Wastewater Disposal Feasibility Study

Vineyard House Winery, Use Permit P18-00448-UP, Use Permit Exception to the Conservation Regulations P21-00341-UP, and Exemptions to the Road and Street Standards
Planning Commission Hearing Date July 16, 2025

ONSITE WASTEWATER DISPOSAL FEASIBILITY STUDY

FOR

THE VINEYARD HOUSE WINERY

LOCATED AT:
1581 Oakville Grade Road
Napa, CA 94558
NAPA COUNTY APN 027-360-022

PREPARED FOR:
The Vineyard House
Care of: Jeremy Nickel
1581 Oakville Grade Road
Napa, CA 94558
Telephone: (707) 944-0392

PREPARED BY:

APPLIED CIVIL ENGINEERING INCORPORATED

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Michael R. Muelrath

Michael R. Muelrath R.C.E. 67435

12/21/2018
Date

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INTRODUCTION

The Vineyard House is applying for a Use Permit to construct and operate a new winery at their property located at 1581 Oakville Grade Road in Napa County, California. The subject property, known as Napa County Assessor's Parcel Number 027-360-022, is located along a private driveway approximately 1/3rd mile south of the intersection of the private driveway and Oakville Grade Road.

The Use Permit application under consideration proposes the construction and operation of a new winery with the following characteristics:

- Wine Production:
  - 20,000 gallons of wine per year
  - Crushing, fermenting, aging and bottling

- Employees:
  - 4 full time
  - 2 part time

- Marketing Plan:
  - Daily Tours and Tastings by Appointment
    - 12 visitors per day maximum
    - 60 visitor per week average
  - Small Group Marketing Events
    - 12 per year
    - 20 guests maximum
    - Food prepared offsite by catering company
  - Non-Profit or Industry Events
    - 1 per year
    - 50 guests maximum
    - Food prepared offsite by catering company
    - Portable toilets brought in for guest use
  - Harvest Party or Related Event
    - 1 per year
    - 100 guests maximum
    - Food prepared offsite by catering company
    - Portable toilets brought in for guest use

Existing improvements on the property include a single family residence, a barn / viticulture office, vineyards and the associated access and utility infrastructure typical for this type of residential and agricultural development. All domestic wastewater from the main residence and barn / viticulture office is collected into one septic tank and disposed of in a conventional dispersal field located just north of the existing residence. The main residence and barn / viticulture office buildings both become part of the winery facility as part of this proposal. Please see The Vineyard

House Winery Use Permit Conceptual Site Improvement Plans for approximate locations of existing and proposed site and wastewater features.

The Vineyard House has requested that Applied Civil Engineering Incorporated (ACE) evaluate the feasibility of disposing of the winery process wastewater as well as the domestic sanitary wastewater that will be generated by the proposed winery via an onsite wastewater disposal system. The remainder of this report describes the onsite soil conditions, the predicted winery process and sanitary wastewater flows and outlines the conceptual design of an onsite wastewater disposal system.

SOILS INFORMATION

The United States Department of Agriculture Soil Conservation Service Soils Map for Napa County shows the following soil types mapped on the property:

- Coombs gravelly loam, 2 to 5 percent slopes
- Sobrante loam, 5 to 30 percent slopes
- Felton gravelly loam, 30 to 50 percent slopes
- Hambright rock-outcrop complex, 2 to 30 percent slopes
- Hambright rock-outcrop complex, 30 to 75 percent slopes

A site specific soils analysis was conducted during a site evaluation performed by ACE on May 13, 2011 (E11-00151). The site evaluation consisted of the excavation and observation of six test pits located north and west of the existing residence in the lawns. The test pits revealed variable depths of acceptable soil ranging from 24 inches to 72 inches with the upper horizon having a USDA soil texture classification of sandy clay loam. The only limiting condition that was observed was the presence of >50% rock in Test Pit #2 at a depth of 36".

Please refer to the Site Evaluation Report in Appendix 4 for additional details.

PREDICTED WASTEWATER FLOW

The onsite wastewater disposal system will be designed for the peak winery process wastewater flow and the peak sanitary wastewater flow from the proposed winery.

Winery Process Wastewater

We have used the generally accepted standard that six gallons of winery process wastewater are generated for each gallon of wine that is produced each year and that 1.5 gallons of wastewater are generated during the crush period for each gallon of wine that is produced. Based on the size of the winery and our understanding that both red and white wines will be produced we have assumed a 30 day crush period. Using these assumptions, the average and peak winery process wastewater flows are calculated as follows:

$$\text{Annual Winery Process Wastewater Flow} = \frac{20{,}000 \text{ gallons wine}}{\text{year}} \times \frac{6 \text{ gallons wastewater}}{1 \text{ gallon wine}}$$

Annual Winery Process Wastewater Flow = 120,000 gallons per year

$$\text{Average Daily Winery Process Wastewater Flow} = \frac{120{,}000 \text{ gallons}}{\text{year}} \times \frac{1 \text{ year}}{365 \text{ days}}$$

Average Daily Winery Process Wastewater Flow = 329 gallons per day (gpd)

$$\text{Peak Winery Process Wastewater Flow} = \frac{20{,}000 \text{ gallons wine}}{\text{year}} \times \frac{1.5 \text{ gallons wastewater}}{1 \text{ gallon wine}} \times \frac{1 \text{ year}}{30 \text{ crush days}}$$

Peak Winery Process Wastewater Flow = 1,000 gpd

Winery Sanitary Wastewater

The peak sanitary wastewater flow from the winery is calculated based on the number of winery employees, the number of daily visitors for tours and tastings and the number of guests attending private marketing events. In accordance with Table 4 of Napa County's "Regulations for Design, Construction, and Installation of Alternative Sewage Treatment Systems" we have used a design flow rate of 15 gallons per day per employee and 3 gallons per day per visitor for tours and tastings. Table 4 does not specifically address design wastewater flows for guests at marketing events. For marketing events that will have catered meals that are prepared offsite we have conservatively estimated 5 gallons of wastewater per guest. Based on these assumptions, the peak winery sanitary wastewater flows are calculated as follows:

Employees

Peak Sanitary Wastewater Flow = 6 employees X 15 gpd per employee

Peak Sanitary Wastewater Flow = 90 gpd

Daily Tours and Tastings

Peak Sanitary Wastewater Flow = 12 visitors per day X 3 gallons per visitor

Peak Sanitary Wastewater Flow = 36 gpd

Marketing Events with Catered Meals Prepared Offsite:

Peak Sanitary Wastewater Flow = 20 guests X 5 gallons per guest

Peak Sanitary Wastewater Flow = 100 gpd

Wine Club Events with Catered Meals Prepared Offsite:

Peak Sanitary Wastewater Flow = 50 guests X 5 gallons per guest

Peak Sanitary Wastewater Flow = 250 gpd

Wine Auction and Napa Premier Related Events with Catered Meals Prepared Offsite:

Peak Sanitary Wastewater Flow = 100 guests X 5 gallons per guest

Peak Sanitary Wastewater Flow = 500 gpd

Total Peak Winery Sanitary Wastewater Flow

As previously noted, all events with more than 20 guests in attendance will utilize portable sanitary facilities to minimize the load on the septic system. Therefore, assuming that daily tours and tastings and a maximum of one marketing event may occur on the same day the total peak winery sanitary wastewater flow is based on employees, daily tours and tastings and a marketing event for 20 people and is calculated as follows:

Total Peak Winery Sanitary Wastewater Flow = 90 gpd + 36 gpd + 100 gpd

Total Peak Winery Sanitary Wastewater Flow = 226 gpd

RECOMMENDATIONS

Based on the anticipated wastewater flows, the proposed site layout and the findings of our site evaluation we recommend that the process and sanitary wastewater generated at the proposed winery be kept separate for treatment and disposal. The sanitary wastewater should be disposed of onsite in the existing conventional septic system that currently serves the existing residence. The existing system has a design capacity of 330 gpd and will not need to be expanded to increase the design capacity.

The process wastewater should be pre-treated and disposed of via irrigation in the onsite vineyard area. This dual system will allow for a smaller subsurface septic system than if the two waste streams were combined. Furthermore, using the treated winery process wastewater for irrigation will offset groundwater demand and result in greater operational flexibility compared to utilizing the domestic waste subsurface dispersal system for winery process wastewater disposal.

The conceptual designs of the two wastewater disposal systems are outlined in the following sections of this report.

