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Wastewater Feasibility Study

Dakota Shy Winery, Use Permit Major Modification
Application No. P19-00131-MOD
Planning Commission Hearing, February 17, 2021

July 2019 - Revised
Job No. 14-02

BARTELT ENGINEERING

ONSITE WASTEWATER DISPERSAL FEASIBILITY STUDY FOR DAKOTA SHY WINERY 771 SAGE CANYON ROAD, NAPA COUNTY, CA APN 030-120-024

As required by Napa County Planning, Building & Environmental Services (PBES), this study outlines the feasibility of providing onsite wastewater dispersal for an existing winery located at 771 Sage Canyon Road, Napa County, CA.

PROJECT DESCRIPTION

It is our understanding that Dakota Shy Winery is proposing to increase both the wine production limit from 14,000 gallons per year to 20,000 gallons per year and the number of private tours and tasting visitors from 20 per day to 48 per day. The approved marketing plan events are also being proposed to be modified at this time. The Applicant intends to add one (1) Large Event at the winery per year for 125 guests. Refer to Use Permit #P14-00335-UP and #P14-00336-VAR for additional information on approved uses. The project further proposes to keep an existing olive orchard that was approved under #P14-00335-UP to be removed and replaced with vineyard. This feasibility study evaluates onsite wastewater dispersal per Napa County PBES guidelines.

Table 1 summarizes the approved and proposed staffing plan:

TABLE 1: STAFFING PLAN SUMMARY

Description	Number of Employees	
	Approved	Proposed
Full-time Employees	6	7
Part-time Employees	2	0
Harvest/Seasonal Employees	2	3

Table 2 summarizes the approved and proposed marketing plan:

TABLE 2: MARKETING PLAN SUMMARY

Description	Number of Guests		Event Staff	Frequency
	Approved	Proposed		
Tour & Tasting Visitors	20 per day	48 per day	0 per day	Daily
Wine Club / Release Events	40 per day	40 per event	3 per event	2 per year
Large Event	N/A	125 per event	6 per event	1 per year

CIVIL ENGINEERING • LAND PLANNING
1303 Jefferson Street, 200 B, Napa, CA 94559
www.barteltengineering.com Tel: 707-258-1301 Fax: 707-258-2926

As part of our services, representatives from Bartelt Engineering have reviewed the operational methods for the winery with our Client, reviewed the parcel files at Napa County PBES, held conversations with Napa County PBES staff, performed a reconnaissance of the site to view existing conditions and conducted a site evaluation on June 30, 2014 to evaluate the feasibility of installing and/or expanding an onsite wastewater dispersal system.

This study and the associated Use Permit Modification Drawings prepared by Bartelt Engineering are provided to demonstrate that the proposed improvements to the existing process wastewater and sanitary wastewater systems can feasibly be developed and that all wastewater can adequately be dispersed onsite.

WASTEWATER ANALYSIS

Process Wastewater Flow

The winery facility's production wastewater (PW) flow rates for harvest and non-harvest seasons can be calculated as follows:

Harvest Peak Winery PW Flow:

20,000 gallons of wine/year x 1.5 gallons of water/gallon of wine ÷ 30 days harvest =

Harvest Peak Winery PW Flow = 1,000 gallons per day (gpd)

Non-Harvest Peak Winery PW Flow:

20,000 gallons of wine/year x 4.5 gallons of water/gallon of wine ÷ 335 days non-harvest =

Non-Harvest Peak Winery PW Flow = 269 gpd

Sanitary Wastewater Flow

Sanitary wastewater (SW) generated at the winery production facility, offices and tasting room including full-time employees, seasonal (harvest) employees, event staff, and guests can be itemized as follows:

Employees:

- 7 Full-Time Employees x 15 gpd per employee = 105 gpd
- 3 Harvest Season x 15 gpd per employee = 45 gpd

Guests[1]:

- Tour and Tasting Visitors:
  - (48 guests per day) x (3 gpd per guest) = 144 gpd per day
- Wine Club / Release Events:
  - (40 guests per event) x (3 gpd per guest) = 120 gpd per event
  - (3 event staff) x (15 gpd per event staff) = 45 gpd per event
- Large Events:
  - (125 guests per event) x (3 gpd per guest) x (60% usage rate) = 225 gpd per event
  - (6 event staff) x (15 gpd per event staff) = 90 gpd per event

> ***Note:*** *This feasibility study assumes that portable toilets are also utilized for events regardless of the season.*

Total Harvest Season and Non-Harvest Season Peak Sanitary Wastewater Flow

The total proposed harvest season peak SW flow is the combination of the winery production facility SW flows during the months of September through October (harvest). The total proposed non-harvest season peak SW flow is the combination of the winery production facility SW flows during the months of November through August (non-harvest).

Table 3 uses the marketing schedule to calculate the SW flows generated by employees and guests during daily event sequences in harvest and non-harvest seasons. SW flows in the same column indicate the events may occur on the same day.

TABLE 3: HARVEST AND NON-HARVEST SEASON DAILY SANITARY WASTEWATER FLOWS

	Daily Occurrence					
	Harvest			Non-Harvest		
Employees	150	150	150	105	105	105
Tours and Tastings	144	-		144	-	-
Wine Club / Release Event	-	165		-	165	-
Large Event	-	-	315	-	-	315
Total Flow (gpd)	194	315	465	249	270	420

Table 3 shows that the greatest SW flow during the harvest and non-harvest seasons is generated during a Large Event hosted at the winery.

[1] Wastewater generation rate is 3 gpd for restroom use per Napa County Planning, Building and Environmental Services Regulations.

