WASTEWATER FEASIBILITY STUDY

for

RAYMOND VINEYARD AND CELLAR INC.

Napa County, CA
APN 030-270-013

Project No. 2010080

SUMMIT

Prepared by:

SUMMIT ENGINEERING, INC.
Consulting Civil Engineers
463 Aviation Boulevard, Suite 200
Santa Rosa, CA 95403

May 09, 2011
Revised June 13, 2013

RAYMOND VINEYARD & CELLAR INC.
Napa County, California

WASTEWATER FEASIBILITY STUDY

Introduction

The purpose of this report is to present background data and calculations for the Process Wastewater (PW) and Sanitary Sewage (SS) treatment system improvements that will be required to support the increased wastewater flows from the Use Permit Modification.

Project Description

Boisset Family Estates is considering a Use Permit Modification for the Raymond Vineyard & Cellar Inc winery facility located at 849 Zinfandel Lane, near the town of St. Helena (APN 030-270-013). The Use Permit Modification involves the conversion of various existing buildings to accommodate hospitality services (e.g. conversion of the existing residence to a private tasting venue with kitchen). In addition to the conversion of existing buildings, the proposed modification will also involve a change to the marketing plan for proposed events which requires a sanitary wastewater feasibility study.

An ultimate production capacity of 1,500,000 gallons of wine is being requested. This production represents the total gallons of wine to be bottled; up to approximately 2,500 tons of grapes will be crushed onsite (412,500 gallons of wine) and approximately 1,087,500 gallons of juice will be trucked in. This production increase will require some improvements to be made to the existing PW treatment system.

Site Description

The facility is located in an agricultural area with vineyards to the north, west and south and east. Zinfandel Lane runs parallel with the northern edge of the property.

The existing buildings, vineyards, roads, well locations, property lines, existing PW Ponds, and existing and proposed SS treatment and disposal areas are located on the Overall Site Plan (Enclosure A).

PW Design Summary

The following list provides the assumptions used in the development of this feasibility study. Detailed calculations are provided in Enclosure B of this report. Process wastewater flow data observed at Raymond for 2012 was used in this analysis.

Assumptions:

- 6 gallons of process wastewater generated for every gallon of wine produced from onsite crush operations
- 2 gallons of process wastewater generated for every gallon of wine produced from juice trucked in
- Peak process wastewater generation months are October, November, December accounting for 9.0%, 16.9%, and 15.7% of the annual PW generation, respectively.
- Raw Process Wastewater Biochemical Oxygen Demand (BOD) is 7,700 mg/L
- Aerator oxygen transfer rate is 1.8 lbs oxygen per horsepower-hour
- A 10-year return period for precipitation was used for the water balance

Raymond - Process Wastewater Management System	
Item	**Proposed Conditions and Facilities**
Annual Wine Production	1,500,000 Gal (bottled) (2,500 tons grapes crushed) (1,087,500 gallons of juice)
PW Design Flow	27,000 GPD
Solids Removal	(E) Rotary Screen
Facultative Aerated Treatment Ponds	Pond 1, 1.103 Mgal Pond 2, 2.555 Mgal Pond 3, 2.345 Mgal Total Vol. = 6.003 Mgal
Total Hydraulic Retention Time	222.3 days
Total Pond Aeration	Vertical Axis 60 HP
Irrigation Disposal Area	62.2 acres
Plumbing Modifications	N/A

SS Design Summary

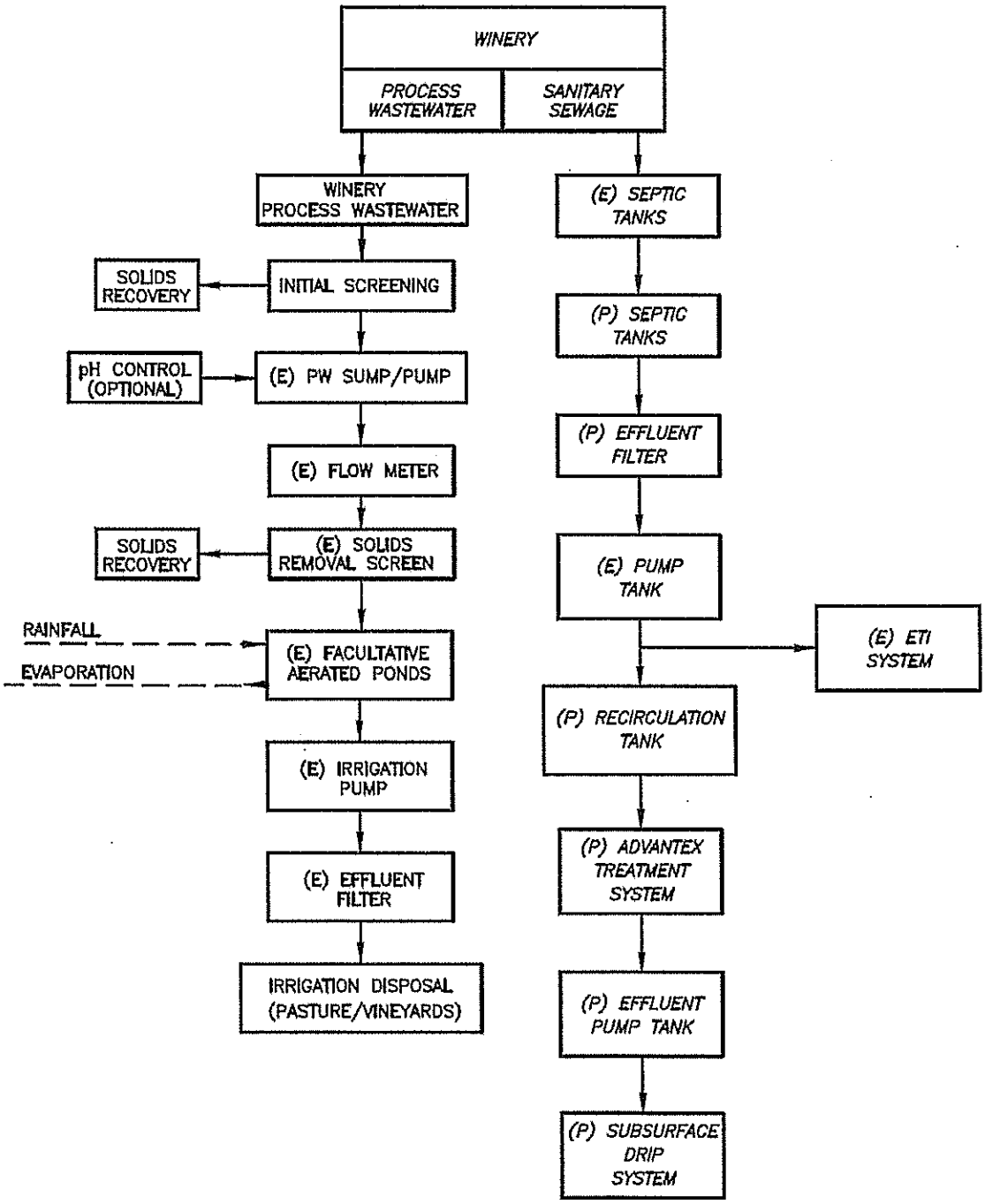
Sanitary sewage (SS) at Raymond will consist of typical wastewater generated from restrooms and hospitality services. As stated in the Use Permit Modification application, winery tours and tasting will occur 7 days a week with peak of 500 tasting visitors per day and 90 employees .Portable toilets will be utilized for events with more than 150 guests. Based on the projected number of employees and visitors, the design flow rate for the sanitary sewage management system is 5,100 gallons per day. Please refer to Enclosure B for detailed calculations.

The following events are planned for Raymond:

- 2 events per year for up to 500 people, (2 evening events - indoor or outdoor);
- 4 events per year for up to 250 people (3 evening events, 1 daytime event)
- 6 events per year for up to 150 people (3 evening events and 3 daytime events);
- 12 events per year for up to 100 people (8 evening events and 4 daytime events);
- 26 events per year for up to 50 people (18 evening and 8 daytime events);

Raymond - Sanitary Sewage Management System		
Item	**Existing Conditions and Facilities**	**Proposed Conditions and Facilities**
Design Flow	1,745 GPD	5,100 GPD
Septic Tanks	(2) 1,500 Gal	(2) 1,500 Gal (1) 2,500 Gal
Pump Tank	Duplex	Duplex – convert plumbing to pump between (E) ETI bed and (N) disposal field
Pretreatment	None	AdvanTex Treatment System, including: (1) AX100 Filter Pod (1) 5,000 Gal Recirculation Tank (1) 5,000 Gal Effluent Pump Tank
Disposal Field	ETI Bed (1,745 GPD)	(E) ETI Bed (1,745 GPD) Subsurface Drip (3,355 GPD)

WASTEWATER MANAGEMENT SYSTEM SCHEMATIC



WINERY PROCESS WASTEWATER

Process wastewater will consist primarily of wastewater collected at floor drains and trenches within the winery, receiving, crush, tank, and washdown areas. No sanitary sewage will be designed to discharge into the PW management system. Exterior tank and process areas not under a roof will be provided with diversion capability to provide a means of routing rainwater to the storm drainage system when those areas are not in use for process purposes. No distillation will occur at the facility; hence there will be no stillage waste.

Process Wastewater Conveyance, Treatment and Disposal

The following features will be incorporated into the process wastewater management system:

1) Initial screening (existing)

2) Gravity collection system (existing)

3) PW pump station (existing)

4) Pretreatment consisting of:

   a) pH control (if necessary)

   b) Flow measurement (existing)

   c) Solids removal screen (existing)

5) Facultative aerated ponds (existing)

6) Irrigation Filter/Pump (existing)

7) Irrigation disposal (reuse)

A discussion of each of these features is provided below. Refer to the Wastewater Management System Schematic in Enclosure A for a flow diagram of the PW management system.

1) Initial screening (existing) – Provided by screened baskets and strainers installed on the trench drains and floor drains within the winery. Screen opening sizes are assumed to be on the order of 1/4 inch for exterior drains and 1/8 inch for interior drains.

2) Gravity collection system (existing) – Designed to provide low maintenance and no infiltration or exfiltration. Existing piping is assumed to be compatible with process wastewaters and satisfy Uniform Plumbing Code and local requirements.

3) PW pump station -- The existing pump station is expected to be capable of pumping all of the anticipated process wastewater flow ranges (see Pond Sizing, Enclosure C, for projected process wastewater flows) expected from the increase in production. If necessary, a larger pump could be installed to handle the most extreme PW flow conditions (peak hour events or similar events of infrequent occurrence and short duration). The pump station conveys PW to the solids removal screen followed by the aerated pond system.

