GEOTECHNICAL INVESTIGATION

ARTESA VINEYARDS
RESERVOIR AND SUMP POND
ANNAPOLIS ROAD
ANNAPOLIS, CALIFORNIA

11673.1

June 25, 2002

Brunsing Associates, Inc.

GEOTECHNICAL INVESTIGATION

ARTESA VINEYARDS
RESERVOIR AND SUMP POND
ANNAPOLIS ROAD
ANNAPOLIS, CALIFORNIA

11673.1

Prepared for

Artesa Vineyards & Winery
1345 Henry Road
Napa, CA 94559

Prepared by

BACE GEOTECHNICAL
A Division of Brunsing Associates, Inc.
P.O. Box 749
Windsor, CA 95492
(707) 838-0780

June 25, 2002

Keith Colorado
Project Engineer, E.I.T. - 106515

REGISTERED GEOLOGIST
ERIK E. OLSBORG
No. 1072
Certified
Engineering
Geologist
STATE OF CALIFORNIA

2/28/03

Erik E. Olsborg
Engineering Geologist - 1072

REGISTERED PROFESSIONAL ENGINEER
PETER R. DODSWORTH
GE 000278
Exp. 12/31/2004
GEOTECHNICAL
STATE OF CALIFORNIA

Peter R. Dodsworth
Geotechnical Engineer - 278

TABLE OF CONTENTS

LIST OF ILLUSTRATIONS

1.0 INTRODUCTION

This report presents the results of our Geotechnical Investigation for the planned reservoir and sump on Artesa Vineyards and Winery's Fairfax Vineyard, Annapolis Road, Annapolis, California. The property, A.P.N. 123-040-22,24, & 27, is located on the south side of Annapolis Road approximately 0.25 miles west of the intersection of Soda Springs Road and Annapolis Road, as shown on the Vicinity Map, Plate 1.

Based on discussions with Mr. Lee Erickson and our review of the plans revision dated April 7, 2002, by Erickson Engineering Inc., we understand that the reservoir bottom will be at Elevation 788 feet and the top of the embankment at Elevation 810 feet. The reservoir is planned to be about 36.5 acre-feet and have a compacted soil liner. The sump pond bottom will be at an elevation of 688 feet and the top of embankment at an elevation of 700 feet. The sump will have either a synthetic or a soil liner. Both the reservoir and the sump pond will have exterior and interior slopes of two and one half horizontal to one vertical (2-1/2H:1V). The planned reservoir and sump pond locations are shown on the Site Plan, Plate 2.

The purpose of our investigation was to evaluate the site soil/rock conditions in order to determine project feasibility, and to provide geotechnical conclusions and recommendations regarding site grading, including embankments and compacted soil liner construction, suitability of on-site soils for use as liner material, and the need for subdrainage, keying and benching. The scope of our services, as outlined in our Service Agreement transmitted September 26, 2001, consisted of subsurface exploration, laboratory testing, geologic and engineering analysis, and the preparation of this report.

2.0 INVESTIGATION

2.1 Field Exploration

The field exploration consisted of excavating, logging, and sampling seven test pits to depths ranging from 10.5 to 15.5 feet on December 11, 2001. The test pits were excavated with a client-provided backhoe. Within the deeper cut areas of the reservoir, our field exploration also consisted of drilling, logging and sampling two test borings about 23.5 feet and 25.0 feet in depth on January 14, 2002. The borings were drilled with a track-mounted drill rig utilizing flight auger equipment. The location of the test pits and borings are shown on Plate 2.

Our staff engineer logged the test pits and obtained both relatively undisturbed (tube) and loose bulk samples of the soil and rock materials encountered for visual classification and laboratory testing. The relatively undisturbed tube samples were obtained using a 3-inch outside diameter Sprague & Henwood (S & H) split-barrel sampler, pushed with the backhoe bucket.

Our staff engineer also logged the test borings, and obtained relatively undisturbed tube samples of the materials encountered for visual classification and laboratory testing. Samples of the soil and rock materials encountered were obtained using the S & H split-barrel sampler, driven by a 140-pound drop hammer falling 30 inches per blow. Blows required to drive the sampler were converted to equivalent "Standard Penetration" blow counts for correlation with empirical test data. Sampler penetration resistance (blow counts) provides a relative measure of soil consistency and strength.

The logs of the test pits and test borings, showing the various soil and rock materials encountered and the depths at which samples were obtained, are presented on Plates 3 through 8. The soils are classified in accordance with the Unified Soil Classification System outlined on Plate 9. The Physical Properties Criteria for soil classification are presented on Plate 10, and the rock characteristics used to describe the bedrock materials are presented on Plate 11.

2.2 Laboratory Testing

Selected samples were tested in our laboratory to determine their pertinent geotechnical engineering characteristics. Laboratory testing consisted of moisture content/dry density, maximum dry density (compaction), triaxial compressive strength, classification (particle size analysis), and remolded permeability (triaxial cell). The laboratory test data are summarized on the logs, alongside the samples tested, in the manner shown on the Key to Test Data on Plate 9. Compaction test data are presented on Plate 12, the sieve analysis are plotted on Plate 13, and the permeability test results are summarized on Plate 14.

3.0 SITE CONDITIONS

The site for the reservoir and sump is located in the rolling hills east of Annapolis. The reservoir is to be located on the crest of Beatty Ridge. The sump will be located near the easterly ridge toe, just upslope of a ravine containing Patchett Creek. The site is currently unoccupied and is accessed by a dirt road from Annapolis Road. The reservoir site is covered with a moderate growth of grass and a few scattered trees. To the south of the planned reservoir and to the east and south of the sump pond is a thick wooded area comprised mostly of redwoods. The reservoir site slopes gently to the southeast at approximately eight horizontal to one vertical (8H:1V). The southeasterly slopes, downslope of the planned sump, are moderately steep, about 4H:1V.

4.0 SITE GEOLOGY AND SOILS

The site bedrock consists of shallow marine sediments of the Pliocene Ohlson Ranch Formation. These rocks consist of silty sandstone and minor shale. The sandstone is occasionally fractured, soft to moderate in hardness, and little to moderately weathered. The shale was found only in Test Pit TP-5 within the planned sump location. The shale is intensely fractured, low in hardness to hard, and moderately weathered. No bedding orientation was observed within the Ohlson Ranch Formation rocks.

The backhoe and drill rig were able to excavate the sandstone with little difficulty. The backhoe encountered practical excavation refusal in hard shale below 11 feet in Test Pit TP-5.

The bedrock is blanketed by one to three feet, or more, of sandy silty residual/colluvial soil. The silt is soft to medium stiff, porous, with some roots; porous soils are subject to collapse when loaded in a saturated condition.

No evidence of faulting or landsliding was observed at the site, and none of the published geologic maps that we reviewed show faults or landslides in the reservoir/sump area. The nearest active faults are the San Andreas and Maacama Faults, located approximately 3 miles southwest and 21 miles northeast, respectively, of the property.

Moderate ground-water seepage was encountered in our test pits and borings, except for Test Pit TP-6. The ground water was mostly perched within the upper 2 to 3-1/2 feet at each test pit or boring location. Ground water was encountered at 6 feet in Test Boring 2; however, the water level was measured at 2 feet below the ground surface approximately 2 hours after completion of drilling.

Minor caving occurred within the upper two feet of Test Pits TP-1 and TP-2.

5.0 DISCUSSIONS AND CONCLUSIONS

5.1 General

Based on the results of our field exploration and laboratory testing, we conclude that the site is geotechnically suitable for the planned reservoir and sump pond. The main geotechnical constraints that should be considered in design and construction for the reservoir and sump include the presence of weak/porous surface soils, isolated seepage areas, and strong seismic shaking from future earthquakes. These considerations and possible mitigation measures are discussed below along with other specific aspects of this project.

