2	0.100	1000.0

1. For design purpose, the "Soil Type" category to be used in the above table shall be based on the most restrictive soil type encountered within two feet below the bottom of the drip line.
2. Dispersal field area calculation: Total square feet area of dispersal field = Design flow divided by loading rate.

Conventional Sewage Treatment System Soil Application Rates

TEXTURE	STRUCTURE		APPLICATION RATE (Gal/ft^2 /day)
	Shape	Grade	STE
Coarse Sand, Sand, Loamy Coarse Sand	Single grain	Structureless	Prohibited
Sandy Loam, Loamy Sand	Massive	Structureless	Prohibited
	Platy	Weak, mod, strong	Prohibited
	Prismatic, blocky, granular	Weak	0.33
		Moderate, strong	0.5
Loam, Silt Loam, Sandy Clay Loam, Fine Sandy Loam	Massive	Structureless	Prohibited
	Platy	Weak, mod, strong	Prohibited
	Prismatic, blocky, granular	Weak	0.25
		Moderate, Strong	0.33
Clay Loam	Massive	Structureless	Prohibited
	Platy	Weak, moderate, strong	Prohibited
	Prismatic, blocky, granular	Weak, moderate	0.25
		Strong	0.33
Sandy Clay, Silty Clay Loam	Massive	Structureless	Prohibited
	Platy	Weak, moderate, strong	Prohibited
	Prismatic, blocky, granular	Weak, moderate	Prohibited
		Strong	0.25
Clay, Silty Clay	Massive	Structureless	Prohibited
	Platy	Weak, moderate, strong	Prohibited
	Prismatic, blocky, granular	Weak	Prohibited
		Moderate, strong	Prohibited

CONVENTIONAL SEWAGE TREATMENT SYSTEM SOIL APPLICATION RATES BASED ON PERCOLATION RATES	
Percolation Rate (mpi)	Application Rate (STE)
< 5 MPI	Prohibited
5 to 10 MPI	0.5
10-20 MPI	0.33
20-60 MPI	0.25
> 60 MPI	Prohibited

OB-16

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OUTSIDE CLIENT LABORATORY TEST REQUEST

JOB NO: 9.147.13	CLIENT: Bartelt Engineering
DATE: 4-3-09	CLIENTS JOB NAME: 588 Zinfandel Lane
TECHNICIAN:	CLIENTS JOB NUMBER: 08-16
NEED RESULTS BY: _____	RECEIVED: _____ APPROVED: _____

ID	DEPTH	TEST		INSTRUCTIONS	TEST BILLING	#	PRICE	TOTAL
TP-1	Hor.-1	Bouyocous Hydrometer	X		Expansion Index			
	Hor.2	"	X		Plasticity Index			
TP-4	Hor.-1	"	X		Minus #200			
	Hor 2	"	X		Sieve Analysis To #200			
TP-6	Hor. -1	"	X		Compaction 6"			
	Hor - 2	"	X		Compaction 4"			
TP-7	Hor-2	"	X		MD			
TP-8	Hor. - 1	"	X		Moisture			
	Hor. -2	"	X		UC			
TP-9	Hor - 1	"	X		TX/UU			
	Hor - 2	"	X		R-Value			
	Hor - 3	"	X		Falling Head Perm			
TP-10	Hor - 1	"	X		BOUYOCOUS HYDROMETER	14	65	910
	Hor - 2	"	X	OFFICE _____				
				PROJECT MANAGER				

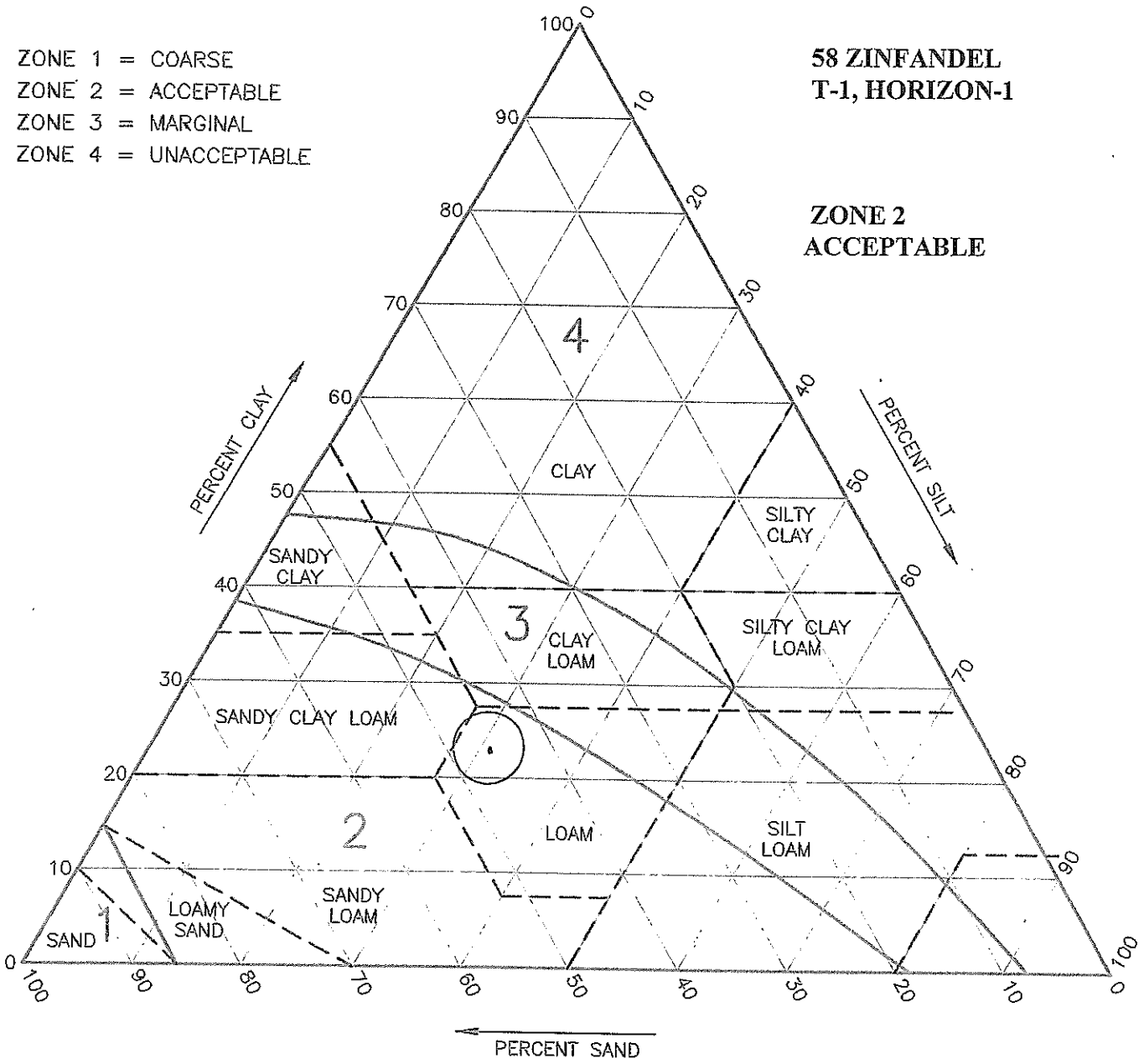
This is not an invoice, do not pay, the invoice will follow at a later date. TOTAL 910

SOIL PERCOLATION SUITABILITY CHART

ZONE 1 = COARSE
ZONE 2 = ACCEPTABLE
ZONE 3 = MARGINAL
ZONE 4 = UNACCEPTABLE

58 ZINFANDEL
T-1, HORIZON-1

ZONE 2
ACCEPTABLE



Instructions:

1. Plot texture on triangle based on percent sand, silt, and clay as determined by hydrometer analysis.
2. Adjust for coarse fragments by moving the plotted point in the sand direction an additional 2% for each 10% (by volume) of fragments greater than 2mm in diameter.
3. Adjust for compactness of soil by moving the plotted point in the clay direction an additional 15% for soils having a bulk-density greater than 1.7 gm/cc.

Note:

For soils falling in sand, loamy sand or sandy loam classification bulk density analysis will generally not affect suitability and analysis not neccesary.

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Experience is the difference

April 8, 2009
File: 9147.13

Bartelt Engineering
1339 Pearl Street, Suite 205
Napa, CA 94559

Subject: **Laboratory Test Results**
Soil Texture Analysis by
Bouyoucos Hydrometry Method
58 ZINFANDEL

Dear Mr. Bartelt:

This letter transmits the results of our laboratory testing performed for the subject project. Your personnel delivered the samples on April 3, 2009

We performed a Soil Texture Analysis by the Bouyoucos Hydrometery Method with the following results:

Size/Density	TP-1 HORIZON-1
+ #10 Sieve	3.9 %
Sand	47.0 %
Clay	22.8 %
Silt	30.2 %
Db g/cc	--

We trust this provides the information required at this time. Should you have further questions, please call.

Yours very truly,

RGH GEOTECHNICAL

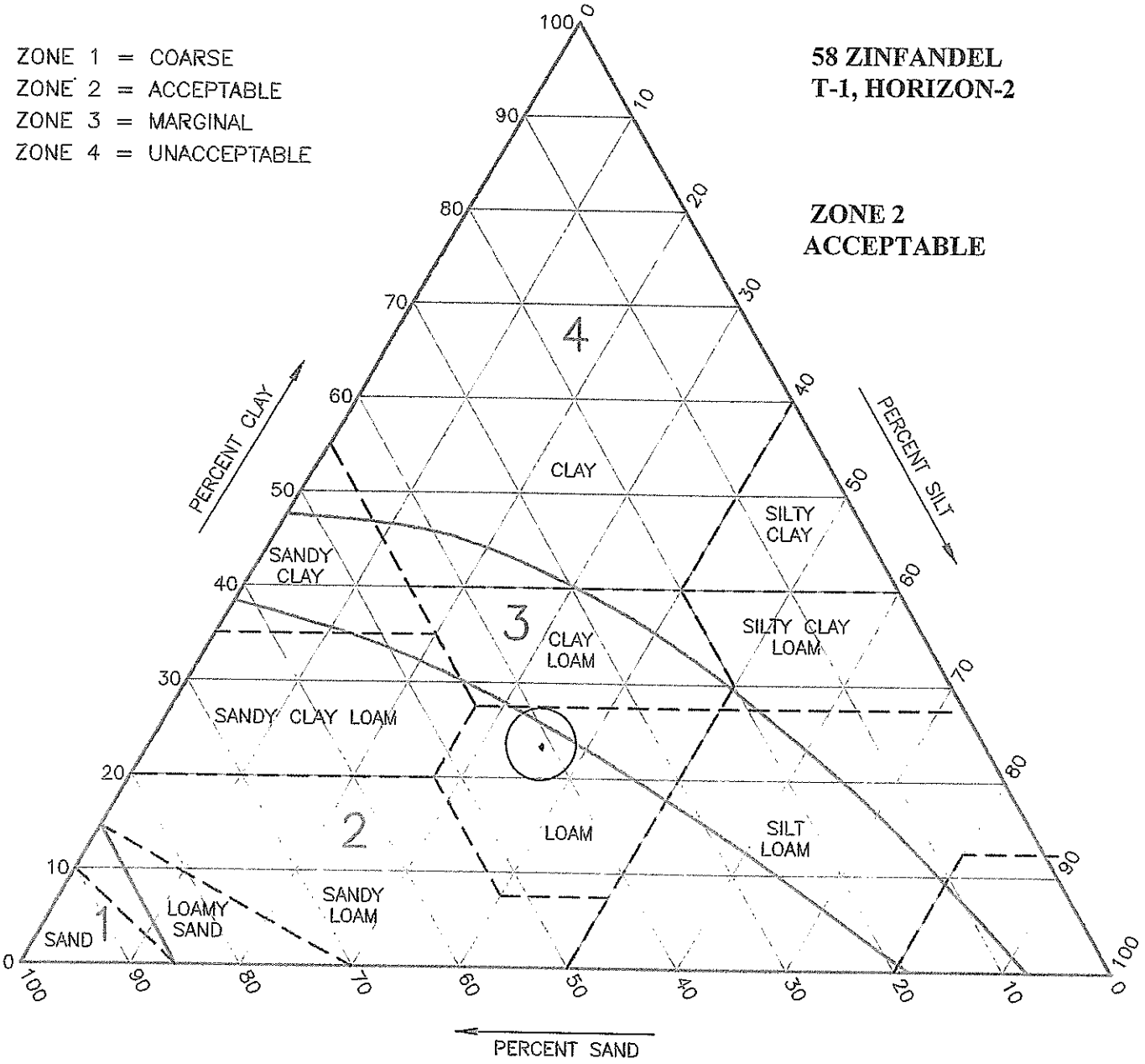
Tarance E. McCue
Senior Laboratory Advisor

SOIL PERCOLATION SUITABILITY CHART

ZONE 1 = COARSE
ZONE 2 = ACCEPTABLE
ZONE 3 = MARGINAL
ZONE 4 = UNACCEPTABLE

58 ZINFANDEL
T-1, HORIZON-2

ZONE 2
ACCEPTABLE



Instructions:

1. Plot texture on triangle based on percent sand, silt, and clay as determined by hydrometer analysis.
2. Adjust for coarse fragments by moving the plotted point in the sand direction an additional 2% for each 10% (by volume) of fragments greater than 2mm in diameter.
3. Adjust for compactness of soil by moving the plotted point in the clay direction an additional 15% for soils having a bulk-density greater than 1.7 gm/cc.

Note:

For soils falling in sand, loamy sand or sandy loam classification bulk density analysis will generally not affect suitability and analysis not neccesary.

Experience is the difference

April 8, 2009
File: 9147.13

Bartelt Engineering
1339 Pearl Street, Suite 205
Napa, CA 94559

Subject: **Laboratory Test Results**
Soil Texture Analysis by
Bouyoucos Hydrometry Method
58 ZINFANDEL

Dear Mr. Bartelt:

This letter transmits the results of our laboratory testing performed for the subject project. Your personnel delivered the samples on April 3, 2009

We performed a Soil Texture Analysis by the Bouyoucos Hydrometery Method with the following results:

Size/Density	TP-1 HORIZON-2
+ #10 Sieve	1.1 %
Sand	41.0 %
Clay	23.8 %
Silt	35.2 %
Db g/cc	--

We trust this provides the information required at this time. Should you have further questions, please call.

