GEOTECHNICAL INVESTIGATION
NORTH FORK VINEYARDS
HIGHWAY 166
NEW CUYAMA, CALIFORNIA

January 4, 2016

PROJECT 15-7274

PREPARED BY:

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1.0 INTRODUCTION

This report presents the results of our geotechnical investigation for the proposed reservoirs and yard area to be constructed at North Fork Vineyards in the New Cuyama area of Santa Barbara County, California. A site location map is presented in Figure 1.

The reservoir sites are located within vacant and cattle grazing land on the south side of Highway 166, approximately 6 miles west of New Cuyama. The terrain in the vicinity of the proposed reservoirs is slightly sloping with elevations varying from around 1725 feet above mean sea level (MSL) to 1954 feet above MSL. Site gradients vary from less than 5 percent to greater than 10 percent. Based on the plans provided by Tom Howell the reservoirs will be roughly rectangular in shape. The proposed yard area is located in relatively level to slightly sloping terrain with site elevations of around 1775 feet above MSL

It is our understanding that the reservoirs will be constructed with inboard and outboard slope gradients of 2-1/2:1 (horizontal:vertical). The materials excavated from the site will reportedly be used to construct the slopes and berms. The inboard slopes and bottom of the pond will be cover with a HDPE type liner.

The project description is based on a site reconnaissance performed by a **GSI Soils, Inc.** engineer, and information provided by Tom Howell and Kevin Merrill of Mesa Vineyard Management. The site plan provided forms the basis for the "Site Plan", Figure 2. Limited information is available on the yard area. For preliminary planning purposes, it is assumed that any structures constructed will likely be wood framed with concrete slab-on-grade floors. For the purpose of this report, loads on the order of 15 kips (columns) and 1.5 kips per lineal foot (continuous) have been estimated

In the event that there is change in the nature, design or location of improvements, or if the assumed loads are not consistent with actual design loads, the conclusions and recommendations contained in this report should be reviewed and modified, if required. Evaluations of the soils for hydrocarbons or other chemical properties are beyond the scope of the investigation.

2.0 PURPOSE AND SCOPE

The purpose of this study was to explore and evaluate the surface and subsurface soil conditions at the site and to develop geotechnical information and design criteria for the proposed project. The scope of this study included the following items.

1. A review of available geotechnical information for this area of New Cuyama.

2. A field study consisting of a site reconnaissance and an exploratory boring program to formulate a description of the subsurface conditions.

3. A laboratory testing program performed on representative soil samples collected during our field study.

4. Engineering analysis of the data gathered during our field study, laboratory testing, and literature review. Development of recommendations for site preparation and grading.

5. Preparation of this report summarizing our findings, conclusions, and recommendations regarding the geotechnical aspects of the project site.

3.0 SUBSURFACE SOIL CONDITIONS

The near surface soils encountered in our exploratory borings generally consisted of silty sands and sandy silts to a depth of 3 to 4 feet. These materials were encountered in a dry to slightly moist state and in a loose condition. Clayey silts and sandy silts with some gravel were found below a depth of 4 feet in a slightly moist state and in a dense to very dense condition. In the reservoir sites these materials would be considered weathered bedrock.

Based on our experience there are varying degrees of collapse potential in the New Cuyama area. The soils in the yard area generally consist of younger alluvium (Qya) as a result of flood plain deposits, alluvial fans and stream bed deposits. The structure of these soils typically has increased voids or weak cementing that dissolve with excess water, resulting in hydro-compaction. Based on our experience, overexcavation of the upper 3 to 5 feet appears to have been effective in minimizing the potential for hydro-consolidation/collapse for typical rainfall amounts and irrigation practices. For collapse to occur a source of excess water would need to be present at the site. It will therefore be important to control water all sources at the site and to increase efforts in the preparation and backfill of utility lines since a break in a line could result in an event that would trigger soil collapse.

Free groundwater was not encountered in the exploratory borings to a depth of 20 feet. However, very moist conditions in the upper 4 to 5 feet may be present during wet winter months. A more detailed description of the soils encountered is presented graphically on the "Exploratory Boring Logs", B-1 to B-4, Appendix A. An explanation of the symbols and descriptions used on these logs are presented on the "Soil Classification Chart”.

The soil profile described above is generalized; therefore, the reader is advised to consult the boring logs (Appendix A) for specific soil conditions. Care should be exercised in interpolating or extrapolating subsurface conditions beyond the borings. On the boring logs we have indicated the soil type, moisture content, grain size, dry density, and the applicable Unified Soil Classification System Symbol.

The location of our exploratory borings, shown on Site Plan, Figure 2, was approximately determined from features at the site. Hence, accuracy can be implied only to the degree that this method warrants. Surface elevations at the boring location were not determined.

4.0 SEISMIC CONSIDERATIONS

4.1 Seismic Coefficients

Structures should be designed to resist the lateral forces generated by earthquake shaking in accordance with the building code and local design practice. This section presents seismic design parameters for use with the 2013 California Building Code (CBC) and ASCE 7-05. The site coordinates and the USGS interactive web page were used to obtain the seismic design criteria. The peak ground acceleration was estimated for a 2 percent probability of occurrence in 50 years using the USGS online deaggregation tool.

Seismic Data

California Building Code (2013)Seismic Parameter	Values for Site Class D
Latitude, degrees	35.015765
Longitude, degrees	-119.855920
Ss, Seismic Factor, Site Class B at 0.2 sec	1.322
S_1 Seismic Factor, Site Class B at 1 sec	0.565
Site Class	Sd, Stiff Soil
S_{MS}, Site Specific Response Parameter for Site Class at 0.2 sec	1.322
S_{M1}, Site Specific Response Parameter for Site Class D at 1 sec	0.847
S_{DS} = 2/3 S_{MS1}	0.882
S_{D1} = 2/3 S_{M1}	0.565
Rick category	I/II/III

4.2 Liquefaction Analysis

Liquefaction is described as the sudden loss of soil shear strength due to a rapid increase of pore water pressures caused by cyclic loading from a seismic event. In simple terms it means that the soil acts more like a fluid than a solid in a liquefiable event. In order for liquefaction to occur, the following are generally needed; granular soils (sand, silty sand and sandy silt), groundwater and low density (very loose to medium dense) conditions. A preliminary opinion on the potential for liquefaction is provided based on the soil borings and our experience in this area of Santa Barbara County. In general, loose silty sands and sandy silts were found to a depth of 4 to 5 feet. Silty sands and weathered bedrock materials were found below these materials to a depth of 20 feet below grade. Groundwater was not encountered in the borings. Based on our soil borings and previous field explorations in this area, liquefaction has a low potential to occur due to the dense condition of the soils and bedrock below a depth of 5 feet and the depth to groundwater which likely exceeds 50 feet below existing grades. This is a preliminary assessment and a detailed liquefaction study would be required to fully investigate the potential for liquefaction.

