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Geotechnical Engineering • Materials Testing • Environmental Engineering

GEOTECHNICAL INVESTIGATION
HAWK SITE
TRACT 34

Prepared for:

Amrep Southwest, Inc.

Project No.: 04-1-270

December 10, 2004

V
&
A

TABLE OF CONTENTS

V
&
A

TABLE OF CONTENTS

1.0 INTRODUCTION

This report presents the results of our geotechnical investigation for Tract 34 of the Hawk Site.

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; and
Earthwork Construction.

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, Vinyard & Associates, Inc. will perform an environmental audit of the site.

2.0 PROPOSED CONSTRUCTION

Based upon information obtained from personnel with Amrep Southwest, Inc. we anticipate the site will be developed with single-family residences. The proposed buildings will be constructed utilizing conventional wood-frame construction. The ground floor will be a conventional concrete slab-on-grade. No basements or below grade structures are anticipated. The maximum column and bearing wall loads (dead plus live) are not anticipated to exceed ten kips and one kip per linear foot, respectively. 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 significant cut/fill earthwork will be required to develop the site.

3.0 SITE CONDITIONS

The site is bound to the north by Tract 33, which is undeveloped. The site is bound on the remaining sides by undeveloped land.

The site slopes downward to the north, generally, at a shallow grade. Topography is gently rolling with hills and swales. Vegetation on-site consists of brush, grasses, juniper, and occasional cacti.

4.0 SITE SUBSURFACE CONDITIONS

To explore the site subsurface conditions, four 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 5, the soils encountered in the test holes typically consisted of silty sands. Infrequent layers of sandy silt were also encountered. The sands were fine to medium grained and slightly moist. The majority of the soils were medium dense with infrequent loose and dense layers.

Neither flowing groundwater nor bedrock was encountered in the test holes to a depth of thirty-one 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.

The soils encountered in the test holes exhibit a limited consolidation potential under the anticipated structural loads. Limited to moderate consolidation (collapse) occurs when site soils increase in moisture content. Refer to Figures 7 and 8.

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 in the test holes are medium dense with an average dry density of approximately 99 pcf. Natural moisture

content averaged approximately three percent. Test results are presented on the Logs of Test Holes, Figures 2 through 5, 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 tested soils are slightly compressible under anticipated loads. Limited to moderate additional settlement occurred when the tested soils increased in moisture content. Test results are presented on Figures 7 and 8.

6.0 FOUNDATIONS

If the recommendations presented in this report are implemented particularly those regarding site grading and drainage, the proposed structures may be supported on either conventional spread and strip footings or monolithic slabs with turned down edges. To provide more uniform support, a minimum of four feet of structural fill should be placed on all building pads. Engineered fill should extend a minimum of five feet laterally beyond the edge of all footings. Foundations may be designed for an allowable bearing pressure of 1500 pounds per square foot. This value may be increased by one-third for short-term loads due to wind and earthquakes. If it is not feasible to implement the site grading, drainage, and landscaping recommenda-

tions presented herein, an alternate foundation system may be required. This office should be contacted for additional recommendations.

The base of exterior footings should be embedded a minimum of eighteen inches below lowest adjacent grade. The base of interior footings should be embedded a minimum of twelve inches below finish pad grade. Spread and strip footings should be a minimum of twenty-four and eighteen inches wide, respectively. Turned down edges should be a minimum of twelve inches wide. 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 300 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.

A minimum of four feet of structural fill should be placed on all building pads. Prior to fill placement and following footing excavation, the natural soils should be scarified to a depth of eight inches and moistened to a near optimum moisture content (±3%). The exposed soils should then be compacted to a minimum of 95% of maximum density as determined by ASTM D-1557. All fill below structures should be placed and compacted as detailed in the attached Appendix. Prior to pouring concrete footing excavations should be cleaned of any slough, loose

soil, or debris. Footing excavations should be compacted as detailed in the attached Appendix.

Foundations designed and constructed as described herein are not anticipated to settle more than one inch. The majority of this settlement should occur during construction. Differential settlement between adjacent column footings should 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 will be fully implemented.

The site soils are slightly to moderately collapsible if allowed to increase in moisture content. If the soils supporting footings are allowed to increase in moisture content, additional settlement of 1/4 inch per foot of wetted soil could occur.

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

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

7.0 CONCRETE SLABS-ON-GRADE

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

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

Slabs should be adequately reinforced with steel. Reinforcement should be placed in the middle of the slab. Steel reinforcement should be turned down into turned down edges.