Yours very truly,

RGH GEOTECHNICAL

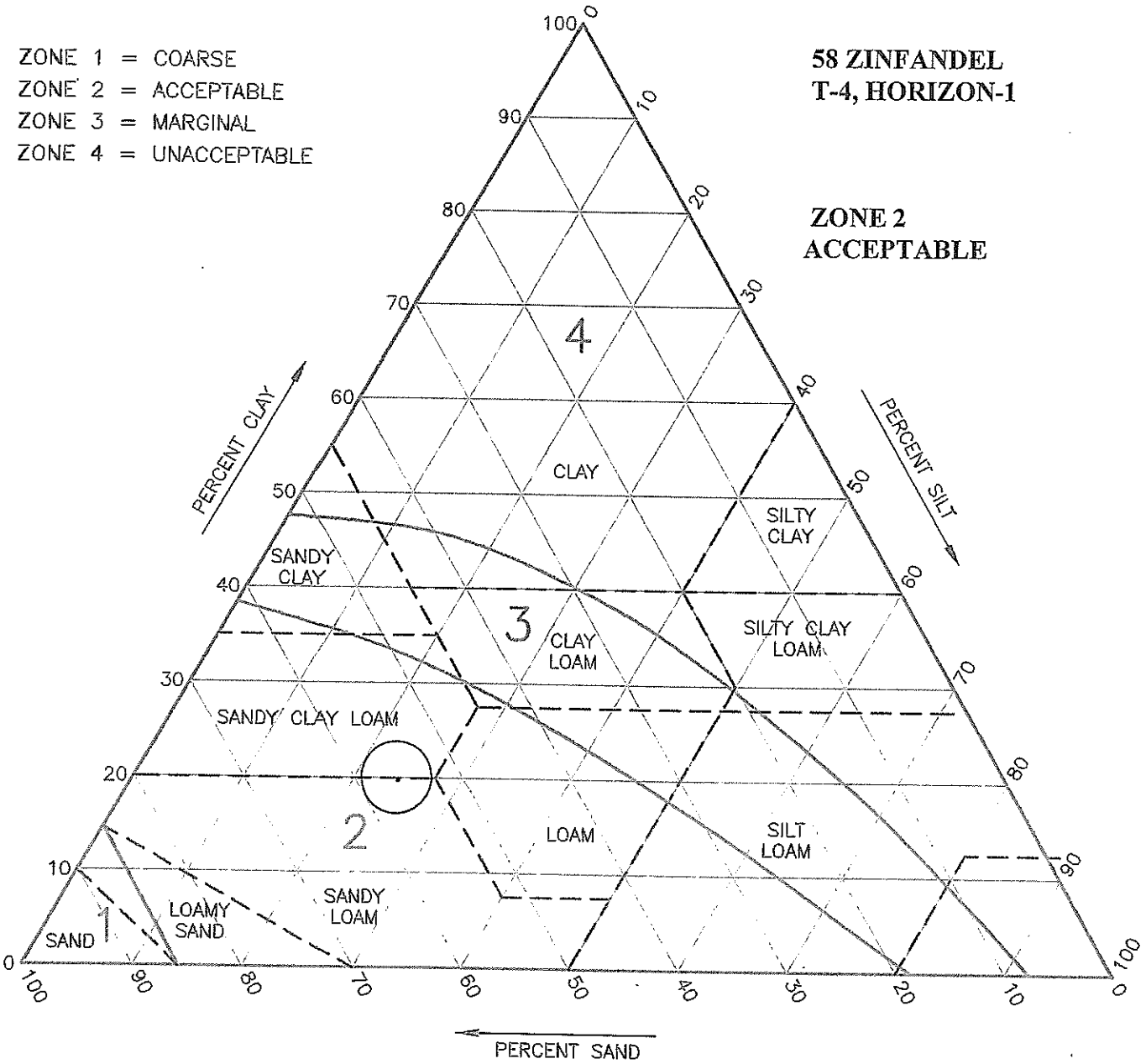
Tarance E. McCue
Senior Laboratory Advisor

SOIL PERCOLATION SUITABILITY CHART

ZONE 1 = COARSE
ZONE 2 = ACCEPTABLE
ZONE 3 = MARGINAL
ZONE 4 = UNACCEPTABLE

58 ZINFANDEL
T-4, HORIZON-1

ZONE 2
ACCEPTABLE



Instructions:

1. Plot texture on triangle based on percent sand, silt, and clay as determined by hydrometer analysis.
2. Adjust for coarse fragments by moving the plotted point in the sand direction an additional 2% for each 10% (by volume) of fragments greater than 2mm in diameter.
3. Adjust for compactness of soil by moving the plotted point in the clay direction an additional 15% for soils having a bulk-density greater than 1.7 gm/cc.

Note:

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Experience is the difference

April 8, 2009
File: 9147.13

Bartelt Engineering
1339 Pearl Street, Suite 205
Napa, CA 94559

Subject: **Laboratory Test Results**
Soil Texture Analysis by
Bouyoucos Hydrometry Method
58 ZINFANDEL

Dear Mr. Bartelt:

This letter transmits the results of our laboratory testing performed for the subject project. Your personnel delivered the samples on April 3, 2009

We performed a Soil Texture Analysis by the Bouyoucos Hydrometery Method with the following results:

Size/Density	TP-4 HORIZON-1
+ #10 Sieve	8.4 %
Sand	55.0 %
Clay	19.8 %
Silt	25.2 %
Db g/cc	--

We trust this provides the information required at this time. Should you have further questions, please call.

Yours very truly,

RGH GEOTECHNICAL

Tarance E. McCue

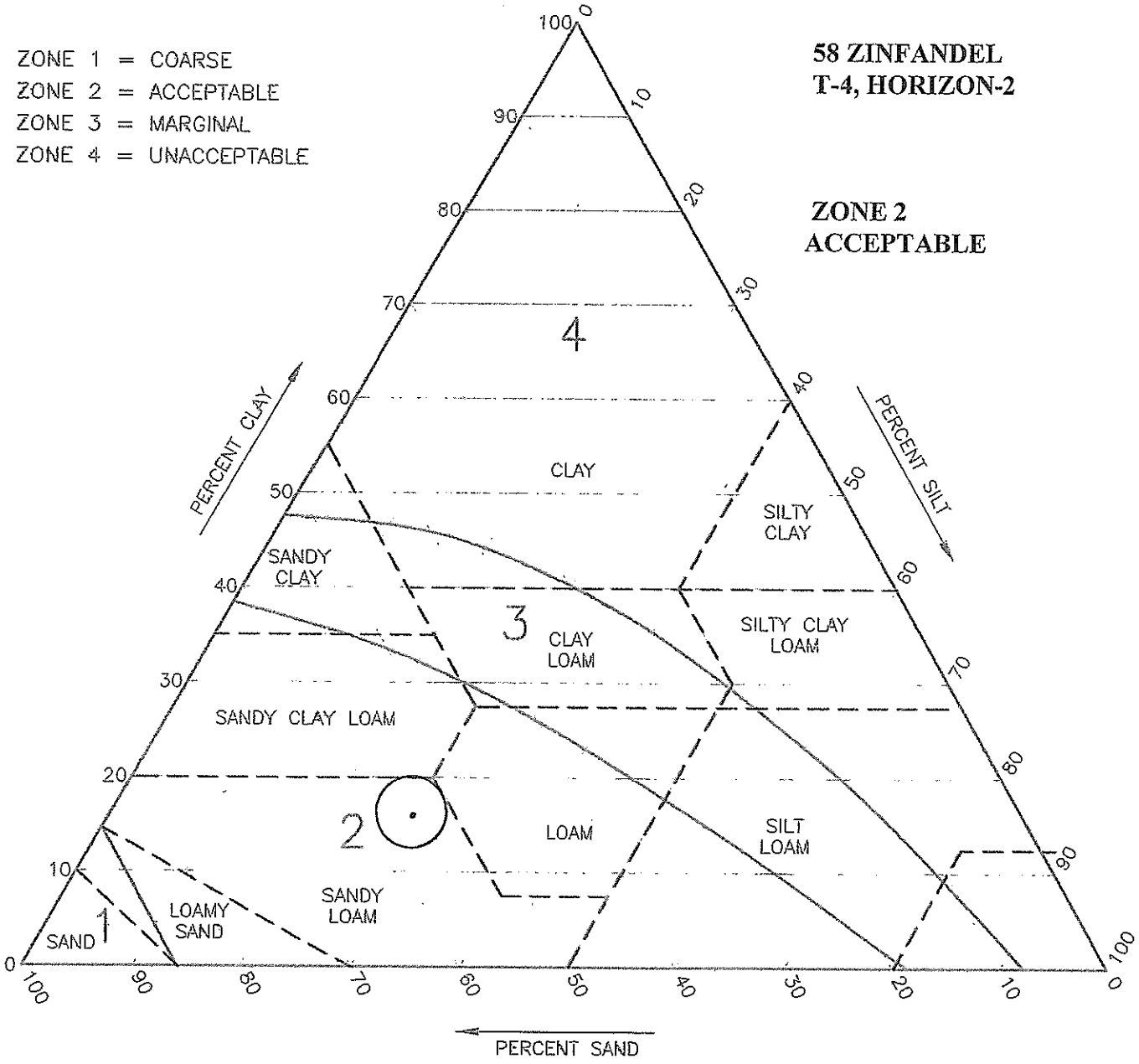
Tarance E. McCue
Senior Laboratory Advisor

SOIL PERCOLATION SUITABILITY CHART

ZONE 1 = COARSE
ZONE 2 = ACCEPTABLE
ZONE 3 = MARGINAL
ZONE 4 = UNACCEPTABLE

58 ZINFANDEL
T-4, HORIZON-2

ZONE 2
ACCEPTABLE



Instructions:

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2. Adjust for coarse fragments by moving the plotted point in the sand direction an additional 2% for each 10% (by volume) of fragments greater than 2mm in diameter.
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Experience is the difference

April 8, 2009
File: 9147.13

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Soil Texture Analysis by
Bouyoucos Hydrometry Method
58 ZINFANDEL

Dear Mr. Bartelt:

This letter transmits the results of our laboratory testing performed for the subject project. Your personnel delivered the samples on April 3, 2009

We performed a Soil Texture Analysis by the Bouyoucos Hydrometery Method with the following results:

Size/Density	TP-4 HORIZON-2
+ #10 Sieve	5.1 %
Sand	56.8 %
Clay	16.0 %
Silt	27.2 %
Db g/cc	--

We trust this provides the information required at this time. Should you have further questions, please call.

Yours very truly,

RGH GEOTECHNICAL

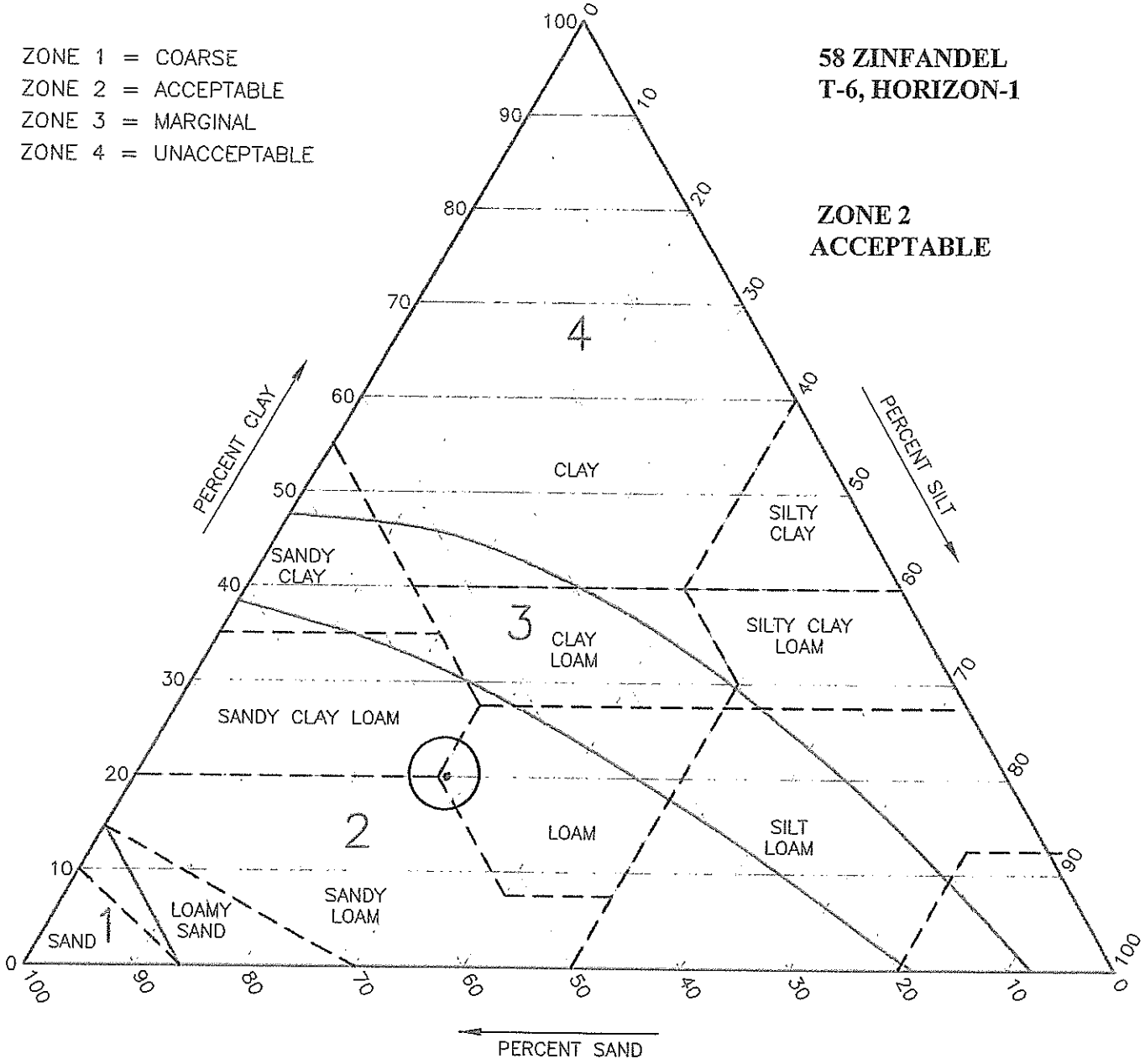
Tarance E. McCue
Senior Laboratory Advisor

SOIL PERCOLATION SUITABILITY CHART

ZONE 1 = COARSE
ZONE 2 = ACCEPTABLE
ZONE 3 = MARGINAL
ZONE 4 = UNACCEPTABLE

58 ZINFANDEL
T-6, HORIZON-1

ZONE 2
ACCEPTABLE



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2. Adjust for coarse fragments by moving the plotted point in the sand direction an additional 2% for each 10% (by volume) of fragments greater than 2mm in diameter.
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RGH
GEOTECHNICAL

Experience is the difference

April 8, 2009
File: 9147.13

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1339 Pearl Street, Suite 205
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Subject: **Laboratory Test Results**
Soil Texture Analysis by
Bouyoucos Hydrometry Method
58 ZINFANDEL

Dear Mr. Bartelt:

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We performed a Soil Texture Analysis by the Bouyoucos Hydrometery Method with the following results:

Size/Density	TP-6 HORIZON-1
+ #10 Sieve	10.8 %
Sand	50.8 %
Clay	20.0 %
Silt	29.2 %
Db g/cc	--

We trust this provides the information required at this time. Should you have further questions, please call.

Yours very truly,

RGH GEOTECHNICAL

Tarance E. McCue

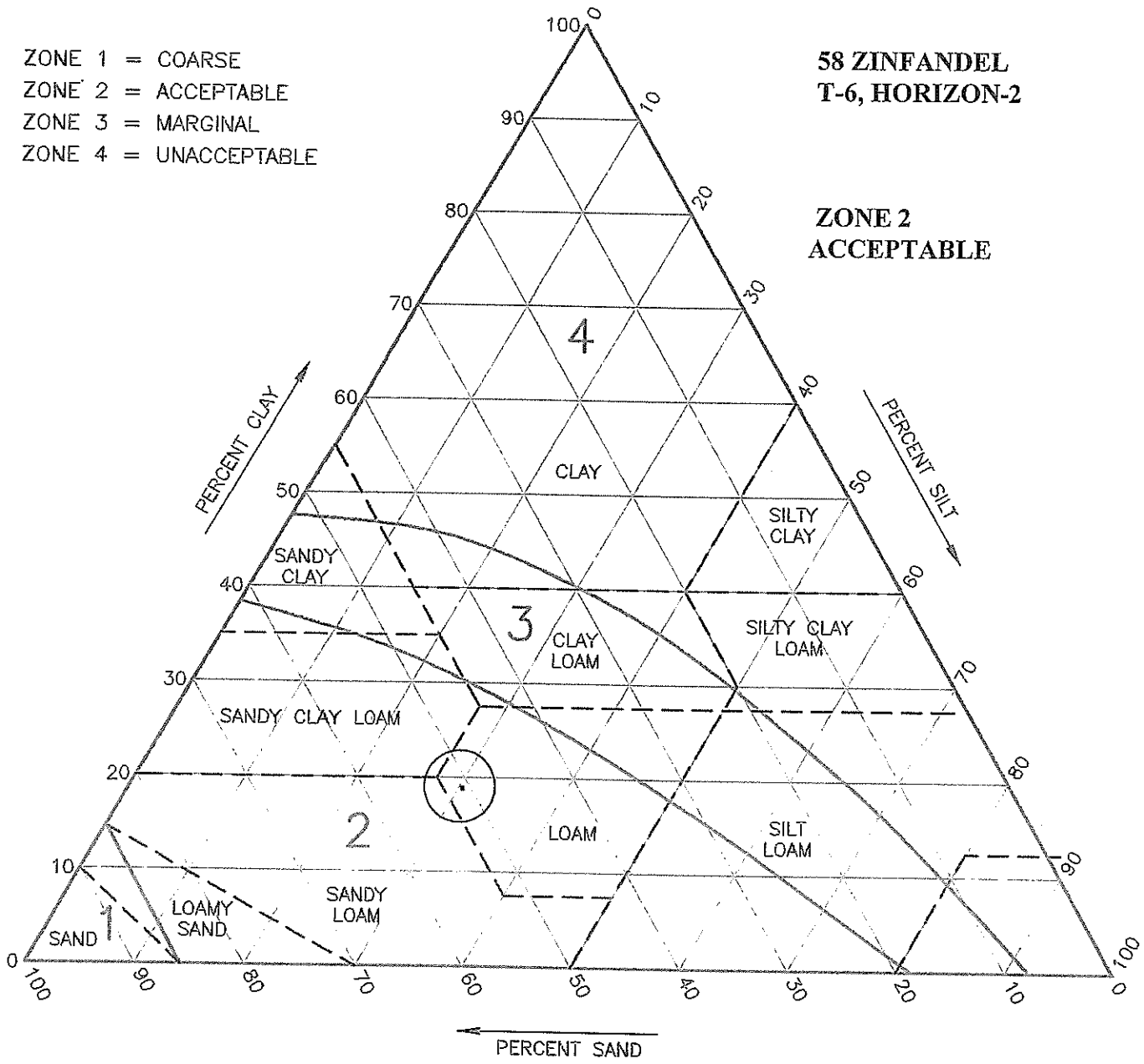
Tarance E. McCue
Senior Laboratory Advisor

SOIL PERCOLATION SUITABILITY CHART

ZONE 1 = COARSE
ZONE 2 = ACCEPTABLE
ZONE 3 = MARGINAL
ZONE 4 = UNACCEPTABLE

58 ZINFANDEL
T-6, HORIZON-2

ZONE 2
ACCEPTABLE



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Experience is the difference

April 8, 2009
File: 9147.13

Bartelt Engineering
1339 Pearl Street, Suite 205
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Subject: **Laboratory Test Results**
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Bouyoucos Hydrometry Method
58 ZINFANDEL

Dear Mr. Bartelt:

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We performed a Soil Texture Analysis by the Bouyoucos Hydrometery Method with the following results:

Size/Density	TP-6 HORIZON-2
+ #10 Sieve	5.0 %
Sand	50.6 %
Clay	19.0 %
Silt	30.4 %
Db g/cc	--

We trust this provides the information required at this time. Should you have further questions, please call.

