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GEOTECHNICAL SUBSURFACE EXPLORATION FOR THE PROPOSED

WHITE TANKS FLOOD RETARDING STRUCTURE #3, NORTH INLET CHANNEL WHITE TANK MOUNTAINS, MARICOPA COUNTY, ARIZONA



Prepared By:

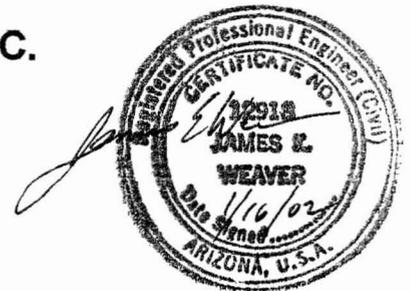
ALPHA GEOTECHNICAL & MATERIALS, INC.

5002 South 40th Street
Suite E
Phoenix, Arizona 85040

Prepared For:

WOOD PATEL AND ASSOCIATES, INC.

2051 West Northern Avenue
Suite 100
Phoenix, Arizona 85021



ALPHA

Geotechnical & Materials, Inc.

January 16, 2002

Wood Patel and Associates, Inc.
2051 W. Northern Ave, Suite 100
Phoenix, Arizona 85021

Attention: Mr. Ashok Patel, P.E.

**RE: GEOTECHNICAL SUBSURFACE EXPLORATION
White Tanks Flood Retarding Structure #3, North Inlet Channel
White Tank Mountains, Maricopa County, Arizona
Alpha Project #01-A-00111**

In accordance with your request and authorization, ALPHA Geotechnical & Materials, Inc. (ALPHA) has performed geotechnical engineering services for the proposed new north inlet channel near the White Tank Mountains west of Phoenix in Maricopa County, Arizona.

INTRODUCTION

The purpose of this geotechnical exploration was to evaluate the general surface and subsurface conditions along the proposed alignment of the channel, and to evaluate these conditions with respect to design and construction considerations for the channel. Our scope of services was in accordance with our proposal 01P149C, dated November 19, 2001. This geotechnical report is based on available project information and the site plan provided by the client



and our experience with similar construction and soil conditions. It should be noted that project design has not been finalized at the time of this report. Therefore, additional geotechnical engineering services will be necessary once the design has been finalized.

SITE AND PROJECT DESCRIPTION

Geotechnical Site Reconnaissance

At the time of our field work, the alignment of the proposed channel was mostly undisturbed native desert. However, there is an existing unlined, earth channel along part of the proposed channel alignment. This channel has been constructed by excavation into the native soils. The height of the earth embankments forming this existing channel vary along its length. The channel ranges from about 30 to 60 feet wide and 15 to 30 feet deep. The side slopes are generally about 4:1 H:V. The ground surface is mostly relatively flat to rolling. With the exception of the existing channel, no evidence of prior structural development was noted along the alignment.

Project Description

Based on information provided by our client, we understand the new channel is to be an approximately three-mile long, open channel. The channel will be constructed by both excavating into the native soils along some portions and by constructing embankments along other portions. Some or all of the channel may be lined with gunite and/or some other type of protection to reduce the potential for erosion and reduce infiltration of water from the channel. The alignment and configuration of the channel have not been determined at this time.

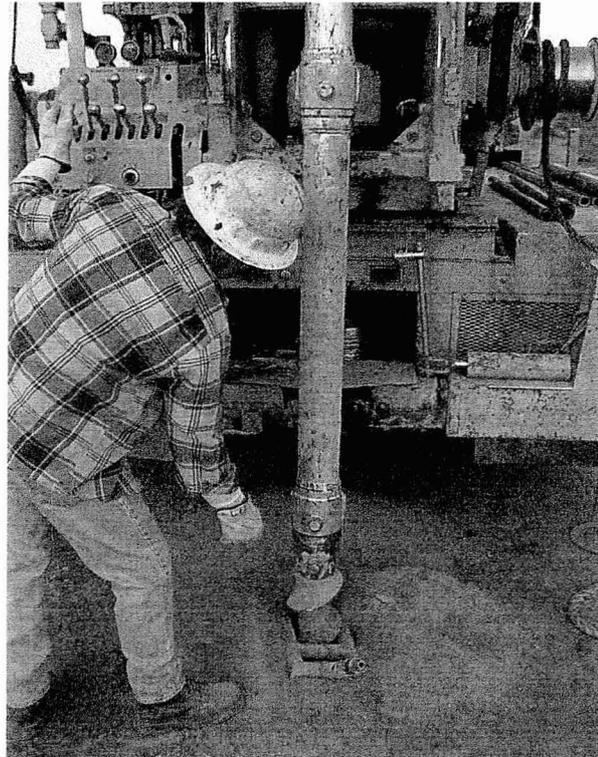
FIELD EXPLORATION AND TESTING

Field Exploration

We excavated eight auger test borings at intervals of about one-half mile along the channel alignment using a CME-75 truck-mounted drill rig. The test boring locations are shown on the Site Plan which is included in the appendix of this report. The test borings extended to depths of approximately 18 to 30 feet below existing ground level. Refusal to further penetration was encountered in borings 2 @18', 4 @18' and 6 @27'.

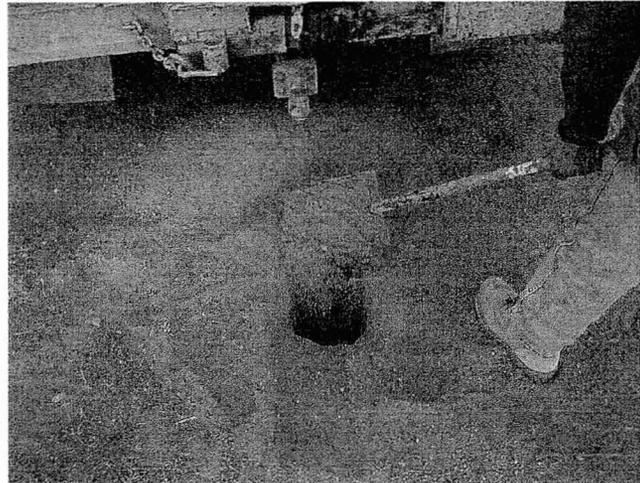
Bulk soil samples were collected by hand from the test borings. "Undisturbed" samples of the native soils were collected by driving a California ring sampler in general accordance with ASTM D-1586 specifications. Samples obtained during the field exploration were transported to the laboratory. The boring logs, key to classification, and terms and symbols are included in the appendix of this report.

Resistance blow counts were obtained for each sample. These values represent the number of blows required to drive the samplers 12 inches into the soil, using a 140 pound hammer falling 30 inches. These blow counts, which are shown on the boring logs, are relative indicators of the



strength and density of the soils.

Colors of the soils were determined using the Munsell Soil Color Charts. The colors are described by Hue, Value and Chroma. The Hue notation of a color indicates its relation to Red, Yellow, Green, Blue and Purple; the Value notation indicates its lightness; and the Chroma notation indicates its strength (or departure from a neutral of the same lightness.)



Laboratory Testing

Laboratory tests performed for the project consisted of gradation, plasticity index, and consolidation/expansion properties of soils.

Results of the gradation, plasticities and consolidation/expansion tests are attached to this report. Densities and moisture contents of the driven ring test samples are presented on the test boring logs.

GENERAL SITE CONDITIONS

Site Geology: The site is located in the Basin and Range Province which extends from southern Arizona to eastern California and north through Nevada. Northwest-southeast trending mountain ranges divided by large alluvial basins define the Basin and Range. This province formed between 20 and 5 million years ago due to the extension of the continental crust. The extension caused normal block faulting perpendicular to direction of crustal spreading, resulting in the down-dropping of the basins relative to the ranges. The geology of the ranges is extremely complex due to the block faulting which has been superimposed on previously thrust, deformed, intruded and metamorphosed bedrock (Davis 1984). Surficial deposits in this vicinity are generally soils of the Holocene to middle Pleistocene eras.

Soil Stratigraphy

The site soils were identified as sand/clay mixed soils or clayey sands with varying amounts of gravel to the full depths of the excavations. The soils ranged from moderately dense to very dense. The soils below depths of 10 to 15 feet were very dense. The soils had non-plastic fines. Carbonate cementation in the soils was classified as ranging from nil to moderate, as determined by the ASTM Designation D 2488.

Groundwater

Soil moisture contents were low to moderate throughout the test borings and no free groundwater was encountered in any of the test borings for this project.

DISCUSSION OF RESULTS

1. Field penetration tests indicated the native soils to depths of about ten to fifteen feet were medium dense to very dense. Compression tests were performed on samples of these soils to evaluate the compression/collapse potential of these soils. These tests indicate the

native soils have low compression potentials at the existing moisture contents and slight (less than 1%) collapse potentials when the soils become wet at the current overburden pressures. Therefore, only slight settlement potentials are estimated if the channel is constructed in the undisturbed native soils. These settlement potentials could be reduced by compacting the soils in the beds and sides of the channels.

2. The soils have non-plastic fines and low percentages of clay-sized particles. ASTM D4647 indicates soils with less than 12% finer than 0.005mm and a plastic limit less than 4 are considered non-dispersive.
3. Excavation of the soils may be difficult, particularly below about ten to fifteen feet, due to the density and cementation of the soils. Further testing should be performed to better evaluate excavation difficulty once the alignment and depth of the channel have been determined. Alternately, if the excavation conditions are a significant part of the design of the project, additional studies could be performed to help define the most effective design.
4. Most of the soils encountered in our test borings appear to be suitable for use in soil cement which may be utilized to help reduce surface erosion in the channel. Additional testing would be necessary to determine the required gradation and cement content for materials to be used for soil cement.

CLOSURE

Limitations

Our professional services have been performed using that degree and skill ordinarily exercised, under similar circumstances, by reputable geotechnical engineers practicing in this or similar localities. No other warranty, express or implied, is made.

The recommendations contained in this report are based on our field exploration, laboratory test results, and our understanding of the proposed construction. The subsurface data used in the preparation of this report was obtained from the test borings excavated during the field subsurface exploration. It is anticipated that some variations in the soil conditions will exist on-site. The nature and extent of variations may not be evident until construction occurs. If any conditions are encountered at this site which are different from those described in this report, we should be immediately notified so that we may make any necessary revisions to the recommendations contained in this report. In addition, if the scope of the proposed construction changes from that described in this report, our firm should also be notified.

It is the Client's responsibility to see that all parties to the project including the designer, contractor, subcontractor, etc. are made aware of this report in its entirety. The use of information contained in this report for bidding purposes should be done at the contractor's option and risk.

This report may be used only by the Client and only for the purposes stated, within a reasonable time from its issuance. Land use, site conditions (both on and off-site), or other factors may change over time, and additional work may be required with the passage of time. Any party, other than the Client, who wishes to use this report shall notify ALPHA of such intended use. Based on

the intended use of this report, ALPHA may require that additional work be performed and that an updated report be issued. Non-compliance with any of these requirements, by the Client or anyone else, will release ALPHA from any liability resulting from the use of this report by any unauthorized party.

This report is for the exclusive purpose of providing geotechnical engineering and/or testing information and recommendations. The scope of services for this project does not include, either specifically or by implication, any environmental assessment of the site or identification of contaminated or hazardous materials or conditions. If the owner is concerned about the potential for such contamination, other studies should be undertaken.

Should you have any questions concerning the contents of this report or any other matter, please do not hesitate to contact the undersigned at (602) 453-3265.

Respectfully submitted,

ALPHA Geotechnical & Materials, Inc.

James E. Weaver
James E. Weaver, P.E.
President



Lyle M. Tweet / AM
Lyle M. Tweet, P.E.
President
LMT Engineering, Inc.