4) Pretreatment – Consisting of the following elements:

   a) pH control system (if necessary)

      i) Summit's experience over the last 10 years has indicated that pH neutralization of winery PW is typically not required for aerated pond systems. The combination of naturally occurring alkalinity in the source water and the alkaline cleaning compounds typically used within the winery usually provide sufficient buffering to maintain pond pH above 6.5. Neutralizing chemicals should only be used when absolutely necessary.

      Summit does not recommend the installation of pH control systems when the PW management system is first constructed. Instead, Summit recommends that the pH of the ponds be monitored for a year (monitoring is required by the RWQCB), especially through one harvest season. If at the end of the one-year monitoring period it has been demonstrated that pH control is necessary (or sooner if conditions warrant), a pH control system could be added. A description of this system is presented below.

      (1) Capability for addition of an automatic pH control system (if necessary) in the future, to adjust pH of the wastewater (as required) to above 6.5. This future system (if provided) will consist of a pH sensor, controller/recorder, control piping manifold, and chemical storage. A pH probe will be available for monitoring. Aqueous ammonia will be used as the neutralizing chemical and will be introduced in the pumping station wetwell. The wetwell will include a ½-inch black iron steel pipe for ease of future connection of the ammonia piping.

      (2) The pH adjustment may provide a more favorable environment (if necessary) for the growth anaerobic treatment; anhydrous ammonia will also serve as a supplemental nutrient in the biological process. The adjustment of the pH also reduces the chances for emission of hydrogen sulfide odors that can occur in a low pH environment.

   b) Flow measurement (existing) – An existing inline flow measurement device will be utilized to measure flows from the PW pump station to the facultative aerated ponds.

   c) Solids removal screen (existing) – An existing motorized rotary drum screen removes the large solids from the system and, as a result, reduces the organic biological loading on, and the accumulation of solids in, the aerated pond system. Solids from the screening operations will continue to be treated as pomace (residual grape solids). Refer to the solid waste section for a description of pomace handling.

5) Facultative aerated ponds (existing) – A production level of 1,500,000 gallons of wine bottled is proposed (correlating to approximately 2,500 tons crushed onsite and 1,087,500 gallons of juice trucked in).

   a) In 2012 the existing irrigation/frost protection pond was be converted to provide additional PW treatment (this change in process was reviewed by Napa County). The modified pond treatment system consists of three treatment ponds with a normal residence time of 222 days at average day peak harvest month flow conditions as presented in Enclosure B. For process wastewater/rainfall inputs and evaporation/irrigation outputs, refer to the pond water balance (based on 10-year rainfall and a minimum two foot freeboard) in Enclosure C. The total volume of the modified pond system is approximately 6.00 Mgal (Pond No. 1: 1.103 Mgal, Pond No. 2:

2.555 Mgal, and Pond No. 3: 2.345), with a 2 ft minimum freeboard. The treated water will then be used for onsite irrigation and frost protection.

Surface mechanical aerators for the aeration pond will be sized to satisfy biochemical oxygen demand as well as oxygen dispersion requirements. Time clock control of the aerators will be provided to allow operations personnel to adjust aerator operation to changing winery functions and pond conditions.

Treatment systems of this type have been utilized at a number of wineries in California and in other states; locations include:

Winery and Location	Constructed
Chateau St. Jean Winery, Kenwood	1974
Buena Vista Winery, Sonoma County	1975
Jordan Winery, Healdsburg	1976
Beaulieu Vineyard, Rutherford	1982
Clos du Val Winery, Napa	1983
Louis M. Martini Winery, Napa County	1985
Ferrari-Carano Winery, Sonoma County	1986
Mumm Napa Valley, Napa County	1988
Montinore Vineyards, Washington Co., Oregon	1989
Clos Pegase, Napa County	1990
Scharffenberger Cellars, Mendocino County	1990
Cakebread Cellars, Napa County	1991
King Estate Vineyards, Lane County, Oregon	1992
Kendall-Jackson, Laughlin Road, Sonoma County	1996
Wild Horse Vineyards, San Luis Obispo County	1997
Kendall-Jackson, Monterey County	1998
Seghesio Winery, Healdsburg, Sonoma County	1999
Benziger Imagery Winery, Sonoma County	2000
Kendall-Jackson, Stonestreet, Sonoma County	2000
Edna Valley Vineyard, San Luis Obispo County	2000
Villa Mt. Eden, Napa County	2000
Sanford Winery, Santa Barbara County	2000
Stags Leap Winery, Napa County	2001
Far Niente Winery, Napa County	2001
Sutter Home Lodi, San Joaquin County	2001
Zaca Mesa Winery	2004
Merryvale Winery	2005
Sequoia Grove Winery	2008

6) Filter/Irrigation Pump (existing) – The existing filter and irrigation pump will be utilized to screen secondary effluent prior to vineyard irrigation.

7) Irrigation disposal (reuse) -- Final disposal (reuse) of effluent to be accomplished by irrigation of pasture and vineyard. Refer to Enclosure D for proposed application rates to the disposal area and effluent storage volumes. The effluent is to be applied at low rates to prevent irrigation runoff. The irrigation demand is the lowest during the wet season (November through April) and application rates, during this period, should be less than 0.5 inches per acre per week. Total existing irrigation

area is approximately 62.2 acres.

OTHER CONSIDERATIONS

Odor Control

There should be no obnoxious odors from a properly designed and operated treatment system of this type. See Alternative Courses of Action, below, for operation alternatives during unforeseen conditions.

Ground Water Contamination

No disposal of reclaimed wastewater will occur within 100 feet of any existing wells.

Irrigation disposal of treated effluent is considered a beneficial use and is considered an effective means to protect groundwater quality. Well water may be added to the treated PW when capacity permits to supplement the volume of water used for irrigation

Surface Waters

All wastewater treatment facilities are designed with sufficient drainage facilities to divert local runoff. Irrigation/disposal operations will be routinely monitored to ensure against surface runoff. Irrigation/disposal will be suspended for approximately 48 hours prior to, during and following any forecasted storms. Irrigation/disposal will be suspended as long as saturated soil conditions persist.

Protection

Wastewater treatment facilities will be posted with appropriate warning signs. The aerated ponds are fenced to restrict public access.

Alternative Courses of Action

Although no operational difficulties are foreseen, the following additional courses of action would be available, if necessary:

1) Ability to add carbon dioxide to reduce pH at the pretreatment site or installation of another type of pH control system

2) Ability to add a supplemental oxygen source to the ponds for odor control (such as hydrogen peroxide)

3) Provision of higher aeration capacity in the ponds

4) Additional stages of treatment to increase effluent quality

5) Increased use of irrigation/disposal area to increase discharge capacity

The facultative aerated ponds have been designed for retention of wastewater and rainwater through the majority of the rainy season with minimal discharges to irrigation/disposal fields (based on a 2-foot freeboard for the 10-year seasonal rainfall. Should there be a winter with more rainfall than the design condition, several operational procedures are available to compensate:

1) Additional water conservation at winery

2) Light irrigation during periods between storms -- not exceeding the assimilative capacity of the soil

3) Increased irrigation during the months of planned irrigation

4) Pumping and truck transfer of treated and diluted wastewater to a sewage treatment plant or land disposal site

SOLID WASTES

Solid wastes from the winery include primarily pomace, seeds and stems. The estimated quantities of these wastes (at ultimate capacity) are as follows:

2,500 tons grapes crushed onsite

Ultimate Annual Total - 35% x 2,500 tons grapes = 875 tons solid wastes

Based on a unit weight of 38 pounds per cubic foot, the annual volume of solids wastes would be:

$$875 \text{ tons} \times \frac{2000 \text{ lbs}}{1 \text{ ton}} \times \frac{1}{38 \text{ lbs/CF}} \times \frac{1 \text{ CY}}{27 \text{ CF}} = 1{,}705 \text{ CY}$$

These organic solids will be hauled to an off-site composting location. Alternatively, the solids could be composted, spread on the vineyard, and disked in as a soil conditioner and supplemental nutrient source. This quantity of solids wastes applied to 20 acres of vineyard would be approximately 0.65 inches deep, as shown below.

$$1{,}705 \text{CY} \times \frac{1 \text{ acre}}{4840 \text{ SY}} \times \frac{36 \text{ in}}{1} \div 71 \text{ acres} = 0.18 \text{ in}$$

Solids, in the form of sludge, accumulate in the ponds requiring periodic removal every 5 to 10 years. Those highly decomposed solids could be either dried and spread in a vineyard area or transported to a solid waste disposal site.

SANITARY SEWAGE

The owner intends to design and install a new onsite system in accordance with all necessary Napa County Environmental Management criteria and permits. Sanitary sewage (SS) flows will be handled separately from process wastewater flows. The SS system will be designed to accommodate ultimate marketing plans and associated SS flows. The ultimate design flow for the sanitary system is 6,000 gpd.

Sanitary sewage will be treated and disposed of using septic tanks, an existing Evaporation Transpiration & Infiltration (ETI) system and a new AdvanTex textile filter/subsurface drip system. Given suitable soils, this method of treatment and disposal of SS is appropriate.

The SS treatment and disposal system will have the following components:

1) Gravity collection

2) Septic tanks with effluent filter

3) Treatment systems

    a. Existing ETI system

    b. AdvanTex textile filter/subsurface drip disposal

A discussion of each of these features is provided below.

1) Gravity collection -- Designed to provide low maintenance and no infiltration or exfiltration. Piping is compatible with sanitary sewage and satisfies Uniform Plumbing Code and local requirements.

2) Septic tanks – Based on the Uniform Plumbing Code, the required septic tank size for the winery SS flows is 4,950 gallons. Two existing 1,500 gallon septic tanks are provided for septic tankage. An additional 2,500 gallon septic tank will be required to provide for adequate settling of solids.

3) Pump tank – Wastewater from the sanitary sewage septic tanks will flow by gravity to the existing Pump Tank where it will be pumped to the either the ETI system or the recirculation tank for the AdvanTex Pretreatment system. Existing pumping and controls systems will need to be evaluated.

4) SS treatment systems will consist of an existing mound system and an Orenco AdvanTex system with a subsurface drip field for effluent disposal.

    a. An existing ETI system will serve as an area for primary treatment of sanitary sewage flows. The existing ETI consists of two beds approximately 50' x 12' each, and has a SS flow design capacity of 1,745 gpd.

    b. AdvanTex Textile Filter/Subsurface Drip System –

        i. Orenco System's AdvanTex Treatment System is a packed bed textile filter that supports attached growth biological treatment. In addition to the packed bed filter, the treatment system will include septic tanks, a recirculating tank, pumps,

and valves. Controls will consist of a timer with float switch override, high water alarms, and a duplex pump control panel equipped with remote telemetry and a web based monitoring system.

ii. Subsurface drip disposal – The subsurface drip disposal field will provide for effluent disposal. The drip tubing, manufactured by Geoflow, will be installed in 12 inch deep trenches with 12 inches of native backfill. Installation of the drip tubing near the soil surface will maximize the evaporation and percolation into the root zone of the soil. The area for a subsurface drip disposal field will be a minimum of 5,700 square feet and a minimum 200% reserve area of 11,400 square feet.