Yours very truly,

RGH GEOTECHNICAL

Tarance E. McCue

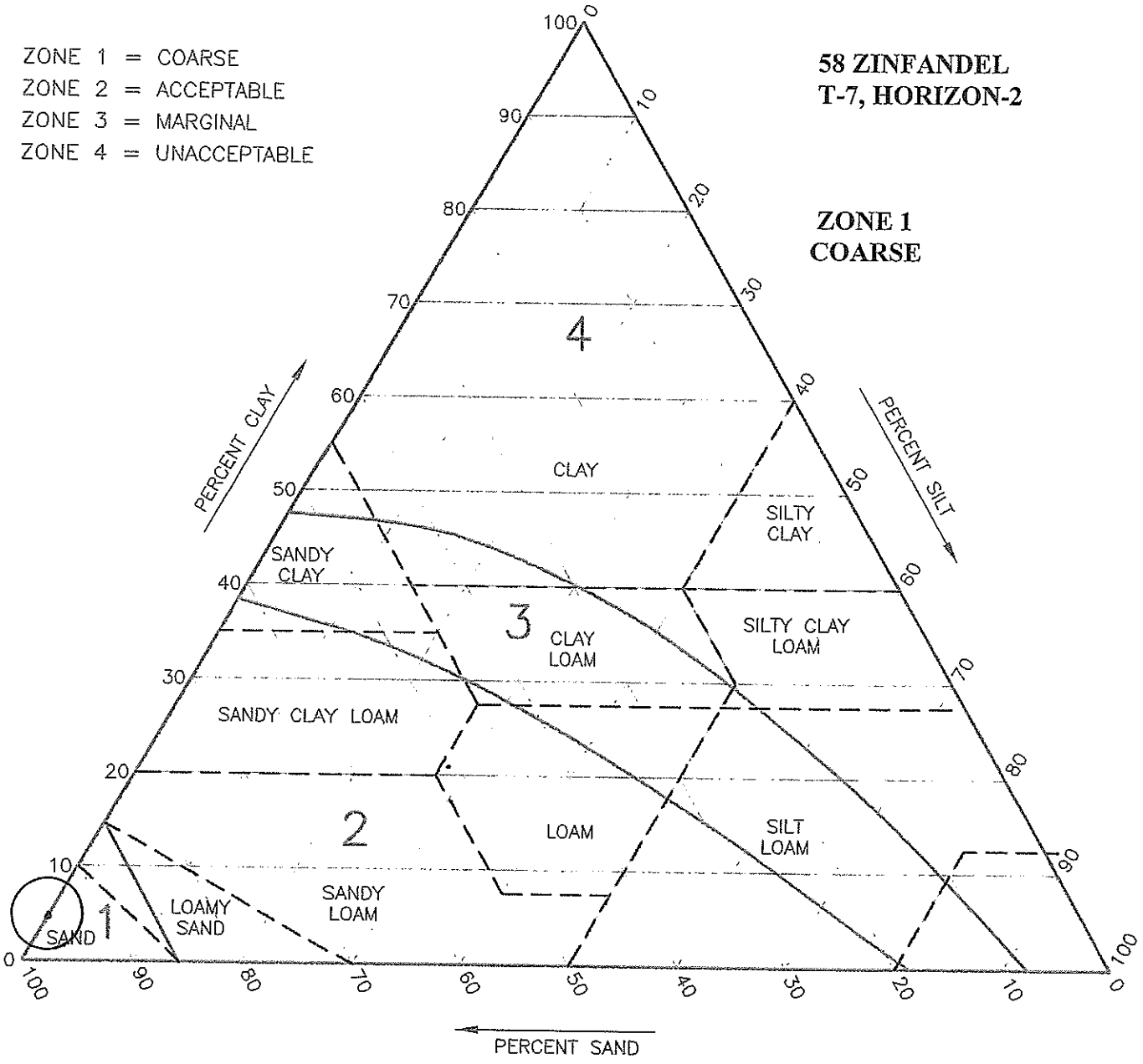
Tarance E. McCue
Senior Laboratory Advisor

SOIL PERCOLATION SUITABILITY CHART

ZONE 1 = COARSE
ZONE 2 = ACCEPTABLE
ZONE 3 = MARGINAL
ZONE 4 = UNACCEPTABLE

58 ZINFANDEL
T-7, HORIZON-2

ZONE 1
COARSE



Instructions:

1. Plot texture on triangle based on percent sand, silt, and clay as determined by hydrometer analysis.
2. Adjust for coarse fragments by moving the plotted point in the sand direction an additional 2% for each 10% (by volume) of fragments greater than 2mm in diameter.
3. Adjust for compactness of soil by moving the plotted point in the clay direction an additional 15% for soils having a bulk-density greater than 1.7 gm/cc.

Note:

For soils falling in sand, loamy sand or sandy loam classification bulk density analysis will generally not affect suitability and analysis not neccesary.

RGH
CONSULTANTS

Experience is the difference

April 8, 2009
File: 9147.13

Bartelt Engineering
1339 Pearl Street, Suite 205
Napa, CA 94559

Subject: **Laboratory Test Results**
Soil Texture Analysis by
Bouyoucos Hydrometry Method
58 ZINFANDEL

Dear Mr. Bartelt:

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We performed a Soil Texture Analysis by the Bouyoucos Hydrometery Method with the following results:

Size/Density	TP-7 HORIZON-2
+ #10 Sieve	75.2 %
Sand	91.8 %
Clay	4.0 %
Silt	4.2 %
Db g/cc	--

We trust this provides the information required at this time. Should you have further questions, please call.

Yours very truly,

RGH GEOTECHNICAL

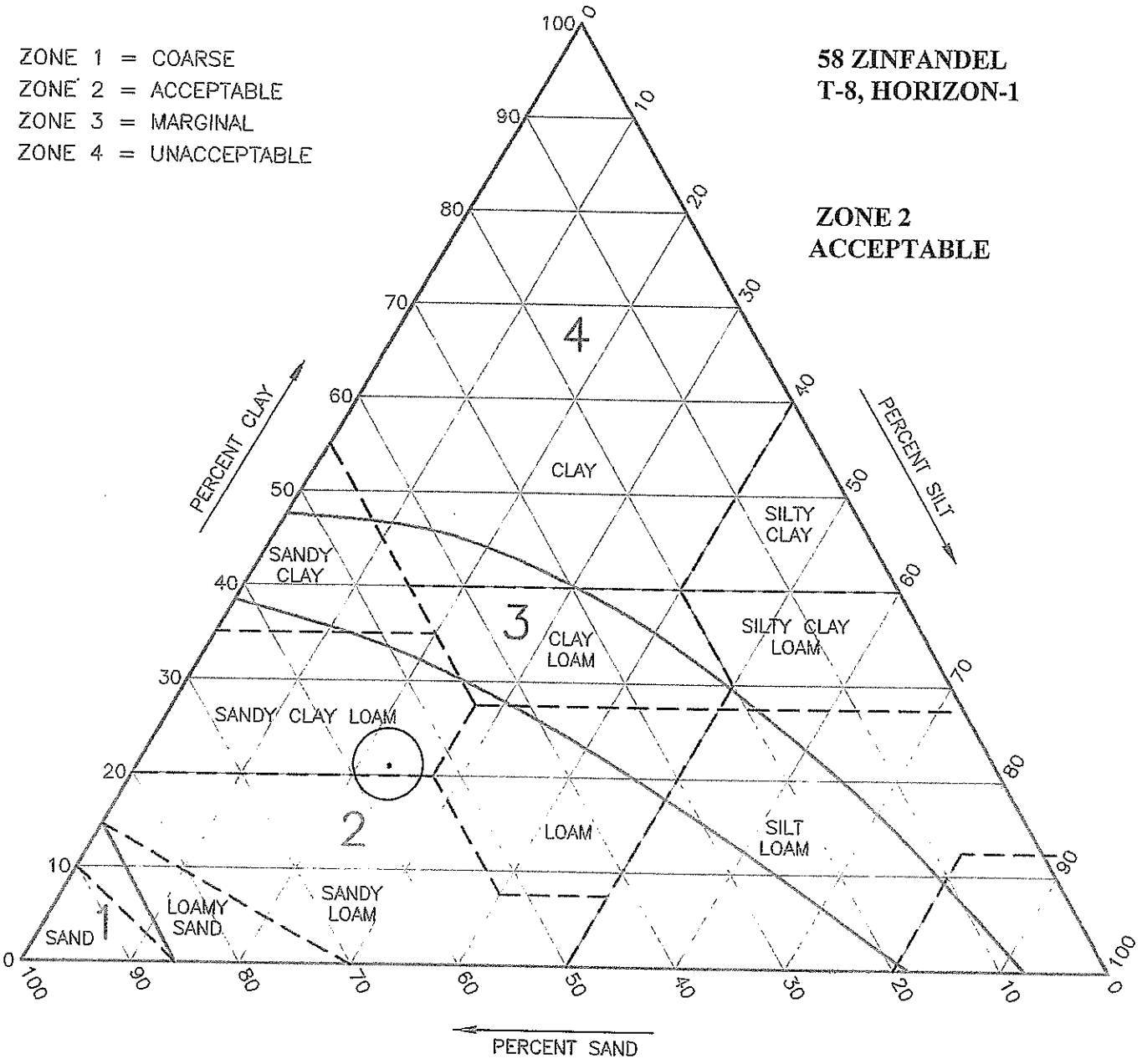
Tarance E. McCue
Senior Laboratory Advisor

SOIL PERCOLATION SUITABILITY CHART

ZONE 1 = COARSE
ZONE 2 = ACCEPTABLE
ZONE 3 = MARGINAL
ZONE 4 = UNACCEPTABLE

58 ZINFANDEL
T-8, HORIZON-1

ZONE 2
ACCEPTABLE



Instructions:

1. Plot texture on triangle based on percent sand, silt, and clay as determined by hydrometer analysis.
2. Adjust for coarse fragments by moving the plotted point in the sand direction an additional 2% for each 10% (by volume) of fragments greater than 2mm in diameter.
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Note:

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Experience is the difference

April 8, 2009
File: 9147.13

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1339 Pearl Street, Suite 205
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Subject: **Laboratory Test Results**
Soil Texture Analysis by
Bouyoucos Hydrometry Method
58 ZINFANDEL

Dear Mr. Bartelt:

This letter transmits the results of our laboratory testing performed for the subject project. Your personnel delivered the samples on April 3, 2009

We performed a Soil Texture Analysis by the Bouyoucos Hydrometery Method with the following results:

Size/Density	TP-8 HORIZON-1
+ #10 Sieve	9.0 %
Sand	55.6 %
Clay	21.0 %
Silt	23.4 %
Db g/cc	--

We trust this provides the information required at this time. Should you have further questions, please call.

Yours very truly,

RGH GEOTECHNICAL

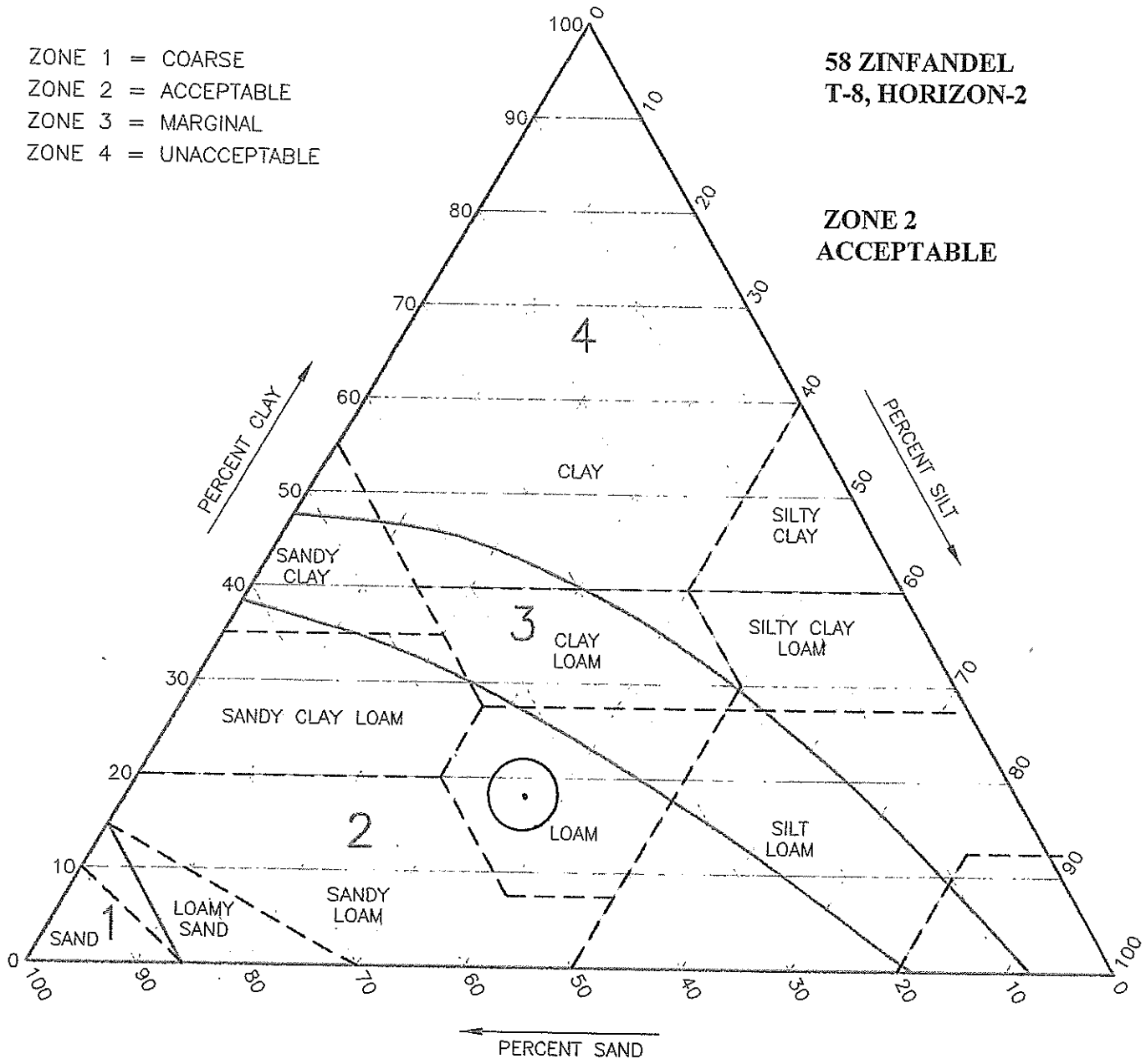
Tarance E. McCue
Senior Laboratory Advisor

SOIL PERCOLATION SUITABILITY CHART

ZONE 1 = COARSE
ZONE 2 = ACCEPTABLE
ZONE 3 = MARGINAL
ZONE 4 = UNACCEPTABLE

58 ZINFANDEL
T-8, HORIZON-2

ZONE 2
ACCEPTABLE



Instructions:

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2. Adjust for coarse fragments by moving the plotted point in the sand direction an additional 2% for each 10% (by volume) of fragments greater than 2mm in diameter.
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We performed a Soil Texture Analysis by the Bouyoucos Hydrometery Method with the following results:

Size/Density	TP-8 HORIZON-2
+ #10 Sieve	1.0 %
Sand	45.8 %
Clay	18.0 %
Silt	36.2 %
Db g/cc	--

We trust this provides the information required at this time. Should you have further questions, please call.