If moisture-sensitive floor covering is utilized, the flooring manufacturer should be contacted to determine the necessity of a vapor retarder. The vapor retarder may consist of a 6-mil polyethylene film or equivalent. To provide a working surface and to reduce shrinkage cracking and slab curl, the barrier may be overlain with four inches of trimmable, compactable, granular fill. Refer to the ACI "Manual of Concrete Practice" Sections 3.2.3 and 4.1.5.

Slabs should bear on a minimum of four feet of structural fill. Prior to placing slabs or structural fill, the natural soils should be stripped of vegetation, scarified to a depth of eight inches, and moistened to a near optimum (±3%) moisture content. The exposed soils should then be compacted to a minimum of 95% of maximum density as determined by ASTM D-1557. All fill below slabs should be placed and compacted as detailed in the attached Appendix.

8.0 RETAINING WALLS

Retaining walls constructed in conjunction with this project are not anticipated to exceed five 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 should be contacted for supplemental recommendations.

Foundations for retaining walls may be designed for a maximum toe bearing pressure of 1500 pounds per square foot. Retaining wall footings should be embedded a minimum of eighteen inches below lowest adjacent grade. Prior to placing footings, the exposed soils should 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	32 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 should 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 should be placed and compacted as detailed in the attached Appendix. Backfill adjacent to walls should 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 should be waterproofed prior to backfilling. Weep holes should 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 should be stripped of vegetation and deleterious materials. All strippings should be hauled off-site or utilized in landscaped areas.

All existing utilities, leach fields, and disturbed soil should be removed from below the proposed structure. The resulting excavations should be backfilled with compacted 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 should be disposed of off-site or utilized for landscaping. Cobbles and boulders should 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 depth of eight inches and moisture conditioned to a near optimum (±3%) moisture content. The exposed soils should then be compacted to a minimum of 95% of maximum density as determined by ASTM D-1557. If vibratory compaction poses a threat to nearby structures, static compaction should be utilized.

9.5 Fill Placement and Compaction

Structural fill should be placed in horizontal lifts a maximum of eight inches in loose thickness, moisture conditioned to a near optimum moisture content and mechanically compacted. Fill below footings and slabs should be compacted to a minimum of 95% of maximum dry density as determined by ASTM D-1557. On-site native soils appear suitable for re-use as engineered fill.

9.6 Observation

Placement and compaction of structural fill should 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 should 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 should be tested periodically to confirm the fill is compacted to the criteria presented in this report. Prior to placing fill the natural ground should be moisture conditioned, compacted, and tested to confirm it is properly compacted. Fill areas should be tested at maximum one-foot vertical intervals. If fill areas are worked at different times, each individual area should be tested. Following finish grading, the final surface should be tested. Following foundation excavation, the footing excavations should be tested. Utility trench backfill should be tested as necessary.

9.8 Remedial Earthwork

Foundation and utility excavations should be carefully observed for the presence of clay. If significant clay layers are observed, the clay should be

removed from below the proposed structures to a minimum depth of eight feet below the bottom of foundations. Removals should extend a minimum of five feet laterally beyond the building perimeter. Excavations should be backfilled with structural fill as detailed in this report.

10.0 SITE GRADING AND DRAINAGE

The site soils are slightly to moderately collapsible if allowed to increase in moisture content. To reduce the risk of structure settlement the site should 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 should be utilized below down spouts and canales.

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

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

11.0 LANDSCAPING

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

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

All interior planters should be closed bottom and watertight.

12.0 UTILITIES

The site soils are slightly to moderately 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 should be pressure checked for leaks. Any leaks found should be repaired.

Backfill in utility line trenches below slabs, driveways, and pavement should be compacted to a minimum of 90% of maximum density as determined by ASTM D-1557. Utility trenches should be as narrow as can be properly compacted. 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 should not be placed longitudinally over utility lines. Additionally, column footings should 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 should be retained in an effective manner such that no loose material can fall into the excavation.

Temporary construction excavations less than eight feet deep should be sloped no steeper than 1½:1 (horizontal:vertical). If deeper excavations are required, this office should be contacted for supplemental recommendations. Limited raveling of slopes will occur particularly as the exposed soils dry out. Heavy equipment and material stockpiles should be located a minimum of five feet from the top of slope.

14.0 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.