SUMMIT ENGINEERING, INC.
Project No. 2010080

RAYMOND VINEYARD & CELLAR INC.

WASTEWATER FEASIBILITY STUDY

ENCLOSURE A

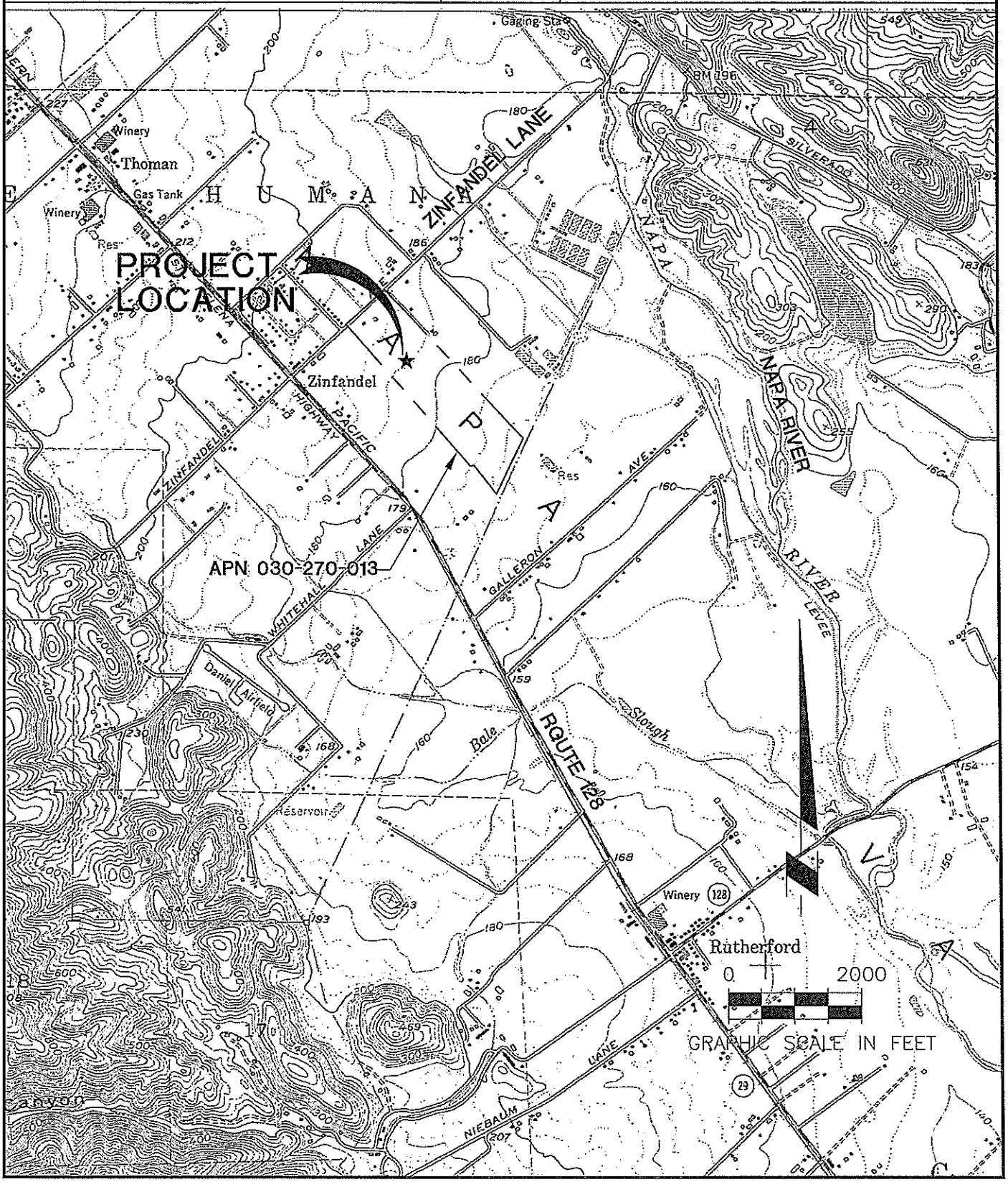
VICINITY MAP
ASSESSOR'S PARCEL MAP
OVERALL SITE PLAN
SS DISPOSAL FIELD LAYOUT
TYPICAL WINERY PROCESS WASTEWATER CHARACTERISTICS

RAYMOND VINEYARD AND CELLAR INC.
849 ZINFANDEL LANE
ST. HELENA, CA 94574
APN 030-270-013

SUMMIT

VICINITY MAP

PROJECT NO. 2010080 DATE 05-09-2011
BY KO CHK GG SHT NO 1 OF 1



Apr 04, 2013 - 4:12pm P:\Project\2010\2010080 Raymond Winery UP-WaterWWFS and UP\CAD\Wastewater\10080-VICINITY MAP.dwg

SUMMIT ENGINEERING INC.
463 AVIATION BLVD. #200
SANTA ROSA, CA 95403
707.527.0775
FAX 707.527.0212

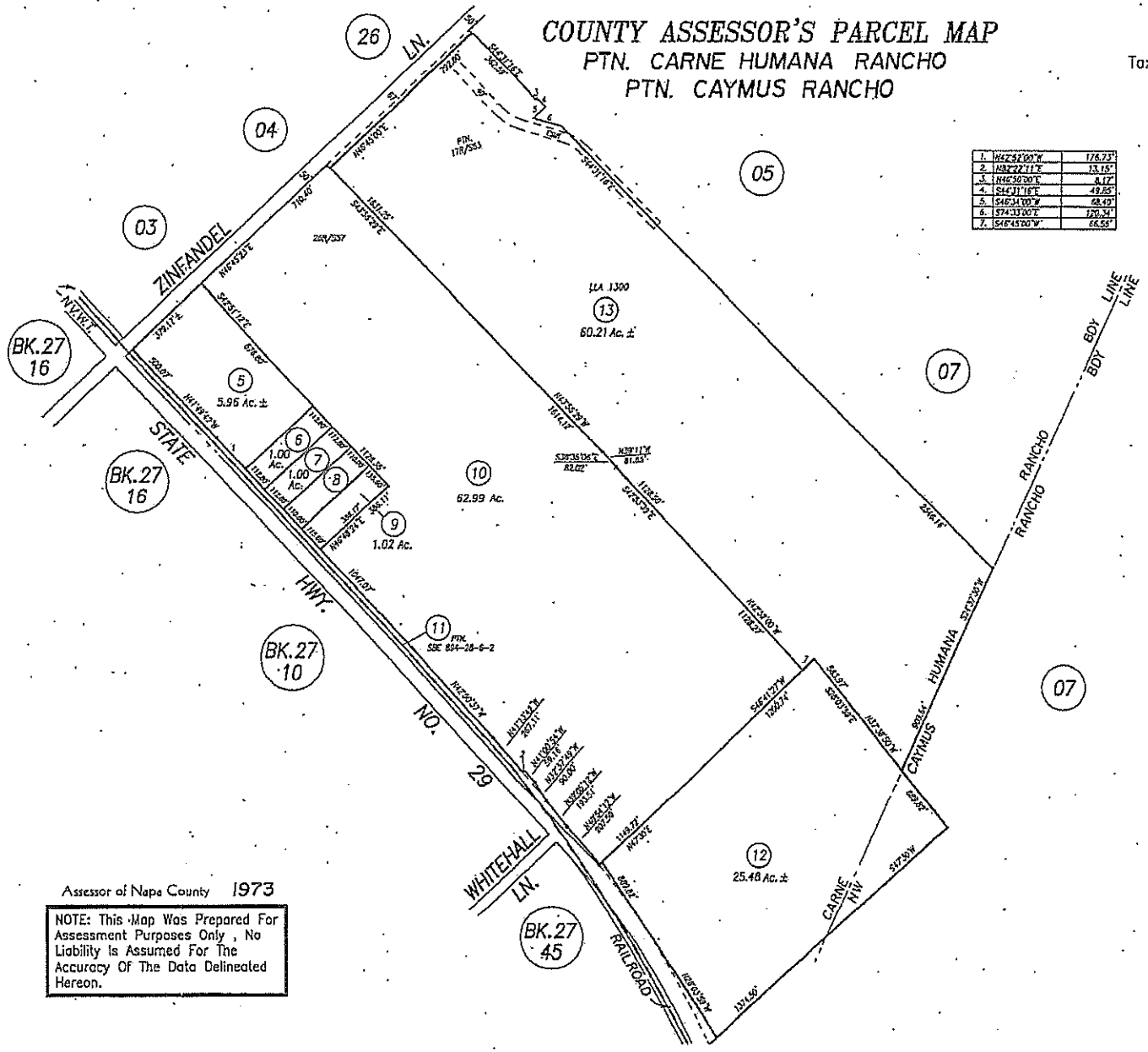
COUNTY ASSESSOR'S PARCEL MAP

PTN. CARNE HUMANA RANCHO

PTN. CAYMUS RANCHO

Tax Area Code
85001

30–27



1.	N42°52'00"W	176.73'
2.	N82°22'11"E	13.15'
3.	N46°30'00"E	8.17'
4.	S84°31'18"E	49.85'
5.	S46°34'00"W	68.49'
6.	S74°33'00"E	120.24'
7.	S46°45'00"W	66.55'

1"= 400'

