CONSULTING CIVIL ENGINEERS
RIECHERS & SPENCE ASSOCIATES

WINERY WASTEWATER FEASIBILITY REPORT

KRUPP BROTHERS WINERY
3150 SILVERADO TRAIL
NAPA, CALIFORNIA

APN 039-610-006

REGISTERED PROFESSIONAL ENGINEER
Hugh A. Linn
No. 52509
Exp. 12/31/14
CIVIL
STATE OF CALIFORNIA

PROPERTY OWNER:

Bart and Patricia Krupp
300 Upper Mountain Ave
Montclair, NJ 07043

Project# 4111005.0
December 14, 2011
Revised: April 15, 2014

1515 Fourth Street, Napa, CA 94559 www.rsacivil.com 707.252.3301.v 707.252.4966.f

WASTEWATER FEASIBILITY REPORT
KRUPP WINERY

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APPENDICES

INTRODUCTION

The Owner is applying to the County of Napa for a Winery Use Permit Modification that will allow operation of a 50,000 gallon per year winery on a 13 +/- acre parcel located at 3150 Silverado Trail, Napa. The current Assessors Parcel Number is 039-610-006. The existing residence on the parcel will remain. The proposed winery will have six full-time, four part-time, and up to four part-time harvest employees.

Most of the property is relatively level and is currently used for vineyards. Hardman Creek runs roughly north to south on the eastern side of the property. A slope approximately 20 feet high runs up from the creek and this is where the existing residence is located. The proposed winery location is west of the creek in an area that is currently vineyard. One well exists on the site near the eastern property line and is available for winery use. Appendix 1 contains a Site Location Map and a USGS Site Map showing the parcel topography, features and boundary. Appendix 2 contains a reduced version of the proposed winery plan set.

This report will evaluate the disposal of wastewater consisting of winery process wastewater, winery domestic wastewater, and the domestic wastewater from the existing residence.

EXISTING SEPTIC SYSTEM

Information from Napa County files for the parcel shows an existing septic system for the house consisting of a 1500 gallon septic tank, 800 gallon sump tank, 340 feet of primary distribution line and 400 feet of reserve lines.

The distribution lines are located near the northern property boundary. This area will be impacted by the proposed winery improvements. It is proposed that the existing drain field be abandoned.

Site evaluation for the existing system was carried out on August 19, 2002. Test pit locations are shown on the plan of the existing septic system.

An earlier site evaluation was carried out on May 2, 2001, but the location of these pits was not used for a distribution system.

SITE EVALUATION

Riechers Spence & Associates conducted a site evaluation on the subject parcel on May 24, 2011. Appendix 4 contains a map of test pit locations and test pit logs for the site evaluation.

The site evaluation was conducted by Carl Butts, Hugh Linn and Bruce Fenton of Riechers Spence and Associates and observed by Kim Withrow and Rebecca Setliff of Napa County Environmental Management.

A representative soil sample was collected during the site evaluation and analyzed by RGH Consultants Inc. The soil samples underwent a soil texture analysis by Bouyoucos Hydrometer Method. The soil sample results are shown in Appendix 4. Site evaluation test pit logs are shown in Appendix 4.

WINERY PROCESS WASTEWATER CHARACTERISTICS

The following is a summary of the winery wastewater characteristics:

Wine Production:

50,000 gallons of wine per year
2.38 gallons of wine per case
21,008 cases/year

Wastewater Production:

5 gallons of wastewater/gallon of wine
250,000 gallons/year

Peak Daily Waste Water Flow:

Crush Period = 60 days
Annual wine production x 1.5 / 60
1,250 gallons/day

Average Daily Flow:

250,000/365 = 685 gallons/day

Monthly Wastewater Flows:

TABLE 1

	% By Month	Waste/Month	
Sep	15%	37,500	Gal/Month
Oct	15%	37,500	Gal/Month
Nov	11%	26,250	Gal/Month
Dec	8%	18,750	Gal/Month
Jan	4%	10,000	Gal/Month
Feb	6%	15,000	Gal/Month
Mar	6%	15,000	Gal/Month
Apr	5%	11,250	Gal/Month
May	6%	15,000	Gal/Month
Jun	7%	17,500	Gal/Month
Jul	9%	21,250	Gal/Month
Aug	10%	25,000	Gal/Month
Totals	100%	250,000	Gal/Year

DOMESTIC WASTEWATER CHARACTERISTICS

The winery domestic waste system has been sized to accommodate the unit values in Table 2 below. The number of visitors and employees is based on information provided by the owner. 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 2

Use	Source	Number	Projected Flow (gpd)	Total Flow (gpd)
WINERY	Full-time employees	6	15	90
	Part-time employees	4	15	60
	Part-time harvest employees	4	15	60
	Visitors	100	3	300
	Private Promotional w/ Meals (external caterer)	24	15	360
	Total People	138	**Winery Peak Flow**	**870**
RESIDENTIAL	Bedrooms	5	120	600
Combined Domestic Waste System			**Total Peak Flow**	**1,470**

The number of visitors is based on a maximum expected daily visitor count. Any combination of events where the expected total guest count exceeds 124 persons in a single day will require the use of portable sanitation facilities.

WINERY PROCESS WASTEWATER - SURFACE DRIP IRRIGATION

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, 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 a treatment train including a septic tank, treatment tank with High Strength Membrane Bio-Reactor (HSMBR) unit, and pump tank are proposed. This treatment train may be modified for more desirable treatment processes prior to submitting construction plans. The following sections describe this process in more detail. This system is shown on Sheet UP3 contained in Appendix 2.

Septic Tank

The septic tank will serve to buffer peak flows and strengths from overwhelming the system and impairing treatment. This tank has been designed with baffles near the outlet. This tank will provide three days storage and will also serve to function as a primary settling basin. This tank will be 4,000 gallons.

Treatment Tank

The treatment tank will serve to treat wastewater flows using a High Strength Membrane Bio-Reactor (HSMBR) unit. This tank will provide ten days storage. This tank will be 13,000 gallons.

Pump Tank

The pump tank will serve to hold wastewater prior to distribution to the dispersal field. This tank will house dual pumps. This tank will be 1,000 gallons.

Holding Tank and Dispersal Field

To provide a preliminary estimate of the amount of storage tanks required, we have prepared a monthly water balance, as shown in Appendix 7. 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 vine water demand. The irrigation will be applied to areas of vineyards outside well setback requirements. The area available for irrigation is shown in Appendix 6. An area of 5.5 acres of vineyard and 0.5 acres of cover crop has been used to calculate the storage capacity required. Based on monthly analysis no storage is required. Storage capacity of 20,000 gallons is provided for treated process wastewater generated during wet weather periods.

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.

DOMESTIC WASTEWATER - SUB SURFACE DRIP

For the domestic wastewater we propose installation of a new septic system and dispersal field for the proposed winery. For the residence the addition of a HOOT treatment system and a new

dispersal field is proposed. Existing tanks for the residence are to remain if an inspection demonstrates that they are still operational. The existing leach field would be abandoned in accordance with Napa County Environmental Management requirements.

Domestic wastewater from the existing residence will flow into the existing septic and pump tanks before being pumped to a new HOOT H-600 tank. After pretreatment in the HOOT H-600, wastewater will be pumped to the proposed distribution field.

Domestic wastewater for the proposed winery will flow to a HOOT-1000 tank for treatment before being pumped to the dispersal field.

Wastewater from the kitchen will first flow to a 750-gallon grease interceptor tank before flowing to the HOOT H-1000. The 750-gallon grease interceptor tank will be capable of supporting 21 Drainage Fixture Units (DFUs) from the kitchen. See Table 1014.3.6 from the 2013 California Plumbing Code in Appendix 5.

The subsurface drip 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 most limiting usable soil type was sandy clay loam. The allowable application rate for sandy clay loam is 0.6 gallons/square foot/day for pre-treated effluent. Peak daily domestic wastewater flow is 1470 gallons/day.

$$Dispersal\ Field\ Area(primary) = \frac{1470\,gpd}{0.6\,gpd/SF} = 2{,}450\,square\ feet$$

In addition to the primary dispersal area of 2,450 square feet, a 200% reserve area is required. The reserve area will be located adjacent to the primary field where the soil application rate is also 0.6 gallons/square foot/day.

$$Dispersal\ Field\ Area\,(reserve\,area) = \frac{1470\,gpd}{0.6\,gpd/SF} = 2{,}450\,square\ feet$$

The total requirement for domestic wastewater reserve dispersal area is 4,900 square feet. Total area required for the primary and reserve is 7,350 square feet.

The system layout is shown on UP3 in Appendix 2.

STORMWATER DIVERSION

Operational areas including crush pad, trash and recycling enclosure, and mechanical pad will be covered.

OPERATION AND MAINTENANCE

The winery process and domestic waste systems will be fully automated and has been 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 inspection for the system installed.

CONCLUSION

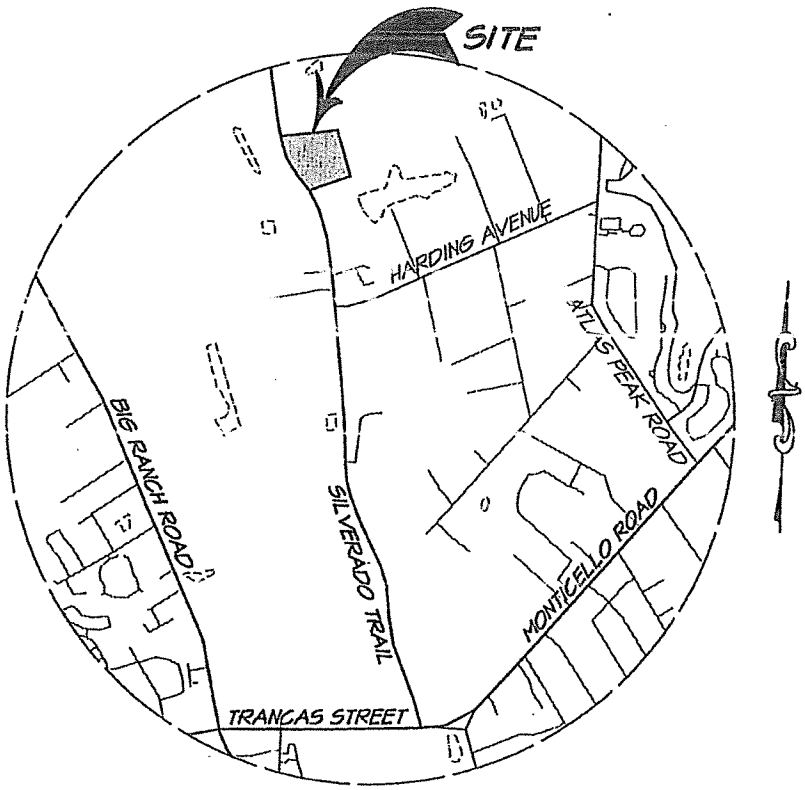
This report demonstrates that enough dispersion area is available making a sub-surface drip system a feasible option for treating the Krupp Winery's domestic wastewater. It has also been demonstrated that it is feasible to treat the winery process wastewater and distribute this to the vineyard using drip irrigation.