Sanitary Wastewater Disposal Via Conventional Septic System

Required Disposal Field Area

The disposal field area is calculated based upon the design hydraulic loading rate for the soil conditions (0.33 gpd / sf) and the effective trench sidewall area. The existing trenches provide 3 square feet of sidewall per lineal feet of trench. Based on these design parameters, the required length of trench is calculated as follows:

$$\text{Required Length of Trench} = 226 \text{ gpd} \times \frac{1 \text{ square foot}}{0.33 \text{ gpd}} \times \frac{1 \text{ lineal foot}}{3 \text{ square feet}}$$

Required Length of Trench =228 lineal feet

Available Disposal Field Area

The existing leach lines total 330 feet in length which is in excess of the required 228 feet. The layout of the disposal field is shown on The Vineyard House Winery Use Permit Conceptual Site Improvement Plans in Appendix 2.

Required Reserve Area

Napa County code requires that an area be set aside to accommodate a future onsite wastewater disposal system in the event that the primary system fails or the soil in the primary area is otherwise rendered unsuitable for wastewater disposal.

Available Reserve Area

Based on the proposed site plan we have determined that there is enough area to set aside for an additional 330 lineal feet of conventional leach line in the vicinity of Test Pits #3, #4, and #5 as shown on The Vineyard House Winery Use Permit Conceptual Site Improvement Plans in Appendix 2.

Septic Tank Capacity

We recommend a minimum septic tank size of 1,200 gallons to provide a minimum hydraulic retention time of three days based on peak sanitary waste flows. The existing septic tank is adequate to meet this requirement.

Process Wastewater Disposal Via Irrigation

Pretreatment

Based on the winery's planned production level and waste flows we recommend that treatment be achieved through the use of a package plant type system or other treatment system designed to accept winery process wastewater that is capable of meeting the following treatment requirements:

Parameter	Pre-treatment*	Post Treatment**
pH	3 to 10	6 to 9
BOD_5	500 to 12,000 mg/l	<160 mg/l
TSS	40 to 800 mg/l	<80 mg/l
SS	25 to 100 mg/l	<1 mg/l

* Reference California Regional Water Quality Control Board Central Coast Region General Waste Discharge Requirements Order No. R3-2008-0018 for winery process wastewater characteristics

** Required for discharge to land via surface irrigation by Napa County for samples taken at the discharge of the treatment unit.

Process Wastewater Disposal

We propose that disposal of the treated winery process wastewater be via irrigation of the onsite vineyard. The existing vineyard on the winery property totals approximately 25.5 acres. For the purpose of this study we have assumed that the winery process wastewater will be applied to only 1 acre of the existing vineyard. This is a conservative assumption to simplify this analysis as much more vineyard is available. The final irrigation area will be determined and incorporated into the final design with the installation permit application.

In order to accommodate differences in the timing of wastewater generation, irrigation demand, and limitations on wet weather application of treated wastewater a storage tank will be required. We have prepared a water balance calculation to size a tank that will temporarily store wastewater generated at the winery before it is applied to the vineyard. The water balance calculations assume a monthly winery process wastewater generation rate and a monthly vineyard irrigation schedule based on our past experience with projects of this type. The water balance further assumes that during the summer the treated wastewater will be used to offset the irrigation needs of the vineyard and in the winter application of treated winery process wastewater will be very limited (0.8" maximum per month) to prevent runoff. In the event that winter application is not possible due to extended wet weather patterns winery operations will have to be adjusted to work within the capacity of the storage tank(s) or the tank(s) will need to be emptied by hauling waste to an approved offsite disposal location. The water balance calculations show that the proposed land application area is large enough to accept all of the wastewater generated each month throughout the year without carry over (see Appendix 3). To provide operational flexibility, we recommend that the storage tank(s) have a minimum capacity of approximately 10,000 to 20,000 gallons so that approximately one to two weeks' worth of peak flow can be contained to allow flexibility in irrigation scheduling during the harvest period.

All application of treated winery process wastewater must comply with the requirements of the Napa County Process Wastewater Guidelines for Surface Drip Irrigation.

CONCLUSION

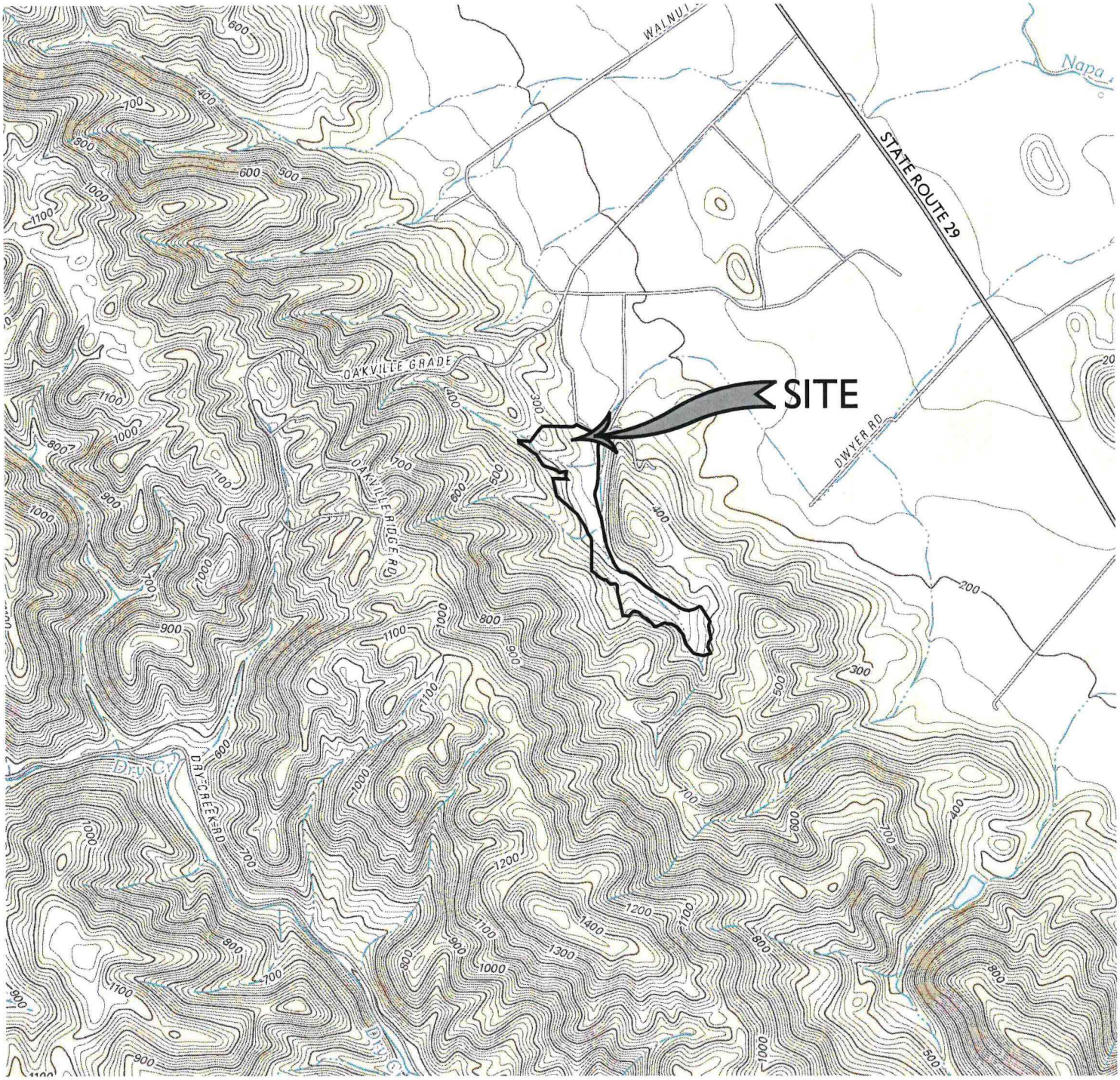
It is our opinion that the proposed winery sanitary wastewater disposal needs can be served by utilizing the existing conventional onsite septic system and the winery process wastewater can be pretreated and disposed of via irrigation within the onsite vineyard area. Full design calculations and construction plans should be prepared in accordance with Napa County standards at the time of building permit application.