5.2 Weak-Porous Surface Soils

The weak-porous surface soils will collapse when loaded with embankment fill material, and will be pervious where exposed in cut areas. Therefore, these soils should be removed and replaced as properly compacted fill within embankment areas and within reservoir/sump cut areas where not removed by planned excavation.

5.3 Seepage and Pervious Zones

Isolated seepage and pervious zones will be encountered during planned excavations for the reservoir and sump. Therefore, to prevent leakage from the reservoir and sump sides and bottoms, a compacted soil liner at least two feet in perpendicular thickness needs to be provided. Detailed recommendations for compacted soil liner are presented in the following sections of this report. Based on our test data, we conclude that the on-site soils in the reservoir and sump pond areas will be suitable for reuse as compacted soil liner.

As mentioned above, we understand that a synthetic liner may be used for sump. Suggested synthetic liner design considerations are presented in the recommendations section of the report.

Where seepage is encountered, subdrainage will have to be provided to intercept the subsurface water beneath the liner, whether compacted soil or synthetic.

5.4 Excavatability

As mentioned above and noted on the test pit log, refusal to the backhoe was experienced in hard shale at a depth of about 11 feet in Test Pit TP-5. However, based on our observation of drilling equipment during exploration, and dozer/backhoe/excavator performance at sites in the vicinity, we conclude that the majority of planned excavations can be achieved using conventional heavy excavation equipment, such as a Caterpillar D8R tractor equipped with a single-tooth ripper. Localized, more massive hard rock zones could possibly be encountered, especially within the planned sump.

5.5 Seismic Hazards/Ground Shaking

The proposed reservoir and sump will be subject to strong ground shaking from future earthquakes. With the embankments founded upon firm soil/rock, and with interior and exterior slopes of 2 1/2 H:1V, the embankments should be well suited to resist the effects of ground shaking. Since no active faults were found or are shown on published references in the site vicinity, the possibility of fault rupture is considered low.

5.5 Review of Project Plans

BACE's review of the project plans, revision dated April 7, 2002, by Erickson Engineering, Inc., found these plans to be in conformance with the intent of the recommendations presented in this report.

6.0 RECOMMENDATIONS

6.1 Site Preparation and Grading

Areas to be graded should be cleared of debris and surface vegetation and stripped to remove surface soils containing roots. We anticipate the depth of stripping would generally be about two to four inches. Deeper stripping and grubbing may be required to remove concentrations of organic matter. The cleared materials should be removed from the site, while stripped soils can be re-used as topsoil.

The upper weak/porous surface soils (average two to three feet in thickness) should be removed from embankment areas and the zone extending at least five feet beyond the exterior embankment toe. Deeper excavation will be required beneath the toe of the embankments for the reservoir and sump to provide keyways at least 10 feet wide and at least 8 feet in depth into firm soil/rock. We anticipate that the reservoir keyway could be as deep as 10 feet below the existing ground surface.

The excavated soils, minus remaining organic matter and over-size rocks (greater than six inches in largest dimension), can be stockpiled for later use as liner material, and/or embankment fill material. During embankment construction, concentrations of gravels or sands should be thoroughly mixed with available silty/clayey soils so that zones of concentrated granular soils (potential leakage zones) are not created.

Where existing slopes are steeper then (6H:1V), or if seepage is encountered, a subdrain should be installed on the uphill side of the keyway, in accordance with the Keyway Drainage Detail, plate 15.

After planned excavations are completed, the exposed soils should be scarified to at least 6 inches in depth, moisture conditioned to (and maintained at) a uniform moisture content at least 2 percent above optimum moisture content, and compacted to at least 90 percent relative compaction. Embankment fill materials should be placed in horizontal layers eight inches or less in loose thickness, moisture conditioned to (and be maintained) at least 2 percent above optimum moisture content, and compacted to at least 90 percent relative compaction, using self-propelled compactors or sheepsfoot rollers. Smooth-wheel rollers should not be used except for final subgrade preparation.

The downstream slope of the embankment should be inclined no steeper than 2H:1V, preferably at 2-1/2H:1V. The upstream face of the embankment should be inclined no steeper than 2-1/2H:1V, preferably at 3H:1V. Fill slopes should be compacted by rolling and trimming, or overfilled and trimmed back to planned grade, to expose a firm, smooth surface free of loose material. Slopes should be planted with vegetation (or protected from erosion by other measures) upon completion of grading.

6.2 Liners

Soil liner material should consist of silty/clayey soils with a Plasticity Index of at least five percent. In addition, the liner material should meet the following gradation:

Sieve/Screen Size	Percent Passing (by dry weight)
6 inch	100
4 inch	90 - 100
No. 4	70 - 100
No. 200	30 - 100

In general, the on-site soils encountered in our test pits and borings should meet the above criteria. Soil suitability for liner material should be determined in the field by BACE. The compacted soil liner should be at least 2 feet in thickness, perpendicular to the reservoir or sump surface. Liner soils should be placed and compacted as described in Section 6.1 of this report.

The synthetic liner should at least be 60 mil. thickness high-density polyethylene (HDPE). The liner should be installed, and each joint and penetration sealed, per the manufacturer's recommended procedures. If no other requirement is provided, the edges should overlap at least 24 inches. The liner installation should be inspected and tested in accordance with the manufacturer's requirements.

6.3 Rip Rap

If used, the riprap section should be about two-feet thick and placed over geotextile filter fabric (Mirafi 700X, or equivalent), underlain by the compacted soil liner within seepage zones. Riprap rock should be sound, and resistant to abrasion and reasonably free from cracks, seams, and other defects that should tend to increase unduly their destruction by water action. Riprap rock should be between six inches and two feet in size and carefully fitted together to provide a tight interlock.

6.4 Surface and Subsurface Drainage

Surface water runoff should be intercepted and directed away from the top and toe of cut slopes and fill slopes. Drainage ways should be maintained to prevent water from ponding along the top or toe of the slopes.

Depending upon the time of year, ground water seepage may be encountered during embankment excavation operations. If seepage is severe, an upstream cutoff trench may be needed. Ground water collected in the cutoff trench should be pumped to the vicinity of the existing creek on site.

We anticipate that subdrains will most likely be needed to intercept subsurface water beneath the compacted soil or synthetic liner. We recommend installing a subdrain as illustrated on the Trench Subdrain Detail presented Plate 15. Finger subdrains or extended gravel blankets may be required up the slopes where concentrated seepage is encountered. Beneath sythetic liner, composite prefabricated drains (such as Miradrain or equivalent) can be used as an alternative subdrain system. The composite subdrainage should be installed in accordance with manufacturer's suggested procedures.

Surface and subsurface water should be collected in solid pipes and outletted into the existing or established drainage system(s) on site. Alternatively, the collected water can be pumped into the reservoir and sumps.

After construction, ground water seepage may continue within the reservoir and sump under the compacted-fill core trench. BACE should be contacted to provide remedial recommendations (such as grouting, upstream slurry trench) if this impairs the functioning of the reservoir or sump pond.

6.5 Additional Services

Prior to construction, BACE should review the final grading and reservoir/sump construction plans, and related specifications, for conformance with our recommendations. During construction, BACE should be retained to provide periodic observations, together with field and laboratory testing, during site preparation, keyway excavation, subdrain installation (if needed), placement and compaction of fills for embankment construction and soil liner installation, and synthetic liner installation (if used). Pond and sump excavations should be reviewed by BACE while the excavation operations are being performed. Our observations and tests will allow us to verify conformance of the work to project guidelines, determine that soil conditions are as anticipated, and to modify our recommendations, if necessary.