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

APPENDIX 1

Vicinity Map & USGS Site Map

KRUPP BROTHERS WINERY
VICINITY MAP
NAPA CALIFORNIA



CONSULTING CIVIL ENGINEERS
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Napa, Calif. 94559
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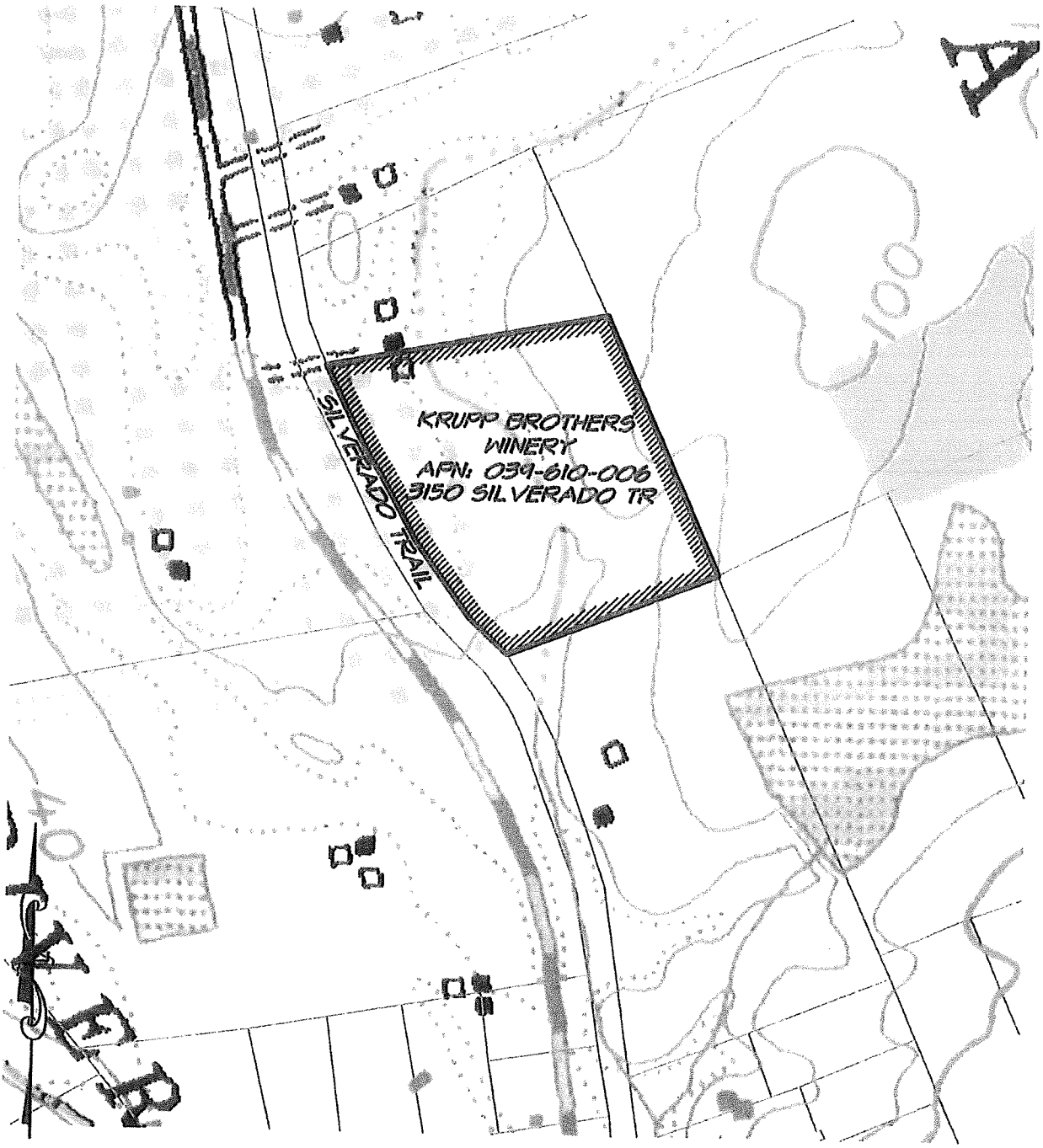
JUNE 1, 2011

4111005.0 pltmap.dwg 1 OF 3

KRUPP BROTHERS WINERY
USGS MAP
NAPA COUNTY CALIFORNIA



GRAPHIC SCALE

400 0 400 800

(IN FEET)
1 inch = 400 FT

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v 707.252.3301
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AUG. 11, 2011

4111005.0 usgs.dwg sheet 1

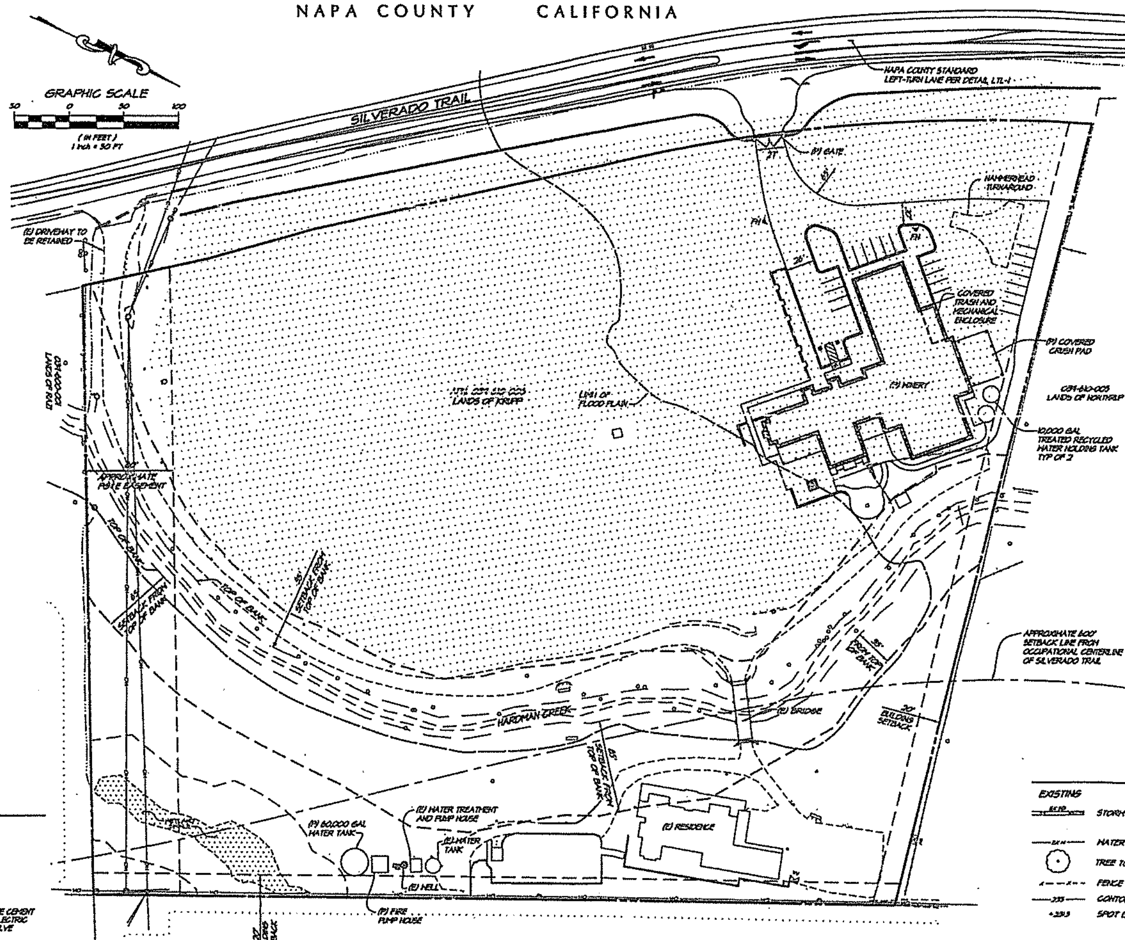
APPENDIX 2

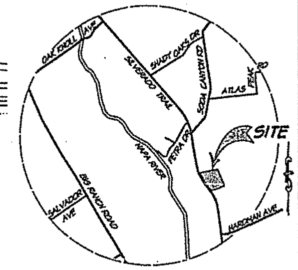
Reduced Use Permit Plan Set

KRUPP BROTHERS WINERY

USE PERMIT MODIFICATIONS

NAPA COUNTY CALIFORNIA





LOCATION MAP

NO SCALE

PROJECT INFORMATION

OWNER:	BART AND PATRICIA KRUPP
OWNER ADDRESS:	330 UPPER MOUNTAIN AVE MONTCLAIR, NJ 07043
SITE ADDRESS:	3150 SILVERADO TRAIL NAPA, CA 94558
CIVIL ENGINEER:	RIECHERS SPENCE & ASSOC. 1515 FOURTH STREET NAPA, CA 94559
CONTACT:	HUGH LINN TEL: 707-252-3301
APN:	039-610-006
PARCEL AREA:	13.23 ACRES±
EXISTING USE:	RURAL HOMESITE
PROPOSED USE:	WINERY
EXISTING ZONING:	AP
PROPOSED ZONING:	AP

BOUNDARY NOTES

THE BOUNDARIES SHOWN HEREIN ARE BASED UPON TOPOGRAPHIC MAP PREPARED BY RSA, DATED MARCH 2011.