Yours very truly,

RGH GEOTECHNICAL

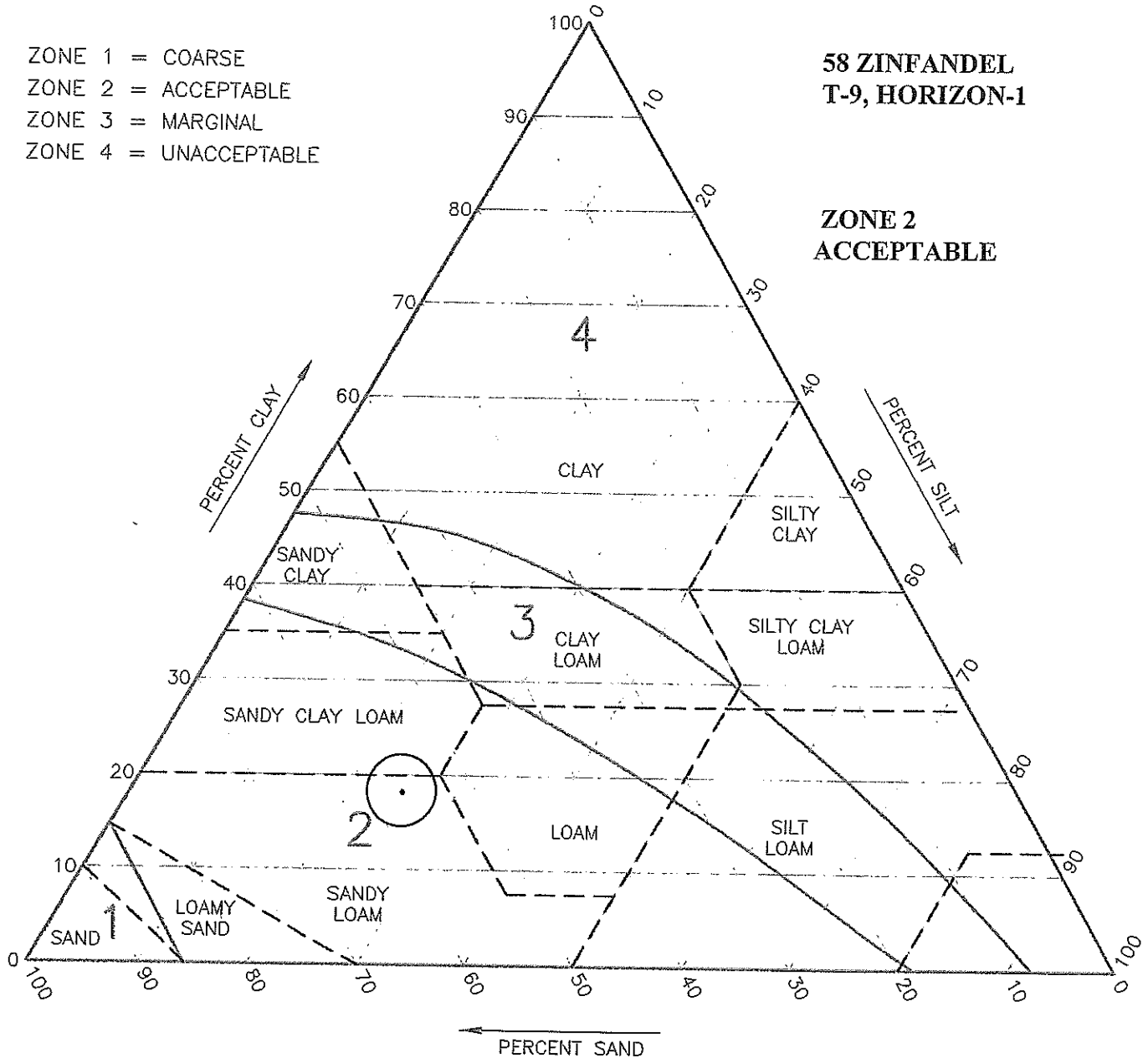
Tarance E. McCue
Senior Laboratory Advisor

SOIL PERCOLATION SUITABILITY CHART

ZONE 1 = COARSE
ZONE 2 = ACCEPTABLE
ZONE 3 = MARGINAL
ZONE 4 = UNACCEPTABLE

58 ZINFANDEL
T-9, HORIZON-1

ZONE 2
ACCEPTABLE



Instructions:

1. Plot texture on triangle based on percent sand, silt, and clay as determined by hydrometer analysis.
2. Adjust for coarse fragments by moving the plotted point in the sand direction an additional 2% for each 10% (by volume) of fragments greater than 2mm in diameter.
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We performed a Soil Texture Analysis by the Bouyoucos Hydrometery Method with the following results:

Size/Density	TP-9 HORIZON-1
+ #10 Sieve	21.9 %
Sand	53.8 %
Clay	18.0 %
Silt	27.2 %
Db g/cc	--

We trust this provides the information required at this time. Should you have further questions, please call.

Yours very truly,

RGH GEOTECHNICAL

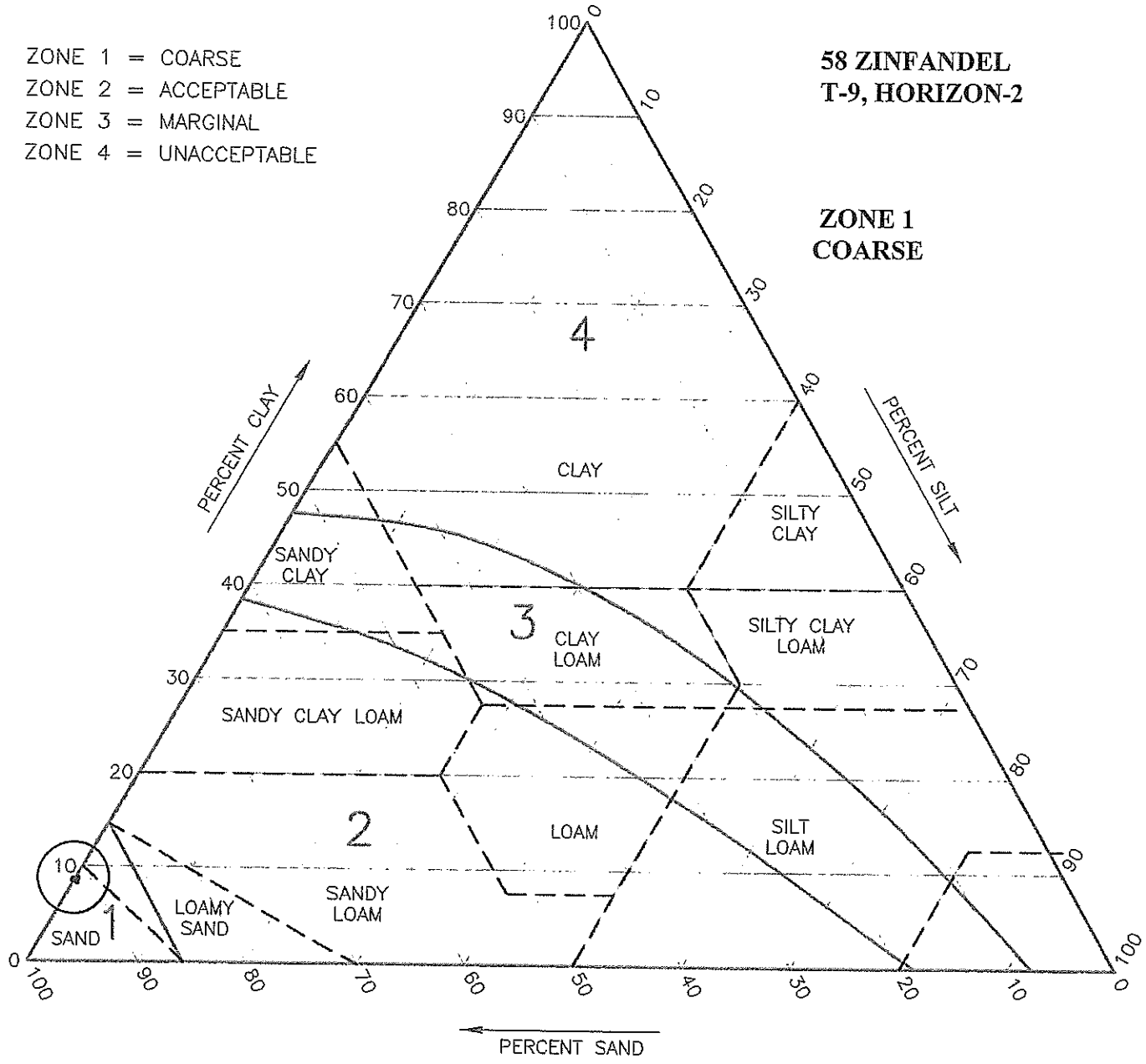
Tarance E. McCue
Senior Laboratory Advisor

SOIL PERCOLATION SUITABILITY CHART

ZONE 1 = COARSE
ZONE 2 = ACCEPTABLE
ZONE 3 = MARGINAL
ZONE 4 = UNACCEPTABLE

58 ZINFANDEL
T-9, HORIZON-2

ZONE 1
COARSE



Instructions:

1. Plot texture on triangle based on percent sand, silt, and clay as determined by hydrometer analysis.
2. Adjust for coarse fragments by moving the plotted point in the sand direction an additional 2% for each 10% (by volume) of fragments greater than 2mm in diameter.
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RGH
GEOMUTANTS

Experience is the difference

April 8, 2009
File: 9147.13

Bartelt Engineering
1339 Pearl Street, Suite 205
Napa, CA 94559

Subject: **Laboratory Test Results**
Soil Texture Analysis by
Bouyoucos Hydrometry Method
58 ZINFANDEL

Dear Mr. Bartelt:

This letter transmits the results of our laboratory testing performed for the subject project. Your personnel delivered the samples on April 3, 2009

We performed a Soil Texture Analysis by the Bouyoucos Hydrometery Method with the following results:

Size/Density	TP-9 HORIZON-2
+ #10 Sieve	71.0 %
Sand	85.8 %
Clay	8.0 %
Silt	6.2 %
Db g/cc	--

We trust this provides the information required at this time. Should you have further questions, please call.

Yours very truly,

RGH GEOTECHNICAL

Tarance E. McCue

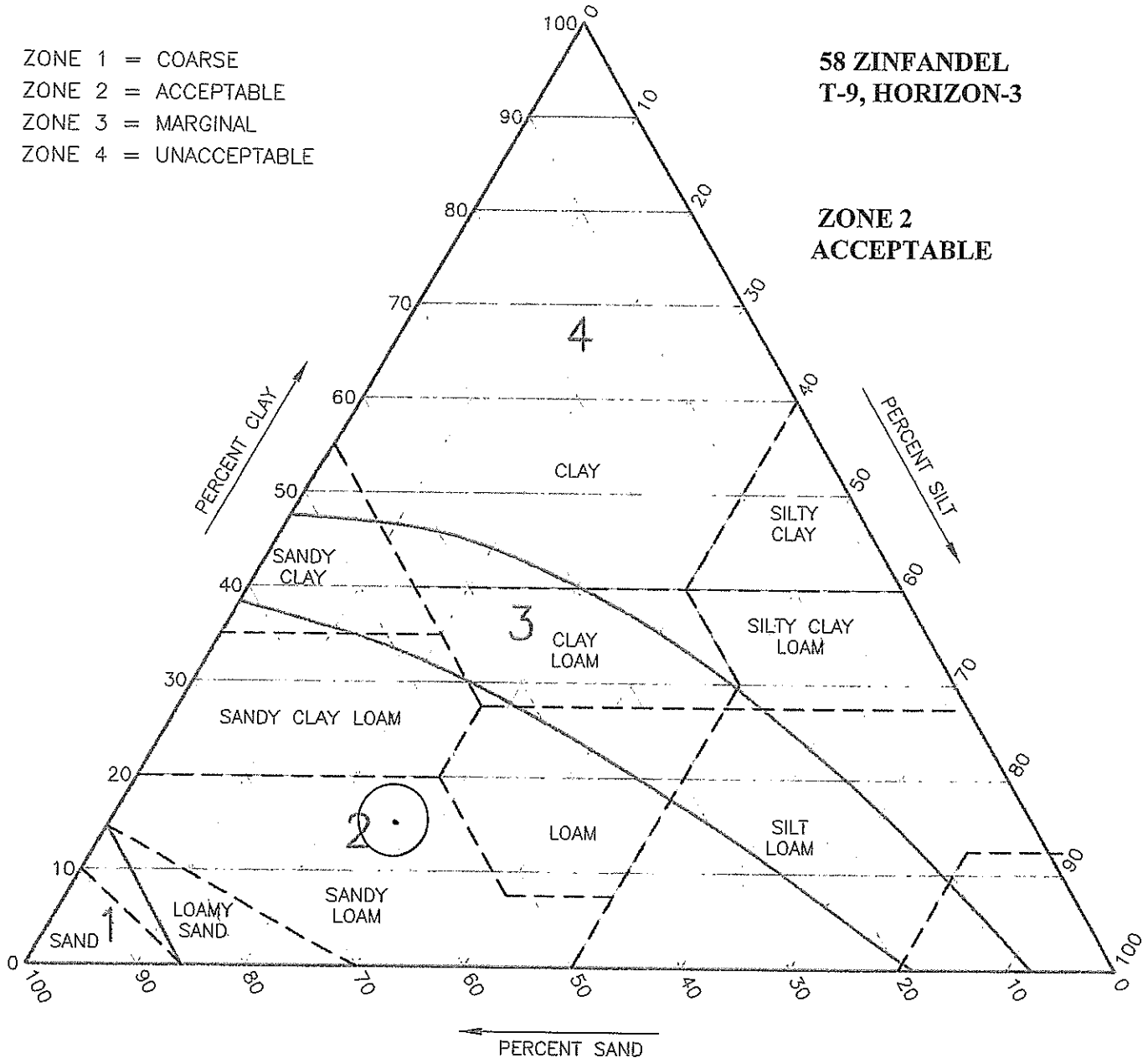
Tarance E. McCue
Senior Laboratory Advisor

SOIL PERCOLATION SUITABILITY CHART

ZONE 1 = COARSE
ZONE 2 = ACCEPTABLE
ZONE 3 = MARGINAL
ZONE 4 = UNACCEPTABLE

58 ZINFANDEL
T-9, HORIZON-3

ZONE 2
ACCEPTABLE



Instructions:

1. Plot texture on triangle based on percent sand, silt, and clay as determined by hydrometer analysis.
2. Adjust for coarse fragments by moving the plotted point in the sand direction an additional 2% for each 10% (by volume) of fragments greater than 2mm in diameter.
3. Adjust for compactness of soil by moving the plotted point in the clay direction an additional 15% for soils having a bulk-density greater than 1.7 gm/cc.

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Experience is the difference

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Dear Mr. Bartelt:

This letter transmits the results of our laboratory testing performed for the subject project. Your personnel delivered the samples on April 3, 2009

We performed a Soil Texture Analysis by the Bouyoucos Hydrometery Method with the following results:

Size/Density	TP-9 HORIZON-3
+ #10 Sieve	23.3 %
Sand	55.8 %
Clay	16.0 %
Silt	28.2 %
Db g/cc	--

We trust this provides the information required at this time. Should you have further questions, please call.

