URS

GEOTECHNICAL DATA REPORT
WHITE TANKS FRS #3
FCDMC CONTRACT NO. 98-11

Prepared for

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

URS Project No. E1-15448007
May 11, 2001

URS

Property of
Flood Control District of MC
Please Return to
2801 W. Durango
Phoenix, AZ 85009

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Registered Professional Engineer (Civil)
CERTIFICATE NO.
32647
TODD E.
RINGSMUTH
Date Signed 5-11-01
ARIZONA, U.S.A.

URS

May 11, 2001

Mr. Tom R. Renckly, P.E.
Structures Management Branch Manager
Flood Control District of Maricopa County
2801 West Durango
Phoenix, Arizona 85009

RE: WHITE TANKS FRS #3
GEOTECHNICAL DATA REPORT
URS PROJECT NO: E1-15448007

Dear Mr. Renckly:

URS Corporation (URS) has prepared this Geotechnical Data Report for the White Tanks FRS #3 project. This report includes a summary of the geotechnical investigations performed for the various phases of the project. Discussions and recommendations pertaining to geotechnical conditions at the site are not included; this information was previously presented through various other technical memoranda and submittals. This work was authorized under contract FCD 98-11 and subsequent approved change orders.

Should you have questions or comments regarding this submittal, please do not hesitate to contact us at (602) 371 1100.

Sincerely

URS Corporation

Ravi Murthy, P.E.
Senior Geotechnical Engineer

Todd E. Ringsmuth, P.E.
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1.0 INTRODUCTION

1.1 PROJECT OVERVIEW

White Tanks Flood Retarding Structure (FRS) #3 is located east of the White Tank Mountains, approximately 20 miles west of Phoenix, Arizona. The facility is owned and operated by the Flood Control District of Maricopa County (District). The north end of the embankment is approximately 1 mile south of the intersection of Northern Avenue and the Beardsley Canal in Maricopa County. FRS #3 is a homogenous earth embankment dam constructed in 1954 by the Natural Resource Conservation Service (NRCS), then known as the Soil Conservation Service (SCS). The embankment is about 7700 feet long, with a crest width of 10 to 11 feet, and a height of approximately 27 feet at its point of maximum depth. The upstream and downstream faces of the dam are sloped at 2.5:1 (Horizontal:Vertical) and 2:1 (H:V), respectively. Three corrugated metal pipes (CMPs) through the embankment serve as the principal outlets to the structure. Two outlets are 48 inches in diameter while the third is a 24-inch diameter pipe. The emergency spillway for the structure is cut into natural ground at the south abutment of the dam. In 1982, the NRCS implemented a remedial action program to address transverse cracking of the embankment. A section of the embankment between stations 56+10 and 59+90 was breached and reconstructed. A central chimney drain, and finger outlet drains were installed along the entire length of the embankment.

Since its construction in 1954, the crest of the dam has settled approximately 3.6 feet at the north end of the alignment. This settlement is in response to regional land subsidence associated with excessive groundwater withdrawal in the area. The amount of settlement appears to decrease steadily along the alignment until virtually no settlement is observed at the southern end of the embankment. The embankment has exhibited transverse cracking along its entire length. Lesser amounts of longitudinal cracking was also noted during annual inspections of the facility.

1.2 AUTHORIZATION

In September 1998, the District retained URS Corp. (then Dames & Moore, Inc.) to design and implement modifications to the dam and its appurtenant structures, under contract FCD98-11. The primary engineering and design tasks to be completed under this contract included:

- Raise the embankment to compensate for current and predicted ground subsidence effects
- Modify the emergency spillway to safely pass the Probable Maximum Flood (PMF), and
- Modify the existing principal outlets in order to meet current regulatory standards

On October 20, 1999, the District decided to evaluate non-structural alternatives for FRS #3. Contract FCD98-11 was modified to included a preliminary evaluation of various basin configurations for flood control. The basins would provide storage capacity expected for the 100-year, 24-hour storm event, and also serve as active and passive recreational facilities. URS' scope also included a preliminary evaluation of the existing impoundment area as a potential aggregate source.

Concurrently with the Basin Alternatives study, and at the request of the Arizona Department of Water Resources (ADWR), the District also initiated a program to implement interim dam safety measures for FRS #3. Contract FCD98-11 was modified to allow URS to design and permit diaphragm filters at the three principal outlets at FRS #3.

1.3 PURPOSE AND SCOPE OF GEOTECHNICAL DATA REPORT

Each of the three major tasks or projects mentioned above had an associated geotechnical component. In addition, minor geotechnical tasks were implemented to evaluate the center filter along the embankment, selected areas of transverse cracking, and the emergency spillway. The primary objective of this Geotechnical Data Report (GDR) is to organize and summarize the data generated during the various geotechnical investigations at the site.

The report is organized in sections corresponding to the various investigative phases. Each section includes a brief description of the activities completed during the field investigation. Technical discussions and design recommendations associated with these investigations have been previously presented in various technical memoranda and reports. Therefore, information presented in this GDR is limited to logs of borings and test pits, and results of laboratory tests. These data are presented in appendices following the main report. Detailed discussions and recommendations are not included herein.

2.0 DAM MODIFICATION INVESTIGATION

2.1 FIELD INVESTIGATION

The proposed field investigation for this phase of the project was documented in formal Work Plan, a copy of which was included in the Design Issues Report dated November 20, 1998. The program included a total of 22 hollow stem auger borings and 25 backhoe-excavated test pits to investigate various components of the facility including the embankment, emergency spillway, and the impoundment. However, several of the proposed test pit locations within the impoundment area could not be accessed due to natural and man-made topographic features on the site. The final program consisted of 22 borings and 9 test pits, along and in close proximity to the embankment.

The drilling was performed by ATL Inc. using a Mobil B50 truck-mounted drill rig equipped with hollow stem augers. Standard Penetration Testing (SPT) and split-spoon sampling was carried out at regular intervals in the borings. The borings were backfilled with a lean cement grout after drilling and sampling operations were complete. The test pits were excavated using a medium-size backhoe, provided and operated by ATL Inc. The test pits were backfilled with soil cuttings after sampling and logging was complete.

The drilling and test pit excavation operations were supervised by a field engineer from URS, who visually examined the soils encountered, collected samples, and prepared the field logs for all borings and test pits. The field investigation was completed between late October and early December, 1998.

2.2 LABORATORY TESTING PROGRAM

Selected soil samples collected during the field investigation were forwarded to URS' laboratories in Phoenix, Arizona and Salt Lake City, Utah, for testing. Sieve analyses and Atterberg limits tests were performed on several samples to aid in soil classification and identification. Response to wetting (collapse) tests were performed on selected, relatively undisturbed samples to evaluate the collapse potential of the embankment and foundation soils. Moisture-density tests (Standard Proctor ASTM D-695) were performed on some bulk samples. Triaxial tests with pore pressure measurements were performed on selected remolded and relatively undisturbed soil samples collected during the field investigation.

The locations of all borings and test pits completed during this phase of investigation are depicted on Figure 1. Logs of the borings and test pits are included in Appendix A. Results of

the sieve analyses and Atterberg Limits tests are summarized in Table 1. Particle size distribution curves are also included in Appendix A, which also includes the Standard Proctor Moisture-Density Relationships. Results of the triaxial tests are summarized in Table A-1.

3.0 BASIN ALTERNATIVES PROJECT

3.1 FIELD INVESTIGATION

The geotechnical field investigation program for the Basin Alternatives study included:

- Six borings (B-1 through B-6)
- Three test pits (TP-1, TP-2, and TP-3)
- Six refraction seismic survey lines

The six borings (B-1 through B-6) were drilled by ATL Inc. using a CME 75 truck-mounted drill rig equipped with hollow stem augers. ATL Inc. also excavated the three test pits (TP-1, TP-2, and TP-3) for the project. The drilling, sampling, and logging protocol and procedures were generally similar to those described in Section 2, with the exception that the borings were backfilled with soil cuttings (instead of cement grout) after drilling and sampling activities were completed. The locations of the borings and test pits are shown on Figure 1.

Hasbrouck Geophysics Inc. was sub-contracted to perform refraction seismic surveys along six lines at the site. The locations of these lines is noted on the site plan in Figure 1. The field data was collected by Bird Seismic Services Inc. and processed and interpreted by Hasbrouck Geophysics Inc. The overall objective of the survey was to evaluate ease of excavation or ripability in the project area. The refraction seismic survey was performed using a 24-channel Bison Spectra signal-enhancement seismograph, Sensor Model SM-11-30Hz geophones, and a 16-pound sledgehammer source. The field investigation for this phase was completed in November 1999.

3.2 LABORATORY TESTING PROGRAM

The laboratory testing program during this phase of the project was limited to sieve analyses and Atterberg limits tests on selected samples collected during the field investigation.

Results of the field investigation and the laboratory testing program including boring logs, logs of test pits, results of the infiltration tests, and particle size distribution curves are presented in Appendix B. Geophysical profiles generated from data from the refraction seismic surveys are also included therein. It should be noted that the values for layer depths and velocities as estimated from refraction seismic surveys must be taken as interpreted and not absolute.

4.0 INTERIM DAM SAFETY INVESTIGATION

4.1 FIELD INVESTIGATION

The geotechnical investigation for the Interim Dam Safety project consisted of three test pits (TP-A, TP-B, AND TP-C) excavated at the emergency spillway. The test pits were excavated with a medium-sized backhoe provided and operated by ATL Inc., under the supervision of a field engineer from URS. The test pits were excavated to evaluate and sample the soils at the emergency spillway. Logs were not prepared for the three test pits. The locations of the test pits are shown on Figure 1.

4.2 LABORATORY TESTING PROGRAM

The laboratory testing program during this phase of the project was limited to sieve analyses and Atterberg limits tests on selected samples collected during the field investigation. Graphical results of the sieve analyses performed on selected samples collected during the field investigation are provided in Appendix C. All test results are summarized in Table 1.

5.0 EXISTING FILTER INVESTIGATION

5.1 FIELD INVESTIGATION

Three exploratory borings were drilled on the crest of the dam on November 1, 1999. ATL, Inc. completed the work under the supervision of a URS field engineer using a CME 75 with a 3 ¾-inch hollow stem auger. The borings were located at Stations 57+30, 58+00, and 59+00 (see Figure 1) and were drilled to depths of 30 feet. Boring logs are presented in Appendix D. A test pit was excavated using a backhoe on the crest of the dam on March 31, 2000 to provide additional insight regarding the construction of the existing filter at this location. The test pit was located at approximately Station 58+90 (see Figure 1). The approximate dimensions of this pit were 6 feet wide, 8 feet long, and 5.5 feet deep. Logs of the borings are included in Appendix D.

5.2 LABORATORY TESTING PROGRAM

Mechanical sieve tests were performed on selected samples to obtain grain-size distributions. Four samples from the test pit and four samples from the borings were tested. The grain-size distributions are presented in Appendix D.

6.0 CRACK INVESTIGATION

6.1 FIELD INVESTIGATION

URS conducted inspections of the dam in October 1998 and November 1999. During the November 1999 inspection, transverse and longitudinal cracks were observed at Station 59+00. URS performed a field investigation on March 31, 2000 to determine the lateral and vertical extent of the cracks. A test pit was excavated on the upstream side of the dam at Station 59+00. URS engineers directed the fieldwork. Figure 1 illustrates the location of the test pit.

6.2 LABORATORY TESTING PROGRAM

A mechanical sieve test was performed on the sample taken from the test pit. The grain-size distribution obtained from this test is presented in Appendix E.

7.0 CLOSURE

URS has prepared this Geotechnical Data Report to provide a concise summary of all geotechnical investigations performed at the White Tanks FRS #3 site. This report includes field and laboratory test data generated during various phases of geotechnical investigation. However, discussions and recommendations arising from these investigations are not included herein.

TABLES

Table 1

SUMMARY OF LABORATORY TEST RESULTS

#	Boring / Test Pit	Sample #	Depth	Type of Sample	Soil Classification (USCS)	Atterberg Limits			Sieve Analysis																	Moisture Content (%)	Dry Density (pcf)
						PL (%)	LL (%)	PI (%)	2.5"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#8	#10	#16	#20	#30	#40	#50	#60	#100	#200		
DAM MODIFICATIONS DESIGN PROJECT																											
1	DMB-1	1	5 - 6	Sleeve	ML	NV	NV	NP							100	95.8		92		85.2		78.7		72.2	64.7	53.1	3.6	
2	DMB-1	4	20 - 21	Sleeve	SC	20	30	10					100		97.4	89.4		79.4		65		53.6		43.8	35.9	27.9	2.7	
3	DMB-2	1	5 - 6	Sleeve	SC	19	30	11					100		97	89.4		79.6		64.9		54.9		47.5	41.4	34.7	3.5	
4	DMB-2	5	25 - 26.5	Small Bag	SM	NV	NV	NP			100	88	88	86	84	78	72		65		55	49	44		36	32.6		
5	DMB-2	3	15 - 15.5	Sleeve	SM	**	**	**					100		92.9	79.5		65.9		51.7		40.8		32.2	26.5	20.3	1.5	118
6	DMB-3	2	10 - 11	Sleeve	SC	22	35	13					100		92.5	89.7		84.7		76.2		69.9		63.3	56.7	47.5	5.3	
7	DMB-3	5	25 - 26.5	Small Bag	CL	21	33	12									100		97		91	86	83		77	70.5		
8	DMB-4	1	5 - 6.5	Small Bag	CL-ML	20	27	7							100	99	97		94		88	83	79		68	57.8		
9	DMB-4	4	20 - 21.5	Small Bag	CL	15	23	8							100	98	97		93		86	81	76		65	55.4		
10	DMB-5	1	5 - 6.5	Small Bag	SC-SM	19	26	7						100	98	93	85		75		66	60	55		46	37.5		
11	DMB-6	1	5 - 6.5	Sleeve	SC	21	32	9			100	87	87	83	82	79	74		67		60	55	51		44	38.6		
12	DMB-6	6	30 - 31.5	Sleeve	SM	25	38	13								100	98		95		91	88	85		77	69.9		
13	DMB-7	1	5 - 6.5	Small Bag	CL	20	37	17						100	98	97	94		88		81	76	72		64	56	5.2	
14	DMB-8	2	10 - 11.5	Small Bag	SC	23	33	10			100		96.5		92	81.4		68.1		53		43.1		35.4	28.9	23.3	5.3	
15	DMB-8	6	30 - 30.5	Sleeve	ML	**	**	**					100		97.8	96		93.6		86.9		80.6		74	66.1	54.9	6.7	124
16	DMB-9	2	10 - 11.5	Small Bag	CL	19	28	9						100	98	95	92		87		81	77	73		65	55.5		
17	DMB-9	3	15 - 16.5	Sleeve	SC-SM	18	24	6					100	99	98	94	91		85		78	73	68		55	44.2		
18	DMB-9	5	30 - 31.5	Small Bag	SP-SM	NV	NV	NP				100	97	92	89	83	68		52		39	32	26		17	11.9		
19	DMB-10	1	5 - 6.5	Small Bag	SC	20	29	9			100	74	74	74	73	69	67		61		55	51	47		41	35.6		
20	DMB-10	2	10 - 10.5	Small Bag	SC	21	32	11					100		94.8	90.5		83.5		74.7		66.5		59.1	52.9	45	4.7	
21	DMB-10	5	30 - 31.5	Small Bag	SP-SM	NV	NV	NP					100		91.7	86.6		74.3		53.6		33.9		20.8	13.5	8.5	1	
22	DMB-11	1	5 - 6.5	Small Bag	SC	22	35	13						100	94	87	80		71		62	58	55		48	40.8		
23	DMB-11	5	25 - 26.5	Small Bag	SC	22	40	18			100		100		96.2	90.8		77		62.1		51.4		44.5	39.1	33.4	3.9	
24	DMB-12	1	5 - 6	Sleeve	CL	21	33	12							100	99.4		98.3		94.6		89.5		84.6	79.1	68.6	6	97
25	DMB-13	7	10 - 11.5	Sleeve	ML	25	35	10					100		97.5	96.8		90.2		78.1		68		59.9	52.3	41.4	5.8	101
26	DMB-14	1	5 - 6.5	Sleeve	SM	NV	NV	NP					100		97.6	90.7		77.4		62.2		52.4		43.9	35.4	25.8	3.1	108
27	DMB-15	2	10 - 11.5	Small Bag	SM	24	28	4					100		99.3	97.9		94.9		84.4		69.9		55.9	43.6	32.4	4.9	

Table 1

SUMMARY OF LABORATORY TEST RESULTS

#	Boring / Test Pit	Sample #	Depth	Type of Sample	Soil Classification (USCS)	Atterberg Limits			Sieve Analysis																		Moisture Content (%)	Dry Density (pcf)
						PL (%)	LL (%)	PI (%)	2.5"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#8	#10	#16	#20	#30	#40	#50	#60	#100	#200		
54	B-4	1	5-6.5	Bag	SC-SM	21	26	5			100		97.6		96.3	93.8		87.2		72.9		58.5		47.1	39.6	35.4	1.7	
55	B-4	4	20-21.5	Bag	SM/ML	**	**	**							100	97.6		91.9		83.3		70.3		61.2	54.5	50.8	5.9	
56	B-4	6	28.5-30	Bag	SM/ML	**	**	**					100		96.7	92.6		85.7		76.4		68		62	56.7	52.1	5.7	
57	B-5	1	5-6.5	Bag	SC-SM	**	**	**			100		96.5		95.2	91.3		83.4		71.3		61.3		51.2	44.8	40.9	3.5	
58	B-5	2	10-11.5	Bag	SC-SM	**	**	**			100		88.4		75.2	68.3		58.3		47.2		38.1		32.4	26.1	23	2.2	
59	B-6	1	5-6.5	Bag	SM	**	**	**							100	98		94		84.8		74.8		60.8	49.3	44.8	1.7	
60	B-6	2	10-11.5	Bag	SM	**	**	**							100	96.5		86		63.6		47.9		38.1	31.4	27	2.3	
61	TP-1	1	0-4	Bulk	ML	18	21	3					100		99.5	98.7		95.8		89.3		82.4		71	64.5	60.6	3	
62	TP-1	2	13	Bulk	SM	NV	NV	NP			100		98.2		95.4	93.2		87.7		78		63.8		53.9	46	41.1	2.7	
63	TP-2	1	0-3	Bulk	CL	20	31	11					100		99.8	97.2		93.8		87.5		79.1		71	60.3	53.6	4	
64	TP-2	**	16-16.5	Bag	SP-SM	NV	NV	NP			100		81.8		69.8	61.3		47.8		33.8		20.5		14.3	10.4	8.9	2	
65	TP-3	1	0-4	Bulk	CL-ML	17	22	5					100		99.1	98.6		95.5		88.7		78.6		68.9	60.4	54.9	2.9	
66	TP-3	2	11-17.5	Bulk	SC-SM	20	27	7		100	82.3		74.4		68.2	60.3		51.3		39.5		29.3		24.5	21.3	18.6	3.1	
FILTER INVESTIGATION																												
67	57+30	**	5-10	Bulk	GP	**	**	**		[1]98	90	68	49	31	22	13	8	8	8		8	8	8		8	4.2		
68	57+30	**	20-25	Bulk	GP	**	**	**		100	86	48	24	5	2	1	1	1	1		1	1	1		1	0.8		
69	58+00	**	5-10	Bulk	GP	**	**	**	93	69	13	2	1	1	1	1	1	1	1		1	1	1		1	0.3		
70	59+00	**	15-20	Bulk	GP	**	**	**	100	87	36	7	2	1	1	1	1	1	1		1	1	1		1	0.3		

Table 1

SUMMARY OF LABORATORY TEST RESULTS

#	Boring / Test Pit	Sample #	Depth	Type of Sample	Soil Classification (USCS)	Atterberg Limits			Sieve Analysis																	Moisture Content (%)	Dry Density (pcf)
						PL (%)	LL (%)	PI (%)	2.5"	2"	1.5"	1"	3/4"	1/2"	3/8"	#4	#8	#10	#16	#20	#30	#40	#50	#60	#100	#200		
28	DMB-15	3	30 - 21	Sleeve	SP-SM	NV	NV	NP			100		93.3		73	60.4		45.4		33.2		25.3		19.1	14.3	9.8	1.7	
29	DMB-16	1	5 - 6	Sleeve	CL	22	32	10							100	97.3		94.7		90.4		86.2		81	73.6	61.8	5.7	
30	DMB-16	4	25 - 26	Sleeve	CL	**	**	**								100	97		92		85	80	75		64	54.6		
31	DMB-16	5	30 - 31.5	Small Bag	SP-SM	NV	NV	NP					100		99.6	95.3		82		50.4		30.4		19.8	13.8	9.1	2.4	
32	DMB-17	1	5 - 6	Sleeve	SM	NV	NV	NP						100	99	98	96		92		84	79	73		51	35.7		
33	DMB-17	3	15 - 16.5	Small Bag	SC	20	28	8					100		98.7	91.6		79.7		63.6		51.3		42.2	34	26.4	2.8	
34	DMB-17	5	30 - 31	Small Bag	SC-SM	23	30	7							100	96	91		80		67	60	53		41	32.2		
35	DMB-18	1	5 - 5.5	Small Bag	CL	21	38	17							100	99.8		97.4		91.8		87.3		83.2	77.7	67.8	7.8	98
36	DMB-18	3	15 - 16.5	Small Bag	CL	21	41	20							100	98.8		95.3		85		75.4		67	58.9	48.7	6	
37	DMB-18	7	35 - 36.5	Small Bag	CL	20	38	18								100	98		96		92	89	86		81	76.9		
38	DMB-19	1	5 - 5.5	Sleeve	CL-ML	21	26	5					100		92.6	89.9		84.4		75.9		68.7		61.8	55.1	45.3	4.5	103
39	DMB-19	4	20 - 21	Small Bag	SC	20	42	22			100		100		97.4	93.7		85.1		73.1		64.1		56.8	49.7	40.7	6.3	
40	DMB-19	5	25 - 26.5	Small Bag	SW-SM	NV	NV	NP				100	90	85	84	72	55		43		33	28	24		17	11.6		
41	DMB-20	1	5 - 6	Sleeve	SM	NV	NV	NP					100	98	97	90	81		68		58	54	50		45	43		
42	DMB-21	2	15 - 15.5	Small Bag	ML	NV	NV	NP						100	98	93	86		80		75	72	69		65	61.5		
42	DMB-22	1	5 - 5.5	Small Bag	CL	25	45	20				100	94	94	94	94	92		90		87	85	83		80	77.3		
43	DMP-5	A	0 - 2.5	Bulk	ML	18	20	2							100	98	96		90		83	79	75		68	58.5		
44	DMP-6	B	4 - 5	Bulk	CL	22	33	11			100	99	99	99	99	98	98		97		96	96	95		95	93.5		
45	DMP-7	A	0 - 2	Bulk	SW-SM	NV	NV	NP	100	99	95	91	87	83	79	72	60		46		31	24	18		11	8.6		
46	DMP-13	A	2.5 - 4.5	Bulk	SM	NV	NV	NP	98	98	95	90	87	83	80	73	66		58		49	41	35		26	22.6		
47	DMP-17	A	0 - 1.5	Bulk	SM	NV	NV	NP		100	99	97	96	95	94	92	89		83		74	67	60		48	38.4		
48	DMP-19	A	1.5 - 4	Bulk	SM	NV	NV	NP	94	94	91	87	86	84	82	79	75		67		57	50	43		33	27.3		
BASIN ALTERNATIVES PROJECT																												
49	B-1	6	30-31.5	Bag	SM	**	**	**					100		95.7	84.2		69		55.8		40.4		31.9	26.8	24.5	2.4	
50	B-2	3	15-16.5	Bag	SM	**	**	**					100		96.4	94.5		88.4		78		66.6		56.4	46.8	41.4	4.3	
51	B-2	4	20-21.5	Bag	SC	**	**	**			100		98.7		94.3	88.1		75.2		57.1		37.4		29.6	26.2	24	3.2	
52	B-3	1	5-6.5	Bag	SM	**	**	**					100		98	93.8		85.1		67.8		49.7		33.5	25	20.2	1.7	
53	B-3	4	20-21.5	Bag	SM	**	**	**			100		90.6		85.1	82.4		76.5		65.5		52.6		39.3	32	26.2	3.5	

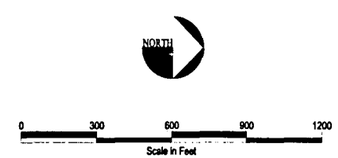
TABLE 2
SUMMARY OF TRIAXIAL TEST RESULTS

BORING/ TEST PIT #	DEPTH (feet)	SAMPLE TYPE	USCS SOIL TYPE	LIQUID LIMIT	PI	STRENGTH PARAMETERS				AVERAGE PERMEABILITY (cm/sec)
						PHI (degrees)		COHESION (psf)		
						EFFECTIVE	TOTAL	EFFECTIVE	TOTAL	
DMB-3	10	UNDISTURBED	SC/CL	35	13	34	22	0	220	3.12E-06 TO 9.59E-06
DMB-8	10	UNDISTURBED	SC	33	23	37	32.5	150	50	1.72E-06 TO 8.91E-06
DMB-15	10	UNDISTURBED	SM/ML	28	24	36	21	120	300	7.22E-06 TO 1.51E-05
DMP-5	0 - 2	REMOLDED	ML	20	2	40	19	0	690	N/A
DMP-6	4 - 5	REMOLDED	CL	33	11	34	19	100	390	N/A
DMP-7	8 - 9	REMOLDED	SP-SM	NV	NP	39	36	400	1100	N/A
DMP-19	1.5 - 4	REMOLDED	SM	NV	NP	30	22	300	700	N/A

FIGURES

NOTES:

- ● TEST PIT/BORING AND IDENTIFICATION FOR MODIFICATIONS DESIGN
- ■ TEST PIT/BORING AND IDENTIFICATION FOR BASIN ALTERNATIVES STUDY
- ▲ TEST PITS/BORINGS AND IDENTIFICATION FOR INTERIM DAM SAFETY PROJECT
- □ TEST PITS FOR FILTER & CRACK INVESTIGATION
- ● DMB-1 TO DMB-22 DRILLED AS PART OF MODIFICATIONS DESIGN PROJECT
- ● DMP-1 TO DMP-19 (SEVERAL INTERMEDIATE MISSING) EXCAVATED AS PART OF MODIFICATIONS DESIGN PROJECT
- ■ B-1 TO B-6 DRILLED AS PART OF BASIN ALTERNATIVES STUDY
- ■ TP-1 TO TP-3 EXCAVATED AS PART OF BASIN ALTERNATIVES STUDY
- — SL-1 TO SL-6 SEISMIC REFRACTION SURVEY FOR BASIN ALTERNATIVES STUDY
- ▲ TP-A TO TP-C EXCAVATED AS PART OF INTERIM DAM SAFETY PROJECT
- □ BORINGS 57+30, 58+00, 59+00 DRILLED AS PART OF FILTER AND CRACK INVESTIGATION



WHITE TANKS FRS #3

Flood Control District of Maricopa County

DAMES & MOORE
A DAMES & MOORE GROUP COMPANY

SOURCE:
BASE MAP OF WHITE TANKS/AGUA FRIA A.D.M.S. TOPOGRAPHIC MAPS, FLOWN 12/22/89 BY COOPER AERIAL OF PHOENIX, INC. FOR THE WLB GROUP INC., AREA DRAINAGE MASTER STUDY.

A14751.DWG 4-19-01 XREF:TOPO1289

Dames & Moore Job No. 15448-007-058

Location of Borings and Testpits

Figure 1

APPENDIX A

MODIFICATIONS DESIGN PROJECT

BORING LOG

LOCATION OF BORING:	JOB NO.	CLIENT	LOCATION
WHITE TANKS DAM	15448-005-022	MARICOPA COUNTY FLOOD CONTROL DISTRICT	WHITE TANKS

DRILLING METHOD:	INTERVAL:	DRILLER:	BORING NO.
MOBILE B-57 WITH 6-INCH HOLLOW STEM AUGER	0'-35.5'	ATL, INC.	DMB-1
			SHEET 1 OF 1

SAMPLING METHOD:	INTERVAL:
STANDARD PENETRATION TEST WITH SPLIT SPOON (SPT) AND DAMES & MOORE TYPE (U) WITH BRASS SLEEVES AND RINGS	5-FOOT INTERVALS

			DRILLING START	DRILLING FINISH
LOGGED BY: PLG	WATER LEVEL	NA	TIME 1135	TIME 1415
CHECKED BY: PLG	TIME			
	DATE		DATE 10/27/98	DATE 10/27/98
DATUM: ELEVATION: feet	CASING DEPTH			

SURFACE CONDITIONS: GRADED ROADWAY SURFACE ON TOP OF DAM

DEPTH IN FEET	SAMPLER TYPE	SAMPLE NO.	SAMPLE DEPTH (ft)	% PASSING #200 SIEVE	LIQUID LIMIT %	PLASTICITY INDEX %	WATER CONTENT %	DRY DENS. (pcf)	BLOWS/ft	USCS	DESCRIPTION
5	SPT	1.0	5.0						33 27 27	SC	CLAYEY SAND WITH GRAVEL: Sand is fine, gravel is fine, dry to moist, light brown, very dense
										CL ML	Decrease in fine gravel, color becomes brown
10	U	2.0	10.0						25 50/5"		SANDY SILTY CLAY: Sand is primarily fine grained slightly moist, brown, hard, some signs of light cementation evident
15	SPT	3.0	15.0						28 45 50/3"		
20	SPT	4.0	20.0						25 48 47	SM	SILTY SAND WITH GRAVEL: Sand is primarily fine to medium grained though some coarse fraction present, gravel is coarse to fine (up to 2" rises in cuttings) and sub-angular, dry to slightly moist, light-brown, very dense, some signs of light cementation.
										CL	SANDY LEAN CLAY: Sand is primarily fine though some medium grained sand is present, dry, light brown, hard, some signs of moderate cementation
25	SPT	5.0	25.0						50/4"		
30	SPT	6.0	30.0						25 48 50/3"		Same as above, cementation is strong in some layers, low return
35	SPT	7.0	35.0						50/5"		Decrease in cementation (moderate)
											Boring terminated at 35.5' below ground surface.

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BORING LOG

LOCATION OF BORING:	JOB NO.	CLIENT	LOCATION
WHITE TANKS DAM	15448-005-022	MARICOPA COUNTY FLOOD CONTROL DISTRICT	WHITE TANKS

DRILLING METHOD:	INTERVAL:	DRILLER:	BORING NO.
MOBILE B-57 WITH 6-INCH HOLLOW STEM AUGER	0'-35.5'	ATL, INC.	DMB-2
			SHEET 1 OF 1

SAMPLING METHOD:	INTERVAL:
STANDARD PENETRATION TEST WITH SPLIT SPOON (SPT) AND DAMES & MOORE TYPE (U) WITH BRASS SLEEVES AND RINGS	5-FOOT INTERVALS

				DRILLING START	DRILLING FINISH
LOGGED BY: PLG	WATER LEVEL	NA		TIME 1230	TIME 1450
CHECKED BY: PLG	TIME				
	DATE			DATE 10/28/98	DATE 10/28/98
DATUM: ELEVATION: feet	CASING DEPTH				

SURFACE CONDITIONS: GRADED ROADWAY SURFACE ON TOP OF DAM

DEPTH IN FEET	SAMPLER TYPE	SAMPLE NO.	SAMPLE DEPTH (ft)	% PASSING #200 SIEVE	LIQUID LIMIT %	PLASTICITY INDEX %	WATER CONTENT %	DRY DENS. (pcf)	BLOWS/ft	USCS	DESCRIPTION
										SC	CLAYEY SAND: Sand is fine grained, dry to slightly moist, brown, dense
5	SPT	1.0	5.0						48 50/5"	SM	SILTY SAND WITH GRAVEL: Sand is fine to coarse though predominantly fine to medium, gravel is fine grained and sub-angular, dry, light brown, very dense
10	SPT	2.0	10.0	20		NP	3.5		50/4"		
15	U	3.0	15.0				1.5	116.3	13 42		Same as above
											Few coarse gravel
20	U	4.0	20.0	33		NP			48 50/3"		Some light cementation of material evident by white bands within sample
										SM	Base of Dam fill material
25	SPT	5.0	25.0				3.7		28 32 30		SILTY SAND WITH GRAVEL: Sand is fine to coarse grained, gravel is fine to coarse grained, dry, light brown, very dense. (Native material)
30	SPT	6.0	30.0						26 50/4"		Same as above, increased coarse sand and fine gravel content
											Rig rattles, chatters, possible increase in rock
35	SPT	7.0	35.0						23 28 29		
											Boring terminated at 36.5' below ground surface.

