Geotechnical Investigation

Tract K-N La Luz Del Oeste Unit 4
Albuquerque, New Mexico

Prepared for:
Las Ventanas Homes, LLC

Project No.: 13-1-110
October 30, 2013

8916-A ADAMS ST., NE
ALBUQUERQUE, NM 87113
OFFICE: 505.797.9743
CONTACTUS@X8EVINYARD.COM

TABLE OF CONTENTS

8916-A Adams Street NE
Albuquerque, NM 87113

Office: 505.797.9743
Fax: 505.797.9749

TABLE OF CONTENTS

8916-A Adams Street NE
Albuquerque, NM 87113

Office: 505.797.9743
Fax: 505.797.9749

1.0 INTRODUCTION

This report presents the results of our geotechnical investigation for the proposed Retaining wall changes and retention ponds percolation rates. Vinyard & Associates Geotechnical Investigation Project No. 06-1-341 and dated November 4, 2006 is being used as a reference for this report.

The investigation was performed to determine site subsurface conditions and, based upon the conditions observed in the test holes, to develop geotechnical recommendations for:

Foundation Design;
Slabs-on-Grade;
Lateral Earth Pressures;
Site Grading;
Earthwork Construction; and
Percolation Rates.

The conclusions and recommendations presented are based on information provided to us regarding the proposed development, on subsurface conditions disclosed by the test holes, on laboratory testing, and upon the local standards of our profession at the time this report was prepared.

This investigation was not performed to determine the presence of potentially hazardous waste or radon gas. Determination of the presence of potentially hazardous materials was beyond the scope of this investigation and requires the use of exploration techniques and analytic testing which were not appropriate for this investigation. If desired, X8e Vinyard will perform an environmental audit of the site.

2.0 PROPOSED CONSTRUCTION

We anticipate the site will be developed with single family residences. The proposed buildings will be constructed utilizing wood framed construction. The ground floor will be a conventional concrete slab-on-grade. The maximum column and bearing wall loads (dead plus live) are not anticipated to exceed ten kips and one kip per linear foot, respectively. Changes in retaining wall heights from five feet to eight feet have been proposed. The retaining walls are proposed to be about eight to ten feet beyond the edge of the single family dwellings. Also, retention basins have been proposed to be located near the base of the retaining walls. If structure loads or configuration differ from those indicated in this report, this office should be notified.

Final site grading plans were not available during preparation of this report. We anticipate that a minimum of six feet of cut/fill will be required to develop the site.

3.0 SITE CONDITIONS

The site is bound to the north by Dellyne Avenue, an asphalt paved roadway. To the east of the site is a silt fence beyond were asphalt paved driveways and single family dwellings. To the west of the site are several trees, beyond were single family dwellings. The site is bound to the south by an asphalt paved roadway and several single family dwellings.

The site has been previously graded with a slope descending generally towards the east and extending into relatively level ground surfaces beyond the slope face. There are several stockpiles of soil located near the southern portion of the site. Vegetation consisted of trees towards the west end of the site and a limited amount of weeds and grasses. There were several underground utilities that were on site such as water lines and storm drains.

4.0 SITE SUBSURFACE CONDITIONS

To explore the site subsurface conditions, six test holes were drilled at the approximate locations shown on the Site Plan, Figure 1. As shown on the Logs of Test Holes, Figures 2 through 7 the soils encountered in the test holes consisted of clayey SAND, silty SAND and poorly graded SAND. The SANDS were generally medium dense and slightly moist.

Neither flowing groundwater nor bedrock was encountered in the test holes to a depth of 21 feet, the maximum depth of exploration. However, groundwater conditions may change with time due to precipitation, variations in groundwater level, seepage from ponding areas, or leaking utilities. Further evaluation of the groundwater table and determination of the magnitude of seasonal fluctuation would require installation of piezometers and monitoring over time, which was beyond the scope of this investigation.

The soils encountered in the test holes exhibit a moderate consolidation potential under the anticipated structural loads. Significant consolidation (collapse) occurs when site soils increase in moisture content. Refer to Figures 9 through 14

The test holes allow observation of a very small portion of the soils below the site. Significant variations in subsurface conditions may occur across the site, which were not disclosed by the test holes.

5.0 LABORATORY TESTING

A laboratory testing program was performed on samples obtained during the field investigation which appeared representative of the soils encountered in the test holes. The laboratory testing program was structured to determine the physical properties of the soils encountered in the test holes necessary for development of geotechnical recommendations.

The laboratory testing program included:

- Moisture Content;
- Dry Density;
- Sieve Analysis;
- Atterberg Limits; and
- Consolidation/Collapse.

Moisture Content and Dry Density tests were performed to evaluate the in-place soil density and moisture content. Test results help to evaluate settlement potential. Test results indicate the soils encountered have a consistency, in the test holes, are medium stiff to hard, with an average dry density of approximately 107 pcf. Natural moisture content averaged approximately four percent. Test results are presented on the Logs of Test Holes, Figures 2 through 8, and are summarized on Table 1.

Sieve Analysis and Atterberg Limits tests were performed to confirm field soil classifications and to provide information on general physical soil properties. Test results are presented on Table 1.

Consolidation/Collapse tests were performed to evaluate structure settlement and to determine the effect of water on site soils. The tests indicate the soils encountered in the test holes are compressible under anticipated loads. Some additional settlement occurs if the site soils are allowed to increase in moisture content. Test results are presented in Figures 9 through 14.

6.0 FOUNDATIONS

The proposed structures may be supported on conventional spread and strip footings bearing on a minimum of six feet of structural fill. Structural fill shall extend a minimum of six feet beyond all footing edges. If it is not feasible to implement the site grading, drainage, and landscaping recommendations presented herein, an alternate foundation system may be required. This office shall be contacted for additional recommendations. Conventional foundations may be designed for an allowable bearing pressure of 1,500 pounds per square foot. This value may be increased by one-third for short-term loads due to wind and earthquakes.

The base of exterior footings shall be embedded a minimum of eighteen inches below lowest adjacent grade. The base of interior footings shall be embedded a minimum of twelve inches below finish pad grade. Spread and strip footings shall be a minimum of twenty-four and eighteen inches wide, respectively. However, local building codes may require greater dimensions.

Lateral foundation loads will be resisted by a combination of passive soil pressure against the sides of footings and friction along the base. A passive soil resistance of 200 pounds per cubic foot may be utilized for design. Frictional resistance may be determined by multiplying foundation dead load by a coefficient of friction of 0.40.

Prior to fill placement and following footing excavation, the natural soils shall be scarified to a minimum depth of eight inches and moistened to near optimum moisture content (±3%). The exposed soils shall then be compacted to a minimum of 95% of maximum density as determined by ASTM D-1557, if vibratory compaction will endanger existing structures, a fully loaded scraper may be utilized. All fill below structures shall be placed and compacted as detailed in the attached Appendix. Prior to placing concrete, footing excavations shall be cleaned of any slough, loose soil, or debris. Footing excavations shall be compacted as detailed in the attached Appendix.

Post-construction settlement of foundations designed and constructed as described herein is not anticipated to exceed 1 inch. Differential settlement between adjacent column footings shall not exceed one-half of the above value. The above settlement estimates are based on the assumption the site soils will not be allowed to increase in moisture content and that the site grading, drainage, earthwork, and landscaping recommendations presented in this report and the applicable building codes will be fully implemented.

The site soils are moderately collapsible if allowed to increase in moisture content. If the soils supporting footings are allowed to increase in moisture content, additional settlement of ½ inch per foot of wetted soil could occur.

Foundations shall be designed and constructed to tolerate the above settlement. Foundations shall be designed by a qualified structural engineer.

To reduce the effect of settlement on the structure, we suggest that all stucco be fiberglass reinforced. Periodic control joints shall be utilized in the stucco particularly at window and door corners. Periodic control joints shall also be utilized in masonry walls.

Based upon the results of this investigation and our previous experience in the site vicinity, an International Building Code Site Classification of "D" may be utilized for design.

7.0 CONCRETE SLABS-ON-GRADE

Concrete slabs-on-grade may be utilized. Slabs shall be isolated from all foundations, stem walls, and utility lines. Frequent joints shall be scored or cut in slabs to control the location of cracks.