4.3 Lateral Spreading

The potential for lateral spreading at the property would be low due to the shallow depth to bedrock and the lack of liquefiable soil zones.

4.4 Slope Stability

As indicated previously the reservoirs are primarily located in sloping terrain with gradients varying from less the 10 percent to greater than 30 percent. Although shallow instability could occur in the steeper areas, if over-saturated conditions are present, the potential for movement to influence the proposed construction would be low to negligible. Instability of the proposed 2-1/2:1 (h:v) graded berm slopes are also anticipated to be negligible due to the shear strength and cohesion properties of the native soils and the compactability of these materials.

5.0 CONCLUSIONS AND RECOMMENDATIONS

1. The site is suitable for the proposed reservoirs and yard are provided the recommendations presented in this report are incorporated into the project plans and specifications. As indicated above, areas of the site over alluvial soils are prone to hydro-consolidation and collapse. Particular attention should be made to the control of surface water and the implementation of construction methods that would minimize the potential for excessive water accumulating at the site.

2. All grading plans should be reviewed by **GSI Soils Inc.**, hereinafter described as the Geotechnical Engineer, prior to contract bidding. This review should be performed to determine whether the recommendations contained within this report are incorporated into the project plans and specifications.

3. The Geotechnical Engineer should be notified at least 2 working days before site clearing or grading operations commence, and should be present to observe the stripping of deleterious material and provide consultation to the Grading Contractor in the field.

4. Field observation and testing during the grading operations should be provided by the Geotechnical Engineer so that a decision can be formed regarding the

adequacy of the site preparation, the acceptability of fill materials, and the extent to which the earthwork construction and the degree of compaction comply with the project geotechnical specifications. Any work related to grading performed without the full knowledge of, and under direct observation of the Geotechnical Engineer, may render the recommendations of this report invalid.

5.1 Clearing and Stripping

1. All surface and subsurface deleterious materials should be removed from the pond site and disposed of off-site. This includes, but is not limited to fills and loose soils, buried utility lines, loose fills, septic systems, debris, building materials, and any other surface and subsurface structures within proposed building areas. Voids left from site clearing, should be cleaned and backfilled as recommended for structural fill.

2. Once the site has been cleared, the exposed ground surface should be stripped to remove surface vegetation and organic soil. The surface may be disced, rather than stripped, if the organic content of the soil is not more than three percent by weight. If stripping is required, depths should be determined by a member of our staff in the field at the time of stripping. Strippings may be either disposed of off-site or stockpiled for future use in landscape areas if approved by the landscape architect.

5.2 Site Preparation

1. Due to the loose condition of the near surface soils and the sloping terrain, keys and benches will be required to construct the reservoir slopes and berms. Schematic drawings are provided on Figure 3 for construction of the reservoirs on sloping and near level terrain. It is anticipated that reworking of the soils will extend to 3 feet or greater below existing ground surface or the beneath the berms and/or bottom of the reservoirs. The exact depth of reworking efforts should be determined by a geotechnical engineer at the time of excavation. The exposed surfaces should then be scarified, moisture conditioned to slightly above optimum and compacted to at least 90 percent of ASTM D1557-02 prior to

placing fill. As indicated on Figure 3, excavation of a 10 foot wide keyway at the bottom of the slopes extending at least 2 feet into competent soils and a minimum 5 feet below existing grades, whichever is deeper. Keys and benches should be a minimum of 10 feet wide by a maximum of 4 feet high or as directed by the geotechnical engineer. The removed soils can be used to construct the slopes and should be compacted to at least 90 percent of ASTM D1557-02.

2. Inboard and outboard cut and fill slopes for the pond and around the perimeter should be no steeper than 2-1/2:1 (horizontal:vertical), and should be properly compacted to 90 percent of maximum dry density. Fill slopes they should be overbuilt and cut back to provide firm, uniformly compacted slopes.

3. Water should be conveyed to the base of the reservoir through a conduit or over a paved channel. Water should not be allowed to run freely over the sides of the inboard and outboard slopes. Erosion protection measures should be undertaken to protect the slopes.

4. In the yard area, building pads and related construction should be overexcavated to a depth of four (4) feet below existing grades or two (2) feet below the bottom of the deepest footing, whichever is greater. The exposed surface should then be scarified and wetted to above optimum moisture and compacted by means of heavy vibrating equipment so that an additional one (1) feet is at least ninety (90) percent of maximum dry density (ASTM D1557-02). The removed non-expansive soils can then be replaced and similarly compacted. The lateral limits of overexcavation, scarification, and fill placement should be at least 5 feet beyond the perimeter building and footing lines.

5. The near-surface soils may become partially or completely saturated during the rainy season. Grading operations during this time period may be difficult since the saturated materials may not be compactable and they may not support construction equipment. Consideration should be given to the seasonal limit of the grading operations on the site.

5.3 Structural Fill

1. The embankments may be constructed with the soil (silty sands and sandy silts) encountered at the site. All fill should be free of organic and deleterious material. Structural fill should not contain rocks larger than 3 inches in greatest dimension, and should have no more than 15 percent larger than 1.5 inches in greatest dimension.

2. Import soil for the embankments should be free of organic and other deleterious material and should have a very low expansion potential, with a plasticity index of less than 10 and a sand equivalent of at least 20. Before delivery to the site, a sample of the proposed import should be tested in our laboratory to determine its suitability for use as structural fill.

3. Structural fill using on-site inorganic soil or approved import should be placed in layers, each not exceeding eight inches in thickness before compaction. On-site inorganic or imported soil should be conditioned with water, or allowed to dry, to produce a soil water content at approximately optimum value, and should be compacted to at least 90 percent relative compaction based on ASTM D1557-02.

5.4 Foundations

1. Conventional continuous footings and spread footings may be used for support of lightly loaded Ag structures. All of the foundation materials should be competent after preparation in accordance with the grading section of this report.

