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Wastewater Feasibility Study



WASTEWATER FEASIBILITY REPORT

For

Knollwood Vineyards
4101 Big Ranch Road
Napa, CA 94558

APN 036-190-026

Prepared for:

J. Kevin Corley
4242 Big Ranch Road
Napa, CA 94558

Project# 4117060.0

March 19, 2019

Revised: July 17, 2024





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I. INTRODUCTION

Knollwood Vineyards is seeking a use permit modification to acknowledge existing production of 33,000 gallons of wine per year, increase production to 40,000 gallons per year, increase employees, and permit visitors and marketing events. The winery property is a 31.7 ± acre parcel located at 4101 Big Ranch Road, Napa, California (APN 036-190-026). See Attachment 1 for a vicinity map and USGS sitemap, and see Attachment 2 for a reduced Use Permit plan set.

This report will evaluate the disposal of domestic and winery process wastewater to support the proposed use permit modification.

II. EXISTING PROCESS AND DOMESTIC WASTEWATER DISPOSAL SYSTEMS

There are two existing leach fields, one serving the existing domestic wastewater system, and the other serving process wastewater. The existing leach line serving the domestic wastewater system will be abandoned per Napa County standards.

The existing process wastewater system was permitted in 1987 for a capacity of 500 gpd. A new separate treatment system is proposed to handle the process wastewater, so the existing system will be re-purposed to dispose of domestic wastewater. A licensed septic contractor shall inspect the process wastewater leach field, and repair as necessary, prior to re-use for domestic wastewater.

III. WINERY DOMESTIC WASTEWATER CHARACTERISTICS

Knollwood Vineyards intends to increase the number of employees and visitors such that the domestic wastewater produced does not exceed the 500 GPD capacity of the existing field. The unit values for proposed employees and visitors are shown. 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 expansion:

Table 1. Domestic Wastewater overview

Use	Source	Number	Projected Flow (gpd)	Total Flow No Event Day (gpd)	Total Flow Event Day (gpd)
WINERY	Full-time employees	8	15	120	120
	Part-time employees	2	15	30	30
	Harvest employees	5	15	75	75
	Visitors	14	3	42	0*
	Marketing Event w/ meals (catered)	26*	10	0	260*
	Event Staff	1	15	0	15
Grand Total			Total Peak Flow	267	500

* There will be no visitors on days with marketing events. Portable toilets will be required for all events with greater than 26 people.



IV. WINERY PROCESS WASTEWATER CHARACTERISTICS

The following is a summary of the winery wastewater characteristics:

Wine Production: 40,000 gallons of wine per year
2.38 gallons of wine per case
16,807 cases/year

Wastewater Production: 5 gallons of wastewater/gallon of wine
200,000 gallons/year

Peak Daily Waste Water Flow: Crush Period = 45 days
Annual wine production x 1.5 / 45
1,333 gallons/day

Average Daily Flow: 200,000/365 = 548 gallons/day

Monthly Wastewater Flows:

	% By Month	Waste/Month	
Sep	14%	28,000	Gal/Month
Oct	14%	28,000	Gal/Month
Nov	11%	22,000	Gal/Month
Dec	8%	16,000	Gal/Month
Jan	4%	8,000	Gal/Month
Feb	6%	12,000	Gal/Month
Mar	6%	12,000	Gal/Month
Apr	5%	10,000	Gal/Month
May	6%	12,000	Gal/Month
Jun	7%	14,000	Gal/Month
Jul	9%	18,000	Gal/Month
Aug	10%	20,000	Gal/Month
Totals	100%	200,000	Gal/Year

V. WINERY PROCESS WASTEWATER SUBSURFACE 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	6,000
TSS	mg/l	500
Nitrogen	mg/l	20
Phosphorus	mg/l	10

The treatment goal for surface drip irrigation is 160 mg/L BOD and 80 mg/L TSS. To meet this goal, a Vitalis Worm Farm treatment train is proposed. This treatment train may be modified for more desirable treatment process prior to submitting construction plans. A Biofiltro worm farm and a LYVE MBBR System are included as alternatives to the Vitalis treatment system. The following sections describe this process in more detail.

The existing 750-gallon sump tank will be re-used to convey winery process wastewater to the proposed treatment system.

V.A. OPTION 1: VITALIS WORM FARM SYSTEM

Septic Tank with bacteria and pH adjustment

A new 2,000-gallon septic tank will serve as a pump tank with primary solid retention. This septic tank will include a bacteria dosing pump and a pH dosing pump. The bacteria dosing pump will introduce beneficial bacteria that work in conjunction with the worms to break down the wastewater solids. The pH dosing pump regulates the pH level of the effluent so that it remains within the acceptable pH range for the worm treatment system.

Worm Bed Treatment & Sump Tanks

From the septic tank, the wastewater is pumped into four 10'-9" diameter 6' tall worm bed treatment tanks. The wastewater filters through the worm bed tanks where the worms help to reduce the TSS. From there, wastewater flows into a second 2,000-gallon septic tank equipped with a bacteria dosing pump. This tank is connected to another set of four 10'-9" diameter 6' tall worm bed treatment tanks. Wastewater filters through the second set of worm bed tanks and flows into a third 2,000-gallon septic tank connected to a third set of four 10'-9" diameter 6' tall worm bed treatment tanks. Wastewater filters through the third set of worm bed tanks and flows into a 500-gallon sump tank, where water is pumped into irrigation water storage tanks. See Attachment 4 for a reduced set of Use Permit plans showing this layout and Attachment 3 for a system layout from Vitalis.

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 attachment 6. 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 Attachment 6. An area of 10.8 acres of vineyard has been used to calculate the storage capacity required. Based on the 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.

V.B. OPTION 2: BIOFILTRIO WORM FARM SYSTEM

Septic Tank with pH adjustment

A new 2,000-gallon septic tank will serve as a pump tank with primary solid retention. This septic tank will include a pH dosing pump.

IBC Totes with flow, pH, and ORP monitoring.

From the septic tank, wastewater is pumped into two Intermediate Bulk Containers (IBCs) that will measure flow, Oxygen Reduction Potential (ORP), and pH.

BIDA first and second pass systems

From the IBC totes, the wastewater is then pumped into BIDA first pass. The BIDA system is housed in two modified shipping containers with two floors. Each floor contains wood shavings, aerobic microbes, worms, and drainage basins. The microbes and worms work in conjunction to aerate the wastewater and reduce the solids.

Wastewater flows from the BIDA first pass into an underground 300 gallon holding tank where it is then pumped into a BIDA second pass, similar to the BIDA First Pass. Wastewater then flows into a second 300 gallon holding tank where it is pumped into irrigation water storage tanks. See Attachment 5 for a system layout from Biofiltro.

V.C. OPTION 3: LYVE SYSTEM

Septic Tank with screening

A new 2,000-gallon septic tank will serve as the screening tank. It will be equipped with duplex filter canister screens, with one screen operating in duty and the second screen operating in stand-by. Wastewater will be pumped from the septic tank, through the canister screens, and into the Equalization tank.



Packaged Plant Treatment Unit

From the sump tank, wastewater is pumped to the packaged plant treatment unit, which has five components to treat wastewater: Equalization Tank, Moving Bed Biofilm Reactor (MBBR), the Activated Sludge Aeration Basin (ASAB), the Membrane Bio Reactor (MBR), and Sludge Digesters.

The equalization tank will be continually mixed and provide aeration, pH monitoring and adjustment, nutrient level monitoring and adjustment, and prevent surges or uneven flow patterns. The pH and nutrient levels are adjusted by a separate dosing pumps and tanks and are monitored by the Lyve control center.

The wastewater flows from the Equalization Tank into the MBBR where the wastewater will be aerated, monitored for Dissolved Oxygen (DO) levels, and the BOD reduced through the use of bacterial cultures.

From there, wastewater flows into the ASAB, where the wastewater is aerated, the remaining balance of the BOD is removed, and the take up of the TSS occurs. From there, wastewater flows into the MBR for solids separation. The effluent is pulled through the membrane to physically separate suspended solids and send clean effluent to the irrigation water storage tanks. Accumulating solids will either be returned to the ASAB or sent to one of two sludge digesters.

The two sludge digesters work alternately so as to allow one digester to settle and separate the clear water from the sludge. The clear water is returned to the EQ tank for reprocessing, while the thickened sludge is pumped and hauled off by a third-party septic hauler. See Attachment 6 for the Lyve System Layout Description.

VI. CONCLUSION

Sufficient capacity is available in the existing process wastewater sub-surface drip field to re-use the field for 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 Health Division Design standards for the treatment of winery wastewater.



ATTACHMENT 1

Vicinity Map, USGS Site Map

KNOLLWOOD VINEYARDS VICINITY MAP

NAPA COUNTY

CALIFORNIA



VICINITY MAP

SCALE: 1" = 3000'

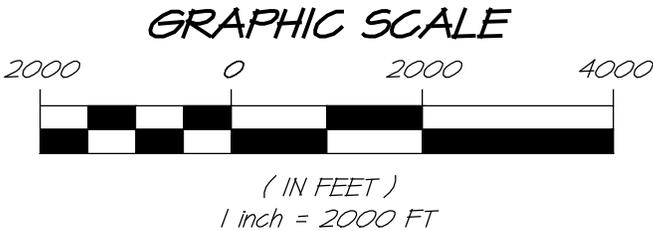
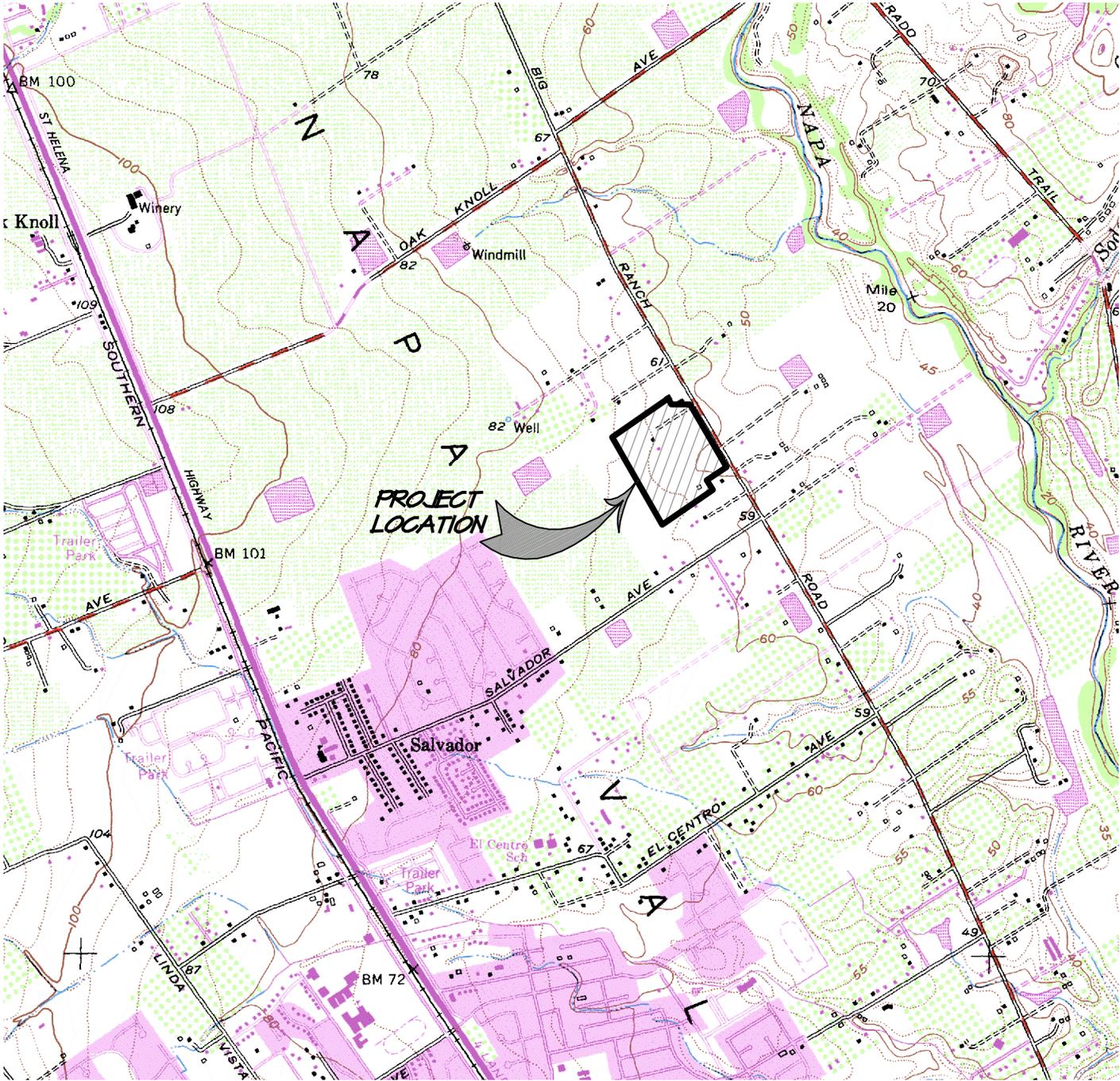
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KNOLLWOOD VINEYARDS USGS MAP