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

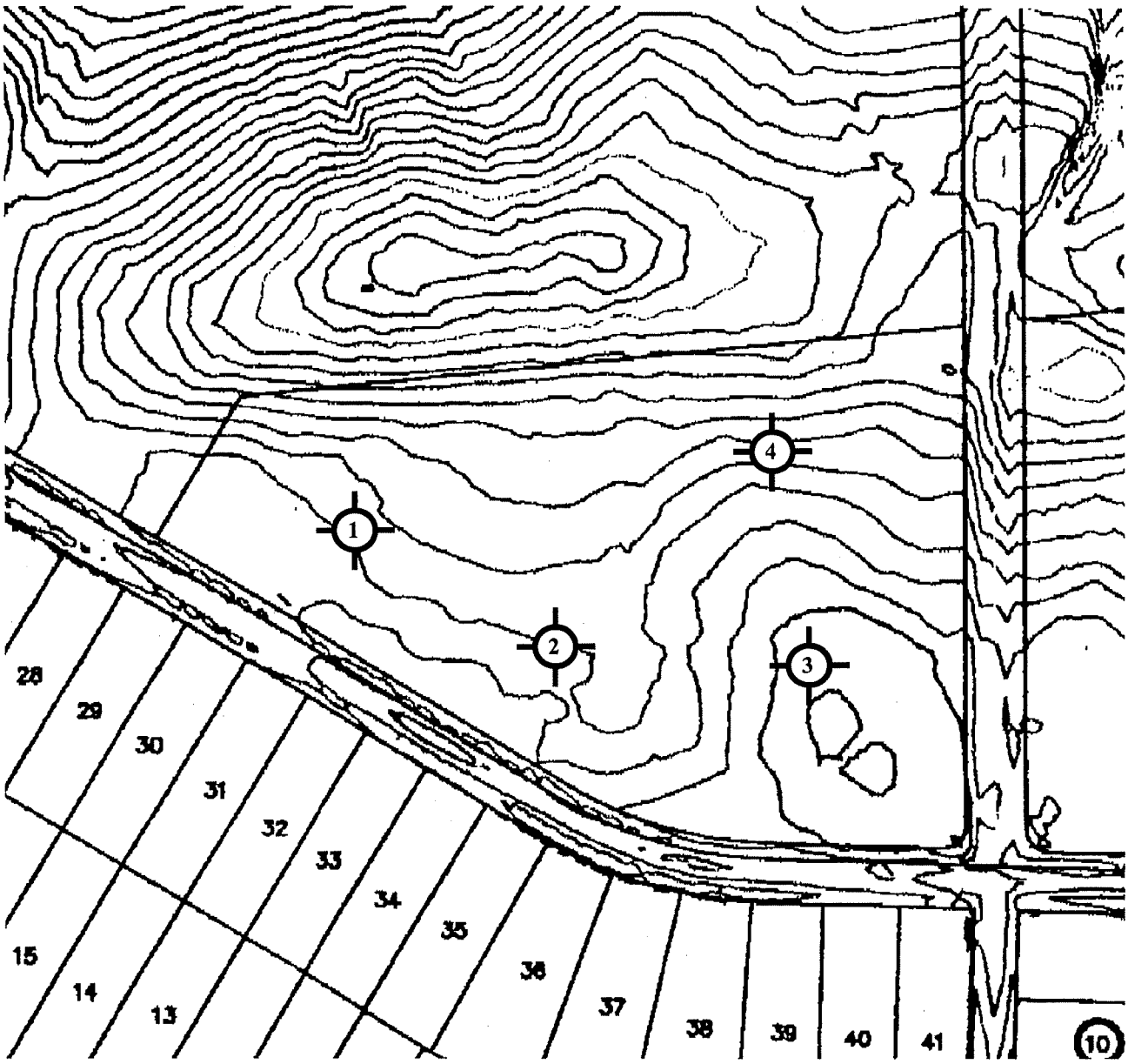
This office would be pleased to review site grading and drainage plans to evaluate conformance with the recommendations presented herein. All site earthwork should be observed by a qualified geotechnical engineer or his representative. **Vinyard & Associates, Inc.** would be pleased to provide these services.

Vinyard & Associates, Inc.

Martin D. Vinyard, P.E.