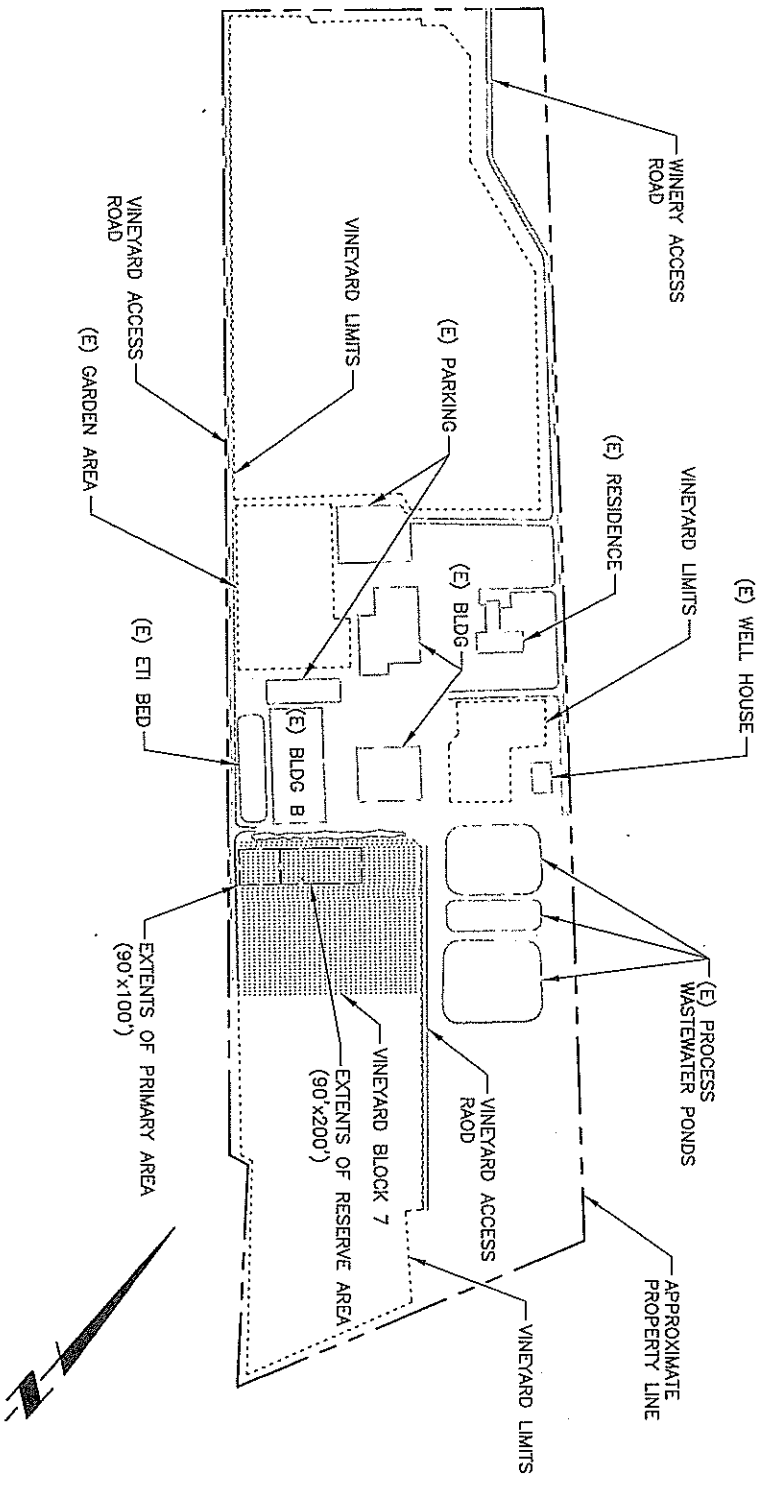
Assessor of Napa County 1973

NOTE: This Map Was Prepared For Assessment Purposes Only , No Liability Is Assumed For The Accuracy Of The Data Delineated Hereon.

REVISION	DATE
	8–10–93
	6–16–94
270–10 PTN TO HWY 60	11–19–96
270–13 LLA	12–11–02
270–13 ESMT	2–5–07

30–27

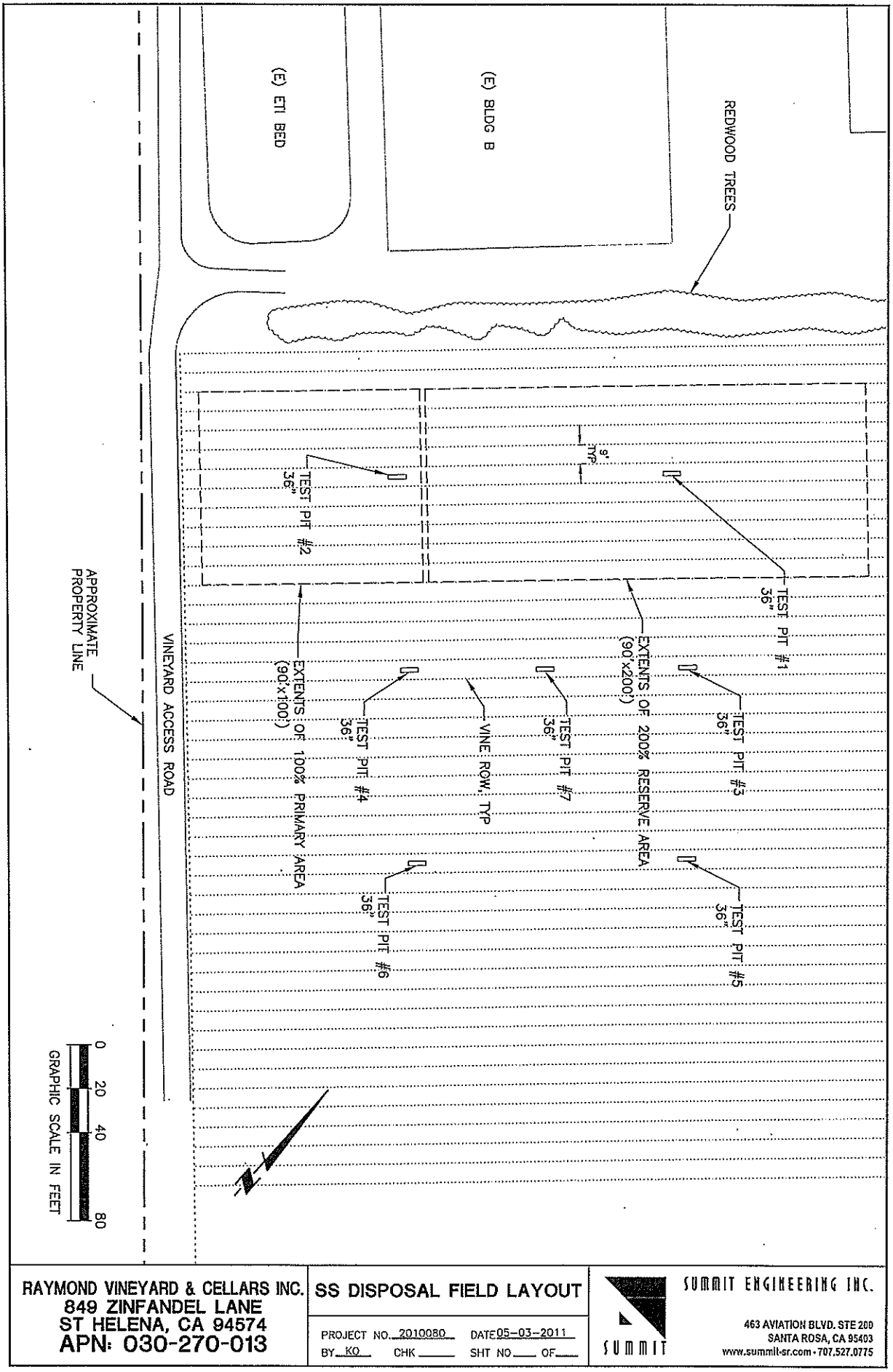
PLOTTED ON: 4/4/2013 4:14 PM
P:\PROJECT\2010\2010080 RAYMOND WINERY UP-WATERWWFS AND UP\CAD\WASTEWATER\SITE PLAN.DWG



RAYMOND VINEYARD AND CELLAR INC. 849 ZINFANDEL LANE ST HELENA, CA 94574 APN: 030-270-013	OVERALL SITE PLAN PROJECT NO. 2010080 DATE 02-02-2011 BY KO CHK ____ SHT NO ____ OF ____	SUMMIT ENGINEERING INC. 463 AVIATION BLVD. STE 200 SANTA ROSA, CA 95403 www.summit-sr.com - 707.527.0775

PLOTTED ON: 4/4/2013 4:15 PM

P:\PROJECT\2010\2010080 RAYMOND WINERY UP-WATERWWFS AND UP\CAD\WASTEWATER\SITE PLAN.DWG



RAYMOND VINEYARD & CELLARS INC. 849 ZINFANDEL LANE ST HELENA, CA 94574 APN: 030-270-013	SS DISPOSAL FIELD LAYOUT PROJECT NO. 2010080 DATE 05-03-2011 BY KO CHK ____ SHT NO ____ OF ____	SUMMIT ENGINEERING INC. 463 AVIATION BLVD. STE 200 SANTA ROSA, CA 95403 www.summit-sr.com • 707.527.0775

SUMMIT ENGINEERING, INC.
Project No. 2010080
May 9, 2011
Revised May 2, 2013

TYPICAL WINERY PROCESS WASTEWATER CHARACTERISTICS

Characteristic	Units	Crushing Season Range	Non-crushing Season Range
pH	--	2.5 - 9.5	3.5 - 11.0
Dissolved Oxygen	mg/L	0.5 - 8.5	1.0 - 10.0
BOD_5	mg/L	500 – 12,000	300 – 3,500
COD	mg/L	800 – 15,000	500 – 6,000
Grease	mg/L	5 - 30	5 - 50
Settleable Solids	mg/L	25 - 100	2 - 100
Nonfilterable Residue	mg/L	40 - 800	10 - 400
Volatile Suspended Solids	mg/L	150 - 700	80 - 350
Total Dissolved Solids	mg/L	80 – 2,900	80 – 2,900
Nitrogen	mg/L	1 - 40	1 - 40
Nitrate	mg/L	0.5 - 4.8	-
Phosphorous	mg/L	1 - 10	1 - 40
Sodium	mg/L	35 - 200	35 - 200
Alkalinity ($CaCO_3$)	mg/L	40 - 730	10 - 730
Chloride	mg/L	3 - 250	3 - 250
Sulfate	mg/L	10 - 75	20 - 75

SUMMIT ENGINEERING, INC.
Project No. 2010080

RAYMOND VINEYARD & CELLAR INC.