Slabs shall bear on a minimum of six feet of structural fill. Prior to placing slabs on structural fill, the natural soils shall be stripped of vegetation, scarified to a depth of eight inches, and moisture conditioned to near optimum plus or minus three percent moisture content. The exposed soils shall then be compacted to a minimum of 95% of maximum density as determined by ASTM D-1557. All fill below slabs shall be placed and compacted as detailed in the attached Appendix.

Thickened slabs may be utilized to support interior partitions. Thickened slabs shall be a minimum of twelve inches in width and shall be designed to exert a maximum earth pressure of 500 pounds per square foot. Wall loads on thickened slabs shall not exceed 800 pounds per linear foot. The thickness and reinforcement should be determined by a qualified structural engineer.

If moisture-sensitive floor covering is utilized, the flooring manufacturer should be contacted to determine the necessity of a vapor barrier. The moisture barrier may consist of 6-mil polyethylene film of equivalent. The barrier should be overlain with one or two inches of clean sand and provide a working surface and reduce shrinkage cracking.

For structural design of the floor slab, a modulus of subgrade reaction of 300 kips per cubic foot may be utilized. This value is for a 1' x 1' square or a 1' wide strip. The above value may be modified for various effective widths based upon the following equation:

$$K_s = 300\left[\frac{B+1}{2B}\right]^2$$

K_s = Modulus of subgrade reaction (kips per cubic foot)

B = Effective width of loaded area (feet)

8.0 RETAINING WALLS

Retaining walls constructed in conjunction with this project are not anticipated to exceed eight feet in height. If higher walls or unusual loading conditions such as sloping backfill, slopes below retaining wall footings or surcharges are anticipated, this office shall be contacted for

supplemental recommendations. Foundations for retaining walls shall bear on a minimum of six feet of structural fill. Structural fill shall extend a minimum of six feet beyond all footing edges.

Foundations for retaining walls may be designed for a maximum toe bearing pressure of 1,500 pounds per square foot. This value may be increased by one-third for short-term loads due to winds and earthquakes. Retaining wall footings shall be embedded a minimum of eighteen inches below lowest adjacent grade. Prior to placing footings, the exposed soils shall be scarified to a depth of eight inches, moisture conditioned to a near optimum (±3%) moisture content, and compacted to a minimum of 95% of maximum density as determined by ASTM D-1557.

We recommend that the following equivalent fluid pressures be utilized for design of retaining walls:

Loading Condition	Equivalent Fluid Pressure*
Active Earth Pressure	45 pcf
Passive Earth Pressure	
Undisturbed Natural Soils	300 pcf
Structural Fill	400 pcf
Earth Pressure at Rest	60 pcf

* Does not include a factor of safety or hydrostatic pressure.

The above earth pressures do not include a factor of safety or hydrostatic pressure. If retaining walls are restrained against rotation corners of basements, upper floors, etc. the earth pressure at rest shall be utilized for design.

Lateral retaining wall loads will be resisted by passive earth pressure at the toe and friction along the base of the wall. A coefficient of friction between soil and concrete of 0.4 may be used for design.

Backfill adjacent to retaining walls shall be placed and compacted as detailed in the attached Appendix. Backfill adjacent to walls shall be compacted with relatively light, hand-operated equipment to prevent overstressing the wall and excessive lateral deflections.

To prevent staining of concrete, the back of retaining walls shall be waterproofed prior to backfilling. Weep holes shall be constructed near the base of exterior walls. Perimeter drains may be necessary around interior walls.

9.0 EARTHWORK

9.1 General

The recommendations presented in this report are based upon the assumption that site earthwork will be performed as recommended in this report and the attached Appendix. Presented below is a summary of the site earthwork recommendations. Detailed earthwork procedures are presented in the attached Appendix.

9.2 Clearing and Grubbing

Prior to placing structural fill, all borrow and fill areas shall be stripped of vegetation and deleterious materials. All strippings shall be hauled off-site or utilized in landscaped areas. The stockpile fill on-site to the best of our knowledge was not placed under the observation of a geotechnical engineer and therefore is not suitable for structure support. The existing stockpiled fill appears suitable for reuse as structural fill provided all deleterious material is removed.

All existing fill and disturbed soil shall be removed from below the proposed structures. In addition to this all existing vegetation, such as trees and other landscaping plants must be removed and disposed of offsite. Also, any existing pavements must be removed and disposed of offsite. The resulting excavations shall be backfilled with structural fill as detailed in the attached Appendix.

9.3 Excavation

We anticipate that on-site soils can be excavated with conventional earthwork equipment. Occasional cobbles or boulders may be encountered during excavation. Cobbles and boulders shall be disposed of off-site or utilized for landscaping. Cobbles and boulders shall not be placed within structural fills.

9.4 Natural Ground Preparation

Prior to placing structural fill and subsequent to final grading in cut areas, the exposed soils should be scarified to a minimum depth of eight inches and moisture conditioned to near optimum (±3%) moisture content. The exposed soils shall then be compacted to a minimum of 95% of maximum density as determined by ASTM D-1557.

9.5 Fill Placement and Compaction

Structural fill shall be placed in horizontal lifts a maximum of eight inches in loose thickness, moisture conditioned to near optimum moisture content, and mechanically compacted. Fill below footings and slabs shall be compacted to a minimum of 95% of maximum dry density as determined by ASTM D-1557.

9.6 Observation and Testing

Placement and compaction of structural fill shall be observed and tested by a qualified geotechnical engineer or his representative. The purpose of the observation and testing is to confirm that the recommendations presented herein are followed and to provide supplemental recommendations, if subsurface conditions differ from those anticipated.

Foundation excavations shall be observed by a qualified geotechnical engineer, or his representative, prior to placement of reinforcement or concrete. The purpose of the observation is to determine if the exposed soils are similar to those anticipated.

9.7 Frequency of Testing

Earthwork shall be tested periodically to confirm the fill is compacted to the criteria presented in this report. Prior to placing fill, the natural ground shall be moisture conditioned, compacted, and

tested to confirm it is properly compacted. Fill areas shall be tested at maximum one-foot vertical intervals. If fill areas are worked at different times, each individual area shall be tested. Following finish grading the final surface shall be tested. Following foundation excavation the footing excavations shall be tested. Utility trench backfill shall be tested as necessary.

10.0 SITE GRADING AND DRAINAGE

The site soils are moderately collapsible if allowed to increase in moisture content. To reduce the risk of structure settlement, the site shall be graded to rapidly drain away from structures. We suggest a minimum four percent gradient within at least the first ten feet away from structures in areas not protected by sidewalks and pavement. Splash blocks shall be utilized below down spouts and canals.

If ponding areas are required, they shall be located as far away from structures as possible, a minimum of ten feet. If this criteria cannot be met, this office shall be contacted for supplemental recommendations.

Roof gutters and downspouts shall be utilized. Roof gutters shall discharge to the front of the structures. Water should run off rapidly.

11.0 LANDSCAPING

Landscaping adjacent to structures shall be designed and constructed to minimize the potential for wetting of soils supporting the proposed facilities. If soils supporting the proposed facilities are allowed to increase in moisture content, significant localized settlement could occur.

Trees and shrubs within five feet of structures shall be hand watered or watered using controlled drip irrigation. If drip irrigation is used, emitters shall discharge no more than one gallon per hour. If grass must be planted within five feet of structures, watering shall be carefully controlled to prevent overwatering. Grassed areas adjacent to structures shall be sloped so that excess irrigation water will run off promptly. Sprinkler lines and drip irrigation mains shall be located a minimum of five feet away from foundations.

Mowing strips, planters and sidewalks shall not "dam" water adjacent to structures. If necessary, mowing strips shall be perforated to allow water to flow away from structures.

All interior planters and fountains shall be closed-bottom and watertight.

12.0 UTILITIES

The site soils are collapsible if allowed to increase in moisture content. If post-construction water or sewer line leaks occur, localized settlement may result. Following installation, all water and sewer lines shall be pressure checked for leaks. Any leaks found shall be repaired. Backfill in utility line trenches below slabs and pavement shall be compacted to a minimum of 90% of maximum density as determined by ASTM D-1557. To reduce the possibility of breaking utility lines with compaction equipment, heavy compactors should not be utilized.