Dist: Addressee (3)

APPENDIX

UNIFIED SOIL CLASSIFICATION SYSTEM					CONSISTENCY OR RELATIVE DENSITY		
Major Divisions			Group Symbols	Typical Names	CRITERIA		
Coarse-Grained Soils More than 50% retained on No. 200 sieve	Gravels 50% or more of coarse fraction retained on No. 4 sieve	Clean Gravels	GW	Well-graded gravels and gravel-sand mixtures, little or no fines	<u>Standard Penetration Test</u> Density of Granular Soils Penetration Resistance N (blows/ft) Relative Density		
			GP	Poorly graded gravels and gravel-sand mixtures, little or no fines			
		Gravels With Fines	GM	Silty gravels, gravel-sand-silt mixtures			
			GC	Clayey gravels, gravel-sand-clay mixtures			
	Sands More than 50% of coarse fraction passes No. 4 sieve	Clean Sands	SW	Well-graded sands and gravelly sands, little or no fines	0-4	Very Loose	
			SP	Poorly graded sands and gravelly sands, little or no fines	5-10	Loose	
		Sands With Fines	SM	Silty sands, sand-silt mixtures	11-30	Medium Dense	
			SC	Clayey sands, sand-clay mixtures	31-50	Dense	
Fine-Grained Soils 50% or more passes No. 200 sieve	Silts and Clays Liquid Limit 50% or less		ML	Inorganic silts, very fine sands, rock flour, silty or clayey fine sands	> 50	Very Dense	
			CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays	<u>Standard Penetration Test</u> Consistency of Cohesive Soils Penetration Resistance N (blows/ft) Consistency Unconfined Compressive Strength (Tons/ft ²)		
			OL	Organic silts and organic silty clays of low plasticity			
	Silts and Clays Liquid Limit greater than 50%		MH	Inorganic silts, micaceous or diatomaceous fine sands or silts, elastic silts	< 2	Very Soft	< 0.25
			CH	Inorganic clays of high plasticity, fat clays	2-4	Soft	0.25-0.50
					4-8	Firm	0.50-1.00
			OH	Organic clays of medium to high plasticity	8-15	Stiff	1.00-2.00
	15-30	Very Stiff			2.00-4.00		
Highly Organic Soils			PT	Peat, muck, and other highly organic soils	> 30	Hard	> 4.0

3" 3/4" #4 #10 #40 #200 U.S. Standard Sieve

Unified Soil Classification	Cobbles	Gravel		Sand			Silt or Clay
		coarse	fine	coarse	medium	fine	

MOISTURE CONDITIONS

MATERIAL QUANTITY

OTHER SYMBOLS

Dry	Absence of moist, dusty, dry to the touch	trace	0 - 5%	C	Core Sample
Slightly Damp	Below optimum moisture content for compaction	few	5 - 10%	S	SPT Sample
Moist	Near optimum moisture content, will moisten the hand	little	10 - 25%	B	Bulk Sample
Very Moist	Above optimum moisture content	some	25 - 45%	▼	Groundwater
Wet	Visible free water; below water table	mostly	50 - 100%	Qp	Pocket Penetrometer

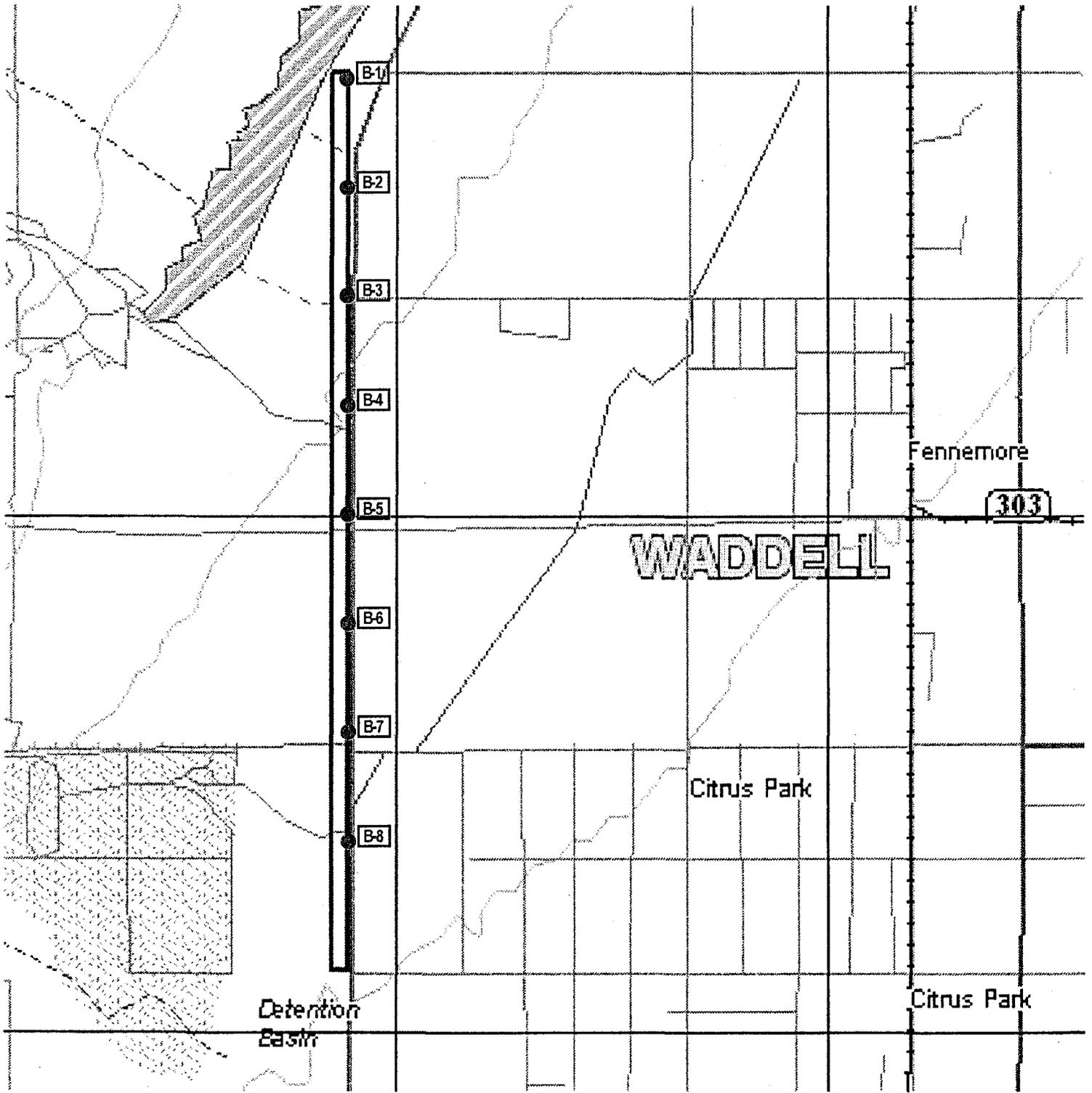
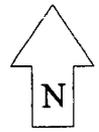
BASIC LOG FORMAT:

Group name, Group symbol, (grain size), color, moisture, consistency or relative density. Additional comments: odor, presence of roots, mica, gypsum, coarse grained particles, etc.

EXAMPLE:

Brown, loose fine to medium Sand (SP), trace silt, little fine gravel, damp

UNIFIED SOIL CLASSIFICATION SYSTEM



SITE MAP FOR WHITE TANKS

Project: White Tanks Flood Retarding Structure #3, North Inlet Channel

Project Location: White Tank Mountains, Maricopa County, Arizona	Boring Location: See attached Site Plan.
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SAMPLE TYPE	BLOWS PER 6"	DRY DENSITY (PCF)	MOISTURE (%)	DEPTH (FEET)	USCS CODE	Northing: 33° 35.708'	Westing: 112° 28.214'
						Remarks: There was no sample recovery at 5 feet due to cohesionless soil.	
						DESCRIPTION OF SUBSURFACE CONDITIONS	
H				1	SM	GRAVELLY SILTY SAND pale brown to very pale brown (10YR 6.5/3), poor gradation, subangular particles, loose, no plasticity, moist, nil cementation Becomes very dense Becomes more gravelly Becomes very dense	
R	42/ 50-5"			2			
R	10/14	NR		3			
R	20/ 50-4"			4			
R	50-5"			5			
				6			
				7			
				8			
				9			
				10			
				11			
				12			
				13			
				14			
				15			
				16			

The stratification lines represent the approximate boundary lines between soil and rock types: In-situ, the transition may be gradual.	Sample Type Key: S = Split Spoon H = Hand Sample NR = No Recovery R = Ring Sampler RF = Refusal
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ALPHA GEOTECHNICAL & MATERIALS, INC. 5002 S. 40 TH STREET PHOENIX, ARIZONA 85040	Boring Date: 12/19/2001 Drill Rig Type: CME-75
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ALPHA PROJECT NO. 01-A-000111

LOG OF TEST BORING NO. 1 (2 of 2)

Project: White Tanks Flood Retarding Structure #3, North Inlet Channel

Project Location: White Tank Mountains,
Maricopa County, Arizona

Boring Location: See attached Site Plan.

Northing: 33° 35.708'

Westing: 112° 28.214'

Remarks: There was no sample recovery at 20 and 25 feet due to cohesionless soil.

SAMPLE TYPE	BLOWS PER 6"	DRY DENSITY (PCF)	MOISTURE (%)	DEPTH (FEET)	USCS CODE	DESCRIPTION OF SUBSURFACE CONDITIONS
R	50-5"	NR		16	SM	GRAVELLY SILTY SANDY pale brown to very pale brown (10YR 6.5/3), poor gradation, subangular particles, medium dense, no plasticity, moist, nil cementation
				17		
				18		
				19		
				20		
				21		
				22		
				23		
				24		
R	50-5"	NR		25		
				26		
				27		
				28		
				29		
				30		
						BOTTOM OF BORING No Groundwater Encountered

The stratification lines represent the approximate boundary lines between soil and rock types: In-situ, the transition may be gradual.

Sample Type Key: S = Split Spoon H = Hand Sample
NR = No Recovery R = Ring Sampler RF = Refusal

ALPHA GEOTECHNICAL & MATERIALS, INC.
5002 S. 40TH STREET
PHOENIX, ARIZONA 85040

Boring Date: 12/19/2001

Drill Rig Type: CME-75

ALPHA PROJECT NO. 01-A-000111

LOG OF TEST BORING NO. 2 (1 of 2)

Project: White Tanks Flood Retarding Structure #3, North Inlet Channel

Project Location: White Tank Mountains,
Maricopa County, Arizona

Boring Location: See attached Site Plan.

SAMPLE TYPE	BLOWS PER 6"	DRY DENSITY (PCF)	MOISTURE (%)	DEPTH (FEET)	USCS CODE	Northing: 33° 35.262' Westing: 112° 28.225' Remarks: There was no sample recovery at 15 feet due to cohesionless soil.
						DESCRIPTION OF SUBSURFACE CONDITIONS
H				1	SM/ML	SANDY SILT TO SILTY SAND W/ TRACE GRAVEL brown to light brown (7.5YR 5.5/4), poor gradation, subangular particles, loose, no plasticity, moist, nil cementation Becomes dense Weak cementation Moderate cementation Becomes more gravelly
R	23/43			2		
				3		
				4		
R	23/34	95	5.7	5		
				6		
				7		
				8		
				9		
R	25/33			10		
				11		
				12		
				13		
				14		
R	35/49	NR		15		
				16		

The stratification lines represent the approximate boundary lines between soil and rock types: In-situ, the transition may be gradual.

Sample Type Key: S = Split Spoon H = Hand Sample
 NR = No Recovery R = Ring Sampler RF = Refusal

ALPHA GEOTECHNICAL & MATERIALS, INC.
 5002 S. 40TH STREET
 PHOENIX, ARIZONA 85040

Boring Date: 12/19/2001

Drill Rig Type: CME-75

ALPHA PROJECT NO. 01-A-000111

LOG OF TEST BORING NO. 2 (2 of 2)

Project: White Tanks Flood Retarding Structure #3, North Inlet Channel

Project Location: White Tank Mountains,
Maricopa County, Arizona

Boring Location: See attached Site Plan.

Northing: 33° 35.262'

Westing: 112° 28.225'

Remarks: Auger refusal occurred at 18 feet.

SAMPLE TYPE	BLOWS PER 6"	DRY DENSITY (PCF)	MOISTURE (%)	DEPTH (FEET)	USCS CODE	DESCRIPTION OF SUBSURFACE CONDITIONS
				16	SM/ML	SANDY SILT TO SILTY SAND W/ TRACE GRAVEL brown to light brown (7.5YR 5.5/4), poor gradation, subangular particles, very dense, no plasticity, moist, moderate cementation
				17		
				18		BOTTOM OF BORING Auger Refusal No Groundwater Encountered
				19		
				20		
				21		
				22		
				23		
				24		
				25		
				26		
				27		
				28		
				29		
				30		

The stratification lines represent the approximate boundary lines between soil and rock types: In-situ, the transition may be gradual.

Sample Type Key: S = Split Spoon H = Hand Sample
NR = No Recovery R = Ring Sampler RF = Refusal

ALPHA GEOTECHNICAL & MATERIALS, INC.
5002 S. 40TH STREET
PHOENIX, ARIZONA 85040

Boring Date: 12/19/2001

Drill Rig Type: CME-75

Project: White Tanks Flood Retarding Structure #3, North Inlet Channel

Project Location: White Tank Mountains, Maricopa County, Arizona Boring Location: See attached Site Plan.

Northing: 33° 34.845' Westing: 112° 28.234'

Remarks: There was no sample recovery at 2, 5 and 15 feet due to cohesionless soil.

DESCRIPTION OF SUBSURFACE CONDITIONS

SAMPLE TYPE	BLOWS PER 6"	DRY DENSITY (PCF)	MOISTURE (%)	DEPTH (FEET)	USCS CODE	DESCRIPTION OF SUBSURFACE CONDITIONS
H				1	SM	<p>SILTY SAND W/ TRACE GRAVEL strong brown (7.5YR 4/6), poor gradation, subangular particles, loose, no plasticity, moist, nil cementation</p> <p>Becomes medium dense</p> <p>Becomes more sandy Becomes loose</p> <p>Weak cementation Becomes medium dense</p> <p>Becomes dense</p>
R	15/18	NR		2		
				3		
				4		
R	6/7	NR		5		
				6		
				7		
				8		
				9		
R	20/26	102	5.4	10		
				11		
				12		
				13		
				14		
R	23/38	NR		15		
				16		

The stratification lines represent the approximate boundary lines between soil and rock types: In-situ, the transition may be gradual. Sample Type Key: S = Split Spoon H = Hand Sample
NR = No Recovery R = Ring Sampler RF = Refusal

<p>ALPHA GEOTECHNICAL & MATERIALS, INC. 5002 S. 40TH STREET PHOENIX, ARIZONA 85040</p>	<p>Boring Date: 12/19/2001</p> <hr/> <p>Drill Rig Type: CME-75</p>
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ALPHA PROJECT NO. 01-A-000111

LOG OF TEST BORING NO. 3 (2 of 2)

Project: White Tanks Flood Retarding Structure #3, North Inlet Channel

Project Location: White Tank Mountains,
Maricopa County, Arizona

Boring Location: See attached Site Plan.

Northing: 33° 34.845'

Westing: 112° 28.234'

Remarks: There was no sample recovery at 20 and 25 feet due to cohesionless soil.