2. The perimeter footings should be at least 15 inches wide and embedded a minimum of 24 inches below pad grade or below adjacent finished grade, whichever is lower. Spread footings should be a minimum of 18 inches square and 24 inches deep and tied to perimeter footings with grade beams. The reinforcement for the footings should be designed by the structural engineer; however, a minimum of two (2) No. 5 rebar should be provided top and bottom in continuous footings and grade beams with dowels (#3 bars @ 18 inches o.c.) to tie the slab to the footings and grade beams.

3. An allowable dead plus live load bearing pressure of 1,500 psf may be used for design. A total settlement (structural) of less than 1-inch is anticipated with differential settlements being 50 percent of this value.

4. The above allowable pressures are for support of dead plus live loads and may be increased by one-third for short term wind and seismic loads.

5. Lateral forces on structures may be resisted by passive pressure acting against the sides of shallow footings and/or friction between the soil and the bottom of the footing. For resistance to lateral loads, a friction factor of 0.35 may be utilized for sliding resistance at the base of the spread footings in undisturbed native materials or engineered fill. A passive resistance of 350 pcf equivalent fluid weight may be used against the side of shallow footings. If friction and passive pressures are combined, the lesser value should be reduced by 33 percent.

5.5 Slab-On-Grade Construction

1. Concrete slabs-on-grade and flatwork should not be placed directly on unprepared loose fill materials. Preparation of subgrade to receive concrete slabs-on-grade and flatwork should be processed as discussed in the preceding sections of this report.

2. Where floor dampness in not objectionable, concrete slabs may be cast on a minimum of 6 inches of select import (decomposed granite and Class II/III Base) compacted to 90 percent. If it is desired to minimize floor dampness a section of capillary break material at least 4 inches thick and covered with a 10-mil polyethylene barrier should be provided between the floor slab and compacted soil subgrade. All seams through the vapor barrier should be overlapped and sealed. Where pipes extend through the vapor barrier, the barrier should be sealed to the pipes. The capillary break should be a clean free-draining material such as clean gravel or permeable aggregate complying with Caltrans Standard Specifications 68, Class I, Type A or Type B, to service as a cushion and a

capillary break. It is suggested that a 2-inch thick sand layer be placed on top of the membrane to assist in the curing of the concrete. The sand should be lightly moistened prior to placing concrete.

3. Concrete slabs-on-grade should be a minimum of 4 inches thick and should be reinforced with No. 3 reinforcing bars placed at 18 inches on-center both ways at or slightly above the center of the structural section. Reinforcing bars should have a minimum clear cover of 1.5 inches, and hot bars should be cooled prior to placing concrete. The aforementioned reinforcement may be used for anticipated uniform floor loads not exceeding 100 psf. If floor loads greater than 100 psf are anticipated the slab should be evaluated by a structural engineer.

4. All slabs should be poured at a maximum slump of less than 5 inches. Excessive water content is the major cause of concrete cracking. For design of concrete floors, a modulus of subgrade reaction of k = 100 psi per inch would be applicable to on-site engineered fill soils.

5.6 Pavement Design

1. The following table provides recommended pavement sections based on an estimated R-Value of 20 for the near surface sandy silt soils encountered.

RECOMMENDED MINIMUM ASPHALT CONCRETE PAVEMENT SECTIONS DESIGN THICKNESS		
T.I.	**A.C.-in. (ft.)**	**A.B.-in. (ft.)**
4.5	2.5	7.0
5.0	2.5	8.5
5.5	3.0	8.5
6.0	3.0	11.0
T.I. =	**Traffic Index**	
A.C. =	**Asphaltic Concrete - must meet specifications for Caltrans Type B Asphalt Concrete**	
A.B. =	**Aggregate Base - must meet specifications for Caltrans Class II Aggregate Base (R-Value = minimum 78)**	
	***Gravel for All-weather roads should conform to the requirements for ¾" maximum Class II Base with increased binder. The amount passing the #30 and #200 sieves should vary between 15 to 30 and 7 to 11 percent respectively**	

2. All sections should be crowned for good drainage. Aggregate base should consist of imported material conforming to Caltrans Standard Specifications for Class 2 aggregate base, Section 26-1.02A. Class 3 aggregate manufactured from reclaimed materials can be used in lieu of Class 2 material, provided that Class 3 material meets the gradation and quality requirements for Class 2 aggregate base. All asphalt pavement construction should conform with Section 39 of the latest edition of the Standard Specifications, State of California, Department of Transportation. Aggregate bases and sub-bases should also be compacted to a minimum relative compaction of 95 percent based ASTM D1557-02.

3. Gravel roads (TI's up to 6.0) should have a minimum section of 12 inches of Class II Base with sufficient binder as indicated in the table above. The upper 12 inches of subgrade for gravel roads should be compacted to a minimum relative compaction of 95 percent based on ASTM D1557-02. Gravel roads should be crowned for good drainage.

5.7 <u>Underground Facilities Construction</u>

1. The attention of contractors, particularly the underground contractors, should be drawn to the State of California Construction Safety Orders for "Excavations, Trenches, and Earthwork". Trenches or excavations greater than 5 feet in depth should be shored or sloped back in accordance with OSHA Regulations prior to entry.

2. For purposes of this section of the report, bedding is defined as material placed in a trench up to 1 foot above a utility pipe and backfill is all material placed in the trench above the bedding. Unless concrete bedding is required around utility pipes, free-draining sand should be used as bedding. Sand proposed for use as bedding should be tested in our laboratory to verify its suitability and to measure its compaction characteristics. Sand bedding should be compacted by mechanical means to achieve at least 90% relative compaction based on ASTM Test D1557-02.

3. On-site inorganic soil, or approved import, may be used as utility trench backfill. Proper compaction of trench backfill will be necessary under and adjacent to structural fill, building foundations, concrete slabs and vehicle pavements. In these areas, backfill should be conditioned with water (or allowed to dry), to produce a soil water content of about 2-3% above the optimum value and placed in horizontal layers each not exceeding 8 inches in thickness before compaction. Each layer should be compacted to at least 90% relative compaction based on ASTM Test D1557-02. The top lift of trench backfill under vehicle pavements should be compacted to 95% relative compaction. Trench walls must be kept moist prior to and during backfill placement.

5.8 Surface and Subsurface Drainage

1. Concentrated surface water runoff within or immediately adjacent to the site should be conveyed in pipes or in lined channels to discharge areas that are relatively level or that are adequately protected against erosion.