MDV/er

Hawk Site Tract 34



TEST HOLE LOCATION

Plan is not to scale

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Site Plan

V&A Project No.: 04-1-270

FIGURE 1

V & A

LOG OF TEST HOLE NO. 1

Project: Hawk Site Tract 34 — Project No.: 04-1-270
Elevation - Top of Test Hole: N/A — Date Drilled: 11/24/2004
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
	23	R	97	5.5	1	SM	SAND, very silty, fine grained, medium dense, medium moist, light brown
5						SC	SAND, very clayey, fine grained, medium moist, light brown
	12	R	103	3.4	1,2,5	SM	SAND, very silty, fine to medium grained, medium dense, slightly moist, orangish brown
10	13	S		2.6			Fine to coarse grained
15	29	S		3.6			Fine to medium grained, pinkish brown
20	32	S		3.4			Fine grained, dense, buff
25	45	S		3.6			
30	53	S		3.9			
35							Bottom of hole at 31½'

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

Figure: 2

V & A

LOG OF TEST HOLE NO. 2

Project: Hawk Site Tract 34 — Project No.: 04-1-270

Elevation - Top of Test Hole: N/A — Date Drilled: 11/24/2004

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
						SM	SAND, very silty, fine grained, medium dense, medium moist, yellowish brown
	13	R	109	1.1	1		
5	11	R	106	4.2	1		Fine to medium grained
10	13	S		2.6			
15	17	S		3.8			Fine grained, pinkish brown
20	22	S		4.1			
25	35	S		22.8			Yellowish brown, with thin clay lens
30	45	S		3.0			
35							Bottom of hole at 31½'

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

Figure: 3

V & A

LOG OF TEST HOLE NO. 3

Project: Hawk Site Tract 34 Project No.: 04-1-270

Elevation - Top of Test Hole: N/A Date Drilled: 11/24/2004

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
						SM	SAND, very silty, fine grained, moist, brown
5	34	R	79	43.1	1	SC	SAND, very clayey, fine grained, medium moist, light brown
10	8	R	99	5.5	1,2	SM	SAND, very silty, fine grained, loose, medium moist, brown
	50	S		5.5	1,2	SM-SC	SAND, very silty-clayey, fine grained, dense, medium moist, orangish brown
15	29	S		3.5		SM	SAND, very silty, fine grained, medium dense, medium moist, pinkish brown
20	32	S		1.3		SP-SM	SAND, slightly silty, fine to coarse grained, gravelly, medium dense, medium moist, pinkish brown
25 30 35							Bottom of hole at 21½'

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

Figure: 4

V & A

LOG OF TEST HOLE NO. 4

Project: Hawk Site Tract 34 Project No.: 04-1-270

Elevation - Top of Test Hole: N/A Date Drilled: 11/24/2004

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
	15	R	97	5.7		SC	SAND, very clayey, fine grained, medium dense, medium moist, light brown
5	7	R	104	3.9	1	SM	SAND, very silty, fine grained, loose, medium moist, light tan
10	13	S		2.4			Fine to medium grained, medium dense
15	48	S		3.9			Fine grained, dense, orangish brown, with thin lenses of poorly graded sand with gravel
20	17	S		2.4			Medium dense
25	27	S		2.9			
30	39	S		1.6			Dense, gravelly
35							Bottom of hole at 31½'

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

Figure: 5

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. Six 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.