APPENDIX 1: Site Topography Map

SITE TOPOGRAPHY MAP

REPRESENTS A PORTION OF THE
UNITED STATES GEOLOGICAL SURVEY 7.5 MINUTE QUADRANGLE
"RUTHERFORD, CA"

SCALE: 1" = 2,000'



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THE VINEYARD HOUSE WINERY

1581 OAKVILLE GRADE ROAD
NAPA, CA 94558
APN 027-360-022

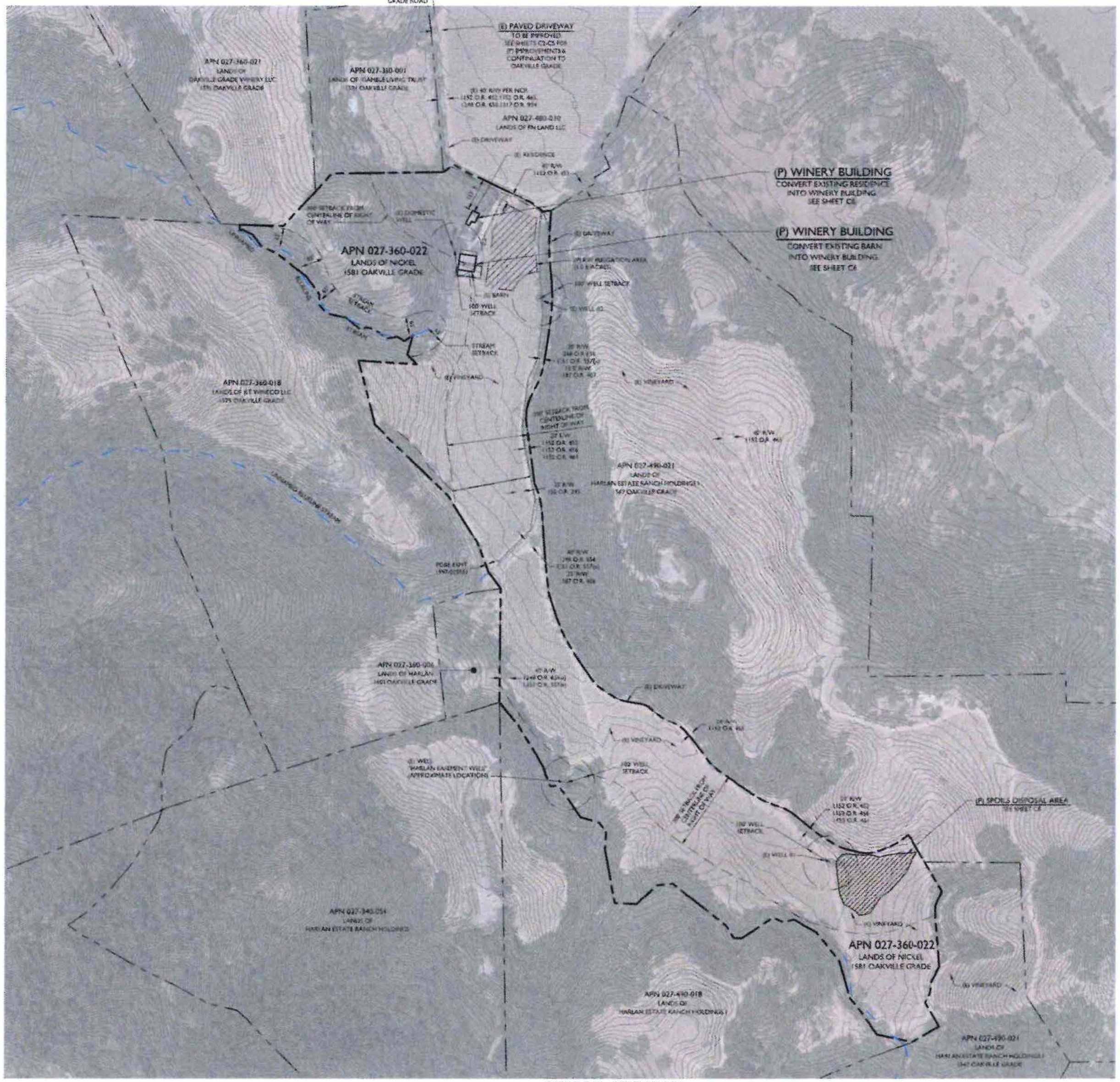
JOB NO. 10-130

DECEMBER 2018

APPENDIX 2: The Vineyard House
Winery Use Permit Conceptual Site Improvement Plans (Reduced)

THE VINEYARD HOUSE WINERY

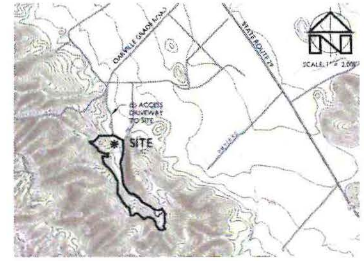
USE PERMIT CONCEPTUAL SITE IMPROVEMENT PLANS



OVERALL SITE PLAN

SCALE: 1" = 200'

SCALE: 1" = 200'



LOCATION MAP

SCALE: 1" = 2,000'

PROJECT INFORMATION:

PROPERTY OWNER & APPLICANT:
JEREMY NICKEL
1581 OAKVILLE GRADE ROAD
NAPA, CA 94558

SITE ADDRESS:
1581 OAKVILLE GRADE ROAD
NAPA, CA 94558

ASSESSOR'S PARCEL NUMBER:
027-360-022

PARCEL SIZE:
43 ± ACRES

ZONING:
AGRICULTURAL WATERSHED (AW)

DOMESTIC WATER SOURCE:
WELLS

FIRE PROTECTION WATER SOURCE:
STORAGE TANK

WASTEWATER DISPOSAL:
ONSITE TREATMENT AND DISPERSAL

SHEET INDEX:

PROJECT DESCRIPTION:

THE PURPOSE OF THIS PROJECT IS TO CONVERT THE EXISTING BARN INTO A WINERY PRODUCTION BUILDING AND THE EXISTING RESIDENCE INTO A HOSPITALITY/ADMIN BUILDING. THE GENERAL SCOPE INCLUDES RENOVATION OF TWO EXISTING BUILDINGS AND THE CONSTRUCTION OF A NEW WINE CAVE AND UPGRADES TO INFRASTRUCTURE AS NEEDED TO SUPPORT THESE CHANGES. THESE PLANS ARE INTENDED TO CONCEPTUALLY OUTLINE THE SITE IMPROVEMENTS PROPOSED AS PART OF THE USE PERMIT.

FLOOD HAZARD NOTE:

ACCORDING TO THE FEDERAL EMERGENCY MANAGEMENT AGENCY (FEMA) FLOOD INSURANCE RATE MAP (FIRM) MAP NUMBER 06055C0395E, EFFECTIVE SEPTEMBER 26, 2008, THE PROJECT SITE IS NOT LOCATED IN A SPECIAL FLOOD HAZARD AREA.

NOTES:

1. FADED BACKGROUND REPRESENTS EXISTING TOPOGRAPHIC FEATURES. TOPOGRAPHIC INFORMATION ON SHEET C1 WAS TAKEN FROM THE NAPA COUNTY GEOGRAPHIC INFORMATION SYSTEM DATABASE. TOPOGRAPHIC INFORMATION ON ALL OTHER SHEETS WAS TAKEN FROM VARIOUS SITE SURVEYS OF THE DRIVEWAY AND BUILDING SITE. APPLIED CIVIL ENGINEERING INCORPORATED ASSUMES NO LIABILITY REGARDING THE ACCURACY OR COMPLETENESS OF THE TOPOGRAPHIC INFORMATION.
2. AERIAL PHOTOGRAPHS WERE OBTAINED FROM THE SAN FRANCISCO ESTUARY INSTITUTE (SFEI) SAN FRANCISCO BAY AREA ORTHOPHOTOS DATABASE, DATED JUNE 2014 AND MAY NOT REPRESENT CURRENT CONDITIONS.
3. CONTOUR INTERVAL: SHEET C1: FIVE (5) FEET, HIGHLIGHTED EVERY TWENTY FIVE (25) FEET. ALL OTHER SHEETS: ONE (1) FOOT, HIGHLIGHTED EVERY FIVE (5) FEET.
4. BENCHMARK: ASSUMED
5. THE PROPERTY LINES SHOWN ON THESE PLANS DO NOT REPRESENT A BOUNDARY SURVEY. THEY ARE APPROXIMATE AND ARE PROVIDED FOR INFORMATIONAL PURPOSES ONLY.

