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Wastewater Feasibility Study



WINERY WASTEWATER FEASIBILITY REPORT

CHANTICLEER WINERY
4 VINEYARD VIEW DRIVE
YOUNTVILLE, CALIFORNIA

APN 034-150-026

Prepared for:

George Grodahl
4 Vineyard View Drive
Yountville, CA 94559



#4112060.0
June 18, 2013
Revised September 10, 2014



WASTEWATER FEASIBILITY REPORT
CHANTICLEER WINERY

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INTRODUCTION

The owner is applying to the County of Napa for a Winery Use Permit that will allow operation of a 10,000 gallon per year winery. The Chenticleer Winery project is located at 4 Vineyard View Drive, Yountville, California. The APN is 034-150-026 and the parcel has an area of 40 +/- acres. The parcel is undeveloped woodland, range and vineyard. There is a main house and a guest house on the parcel. The main house is located on a knoll near the center of the parcel, and the guest house is located on a knoll on the northeast portion of the parcel. There is an existing barn which will be the site of the new winery. Two wells exist on the property near center of the parcel.

This report evaluates the disposal of both winery process wastewater and winery domestic wastewater.

EXISTING SEPTIC SYSTEM

Information from Napa County Environmental Health files for the parcel shows two existing septic systems. One is a mound system that serves the existing 4 bedroom main residence and the one bedroom guest house. The other is an abandoned system that served the guest house. The guest house effluent is now pumped to the main tank at the main residence. The main tank then gravity flows to the mound system.

CAVE SETBACK FROM EXISTING SEPTIC SYSTEMS ON ADJACENT PARCELS

Information retrieved from Napa County files for adjacent parcels shows that there are no existing systems within the 400 foot cave setback. The proposed septic system for the winery domestic wastewater will be within 400 feet of the cave, but will be compliant with current code and therefore must meet the 100 foot setback. The treated process wastewater system also meets the 100 foot setback. See the Cave Setback Exhibit in Appendix 3.

SITE EVALUATION

A site evaluation was conducted on February 1, 2013 by Lisa Blanc from RSA+ and observed by Sheldon Sapoznik of Napa County Environmental Management. Appendix 4 contains the Site Evaluation results.

This report shows that the test pits contain strong structured clay and the acceptable pits have at least a depth of 24" of soil.

Primary dispersal and reserve areas for the sanitary wastewater will be located in the areas represented by test pit #'s 1 and 2. The primary and reserve areas will require six (6) inches of clay loam soil to be placed over the dispersal field to achieve the required minimum depth of thirty (30) inches for a Geoflow drip dispersal system. Sanitary wastewater will be pretreated to meet Napa County Requirements for pre-treated effluent prior to dispersal. Dispersal of the winery process wastewater will be surface drip for irrigation.



WINERY DOMESTIC WASTEWATER CHARACTERISTICS

The winery domestic wastewater system has been sized to accommodate the generation rates in Table 1 below. The number of visitors and employees is based on information provided by the owner/applicant. The projected flow is based on Napa County Environmental Management guidelines. The following is a summary of the estimated flows from the proposed winery.

Table 1

Use	Source	Number	Projected Flow (gpd)	Total Flow Small Event Day (gpd)
WINERY	Full-time employees	2	15	30
	Part-time employees	2	15	30
	Visitors	10	3	30
	Marketing Event w/ meals (off-site catering)	25	10	250
Winery Subtotals				340
Grand Total			Total Peak Flow	340

The number of visitors is based on a maximum expected daily visitor count. Any combination of events where the expected total guest count exceeds 35 persons in a single day will require the use of portable sanitation facilities.

WINERY PROCESS WASTEWATER CHARACTERISTICS

Wine Production: 10,000 gallons of wine per year
 2.38 gallons of wine per case
 4,202 cases/year

Wastewater Production: 5 gallons of wastewater/gallon of wine
 50,000 gallons/year

Peak Daily Waste Water Flow: Crush Period = 30 days
 Annual wine production x 1.5 / 30
 500 gallons/day

Average Daily Flow: 50,000/365 = 137 gallons/day

Monthly Wastewater Flows: (See Table 2)



TABLE 2

Monthly Break Down

	% By Month	Waste/Month	
September	14%	7,000	Gal/Month
October	14%	7,000	Gal/Month
November	11%	5,500	Gal/Month
December	8%	4,000	Gal/Month
January	4%	2,000	Gal/Month
February	6%	3,000	Gal/Month
March	6%	3,000	Gal/Month
April	5%	2,500	Gal/Month
May	6%	3,000	Gal/Month
June	7%	3,500	Gal/Month
July	9%	4,500	Gal/Month
August	10%	5,000	Gal/Month

PROPOSED WASTEWATER TREATMENT SYSTEMS

Separate systems are proposed for domestic wastewater and process wastewater treatment.

1. Domestic Wastewater System

OPTION 1 - ADVANTEX PRE-TREATMENT SYSTEM

For winery domestic wastewater we propose the following treatment system:

- 1,200 gallon septic tank - tasting room
- Advantex AX-20 Treatment pod with 1,200 gallon recirculation tank
- 1,200 gallon pump tank
- Geoflow distribution system.

The winery domestic wastewater will collect in a 1,200 gallon septic tank, then flow to a 1,200 gallon recirculation tank with one Advantex AX-20 pod for treatment, before flowing to a 1,200 gallon pump tank. The system will be designed to treat the waste to meet the Napa County drip dispersal discharge limits of 30-mg/L BOD, 30-mg/L TSS and 1.0 mg/L settleable solids. The nominal loading rate provided by Orenco is 25 gallons/sq ft/day. The filter area of one AX-20 pod is 20 square feet providing a capacity of 500 gallons per day per unit. This is adequate for the projected peak flow of 340 gallons per day.

Treated effluent from the Advantex AX-20 pod will flow to the pump tank for final dosing to a Geoflow drip dispersal field. The Geoflow system will be evenly time-dosed over the entire 24-

hour day by a 1/2 hp, 10 gpm pump. An Orenco Control Panel will control distribution. The pump tank also allows for the Napa County minimum of one day of emergency storage above the high water alarm.

The distribution field is sized to meet Napa County Environmental Management guidelines. The distribution field will be placed in the area of the site evaluation where the limiting usable soil type was clay with strong, sub-angular blocky structure. The distribution field will allow 0.3 gallons/square foot/day. Peak daily winery domestic wastewater flow is 340 gallons/day and will require 1,133 square feet of primary distribution field.

In addition to the primary dispersal area of 1,133 square feet, a 2,267 square foot (200%) reserve area is required. The total requirement for winery domestic wastewater primary and reserve dispersal areas is therefore 3,400 square feet. This system is shown on the Use Permit plans. See Appendix 2 for system layout.

OPTION 2 - HOOT AEROBIC TREATMENT SYSTEM

For winery domestic wastewater we propose the following alternate treatment system:

- Hoot Aerobic Treatment System (H-600 BNR)
- Geoflow distribution system.

The winery will have one 600 gallon per day Hoot Aerobic Treatment Systems (H-600 BNR). The effluent will be distributed to a Geoflow drip dispersal field. System sizing, tank sizing, and treatment system settings are based on Hoot manufacturers specifications to achieve the design treatment goals of 30 mg/l BOD₅ and 30 mg/l TSS.

Treated effluent from the Hoot Aerobic Treatment System will flow to the dosing portion of the tank for final dosing to a Geoflow drip dispersal field. The Geoflow system will be evenly time-dosed over the entire 24-hour day by a 1/2 hp, 10 gpm pump supplied with the Hoot System. The Hoot Automatic Controller supplied with the Hoot System will control distribution. The dosing portion of the tank also allows for the Napa County minimum of one day of emergency storage above the high water alarm.

Flow meters will be installed at the tank to measure the volume of flow discharged to and from the Geoflow system. Net discharge will be calculated as the difference between the two meter readings.

The same dispersal field as described for Option 1 - Advantex system would be used. The Civil Use Permit plans show the HOOT system.



2. Winery Process Waste Water Treatment

According to Napa County Environmental Management Sewage Treatment System Design Guidelines, winery process wastewater must be treated prior to surface discharge. Based on our experience, typical winery wastewater characteristics are as follows:

Characteristics	Units	Average
pH		3.5
BOD5	mg/l	6000
TSS	mg/l	500
Nitrogen	mg/l	20
Phosphorus	mg/l	10

The treatment goal is 160 mg/l BOD and 80 mg/l TSS. To meet this treatment goal, either a surface drip system, including treatment train including septic tank, pump tank, aeration tank, settling tank, filter pods, recirculation tank, pump tank, and treated process wastewater storage tank, or hold and haul are proposed. These treatments may be modified for more desirable treatment processes prior to submitting construction plans. The following sections describe each process in more detail. Surface drip with Advantex Pre-treatment system is shown on the use permit plans contained in Appendix 2.