Design Wastewater Flows

The greatest practical harvest and non-harvest season peak sanitary wastewater flow is summarized in the following table:

TABLE 4: HARVEST AND NON-HARVEST SEASON PEAK DAILY FLOW SUMMARY

Wastewater Source	Harvest (gpd)	Non-Harvest (gpd)
Process Wastewater	1,000	269
Sanitary Wastewater	465	420
Combined Wastewater	1,465	689

EXISTING COMBINED WASTEWATER SYSTEM EVALUATION

The proposed improvements to the existing combined wastewater (CW) system is discussed further in the following sections. Refer to the associated Use Permit Modification Drawings for location of the existing primary and replacement dispersal areas.

Existing Wastewater Tanks

The existing combined process wastewater and sanitary wastewater system that currently serves the Winery Building includes the following components:

- Two (2) 1,500 gallons septic tanks for PW flows
- One (1) 1,500 gallons septic tank for SW flows
- One (1) 2,000 gallons dose tank for CW flows
- Pressure distribution (PD) leachfield (720 lineal feet (ft) total) for CW flows

The following table summarized the existing components of the SW treatment system and the estimated peak flow from the corresponding building:

TABLE 5: SANITARY WASTEWATER TREATMENT TANK SUMMARY

Septic Tank Wastewater Source	Peak Flow (gpd)	Existing Tank Capacity (gallons)	Minimum Recommended Retention Time (days)	Calculated Retention Time (days)
Process Wastewater	1,000	3,000	3	3
Sanitary Wastewater	465	1,500	3	3.2
Dosing Tank[2]	1,465	2,000	1	1.3

[2] Existing dosing tank includes a duplex pumping system.

As demonstrated in the above table, the recommended hydraulic retention time is achieved with the proposed increase in wastewater flows for the existing treatment tanks. Additional treatment tanks are not proposed at this time.

Existing PD Leachfield Evaluation

The existing PD leachfield is installed in the vicinity of test pits #1, #2, and #3 from the site evaluation performed by Bartelt Engineering on June 30, 2014 (see attached). The soil in this area was determined to be Loam (L). Napa County recommends a soil hydraulic loading rate of 0.8 gal/sf/day for L soil when using septic tank effluent (STE)[3].

The existing PD leachfield includes 12 lateral trenches each 60 feet in length. The total installed PD lateral length is 720 lineal feet (lf). Each trench is 18 inches wide and has a total trench depth of 36 inches. The sidewall depth to the top of the distribution lateral is 18 inches. The installed trench section has a total sidewall area of 3 square feet. The total PD leachfield dispersal capacity is calculated below:

Existing PD Leachfield Capacity = (total lineal feet) x (sidewall area) x (hydraulic loading rate)

= 720 lf x 3.0 sf/lf x 0.8 gal/sf/day = 1,728 gpd

Proposed Peak CW Flow = 1,465 gpd

Since the existing capacity of the PD leachfield of 1,728 gpd is greater than the proposed peak CW of 1,465 gpd an expansion of the existing wastewater system is not being proposed at this time.

OPERATION AND MAINTENANCE

Per Napa County PBES requirements, the CW dispersal system is classified as an Alternative Sewage Treatment Systems (ASTS) and therefore will continue to be maintained by a Service Provider.

SUMMARY & CONCLUSIONS

Process wastewater and sanitary wastewater generated from the existing winery building is anticipated to increase as a result of the proposed changes to the wine production limit and private tour and tasting visitation. This study demonstrates that all wastewater generated from the proposed project can feasibly be treated and dispersed onsite per Napa County PBES requirements. Expansion of the existing wastewater system is not being proposed at this time because existing infrastructure is adequately sized to treat and disperse the proposed increase in wastewater flows.

[3] Soil application rate is 0.80 gal/sf/day and 1.0 gal/sf/day for septic tank effluent (STE) and pretreated effluent (PTE) alternative sewage treatment systems, respectively.

ATTACHMENTS

Site Evaluation Report dated June 30, 2014

REFERENCES

California Onsite Wastewater Association (COWA). "Pumping and Pressure Distribution Systems." May 1998.

Geoflow, Inc. Wastewater Design, Installation and Maintenance Guidelines. v1, 2007.

Napa County Department of Environmental Management. "Design, Construction and Installation of Alternative Sewage Treatment Systems." April 12, 2010.

Telsco Industries. "Turf Irrigation Manual." By James A. Watkins. 1987.

U.S. Department of Health, Education and Welfare, Public Health Service Publication. Manual of Septic-Tank Practice. 1967.

U.S. Environmental Protection Agency. "Onsite Wastewater Treatment Systems Manual." February 2002.

Napa County Planning, Building and Environmental Services, “Napa County Onsite Wastewater Treatment Systems (OWTS) Technical Standards.” Final Draft.

Orenco Systems, Incorprated. “AdvanTex Design Criteria for Commercial Treatment Systems”. Rev.1.6. January 2016.

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 #: E14-00351
APN: 030-120-024
(County Use Only) Reviewed by: Date:

PLEASE PRINT OR TYPE ALL INFORMATION

Property Owner DS Property, LLC	☒ New Construction ☐ Addition ☒ Remodel ☐ Relocation ☐ Other:
Property Owner Mailing Address 555 Kansas Avenue, Suite 101	☐ Residential - # of Bedrooms: Design Flow : gpd
City State Zip Topeka, KS 66603	☒ Commercial – Type: Winery Sanitary Waste: 750 gpd Process Waste: 700 gpd
Site Address/Location 771 Sage Canyon Road, St. Helena, CA	☐ Other: Sanitary Waste: gpd Process Waste: gpd

Evaluation Conducted By:

Company Name Bartelt Engineering	Evaluator's Name Paul N. Bartelt, P.E.	Signature (Civil Engineer, R.E.H.S., Geologist, Soil Scientist)
Mailing Address: 1303 Jefferson Street, 200 B		Telephone Number (707) 258-1301
City State Zip Napa CA 94559		Date Evaluation Conducted June 30, 2014