7.0 LIMITATIONS

This geotechnical investigation and review of the proposed reservoir/sump development were performed in accordance with the usual and current standards of the profession, as they relate to this and similar localities. No other warranty, expressed or implied, is provided as to the conclusions and professional advice presented in this report. Our conclusions are based upon reasonable geologic and engineering interpretation of available data. A soil corrosion study was not included in our scope of services for this project.

The samples taken and tested, and the observations made, are considered to be representative of the site; however, soil and geologic conditions may vary significantly between test pits and borings. As in most projects, conditions revealed during construction excavation may be at variance with preliminary findings. If this occurs, the changed conditions must be evaluated by BACE and revised recommendations be provided as required.

This report is issued with the understanding that is the responsibility of the owner, or of his/her representative, that the information and recommendations contained herein are brought to the attention of all other design professionals for the project, and incorporated into the plans, and the Contractor and Subcontractors implement such recommendations in the field. The safety of others is the responsibility of the Contractor. The Contractor should notify the Owner and BACE if he/she considers any of the recommended actions presented herein to be unsafe or otherwise impractical.

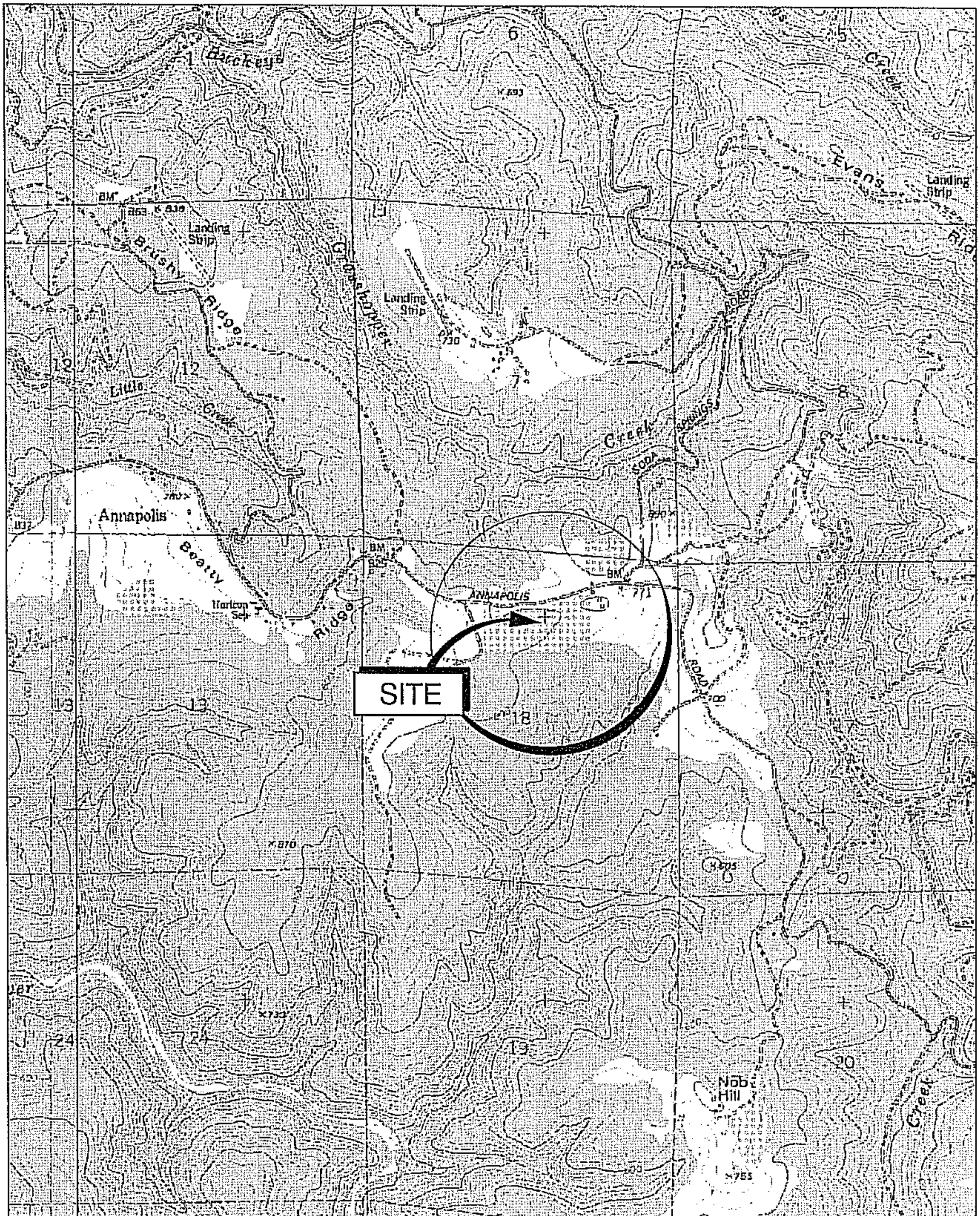
Changes to the conditions of a site can occur with the passage of time, whether they are due to natural events or to human activities on this, or adjacent sites. In addition, changes in applicable or appropriate codes and standards may occur, whether they result from legislation or the broadening of knowledge. Accordingly, this report may become invalidated wholly or partially by changes outside our control. Therefore, this report is subject to review and revision as changed conditions are identified.

The recommendations contained in this report are based on certain specific project information regarding type of construction and reservoir/sump locations, which has been made available to us. If any conceptual changes are undertaken during final project design, we should be allowed to review them in light of this report to determine if our recommendations are still applicable.

ILLUSTRATIONS

DISTRIBUTION

Two Copies	David Dipiero Artesa Vineyards & Winery 1345 Henry Road Napa, CA 94559
Four Copies	Lee Erickson Erickson Engineering, Inc. PO Box 446 Valley Ford, CA 94972