SAMPLE TYPE	BLOWS PER 6"	DRY DENSITY (PCF)	MOISTURE (%)	DEPTH (FEET)	USCS CODE	DESCRIPTION OF SUBSURFACE CONDITIONS
				16	SM	SILTY SAND W/ TRACE GRAVEL strong brown (7.5YR 4/6), poor gradation, subangular particles, dense, no plasticity, moist, weak cementation Becomes very dense
				17		
				18		
				19		
R	22/ 50-4"	NR		20		
				21		
				22		
				23		
				24		
R	41/ 50-3"	NR		25		
				26		
				27		
				28		
				29		
				30		
						BOTTOM OF BORING No Groundwater Encountered

The stratification lines represent the approximate boundary lines between soil and rock types: In-situ, the transition may be gradual.

Sample Type Key: S = Split Spoon H = Hand Sample
NR = No Recovery R = Ring Sampler RF = Refusal

ALPHA GEOTECHNICAL & MATERIALS, INC.
 5002 S. 40TH STREET
 PHOENIX, ARIZONA 85040

Boring Date: 12/19/2001

Drill Rig Type: CME-75

Project: White Tanks Flood Retarding Structure #3, North Inlet Channel

Project Location: White Tank Mountains,
Maricopa County, Arizona

Boring Location: See attached Site Plan.

SAMPLE TYPE	BLOWS PER 6"	DRY DENSITY (PCF)	MOISTURE (%)	DEPTH (FEET)	USCS CODE	Northing: 33° 34.364' Westing: 112° 28.249' Remarks: There was no sample recovery at 2 and 15 feet due to cohesionless soil.
						DESCRIPTION OF SUBSURFACE CONDITIONS
H				1	SM	SILTY SAND W/ TRACE GRAVEL brown to pale brown (10YR 5.5/3), poor gradation, subangular particles, loose, no plasticity, moist, nil cementation Becomes more sandy Becomes very loose Weak cementation Becomes medium dense Becomes more gravelly Becomes dense
NR	11/11			2		
				3		
				4		
R	5/5	97	2.6	5		
				6		
				7		
				8		
				9		
R	7/8	84	6.8	10		
				11		
				12		
				13		
				14		
R	25/37	NR		15		
				16		

The stratification lines represent the approximate boundary lines between soil and rock types: In-situ, the transition may be gradual.

Sample Type Key: S = Split Spoon H = Hand Sample
 NR = No Recovery R = Ring Sampler RF = Refusal

ALPHA GEOTECHNICAL & MATERIALS, INC.
 5002 S. 40TH STREET
 PHOENIX, ARIZONA 85040

Boring Date: 12/19/2001

Drill Rig Type: CME-75

ALPHA PROJECT NO. 01-A-000111

LOG OF TEST BORING NO. 4 (2 of 2)

Project: White Tanks Flood Retarding Structure #3, North Inlet Channel

Project Location: White Tank Mountains,
Maricopa County, Arizona

Boring Location: See attached Site Plan.

SAMPLE TYPE	BLOWS PER 6"	DRY DENSITY (PCF)	MOISTURE (%)	DEPTH (FEET)	USCS CODE	Northing: 33° 34.364' Westing: 112° 28.249' Remarks: Auger refusal occurred at 18 feet.
						DESCRIPTION OF SUBSURFACE CONDITIONS
				16	SM	SILTY SAND W/ TRACE GRAVEL brown to pale brown (10YR 5.5/3), poor gradation, subangular particles, dense, no plasticity, moist, weak cementation
			17			
				18		BOTTOM OF BORING Auger Refusal No Groundwater Encountered
				19		
				20		
				21		
				22		
				23		
				24		
				25		
				26		
				27		
				28		
				29		
				30		

The stratification lines represent the approximate boundary lines between soil and rock types: In-situ, the transition may be gradual.

Sample Type Key: S = Split Spoon H = Hand Sample
NR = No Recovery R = Ring Sampler RF = Refusal

ALPHA GEOTECHNICAL & MATERIALS, INC.
 5002 S. 40TH STREET
 PHOENIX, ARIZONA 85040

Boring Date: 12/19/2001

Drill Rig Type: CME-75

Project: White Tanks Flood Retarding Structure #3, North Inlet Channel

Project Location: White Tank Mountains,
Maricopa County, Arizona

Boring Location: See attached Site Plan.

SAMPLE TYPE	BLOWS PER 6"	DRY DENSITY (PCF)	MOISTURE (%)	DEPTH (FEET)	USCS CODE	Northing: 33° 33.969' Westing: 112° 28.261'
						Remarks:
DESCRIPTION OF SUBSURFACE CONDITIONS						
H				1	SM/ML	SILTY SAND TO SANDY SILT W/ TRACE GRAVEL light brownish gray to light gray (10YR 6.5/2), poor gradation, subangular particles, loose, no plasticity, moist, nil cementation Becomes medium dense Weak cementation Becomes light brown Moderate cementation Weak cementation Becomes more gravelly Becomes dense
R	13/15	103	5.6	2		
				3		
				4		
R	9/15	110	3.0	5		
				6		
				7		
				8		
				9		
R	11/17	90	4.1	10		
				11		
				12		
				13		
				14		
R	26/36			15		
				16		

The stratification lines represent the approximate boundary lines between soil and rock types: In-situ, the transition may be gradual.

Sample Type Key: S = Split Spoon H = Hand Sample
NR = No Recovery R = Ring Sampler RF = Refusal

ALPHA GEOTECHNICAL & MATERIALS, INC.
 5002 S. 40TH STREET
 PHOENIX, ARIZONA 85040

Boring Date: 12/19/2001

Drill Rig Type: CME-75

Project: White Tanks Flood Retarding Structure #3, North Inlet Channel

Project Location: White Tank Mountains, Maricopa County, Arizona **Boring Location: See attached Site Plan.**

SAMPLE TYPE	BLOWS PER 6"	DRY DENSITY (PCF)	MOISTURE (%)	DEPTH (FEET)	USCS CODE	Northing: 33° 33.969' Westing: 112° 28.261'					
						Remarks: There was no sample recovery at 20 feet due to cohesionless soil.					
						DESCRIPTION OF SUBSURFACE CONDITIONS					

R	29/46	NR		16	SM	SILTY SAND W/ SOME GRAVEL light brownish gray to light gray (10YR 6.5/2), poor gradation, particles, subangular dense, no plasticity, moist, weak cementation
				17		
R	34/ 50-4"			18		Becomes more gravelly
				19		
				20		
				21		
				22		
				23		
				24		
				25		
				26		
				27		
				28		Becomes very dense
				29		
				30		
BOTTOM OF BORING No Groundwater Encountered						

The stratification lines represent the approximate boundary lines between soil and rock types: In-situ, the transition may be gradual. Sample Type Key: S = Split Spoon H = Hand Sample
 NR = No Recovery R = Ring Sampler RF = Refusal

ALPHA GEOTECHNICAL & MATERIALS, INC. 5002 S. 40 TH STREET PHOENIX, ARIZONA 85040	Boring Date: 12/19/2001
	Drill Rig Type: CME-75

Project: White Tanks Flood Retarding Structure #3, North Inlet Channel

Project Location: White Tank Mountains,
Maricopa County, Arizona

Boring Location: See attached Site Plan.

Northing: 33° 33.501'

Westing: 112° 28.260'

Remarks: There was no sample recovery at 10 feet due to cohesionless soil.

SAMPLE TYPE	BLOWS PER 6"	DRY DENSITY (PCF)	MOISTURE (%)	DEPTH (FEET)	USCS CODE	DESCRIPTION OF SUBSURFACE CONDITIONS
H				1	SM	SILTY SAND W/ TRACE GRAVEL strong brown (7.5YR 4.5/6), poor gradation, subangular loose, no plasticity, moist, nil cementation
R	14/14	107	2.8	2		Becomes medium dense
				3		
				4		
R	19/38			5		Becomes dense
				6		
				7		
				8		
				9		
R	50-3"	NR		10		Becomes very dense
				11		
				12		
				13		
				14		
R	50-4"			15		Weak cementation
				16		

The stratification lines represent the approximate boundary lines between soil and rock types: In-situ, the transition may be gradual.

Sample Type Key: S = Split Spoon H = Hand Sample
NR = No Recovery R = Ring Sampler RF = Refusal

ALPHA GEOTECHNICAL & MATERIALS, INC.
5002 S. 40TH STREET
PHOENIX, ARIZONA 85040

Boring Date: 12/19/2001

Drill Rig Type: CME-75

Project: White Tanks Flood Retarding Structure #3, North Inlet Channel

Project Location: White Tank Mountains, Maricopa County, Arizona **Boring Location: See attached Site Plan.**

Northing: 33° 33.501'
Westing: 112° 28.260'
 Remarks: There was no sample recovery at 20 feet due to cohesionless soil. Auger refusal occurred at 27 feet.

DESCRIPTION OF SUBSURFACE CONDITIONS

SAMPLE TYPE	BLOWS PER 6"	DRY DENSITY (PCF)	MOISTURE (%)	DEPTH (FEET)	USCS CODE	DESCRIPTION OF SUBSURFACE CONDITIONS
NR	50-5"			16	SM	SILTY SAND W/ TRACE GRAVEL strong brown (7.5YR 4.5/6), poor gradation, subangular particles, very dense, no plasticity, moist, weak cementation
				17		
				18		
				19		
				20		
				21		
				22		
				23		
				24		
				25		
R	50-3"			25		Becomes more silty
				26		
				27		
				28		
				29		
			30		BOTTOM OF BORING Auger Refusal No Groundwater Encountered	

The stratification lines represent the approximate boundary lines between soil and rock types: In-situ, the transition may be gradual.

 Sample Type Key: S = Split Spoon H = Hand Sample
 NR = No Recovery R = Ring Sampler RF = Refusal

ALPHA GEOTECHNICAL & MATERIALS, INC. 5002 S. 40TH STREET PHOENIX, ARIZONA 85040	Boring Date: 12/19/2001
	Drill Rig Type: CME-75

Project: White Tanks Flood Retarding Structure #3, North Inlet Channel

Project Location: White Tank Mountains, Maricopa County, Arizona **Boring Location: See attached Site Plan.**

Northing: 33° 33.094'
Westing: 112° 28.255'
 Remarks: Bore hole is in gravel roadway. There was no sample recovery at 10 feet due to cohesionless soil.

DESCRIPTION OF SUBSURFACE CONDITIONS

SAMPLE TYPE	BLOWS PER 6"	DRY DENSITY (PCF)	MOISTURE (%)	DEPTH (FEET)	USCS CODE	DESCRIPTION OF SUBSURFACE CONDITIONS
H				1	SM/ML	<p>SILTY SAND TO SANDY SILT brown (7.5YR 4.5/4), poor gradation, subangular particles, dense, no plasticity, dry, nil cementation</p> <p>Becomes medium dense Becomes moist</p> <p>Weak cementation</p> <p>Becomes dense Becomes gravelly</p>
R	28/19			2		
				3		
				4		
R	15/24	100	6.6	5		
				6		
				7		
				8		
				9		
R	20/35	NR		10		
				11		
				12		
				13		
				14		
R	25/49			15		
				16		

The stratification lines represent the approximate boundary lines between soil and rock types: In-situ, the transition may be gradual.

 Sample Type Key: S = Split Spoon H = Hand Sample
 NR = No Recovery R = Ring Sampler RF = Refusal

<p>ALPHA GEOTECHNICAL & MATERIALS, INC. 5002 S. 40TH STREET PHOENIX, ARIZONA 85040</p>	<p>Boring Date: 12/19/2001</p> <hr/> <p>Drill Rig Type: CME-75</p>
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Project: White Tanks Flood Retarding Structure #3, North Inlet Channel

Project Location: White Tank Mountains,
Maricopa County, Arizona

Boring Location: See attached Site Plan.

SAMPLE TYPE	BLOWS PER 6"	DRY DENSITY (PCF)	MOISTURE (%)	DEPTH (FEET)	USCS CODE	Northing: 33° 33.094' Westing: 112° 28.255'
						Remarks: There was no sample recovery at 20 feet due to cohesionless soil. No blow counts were recorded at 25 feet.
DESCRIPTION OF SUBSURFACE CONDITIONS						
R	16/22	NR		16	SM/ML	SILTY SAND TO SANDY SILT brown (7.5YR 4.5/4), poor gradation, subangular particles, dense, no plasticity, moist, weak cementation Becomes medium dense Becomes more sandy Becomes gravelly
				17		
				18		
				19		
				20		
				21		
				22		
				23		
				24		
				25		
				26		
				27		
				28		
				29		
				30		BOTTOM OF BORING No Groundwater Encountered

The stratification lines represent the approximate boundary lines between soil and rock types: In-situ, the transition may be gradual.

Sample Type Key: S = Split Spoon H = Hand Sample
NR = No Recovery R = Ring Sampler RF = Refusal

ALPHA GEOTECHNICAL & MATERIALS, INC.
 5002 S. 40TH STREET
 PHOENIX, ARIZONA 85040

Boring Date: 12/19/2001

Drill Rig Type: CME-75

Project: White Tanks Flood Retarding Structure #3, North Inlet Channel

Project Location: White Tank Mountains,
Maricopa County, Arizona

Boring Location: See attached Site Plan.