Utility trenches may not be compacted to the same degree as the remainder of the building pad. Therefore, wall footings and thickened slabs shall not be placed longitudinally over utility lines. Additionally, column footings shall not be placed over utility trenches.

13.0 TRENCHES AND EXCAVATIONS

All trenches greater than four feet in depth must be sloped, shored or braced, or otherwise supported according to OSHA Construction and Safety Standards. Material excavated from the trench or spoil must be placed a minimum of two feet from the edge of the excavation. The spoil shall be retained in an effective manner such that no loose material can fall into the excavation.

Temporary construction excavations less than eight feet deep shall be sloped no steeper than 1 ½:1 (horizontal: vertical). If deeper excavations are required, this office shall be contacted for supplemental recommendations. Limited raveling of slopes will occur particularly as the exposed soils dry out. Heavy equipment and material stockpiles shall be located a minimum of five feet from the top of slope.

14.0 RETENTION BASINS

To determine the percolation rate of the site soils, three percolation tests were performed at the approximate locations indicated on the Site Plan, Figure 1. The tests were performed by augering a six-inch diameter hole to a depth of five feet. The sides of the hole were then scored to provide a natural soil-water interface. The holes were then filled with water and the surrounding soils allowed too saturate. The holes were then refilled with water and the percolation rates measured.

The following percolation rates were measured:

Percolation Test Hole Number	Percolation Rate (minutes/inch)
1	6.5
2	4.5
6	5.3

The percolation rate is highly dependent upon soil type. The sandy soils exhibited a higher rate and the siltier soils a lower rate. Due to the soil depositional process and variations in soil type, we suggest all retention basins be designed for the slower percolation rate. Retention basins should be located to the east of the proposed single family dwellings. This is generally down slope from the proposed retaining walls and single family dwellings and will reduce moisture from the retention basins infiltrating into the soils below structures. Retention basins shall be located a minimum of six feet from structures.

15.0 ASPHALTIC CONCRETE PAVEMENT

The pavement recommendations presented herein are based upon City of Albuquerque Standard Specifications for Public Works Construction design procedures.

Traffic is anticipated to consist primarily of automobiles and pickup truck traffic. Very limited delivery and semi-truck traffic are anticipated.

Additional design coefficients utilized in our analysis are:

Design Period*	20 years
Regional Factor	1.5
Serviceability Index	1.4

*Periodic pavement maintenance will be required during this period.

To evaluate the required pavement section, the following structural coefficients were utilized in our analysis:

Material	Coefficient
Asphaltic Concrete	0.40
Aggregate Base Course	0.10

Based upon the above criteria, we recommend the following asphaltic concrete pavement sections:

	Asphaltic Concrete	Aggregate Base Course
Residential Roadways	3”	
Collector Roadways	4”	8”

Pavement subgrade and all fill below paved areas shall be placed and compacted as detailed in the attached Appendix. Aggregate Base Course shall consist of Class I or Class II material as specified in Section 302 of the "City of Albuquerque Standard Specifications for Public Works Construction." Base course shall be compacted to a minimum of 95% of maximum density as determined by ASTM D-1557.

Asphaltic concrete shall be Class SP-B as described in Section 116 of the “City of Albuquerque Standard Specifications for Public Works Construction.” Class SP-C Asphaltic Concrete may be utilized if a very smooth surface is desired. However, Class SP-C Asphaltic Concrete tends to be less durable than Class SP-B. Asphaltic Concrete shall be compacted to a range of 93-97% of the maximum Theoretical Unit Weight (ASTM D-2041).

Prior to placing Aggregate Base Course or Asphaltic Concrete, a soil sterilant may be applied. The sterilant shall be applied as per the manufacturer's recommendations.

The above pavement recommendations assume the pavement subgrade will consist of on-site silty SAND, clayey SAND soils. If the subgrade consists of imported soil, the import shall be similar to the on-site soils. If this is not possible, modification of the above pavement sections may be necessary.

Fill in utility line trenches below the pavement must be properly compacted to prevent localized pavement settlement. To minimize settlement and maintenance of the pavement, all trenches shall be backfilled with compacted fill as detailed in the attached Appendix.

The site shall be graded to prevent saturation of pavement subgrade soils. If soils supporting the proposed pavement increase in moisture content, their ability to support the proposed pavement is significantly reduced.

Periodic pavement maintenance consisting of crack cleaning and sealing should be performed to extend pavement life. Seal coating may also be desired after the pavement has been in service for several years to improve appearances and increase pavement life.

16.0 CLOSURE

The recommendations presented in this report are based upon the subsurface conditions disclosed by the test holes. Soil and groundwater conditions may vary between test holes and with time.

This report reflects our interpretation of the site subsurface conditions. We strongly recommend that prior to bidding all contractors perform their own subsurface investigation to form their own opinion of the site soil, rock, and groundwater conditions. Should contractors elect to use this report for construction, bidding or estimating purposes, they do so at their own risk.

In a southwest climate it is particularly important to protect the soils supporting the proposed structure from an increase in moisture content. If soils supporting the structure increase in moisture content due to any cause such as poor site drainage, ponding areas, or leaking utility lines, significant structural settlement and distress may occur.

Over time site conditions and soils or groundwater conditions may change. If the project is not completed within two years of the date of this report, this office shall be contacted prior to the start of construction to confirm the recommendations presented remain applicable.

If conditions are encountered during construction which differ from those presented herein, this office shall be contacted for supplemental recommendations. The staff of X8e Vinyard is available for supplemental consultation as necessary.

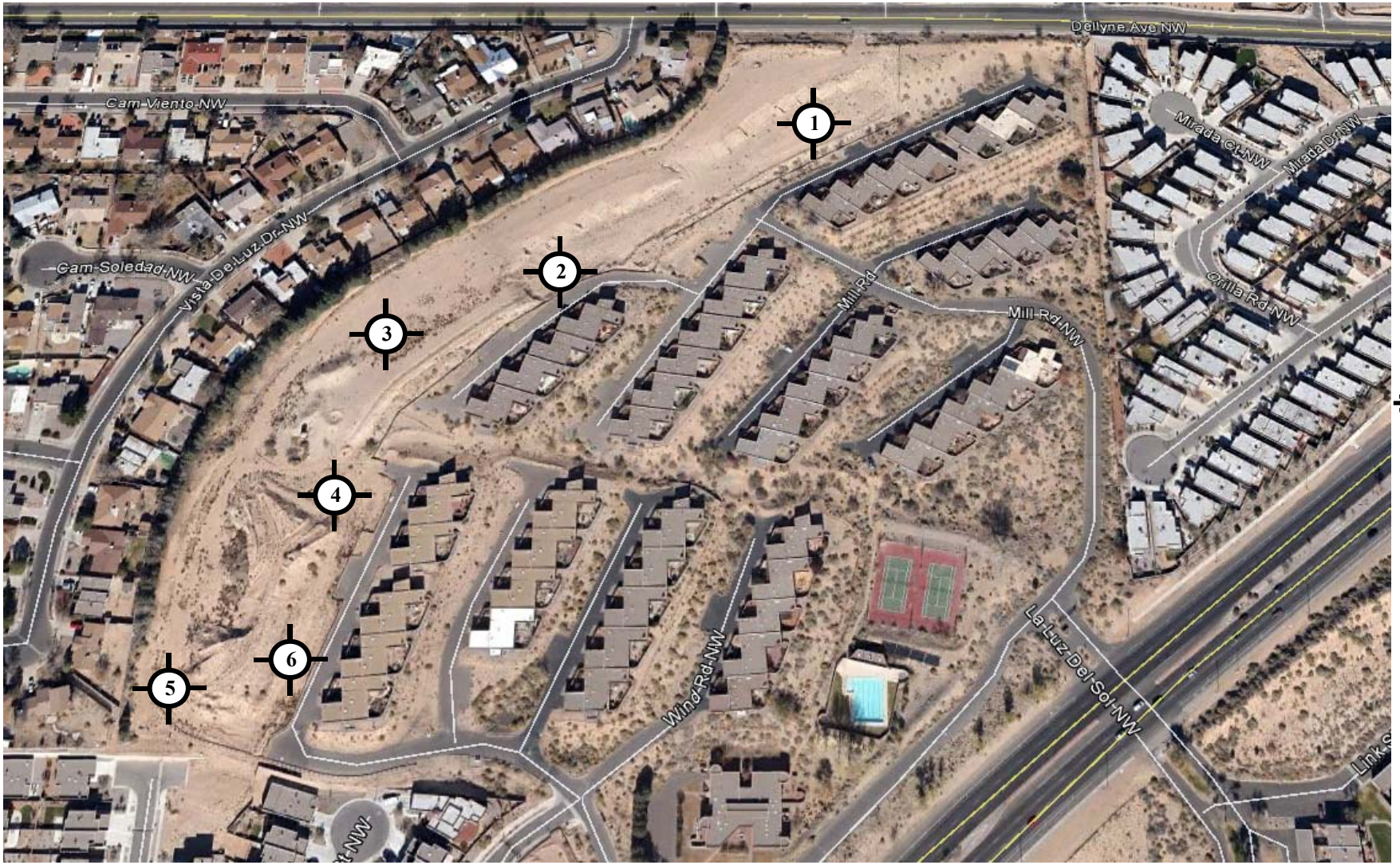
All site earthwork shall be observed by a qualified geotechnical engineer or his representative. X8e Vinyard would be pleased to provide these services.