NAPA COUNTY

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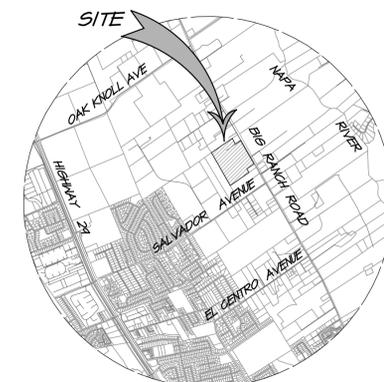
MARCH 8, 2019 4117060.0 EXH-USGS.DWG



ATTACHMENT 2

Reduced Use Permit Plan Set

KNOLLWOOD VINEYARDS USE PERMIT MODIFICATIONS



VICINITY MAP
SCALE: 1" = 3000'

PROJECT INFORMATION

APPLICANT: KNOLLWOOD VINEYARDS
4101 BIG RANCH ROAD
NAPA, CA 94558

SITE ADDRESS: 4101 BIG RANCH ROAD
NAPA, CA 94558

CIVIL ENGINEER: RSA+
1515 FOURTH STREET
NAPA, CA 94559
(707) 252-3301

APN: 036-140-026

PARCEL AREA: 31.70 ACRES

EXISTING USE: VINEYARD & WINERY

PROPOSED USE: VINEYARD & WINERY

ZONING: AP

TOPOGRAPHIC SURVEY

FIELD SURVEY PERFORMED BY RSA+ APRIL, 2018.

CONTOURS ARE SHOWN EVERY ONE FOOT (1'), HIGHLIGHTED EVERY FIVE FEET (5').

BOUNDARY NOTE

THIS BOUNDARY SHOWN ON THIS MAP IS RECORD INFORMATION PER GRANT DEED DOCUMENT NO. 2017-0008132, NAPA COUNTY RECORDS.

DATUM

VERTICAL DATUM: NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88).

HORIZONTAL DATUM: NORTH AMERICAN DATUM OF 1983 (NAD83)
2011 EPOCH BASED UPON G.P.S. OBSERVATIONS ON NETWORK UTILIZING CONTINUALLY OPERATING REFERENCE STATION (C.O.R.S.) INFORMATION FROM THE CALIFORNIA SPATIAL REFERENCE CENTER (C.S.R.C.)

SHEET INDEX

UP1	COVER SHEET
UP2	DRIVEWAY LAYOUT, GRADING, AND ESCP
UP3	WINERY LAYOUT, GRADING, AND ESCP
UP4	UTILITY PLAN
UP5	EXISTING COVERAGE & DEVELOPMENT
UP6	PROPOSED COVERAGE & DEVELOPMENT
A1	EXISTING FLOOR PLANS
A2	PROPOSED FLOOR PLANS
A3	EXISTING ELEVATIONS

LOCAL SITE CONTROL

#	GROUND NORTHING	GROUND EASTING	ELEVATION
1	1840255.65	6413218.28	61.34'
2	1840021.17	6412801.74	70.86'
3	1840542.26	6413112.64	63.68'
4	1840112.92	6413315.13	66.02'

ASSOCIATED PERMITS

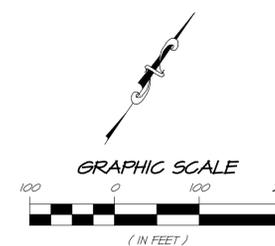
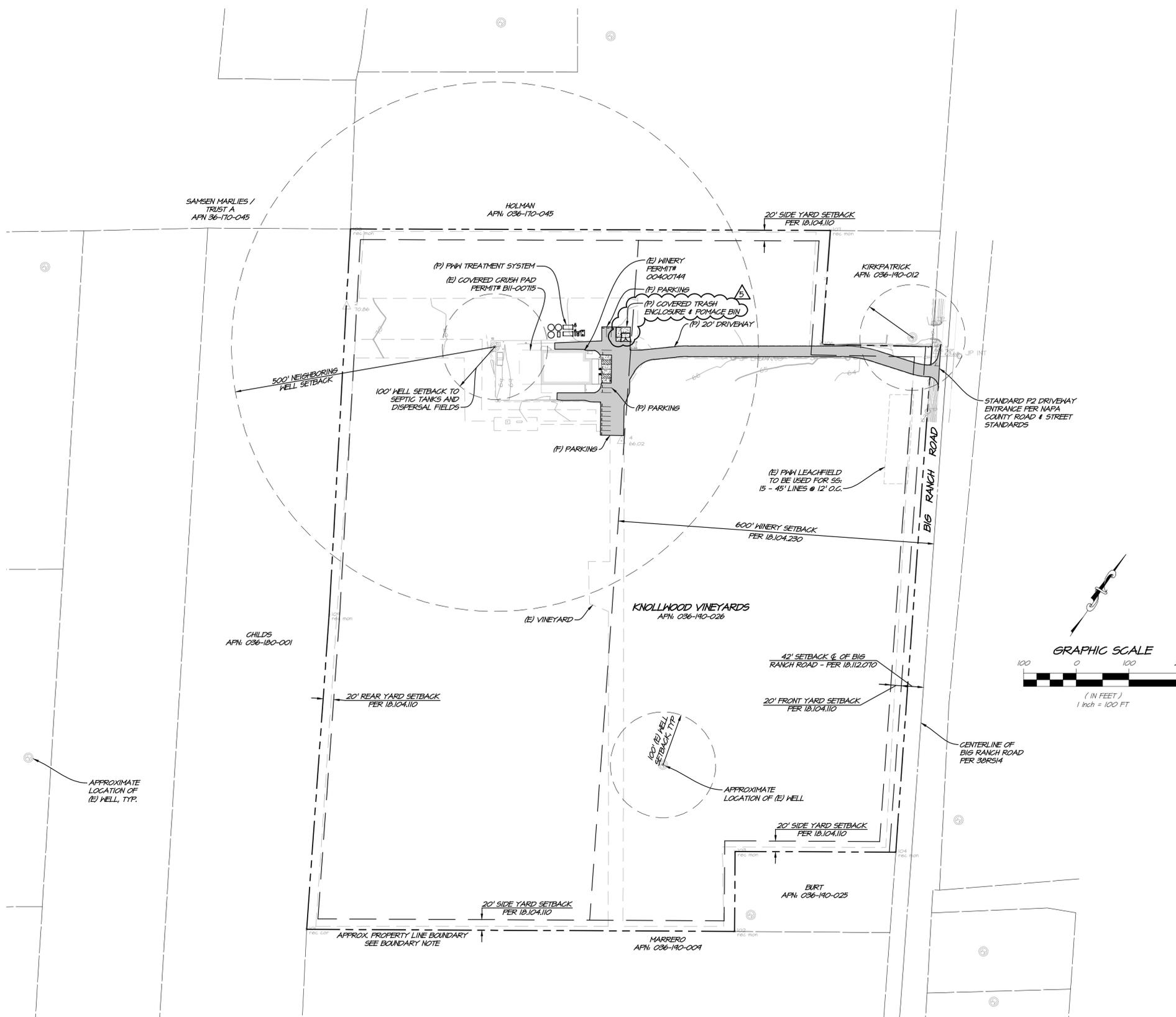
PERMIT #	PHASE
0040104	SEPTIC/PROCESS WASTE WATER
0040149	WINERY
B11-00715	GRUSH PAD CANOPY

SYMBOL LEGEND

- EXISTING**
- LIGHT
 - ⊕ HOSE BIB
 - ⊕ GAS RISER
 - ⊕ GAS VALVE
 - EV ELECTRIC VAULT
 - TREE (AS NOTED)
 - SEWER CLEANOUT
 - △ SURVEY CONTROL STATION
 - IRRIGATION CONTROL VALVE
 - FLOWLINE
 - EDGE OF GRAVEL
 - LIMITS OF RSA+ TOPO
 - LIMITS OF COUNTY CONTOURS
- PROPOSED**
- SD STORM DRAIN LINE
 - DW DOMESTIC WATER LINE
 - FW FIRE WATER LINE
 - SL SEWER LINE
 - SLOPE AS SHOWN
 - WDH MET DRAFT HYDRANT
 - MV WATER VALVE
 - DI DRAIN INLET
 - AD AREA DRAIN
 - X EX TREE TO BE REMOVED
 - SHALE FLOW LINE
 - PROPERTY LINE

ABBREVIATIONS

- AC ASPHALT CONCRETE
- BFG BOTTOM FINISH GRADE
- C CONTRACT STALL
- C CENTERLINE
- CONF CONFORM
- CY CUBIC YARD
- DI DRAIN INLET
- DW DOMESTIC WATER
- EG EXISTING GRADE
- EP EDGE OF PAVEMENT
- ESCP EROSION & SEDIMENT CONTROL PLAN
- EX / (E) EXISTING
- (F) FUTURE
- FF FINISH FLOOR
- FG FINISH GRADE
- FH FIRE HYDRANT
- FL FLOW LINE
- FW FIRE WATER
- GAL GALLON
- GB GRADE BREAK
- HP HIGH POINT
- INV INVERT
- LF LINEAL FEET/FOOT
- LP LOW POINT
- MH MANKHOLE
- OC ON CENTER
- OWTS ONSITE WATER TREATMENT SYSTEM
- PL PROPERTY LINE
- (P) PROPOSED
- R RADUS
- S SLOPE (FEET/FOOT)
- S.A.D. SEE ARCHITECTS DRAWINGS
- SB SETBACK
- SD STORM DRAIN
- SDCO STORM DRAIN CLEANOUT
- SF SQUARE FEET
- S.M.D. SEE MECHANICAL DRAWINGS
- SMH SANITARY SEWER MANKHOLE
- STA STATION
- TFG TOP FINISH GRADE
- TH TOP OF WALL
- TYP TYPICAL
- WV WATER VALVE
- WW WASTE WATER