Northing: 33° 32.416'

Westing: 112° 28.349'

Remarks:

SAMPLE TYPE	BLOWS PER 6"	DRY DENSITY (PCF)	MOISTURE (%)	DEPTH (FEET)	USCS CODE	DESCRIPTION OF SUBSURFACE CONDITIONS
H				1	SM/ML	SILTY SAND TO SANDY SILT brown to light brown (7.5YR 5.5/3), poor gradation, subangular particles, loose, no plasticity, dry, nil cementation Becomes medium dense Weak cementation Becomes dense Becomes gravelly Becomes medium dense Becomes more sandy
R	8/11			2		
				3		
				4		
R	17/29			5		
				6		
				7		
				8		
				9		
R	30/35			10		
				11		
				12		
				13		
				14		
R	20/22			15		
				16		

The stratification lines represent the approximate boundary lines between soil and rock types: In-situ, the transition may be gradual.

Sample Type Key: S = Split Spoon H = Hand Sample
 NR = No Recovery R = Ring Sampler RF = Refusal

ALPHA GEOTECHNICAL & MATERIALS, INC.
 5002 S. 40TH STREET
 PHOENIX, ARIZONA 85040

Boring Date: 12/19/2001

Drill Rig Type: CME-75

ALPHA PROJECT NO. 01-A-000111

LOG OF TEST BORING NO. 8 (2 of 2)

Project: White Tanks Flood Retarding Structure #3, North Inlet Channel

Project Location: White Tank Mountains,
Maricopa County, Arizona

Boring Location: See attached Site Plan.

Northing: 33° 32.416'

Westing: 112° 28.349'

Remarks: There was no sample recovery at 25 feet due to cohesionless soil.

SAMPLE TYPE	BLOWS PER 6"	DRY DENSITY (PCF)	MOISTURE (%)	DEPTH (FEET)	USCS CODE	DESCRIPTION OF SUBSURFACE CONDITIONS
R	50-5"			16	SM/ML	SILTY SAND TO SANDY SILT brown to light brown (7.5YR 5.5/3), poor gradation, subangular particles, medium dense, no plasticity, moist, weak cementation Becomes very dense
				17		
				18		
				19		
				20		
				21		
				22		
				23		
				24		
				25		
R	14/20	NR		26		Becomes medium dense Becomes gravelly
				27		
				28		
				29		
				30		
						BOTTOM OF BORING No Groundwater Encountered

The stratification lines represent the approximate boundary lines between soil and rock types: In-situ, the transition may be gradual.

Sample Type Key: S = Split Spoon H = Hand Sample
NR = No Recovery R = Ring Sampler RF = Refusal

ALPHA GEOTECHNICAL & MATERIALS, INC.
 5002 S. 40TH STREET
 PHOENIX, ARIZONA 85040

Boring Date: 12/19/2001

Drill Rig Type: CME-75

Alpha Geotechnical and Materials

PROJECT: White Tanks Canal
LOCATION: Maricopa County
MATERIAL: Native
SAMPLE: B1 @ 0-2'

JOB NO: 01-A-00111
WORK ORDER NO: 1
LAB NO: 1
DATE SAMPLED: 12/19/01

HYDROMETER TEST REPORT (ASTM D-422)

WEIGHT OF SAMPLE DISPERSED	67.70	SPECIFIC GRAVITY OF SOLIDS	2.65
PERCENT PASSING #10 SIEVE	68		

HYDROMETER RESULTS (% PASSING)

PARTICLE SIZE (DIA. mm)	0.0543	0.0366	0.0215	0.0153	0.0109	0.0053	0.0023	0.0023
PERCENT SAMPLE TESTED	24.0	14.3	11.1	9.6	8.1	5.3	3.5	3.5
PERCENT TOTAL SAMPLE	16.3	9.7	7.5	6.5	5.5	3.6	2.4	2.4

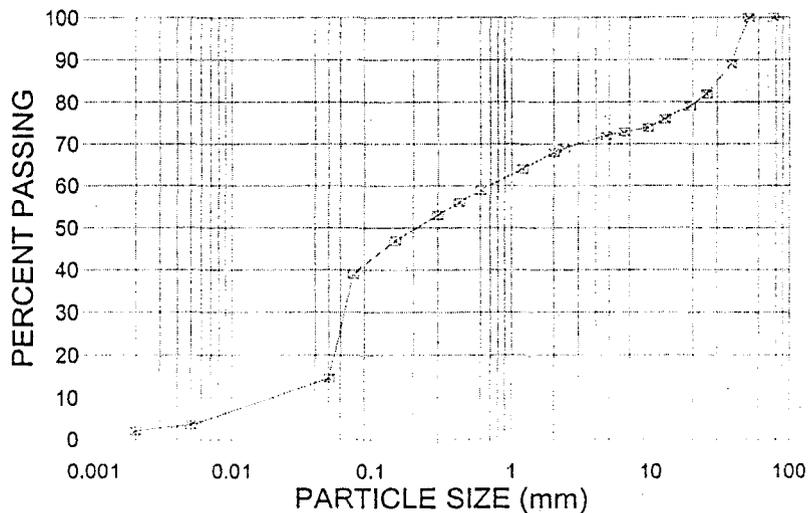
FULL SIEVE ANALYSIS MECHANICAL SIEVE & HYDROMETER (% PASSING)

3 IN	100
2 IN	100
1 1/2 IN	89
1 IN	82
3/4 IN	79
1/2 IN	76
3/8 IN	74
1/4 IN	73
# 4	72
# 8	69
# 10	68
# 16	64
# 30	59
# 40	56
# 50	53
# 100	47
# 200	39
05 mm	15
.005 mm	3
002 mm	2

MECHANICAL SIEVE ANALYSIS AFTER HYDROMETER (% PASSING)

#200	#100	#50	#40	#30	#16	#10
39	47	53	56	59	64	68

PARTICLE SIZE DISTRIBUTION CURVE



Alpha Geotechnical and Materials

PROJECT: White Tanks Canal
 LOCATION: Maricopa County
 MATERIAL: Native
 SAMPLE: B2 @ 0-2'

JOB NO: 01-A-00111
 WORK ORDER NO: 1
 LAB NO: 2
 DATE SAMPLED: 12/19/01

HYDROMETER TEST REPORT (ASTM D-422)

WEIGHT OF SAMPLE DISPERSED 71.30 SPECIFIC GRAVITY OF SOLIDS 2.65
 PERCENT PASSING #10 SIEVE 95

HYDROMETER RESULTS (% PASSING)

PARTICLE SIZE (DIA. mm)	0.0525	0.0348	0.0207	0.0149	0.0106	0.0051	0.0022	0.0022
PERCENT SAMPLE TESTED	36.2	27.7	21.4	17.2	15.2	11.8	9.2	9.2
PERCENT TOTAL SAMPLE	34.2	26.2	20.2	16.3	14.4	11.1	8.7	8.7

FULL SIEVE ANALYSIS

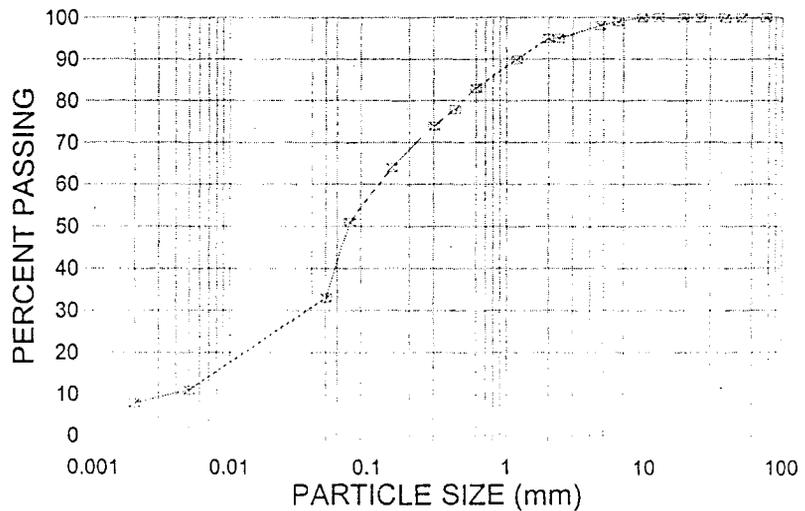
MECHANICAL SIEVE & HYDROMETER (% PASSING)

3 IN	100
2 IN	100
1 1/2 IN	100
1 IN	100
3/4 IN	100
1/2 IN	100
3/8 IN	100
1/4 IN	99
# 4	98
# 8	95
# 10	95
# 16	90
# 30	83
# 40	78
# 50	74
# 100	64
# 200	51
.05 mm	33
.005 mm	11
.002 mm	8

MECHANICAL SIEVE ANALYSIS AFTER HYDROMETER (% PASSING)

	#200	#100	#50	#40	#30	#16	#10
	66	75	81	85	88	93	95

PARTICLE SIZE DISTRIBUTION CURVE



Alpha Geotechnical and Materials

PROJECT: White Tanks Canal
 LOCATION: Maricopa County
 MATERIAL: Native
 SAMPLE: B5 @ 0-2'

JOB NO: 01-A-00111
 WORK ORDER NO: 1
 LAB NO: 5
 DATE SAMPLED: 12/19/01

HYDROMETER TEST REPORT (ASTM D-422)

WEIGHT OF SAMPLE DISPERSED 95.40 SPECIFIC GRAVITY OF SOLIDS 2.65
 PERCENT PASSING #10 SIEVE 88

HYDROMETER RESULTS (% PASSING)

PARTICLE SIZE (DIA. mm)	0.0523	0.0351	0.0207	0.0149	0.0107	0.0052	0.0022	0.0022
PERCENT SAMPLE TESTED	26.5	19.0	16.1	13.2	10.4	9.4	7.6	7.6
PERCENT TOTAL SAMPLE	23.3	16.7	14.1	11.6	9.1	8.2	6.7	6.7

FULL SIEVE ANALYSIS

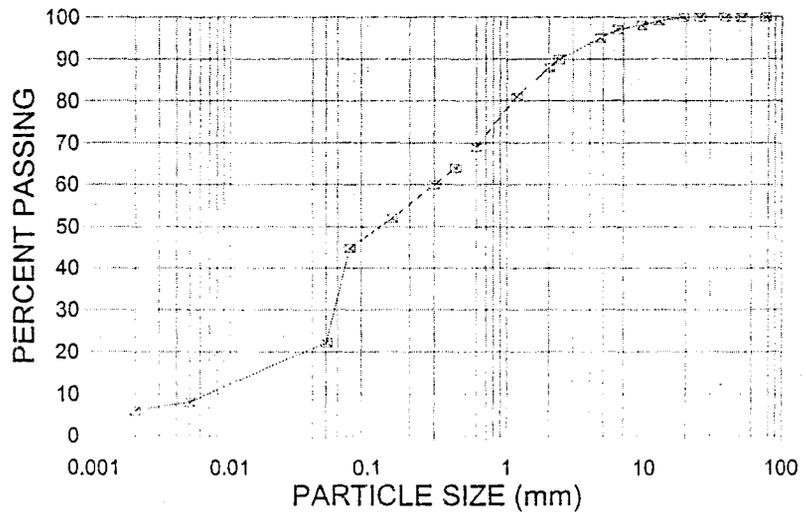
MECHANICAL SIEVE & HYDROMETER (% PASSING)

3 IN	100
2 IN	100
1 1/2 IN	100
1 IN	100
3/4 IN	100
1/2 IN	99
3/8 IN	98
1/4 IN	97
# 4	95
# 8	90
# 10	88
# 16	81
# 30	69
# 40	64
# 50	60
# 100	52
# 200	45
.05 mm	22
.005 mm	8
.002 mm	6

MECHANICAL SIEVE ANALYSIS AFTER HYDROMETER (% PASSING)

#200	#100	#50	#40	#30	#16	#10
45	52	60	64	69	81	88

PARTICLE SIZE DISTRIBUTION CURVE



Alpha Geotechnical and Materials

PROJECT: White Tanks Canal
 LOCATION: Maricopa County
 MATERIAL: Native
 SAMPLE: B8 @ 0-2'

JOB NO: 01-A-00111
 WORK ORDER NO: 1
 LAB NO: 8
 DATE SAMPLED: 12/19/01

HYDROMETER TEST REPORT (ASTM D-422)

WEIGHT OF SAMPLE DISPERSED 97.10 SPECIFIC GRAVITY OF SOLIDS 2.65
 PERCENT PASSING #10 SIEVE 100

HYDROMETER RESULTS (% PASSING)

ARTICLE SIZE (DIA. mm)	0.0529	0.0354	0.0208	0.0149	0.0106	0.0052	0.0022	0.0022
PERCENT SAMPLE TESTED	25.1	16.8	13.5	11.9	10.4	7.5	5.5	5.5
PERCENT TOTAL SAMPLE	25.0	16.7	13.5	11.9	10.3	7.4	5.4	5.4

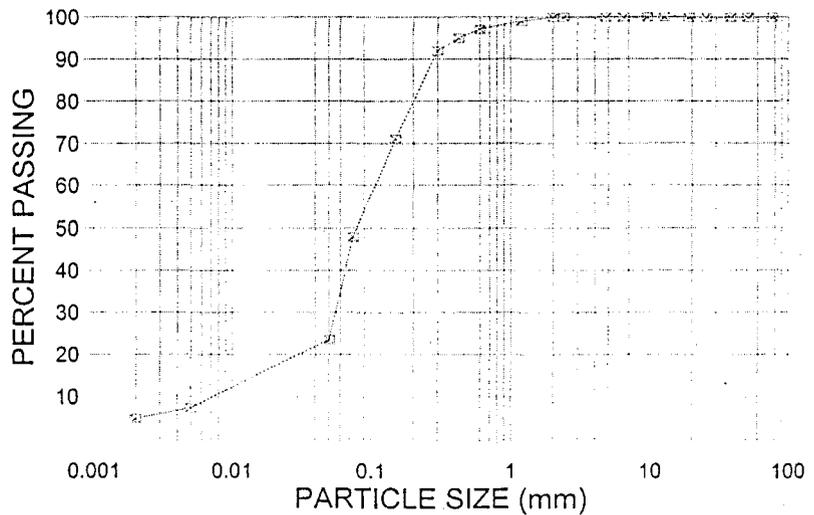
FULL SIEVE ANALYSIS MECHANICAL SIEVE & HYDROMETER (% PASSING)

IN	100
2 IN	100
1/2 IN	100
IN	100
3/4 IN	100
1/2 IN	100
3/8 IN	100
1/4 IN	100
# 4	100
# 8	100
# 10	100
# 16	99
# 30	97
# 40	95
# 50	92
# 100	71
# 200	48
# 75 mm	24
# 600 mm	7
# 102 mm	5

MECHANICAL SIEVE ANALYSIS AFTER HYDROMETER (% PASSING)

#200	#100	#50	#40	#30	#16	#10
52	73	93	95	97	99	100

PARTICLE SIZE DISTRIBUTION CURVE



ALPHA Geotechnical & Materials, Inc.