WASTEWATER FEASIBILITY STUDY

ENCLOSURE B

WASTEWATER MANAGEMENT SYSTEM
DESIGN CRITERIA/CAPACITY ASSESSMENT

RAYMOND VINEYARD AND CELLAR INC.
Napa County, California

WASTEWATER MANAGEMENT SYSTEM FEASIBILITY STUDY
DESIGN CRITERIA/CAPACITY ASSESMENT

PW DESIGN FLOWS

Based on typical flow data from wineries of similar size and characteristics and corresponding process wastewater (PW) generation rates, projected flows for the proposed 1,500,000 gallon winery are calculated as follows:

PW Flow Generation

Annual PW Volume

Gallons of wine bottled	= 1,500,000 gal wine/year
Tons of grapes crushed (approximate)	= 2,500 tons/year
Gallons of wine from onsite production	= 412,500 gal wine/year
Gallons of wine from juice truck in	= 1,087,500 gal wine/year
Generation rate (for onsite production)	= 6 gal PW/gal wine
Generation rate (for juice bottled)	= 2 gal PW/gal wine

Annual PW Volume:

= 412,500 gal wine x 6 gal PW/gal wine + 1,087,500 gal wine x 2 gal PW/gal wine

= 4,650,000 gal PW

Average Day Flow

4,650,000 gal PW ÷ 365 days/year = 13,000 gpd PW

Average Day Peak Harvest Month

$$\frac{4{,}650{,}000 \text{ gal PW/year} \times (0.169)}{30} = 27{,}000 \text{ gpd PW}$$

Pond Sizing

Pond No. 1

Total Volume	=	1.103 Mgal
Retention Time	=	1,103,000 gallons / 27,000 gpd
	=	40.9 days

Pond No. 2

Total Volume	=	2.555 Mgal
Retention Time	=	2,555,000 gallons / 27,000 gpd
	=	94.6 days

Pond No. 3

Total Volume	=	2.345 Mgal
Retention Time	=	2,345,000 gallons / 27,000 gpd
	=	86.9 days

Totals, Pond Nos. 1 and 2

Retention Time	=	40.9 days + 94.6 days + 86.9 days
	=	222.4 days

Retention Time of approximately 222 days

Pond Aeration

Sizing parameters for the aerators are as follows:

- BOD Loading = 7,700 mg/L
- Average Day Harvest Flow = 27,000 gpd
- Oxygen Requirement = 1.5 lbs O_2/lb BOD
- Oxygen Transfer Rate = 1.8 lbs O_2/HP - hr
- Power/Vol Ratio, Pond No. 1 = 0.20 - 0.40 HP/1,000 cu ft
- Power/Vol Ratio, Pond No. 2 = 0.05 - 0.10 HP/1,000 cu ft
- Power/Vol Ratio, Pond No. 3 = 0.05 – 0.10 HP/1,000 cu ft
- Pond No. 1 Volume = 1.10 Mgal
- Pond No. 2 Volume = 2.55 Mgal
- Pond No. 3 Volume = 2.35 Mgal

BOD_5 Mass Loading:

Average Day Harvest Flow = 27,000 gpd
BOD_5 Concentration = 7,700 mg/l

BOD_5 (Mass) = (7,700 mg/L)(0.027 MGD)(8.345 lbs/MG) = 1,735 lbs/day

Oxygen Requirements:

$$= \frac{(1.5 \text{ lbs } O_2/\text{lbs } BOD_5)(1{,}735 \text{ lbs } BOD_5/\text{d})}{(24 \text{ hrs/d})}$$

= 108 lbs O_2/hr

Aerator Horsepower Required:

$$= \frac{108 \text{ lbs } O_2/\text{hr}}{1.8 \text{ lbs } O_2/\text{HP-hr}}$$

= 60 HP

Use 50 HP in Pond 1 and 10 HP in Pond 2 for primary treatment

Check Power-to-Volume Ratio:

The volume of Pond No. 1 is approximately 1.10 Mgal with a freeboard of 2 ft.

$$P\backslash V = \frac{50 \text{ HP}}{1{,}100{,}000 \text{ gal}} \times \frac{7.48 \text{gal}}{\text{cf}} \times \frac{10^3}{1{,}000 \text{ cf}} = 0.34 \text{ HP/1,000 cf}$$

P\V of 0.34 HP/1,000 cf is within the acceptable range of 0.20 – 0.40. Therefore, oxygen transfer and

mixing is likely to occur in the upper 8-10 feet of the pond as required in a facultative aerated pond system.

Aerated Pond No. 2

The volume of Pond No. 2 is approximately 2.56 Mgal with a freeboard of 2 ft.

Aerator Sizing:

$$P\backslash V = \frac{10\ HP}{2{,}560{,}000\ gal} \times \frac{7.48 gal}{cf} \times \frac{10^3}{1{,}000\ cf} = 0.03\ HP/1{,}000\ cf$$

P/V of 0.10 HP/1,000 cf is within the Summit Engineering, Inc. will provide adequate aeration for pond 2. Low power to volume ratios in the secondary ponds allows for additional solids settling, reducing overall effluent TSS.

Aerated Pond No. 3

The volume of Pond No. 3 is approximately 2.35 Mgal with a freeboard of 2 ft.

Aerator Sizing:

$$P\backslash V = \frac{10\ HP}{2{,}350{,}000\ gal} \times \frac{7.48 gal}{cf} \times \frac{10^3}{1{,}000\ cf} = 0.03\ HP/1{,}000\ cf$$

Pond 3 will be utilized for storage prior to irrigation; this pond will not need to provide primary treatment. Aeration will be provided so that the stored effluent dos not become stagnant. reducing overall effluent TSS.

SANITARY SEWAGE

Sanitary sewage (SS) at Raymond will consist of typical wastewater generated from restrooms and hospitality services. As stated in the Use Permit Modification application, winery tours and tasting will occur 7 days a week with peak of 500 tasting visitors per day and 90 employees. Portable toilets will be utilized for events with more than 150 guests.

The following events are planned for Raymond:

- 2 events per year for up to 500 people, (2 evening events - indoor or outdoor);
- 4 events per year for up to 250 people (3 evening events, 1 daytime event)
- 6 events per year for up to 150 people (3 evening events and 3 daytime events);
- 12 events per year for up to 100 people (8 evening events and 4 daytime events);
- 26 events per year for up to 50 people (18 evening and 8 daytime events);

Anticipated sanitary sewage flows are projected as follows:

Average Non-Harvest Tasting Day w/o Event

60 Full-time employees x 15 gpcd		=	900 gpd
10 Part-time employees x 15 gpcd		=	150 gpd
500 Tasting visitors x 3 gpcd		=	1,500 gpd
	Total	=	2,550 gpd

Average Harvest Tasting Day w/o Event

60 Full-time employees x 15 gpcd		=	900 gpd
30 Part-time employees x 15 gpcd		=	450 gpd
500 Tasting visitors x 3 gpcd		=	1,500 gpd
	Total	=	2,850 gpd

Non-Harvest Peak Tasting w/ Event

60 Full-time employees x 15 gpcd		=	900 gpd
10 Part-time employees x 15 gpcd		=	150 gpd
500 Tasting visitors x 3 gpcd		=	1,500 gpd
150 Event visitors x 15 gpcd		=	2,250 gpd
	Total	=	4,800 gpd

Harvest Peak Tasting w/ Event

60 Full-time employees x 15 gpcd		=	900 gpd
30 Part-time employees x 15 gpcd		=	450 gpd
500 Tasting visitors x 3 gpcd		=	1,500 gpd
150 Event visitors x 15 gpcd		=	2,250 gpd

Total = 5,100 gpd

SS SYSTEM DESIGN FLOWS

Following solids settling in the septic tank, SS will flow into a pump tank. The SS flows will then be distributed, based on their design capacities, between the existing ETI system and the proposed AdvanTex/subsurface drip system (as described below). The original ETI system was designed for 1,745 gpd.

Existing Mound System Capacity: 1,745 gpd

Proposed AdvanTex/Subsurface Drip System Capacity: 5,100 gpd – 1,745 gpd = 3,355 gpd
The proposed AdvanTex/Subsurface Drip System will be designed for a peak SS flow rate of **3,355** gallons per day.

Sanitary Sewage Septic Tanks

The required septic tank size for the winery SS flow based on the projected peak day SS and the Uniform Plumbing Code Sizing Requirements is calculated as follows:

V = 1,125 + 0.75*Q
= 1,125 + (0.75) * 5,100 gpd
= 4,950 gallons

Two existing 1,500 gallon septic tanks and one new 2,500 gallon septic tank will be adequate to handle the existing and additional Winery SS flows. An effluent filter will be added to the outlet of the septic tanks to reduce solids passage to the pump station and Advantex Treatment System/subsurface drip system.

Proposed SS Treatment System

Following solids settling in the septic tank, SS will flow to the AdvanTex Pretreatment/subsurface drip system.

Soil Investigation Results

The projected subsurface drip field and PD leachfield sizing for this feasibility study is based on a site evaluation performed on April 5th, 2011 with NCEM and Summit Engineering. Seven soil profiles were excavated within the vineyard area south of the existing ETI bed. Please refer to the attached site map for the soil profile locations. The soil profiles displayed acceptable soils to depths ranging from 41-54 inches. However, mottling was observed at 36" which will be considered the limiting depth. These soils were classified as a sandy clay loam with moderate blocky structure with an assigned hydraulic loading rate of 0.6 gal/sf/day. Approximately 81,000 square feet is available for a subsurface drip system.

AdvanTex Textile Filter Treatment & Subsurface Drip Disposal System

Orenco System's AdvanTex Treatment System is a packed bed textile filter that supports attached growth biological treatment. In addition to the packed bed filter, as mentioned above, the treatment system will include a septic tank, a recirculating tank, pumps, and valves. Controls will consist of a timer with float switch override, high water alarms, and a duplex pump control panel equipped with remote telemetry and a web based monitoring system. Summit Engineering Inc. recommends 1 AX100 filter for the Raymond Winery SS application. Performance testing of this treatment system by the National Sanitation Foundation (NSF) indicates it is capable of treating residential sanitary sewage wastewater to effluent values of 8 mg/L BOD_5 and 6 mg/L suspended solids (30-day arithmetic mean).

The system components sizing is as follows:

AdvanTex units:	1 – AX100 Filter Pod (16' by 8')
Recirculation Tank:	1 – 5,000 gallon tank (17' by 8')
Effluent Pump Tank:	1 – 5,000 gallon tank (17' by 8')

Subsurface Drip Disposal System

Subsurface drip system disposal field sizing is based on the drip tubing manufacture's recommendation, Table 1 of the Geoflow Design and Installation Manual. The onsite soil is identified in Table 1 as a Class III soil type (clay loam), which corresponds to an estimated percolation rate of 30-45 MPI, and is used to size the system. Approximately 167 square feet of drip field is required for every 100 gpd of effluent discharge.

Subsurface Drip Disposal Area = $3{,}355 \text{ gpd} \times \frac{167 \text{ sf}}{100 \text{ gpd}}$

= 5,603 sf

A minimum subsurface drip disposal area of 5,700 sf will be provided as well as a minimum 200% reserve area (11,400 sf).

The drip tubing will be installed in 12 inch deep trenches with 12 inches of native backfill. Installation of the drip tubing near the soil surface will maximize the evaporation and percolation into the root zone of the soil.

SUMMIT ENGINEERING, INC.
Project No. 2010080

RAYMOND VINEYARD & CELLAR INC.