Yours very truly,

RGH GEOTECHNICAL

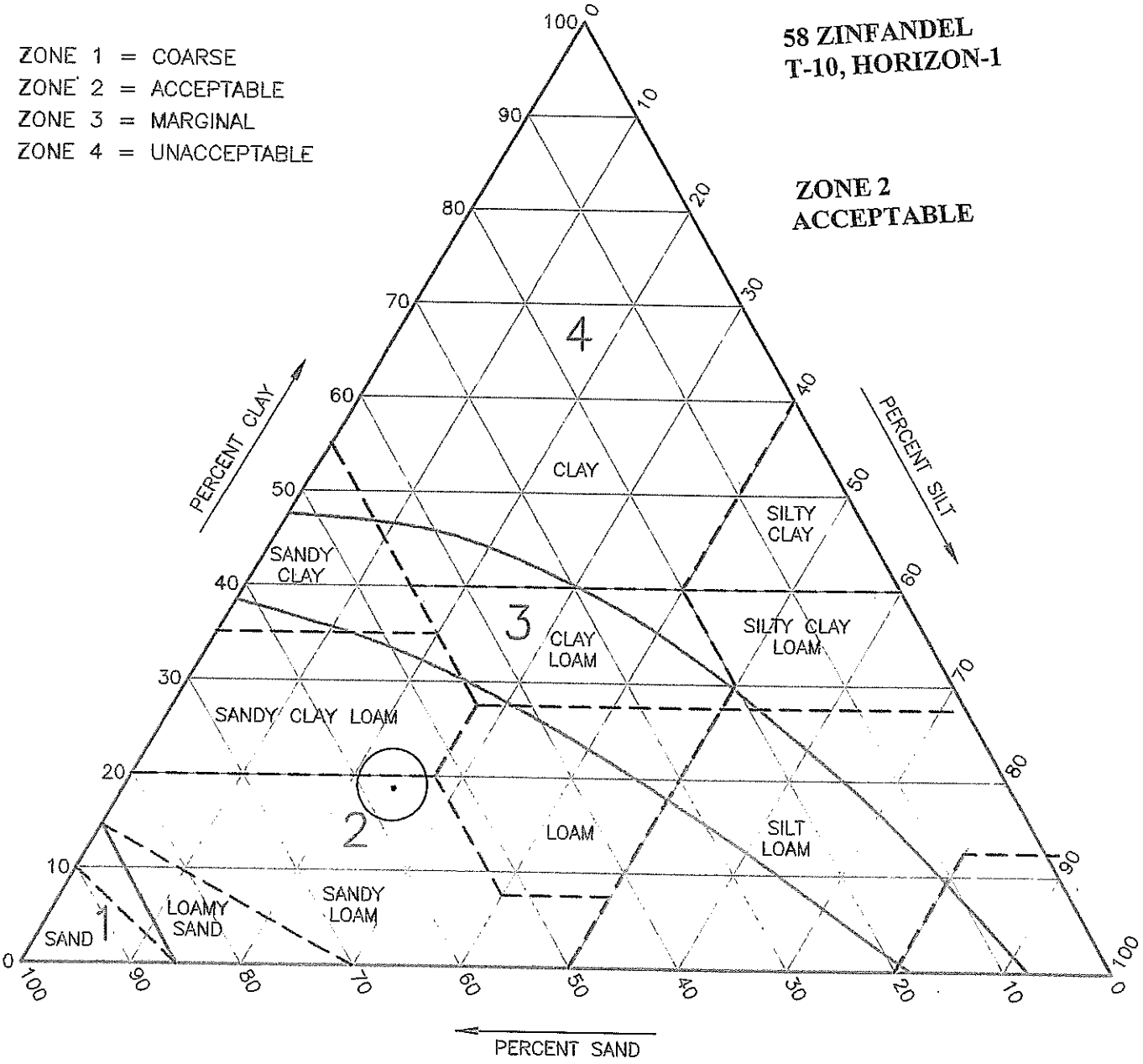
Tarance E. McCue
Senior Laboratory Advisor

SOIL PERCOLATION SUITABILITY CHART

ZONE 1 = COARSE
ZONE 2 = ACCEPTABLE
ZONE 3 = MARGINAL
ZONE 4 = UNACCEPTABLE

58 ZINFANDEL
T-10, HORIZON-1

ZONE 2
ACCEPTABLE



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We performed a Soil Texture Analysis by the Bouyoucos Hydrometery Method with the following results:

Size/Density	TP-10 HORIZON-1
+ #10 Sieve	10.6 %
Sand	56.6 %
Clay	18.8 %
Silt	24.6 %
Db g/cc	--

We trust this provides the information required at this time. Should you have further questions, please call.

Yours very truly,

RGH GEOTECHNICAL

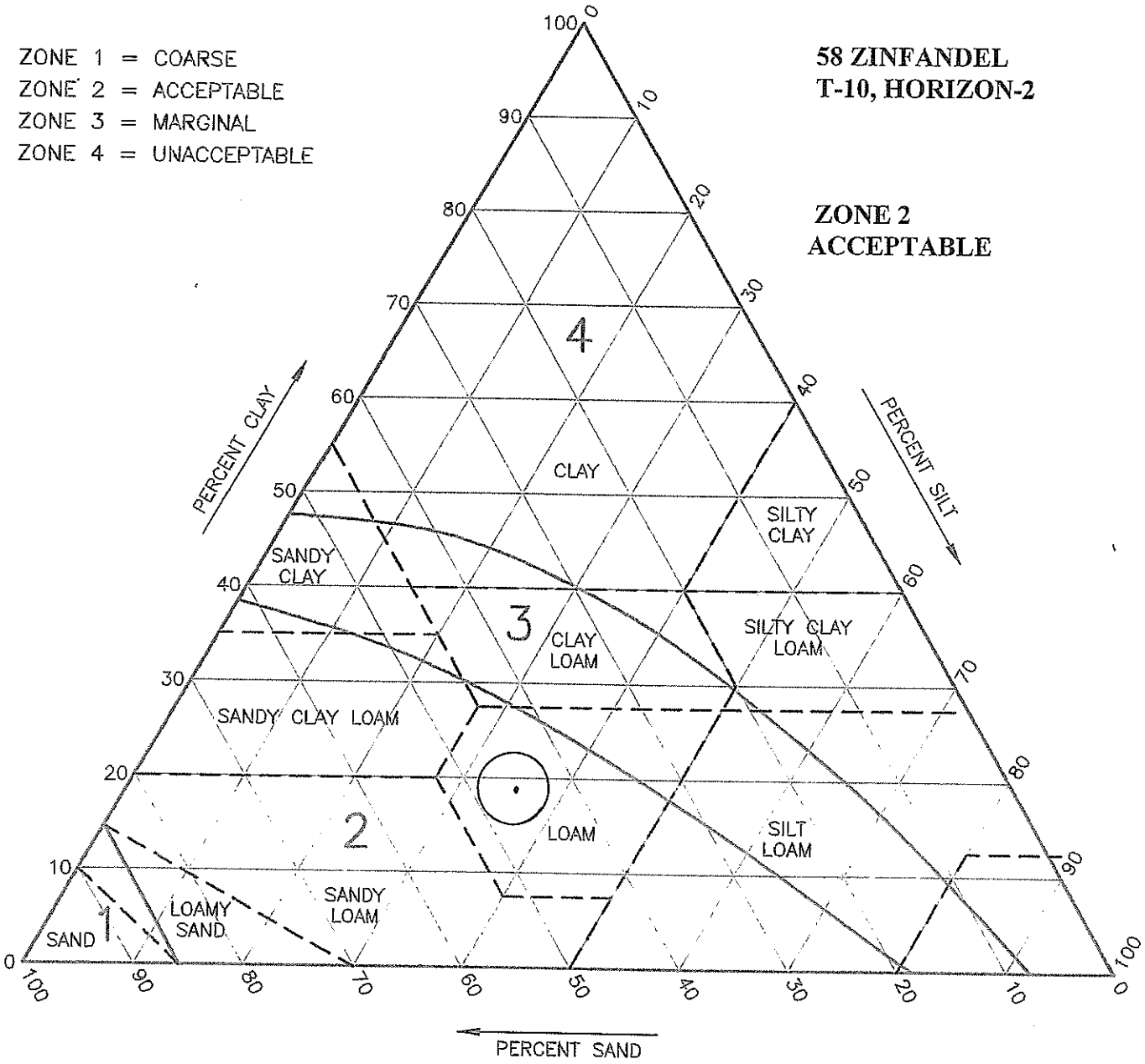
Tarance E. McCue
Senior Laboratory Advisor

SOIL PERCOLATION SUITABILITY CHART

ZONE 1 = COARSE
ZONE 2 = ACCEPTABLE
ZONE 3 = MARGINAL
ZONE 4 = UNACCEPTABLE

58 ZINFANDEL
T-10, HORIZON-2

ZONE 2
ACCEPTABLE



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58 ZINFANDEL

Dear Mr. Bartelt:

This letter transmits the results of our laboratory testing performed for the subject project. Your personnel delivered the samples on April 3, 2009

We performed a Soil Texture Analysis by the Bouyoucos Hydrometery Method with the following results:

Size/Density	TP-10 HORIZON-2
+ #10 Sieve	4.7 %
Sand	46.8 %
Clay	19.0 %
Silt	34.2 %
Db g/cc	--

We trust this provides the information required at this time. Should you have further questions, please call.

Yours very truly,

RGH GEOTECHNICAL

Tarance E. McCue
Senior Laboratory Advisor

RGH CONSTRUCTORS

Experience is the difference

BOUYOCOUS HYDROMETER

CLIENT Bartelt JOB NAME 588 Rinaldi JOB# 0316

SAMPLE NUMBER	TP-10 (8)						
DEPTH	4 or 2						
A. Oven dry wt. (grams)	50.0						
B. Starting Time (hr: min: sec:)	1057						
C. Temp. @ 40 sec. (degrees F)	66.0						
D. Hydro reading @ 40 sec. (gm/l)	33.5						
E. Composite Corr. (gm/l)	6.9						
F. True Density @ 40 sec. (gm/l) D-E ●	26.6						
G. Temp. @ 2 hrs. (degrees F)	65.4						
H. Hydro reading @ 2 hrs. (gm/l)	16.5						
I. Composite Corr. (gm/l)	-7.0						
J. True Density @ 2 hrs. (gm/l) H-I ●	9.5						
K. % Sand = 100 – [(F/A) x 100]	46.8						
L. % Clay = [(J/A) x 100]	19.0						
M. % Silt = 100-(K+L)	34.2						
N. % No. 10 =	4.7						

Cup Number	B-21						
Dry Before Wash + Tare	813.8						
Dry After Wash + Tare	122.3						
Dry Wt. Passing #10	691.5						
Tare Weight	93.6						
Dry Wt. Before Wash	715.7						
% Passing #10	95.3						
% #10	4.7						

RGH ENVIRONMENTAL

Experience is the difference

Red

BOUYOCOUS HYDROMETER

CLIENT Bartelt JOB NAME 588 Zinfandel JOB# 0816

	①	②	③	④	⑤	⑥	⑦
SAMPLE NUMBER	TP-4	TP-6	TP-7	TP-8	TP-9	TP-9	TP-9
DEPTH	Hor-2	Hor-1	Hor-2	Hor-2	Hor-1	Hor-2	Hor-3
A. Oven dry wt. (grams)	50g	50.0g	50g	50g	50g	50g	50g
B. Starting Time (hr: min: sec:)	1043	1045	1047	1049	1051	1053	1055
C. Temp. @ 40 sec. (degrees F)	65.9	66.0	66.2	66.0	66.0	66.0	66.0
D. Hydro reading @ 40 sec. (gm/l)	28.5	31.5	11.0	34.0	30.0	14.0	29.0
E. Composite Corr. (gm/l)	-6.9	-6.9	-6.9	-6.9	-6.9	-6.9	-6.9
F. True Density @ 40 sec. (gm/l) D-E ●	21.6	24.6	4.1	27.1	23.1	7.1	22.1
G. Temp. @ 2 hrs. (degrees F)	65.3	65.4	65.5	65.5	65.5	65.5	65.4
H. Hydro reading @ 2 hrs. (gm/l)	15.0	17.0	9.0	16.0	16.0	11.0	15.0
I. Composite Corr. (gm/l)	-7.0	-7.0	-7.0	-7.0	-7.0	-7.0	-7.0
J. True Density @ 2 hrs. (gm/l) H-I ●	8.0	10.0	2.0	9.0	9.0	4.0	8.0
K. % Sand = 100 – [(F/A) x 100]	56.8	50.8	91.8	45.8	53.8	85.8	55.8
L. % Clay = [(J/A) x 100]	16.0	20.0	4.0	18.0	18.0	8.0	16.0
M. % Silt = 100-(K+L)	27.2	29.2	4.2	36.2	27.2	6.2	28.2
N. % No. 10 =	5.1	10.8	75.2	1.0	21.9	71.0	23.3

Cup Number	B-2	B-7	B-18	B-17	R-1	B-16	B-14
Dry Before Wash + Tare	381.3	398.6	1460.6	875.8	838.1	1432.6	817.2
Dry After Wash + Tare	115.9	133.3	1123.6	110.5	395.4	1046.7	267.5
Dry Wt. Passing #10	265.4	265.3	337.0	765.3	442.7	385.9	549.7
Tare Weight	101.5	101.3	103.5	103.1	101.6	100.1	100.8
Dry Wt. Before Wash	279.8	297.3	1357.1	772.7	566.5	1332.5	716.4
% Passing #10	94.9	89.2	24.8	99.0	78.1	29.0	76.7
% #10	5.1	10.8	75.2	1.0	21.9	71.0	23.3

RGH

Experience is the difference

BOUYOCOUS HYDROMETER

CLIENT BARTELT ENG. JOB NAME SB ZIFANDEL JOB# _____

SAMPLE NUMBER		TP-10	TP-8	TP-6	TP-4	TP-1	TP-1
DEPTH		HOR-1	HOR-1	HOR-2	HOR-1	HOR 2	HOR 1
A. Oven dry wt. (grams)		50.0	50.0	50.0	50.0	50.0	50.0
B. Starting Time (hr: min: sec:)		0937	0935	0933	0931	0929	0927
C. Temp. @ 40 sec. (degrees F)		69.0	68.9	69.2	68.0	68.0	67.9
D. Hydro reading @ 40 sec. (gm/l)		28.0	28.5	31.0	29.0	26.0	33.0
E. Composite Corr. (gm/l)		-6.3	-6.3	-6.3	-6.5	-6.5	-6.5
F. True Density @ 40 sec. (gm/l) D-E ●		21.7	22.2	24.7	22.5	19.5	26.5
G. Temp. @ 2 hrs. (degrees F)		67.7	67.8	67.9	67.6	67.4	67.2
H. Hydro reading @ 2 hrs. (gm/l)		16.0	17.0	16.0	16.5	18.5	18.0
I. Composite Corr. (gm/l)		-6.6	-6.5	-6.5	-6.6	-6.6	-6.6
J. True Density @ 2 hrs. (gm/l) H-I ●		9.4	10.5	9.5	9.9	11.9	11.4
K. % Sand = 100 – [(F/A) x 100]		56.6	55.6	50.6	55.0	41.0	47.0
L. % Clay = [(J/A) x 100]		18.8	21.0	19.0	19.8	23.8	22.8
M. % Silt = 100-(K+L)		24.6	23.4	30.4	25.2	35.2	30.2
N. % No. 10 =		10.6	9.0	5.0	8.4	1.1	3.9

Cup Number		B-1	B-5	B-3	B-11	B-2	B-3
Dry Before Wash + Tare		892.5	778.8	689.6	710.2	993.7	892.9
Dry After Wash + Tare		192.7	198.0	189.8	151.3	112.2	192.8
Dry Wt. Passing #10		793.8	579.8	639.6	558.8	881.5	759.1
Tare Weight		93.1	100.2	50.2	100.2	100.2	102.6
Dry Wt. Before Wash		885.6	677.4	673.2	610.2	891.5	790.2
% Passing #10		89.4	91.0	95.0	91.6	98.9	96.1
% #10		10.6	9.0	5.0	8.4	1.1	3.9

Napa County Department of
Environmental Management

SITE EVALUATION REPORT

Please attach an 8.5" x 11" plot map showing the locations of all test pits triangulated from permanent landmarks or known property corners. The map must be drawn to scale and include a North arrow, surrounding geographic and topographic features, direction and % slope, distance to drainages, water bodies, potential areas for flooding, unstable landforms, existing or proposed roads, structures, utilities, domestic water supplies, wells, ponds, existing wastewater treatment systems and facilities.