OPTION 1 - SURFACE DRIP - ADVANTEX PRE-TREATMENT SYSTEM

Septic Tank

A 1,500 gallon septic tank will serve to buffer peak flows and strengths from overwhelming the system and impairing treatment. This tank will provide three days of peak wastewater storage and will also serve to function as a primary settling basin. A pump will deliver waste to the aeration tank.

Aeration Tank

A 1,000 gallon aeration tank will add air through a fine bubble diffuser to begin biological digestion of the organic carbon contained in the winery wastewater. This tank will provide one day of peak wastewater storage.

Settling Tank

A 1,000 gallon settling tank will provide settling following aeration.

Recirculation Tank and Advantex Textile Filter Pods

A 1,000 gallon recirculation tank will provide the storage capacity for the Advantex textile filters which will reduce the BOD₅ to acceptable levels for drip discharge. The recirculation ratio will be set to filter the peak day flow a minimum of 4 times. Because of wastewater strength and treatment criteria, the AX-100 pods will treat 3 gpd per square foot. Each pod has an area of 100 square feet. 2 Advantex AX-100 pods in a one-stage treatment configuration are proposed.

Pump Tank and Dispersal Field

It is proposed to use surface drip dispersal to dispose of treated winery process wastewater. To provide a preliminary estimate of the amount of storage required, we have prepared a monthly water balance, as shown in Appendix 5. Monthly wastewater production is based on a percentage of the total annual wastewater production. The amount of water allowed to be applied is estimated by the typical landscape water demand. For vineyard irrigation, an area of 0.55 acres was used to calculate the storage capacity required. Based on our assumptions we consider that a 5,000 gallon tank will provide adequate storage. The irrigation will be applied to areas of vineyard that meet Napa County Code setback requirements. An area available for irrigation is shown on the use permit plans in Appendix 2. Alternative landscape or vineyard areas that meet Napa County Code setback requirements may also be irrigated with recycled process waste water.

During the summer months all of the treated wastewater will be used for irrigation. During the wet winter months, a limited discharge will be consistent with landscape water demand and no discharge will occur within 48-hours of a forecasted rain event and also for 48-hours after a rain event. These irrigation scheduling constraints necessitate installing tanks to store excess water that cannot be discharged during the winter months. All stored water will then be used for irrigation during the summer months, or acceptable dry periods during the winter months.

The system layout is shown on the use permit plans in Appendix 2.

OPTION 2 - HOLD AND HAUL

Process waste will gravity flow and be held in one 5000-gallon septic tank. The hold and haul tank system has been sized to store 10 days of peak wastewater flow. A high water alarm beacon, powered by the electrical system in the building, will be located on an exterior panel adjacent to the crush pad and holding tank.

STORMWATER DIVERSION

The proposed crush pad will be located under a covered area. This prevents storm water from entering the process waste system.

OPERATION AND MAINTENANCE

The winery domestic wastewater and winery process wastewater systems will be fully automated and will be designed so minimal input from winery staff is required. Per Napa County guidelines, a Registered Civil Engineer, Registered Environmental Health Specialist, or Licensed Contractor will provide semi-annual monitoring and evaluation of the system. The contract with the responsible party will be provided prior to the final for the system installed.



CONCLUSION

This report demonstrates that a subsurface geoflow drip system is feasible and there is enough dispersion area available for winery domestic wastewater. It also demonstrates that a surface drip system is feasible and there is enough dispersion area and tank storage available for process wastewater.

The above methodology results in a design that meets the Napa County Environmental Health Design standards for the treatment of winery and domestic wastewater.



Appendix 1

Vicinity Map
USGS Map

CHANTICLEER WINERY VICINITY MAP NAPA COUNTY CALIFORNIA

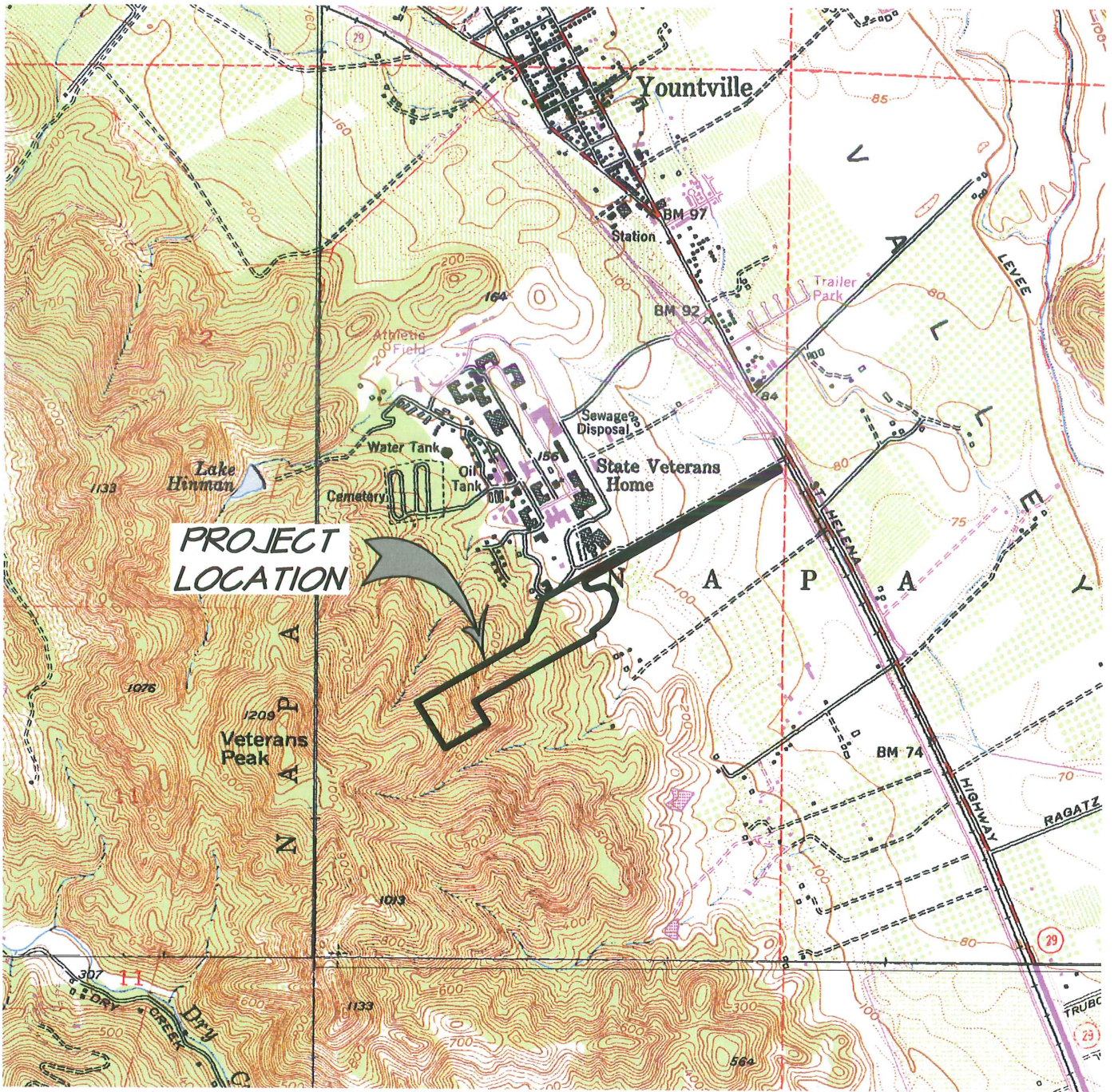


1515 Fourth Street
Napa, Calif. 94559
v 707.252.3301
f 707.252.4966

AUGUST 26, 2014

4112060.0 Exh-Vic Map.dwg 1 OF 1

CHANTICLEER WINERY USGS QUAD MAP NAPA COUNTY CALIFORNIA



SCALE: 1"=2000'