Primary Area See below	Expansion Area See below
Acceptable Soil Depth: 86, 90 & 93 in. Test pits #: 1, 2 & 3	Acceptable Soil Depth: 84 & 88 in. Test pits # 4, 5 & 6:
Soil Application Rate (gal. /sq. ft. /day): STE 0.8, PTE 1.0	Soil Application Rate (gal. /sq. ft. /day): STE 0.6, PTE 0.75, Drip 0.6
System Type(s) Recommended: Pressure Distribution System	System Type(s) Recommended: Pressure Distribution System, Subsurface Drip
Slope: 0% to 1%. Distance to nearest water source: 100+ feet	Slope: 0% to 2%. Distance to nearest water source: 100+ feet
Hydrometer test performed? No ☐ Yes ☒ (attach results)	Hydrometer test performed? No ☐ Yes ☒ (attach results)
Bulk Density test performed? No ☒ Yes ☐ (attach results)	Bulk Density test performed? No ☒ Yes ☐ (attach results)
Groundwater Monitoring Performed? No ☒ Yes ☐ (attach results)	Groundwater Monitoring Performed? No ☒ Yes ☐ (attach results)

Site constraints/Recommendations:

A site evaluation was conducted on June 30, 2014 by Paul Bartelt, Michael Grimes, Rich Paxton and Nick Warnock of Bartelt Engineering. Test pits were excavated by Harold Smith & Son, Inc. Kim Withrow of Napa County Environmental Health visited the site to inspect soil conditions. Test pits #1 - 5 showed suitable soil for the installation of an Alternative Sewage Treatment System (ASTS) Pressure Distribution System (PD) dispersal field within the area tested with required reserve area. Test Pit #6 showed suitable soil for subsurface drip 200% reserve area for existing residential septic field.

Test Pit # 1 * Hydrometer Test Performed

Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure	Consistence			Pores	Roots	Mottling
					Side Wall	Ped	Wet			
0-86		0-15	L	SSB	H	F	S	MF/FM/ MVF	FF/FM	None

Slope = 1%. Acceptable soil depth observed: 86 inches.
Assigned soil application rate = STE 0.33 gal/sf/day for a Conventional – Standard System
STE 0.8 gal/sf/day for ASTS
PTE 1.0 gal/sf/day for ASTS
Subsurface Drip = 0.7 gal/sf/day

No groundwater observed. *See attached Soil Texture Analysis by Bouyoucos Hydrometry Method prepared by RGH Consultants, Inc. dated July 16, 2014.

Test Pit # 2 * Hydrometer Test Performed

Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure	Consistence			Pores	Roots	Mottling
					Side Wall	Ped	Wet			
0-90		0-15	L	SSB	SH	FRB	S	MF/CVF	CVF/CF	None

Slope = 1%. Acceptable soil depth observed: 90 inches.
Assigned soil application rate = STE 0.33 gal/sf/day for a Conventional – Standard System
STE 0.8 gal/sf/day for ASTS
PTE 1.0 gal/sf/day for ASTS
Subsurface Drip = 0.7 gal/sf/day

No groundwater observed. *See attached Soil Texture Analysis by Bouyoucos Hydrometry Method prepared by RGH Consultants, Inc. dated July 16, 2014.

Test Pit # 3 * Hydrometer Test Performed

Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure	Consistence			Pores	Roots	Mottling
					Side Wall	Ped	Wet			
0-93		0-15	L	SSB	SH	FRB	S	MVF/FF	CF/ FM/FF	None

Slope = 1%. Acceptable soil depth observed: 93 inches.
Assigned soil application rate = STE 0.33 gal/sf/day for a Conventional – Standard System
STE 0.8 gal/sf/day for ASTS
PTE 1.0 gal/sf/day for ASTS
Subsurface Drip = 0.7 gal/sf/day

No groundwater observed. *See attached Soil Texture Analysis by Bouyoucos Hydrometry Method prepared by RGH Consultants, Inc. dated July 16, 2014.

Test Pit # 4 * Hydrometer Test Performed

Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure	Consistence			Pores	Roots	Mottling
					Side Wall	Ped	Wet			
0-84		0-15	L	SSB	SH	FRB	SS	MVF/FF	CF/FVF/ FM/FC	None

Slope = 1.7%. Acceptable soil depth observed: 84 inches.
Assigned soil application rate = STE 0.33 gal/sf/day for a Conventional – Standard System
STE 0.8 gal/sf/day for ASTS
PTE 1.0 gal/sf/day for ASTS
Subsurface Drip = 0.7 gal/sf/day

No groundwater observed. *See attached Soil Texture Analysis by Bouyoucos Hydrometry Method prepared by RGH Consultants, Inc. dated July 16, 2014.

Test Pit # 5 * Hydrometer Test Performed

Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure	Consistence			Pores	Roots	Mottling
					Side Wall	Ped	Wet			
0-84		0-15	CL	SSB	SH	FRB	SS	CVF/FF	FVF/FF	None

Slope = 1.7%. Acceptable soil depth observed: 84 inches.
Assigned soil application rate = STE 0.33 gal/sf/day for a Conventional – Standard System
STE 0.6 gal/sf/day for ASTS
PTE 0.75 gal/sf/day for ASTS
Subsurface Drip = 0.6 gal/sf/day

No groundwater observed. *See attached Soil Texture Analysis by Bouyoucos Hydrometry Method prepared by RGH Consultants, Inc. dated July 16, 2014.