Permit #: E08-00639
APN: 030-260-016
(County Use Only) Reviewed by: Date:

PLEASE PRINT OR TYPE ALL INFORMATION

Property Owner Kohala Investment Works, c/o Duane Kanuha	☒ New Construction ☐ Addition ☒ Remodel ☐ Relocation ☐ Other:
Property Owner Mailing Address 101 Aupuni Street, Suite 206	☒ Residential - # of Bedrooms: 3 Design Flow : 450 gpd
City State Zip Hilo Hawaii 96721	☒ Commercial – Type: Winery Sanitary Waste: 495 gpd Process Waste: 1,500 gpd
Site Address/Location 588 Zinfandel Lane, St. Helena	☐ Other: Sanitary Waste: gpd Process Waste: gpd

Evaluation Conducted By:

Company Name Bartelt Engineering	Evaluator's Name Paul N. Bartelt, P.E.	Signature (Civil Engineer, R.E.H.S., Geologist, Soil Scientist)
Mailing Address: 1303 Jefferson Street, 200 B		Telephone Number (707) 258-1301
City State Zip Napa CA 94559		Date Evaluation Conducted November 14, 2008

Primary Area See below	Expansion Area See below
Acceptable Soil Depth: 65-87 in. Test pit #'s: 2, 3, 4 & 5	Acceptable Soil Depth: 69-71 in. Test pit #' : 6 ,7 ,8 ,9 ,10, 11, 12 & 13
Soil Application Rate (gal. /sq. ft. /day): STE 0.35 / 0.25	Soil Application Rate (gal. /sq. ft. /day): STE 0.35 / 0.25
System Type(s) Recommended: Pressure Distribution / Conventional	System Type(s) Recommended: Pressure Distribution / Conventional
Slope: 0 - 2 %. Distance to nearest water source: 100 ft.+	Slope: 0 - 2 %. Distance to nearest water source: 100 ft. +
Hydrometer test performed? No ☐ Yes ☒ (attach results)	Hydrometer test performed? No ☐ Yes ☒ (attach results)
Bulk Density test performed? No ☒ Yes ☐ (attach results)	Bulk Density test performed? No ☒ Yes ☐ (attach results)
Groundwater Monitoring Performed? No ☒ Yes ☐ (attach results)	Groundwater Monitoring Performed? No ☒ Yes ☐ (attach results)

Site constraints/Recommendations:

See Septic System Feasibility Study prepared by Bartelt Engineering dated December 10, 2008 for septic system recommendations.

Test Pit # 1 ** Could Have Dug Deeper

Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure	Consistence			Pores	Roots	Mottling
					Side Wall	Ped	Wet			
0-27		<15	CL	SSB	SH	FRB	SS	MVF/FM	MVF/FM/ FC	None
27-50	C	<15	CL	SSB	SH/H	FRB	SS	MVF/MF/ MM	MVF/FM/ FC	None
50-55	A	15-30	CL	WG	SH	L	SS	CVF/CF/ CM	FVF	None
55-65	A	<15	CL	SAB	H	VFRB	SS	MVF/MF/ MM	FVF	None

Slope = 0-2 %. Acceptable soil depth: 65 inches. **Assigned soil application rate = STE 0.50 / PTE 0.75 gal /sf /day for an alternative sewage treatment system; 0.25 gal /sf /day for a conventional sewage treatment system.

No groundwater observed.

Test Pit # 2 *Hydrometer Test Performed
** Could Have Dug Deeper

Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure	Consistence			Pores	Roots	Mottling
					Side Wall	Ped	Wet			
0-21		<15	CL	SSB	SH	FRB	SS	MVF/FM	MVF/FM/ FC	None
21-65	C	<15	CL	SSB	SH/H	FRB	SS	MVF/MF/ MM	MVF/FM/ FC	None

Slope = 0-2 %. Acceptable soil depth: 65 inches. **Assigned soil application rate = STE 0.6 / PTE 0.75 gal /sf /day for an alternative sewage treatment system; 0.33 gal /sf /day for a conventional sewage treatment system.

No groundwater observed. *See attached Soil Texture Analysis by Bouyoucos Hydrometry Method prepared by RGH Consultants, Inc. dated November 24, 2008.

Test Pit # 3

Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure	Consistence			Pores	Roots	Mottling
					Side Wall	Ped	Wet			
0-30		<15	CL	SSB	SH	FRB	SS	MVF/FM	MVF/FM/ FC	None
30-48	C	<15	CL	SSB	SH/H	FRB	SS	MVF/MF/ MM	MVF/FM/ FC	None
48-54	A	15-30	CL	WG	SH	L	SS	CVF/CF/ CM	FVF	None
54-67	A	<15	CL	SAB	H	VFRB	SS	MVF/MF/ MM	FVF	None

Slope = 0-2 %. Acceptable soil depth: 67 inches. Assigned soil application rate = STE 0.50 / PTE 0.75 gal /sf /day for an alternative sewage treatment system; 0.25 gal /sf /day for a conventional sewage treatment system.

No groundwater observed.

Test Pit # 4

Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure	Consistence			Pores	Roots	Mottling
					Side Wall	Ped	Wet			
0-24		<15	CL	SSB	SH	FRB	SS	MVF/FM	MVF/FM/ FC	None
24-70	C	<15	CL	SSB	SH/H	FRB	SS	MVF/MF/ MM	MVF/FM/ FC	None
Slope = 0-2 %. Acceptable soil depth: 70 inches. Assigned soil application rate = STE 0.6 / PTE 0.75 gal /sf /day for an alternative sewage treatment system; 0.33 gal /sf /day for a conventional sewage treatment system.										
No groundwater observed.										

Test Pit # 5

Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure	Consistence			Pores	Roots	Mottling
					Side Wall	Ped	Wet			
0-22		<15	CL	SSB	SH	FRB	SS	MVF/FM	MVF/FM/ FC	None
22-87	C	<15	CL	SSB	SH/H	FRB	SS	MVF/MF/ MM	MVF/FM/ FC	None
Slope = 0-2 %. Acceptable soil depth: 87 inches. Assigned soil application rate = STE 0.6 / PTE 0.75 gal /sf /day for an alternative sewage treatment system; 0.33 gal /sf /day for a conventional sewage treatment system.										
No groundwater observed.										

Test Pit # 6

Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure	Consistence			Pores	Roots	Mottling
					Side Wall	Ped	Wet			
0-24		<15	CL	SSB	SH	FRB	SS	MVF/FM	MVF/FM/ FC	None
24-40	C	<15	CL	SSB	SH/H	FRB	SS	MVF/MF/ MM	MVF/FM/ FC	None
40-60	A	15-30	CL	WG	SH	L	SS	CVF/CF/ CM	FVF	None
60-70	A	<15	CL	SAB	H	VFRB	SS	MVF/MF/ MM	FVF	None
Slope = 0-2 %. Acceptable soil depth: 70 inches. Assigned soil application rate = STE 0.50 / PTE 0.75 gal /sf /day for an alternative sewage treatment system; 0.25 gal /sf /day for a conventional sewage treatment system.										
No groundwater observed.										

Test Pit # 7

Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure	Consistence			Pores	Roots	Mottling
					Side Wall	Ped	Wet			
0-31		<15	CL	SSB	SH	FRB	SS	MVF/FM	MVF/FM/ FC	None
31-48	C	<15	CL	SSB	SH/H	FRB	SS	MVF/MF/ MM	MVF/FM/ FC	None
48-55	A	15-30	CL	WG	SH	L	SS	CVF/CF/ CM	FVF	None
55-71	A	<15	CL	SAB	H	VFRB	SS	MVF/MF/ MM	FVF	None

Slope = 0-2 %. Acceptable soil depth: 71 inches. Assigned soil application rate = STE 0.50 / PTE 0.75 gal /sf /day for an alternative sewage treatment system; 0.25 gal /sf /day for a conventional sewage treatment system.

No groundwater observed.

Test Pit # 8

Horizon Depth (Inches)	Boundary	%Rock	Texture	Structur e	Consistence			Pores	Roots	Mottling
					Side Wall	Ped	Wet			
0-24		<15	CL	SSB	SH	FRB	SS	MVF/FM	MVF/FM/ FC	None
24-70	C	<15	CL	SSB	SH/H	FRB	SS	MVF/MF/ MM	MVF/FM/ FC	None

Slope = 0-2 %. Acceptable soil depth: 70 inches. Assigned soil application rate = STE 0.6 / PTE 0.75 gal /sf /day for an alternative sewage treatment system; 0.33 gal /sf /day for a conventional sewage treatment system.

No groundwater observed.

Test Pit # 9 ** Could Have Dug Deeper

Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure	Consistence			Pores	Roots	Mottling
					Side Wall	Ped	Wet			
0-28		<15	CL	SSB	SH	FRB	SS	MVF/FM	MVF/FM/ FC	None
28-51	C	<15	CL	SSB	SH/H	FRB	SS	MVF/MF/ MM	MVF/FM/ FC	None
51-57	A	15-30	CL	WG	SH	L	SS	CVF/CF/ CM	FVF	None
57-69	A	<15	CL	SAB	H	VFRB	SS	MVF/MF/ MM	FVF	None

Slope = 0-2 %. Acceptable soil depth: 69 inches. **Assigned soil application rate = STE 0.50 / PTE 0.75 gal /sf /day for an alternative sewage treatment system; 0.25 gal /sf /day for a conventional sewage treatment system.

No groundwater observed.

Test Pit # 10

Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure	Consistence			Pores	Roots	Mottling
					Side Wall	Ped	Wet			
0-35		<15	CL	SSB	SH	FRB	SS	MVF/FM	MVF/FM/ FC	None
35-50	C	<15	CL	SSB	SH/H	FRB	SS	MVF/MF/ MM	MVF/FM/ FC	None
50-57	A	15-30	CL	WG	SH	L	SS	CVF/CF/ CM	FVF	None
57-71	A	<15	CL	SAB	H	VFRB	SS	MVF/MF/ MM	FVF	None

Slope = 0-2 %. Acceptable soil depth: 71 inches. Assigned soil application rate = STE 0.50 / PTE 0.75 gal /sf /day for an alternative sewage treatment system; 0.25 gal /sf /day for a conventional sewage treatment system.

No groundwater observed.

Test Pit # 11

Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure	Consistence			Pores	Roots	Mottling
					Side Wall	Ped	Wet			
0-40		<15	CL	SSB	SH	FRB	SS	MVF/FM	MVF/FM/ FC	None
40-63	A	15-30	CL	WG	SH	L	SS	CVF/CF/ CM	FVF	None
63-71	A	<15	CL	SAB	H	VFRB	SS	MVF/MF/ MM	FVF	None

Slope = 0-2 %. Acceptable soil depth: 71 inches. Assigned soil application rate = STE 0.50 / PTE 0.75 gal /sf /day for an alternative sewage treatment system; 0.25 gal /sf /day for a conventional sewage treatment system.

No groundwater observed. Encountered irrigation water line during excavation.

Test Pit # 12 ** Could Have Dug Deeper

Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure	Consistence			Pores	Roots	Mottling
					Side Wall	Ped	Wet			
0-42		<15	CL	SSB	SH	FRB	SS	MVF/FM	MVF/FM/ FC	None
42-62	A	15-30	CL	WG	SH	L	SS	CVF/CF/ CM	FVF	None
62-69	A	<15	CL	SAB	H	VFRB	SS	MVF/MF/ MM	FVF	None

Slope = 0-2 %. Acceptable soil depth: 69 inches. **Assigned soil application rate = STE 0.50 / PTE 0.75 gal /sf /day for an alternative sewage treatment system; 0.25 gal /sf /day for a conventional sewage treatment system.

No groundwater observed.

Test Pit # 13 ** Could Have Dug Deeper

Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure	Consistence			Pores	Roots	Mottling
					Side Wall	Ped	Wet			
0-30		<15	CL	SSB	SH	FRB	SS	MVF/FM	MVF/FM/ FC	None
30-60	A	15-30	CL	WG	SH	L	SS	CVF/CF/ CM	FVF	None
60-69	A	<15	CL	SAB	H	VFRB	SS	MVF/MF/ MM	FVF	None

Slope = 0-2 %. Acceptable soil depth: 69 inches. **Assigned soil application rate = STE 0.50 / PTE 0.75 gal /sf/day for an alternative sewage treatment system; 0.25 gal /sf/day for a conventional sewage treatment system.

No groundwater observed. Encountered irrigation water line during excavation.

Table of Abbreviations

Boundary	Texture	Structure	Consistence			Pores	Roots	Mottling
			Side Wall	Ped	Wet			
A=Abrupt <1" C=Clear 1"-2.5" G=Gradual 2.5"-5" D=Difuse >5"	S=Sand LS=Loamy Sand SL=Sandy Loam SCL=Sandy Clay Loam SC=Sandy Clay CL=Clay Loam L=Loam C=Clay SiC=Silty Clay SiCL=Silty Clay Loam SiL=Silt Loam Si=Silt	W=Weak M=Moderate S=Strong G=Granular PL=Platy Pr=Prismatic C=Columnar AB=Angular Blocky SB=Subangular Blocky M=Massive C=Cemented	L=Loose S=Soft SH=Slighty Hard H=Hard VH=Very Hard ExH=Extremely Hard	L=Loose VFRB=Very Friable FRB=Friable F=Firm VF=Very Firm ExF=Extremely Firm	NS=NonSticky SS=Slightly Sticky S=Sticky VS=Very Sticky NP=NonPlastic SP=Slightly Plastic P=Plastic VP=Very Plastic	Quantity: F=Few C=Common M=Many Size: VF=Very Fine F=Fine M=Medium C=Coarse	Quantity: F=Few C=Common M=Many Size: VF=Very Fine F=Fine M=Medium C=Coarse VC=Very Course	Quantity: F=Few C=Common M=Many Size: F=Fine M=Medium C=Coarse VC=Very Course ExC=Extremely Coarse Contrast: Ft=Faint D=Distinct P=Prominent

Attach additional sheets as needed

Alternative Sewage Treatment System Soil Application Rates

TEXTURE	STRUCTURE		APPLICATION RATE (Gal/ft^2/day)	
	Shape	Grade	STE[1]	PTE[1,2]
Coarse Sand, Sand, Loamy Coarse Sand	Single grain	Structureless	1.0	1.2
Fine Sand, Loamy Fine Sand	Single grain	Structureless	0.6	1.0
Sandy Loam, Loamy Sand	Massive	Structureless	0.35	0.5
	Platy	Weak	0.35	0.5
	Prismatic, blocky, granular	Weak	0.5	0.75
		Moderate, Strong	0.8	1.0
Loam, Silt Loam, Sandy Clay Loam, Fine Sandy Loam	Massive	Structureless		
	Platy	Weak, moderate, strong		
	Prismatic, blocky, granular	Weak, moderate	0.5	0.75
		Strong	0.8	1.0
Sandy Clay, Silty Clay Loam, Clay Loam	Massive	Structureless		
	Platy	Weak, moderate, strong		
	Prismatic, blocky, granular	Weak, moderate	0.35	0.5
		Strong	0.6	0.75
Clay, Silty Clay	Massive	Structureless		
	Platy	Weak, moderate, strong		
	Prismatic, blocky, granular	Weak		
		Moderate, strong	0.2	0.25

1. See Table 1 in the Design, Construction and Installation of Alternative Sewage Treatment Systems.
2. A higher application rate for pretreated effluent may only be used when pretreatment is not used for one foot of vertical separation credit.

MINIMUM SURFACE AREA GUIDELINES TO DISPOSE OF 100 GPD OF SECONDARY TREATED EFFLUENT FOR SUBSURFACE DRIP DISPERSAL SYSTEMS

		Soil Absorption Rates		Design Application Rate (Gal/ft^2/day)	Total Area Required Sq. ft./100 gallons per day
Soil Class	Soil Type	Est. Soil Perc. Rate minutes/inch	Hydraulic Conductivity inches/hour		
I	Coarse sand	1 – 5	>2	1.400	71.5
I	Fine sand	5 – 10	1.5 – 2	1.200	83.3
II	Sandy loam	10 – 20	1.0 – 1.5	1.000	100.0
II	Loam	20 – 30	0.75 – 1.0	0.700	143.0
III	Clay loam	30 – 45	0.5 – 0.75	0.600	167.0
III	Silt - clay loam	45 – 60	0.3 – 0.5	0.400	250.0
IV	Clay non-swell	60 – 90	0.2 – 0.3	0.200	500.0
IV	Clay - swell	90 – 120	0.1 – 0.2	0.100	1000.0

1. For design purpose, the "Soil Type" category to be used in the above table shall be based on the most restrictive soil type encountered within two feet below the bottom of the drip line.
2. Dispersal field area calculation: Total square feet area of dispersal field = Design flow divided by loading rate.