CONSULTING CIVIL ENGINEERS
**RIECHERS
& SPENCE**
ASSOCIATES

1515 Fourth Street
Napa, Calif. 94559
v 707.252.3301
f 707.252.4966

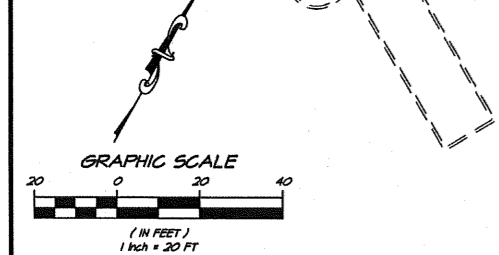
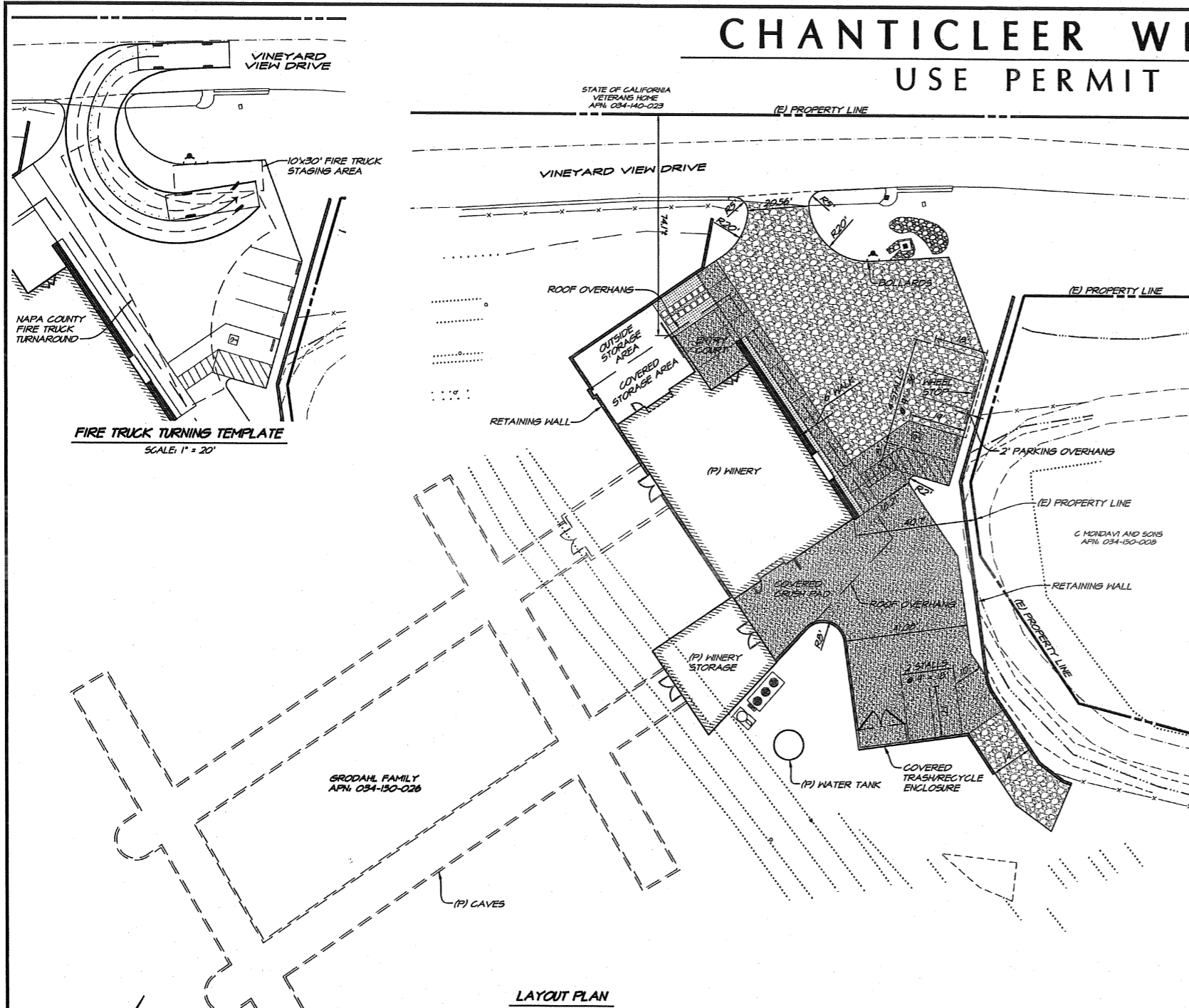
AUGUST 26, 2014
4112060.0 Exh-USGS.dwg 1 OF 1



Appendix 2

Reduced Use Permit Civil Plan Set

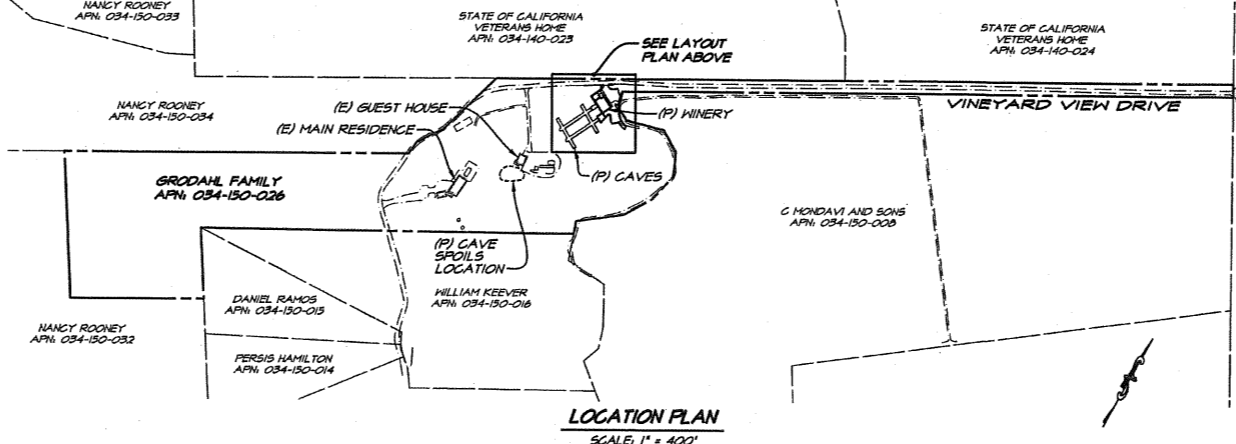
CHANTICLEER WINERY USE PERMIT



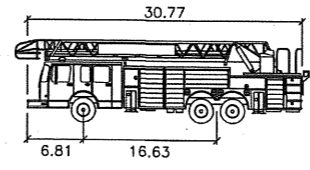
HATCH LEGEND

	(P) WINERY
	(P) CONCRETE
	(P) GRAVEL (SPECIAL REQUEST)

LAYOUT PLAN
SCALE: 1" = 20'



LOCATION PLAN
SCALE: 1" = 400'



NAPA COUNTY FIRE ENGINE
NO SCALE

Width : 8.50
Track : 8.50
Lock to Lock Time : 7.00
Steering Angle : 34.00

SYMBOL LEGEND

	STORM DRAIN LINE		STORM DRAIN LINE
	OVERHEAD LINE		SANITARY SEWER LINE
	FENCE		WATER SERVICE LINE
	DRAIN INLET		SANITARY SEWER MANHOLE
	TREE TO REMAIN		STORM DRAIN MANHOLE
	JOINT POLE		SLOPE AS SHOWN
	IRRIGATION CONTROL VALVE		FIRE HYDRANT
	SURVEY CONTROL STATION		WATER VALVE
	CONTOUR LINE		DROP INLET
	FLOLINE		AREA DRAIN
	VINEYARD		SANITARY SEWER CLEANOUT
	TOE OF BANK		PROPERTY LINE
	TOP OF BANK		GRADE BREAK
			EDGE OF GRAVEL

ABBREVIATIONS

BFG	BOTTOM FINISH GRADE	MH	MANHOLE
BM	BENCHMARK	OC	ON CENTER
CL	CENTERLINE	OH	OVERHEAD
CO	CLEANOUT	PS&E	PACIFIC GAS AND ELECTRIC
CV	CHECK VALVE	PIV	POST INDICATOR VALVE
DI	DROP INLET	P	PROPOSED
DM	DOMESTIC WATER	PWW	PROCESS WASTE WATER
EP	EDGE OF PAVEMENT	PWWC	PROCESS WASTE WATER CLEANOUT
EX / (E)	EXISTING	R	RADIUS
FGC	FIRE DEPT. CONNECTION	RSA	RIECHERS SPENCE & ASSOCIATES
FF	FINISH FLOOR	ROM	RIGHT OF WAY
FFG	FINISH FLOOR OF CAVE	S	SLOPE (FEET/FOOT)
FG	FINISH GRADE	S.A.D.	SEE ARCHITECTS DRAWINGS
FH	FIRE HYDRANT	SD	STORM DRAIN
FWW	FORCED PROCESS WASTE WATER	SS	SANITARY SEWER
FWM	FORCED WATER MAIN	SSCO	SANITARY SEWER CLEANOUT
FSS	FORCED SANITARY SEWER	STA	STATION
FS	FIRE SERVICE	STD	STANDARD
F	FIRE WATER LINE	TC	TOP OF CURB
FB	GRADE BREAK	TFS	TOP FINISH GRADE
HP	HIGH POINT	TH	TOP OF WALL
INV	INVERT	W	DOMESTIC WATER LINE
LF	LINEAL FEET/FOOT	WM	WATER METER
LP	LOW POINT	WV	WATER VALVE



VICINITY MAP
NO SCALE

PROJECT INFORMATION

OWNER: GEORGE GRODAHL
4 VINEYARD VIEW DRIVE
YOUNTVILLE, CA 94599

SITE ADDRESS: 4 VINEYARD VIEW DRIVE
YOUNTVILLE, CA 94599

CIVIL ENGINEER: RIECHERS SPENCE & ASSOC.
1515 FOURTH STREET
NAPA, CA 94559

APN: 034-150-026

PARCEL AREA: 40 ACRES±

EXISTING USE: VINEYARD

PROPOSED USE: WINERY

EXISTING ZONING: AH

PROPOSED ZONING: AH

BOUNDARY NOTES

THE BOUNDARY SHOWN IS BASED ON FOUND MONUMENTS SHOWN IN BOOK 17 RECORD OF SURVEYS TO.