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BORING LOG

LOCATION OF BORING:	JOB NO.	CLIENT	LOCATION
WHITE TANKS DAM	15448-005-022	MARICOPA COUNTY FLOOD CONTROL DISTRICT	WHITE TANKS

DRILLING METHOD:	INTERVAL:	DRILLER:	BORING NO.
MOBILE B-57 WITH 6-INCH HOLLOW STEM AUGER	0'-30.5'	ATL, INC.	DMB-3
			SHEET 1 OF 1

SAMPLING METHOD:	INTERVAL:
STANDARD PENETRATION TEST WITH SPLIT SPOON (SPT) AND DAMES & MOORE TYPE (U) WITH BRASS SLEEVES AND RINGS	5-FOOT INTERVALS

				DRILLING START	DRILLING FINISH
LOGGED BY: PLG	WATER LEVEL	NA		TIME 0715	TIME 0910
CHECKED BY: PLG	TIME				
	DATE			DATE 11/3/98	DATE 11/3/98
DATUM: ELEVATION: feet	CASING DEPTH				

SURFACE CONDITIONS: GRADED ROADWAY SURFACE ON TOP OF DAM

DEPTH IN FEET	SAMPLER TYPE	SAMPLE NO.	SAMPLE DEPTH (ft)	% PASSING #200 SIEVE	LIQUID LIMIT %	PLASTICITY INDEX %	WATER CONTENT %	DRY DENS. (pcf)	BLOWS/ft	USCS	DESCRIPTION
										SC	CLAYEY SAND WITH GRAVEL: Sand is predominantly fine to medium grained, gravel is fine to coarse and sub-rounded, dry, brown, very dense
5	SPT	1.0	5.0				6.1		34 50/5"		Same as above, gravel is fine grained
10	U	2.0	10.0	48	35	13	5.3	112.6	45 50/5"		Same as above, Sand and gravel are both fine to coarse grained
15	SPT	3.0	15.0				4.9		30 50/4"	CL	SANDY LEAN CLAY WITH GRAVEL: Gravel is fine, sand is fine to medium grained, dry, brown, hard
20	U	4.0	20.0						24 30		Same as above
25	SPT	5.0	25.0	71	33	12	4.9		48 50/4"		LEAN CLAY WITH SAND: Sand is primarily fine to medium with small coarse fraction, dry, brown, hard
										SP SM	SILTY SAND AND GRAVEL: Gravel and cobbles up to 5" diameter, difficult drilling (no recovery)
30											Refusal at 30.5' below ground surface
35											

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BORING LOG

LOCATION OF BORING:	JOB NO.	CLIENT MARICOPA COUNTY FLOOD CONTROL DISTRICT	LOCATION WHITE TANKS
WHITE TANKS DAM	15448-005-022		

DRILLING METHOD:	INTERVAL:	DRILLER:	BORING NO.
MOBILE B-57 WITH 6-INCH HOLLOW STEM AUGER	0'-36'	ATL, INC.	DMB-4
			SHEET 1 OF 1

SAMPLING METHOD:	INTERVAL:
STANDARD PENETRATION TEST WITH SPLIT SPOON (SPT) AND DAMES & MOORE TYPE (U) WITH BRASS SLEEVES AND RINGS	5-FOOT INTERVALS

LOGGED BY: PLG	WATER LEVEL	NA		DRILLING START TIME 0929	DRILLING FINISH TIME 1145
CHECKED BY: PLG	TIME				
	DATE			DATE 11/3/98	DATE 11/3/98
DATUM: ELEVATION: feet	CASING DEPTH				

SURFACE CONDITIONS: GRADED ROADWAY SURFACE ON TOP OF DAM

DEPTH IN FEET	SAMPLER TYPE	SAMPLE NO.	SAMPLE DEPTH (ft)	% PASSING #200 SIEVE	LIQUID LIMIT %	PLASTICITY INDEX %	WATER CONTENT %	DRY DENS. (pcf)	BLOWS/ft	USCS	DESCRIPTION
										CL ML	SANDY SILTY CLAY WITH GRAVEL: Sand is predominantly fine to medium graine, gravel is fine to coarse grained, dry, brown, hard
5	U	1.0	5.0	58	27	7	4.6	102.0	29 26		Same as above
10	SPT	2.0	10.0				4.0		48 50/4"		Same as above
15	U	3.0	15.0						40 43		Same as above, decreased in gravel content
20	SPT	4.0	20.0	55	23	8	3.1		50/4"	CL	SANDY LEAN CLAY: Sand is fine to coarse grained, dry, brown, hard
25											No recovery
30	U	5.0	30.0						45 48		Same as above, some signs of light cementaion
35	SPT	6.0	35.0				1.5		40 50/5"	SM	SILTY SAND WITH GRAVEL: Sand is fine to coarse, gravel is fine to coarse, dry, light brown, very dense, some signs of light cementation

Boring terminated at 36' below ground surface.

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BORING LOG

LOCATION OF BORING:	JOB NO.	CLIENT	LOCATION
WHITE TANKS DAM	15448-005-022	MARICOPA COUNTY FLOOD CONTROL DISTRICT	WHITE TANKS

DRILLING METHOD:	INTERVAL:	DRILLER:	BORING NO.
MOBILE B-57 WITH 6-INCH HOLLOW STEM AUGER	0'-35'	ATL, INC.	DMB-5
			SHEET 1 OF 1

SAMPLING METHOD:	INTERVAL:
STANDARD PENETRATION TEST WITH SPLIT SPOON (SPT) AND DAMES & MOORE TYPE (U) WITH BRASS SLEEVES AND RINGS	5-FOOT INTERVALS

				DRILLING START	DRILLING FINISH
LOGGED BY: PLG	WATER LEVEL	NA		TIME 1305	TIME 1455
CHECKED BY: PLG	TIME				
	DATE			DATE 11/3/98	DATE 11/3/98
DATUM: ELEVATION: feet	CASING DEPTH				

SURFACE CONDITIONS: GRADED ROADWAY SURFACE ON TOP OF DAM

DEPTH IN FEET	SAMPLER TYPE	SAMPLE NO.	SAMPLE DEPTH (ft)	% PASSING #200 SIEVE	LIQUID LIMIT %	PLASTICITY INDEX %	WATER CONTENT %	DRY DENS. (pcf)	BLOWS/ft	USCS	DESCRIPTION
										CL ML	SANDY SILTY CLAY WITH GRAVEL: Sand is primarily fine to medium grained, gravel is skewed to the fine fraction, though few coarse present, dry, brown, hard
5	SPT	1.0	5.0	38	26	7	4.8		41 50/3"	SC SM	SILTY CLAYEY SAND: Sand is fine to coarse grained, few gravels (fine), dry, brown, very dense, lightly cemented
10	U	2.0	10.0						50/4"		Same as above, increased gravel, gravel is sub-rounded to sub-angular and fine to coarse grained
15	SPT	3.0	15.0						50/5"		Same as above
20											No recovery
25	U	4.0	25.0	62	24	6	4.4	78.5	23 25	CL ML	SANDY SILTY CLAY: Sand is fine to coarse grained, gravels are fine and sparse (less than 2%), dry, brown, hard
30											No recovery
										SP SM	(No recovery) Cobbles and gravel
35											Auger refusal at 35' below ground surface.

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BORING LOG

LOCATION OF BORING:	JOB NO.	CLIENT MARICOPA COUNTY FLOOD CONTROL DISTRICT	LOCATION WHITE TANKS
WHITE TANKS DAM	15448-005-022		

DRILLING METHOD:	INTERVAL:	DRILLER:	BORING NO.
MOBILE B-57 WITH 6-INCH HOLLOW STEM AUGER	0'-36.5'	ATL, INC.	DMB-6
			SHEET 1 OF 1

SAMPLING METHOD:	INTERVAL:
STANDARD PENETRATION TEST WITH SPLIT SPOON (SPT) AND DAMES & MOORE TYPE (U) WITH BRASS SLEEVES AND RINGS	5-FOOT INTERVALS

				DRILLING START	DRILLING FINISH
LOGGED BY: PLG	WATER LEVEL	NA		TIME 1103	TIME 1725
CHECKED BY: PLG	TIME				
	DATE			DATE 11/5/98	DATE 11/5/98
DATUM: ELEVATION: feet	CASING DEPTH				

SURFACE CONDITIONS: GRADED ROADWAY SURFACE ON TOP OF DAM

DEPTH IN FEET	SAMPLER TYPE	SAMPLE NO.	SAMPLE DEPTH (ft)	% PASSING #200 SIEVE	LIQUID LIMIT %	PLASTICITY INDEX %	WATER CONTENT %	DRY DENS. (pcf)	BLOWS/ft	GRAPHIC LOG	USCS	DESCRIPTION
											CL	SANDY LEAN CLAY WITH GRAVEL: Sand is primarily fine to medium grained though a coarse fraction is present, gravel is fine to coarse, dry to slightly moist, brown, hard
5	U	1.0	5.0	39	32	9	3.0	121.7	20 28		SC	CLAYEY SAND WITH GRAVEL: Sand is fine to coarse grained, gravel is fine to coarse, dry to slightly moist, brown, very dense Small increase in gravel
10	U	2.0	10.0						45 48			Same as above
15	SPT	3.0	15.0				4.5		48 50/3"			Same as above
20	U	4.0	20.0				6.2	100.9	46 50/4"			Same as above, cemented light to moderate in layers and modules
25	SPT	5.0	25.0						8 9 8			Same as above, becomes medium dense, decreased cementaion
30	U	6.0	30.0	70	38	13	4.5	83.6	45 50/5"		CL	SANDY LEAN CLAY: Sand is predominantly fine grained, dry, light brown, hard, moderately well cemented
35	SPT	7.0	35.0						25 37 42		SM	SILTY SAND WITH GRAVEL: Sand is fine to coarse, gravel is fine to coarse and sub-angular, dry, light brown, very dense

Boring terminated at 36.5' below ground surface.

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BORING LOG

LOCATION OF BORING:	JOB NO.	CLIENT	LOCATION
WHITE TANKS DAM	15448-005-022	MARICOPA COUNTY FLOOD CONTROL DISTRICT	WHITE TANKS

DRILLING METHOD:	INTERVAL:	DRILLER:	BORING NO.
MOBILE B-57 WITH 6-INCH HOLLOW STEM AUGER	0'-14.5'	ATL, INC.	DMB-7
			SHEET 1 OF 1

SAMPLING METHOD:	INTERVAL:
STANDARD PENETRATION TEST WITH SPLIT SPOON (SPT) AND DAMES & MOORE TYPE (U) WITH BRASS SLEEVES AND RINGS	5-FOOT INTERVALS

			DRILLING START	DRILLING FINISH
LOGGED BY: PLG	WATER LEVEL	NA	TIME 1240	TIME 1305
CHECKED BY: PLG	TIME			
	DATE		DATE 11/5/98	DATE 11/5/98
DATUM: ELEVATION: feet	CASING DEPTH			

SURFACE CONDITIONS: GRADED ROADWAY SURFACE ON TOP OF DAM

DEPTH IN FEET	SAMPLER TYPE	SAMPLE NO.	SAMPLE DEPTH (ft)	% PASSING #200 SIEVE	LIQUID LIMIT %	PLASTICITY INDEX %	WATER CONTENT %	DRY DENS. (pcf)	BLOWS/ft	GRAPHIC LOG	USCS	DESCRIPTION
											CL	SANDY LEAN CLAY WITH GRAVEL: Sand is predominatly fine to medium with some coarse, gravel is fine to coarse grained, dry to slightly moist, brown, hard
5	SPT	1.0	5.0	56	37	17	6.9		18 28 49			Same as above, moderately cemented
10	U		10.0				9.3	121.4	34 40			Becomes slightly moist
15												Boring terminated at 14.5' below ground surface.
20												
25												
30												
35												

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BORING LOG

LOCATION OF BORING:	JOB NO.	CLIENT MARICOPA COUNTY FLOOD CONTROL DISTRICT	LOCATION WHITE TANKS
WHITE TANKS DAM	15448-005-022		

DRILLING METHOD:	INTERVAL:	DRILLER:	BORING NO.
MOBILE B-57 WITH 6-INCH HOLLOW STEM AUGER	0'-36.5'	ATL, INC.	DMB-8
			SHEET 1 OF 1

SAMPLING METHOD:	INTERVAL:
STANDARD PENETRATION TEST WITH SPLIT SPOON (SPT) AND DAMES & MOORE TYPE (U) WITH BRASS SLEEVES AND RINGS	5-FOOT INTERVALS

				DRILLING START	DRILLING FINISH
LOGGED BY: PLG	WATER LEVEL	NA		TIME 1059	TIME 1420
CHECKED BY: PLG	TIME				
	DATE			DATE 11/4/98	DATE 11/4/98
DATUM: ELEVATION: feet	CASING DEPTH				

SURFACE CONDITIONS: GRADED ROADWAY SURFACE ON TOP OF DAM

DEPTH IN FEET	SAMPLER TYPE	SAMPLE NO.	SAMPLE DEPTH (ft)	% PASSING #200 SIEVE	LIQUID LIMIT %	PLASTICITY INDEX %	WATER CONTENT %	DRY DENS. (pcf)	BLOWS/ft	USCS	DESCRIPTION
										CL	SANDY LEAN CLAY WITH GRAVEL: Sand is fine to coarse, gravel is fine to coarse and sub-angular to sub-rounded, dry to slightly moist, brown, hard
5	SPT	1.0	5.0				5.2		37 50/3"		Same as above, some light to moderate cementation, decreased gravel content
10	U	2.0	10.0	22	33	10	5.3	114.6	42 47	SC SM	SILTY CLAYEY SAND: Sand is fine to coarse, dry to slightly moist, brown, very dense
15	U	3.0	15.0						29 36		SILTY CLAYEY SAND WITH GRAVEL: Sand is fine to coarse, gravel is fine, dry to slightly moist, brown, very dense, lightly cemented
20	SPT	4.0	20.0				4.2		27 35 50	ML	SANDY SILT: Sand is fine to coarse grained, few fine gravels, slightly moist, brown, hard
25	U	5.0	25.0				6.2		20 26		Same as above
30	U	6.0	30.0				6.7		30 36		Same as above
35	SPT	7.0	35.0						13 12 13	SM	SILTY SAND WITH GRAVEL: Sand is fine to coarse grained, gravel is fine to coarse, slightly moist, light brown, medium dense
											Boring terminated at 36.5' below ground surface.

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BORING LOG

LOCATION OF BORING:	JOB NO.	CLIENT MARICOPA COUNTY FLOOD CONTROL DISTRICT	LOCATION WHITE TANKS
WHITE TANKS DAM	15448-005-022		

DRILLING METHOD:	INTERVAL:	DRILLER:	BORING NO.
MOBILE B-57 WITH 6-INCH HOLLOW STEM AUGER	0'-35.83'	ATL, INC.	DMB-9
			SHEET 1 OF 1

SAMPLING METHOD:	INTERVAL:
STANDARD PENETRATION TEST WITH SPLIT SPOON AND DAMES & MOORE TYPE U WITH BRASS SLEEVES AND RINGS	5-FOOT INTERVALS

			DRILLING START	DRILLING FINISH
LOGGED BY: PLG	WATER LEVEL	NA	TIME 0722	TIME 0956
CHECKED BY: PLG	TIME			
	DATE		DATE 11/4/98	DATE 11/4/98
DATUM: ELEVATION: feet	CASING DEPTH			

SURFACE CONDITIONS: GRADED ROADWAY SURFACE ON TOP OF DAM

DEPTH IN FEET	SAMPLER TYPE	SAMPLE NO.	SAMPLE DEPTH (ft)	% PASSING #200 SIEVE	LIQUID LIMIT %	PLASTICITY INDEX %	WATER CONTENT %	DRY DENS. (pcf)	BLOWS/ft	USCS	DESCRIPTION
										CL	SANDY LEAN CLAY WITH GRAVEL: Sand is fine to coarse, gravel is fine to coarse, sub-rounded to sub-angular, dry to slightly moist, brown, hard, gravel up to 2" in diameter
5	U	1.0	5.0						26 50/4"		SANDY LEAN CLAY: Sand is fine to coarse, sub-rounded to sub-angular, slightly moist, brown, hard
10	SPT	2.0	10.0	56	28	9	6.0		33 50/4"		Same as above, some light to moderate cementation
15	U	3.0	15.0	44	24	6	2.2	111.3	22 23	SC SM	SILTY CLAYEY SAND: Sand is primarily fine to medium grained with some coarse sand and few fine gravels, dry, brown, very dense
20	SPT	4.0	20.0				5.8		40 50/4"		Same as above, decreased gravel content (less than 2%), sand is primarily fine grained, becomes dry to slightly moist
										SP SM	Base of Dam
											Gravel/cobbles
25											No recovery
											Gravel/cobbles
30	SPT	5.0	30.0	12		NP	0.9		17 38 41		POORLY GRADED SAND WITH SILT AND GRAVEL: Sand is fine to coarse predominantly fine grained, all components are sub-angular, dry, light brown, very dense, some possible signs of cementation though not evident from sample cohesion
											Gravel/cobbles
35	SPT	6.0	35.0				2.3		33 50/4"		Same as above
											Boring terminated at 35.83' below ground surface.

BLGV022 1/22/99

DAMES & MOORE

BORING LOG

LOCATION OF BORING:	JOB NO.	CLIENT MARICOPA COUNTY FLOOD CONTROL DISTRICT	LOCATION WHITE TANKS
WHITE TANKS DAM	15448-005-022		

DRILLING METHOD:	INTERVAL:	DRILLER:	BORING NO.
MOBILE B-57 WITH 6-INCH HOLLOW STEM AUGER	0'-36.33'	ATL, INC.	DMB-10
			SHEET 1 OF 1

SAMPLING METHOD:	INTERVAL:
STANDARD PENETRATION TEST WITH SPLIT SPOON (SPT) AND DAMES & MOORE TYPE (U) WITH BRASS SLEEVES AND RINGS	5-FOOT INTERVALS

			DRILLING START	DRILLING FINISH
LOGGED BY: PLG	WATER LEVEL	NA	TIME 1425	TIME 0810
CHECKED BY: PLG	TIME			
	DATE		DATE 10/27/98	DATE 10/28/98
	CASING DEPTH			

DATUM: ELEVATION: feet

SURFACE CONDITIONS: GRADED ROADWAY SURFACE AT DOWNSTREAM TOE OF DAM

DEPTH IN FEET	SAMPLER TYPE	SAMPLE NO.	SAMPLE DEPTH (ft)	% PASSING #200 SIEVE	LIQUID LIMIT %	PLASTICITY INDEX %	WATER CONTENT %	DRY DENS. (pcf)	BLOWS/ft	GRAPHIC LOG	USCS	DESCRIPTION
											SC	CLAYEY SAND WITH GRAVEL: Sand is fine to coarse, gravel is primarily coarse with few fine gravels and sub-angular, dry, light brown, dense
5	SPT	1.0	5.0	36	29	9	2.5		19 20 27			Same as above
10	U	2.0	10.0						50/4"			Same as above, becomes very dense, light cementation
15												No recovery
20	SPT	3.0	20.0				5.5		36 50/3"			Same as above, becomes dry to slightly moist
25	U	4.0	25.0						21 40			Same as above
											SW	WELL GRADED SAND WITH GRAVEL: Sand is fine to coarse, gravel primarily fine grained, components are angular to sub-angular, dry, light brown, dense
30	SPT	5.0	30.0						6 12 23			Increased gravel/cobble content in excess of 3-4" diameter
											SM	SILTY SAND WITH GRAVEL: Sand is fine to coarse grained, gravel is fine to coarse grained, light brown, very dense
35	SPT	6.0	35.0						22 50/4"			Boring terminated at 36.33' below ground surface

BLGV022 1/22/99

DAMES & MOORE

BORING LOG

LOCATION OF BORING:	JOB NO.	CLIENT	LOCATION
WHITE TANKS DAM	15448-005-022	MARICOPA COUNTY FLOOD CONTROL DISTRICT	WHITE TANKS

DRILLING METHOD:	INTERVAL:	DRILLER:	BORING NO.
MOBILE B-57 WITH 6-INCH HOLLOW STEM AUGER	0'-35'	ATL, INC.	DMB-11
			SHEET 1 OF 1

SAMPLING METHOD:	INTERVAL:
STANDARD PENETRATION TEST WITH SPLIT SPOON (SPT) AND DAMES & MOORE TYPE (U) WITH BRASS SLEEVES AND RINGS	5-FOOT INTERVALS

			DRILLING START	DRILLING FINISH
LOGGED BY: PLG	WATER LEVEL	NA	TIME 0920	TIME 1130
CHECKED BY: PLG	TIME			
	DATE		DATE 10/28/98	DATE 10/28/98
	CASING DEPTH			

DATUM: ELEVATION: feet

SURFACE CONDITIONS: GRADED ROADWAY SURFACE AT DOWNSTREAM TOE OF DAM

DEPTH IN FEET	SAMPLER TYPE	SAMPLE NO.	SAMPLE DEPTH (ft)	% PASSING #200 SIEVE	LIQUID LIMIT %	PLASTICITY INDEX %	WATER CONTENT %	DRY DENS. (pcf)	BLOWS/ft	GRAPHIC LOG	USCS	DESCRIPTION
											SM	SILTY SAND: Sand is fine to medium grained, dry to slightly moist, brown, hard
5	SPT	1.0	5.0	41	35	13	4.9		16 23 26		SC	CLAYEY SAND: Sand is fine to coarse, some fine gravels, dry, light brown, dense
											ML	SANDY SILT: Sand is primarily fine with some medium to coarse grains, dry, light brown, hard. No signs of cementation
10	SPT	2.0	10.0						29 50/6"			
15	SPT	3.0	15.0						21 29 32			Same as above
20	SPT	4.0	20.0						45 50/5"			Same as above
25	SPT	5.0	25.0						16 41 50/5"		SM	SANDY SILT WITH GRAVEL: Sand is fine to coarse grained, gravel is fine, angular to sub-angular, dry, light brown, hard
30	SPT	6.0	30.0						50 50/4"			Same as above
35												No recovery

Boring terminated at 35' below ground surface.

BLGV022 1/22/99

DAMES & MOORE

BORING LOG

LOCATION OF BORING:	JOB NO.	CLIENT	LOCATION
WHITE TANKS DAM	15448-005-022	MARICOPA COUNTY FLOOD CONTROL DISTRICT	WHITE TANKS

DRILLING METHOD:	INTERVAL:	DRILLER:	BORING NO.
MOBILE B-57 WITH 6-INCH HOLLOW STEM AUGER	0'-28'	ATL, INC.	DMB-12
			SHEET 1 OF 1

SAMPLING METHOD:	INTERVAL:
STANDARD PENETRATION TEST WITH SPLIT SPOON (SPT) AND DAMES & MOORE TYPE (U) WITH BRASS SLEEVES AND RINGS	5-FOOT INTERVALS

			DRILLING START	DRILLING FINISH
LOGGED BY: PLG	WATER LEVEL	NA	TIME 1018	TIME 1144
CHECKED BY: PLG	TIME			
	DATE		DATE 11/5/98	DATE 11/5/98
DATUM: ELEVATION: feet	CASING DEPTH			

SURFACE CONDITIONS: GRADED ROADWAY SURFACE AT DOWNSTREAM TOE OF DAM

DEPTH IN FEET	SAMPLER TYPE	SAMPLE NO.	SAMPLE DEPTH (ft)	LABORATORY TESTS: % PASSING #200 SIEVE	LIQUID LIMIT %	PLASTICITY INDEX %	WATER CONTENT %	DRY DENS. (pcf)	BLOWS/ft	GRAPHIC LOG	USCS	DESCRIPTION
											CL	SANDY LEAN CLAY WITH GRAVEL: Sand is primarily fine to medium grained, gravel is fine to coarse though primarily fine grained, dry, brown, hard
5	U	1.0	5.0	69	33	12	6.0	91.5	25 31			Same as above, becomes dry to slightly moist, moderate cementation, noted by white layers/nodules in sample
10	SPT	2.0	10.0						29 37 41			Same as above, becomes light brown Cobbles/gravels up to 4" diameter
15	U	3.0	15.0						30 33			Same as above
20	SPT	4.0	20.0						29 39 45		SM	SILTY SAND WITH GRAVEL: Sand is fine to medium grained, gravel is fine to coarse, dry, light brown, very dense, some moderate cementaion Increased cobble/gravel layer
25	U	5.0	25.0						48 50/3"		ML	SANDY SILT WITH GRAVEL: Sand is fine to coarse, gravel is primarily fine with few coarse, dry, light brown, hard
30												Auger refusal at 28' below ground surface.
35												

BLGV022 1/22/99

DAMES & MOORE

BORING LOG

LOCATION OF BORING:	JOB NO.	CLIENT	LOCATION
WHITE TANKS DAM	15448-005-022	MARICOPA COUNTY FLOOD CONTROL DISTRICT	WHITE TANKS

DRILLING METHOD:	INTERVAL:	DRILLER:	BORING NO.
MOBILE B-57 WITH 6-INCH HOLLOW STEM AUGER	0'-36.5'	ATL, INC.	DMB-13
			SHEET 1 OF 1

SAMPLING METHOD:	INTERVAL:
STANDARD PENETRATION TEST WITH SPLIT SPOON (SPT) AND DAMES & MOORE TYPE (U) WITH BRASS SLEEVES AND RINGS	5-FOOT INTERVALS

			DRILLING START	DRILLING FINISH
LOGGED BY: PLG	WATER LEVEL	NA	TIME 1502	TIME 0805
CHECKED BY: PLG	TIME			
	DATE		DATE 11/4/98	DATE 11/5/98
DATUM: ELEVATION: feet	CASING DEPTH			

SURFACE CONDITIONS: GRADED ROADWAY SURFACE AT DOWNSTREAM TOE OF DAM

DEPTH IN FEET	SAMPLER TYPE	SAMPLE NO.	SAMPLE DEPTH (ft)	% PASSING #200 SIEVE	LIQUID LIMIT %	PLASTICITY INDEX %	WATER CONTENT %	DRY DENS. (pcf)	BLOWS/ft	USCS	DESCRIPTION
										SM	SILTY SAND WITH GRAVEL: Sand is fine to coarse grained, gravel is fine to coarse, all components are sub-angular to sub-rounded, dry, light brown, dense Some cobbles up to 4" diameter
5	SPT	1.0	5.0						25 50/5"	CL	SANDY LEAN CLAY: Sand is fine to coarse though primarily fine, dry to slightly moist, brown, very hard, some lenses of moderate cementation
										SM	SILTY SAND WITH GRAVEL: Sand is fine to coarse, gravel is fine to coarse, dry to slightly moist, brown, very dense, some moderate cementation
10	U	2.0	10.0	41	35	10	5.8	95.5	25 30		
15	SPT	3.0	15.0						47 50/4"		Becomes dry and light brown
20	U	4.0	20.0						45 50/1"		Same as above Increased gravels/cobbles
25	SPT	5.0	25.0						35 50/3"		Becomes SILTY SAND, light brown/grey (Progress of sampler stopped by rock only partially retrieved)
30	SPT	6.0	30.0						30 33 39		No recovery Gravel/cobbles
35											Same as above
											Boring terminated at 36.5' below ground surface.

BLGV022 1/22/99

DAMES & MOORE

BORING LOG

LOCATION OF BORING:	JOB NO.	CLIENT	LOCATION
WHITE TANKS DAM	15448-005-022	MARICOPA COUNTY FLOOD CONTROL DISTRICT	WHITE TANKS

DRILLING METHOD:	INTERVAL:	DRILLER:	BORING NO.
MOBILE B-57 WITH 6-INCH HOLLOW STEM AUGER	0'-35.5'	ATL, INC.	DMB-14
			SHEET 1 OF 1

SAMPLING METHOD:	INTERVAL:
STANDARD PENETRATION TEST WITH SPLIT SPOON (SPT) AND DAMES & MOORE TYPE (U) WITH BRASS SLEEVES AND RINGS	5-FOOT INTERVALS

				DRILLING START	DRILLING FINISH
LOGGED BY: PLG	WATER LEVEL	NA		TIME 1320	TIME
CHECKED BY: PLG	TIME				
	DATE			DATE 11/2/98	DATE 11/2/98
DATUM: ELEVATION: feet	CASING DEPTH				

SURFACE CONDITIONS: GRADED ROADWAY SURFACE AT DOWNSTREAM TOE OF DAM

DEPTH IN FEET	SAMPLER TYPE	SAMPLE NO.	SAMPLE DEPTH (ft)	% PASSING #200 SIEVE	LIQUID LIMIT %	PLASTICITY INDEX %	WATER CONTENT %	DRY DENS. (pcf)	BLOWS/ft	GRAPHIC LOG	USCS	DESCRIPTION
											SM	SILTY SAND WITH GRAVEL: Sand is primarily fine to medium, gravel is fine to coarse and sub-angular, dry, brown, medium dense
5	U	1.0	5.0	26		NP	3.1	104.8	8 9			Same as above
											SW SM	WELL GRADED SAND WITH SILT AND GRAVEL: Sand is fine to coarse, gravel is fine to coarse, angular to sub-angular, dry, light brown, medium dense
10	SPT	2.0	10.0						6 16 8			
15												No recovery
											SW	WELL GRADED SAND: Sand is fine to coarse, sub-angular to sub-rounded, little or no fines, dry, brown, very dense
20	U	3.0	20.0						46 43			
25	SPT	4.0	25.0						13 22 35		SM	SILTY SAND WITH GRAVEL: Sand is fine to coarse grained, gravel is fine to coarse grained and angular, dry, light brown/grey, very dense possibly some light cementation Gravel/cobbles up to 4" diameter, appear to be slightly cemented
30	U	5.0	30.0						26 42		ML	SANDY SILT: Sand is fine to medium grained, dry, brown, hard, slight to moderate cementation in localized layers/nodules
35	SPT	6.0	35.0						50/4"			Same as above

Boring terminated at 35.5' below ground surface.

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DAMES & MOORE

BORING LOG

LOCATION OF BORING:	JOB NO.	CLIENT	LOCATION
WHITE TANKS DAM	15448-005-022	MARICOPA COUNTY FLOOD CONTROL DISTRICT	WHITE TANKS

DRILLING METHOD:	INTERVAL:	DRILLER:	BORING NO.
MOBILE B-57 WITH 6-INCH HOLLOW STEM AUGER	0'-24'	ATL, INC.	DMB-15
			SHEET 1 OF 1

SAMPLING METHOD:	INTERVAL:
STANDARD PENETRATION TEST WITH SPLIT SPOON (SPT) AND DAMES & MOORE TYPE (U) WITH BRASS SLEEVES AND RINGS	5-FOOT INTERVALS

			DRILLING START	DRILLING FINISH
LOGGED BY: PLG	WATER LEVEL	NA	TIME 1528	TIME 0750
CHECKED BY: PLG	TIME			
	DATE		DATE 10/28/98	DATE 10/29/98
DATUM: ELEVATION: feet	CASING DEPTH			

SURFACE CONDITIONS: GRADED ROADWAY SURFACE AT UPSTREAM TOE OF DAM

DEPTH IN FEET	SAMPLER TYPE	SAMPLE NO.	SAMPLE DEPTH (ft)	% PASSING #200 SIEVE	LIQUID LIMIT %	PLASTICITY INDEX %	WATER CONTENT %	DRY DENS. (pcf)	BLOWS/ft	GRAPHIC LOG	USCS	DESCRIPTION
											ML	SILT WITH SAND: Sand is fine to coarse but primarily fine to medium grained, dry to slightly moist, brown, hard
5	SPT	1.0	5.0				4.6		11 15 21			
											SM	SILTY SAND WITH GRAVEL: Sand is fine to coarse, gravel is primarily fine grained, all components are sub-angular to sub-rounded, dry to slightly moist, light brown, very dense
10	U	2.0	10.0	32	28	4	4.9	106.7	26 41			
15												
20	SPT	3.0	20.0						17 31 29			Same as above, gravel is fine to coarse grained, signs of possible cobbles noted by difficult drilling, cementation is moderate Sand/gravel/cobble mixture cobbles up to 8" diameter in cuttings
25												Auger refusal at 24' below ground surface, possible caliche layers in addition to large amount of rock.
30												
35												

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DAMES & MOORE

BORING LOG

LOCATION OF BORING:	JOB NO.	CLIENT	LOCATION
WHITE TANKS DAM	15448-005-022	MARICOPA COUNTY FLOOD CONTROL DISTRICT	WHITE TANKS

DRILLING METHOD:	INTERVAL:	DRILLER:	BORING NO.
MOBILE B-57 WITH 6-INCH HOLLOW STEM AUGER	0'-36'	ATL, INC.	DMB-16
			SHEET 1 OF 1

SAMPLING METHOD:	INTERVAL:
STANDARD PENETRATION TEST WITH SPLIT SPOON (SPT) AND DAMES & MOORE TYPE (U) WITH BRASS SLEEVES AND RINGS	5-FOOT INTERVALS

			DRILLING START	DRILLING FINISH
LOGGED BY: PLG	WATER LEVEL	NA	TIME 0825	TIME 1032
CHECKED BY: PLG	TIME			
	DATE		DATE 11/29/98	DATE 11/29/98
DATUM: ELEVATION: feet	CASING DEPTH			

SURFACE CONDITIONS: GRADED ROADWAY SURFACE AT UPSTREAM TOE OF DAM

DEPTH IN FEET	SAMPLER TYPE	SAMPLE NO.	SAMPLE DEPTH (ft)	% PASSING #200 SIEVE	LIQUID LIMIT %	PLASTICITY INDEX %	WATER CONTENT %	DRY DENS. (pcf)	BLOWS/ft	USCS	DESCRIPTION
										ML	SANDY SILT: Sand is fine to medium grained, dry, brown, hard
5	SPT	1.0	5.0						11 17 18		SILT WITH SAND: Sand is medium to coarse grained, dry to slightly moist, brown, hard
10	U	2.0	10.0						16 20	SM	SILTY SAND WITH GRAVEL: Sand is fine to coarse though predominantly fine grained, gravel is fine, dry to slightly moist, light brown, dense, some signs of light cementation
15	SPT	3.0	15.0				5.3		29 36 36	SW SM	WELL GRADED SAND WITH SILT AND GRAVEL: Sand is fine to coarse grained, gravel is fine, components are angular, dry to slightly moist, light brown, very dense, light cemented
20											No recovery
25	SPT	4.0	25.0	55	31	10	6.4		30 40 47	CL	SANDY LEAN CLAY: Sand is fine to coarse though primarily fine grained, dry to slightly moist, brown, hard, no signs of cementation
30	SPT	5.0	30.0						11 11 14	SW	WELL GRADED SAND WITH GRAVEL: Sand is fine to coarse grained, gravel is predominantly fine, all components are sub-angular, dry, light brown, medium dense, no signs of cementation
35	SPT	6.0	35.0				9.3		32 50/5"	ML	Silt with sand, sand is primarily fine grained though some is medium grained, moist, brown, hard

Boring terminated at 36' below ground surface.