Conventional Sewage Treatment System Soil Application Rates

TEXTURE	STRUCTURE		APPLICATION RATE (Gal/ft^2/day)
	Shape	Grade	STE
Coarse Sand, Sand, Loamy Coarse Sand	Single grain	Structureless	Prohibited
Sandy Loam, Loamy Sand	Massive	Structureless	Prohibited
	Platy	Weak, mod, strong	Prohibited
	Prismatic, blocky, granular	Weak	0.33
		Moderate, strong	0.5
Loam, Silt Loam, Sandy Clay Loam, Fine Sandy Loam	Massive	Structureless	Prohibited
	Platy	Weak, mod, strong	Prohibited
	Prismatic, blocky, granular	Weak	0.25
		Moderate, Strong	0.33
Clay Loam	Massive	Structureless	Prohibited
	Platy	Weak, moderate, strong	Prohibited
	Prismatic, blocky, granular	Weak, moderate	0.25
		Strong	0.33
Sandy Clay, Silty Clay Loam	Massive	Structureless	Prohibited
	Platy	Weak, moderate, strong	Prohibited
	Prismatic, blocky, granular	Weak, moderate	Prohibited
		Strong	0.25
Clay, Silty Clay	Massive	Structureless	Prohibited
	Platy	Weak, moderate, strong	Prohibited
	Prismatic, blocky, granular	Weak	Prohibited
		Moderate, strong	Prohibited

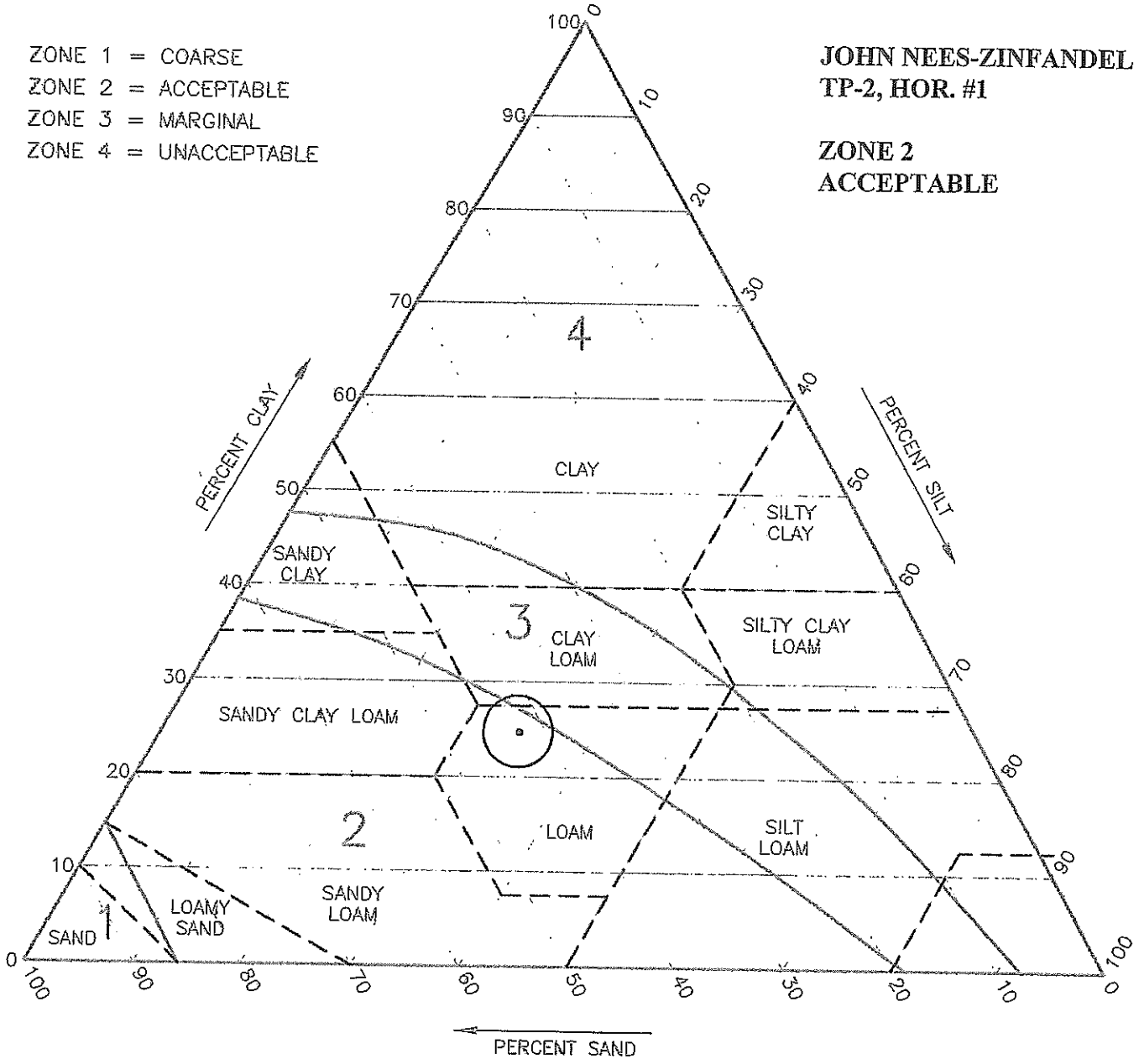
CONVENTIONAL SEWAGE TREATMENT SYSTEM SOIL APPLICATION RATES BASED ON PERCOLATION RATES	
Percolation Rate (mpi)	Application Rate (STE)
< 5 MPI	Prohibited
5 to 10 MPI	0.5
10-20 MPI	0.33
20-60 MPI	0.25
> 60 MPI	Prohibited

SOIL PERCOLATION SUITABILITY CHART

ZONE 1 = COARSE
ZONE 2 = ACCEPTABLE
ZONE 3 = MARGINAL
ZONE 4 = UNACCEPTABLE

JOHN NEES-ZINFANDEL LANE
TP-2, HOR. #1

ZONE 2
ACCEPTABLE



Instructions:

1. Plot texture on triangle based on percent sand, silt, and clay as determined by hydrometer analysis.
2. Adjust for coarse fragments by moving the plotted point in the sand direction an additional 2% for each 10% (by volume) of fragments greater than 2mm in diameter.
3. Adjust for compactness of soil by moving the plotted point in the clay direction an additional 15% for soils having a bulk-density greater than 1.7 gm/cc.

Note:

For soils falling in sand, loamy sand or sandy loam classification bulk density analysis will generally not affect suitability and analysis not neccesary.

R G H

CONSULTANTS, INC.

Geotechnical
Geological
And Laboratory Services

File: 9147.9

November 24, 2008
Bartelt Engineering
1339 Pearl Street, Suite 205
Napa, CA 94559

Subject: **Laboratory Test Results**
Soil Texture Analysis by
Bouyoucos Hydrometry Method
JOHN NEESE-ZINFANDEL LANE

Dear Mr. Bartelt:

This letter transmits the results of our laboratory testing performed for the subject project. Your personnel delivered the samples on November 19, 2008.

We performed a Soil Texture Analysis by the Bouyoucos Hydrometery Method with the following results:

Size/Density	TP-2 HOR. #1
+ #10 Sieve	5.8 %
Sand	42.0 %
Clay	25.0 %
Silt	33.0 %
Db g/cc	--

We trust this provides the information required at this time. Should you have further questions, please call.

Yours very truly,

RGH GEOTECHNICAL

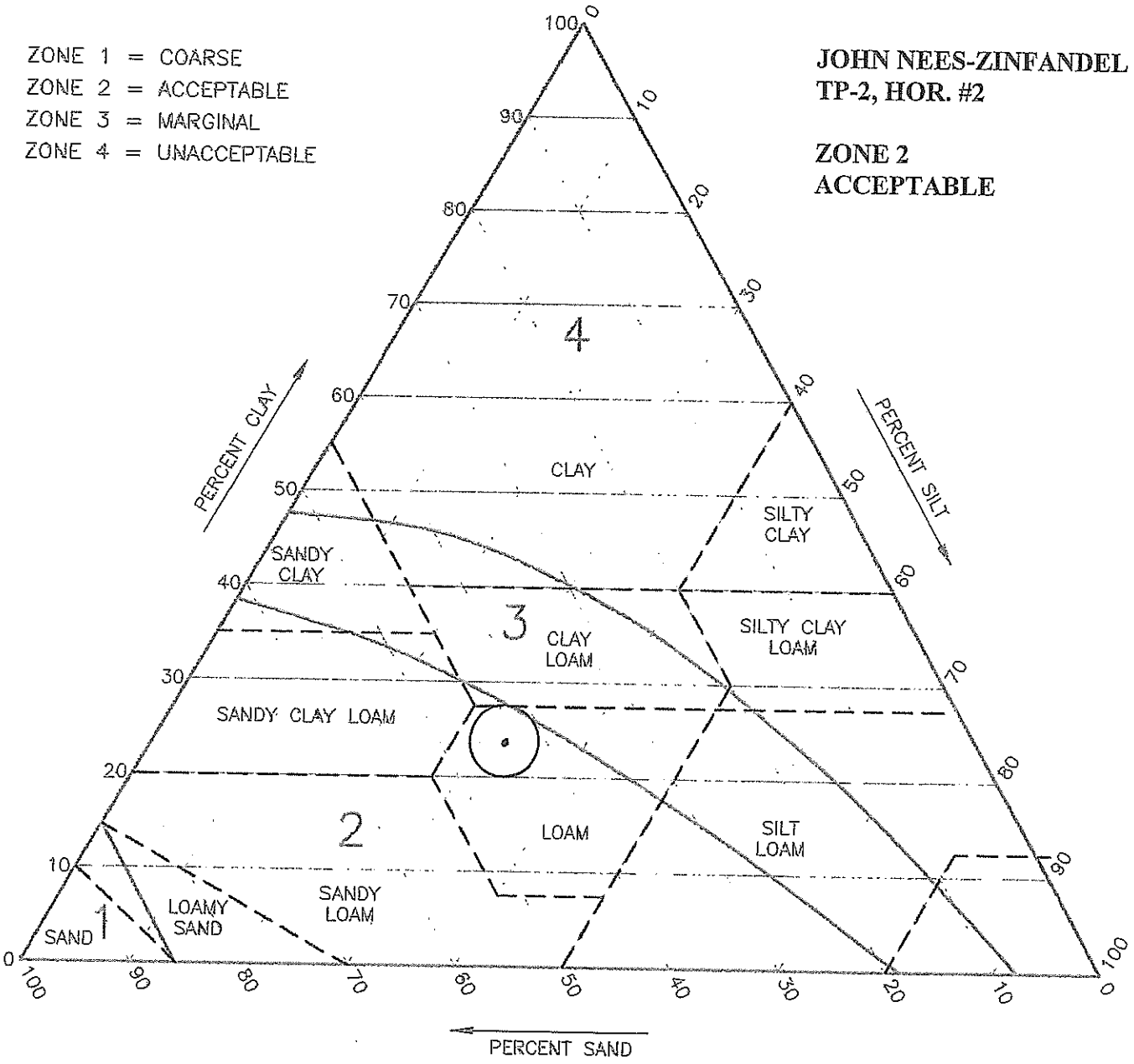
Tarance E. McCue
Senior Laboratory Advisor

SOIL PERCOLATION SUITABILITY CHART

ZONE 1 = COARSE
ZONE 2 = ACCEPTABLE
ZONE 3 = MARGINAL
ZONE 4 = UNACCEPTABLE

JOHN NEES-ZINFANDEL LANE
TP-2, HOR. #2

ZONE 2
ACCEPTABLE



Instructions:

1. Plot texture on triangle based on percent sand, silt, and clay as determined by hydrometer analysis.
2. Adjust for coarse fragments by moving the plotted point in the sand direction an additional 2% for each 10% (by volume) of fragments greater than 2mm in diameter.
3. Adjust for compactness of soil by moving the plotted point in the clay direction an additional 15% for soils having a bulk-density greater than 1.7 gm/cc.

Note:

For soils falling in sand, loamy sand or sandy loam classification bulk density analysis will generally not affect suitability and analysis not neccesary.

R G H

CONSULTANTS, INC.

Geotechnical
Geological
And Laboratory Services

File: 9147.9

November 24, 2008
Bartelt Engineering
1339 Pearl Street, Suite 205
Napa, CA 94559

Subject: **Laboratory Test Results**
Soil Texture Analysis by
Bouyoucos Hydrometry Method
JOHN NEESE-ZINFANDEL LANE

Dear Mr. Bartelt:

This letter transmits the results of our laboratory testing performed for the subject project. Your personnel delivered the samples on November 19, 2008.

We performed a Soil Texture Analysis by the Bouyoucos Hydrometery Method with the following results:

Size/Density	TP-2 HOR. #2
+ #10 Sieve	0.5 %
Sand	44.0 %
Clay	23.8 %
Silt	32.2 %
Db g/cc	--

We trust this provides the information required at this time. Should you have further questions, please call.

Yours very truly,

RGH GEOTECHNICAL

Tarance E. McCue
Senior Laboratory Advisor

R G H

CONSULTANTS, INC.

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And Laboratory Services

Red

BOUYOCOUS HYDROMETER

CLIENT Ro-Tex JOB NAME [illegible] JOB# [illegible]

SAMPLE NUMBER	[illegible]		[illegible]				
DEPTH	[illegible]		[illegible]				
A. Oven dry wt. (grams)	50.0		50.0				
B. Starting Time (hr: min: sec:)	1241		1239				
C. Temp. @ 40 sec. (degrees F)	67.8		67.8				
D. Hydro reading @ 40 sec. (gm/l)	34.5		35.5				
E. Composite Corr. (gm/l)	-6.5		-6.5				
F. True Density @ 40 sec. (gm/l) D-E ○	28.0		29.0				
G. Temp. @ 2 hrs. (degrees F)	67.7		67.8				
H. Hydro reading @ 2 hrs. (gm/l)	18.5		19.0				
I. Composite Corr. (gm/l)	-6.6		-6.5				
J. True Density @ 2 hrs. (gm/l) H-I ○	11.9		12.5				
K. % Sand = 100 – [(F/A) x 100]	41.0		42.0				
L. % Clay = [(J/A) x 100]	23.8		25.0				
M. % Silt = 100-(K+L)	32.2		33.0				
N. % No. 10 =	0.5		5.8				

Cup Number	3-C		B-17				
Dry Before Wash + Tare	[illegible]		530.[illegible]				
Dry After Wash + Tare	[illegible]		[illegible]				
Dry Wt. Passing #10	438.6		402.5				
Tare Weight	101.3		103.2				
Dry Wt. Before Wash	491.1		429.2				
% Passing #10	99.5		94.2				
% #10	0.5		5.8				

HYDROLOGY REPORT

✓ Scanned 8/1/09

BARTELT engineering

May 6, 2009
#08-16

RECEIVED
MAY 13
NAPA CO. CONSERVATION
DEVELOPMENT & PLANNING DEPT.

Erich Kroll
Napa County Department of Public Works
1195 Third Street, Room 201
Napa, CA 94559

Re: Hydrology Calculations for the proposed Wheeler Winery located at 588 Zinfandel Lane, St. Helena, CA, APN 030-260-016

Dear Mr. Kroll:

At your Department's request we have prepared Hydrology Calculations evaluating the potential change in surface storm water runoff associated with the proposed improvements at 588 Zinfandel Lane. The site is on relatively level topography with drainage consisting primarily of sheet flow in a southeasterly direction across the parcel to a County maintained storm drain located in Zinfandel Lane.

The pervious and impervious areas for this study were determined using topographic information taken from the "A.L.T.A. / A.C.S.M. Land Title Survey of the Lands Described in the Preliminary Title Report 00097222-LT" prepared by Albion Surveys, Inc. dated August 2008 and various site visits by Bartelt Engineering. The subject parcel covers approximately 11.719 acres with existing vineyard, residences, garage, tennis court, pool, water tanks, miscellaneous outbuildings, paved and chip sealed drive areas.

The pervious areas were modeled as relatively flat land, with average slopes of 0% to 5% with well drained light and medium textured soils sandy loams, silts, silt loams; good to excellent vegetal cover; a surface having negligible surface depressions, small drainage ways with an average weighted Run-Off Coefficient or "C" value of 0.32.

The impervious areas were modeled as relatively flat land with average slopes of 0% to 5% with no effective soil cover or negligible infiltration capacity and a "C" value of 0.90.

The existing and proposed pervious and impervious areas and respective percentage of each area within the subject parcel and weighted "C" value are listed as follows:

Existing Pervious and Impervious Areas:

10.78 acres or 92.03% pervious
0.93 acres or 7.97% impervious
$C = (0.32) \times (92.03\%) + (0.90) \times (7.97\%) = 0.366$

civil engineering
land planning
1303 jefferson street, 200 B
napa, california 94559
(707) 258-1301
(707) 258-2926 fax

Proposed Pervious and Impervious Areas:

10.76 acres or 91.88% pervious
0.95 acres or 8.12% impervious
C = (0.32) x (91.88%) + (0.90) x (8.12%) = 0.367

For the subject parcel we used a normal annual site precipitation of 32 inches, a 10-year 60 minute rainfall of 1.0 inch, a 100-year 60 minute rainfall of 1.4 inches and a Time of Concentration of 10 minutes (see attached pages from the Napa County Road & Street Standards).