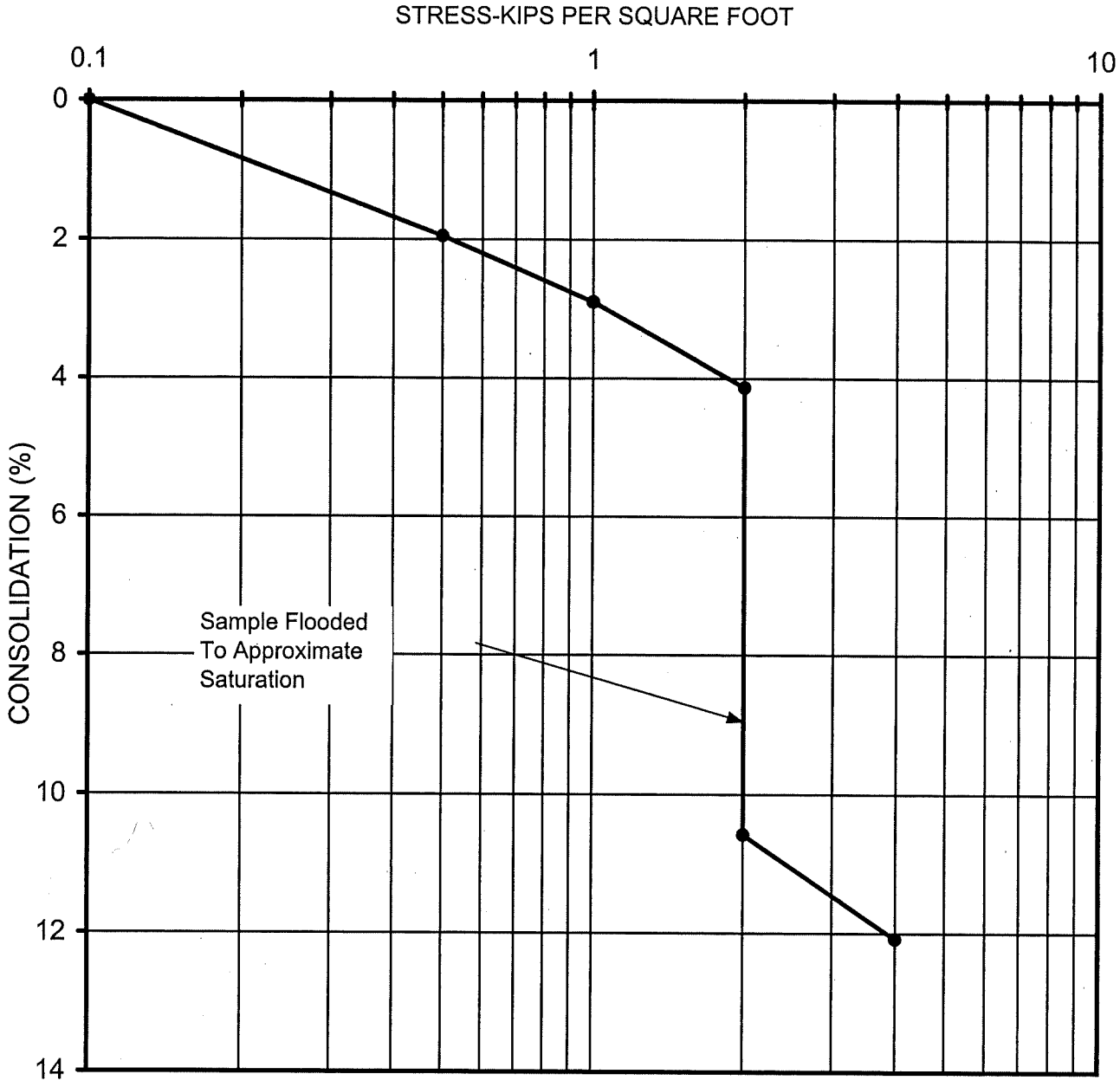
"Water Content %" indicates the laboratory determined soil moisture content in percent (ASTM D-2216).