BENCHMARK

NAPA COUNTY #33-C, ELEVATION = 56.44' (NGVD 1929).

SHEET INDEX

UP1	SITE AND WINERY LAYOUT PLAN
UP2	GRADING AND EROSION PLAN
UP3	UTILITY PLAN

SYMBOL LEGEND

EXISTING		PROPOSED	
	STORM DRAIN LINE		STORM DRAIN LINE
			FIRE MAIN
	WATER LINE		PROPERTY LINE
	TREE TO REMAIN		DIRECTION OF EX. DRAINAGE
	FENCE		100-YEAR OVERLAND RELEASE PATH
	CONTOUR LINE		
	SPOT ELEVATION		

ABBREVIATIONS

AD	AREA DRAIN	GB	GRADE BREAK
AB	AGGREGATE BASE	HP	HIGH POINT
AC	ASPHALT CONCRETE	INV	INVERT
ARV	AIR RELEASE VALVE	IP	IRON PIPE
BFP	BACK FLOW PREVENTER	JP	JOINT POLE
BM	BENCHMARK	LF	LINEAL FEET/FOOT
BO	BLOWOFF	LP	LOW POINT
BSW	BACK OF SIDEWALK	MH	MANHOLE
C&G	CURB AND GUTTER	OC	ON CENTER
CB	CATCH BASIN	OH	OVERHEAD
℄	CENTERLINE	PCC	PORTLAND CONCRETE CEMENT
CIPP	CAST IN PLACE PIPE	PG&E	PACIFIC GAS AND ELECTRIC
CMP	CORRUGATED METAL PIPE	PIV	POST INDICATOR VALVE
CO	CLEANOUT	PL	PROPERTY LINE
CPP	CORRUGATED PLASTIC PIPE	PRC	POINT OF REVERSE CURVE
CV	CHECK VALVE	PVC	POLYVINYL CHLORIDE
DI	DROP INLET	PW	PROCESS WASTE
DIP	DUCTILE IRON PIPE	R	RADIUS
DS	DOWNSPOUT	RSA	RIECHERS SPENCE & ASSOCIATES
DCV	DOUBLE CHECK VALVE	ROW	RIGHT OF WAY
DDCV	DOUBLE DETECTOR CHECK VALVE	RCP	REINFORCED CONCRETE PIPE
EP	EDGE OF PAVEMENT	S	SLOPE (FEET/FOOT)
EX	EXISTING	SD	STORM DRAIN
F/C	FACE OF CURB	SS	SANITARY SEWER
FDC	FIRE DEPT. CONNECTION	STA	STATION
FF	FINISH FLOOR	STD	STANDARD
FFC	FINISH FLOOR OF CAVE	STL	STEEL PIPE
FG	FINISH GRADE	TC	TOP OF CURB
FH	FIRE HYDRANT	TW	TOP OF WALL
FS	FIRE SERVICE	VCP	VITRIFIED CLAY PIPE
FL	FLOW LINE	W	DOMESTIC WATER LINE
FW	FIRE WATER LINE	WM	WATER METER
		WV	WATER VALVE

PARKING SUMMARY

STANDARD (9'x19')	22 STALLS
ACCESSIBLE (9'x20')	2 STALLS
TOTAL	24 STALLS

REGISTERED PROFESSIONAL ENGINEER HUGH ALEXANDER LINN No. 52509 Exp. 12-31-14 CIVIL ENGINEER STATE OF CALIFORNIA

PREPARED UNDER THE DIRECTION OF:

HUGH A. LINN RCE 52509 EXP 12-31-14

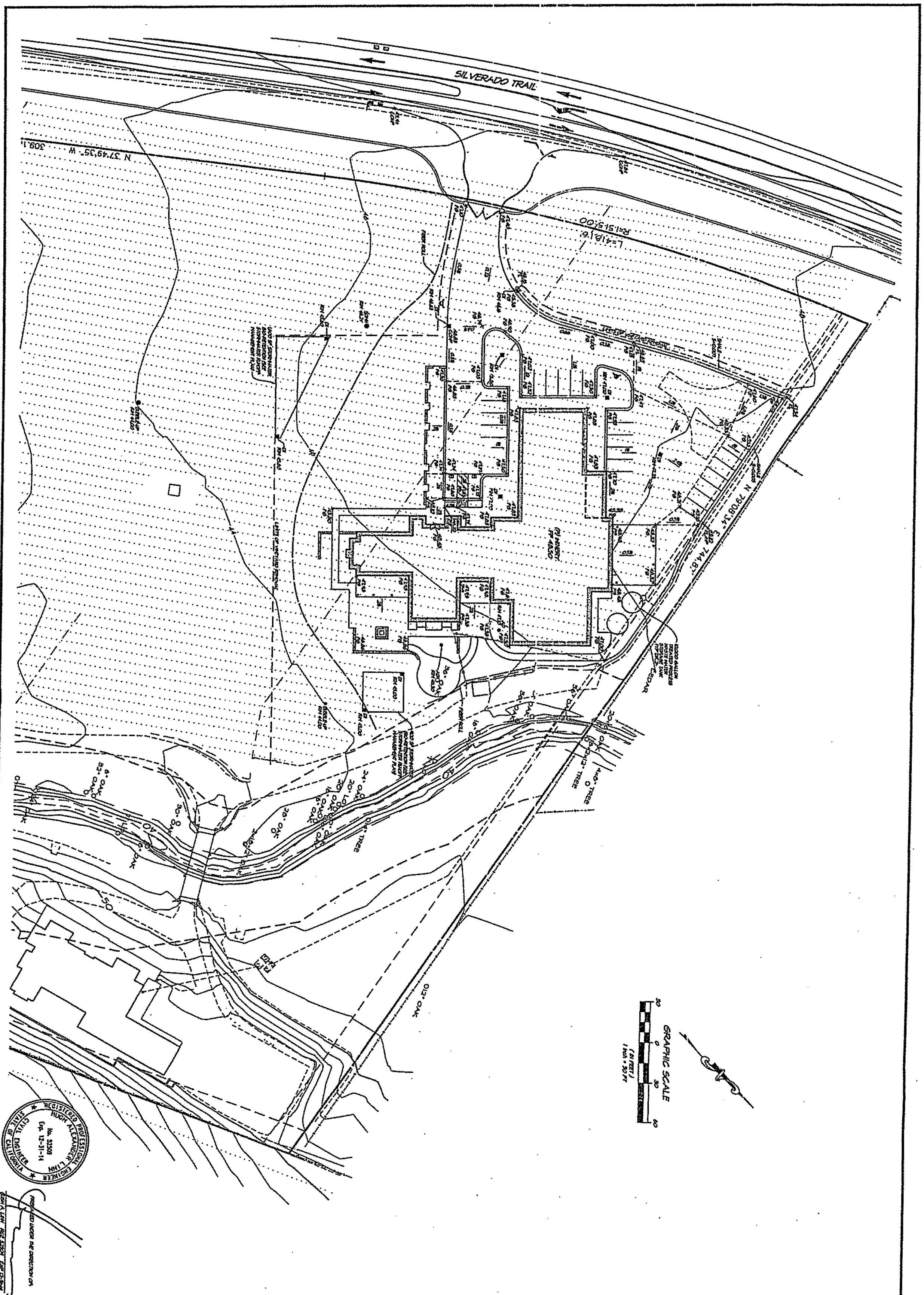
RIECHERS SPENCE & ASSOCIATES
CONSULTING CIVIL ENGINEERS
1515 Fourth Street Napa, California 94559
v 707.252.3301 f 707.252.4966

NO.	DATE	REVISIONS	BY	APPD

KRUPP BROTHERS WINERY
SITE PLAN
NAPA COUNTY CALIFORNIA

DATE	04/16/2014
DRAWN	SCB/FH
DESIGNED	ECB
CHECKED	BHF
JOB NO.	418005.0
SHEET NO.	UP1 OF 3 SHEETS

PRELIMINARY NOT FOR CONSTRUCTION



KRUPP BROTHERS WINERY

GRADING AND EROSION CONTROL PLAN

NAPA COUNTY CALIFORNIA

UP2

OF 5 SHEETS

RIECHERS & SPENCE ASSOCIATES
CONSULTING CIVIL ENGINEERS
1515 Fourth Street
Napa, California 94559
T 707.252.3301
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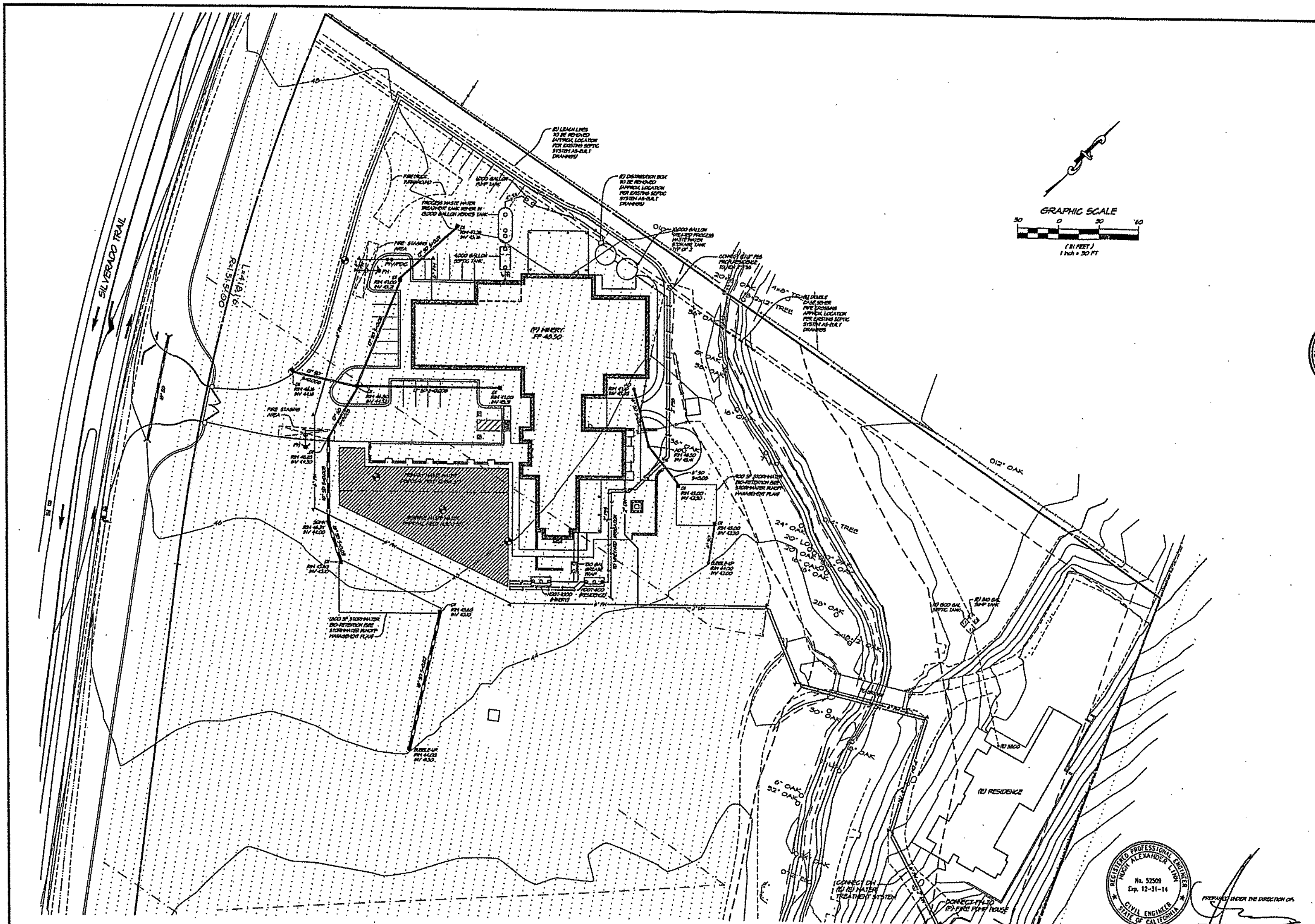
REV.	DATE	REVISIONS	BY	APPD