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DAMES & MOORE

BORING LOG

LOCATION OF BORING:	JOB NO.	CLIENT	LOCATION
WHITE TANKS DAM	15448-005-022	MARICOPA COUNTY FLOOD CONTROL DISTRICT	WHITE TANKS

DRILLING METHOD:	INTERVAL:	DRILLER:	BORING NO.
MOBILE B-57 WITH 6-INCH HOLLOW STEM AUGER	0'-36.5'	ATL, INC.	DMB-17
			SHEET 1 OF 1

SAMPLING METHOD:	INTERVAL:
STANDARD PENETRATION TEST WITH SPLIT SPOON (SPT) AND DAMES & MOORE TYPE (U) WITH BRASS SLEEVES AND RINGS	5-FOOT INTERVALS

			DRILLING START	DRILLING FINISH
LOGGED BY: PLG	WATER LEVEL	NA	TIME 1130	TIME 1330
CHECKED BY: PLG	TIME			
	DATE		DATE 10/29/98	DATE 10/29/98
DATUM: ELEVATION: feet	CASING DEPTH			

SURFACE CONDITIONS: GRADED ROADWAY SURFACE AT UPSTREAM TOE OF DAM

DEPTH IN FEET	SAMPLER TYPE	SAMPLE NO.	SAMPLE DEPTH (ft)	% PASSING #200 SIEVE	LIQUID LIMIT %	PLASTICITY INDEX %	WATER CONTENT %	DRY DENS. (pcf)	BLOWS/ft	USCS	DESCRIPTION
										SM	SILTY SAND WITH GRAVEL: Sand is primarily fine grained, gravel is fine, dry to slightly moist, brown, dense
5	U	1.0	5.0	36		NP	10.9		16 20		SILTY SAND: Sand is fine to coarse though primarily fine to medium grained, less than 2% fine gravel, moist, brown, dense
10	SPT	2.0	10.0				3.8		16 33 50/5"		SILTY SAND WITH GRAVEL: Sand is fine to coarse grained, gravel is fine to coarse, dry, brown, very dense
15	SPT	3.0	15.0						25 33 37	SW SM	WELL GRADED SAND WITH SILT AND GRAVEL: Sand is fine to coarse, gravel appears to be predominantly fine, dry, light brown, very dense. Some signs of light cementation
20	SPT	4.0	20.0				2.7		43 50/4"		Same as above, increased silt content, gravel is fine to coarse, increased cementation
25											No recovery, increased rock/gravel content
30	SPT	5.0	30.0	32	30	7	3.8		49 50/4"	SC SM	SILTY CLAYEY SAND: Sand is fine to coarse, few fine gravels, dry, light brown, very dense. No signs of cementation
35	SPT	6.0	35.0				6.2		16 21 25		Same as above
											Boring terminated at 36.5' below ground surface.

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DAMES & MOORE

BORING LOG

LOCATION OF BORING:	JOB NO.	CLIENT MARICOPA COUNTY FLOOD CONTROL DISTRICT	LOCATION WHITE TANKS
WHITE TANKS DAM	15448-005-022		

DRILLING METHOD:	INTERVAL:	DRILLER:	BORING NO.
MOBILE B-57 WITH 6-INCH HOLLOW STEM AUGER	0'-35.5'	ATL, INC.	DMB-18
			SHEET 1 OF 1

SAMPLING METHOD:	INTERVAL:	DRILLING START	DRILLING FINISH
STANDARD PENETRATION TEST WITH SPLIT SPOON (SPT) AND DAMES & MOORE TYPE (U) WITH BRASS SLEEVES AND RINGS	5-FOOT INTERVALS	TIME 1417	TIME 0838
		DATE 10/29/98	DATE 10/30/98

LOGGED BY: PLG	WATER LEVEL	NA	
CHECKED BY: PLG	TIME		
	DATE		
DATUM: ELEVATION: feet	CASING DEPTH		

SURFACE CONDITIONS: GRADED ROADWAY SURFACE AT DOWNSTREAM TOE OF DAM

DEPTH IN FEET	SAMPLER TYPE	SAMPLE NO.	SAMPLE DEPTH (ft)	% PASSING #200 SIEVE	LIQUID LIMIT %	PLASTICITY INDEX %	WATER CONTENT %	DRY DENS. (pcf)	BLOWS/ft	GRAPHIC LOG	USCS	DESCRIPTION
											CL	SANDY LEAN CLAY: Sand is fine to medium grained, slightly moist, brown, hard, light to moderate cementation
5	U	1.0	5.0	68	38	17	7.8	90.9	22 40			
10	SPT	2.0	10.0						50/4"		GW	Rock/Sand mixture, low return due to high amount of rock, up to 3" diameter. (cuttings)
15	SPT	3.0	15.0						31 48 50/5"		CL	SANDY LEAN CLAY WITH GRAVEL: Sand is fine to medium grained, gravel is fine, dry, light brown, hard. No signs of cementation
20	SPT	4.0	20.0						49 50/3"		ML	SILT WITH SAND: Sand is fine to medium grained, dry, light brown, hard
25	U	5.0	25.0						30 40		SW SM	WELL GRADED SAND WITH SILT AND GRAVEL: Sand is fine to coarse, gravel is fine to coarse, dry, light brown, very dense, material ranging from clayey sands/gravels to predominantly sandy silt in layers approximately 2" thick
30	SPT	6.0	30.0						50/4"		GW	WELL GRADED GRAVEL: Gravel is fine to coarse, sand is fine to coarse, dry, grey/light brown, very dense, many larger rocks broken driving sampler, possible cobble content up to 4" diameter
											CL	SANDY LEAN CLAY: Sand is fine to coarse though primarily fine to medium, dry, light brown, hard, some light cementation
35	SPT	7.0	35.0	77	38	18	3.3		50/3"			
												Boring terminated at 35.5' below ground surface.

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DAMES & MOORE

BORING LOG

LOCATION OF BORING:	JOB NO.	CLIENT	LOCATION
WHITE TANKS DAM	15448-005-022	MARICOPA COUNTY FLOOD CONTROL DISTRICT	WHITE TANKS

DRILLING METHOD:	INTERVAL:	DRILLER:	BORING NO.
MOBILE B-57 WITH 6-INCH HOLLOW STEM AUGER	0'-36.5'	ATL, INC.	DMB-19
			SHEET 1 OF 1

SAMPLING METHOD:	INTERVAL:
STANDARD PENETRATION TEST WITH SPLIT SPOON (SPT) AND DAMES & MOORE TYPE (U) WITH BRASS SLEEVES AND RINGS	5-FOOT INTERVALS

			DRILLING START	DRILLING FINISH
LOGGED BY: PLG	WATER LEVEL	NA	TIME 0907	TIME 1050
CHECKED BY: PLG	TIME			
	DATE		DATE 10/30/98	DATE 10/30/98
DATUM: ELEVATION: feet	CASING DEPTH			

SURFACE CONDITIONS: GRADED ROADWAY SURFACE AT UPSTREAM TOE OF DAM

DEPTH IN FEET	SAMPLER TYPE	SAMPLE NO.	SAMPLE DEPTH (ft)	% PASSING #200 SIEVE	LIQUID LIMIT %	PLASTICITY INDEX %	WATER CONTENT %	DRY DENS. (pcf)	BLOWS/ft	GRAPHIC LOG	USCS	DESCRIPTION
											ML	SANDY SILT WITH GRAVEL: Sand is fine to coarse, gravel is coarse to fine and sub-rounded to sub-angular, dry, brown, hard Cobbles up to 4" diameter
5	U	1.0	5.0	45	26	5	4.5	96.6	16 16		SC SM	SILTY, CLAYEY SAND: Sand is fine to coarse, few fine gravels, dry to slightly moist, brown, dense
10	SPT	2.0	10.0				5.0		26 30 25			Same as above, becomes very dense
15	U	3.0	15.0				2.8		25 35			Same as above, becomes dry
20	SPT	4.0	20.0						39 50/4"		SM	SILTY SAND WITH GRAVEL: Sand is fine to coarse, gravel is predominantly fine with few coarse grained gravels, dry, light brown, very dense, moderately well cemented
25	SPT	5.0	25.0	12		NP	8.9		13 22 24		SW SM	WELL GRADED SAND WITH SILT AND GRAVEL: Sand is fine to coarse, gravel is fine to coarse, components are angular to sub-angular, slightly moist, grey/light brown, dense, moderate cementation
30	U	6.0	30.0						46 50/3"		ML	SILT WITH SAND: Sand is primarily fine to medium grained, few fine gravels, dry to slight moist, brown, hard
35	SPT	7.0	35.0						19 20 16		SM	SILTY SAND WITH GRAVEL: Sand is fine to coarse, gravel is fine, dry, light brown/grey, dense, light cementation Boring terminated at 36.5' below ground surface.

BLGV022 1/22/99

DAMES & MOORE

BORING LOG

LOCATION OF BORING:	JOB NO.	CLIENT MARICOPA COUNTY FLOOD CONTROL DISTRICT	LOCATION WHITE TANKS
WHITE TANKS DAM	15448-005-022		

DRILLING METHOD:	INTERVAL:	DRILLER:	BORING NO.
MOBILE B-57 WITH 6-INCH HOLLOW STEM AUGER	0'-8'	ATL, INC.	DMB-20
			SHEET 1 OF 1

SAMPLING METHOD:	INTERVAL:
STANDARD PENETRATION TEST WITH SPLIT SPOON (SPT) AND DAMES & MOORE TYPE (U) WITH BRASS SLEEVES AND RINGS	5-FOOT INTERVALS

			DRILLING START	DRILLING FINISH
LOGGED BY: PLG	WATER LEVEL	NA	TIME 0900	TIME 0935
CHECKED BY: PLG	TIME			
	DATE		DATE 11/2/98	DATE 11/2/98
DATUM: ELEVATION: feet	CASING DEPTH			

SURFACE CONDITIONS: SPARSE DESERT VEGETATION

DEPTH IN FEET	SAMPLER TYPE	SAMPLE NO.	SAMPLE DEPTH (ft)	% PASSING #200 SIEVE	LIQUID LIMIT %	PLASTICITY INDEX %	WATER CONTENT %	DRY DENS. (pcf)	BLOWS/ft	GRAPHIC LOG	USCS	DESCRIPTION
											SM	SILTY SAND WITH GRAVEL: Sand is fine to coarse grained, gravel is fine to coarse grained, all components are angular to sub-angular, dry, light brown, medium dense
5	U	1.0	5.0	43		NP	1.9		23 24			SILTY SAND: Sand is fine to coarse, dry, light brown, dense, some light cementation
												Cobble/gravel mixture, signs of increased cementation (moderately well)
												Auger refusal at 8' below ground surface.
10												
15												
20												
25												
30												
35												

BLGVO22 1/22/99

DAMES & MOORE

BORING LOG

LOCATION OF BORING:	JOB NO.	CLIENT	LOCATION
WHITE TANKS DAM	15448-005-022	MARICOPA COUNTY FLOOD CONTROL DISTRICT	WHITE TANKS

DRILLING METHOD:	INTERVAL:	DRILLER:	BORING NO.
MOBILE B-57 WITH 6-INCH HOLLOW STEM AUGER	0'-20.5'	ATL, INC.	DMB-21
			SHEET 1 OF 1

SAMPLING METHOD:	INTERVAL:
STANDARD PENETRATION TEST WITH SPLIT SPOON (SPT) AND DAMES & MOORE TYPE (U) WITH BRASS SLEEVES AND RINGS	5-FOOT INTERVALS

			DRILLING START	DRILLING FINISH
LOGGED BY: PLG	WATER LEVEL	NA	TIME 1105	TIME 1207
CHECKED BY: PLG	TIME			
	DATE		DATE 11/2/98	DATE 11/2/98
DATUM: ELEVATION: feet	CASING DEPTH			

SURFACE CONDITIONS: SPARSE DESERT VEGETATION

DEPTH IN FEET	SAMPLER TYPE	SAMPLE NO.	SAMPLE DEPTH (ft)	% PASSING #200 SIEVE	LIQUID LIMIT %	PLASTICITY INDEX %	WATER CONTENT %	DRY DENS. (pcf)	BLOWS/ft	USCS	DESCRIPTION
										GW GM	WELL GRADED GRAVEL WITH SILT AND SAND: Sand is fine to coarse, gravel is fine to coarse. Cobbles up to 6" diameter, dry, light brown, dense
										SM	SILTY SAND WITH GRAVEL: Sand is fine to coarse, gravel is fine, dry, light brown, very dense, moderate cementation
5	SPT	1.0	5.0						48 50/3"		Gravel/cobbles up to 3" diameter
10	SPT	-	10.0						50/3"	SW	WELL GRADED SAND WITH GRAVEL: Sand is fine to coarse, gravel is fine to coarse, dry, light brown, very dense
15	SPT	2.0	15.0	62		NP	1.5		50 50/4"	ML	SANDY SILT: Sand is fine to coarse, less than 8% fine and sub-angular gravels, dry, light brown, very dense
20										GW	Cobbles up to 6-7" diameter, no recovery GRAVEL COBBLES
											Auger refusal at 20.5' below ground surface.
25											
30											
35											

BLGV022 1/22/99

DAMES & MOORE

BORING LOG

LOCATION OF BORING:	JOB NO.	CLIENT MARICOPA COUNTY FLOOD CONTROL DISTRICT	LOCATION WHITE TANKS
WHITE TANKS DAM	15448-005-022		

DRILLING METHOD:	INTERVAL:	DRILLER:	BORING NO.
MOBILE B-57 WITH 6-INCH HOLLOW STEM AUGER	0'-24'	ATL, INC.	DMB-22
			SHEET 1 OF 1

SAMPLING METHOD:	INTERVAL:
STANDARD PENETRATION TEST WITH SPLIT SPOON (SPT) AND DAMES & MOORE TYPE (U) WITH BRASS SLEEVES AND RINGS	5-FOOT INTERVALS

LOGGED BY: PLG	WATER LEVEL	NA		DRILLING START	DRILLING FINISH
CHECKED BY: PLG	TIME			TIME 0945	TIME 1042
	DATE			DATE 11/2/98	DATE 11/2/98
DATUM: ELEVATION: feet	CASING DEPTH				

SURFACE CONDITIONS: SPARSE DESERT VEGETATION

DEPTH IN FEET	SAMPLER TYPE	SAMPLE NO.	SAMPLE DEPTH (ft)	% PASSING #200 SIEVE	LIQUID LIMIT %	PLASTICITY INDEX %	WATER CONTENT %	DRY DENS. (pcf)	BLOWS/ft	GRAPHIC LOG	USCS	DESCRIPTION
											CL	SANDY LEAN CLAY WITH GRAVEL: Sand is predominantly fine to medium grained, though some is coarse, gravel is fine to coarse, dry, brown, hard
5	SPT	1.0	5.0	77	45	20			40 50/3"			SANDY LEAN CLAY: Sand is fine to coarse, few fine to coarse grained gravels, dry, brown, hard
10	U	2.0	10.0						45 50/3"		SM	SILTY SAND WITH GRAVEL: Sand is fine to medium with some coarse fraction, gravel is fine grained, dry, light brown, very dense, moderate cementation
15	SPT	3.0	15.0						43 48 50/2"			Same as above
20												(No recovery)
											GW	COBBLES/GRAVEL: Estimated cobbles <5" diameter
25												Auger refusal at 24' below ground surface.
30												
35												

BLGV022 1/22/99

DAMES & MOORE

TEST PIT LOG

Location:	White Tanks FRS #3	Job No.	15448-005-022	Client	FCDMC	Test Pit No.
Logged By:	PLG	Checked By:	PLG			DMP-5

DEPTH (feet)	SAMPLE No./Type	USCS SYMBOL	GENERAL DESCRIPTION
0 0.5 1 1.5 2	A/Bulk & 1/Bag	ML	**SANDY SILT:** Sand is primarily fine to medium grained, dry, brown, hard. Soil is compacted to approximately 6 inches below surface
2.5 3 3.5	2/Bag	SM	**SILTY SAND:** Sand is fine to coarse, dry, brown, dense. Contains 1-inch (approx.) thick lenses of relatively clean sands
4 4.5 5 5.5	3/Bag	ML	**SANDY SILT:** Sand is primarily fine to coarse grained, dry, brown, hard. Light to Moderate cementation
6 6.5 7 7.5	4/Bag	SM	SILTY SAND WITH GRAVEL: Sand is fine to coarse, gravel is fine to coarse, sub-rounded to sub-angular, few cobbles up to 6-inches in diameter, dry, brown Same as above, decrease in gravel content.
8 8.5 9	5/Bag		Excavation terminated at 9.0 feet.

TEST PIT LOG

Location:	White Tanks FRS #3	Job No.	15448-005-022	Client	FCDMC	Test Pit No.
Logged By:	PLG	Checked By:	PLG			DMP-6

DEPTH (feet)	SAMPLE No./Type	USCS SYMBOL	GENERAL DESCRIPTION
0 0.5 1 1.5 2	1/Bag	ML	**SILT WITH SAND:** Sand is fine grained, dry to slightly moist, brown, firm.
2.5 3 3.5 4	A/Bulk & 2/Bag	SM	**SILTY SAND with GRAVEL:** Sand is fine to coarse, gravel is fine to coarse, sub-angular to sub-rounded, slightly moist, brown, dense. Very few cobbles upto 4 inches
4.5 5 5.5 6	B/Bulk	CL	**LEAN CLAY:** Moist, dark brown, firm, moderately plastic. Less than 3% sand/gravel. Some thin (1-inch approx.) layers of highly plastic clay.
6.5 7 7.5 8 8.5 9 9.5 10	3/Bag		Excavation terminated to 10.0 feet.

TEST PIT LOG

Location:	White Tanks FRS #3	Job No.	15448-005-022	Client	FCDMC	Test Pit No.
Logged By:	PLG	Checked By:	PLG			DMP-7

DEPTH (feet)	SAMPLE No./Type	USCS SYMBOL	GENERAL DESCRIPTION
0 0.5 1 1.5 2	A/Bulk & 1/Bag	SW-SM	**WELL GRADED SAND WITH SILT, GRAVEL, AND COBBLES:** Sand is fine to coarse, gravel is fine to coarse, few cobbles up to 7 inches, dry, light brown, medium dense.
2.5 3 3.5 4 4.5 5 5.5 6	2/Bag	SW-SM	**WELL GRADED SAND WITH GRAVEL:** Sand is primarily medium to coarse with a smaller portion of fine sand. Gravel is fine to coarse, all components are angular to sub-angular, dry, light brown, loose, clean of fines. Same as above. Gravel is fine, dense, some light cementation.
6.5 7 7.5 8 8.5	3/Bag		Excavation terminated at 8.5 feet.

TEST PIT LOG

Location:	White Tanks FRS #3	Job No.	15448-005-022	Client	FCDMC	Test Pit No.
Logged By:	PLG	Checked By:	PLG			DMP-8

DEPTH (feet)	SAMPLE No./Type	USCS SYMBOL	GENERAL DESCRIPTION
0 0.5 1 1.5 2 2.5	1/Bag	SM	**SILTY SAND WITH GRAVEL AND COBBLES:** Sand is fine to coarse. Cobbles are less than 4 inches. Gravel and cobbles are sub-angular, dry, light brown, medium dense.
3 3.5 4	2/Bag	SP	**POORLY GRADED SAND WITH GRAVEL AND COBBLES:** Sand is medium to coarse grained, cobbles up to 10 inches and sub-angular, dry, light brown, loose
4.5 5 5.5 6 6.5	3/Bag	ML	**SANDY SILT:** Sand is primarily fine to medium grained, dry to slightly moist, brown to light brown, hard
7 7.5	4/Bag		Same as above. Some fine gravels, becomes slightly moist Excavation terminated at 7.5 feet

TEST PIT LOG

Location:	White Tanks FRS #3	Job No.	15448-005-022	Client	FCDMC	Test Pit No.
Logged By:	PLG	Checked By:	PLG			DMP-13

DEPTH (feet)	SAMPLE No./Type	USCS SYMBOL	GENERAL DESCRIPTION
0 0.5 1	1/Bag	SM	**SILTY SAND WITH GRAVEL:** Sand is fine to coarse, gravel is fine to coarse, dry, light brown, dense.
1.5 2 2.5	2/Bag	SP	**POORLY GRADED SAND:** Sand is primarily medium grained with small fraction of coarse grained. Gravel (10-15%) is fine to coarse, dry, slightly moist, light brown, loose
3 3.5 4 4.5	A/Bulk & 3/Bag	SM	**SILTY SAND WITH GRAVEL:** Sand is fine to coarse, gravel is fine to coarse, dry to slightly moist, light brown, dense.
5 5.5		GP	**POORLY GRADED GRAVEL:** Gravel is primarily coarse grained with a small medium to coarse grained sand fraction, light brown, dense. Cobbles up to 10 inches in diameter
6 6.5 7 7.5	4/Bag	SM	**SILTY SAND WITH GRAVEL:** Sand is fine to coarse, slightly moist, brown, very dense. Excavation terminated at 7.5 feet

TEST PIT LOG

Location:	White Tanks FRS #3	Job No.	15448-005-022	Client	FCDMC	Test Pit No.
Logged By:	PLG	Checked By:	PLG			DMP-14

DEPTH (feet)	SAMPLE No./Type	USCS SYMBOL	GENERAL DESCRIPTION
0 0.5 1 1.5 2 2.5 3 3.5	1/Bag A/Bulk & 2/Bag	ML	**SANDY SILT WITH GRAVEL:** Sand is predominantly fine with lesser amounts of medium to coarse sand. Gravel is fine with a small coarse fraction, dry, light brown, firm.
4 4.5 5 5.5	3/Bag	ML	**WELL GRADED GRAVEL WITH SAND:** Sand is primarily medium to coarse grained, gravel is fine to coarse, cobbles up to 7 inches in diameter, dry, light brown, dense.
6 6.5 7		SM	**SILTY SAND WITH GRAVEL:** Sand is medium to coarse grained, gravel is fine, dry, light brown, dense.
7.5 8	4/Bag	SP	**POORLY GRADED SAND WITH GRAVEL:** Sand is fine to coarse though predominantly medium to coarse grained, gravel is fine with a small coarse fraction, very small fines fraction, dry, light brown, loose to medium dense.

TEST PIT LOG

Location:	White Tanks FRS #3	Job No.	15448-005-022	Client	FCDMC	Test Pit No.
Logged By:	PLG	Checked By:	PLG			DMP-17

DEPTH (feet)	SAMPLE No./Type	USCS SYMBOL	GENERAL DESCRIPTION
0 0.5 1 1.5	A/Bulk & 1/Bag	SM	**SILTY SAND WTH GRAVEL:** Sand is predominantly fine to medium grained, gravel is fine to coarse, dry, light brown, medium dense. Same as above. Decreased gravel, increased fines.
2 2.5 3 3.5	2/Bag		Same as above. Increased gravel, sand is fine to coarse.
4 4.5 5	3/Bag		
5.5 6 6.5	4/Bag	SM	**WELL GRADED SAND WITH SILT AND GRAVEL:** Fine to coarse with some gravel (less than 5%) up to 3 inches, light brown, medium dense. Same as above. Decreased gravel.
7 7.5 8 8.5	5/Bag		Excavation terminated at 8.5 feet.

TEST PIT LOG

Location:	White Tanks FRS #3	Job No.	15448-005-022	Client	FCDMC	Test Pit No.
Logged By:	PLG	Checked By:	PLG			DMP-19

DEPTH (feet)	SAMPLE No./Type	USCS SYMBOL	GENERAL DESCRIPTION
0 0.5 1 1.5 2	1/Bag	SM	**SILTY SAND WITH GRAVEL:** Sand is primarily fine to medium grained, gravel is fine, dry, light brown, medium dense
2.5 3 3.5	A/Bulk & 2/Bag		Same as above. Sand is fine to coarse grained, gravel is fine to coarse, few cobbles to 7 inches.
4 4.5 5	3/Bag	SP	**POORLY GRADED WITH GRAVEL:** Sand is primarily medium to coarse grained, gravel is fine to coarse, dry, light brown, loose
5.5 6 6.5 7 7.5 8		SM	**SILTY SAND WITH GRAVEL:** Sand is fine to coarse, gravel is fine to coarse, few cobbles up to 8 inches in diameter, light brown, dense. Excavation terminated at 8.0 feet.

Moisture Contents and Density Determinations

Project: White Tanks FRS #3 Design

Client: Flood Control District of Maricopa County

Job No: 15448-005-022

Page no. 1 of 3

Boring	DMB-3	DMB-9	DMB-16	DMB-5	DMB-10	DMB-17	DMB-2	DMB-10	DMB-15	DMB-8	DMB-19	DMB-17	DMB-19
Sample No.	1	5	4	1	1	5	2	3	11	4	2	6	5
Sample Depth	5'	30'	25'	5'	5'	30'	10'	20'	5'	20'	10'	35'	25'
Date Sampled/By	11/3/1998	11/4/1998	10/29/1998	11/3/1998	10/27/1998	10/29/1998	10/28/1998	10/28/1998	10/28/1998	11/4/1998	10/30/1998	10/29/1998	10/29/1998
Date Tested/By	12/7/1998	12/7/1998	12/7/1998	12/7/1998	12/7/1998	12/7/1998	12/7/1998	12/7/1998	12/7/1998	12/7/1998	12/7/1998	12/7/1998	12/7/1998
	CAK	CAK	CAK	CAK	CAK	CAK	CAK	CAK	CAK	CAK	CAK	CAK	CAK
Soil Type													
Lab Id													
DENSITY													
No. of Rings													
Wt of Wet Soil & Rings(gms)													
Wt of Rings(gms)													
Wt of Wet Soil(gms)													
Wet Density(PCF)													
Dry Density(PCF)													
Dia. of Ring(in)													
Ht of Ring(in)													
Depth to Top of Soil(in)													
Ht of Soil(in)													
Volume of Ring(cf)													
MOISTURE CONTENT													
Dish	5	14	125	12B	29	30	32	7	20	13	6	15	27
Wt of Wet Soil & Tare(gms)	62.03	70.59	50.05	66.78	67	65.23	62.3	69.84	65.58	62.58	63.24	58.06	74.29
Wt of Dry Soil & Tare(gms)	59.28	70.11	48.05	64.36	65.77	63.37	60.66	66.91	63.29	60.62	60.89	55.53	73.04
Wt of Moisture(gms)	2.75	0.48	2	2.42	1.23	1.86	1.64	2.93	2.29	1.96	2.35	2.53	5.22
Wt of Tare(gms)	13.89	14.13	16.57	13.48	16.16	13.93	14.14	14.06	13.94	14.42	14.19	14.52	14.21
Wt of Dry Soil(gms)	45.39	55.98	31.48	50.88	49.61	49.44	46.52	52.85	49.35	46.2	46.7	41.01	58.83
Moisture Content(%)	6.1	0.9	6.4	4.8	2.5	3.8	3.5	5.5	4.6	4.2	5	6.2	8.9

Moisture Contents and Density Determinations

Project: White Tanks FRS #3 Design

Job No: 15448-005-022

Client: Flood Control District of Maricopa County

Page no. 2 of 3

Boring	DMB-9	DMB-4	DMB-4	DMB-16	DMB-16	DMB-11	DMB-19	DMB-9	DMB-5	DMB-17	DMB-4	DMB-17	DMB-17
Sample No.	2	2	4	6	3	1	3	4	2	2	6	4	1
Sample Depth	10'	10'	20'	35'	15'	5'	15'	20'	10'	10'	35'	20'	5'
Date Sampled/By	11/4/1998	11/3/1998	11/3/1998	10/29/1998	10/29/1998	10/28/1998	10/30/1998	11/4/1998	11/3/1998	10/29/1998	11/3/1998	10/29/1998	10/29/1998
Date Tested/By	12/7/1998	12/7/1998	12/7/1998	12/7/1998	12/7/1998	12/7/1998	12/7/1998	12/7/1998	12/7/1998	12/7/1998	12/7/1998	12/7/1998	12/7/1998
	CAK	CAK	CAK	CAK	CAK	CAK	CAK	CAK	CAK	CAK	CAK	CAK	CAK
Soil Type													
Lab Id													
DENSITY													
No. of Rings													
t of Wet Soil & Rings(gms)													
Wt of Rings(gms)													
Wt of Wet Soil(gms)													
Wet Density(PCF)													
Dry Density(PCF)													
Dia. of Ring(in)													
Ht of Ring(in)													
Depth to Top of Soil(in)													
Ht of Soil(in)													
Volume of Ring(cf)													
MOISTURE CONTENT													
Dish	24	17	26A	3	18	80	26B	23	11	9	16	34	48
Wt of Wet Soil & Tare(gms)	56.03	74.86	66.15	57.78	65.16	68.63	71.52	63.45	77.58	78.73	82.68	130.74	97.98
Wt of Dry Soil & Tare(gms)	53.63	72.54	64.61	54.06	62.58	66.11	69.96	60.76	75.71	76.39	81.69	128.71	96.74
Wt of Moisture(gms)	2.4	2.32	1.54	3.72	2.58	2.52	1.56	2.69	1.87	2.34	0.99	2.03	5.22
Wt of Tare(gms)	13.92	14.33	14.15	14.14	14.26	14.27	13.89	14.15	16.57	14.07	14.01	52.18	49
Wt of Dry Soil(gms)	39.71	58.21	50.46	39.92	48.32	51.84	56.07	46.61	59.14	62.32	67.68	76.53	47.74
Moisture Content(%)	6	4	3.1	9.3	5.3	4.9	2.8	5.8	3.2	3.8	1.5	2.7	10.9

Moisture Contents and Density Determinations

Project: White Tanks FRS #3 Design

Job No: 15448-005-022

Client: Flood Control District of Maricopa County

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Boring	DMB-6	DMB-8	DMB-8	DMB-6	DMB-7	DMB-3	DMB-3	DMB-9	DMB-6	DMB-4	DMB-5	DMB-7
Sample No.	3	1	5	7	1	5	3	6	4	1	4	2
Sample Depth	15'	5'	25'	35'	5'	25'	15'	35'	20'	5'	25'	10'
Date Sampled/By	11/5/1998	11/4/1998	11/4/1998	11/5/1998	11/5/1998	11/3/1998	11/3/1998	11/4/1998	11/5/1998	11/3/1998	11/3/1998	11/5/1998
Date Tested/By	12/7/1998	12/7/1998	12/7/1998	12/7/1998	12/7/1998	12/7/1998	12/7/1998	12/7/1998	12/7/1998	12/7/1998	12/7/1998	12/8/1998
	CAK	CAK	CAK	CAK	CAK	CAK	CAK	CAK	CAK	CAK	CAK	CAK
Soil Type												
Lab Id												
DENSITY									1	1	1	1
No. of Rings									989.6	978.6	797.6	1178.5
Wt of Wet Soil & Rings(gms)									205.2	198.8	205.3	205.5
Wt of Rings(gms)									784.4	779.8	592.3	973
Wt of Wet Soil(gms)									107.2	106.7	82	132.7
Wet Density(PCF)									100.9	102	78.5	121.4
Dry Density(PCF)												
									2.44	2.44	2.44	2.44
Dia. of Ring(in)									6	6	6	6
Ht of Ring(in)									0.0390633	0.04687	0.11719	0.02943
Depth to Top of Soil(in)									5.9609367	5.95313	5.88281	5.97057
Ht of Soil(in)									0.01613	0.01611	0.01592	0.01616
Volume of Ring(cf)												
MOISTURE CONTENT												
Dish	33	22	11	40	15	36M	57	50	153	62	60	12B
Wt of Wet Soil & Tare(gms)	95.8	109.25	96.99	105.84	111.3	106.82	121.21	107.72	163.53	109.91	114.43	50.3
Wt of Dry Soil & Tare(gms)	93.93	106.48	94.39	104.94	107.58	104.2	118.53	106.69	157.65	107.73	112.61	47.18
Wt of Moisture(gms)	1.87	2.77	2.6	0.9	3.72	2.62	2.68	1.03	5.88	2.18	1.82	3.12
Wt of Tare(gms)	52.62	53.01	52.72	51.04	53.41	50.56	63.42	62.08	63.28	60.36	70.79	13.49
Wt of Dry Soil(gms)	41.31	53.47	41.67	53.9	54.17	53.64	55.11	44.61	94.37	47.37	41.82	33.69
Moisture Content(%)	4.5	5.2	6.2	1.7	6.9	4.9	4.9	2.3	6.2	4.6	4.4	9.3

PARTICLE SIZE ANALYSIS

DAMES & MOORE GROUP

Project: White Tanks FRS #3 Project No.: 15448-005-022 Date: December 21, 1998

Client: Maricopa County Flood Control District

Stockpile/Windrow Sample

Location:

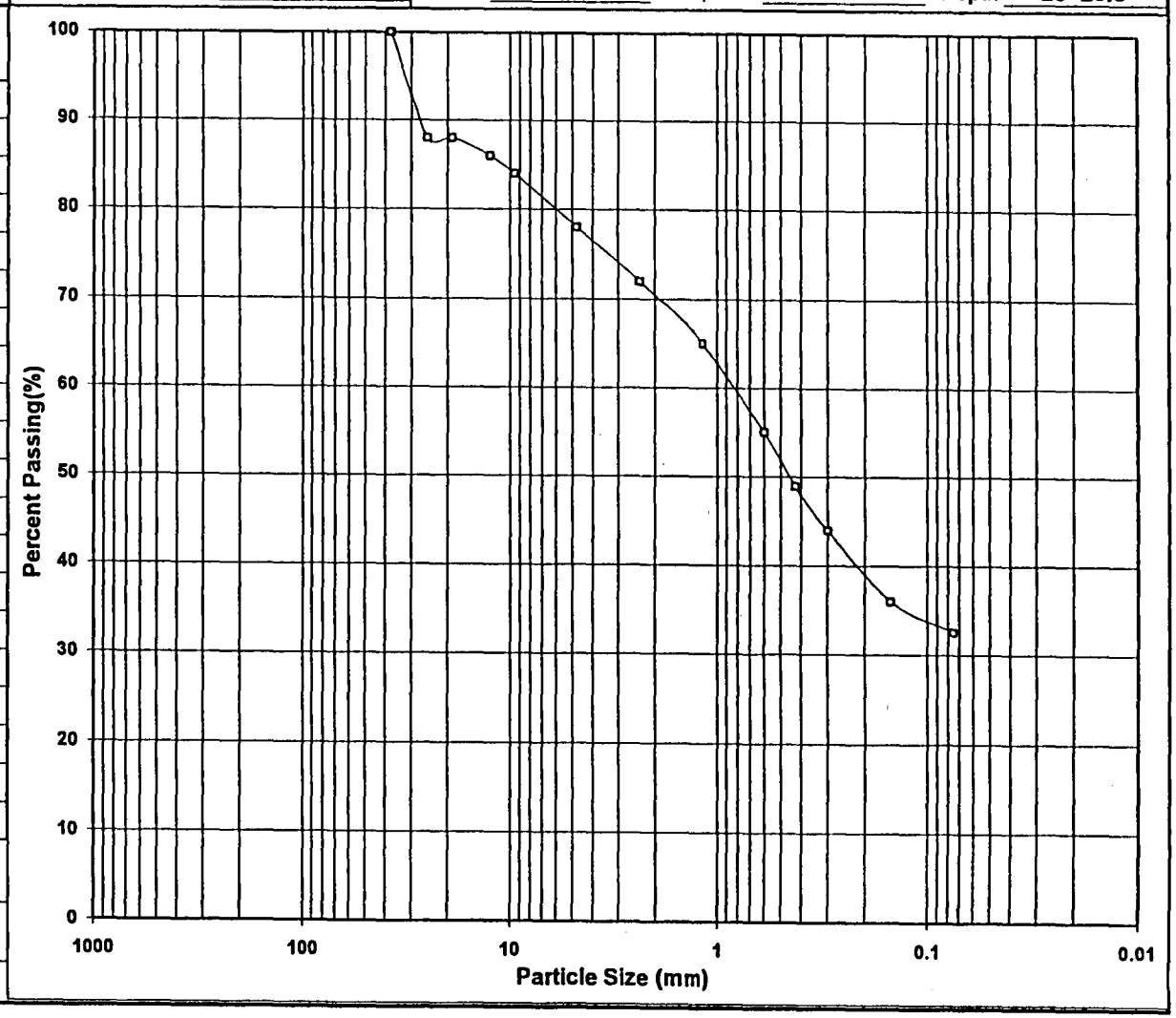
Drilled Sample:

Boring DMB-2 Sample # 5 Depth 25'-26.5'

Sieve US Std	Sieve Metric(mm)	Percent Passing	Specification
3"	75.0		
2.5"	62.5		
2"	50.0		
1.5"	37.5	100	
1.25"	31.3		
1"	25.0	88	
3/4"	19.0	88	
1/2"	12.5	86	
3/8"	9.5	84	
#4	4.75	78	
#8	2.36	72	
#10	2.0		
#16	1.18	65	
#30	0.6	55	
#40	0.43	49	
#50	0.3	44	
#100	0.15	36	
#200	0.075	32.6	

Plasticity Index NONPLASTIC

USCS Classification: SM



PARTICLE SIZE ANALYSIS

DAMES DCM MOORE GROUP

Project: White Tanks FRS #3 Project No.: 15448-005-022 Date: December 21, 1998

Client: Maricopa County Flood Control District

Stockpile/Windrow Sample

Location:

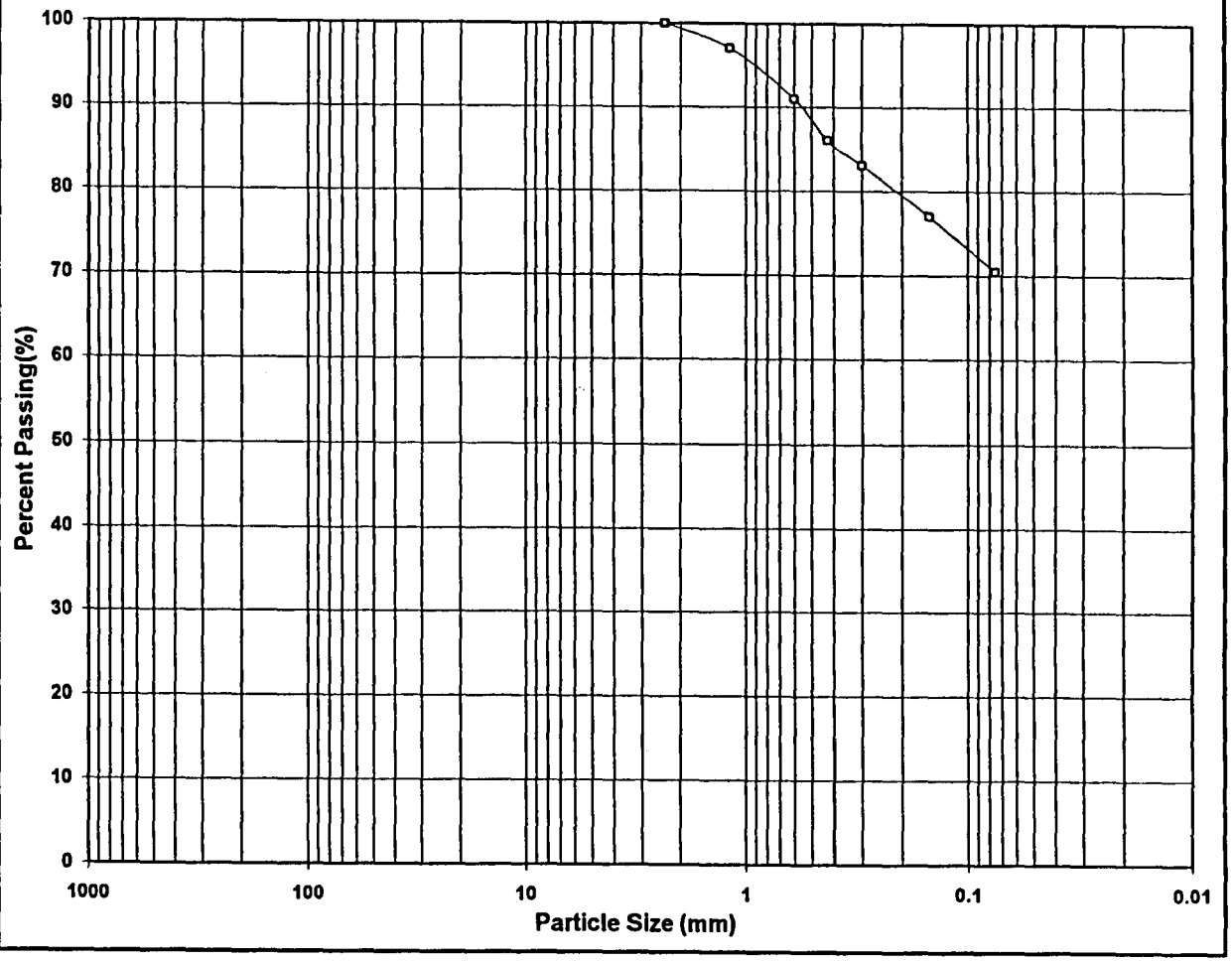
Drilled Sample:

Boring DMB-3 Sample # 5 Depth 25'-26'

Sieve US Std	Sieve Metric(mm)	Percent Passing	Specification
3"	75.0		
2.5"	62.5		
2"	50.0		
1.5"	37.5		
1.25"	31.3		
1"	25.0		
3/4"	19.0		
1/2"	12.5		
3/8"	9.5		
#4	4.75		
#8	2.36	100	
#10	2.0		
#16	1.18	97	
#30	0.6	91	
#40	0.43	86	
#50	0.3	83	
#100	0.15	77	
#200	0.075	70.5	

Plasticity Index 12

USCS Classification: CL



PARTICLE SIZE ANALYSIS

DAMES MOORE GROUP

Project: White Tanks FRS #3 Project No.: 15448-005-022 Date: December 21, 1998

Client: Maricopa County Flood Control District

Stockpile/Windrow Sample

Location:

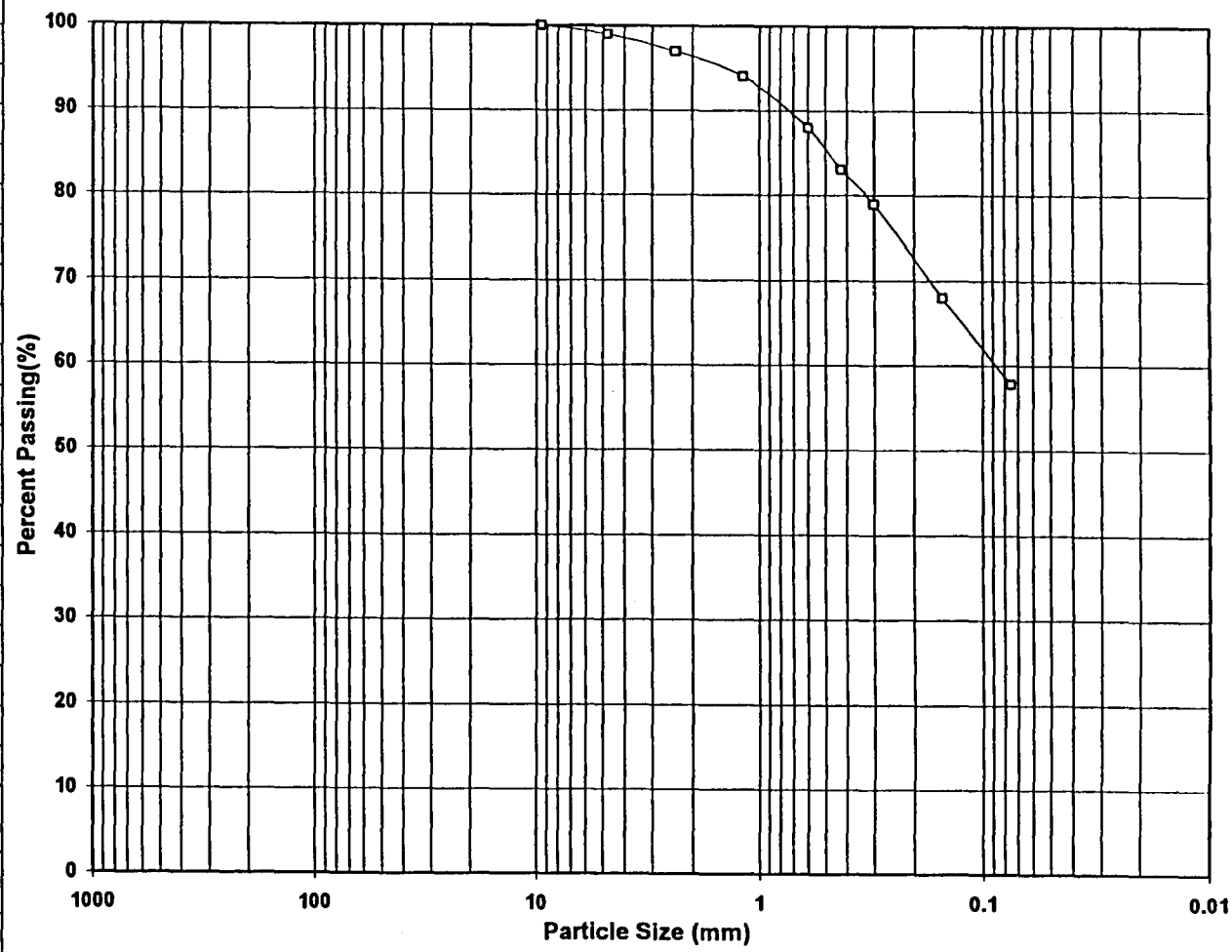
Drilled Sample:

Boring DMB-4 Sample # 1 Depth 5'-5.5'

Sieve US Std	Sieve Metric(mm)	Percent Passing	Specification
3"	75.0		
2.5"	62.5		
2"	50.0		
1.5"	37.5		
1.25"	31.3		
1"	25.0		
3/4"	19.0		
1/2"	12.5		
3/8"	9.5	100	
#4	4.75	99	
#8	2.36	97	
#10	2.0		
#16	1.18	94	
#30	0.6	88	
#40	0.43	83	
#50	0.3	79	
#100	0.15	68	
#200	0.075	57.8	

Plasticity Index 7

USCS Classification: CL-ML



PARTICLE SIZE ANALYSIS

DAMES & MOORE GROUP

Project: White Tanks FRS #3 Project No.: 15448-005-022 Date: December 21, 1998

Client: Maricopa County Flood Control District

Stockpile/Windrow Sample

Location:

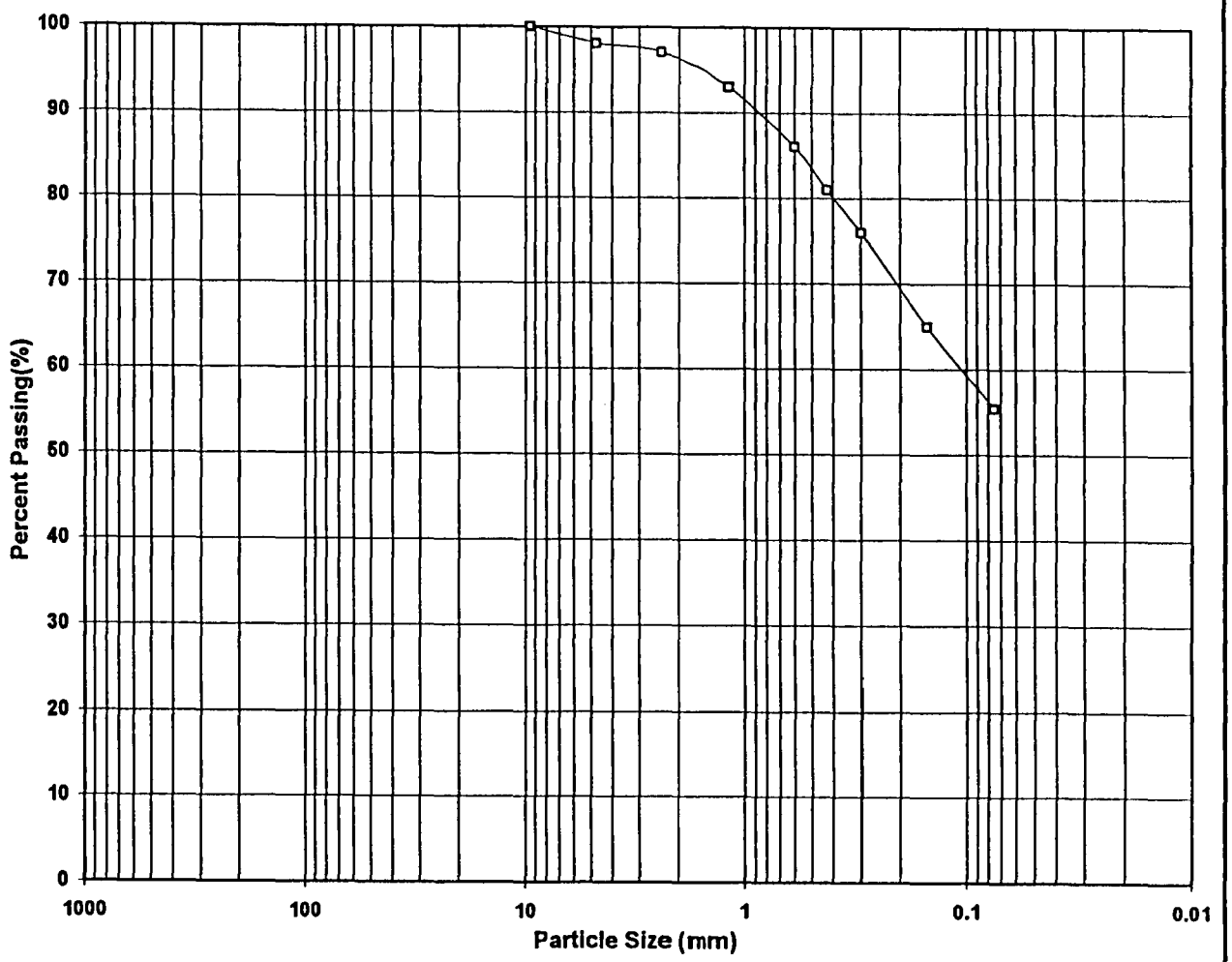
Drilled Sample:

Boring DMB-4 Sample # 4 Depth 20'

Sieve US Std	Sieve Metric(mm)	Percent Passing	Specification
3"	75.0		
2.5"	62.5		
2"	50.0		
1.5"	37.5		
1.25"	31.3		
1"	25.0		
3/4"	19.0		
1/2"	12.5		
3/8"	9.5	100	
#4	4.75	98	
#8	2.36	97	
#10	2.0		
#16	1.18	93	
#30	0.6	86	
#40	0.43	81	
#50	0.3	76	
#100	0.15	65	
#200	0.075	55.4	

Plasticity Index 8

USCS Classification: CL



PARTICLE SIZE ANALYSIS

DAMES & MOORE GROUP

Project: White Tanks FRS #3 Project No.: 15448-005-022 Date: December 21, 1998

Client: Maricopa County Flood Control District

Stockpile/Windrow Sample

Location:

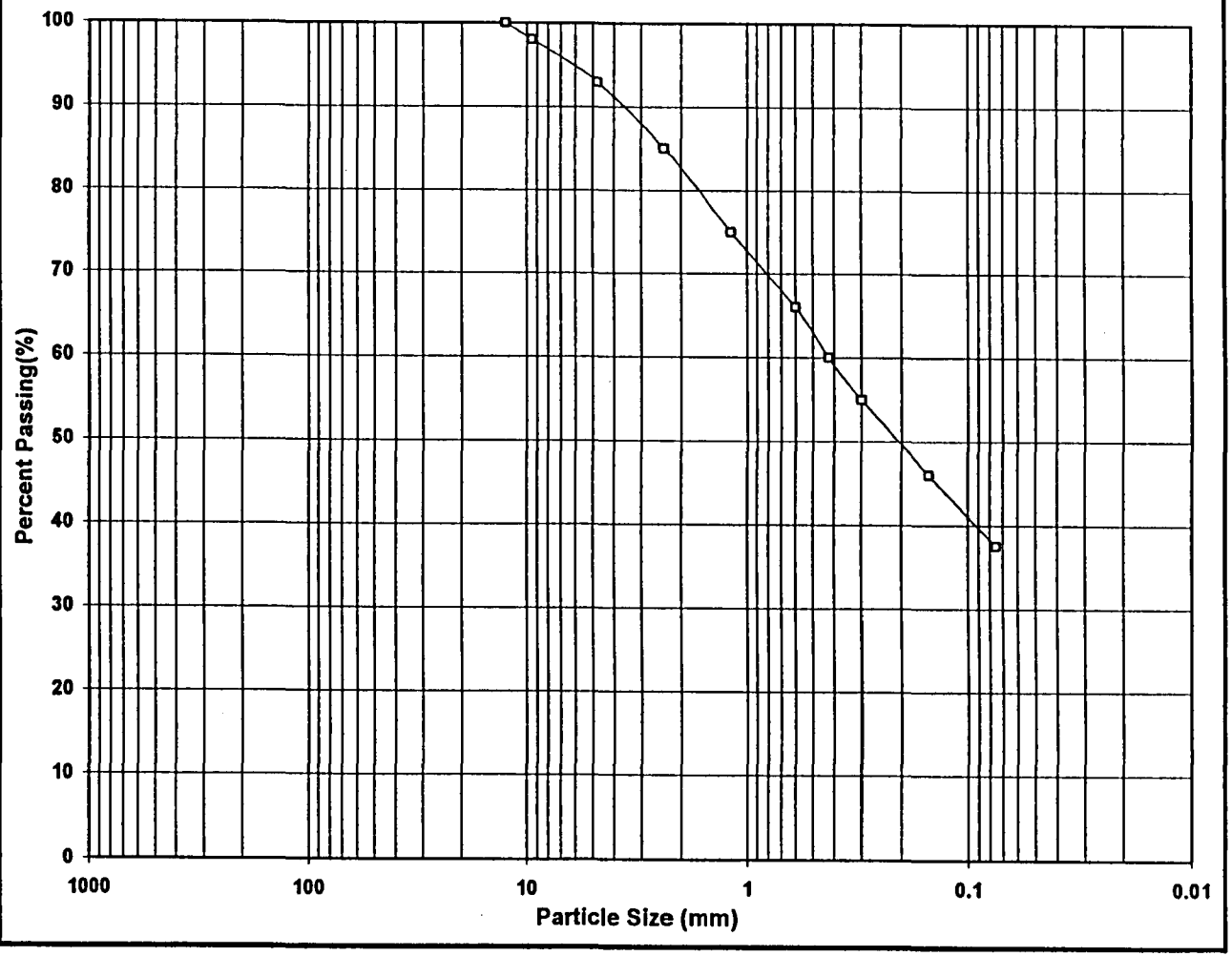
Drilled Sample:

Boring DMB-5 Sample # 1 Depth 5'-6'

Sieve US Std	Sieve Metric(mm)	Percent Passing	Specification
3"	75.0		
2.5"	62.5		
2"	50.0		
1.5"	37.5		
1.25"	31.3		
1"	25.0		
3/4"	19.0		
1/2"	12.5	100	
3/8"	9.5	98	
#4	4.75	93	
#8	2.36	85	
#10	2.0		
#16	1.18	75	
#30	0.6	66	
#40	0.43	60	
#50	0.3	55	
#100	0.15	46	
#200	0.075	37.5	

Plasticity Index 7

USCS Classification: SC-SM



PARTICLE SIZE ANALYSIS

DAMES DCM MOORE GROUP

Project: White Tanks FRS #3 Project No.: 15448-005-022 Date: December 21, 1998

Client: Maricopa County Flood Control District

Stockpile/Windrow Sample

Location:

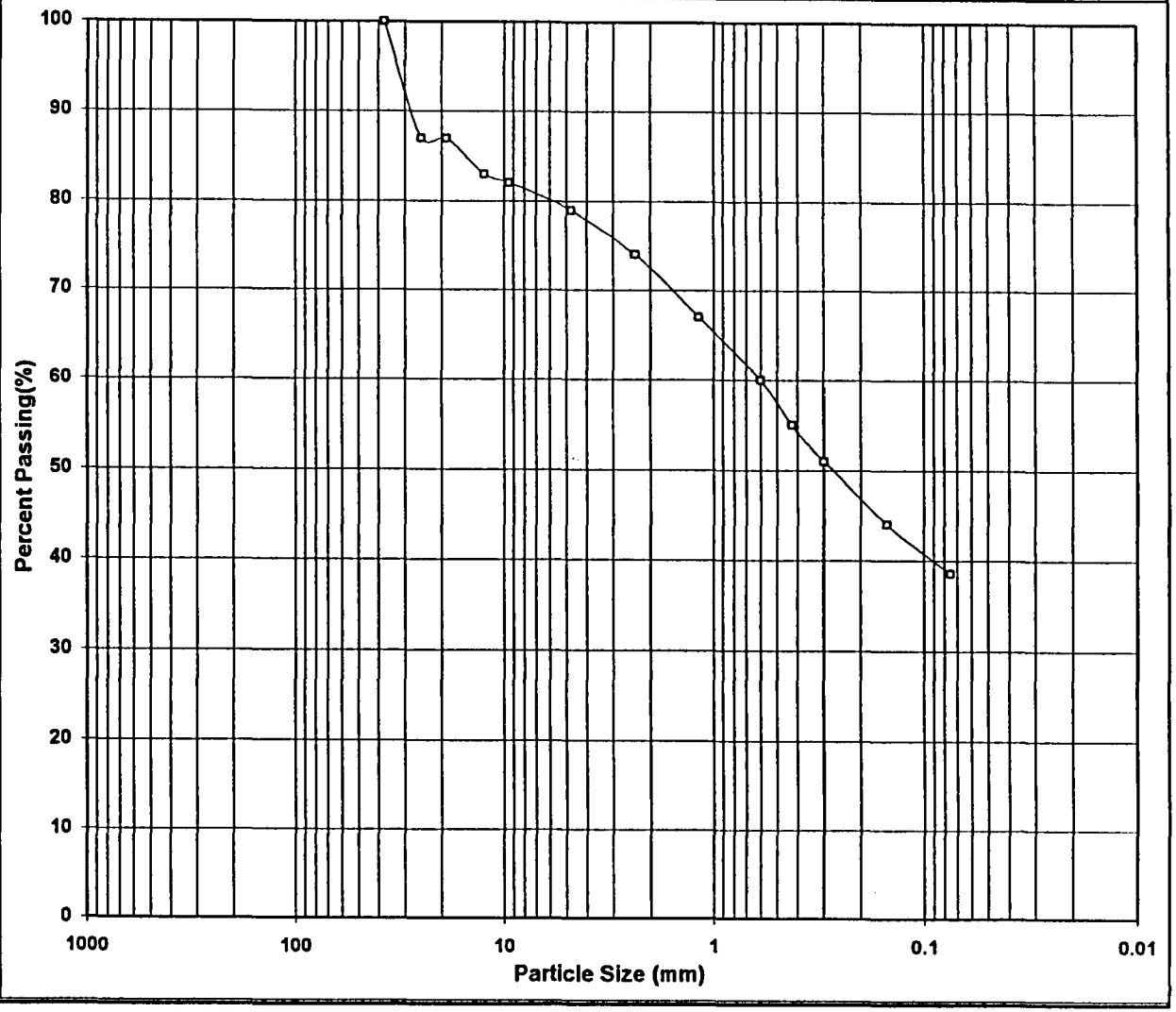
Drilled Sample:

Boring DMB-6 Sample # 1 Depth 5'

Sieve US Std	Sieve Metric(mm)	Percent Passing	Specification
3"	75.0		
2.5"	62.5		
2"	50.0		
1.5"	37.5	100	
1.25"	31.3		
1"	25.0	87	
3/4"	19.0	87	
1/2"	12.5	83	
3/8"	9.5	82	
#4	4.75	79	
#8	2.36	74	
#10	2.0		
#16	1.18	67	
#30	0.6	60	
#40	0.43	55	
#50	0.3	51	
#100	0.15	44	
#200	0.075	38.6	

Plasticity Index 9

USCS Classification: SC



PARTICLE SIZE ANALYSIS

DAMES & MOORE GROUP

Project: White Tanks FRS #3 Project No.: 15448-005-022 Date: December 21, 1998

Client: Maricopa County Flood Control District

Stockpile/Windrow Sample

Location:

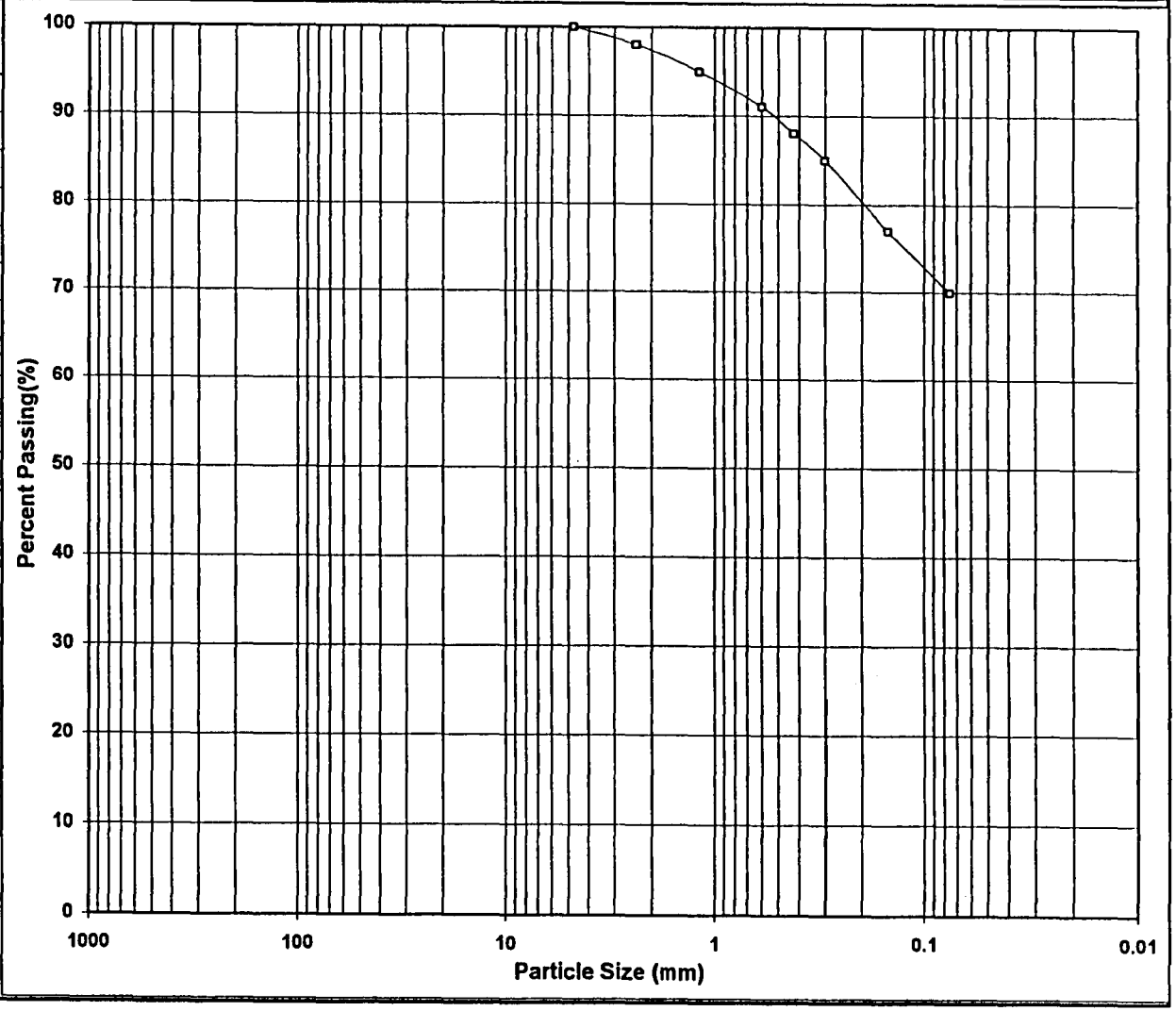
Drilled Sample:

Boring DMB-6 Sample # 6 Depth 30'

Sieve US Std	Sieve Metric(mm)	Percent Passing	Specification
3"	75.0		
2.5"	62.5		
2"	50.0		
1.5"	37.5		
1.25"	31.3		
1"	25.0		
3/4"	19.0		
1/2"	12.5		
3/8"	9.5		
#4	4.75	100	
#8	2.36	98	
#10	2.0		
#16	1.18	95	
#30	0.6	91	
#40	0.43	88	
#50	0.3	85	
#100	0.15	77	
#200	0.075	69.9	

Plasticity Index 13

USCS Classification: CL



PARTICLE SIZE ANALYSIS

DAMES MOORE GROUP

Project: White Tanks FRS #3 Project No.: 15448-005-022 Date: December 21, 1998

Client: Maricopa County Flood Control District

Stockpile/Windrow Sample

Location:

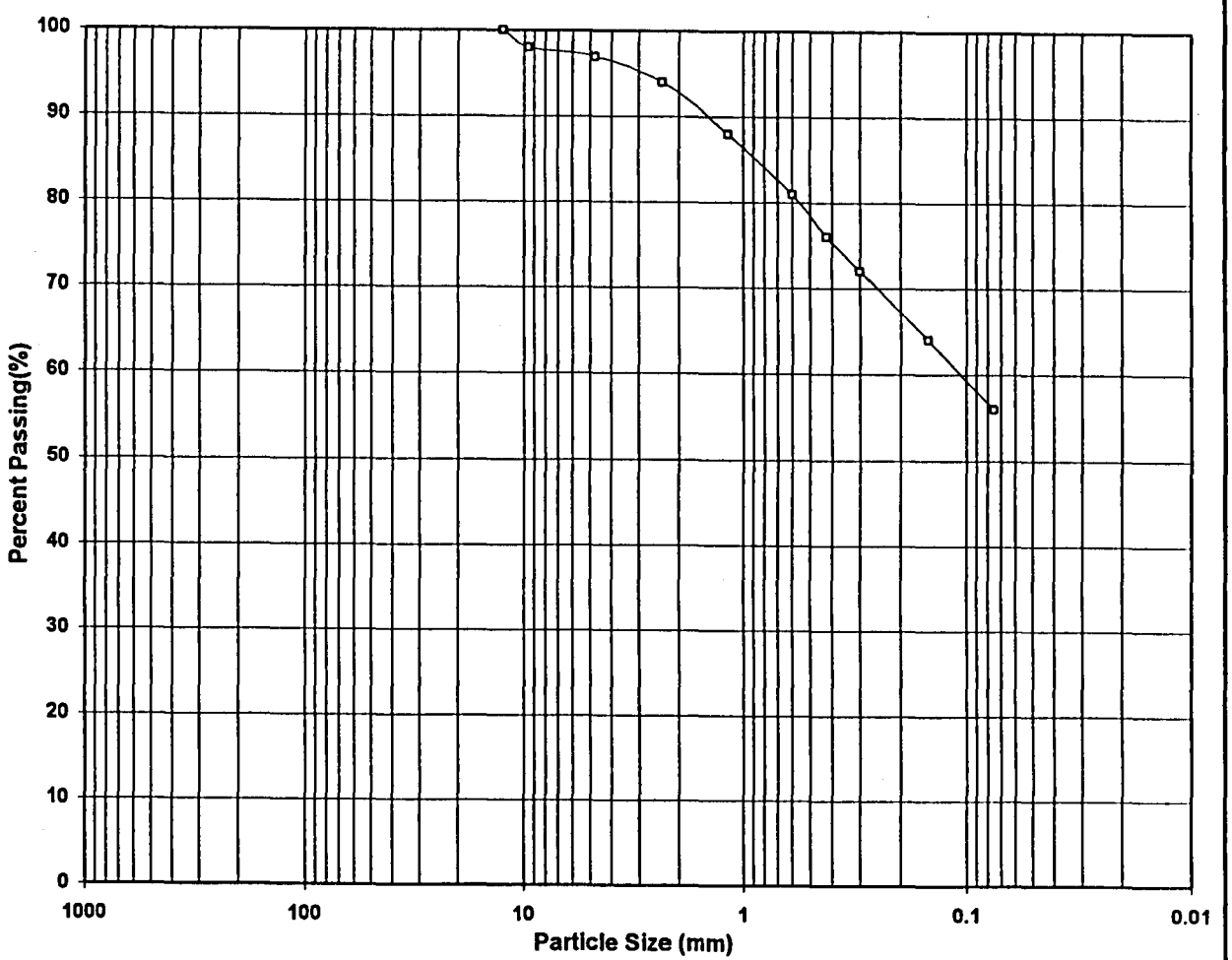
Drilled Sample:

Boring DMB-7 Sample # 1 Depth 5'-6'

Sieve US Std	Sieve Metric(mm)	Percent Passing	Specification
3"	75.0		
2.5"	62.5		
2"	50.0		
1.5"	37.5		
1.25"	31.3		
1"	25.0		
3/4"	19.0		
1/2"	12.5	100	
3/8"	9.5	98	
#4	4.75	97	
#8	2.36	94	
#10	2.0		
#16	1.18	88	
#30	0.6	81	
#40	0.43	76	
#50	0.3	72	
#100	0.15	64	
#200	0.075	56	

Plasticity Index 17

USCS Classification: CL



PARTICLE SIZE ANALYSIS

DAMES MOORE GROUP

Project: White Tanks FRS #3 Project No.: 15448-005-022 Date: December 21, 1998

Client: Maricopa County Flood Control District

Stockpile/Windrow Sample

Location:

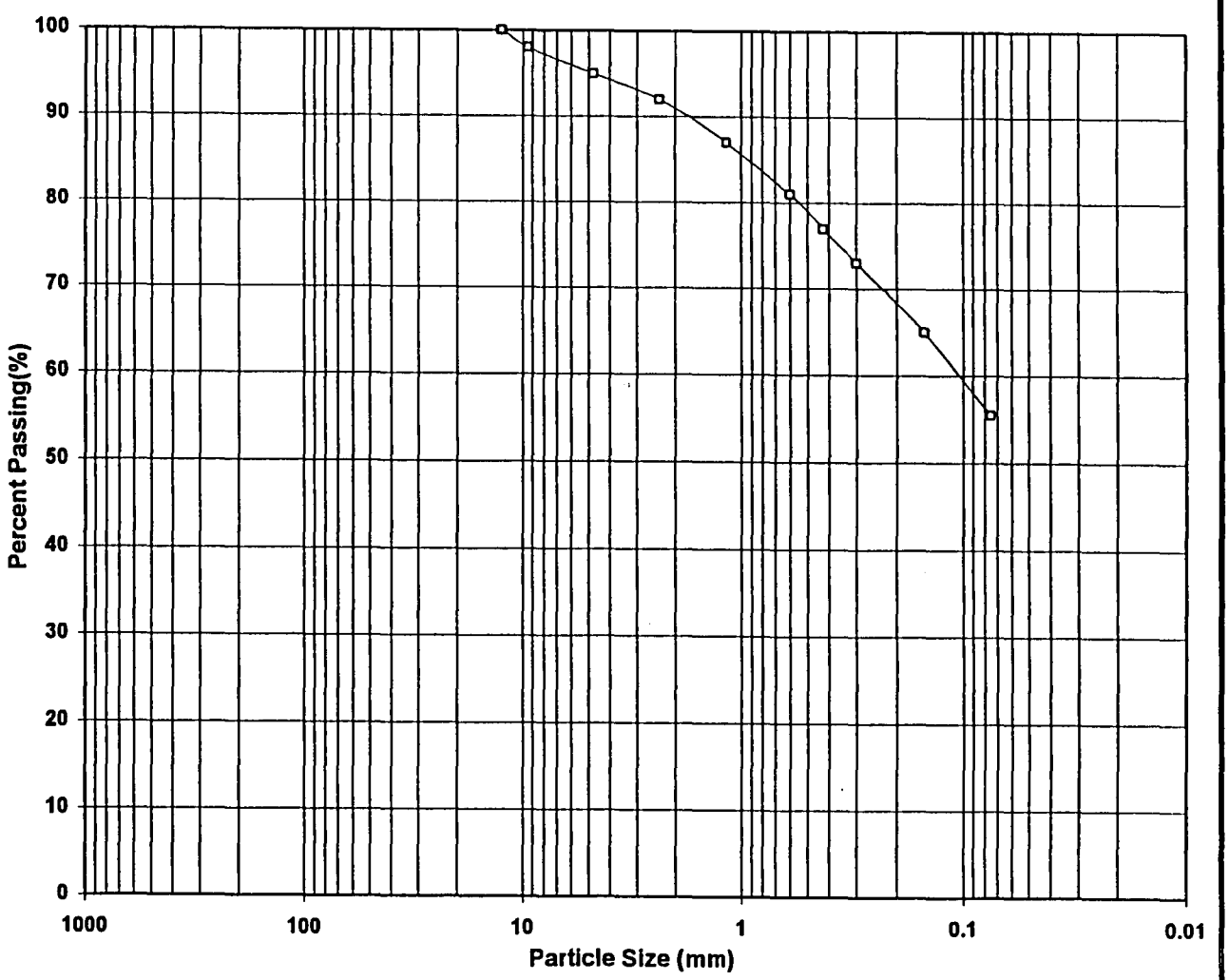
Drilled Sample:

Boring DMB-9 Sample 2 Depth 10'-11'

Sieve US Std	Sieve Metric(mm)	Percent Passing	Specification
3"	75.0		
2.5"	62.5		
2"	50.0		
1.5"	37.5		
1.25"	31.3		
1"	25.0		
3/4"	19.0		
1/2"	12.5	100	
3/8"	9.5	98	
#4	4.75	95	
#8	2.36	92	
#10	2.0		
#16	1.18	87	
#30	0.6	81	
#40	0.43	77	
#50	0.3	73	
#100	0.15	65	
#200	0.075	55.5	

Plasticity Index 9

USCS Classification: CL



PARTICLE SIZE ANALYSIS

DAMES MOORE GROUP

Project: White Tanks FRS #3 Project No.: 15448-005-022 Date: December 21, 1998

Client: Maricopa County Flood Control District

Stockpile/Windrow Sample

Location:

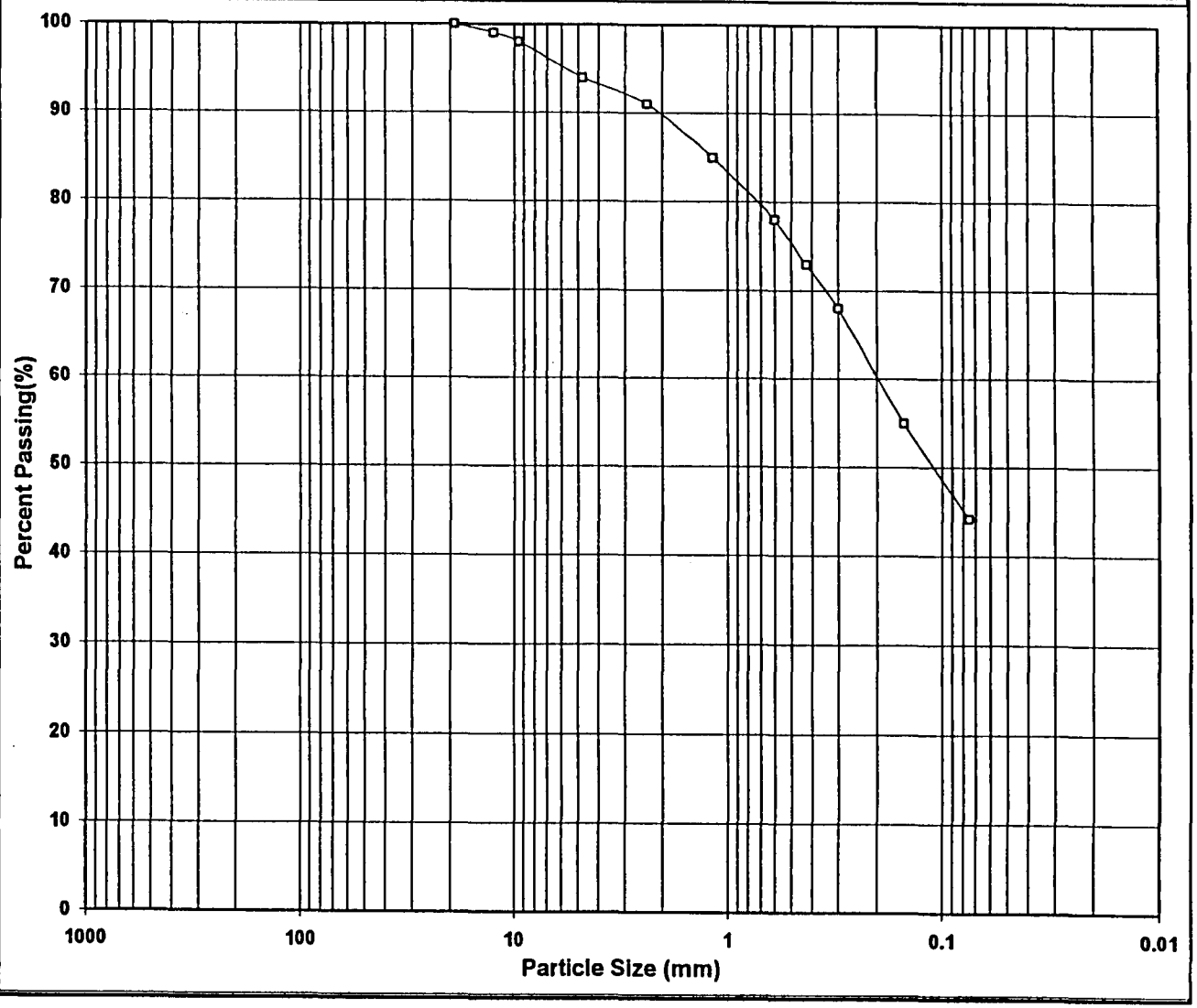
Drilled Sample:

Boring DMB-9 Sample # 3 Depth 15'

Sieve US Std	Sieve Metric(mm)	Percent Passing	Specification
3"	75.0		
2.5"	62.5		
2"	50.0		
1.5"	37.5		
1.25"	31.3		
1"	25.0		
3/4"	19.0	100	
1/2"	12.5	99	
3/8"	9.5	98	
#4	4.75	94	
#8	2.36	91	
#10	2.0		
#16	1.18	85	
#30	0.6	78	
#40	0.43	73	
#50	0.3	68	
#100	0.15	55	
#200	0.075	44.2	

Plasticity Index 6

USCS Classification: SC-SM



PARTICLE SIZE ANALYSIS

DAMES & MOORE GROUP

Project: White Tanks FRS #3 Project No.: 15448-005-022 Date: December 21, 1998

Client: Maricopa County Flood Control District

Stockpile/Windrow Sample

Location:

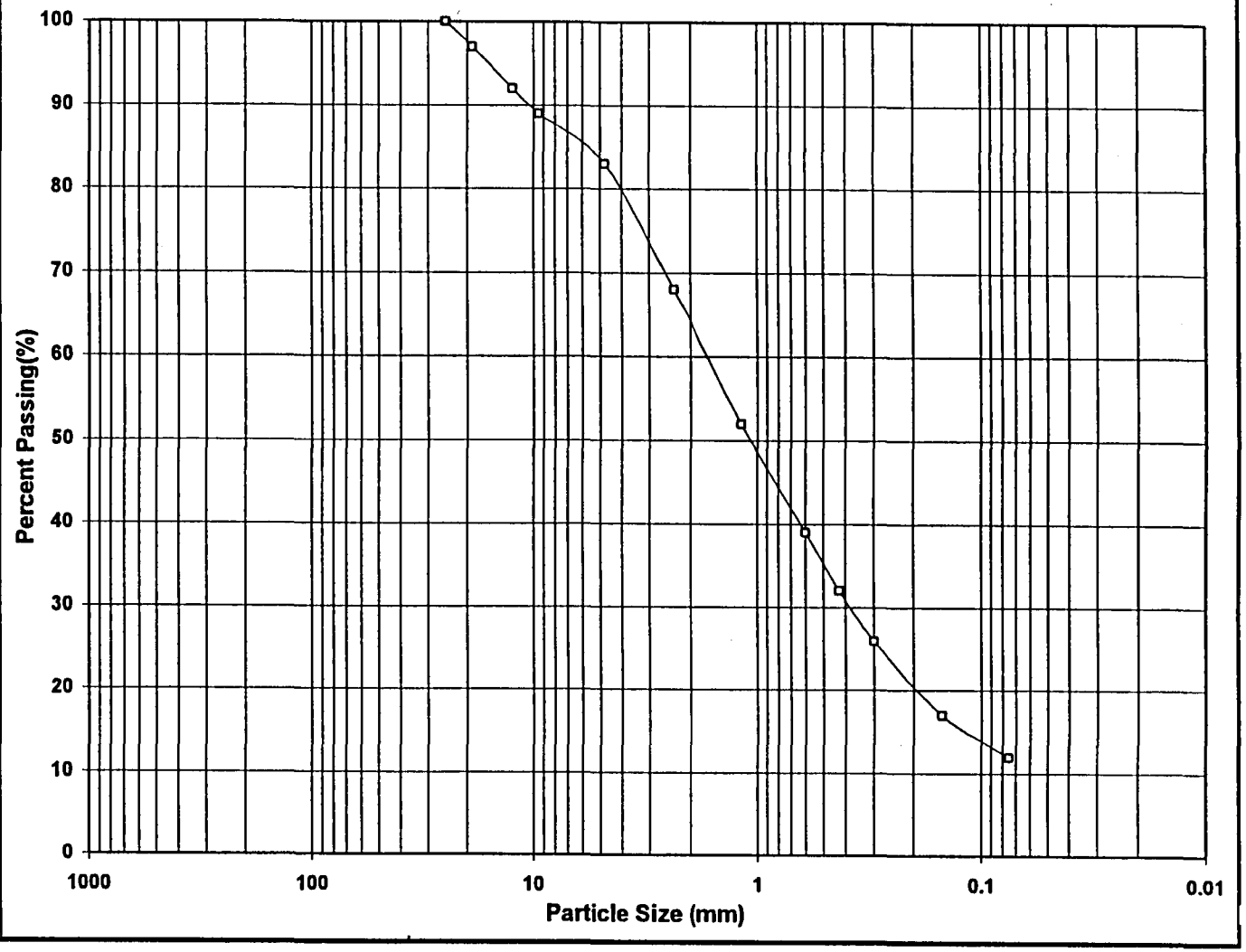
Drilled Sample:

Boring DMB-9 Sample # 5 Depth 30'

Sieve US Std	Sieve Metric(mm)	Percent Passing	Specification
3"	75.0		
2.5"	62.5		
2"	50.0		
1.5"	37.5		
1.25"	31.3		
1"	25.0	100	
3/4"	19.0	97	
1/2"	12.5	92	
3/8"	9.5	89	
#4	4.75	83	
#8	2.36	68	
#10	2.0		
#16	1.18	52	
#30	0.6	39	
#40	0.43	32	
#50	0.3	26	
#100	0.15	17	
#200	0.075	11.9	

Plasticity Index NONPLASTIC

USCS Classification: SP-SM



PARTICLE SIZE ANALYSIS

DAMES MOORE GROUP

Project: White Tanks FRS #3 Project No.: 15448-005-022 Date: December 21, 1998

Client: Maricopa County Flood Control District

Stockpile/Windrow Sample

Location:

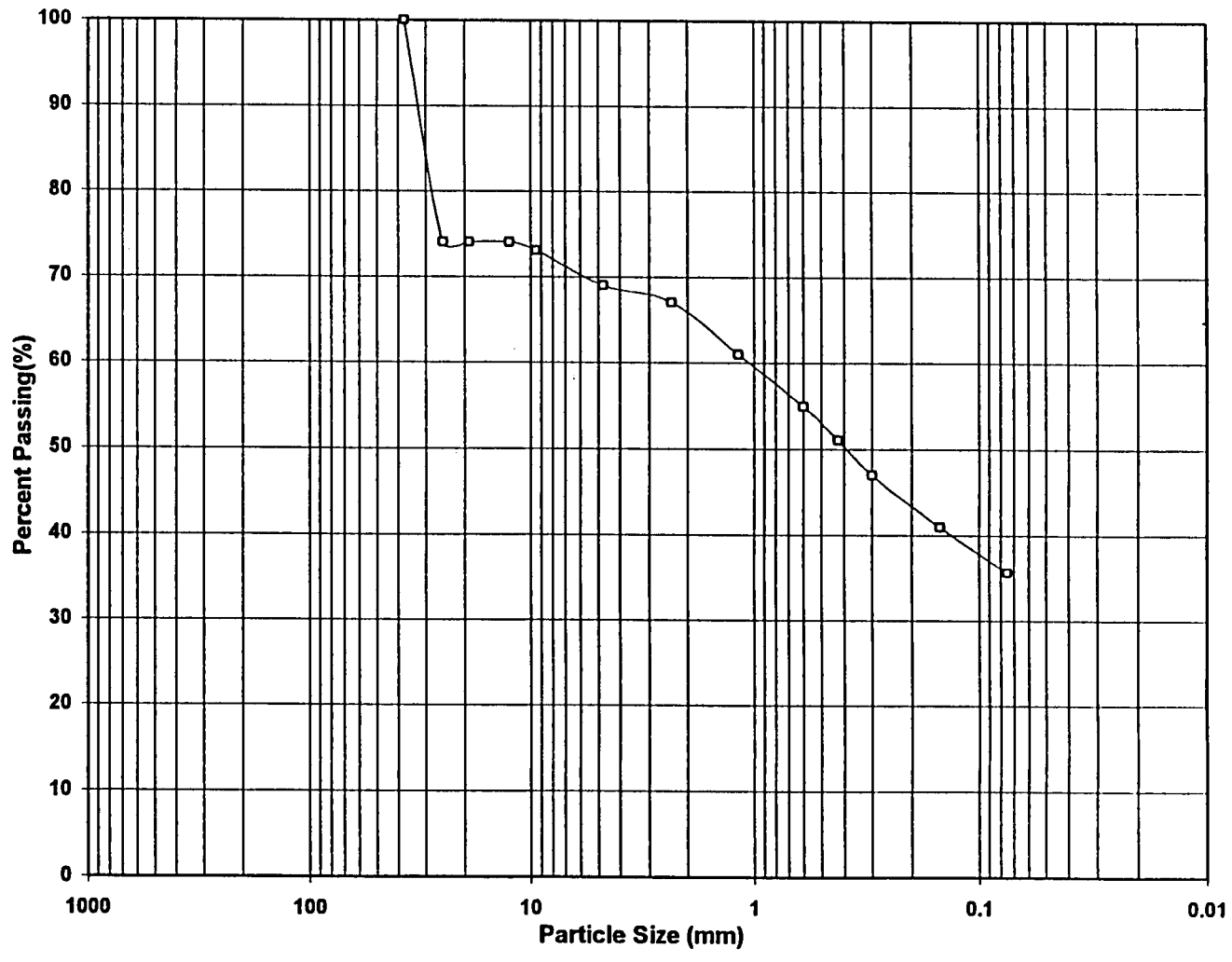
Drilled Sample:

Boring DMB-10 Sample # 1 Depth 5'-6'

Sieve US Std	Sieve Metric(mm)	Percent Passing	Specification
3"	75.0		
2.5"	62.5		
2"	50.0		
1.5"	37.5	100	
1.25"	31.3		
1"	25.0	74	
3/4"	19.0	74	
1/2"	12.5	74	
3/8"	9.5	73	
#4	4.75	69	
#8	2.36	67	
#10	2.0		
#16	1.18	61	
#30	0.6	55	
#40	0.43	51	
#50	0.3	47	
#100	0.15	41	
#200	0.075	35.6	

Plasticity Index 9

USCS Classification: SC



PARTICLE SIZE ANALYSIS

DAMES MOORE GROUP

Project: White Tanks FRS #3 Project No.: 15448-005-022 Date: December 21, 1998

Client: Maricopa County Flood Control District

Stockpile/Windrow Sample

Location:

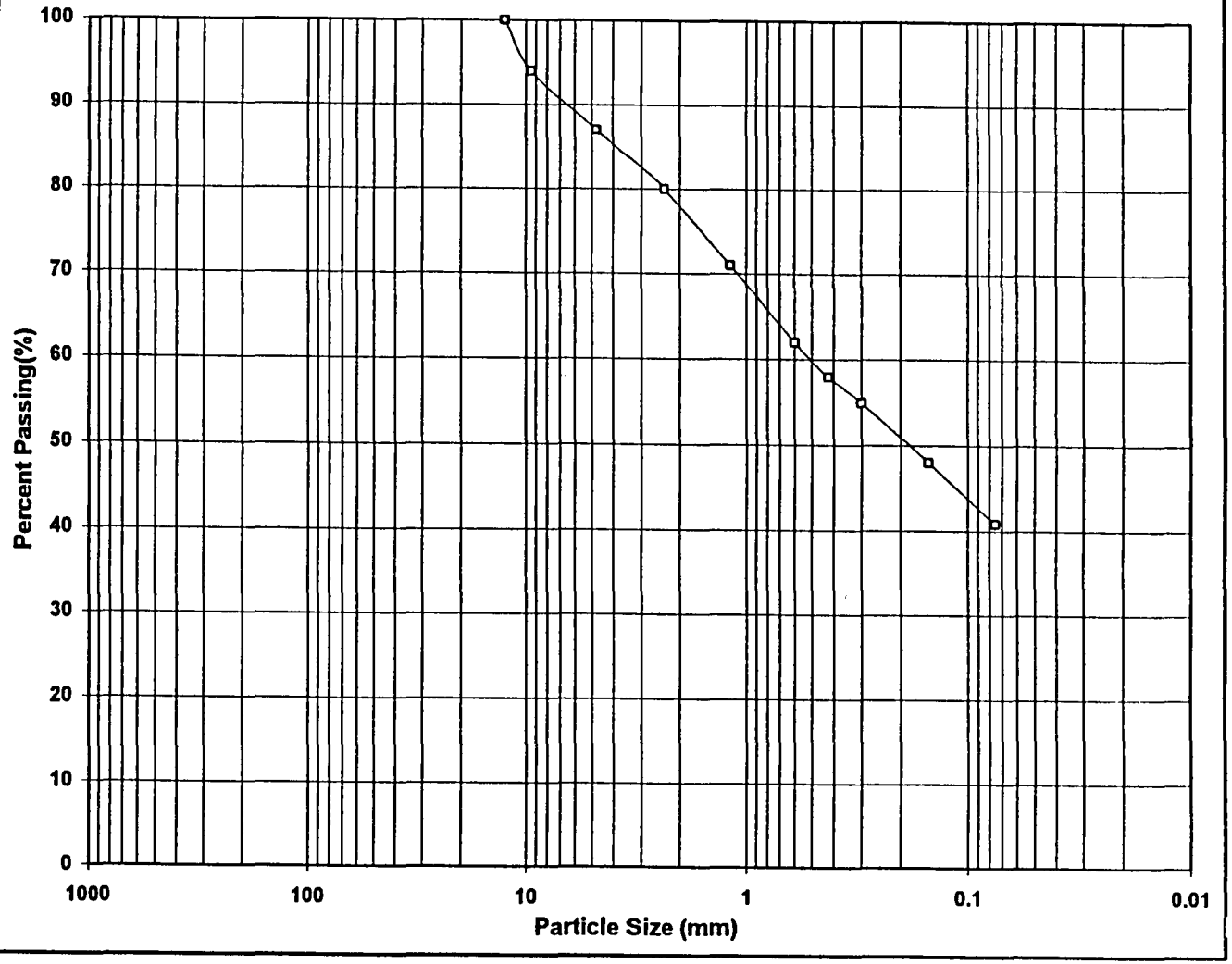
Drilled Sample:

Boring DMB-11 Sample # 1 Depth 5'-6.5'

Sieve US Std	Sieve Metric(mm)	Percent Passing	Specification
3"	75.0		
2.5"	62.5		
2"	50.0		
1.5"	37.5		
1.25"	31.3		
1"	25.0		
3/4"	19.0		
1/2"	12.5	100	
3/8"	9.5	94	
#4	4.75	87	
#8	2.36	80	
#10	2.0		
#16	1.18	71	
#30	0.6	62	
#40	0.43	58	
#50	0.3	55	
#100	0.15	48	
#200	0.075	40.8	

Plasticity Index 13

USCS Classification: SC



PARTICLE SIZE ANALYSIS

DAMES & MOORE GROUP

Project: White Tanks FRS #3 Project No.: 15448-005-022 Date: December 21, 1998

Client: Maricopa County Flood Control District

Stockpile/Windrow Sample

Location:

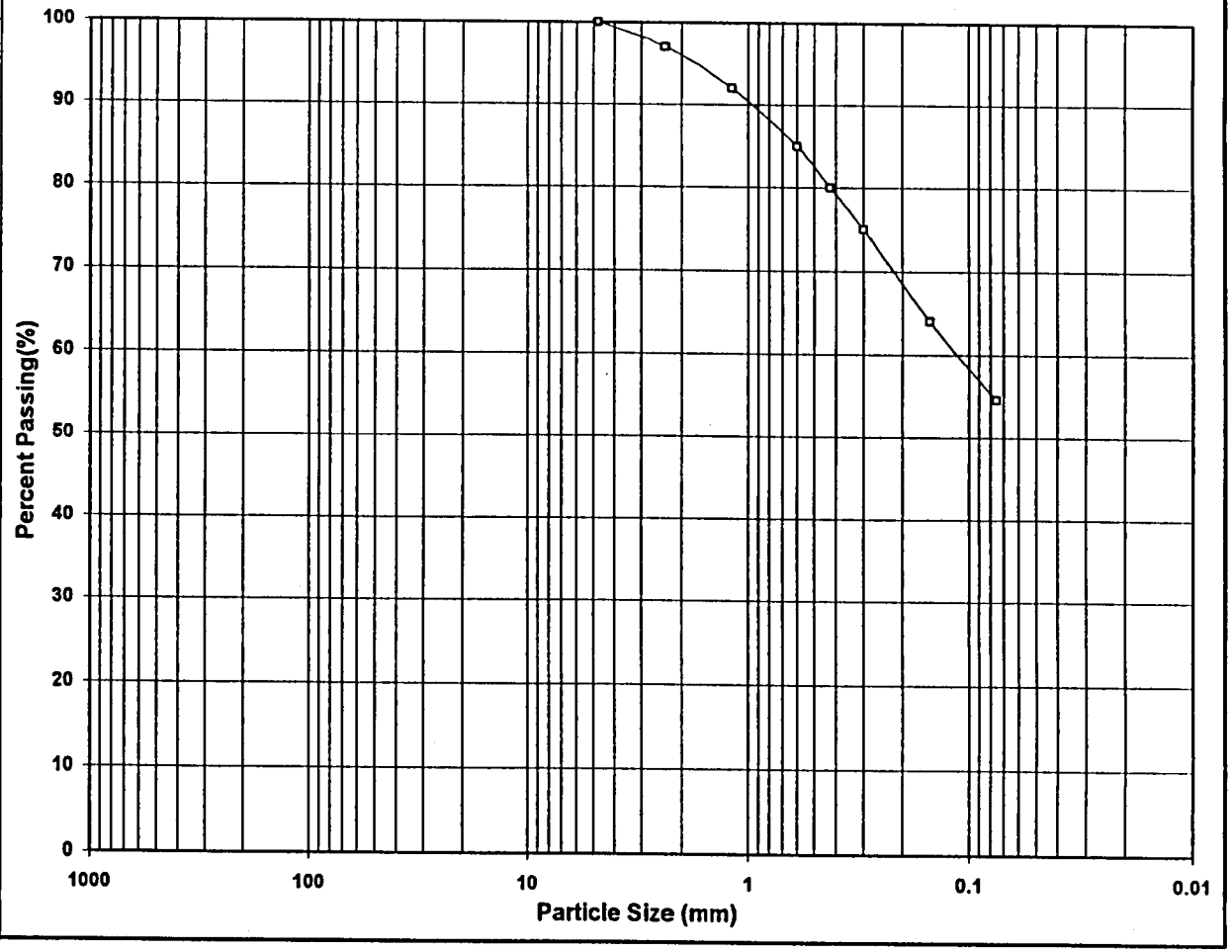
Drilled Sample:

Boring DMB-16 Sample # 4 Depth 25'-26'

Sieve US Std	Sieve Metric(mm)	Percent Passing	Specification
3"	75.0		
2.5"	62.5		
2"	50.0		
1.5"	37.5		
1.25"	31.3		
1"	25.0		
3/4"	19.0		
1/2"	12.5		
3/8"	9.5		
#4	4.75	100	
#8	2.36	97	
#10	2.0		
#16	1.18	92	
#30	0.6	85	
#40	0.43	80	
#50	0.3	75	
#100	0.15	64	
#200	0.075	54.6	

Plasticity Index 10

USCS Classification: CL



PARTICLE SIZE ANALYSIS

DAMES MOORE GROUP

Project: White Tanks FRS #3 Project No.: 15448-005-022 Date: December 21, 1998

Client: Maricopa County Flood Control District

Stockpile/Windrow Sample

Location:

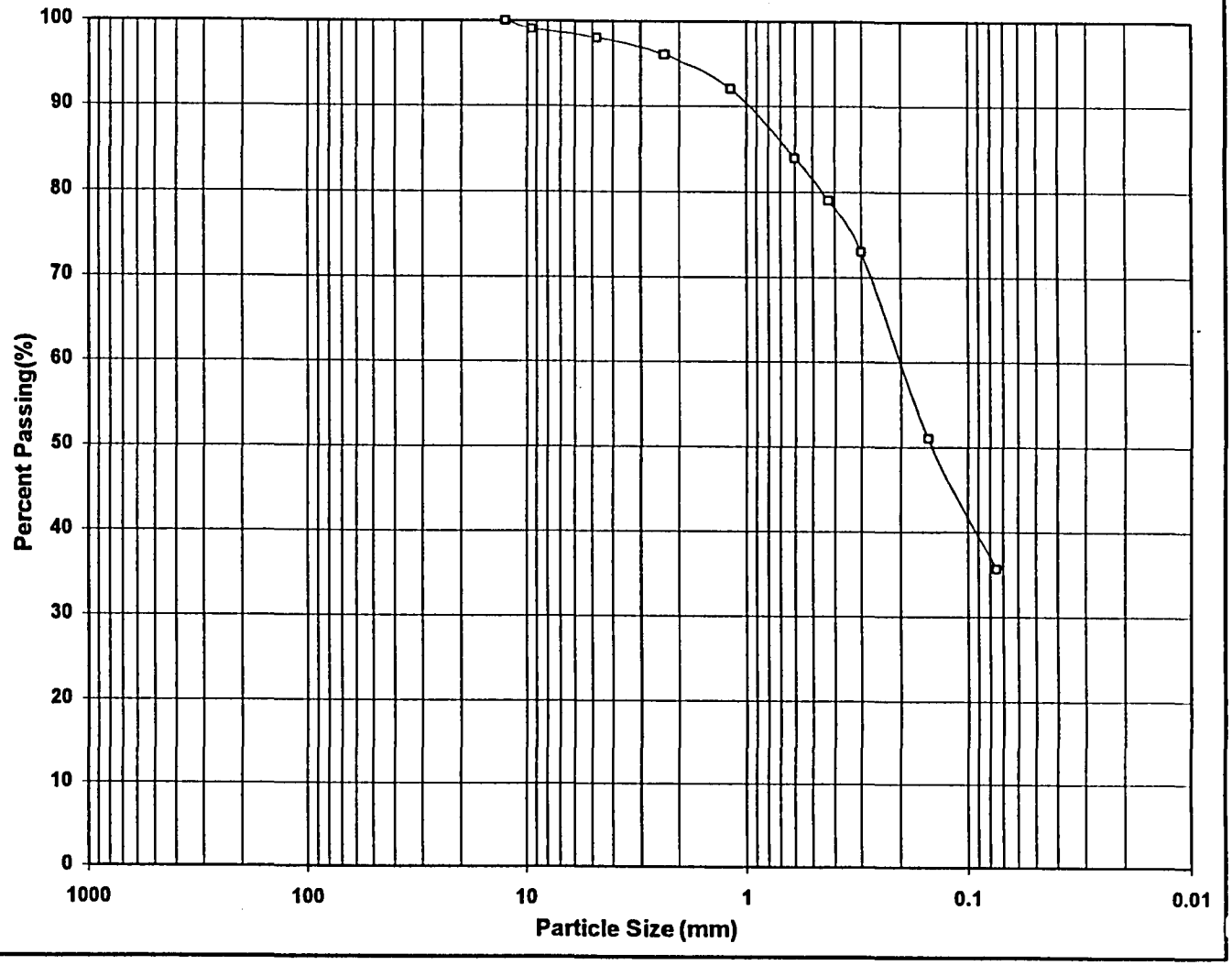
Drilled Sample:

Boring DMB-17 Sample # 1 Depth 5'-6'

Sieve US Std	Sieve Metric(mm)	Percent Passing	Specification
3"	75.0		
2.5"	62.5		
2"	50.0		
1.5"	37.5		
1.25"	31.3		
1"	25.0		
3/4"	19.0		
1/2"	12.5	100	
3/8"	9.5	99	
#4	4.75	98	
#8	2.36	96	
#10	2.0		
#16	1.18	92	
#30	0.6	84	
#40	0.43	79	
#50	0.3	73	
#100	0.15	51	
#200	0.075	35.7	

Plasticity Index NONPLASTIC

USCS Classification: SM



PARTICLE SIZE ANALYSIS

DAMES & MOORE GROUP

Project: White Tanks FRS #3 Project No.: 15448-005-022 Date: December 21, 1998

Client: Maricopa County Flood Control District

Stockpile/Windrow Sample

Location:

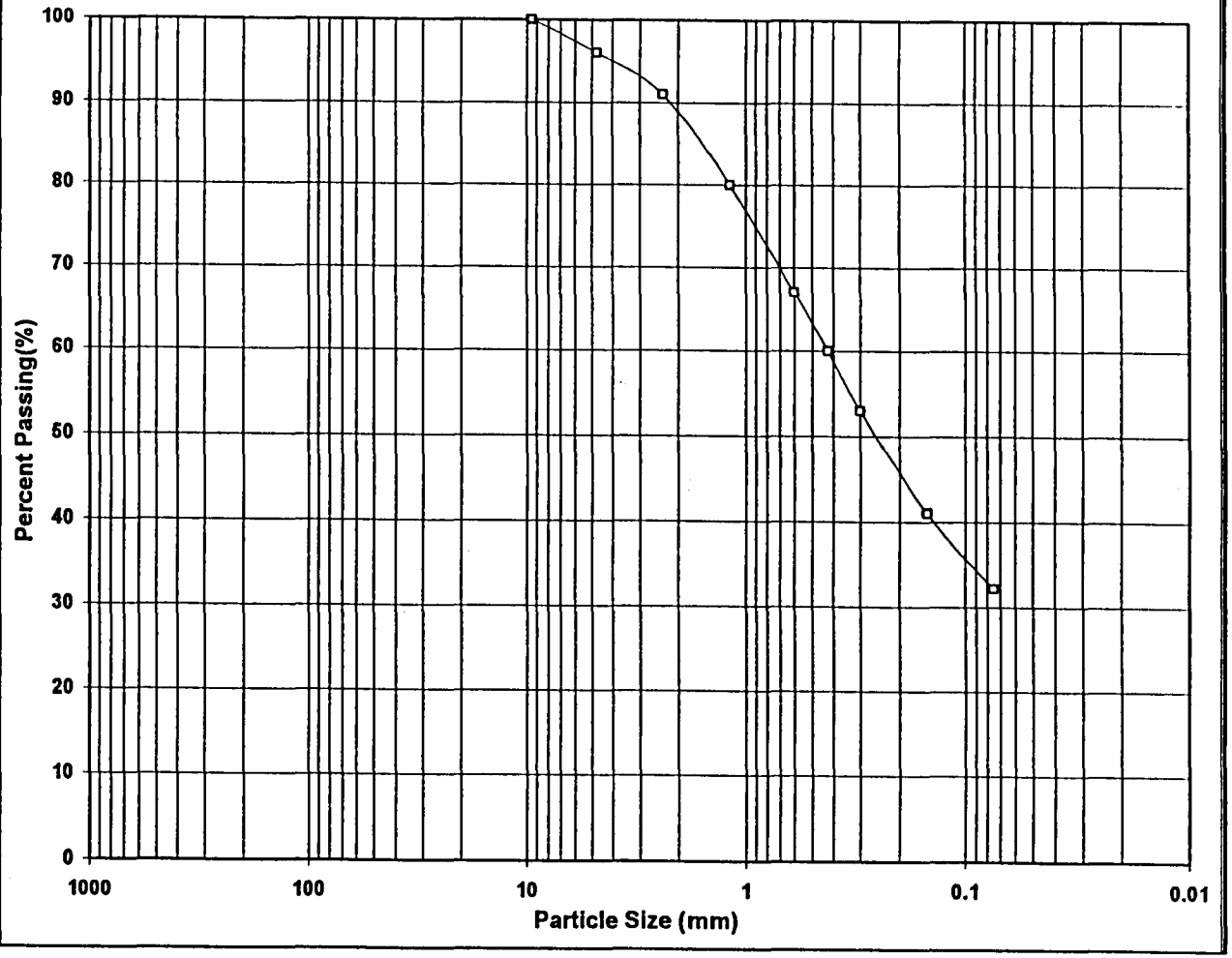
Drilled Sample:

Boring DMB-17 Sample # 5 Depth 30'

Sieve US Std	Sieve Metric(mm)	Percent Passing	Specification
3"	75.0		
2.5"	62.5		
2"	50.0		
1.5"	37.5		
1.25"	31.3		
1"	25.0		
3/4"	19.0		
1/2"	12.5		
3/8"	9.5	100	
#4	4.75	96	
#8	2.36	91	
#10	2.0		
#16	1.18	80	
#30	0.6	67	
#40	0.43	60	
#50	0.3	53	
#100	0.15	41	
#200	0.075	32.2	

Plasticity Index 7

USCS Classification: SC-SM



PARTICLE SIZE ANALYSIS

DAMES MOORE GROUP

Project: White Tanks FRS #3 Project No.: 15448-005-022 Date: December 21, 1998

Client: Maricopa County Flood Control District

Stockpile/Windrow Sample

Location:

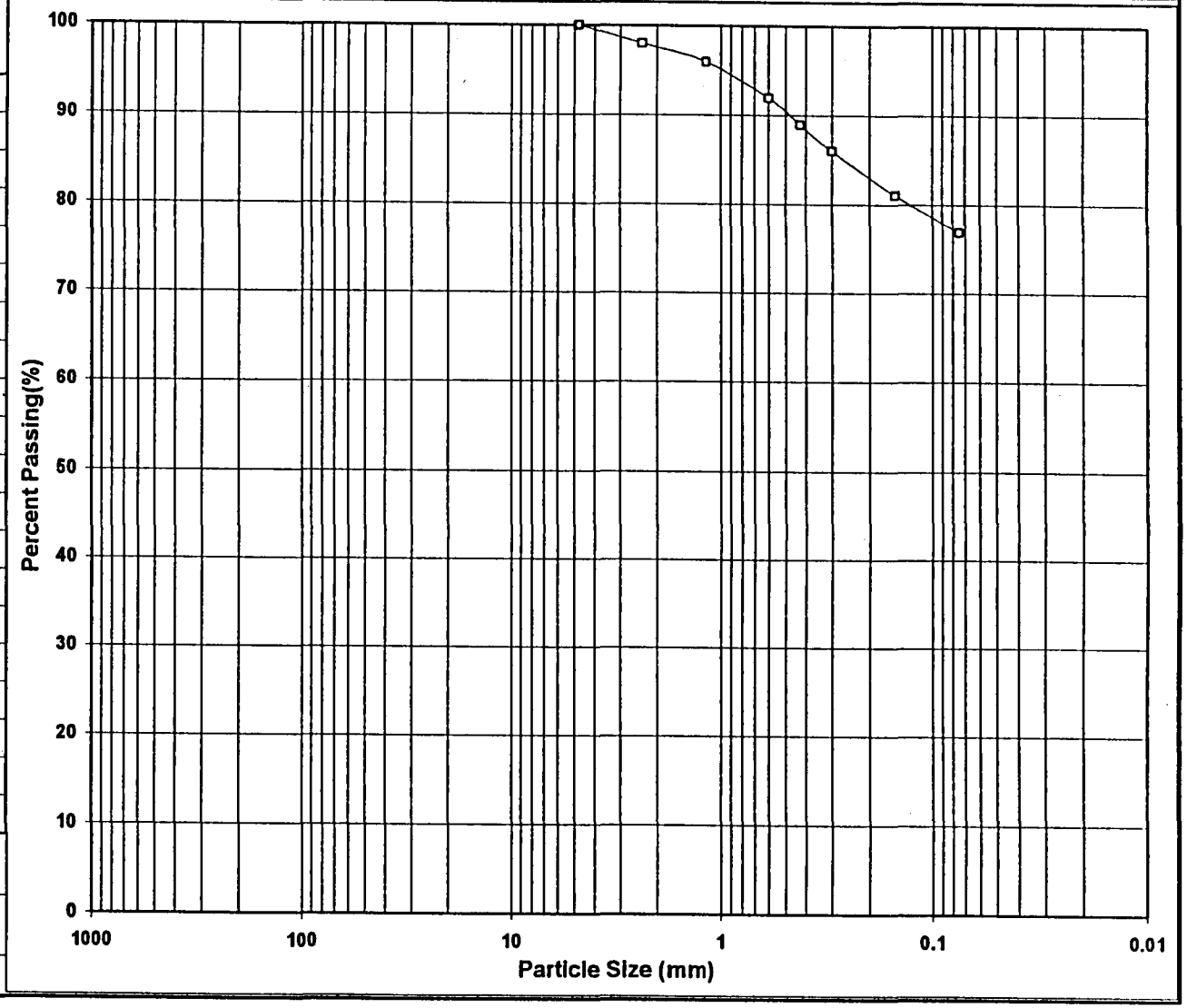
Drilled Sample:

Boring DMB-18 Sample # 7 Depth 35'

Sieve US Std	Sieve Metric(mm)	Percent Passing	Specification
3"	75.0		
2.5"	62.5		
2"	50.0		
1.5"	37.5		
1.25"	31.3		
1"	25.0		
3/4"	19.0		
1/2"	12.5		
3/8"	9.5		
#4	4.75	100	
#8	2.36	98	
#10	2.0		
#16	1.18	96	
#30	0.6	92	
#40	0.43	89	
#50	0.3	86	
#100	0.15	81	
#200	0.075	76.9	

Plasticity Index 18

USCS Classification: SC



PARTICLE SIZE ANALYSIS

DAMES DCM MOORE GROUP

Project: White Tanks FRS #3 Project No.: 15448-005-022 Date: December 21, 1998

Client: Maricopa County Flood Control District

Stockpile/Windrow Sample

Location:

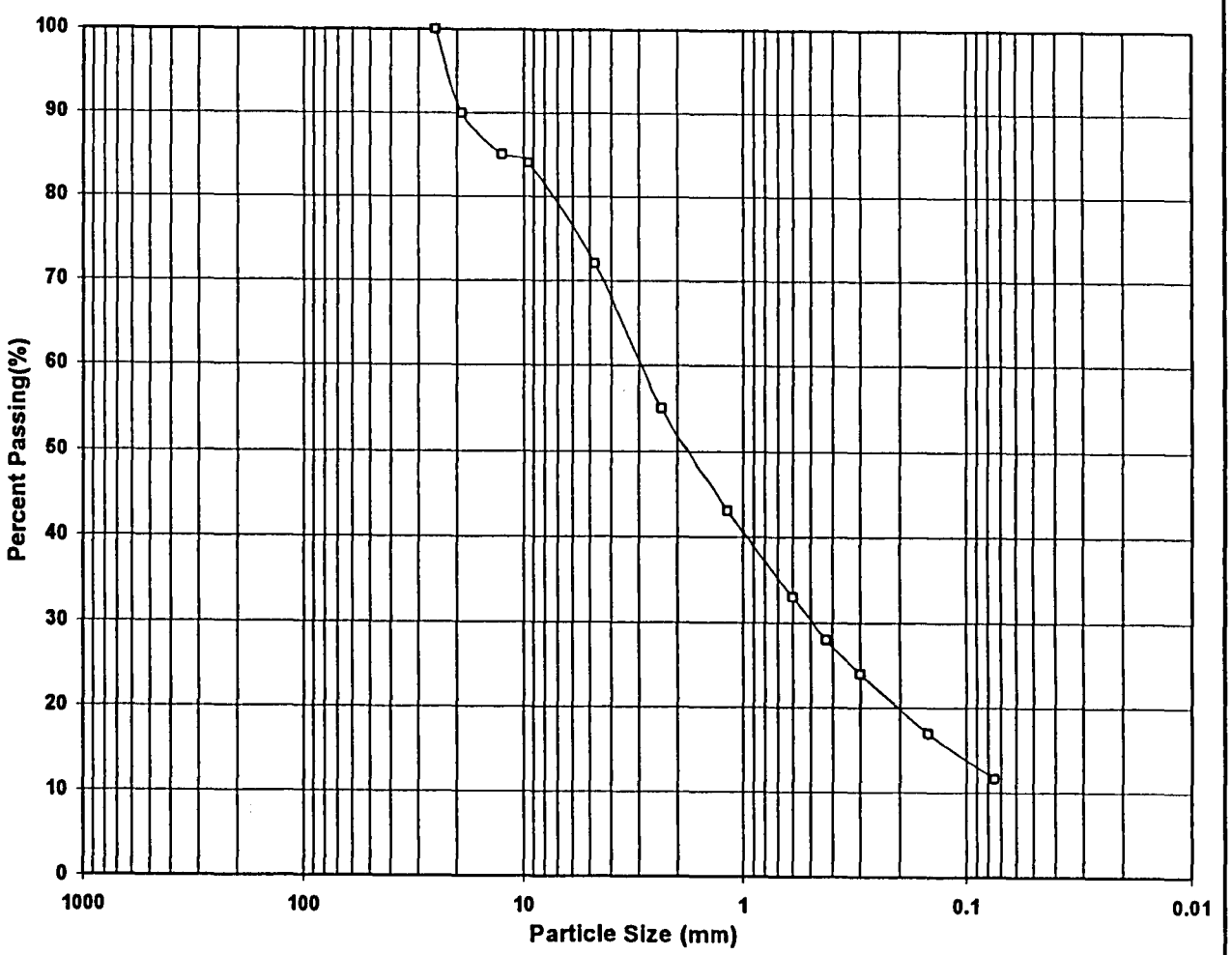
Drilled Sample:

Boring DMB-19 Sample # 5 Depth 25'

Sieve US Std	Sieve Metric(mm)	Percent Passing	Specification
3"	75.0		
2.5"	62.5		
2"	50.0		
1.5"	37.5		
1.25"	31.3		
1"	25.0	100	
3/4"	19.0	90	
1/2"	12.5	85	
3/8"	9.5	84	
#4	4.75	72	
#8	2.36	55	
#10	2.0		
#16	1.18	43	
#30	0.6	33	
#40	0.43	28	
#50	0.3	24	
#100	0.15	17	
#200	0.075	11.6	

Plasticity Index NONPLASTIC

USCS Classification: SW-SM



PARTICLE SIZE ANALYSIS

DAMES MOORE GROUP

Project: White Tanks FRS #3 Project No.: 15448-005-022 Date: December 21, 1998

Client: Maricopa County Flood Control District

Stockpile/Windrow Sample

Location:

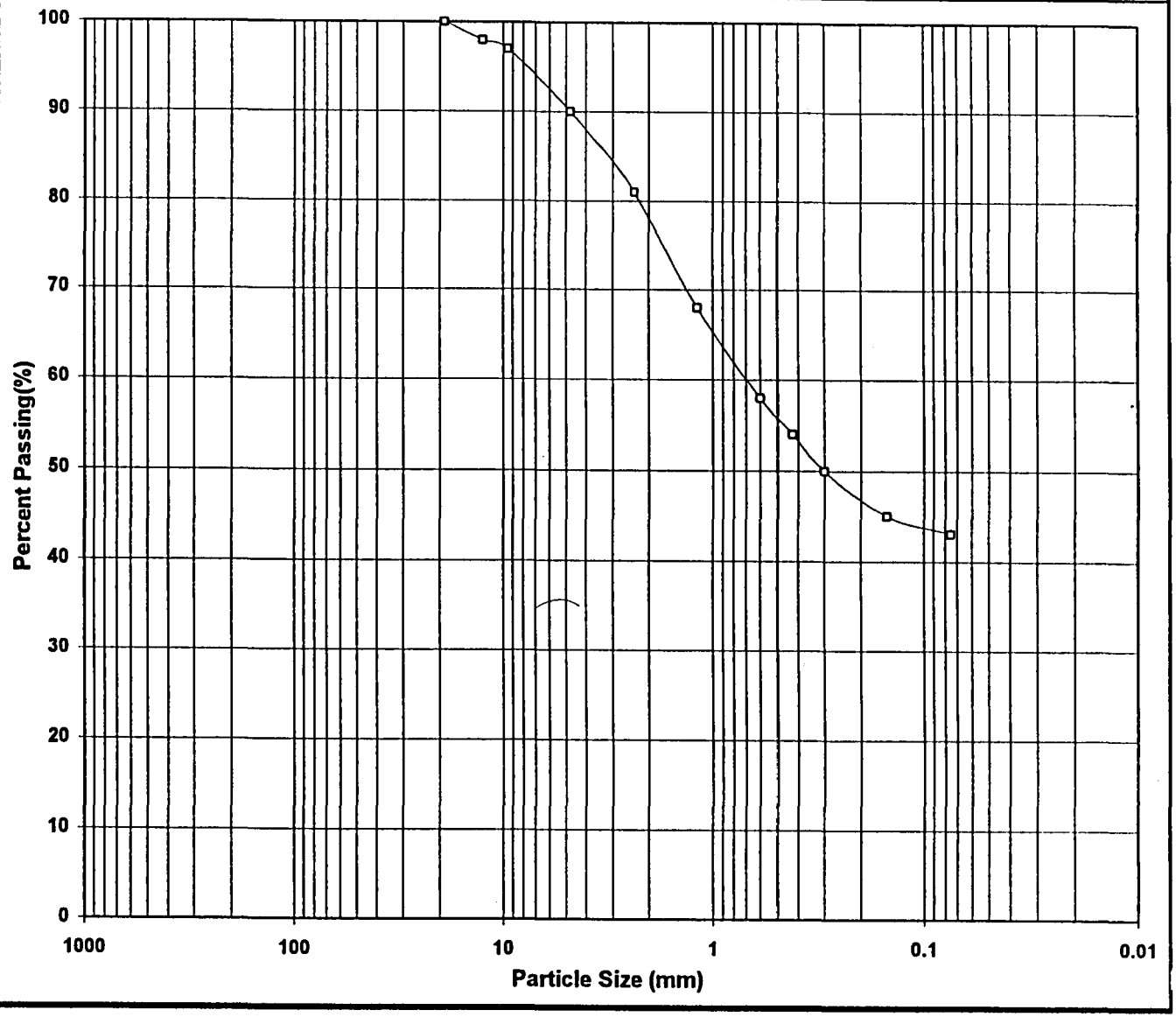
Drilled Sample:

Boring DMB-20 Sample # 1 Depth 5'-5.5'

Sieve US Std	Sieve Metric(mm)	Percent Passing	Specification
3"	75.0		
2.5"	62.5		
2"	50.0		
1.5"	37.5		
1.25"	31.3		
1"	25.0		
3/4"	19.0	100	
1/2"	12.5	98	
3/8"	9.5	97	
#4	4.75	90	
#8	2.36	81	
#10	2.0		
#16	1.18	68	
#30	0.6	58	
#40	0.43	54	
#50	0.3	50	
#100	0.15	45	
#200	0.075	43	

Plasticity Index NONPLASTIC

USCS Classification: SM



PARTICLE SIZE ANALYSIS

DAMES MOORE GROUP

Project: White Tanks FRS #3 Project No.: 15448-005-022 Date: December 21, 1998

Client: Maricopa County Flood Control District

Stockpile/Windrow Sample

Location:

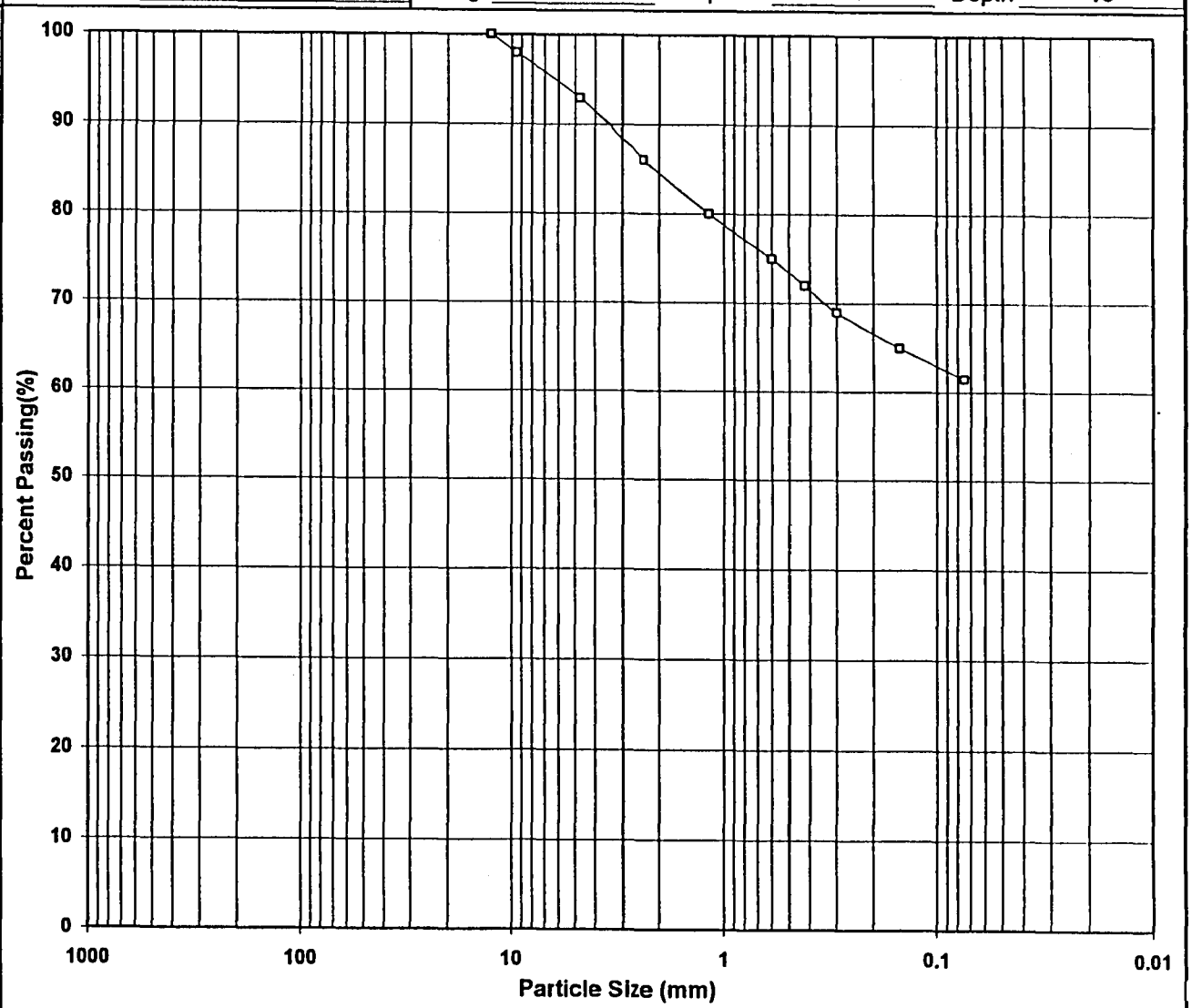
Drilled Sample:

Boring DMB-21 Sample # 2 Depth 15'

Sieve US Std	Sieve Metric(mm)	Percent Passing	Specification
3"	75.0		
2.5"	62.5		
2"	50.0		
1.5"	37.5		
1.25"	31.3		
1"	25.0		
3/4"	19.0		
1/2"	12.5	100	
3/8"	9.5	98	
#4	4.75	93	
#8	2.36	86	
#10	2.0		
#16	1.18	80	
#30	0.6	75	
#40	0.43	72	
#50	0.3	69	
#100	0.15	65	
#200	0.075	61.5	

Plasticity Index NONPLASTIC

USCS Classification: ML



PARTICLE SIZE ANALYSIS

DAMES MOORE GROUP

Project: White Tanks FRS #3 Project No.: 15448-005-022 Date: December 21, 1998

Client: Maricopa County Flood Control District

Stockpile/Windrow Sample

Location:

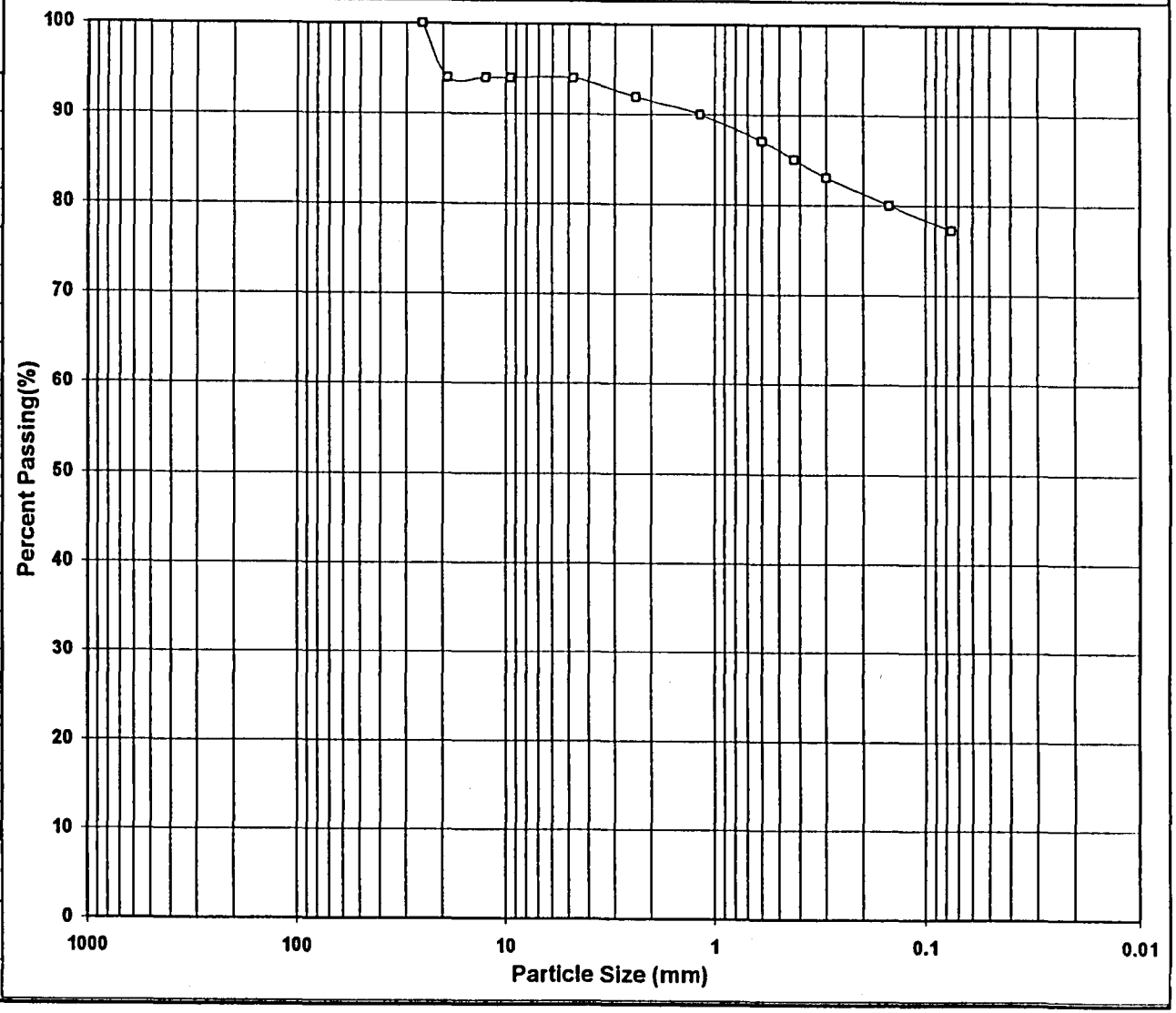
Drilled Sample:

Boring DMB-22 Sample # 1 Depth 5'

Sieve US Std	Sieve Metric(mm)	Percent Passing	Specification
3"	75.0		
2.5"	62.5		
2"	50.0		
1.5"	37.5		
1.25"	31.3		
1"	25.0	100	
3/4"	19.0	94	
1/2"	12.5	94	
3/8"	9.5	94	
#4	4.75	94	
#8	2.36	92	
#10	2.0		
#16	1.18	90	
#30	0.6	87	
#40	0.43	85	
#50	0.3	83	
#100	0.15	80	
#200	0.075	77.3	

Plasticity Index 20

USCS Classification: CL



PARTICLE SIZE ANALYSIS

DAMES MOORE GROUP

Project: **White Tanks FRS #3** Project No.: **15448-005-022** Date: **December 21, 1998**

Client: **Maricopa County Flood Control District**

Stockpile/Windrow Sample

Location:

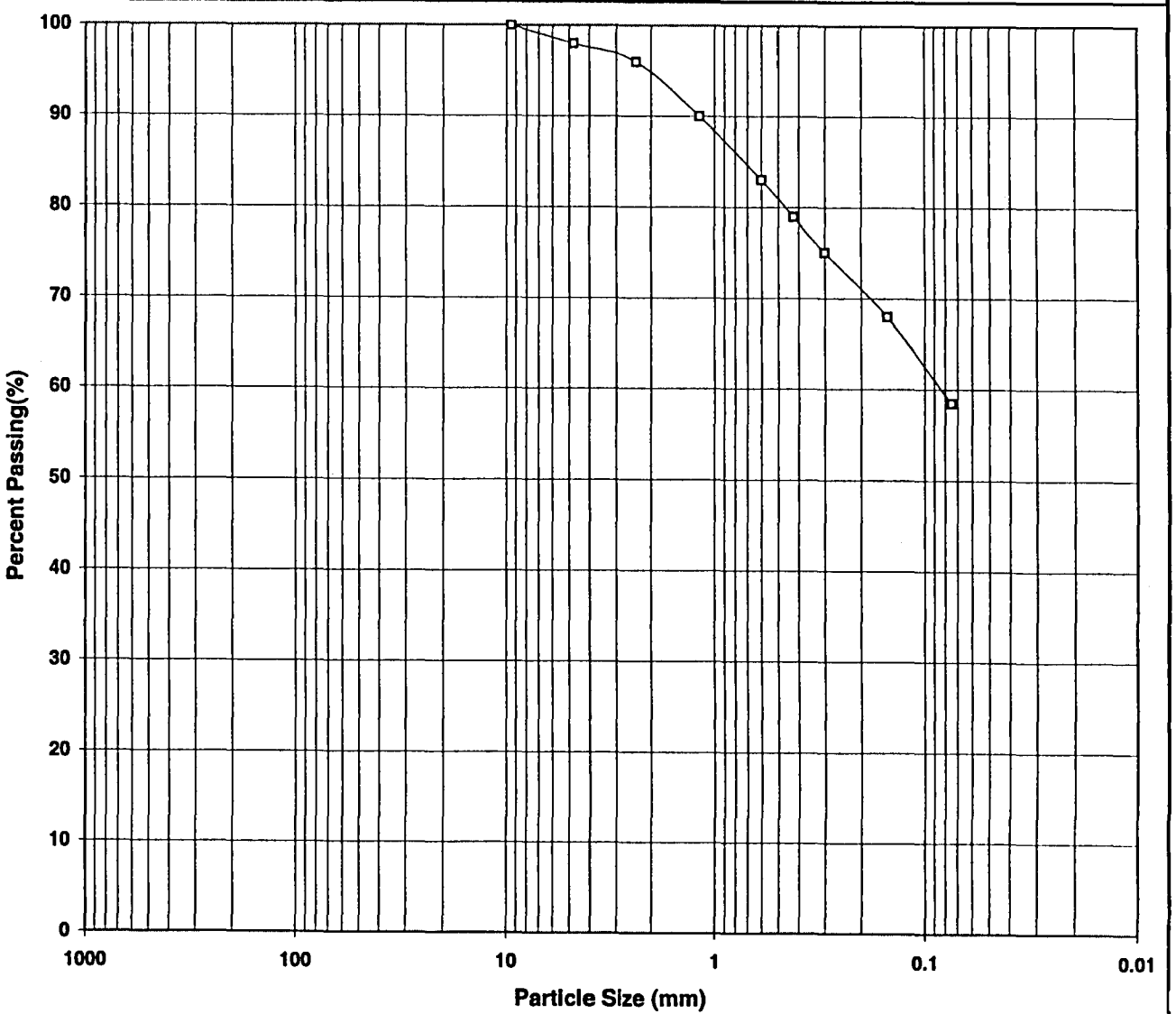
Drilled Sample:

Boring **DMP-5** Sample # **A** Depth **0'-2.5'**

Sieve US Std	Sieve Metric(mm)	Percent Passing	Specification
3"	75.0		
2.5"	62.5		
2"	50.0		
1.5"	37.5		
1.25"	31.3		
1"	25.0		
3/4"	19.0		
1/2"	12.5		
3/8"	9.5	100	
#4	4.75	98	
#8	2.36	96	
#10	2.0		
#16	1.18	90	
#30	0.6	83	
#40	0.43	79	
#50	0.3	75	
#100	0.15	68	
#200	0.075	58.5	

Plasticity Index **2**

USCS Classification: **ML**



PARTICLE SIZE ANALYSIS

DAMES MOORE GROUP

Project: White Tanks FRS #3 Project No.: 15448-005-022 Date: December 21, 1998

Client: Maricopa County Flood Control District

Stockpile/Windrow Sample

Location:

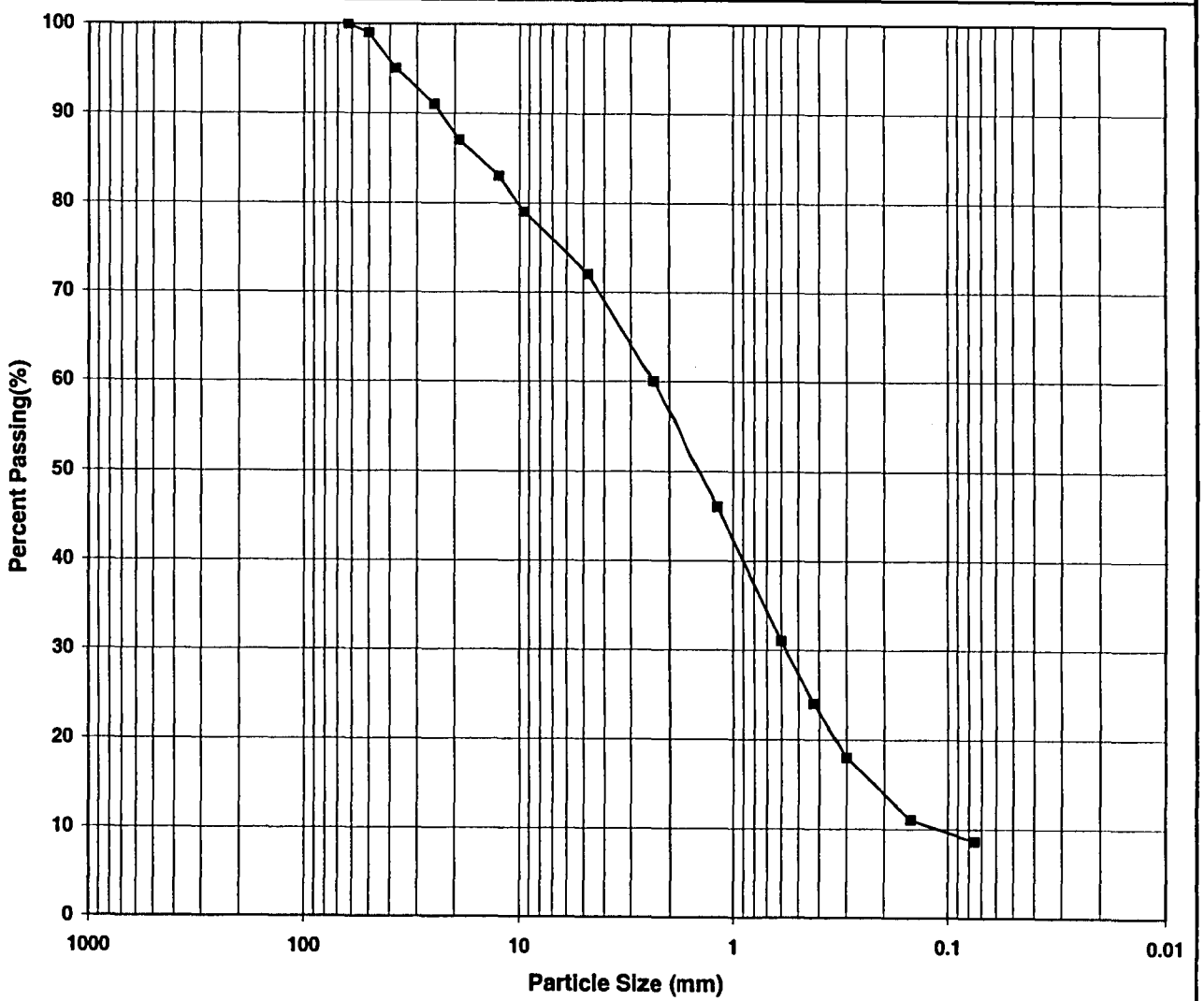
Drilled Sample:

Boring DMP-7 Sample # A Depth 0'-2'

Sieve US Std	Sieve Metric(mm)	Percent Passing	Specification
3"	75.0		
2.5"	62.5	100	
2"	50.0	99	
1.5"	37.5	95	
1.25"	31.3		
1"	25.0	91	
3/4"	19.0	87	
1/2"	12.5	83	
3/8"	9.5	79	
#4	4.75	72	
#8	2.36	60	
#10	2.0		
#16	1.18	46	
#30	0.6	31	
#40	0.43	24	
#50	0.3	18	
#100	0.15	11	
#200	0.075	8.6	

Plasticity Index NONPLASTIC

USCS Classification: SW-SM



PARTICLE SIZE ANALYSIS

DAMES MOORE GROUP

Project: White Tanks FRS #3 Project No.: 15448-005-022 Date: December 21, 1998

Client: Maricopa County Flood Control District

Stockpile/Windrow Sample

Location:

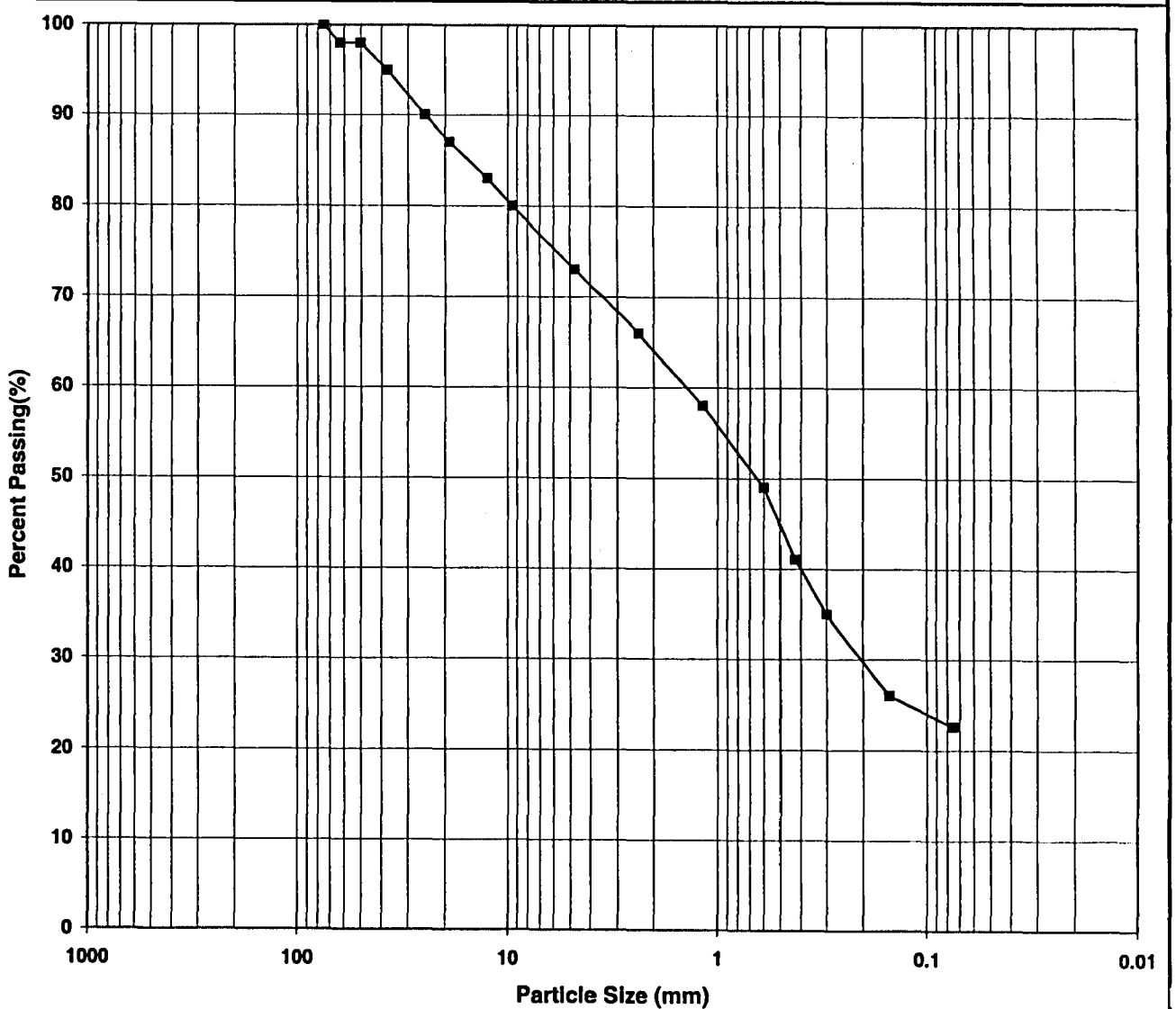
Drilled Sample:

Boring DMP-13 Sample # A Depth 2.5'-4.5'

Sieve US Std	Sieve Metric(mm)	Percent Passing	Specification
3"	75.0	100	
2.5"	62.5	98	
2"	50.0	98	
1.5"	37.5	95	
1.25"	31.3		
1"	25.0	90	
3/4"	19.0	87	
1/2"	12.5	83	
3/8"	9.5	80	
#4	4.75	73	
#8	2.36	66	
#10	2.0		
#16	1.18	58	
#30	0.6	49	
#40	0.43	41	
#50	0.3	35	
#100	0.15	26	
#200	0.075	22.6	

Plasticity Index NONPLASTIC

USCS Classification: SM



PARTICLE SIZE ANALYSIS

DAMES MOORE GROUP

Project: White Tanks FRS #3 Project No.: 15448-005-022 Date: December 21, 1998

Client: Maricopa County Flood Control District

Stockpile/Windrow Sample

Location:

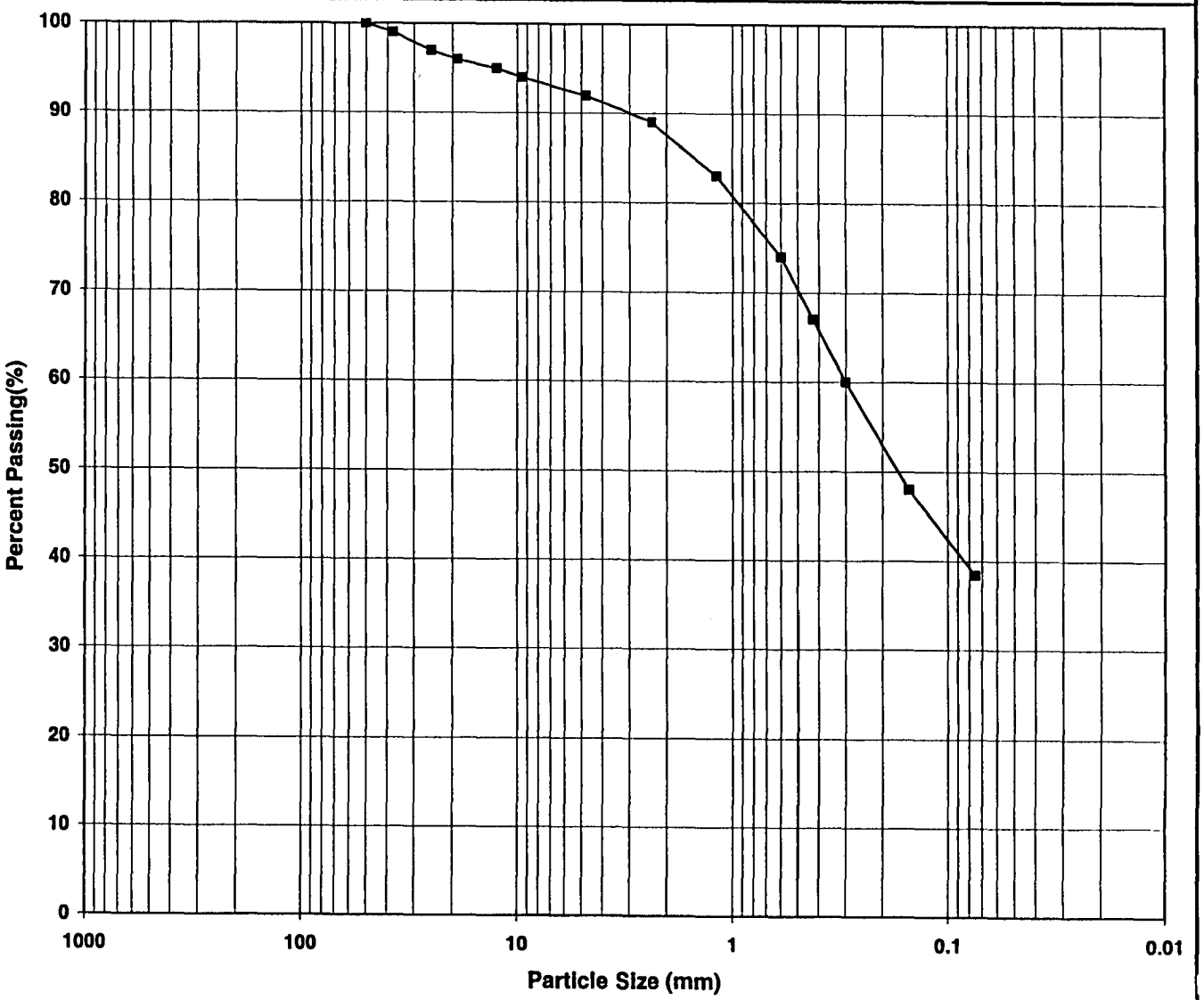
Drilled Sample:

Boring DMP-17 Sample # A Depth 0'-1.5'

Sieve US Std	Sieve Metric(mm)	Percent Passing	Specification
3"	75.0		
2.5"	62.5		
2"	50.0	100	
1.5"	37.5	99	
1.25"	31.3		
1"	25.0	97	
3/4"	19.0	96	
1/2"	12.5	95	
3/8"	9.5	94	
#4	4.75	92	
#8	2.36	89	
#10	2.0		
#16	1.18	83	
#30	0.6	74	
#40	0.43	67	
#50	0.3	60	
#100	0.15	48	
#200	0.075	38.4	

Plasticity Index NONPLASTIC

USCS Classification: SM



PARTICLE SIZE ANALYSIS

DAMES MOORE GROUP

Project: White Tanks FRS #3 Project No.: 15448-005-022 Date: December 21, 1998

Client: Maricopa County Flood Control District

Stockpile/Windrow Sample

Location:

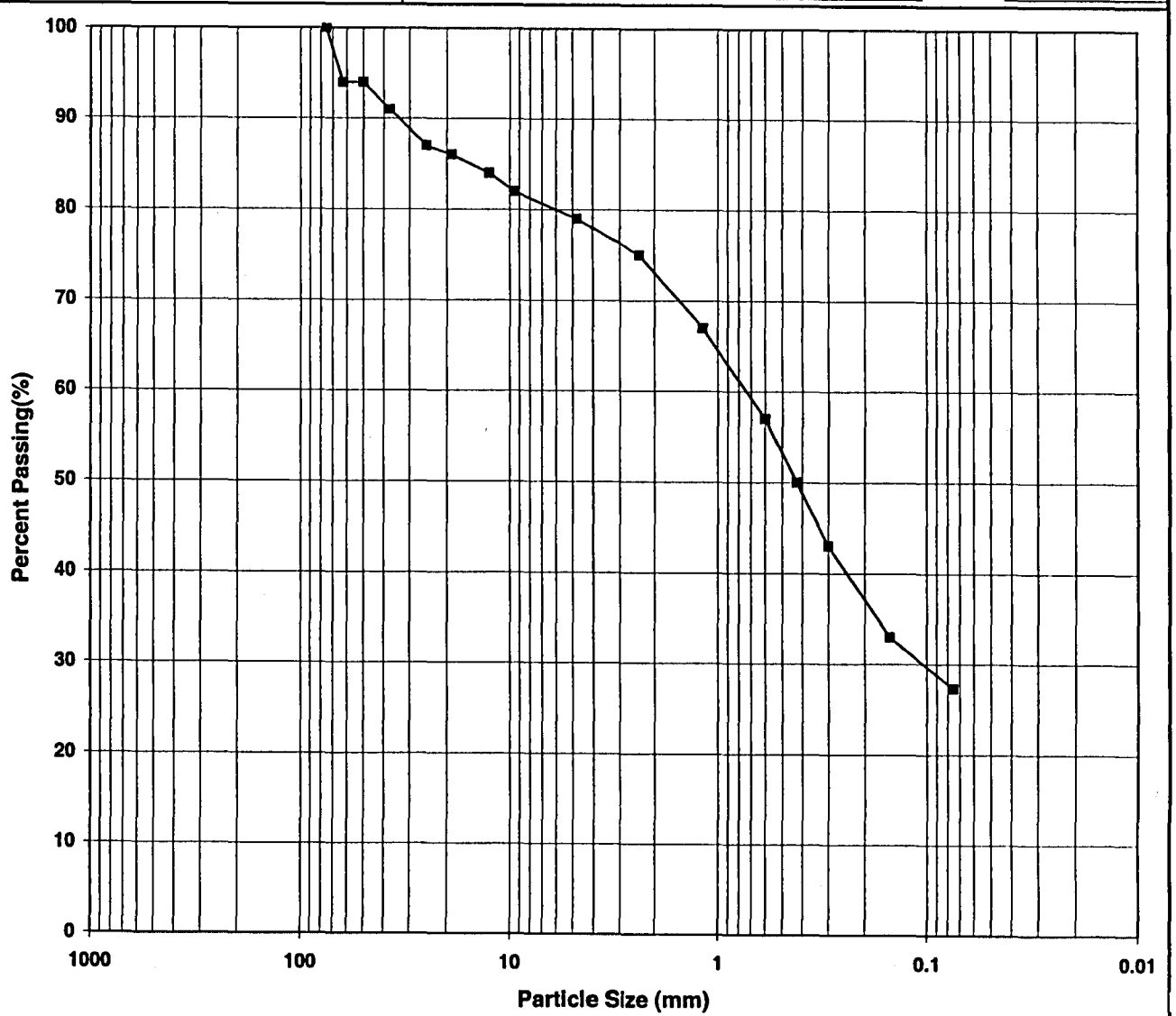
Drilled Sample:

Boring DMP-19 Sample # A Depth 1.5'-4'

Sieve US Std	Sieve Metric(mm)	Percent Passing	Specification
3"	75.0	100	
2.5"	62.5	94	
2"	50.0	94	
1.5"	37.5	91	
1.25"	31.3		
1"	25.0	87	
3/4"	19.0	86	
1/2"	12.5	84	
3/8"	9.5	82	
#4	4.75	79	
#8	2.36	75	
#10	2.0		
#16	1.18	67	
#30	0.6	57	
#40	0.43	50	
#50	0.3	43	
#100	0.15	33	
#200	0.075	27.3	

Plasticity Index NONPLASTIC

USCS Classification: SM



Moisture/Density Relationship Test

DAMES MOORE GROUP

Project **White Tanks FRS #3** Project No. 15448-005-022 Proctor # **SR-4**

Client **Maricopa County Flood Control District** Date of Report: **12/21/98**

Stockpile/Windrow Sample
Location:

Drilled Sample:
Boring **DMP-5** Sample # **A** Depth **0'-2'**

Soil Description Native **XXX** From:

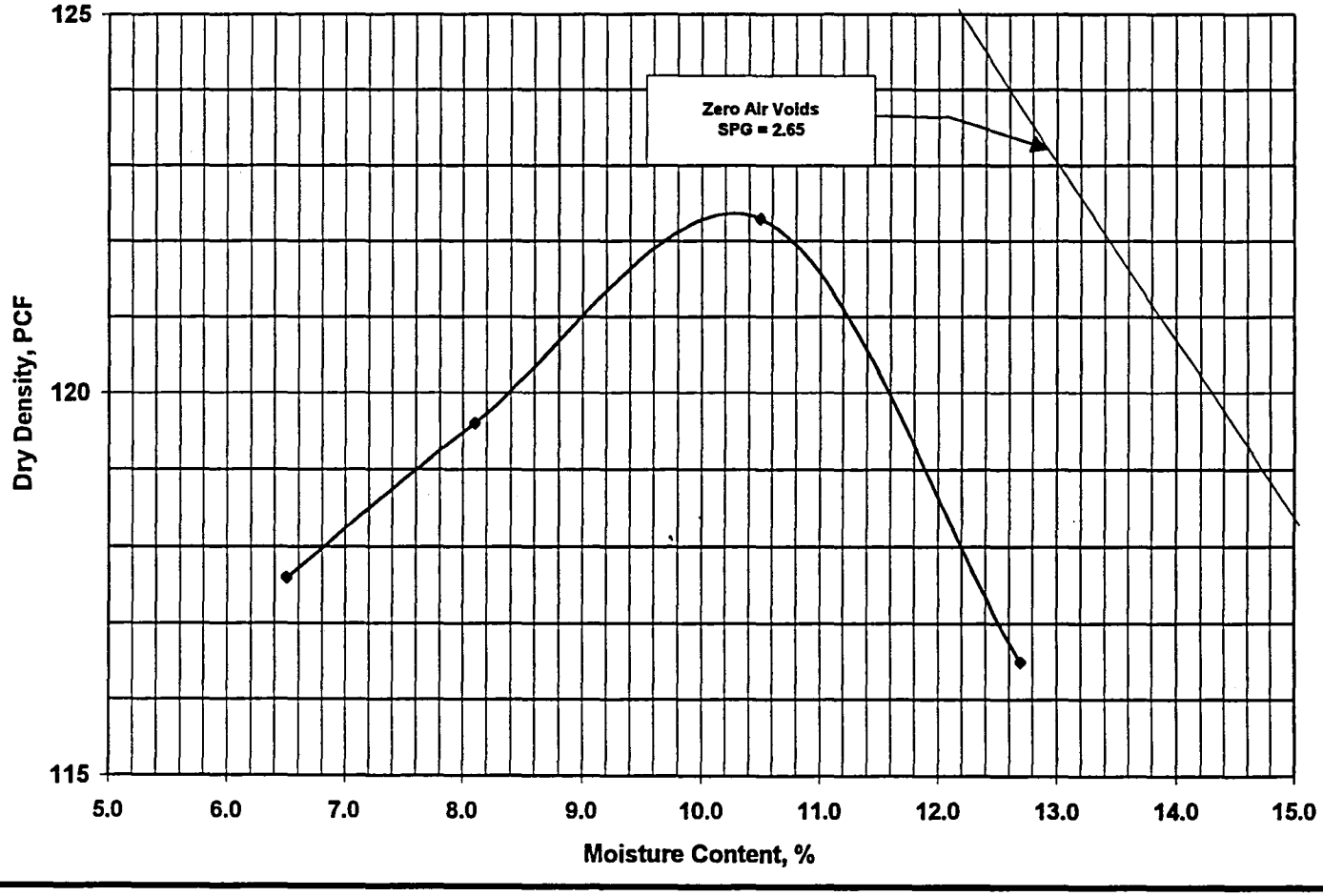
Type of Compaction:		Mold Dia (in)	Mold (ft^3)	Hammer (lbs)	Drop (in)	Layers	Blows per Layer
	ASTM D 1557, Method A	4	0.033	10	18	5	25
XX	ASTM D 698, Method A	4	0.033	5.5	10	3	25

Moisture as Received

Rock Content as Received

	Points 1	2	3	4	5	6	7	8
Moisture(%)	6.5	8.1	10.5	12.7				
Dry Density(PCF)	117.6	119.6	122.3	116.5				

Maximum Dry Density **122.5** PCF Optimum Moisture **10.2** %



Tested By **CAK** Calc'd By **MER** Reviewed By
Date Tested **12/16/98** Date Calc'd **12/18/98** Date Reviewed

Moisture/Density Relationship Test

DAMES MOORE GROUP

Project **White Tanks FRS #3** Project No. 15448-005-022 Proctor # **SR-5**

Client **Maricopa County Flood Control District** Date of Report: **12/21/98**

Stockpile/Windrow Sample
Location:

Drilled Sample:
Boring **DMP-6** Sample # **B** Depth **4'-6'**

Soil Description Native **XXX** From:

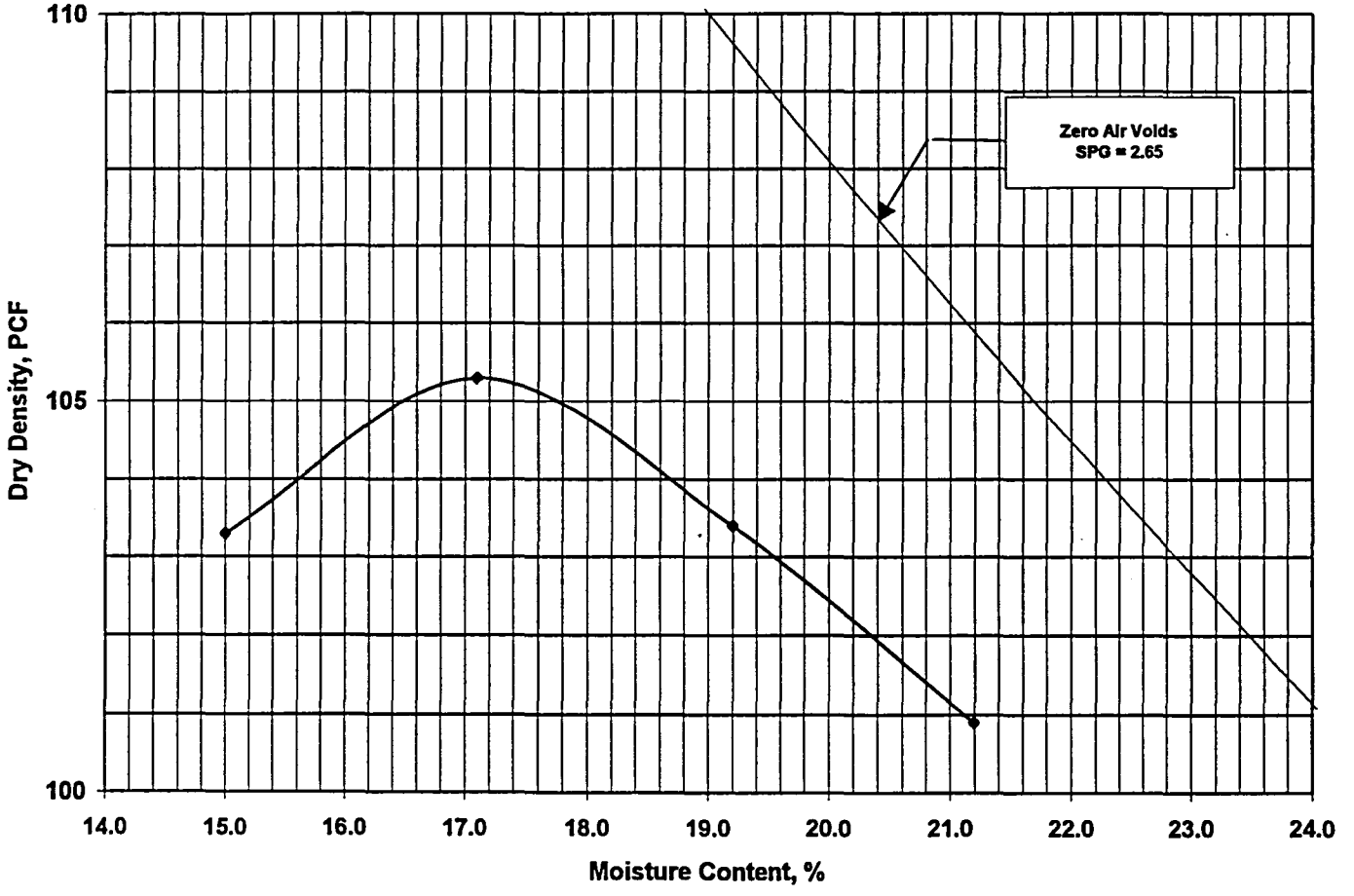
Type of Compaction:		Mold Dia (in)	Mold (ft^3)	Hammer (lbs)	Drop (in)	Layers	Blows per Layer
	ASTM D 1557, Method A	4	0.033	10	18	5	25
XX	ASTM D 698, Method A	4	0.033	5.5	10	3	25

Moisture as Received

Rock Content as Received

	Points 1	2	3	4	5	6	7	8
Moisture(%)	15.0	17.1	19.2	21.2				
Dry Density(PCF)	103.3	105.3	103.4	100.9				

Maximum Dry Density **105.3** PCF Optimum Moisture **17.3** %



Tested By **CAK** Calc'd By **MER** Reviewed By
Date Tested **12/15/98** Date Calc'd **12/18/98** Date Reviewed

Moisture/Density Relationship Test

DAMES DCM MOORE GROUP

Project **White Tanks FRS #3** Project No. 15448-005-022 Proctor # **SR-6**

Client **Maricopa County Flood Control District** Date of Report: **12/21/98**

Stockpile/Windrow Sample

Location:

Drilled Sample:

Boring **DMP-7** Sample # **A** Depth **0'-2'**

Soil Description Native **XXX** From:

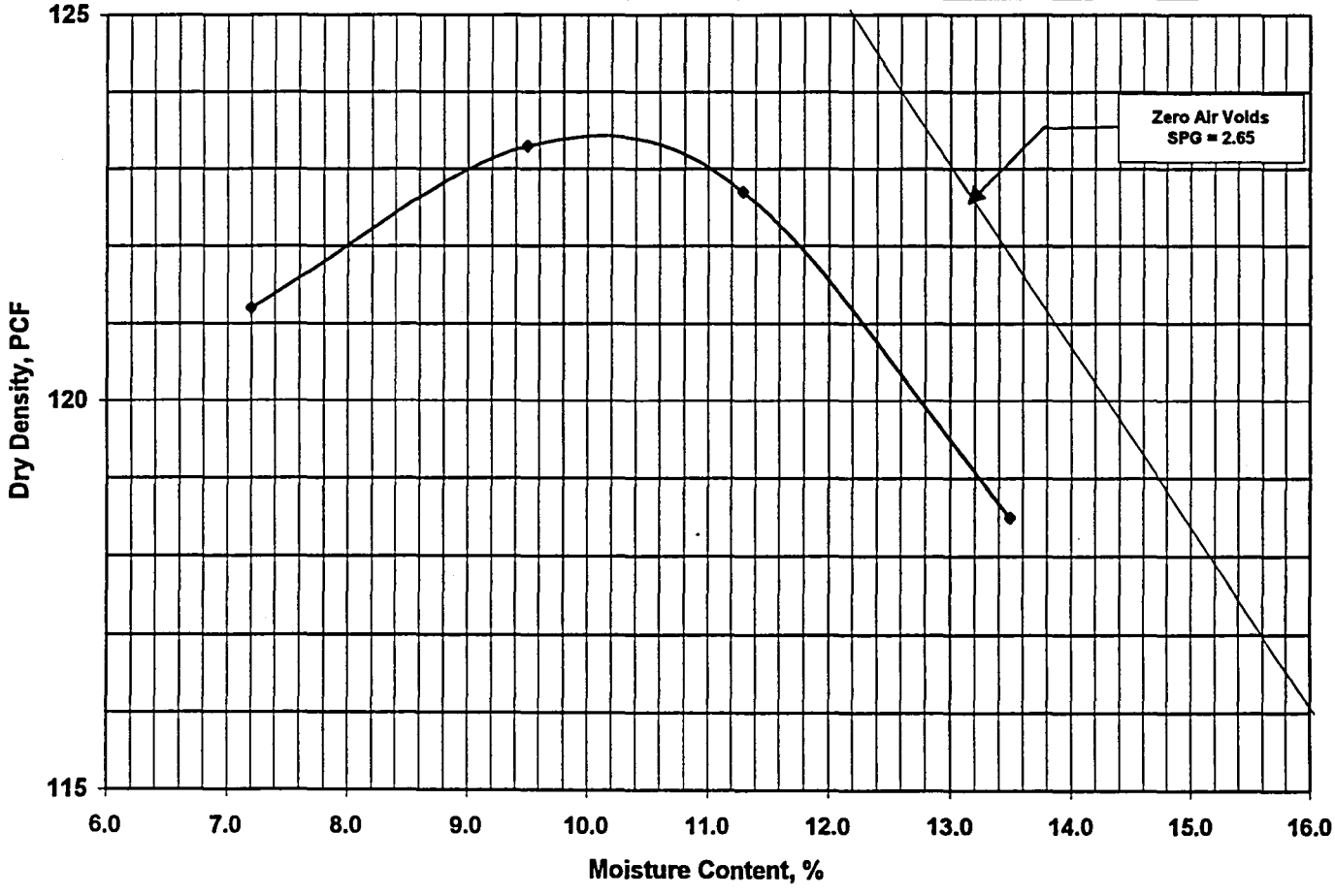
Type of Compaction:		Mold Dia (in)	Mold (ft^3)	Hammer (lbs)	Drop (in)	Layers	Blows per Layer
	ASTM D 1557, Method A	4	0.033	10	18	5	25
XX	ASTM D 698, Method A	4	0.033	5.5	10	3	25

Moisture as Received

Rock Content as Received

	Points 1	2	3	4	5	6	7	8
Moisture(%)	7.2	9.5	11.3	13.5				
Dry Density(PCF)	121.2	123.3	122.7	118.5				

Maximum Dry Density **123.4** PCF Optimum Moisture **10.6** %



Tested By **CAK** Calc'd By **MER** Reviewed By

Date Tested **12/15/98** Date Calc'd **12/18/98** Date Reviewed

Moisture/Density Relationship Test

DAMES MOORE GROUP

Project **White Tanks FRS #3** Project No. **15448-005-022** Proctor # **SR-7**

Client **Maricopa County Flood Control District** Date of Report: **12/21/98**

Stockpile/Windrow Sample
Location:

Drilled Sample:
Boring **DMP-13** Sample # **A** Depth **2.5-4.5**

Soil Description Native **XXX** From:

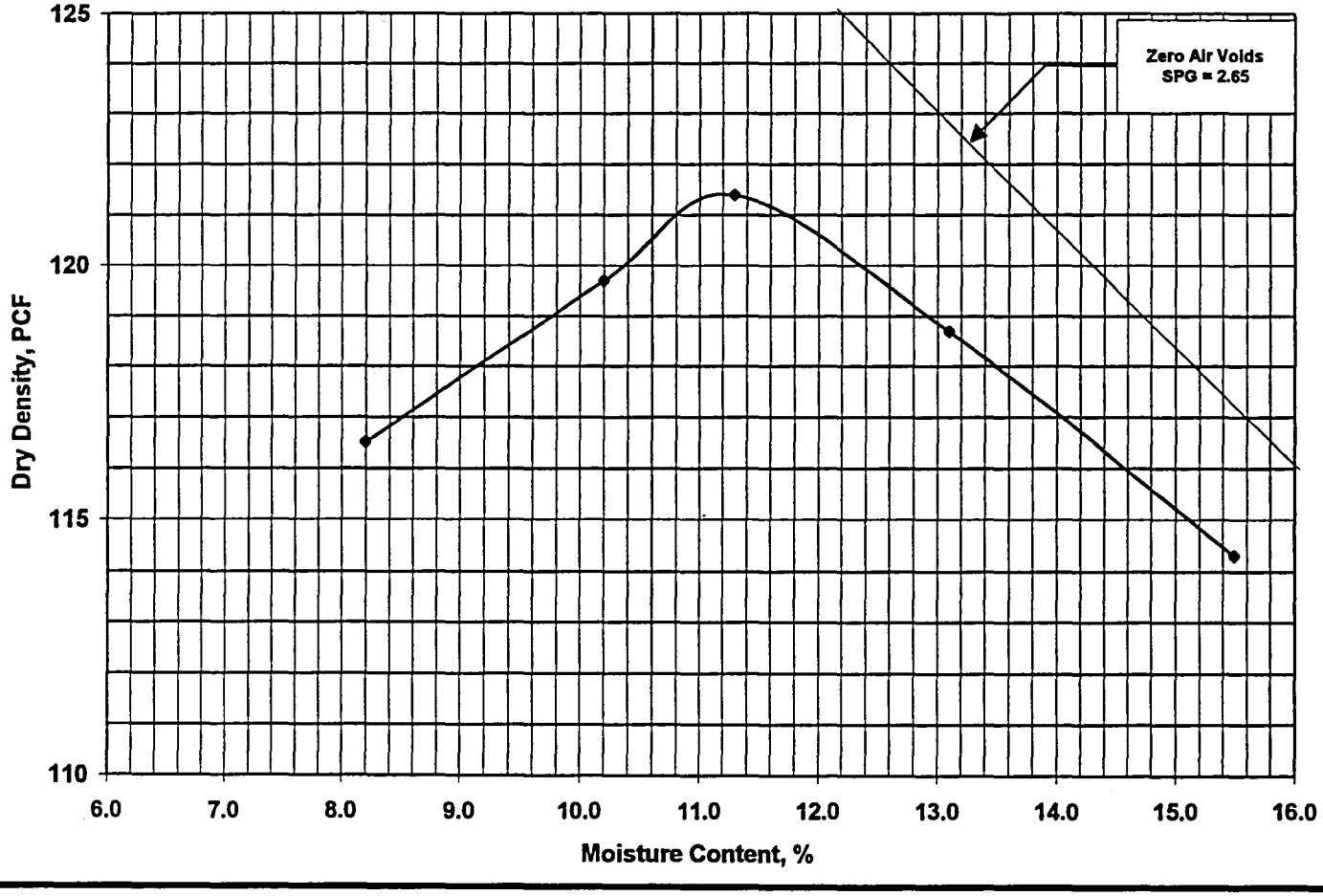
Type of Compaction:		Mold Dia (in)	Mold (ft^3)	Hammer (lbs)	Drop (in)	Layers	Blows per Layer
	ASTM D 1557, Method A	4	0.033	10	18	5	25
XX	ASTM D 698, Method A	4	0.033	5.5	10	3	25

Moisture as Received

Rock Content as Received

	Points 1	2	3	4	5	6	7	8
Moisture(%)	8.2	10.2	11.3	13.1	15.5	17.8		
Dry Density(PCF)	116.5	119.7	121.4	118.7	114.3	109.5		