X8e Vinyard

Joel A. Warriner, Sr., P.E.

X8e Vinyard Project No.: 13-1-110

SITE PLAN
***Scale Unknown**



(#) Boring Location

Percolation tests were performed at borings 1, 2, and 6.

FIGURE 1

LOG OF TEST HOLE NO. 1

Project: Tract K-N La Luz Del Oeste Unit 4 — Project No.: 13-1-110
Elevation: N/A — Date Drilled: 10/22/2013
Depth to Groundwater: Not Encountered — Drilling Method: 7" H.S.A.

Depth, feet	Blows/Foot	Sample Type	Dry Density pcf	Water Content, %	Additional Testing	Unified Classification	Material Description
5	26	R		8.0		SC	SAND, clayey, fine grained, medium dense, moist, light brown
	31	R	107	6.8	1,2,5	ML	SILT, sandy, fine grained, hard, slightly moist, light brown
10							
15	20	S		1.4		SP	SAND, medium grained, medium dense, slightly moist, light brown
	21	S		1.6			
20							
	23	S		2.2			Medium to coarse grained, trace gravel
25							Bottom of hole at 21½'
30							
35							

ADDITIONAL TESTS: 1= Sieve Analysis 2= Atterberg Limits 3=Direct Shear 4=R-Value 5=Other

Figure: 2

LOG OF TEST HOLE NO. 2

Project: Tract K-N La Luz Del Oeste Unit 4 — Project No.: 13-1-110
Elevation: N/A — Date Drilled: 10/22/2013
Depth to Groundwater: Not Encountered — Drilling Method: 7" H.S.A.

Depth, feet	Blows/Foot	Sample Type	Dry Density pcf	Water Content, %	Additional Testing	Unified Classification	Material Description
						SP	SAND, medium to coarse grained, trace gravel, medium dense, slightly moist, light brown
	24	R	109	3.0	1,2,5		
5							
	14	R		2.8			Medium grained
10							
	23	S		4.9			Trace clay, coarse grained, slight gravel, moist Medium grained
15							
	14	S		5.6			
20							
	26	S		5.0			
							Bottom of hole at 21½'
25							
30							
35							

ADDITIONAL TESTS: 1= Sieve Analysis 2= Atterberg Limits 3=Direct Shear 4=R-Value 5=Other

Figure: 3

LOG OF TEST HOLE NO. 3

Project: Tract K-N La Luz Del Oeste Unit 4 — Project No.: 13-1-110
Elevation: N/A — Date Drilled: 10/22/2013
Depth to Groundwater: Not Encountered — Drilling Method: 7" H.S.A.

Depth, feet	Blows/Foot	Sample Type	Dry Density pcf	Water Content, %	Additional Testing	Unified Classification	Material Description
						SP	SAND, trace silt, medium grained, medium dense, moist, light brown
	13	R		5.3			
5							
	9	R	111	4.2	1,2,5		No silt, medium to coarse grained, loose
10							
	14	S		4.2			Slight gravel, medium dense, slightly mois
15							
	25	S		5.4			Trace silt
20							
	26	S		1.6			
						SM	SAND, silty, fine grained, medium dense, slightly moist, light brown/white
							Bottom of hole at 21½'
25							
30							
35							

ADDITIONAL TESTS: 1= Sieve Analysis 2= Atterberg Limits 3=Direct Shear 4=R-Value 5=Other

Figure: 4

LOG OF TEST HOLE NO. 4

Project: Tract K-N La Luz Del Oeste Unit 4 — Project No.: 13-1-110
Elevation: N/A — Date Drilled: 10/22/2013
Depth to Groundwater: Not Encountered — Drilling Method: 7" H.S.A.

Depth, feet	Blows/Foot	Sample Type	Dry Density pcf	Water Content, %	Additional Testing	Unified Classification	Material Description
						SP	SAND, medium grained, medium dense, slightly moist, light brown
	14	R		3.5			
5							
	15	R	107	3.9	1,2,5		
10							
	12	S		3.3			
15							
	24	S		2.9			
20							
	20	S		4.8			
							Bottom of hole at 21½'
25							
30							
35							

ADDITIONAL TESTS: 1= Sieve Analysis 2= Atterberg Limits 3=Direct Shear 4=R-Value 5=Other

Figure: 5

LOG OF TEST HOLE NO. 5

Project: Tract K-N La Luz Del Oeste Unit 4 — Project No.: 13-1-110
Elevation: N/A — Date Drilled: 10/22/2013
Depth to Groundwater: Not Encountered — Drilling Method: 7" H.S.A.

Depth, feet	Blows/Foot	Sample Type	Dry Density pcf	Water Content, %	Additional Testing	Unified Classification	Material Description
						SP	SAND, medium grained, dense, moist, light brown
5	38	R	109	4.3	1,2,5	SM	SAND, silty, medium grained, dense, slightly moist, light brown
	16	R		2.7			Slightly moist, medium dens
10	14	S		1.1			
15						SM	SAND, silty, fine grained, medium dense, slightly moist, light brown/white
	17	S		0.8		SP	SAND, medium grained, medium dense, slightly moist, light brown
20						SM	SAND, silty, fine grained, medium dense, slightly moist, light brown/white
	21	S		17.5			
						CL	CLAY, slightly sandy, very stiff, moist, brow
25						SM	SAND, silty, fine grained, medium dense, slightly moist, light brown
							Bottom of hole at 21½'
30							
35							

ADDITIONAL TESTS: 1= Sieve Analysis 2= Atterberg Limits 3=Direct Shear 4=R-Value 5=Other

Figure: 6

LOG OF TEST HOLE NO. 6

Project: Tract K-N La Luz Del Oeste Unit 4 — Project No.: 13-1-110
Elevation: N/A — Date Drilled: 10/22/2013
Depth to Groundwater: Not Encountered — Drilling Method: 7" H.S.A.

Depth, feet	Blows/Foot	Sample Type	Dry Density pcf	Water Content, %	Additional Testing	Unified Classification	Material Description
5	15	R		2.3		SC	SAND, clayey, slight gravel, medium dense, moist, light brown
10	16	R	100	5.9	1,2,5	SM	SAND, silty, medium grained, medium dense, moist, light brown
15	27	S		4.3			
20	16	S		5.8		SP	SAND, slightly silty, medium grained, medium dense, slightly moist, light brown
	27	S		2.9			Trace clay
25							Bottom of hole at 21½'
30							
35							

ADDITIONAL TESTS: 1= Sieve Analysis 2= Atterberg Limits 3=Direct Shear 4=R-Value 5=Other

Figure: 7

NOTES - LOGS OF TEST HOLES

Test hole locations were determined by compass bearing and pacing distances from known topographic points.

"Drilling Method" refers to the equipment utilized to advance the test hole. A seven-inch outside diameter, continuous flight, hollowstem auger was utilized.