PROJECT: WHITE TANKS CANAL
LOCATION: MARICOPA COUNTY
MATERIAL: NATIVE
SAMPLE SOURCE: B-2 @ 0-2'

JOB NUMBER: 01-A-00111
WORK ORDER NO: 1
LAB NO: 2
DATE SAMPLED: 12/19/01

MECHANICAL SIEVE ANALYSIS (ASTM C136 & C117)
ATTERBERG LIMITS (ASTM D4318)

MECHANICAL ANALYSIS

SIEVE SIZE	% PASSING	ATTERBERG LIMITS
6 IN	100	
4 IN	100	LL: NV
3 IN	100	PI: NP
2 IN	100	
1 1/2 IN	100	
1 IN	100	
3/4 IN	100	
1/2 IN	100	
3/8 IN	99	
1/4 IN	99	
#4	98	
#8	95	
#10	94	
#16	90	
#30	83	
#40	78	
#50	74	
#100	64	
#200	51	

ALPHA Geotechnical & Materials, Inc.

PROJECT: WHITE TANKS CANAL
LOCATION: MARICOPA COUNTY
MATERIAL: NATIVE
SAMPLE SOURCE: B-3 @ 0-2'

JOB NUMBER: 01-A-00111
WORK ORDER NO: 1
LAB NO: 3
DATE SAMPLED: 12/19/01

MECHANICAL SIEVE ANALYSIS (ASTM C136 & C117)
ATTERBERG LIMITS (ASTM D4318)

MECHANICAL ANALYSIS

SIEVE SIZE	% PASSING	ATTERBERG LIMITS
6 IN	100	
4 IN	100	LL: NV
3 IN	100	PI: NP
2 IN	100	
1 1/2 IN	98	
1 IN	96	
3/4 IN	95	
1/2 IN	91	
3/8 IN	89	
1/4 IN	85	
#4	83	
#8	76	
#10	74	
#16	66	
#30	56	
#40	49	
#50	45	
#100	34	
#200	26	

ALPHA Geotechnical & Materials, Inc.

PROJECT: WHITE TANKS CANAL
LOCATION: MARICOPA COUNTY
MATERIAL: NATIVE
SAMPLE SOURCE: B-4 @ 0-2'

JOB NUMBER: 01-A-00111
WORK ORDER NO: 1
LAB NO: 4
DATE SAMPLED: 12/19/01

MECHANICAL SIEVE ANALYSIS (ASTM C136 & C117)
ATTERBERG LIMITS (ASTM D4318)

MECHANICAL ANALYSIS

SIEVE SIZE	% PASSING	ATTERBERG LIMITS
6 IN	100	
4 IN	100	LL: NV
3 IN	100	PI: NP
2 IN	100	
1 1/2 IN	100	
1 IN	96	
3/4 IN	94	
1/2 IN	90	
3/8 IN	88	
1/4 IN	84	
#4	81	
#8	72	
#10	70	
#16	61	
#30	51	
#40	45	
#50	40	
#100	31	
#200	25	

ALPHA Geotechnical & Materials, Inc.

PROJECT: WHITE TANKS CANAL
LOCATION: MARICOPA COUNTY
MATERIAL: NATIVE
SAMPLE SOURCE: B-6 @ 0-2'

JOB NUMBER: 01-A-00111
WORK ORDER NO: 1
LAB NO: 6
DATE SAMPLED: 12/19/01

MECHANICAL SIEVE ANALYSIS (ASTM C136 & C117)
ATTERBERG LIMITS (ASTM D4318)

MECHANICAL ANALYSIS

SIEVE SIZE	% PASSING	ATTERBERG LIMITS
6 IN	100	
4 IN	100	LL: NV
3 IN	100	PI: NP
2 IN	100	
1 1/2 IN	100	
1 IN	98	
3/4 IN	96	
1/2 IN	94	
3/8 IN	93	
1/4 IN	90	
#4	89	
#8	83	
#10	82	
#16	76	
#30	66	
#40	61	
#50	57	
#100	47	
#200	38	

ALPHA Geotechnical & Materials, Inc.

PROJECT: WHITE TANKS CANAL
LOCATION: MARICOPA COUNTY
MATERIAL: NATIVE
SAMPLE SOURCE: B-7 @ 0-2'

JOB NUMBER: 01-A-00111
WORK ORDER NO: 1
LAB NO: 7
DATE SAMPLED: 12/19/01

MECHANICAL SIEVE ANALYSIS (ASTM C136 & C117)
ATTERBERG LIMITS (ASTM D4318)

MECHANICAL ANALYSIS

SIEVE SIZE	% PASSING	ATTERBERG LIMITS
6 IN	100	
4 IN	100	LL: NV
3 IN	100	PI: NP
2 IN	100	
1 1/2 IN	100	
1 IN	100	
3/4 IN	99	
1/2 IN	98	
3/8 IN	97	
1/4 IN	94	
#4	92	
#8	87	
#10	85	
#16	76	
#30	65	
#40	60	
#50	55	
#100	47	
#200	40	

ALPHA Geotechnical & Materials, Inc.

PROJECT: WHITE TANKS CANAL
LOCATION: MARICOPA COUNTY
MATERIAL: NATIVE
SAMPLE SOURCE: B-8 @ 0-2'

JOB NUMBER: 01-A-00111
WORK ORDER NO: 1
LAB NO: 8
DATE SAMPLED: 12/19/01

MECHANICAL SIEVE ANALYSIS (ASTM C136 & C117)
ATTERBERG LIMITS (ASTM D4318)

MECHANICAL ANALYSIS

SIEVE SIZE	% PASSING	ATTERBERG LIMITS
6 IN	100	
4 IN	100	LL: NV
3 IN	100	PI: NP
2 IN	100	
1 1/2 IN	100	
1 IN	100	
3/4 IN	100	
1/2 IN	100	
3/8 IN	100	
1/4 IN	100	
#4	100	
#8	100	
#10	100	
#16	99	
#30	96	
#40	95	
#50	92	
#100	71	
#200	48	

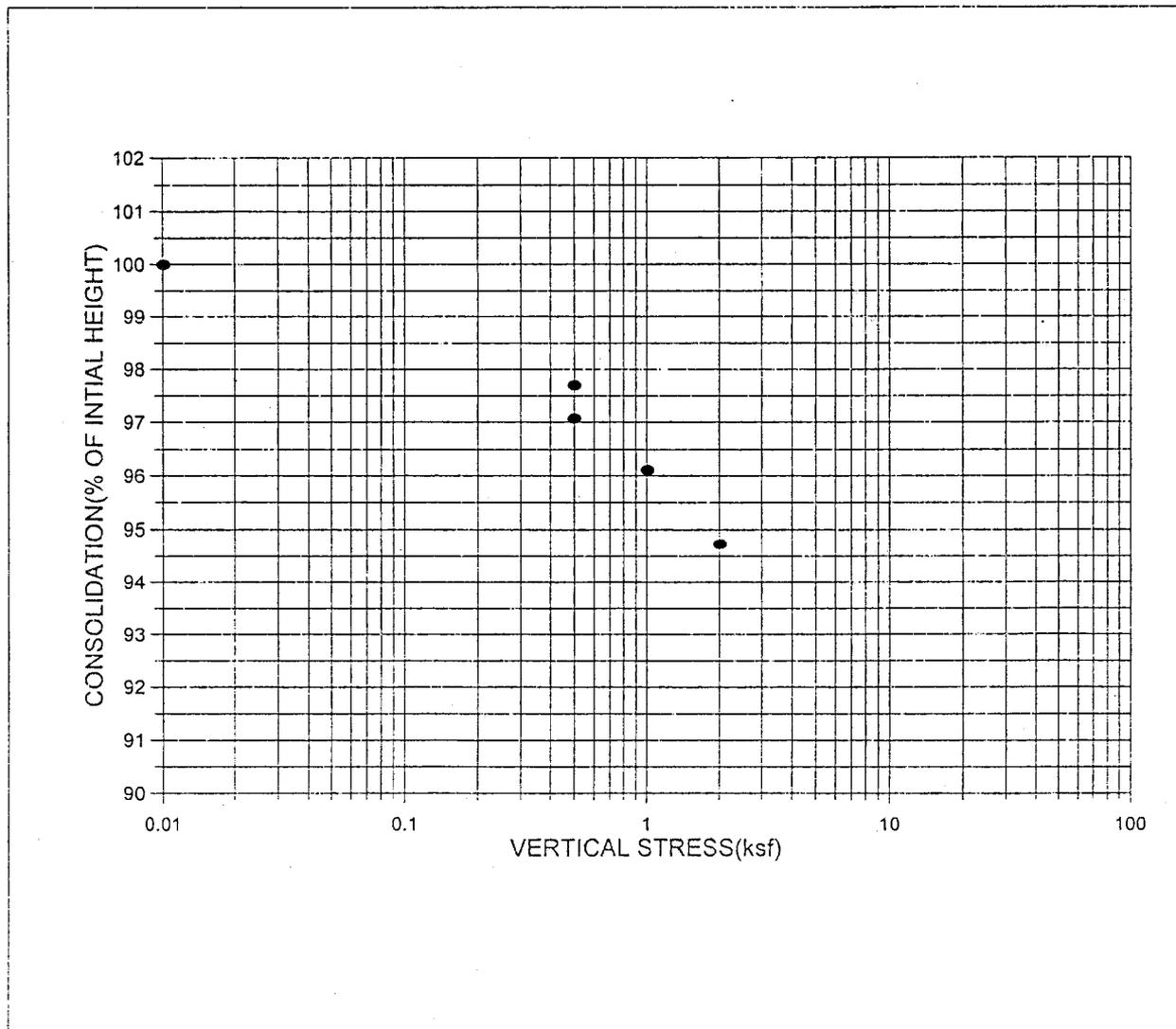
ALPHA Geotechnical & Materials, Inc.

PROJECT: White Tanks Canal
LOCATION: Maricopa County
MATERIAL: Native
SAMPLE SOURCE: Boring 4 @ 5-6'
SAMPLE PREPARATION: Insitu
SOIL TYPE: Silty Sand

JOB NO: 01-A-00111
WORK ORDER NO: 1
LAB NO: 9
DATE SAMPLED:

ONE-DIMENSIONAL CONSOLIDATION PROPERTIES OF SOILS (ASTM D2435)

INITIAL MOISTURE CONTENT	2.6%	FINAL MOISTURE CONTENT	22.3%
INITIAL DRY DENSITY(pcf)	97.0	FINAL DRY DENSITY(pcf)	101.9
INITIAL DEGREE OF SATURATION	10%	FINAL DEGREE OF SATURATION	95%
INITIAL VOID RATIO	0.7	FINAL VOID RATIO	0.6
ESTIMATED SPECIFIC GRAVITY	2.650	SATURATED AT	0.5 ksf



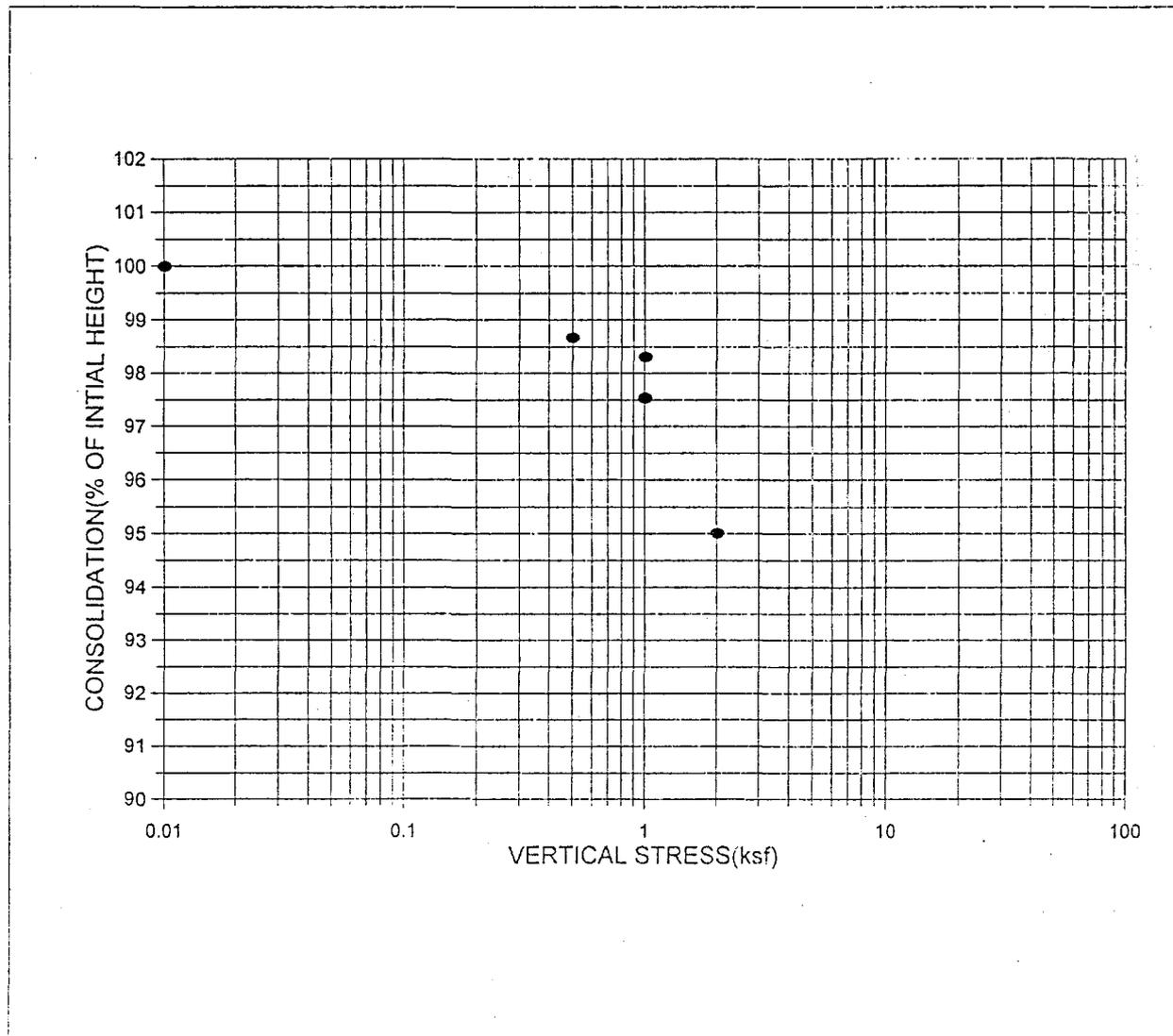
ALPHA Geotechnical & Materials, Inc.