SITE PLAN
SCALE: 1" = 100'



NO.	DATE	REVISIONS
0	03/04/2019	INITIAL SUBMITTAL
1	06/07/2019	FIRST PLAN CHECK
2	01/02/2020	SECOND PLAN CHECK
3	01/27/2022	FOURTH PLAN CHECK
4	06/02/2023	FIFTH PLAN CHECK
5	01/02/2024	SIXTH PLAN CHECK

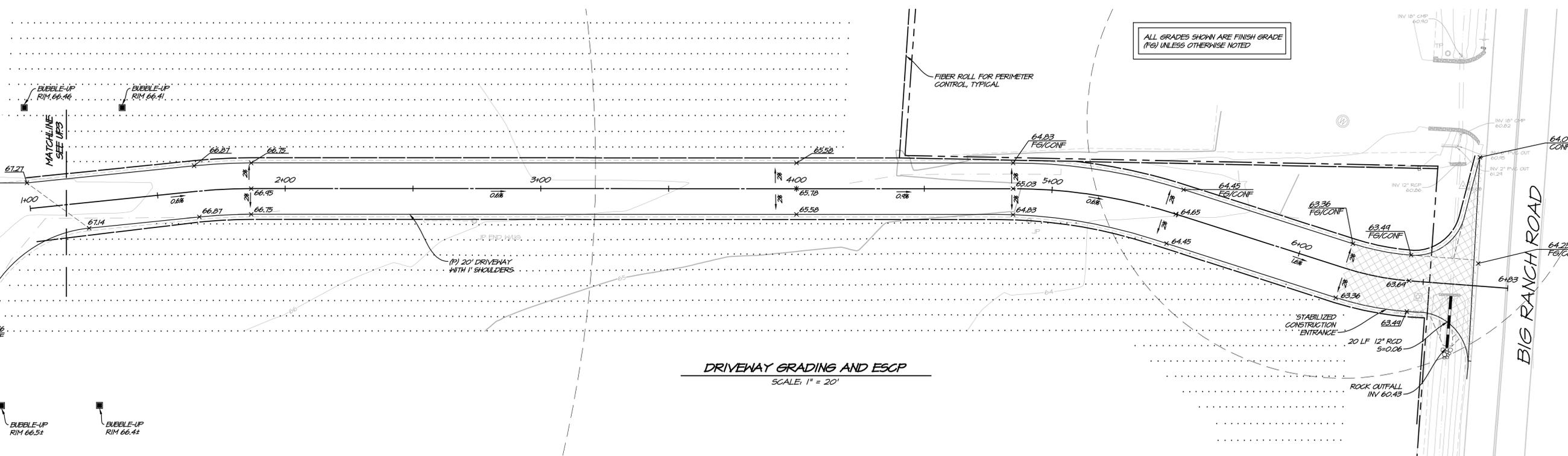
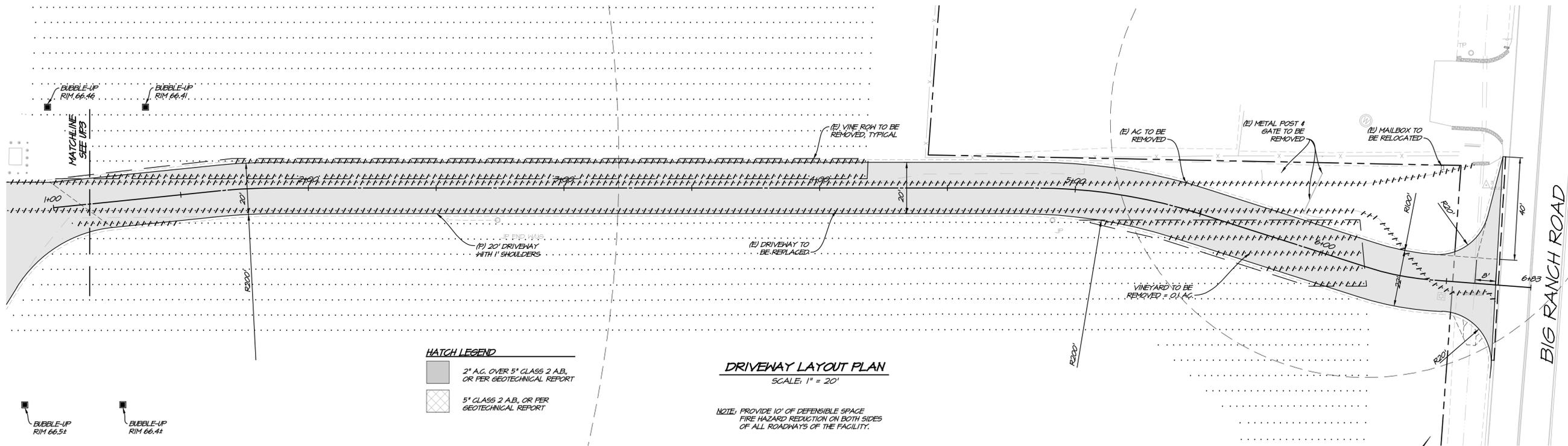
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KNOLLWOOD VINEYARDS COVER SHEET CALIFORNIA NAPA COUNTY



DATE	JAN 2, 2024
DRAWN	LMM
DESIGNED	RRS
CHECKED	NAW
JOB NO.	417060.0
SHEET NO.	UP1
	1 OF 9 SHEETS



NO	DATE	REVISIONS	BY	APPD
0	03/04/2019	INITIAL SUBMITTAL	LMM/PSH	
1	06/07/2019	FIRST PLAN CHECK	LMM/PSH	
2	01/02/2020	SECOND PLAN CHECK	LMM/PSH	
3	01/27/2022	FOURTH PLAN CHECK	LMM/PSH	
4	06/02/2023	FIFTH PLAN CHECK	LMM/PSH	
5	01/02/2024	SIXTH PLAN CHECK	LMM/PSH	

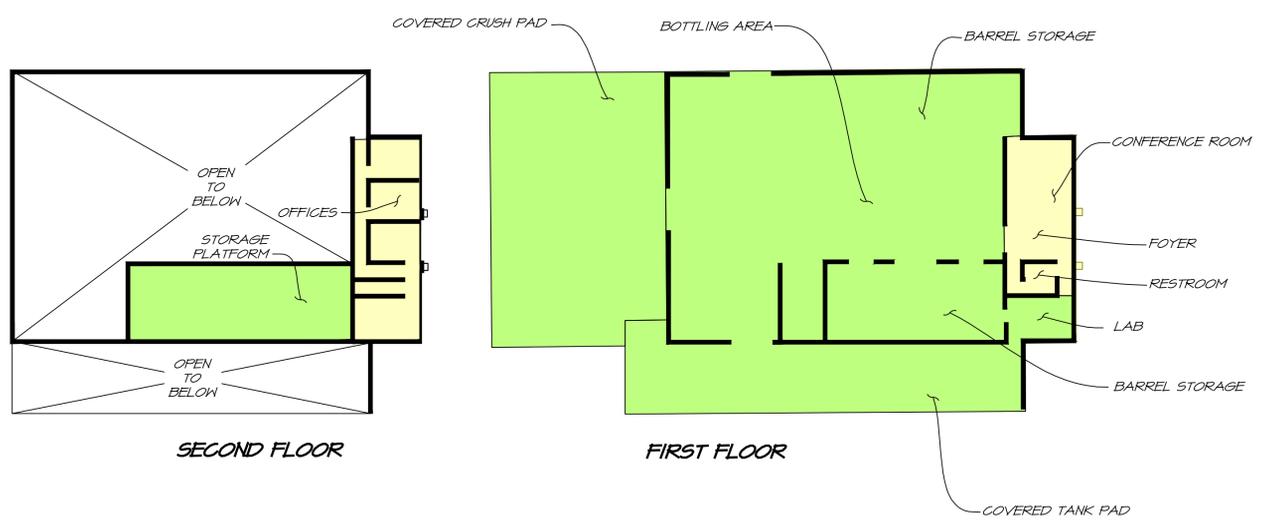
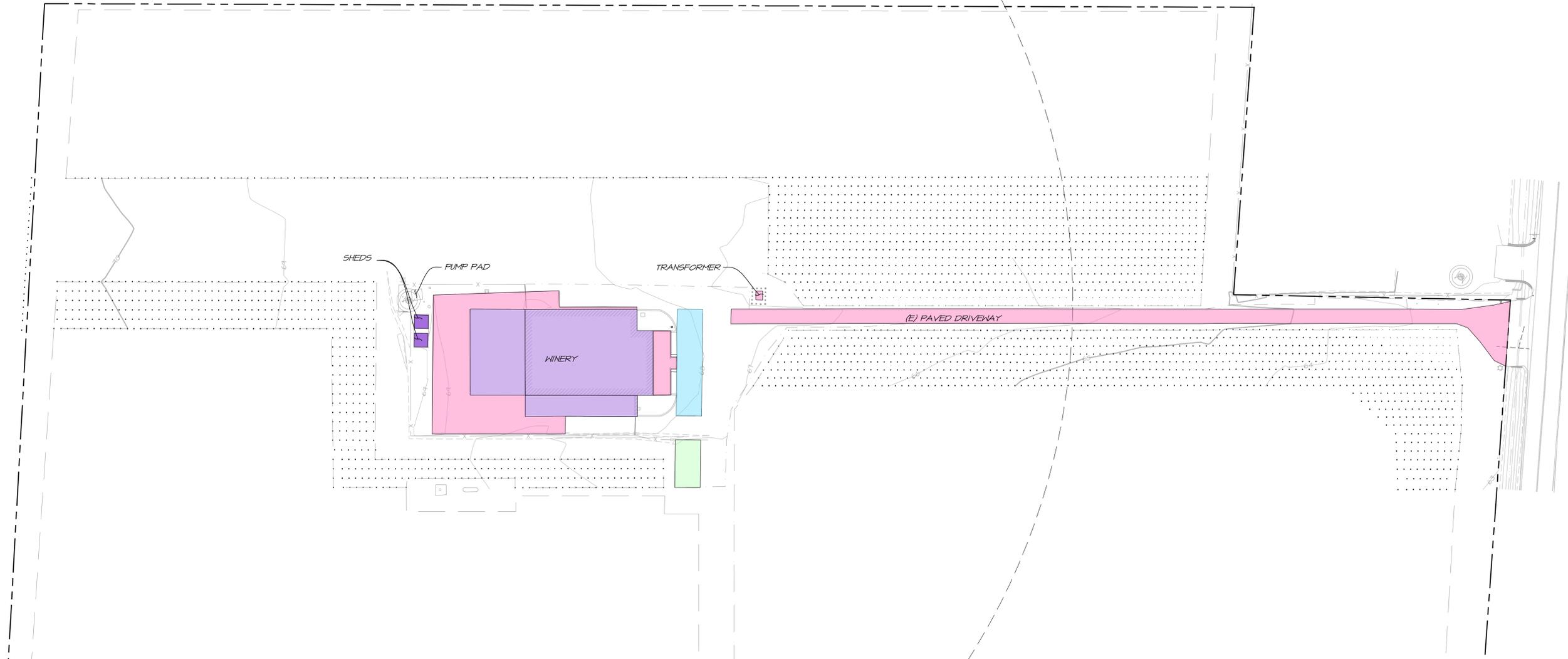
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KNOLLWOOD VINEYARDS
DRIVEWAY LAYOUT, GRADING, AND ESCP
CALIFORNIA
NAPA COUNTY