3-D TopoQuads Copyright © 1999 DeLorme Yarmouth, ME 04096 Source Data: USGS

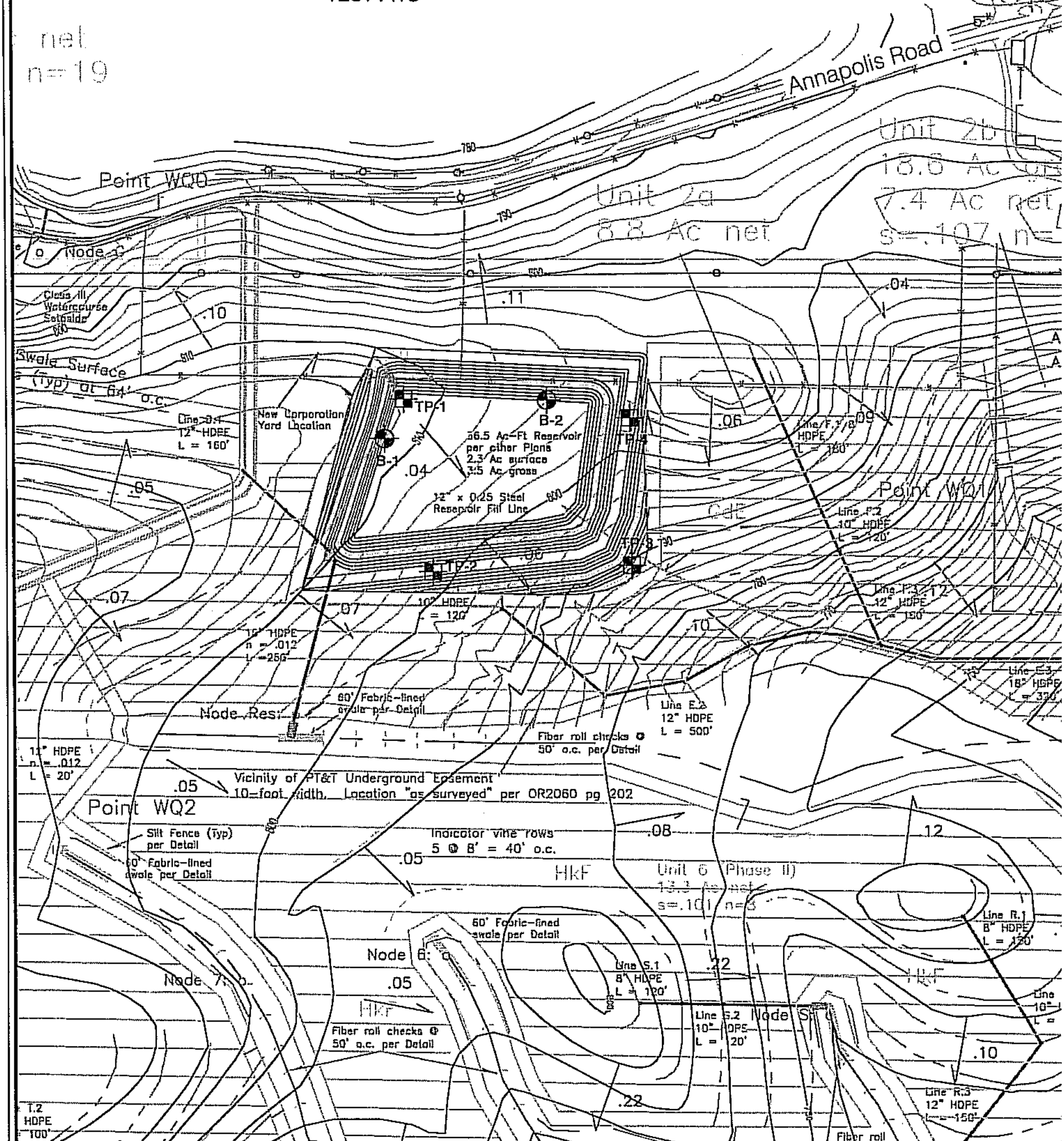
700 ft Scale: 1:24,000 Detail: 13-0 Datum: WGS84

BACE Geotechnical division of Brunsing Associates, Inc. (707) 838-0780	Job No.: 11673.1 Appr.: [signature] Date: 6/25/02	VICINITY MAP ARTESA VINEYARDS Annapolis Road Annapolis, California	PLATE 1

LEGEND

B-1 to B-2 — APPROXIMATE LOCATION OF GEOTECHNICAL TEST BORING

TP-1 to TP-7 — APPROXIMATE LOCATION OF GEOTECHNICAL TEST PITS



REFERENCE:
Site Plan, dated March 30, 2002,
prepared by Erickson Engineering Inc.

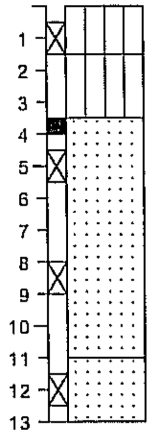
Log of Test Pit TP-1

Equipment: CAT Backhoe; 24" bucket

Date: 12/11/01

Logged By: KAC   Elevation: 811.5' *

Laboratory Tests	Moisture Content (%)	Dry Density (pcf)	Depth (ft.)	Sample
	20.0	104	4	
24% Passing #200 Sieve				
Sieve Analysis; see Plate 12				



BROWN SANDY SILT (ML)
soft to medium stiff, moist to wet

OLIVE TO ORANGE-BROWN CLAYEY SILT (ML)
medium stiff, wet

OLIVE TO ORANGE-BROWN SILTY SANDSTONE
occasioinal fracturing, friable, little weathering, saturated

ORANGE TO OLIVE SILTY SANDSTONE
occasioinal fracturing, low hardness, little weathering, saturated

NOTES:
(1) Minor Caving at 2 feet
(2) Moderate Seepage at 2 feet

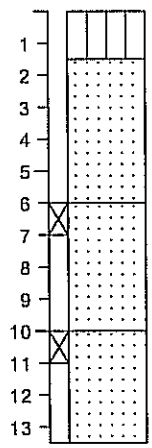
Log of Test Pit TP-2

Equipment: CAT Backhoe; 24" bucket

Date: 12/11/01

Logged By: KAC   Elevation: 802.0' *

Laboratory Tests	Moisture Content (%)	Dry Density (pcf)	Depth (ft.)	Sample
Sieve Analysis; see Plate 12				



BROWN SANDY SILT (ML)
soft, wet

OLIVE TO ORANGE-BROWN SILTY SANDSTONE
occasional fracturing, soft to friable, moderate weathering, saturated

ORANGE TO OLIVE SILTY SANDSTONE
occasional fracturing, friable, little weathering, saturated

BLUE-GRAY SILTY SANDSTONE
occasional fracturing, low hardness, little weathering, saturated

NOTES:
(1) Minor Caving at 2 feet
(2) Moderate Seepage at 2 feet

* Elevations Interpolated from Contours on Plan View by Erickson Engineering Inc., dated December 7, 2001

Scale: 1" = 6'

Log of Test Pit TP-3

Equipment: CAT Backhoe; 24" bucket

Date: 12/11/01

Logged By: KAC   Elevation: 789.0' *

Laboratory Tests	Moisture Content (%)	Dry Density (pcf)	Depth (ft.)	Description
			0–1	BROWN SANDY SILT (ML)
			1–3.5	ORANGE TO OLIVE SILTY SAND (SM) medium dense, moist
24% Passing #200 Sieve			3.5–10	OLIVE TO ORANGE SILTY SANDSTONE occasional fracturing, friable to low hardness, moderate weathering, saturated
			10–11	BLUE-GRAY SILTY SANDSTONE occasional fracturing, low hardness, little weathering, saturated
			11–13.5	OLIVE TO ORANGE SILTY SANDSTONE occasional fracturing, low hardness, little weathering, saturated
			13.5–15.5	BLUE-GRAY SILTY SANDSTONE occasional fracturing, low hardness, little weathering, saturated

NOTES:
(1) No Caving
(2) Moderate Seepage at 3.5 feet

Log of Test Pit TP-4

Equipment: CAT Backhoe; 24" bucket

Date: 12/11/01

Logged By: KAC   Elevation: 802.5' *

Laboratory Tests	Moisture Content (%)	Dry Density (pcf)	Depth (ft.)	Description
			0–1.5	BROWN SANDY SILT (ML) medium stiff, moist
37% Passing #200 Sieve	24.1	98	1.5–15.5	OLIVE TO ORANGE SILTY SANDSTONE occasional fracturing, friable to low hardness, moderate to little weathering, saturated

NOTES:
(1) No Caving
(2) Minor seepage at 2 feet

* Elevations Interpolated from Contours on Plan View by Erickson Engineering Inc., dated December 7, 2001

Scale: 1" = 6'

BACE Geotechnical
division of
Brunsing Associates, Inc.
(707) 838-0780

Job No.: 11673.1
Appr.: [signature]
Date: 6/25/02

LOGS OF TEST PITS TP-3 and TP-4
ARTESA VINEYARDS
Annapolis Road
Annapolis, California

PLATE
4

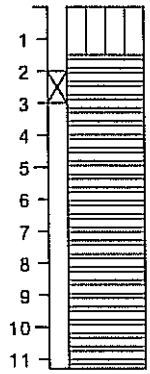
Log of Test Pit TP-5

Equipment: CAT Backhoe; 24" bucket

Date: 12/11/01

Logged By: KAC Elevation: 700.0' *

Laboratory Tests | Moisture Content (%) | Dry Density (pcf) | Depth (ft.) | Sample