BENCHMARK

VERTICAL DATUM IS ASSUMED

TOPOGRAPHY NOTES

WINERY SITE TOPOGRAPHY BASED ON A FIELD SURVEY PERFORMED BY RIECHERS SPENCE & ASSOCIATES IN NOVEMBER 2012. THE VERTICAL DATUM IS ASSUMED AND IS AS SHOWN ON SURVEY CONTROL STATIONS. CONTOURS ARE SHOWN EVERY ONE FOOT (1'), HIGHLIGHTED EVERY FIVE FEET (5').

SURROUNDINGS TOPOGRAPHY IS PROVIDED BY NAPA COUNTY GIS SERVICES 2002. IT IS SHOWN FOR REFERENCE ONLY AND SHOULD BE CONSIDERED APPROXIMATE.

SHEET INDEX

UP1	SITE AND WINERY LAYOUT PLAN
UP2	GRADINGS AND LAYOUT PLAN
UP3	WINERY UTILITY PLAN
UP4	SITE UTILITY PLAN

PARKING SUMMARY

ACCESSIBLE PARKING	1
STANDARD PARKING	5
TOTAL	6

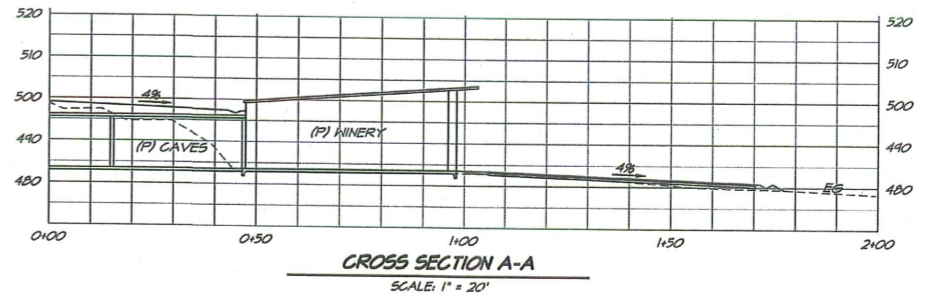
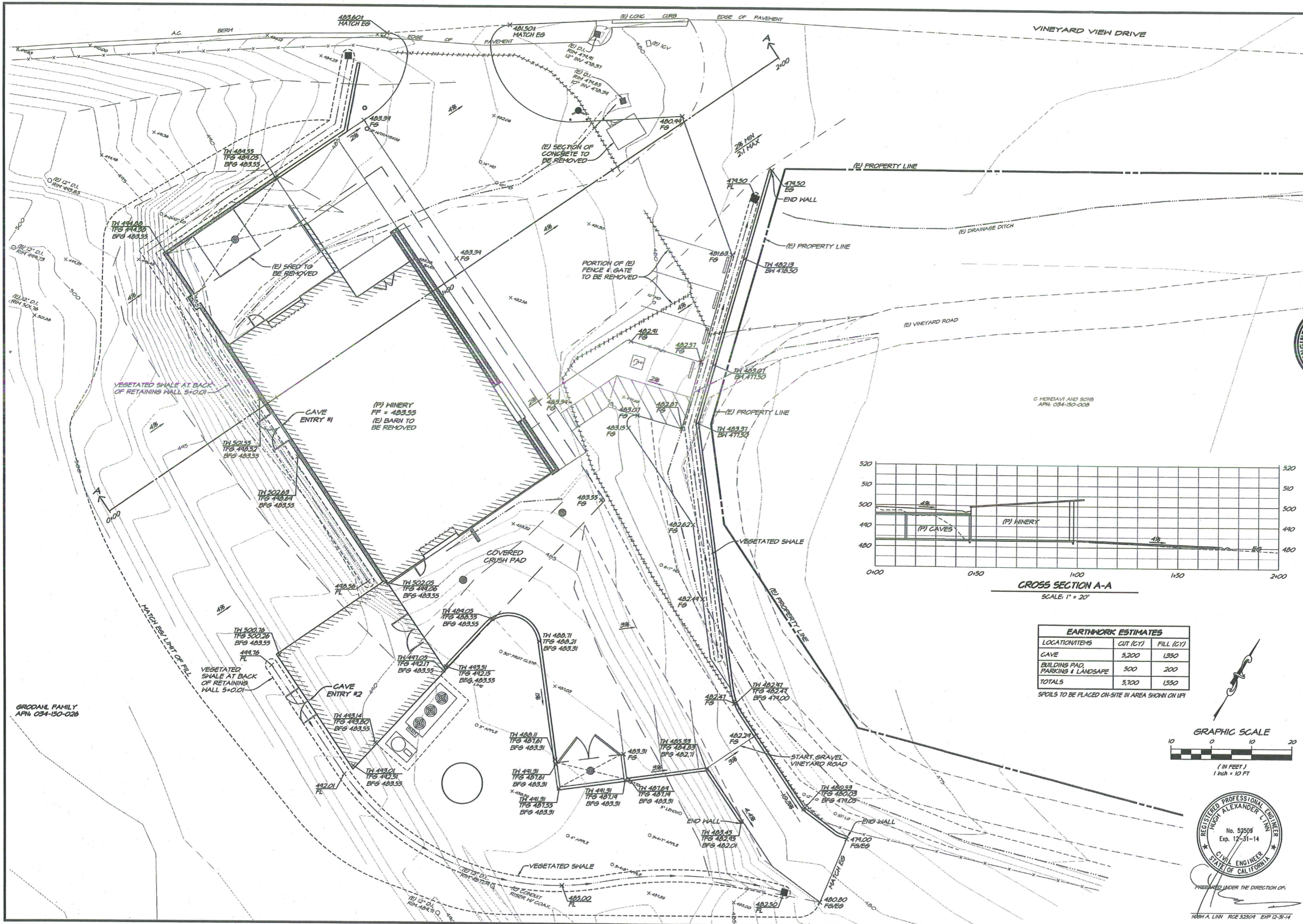


PREPARED UNDER THE DIRECTION OF:
HUGH A. LINN RCE 52509 EXP 12-31-14

RIECHERS SPENCE & ASSOCIATES
 CONSULTING CIVIL ENGINEERS
 1515 Fourth Street
 Napa, California 94559
 Tel: 707.252.3301
 Fax: 707.252.4895

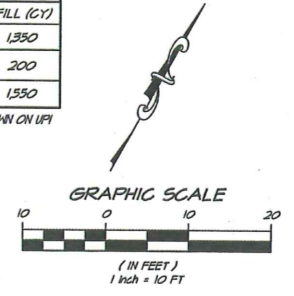
CHANTICLEER WINERY
SITE AND WINERY LAYOUT PLAN
 NAPA COUNTY CALIFORNIA

DATE	SEPT 14, 2014
DRAWN	JPL
DESIGNED	LBEP
CHECKED	BNF
JOB NO.	4120600
SHEET NO.	UP1
	OF 4 SHEETS



EARTHWORK ESTIMATES		
LOCATION/ITEMS	CUT (CY)	FILL (CY)
CAVE	5,200	1,350
BUILDING PAD, PARKING & LANDSCAPE	500	200
TOTALS	5,700	1,550