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THE VINEYARD HOUSE WINERY

USE PERMIT CONCEPTUAL SITE IMPROVEMENT PLANS
OVERALL SITE PLAN

PREPARED UNDER THE DIRECTION OF:

DRAWN BY: SMI

CHECKED BY: MRM

DATE: DECEMBER 21, 2018

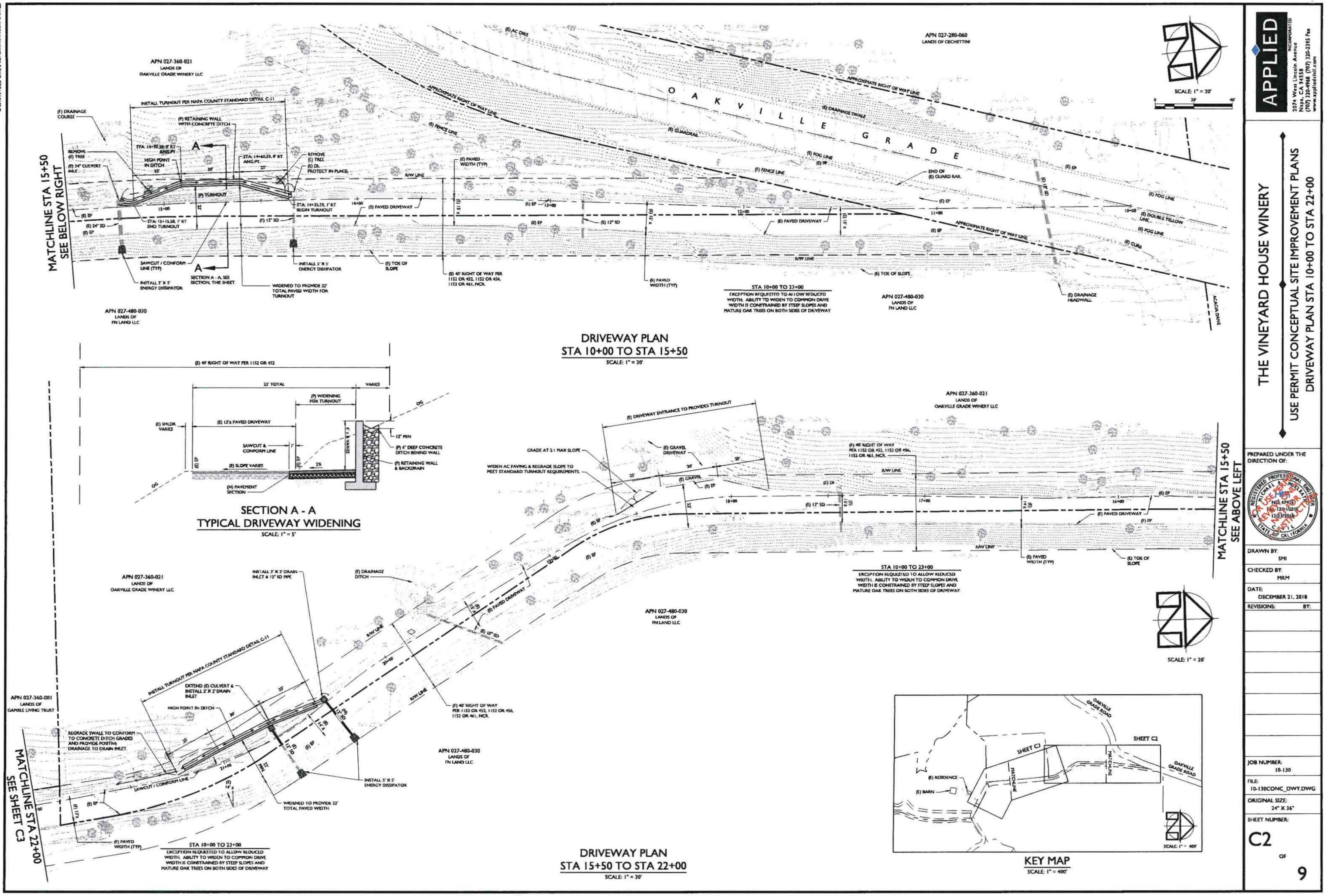
REVISIONS: BY:

JOB NUMBER: 10-130

FILE: 10-130CONC_OSP.DWG

ORIGINAL SIZE: 24" X 36"

SHEET NUMBER: C1 OF 9



APN 027-360-021
LANDS OF
OAKVILLE GRADE WINERY LLC
APN 027-280-060
LANDS OF CECHETTINI
OAKVILLE GRADE
INSTALL TURNOUT PER NAPA COUNTY STANDARD DETAIL C-11
(P) RETAINING WALL WITH CONCRETE DITCH
(F) DRAINAGE COURSE
MATCHLINE STA 15+50
SEE BELOW RIGHT
STA 10+00 TO 23+00
EXCEPTION REQUESTED TO ALLOW REDUCED WIDTH. ABILITY TO WIDEN TO COMMON DRIVE WIDTH IS CONSTRAINED BY STEEP SLOPES AND MATURE OAK TREES ON BOTH SIDES OF DRIVEWAY
INSTALL 5' X 5' ENERGY DISSIPATOR
WIDENED TO PROVIDE 22' TOTAL PAVED WIDTH FOR TURNOUT
(E) 40' RIGHT OF WAY PER 1152 OR 452, 1152 OR 456, 1152 OR 461, NCR
APN 027-480-030
LANDS OF
FN LAND LLC
DRIVEWAY PLAN
STA 10+00 TO STA 15+50
SCALE: 1" = 20'
SECTION A - A
TYPICAL DRIVEWAY WIDENING
SCALE: 1" = 5'
(E) 40' RIGHT OF WAY PER 1152 OR 452
22' TOTAL
VARIES
(P) WIDENING FOR TURNOUT
(E) 12'± PAVED DRIVEWAY
(P) 6" DEEP CONCRETE DITCH BEHIND WALL
(P) RETAINING WALL & BACKDRAIN
(N) PAVEMENT SECTION
SAWCUT & CONFORM LINE
MATCHLINE STA 15+50
SEE ABOVE LEFT
(E) DRIVEWAY ENTRANCE TO PROVIDES TURNOUT
GRADE AT 2:1 MAX SLOPE
WIDEN AC PAVING & REGRADE SLOPE TO MEET STANDARD TURNOUT REQUIREMENTS
EXTEND (E) CULVERT & INSTALL 2' X 2' DRAIN INLET
HIGH POINT IN DITCH
REGRADE SWALE TO CONFORM TO CONCRETE DITCH GRADES AND PROVIDE POSITIVE DRAINAGE TO DRAIN INLET
APN 027-360-001
LANDS OF
GAMBLE LIVING TRUST
MATCHLINE STA 22+00
SEE SHEET C3
DRIVEWAY PLAN
STA 15+50 TO STA 22+00
SCALE: 1" = 20'
KEY MAP
SCALE: 1" = 400'
SHEET C2
SHEET C3
OAKVILLE GRADE ROAD
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USE PERMIT CONCEPTUAL SITE IMPROVEMENT PLANS
DRIVEWAY PLAN STA 10+00 TO STA 22+00
PREPARED UNDER THE DIRECTION OF:
DRAWN BY: SMI
CHECKED BY: MRM
DATE: DECEMBER 21, 2018
REVISIONS: BY:
JOB NUMBER: 10-130
FILE: 10-130CONC_DWY.DWG
ORIGINAL SIZE: 24" X 36"
SHEET NUMBER:
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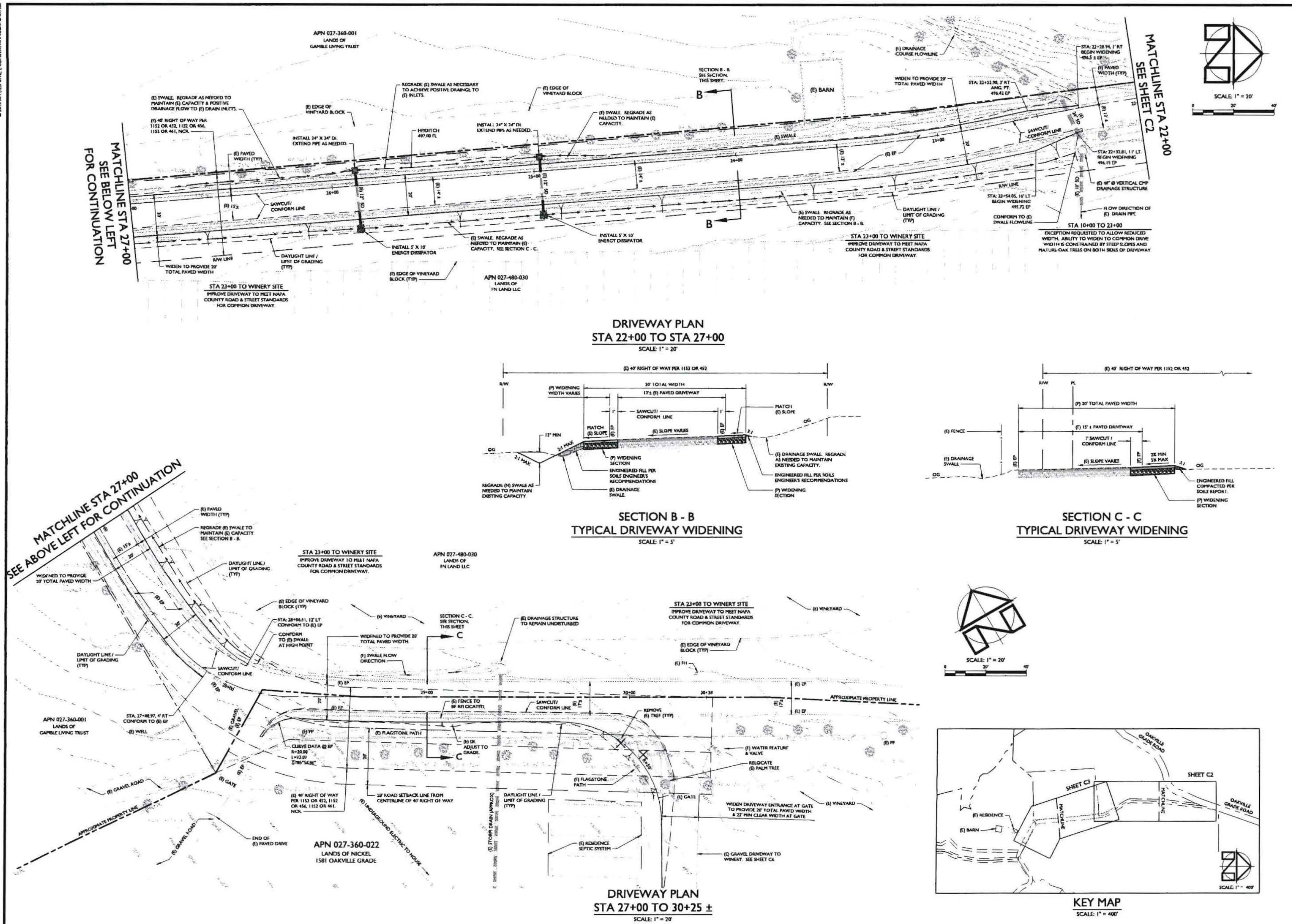