2. Careful attention should be paid to erosion protection of soil surfaces adjacent to the edges of roads, curbs and sidewalks, and in other areas where "hard" edges of structures may cause concentrated flow of surface water runoff. Erosion resistant matting such as Miramat, or other similar products, may be considered for lining drainage channels

3. Maintenance of slopes and drainage devices is important to their long-term performance. The following is a list of procedures that could be considered by the civil engineer for slope maintenance.

    a. Hydroseeding or planting a surface cover of protective vegetation on all outboard slope surfaces is recommended. The outboard slopes should also be covered with erosion control matting such as Greenfix CF072RR or equivalent.

b. Animal burrows can serve to collect normal sheet flow on slopes and cause rapid and destructive erosion, and should be controlled or eliminated.

c. All modifications to slopes should be made under the direction or approval of the soils engineer.

5.9 Geotechnical Observation and Testing

1. Field exploration and site reconnaissance provides only a limited view of the geotechnical conditions of the site. Substantially more information will be revealed during the excavation and grading phases of the construction. Stripping & clearing of vegetation, overexcavation, scarification, fill and backfill placement and compaction should be reviewed by the geotechnical professional during construction to evaluate if the materials encountered during construction are consistent with those assumed for this report.

2. Special inspection of grading should be provided in accordance with California Building Code Section 1705.6 and Table 1705.6. The special inspector should be under the direction of the engineer. As indicated in the table below periodic inspection should suffice for this project.

CBC TABLE 1705.6 REQUIRED VERIFICATION AND INSPECTION OF SOILS

VERIFICATION AND INSPECTION TASK	CONTINUOUS DURING TASK LISTED	PERIODIC DURING TASK LISTED
1. Verify materials below shallow foundations are adequate to achieve the design bearing capacity		X
2. Verify excavations are extended to proper depth and have reached proper material		X
3. Perform classification and testing of compacted fill		X
4. Verify use of proper materials, densities and lift thicknesses during placement and compaction of compacted fill	X	
5. Prior to placement of compacted fill, observe subgrade and verify that site has been prepared properly.		X

3. The validity of the recommendations contained in this report are also dependent upon a prescribed testing and observation program. Our firm assumes no responsibility for construction compliance with these design concepts and recommendations unless we have been retained to perform on-site testing and review during all phases of site preparation, grading, and foundation/slab construction. The Geotechnical Engineer should be notified at least two (2) working days before site clearing or grading operations commence to develop a program of quality control.

6.0 LIMITATIONS AND UNIFORMITY OF CONDITIONS

1. It should be noted that it is the responsibility of the owner or his/her representative to notify **GSI Soils Inc.** a minimum of 48 hours before any stripping, grading, or foundation excavations can commence at this site.

2. The recommendations of this report are based upon the assumption that the soil conditions do not deviate from those disclosed during our study. Should any variations or undesirable conditions be encountered during grading of the site, **GSI Soils Inc.** will provide supplemental recommendations as dictated by the field conditions.

3. This report is issued with the understanding that it is the responsibility of the owner or his/her representative to ensure that the information and recommendations contained herein are brought to the attention of the architect and engineer for the project, and incorporated into the project plans and specifications. The owner or his/her representative is responsible for ensuring that the necessary steps are taken to see that the contractor and subcontractors carry out such recommendations in the field.

4. As of the present date, the findings of this report are valid for the property studied. With the passage of time, changes in the conditions of a property can occur whether they be due to natural processes or to the works of man on this or adjacent properties. Legislation or the broadening of knowledge may result in

changes in applicable standards. Changes outside of our control may find this report to be invalid, wholly or partially. Therefore, this report should not be relied upon after a period of 3 years without our review nor is it applicable for any properties other than those studied.

5. Validity of the recommendations contained in this report is also dependent upon the prescribed testing and observation program during the site preparation and construction phases. Our firm assumes no responsibility for construction compliance with these design concepts and recommendations unless we have been retained to perform continuous on-site testing and review during all phases of site preparation, grading, and foundation/slab construction.

Thank you for the opportunity to have been of service in preparing this report. If you have any questions or require additional assistance, please feel free to contact the undersigned at (805) 349-0140.

Sincerely,

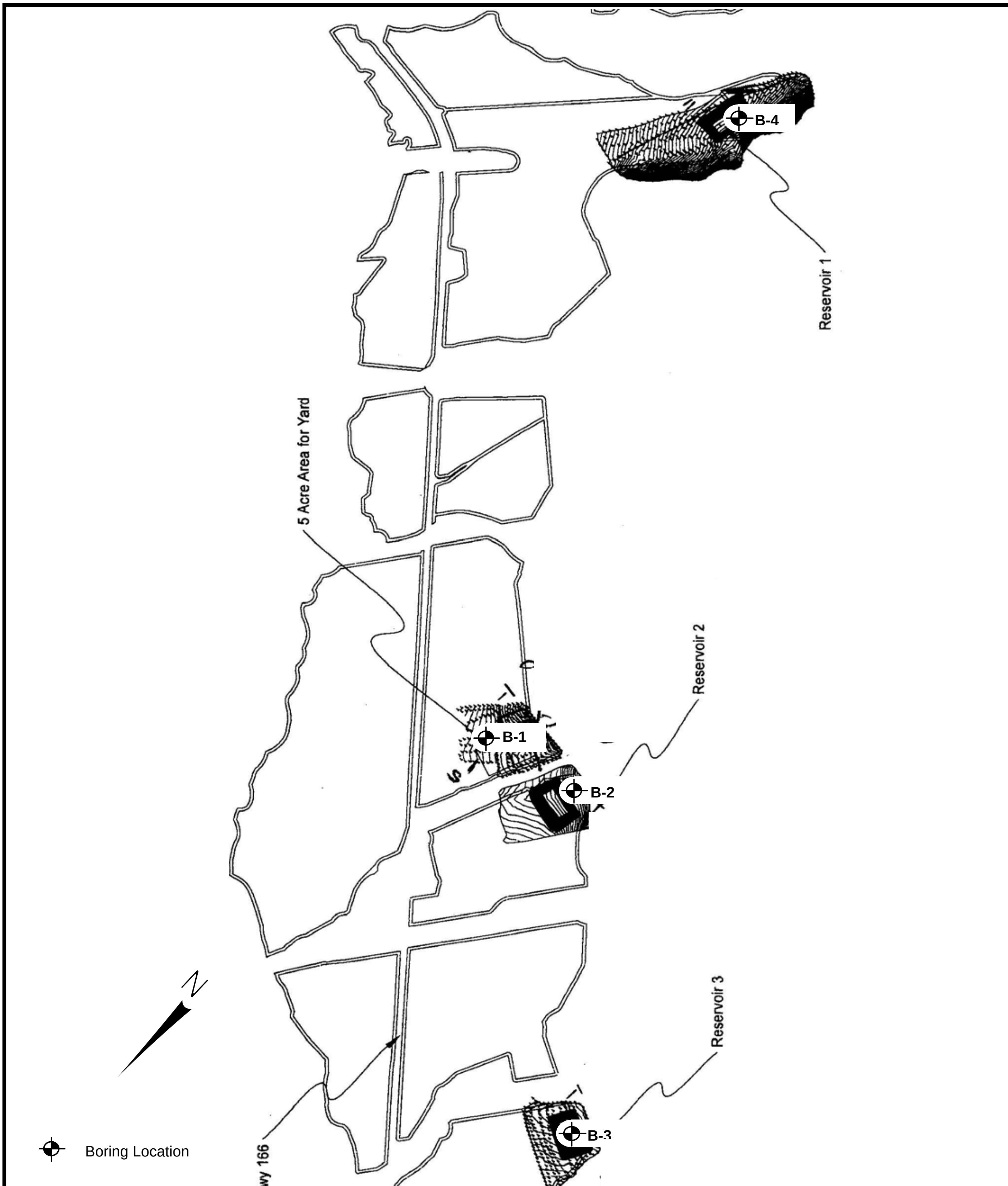
GSI SOILS INC.