PROJECT: White Tanks Canal
LOCATION: Maricopa County
MATERIAL: Native
SAMPLE SOURCE: Boring 4 @ 10-11'
SAMPLE PREPARATION: Insitu
SOIL TYPE: Silty Sand

JOB NO: 01-A-00111
WORK ORDER NO: 1
LAB NO: 10
DATE SAMPLED:

ONE-DIMENSIONAL CONSOLIDATION PROPERTIES OF SOILS (ASTM D2435)

INITIAL MOISTURE CONTENT	6.8%	FINAL MOISTURE CONTENT	31.9%
INITIAL DRY DENSITY(pcf)	83.8	FINAL DRY DENSITY(pcf)	87.7
INITIAL DEGREE OF SATURATION	19%	FINAL DEGREE OF SATURATION	96%
INITIAL VOID RATIO	1.0	FINAL VOID RATIO	0.9
ESTIMATED SPECIFIC GRAVITY	2.650	SATURATED AT	1 ksf



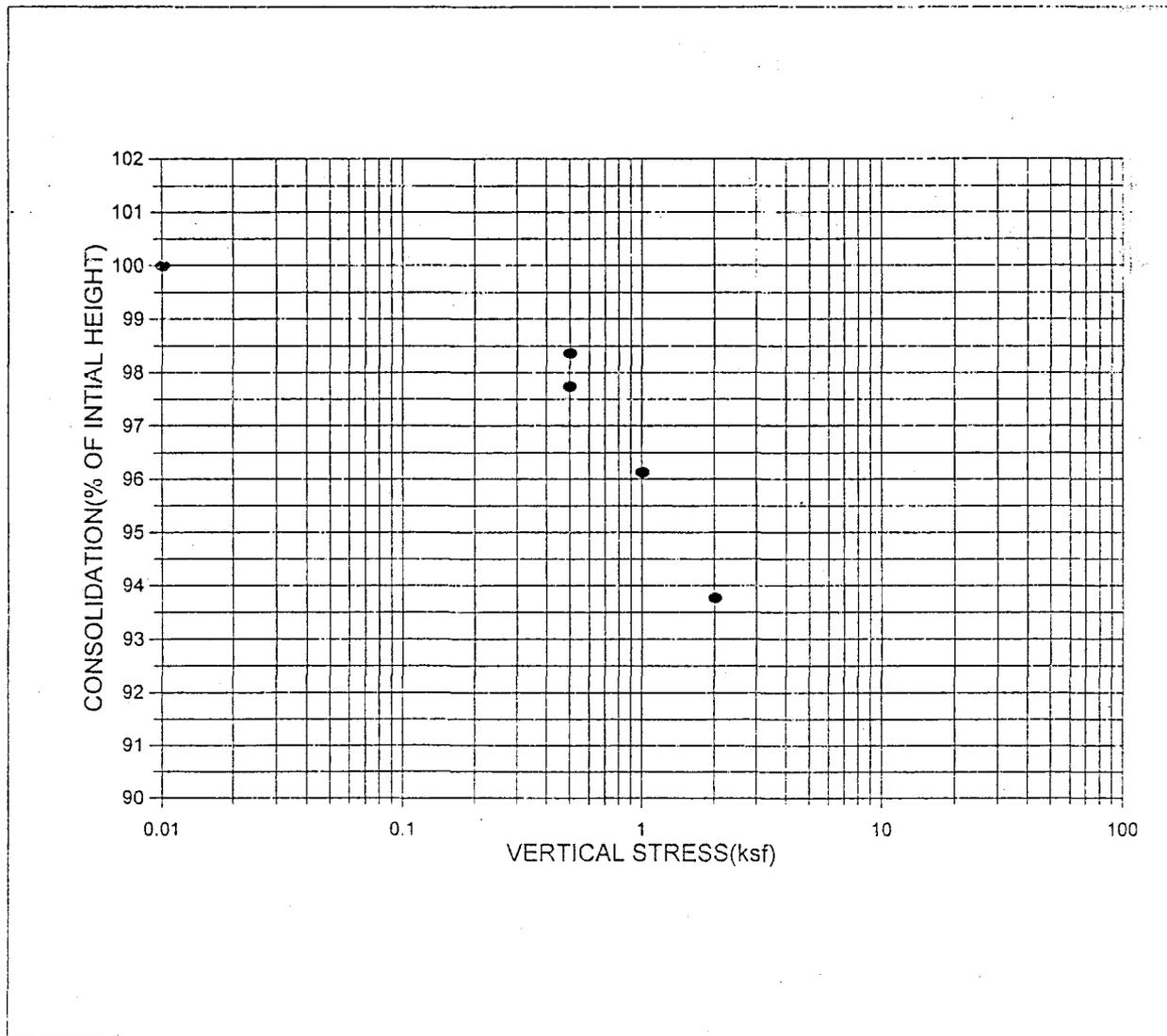
ALPHA Geotechnical & Materials, Inc.

PROJECT: White Tanks Canal
LOCATION: Maricopa County
MATERIAL: Native
SAMPLE SOURCE: Boring 5 @ 2-3'
SAMPLE PREPARATION: Insitu
SOIL TYPE: Silty Sand

JOB NO: 01-A-00111
WORK ORDER NO: 1
LAB NO: 11
DATE SAMPLED: 12/19/01

ONE-DIMENSIONAL CONSOLIDATION PROPERTIES OF SOILS (ASTM D2435)

INITIAL MOISTURE CONTENT	5.6%	FINAL MOISTURE CONTENT	18.3%
INITIAL DRY DENSITY(pcf)	103.2	FINAL DRY DENSITY(pcf)	109.5
INITIAL DEGREE OF SATURATION	24%	FINAL DEGREE OF SATURATION	95%
INITIAL VOID RATIO	0.6	FINAL VOID RATIO	0.5
ESTIMATED SPECIFIC GRAVITY	2.650	SATURATED AT	0.5 ksf



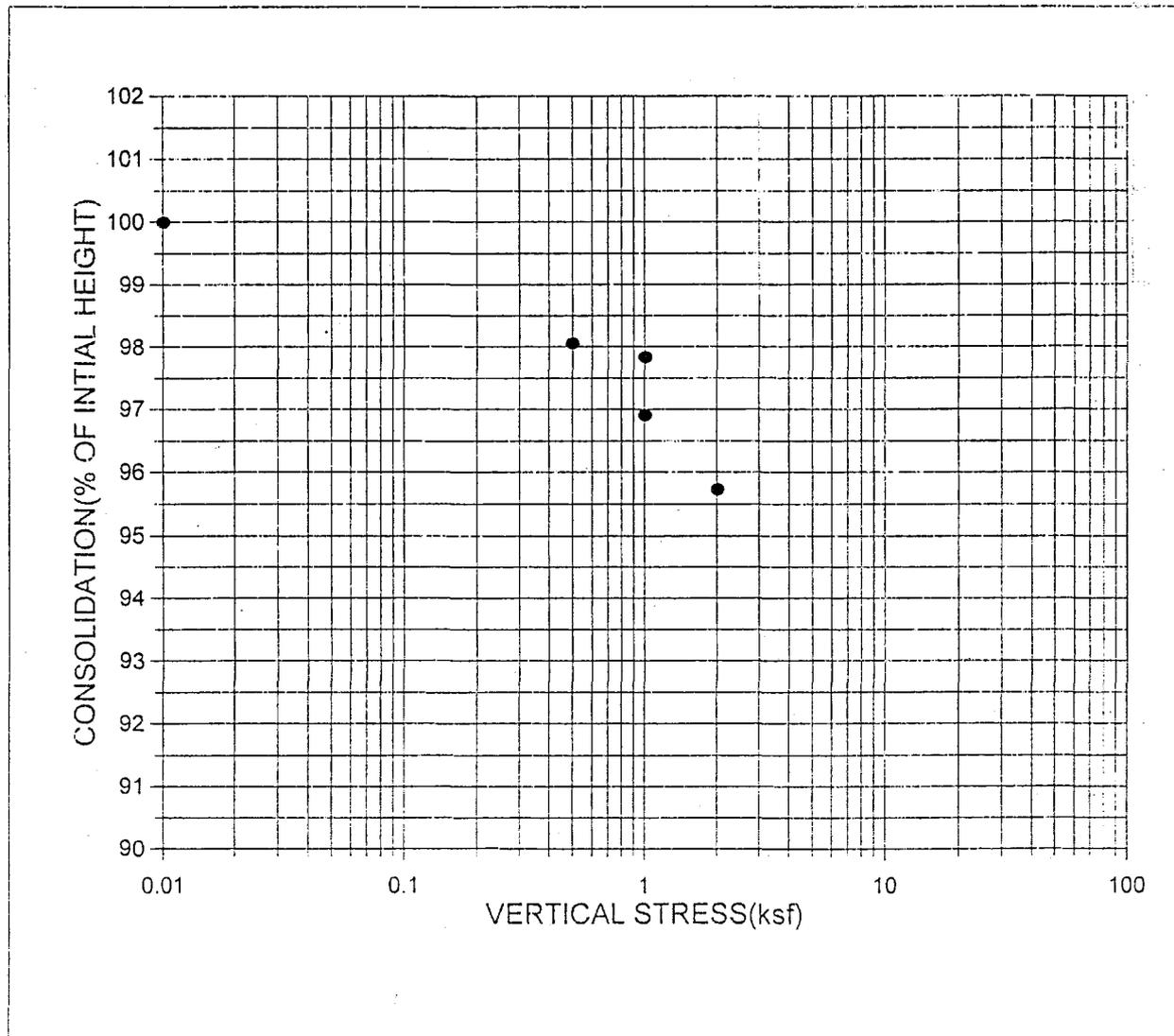
ALPHA Geotechnical & Materials, Inc.