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THE VINEYARD HOUSE WINERY

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DRIVEWAY PLAN STA 22+00 TO STA 30+25 ±

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JOB NUMBER: 10-130
FILE: 10-130CONC_DWY.DWG
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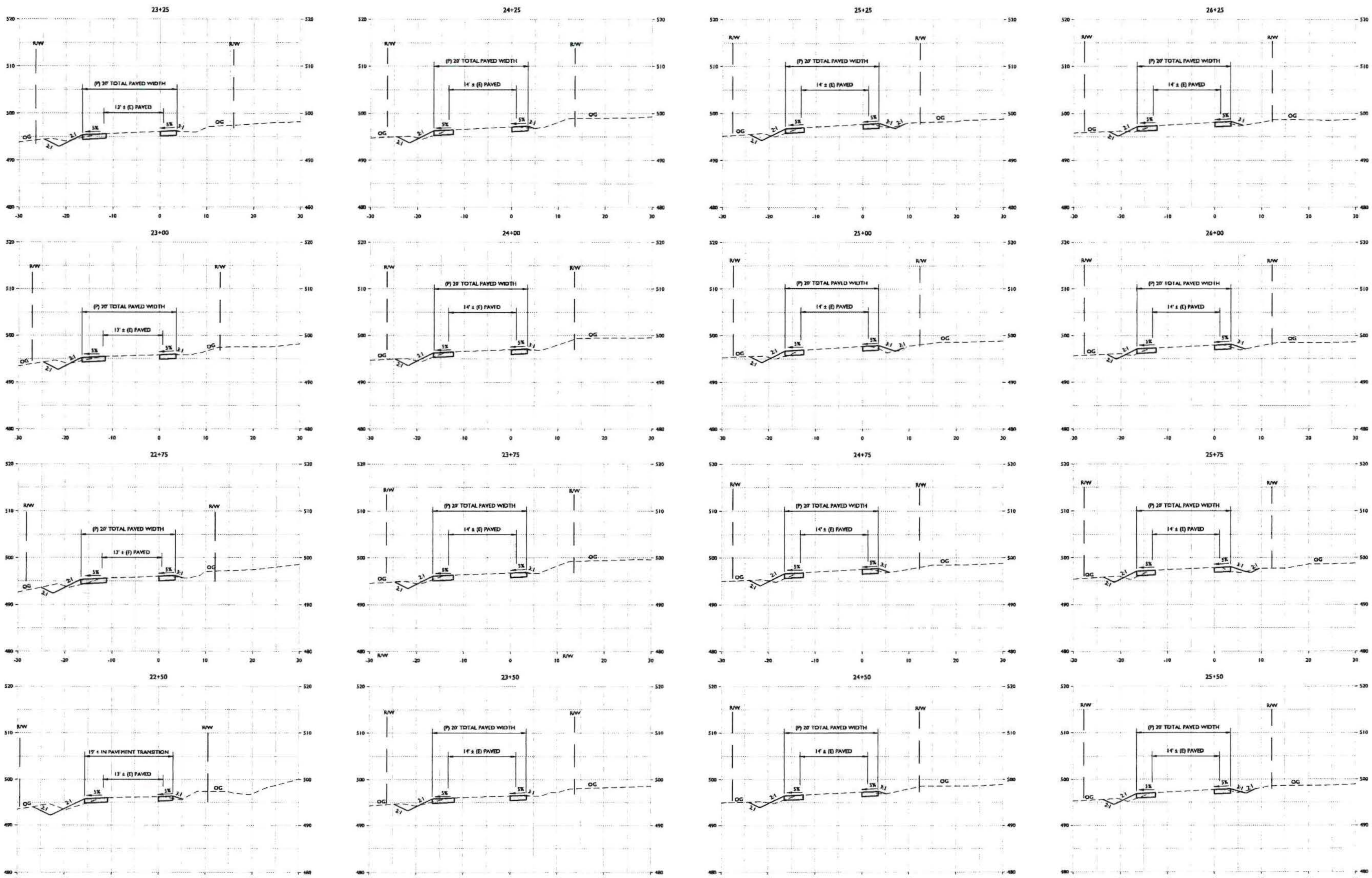

DRIVEWAY SECTIONS STA 22+50 TO STA 26+25

HORIZONTAL SCALE: 1" = 10'
VERTICAL SCALE: 1" = 10'

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DRIVEWAY SECTIONS STA 22+50 TO STA 26+25