WASTEWATER FEASIBILITY STUDY

ENCLOSURE C

WASTEWATER FLOW CALCULATIONS

SUMMIT ENGINEERING, INC.	RAYMOND VINEYARD AND CELLAR INC. Wastewater Feasibility Study Sanitary Sewage Flows	PROJECT NO. BY: CHK:	2010080 GG GG

SANITARY SEWAGE

WINERY

Average Non-Harvest Tasting Day w/o Event				
Employee (full-time)	60 x	15 gpcd	=	900 gal/day
Employee (part-time)	10 x	15 gpcd	=	150 gal/day
Tasting Visitors	500 x	3 gpcd	=	1,500 gal/day
Total			=	**2,550 gal/day**
Average Harvest Tasting Day w/o Event				
Employee (full-time)	60 x	15 gpcd	=	900 gal/day
Employee (part-time)	30 x	15 gpcd	=	450 gal/day
Tasting Visitors	500 x	3 gpcd	=	1,500 gal/day
Total			=	**2,850 gal/day**
Non-Harvest Peak Tasting w/ Event				
Employee (full-time)	60 x	15 gpcd	=	900 gal/day
Employee (part-time)	10 x	15 gpcd	=	150 gal/day
Tasting Visitors	500 x	3 gpcd	=	1,500 gal/day
Peak Event (catered)	150 x	15 gpcd	=	2,250 gal/day
Total			=	**4,800 gal/day**
Harvest Average Tasting w/ Event				
Employee (full-time)	60 x	15 gpcd	=	900 gal/day
Employee (part-time)	30 x	15 gpcd	=	450 gal/day
Tasting Visitors	500 x	3 gpcd	=	1,500 gal/day
Peak Event (catered)	150 x	15 gpcd	=	2,250 gal/day
Total			=	**5,100 gal/day**

DESIGN FLOW = **5,100 gal/day**

***portable toilets will be used for larger events greater than 150 persons**

SUMMIT ENGINEERING, INC.	RAYMOND WINERY AND CELLAR Wastewater Feasibility Study Process Wastewater Flows	PROJECT NO. BY: CHK:	2010080 KO GG

PROCESS WASTEWATER

Annual Volume

Annual Production (projected)					=	1,500,000 gal wine/year
Generation Rate (assumed)[a]					=	165 gal wine/ton grapes
Tons Crushed	1,500,000 gal wine/year	÷	165 gal wine/ton grapes		=	9,091 tons grapes/year
Process Wastewater (PW) Generation Rate[b]	(assumed)				=	6.00 gal PW/gal wine
Annual PW Flow	1,500,000 gal wine/year	x	6.00 gal PW/gal wine		=	*9,000,000 gal PW/year*

Average Day Flow

	9,000,000 gal PW/year	÷	365 days		=	*24,658 gal PW/day*

Napa County Peak Day Flow

Length of Harvest					=	60 days
Peak Flow	1,500,000 gal wine/year 60 days	x	1.5		=	*37,500 gal PW/day*

Average Day Peak Harvest Month Flow

Assume:
1. 16.3% of the PW flows are accounted for during October
2. 30 days in October

Peak Flow	9,000,000 gal PW/year 30 days	x	16.3%		=	*48,900 gal PW/day*
					=	*48,900 gal PW/day*

SUMMIT ENGINEERING, INC.
Project No. 2010080

RAYMOND VINEYARD & CELLAR INC.

WASTEWATER FEASIBILITY STUDY
ENCLOSURE D

PW POND WATER BALANCE AND EFFLUENT DISPERSAL BALANCE

SUMMIT ENGINEERING, INC. Consulting Civil Engineers	Raymond Vineyard & Cellar Inc. 1.5 Mgallons of Wine Bottled Process Wastewater Design Criteria	PROJECT NO BY: CHK:	2010080 GG AS

DESIGN CRITERIA

FULL PRODUCTION

Annual Tons Crushed	2,500 ton/year
Wine Generation Rate	165 gal wine/ton
Annual Gallons from Grapes Crushed	412,500 gal wine/year
Annual Juice Trucked In	1,087,500 gal wine/year
Annual Production (Gallons Bottled)	1,500,000 gal wine/year
PW Generation Rate (for tons crushed)	6.0 gal PW/gal wine
PW Generation Rate (for juice bottled)	2.0 gal PW/gal wine
Total Expected PW Flow	4,650,000 gal PW/year
Peak Months	Oct-Dec
Average Annual Flow	13,000 gal PW/day
Average Day Harvest Flow	22,000 gal PW/day
Average Day Peak Month Flow	27,000 gal PW/day
Average Day Non-Harvest Flow	27,000 gal PW/day

Pond No. 1 Volume	1.103 Mgal
Pond No. 2 Volume	2.555 Mgal
Pond No. 3 Volume	2.345 Mgal
Total Pond Volume	6.003 Mgal

Pond No. 1 HRT*	40.9 days
Pond No. 2 HRT*	94.6 days
Pond No. 3 HRT*	86.9 days
Total HRT*	222.3 days

*HRT Calculated based on Peak Harvest Month Flow

PROCESS WASTEWATER FLOWS - WINEMAKING OPERATIONS

Month	Days in Month	2012 Monthly Percentage of Flows (%)	Monthly Flow based on 2012 data (Mgal)
August	31	5.6%	0.262
September	30	7.8%	0.362
October	31	9.0%	0.420
November	30	16.9%	0.786
December	31	15.7%	0.732
January	31	5.7%	0.266
February	28	5.9%	0.273
March	31	9.2%	0.429
April	30	8.7%	0.406
May	31	5.1%	0.237
June	30	4.9%	0.229
July	31	5.3%	0.248
Total	**365**	**100.0%**	**4.650**

[a] Monthly percentage of annual flow based on 2012 PW Flow data from Raymond

SUMMIT ENGINEERING, INC. Consulting Civil Engineers	Raymond Vineyard & Cellar Inc. 1.5 Mgallons of Wine Bottled Climate Data	PROJECT NO. BY: CHK:	2010080 GG AS

Month	Days	Average Temp[a] (F)	Reference Evapotranspiration[b] (in)	Pan Evaporation[c] (in)	Lake Evaporation[d] (in)	Average Precipitation[e] (in)	10-Year Precipitation[f] (in)	100-Year Precipitation[f] (in)
August	31	70.7	5.9	7.2	5.5	0.1	0.2	0.2
September	30	67.6	5.2	6.4	4.9	0.3	0.4	0.6
October	31	61.7	3.3	3.9	3.0	1.8	2.6	3.4
November	30	52.3	1.1	1.9	1.5	4.0	5.7	7.5
December	31	46.6	1.2	1.4	1.1	6.5	9.3	12.2
January	31	46.0	0.8	1.5	1.2	7.9	11.3	14.9
February	28	50.2	2.3	2.0	1.5	5.8	8.3	10.9
March	31	52.3	3.6	3.4	2.6	4.8	6.8	9.0
April	30	56.3	5.2	4.2	3.2	2.2	3.1	4.1
May	31	62.4	6.7	5.9	4.5	0.7	1.0	1.3
June	30	68.0	7.0	6.5	5.0	0.2	0.3	0.4
July	31	71.1	6.9	8.9	6.9	0.0	0.0	0.0
Total	**365**		**49.2**	**53.2**	**41.0**	**34.4**	**49.0**	**64.7**

[a] Average monthly temperature observed between 1961 and 1995, for St. Helena, CA. See http://www.worldclimate.com

[b] Average monthly reference evaporation rates for Zone 8, Inland San Fransisco Bay Area, typical rainfall year, CIMIS, DWR, 2001. See www.itrc.org.

[c] Average monthly pan evaporation rates observed at Yountville, CA between 1962 and 1969.

[d] Pan evaporation rates adjusted by a factor of 0.77 to determine lake evaporation.

[e] Average monthly rainfall observed between 1931 and 1995, for St. Helena, CA. See http:/www.worldclimate.com

[f] Average monthly rainfall adjusted by the ratio of 10-yr and 100-yr wet year return storm identified by Pearsons Log III Distribution.

SUMMIT ENGINEERING, INC. Consulting Civil Engineers	Raymond Vineyard & Cellar Inc. 1.5 Mgallons of Wine Bottled Aeration Requirements	PROJECT NO. 2010080 BY: GG CHK: AS

DESIGN CRITERIA - EXISTING

Sizing Parameters

BOD Concentration	7,700	mg/L
Average Day, Peak Harvest Month Flow	27,000	gal PW/day
Oxygen Requirement	1.5	lbs O_2/lb BOD
Oxygen Transfer Rate (High Speed Surface Aerator)	1.8	lbs O_2/HP - hr
Power/ Volume Ratio, Pond No. 1	0.20 - 0.40	Hp/ 1,000 cu ft
Power/ Volume Ratio, Pond No. 2 & 3	0.05 - 0.10	Hp/ 1,000 cu ft
Pond No. 1 Volume	1.10	Mgal
Pond No. 2 Volume	2.55	Mgal
Total Pond Volume	3.66	Mgal

Total Aeration

BOD Mass Loading	1,735	lbs BOD/day
Aerator Run Time	24	Hrs/day
Oxygen Requirement	108	lbs O_2/Hr
Calculated Aerator Horsepower	60	Hp
Aerator Horsepower Recommended	60	Hp

Aerated Pond No. 1

Aerator Hp Recommended	50	Hp
Check Power-to-Volume Ratio	0.34	Hp/ 1,000 CF

P\V range desired is 0.20 to 0.40, this will enable oxygen transfer and mixing to occur within the upper 8-10 feet of the pond as required in a facultative aerated lagoon system.

Aerated Pond No. 2

Aerator Hp Recommended	10	Hp
P\V	0.03	Hp/ 1,000 CF

P\V range desired is 0.05 to 0.10, this will enable oxygen transfer and mixing to occur within the upper 3-4 feet of the pond as required in a facultative aerated lagoon system.