BROWN SANDY SILT (ML)
medium stiff, moist, porous, with roots

ORANGE BROWN SHALE
intense fracturing, low hardness, moderate weathering, wet to saturated

becomes close fracturing, hard, little weathering, saturated

NOTES:
(1) No Caving
(2) Moderate Seepage at 3 feet
(3) Practical Backhoe Refusal at 11.3 feet

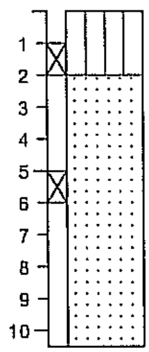
Log of Test Pit TP-6

Equipment: CAT Backhoe; 24" bucket

Date: 12/11/01

Logged By: KAC Elevation: 712.0' *

Laboratory Tests | Moisture Content (%) | Dry Density (pcf) | Depth (ft.) | Sample



BROWN SANDY SILT (ML)
soft, moist to wet

ORANGE TO OLIVE SILTY SANDSTONE
occasional fracturing, friable, moderate to little weathering, wet

28% Passing #200 Sieve (at approx. 5–6 ft)

NOTES:
(1) No Caving
(2) No Free Water Encountered

* Elevations Interpolated from Contours on Plan View by Erickson Engineering Inc., dated December 7, 2001

Scale: 1" = 6'

BACE Geotechnical
division of
Brunsing Associates, Inc.
(707) 838-0780

Job No.: 11673.1

Appr.: [signature]

Date: 6/25/02

LOGS OF TEST PITS TP-5 and TP-6
ARTESA VINEYARDS
Annapolis Road
Annapolis, California

PLATE 5

Log of Test Pit TP-7

Equipment: CAT Backhoe; 24" bucket

Date: 12/11/01

Logged By: KAC   Elevation: 704.0' *

Laboratory Tests	Moisture Content (%)	Dry Density (pcf)	Depth (ft.)	Sample	Description
			0–1.5		DARK BROWN SANDY SILT (ML) soft, wet
20% Passing #200 Sieve			1.5–6	X (4–5)	OLIVE TO ORANGE SILTY SANDSTONE occasional fracturing, friable, moderate weathering, saturated
			6–12	X (6.5–7.5)	BLUE-GRAY SILTY SANDSTONE occasional fracturing, low to moderate hardness, little weathering, saturated

NOTES:

(1) No Caving

(2) Moderate Seepage at 2 feet

* Elevations Interpolated from Contours on Plan View by Erickson Engineering Inc., dated December 7, 2001

Scale: 1" = 6'

BACE Geotechnical
division of
Brunsing Associates, Inc.
(707) 838-0780

Job No.: 11673.1

Appr.: [signature]

Date: 6/25/02

LOG OF TEST PIT TP-7
ARTESA VINEYARDS
Annapolis Road
Annapolis, California

PLATE 6

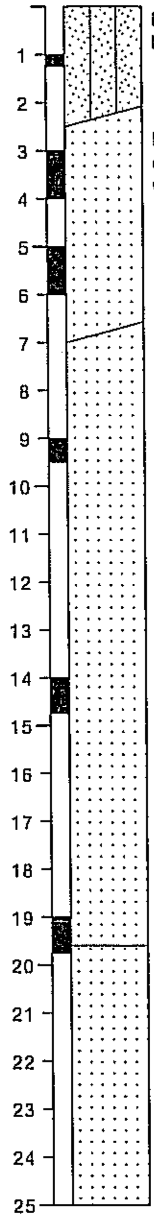
Log of Boring B-1

Equipment: Mobile B-40; 4-inch flight auger

Date: 1/14/02

Logged By: KAC Elevation: 812' **

Laboratory Tests	Moisture Content (%)	Dry Density (pcf)	Blows/foot*	Depth (ft.)	Description
				0	BROWN-OLIVE SILTY SAND (SM) loose, wet
			6	1	
			28 ▼	3	LIGHT OLIVE SILTY SANDSTONE occasional fracturing, low to moderate hardness, moderate weathering, saturated
Tx 1700 (432)	22.4	103		4	
37% Passing #200 Sieve	21.9	103	38 ▽	5	
				7	ORANGE TO OLIVE SILTY SANDSTONE occasional fracturing, moderate hardness, little weathering, saturated
	24.4	97	51/7"	9	
Tx 2000 (1728)	25.4	98	60/8"	14	becoming more olive in color at about 14 feet
29% Passing #200 Sieve	25.7	97	54/8"	19	
				20	GRAY SILTY SANDSTONE occasional fracturing, moderate hardness, little weathering, saturated



NOTES:
(1) Ground water encountered at about 6 feet, measured at 3 feet 2 hours later.
(2) No Caving

* Equivalent "Standard Penetration" Blow Counts.

** Elevations Interpolated from Contours on Plan View by Erickson Engineering Inc., dated December 7, 2001

Scale: 1" = 4'

BACE Geotechnical
division of
Brunsing Associates, Inc.
(707) 838-0780

Job No.: 11673.1
Appr.: [signature]
Date: 6/25/02

LOG OF BORING B-1

ARTESA VINEYARDS
Annapolis Road
Annapolis, California

PLATE 7

BORING LOG 11673_01.GPJ BACE.GDT 6/25/02

Log of Boring B-2

Equipment: Mobile B-40; 4-inch flight auger

Date: 1/14/02

Logged By: KAC Elevation: 806' **

Laboratory Tests	Moisture Content (%)	Dry Density (pcf)	Blows/foot*	Depth (ft.)
	19.1	105	33	2
			52	4
	21.5	108	59	8
Tx 3700 (1296)	26.2	98	48/7"	11
			32/2"	17
	20.4	106	48/3"	23

BROWN SANDY SILT (ML)
medium stiff, wet

ORANGE TO OLIVE SILTY SANDSTONE
occasional fracturing, friable to low hardness, moderate weathering, wet to saturated

ORANGE SILTY SANDSTONE
occasional fracturing, moderate hardness, little weathering, saturated

OLIVE SILTY SANDSTONE
occasional fracturing, moderate hardness, little weathering, saturated

GRAY SILTY SANDSTONE
occasional fracturing, moderate hardness, little weathering, saturated

NOTES:
(1) No Caving
(2) No Ground Water Encountered

* Equivalent "Standard Penetration" Blow Counts.

** Elevations Interpolated from Contours on Plan View by Erickson Engineering Inc., dated December 7, 2001

Scale: 1" = 4'

UNIFIED SOIL CLASSIFICATION SYSTEM (USCS)

MAJOR DIVISIONS			SYMBOLS GRAPH	SYMBOLS LETTER	TYPICAL DESCRIPTIONS
COARSE-GRAINED SOILS	GRAVELS AND GRAVELLY SOILS	CLEAN GRAVELS		GW	WELL-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
		(Little or no fines)		GP	POORLY-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
	MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	GRAVELS WITH FINES		GM	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES
		(Appreciable amount of fines)		GC	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES
	SAND AND SANDY SOILS	CLEAN SANDS		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE		(Little or no fines)		SP	POORLY-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
	50% OR MORE OF COARSE FRACTION PASSING THROUGH NO. 4 SIEVE	SANDS WITH FINES		SM	SILTY SANDS, SAND-SILT MIXTURES
		(Appreciable amount of fines)		SC	CLAYEY SANDS, SAND-CLAY MIXTURES
FINE-GRAINED SOILS	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILT, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY
				OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS				PT	PEAT, HUMOUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

KEY TO TEST DATA

Consol - Consolidation
LL - Liquid Limit
PI - Plasticity Index
EI - Expansion Index
SA - Sieve Analysis
■ Retained, recovered sample
▨ Retained, not recovered
☒ Bulk Sample