"S" under "Sample Type" indicates a Standard Penetration test (ASTM D-1586). The Standard Penetration sampler is 2 inches in outside diameter and 1 3/8 inches inside diameter.

"R" under "Sample Type" indicates a 3-inch outside diameter by 2.5-inch inside diameter sampler. The sampler is lined with 1-inch high brass rings.

"B" under "Sample Type" indicates a bulk sample.

"Blows Per Foot" indicates the number of blows of a 140-pound hammer falling 30 inches required to drive the indicated sampler 12 inches.

"NR" under "Blows/Foot" indicates that no sample was recovered.

"Dry Density PCF" indicates the laboratory determined soil dry density in pounds per cubic foot.

"Water Content %" indicates the laboratory determined soil moisture content in percent (ASTM D-2216).

"Unified Classification" indicates the field soil classification as per ASTM D-2488. When appropriate, the field classification is modified based upon subsequent laboratory tests.

Variations in soil profile, consistency, and moisture content may occur between test holes. Subsurface conditions may also vary between test holes and with time.

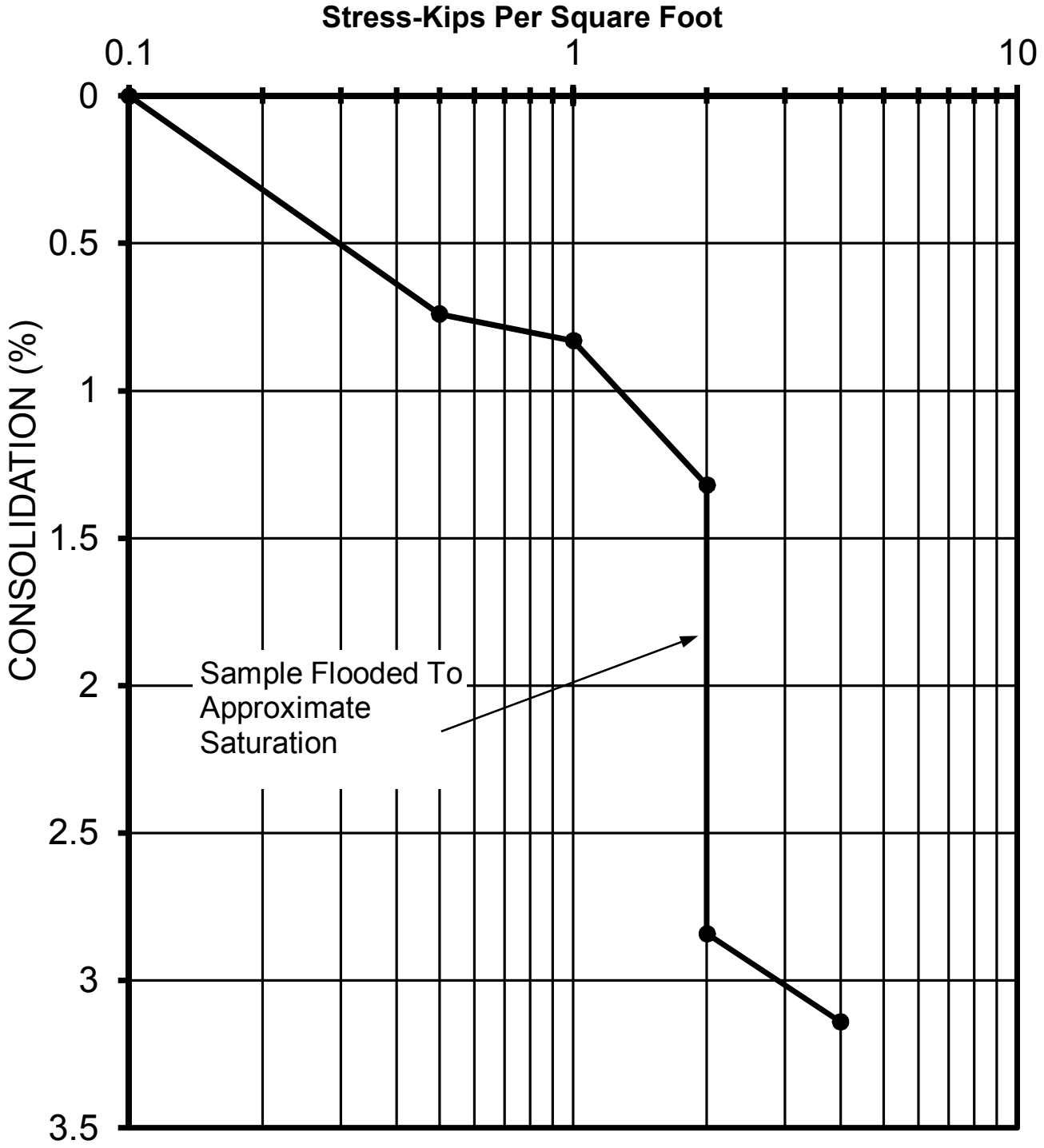
Figure No.: 8

8916-A Adams Street NE
Albuquerque, NM 87113

Office: 505.797.9743
Fax: 505.797.9749

CONSOLIDATION TEST RESULTS

La Luz Oeste Unit 4

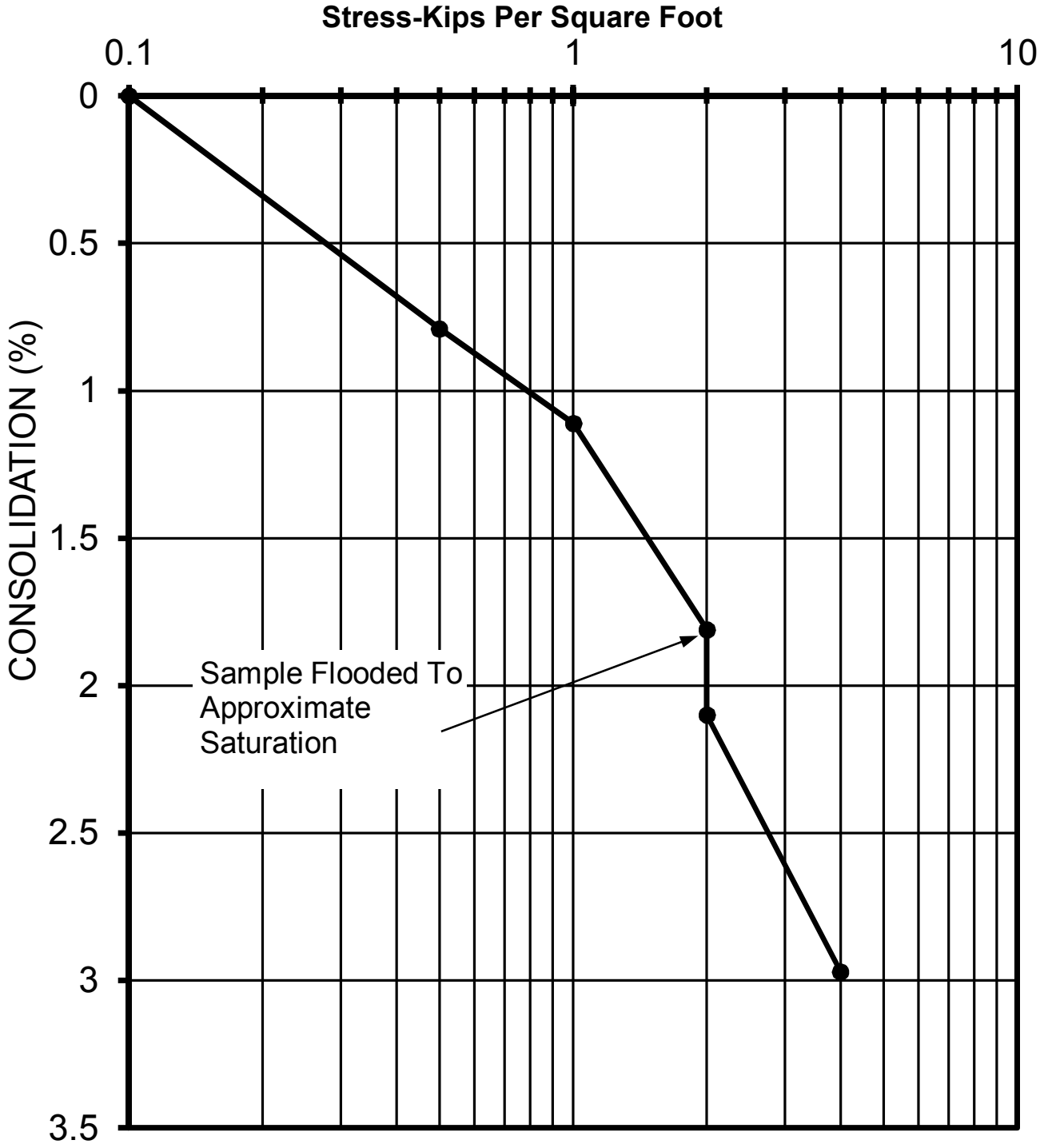


TEST HOLE NUMBER:1
SAMPLE DEPTH: 5 FEET
ML
SOIL DESCRIPTION: Sandy SILT
MOISTURE CONTENT (%):6.8
DRY DENSITY:107 lbs/cu ft