Test Pit # 6 * Hydrometer Test Performed

Horizon Depth (Inches)	Boundary	%Rock	Texture	Structure	Consistence			Pores	Roots	Mottling
					Side Wall	Ped	Wet			
0-88		0-15	CL	SSB	SH	FRB	S	MVF/FF	CF/FM/ FF	None

Slope = 2%. Acceptable soil depth observed: 88 inches.
Assigned soil application rate = STE 0.33 gal/sf/day for a Conventional – Standard System
STE 0.6 gal/sf/day for ASTS
PTE 0.75 gal/sf/day for ASTS
Subsurface Drip = 0.6 gal/sf/day

No groundwater observed. *See attached Soil Texture Analysis by Bouyoucos Hydrometry Method prepared by RGH Consultants, Inc. dated July 16, 2014.

Table of Abbreviations

Boundary	Texture	Structure	Consistence			Pores	Roots	Mottling
			Side Wall	Ped	Wet			
A=Abrupt <1” **C**=Clear 1”-2.5” **G**=Gradual 2.5”-5” **D**=Difuse >5”	**S**=Sand **LS=**Loamy Sand **SL**=Sandy Loam **SCL**=Sandy Clay Loam **SC**=Sandy Clay **CL**=Clay Loam **L**=Loam **C**=Clay **SiC**=Silty Clay **SiCL**=Silty Clay Loam **SiL**=Silt Loam Si=Silt	**W**=Weak **M**=Moderate **S**=Strong _____ **G**=Granular **PL**=Platy **Pr**=Prismatic **C**=Columnar **AB**=Angular Blocky **SB**=Subangular Blocky _____ **M**=Massive **C**=Cemented	**L**=Loose **S**=Soft **SH**=Slighty Hard **H**=Hard **VH**=Very Hard **ExH**=Extremely Hard	**L**=Loose **VFRB**=Very Friable **FRB**=Friable **F**=Firm **VF**=Very Firm **ExF**=Extremely Firm	**NS**=NonSticky **SS**=Slightly Sticky **S**=Sticky **VS**=Very Sticky _____ **NP**=NonPlastic **SP**=Slightly Plastic **P**=Plastic **VP**=Very Plastic	**Quantity:** **F**=Few **C**=Common **M**=Many **Size:** **VF**=Very Fine **F**=Fine **M**=Medium **C**=Coarse	**Quantity:** **F**=Few **C**=Common **M**=Many **Size:** **VF**=Very Fine **F**=Fine **M**=Medium **C**=Coarse **VC**=Very Course	**Quantity:** **F**=Few **C**=Common **M**=Many **Size:** **F**=Fine **M**=Medium **C**=Coarse **VC**=Very Course **ExC**=Extremely Coarse **Contrast:** **Ft**=Faint **D**=Distinct **P**=Prominent

Attach additional sheets as needed

Alternative Sewage Treatment System Soil Application Rates

TEXTURE	STRUCTURE		APPLICATION RATE (Gal/ft^2 /day)	
	Shape	Grade	STE[1]	PTE[1,2]
Coarse Sand, Sand, Loamy Coarse Sand	Single grain	Structureless	1.0	1.2
Fine Sand, Loamy Fine Sand	Single grain	Structureless	0.6	1.0
Sandy Loam, Loamy Sand	Massive	Structureless	0.35	0.5
	Platy	Weak	0.35	0.5
	Prismatic, blocky, granular	Weak	0.5	0.75
		Moderate, Strong	0.8	1.0
Loam, Silt Loam, Sandy Clay Loam, Fine Sandy Loam	Massive	Structureless		
	Platy	Weak, moderate, strong		
	Prismatic, blocky, granular	Weak, moderate	0.5	0.75
		Strong	0.8	1.0
Sandy Clay, Silty Clay Loam, Clay Loam	Massive	Structureless		
	Platy	Weak, moderate, strong		
	Prismatic, blocky, granular	Weak, moderate	0.35	0.5
		Strong	0.6	0.75
Clay, Silty Clay	Massive	Structureless		
	Platy	Weak, moderate, strong		
	Prismatic, blocky, granular	Weak		
		Moderate, strong	0.2	0.25

1. See Table 1 in the Design, Construction and Installation of Alternative Sewage Treatment Systems.
2. A higher application rate for pretreated effluent may only be used when pretreatment is not used for one foot of vertical separation credit.

MINIMUM SURFACE AREA GUIDELINES TO DISPOSE OF 100 GPD OF SECONDARY TREATED EFFLUENT FOR SUBSURFACE DRIP DISPERSAL SYSTEMS

		Soil Absorption Rates		Design Application Rate (Gal/ft^2/day)	Total Area Required Sq. ft./100 gallons per day
Soil Class	Soil Type	Est. Soil Perc. Rate minutes/inch	Hydraulic Conductivity inches/hour		
I	Coarse sand	1 – 5	>2	1.400	71.5
I	Fine sand	5 – 10	1.5 – 2	1.200	83.3
II	Sandy loam	10 – 20	1.0 – 1.5	1.000	100.0
II	Loam	20 – 30	0.75 – 1.0	0.700	143.0
III	Clay loam	30 – 45	0.5 – 0.75	0.600	167.0
III	Silt - clay loam	45 – 60	0.3 – 0.5	0.400	250.0
IV	Clay non-swell	60 – 90	0.2 – 0.3	0.200	500.0
IV	Clay - swell	90 – 120	0.1 – 0.2	0.100	1000.0

1. For design purpose, the “Soil Type” category to be used in the above table shall be based on the most restrictive soil type encountered within two feet below the bottom of the drip line.
2. Dispersal field area calculation: Total square feet area of dispersal field = Design flow divided by loading rate.