Shear Strength, psf ↓ ┌ Confining Pressure, psf

Tx	320 (2600)	- Unconsolidated Undrained Triaxial
TxCU	320 (2600)	- Consolidated Undrained Triaxial
DS	2750 (2600)	- Consolidated Drained Direct Shear
FVS	470	- Field Vane Shear
UC	2000	- Unconfined Compression
PP	2000	- Field Pocket Penetrometer
Sat		- Sample saturated prior to test

▽ Ground Water level during drilling ▼ Stabilized Ground Water level

BACE Geotechnical
division of
Brunsing Associates, Inc.
(707) 838-0780

Job No.: 11673.1
Appr.: [signature]
Date: 6/25/02

SOIL CLASSIFICATION CHART &KEY TO TEST DATA

ARTESA VINEYARDS
Annapolis Road
Annapolis, California

PLATE 9

RELATIVE DENSITY OF COARSE-GRAINED SOILS

Relative Density	Standard Penetration Test Blow Count (blows per foot)
Very loose	Less than 4
Loose	5 to 10
Medium dense	11 to 30
Dense	31 to 50
Very dense	More than 50

CONSISTENCY OF FINE-GRAINED SOILS

Consistency	Identification Procedure	Approximate Shear Strength (psf)
Very soft	Easily penetrated several inches with fist	Less than 250
Soft	Easily penetrated several inches with thumb	250 to 500
Medium stiff	Penetrated several inches by thumb with moderate effort	500 to 1000
Stiff	Readily indented by thumb, but penetrated only with great effort	1000 to 2000
Very stiff	Readily indented by thumb nail	2000 to 4000
Hard	Indented with difficulty by thumb nail	More than 4000

NATURAL MOISTURE CONTENT

Dry	No noticeable moisture content. Requires considerable moisture to obtain optimum moisture content* for compaction.
Damp	Contains some moisture, but is on the dry side of optimum.
Moist	Near optimum moisture content for compaction.
Wet	Requires drying to obtain optimum moisture content for compaction.
Saturated	Near or below the water table, from capillarity, or from perched or ponded water. All void spaces filled with water.

* Optimum moisture content as determined in accordance with ASTM Test Method D1557-91.

Where laboratory test data are not available, the above field classifications provide a general indication of material properties; the classifications may require modification based upon laboratory tests.

Generalized Graphic Rock Symbols

Siltstone or Claystone	Limestone	Tuff (Volcanic Ash)
Shale	Chert	Andesite
Sandstone	Serpentine	Basalt
Conglomerate	Metamorphic Rock	Granite

Stratification

Bedding of Sedimentary Rocks	Thickness of Beds
Massive	No apparent bedding
Very thick bedded	Greater than 4 feet
Thick bedded	2 feet to 4 feet
Thin bedded	2 inches to 2 feet
Very thin bedded	0.5 inches to 2 inches
Laminated	0.125 inches to 0.5 inches
Thinly laminated	less than 0.125 inches

Fracturing

Fracturing Intensity	Thickness of Beds
Little	Greater than 4 feet
Occasional	1 foot to 4 feet
Moderate	6 inches to 1 foot
Close	1 inch to 6 inches
Intense	0.5 inches to 1 inch
Crushed	less than 0.5 inches

Strength

Soft	Plastic or very low strength.
Friable	Crumbles by hand.
Low hardness	Crumbles under light hammer blows.
Moderate hardness	Crumbles under a few heavy hammer blows.
Hard	Breaks into large pieces under heavy, ringing hammer blows.
Very hard	Resists heavy, ringing hammer blows and will yield with difficulty only dust and small flying fragments.

Weathering

Deep	Moderate to complete mineral decomposition, extensive disintegration, deep and thorough discoloration, many extensively coated fractures.
Moderate	Slight decomposition of minerals, little disintegration, moderate discoloration, moderately coated fractures.
Little	No megascopic decomposition of minerals, slight to no effect on cementation, slight and intermittent, or localized discoloration, few stains on fracture surfaces.
Fresh	Unaffected by weathering agents, no disintegration or discoloration, fractures usually less numerous than joints.

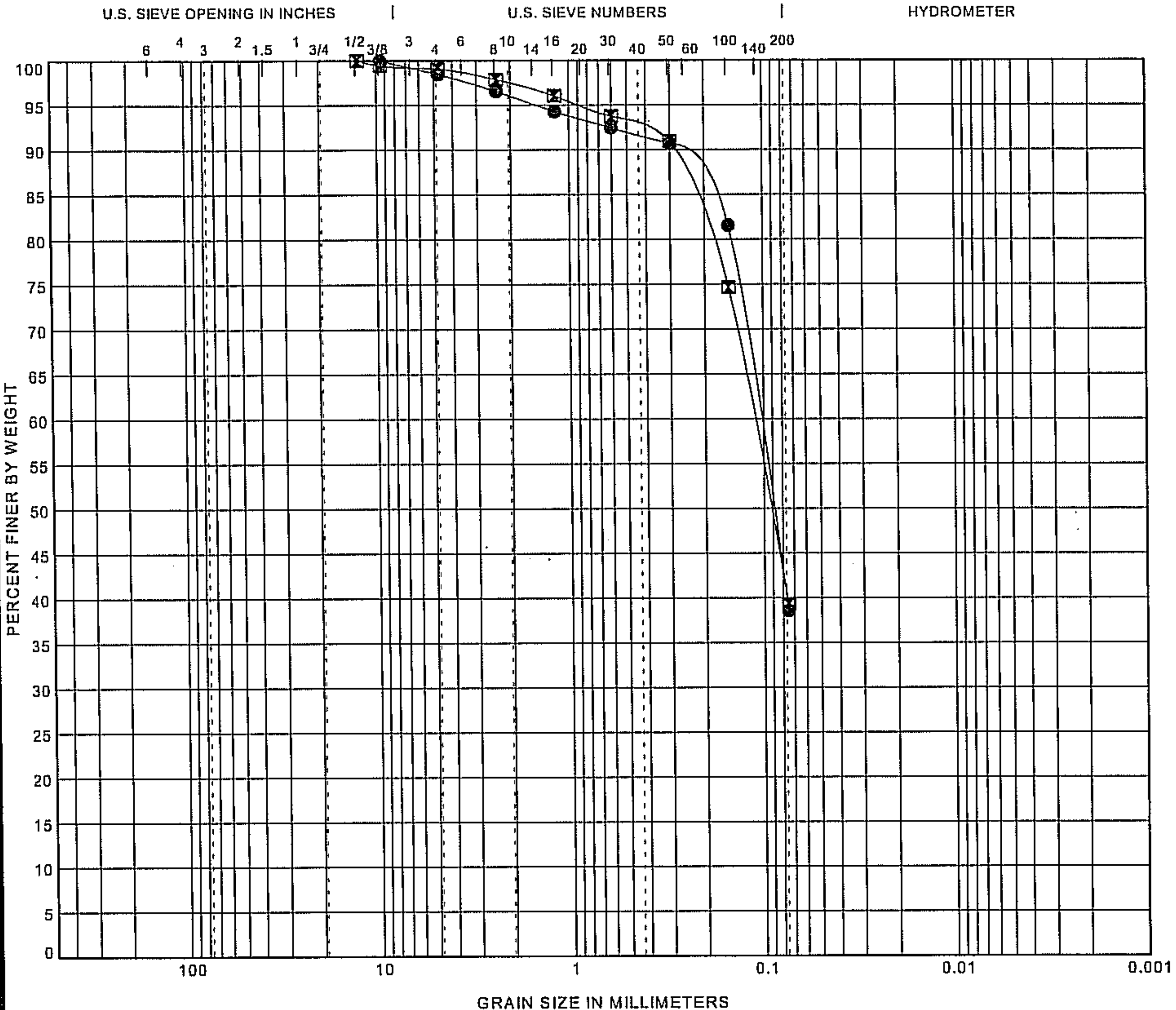
BACE Geotechnical
division of
Brunsing Associates, Inc.
(707) 838-0780