Rick Armero
Project Manager

Ronald J. Church
GE #2184

FIGURES

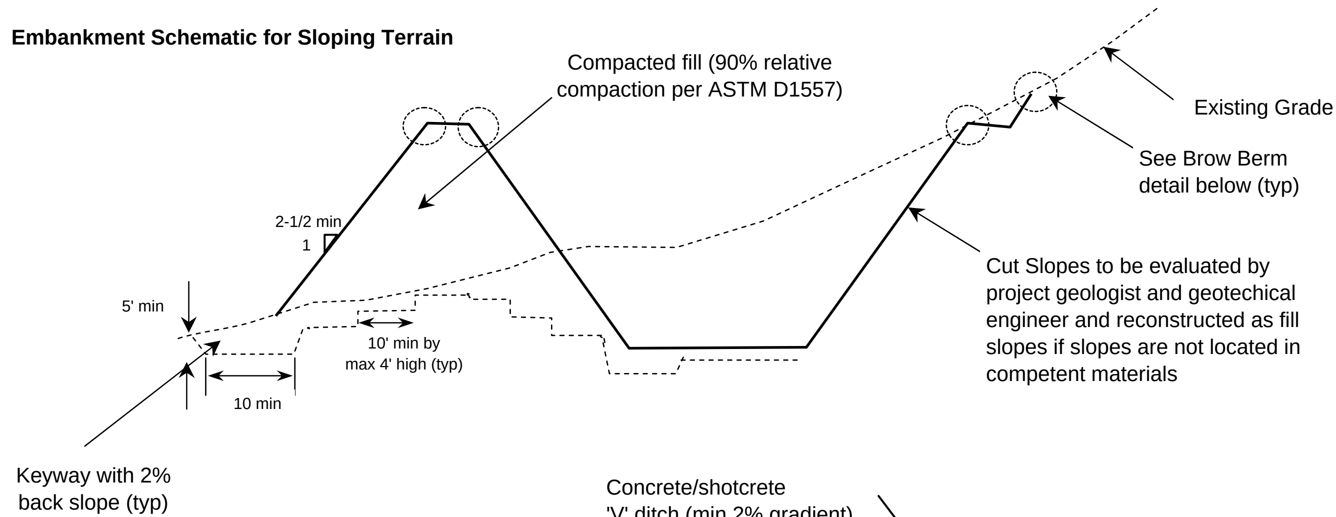
	SITE MAP NORTH FORK VINEYARDS HIGHWAY 166 NEW CUYAMA, CALIFORNIA	Project No.	Figure No.
GSI		15-7274	1

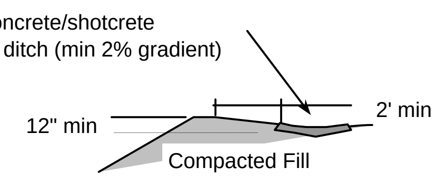


SITE PLAN
NORTH FORK VINEYARDS
HIGHWAY 166
NEW CUYAMA, CALIFORNIA

Project No.	Figure No.
15-7274	2

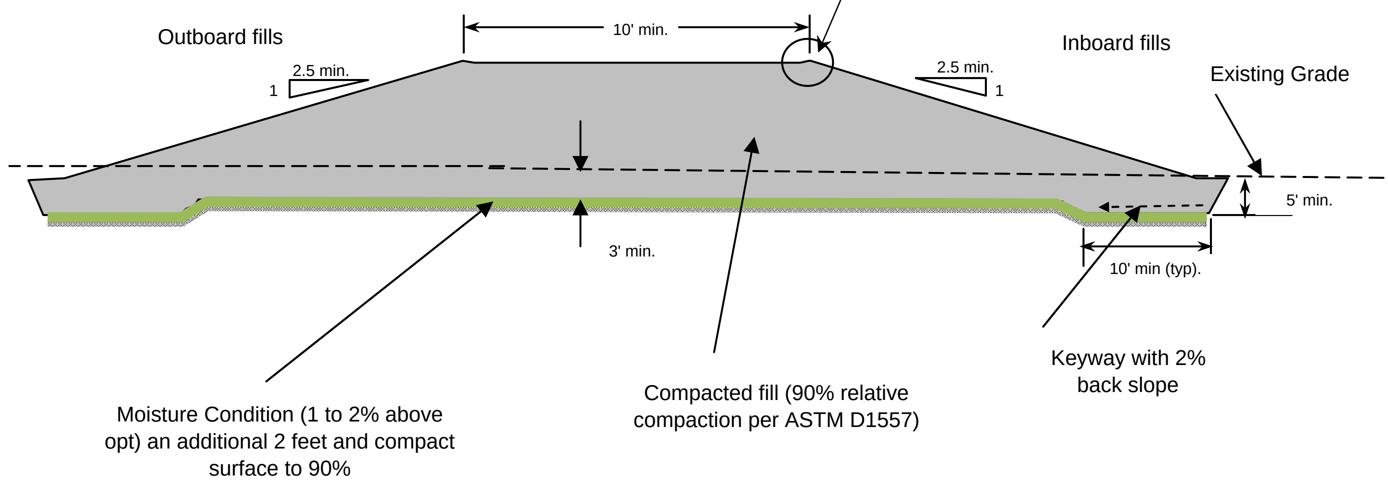
Embankment Schematic for Sloping Terrain