PROJECT: White Tanks Canal
LOCATION: Maricopa County
MATERIAL: Native
SAMPLE SOURCE: Boring 5 @ 5-6'
SAMPLE PREPARATION: Insitu
SOIL TYPE: Sandy Silt w/ Gravel

JOB NO: 01-A-00111
WORK ORDER NO: 1
LAB NO: 12
DATE SAMPLED: 12/19/01

ONE-DIMENSIONAL CONSOLIDATION PROPERTIES OF SOILS (ASTM D2435)

INITIAL MOISTURE CONTENT	4.1%	FINAL MOISTURE CONTENT	27.1%
INITIAL DRY DENSITY(pcf)	90.2	FINAL DRY DENSITY(pcf)	93.8
INITIAL DEGREE OF SATURATION	13%	FINAL DEGREE OF SATURATION	94%
INITIAL VOID RATIO	0.8	FINAL VOID RATIO	0.8
ESTIMATED SPECIFIC GRAVITY	2.650	SATURATED AT	1 ksf

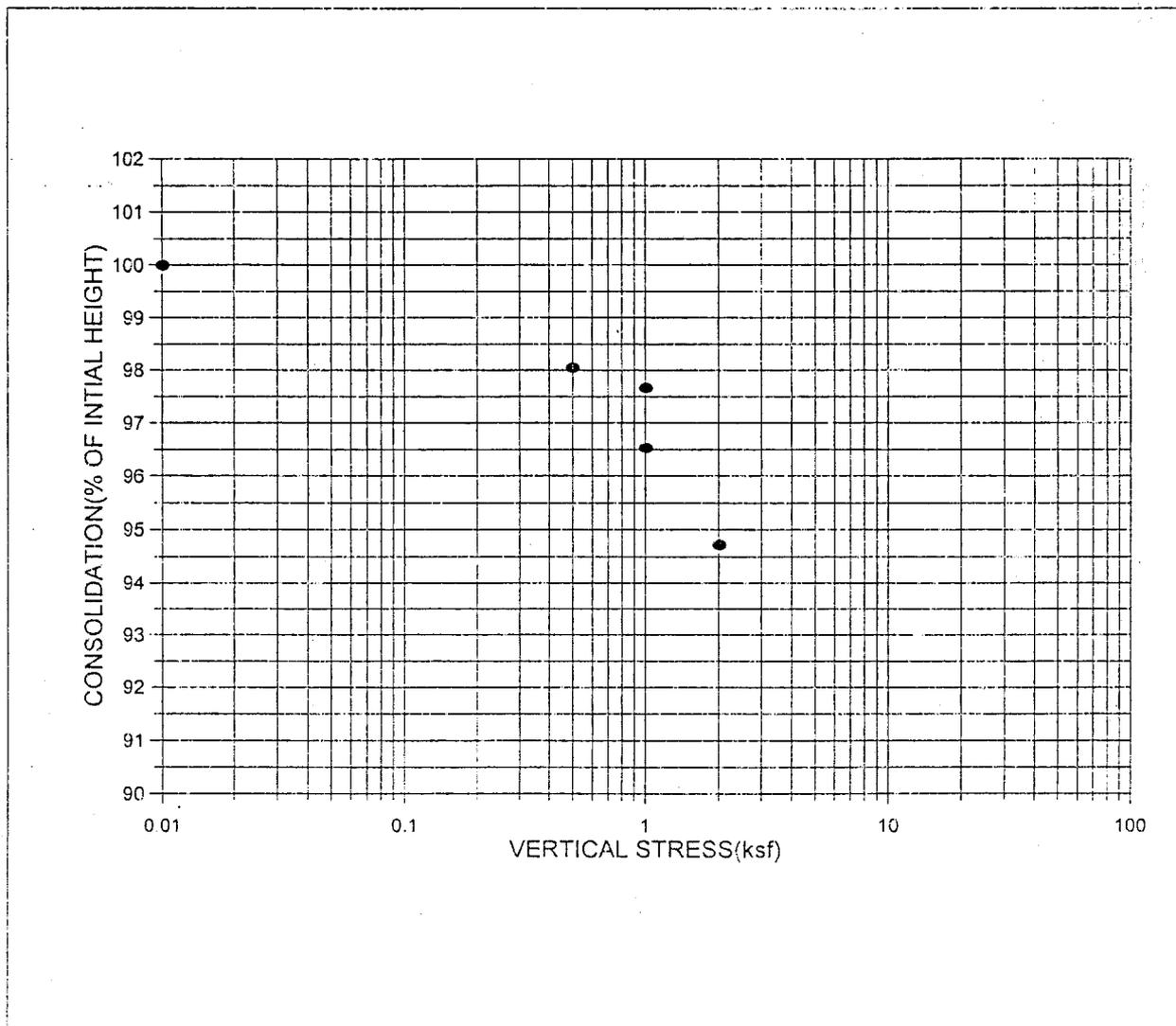


ALPHA Geotechnical & Materials, Inc.

PROJECT:	White Tanks Canal	JOB NO:	01-A-00111
LOCATION:	Maricopa County	WORK ORDER NO:	1
MATERIAL:	Native	LAB NO:	13
SAMPLE SOURCE:	Boring 5 @ 10-11'	DATE SAMPLED:	12/19/01
SAMPLE PREPARATION:	Insitu		
SOIL TYPE:	Sandy Silt		

ONE-DIMENSIONAL CONSOLIDATION PROPERTIES OF SOILS (ASTM D2435)

INITIAL MOISTURE CONTENT	4.1%	FINAL MOISTURE CONTENT	27.1%
INITIAL DRY DENSITY(pcf)	90.2	FINAL DRY DENSITY(pcf)	94.8
INITIAL DEGREE OF SATURATION	13%	FINAL DEGREE OF SATURATION	96%
INITIAL VOID RATIO	0.8	FINAL VOID RATIO	0.7
ESTIMATED SPECIFIC GRAVITY	2.650	SATURATED AT	1 ksf

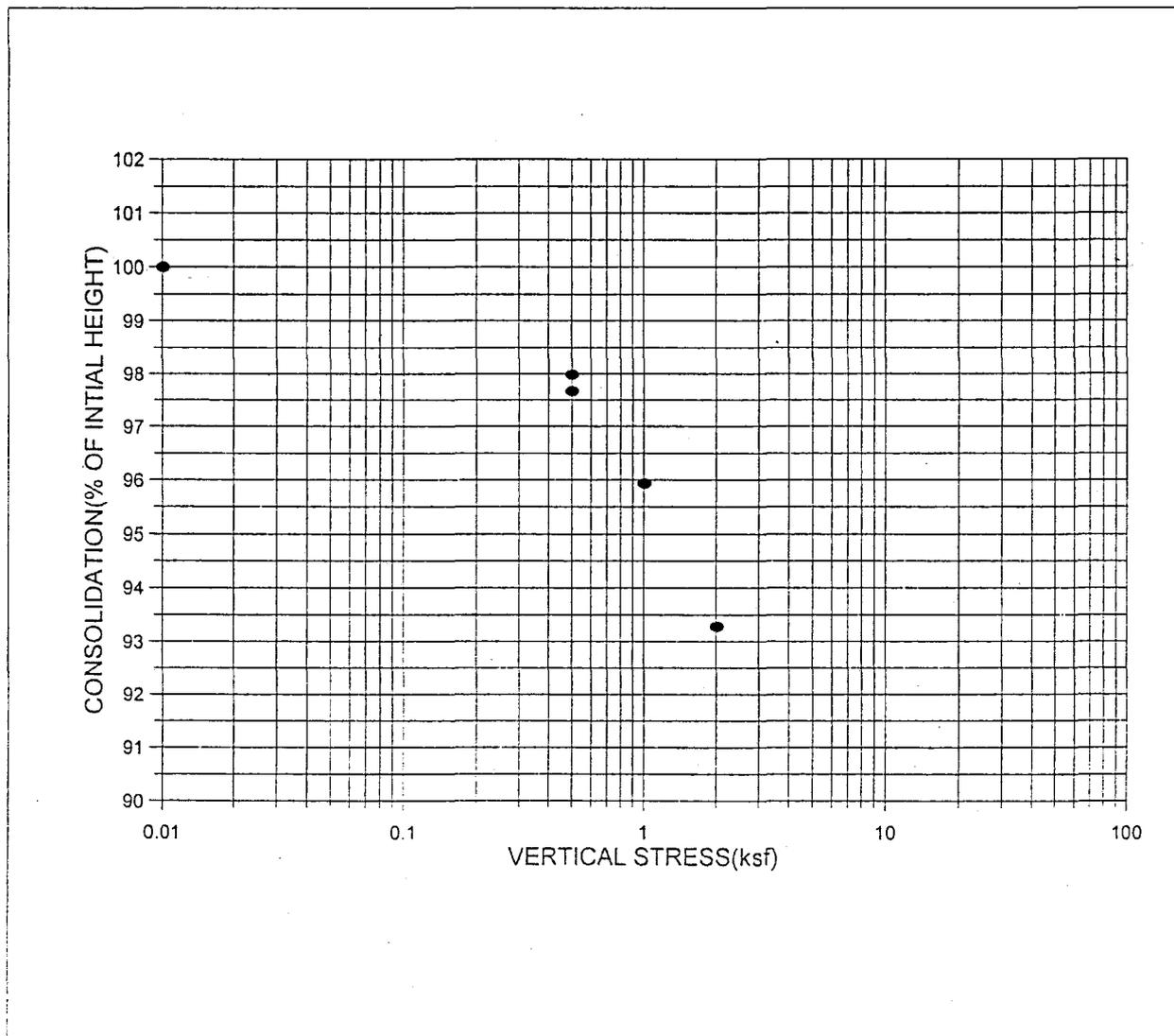


ALPHA Geotechnical & Materials, Inc.

PROJECT:	White Tanks Canal	JOB NO:	01-A-00111
LOCATION:	Maricopa County	WORK ORDER NO:	1
MATERIAL:	Native	LAB NO:	14
SAMPLE SOURCE:	Boring 8 @ 2-3'	DATE SAMPLED:	12/19/01
SAMPLE PREPARATION:	Insitu		
SOIL TYPE:	Silty Sand		

ONE-DIMENSIONAL CONSOLIDATION PROPERTIES OF SOILS (ASTM D2435)

INITIAL MOISTURE CONTENT	5.9%	FINAL MOISTURE CONTENT	21.9%
INITIAL DRY DENSITY(pcf)	95.1	FINAL DRY DENSITY(pcf)	101.5
INITIAL DEGREE OF SATURATION	21%	FINAL DEGREE OF SATURATION	92%
INITIAL VOID RATIO	0.7	FINAL VOID RATIO	0.6
ESTIMATED SPECIFIC GRAVITY	2.650	SATURATED AT	0.5 ksf



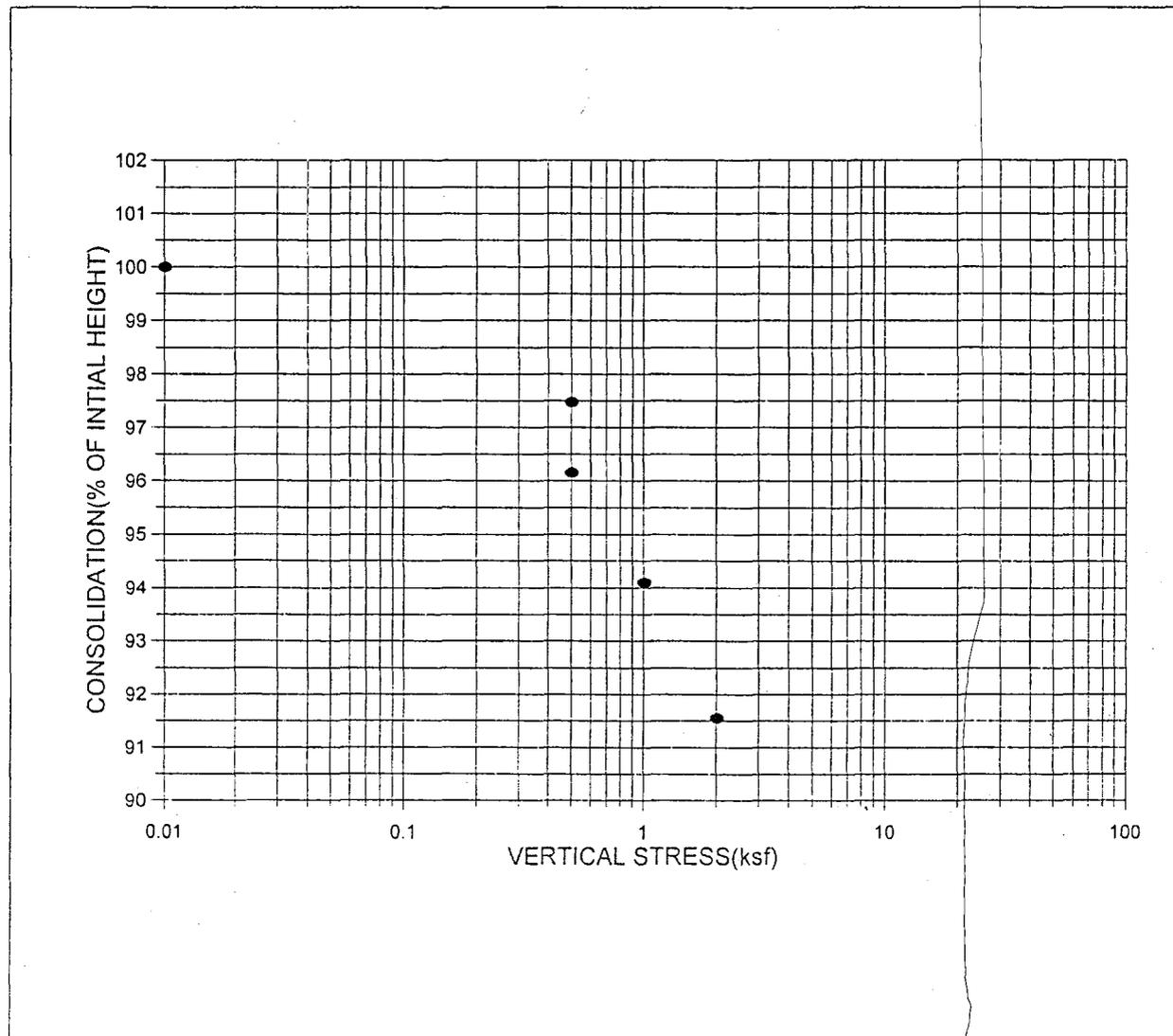
ALPHA Geotechnical & Materials, Inc.

PROJECT: White Tanks Canal
LOCATION: Maricopa County
MATERIAL: Native
SAMPLE SOURCE: Boring 8 @ 5-6'
SAMPLE PREPARATION: Insitu
SOIL TYPE: Lightly Cemented Silty Sand

JOB NO: 01-A-00111
WORK ORDER NO: 1
LAB NO: 15
DATE SAMPLED: 12/19/01

ONE-DIMENSIONAL CONSOLIDATION PROPERTIES OF SOILS (ASTM D2435)

INITIAL MOISTURE CONTENT	5.9%	FINAL MOISTURE CONTENT	21.9%
INITIAL DRY DENSITY(pcf)	95.1	FINAL DRY DENSITY(pcf)	103.4
INITIAL DEGREE OF SATURATION	21%	FINAL DEGREE OF SATURATION	97%
INITIAL VOID RATIO	0.7	FINAL VOID RATIO	0.6
ESTIMATED SPECIFIC GRAVITY	2.650	SATURATED AT	0.5 ksf



ALPHA Geotechnical & Materials, Inc.