SPILDS TO BE PLACED ON-SITE IN AREA SHOWN ON UPI



REGISTERED PROFESSIONAL ENGINEER
HIGH A. ALEXANDER, L.I.N.
No. 52509
Exp. 12-31-14
CIVIL ENGINEER
STATE OF CALIFORNIA

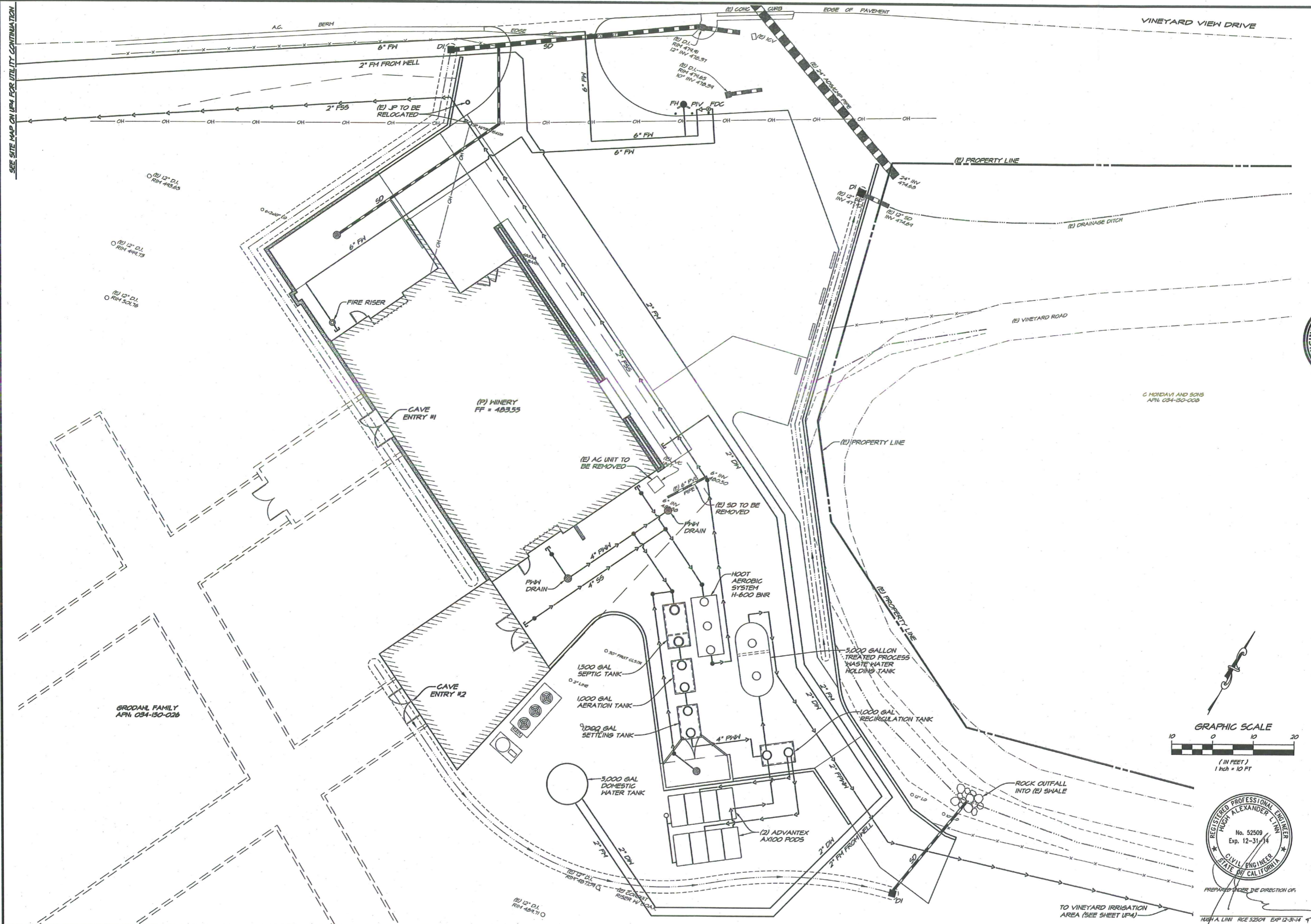
PREPARED UNDER THE DIRECTION OF:
HIGH A. LINN RCE 52504 EXP 12-31-14

**CHANTICLEER WINERY
GRADING AND LAYOUT PLAN
NAPA COUNTY
CALIFORNIA**

**RITCHERS
SPENCE
ASSOCIATES**
CONSULTING CIVIL ENGINEERS
1818 Fourth Street
Napa, California 94559
707.255.1301
707.255.2459

DATE: _____
NO.: _____
REVISIONS: _____
BY: APD

DATE: SEPT 18, 2014
DRAWN: JFH
DESIGNED: LBBF
CHECKED: BNF
JOB NO.: 412080.0
SHEET NO.: **UP2**
OF 4 SHEETS



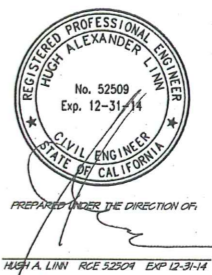
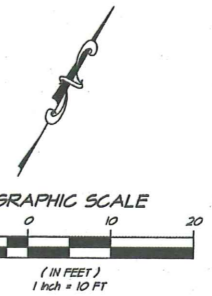
SEE SITE MAP ON UP4 FOR UTILITY CONTINUATION

NO.	DATE	REVISIONS	BY	APPD

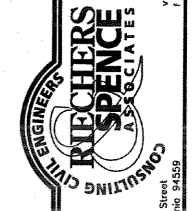
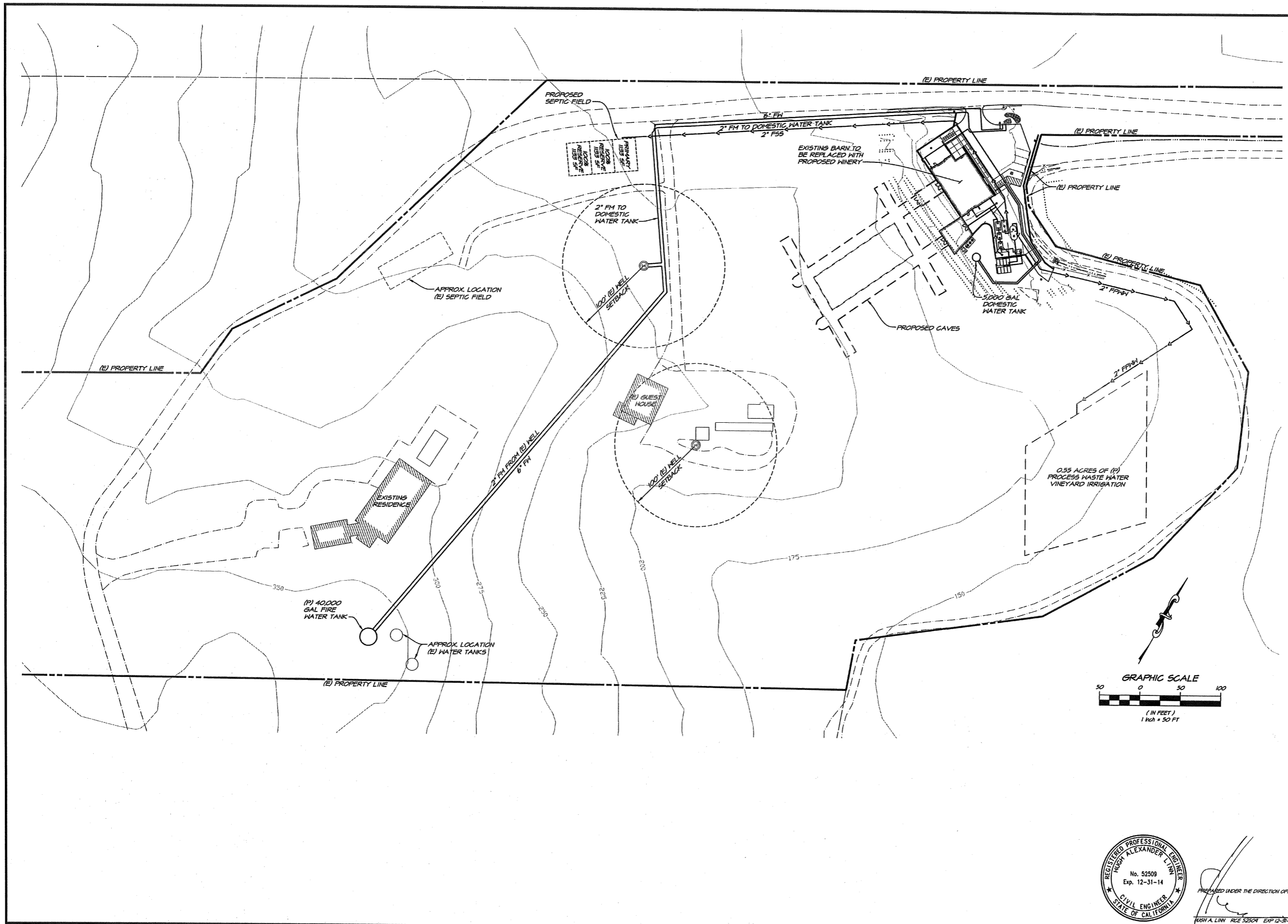
RIECHERS ASSOCIATES
CONSULTING CIVIL ENGINEERS
1515 Fourth Street
Napa, California 94959
P 707.252.4858
F 707.252.4855

**CHANTICLEER WINERY
WINERY UTILITY PLAN
NAPA COUNTY
CALIFORNIA**

DATE: SEPT 19, 2014
DRAWN: JFH
DESIGNED: LBB
CHECKED: BWF
JOB NO.: 412060.0
SHEET NO.:
UP3
OF 4 SHEETS



PREPARED UNDER THE DIRECTION OF
HUGH A. LINN, P.E. 52509 EXP. 12-31-14



1515 Fourth Street
Napa, California 94959
707.252.3301
707.252.4988

CHANTICLEER WINERY
SITE UTILITY PLAN
NAPA COUNTY CALIFORNIA

DATE	SEPT 14, 2014
DRAWN	JFK
DESIGNED	LBEP
CHECKED	EMF
JOB NO.	4120600
SHEET NO.	UP4
OF 4 SHEETS	



PREPARED UNDER THE DIRECTION OF
HUGH A. LINN RCE 52509 EXP 12-31-14



Appendix 3
Cave Setback Exhibit

CHANTICLEER WINERY CAVE SETBACK EXHIBIT

SCALE: 1" = 150'