The existing and proposed storm water runoff predictions for a 10-year and 100-year storm are based on the Rational Method and can be calculated as follows:

Existing Storm Water Runoff:

$Q_{10} = (C) \times (I_{10}) \times (A) = (0.366) \times (2.4) \times (11.719 \text{ acres}) = 10.294 \text{ cfs}$
$Q_{100} = (C) \times (I_{100}) \times (A) = (0.366)) \times (3.1) \times (11.719 \text{ acres}) = 13.296 \text{ cfs}$

Proposed Storm Water Runoff:

$Q_{10} = (C) \times (I_{10}) \times (A) = (0.367) \times (2.4) \times (11.719 \text{ acres}) = 10.322 \text{ cfs}$
$Q_{100} = (C) \times (I_{100}) \times (A) = (0.367) \times (3.1) \times (11.719 \text{ acres}) = 13.333 \text{ cfs}$

The results of the storm water runoff predictions infer that there will be a negligible net increase in storm water runoff as a result of the proposed improvements.

If you have any questions regarding the information provided, please feel free to call me at (707) 258-1301.

Sincerely,

REGISTERED PROFESSIONAL ENGINEER
PAUL N. BARTELT
No. 45102
Exp. 09-30-10
CIVIL
STATE OF CALIFORNIA

Paul N. Bartelt, P.E.
Principal Engineer

PNB:sd

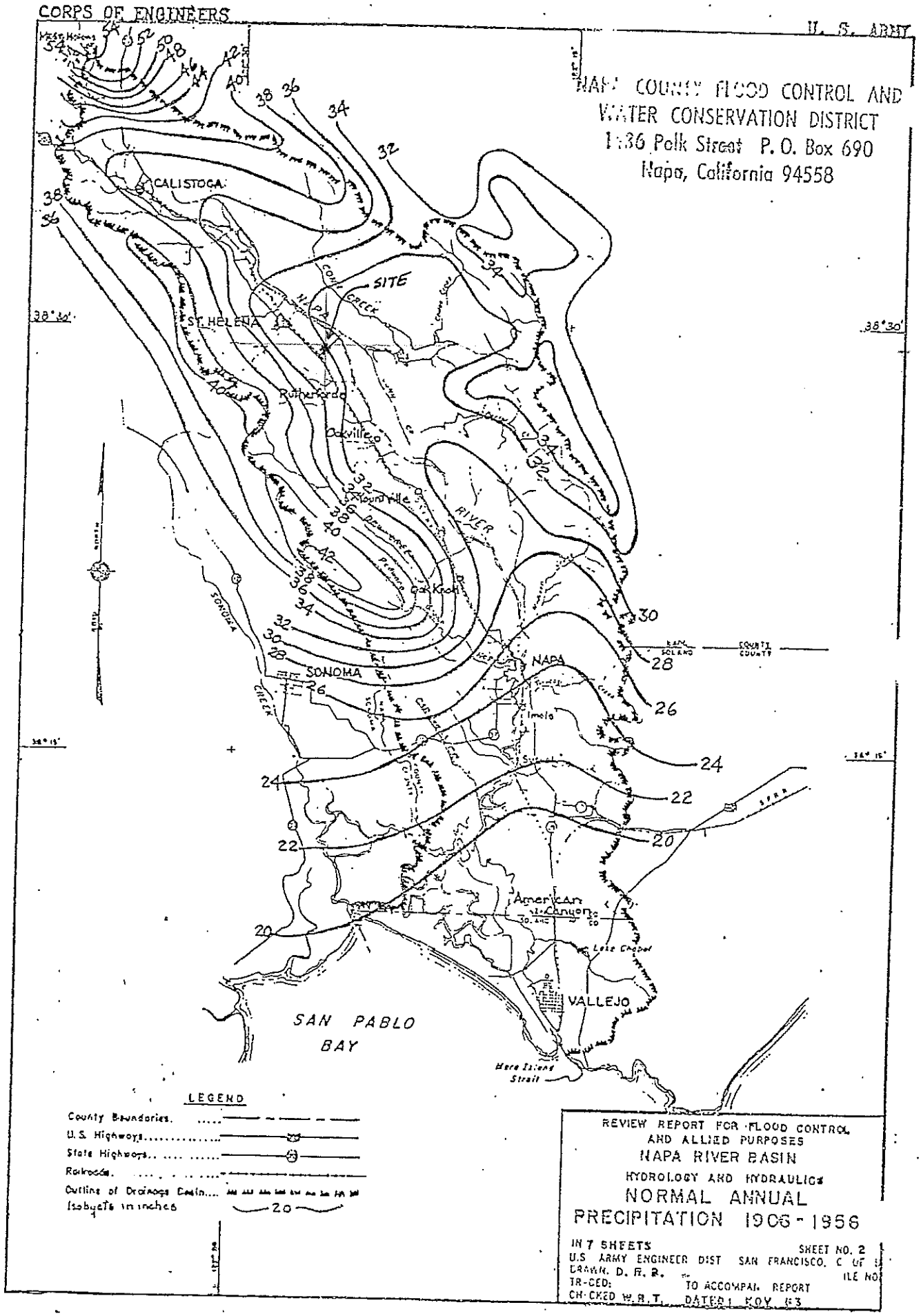
cc: John Nees
Duane Kanuha, Kohala Investment Works
Donna Oldford

RUN-OFF PRODUCING CHARCTERISTICS OF WATERSHEDS SHOWING FACTORS FOR EACH CHARACTERISTIC FOR VARIOUS WATERSHED TYPES

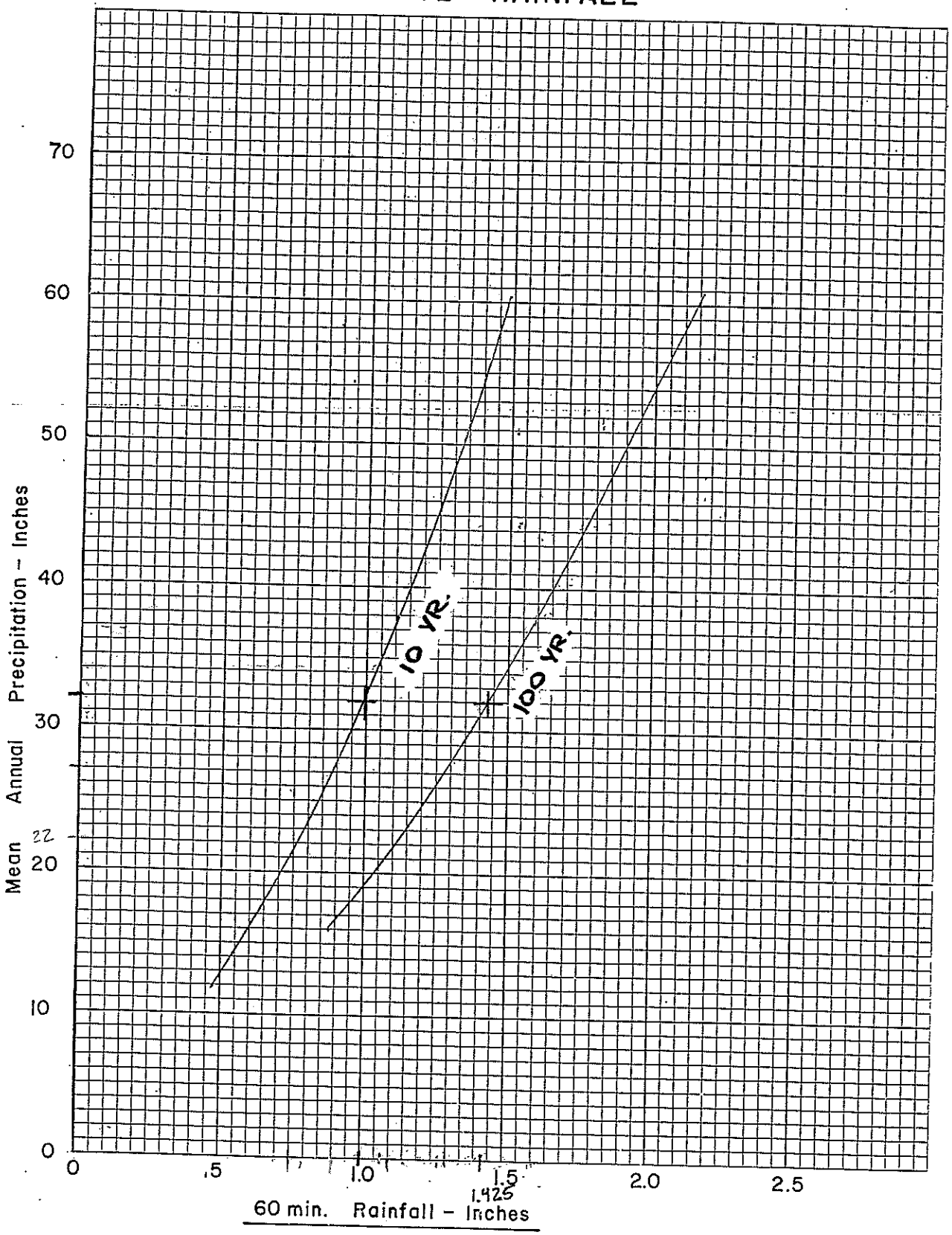
WATERSHED TYPES AND FACTORS				
Run-off Producing Features	Extreme	High	Normal	Low
Relief	0.28-0.36 Steep, rugged terain, with average slopes above 30%.	0.20 - 0.28 Rolling, with average slopes of 10 to 30%.	0.14 - 0.20 Rolling, with average slopes of 5 to 10%.	0.08 - 0.14 Relatively flat land, with average slopes of 0 to 5%.
Soil Infiltration	0.12 - 0.16 No effective soil cover either rock or thin soil mantle of negligible infiltration capacity.	0.08 - 0.12 Slow to take up water; clay or shallow loam soils of low infiltration capacity imperfectly or poorly drained.	0.06 - 0.08 Normal; well drained light and medium textured soils sandy loams, silt, and silt loams.	0.04 - 0.06 High; deep sand or other soil that takes up water readily; very light, well drained soils.
Vegtal Cover	0.12-0.16 No effective plant cover; bare or very sparse cover.	0.08-0.12 Poor to fair; clean cultivation crops or poor natural cover; less than 20% of drainage area under good cover.	0.06-0.08 Fair to good; about 50% of area in good grassland or woodland; not more than 50% of area in cultivated crops.	0.04-0.06 Good to excellent; about 90% of drainage area in good grassland, woodland, or equivalent crop.
Surface	0.10-0.12 Negligible; surface depressions, few and shallow; drainageways steep and small; no marshes.	0.08 - 0.10 Low; well-defined system of small drainageways; no ponds or marsh.	0.06 - 0.08 Normal; considerable surface depression storage; lakes, ponds, and marshes	0.04 - 0.06 High; surface storage high; drainage system not sharply defined; large floodplain storage or large number of ponds or marshes.

THE RUNOFF FACTOR IS DETERMINED BY THE SUM OF THE FACTORS FOR RELIEF INFILTRATION, COVER, AND SURFACE. NOT APPLICABLE TO BUILT UP AREAS.

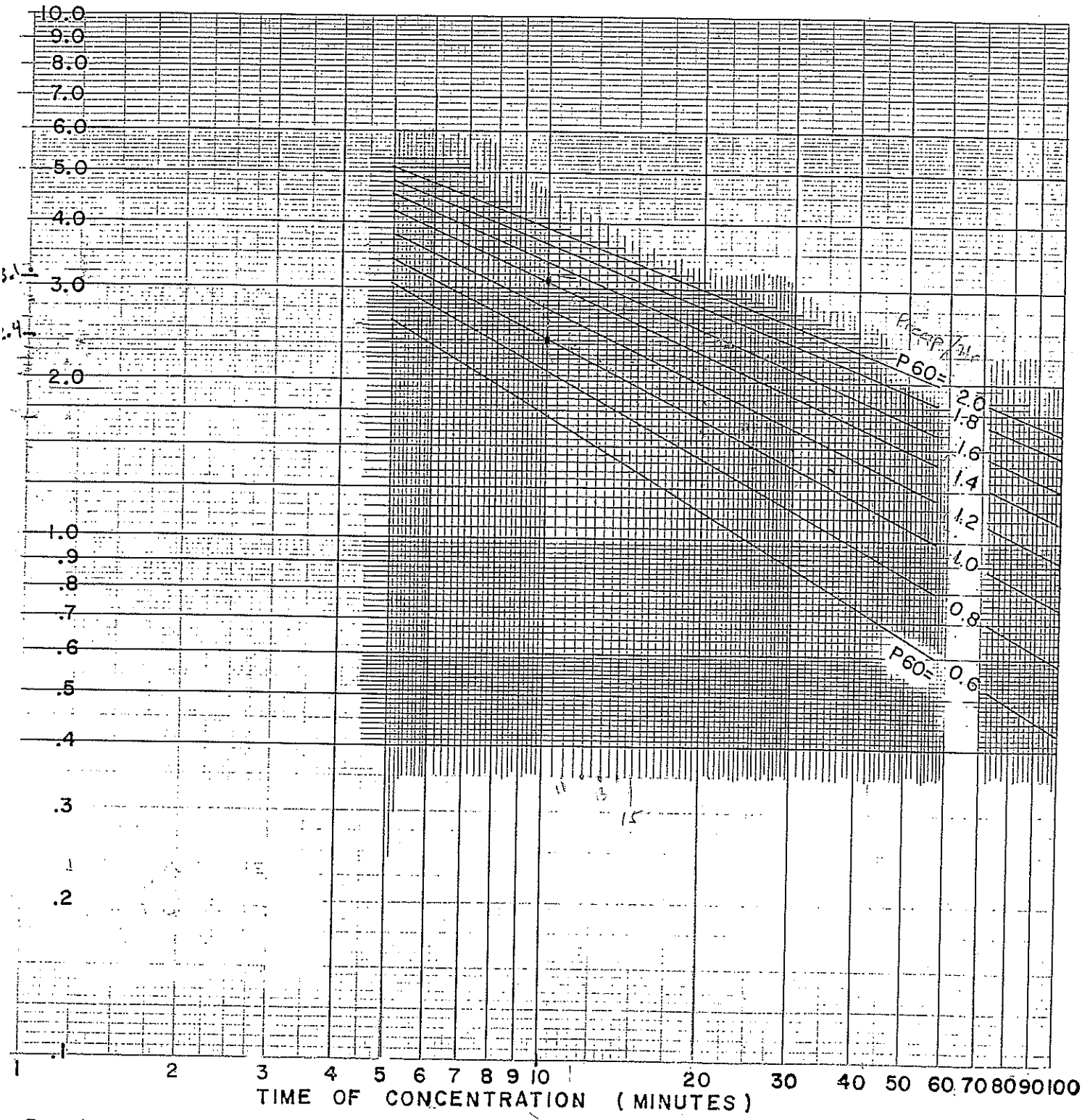
FIGURE 3


CORPS OF ENGINEERS
U. S. ARMY
NAPA COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
1136 Polk Street P. O. Box 690
Napa, California 94558
CALISTOGA
SITE
NAPA
ST. HELENA
Rutherford
Oakville
Yountville
RIVER
Oak Knoll
SONOMA
NAPA
Imola
American Canyon
VALLEJO
SAN PABLO BAY
Mare Island Strait
38°30'
38°15'
LEGEND
County Boundaries
U.S. Highways
State Highways
Railroads
Outline of Drainage Basin
Isohyets in inches
REVIEW REPORT FOR FLOOD CONTROL AND ALLIED PURPOSES
NAPA RIVER BASIN
HYDROLOGY AND HYDRAULICS
NORMAL ANNUAL PRECIPITATION 1906-1956
IN 7 SHEETS
SHEET NO. 2
U.S. ARMY ENGINEER DIST SAN FRANCISCO, C OF E
DRAWN: D. R. R.
FILE NO.
TR-CED:
TO ACCOMPAN REPORT
CH-CKED W. R. T.
DATED: NOV. 53

MEAN ANNUAL PRECIPITATION
VS
60 MINUTE RAINFALL



INTENSITY – DURATION CHART



Based on figure 7-811.6 (-8-64)
State of California
Division of Highways
Planning Manual

ithmic, 2 x 2 Cycles