Brow Berm Detail

Embankment Schematic for Near Level Terrain



Notes:

1) **Final width and depth of keys will be determined by geotechnical engineer during grading.**
2) **Key heel subdrain and blanket drain may be required.**
3) **Subdrains should extend the entire length of the keys.**
4) **Backcut, key depth and width are subject to field change based on consultants inspection.**
5) **A min.10' wide by max. 4' high benches should be installed where berm fills extend into existing slopes**
6) **Bench drains maybe required.**
7) **Mid slope terrace (6'wide) will be required when slope hgt exceeds 20' with shotcrete 'V' ditch (5% gradient)**
8) **Provide permanent slope protection or cover with Greenfix CF072RR or equivalent while vegetation becomes established**

GSI	TYPICAL EMBANKMENT SCHEMATIC NORTH FORK VINEYARDS HIGHWAY 166 NEW CUYAMA, CALIFORNIA	Project No.	Figure No.
		15-7274	3

APPENDIX A

Field Investigation
Key to Boring Logs
Boring Logs

FIELD INVESTIGATION

Test Hole Drilling

The field investigation was conducted on December 10 and 11, 2015. Four (4) exploratory borings were drilled at the approximate locations indicated on the Site Plan, Figure 2. The locations of these borings were approximated in the field.

Undisturbed and bulk samples were obtained at various depths during test hole drilling. The undisturbed samples were obtained by driving a 2.4 inch inside diameter sampler into soils. Bulk samples were also obtained during drilling.

Logs of Boring

A continuous log of soils, as encountered in the borings was recorded at the time of the field investigation, by a Staff Engineer. The Exploration Boring Logs are attached.

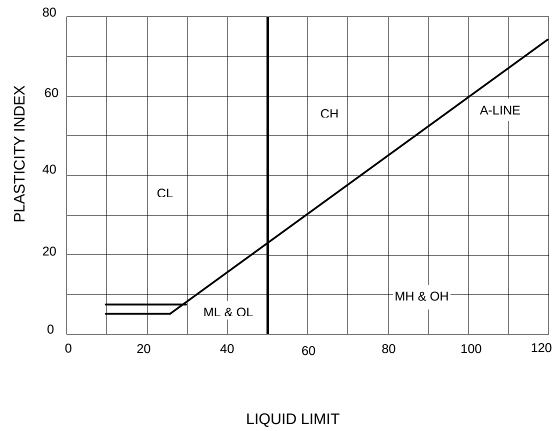
Locations and depth of sampling, in-situ soil dry densities and moisture contents are tabulated in the Boring Logs.

UNIFIED SOIL CLASSIFICATION SYSTEMS

MAJOR DIVISION			SYMBOLS	TYPICAL NAMES
COARSE GRAINED SOILS Over 50% > #200 sieve	GRAVELS Over 50% > #4 sieve	CLEAN GRAVELS WITH LITTLE OR NO FINES	GW	WELL GRADED GRAVELS, GRAVEL-SAND MIXTURES
			GP	POORLY GRADED GRAVELS, GRAVEL-SAND MIXTURES
		GRAVELS WITH OVER 12% FINES	GM	SILTY GRAVELS, POORLY GRADED GRAVEL-SAND-SILT MIXTURES
			GC	CLAYEY GRAVELS, POORLY GRADED GRAVEL-SAND-CLAY MIXTURES
	SANDS Over 50% < #4 sieve	CLEAN SANDS WITH LITTLE OR NO FINES	SW	WELL GRADED SANDS, GRAVELLY SANDS
			SP	POORLY GRADED SANDS, GRAVELLY SANDS
		SANDS WITH OVER 12% FINES	SM	SILTY SANDS, POORLY GRADED SAND-SILT MIXTURES
			SC	CLAYEY SANDS, POORLY GRADED SAND-CLAY MIXTURES
FINE GRAINED SOILS Over 50% < #200 sieve	SILTS AND CLAYS Liquid limit < 50		ML	INORGANIC SILTS, SILTY OR CLAYEY FINE SANDS, OR CLAYEY SILTS WITH SLIGHT PLASTICITY
			CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY, SANDY, OR SILTY CLAYS, LEAN CLAYS
			OL	ORGANIC CLAYS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS Liquid limit > 50		MH	INORGANIC SILTS , MICACEOUS OR DIATOMACIOUS FINE SANDY OR SILTY SOILS, ELASTIC SILTS
			CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
			OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC CLAYS			Pt	PEAT AND OTHER HIGHLY ORGANIC SOILS

PLASTICITY CHART

USED FOR CLASSIFICATION OF FINE GRAINED SOILS



SOIL GRAIN SIZE

U.S. STANDARD SIEVE

	6"		3"	3/4"	4	10	40	200	
BOULDERS	COBBLES	GRAVEL COARSE	GRAVEL FINE	SAND COARSE	SAND MEDIUM	SAND FINE	SILT	CLAY	
	150		75	19	4.75	2.0	0.425	0.075	0.002

SOIL GRAIN SIZE IN MILLIMETERS

SAMPLE DRIVING RECORD

BLOWS PER FOOT	DESCRIPTION
25	25 BLOWS DROVE SAMPLER 12 INCHES, AFTER INITIAL 6 INCHES OF SEATING
50/7"	50 BLOWS DROVE SAMPLER 7 INCHES, AFTER INITIAL 6 INCHES OF SEATING
Ref/3"	50 BLOWS DROVE SAMPLER 3 INCHES DURING OR AFTER INITIAL 6 INCHES OF SEATING