Job No.: 11673.1
Appr.: [signature]
Date: 6/25/02

ROCK CHARACTERISTICS CHART

ARTESA VINEYARDS
Annapolis Road
Annapolis, California

PLATE
11



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		Classification	LL	PL	PI	Cc	Cu
●	TP-1	11.0 ft	ORANGE TO OLIVE SILTY SANDSTONE					
⊠	TP-2	6.0 ft	ORANGE TO OLIVE SILTY SANDSTONE					

	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	TP-1	11.0 ft	9.5	0.106			1.5	59.9	38.6	
⊠	TP-2	6.0 ft	12.5	0.113			0.9	59.8	39.3	

US_GRAIN_SIZE 11673_01.GPJ BACE.GDT 6/25/02

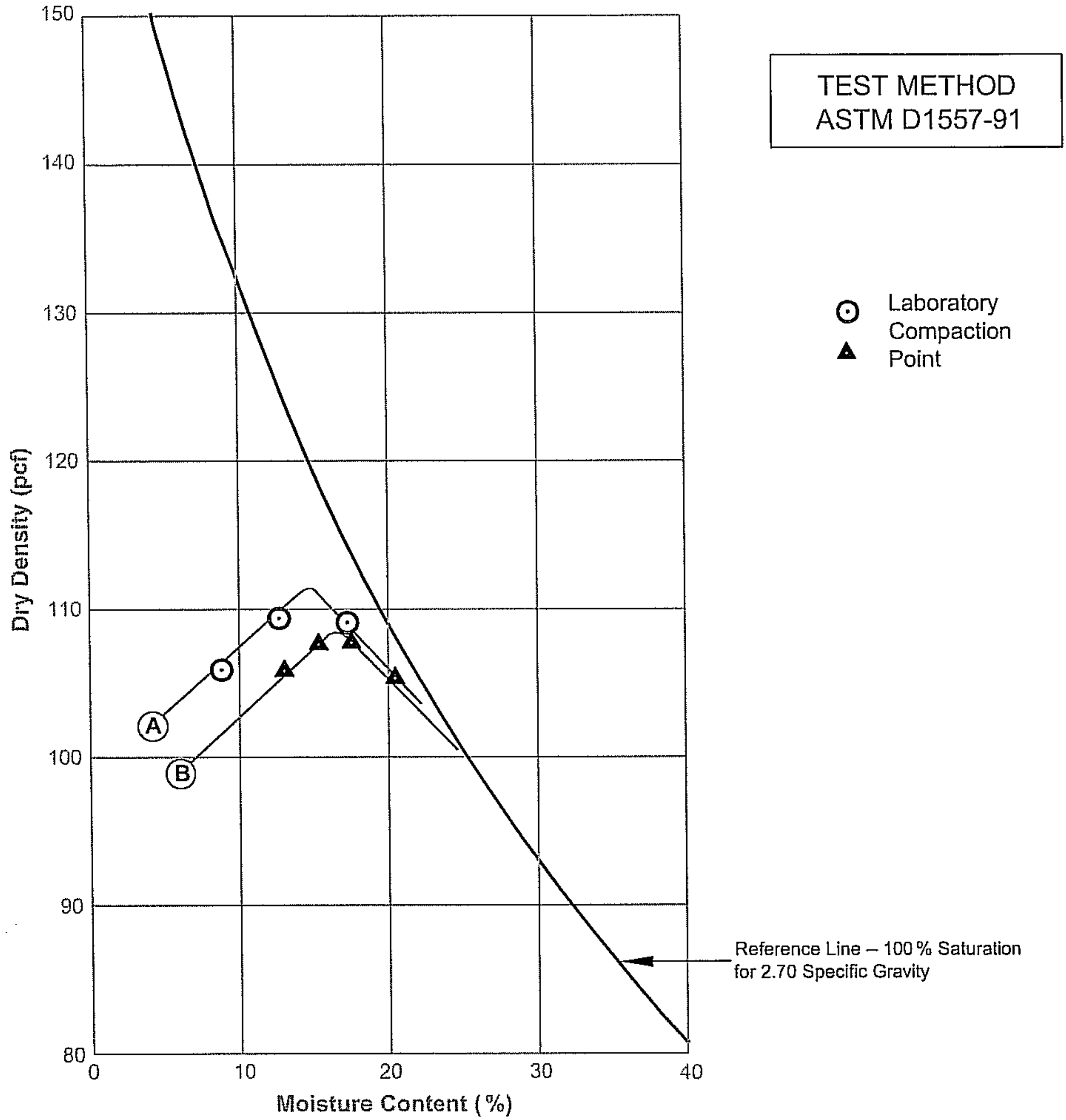
BACE Geotechnical
division of
Brunsing Associates, Inc.
(707) 838-0780

Job No.: 11673.1
Appr.: [signature]
Date: 6/25/02

GRAIN SIZE DISTRIBUTION

ARTESA VINEYARDS
Annapolis Road
Annapolis, California

PLATE
12



Symbol	Sample Source	Classification	Optimum Moisture (%)	Maximum Dry Density (pcf)
Ⓐ ⊙	Test Pit TP -1 @ 8 feet	OLIVE TO ORANGE -BROWN SILTY SAND (SM)	15.0	112
Ⓑ ▲	Test Pit TP-1 @ 11-13 ft. & TP-2 @ 6 ft.	ORANGE TO OLIVE SILTY SAND (SM)	16.5	108