DATE	JAN 2, 2024
DRAWN	LMM
DESIGNED	RRS
CHECKED	NAW
JOB NO.	4117060.0
SHEET NO.	UP2
	2 OF 9 SHEETS



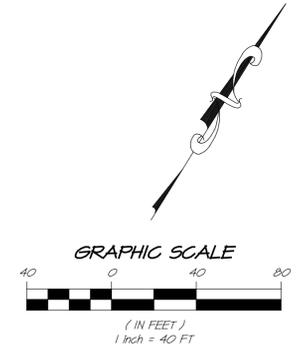
INTERIOR, PRODUCTION & ACCESSORY AREAS
SCALE: 1" = 20'

LEGEND

- EMPLOYEE PARKING = 684 SF
- VISITOR PARKING = 1,534 SF
- STRUCTURES = 10,226 SF
- PAVED AREA & ABOVE GROUND TANKS = 13,325 SF
- ACCESSORY AREAS = 1,382 SF
- PRODUCTION AREAS = 10,526 SF

AREA CALCULATIONS

- + = WINERY DEVELOPMENT AREA = 10,910 SF
- + + + = WINERY COVERAGE AREA = 25,714 SF
- COVERAGE AREA AS PERCENT OF PARCEL = 1.9%
- ACCESSORY AREA AS PERCENT OF PRODUCTION = 13.1%



NO	DATE	REVISIONS	BY	APPD
0	01/02/2024	INITIAL SUBMITTAL	LMM	PSM
1	01/07/2024	FIRST PLAN CHECK	LMM	PSM
2	01/07/2024	SECOND PLAN CHECK	LMM	PSM
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5	01/22/2024	SIXTH PLAN CHECK	LMM	PSM

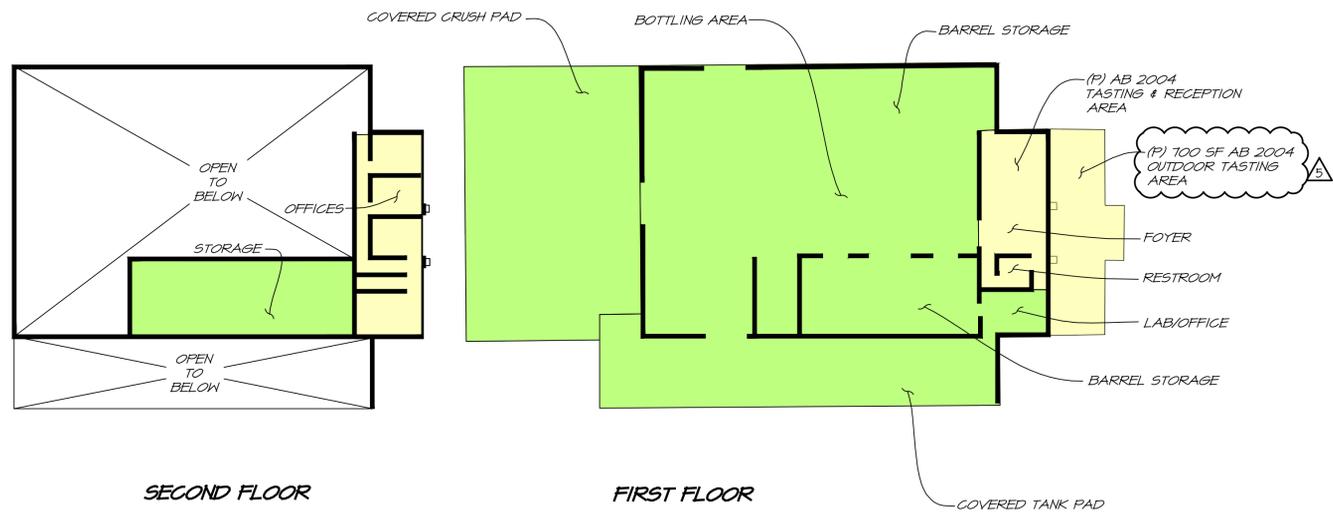
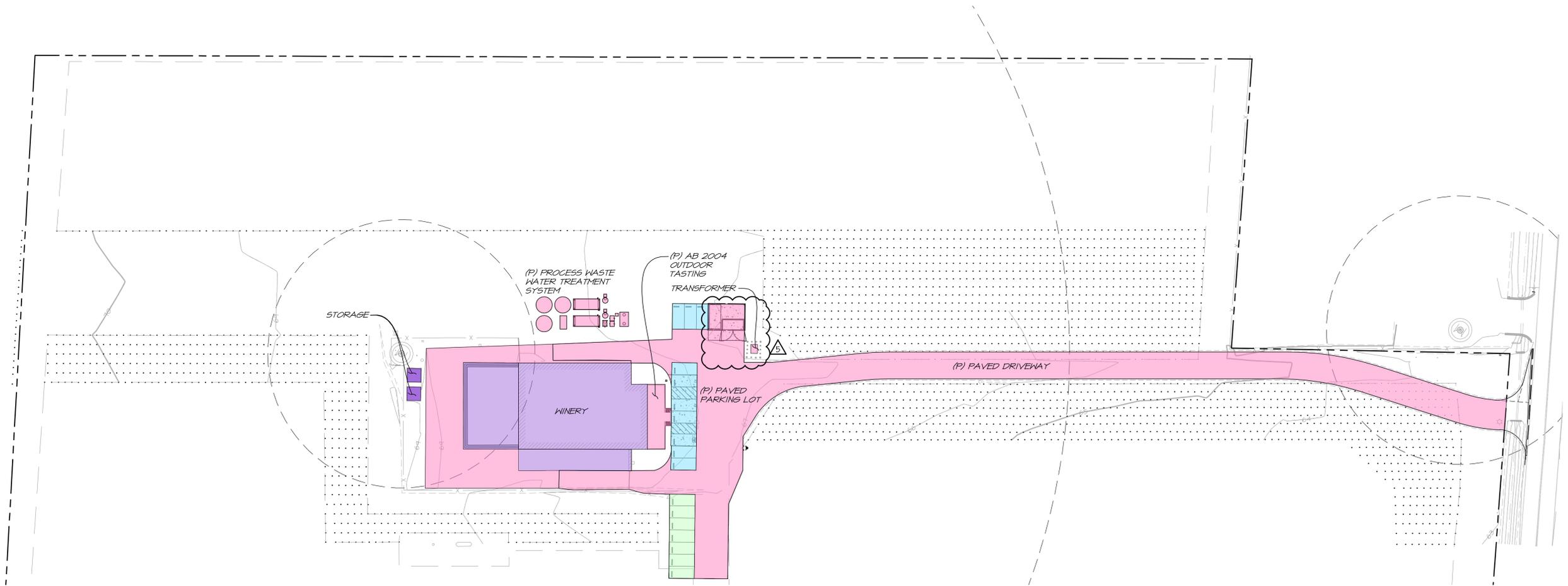
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**KNOLLWOOD VINEYARDS
EXISTING COVERAGE & DEVELOPMENT**
NAPA COUNTY
CALIFORNIA



DATE	JAN 2, 2024
DRAWN	LMM
DESIGNED	RRG
CHECKED	NAW
JOB NO.	41170600
SHEET NO.	UP5
	5 OF 9 SHEETS



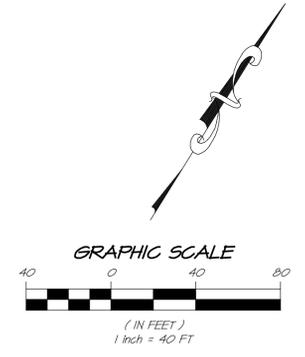
SECOND FLOOR
FIRST FLOOR
INTERIOR, PRODUCTION & ACCESSORY AREAS
 SCALE: 1" = 20'

LEGEND

- EMPLOYEE PARKING = 1,143 SF
- VISITOR PARKING = 2,035 SF
- STRUCTURES = 10,226 SF
- PAVED AREA & ABOVE GROUND TANKS = 24,046 SF
- ACCESSORY AREAS = 2,086 SF
- PRODUCTION AREAS = 10,526 SF

AREA CALCULATIONS

- + = WINERY DEVELOPMENT AREA = 11,165 SF
- + + + = WINERY COVERAGE AREA = 43,325 SF
- COVERAGE AREA AS PERCENT OF PARCEL = 3.1%
- ACCESSORY AREA AS PERCENT OF PRODUCTION = 19.2%

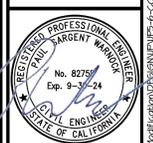


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3	01/12/2025	FOURTH PLAN CHECK	LMM	PSM
4	04/02/2025	FIFTH PLAN CHECK	LMM	PSM
5	04/22/2024	SIXTH PLAN CHECK	LMM	PSM