Conventional Sewage Treatment System Soil Application Rates

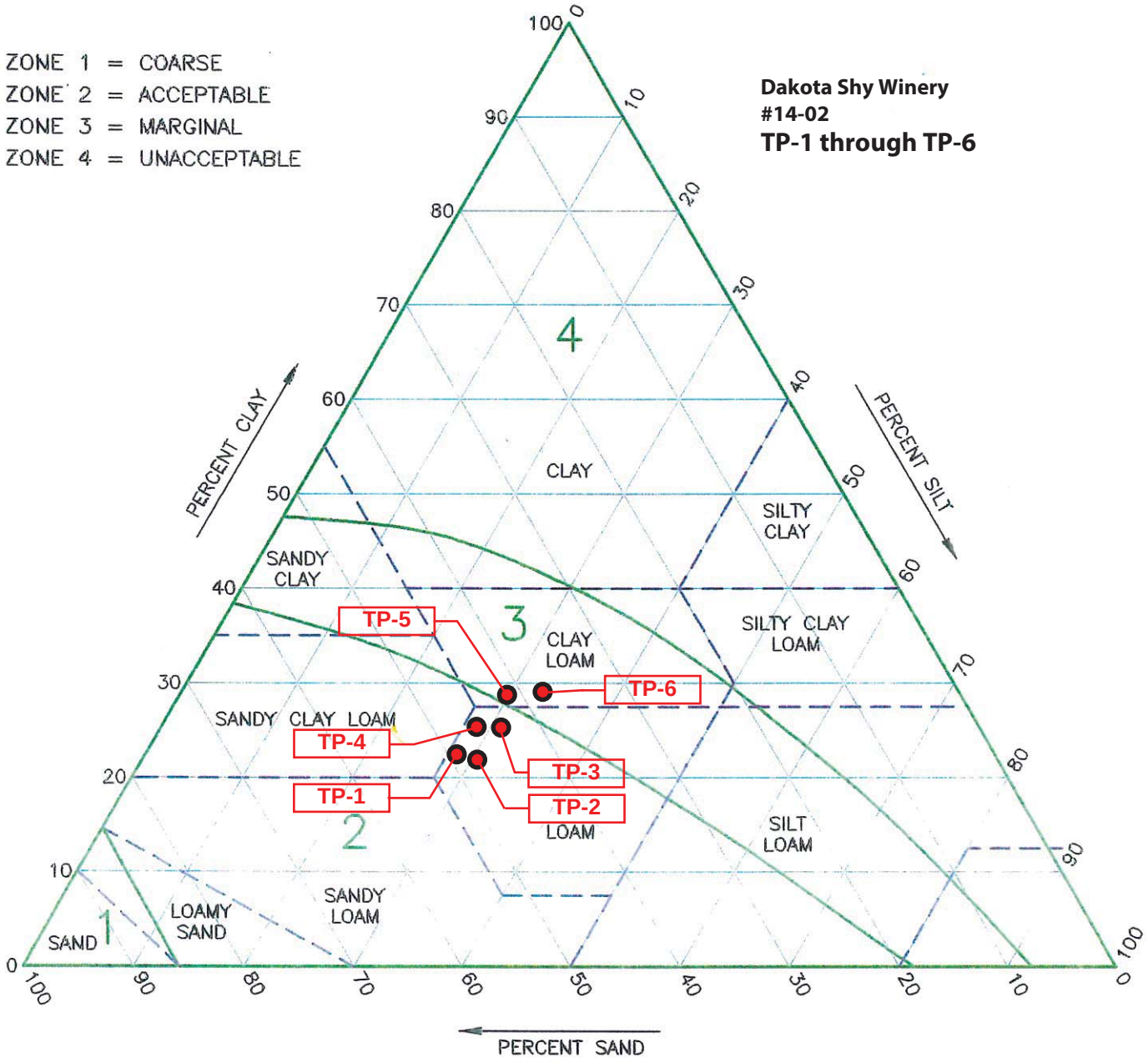
TEXTURE	STRUCTURE		APPLICATION RATE (Gal/ft^2 /day)
	Shape	Grade	STE
Coarse Sand, Sand, Loamy Coarse Sand	Single grain	Structureless	Prohibited
Sandy Loam, Loamy Sand	Massive	Structureless	Prohibited
	Platy	Weak, mod, strong	Prohibited
	Prismatic, blocky, granular	Weak	0.33
		Moderate, strong	0.5
Loam, Silt Loam, Sandy Clay Loam, Fine Sandy Loam	Massive	Structureless	Prohibited
	Platy	Weak, mod, strong	Prohibited
	Prismatic, blocky, granular	Weak	0.25
		Moderate, Strong	0.33
Clay Loam	Massive	Structureless	Prohibited
	Platy	Weak, moderate, strong	Prohibited
	Prismatic, blocky, granular	Weak, moderate	0.25
		Strong	0.33
Sandy Clay, Silty Clay Loam	Massive	Structureless	Prohibited
	Platy	Weak, moderate, strong	Prohibited
	Prismatic, blocky, granular	Weak, moderate	Prohibited
		Strong	0.25
Clay, Silty Clay	Massive	Structureless	Prohibited
	Platy	Weak, moderate, strong	Prohibited
	Prismatic, blocky, granular	Weak	Prohibited
		Moderate, strong	Prohibited

CONVENTIONAL SEWAGE TREATMENT SYSTEM SOIL APPLICATION RATES BASED ON PERCOLATION RATES	
Percolation Rate (mpi)	Application Rate (STE)
< 5 MPI	Prohibited
5 to 10 MPI	0.5
10-20 MPI	0.33
20-60 MPI	0.25
> 60 MPI	Prohibited

SOIL PERCOLATION SUITABILITY CHART

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

Dakota Shy Winery
#14-02
TP-1 through TP-6



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.