SUMMIT ENGINEERING, INC. Consulting Civil Engineers	Raymond Vineyard & Cellar Inc. 1.5 Mgallons of Wine Bottled Pond Worksheet	PROJECT NO. BY: CHK:	2010080 GG AS

Pond No. 1

Bottom Width	39.0'	Bottom Radius	10.0'	Start Month	August
Bottom Length	203.0'	Top Radius	45.0'	Min. Depth	5.0'
Interior Side Slope (x:1)	2.0	Depth	12.0'	Initial Depth	10.0'
Length:Width	0.2	Freeboard	2.0'		

Depth (ft)	Length (ft)	Width (ft)	Radius (ft)	Surface Area (ft^2)	Total Volume (Mgal)
0	203	39	10	8,454	0.000
1	207	43	13	9,607	0.068
2	211	47	16	10,796	0.144
3	215	51	19	12,023	0.229
4	219	55	22	13,288	0.324
5	223	59	25	14,590	0.428
6	227	63	28	15,929	0.542
7	231	67	30	17,305	0.667
8	235	71	33	18,719	0.801
9	239	75	36	20,170	0.947
10	243	79	39	21,659	1.103
11	247	83	42	23,185	1.271
12	251	87	45	24,748	1.450

Pond No. 2

Bottom Width	126.0'	Bottom Radius	10.0'	Start Month	August
Bottom Length	203.0'	Top Radius	45.0'	Min. Depth	5.0'
Interior Side Slope (x:1)	2.0	Depth	12.0'	Initial Depth	9.0'
Length:Width	0.6	Freeboard	2.0'		

Depth (ft)	Length (ft)	Width (ft)	Radius (ft)	Surface Area (ft^2)	Total Volume (Mgal)
0	203	126	10	26,115	0.000
1	207	130	13	27,616	0.201
2	211	134	16	29,153	0.413
3	215	138	19	30,728	0.637
4	219	142	22	32,341	0.873
5	223	146	25	33,991	1.121
6	227	150	28	35,678	1.382
7	231	154	30	37,402	1.655
8	235	158	33	39,164	1.942
9	239	162	36	40,963	2.241
10	243	166	39	42,800	2.555
11	247	170	42	44,674	2.882
12	251	174	45	46,585	3.223

Pond No. 3

Bottom Width	100.0'	Bottom Radius	10.0'	Start Month	August
Bottom Length	203.0'	Top Radius	45.0'	Min. Depth	4.0'
Interior Side Slope (x:1)	2.0	Depth	12.0'	Initial Depth	9.0'
Length:Width	0.5	Freeboard	2.0'		

Depth (ft)	Length (ft)	Width (ft)	Radius (ft)	Surface Area (ft^2)	Total Volume (Mgal)
0	203	100	10	22,057	0.000
1	207	104	13	23,809	0.172
2	211	108	16	25,599	0.356
3	215	112	19	27,426	0.555
4	219	116	22	29,290	0.767
5	223	120	25	31,192	0.993
6	227	124	28	33,131	1.234
7	231	128	30	35,107	1.489
8	235	132	33	37,121	1.759
9	239	136	36	39,172	2.044
10	243	140	39	41,260	2.345
11	247	144	42	43,386	2.662
12	251	148	45	45,549	2.994

SUMMIT ENGINEERING, INC. Consulting Civil Engineers	Raymond Vineyard & Cellar Inc. 1.5 Mgallons of Wine Bottled Pond Water Balance 10-Year	PROJECT NO. 2010080 BY: GG CHK: AS

Pond No. 1

Month	Initial Volume (Mgal)	Pond Evaporation (Mgal)	PW Inflow (Mgal)	10 Year Precipitation (Mgal)	Volume Change (Mgal)	Total Volume (Mgal)	Divert Volume (Mgal)	Final Volume (Mgal)	Final Pond Depth (ft)
August	1.103	-0.074	0.262	0.002	0.190	1.294	0.190	1.103	10.0
September	1.103	-0.066	0.362	0.007	0.302	1.406	0.302	1.103	10.0
October	1.103	-0.040	0.420	0.040	0.420	1.523	0.420	1.103	10.0
November	1.103	-0.020	0.786	0.088	0.854	1.957	0.854	1.103	10.0
December	1.103	-0.015	0.732	0.143	0.860	1.963	0.860	1.103	10.0
January	1.103	-0.016	0.266	0.174	0.424	1.528	0.424	1.103	10.0
February	1.103	-0.021	0.273	0.128	0.379	1.483	0.379	1.103	10.0
March	1.103	-0.035	0.429	0.106	0.500	1.603	0.500	1.103	10.0
April	1.103	-0.044	0.406	0.048	0.411	1.514	0.411	1.103	10.0
May	1.103	-0.061	0.237	0.016	0.191	1.294	0.191	1.103	10.0
June	1.103	-0.068	0.229	0.005	0.165	1.269	0.165	1.103	10.0
July	1.103	-0.093	0.248	0.000	0.155	1.259	0.155	1.103	10.0
Total		**-0.553**	**4.650**	**0.756**	**4.853**		**4.853**		

Pond No. 2

Month	Initial Volume (Mgal)	Pond Evaporation (Mgal)	PW Inflow (Mgal)	10 Year Precipitation (Mgal)	Volume Change (Mgal)	Total Volume (Mgal)	Divert Volume (Mgal)	Final Volume (Mgal)	Final Pond Depth (ft)
August	2.241	-0.141	0.190	0.005	0.054	2.295	1.200	1.095	4.8
September	1.095	-0.103	0.302	0.013	0.212	1.308	0.900	0.408	1.9
October	0.408	-0.054	0.420	0.075	0.440	0.848	0.500	0.348	1.6
November	0.348	-0.026	0.854	0.166	0.994	1.342	0.360	0.982	4.4
December	0.982	-0.022	0.860	0.269	1.107	2.089	0.360	1.729	7.2
January	1.729	-0.028	0.424	0.327	0.724	2.452	0.360	2.092	8.5
February	2.092	-0.039	0.379	0.240	0.581	2.673	0.119	2.555	10.0
March	2.555	-0.070	0.500	0.199	0.629	3.184	0.629	2.555	10.0
April	2.555	-0.087	0.411	0.091	0.415	2.970	0.415	2.555	10.0
May	2.555	-0.121	0.191	0.029	0.099	2.654	0.099	2.555	10.0
June	2.555	-0.134	0.165	0.009	0.040	2.594	0.040	2.555	10.0
July	2.555	-0.183	0.155	0.000	-0.027	2.527	0.286	2.241	9.0
Total		**-1.007**	**4.853**	**1.423**	**5.268**		**5.268**		

SUMMIT ENGINEERING, INC. Consulting Civil Engineers	Raymond Vineyard & Cellar Inc. 1.5 Mgallons of Wine Bottled Irrigation & Effluent Application Rates 10-Year Average Rainfall	PROJECT NO. BY: CHK:	2010080 GG AS

Applied Irrigation Area

Vineyard 62.2 acres

Month	Precipitation[a]	Irrigation Demand[b]		Operating Days per Month[c]	Percolation Capacity[d]		Assimilative Capacity[e]		Effluent Applied		Excess Capacity
	(in)	(in)	(Mgal)	(d)	(in)	(Mgal)	(in)	(Mgal)	(Mgal)	(in)	(Mgal)
August	0.2	9.4	15.9	31	44.64	75.445	54.0	91.298	1.200	0.71	90.10
September	0.4	6.6	11.2	30	43.20	73.011	49.8	84.183	0.900	0.53	83.28
October	2.6	0.0	0.0	16	23.04	38.939	23.0	38.939	0.500	0.30	38.44
November	5.7	0.0	0.0	14	20.16	34.072	20.2	34.072	0.360	0.21	33.71
December	9.3	0.0	0.0	5	7.20	12.169	7.2	12.169	0.360	0.21	11.81
January	11.3	0.0	0.0	6	8.64	14.602	8.6	14.602	0.360	0.21	14.24
February	8.3	0.0	0.0	5	7.20	12.169	7.2	12.169	0.119	0.07	12.05
March	6.8	0.0	0.0	12	17.28	29.205	17.3	29.205	0.629	0.37	28.58
April	3.1	5.1	8.6	13	18.72	31.638	23.8	40.258	0.415	0.25	39.84
May	1.0	8.6	14.6	16	23.04	38.939	31.7	53.508	0.099	0.06	53.41
June	0.3	10.3	17.4	17	24.48	41.373	34.8	58.815	0.040	0.02	58.77
July	0.0	10.7	18.0	30	43.20	73.011	53.9	91.044	0.286	0.17	90.76
Total	**49.0**	**50.7**	**85.7**	**195.0**	**280.8**	**474.6**	**331.5**	**560.3**	**5.3**	**3.1**	**554.99**

(a) Precipitation, 10-year rainfall event, see Climate Data Worksheet.
(b) Irrigation demand determined by Dellevalle Labratories for alfalfa crop land, 10/8/10.
(c) Number of operating days per month based on estimated irrigation days available based on 24-hr post storm criteria for a 10-year return period. Summit Engineering, NBRID Capacity
(d) Design percolation rate is a maximum of 1.44 inches per day for the number of operating day per month.
adjusted by a 0.04 safety factor to account for typical slow rate land application design methodology.
(e) Assimilative capacity is the sum of irrigation demand and percolation applied.

SUMMIT ENGINEERING, INC. Consulting Civil Engineers	Raymond Vineyard & Cellar Inc. 1.5 Mgallons of Wine Bottled Pond Water Balance 100-Year	PROJECT NO. 2010080 BY: GG CHK: AS

Pond No. 1

Month	Initial Volume (Mgal)	Pond Evaporation (Mgal)	PW Inflow (Mgal)	100 Year Precipitation (Mgal)	Volume Change (Mgal)	Total Volume (Mgal)	Divert Volume (Mgal)	Final Volume (Mgal)	Final Pond Depth (ft)
August	1.103	-0.074	0.262	0.003	0.191	1.294	0.191	1.103	10.0
September	1.103	-0.066	0.362	0.009	0.305	1.408	0.305	1.103	10.0
October	1.103	-0.040	0.420	0.052	0.432	1.536	0.432	1.103	10.0
November	1.103	-0.020	0.786	0.116	0.882	1.986	0.882	1.103	10.0
December	1.103	-0.015	0.732	0.189	0.906	2.009	0.906	1.103	10.0
January	1.103	-0.016	0.266	0.230	0.480	1.583	0.480	1.103	10.0
February	1.103	-0.021	0.273	0.169	0.420	1.524	0.420	1.103	10.0
March	1.103	-0.035	0.429	0.139	0.534	1.637	0.534	1.103	10.0
April	1.103	-0.044	0.406	0.064	0.427	1.530	0.427	1.103	10.0
May	1.103	-0.061	0.237	0.021	0.196	1.299	0.196	1.103	10.0
June	1.103	-0.068	0.229	0.006	0.167	1.270	0.167	1.103	10.0
July	1.103	-0.093	0.248	0.000	0.155	1.259	0.155	1.103	10.0
Total		**-0.553**	**4.650**	**0.998**	**5.095**		**5.095**		