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 SUITE 100
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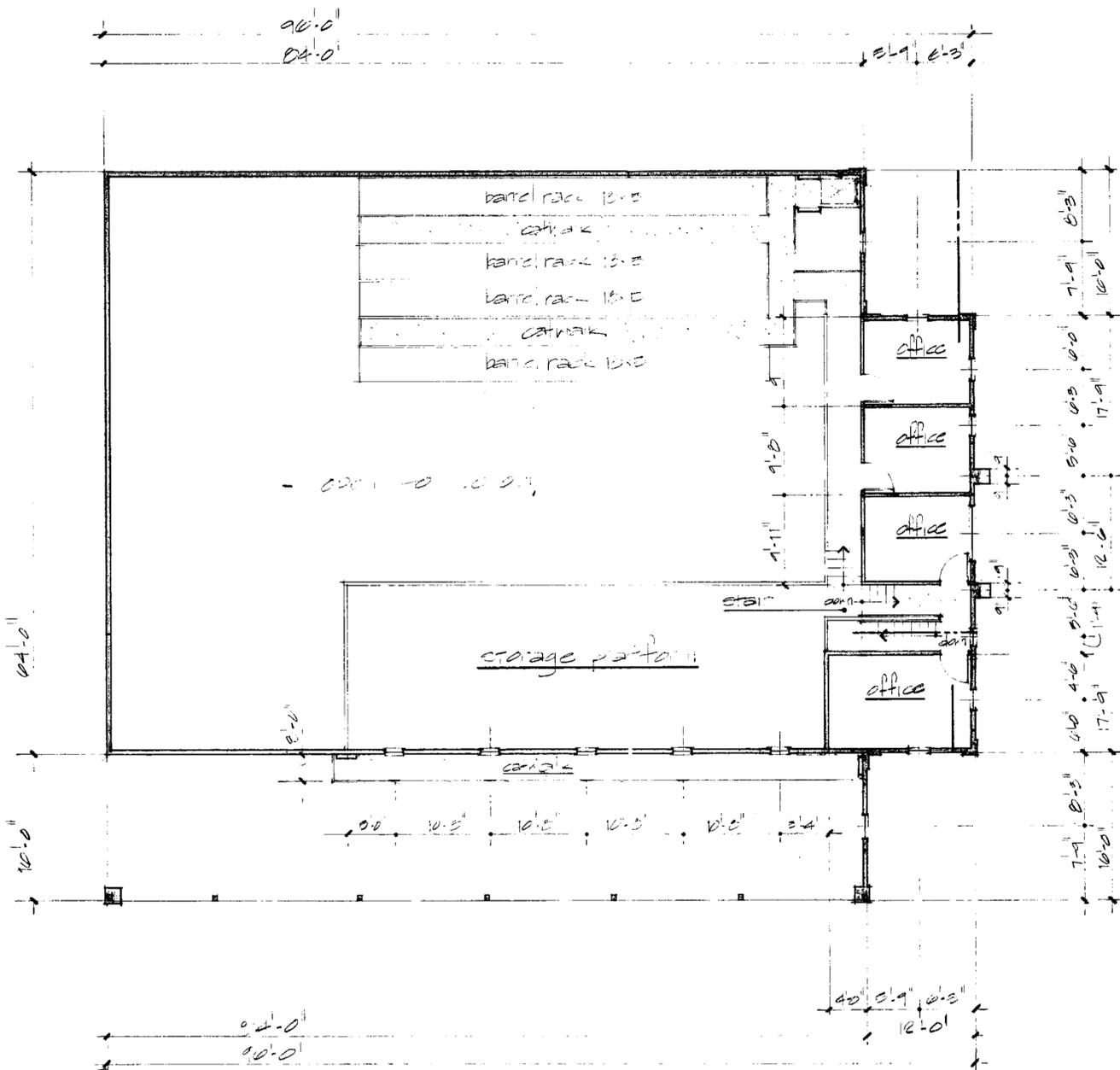
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KNOLLWOOD VINEYARDS
PROPOSED COVERAGE & DEVELOPMENT
 NAPA COUNTY
 CALIFORNIA

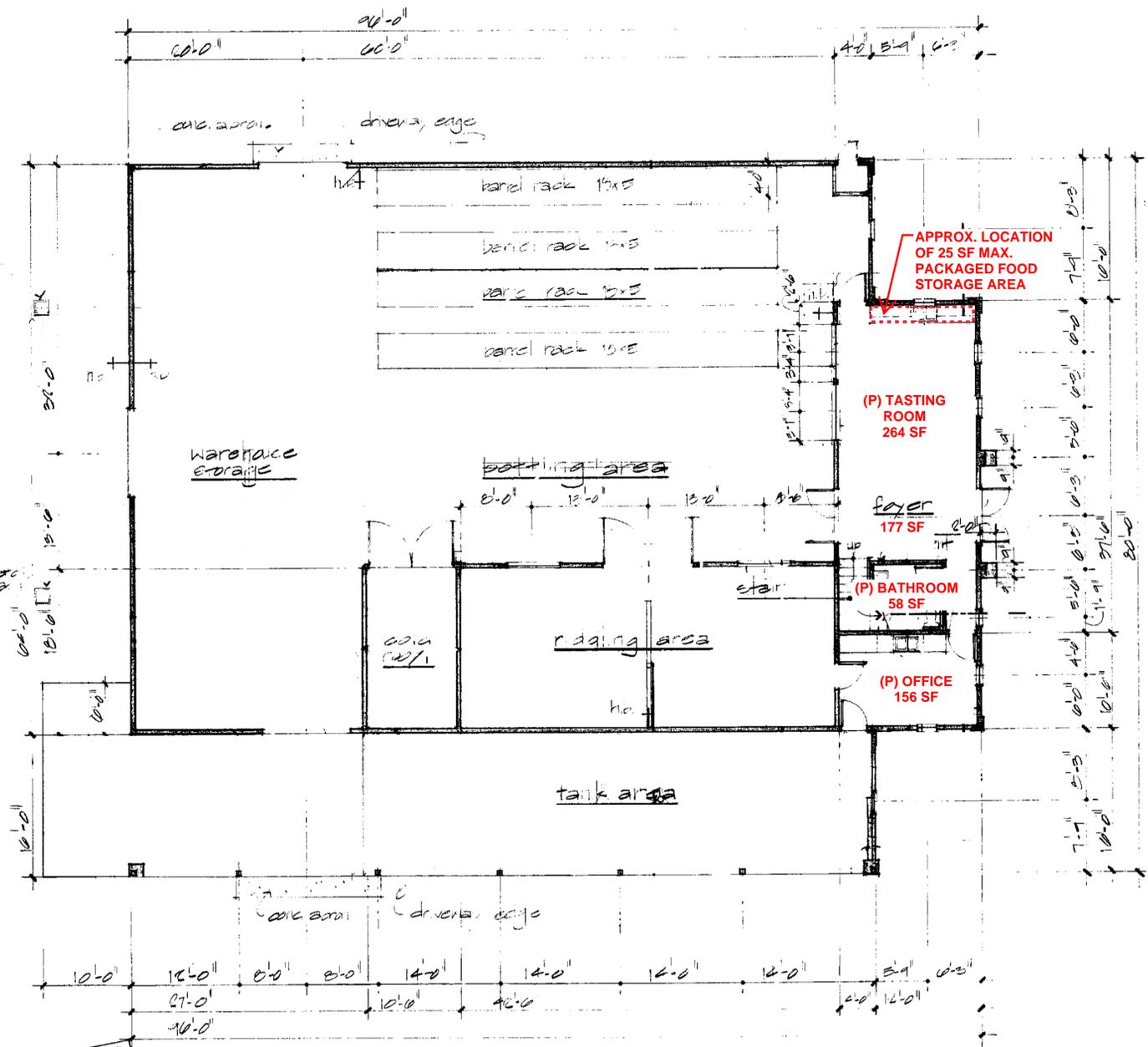


DATE	JAN 2, 2024
DRAWN	LMM
DESIGNED	RRS
CHECKED	NAN
JOB NO.	4170600
SHEET NO.	UP6
6 OF 9 SHEETS	

NOTE:
 ALL BUILDINGS SHALL COMPLY WITH CALIFORNIA FIRE CODE, CHAPTER 10, MEANS OF EGRESS REQUIREMENTS INCLUDING BUT NOT LIMITED TO; EXIT SIGNS, EXIT DOORS, EXIT HARDWARE AND ILLUMINATION.



second floor plan
 project north



first floor plan
 project north

KN design team
 1040 main st.
 suite no. 305
 napa, ca. 94559
 707.257.3602

date: 3.5.21
 scale: as noted
 job no.: 0750
 drawn by: km

PROPOSED FLOOR PLANS

- first floor plan
- second floor plan

Knollwood Vineyards
 Big Ranch Road, Napa, Ca.



SOUTH ELEVATION
SCALE: 1/8" = 1'



EAST ELEVATION
SCALE: 1/8" = 1'



NORTH ELEVATION
SCALE: 1/8" = 1'



WEST ELEVATION
SCALE: 1/8" = 1'

NO.	DATE	REVISIONS
0	03/04/2014	INITIAL SUBMITTAL
1	06/07/2014	FIRST PLAN CHECK
2	01/02/2020	SECOND PLAN CHECK
3	07/27/2021	FOURTH PLAN CHECK
4	06/02/2023	FIFTH PLAN CHECK
5	01/02/2024	SIXTH PLAN CHECK

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**KNOLLWOOD VINEYARDS
EXISTING ELEVATIONS**
NAPA COUNTY
CALIFORNIA



DATE	JAN. 2, 2024
DRAWN	LMM
DESIGNED	RRC
CHECKED	NAN
JOB NO.	41170600
SHEET NO.	A3
9 OF 9 SHEETS	

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ATTACHMENT 3

Existing Wastewater System

DATE 4-17-87 NAPA COUNTY A.P.# 36-190-11
 FEE #50 DEPARTMENT OF ENVIRONMENTAL HEALTH RECORD # 559
 RECEIPT NO. 19521 APPLICATION & PERMIT TO CONSTRUCT A SEWAGE SYSTEM
 BY Wriggan

OWNER: Knollwood Winery CONTRACTOR: Self
 SITE ADDRESS: 4085 Big Ranch ADDRESS:
 MAILING ADDRESS: 4242 Big Ranch

TYPE OF WORK: NEW CONSTRUCTION REPAIR () ADDITION () ALTERATIONS ()
 SPECIAL DESIGN () PRIVATE SEWAGE DISPOSAL SYSTEM (Ponds) ()
 PROPOSED USE: Residential () Units /BDRMS Commercial/Industrial 500 G.P.D.
 Other () Explain

WATER SUPPLY: Public () Individual (Well X, Spring, Creek or Lake)
 Distance from well to any part of nearest sewage disposal system 100' feet.
 Additional nearby wells 100'. Plot plan of proposed sewage system received yes.

County Road setback 62 feet from center line. Bldg. Dept. Form Received

SPECIFICATIONS: Septic Tank: Type Concrete Size 1500 gal. (gallons)
 Drainline: Total Length 667' Trench Depth 36" Rock Under Leach Line 12"
 Sewer Line: Type PVC Approximate Length 610' Depth 12"
 Sump Pump: Tank Size 750 gal Alarm Type audible
 See Special Design Plans Approved: (date) Designer
 See Private Sewage Disposal System Plans Approved: (date) Designer
 Other drain lines must be 25' from the subsurface drain
Subsurface drain must be located - exposed for verification
will verify with Bill Vyenieto in field.
 Issuing Sanitarian: R. Dreyer

WORKER'S COMPENSATION COVERAGE: (Check one of the following)
 A certificate of current Worker's Comp. Insurance is on file with this office.
 A certificate of current Worker's Comp. Insurance is being filed with this application.
 I certify that in the performance of the work for which this permit is issued, I shall not employ any person in any manner without complying with the Worker's Compensation laws California.

TERMS OF PERMIT

- Applicant agrees that:
- 1) Sanitarian will be notified a minimum of 24 hours prior to requiring inspection(s).
 - 2) Sanitarian and engineer's inspection, when indicated, will be obtained prior to covering the system.
 - 3) The permit and a copy of the approved sewage disposal system design shall be available at the parcel site at all times.
 - 4) Any deviation from approved plan and specifications without prior approval of this office will be cause for stopping work until the changes are fully justified and approved.
 - 5) Prior to authorizing occupancy of any building with an engineered designed system a signed statement by the design engineer certifying that the system was installed in compliance with the approved plan must be submitted to the Department of Environmental Health.
 - 6) This permit is subject to revocation if found to be in nonconformance with Napa County Code of Ordinances, Title V, Article 3 (The Sewage Ordinance).

IT IS UNDERSTOOD THAT THE ISSUANCE OF A PERMIT IN NO WAY INDICATES THAT A GUARANTEE OF PERFECT AND INDEFINITE OPERATION OF THIS SYSTEM IS MADE BY THE NAPA COUNTY DEPARTMENT OF ENVIRONMENTAL HEALTH AND THAT THE OWNER IS REQUIRED TO MAKE ANY REPAIRS NECESSARY TO CONFINE SEWAGE AS REQUIRED BY THE COUNTY SEWAGE ORDINANCE. I HEREBY ACKNOWLEDGE THAT I HAVE READ THIS APPLICATION AND STATE THAT THE ABOVE IS CORRECT AND AGREE TO COMPLY WITH ALL COUNTY ORDINANCES AND STATE LAWS REGULATING CONSTRUCTION OF SEWAGE DISPOSAL SYSTEMS. THIS PERMIT SHALL EXPIRE BY LIMITATION IF WORK AUTHORIZED IS NOT COMMENCED WITHIN 2 YEARS.