"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.: 6

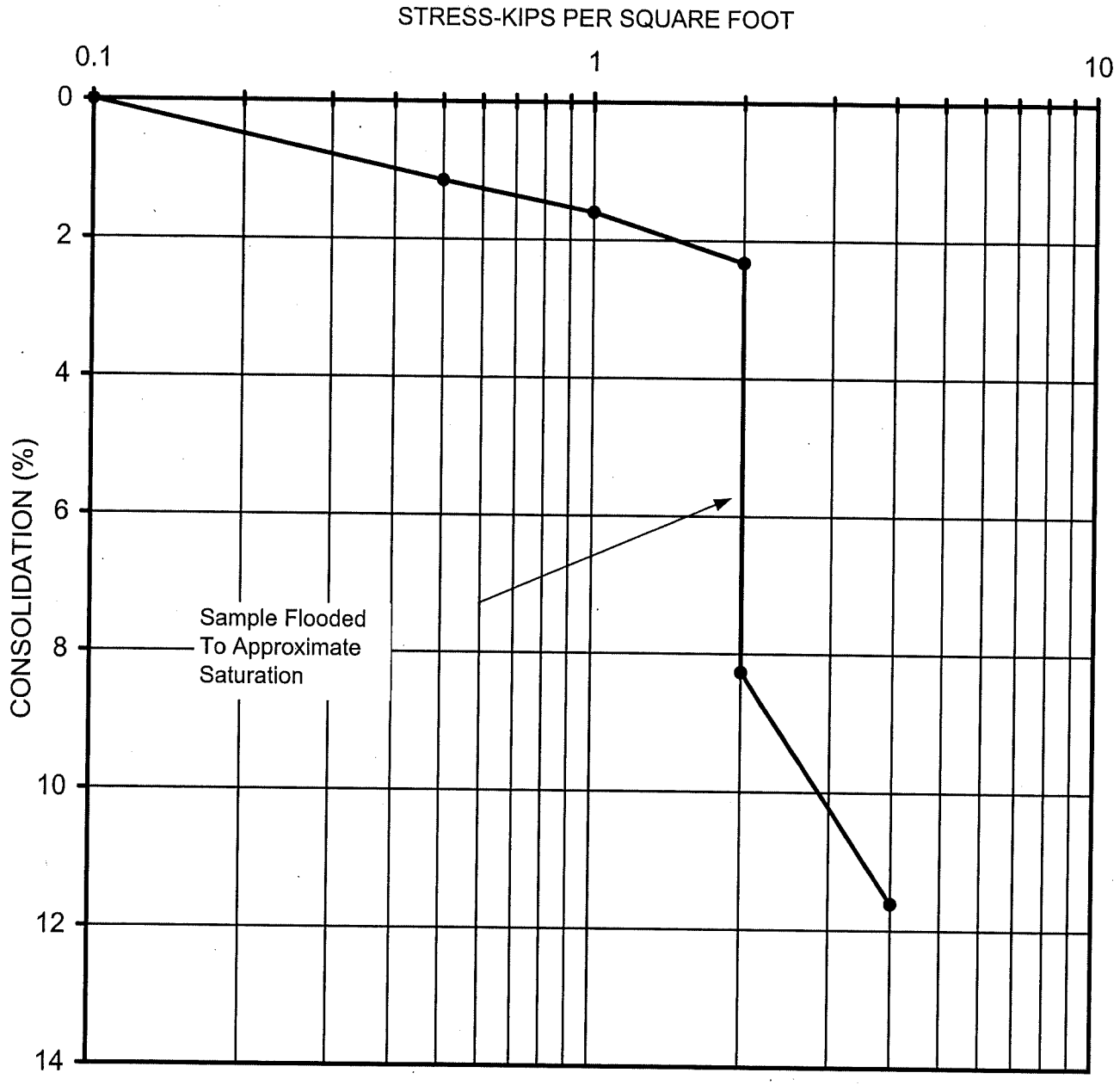
CONSOLIDATION TEST RESULTS



TEST HOLE NUMBER: 1
SAMPLE DEPTH: 5 FEET
SOIL CLASSIFICATION: SM
SOIL DESCRIPTION: SAND, silty
MOISTURE CONTENT (%): 3.4
DRY DENSITY: 103 lbs/cu ft

Vinyard & Associates, Inc.
Project No. 04-1-270
Figure Number : 7

CONSOLIDATION TEST RESULTS



TEST HOLE NUMBER: 3
SAMPLE DEPTH: 5 FEET
SOIL CLASSIFICATION: SM
SOIL DESCRIPTION: SAND, silty
MOISTURE CONTENT (%): 5.5
DRY DENSITY: 99 lbs/cu ft

Vinyard & Associates, Inc.
Project No. 04-1-270
Figure Number : 8

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	ML	97	5.5								100	98	92	79	64.1	SILT, sandy
1	5	SM	103	3.4	NV	NP						100	99	86	33	14.4	SAND, silty
1	10			2.6													
1	15			3.6													
1	20			3.4													
1	25			3.6													
1	30			3.9													
2	2	SM	109	1.1								100	95	75	44	29.6	SAND, silty
2	5	SM	106	4.2								100	96	78	37	15.1	SAND, silty
2	10			2.6													
2	15			3.8													
2	20			4.1													
2	25			22.8													
2	30			3.0													
3	2	SM	79	43.1								100	96	80	57	45.3	SAND, very silty
3	5	SM	99	5.5	NV	NP						100	95	82	62	46.0	SAND, very silty
3	10	SM-SC		5.5	24	7				100	99	97	93	82	56	31.7	SAND, silty-clayey
3	15			3.5													
3	20			1.3													

V & A Project No.: 04-1-270

Project : Hawk Site Tract 34

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	
4	2		95	5.7													
4	5	SM	104	3.9								100	98	79	38	20.3	SAND, silty
4	10			2.4													
4	15			3.9													
4	20			2.4													
4	25			2.9													
4	30			1.6													

V & A Project No.: 04-1-270

Project : Hawk Site Tract 34

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 offsite or stockpiled for subsequent use in landscaped areas or non structural 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 near by 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 near by 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 non expansive 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.