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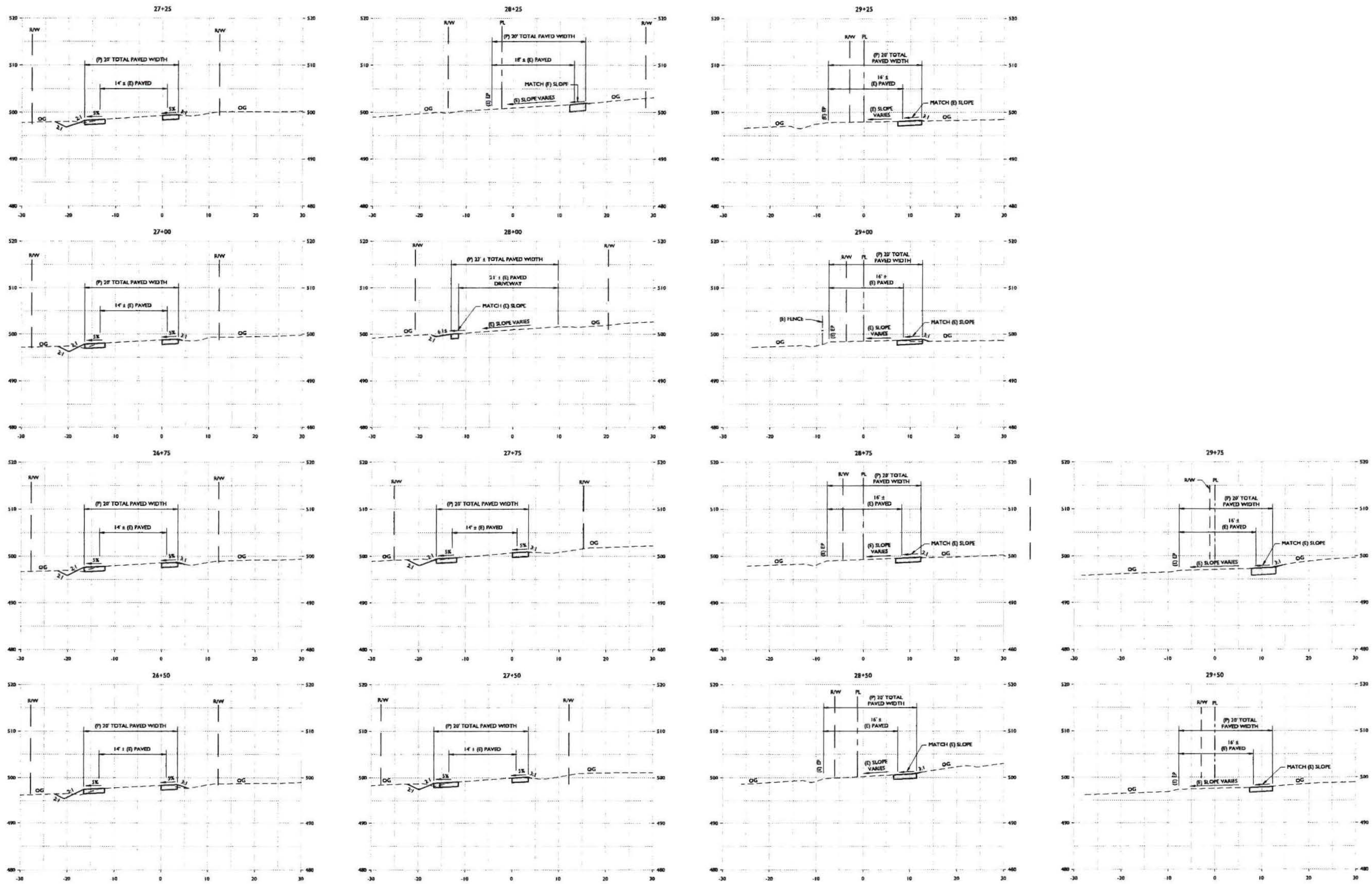

DRIVEWAY SECTIONS STA 26+50 TO STA 29+75

HORIZONTAL SCALE: 1" = 10'
VERTICAL SCALE: 1" = 10'

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THE VINEYARD HOUSE WINERY

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DRIVEWAY SECTIONS STA 26+50 TO STA 29+75

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REVISIONS: BY:

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FILE: 10-130CONC_DWY.DWG
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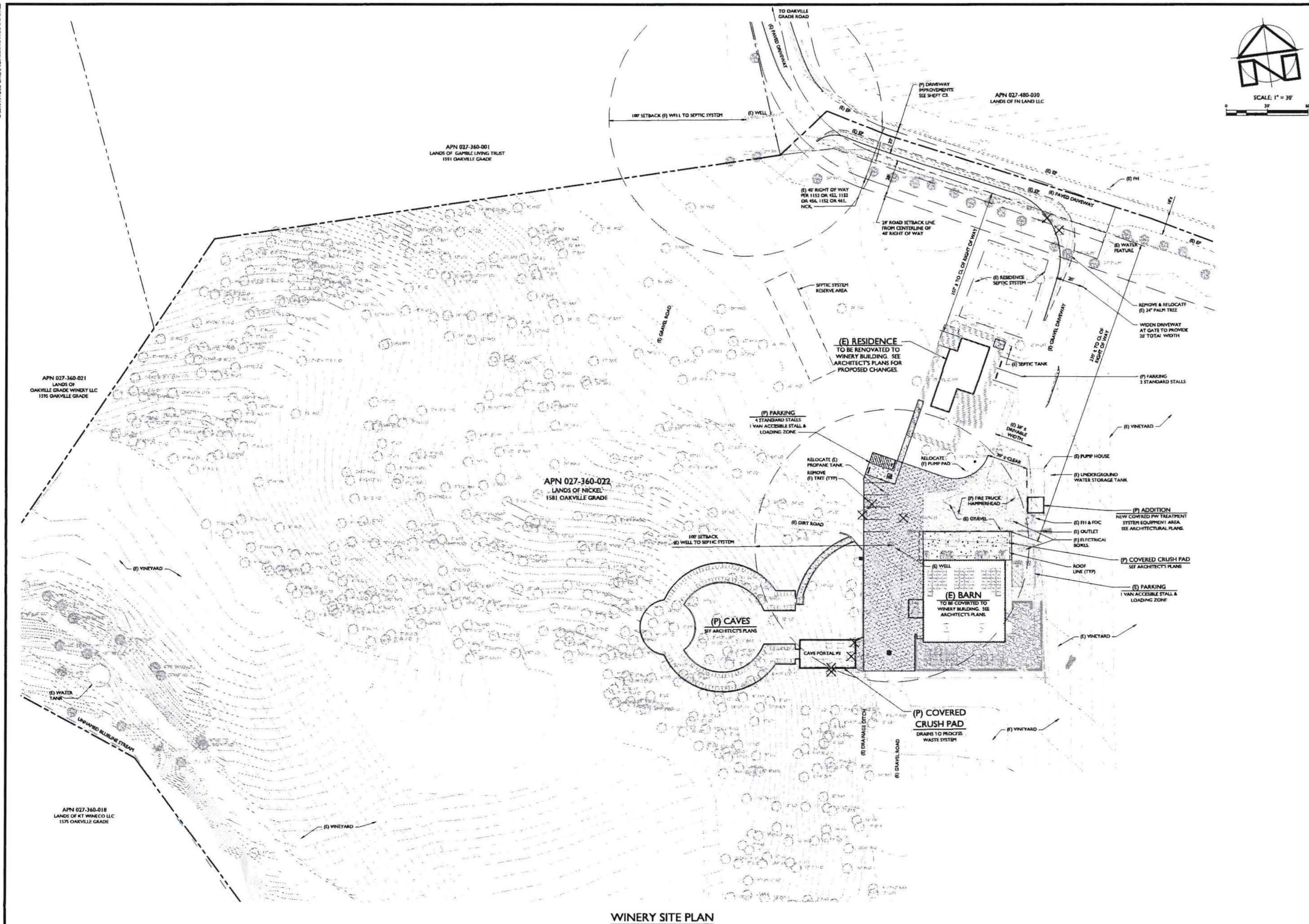
C5
OF
9



WINERY SITE PLAN
SCALE: 1" = 30'

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THE VINEYARD HOUSE WINERY
USE PERMIT CONCEPTUAL SITE IMPROVEMENT PLANS
WINERY SITE PLAN