KRUPP BROTHERS WINERY
UTILITY PLAN
NAPA COUNTY CALIFORNIA

RIECHERS SPENCE & ASSOCIATES
CONSULTING CIVIL ENGINEERS
1513 Fourth Street, Napa, California 94559

DATE	04/16/2014
DESIGNED	ECB
CHECKED	BHF
JOB NO.	410005.0
SHEET NO.	UP3

OF 5 SHEETS

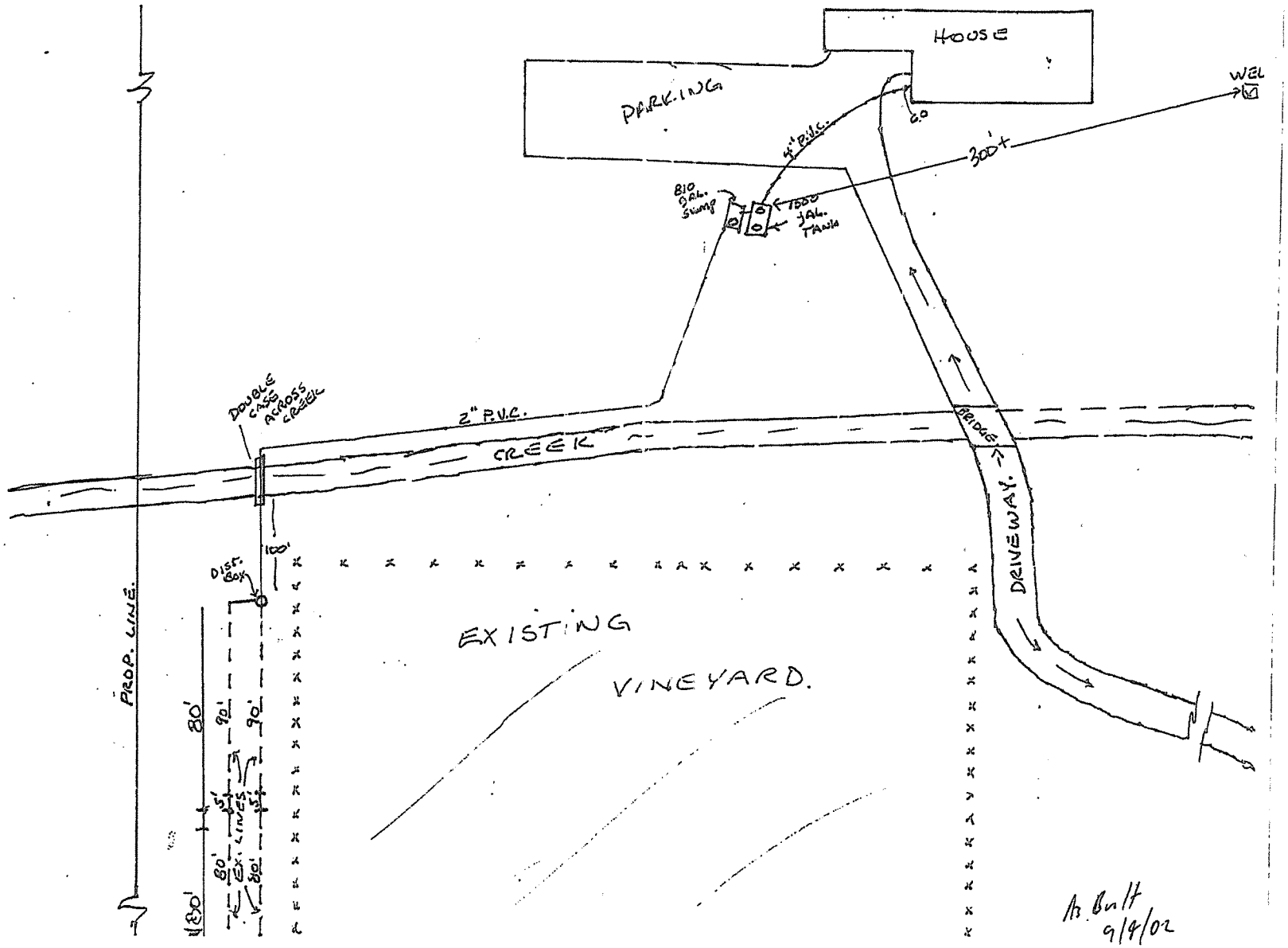
REGISTERED PROFESSIONAL ENGINEER
HUGH ALEXANDER LINN
No. 52509
Exp. 12-31-14
CIVIL ENGINEER
STATE OF CALIFORNIA

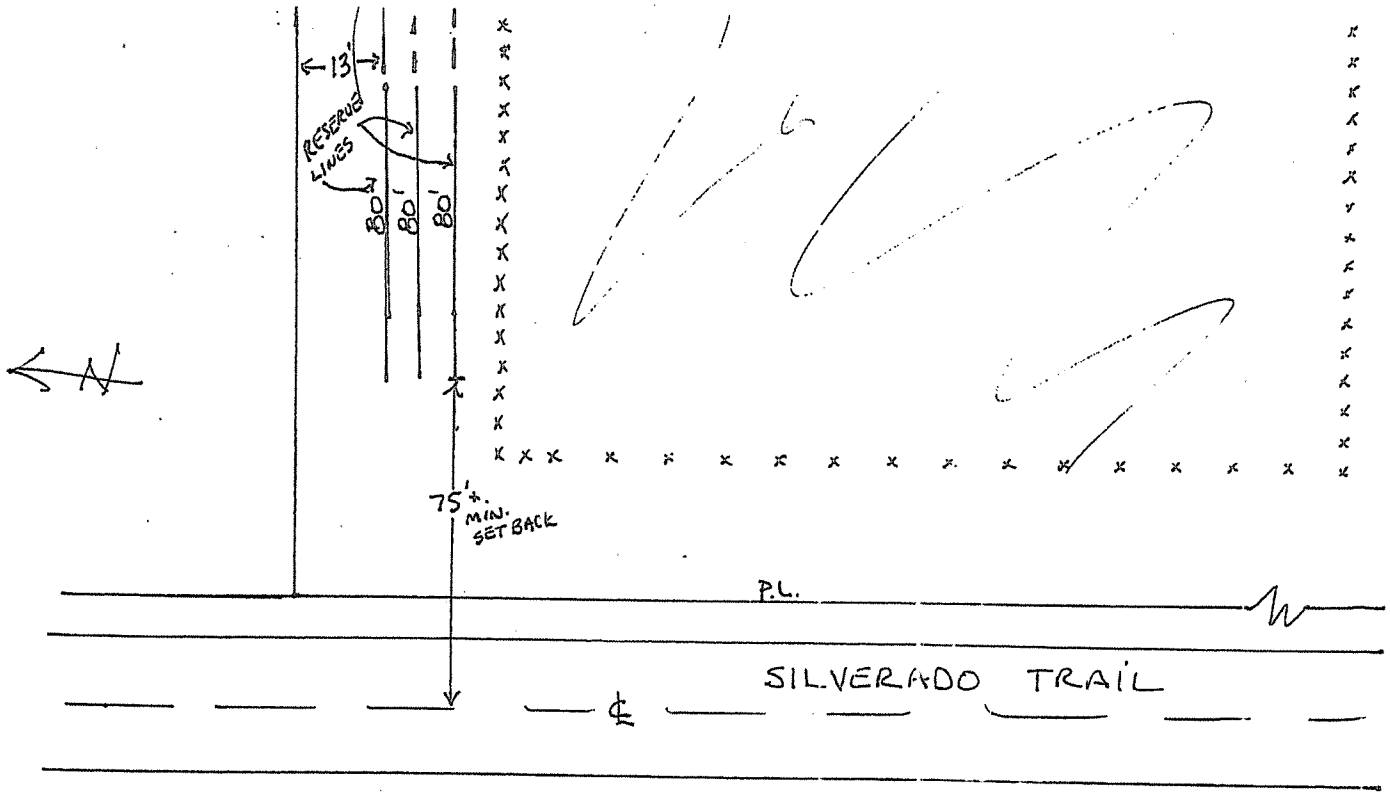
PREPARED UNDER THE DIRECTION OF:

PRELIMINARY NOT FOR CONSTRUCTION

APPENDIX 3

Existing Septic System Documentation


HOUSE
PARKING
WEL
4" P.V.C.
6.0
300'+
810 GAL. SUMP
1000 GAL. TANK
DOUBLE CASE ACROSS CREEK
2" P.V.C.
CREEK
BRIDGE
DRIVEWAY
DIST. BOX
100'
PROP. LINE
80'
90'
90'
80'
80'
5'
5'
5'
EX. LINES
EXISTING
VINEYARD.
As Built
9/4/02



WM. STRACK
3150 SILVERADO TR.
NAPA,

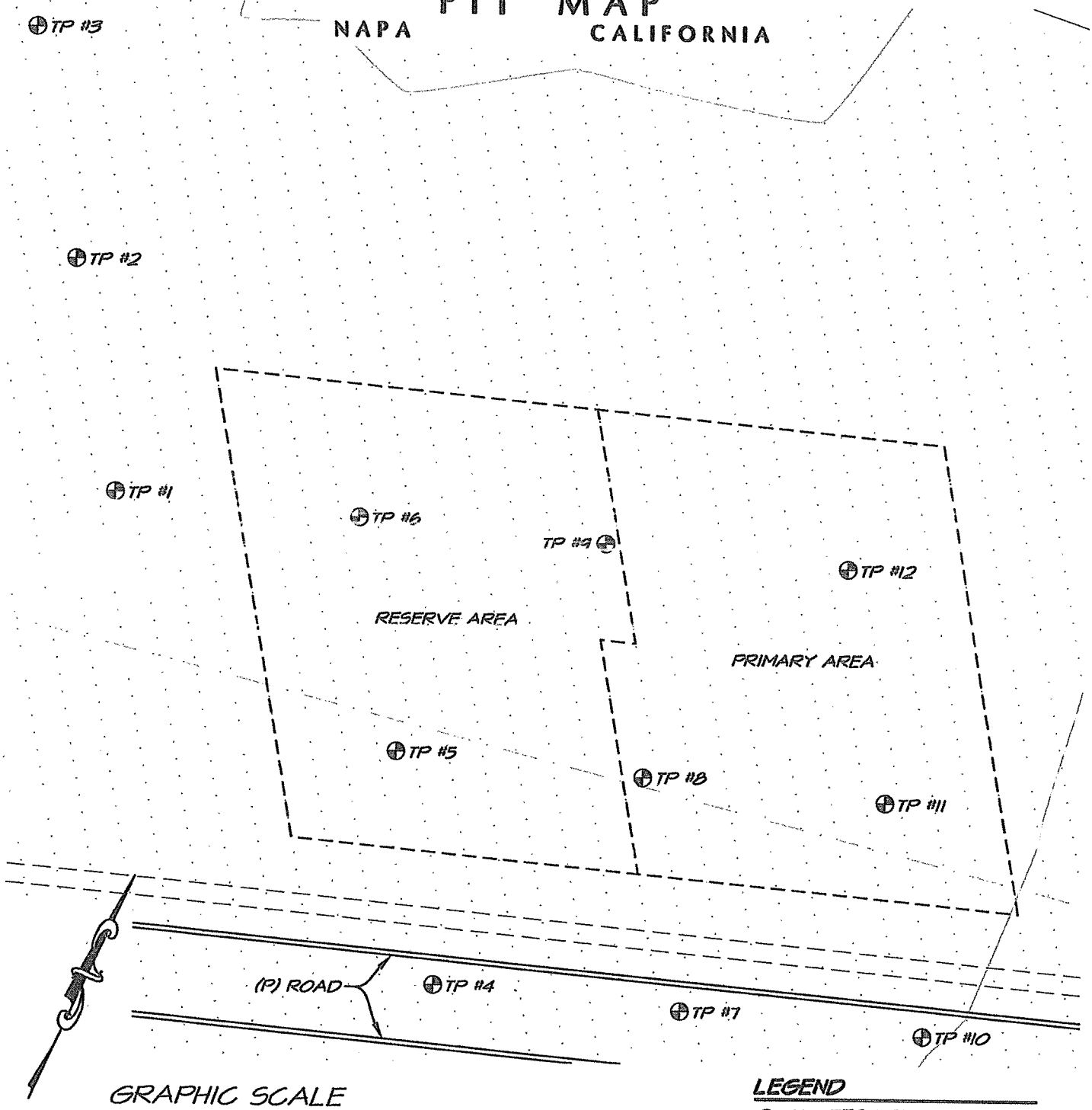
"AS BUILT" PLOT PLAN:
9/4/02

A.P. # 39-610-06

APPENDIX 4

Site Evaluation

KRUPP BROTHERS WINERY
PIT MAP



GRAPHIC SCALE

30 0 30 60

1 INCH = 30 FT.

LEGEND

TP#1 TEST PIT

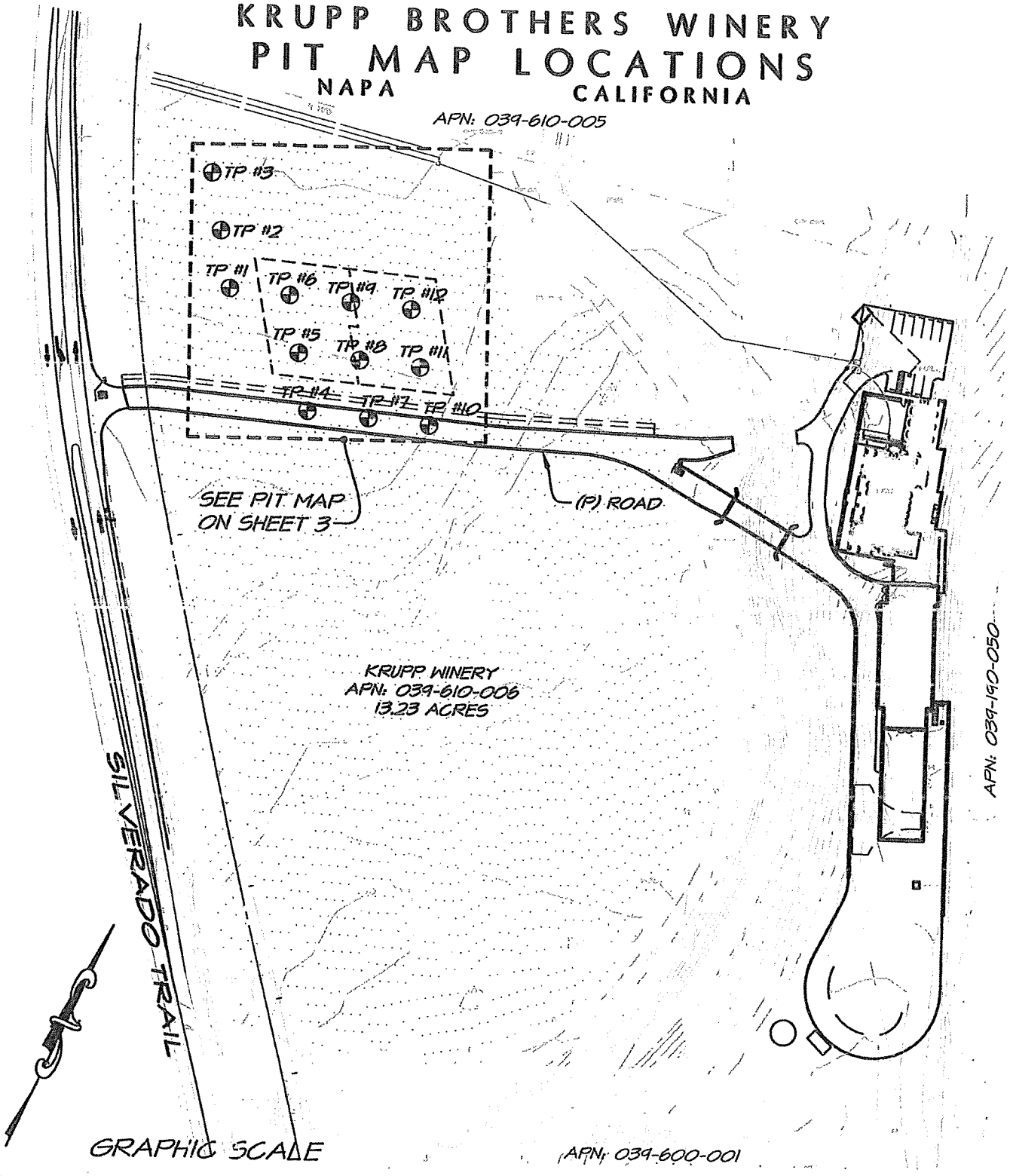
SITE EVALUATION DATE: MAY 24, 2011
APN: 039-610-006
ADDRESS: 3150 SILVERADO TRAIL, NAPA, CA 94558
ENV. HEALTH INSPECTOR: KIM WITHROW & REBECCA SETLIFF

CONSULTING CIVIL ENGINEERS
RIECHERS & SPENCE ASSOCIATES
1515 Fourth Street
Napa, Calif. 94559
v 707.252.3301
f 707.252.4966

JUNE 1, 2011

4111005.0 pitmap.dwg 3 OF 3

KRUPP BROTHERS WINERY
PIT MAP LOCATIONS
NAPA CALIFORNIA



GRAPHIC SCALE

120 0 120 240

1 INCH = 120 FT.

LEGEND

TP#1 TEST PIT

SITE EVALUATION DATE: MAY 24, 2011
APN: 039-610-006
ADDRESS: 3150 SILVERADO TRAIL, NAPA, CA 94558
ENV. HEALTH INSPECTOR: KIM WITHROW & REBECCA SETLIFF

CONSULTING CIVIL ENGINEERS
RIECHERS SPENCE & ASSOCIATES
1515 Fourth Street
Napa, Calif. 94559
v 707.252.3301
f 707.252.4966

JUNE 1, 2011
4111005.0 pitmap.dwg 2 OF 3

Permit Number: E11-00161
APN 039-610-006
RSA Project Number: 4111005.0

Date: 12/05/2011

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 #: E11-00161
APN: 039-610-006
(County Use Only) Reviewed by: Date:

PLEASE PRINT OR TYPE ALL INFORMATION

Property Owner Jan Krupp	☒ New Construction ☐ Addition ☒ Remodel ☐ Relocation ☐ Other:
Property Owner Mailing Address 3265 Soda Canyon Drive	☐ Residential - # of Bedrooms: Design Flow : gpd
City: Napa State: CA Zip: 94558	☒ Commercial – Type: Winery Sanitary Waste: 870 gpd Process Waste: 1250 gpd
Site Address/Location 3150 Silverado Trail Napa, CA 94558	☐ Other: Sanitary Waste: gpd Process Waste: gpd

Evaluation Conducted By:

Company Name Riechers Spence & Associates	Evaluator's Name Bruce Fenton PE	Signature (Civil Engineer, R.E., Geologist, Soil Scientist)
Mailing Address: 1515 Fourth Street		Telephone Number 707-252-3301
City: Napa State: CA Zip: 94559		Date Evaluation Conducted May 24, 2011

REGISTERED PROFESSIONAL ENGINEER — Bruce W. Fenton — No. 77850 — Exp. 06/30/13 — CIVIL — STATE OF CALIFORNIA

Primary Area

Acceptable Soil Depth: 60 in. Test pit #'s: 8, 9, 11, 12

Soil Application Rate (gal. /sq. ft. /day): 0.5 / 0.75

System Type(s) Recommended: Pressure Distribution without pretreatment / with pretreatment

Slope: <1%. Distance to nearest water source: +100 ft.