RGH CONSULTANTS

Experience is the difference

July 16, 2014
File: 9147.46

Bartelt Engineering
1303 Jefferson Street, Ste. 200B
Napa, CA 94559

Subject: **Laboratory Test Results**
Soil Texture Analysis by
Bouyoucos Hydrometry Method
Dakota Shy Winery
JOB# 14-02

Dear Mr. Bartelt:

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

Size/Density	TP-1
+ #10 Sieve	4.7 %
Sand	46.4 %
Clay	26.6 %
Silt	27.0 %
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

RGH CONSULTANTS

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July 16, 2014
File: 9147.46

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1303 Jefferson Street, Ste. 200B
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Subject: **Laboratory Test Results**
Soil Texture Analysis by
Bouyoucos Hydrometry Method
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JOB# 14-02

Dear Mr. Bartelt:

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

Size/Density	TP-2
+ #10 Sieve	1.7 %
Sand	45.6 %
Clay	25.4 %
Silt	29.0 %
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

RGH CONSULTANTS

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July 16, 2014
File: 9147.46

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Napa, CA 94559

Subject: **Laboratory Test Results**
Soil Texture Analysis by
Bouyoucos Hydrometry Method
Dakota Shy Winery
JOB# 14-02

Dear Mr. Bartelt:

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

Size/Density	TP-3
+ #10 Sieve	2.9 %
Sand	42.6 %
Clay	27.6 %
Silt	29.8 %
Db g/cc	--

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

Yours very truly,

RGH GEOTECHNICAL

George Fotou
Laboratory Manager

Experience is the difference

July 16, 2014
File: 9147.46

Bartelt Engineering
1303 Jefferson Street, Ste. 200B
Napa, CA 94559

Subject: **Laboratory Test Results**
Soil Texture Analysis by
Bouyoucos Hydrometry Method
Dakota Shy Winery
JOB# 14-02

Dear Mr. Bartelt:

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

Size/Density	TP-5
+ #10 Sieve	5.2 %
Sand	41.6 %
Clay	29.4 %
Silt	29.0 %
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

Experience is the difference

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1303 Jefferson Street, Ste. 200B
Napa, CA 94559

Subject: **Laboratory Test Results**
Soil Texture Analysis by
Bouyoucos Hydrometry Method
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JOB# 14-02

Dear Mr. Bartelt:

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

Size/Density	TP-5
+ #10 Sieve	5.2 %
Sand	41.6 %
Clay	29.4 %
Silt	29.0 %
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

Experience is the difference

July 16, 2014
File: 9147.46

Bartelt Engineering
1303 Jefferson Street, Ste. 200B
Napa, CA 94559

Subject: **Laboratory Test Results**
Soil Texture Analysis by
Bouyoucos Hydrometry Method
Dakota Shy Winery
JOB# 14-02

Dear Mr. Bartelt:

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

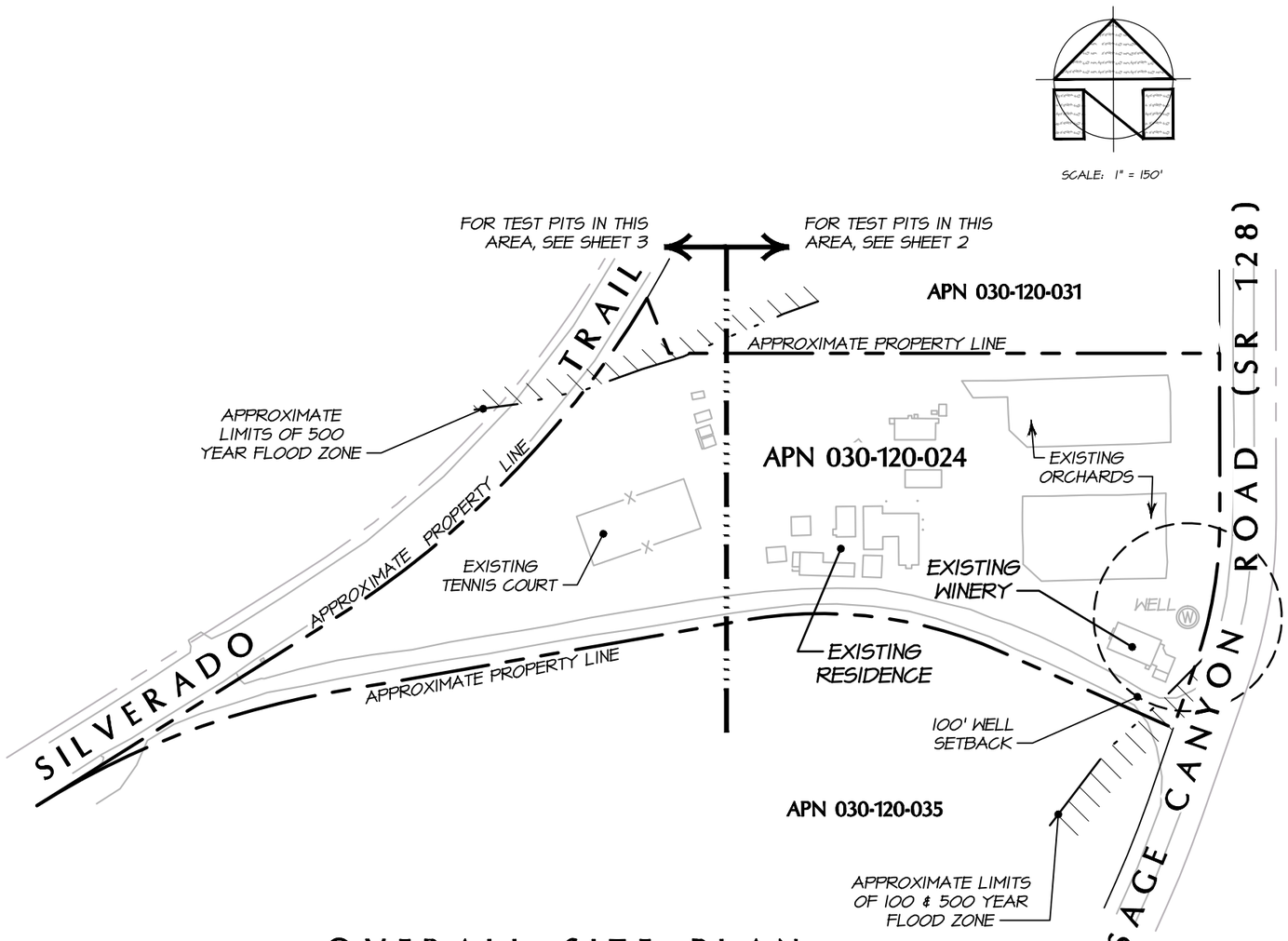
Size/Density	TP-6
+ #10 Sieve	1.9 %
Sand	39.4 %
Clay	29.6 %
Silt	31.0 %
Db g/cc	--