X8eVinyard
Project No. 13-1-110
Figure Number :9

CONSOLIDATION TEST RESULTS

La Luz Oeste Unit 4

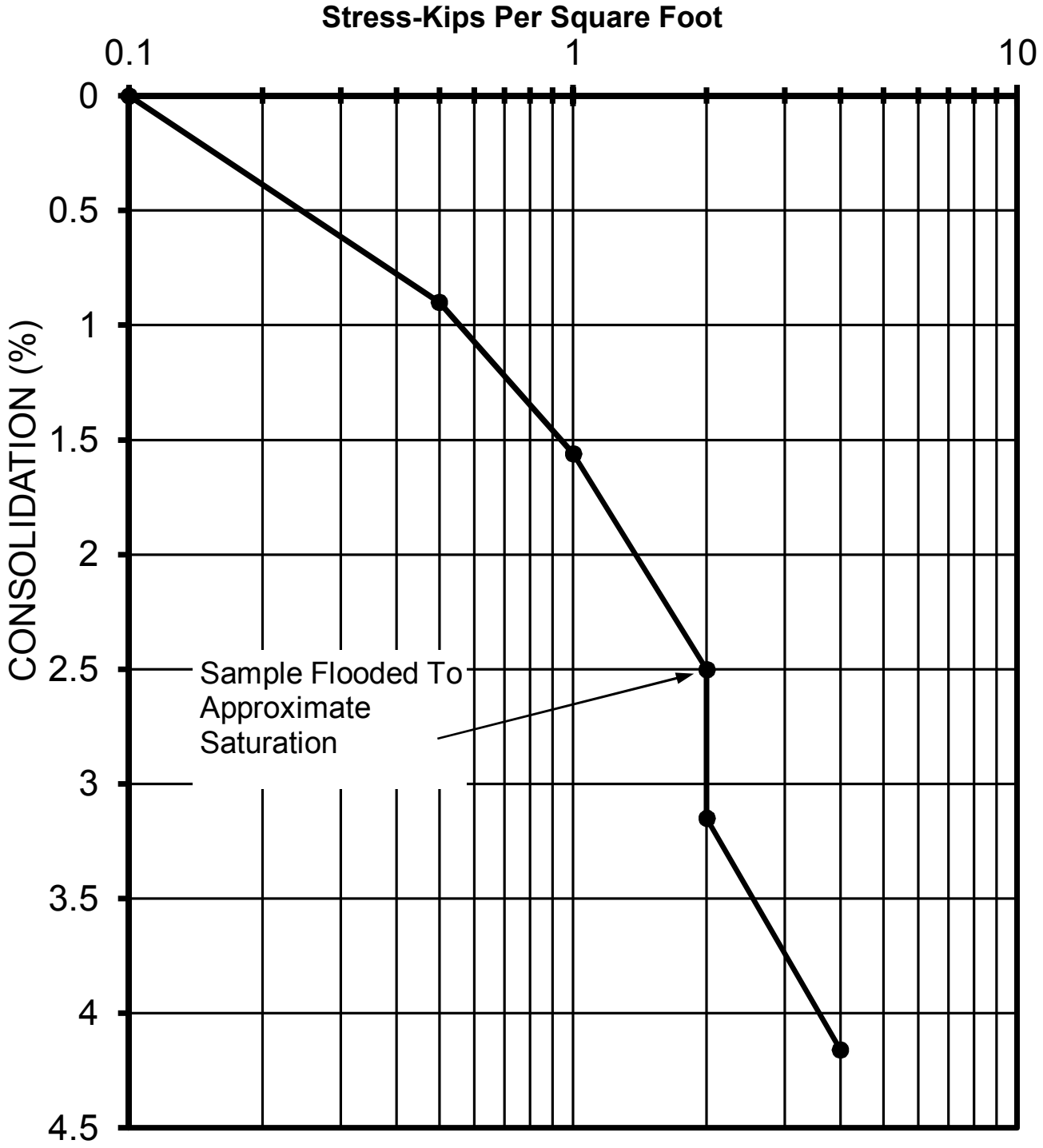


TEST HOLE NUMBER:2
SAMPLE DEPTH: 2 FEET
SP
SOIL DESCRIPTION: Poorly Graded SAND
MOISTURE CONTENT (%):3.0
DRY DENSITY:109 lbs/cu ft