Hydrometer test performed? No ☐ Yes ☒ (attach results)

Bulk Density test performed? No ☒ Yes ☐ (attach results)

Percolation test performed? No ☒ Yes ☐ (attach results)

Groundwater Monitoring Performed? No ☒ Yes ☐ (attach results)

Expansion Area

Acceptable Soil Depth: 60 in. Test pit #'s: 5, 6, 8, 9

Soil Application Rate (gal. /sq. ft. /day): 0.5 / 0.75

System Type(s) Recommended: Pressure Distribution without pretreatment / with pretreatment

Slope: <1%. Distance to nearest water source: +100 ft.

Hydrometer test performed? No ☐ Yes ☒ (attach results)

Bulk Density test performed? No ☒ Yes ☐ (attach results)

Percolation test performed? No ☒ Yes ☐ (attach results)

Groundwater Monitoring Performed? No ☒ Yes ☐ (attach results)

Site constraints/Recommendations:

1. Soil test report indicated soil was sandy clay loam. As test pits were generally consistent in the primary and expansion areas, sandy clay loam adopted for determination of system hydraulic loading rate of 0.75 gallons per day with pretreatment or 0.5 gallons per day without pretreatement for Pressure Distribution System.

Test Pit # 1

X = Limiting Horizon	Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure (Grade / Shape)	Consistence			Pores (QTY / Size)	Roots (QTY / Size)	Mottling (QTY / Size/ Contrast)
						Side Wall	Ped	Wet			
	0-12	G	20	SCL	M/SB	SH	FRB	NS	C/M	F/M	--
	12-48	G	40	SCL	M/SB	H	F	SS	C/M	F/M	--
X	48 +		--	SCL	W/C	H	F	S	F/F	F/-	C/F/FT

Notes: ACCEPTABLE

Test Pit # 2

X = Limiting Horizon	Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure (Grade / Shape)	Consistence			Pores (QTY / Size)	Roots (QTY / Size)	Mottling (QTY / Size/ Contrast)
						Side Wall	Ped	Wet			
	0-18	G	0	SiCL	M/SB	SH	FRB	NC	C/M	F/M	--
X	18-32	G	0	C	S/M	H	VF	SS	F/VF	--	--
	32+		0	SiC	W/C	H	FRB	NS	F/F	--	--

Notes: NOT ACCEPTABLE

Test Pit # 3

X = Limiting Horizon	Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure (Grade / Shape)	Consistence			Pores (QTY / Size)	Roots (QTY / Size)	Mottling (QTY / Size/ Contrast)
						Side Wall	Ped	Wet			
	0-12	G	0	SiCL	M/SB	SH	FRB	NS	C/M	F/M	--
X	12-32	G	0	C	S/M	H	VF	SS	F/VF	--	--
	32+	--	0	SiC	W/C	H	FRB	NS	F/VF	--	--

Notes: NOT ACCEPTABLE

Test Pit # 4

X = Limiting Horizon	Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure (Grade / Shape)	Consistence			Pores (QTY / Size)	Roots (QTY / Size)	Mottling (QTY / Size/ Contrast)
						Side Wall	Ped	Wet			
	0-18	G	20	SCL	M/SB	SH	FRB	NS	C/M	F/M	--
	18-48	G	50	SCL	M/SB	H	F	S	C/M	F/M	--
X	48+	G			W/C	S	F	S	F/F	F/-	C/F/FT

Notes: ACCEPTABLE

Test Pit # 5

X = Limiting Horizon	Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure (Grade / Shape)	Consistence			Pores (QTY / Size)	Roots (QTY / Size)	Mottling (QTY / Size/ Contrast)
						Side Wall	Ped	Wet			
	0-18	G	10	SCL	M/SB	SH	FR	SS	C/F	C/M	--
	18-60	G	40	SCL	M/SB	SH	F	SS	C/F	C/M	--

Notes: ACCEPTABLE

Test Pit # 6

X = Limiting Horizon	Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure (Grade / Shape)	Consistence			Pores (QTY / Size)	Roots (QTY / Size)	Mottling (QTY / Size/ Contrast)
						Side Wall	Ped	Wet			
	0-18	G	10	SCL	M/SB	SH	FRB	NS	F/F	C/M	--
	18-60	G	40	SCL	M/SB	SH	FRB	NS	C/F	F/F	--

Notes: ACCEPTABLE

Test Pit # 7

X = Limiting Horizon	Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure (Grade / Shape)	Consistence			Pores (QTY / Size)	Roots (QTY / Size)	Mottling (QTY / Size/ Contrast)
						Side Wall	Ped	Wet			
	0-12	G	0-5	SCL	M/SB	SH	FRB	NS	F/VF	F/F	--
	12-30	G	20	SCL	M/SB	SH	FRB	NS	F/F	F/M	--
	30-54	G	50	SCL	M/SB	SH	FRB	SB	F/F	C/F	--

Notes: ACCEPTABLE

Test Pit # 8

X = Limiting Horizon	Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure (Grade / Shape)	Consistence			Pores (QTY / Size)	Roots (QTY / Size)	Mottling (QTY / Size/ Contrast)
						Side Wall	Ped	Wet			
	0-18	GR	10	SCL	M/SB	SH	FIRM	NS	C/F	C/F	--
	18-36	GR	30	SCL	M/B	SH	FRB	NS	B/M	F/M	--
	36-60	GR	40	SCL	M/B	SH	FRB	NS	C/M	F/F	--

Notes: ACCEPTABLE

Test Pit # 9

X = Limiting Horizon	Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure (Grade / Shape)	Consistence			Pores (QTY / Size)	Roots (QTY / Size)	Mottling (QTY / Size/ Contrast)
						Side Wall	Ped	Wet			
	0-12	GR	10	SCL	M/SB	SH	F	NS	C/F	C/M	--
	12-60	GR	40	SCL	M/SB	SH	FRB	NS	C/M	F/F	--

Notes: ACCEPTABLE

Test Pit # 10

X = Limiting Horizon	Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure (Grade / Shape)	Consistence			Pores (QTY / Size)	Roots (QTY / Size)	Mottling (QTY / Size/ Contrast)
						Side Wall	Ped	Wet			
	0-12	GR	10	SCL	M/SB	SH	FRB	NS	C/F	C/F	--
	12-30	GR	40	SCL	M/SB	SH	FRB	SS	C/M	F/F	--
	30-60	GR	50	SCL	M/SB	SH	FRB	SS	C/M	F/F	--

Notes: ACCEPTABLE – water at 66"

Test Pit # 11

X = Limiting Horizon	Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure (Grade / Shape)	Consistence			Pores (QTY / Size)	Roots (QTY / Size)	Mottling (QTY / Size/ Contrast)
						Side Wall	Ped	Wet			
	0-18	GR	10	SCL	M/SB	SH	FRB	NS	F/F	C/M	--
	18-36	GR	40	SCL	M/SB	SH	FRB	SS	F/M	F/F	--
	36-60+	GR	50	SCL	M/SB	SH	FRB	SS	F/M	F/F	--

Notes: ACCEPTABLE

Test Pit # 12

X = Limiting Horizon	Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure (Grade / Shape)	Consistence			Pores (QTY / Size)	Roots (QTY / Size)	Mottling (QTY / Size/ Contrast)
						Side Wall	Ped	Wet			
	0-12	GR	10	SCL	M/SB	SH	FRB	SS	F/F	C/M	--
	12-60	GR	50	SCL	M/SB	SH	FRB	NS	C/M	C/M	--

Notes: ACCEPTABLE

Experience is the difference

June 9, 2011
File: 9187.28

Riechers Spence Associates
1541 Third Street
Napa, CA 94559

Subject: **Laboratory Test Results**
Soil Texture Analysis by
Bouyoucos Hydrometry Method
Krupp Residence

Dear Mr. Fenton:

This letter transmits the results of our laboratory testing performed for the subject project. Your personnel delivered the sample on May 31, 2011.