PROJECT: WHITE TANKS CANAL
LOCATION: MARICOPA COUNTY
MATERIAL: NATIVE
SAMPLE SOURCE: VARIOUS

JOB NO: 01-A-00111
WORK ORDER NO: 1
LAB NO: See Below
DATE SAMPLED: 12-19-01

MOISTURE CONTENT AND UNDISTURBED DENSITY OF SOIL
ASTM D2216, ASTM D2937

LAB #	SAMPLE SOURCE	WET WT. (gram)	DRY WT. (gram)	MOISTURE CONTENT	DRY DENSITY
16	B2 @ 5-6'	476.1	451.0	5.7%	94.9
17	B3 @ 10-11'	509.9	483.6	5.4%	101.9
18	B6 @ 2'	654.1	636.1	2.8%	107.1
19	B7 @ 5'	498.9	467.8	6.6%	100.1

ALPHA Geotechnical & Materials, Inc.

Project: WHITE TANKS CANAL
W.O.: 2
Material: SOIL

ALPHA Project #: 01-A-00111
Date: 12-19-01

Undisturbed Density (ASTM D2937)

Lab #	Boring	Wet Wt.	Dry Wt.	% Moisture	Dry Density
23	B-1 @ 2'	336.6	331.4	1.6 %	155.0
25	B-1 @ 15'	392.2	382.9	2.45 %	162.6
26	B-6 @ 5'	331.3	327.9	1.0 %	168.4
27	B-6 @ 15'	326.0	308.0	5.8 %	131.8
29	B-7 @ 2'	293.4	278.6	5.3 %	108.1
31	B-7 @ 15'	355.0	337.1	5.3 %	111.1
33	B-7 @ 25'	326.8	307.4	6.3 %	96.9
34	B-8 @ 10'	284.5	274.1	3.8 %	105.9

ALPHA Geotechnical & Materials, Inc.

PROJECT: WHITE TANKS CANAL
LOCATION: MARICOPA COUNTY
MATERIAL: SOIL
SAMPLE SOURCE: B-2 @ 10'

JOB NUMBER: 01-A-00111
WORK ORDER NO: 2
LAB NO: 20
DATE SAMPLED: 12/19/01

MECHANICAL SIEVE ANALYSIS (ASTM C136 & C117)
ATTERBERG LIMITS (ASTM D4318)

MECHANICAL ANALYSIS

SIEVE SIZE	% PASSING
6 IN	100
4 IN	100
3 IN	100
2 IN	100
1 1/2 IN	100
1 IN	100
3/4 IN	100
1/2 IN	98
3/8 IN	96
1/4 IN	91
#4	86
#8	70
#10	66
#16	51
#30	38
#40	33
#50	30
#100	22
#200	19

ALPHA Geotechnical & Materials, Inc.

PROJECT: WHITE TANKS CANAL
LOCATION: MARICOPA COUNTY
MATERIAL: SOIL
SAMPLE SOURCE: B-5 @ 15'

JOB NUMBER: 01-A-00111
WORK ORDER NO: 2
LAB NO: 21
DATE SAMPLED: 12/19/01

MECHANICAL SIEVE ANALYSIS (ASTM C136 & C117)
ATTERBERG LIMITS (ASTM D4318)

MECHANICAL ANALYSIS

SIEVE SIZE	% PASSING
6 IN	100
4 IN	100
3 IN	100
2 IN	100
1 1/2 IN	72
1 IN	72
3/4 IN	72
1/2 IN	69
3/8 IN	68
1/4 IN	65
#4	63
#8	60
#10	58
#16	52
#30	45
#40	42
#50	38
#100	33
#200	30

ALPHA Geotechnical & Materials, Inc.

PROJECT: WHITE TANKS CANAL
LOCATION: MARICOPA COUNTY
MATERIAL: SOIL
SAMPLE SOURCE: B-1 @ 2'

JOB NO: 01-A-00111
WORK ORDER NO: 2
LAB NO: 23
DATE SAMPLED: 12-19-01

MATERIAL FINER THAN NO. 200 SIEVE
ASTM C117

LAB NO.	SOURCE	% PASSING
23	B-1 @ 2'	12.80%

ALPHA Geotechnical & Materials, Inc.

PROJECT: WHITE TANKS CANAL
LOCATION: MARICOPA COUNTY
MATERIAL: SOIL
SAMPLE SOURCE: B-1 @ 15'

JOB NO: 01-A-00111
WORK ORDER NO: 2
LAB NO: 25
DATE SAMPLED: 12-19-01

**MATERIAL FINER THAN NO. 200 SIEVE
ASTM C117**

LAB NO.	SOURCE	% PASSING
25	B-1 @ 15'	20.00%

ALPHA Geotechnical & Materials, Inc.

PROJECT: WHITE TANKS CANAL
LOCATION: MARICOPA COUNTY
MATERIAL: SOIL
SAMPLE SOURCE: B-6 @ 5'

JOB NO: 01-A-00111
WORK ORDER NO: 2
LAB NO: 26
DATE SAMPLED: 12-19-01

**MATERIAL FINER THAN NO. 200 SIEVE
ASTM C117**

LAB NO.	SOURCE	% PASSING
26	B-6 @ 5'	17.00%

ALPHA Geotechnical & Materials, Inc.

PROJECT: WHITE TANKS CANAL
LOCATION: MARICOPA COUNTY
MATERIAL: SOIL
SAMPLE SOURCE: B-6 @ 15'

JOB NO: 01-A-00111
WORK ORDER NO: 2
LAB NO: 27
DATE SAMPLED: 12-19-01

**MATERIAL FINER THAN NO. 200 SIEVE
ASTM C117**

LAB NO.	SOURCE	% PASSING
27	B-6 @ 15'	65.00%

ALPHA Geotechnical & Materials, Inc.

PROJECT: WHITE TANKS CANAL
LOCATION: MARICOPA COUNTY
MATERIAL: SOIL
SAMPLE SOURCE: B-7 @ 2'

JOB NUMBER: 01-A-00111
WORK ORDER NO: 2
LAB NO: 29
DATE SAMPLED: 12/19/01

MECHANICAL SIEVE ANALYSIS (ASTM C136 & C117)
ATTERBERG LIMITS (ASTM D4318)

MECHANICAL ANALYSIS

SIEVE SIZE	% PASSING	ATTERBERG LIMITS
6 IN	100	
4 IN	100	LL: 27
3 IN	100	PI: 7
2 IN	100	
1 1/2 IN	100	
1 IN	100	
3/4 IN	100	
1/2 IN	100	
3/8 IN	100	
1/4 IN	99	
#4	98	
#8	96	
#10	95	
#16	89	
#30	81	
#40	76	
#50	72	
#100	63	
#200	55	

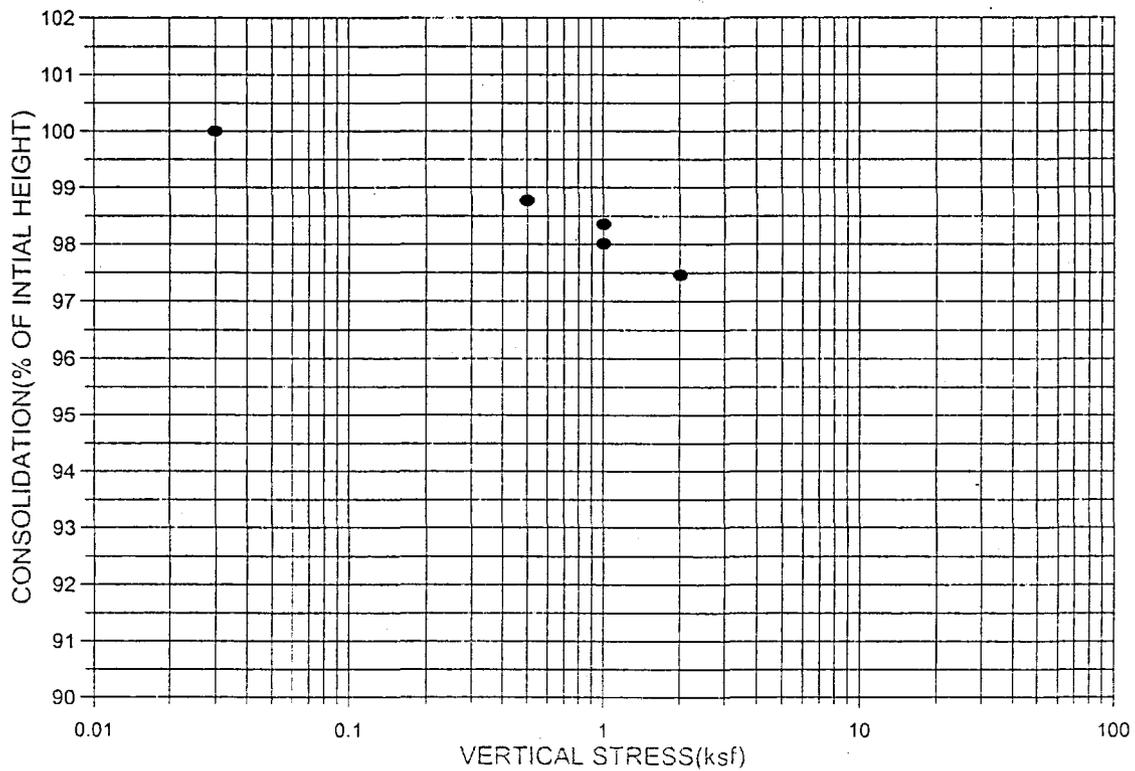
ALPHA Geotechnical & Materials, Inc.

PROJECT: White Tanks Canal
LOCATION: Maricopa County
MATERIAL: Native
SAMPLE SOURCE: Boring 7 @ 10'
SAMPLE PREPARATION: Insitu
SOIL TYPE: Cemented silty clay

JOB NO: 01-A-00111
WORK ORDER NO: 2
LAB NO: 30
DATE SAMPLED: 12/19/01

ONE-DIMENSIONAL CONSOLIDATION PROPERTIES OF SOILS (ASTM D2435)

INITIAL MOISTURE CONTENT	7.7%	FINAL MOISTURE CONTENT	20.9%
INITIAL DRY DENSITY(pcf)	104.1	FINAL DRY DENSITY(pcf)	106.3
INITIAL DEGREE OF SATURATION	35%	FINAL DEGREE OF SATURATION	100%
INITIAL VOID RATIO	0.6	FINAL VOID RATIO	0.6
ESTIMATED SPECIFIC GRAVITY	2.650	SATURATED AT	1 ksf



ALPHA Geotechnical & Materials, Inc.

PROJECT: WHITE TANKS CANAL
LOCATION: MARICOPA COUNTY
MATERIAL: SOIL
SAMPLE SOURCE: B-7 @ 15'

JOB NUMBER: 01-A-00111
WORK ORDER NO: 2
LAB NO: 31
DATE SAMPLED: 12/19/01

MECHANICAL SIEVE ANALYSIS (ASTM C136 & C117)
ATTERBERG LIMITS (ASTM D4318)

MECHANICAL ANALYSIS

SIEVE SIZE	% PASSING	ATTERBERG LIMITS
6 IN	100	
4 IN	100	LL: 38
3 IN	100	PI: 15
2 IN	100	
1 1/2 IN	100	
1 IN	100	
3/4 IN	100	
1/2 IN	93	
3/8 IN	91	
1/4 IN	87	
#4	85	
#8	79	
#10	77	
#16	70	
#30	63	
#40	61	
#50	58	
#100	52	
#200	45	

ALPHA Geotechnical & Materials, Inc.

PROJECT: WHITE TANKS CANAL
LOCATION: MARICOPA COUNTY
MATERIAL: SOIL
SAMPLE SOURCE: B-7 @ 25'

JOB NUMBER: 01-A-00111
WORK ORDER NO: 2
LAB NO: 33
DATE SAMPLED: 12/19/01

MECHANICAL SIEVE ANALYSIS (ASTM C136 & C117)
ATTERBERG LIMITS (ASTM D4318)

MECHANICAL ANALYSIS

SIEVE SIZE	% PASSING	ATTERBERG LIMITS
6 IN	100	
4 IN	100	LL: 37
3 IN	100	PI: 14
2 IN	100	
1 1/2 IN	100	
1 IN	100	
3/4 IN	100	
1/2 IN	97	
3/8 IN	96	
1/4 IN	92	
#4	91	
#8	87	
#10	86	
#16	82	
#30	75	
#40	71	
#50	67	
#100	57	
#200	45	

ALPHA Geotechnical & Materials, Inc.

PROJECT: WHITE TANKS CANAL
LOCATION: MARICOPA COUNTY
MATERIAL: SOIL
SAMPLE SOURCE: B-8 @ 10'

JOB NUMBER: 01-A-00111
WORK ORDER NO: 2
LAB NO: 34
DATE SAMPLED: 12/19/01

MECHANICAL SIEVE ANALYSIS (ASTM C136 & C117)
ATTERBERG LIMITS (ASTM D4318)

MECHANICAL ANALYSIS

SIEVE SIZE	% PASSING	ATTERBERG LIMITS
6 IN	100	
4 IN	100	LL: 31
3 IN	100	PI: 12
2 IN	100	
1 1/2 IN	100	
1 IN	100	
3/4 IN	100	
1/2 IN	100	
3/8 IN	100	
1/4 IN	100	
#4	99	
#8	97	
#10	96	
#16	90	
#30	80	
#40	74	
#50	69	
#100	56	
#200	45	