X8eVinyard
Project No. 13-1-110
Figure Number :10

CONSOLIDATION TEST RESULTS

La Luz Oeste Unit 4

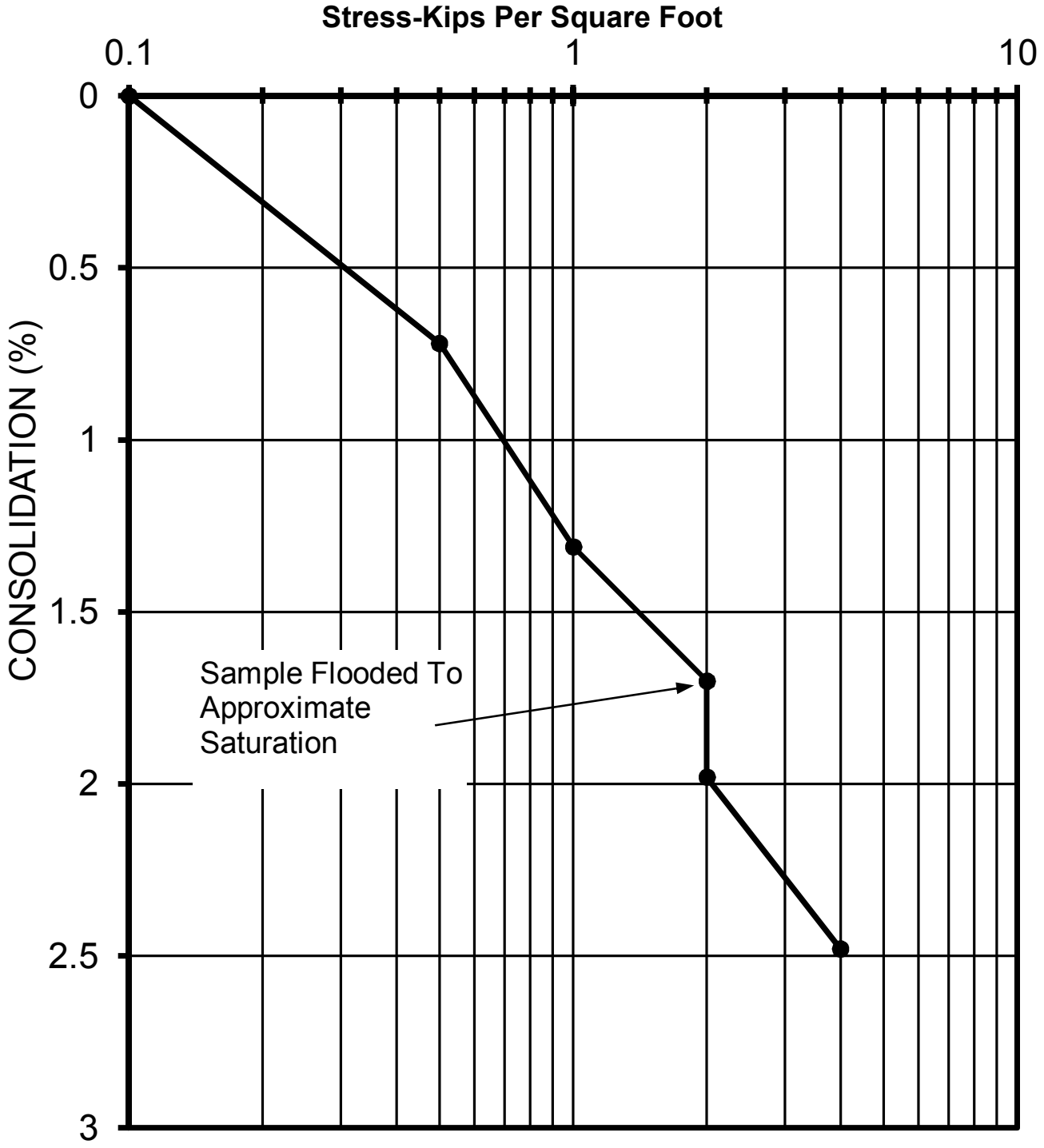


TEST HOLE NUMBER:3
SAMPLE DEPTH: 5 FEET
SP
SOIL DESCRIPTION: Poorly Graded SAND
MOISTURE CONTENT (%):4.2
DRY DENSITY:111 lbs/cu ft

X8eVinyard
Project No. 13-1-110
Figure Number :11

CONSOLIDATION TEST RESULTS

La Luz Oeste Unit 4

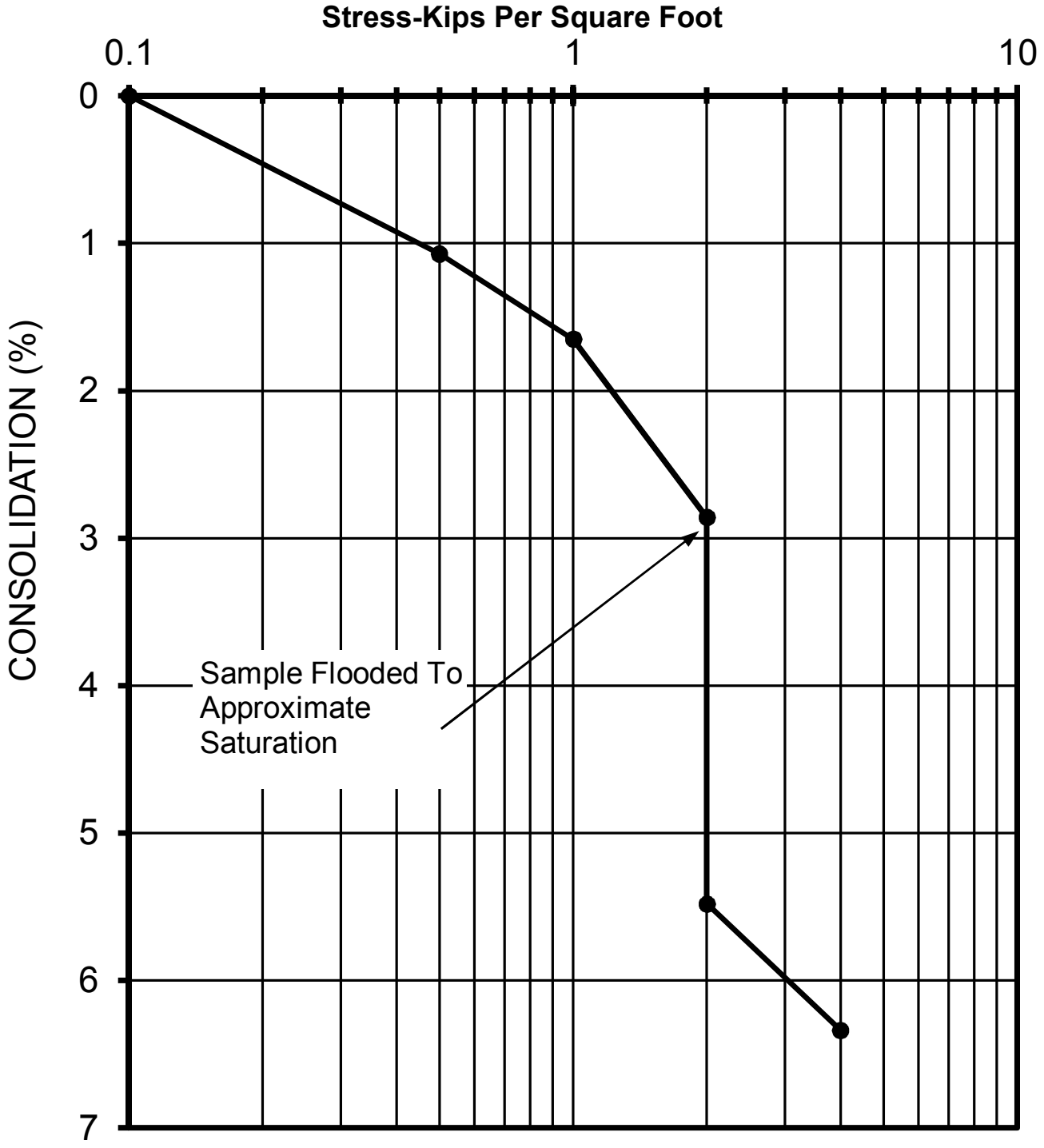


TEST HOLE NUMBER:4
SAMPLE DEPTH: 5 FEET
SP
SOIL DESCRIPTION: Poorly Graded SAND
MOISTURE CONTENT (%):.3.9
DRY DENSITY:107 lbs/cu ft