BACE Geotechnical
a division of
Brunsing Associates, Inc.
(707) 838-0780

Job No.: 11673.1
Appr.:
Date: 6/25/02

COMPACTION TEST DATA
ARTESA VINEYARDS
Annapolis Road
Annapolis, California

PLATE 13

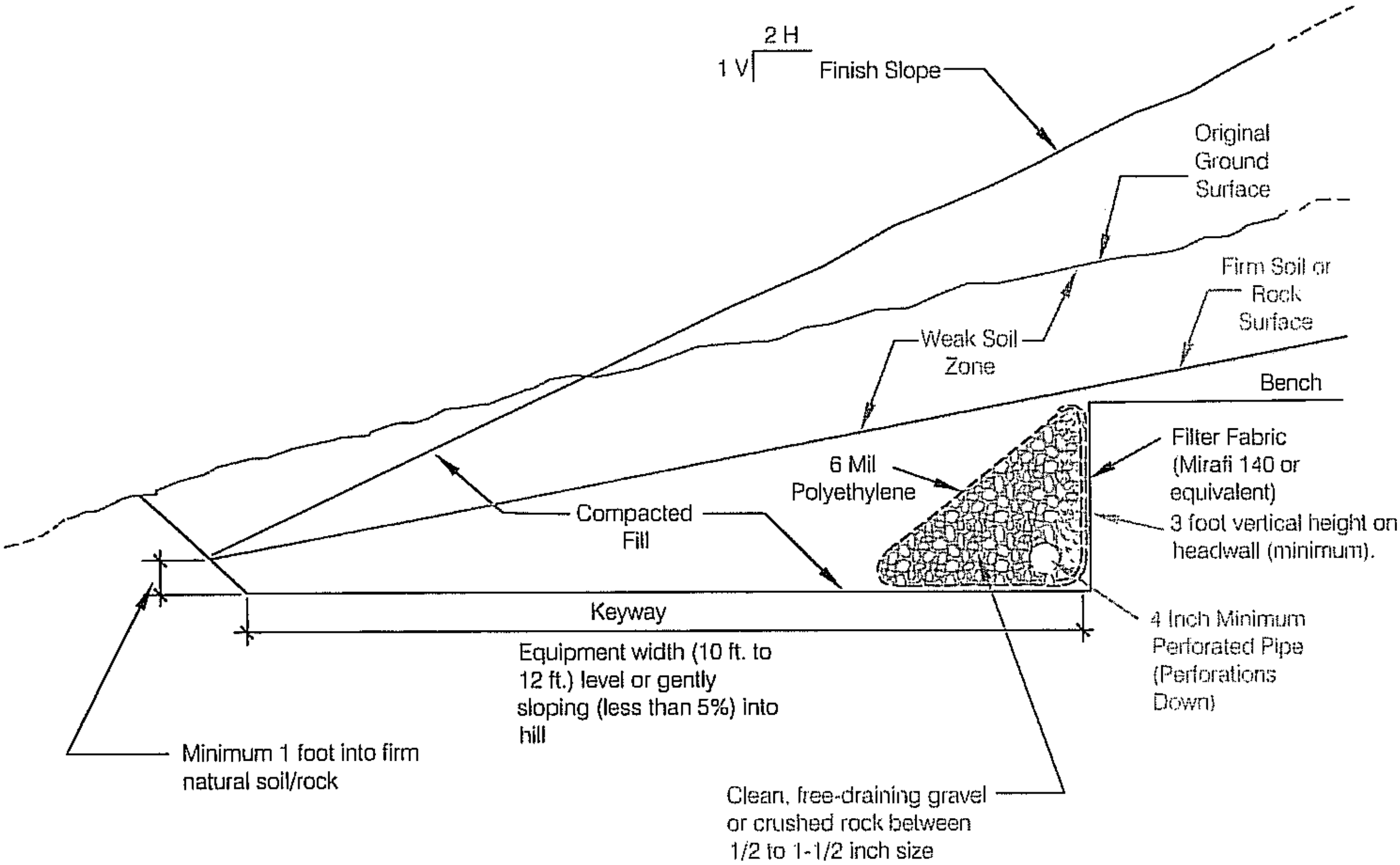
(1) Sample Source	Classification	(2) Remolded Dry Density (pcf)	(2) Remolded Moisture Content (%)	(3) Permeability (cm/sec.)
Bulk A TP-1 @ 8 ft.	OLIVE TO ORANGE-BROWN SILTY SAND (SM)	100	17.0	$1.3x10^{-6}$
Bulk B TP-1 @ 11-13 ft. & TP-2 @ 6 ft.	ORANGE TO OLIVE SILTY SAND (SM)	97	19.0	$7x10^{-7}$

NOTES:

(1) Sample obtained from on-site excavation.

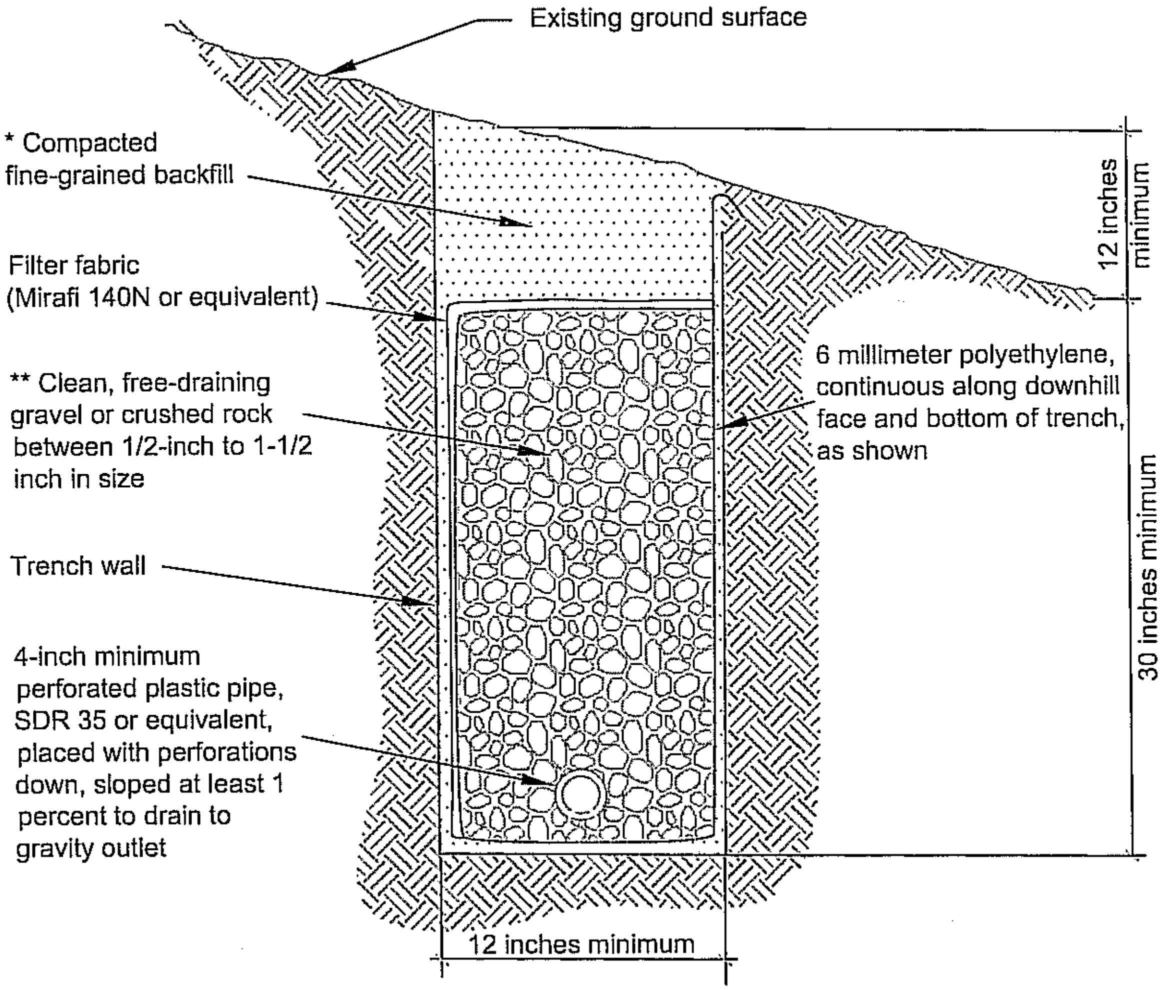
(2) Sample remolded to about 90 % relative compaction and about optimum moisture content based on laboratory compaction test performed in accordance with the ASTM D-1557-91 test method; see compaction data on Plate 13.

(3) Permeability tests performed in accordance with ASTM D-5084.



(NOT TO SCALE)

BACE Geotechnical a division of Brunsing Associates, Inc. (707) 838-0780	Job No.: 11673.1 Appr.: [signature] Date: 6/25/02	KEYWAY/BENCH DRAINAGE DETAIL ARTESA VINEYARDS Annapolis Road Annapolis, California	PLATE 15



* 90 percent relative compaction minimum in accordance with ASTM D 1557-78 Test Method

** Or, as an alternative, use Class 1 Type A Permeable Material per Caltrans specifications

TYPICAL SECTION
NO SCALE

BACE Geotechnical
a division of
Brunsing Associates, Inc.
(707) 838-0780

Job No.: 11673.1
Appr.: [signature]
Date: 6/25/02

TYPICAL TRENCH SUBDRAIN DETAIL
ARTESA VINEYARDS
Annapolis Road
Annapolis, California

PLATE
16