APN: 034-150-023
NO RECORD OF SEPTIC SYSTEM
IN THIS AREA OF THE PARCEL
IN COUNTY FILES

(P) SEPTIC SYSTEM

APN: 034-150-034
NO RECORD OF SEPTIC SYSTEM
IN THIS AREA OF THE PARCEL
IN COUNTY FILES

(E) CODE COMPLIANT
MOUND SEPTIC SYSTEM

(E) GUEST HOUSE

100' (E)
WELL
SETBACK

100' CAVE
SETBACK

400' CAVE
SETBACK

100' (E) WELL
SETBACK

(E) MAIN
RESIDENCE

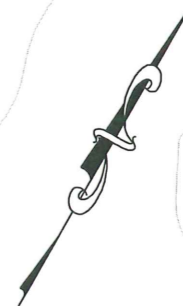
(P) WINERY

VINEYARD VIEW DRIVE

(P) PROCESS
WASTEWATER
IRRIGATION AREA

HATCH LEGEND

-  100' CAVE SETBACK
-  400' CAVE SETBACK



CONSULTING CIVIL ENGINEERS
**RIECHERS
SPENCE
ASSOCIATES**
1515 Fourth Street
Napa, Calif. 94559
v 707.252.3301
f 707.252.4966
SEPTEMBER 19, 2013
4112060.0 Exh-Cave Setback.dwg



Appendix 4

Site Evaluation

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 #: E13-00016

APN: 034-150-026

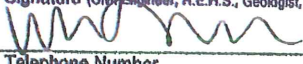
(County Use Only)
Reviewed by:

Date:

PLEASE PRINT OR TYPE ALL INFORMATION

Property Owner GEORGE GRODAHL			<input checked="" type="checkbox"/> New Construction <input type="checkbox"/> Addition <input type="checkbox"/> Remodel <input type="checkbox"/> Relocation <input type="checkbox"/> Other:		
Property Owner Mailing Address 4 VINEYARD VIEW DRIVE			<input type="checkbox"/> Residential - # of Bedrooms: Design Flow : gpd		
City	State	Zip	<input checked="" type="checkbox"/> Commercial -- Type: WINERY Sanitary Waste: 465 gpd Process Waste: 500 gpd <input type="checkbox"/> Other: Sanitary Waste: gpd Process Waste: gpd		
YOUNTVILLE	CA	94599			
Site Address/Location 4 VINEYARD VIEW DRIVE YOUNTVILLE, CA 94599					

Evaluation Conducted By:

Company Name RIECHERS SPENCE & ASSOCIATES		Evaluator's Name LISA BLANC	Signature (Civil Engineer, R.E.H.S., Geologist, Soil Scientist) 
Mailing Address: 1515 FOURTH STREET		Telephone Number (707) 252-3301	
City	State	Zip	Date Evaluation Conducted
NAPA	CA	94559	FEBRUARY 1, 2012

<u>Primary Area</u>	<u>Expansion Area</u>
Acceptable Soil Depth: 24 in. Test pit #'s: 1	Acceptable Soil Depth: 24 in. Test pit #'s: 1, 2
Soil Application Rate (gal. /sq. ft. /day): 0.3	Soil Application Rate (gal. /sq. ft. /day): 0.3
System Type(s) Recommended: GEOFLOW	System Type(s) Recommended: GEOFLOW
Slope: 7 %. Distance to nearest water source: >100 ft.	Slope: 7 %. Distance to nearest water source: >100 ft.
Hydrometer test performed? No <input type="checkbox"/> Yes <input checked="" type="checkbox"/> (attach results)	Hydrometer test performed? No <input type="checkbox"/> Yes <input checked="" type="checkbox"/> (attach results)
Bulk Density test performed? No <input checked="" type="checkbox"/> Yes <input type="checkbox"/> (attach results)	Bulk Density test performed? No <input checked="" type="checkbox"/> Yes <input type="checkbox"/> (attach results)
Groundwater Monitoring Performed? No <input checked="" type="checkbox"/> Yes <input type="checkbox"/> (attach results)	Groundwater Monitoring Performed? No <input checked="" type="checkbox"/> Yes <input type="checkbox"/> (attach results)
Site constraints/Recommendations:	

Test Pit # 1

PLEASE PRINT OR TYPE ALL INFORMATION

Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure	Consistence			Pores	Roots	Mottling
					Side Wall	Ped	Wet			
0-30	C	25%	C	S/SB	SH	FRB	SS	M/F-M	F/F-M	N/A
30-35	ROCK									

Test Pit # 2

Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure	Consistence			Pores	Roots	Mottling
					Side Wall	Ped	Wet			
0-24	C	25%	C	S/SB	SH	FRB	SS	M/F-M	F/F-M	N/A
24-26	ROCK									

Test Pit # 3

Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure	Consistence			Pores	Roots	Mottling
					Side Wall	Ped	Wet			
0-24	WET & MASSIVE									

Test Pit # 4

PLEASE PRINT OR TYPE ALL INFORMATION

Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure	Consistence			Pores	Roots	Mottling
					Side Wall	Ped	Wet			
0-23	WET & MASSIVE									

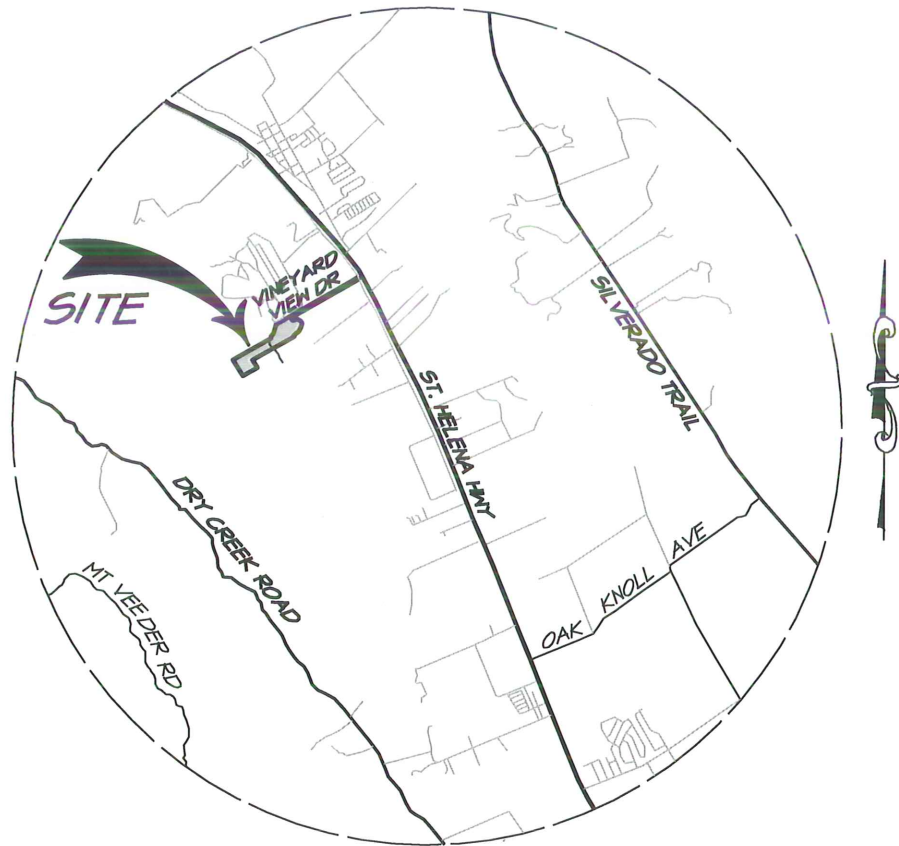
Test Pit # 5

Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure	Consistence			Pores	Roots	Mottling
					Side Wall	Ped	Wet			
0-24	C	25%	C	S/SB	SH	FRB	SS	M/F-M	F/F	N/A