X8eVinyard
Project No. 13-1-110
Figure Number :12

CONSOLIDATION TEST RESULTS

La Luz Oeste Unit 4

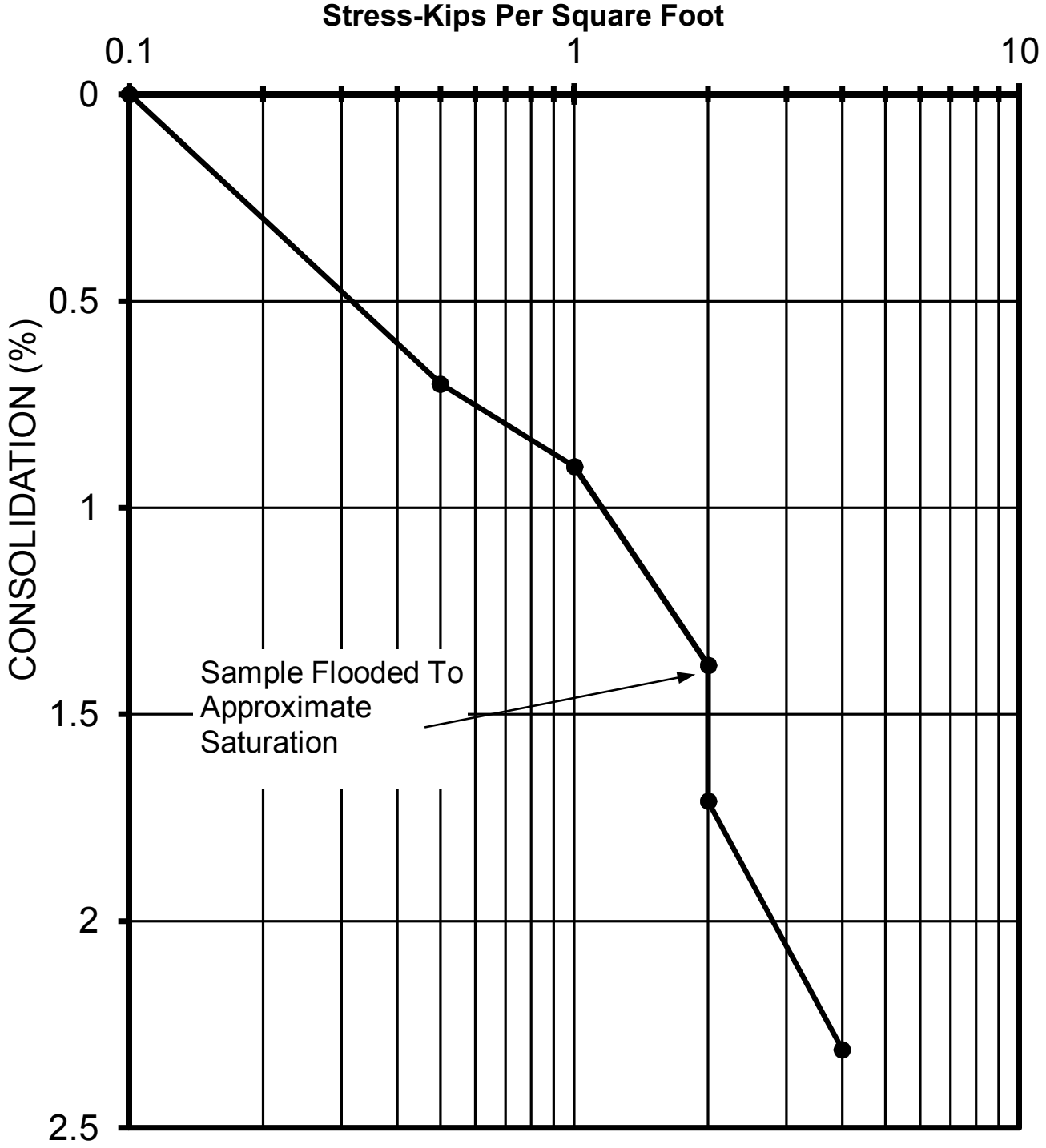


TEST HOLE NUMBER:5
SAMPLE DEPTH: 2 FEET
SM
SOIL DESCRIPTION: Silty SAND
MOISTURE CONTENT (%):.4.3
DRY DENSITY:109 lbs/cu ft

X8eVinyard
Project No. 13-1-110
Figure Number :13

CONSOLIDATION TEST RESULTS

La Luz Oeste Unit 4



TEST HOLE NUMBER:6
SAMPLE DEPTH: 5 FEET
SM
SOIL DESCRIPTION: Silty SAND
MOISTURE CONTENT (%):.5.9
DRY DENSITY:100 lbs/cu ft

X8eVinyard
Project No. 13-1-110
Figure Number :14

SUMMARY OF LABORATORY TEST DATA

Test Hole	Depth (feet)	Unified Classification	Natural Dry Density (pcf)	Natural Moisture Content (%)	Atterberg Limits		SIEVE ANALYSIS-% PASSING BY WEIGHT										Description
					LL	PI	1 1/2"	3/4"	3/8"	No. 4	No. 8	No. 16	No. 30	No. 50	No. 100	No. 200	
1	2			8.0													
1	5	ML	107	6.8	NV	NP								100	91	55.1	SILT, sandy
1	10			1.4													
1	15			1.6													
1	20			2.2													
2	2	SP	109	3.0	NV	NP			100	98	94	85	63	37	11	4.8	SAND, slightly silty
2	5			2.8													
2	10			4.9													
2	15			5.6													
2	20			5.0													
3	2			5.3													
3	5	SP	111	4.2	NV	NP		100	99	98	96	92	81	49	17	7.2	SAND, slightly silty
3	10			4.2													
3	15			5.4													
3	20			1.6													
4	2			3.5													
4	5	SP	107	3.9	NV	NP					100	99	94	58	15	6.3	SAND, slightly silty
4	10			3.3													
4	15			2.9													
4	20			4.8													

X8e Vinyard Project No.: 13-1-110

Project: Tract K-N La Luz Del Oeste Unit 4 **Table No.: 1**

SUMMARY OF LABORATORY TEST DATA

Test Hole	Depth (feet)	Unified Classification	Natural Dry Density (pcf)	Natural Moisture Content (%)	Atterberg Limits		SIEVE ANALYSIS-% PASSING BY WEIGHT										Description
					LL	PI	1 1/2"	3/4"	3/8"	No. 4	No. 8	No. 16	No. 30	No. 50	No. 100	No. 200	
5	2	SM	109	4.3	NV	NP					100	99	94	80	52	35.1	SAND, silty
5	5			2.7													
5	10			1.1													
5	15			0.8													
5	20			17.5													
6	2			2.3													
6	5	SM	100	5.9	NV	NP						100	99	92	67	24.1	SAND, silty
6	10			4.3													
6	15			5.8													
6	20			2.9													

X8e Vinyard Project No.: 13-1-110

Project: Tract K-N La Luz Del Oeste Unit 4 **Table No.: 1**

APPENDIX
EARTHWORK PROCEDURES

General

The Geotechnical Engineer shall be the Owner's representative to observe and evaluate the earthwork operations. The Contractor shall cooperate with the Geotechnical Engineer in the performance of the Engineer's duties.

Clearing and Grubbing

Prior to placing structural fill all borrow areas and areas to receive structural fill shall be stripped of vegetation and deleterious materials. Strippings shall be hauled off-site or stockpiled for subsequent use in landscaped areas or nonstructural fill areas as designated by the Owner or his representative and approved by the Geotechnical Engineer.

Site Preparation - Fill Areas

Prior to placing structural fill the areas to be filled shall be scarified to a depth of eight inches and moisture conditioned as described below. The area to be filled shall then be compacted to a minimum of 95 percent of maximum density as determined by ASTM D-1557. If vibratory compaction techniques pose a threat to the structural integrity of nearby facilities a static compactor shall be used. Any soft or "spongy" areas shall be removed as directed by the Geotechnical Engineer and replaced with structural fill as described herein.

Site Preparation - Cut Areas

Following excavation to rough grade, all building and pavement areas shall be scarified to a depth of eight inches and moisture conditioned as described below. All building and paved areas shall be compacted to a minimum of 95 percent of maximum density as determined by ASTM D-1557. If vibratory compaction techniques pose a threat to the structural integrity of nearby facilities, a static compactor shall be used. Any soft or "spongy" areas shall be removed as directed by the Geotechnical Engineer and replaced with structural fill as described herein.

Foundation, Slab and Pavement Subgrade Preparation

Prior to placing reinforcement, footings, slabs, or pavement, the supporting soils shall be prepared, moisture conditioned, and compacted as described herein.

Fill Material

Fill material shall be nonexpansive soil which may be gravel, sand, silt or clay, or a combination there of.

Sieve Size	Percent Passing By Weight
4”	100
1”	90-100
No. 4	70-100
No. 200	10-40

Fill material shall exhibit a plasticity index of ten or less. No organic, frozen or

decomposable material shall be utilized. All fill material shall be approved by the Geotechnical Engineer.

Fill Placement

Fill material shall be blended as necessary to produce a homogeneous material. Fill material shall be spread in horizontal lifts no greater than eight inches in uncompacted thickness, but in no case thicker than can be properly compacted with the equipment to be utilized. If fill is to be placed on slopes steeper than 5:1 (horizontal:vertical) the natural ground shall be benched with minimum three foot wide benches at maximum two foot vertical intervals.

Moisture Conditioning

Fill material shall be dried or moistened as necessary, prior to compacting, to within ± three percent of optimum moisture content as determined by ASTM D-1557. Moisture shall be distributed uniformly throughout each lift.

Compaction

Structural fill shall be mechanically compacted to the following:

	Minimum Compaction ASTM D-1557
Foundation Support	95%
Slab Support	95%
Below Slab Utility Trenches	90%
General Site Grading	90%
Pavement Support	-
Upper 8" of Subgrade	95%
All other fill below pavement	90%

Aggregate Base Course shall be compacted to a minimum of 95% of maximum density as determined by ASTM D-1557.

Asphaltic concrete shall be compacted to a minimum of 96% of maximum Marshall Density (75 Blows).

Compaction by flooding and jetting is specifically prohibited unless authorized in advance by the Owner or his representative and the Geotechnical Engineer.

Observation and Testing

The Geotechnical Engineer or his representative shall perform field density tests with a frequency and at the locations he feels appropriate. The Geotechnical Engineer or his representative will perform Proctor tests on representative samples of all fill material. To minimize delays, the Earthwork Contractor is encouraged to submit soil samples prior to use for proctor testing.