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

Size/Density	P6 @ 24"
+ #10 Sieve	0.0 %
Sand	54.6 %
Clay	22.0 %
Silt	23.4 %
Db g/cc	--

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

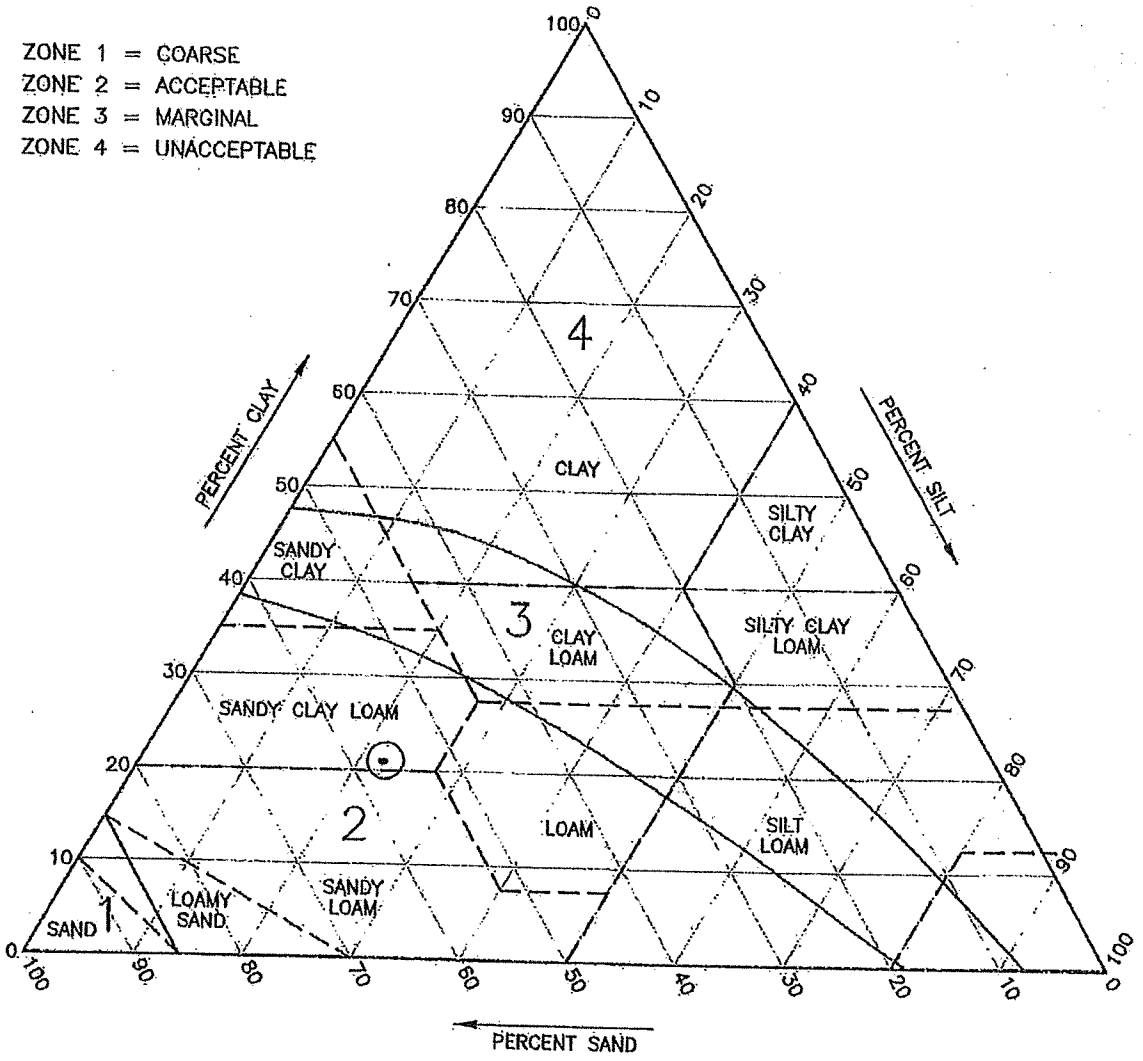
Yours very truly,

RGH GEOTECHNICAL

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 neccesary.

APPENDIX 5

Grease Trap Sizing

drained into the sanitary waste through the interceptor where approved by the Authority Having Jurisdiction.

1014.3.2.1 Toilets and Urinals. Toilets, urinals, and other similar fixtures shall not drain through the interceptor.

1014.3.2.2 Inlet Pipe. Waste shall enter the interceptor through the inlet pipe.

1014.3.3 Design. Gravity interceptors shall be constructed in accordance with the applicable standard in Table 1401.1 or the design approved by the Authority Having Jurisdiction.

1014.3.4 Location. Each grease interceptor shall be so installed and connected that it shall be easily accessible for inspection, cleaning, and removal of the intercepted grease. A gravity grease interceptor in accordance with IAPMO Z1001, shall not be installed in a building where food is handled. Location of the grease interceptor shall meet the approval of the Authority Having Jurisdiction.

1014.3.4.1 Interceptors. Interceptors shall be placed as close as practical to the fixtures they serve.

1014.3.4.2 Business Establishment. Each business establishment for which a gravity grease interceptor is required shall have an interceptor which shall serve that establishment unless otherwise approved by the Authority Having Jurisdiction.

1014.3.4.3 Access. Each gravity grease interceptor shall be located so as to be readily accessible to the equipment required for maintenance.

1014.3.5 Construction Requirements. Gravity grease interceptors shall be designed to remove grease from effluent and shall be sized in accordance with this section. Gravity grease interceptors shall also be designed to retain grease until accumulations can be removed by pumping the interceptor. It is recommended that a sample box be located at the outlet end of gravity grease interceptors so that the Authority Having Jurisdiction can periodically sample effluent quality.

1014.3.6 Sizing Criteria. The volume of the interceptor shall be determined by using Table 1014.3.6. Where drainage fixture units (DFUs) are not known, the interceptor shall be sized based on the maximum DFUs allowed for the pipe size connected to the inlet of the interceptor. Refer to Table 703.2, Drainage Piping, Horizontal.

1014.3.7 Abandoned Gravity Grease Interceptors. Abandoned grease interceptors shall be pumped and filled as required for abandoned sewers and sewage disposal facilities in Section 722.0.

TABLE 1014.3.6
GRAVITY GREASE INTERCEPTOR SIZING

DRAINAGE FIXTURE UNITS[1, 3] (DFUs)	INTERCEPTOR VOLUME[2] (gallons)
8	500
21	750
35	1000
90	1250
172	1500
216	2000
307	2500
342	3000
428	4000
576	5000
720	7500
2112	10 000
2640	15 000

For SI units: 1 gallon = 3.785 L

Notes:

1 The maximum allowable DFUs plumbed to the kitchen drain lines that will be connected to the grease interceptor.

2 This size is based on: DFUs, the pipe size from this code; Table 703.2; Useful Tables for flow in half-full pipes (ref: *Mohinder Nayyar Piping Handbook*, 3rd Edition, 1992). Based on 30-minute retention time (ref.: George Tchobanoglous and Metcalf & Eddy, *Wastewater Engineering Treatment, Disposal and Reuse*, 3rd Ed. 1991 & Ronald Crites and George Tchobanoglous, *Small and Decentralized Wastewater Management Systems*, 1998). Rounded up to nominal interceptor volume.

3 Where the flow rate of directly connected fixture(s) or appliance(s) have no assigned DFU values, the additional grease interceptor volume shall be based on the known flow rate (gpm) (L/s) multiplied by 30 minutes.

1015.0 FOG (Fats, Oils, and Greases) Disposal System.

1015.1 Purpose. The purpose of this section is to provide the necessary criteria for the sizing, application, and installation of FOG disposal systems designated as a pretreatment or discharge water quality compliance strategy.

1015.2 Scope. FOG disposal systems shall be considered engineered systems and shall be in accordance with the requirements of Section 301.4 of this code.

1015.3 Components, Materials, and Equipment. FOG disposal systems, including components, materials, and equipment necessary for the proper function of the system, shall be in accordance with Section 301.1.2 or Section 301.2 of this code.

1015.4 Sizing Application and Installation. FOG disposal systems shall be engineered, sized, and installed in accordance with the manufacturer's installation instructions and as specified in ASME A112.14.6, as listed in Table 1401.1 of this code.

1015.5 Performance. FOG disposal systems shall be tested and certified as listed in Table 1401.1 of this code, and other national consensus standards applicable to FOG disposal systems as discharging a maximum of 5.84 grains per gallon (gr/gal) (100 mg/L) FOG.

1015.6 [OSHPD 1, 2, 3 & 4] Grease interceptors shall not be installed in food preparation area of kitchens.

1015.7 [OSHPD 1, 2, 3 & 4] Grease interceptors shall be installed outside of the kitchen area in location affording ease of maintenance and servicing.

TABLE 702.1
DRAINAGE FIXTURE UNIT VALUES (DFU)

PLUMBING APPLIANCES, APPURTENANCES, OR FIXTURES	MINIMUM SIZE TRAP AND TRAP ARM[7] (inches)	PRIVATE	PUBLIC	ASSEMBLY[8]
Bathtub or Combination Bath/Shower	1½	2.0	2.0	—
Bidet	1¼	1.0	—	—
Bidet	1½	2.0	—	—
Clothes Washer, domestic, standpipe[5]	2	3.0	3.0	3.0
Dental Unit, cuspidor	1½	—	1.0	1.0
Dishwasher, domestic, with independent drain[2]	1½	2.0	2.0	2.0
Drinking Fountain or Water Cooler	1½	0.5	0.5	1.0
Food Waste Grinder, commercial	2		3.0	3.0
Floor Drain, emergency	2	—	0.0	0.0
Floor Drain (for additional sizes see Section 702.0)	2	2.0	2.0	2.0
Shower, single-head trap	2	2.0	2.0	2.0
Multi-head, each additional	2	1.0	1.0	1.0
Lavatory, single	1¼	1.0	1.0	1.0
Lavatory, in sets of two or three	1½	2.0	2.0	2.0
Washfountain	1½	—	2.0	2.0
Washfountain	2	—	3.0	3.0
Mobile Home, trap[9]	3	12.0	—	—
Receptor, indirect waste[1,3]	1½		See footnote[1,3]	
Receptor, indirect waste[1,3]	2		See footnote[1,3]	
Receptor, indirect waste[1]	3		See footnote[1]	
Sinks		—	—	—
Bar	1½	1.0	—	—
Bar[4]	1½		2.0	2.0
Clinical	3		6.0	6.0
Commercial with food waste[4]	1½	—	3.0	3.0
Special Purpose[4]	1½	2.0	3.0	3.0
Special Purpose	2	3.0	4.0	4.0
Special Purpose	3		6.0	6.0
Kitchen, domestic[2] (with or without food waste grinder, dishwasher, or both)	1½	2.0	2.0	—
Laundry[2] (with or without discharge from a clothes washer)	1½	2.0	2.0	2.0
Service or Mop Basin	2	—	3.0	3.0
Service or Mop Basin	3	—	3.0	3.0
Service, flushing rim	3	—	6.0	6.0
Wash, each set of faucets	—	—	2.0	2.0
Urinal, integral trap 1.0 GPF[2]	2	2.0	2.0	5.0
Urinal, integral trap greater than 1.0 GPF	2	2.0	2.0	6.0
Urinal, exposed trap[2]	1½	2.0	2.0	5.0
Water Closet, 1.6 GPF Gravity Tank[10]	3	3.0	4.0	6.0
Water Closet, 1.6 GPF Flushometer Tank[10]	3	3.0	4.0	6.0
Water Closet, 1.6 GPF Flushometer Valve[10]	3	3.0	4.0	6.0
Water Closet, greater than 1.6 GPF Gravity Tank[6]	3	4.0	6.0	8.0
Water Closet, greater than 1.6 GPF Flushometer Valve[6]	3	4.0	6.0	8.0