Test Pit #

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

CHANTICLEER WINERY VICINITY MAP NAPA COUNTY CALIFORNIA

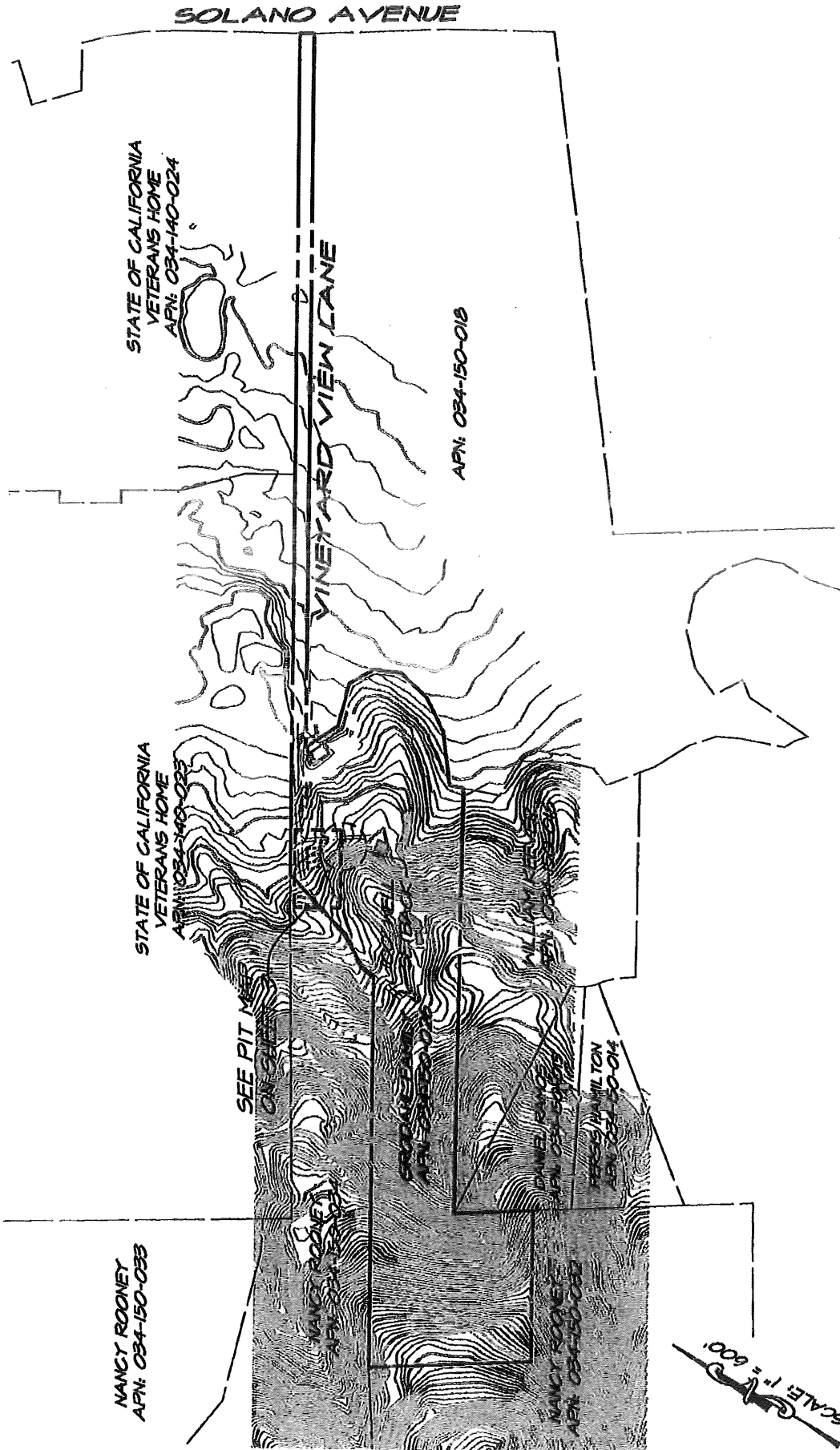


CONSULTING CIVIL ENGINEERS
**RIECHERS
& SPENCE**
ASSOCIATES

1515 Fourth Street
Napa, Calif. 94559
v 707.252.3301
f 707.252.4966

AUGUST 26, 2014
4112060.0 Ext-Vic Map.dwg 1 OF 1

GRODAHL RESIDENCE PIT MAP

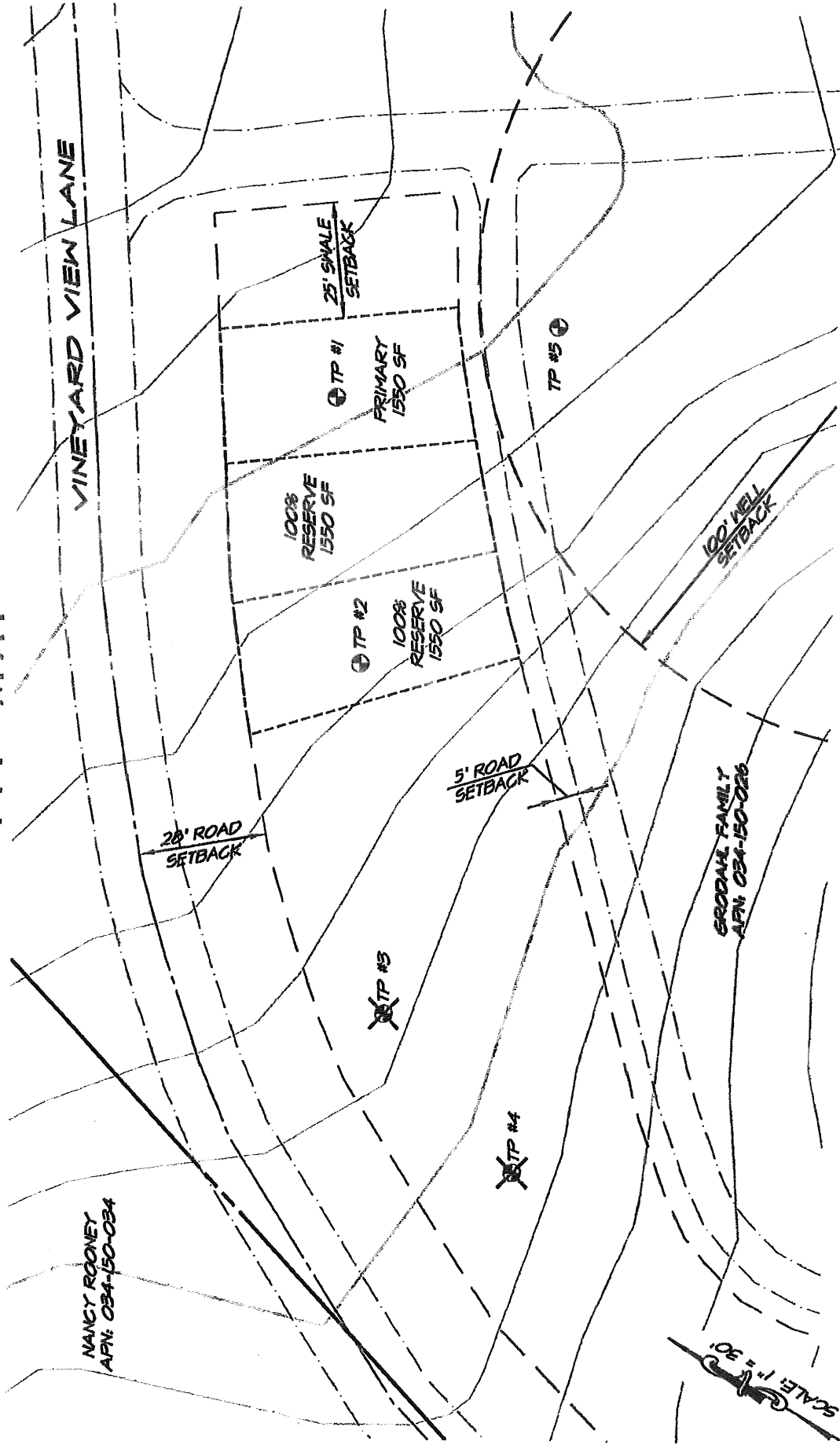


LEGEND
 (N) (E) WELL

SITE EVALUATION DATE: FEBRUARY 1, 2013
APN: 034-150-026
ADDRESS: 4 VINEYARD VIEW DRIVE
NAPA, CALIF. 94558
ENV. HEALTH INSPECTORS: SHELDON SAPOZNIK

**MITCHELLERS
SPENCE
ASSOCIATES**
 CONSULTING CIVIL ENGINEERS
 1515 Fourth Street
 Napa, Calif. 94559
 P 707.252.3301
 F 707.252.4966
 FEBRUARY 11, 2013
 P:\mmap.dwg 2 OF 3

GRODAHL RESIDENCE PIT MAP



SITE EVALUATION DATE: FEBRUARY 1, 2013
APN: 034-150-026
ADDRESS: 4 VINEYARD VIEW DRIVE
 NAPA, CALIF. 94558
ENV. HEALTH INSPECTORS: SHELDON SAPOZNIK

- LEGEND**
- ⊕ TPN TEST PIT
 - ⊙ (E) WELL
 - ⊗ UNACCEPTABLE SOIL

**BECHERS
SPENCE
ASSOCIATES**
 CONSULTING CIVIL ENGINEERS

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 Napa, Calif. 94559
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FEBRUARY 11, 2013
 412060.0 Pitmap.dwg 3 OF 3



Experience is the difference

February 12, 2013

File: 9187.35

Riechers Spence Associates
1541 Third Street
Napa, CA 94559

**Subject: Laboratory Test Results
 Soil Texture Analysis by
 Bouyocous Hydrometry Method
 Grodahl Winery**

Dear Ms. Blanc:

This letter transmits the results of our laboratory testing performed for the subject project. We performed a Soil Texture Analysis by the Bouyocous Hydrometry Method with the following results:

Size/Density	Bag
+ #10 Sieve	7.4 %
Sand	23.8 %
Clay	42.4 %
Silt	33.8 %
Db g/cc	--