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

Yours very truly,

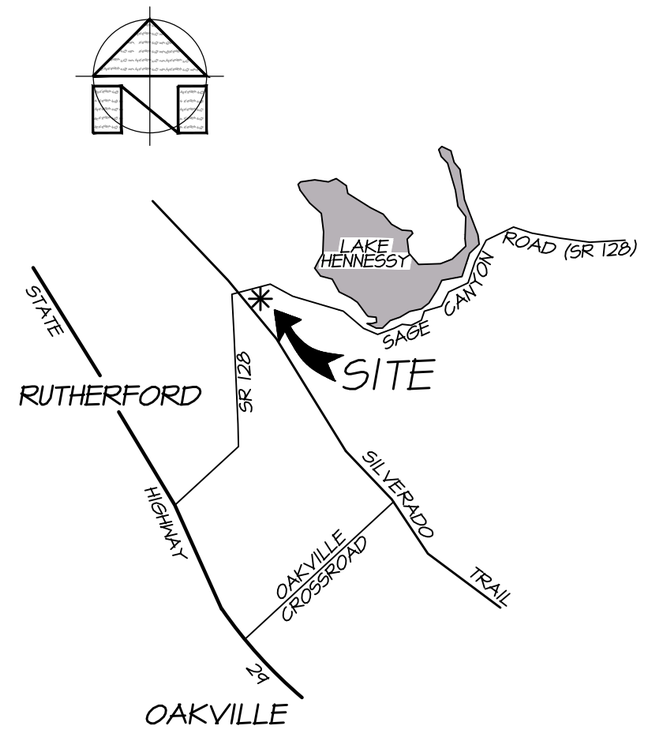
RGH GEOTECHNICAL

George Fotou
Laboratory Manager



OVERALL SITE PLAN
TEST PIT EXHIBIT

SCALE: 1" = 150'