Owner or Authorized Agent William M. Vyenieto

INSPECTION RECORD

Sewer Line 170 ABS Material 12" L Depth 6/26/87 Date ML Inspector

Septic Tank Concrete Type + Sump pump 1800 Size 6/26/87 Date ML Inspector

Leach Lines OK 6/26/87 Date ML Inspector

Soil Compares with Percolation Record OK

Average Surface Slope(s) 1-2%

Trench Width 18" Depth 36" Total Length _____ No. Lines 10

Rock Under Leachline 12" Distance Between Trenches 12"

Top of Leachline to Finish Grade 18" Distance Wells from System 105'

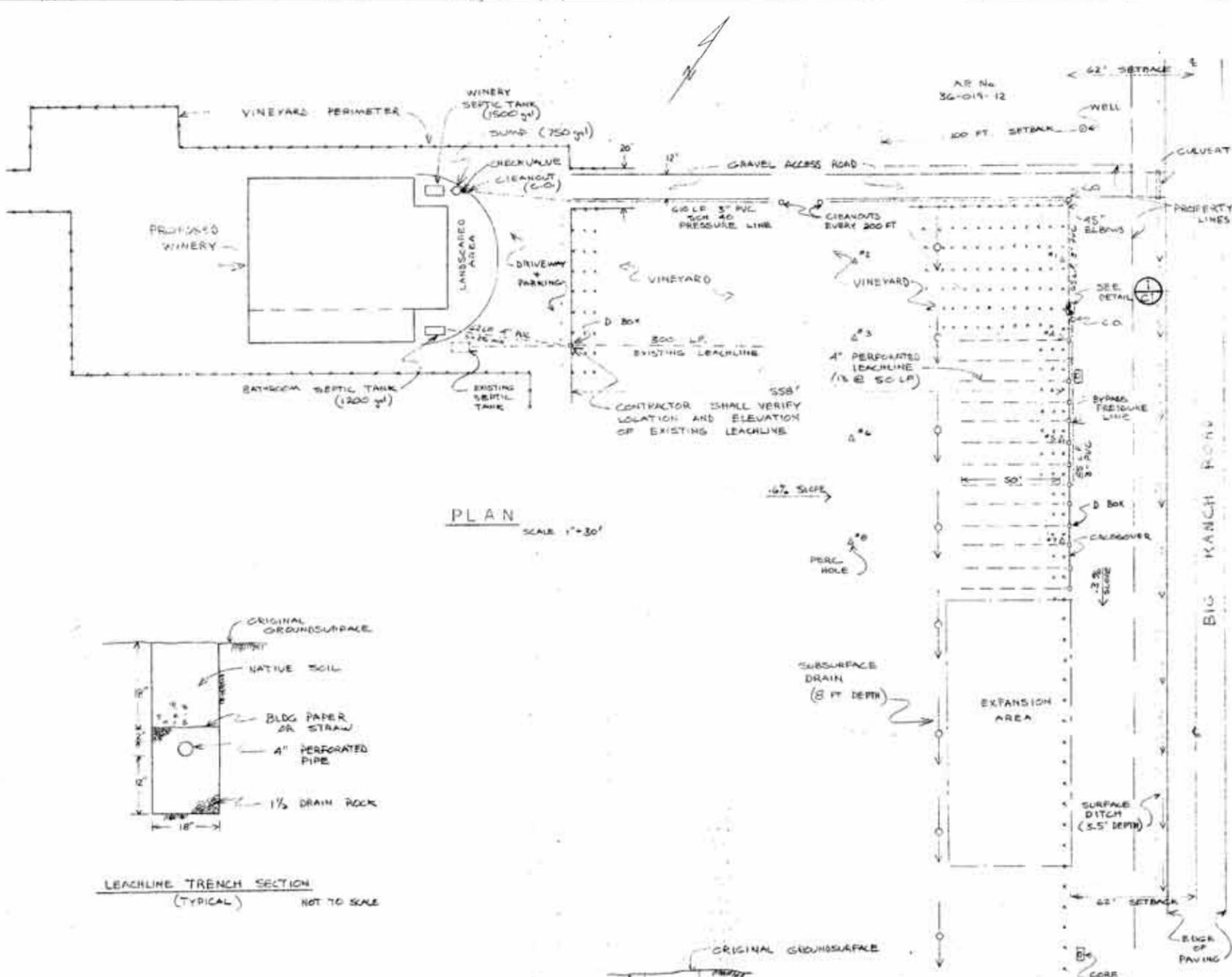
Accessory Facilities (Diversion Drains, Sump Pumps, etc.) _____

Additional Field Notes Inspected 7 lines (45') w/ D boxes
and a 120 gal septic tank. 6 lines are yet to be
inspected and sump pump & alarm. 6/26/87 I inspected
8 x 45' lines this date, D boxes OK 6-29-87 Reg

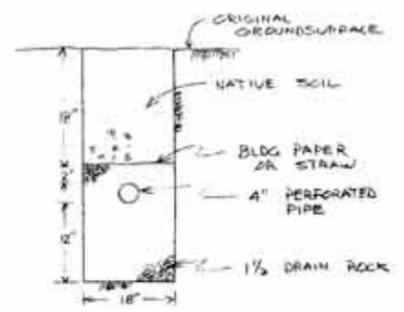
Plot Plan Accuracy Checked _____

Date of Final _____ Inspector _____

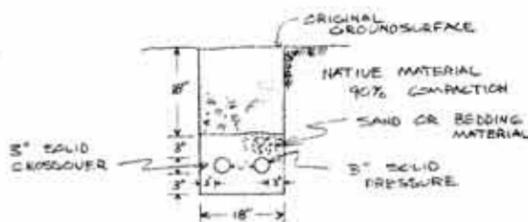
Date Bldg. Dept. Final _____ Inspector _____



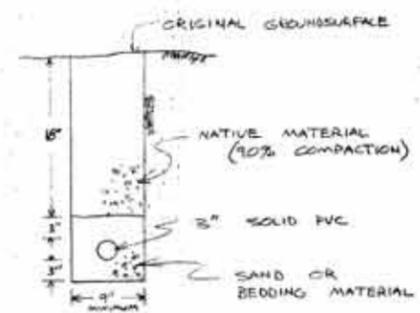
PLAN SCALE 1"=30'



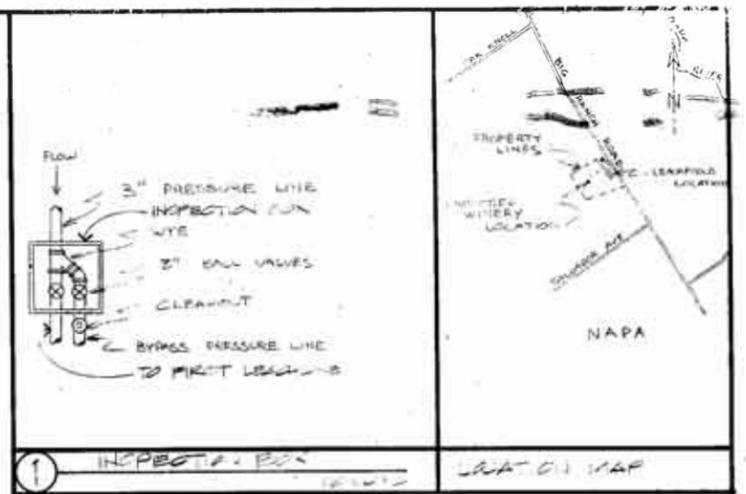
LEACHLINE TRENCH SECTION (TYPICAL) NOT TO SCALE



CROSSOVER TRENCH SECTION (TYPICAL) NOT TO SCALE



PRESSURE LINE TRENCH SECTION (TYPICAL) NOT TO SCALE



- NOTES:
- All work shall conform to Chapter 11, Section 1101 to 1119 (Inclusive) of the Uniform Plumbing Code and to Napa County Sewage Ordinance Title V, Article 3.
 - Crushed rock shall be round rock, gravel, slag, or other suitable material graded evenly from a 3/4" min. to 1/2" max. and shall contain no deleterious material or decomposable matter.
 - Crossover pipes between leachlines shall be graded to cause each preceding pipe to be full before activating the succeeding pipe. A sewer pipe shall be installed with a 1/8" rise from preceding leachline invert. Connector pipe shall contain no perforations and have water-tight joints.
 - Connections between the building sewer and treatment tank and D boxes shall be cast with water-tight joints on natural ground or compacted (90%) min. fill.
 - Contractor to comply with applicable Cal-Osha requirements.
 - Sump pump to be 1hp Sta-Rite 9000 Series (or equal) with water level controls and high water alarm.
 - Pump and pump control system proposed to be used shall be submitted to the Engineer for approval. See detail sheets for sump options and control specs.
 - Perforated leachline pipe laid on a level grade with perforations on the underside.
 - Existing septic tank shall be destroyed and backfilled (95% compaction). New septic tank, solid line, and D box connect to the existing leachfield at the vineyard edge.
 - If PVC sewer pipe is used under driveways, it shall be double encased (sleeved) with ABS SCH 40, cast iron or concrete pipe. Sleeves extend 5 feet past the driveway edges.
 - D boxes shall conform to Environmental Protection Agency (EPA) standards dated 7-7-87.
 - If manufactured sump is used, the second pump and controls can be added.
- Approval of these plans does not constitute approval of any deviation from the approved plans. One set of approved plans shall be available at the project site at all times.
- Napa County, Building Department
Napa, California
- 13 4004
Date: 12/18/87 By: [Signature]