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

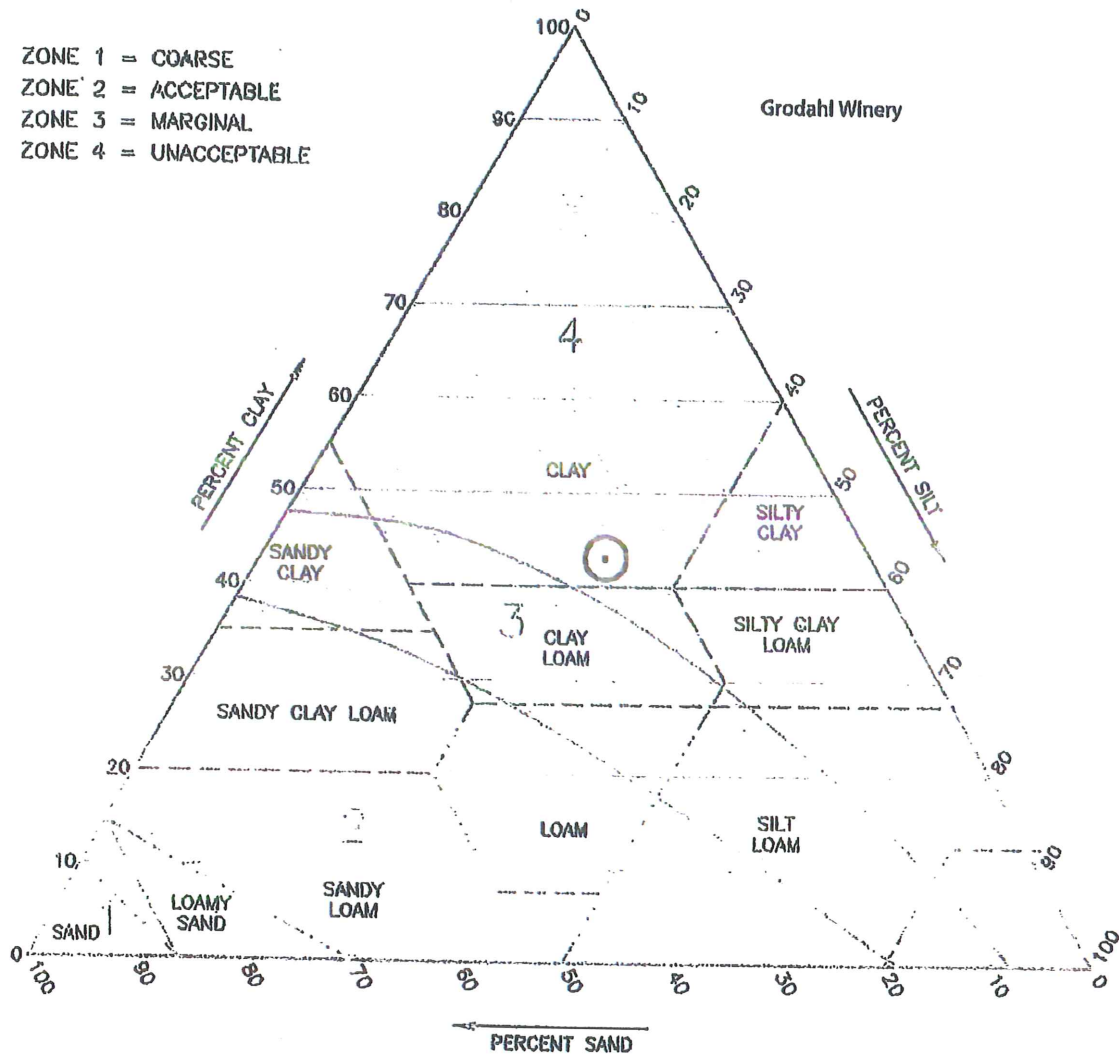
Yours very truly,

RGH GEOTECHNICAL

George Fotou
Laboratory Manager

SOIL PERCOLATION SUITABILITY CHART

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



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 necessary.



Appendix 5

Water Balance

Reclaimed Process Wastewater Water Balance for Irrigation and Storage



Project Description		Annual Process Waste Flow Volume	
Project Number:	4112060.0	Wine Production:	10,000 gal/year
Project Name:	Grodahl Winery	Annual Process Waste per Gallon Wine:	5 gal/year
Prepared By:	Lisa Blanc	Total Annual Process Waste Generated:	50,000 gal/year
Date:	May 7, 2013		

Vineyard Irrigation Parameters	
Acreage of irrigated vineyard:	0.55 acres
Row spacing:	4.0 feet
Vine spacing:	8.0 feet
Total number of vines:	749 vines
Water use per vine per month (peak):	26 gal
Total peak monthly irrigation demand:	19,466 gal

Monthly Process Wastewater Generation											
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
4%	6%	6%	5%	6%	7%	9%	10%	14%	14%	11%	8%
2,000	3,000	3,000	2,500	3,000	3,500	4,500	5,000	7,000	7,000	5,500	4,000

Monthly Vineyard Irrigation Water Use												
(Based on per-vine water use)												
Beginning of month reclaimed water in storage [gallons] (This number brought forward from end of previous month)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
6%	1,168	1,168	704	251	0	0	0	0	0	0	0	1,104
Vineyard irrigation as % of peak month irrigation demand:	6%	6%	6%	10%	100%	100%	100%	100%	100%	100%	10%	10%
Irrigation per month per vine (gallons):	2	2	2	3	26	26	26	26	26	26	3	3
Total vineyard irrigation demand [gallons]:	1,168	1,168	1,168	1,947	19,466	19,466	19,466	19,466	19,466	19,466	1,947	1,947
Will vineyard be irrigated with reclaimed water this month?	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Process wastewater generated this month, reclaimed for vineyard irrigation [gallons]	1,168	1,168	1,168	1,947	2,500	3,500	4,500	5,000	7,000	7,000	1,947	1,947
Remaining vineyard irrigation demand after using this month's process water [gallons]	0	0	0	0	16,466	15,966	14,966	14,466	12,466	12,466	0	0
Drawdown from storage for remaining vineyard irrigation [gallons]	0	0	0	0	0	0	0	0	0	0	0	0
Well water required to satisfy remaining vineyard irrigation demand	0	0	0	0	16,466	15,966	14,966	14,466	12,466	12,466	0	0
Net storage after vineyard irrigation drawdown [gallons]	1,410	704	704	251	0	0	0	0	0	0	0	1,104
This month's process wastewater, remaining after vineyard irrigation, available for landscape irrigation [gallons]	832	1,832	1,053	0	0	0	0	0	0	0	0	3,553

Water balance continues on next page for cover crop irrigation.

**Reclaimed Process Wastewater
Water Balance for Irrigation and Storage**



Monthly Landscape Irrigation Water Use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(Based on evapotranspiration crop demand and irrigated area)												
This month's process wastewater, remaining after vineyard irrigation, available for landscape irrigation [gallons] <i>[From sheet 1]</i>	832	1,832	1,053	0	0	0	0	0	0	0	3,553	2,053
Reference ET (ET _o) (in/month) (see note 1)	1.03	1.53	2.93	4.71	5.82	6.85	7.21	6.44	4.87	3.53	1.64	1.17
Crop Coefficient (K _c) (see note 2)	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Crop water demand per acre [inches]	0.10	0.15	0.29	0.47	0.58	0.69	0.72	0.64	0.49	0.35	0.16	0.12
Crop water demand per acre [gallons]	2,797	4,154	7,956	12,789	15,803	18,599	19,577	17,486	13,223	9,585	4,453	3,177
Total crop water demand for irrigated area [gallons]	1,538	2,285	4,376	7,034	8,691	10,230	10,767	9,617	7,273	5,272	2,449	1,747
Will landscape be irrigated with reclaimed water this month?	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Process wastewater remaining after vineyard irrigation, reclaimed for landscape irrigation [gallons]	832	1,832	1,053	0	0	0	0	0	0	0	2,449	1,747
Landscape irrigation water required from storage or other source [gallons]	706	453	3,322	7,034	8,691	10,230	10,767	9,617	7,273	5,272	0	0
Drawdown from storage for landscape irrigation [gallons]	706	453	251	0	0	0	0	0	0	0	0	0
Process wastewater generated this month, unused for irrigation, to be reclaimed and stored [gallons]	0	0	0	0	0	0	0	0	0	0	1,104	306
Net end-of-month reclaimed water storage after all irrigation [gallons]	704	251	0	0	0	0	0	0	0	0	1,104	1,410
Process wastewater applied to landscape areas (gallons)	1,538	2,285	1,304	0	0	0	0	0	0	0	2,449	1,747
Process wastewater applied to landscape areas (inches)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<i>End of Water Balance</i>												

Peak Monthly Storage = 1,410 gallons

Notes:

1. Reference ETO from California Irrigation Management Information System
2. Crop Coefficient from Table 1 of "Estimating Irrigation Water Needs of Landscape Plantings in California", University of California Cooperative Extension, August 2000.