NOTE: TO AVOID DAMAGE TO SAMPLING TOOLS, DRIVING IS LIMITED TO 50 BLOWS PER 6 INCHES DURING OR AFTER SEATING INTERVAL

KEY TO TEST DATA

B	Bag Sample	CONS	Consolidation (ASTM D2435)
	Drive, No Sample Collected	DS	Cons. Drained Direct Shear (ASTM D3080)
	2 1/2" O.D. Mod. California Sampler, Not Tested	PP	Pocket Penetrometer
	2 1/2" O.D. Mod. California Sampler, Tested	GSD	Grain Size Distribution (ASTM D422)
	Standard Penetration Test	CP	Compaction Test (ASTM D1557)
	Sample Attempted with No Recovery	EI	Expansion Index (ASTM D4829)
	Water Level at Time of Drilling	LL	Liquid Limit (in percent)
	Water Level after Drilling	PI	Plasticity Index

RELATIVE DENSITY

SANDS, GRAVELS, AND NON PLASTIC SILTS	BLOWS/FOOT
VERY LOOSE	0 - 4
LOOSE	4 - 10
MEDIUM DENSE	10 - 30
DENSE	30 - 50
VERY DENSE	OVER 50

RELATIVE DENSITY

CLAYS AND PLASTIC SILTS	STRENGTH	BLOWS/FOOT
VERY SOFT	0 - 1/4	0 - 2
SOFT	1/4 - 1/2	2 - 4
FIRM	1/2 - 1	4 - 8
STIFF	1 - 2	8 - 16
VERY STIFF	2 - 4	16 - 32
HARD	OVER 4	OVER 32

PROJECT NO.:	15-7274	SOIL CLASSIFICATION CHART AND BORING LOG LEGEND
DATE DRILLED:	12/10/2015	
NORTH FORK VINEYARDS NEW CUYAMA, CALIFORNIA		FIGURE NO. A-1

LOGGED BY: **MS** DRILL RIG: **Simco 2400** BORING NO.: **B-1**

ELEVATION: **1765'** BORING DIAMETER (INCH): **5** DATE DRILLED: **11 December 2015**

GROUNDWATER DEPTH (FT):

ELEVATION (FT)	DEPTH (FT)	GRAPHIC LOG	GEOTECHNICAL DESCRIPTION	SOIL TYPE	SAMPLE	CONV. SPT BLOW COUNT	WATER CONTENT (%)	DRY DENSITY (PCF)	LIQUID LIMIT	PLASIT. INDEX	UNC. COMP. STRENGTH (PSF)	COMMENTS AND ADDITIONAL TESTS
			Silty Sand: brown, slightly moist, trace clay and gravel, loose	SM								
1764	1											
1763	2				B		4.5					EI = 0
1762	3		Silty Sand: brown, slightly moist, some clay, loose	SM-ML	B		4.7					
1761	4											
1760	5				◢	5	5.5					
1759	6		Sandy Silt: brown, slightly moist, fine grained, trace clay, firm	ML-SM								
1758	7											
1757	8				B		6.1					
1756	9											
1755	10		stiff		▮▮	12	7.4					
1754	11											
1753	12		increasing sand									
1752	13				B							
1751	14											
1750	15				▮▮	24	6.1					
1749	16											
1748	17		orangish brown									
1747	18											
1746	19				B		6.6					
1745	20		Boring Terminated at 20 feet									

EXPLORATORY BORING LOGS

GSI

NORTH FORK VINEYARDS
HIGHWAY 166, NEW CUYAMA

PROJECT NO.	DATE	FIGURE NO.
15-7274	**January-16**	**A-2**

LOGGED BY: **DG** DRILL RIG: **Hand Auger** BORING NO.: **B-2**

ELEVATION: **1775'** BORING DIAMETER (INCH): **5** DATE DRILLED: **10 December 2015**

GROUNDWATER DEPTH (FT):

ELEVATION (FT)	DEPTH (FT)	GRAPHIC LOG	GEOTECHNICAL DESCRIPTION	SOIL TYPE	SAMPLE	CONV. SPT BLOW COUNT	WATER CONTENT (%)	DRY DENSITY (PCF)	LIQUID LIMIT	PLASIT. INDEX	UNC. COMP. STRENGTH (PSF)	COMMENTS AND ADDITIONAL TESTS
			Sandy Silt: brown, slightly moist, fine grained, some clay, firm	ML								
1774	1											
1773	2				B		4.3					
1772	3		stiff									
1771	4		Silty Sand: brown, slightly moist, fine to medium grained, some shale fragments (severely weathered bedrock)	SM								
1770	5				II	31	4.6					
1769	6											
1768	7		Boring terminated at 7 feet									
1767	8											
1766	9											
1765	10											
1764	11											
1763	12											
1762	13											
1761	14											
1760	15											
1759	16											
1758	17											
1757	18											
1756	19											
1755	20											

EXPLORATORY BORING LOGS

GSI

NORTH FORK VINEYARDS
HIGHWAY 166, NEW CUYAMA

PROJECT NO.	DATE	FIGURE NO.
15-7274	**January-16**	**A-3**

LOGGED BY:	**DG**	DRILL RIG:	**Simco 2400**	BORING NO.:	**B-3**
ELEVATION:	**1730'**	BORING DIAMETER (INCH):	**5**	DATE DRILLED:	**10 December 2015**
GROUNDWATER DEPTH (FT):					

ELEVATION (FT)	DEPTH (FT)	GRAPHIC LOG	GEOTECHNICAL DESCRIPTION	SOIL TYPE	SAMPLE	CONV. SPT BLOW COUNT	WATER CONTENT (%)	DRY DENSITY (PCF)	LIQUID LIMIT	PLASIT. INDEX	UNC. COMP. STRENGTH (PSF)	COMMENTS AND ADDITIONAL TESTS
			Silty Sand: brown, slightly moist, trace clay, some gravel, loose	SM								
1729	1											
1728	2				B		4.4					EI = 0
1727	3		Clayey Silt: brown, slightly moist, some fine grained sand, some shale fragments (highly weathered bedrock).	ML								
1726	4											
1725	5				B		3.1					
1724	6		Boring terminated at 6 feet									
1723	7											
1722	8											
1721	9											
1720	10											
1719	11											
1718	12											
1717	13											
1716	14											
1715	15											
1714	16											
1713	17											
1712	18											
1711	19											
1710	20											

EXPLORATORY BORING LOGS

GSI

NORTH FORK VINEYARDS
HIGHWAY 166, NEW CUYAMA

PROJECT NO.	DATE	FIGURE NO.
15-7274	**January-16**	**A-4**

LOGGED BY: DG	DRILL RIG: Hand Auger	BORING NO.: B-4
ELEVATION: 1945'	BORING DIAMETER (INCH): 5	DATE DRILLED: 10 December 2015
GROUNDWATER DEPTH (FT):		