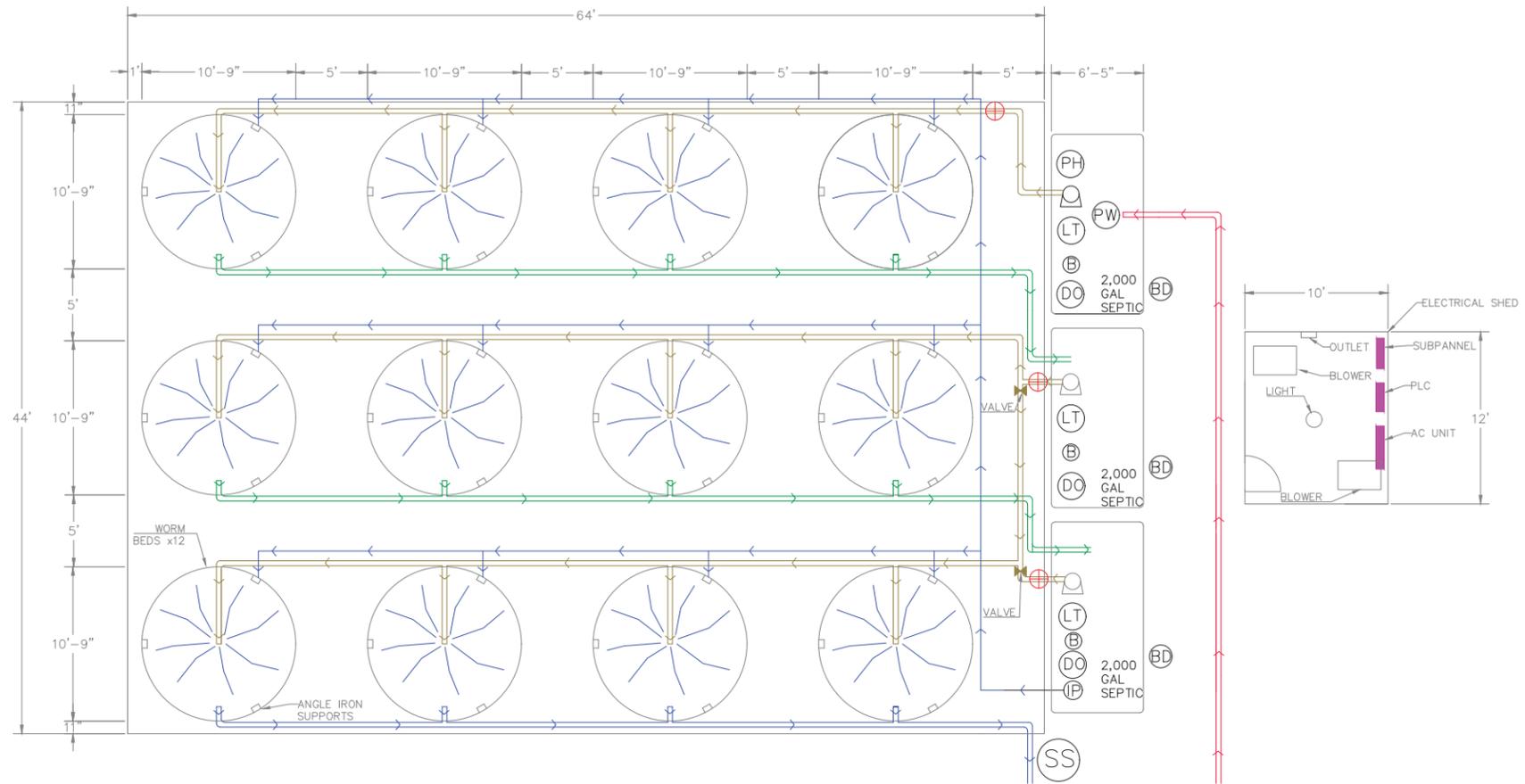
 1040 main st. suite no. 305 napa, ca. 94559 707 257 3602	[Signature] [Signature] [Signature]	PSYDIA: [Signature]
		A.P. NO. 36-100-11
 of 1		H ₂ O ENGINEERING CO. KNOLLWOOD VINEYARDS SEWAGE DISPOSAL SYSTEM 4104 BIG RANCH ROAD NAPA, CA
		SHEET NO. E-1 JAMES FRANCIEWICZ 2-26-87



ATTACHMENT 4

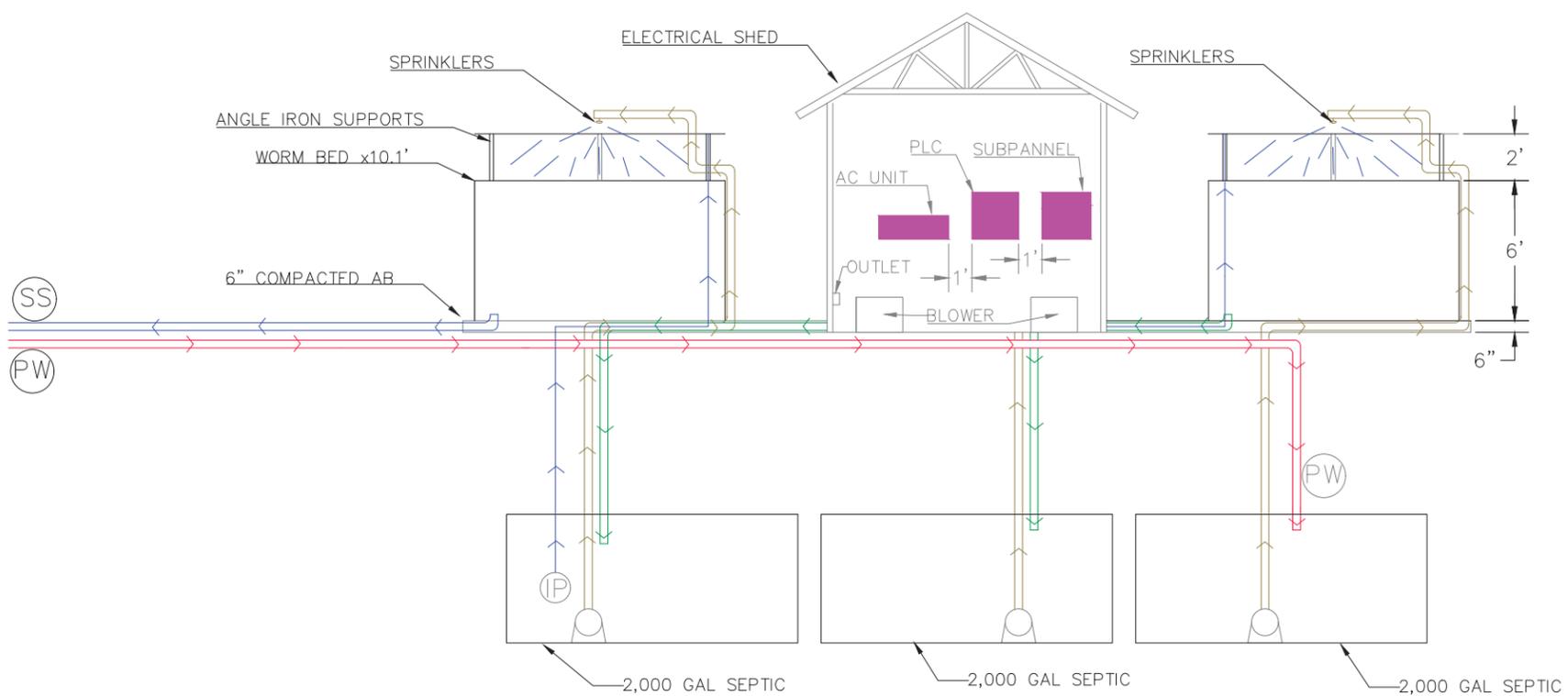
Vitalis System Layout

PLAN VIEW



WATER FLOW

RIGHT VIEW



NOTES

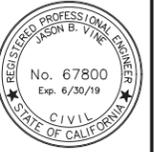
- ⊗ : BALL SWITCH VALVE
- : ELECTRICAL CONDUIT
- ⊙ : 3/4 HP SUBMERSIBLE GRINDING TRANSFER PUMP
- Ⓛ : LEVEL TRANSMITTER
- Ⓟ : BACTERIA DOSING PUMP
- Ⓟ : PH DOSING PUMP
- Ⓛ : DISSOLVED OXYGEN SENSOR
- Ⓡ : IRRIGATION PUMP
- Ⓛ : BACTERIAL DRUM (20 GAL)
- Ⓟ : 2" PWW PRESSURE LINE IN
- Ⓛ : 4" PWW GRAVITY LINE OUT @ 2% MINIMUM
- : FLOW FROM FACILITY TO SEPTIC
- : FLOW FROM SEPTIC TO WORM BED
- : GRAVITY FLOW TO SEPTIC TANK
- : RECYCLED WATER
- : IRRIGATED WATER TO LIVING MOSS ROOF

Revisions:

REALM ENGINEERING
 CIVIL ENGINEERING, SURVEYING & PLANNING
 1767 MARKET STREET SUITE C
 REDDING, CA. 96001
 530-526-7493



Plans Prepared Under the Supervision of:



KNOLLWOOD VINEYARDS
 WATER FLOW

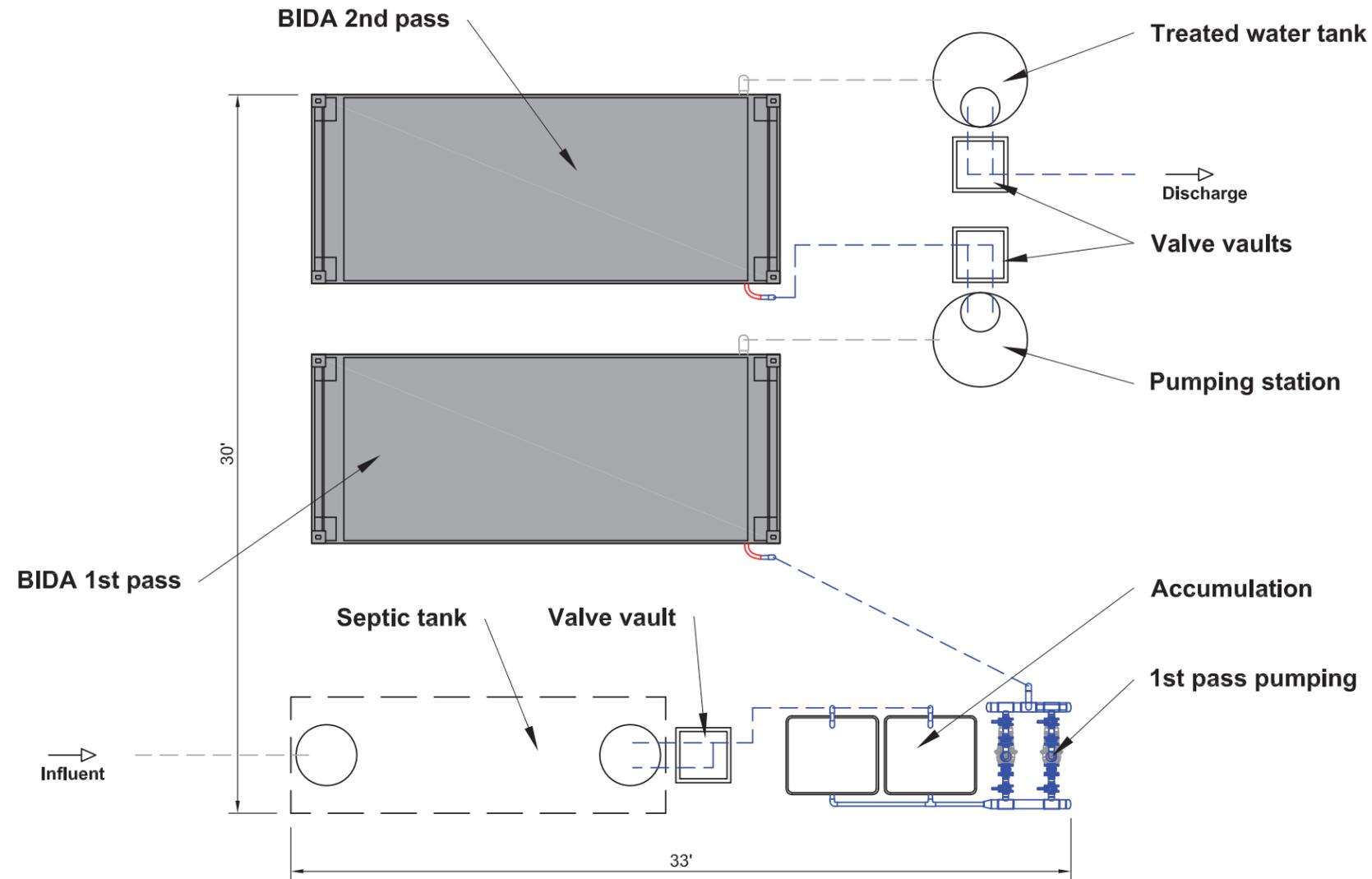
W1



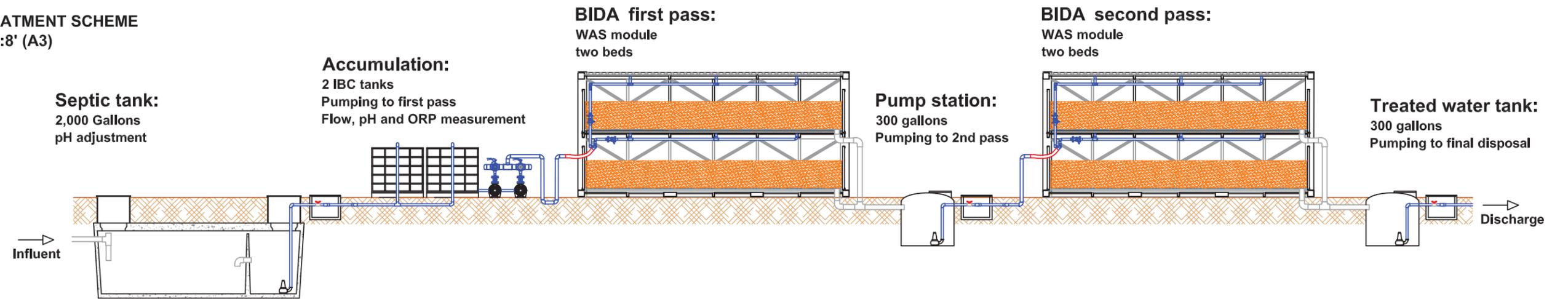
ATTACHMENT 5

Biofiltro System Layout

DISTRIBUTION PROPOSAL
S 1":6' (A3)



TREATMENT SCHEME
S 1":8' (A3)



Measured in feet

Reviewed and approved Matías Sjögren Raab	Date 2018 / 09	Client Knollwood Vineyards	Title Treatment scheme and distribution proposal, 1,200 GD		Scale Indicated	Biofiltro Hernando de Aguirre 201, of. 1301 Providencia - Santiago - Chile	
Drawn Ignacio Vera	Key U18.21	Location 4101 Big Ranch RD, Napa, CA 94558	Project Kevin Corley Winery wastewater treatment plant	Sheet 1 of 3	Version ver1		



ATTACHMENT 6

LYVE System Layout Description

TREATMENT SYSTEM LAYOUT

The major components of the Lyve Wastewater Treatment System and their dimensions and footprints are as follows:

- 💧 Sump underground tank: by others
- 💧 Filter Canister Screens: 3' x 4'
- 💧 Packaged Plant: (EQ, MBBR, Activated Sludge, MBR, Sludge Digesters, and Equipment Cabinet): 38' L x 8' W
- 💧 Chemical tanks: two (2) poly tanks, 4' diameter each
- 💧 One Blower: 3' W by 4' L
- 💧 Effluent Storage Tank: by others

The overall footprint required for the above ground equipment is 44' long by 17' wide.





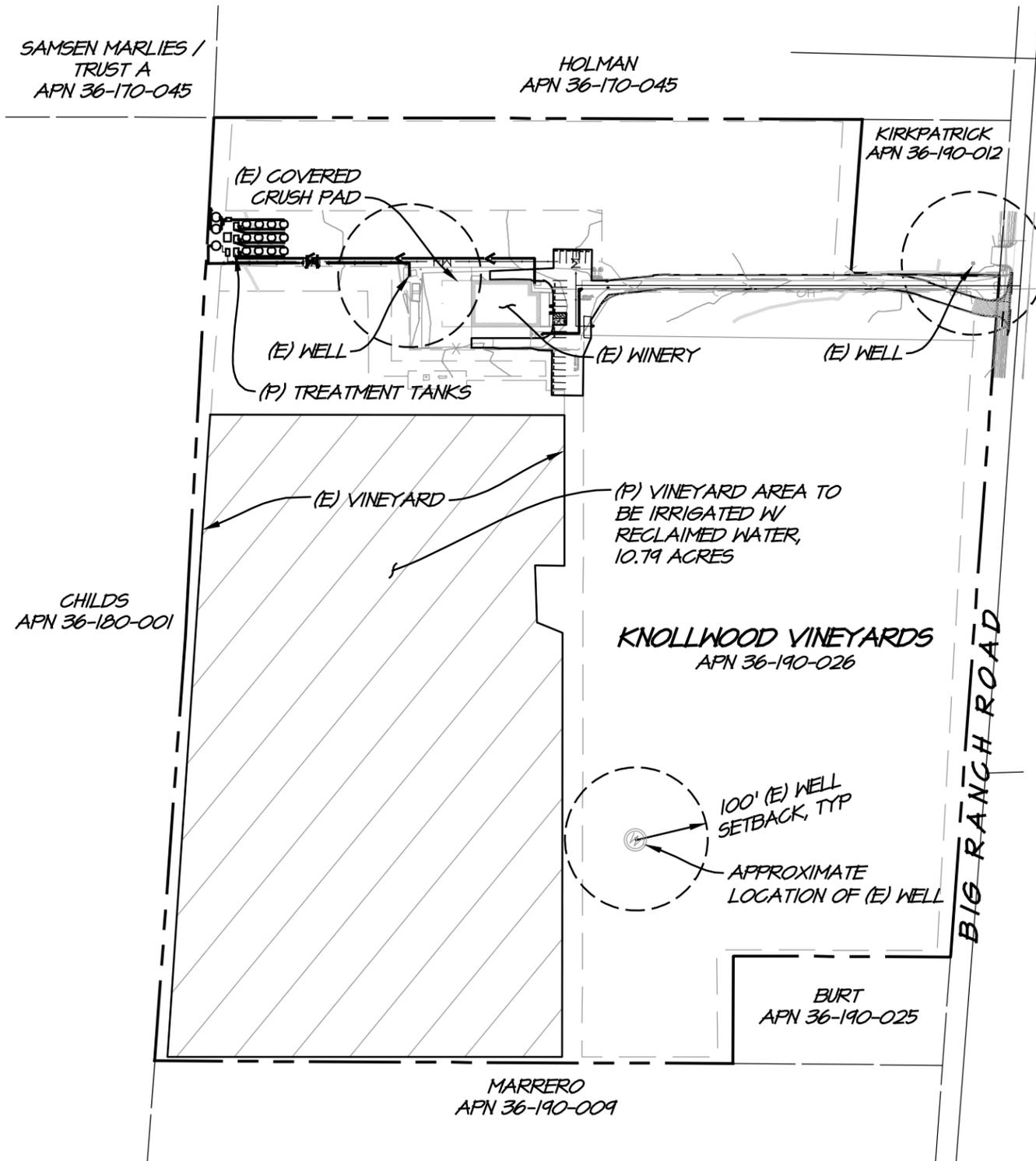
ATTACHMENT 7

Irrigation Water Balance

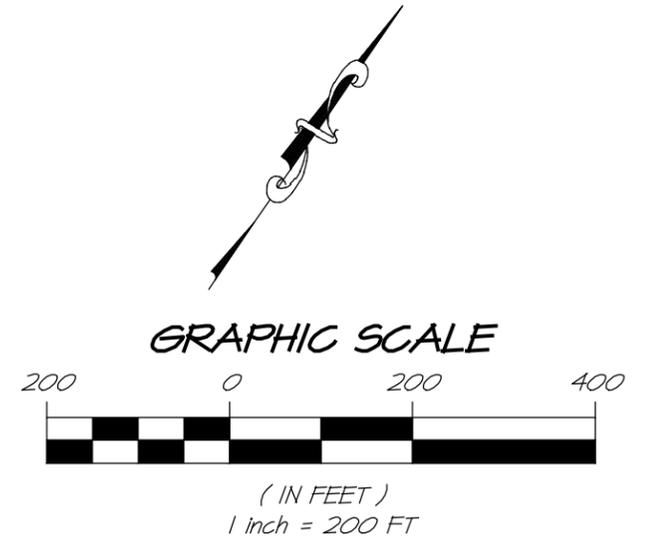
KNOLLWOOD VINEYARDS VINEYARD IRRIGATION AREAS EXHIBIT

NAPA COUNTY

CALIFORNIA



SITE PLAN
SCALE: 1" = 200"



RSA⁺	1515 FOURTH STREET NAPA, CALIF. 94559 OFFICE 707 252.3301 + www.RSAcivil.com +
	RSA ⁺ CONSULTING CIVIL ENGINEERS + SURVEYORS + est. 1980

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

Project Description		Annual Process Waste Flow Volume	
Project Number:	4117060.0	Wine Production:	40,000 gal/year
Project Name:	Knollwood Vineyards		
Prepared By:	Rafael Turcios	Annual Process Waste per Gallon Wine:	5 gal/year
Date:	July 27, 2018	Total Annual Process Waste Generated:	200,000 gal/year

Vineyard Irrigation Parameters		Landscape Irrigation Parameters	
Acreage of irrigated vineyard:	10.79 acres	Crop type / name:	Native grass and trees
Row spacing:	6.2 feet	Total irrigated acres of crop:	0.00 acres
Vine spacing:	6.0 feet		
Total number of vines:	12,737 vines		
Water use per vine per month (peak):	26 gal		
Total peak monthly irrigation demand:	331,174 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]:	8,000	12,000	12,000	10,000	12,000	14,000	18,000	20,000	28,000	28,000	22,000	16,000

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]:	19,870	19,870	33,117	331,174	331,174	331,174	331,174	331,174	331,174	331,174	33,117	33,117
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]	8,000	12,000	12,000	10,000	12,000	14,000	18,000	20,000	28,000	28,000	22,000	16,000
Remaining vineyard irrigation demand after using this month's process water [gallons]	11,870	7,870	21,117	321,174	319,174	317,174	313,174	311,174	303,174	303,174	11,117	17,117
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	11,870	7,870	21,117	321,174	319,174	317,174	313,174	311,174	303,174	303,174	11,117	17,117
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]	0	0	0	0	0	0	0	0	0	0	0	0

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)	0	0	0	0	0	0	0	0	0	0	0	0
Reference ET (ETo) (in/month) (see note 1)	1.24	1.68	3.41	4.8	6.2	6.9	7.44	6.51	5.1	3.41	1.8	0.93
Crop Coefficient (kc) (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]	0.99	1.34	2.73	3.84	4.96	5.52	5.95	5.21	4.08	2.73	1.44	0.74
Crop water demand per acre [gallons]	26,935	36,493	74,072	104,265	134,676	149,881	161,611	141,410	110,782	74,072	39,099	20,201
Total crop water demand for irrigated area [gallons]	0	0	0	0	0	0	0	0	0	0	0	0
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]	0	0	0	0	0	0	0	0	0	0	0	0
Landscape irrigation water required from storage or other source [gallons]	0	0	0	0	0	0	0	0	0	0	0	0
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:

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