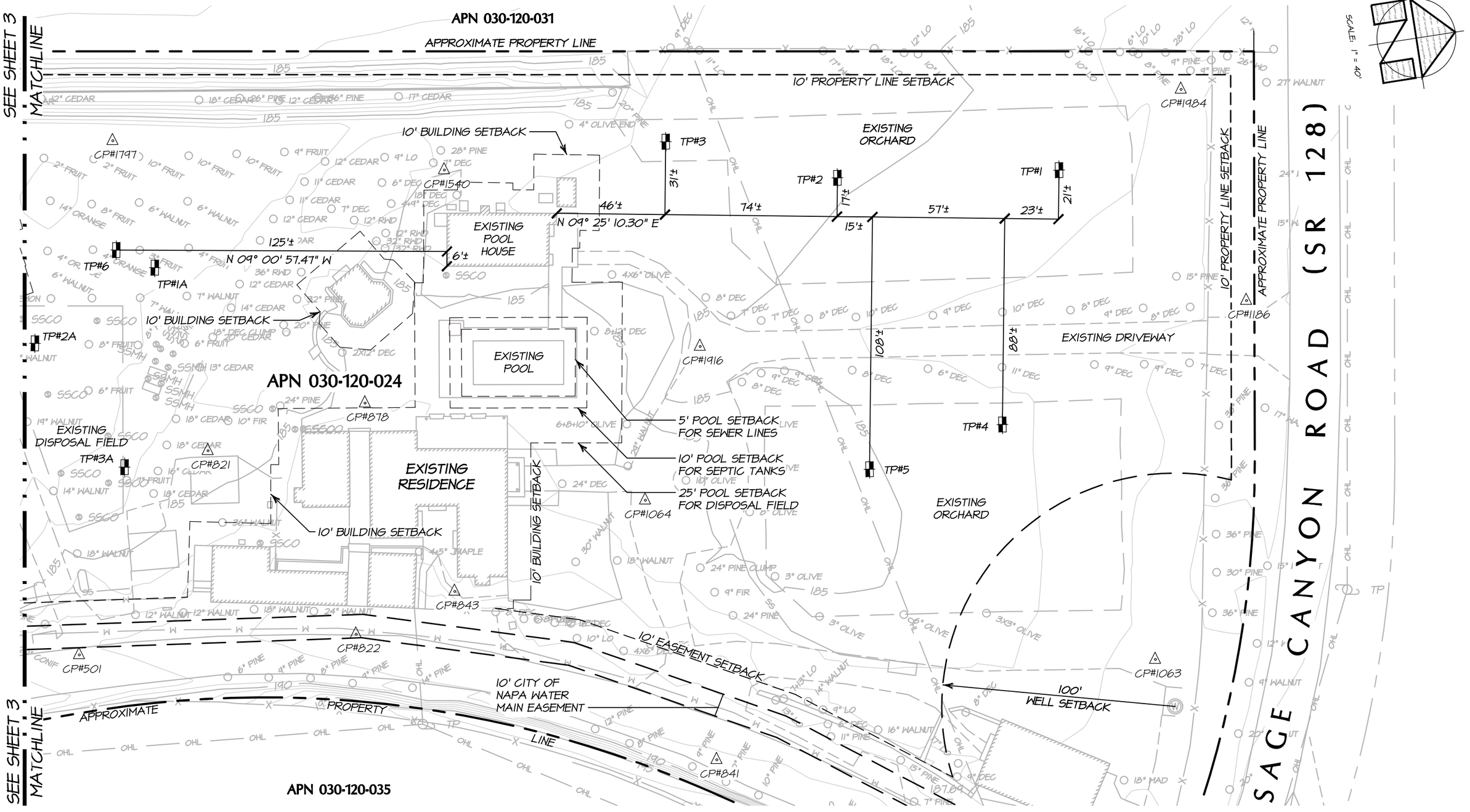


LOCATION MAP

NO SCALE

BARTELT ENGINEERING
CIVIL ENGINEERING · LAND PLANNING
1303 Jefferson Street, 200 B, Napa, CA 94559
www.barteltengineering.com
· Telephone: 707-258-1301 ·

Dakota Shy Winery
771 Sage Canyon Road
St. Helena, CA 94574
APN 030-120-024
Job No. 14-02
September 2014



TEST PIT LOCATION MAP

SCALE: 1" = 40'

TEST PIT EXPLORATION NOTES:

1. ▬ REPRESENTS TEST PIT LOCATION.
2. TEST PITS #1 THROUGH #6 WERE EXCAVATED BY HAROLD SMITH AND SONS, INC. ON JUNE 30, 2014 AND WITNESSED BY A REPRESENTATIVE FROM BARTELT ENGINEERING AND NAPA COUNTY ENVIRONMENTAL HEALTH.
3. TEST PITS #1A THROUGH #5A WERE EXCAVATED BY ALWAYS ENGINEERING ON MAY 9, 2007 AND WITNESSED BY A REPRESENTATIVE FROM ALWAYS ENGINEERING AND NAPA COUNTY ENVIRONMENTAL HEALTH.

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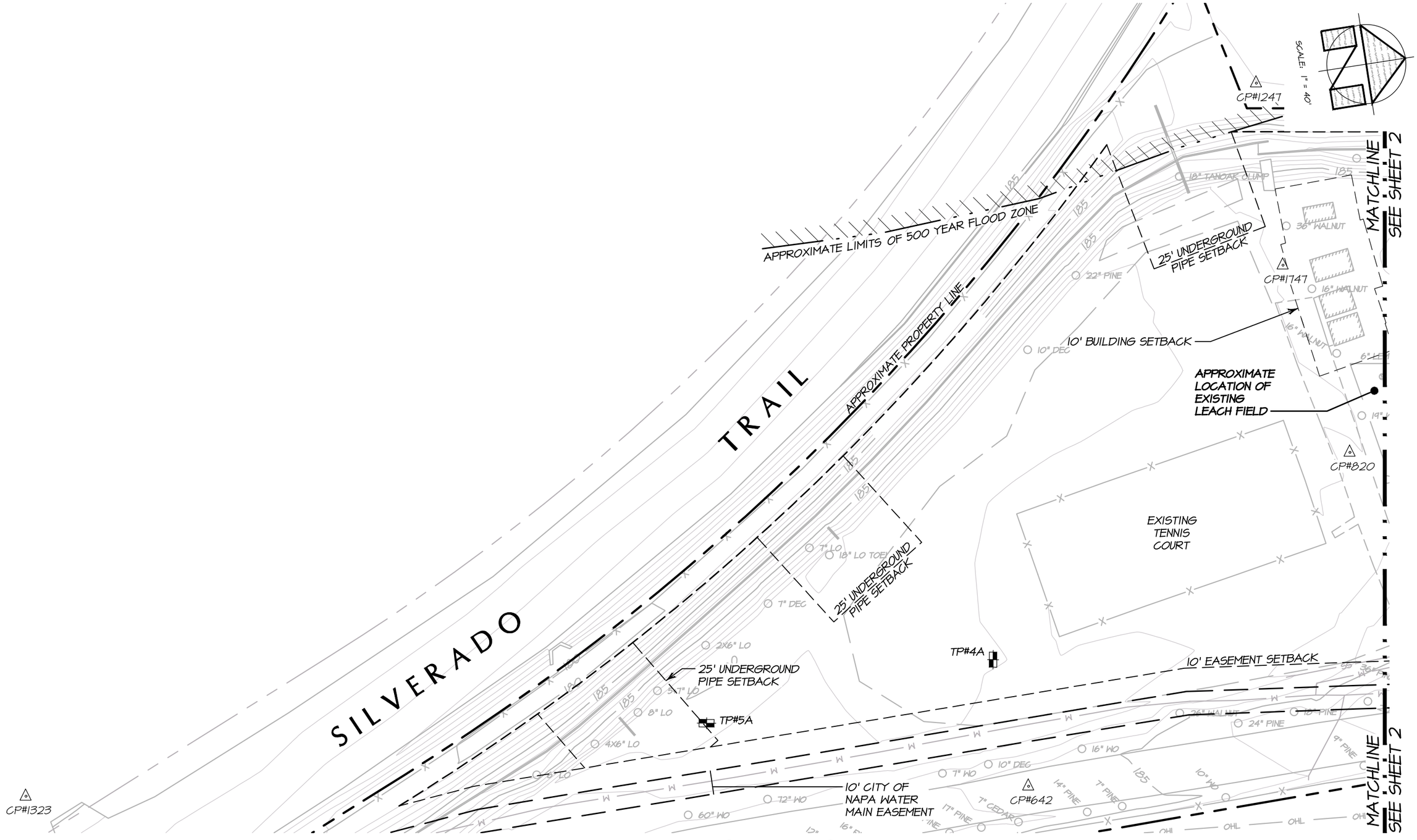

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