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FILE: 10-130CONC_WSP.DWG
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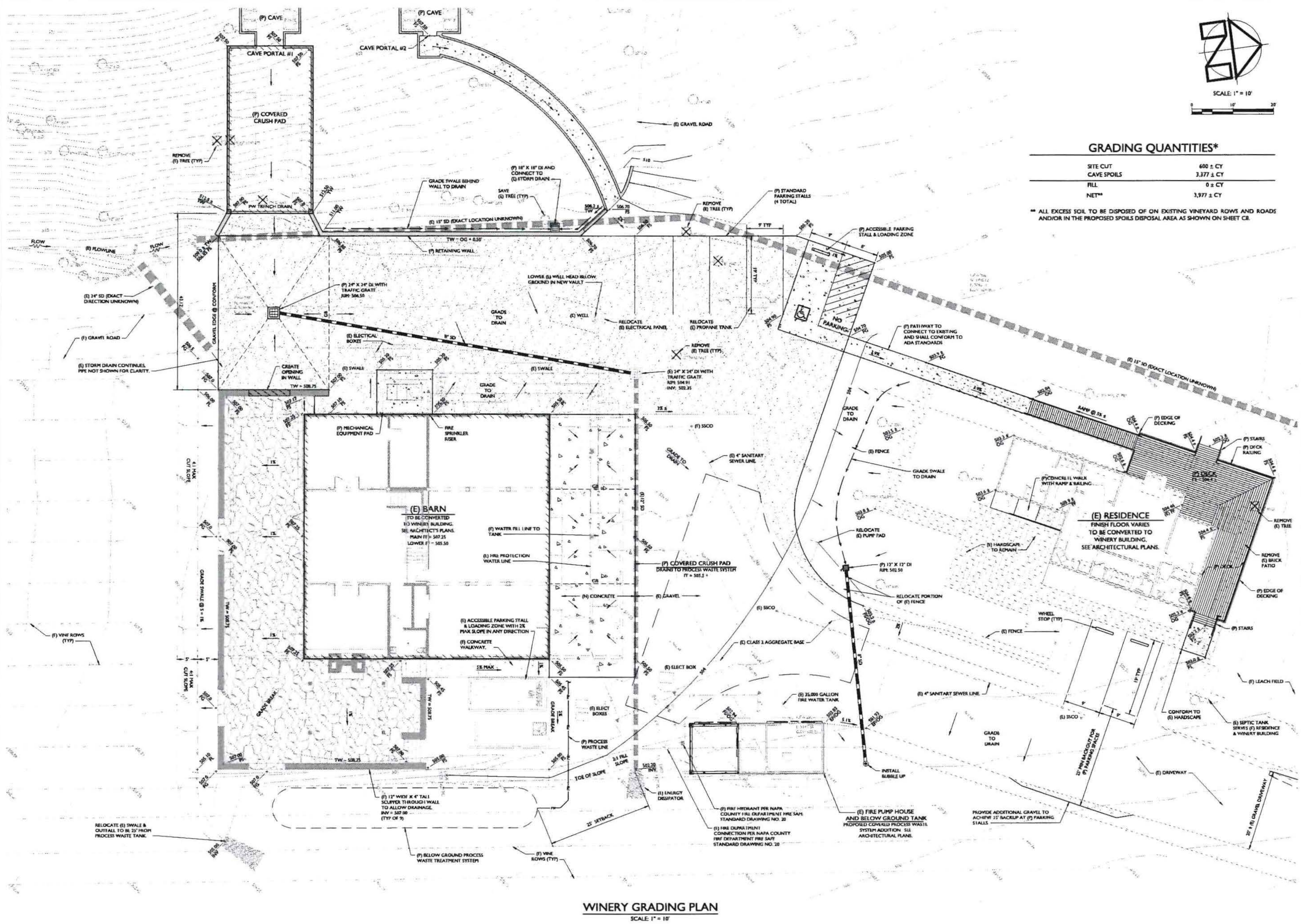
SHEET NUMBER:
C6 OF 9



GRADING QUANTITIES*

SITE CUT	600 ± CY
CAVE SPOILS	3,377 ± CY
FILL	0 ± CY
NET**	3,977 ± CY

** ALL EXCESS SOIL TO BE DISPOSED OF ON EXISTING VINEYARD ROWS AND ROADS AND/OR IN THE PROPOSED SPOILS DISPOSAL AREA AS SHOWN ON SHEET C8.

WINERY GRADING PLAN

SCALE: 1" = 10'

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WINERY GRADING PLAN

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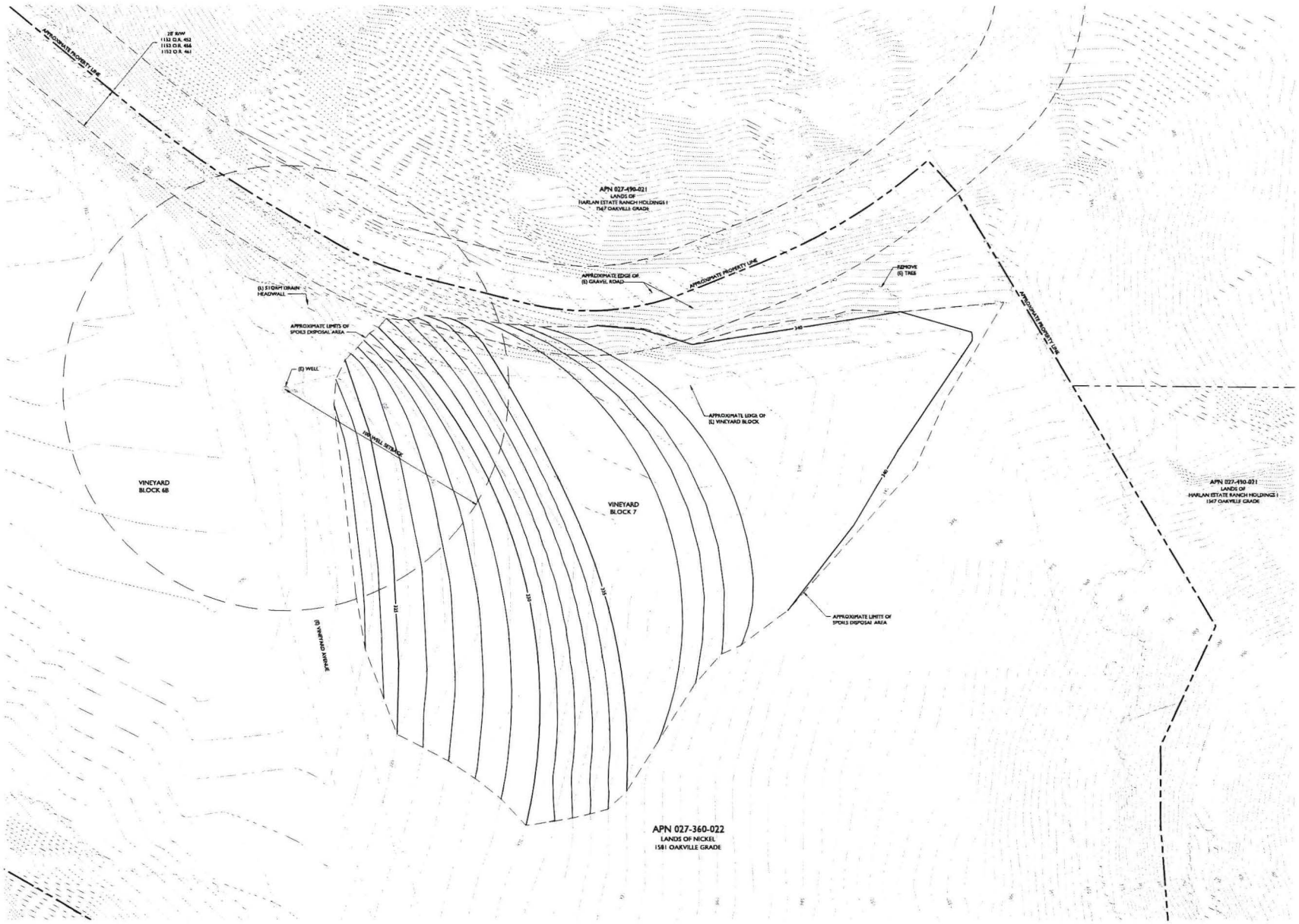
ORIGINAL SIZE: 24" X 36"

SHEET NUMBER: C7 OF 9



SPOILS DISPOSAL AREA
SCALE: 1" = 20'

SCALE: 1" = 20'
0 20' 40'

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SPOILS DISPOSAL AREA

PREPARED UNDER THE DIRECTION OF:

REGISTERED PROFESSIONAL ENGINEER
MICHAEL R. MOHLER
No. 47523
12/31/2018
CIVIL
STATE OF CALIFORNIA

NOT FOR CONSTRUCTION

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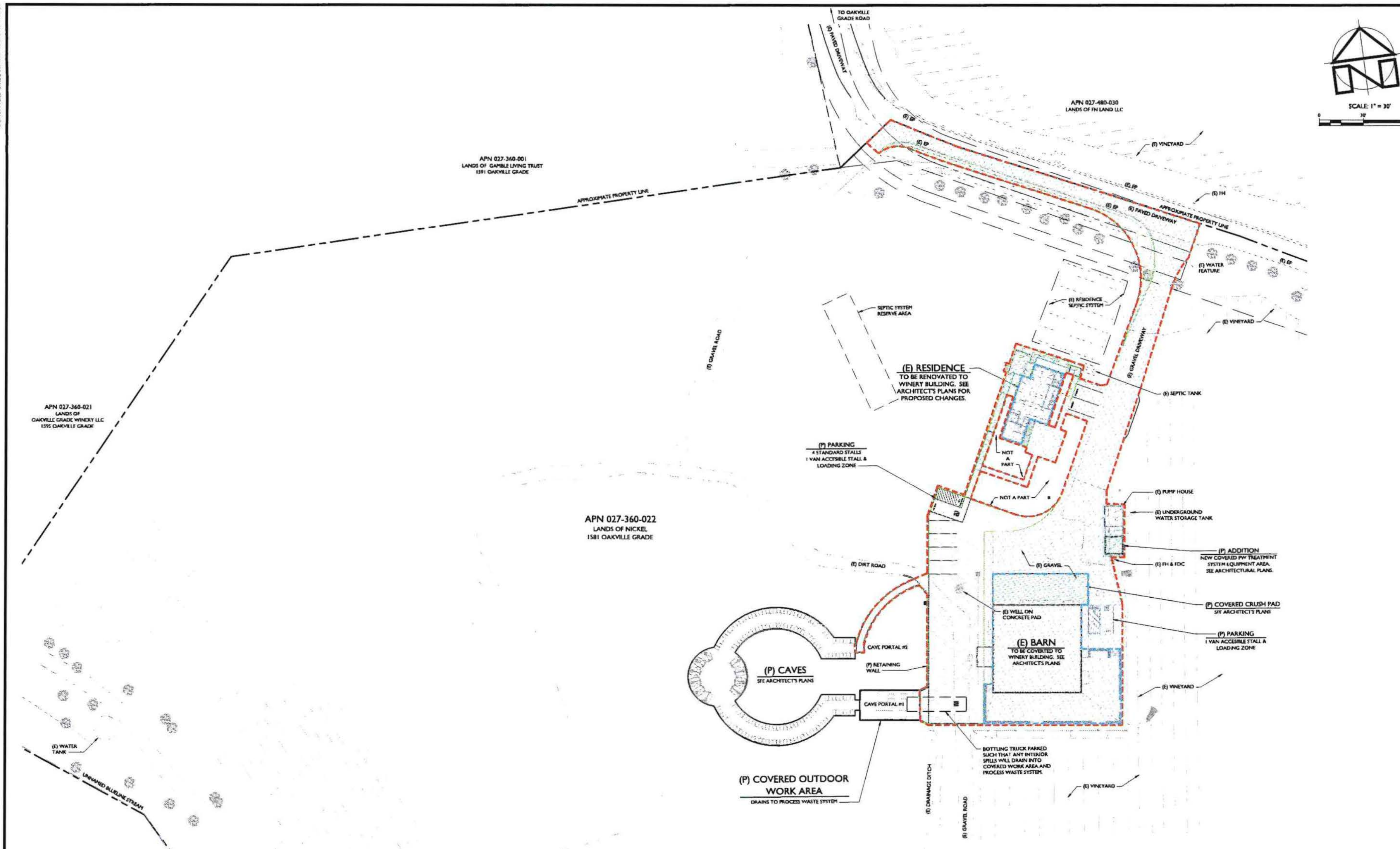
DATE: DECEMBER 21, 2018
REVISIONS: BY:

JOB NUMBER: 10-130
FILE: 10-130CONC_SPOILS.DWG
ORIGINAL SIZE: 24" X 36"
SHEET NUMBER: C8
OF 9



IMPERVIOUS SURFACE SUMMARY

	PRE-PROJECT AREA (SF)	NEW AREA (SF)	RECONSTRUCTED AREA (SF) A*	RECONSTRUCTED AREA (SF) B**	TOTAL NEW AND RECONSTRUCTED AREA (SF)
IMPERVIOUS AREAS	23,100	9,600	2,165	0	11,765

*RECONSTRUCTED AREAS (A) ARE EXISTING IMPERVIOUS SURFACES THAT ARE BEING REPLACED WITH NEW IMPERVIOUS SURFACES.

**RECONSTRUCTED AREAS (B) ARE EXISTING IMPERVIOUS SURFACES THAT ARE BEING COMPLETELY REMOVED AND ARE NOT BEING REPLACED WITH NEW IMPERVIOUS SURFACES.

9,000 ± SF — WINERY DEVELOPMENT AREA

32,322 ± SF — WINERY COVERAGE AREA

IMPERVIOUS SURFACE EXHIBIT

SCALE: 1" = 30'

APPLIED
INCORPORATED
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www.appliedcivil.com

THE VINEYARD HOUSE WINERY

USE PERMIT CONCEPTUAL SITE IMPROVEMENT PLANS

IMPERVIOUS SURFACE EXHIBIT

PREPARED UNDER THE DIRECTION OF:

REGISTERED PROFESSIONAL ENGINEER MICHAEL R. MUELRATH No. 67435 Exp. 12/31/2018 12/21/2018 CIVIL STATE OF CALIFORNIA — FOR USE PERMIT REVIEW ONLY NOT FOR CONSTRUCTION

DRAWN BY: SMI

CHECKED BY: MRM

DATE: DECEMBER 21, 2018

REVISIONS: BY:

JOB NUMBER: 10-130

FILE: 10-130CONC_ISE.DWG

ORIGINAL SIZE: 24" X 36"

SHEET NUMBER: C9 OF 9

APPENDIX 3: Water Storage Tank Water Balance Calculations

Irrigation Storage Tank Water Balance

Month	Beginning Balance	Process Wastewater	Land Application Capacity	Ending Balance
January	0	6,000	21,722	0
February	0	6,000	21,722	0
March	0	6,000	21,722	0
April	0	4,800	21,722	0
May	0	4,800	16,244	0
June	0	6,000	40,611	0
July	0	12,000	40,611	0
August	0	12,000	24,366	0
September	0	19,200	24,366	0
October	0	30,000	37,966	0
November	0	7,200	21,722	0
December	0	6,000	21,722	0
		120,000	314,496	

Notes:

1. All values shown above for beginning balance, inflow, outflow and ending balance are in units of gallons.
2. See attached tables for detailed explanation of process wastewater and irrigation data presented in this table.
3. This water balance is based on the assumption that the tank is empy in August, just prior to crush.
4. This table is intended to illustrate waste disposal capability only. Where irrigation demand exceeds availble treated wastewater availability additional irrigation water will be provided by another source.

Winery Process Wastewater Generation Analysis

Annual Wine Production	20,000 gallons
Wastewater Generation Rate	6 gallons per gallon of wine
Annual Wasewater Generation	120,000 gallons
Crush Season Length	30 days
Wastewater Generated During Crush	1.5 gallons per gallon of wine
Peak Wastewater Generation Rate	1,000 gallons per day

Winery Process Wastewater Generation Table			
Month	Percentage of Annual Total	Monthy Flow (gallons)	Average Flow (gpd)
January	5.0%	6,000	194
February	5.0%	6,000	214
March	5.0%	6,000	194
April	4.0%	4,800	160
May	4.0%	4,800	155
June	5.0%	6,000	200
July	10.0%	12,000	387
August	10.0%	12,000	387
September	16.0%	19,200	640
October	25.0%	30,000	968
November	6.0%	7,200	240
December	5.0%	6,000	194
Total	100.0%	120,000	

Notes:

1. Wastewater generation rates and monthly proportioning are based on our past experience with similar projects.

Irrigation Schedule Analsysis

Vineyard Information:

Total acres of vines	1 acre
Vine Row Spacing (approx)	8 feet
Vine Spacing (approx)	6 feet
Vine density	908 vines per acre (estimated)
Total Vine Count	908 vines

Irrigation Information:

Seasonal Irrigation[1] 179.0 gallons per vine (May through October)

Non-Irrigation Application 0.8 inches October through April

Irrigation Schedule					
Month	Monthly Percentage[2]	Irrigation per Vine (gallons)	Irrigation (gallons)	Non-Seasonal Irrigation Application (gallons)	Total (gallons)
January		0.0	0	21,722	21,722
February		0.0	0	21,722	21,722
March		0.0	0	21,722	21,722
April		0.0	0	21,722	21,722
May	10%	17.9	16,244	0	16,244
June	25%	44.8	40,611	0	40,611
July	25%	44.8	40,611	0	40,611
August	15%	26.9	24,366	0	24,366
September	15%	26.9	24,366	0	24,366
October	10%	17.9	16,244	21,722	37,966
November		0.0	0	21,722	21,722
December		0.0	0	21,722	21,722
Total	100%	179.0	162,443	152,053	314,496

Notes:

1. Irrigation per vine is based on 0.5 acre-feet per acre of vines per WAA Guidelines.
2. Monthly vineyard irrigation percentages are based on our past experience with projects of this type.
3. Non-Irrigation Application is for managing tank levels and assumes a maximum of 5 operational days per month based on historic weather data (Summit Engineering NBRID Capacity Study, 1996) and a saturated soil infiltration rate of 0.1 gallons per square foot per day uniformly over the entire area.