For SI units: 1 inch = 25 mm

Notes:

1. Indirect waste receptors shall be sized based on the total drainage capacity of the fixtures that drain therein to, in accordance with Table 702.2(b).
2. Provide a 2 inch (50 mm) minimum drain.
3. For refrigerators, coffee urns, water stations, and similar low demands.
4. For commercial sinks, dishwashers, and similar moderate or heavy demands.
5. Buildings having a clothes washing area with clothes washers in a battery of three or more clothes washers shall be rated at 6 fixture units each for purposes of sizing common horizontal and vertical drainage piping.
6. Water closets shall be computed as 6 fixture units where determining septic tank sizes based on Appendix H of this code.
7. Trap sizes shall not be increased to the point where the fixture discharge is capable of being inadequate to maintain their self-scouring properties.
8. Assembly [Public Use (see Table 422.1)].
9. *[HCD 2] For drainage fixture unit values related to mobilehome parks in all parts of the State of California, see California Code of Regulations, Title 25, Division 1, Chapter 2, Article 5, Section 1268. For drainage fixture unit values related to special occupancy parks in all parts of the State of California, see California Code of Regulations, Title 25, Division 1, Chapter 2.2, Article 5, Section 2268*

APPENDIX 6

Water Balance for Irrigation and Storage
Irrigation Areas Exhibit

Reclaimed Process Wastewater
Water Balance for Irrigation and Storage

Project Description		Annual Process Waste Flow Volume		
Project Number:	4111005.0	Wine Production:	50,000	gal/year
Project Name:	Krupp Bros Winery			
Prepared By:	Brett Frasier	Annual Process Waste per Gallon Wine:	5	gal/year
Date:	April 15, 2014	Total Annual Process Waste Generated:	250,000	gal/year

Vineyard Irrigation Parameters		Landscape Irrigation Parameters		
Acres of irrigated vineyard:	5.50 acres	Crop type / name:	Native grass and trees	
Row spacing:	7.0 feet	Total irrigated acres of crop:	0.50	acres
Vine spacing:	8.0 feet			
Total number of vines:	4,278 vines			
Water use per vine per month (peak):	26 gal			
Total peak monthly irrigation demand:	111,234 gal			

Monthly Process Wastewater Generation

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Monthly process wastewater generated as % of annual total:	4%	6%	6%	5%	6%	7%	9%	10%	14%	14%	11%	8%
Monthly process wastewater generated [gallons]:	10,000	15,000	15,000	12,500	15,000	17,500	22,500	25,000	35,000	35,000	27,500	20,000

Monthly Vineyard Irrigation Water Use

(Based on per-vine water use)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Beginning of month reclaimed water in storage [gallons] (This number brought forward from end of previous month)	0	0	0	0	0	0	0	0	0	0	0	0
Vineyard irrigation as % of peak month irrigation demand:	6%	6%	10%	100%	100%	100%	100%	100%	100%	100%	10%	10%
Irrigation per month per vine (gallons):	2	2	3	26	26	26	26	26	26	26	3	3
Total vineyard irrigation demand [gallons]:	6,674	6,674	11,123	111,234	111,234	111,234	111,234	111,234	111,234	111,234	11,123	11,123
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]	6,674	6,674	11,123	12,500	15,000	17,500	22,500	25,000	35,000	35,000	11,123	11,123
Remaining vineyard irrigation demand after using this month's process water [gallons]	0	0	0	98,734	96,234	93,734	88,734	86,234	76,234	76,234	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	98,734	96,234	93,734	88,734	86,234	76,234	76,234	0	0
Net storage after vineyard irrigation drawdown [gallons]	0	0	0	0	0	0	0	0	0	0	0	0
This month's process wastewater, remaining after vineyard irrigation, available for landscape irrigation[gallons]	3,326	8,326	3,877	0	0	0	0	0	0	0	16,377	8,877

Water balance continues on next page for cover crop irrigation.

Monthly Landscape Irrigation Water Use

(Based on evapotranspiration crop demand and irrigated area)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
This month's process wastewater, remaining after vineyard irrigation, available for landscape irrigation[gallons] *(From sheet 1)*	3,326	8,326	3,877	0	0	0	0	0	0	0	16,377	8,877
Reference ET (ETo) (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)	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80	0.80
Crop water demand per acre [inches]	0.82	1.22	2.34	3.77	4.66	5.48	5.77	5.15	3.90	2.82	1.31	0.94
Crop water demand per acre [gallons]	22,374	33,235	63,645	102,310	126,422	148,795	156,615	139,889	105,786	76,678	35,624	25,415
Total crop water demand for irrigated area [gallons]	11,187	16,617	31,823	51,155	63,211	74,398	78,308	69,945	52,893	38,339	17,812	12,707
Will landscape be irrigated with reclaimed water this month?	Y	Y	Y	N	N	N	N	N	N	Y	Y	Y
Process wastewater remaining after vineyard irrigation, reclaimed for landscape irrigation [gallons]	3,326	8,326	3,877	0	0	0	0	0	0	0	16,377	8,877
Landscape irrigation water required from storage or other source [gallons]	7,861	8,291	27,946	0	0	0	0	0	0	38,339	1,435	3,831
Drawdown from storage for landscape irrigation [gallons]	0	0	0	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	0	0
Net end-of-month reclaimed water storage after all irrigation [gallons]	0	0	0	0	0	0	0	0	0	0	0	0

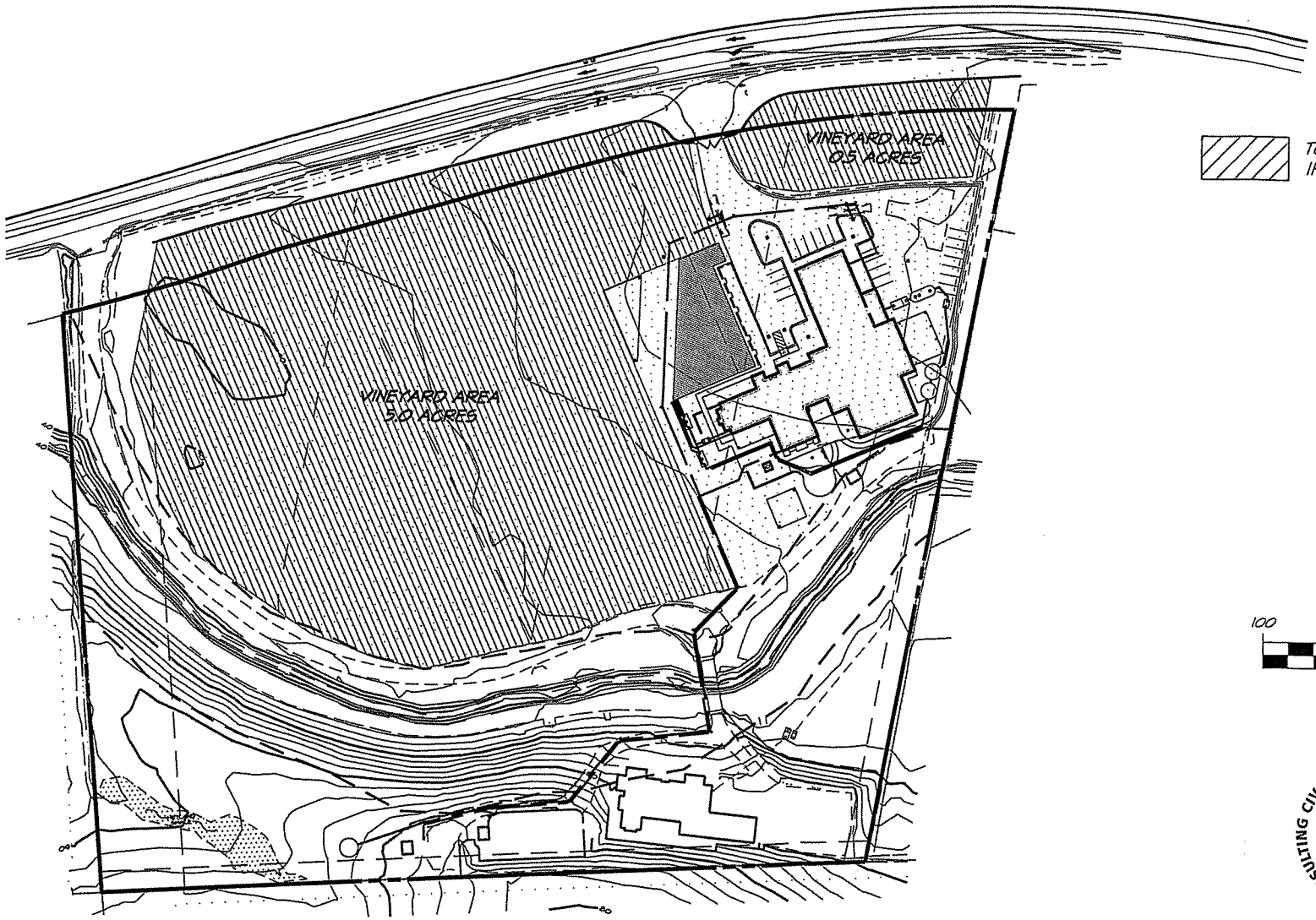
End of Water Balance

Peak Monthly Storage = **0 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.

KRUPP BROTHERS WINERY
VINEYARD AREA EXHIBIT



TOTAL VINEYARD AREA FOR IRRIGATION = 5.5 ACRES

GRAPHIC SCALE

100 0 100 200

(IN FEET)
1 inch = 100 FT

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