Pond No. 2

Month	Initial Volume (Mgal)	Pond Evaporation (Mgal)	PW Inflow (Mgal)	100 Year Precipitation (Mgal)	Volume Change (Mgal)	Total Volume (Mgal)	Divert Volume (Mgal)	Final Volume (Mgal)	Final Pond Depth (ft)
August	2.241	-0.141	0.191	0.006	0.056	2.298	0.000	2.298	9.1
September	2.298	-0.126	0.305	0.017	0.196	2.493	0.000	2.493	9.8
October	2.493	-0.079	0.432	0.098	0.452	2.945	0.391	2.555	10.0
November	2.555	-0.039	0.882	0.219	1.062	3.617	1.062	2.555	10.0
December	2.555	-0.029	0.906	0.356	1.232	3.787	1.232	2.555	10.0
January	2.555	-0.032	0.480	0.432	0.880	3.435	0.880	2.555	10.0
February	2.555	-0.041	0.420	0.317	0.696	3.251	0.696	2.555	10.0
March	2.555	-0.070	0.534	0.263	0.727	3.281	0.727	2.555	10.0
April	2.555	-0.087	0.427	0.120	0.460	3.015	0.460	2.555	10.0
May	2.555	-0.121	0.196	0.039	0.114	2.668	0.114	2.555	10.0
June	2.555	-0.134	0.167	0.011	0.044	2.598	0.044	2.555	10.0
July	2.555	-0.183	0.155	0.001	-0.027	2.528	0.000	2.528	9.9
Total		**-1.081**	**5.095**	**1.879**	**5.893**		**5.606**		

Pond No. 3

Month	Initial Volume (Mgal)	Pond Evaporation (Mgal)	PW Inflow (Mgal)	100 Year Precipitation (Mgal)	Volume Change (Mgal)	Total Volume (Mgal)	Divert Volume (Mgal)	Final Volume (Mgal)	Final Pond Depth (ft)
August	2.044	-0.135	0.000	0.006	-0.129	1.916	0.900	1.016	5.0
September	1.016	-0.096	0.000	0.017	-0.079	0.937	0.600	0.337	1.8
October	0.337	-0.047	0.391	0.096	0.440	0.777	0.500	0.277	1.5
November	0.277	-0.022	1.062	0.214	1.254	1.531	[redacted]	0.681	3.6
December	0.681	-0.019	1.232	0.348	1.560	2.241	[redacted]	1.391	6.6
January	1.391	-0.025	0.880	0.423	1.278	2.669	[redacted]	1.819	8.2
February	1.819	-0.036	0.696	0.310	0.970	2.789	[redacted]	1.939	8.6
March	1.939	-0.062	0.727	0.257	0.921	2.860	0.515	2.345	10.0
April	2.345	-0.084	0.460	0.118	0.494	2.839	0.494	2.345	10.0
May	2.345	-0.117	0.114	0.038	0.035	2.380	0.092	2.288	9.8
June	2.288	-0.128	0.044	0.011	-0.073	2.215	0.000	2.215	9.5
July	2.215	-0.172	0.000	0.001	-0.171	2.044	0.000	2.044	8.9
Total		**-0.943**	**5.606**	**1.837**	**6.500**		**6.501**		

SUMMIT ENGINEERING, INC. Consulting Civil Engineers	Raymond Vineyard & Cellar Inc. 1.5 Mgallons of Wine Bottled Irrigation & Effluent Application Rates 100-Year Average Rainfall	PROJECT NO. 2010080 BY: GG CHK: AS

Applied Irrigation Area Vineyard 62.2 acres

Month	Precipitation[a]	Irrigation Demand[b]		Operating Days per Month[c]	Percolation Capacity[d]		Assimilative Capacity[e]		Effluent Applied		Excess Capacity
	(in)	(in)	(Mgal)	(d)	(in)	(Mgal)	(in)	(Mgal)	(Mgal)	(in)	(Mgal)
August	0.2	9.4	15.853	31	14.88	25.148	24.3	41.001	0.900	0.53	40.10
September	0.6	6.6	11.171	30	14.40	24.337	21.0	35.508	0.600	0.36	34.91
October	3.4	0.0	0.000	16	7.68	12.980	7.7	12.980	0.500	0.30	12.48
November	7.5	0.0	0.000	14	6.72	11.357	6.7	11.357	0.850	0.50	10.51
December	12.2	0.0	0.000	5	2.40	4.056	2.4	4.056	0.850	0.50	3.21
January	14.9	0.0	0.000	6	2.88	4.867	2.9	4.867	0.850	0.50	4.02
February	10.9	0.0	0.000	5	2.40	4.056	2.4	4.056	0.850	0.50	3.21
March	9.0	0.0	0.000	12	5.76	9.735	5.8	9.735	0.515	0.30	9.22
April	4.1	5.1	8.619	13	6.24	10.546	11.3	19.165	0.494	0.29	18.67
May	1.3	8.6	14.568	16	7.68	12.980	16.3	27.548	0.092	0.05	27.46
June	0.4	10.3	17.442	17	8.16	13.791	18.5	31.233	0.000	0.00	31.23
July	0.0	10.7	18.033	30	14.40	24.337	25.1	42.370	0.000	0.00	42.37
Total	**64.7**	**50.7**	**85.7**	**195.0**	**93.6**	**158.2**	**144.3**	**243.9**	**6.5**	**3.8**	**237.38**

(a) Precipitation, 100-year rainfall event, see Climate Data Worksheet.
(b) Irrigation demand determined by Dellevalle Labratories for alfalfa crop land, 10/8/10.
(c) Number of operating days per month based on estimated irrigation days available based on 24-hr post storm criteria for a 100-year return period. Summit Engineering, NBRID Capacity Study, April 1996.
(d) Design percolation rate is a maximum of 0.12 inches per day for the number of operating day per month.
adjusted by a 0.04 safety factor to account for typical slow rate land application design methodology.
(e) Assimilative capacity is the sum of irrigation demand and percolation applied.

SUMMIT ENGINEERING, INC.
Project No. 2010080

RAYMOND VINEYARD & CELLAR INC.

WASTEWATER FEASIBILITY STUDY

ENCLOSURE E

SITE EVALUATION DATA

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 #:	
APN:	030-270-013
(County Use Only) Reviewed by:	Date:

PLEASE PRINT OR TYPE ALL INFORMATION

Property Owner: Boisset Family Estates	☐ New Construction ☒ Addition ☐ Remodel ☐ Relocation. ☒ Other: marketing changes
Property Owner Mailing Address: 839 Zinfandel Lane	☐ Residential - # of Bedrooms: Design Flow: gpd
City: St. Helena State: CA Zip: 94574	☒ Commercial – Type: Sanitary Waste: 5400 gpd Process Waste: N/A gpd
Site Address/Location: Same as above	☐ Other: Sanitary Waste: gpd Process Waste: gpd

Evaluation Conducted By:

Company Name: Summit Engineering	Evaluator's Name: Gina Giacone	Signature (Civil Engineer, R.E.H.S., Geologist, Soil Scientist): Gina Giacone
Mailing Address: 463 Aviation Blvd.		Telephone Number: (707) 527-0775
City: Santa Rosa, State: CA Zip: 95403		Date Evaluation Conducted: 4/5/11

Primary Area	Expansion Area
Acceptable Soil Depth: 36 in. Test pit #'s: 1-7	Acceptable Soil Depth: 36 in. Test pit #'s: 1-7
Soil Application Rate (gal. /sq. ft. /day): 0.6 gal/ft²/day	Soil Application Rate (gal. /sq. ft. /day): 0.6 gal/sf/day
System Type(s) Recommended: Pretreatment/subsurf. drip	System Type(s) Recommended: Pretreatment/subsurf. drip
Slope: <5 %. Distance to nearest water source: >100 ft.	Slope: <5 %. 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)
Percolation test performed? No ☐ Yes ☐ (attach results)	Percolation test performed? No ☐ Yes ☐ (attach results)
Groundwater Monitoring Performed? No ☐ Yes ☐ (attach results)	Groundwater Monitoring Performed? No ☐ Yes ☐ (attach results)

Site constraints/Recommendations:

GW/mottling observed at 36"

Test Pit # 1

PLEASE PRINT OR TYPE ALL INFORMATION

Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure	Consistence			Pores	Roots	Mottling
					Side Wall	Ped	Wet			
0-41"	clear	<5%	SCL	m/G	S	VF	VS	C/m	VF/F	F/F/F+
										↓
									→	@36"
			* Hydrometer @ 36"							
			* GW @ 41"							

Test Pit # 2

Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure	Consistence			Pores	Roots	Mottling
					Side Wall	Ped	Wet			
0-50"	clear	<5%	SCL	m/G	S	VF	VS	C/m	VF/F	F/F/F+
										↓
									→	@36"

Test Pit # 3

Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure	Consistence			Pores	Roots	Mottling
					Side Wall	Ped	Wet			
0-42"	clear	<5%	SCL	m/G	S	VF	VS	C/m	VF/F	F/F/F+
										↓
									→	@36"

Attach additional sheets as needed

Test Pit # 4

PLEASE PRINT OR TYPE ALL INFORMATION

Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure	Consistence			Pores	Roots	Mottling
					Side Wall	Ped	Wet			
0-54"	clear	<5%	SCL	m/G	S	VF	VS	C/m	VF/F	F/F/F+
										↓
									→	@36"

Test Pit # 5

Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure	Consistence			Pores	Roots	Mottling
					Side Wall	Ped	Wet			
0-52"	clear	<10%	SCL	m/G	S/SH	VF	VS	C/m	VF/F	F/m/F+
										↓
									→	@36"

Test Pit # 6

Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure	Consistence			Pores	Roots	Mottling
					Side Wall	Ped	Wet			
0-48"	clear	<5%	SCL	m/G	S	VF	VS	C/m	VF/F	F/F/F+
										↓
									→	@36"

Attach additional sheets as needed

Test Pit # 7

PLEASE PRINT OR TYPE ALL INFORMATION

Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure	Consistence			Pores	Roots	Mottling
					Side Wall	Ped	Wet			
0-52"	clear	<5%	SCL	G	S	VF	VS	c/m	VF/F	F/F/Ft
										↓
									→	@36"

Test Pit #

Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure	Consistence			Pores	Roots	Mottling
					Side Wall	Ped	Wet			

Test Pit #

Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure	Consistence			Pores	Roots	Mottling
					Side Wall	Ped	Wet			

Attach additional sheets as needed

Oakley Laboratory & Field Services
1645 Chapman Way • Santa Rosa , CA 95403 • Telephone 707-575-1075

April 11, 2011
Job No. 11-123.35

Summit Engineering Inc.
463 Aviation Blvd. Suite 200
Santa Rosa, Calif. 95403

Attention: Ms. Gina Giacone

Re: Results of Soil Texture Analysis
By Bouyoucos Hydrometry Method

Client: Raymond Winery

The results of soil texture analysis on samples received on April 6, 2011 are as follows:

Sample Location	TP1 @ 36"
% Plus No. 10 (WT)	2.3
% Sand	47.0
% Clay	27.0
% Silt	26.0
Db g/cc	--

We are pleased to provide laboratory services for you and look forward to your continued work. If you have any questions, please call.

Oakley Laboratory and Field Services

By: _____
Wayne G. Oakley
Laboratory Director