ELEVATION (FT)	DEPTH (FT)	GRAPHIC LOG	GEOTECHNICAL DESCRIPTION	SOIL TYPE	SAMPLE	CONV. SPT BLOW COUNT	WATER CONTENT (%)	DRY DENSITY (PCF)	LIQUID LIMIT	PLASIT. INDEX	UNC. COMP. STRENGTH (PSF)	COMMENTS AND ADDITIONAL TESTS
			Silty Sand: brown, slightly moist, trace clay, some gravel, loose	SM-ML								
1944	1											
1943	2				B		2.3					
1942	3		Silty Sand: brown, slightly moist, fine to medium grained, some shale fragments (severely weathered bedrock)	SM								
1941	4											
1940	5				B		3.0					
1939	6											
1938	7		Boring terminated at 7 feet									
1937	8											
1936	9											
1935	10											
1934	11											
1933	12											
1932	13											
1931	14											
1930	15											
1929	16											
1928	17											
1927	18											
1926	19											
1925	20											

EXPLORATORY BORING LOGS

GSI

NORTH FORK VINEYARDS
HIGHWAY 166, NEW CUYAMA

PROJECT NO.	DATE	FIGURE NO.
15-7274	January-16	A-5

APPENDIX B

Laboratory Testing
Direct Shear Test
R-Value Test
Expansion Index

LABORATORY TESTING

Moisture-Density Tests

The field moisture content, as a percentage of the dry weight of the soil, was determined by weighing samples before and after oven drying. Dry densities, in pounds per cubic foot, were also determined for the undisturbed samples. Results of these determinations are shown in the Exploration Boring Logs.

Direct Shear Test

Direct shear tests were performed on undisturbed samples, to determine strength characteristics of the soil. The test specimens were soaked prior to testing. Results of the shear strength tests are attached.

Resistance (R) Value Test

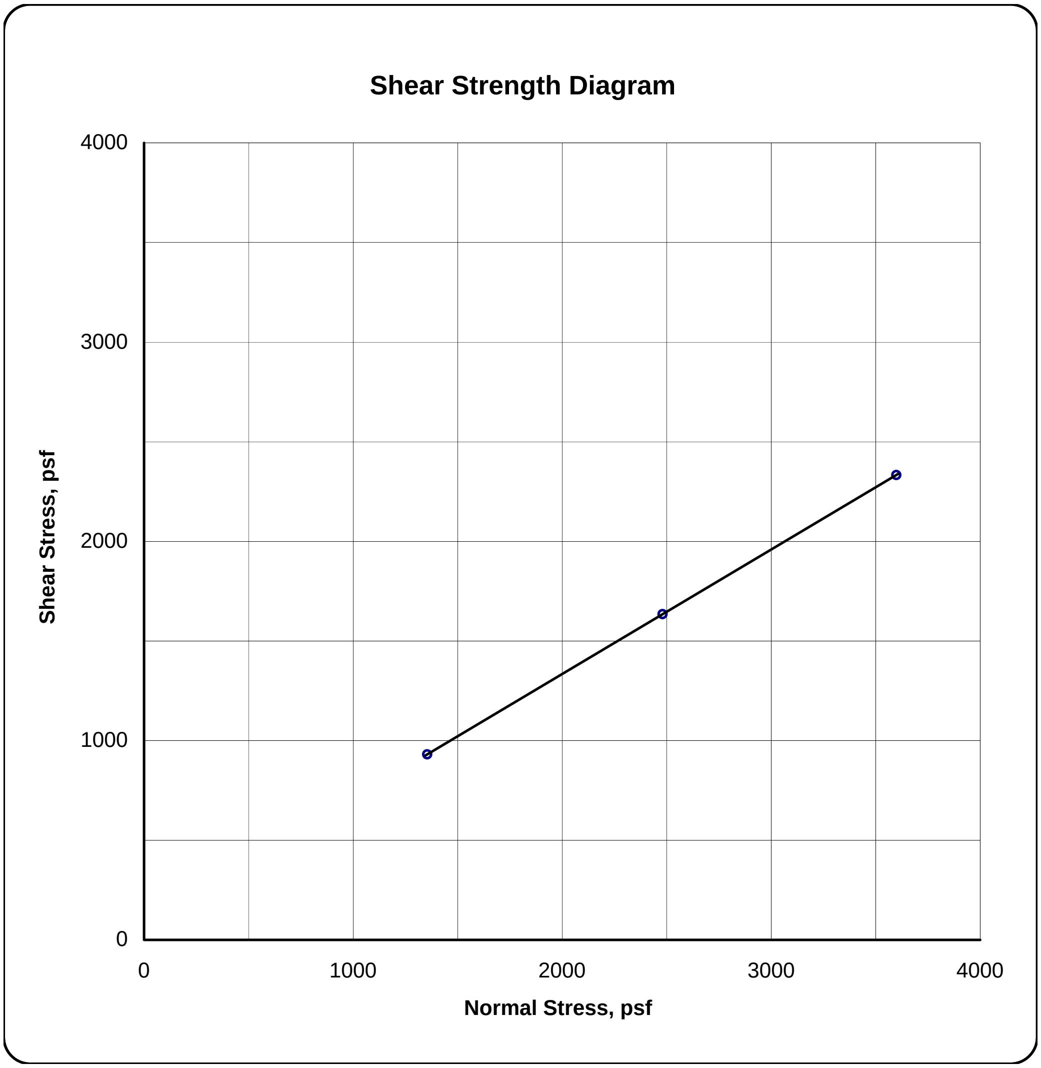
An R-Value test was estimated based on seive analysis and plasticity on a bulk sample obtained from boring B-2. The results of the test indicate that the sandy silt soils have an R-Value of 20

Expansion Index Tests

An expansion index of 0 was obtained for the native silty sands encountered in boring B-1. The test procedure was performed in accordance with ASTM D4829 – Standard Test Method for Expansion Index of Soils.

DIRECT SHEAR TEST

ASTM D3080-11 (Modified for unconsolidated-undrained conditions)



Project:	NORTH FORK VINEYARDS	Project No.	15-7274
Sample Location:	B-1 @ 4 feet	Initial Dry Density (pcf)	98.4
Soil Description:	**Silty Sand**	Initial Moisture (%)	5.5
Sample Type:	○ Remolded ◉ Ring	**Peak Shear Angle** **Cohesion (psf)**	**32** **85**