Maximum Dry Density **121.3** PCF Optimum Moisture **11.2** %



Tested By **CAK** Calc'd By **MER** Reviewed By
Date Tested **12/15/98** Date Calc'd **12/18/98** Date Reviewed

Moisture/Density Relationship Test

DAMES DCM MOORE GROUP

Project **White Tanks FRS #3** Project No. 15448-005-022 Proctor # **SR-2**

Client **Maricopa County Flood Control District** Date of Report: **12/16/98**

Stockpile/Windrow Sample
Location:

Drilled Sample:
Boring **DMP-14** Sample # **A** Depth **2'-3.5'**

Soil Description Native **XXX** From:

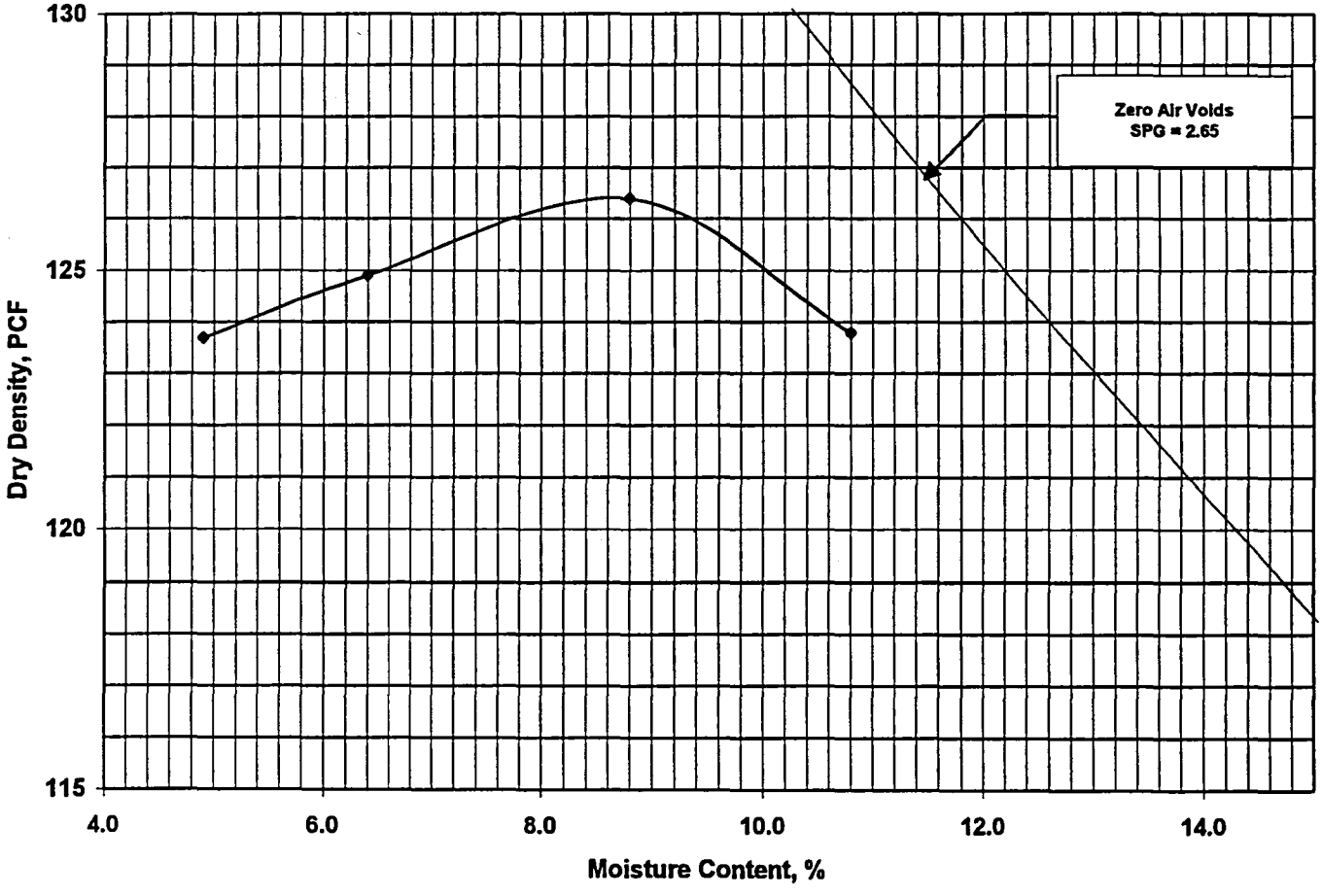
Type of Compaction:		Mold Dia (in)	Mold (ft^3)	Hammer (lbs)	Drop (in)	Layers	Blows per Layer
	ASTM D 1557, Method A	4	0.033	10	18	5	25
XX	ASTM D 698, Method A	4	0.033	5.5	10	3	25

Moisture as Received

Rock Content as Received

	Points 1	2	3	4	5	6	7	8
Moisture(%)	4.9	6.4	8.8	10.8				
Dry Density(PCF)	123.7	124.9	126.4	123.8				

Maximum Dry Density **126.4** PCF Optimum Moisture **8.7** %



Tested By **CAK** Calc'd By **MER** Reviewed By
Date Tested **12/10/98** Date Calc'd **12/16/98** Date Reviewed

Moisture/Density Relationship Test

DAMES & MOORE GROUP

Project **White Tanks FRS #3** Project No. 15448-005-022 Proctor # **SR-1**

Client **Maricopa County Flood Control District** Date of Report: **12/16/98**

Stockpile/Windrow Sample

Location:

Drilled Sample:

Boring **DMP-17** Sample # **A** Depth **0' - 1.5'**

Soil Description Native **XXX** From:

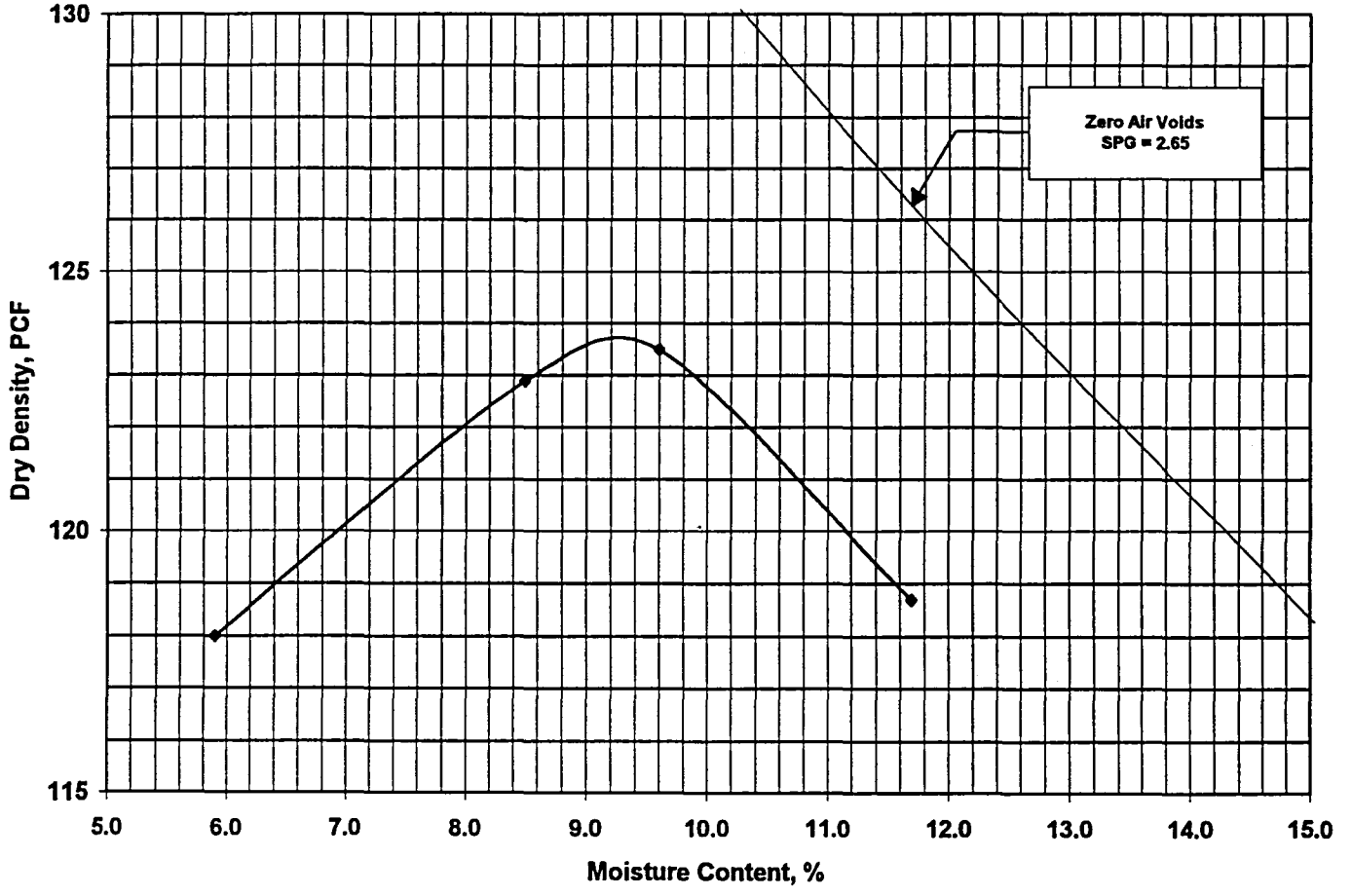
Type of Compaction:		Mold Dia (in)	Mold (ft^3)	Hammer (lbs)	Drop (in)	Layers	Blows per Layer
	ASTM D 1557, Method A	4	0.033	10	18	5	25
XX	ASTM D 698, Method A	4	0.033	5.5	10	3	25

Moisture as Received

Rock Content as Received

	Points 1	2	3	4	5	6	7	8
Moisture(%)	5.9	8.5	9.6	11.7				
Dry Density(PCF)	118.0	122.9	123.5	118.7				

Maximum Dry Density **123.8** PCF Optimum Moisture **9.2** %



Tested By **CAK** Calc'd By **MER** Reviewed By

Date Tested **12/15/98** Date Calc'd **12/16/98** Date Reviewed

Moisture/Density Relationship Test

DAMES & MOORE GROUP

Project **White Tanks FRS #3** Project No. 15448-005-022 Proctor # **SR-3**

Client **Maricopa County Flood Control District** Date of Report: **12/16/98**

Stockpile/Windrow Sample

Location:

Drilled Sample:

Boring **DMP-19** Sample # **A** Depth **1.5' - 4'**

Soil Description Native **XXX** From:

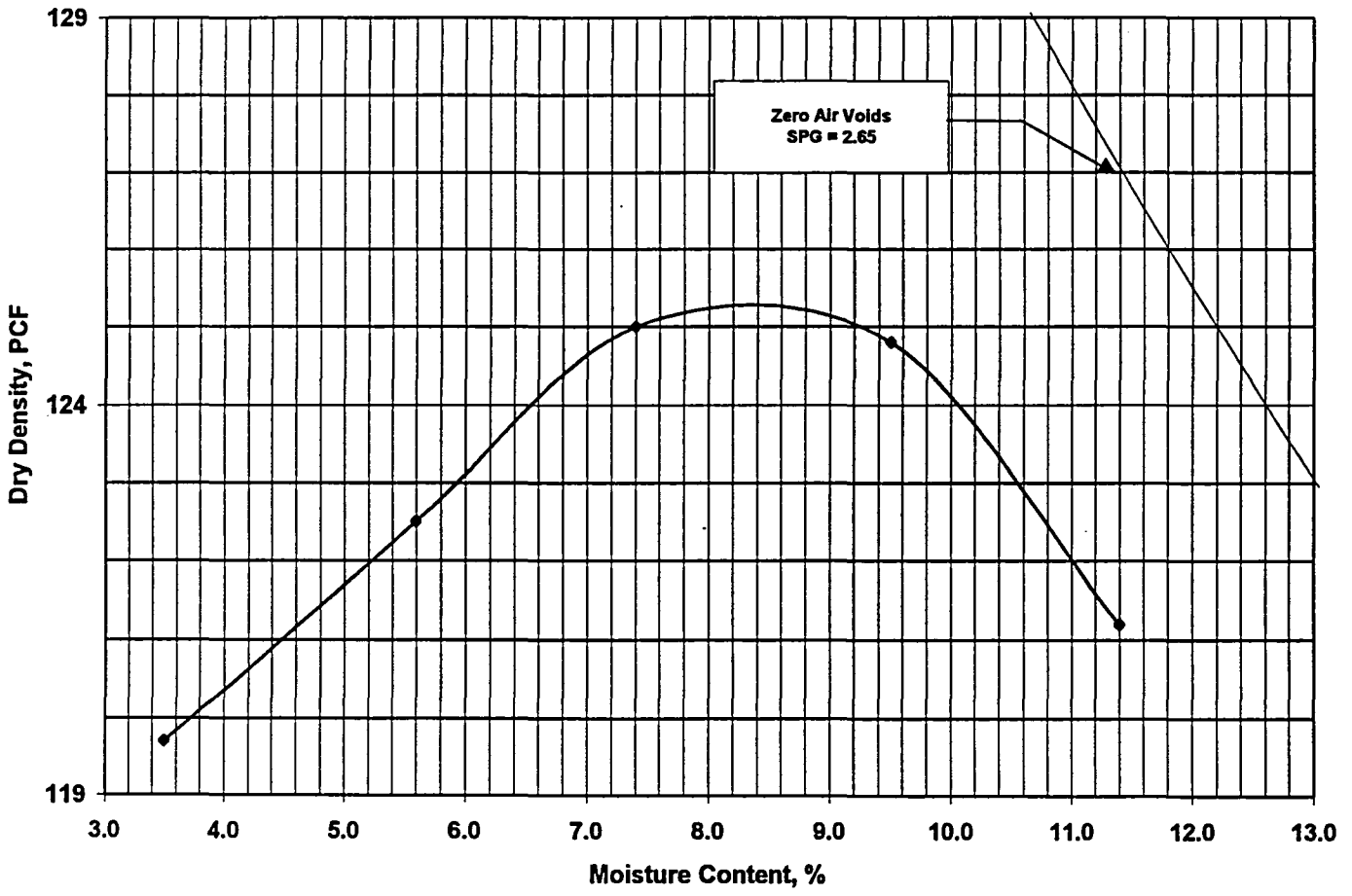
Type of Compaction:		Mold Dia (in)	Mold (ft^3)	Hammer (lbs)	Drop (in)	Layers	Blows per Layer
	ASTM D 1557, Method A	4	0.033	10	18	5	25
XX	ASTM D 698, Method A	4	0.033	5.5	10	3	25

Moisture as Received

Rock Content as Received

	Points 1	2	3	4	5	6	7	8
Moisture(%)	3.5	5.6	7.4	9.5	11.4			
Dry Density(PCF)	119.7	122.5	125.0	124.8	121.2			

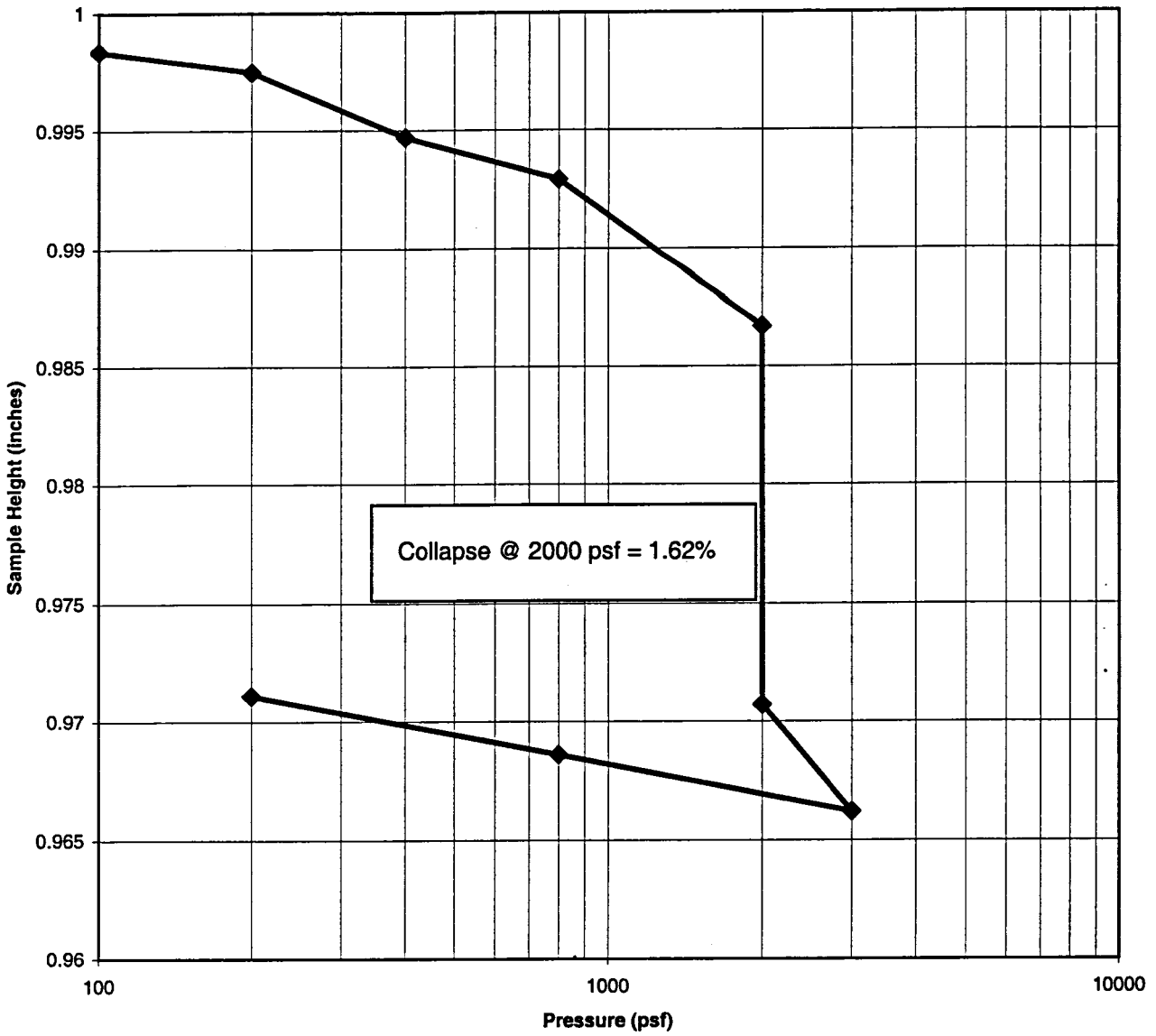
Maximum Dry Density **125.4** PCF Optimum Moisture **8.4** %



Tested By **CAK** Calc'd By **MER** Reviewed By

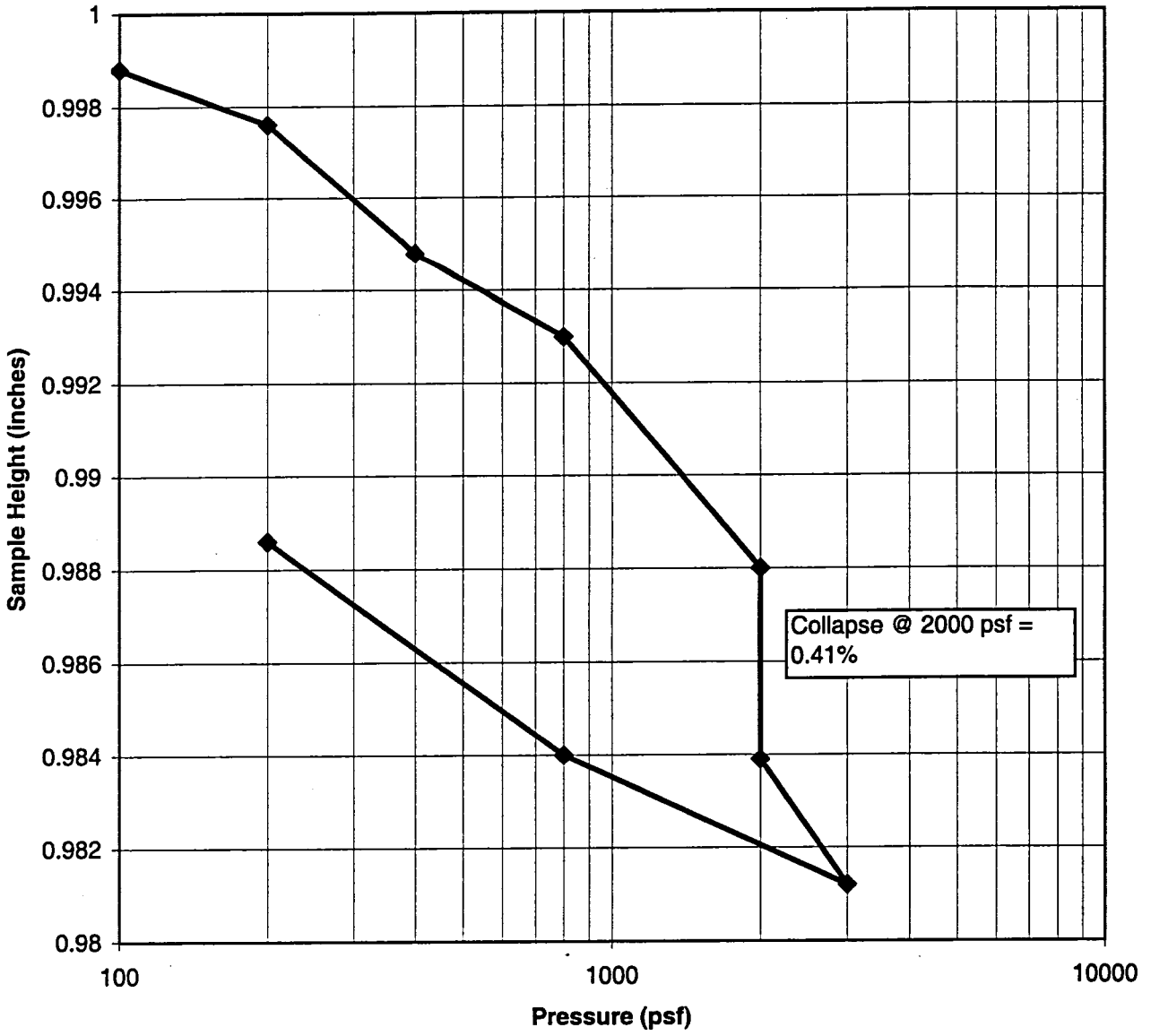
Date Tested **12/9/98** Date Calc'd **12/16/98** Date Reviewed

RESPONSE TO WETTING
Boring DMB-2, Sample at 15 - 15.5 feet.



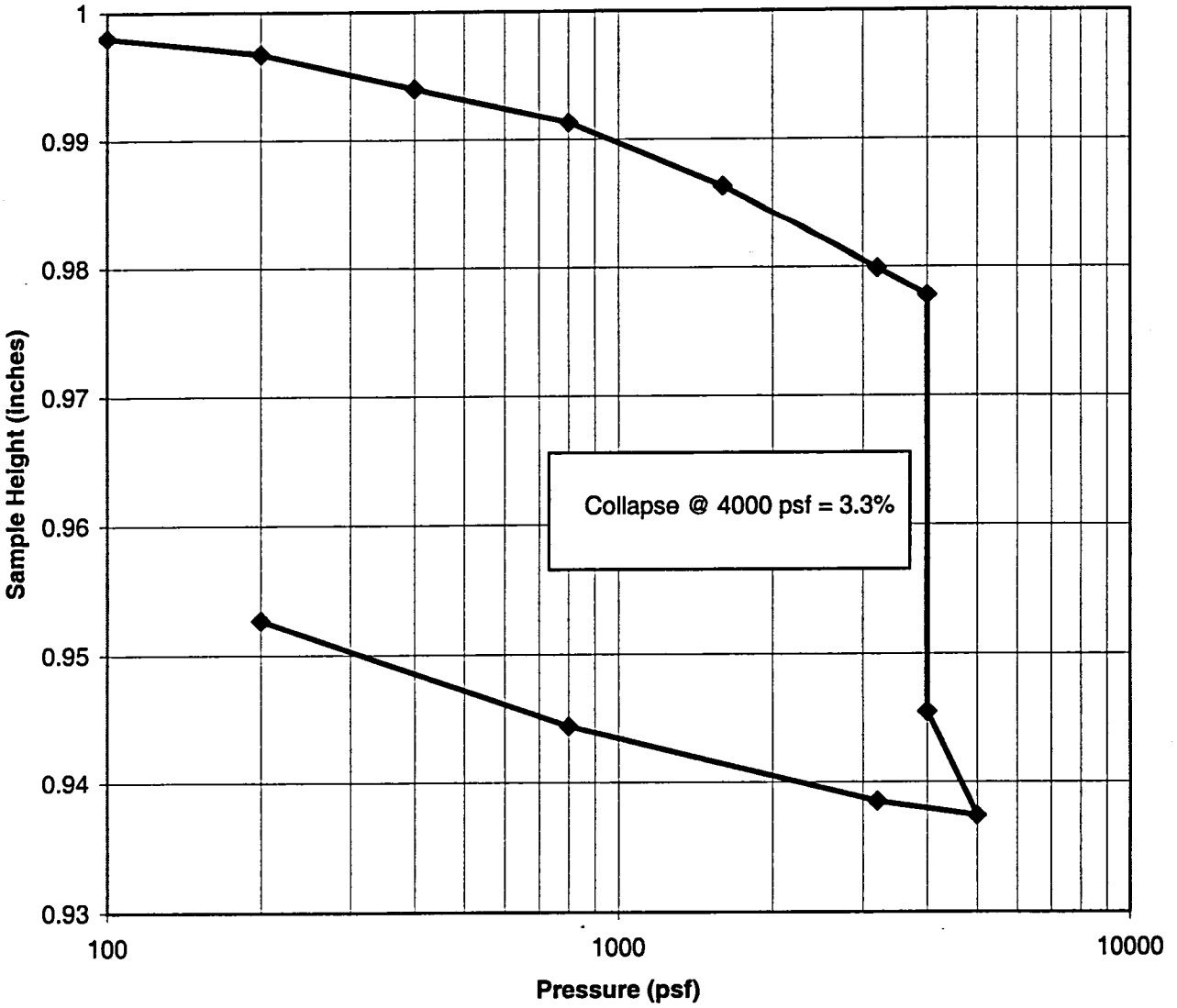
WHITE TANKS FRS #3
15448-005-022

RESPONSE TO WETTING
Boring DMB-8, Sample at 30 - 30.5 feet.



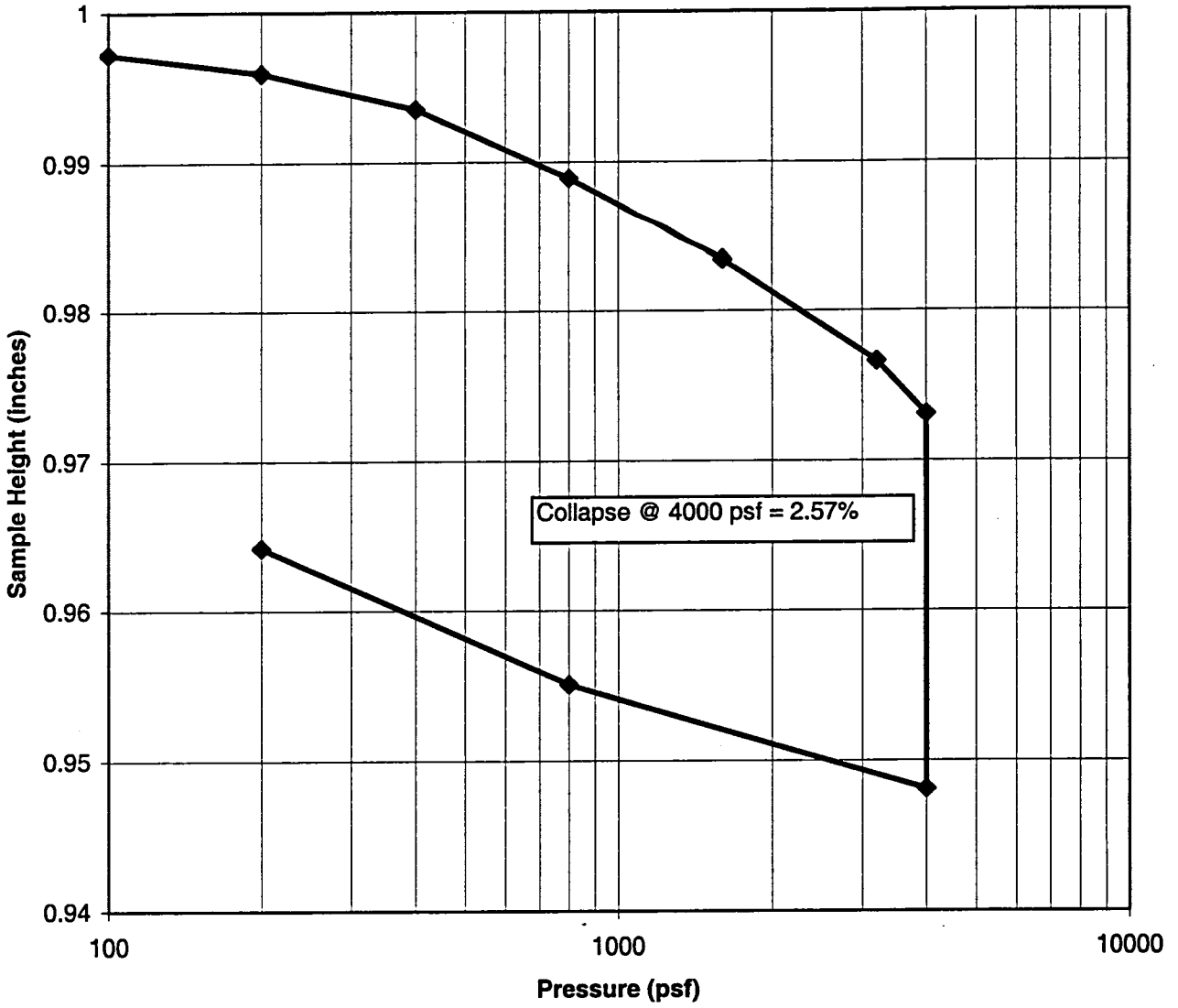
WHITE TANKS FRS #3
15448-005-022

RESPONSE TO WETTING
Boring DMB-12, Sample at 5 - 5.5 feet.



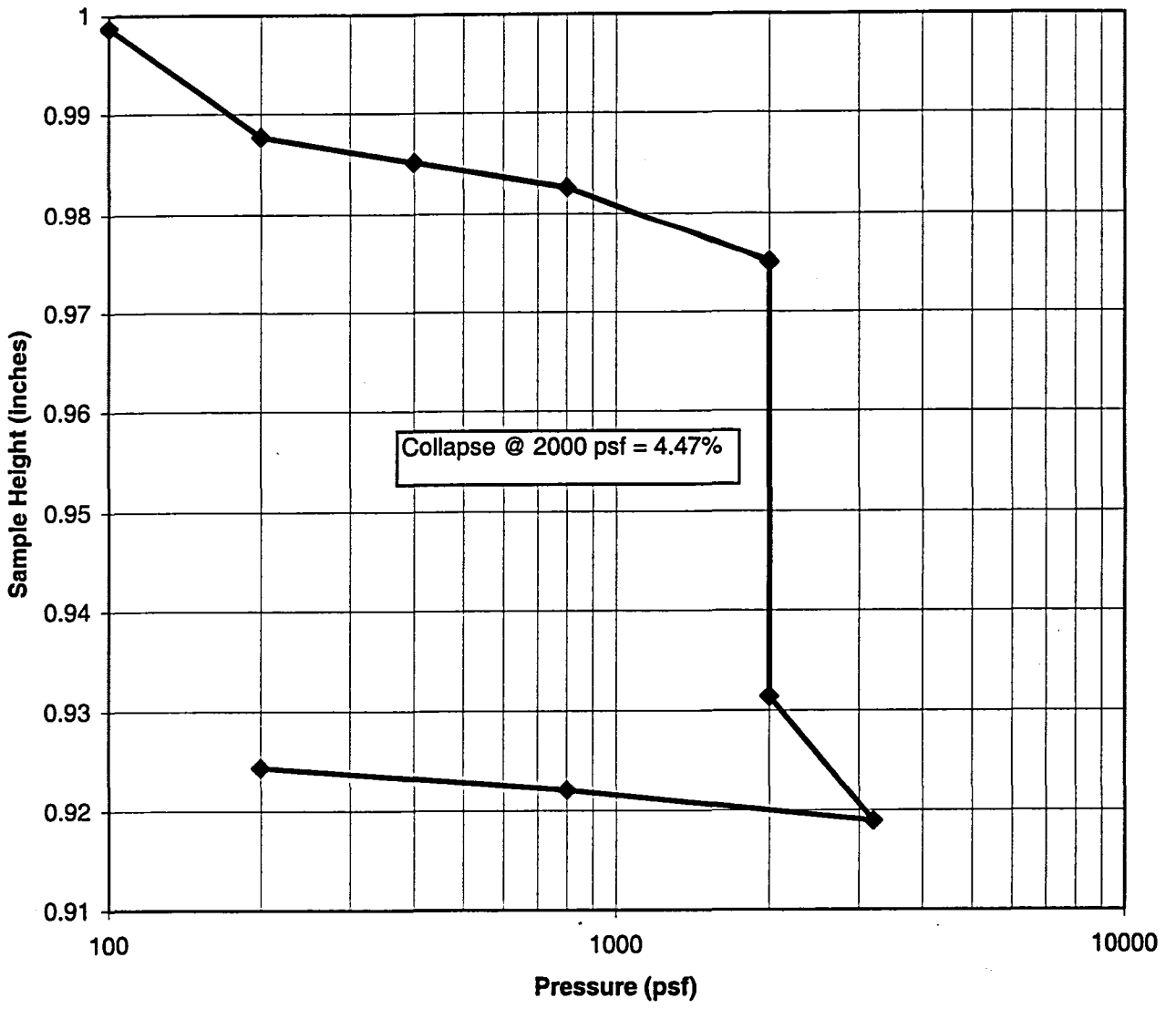
WHITE TANKS FRS #3
15448-005-022

RESPONSE TO WETTING
Boring DMB-13, Sample at 10 - 10.5 feet.



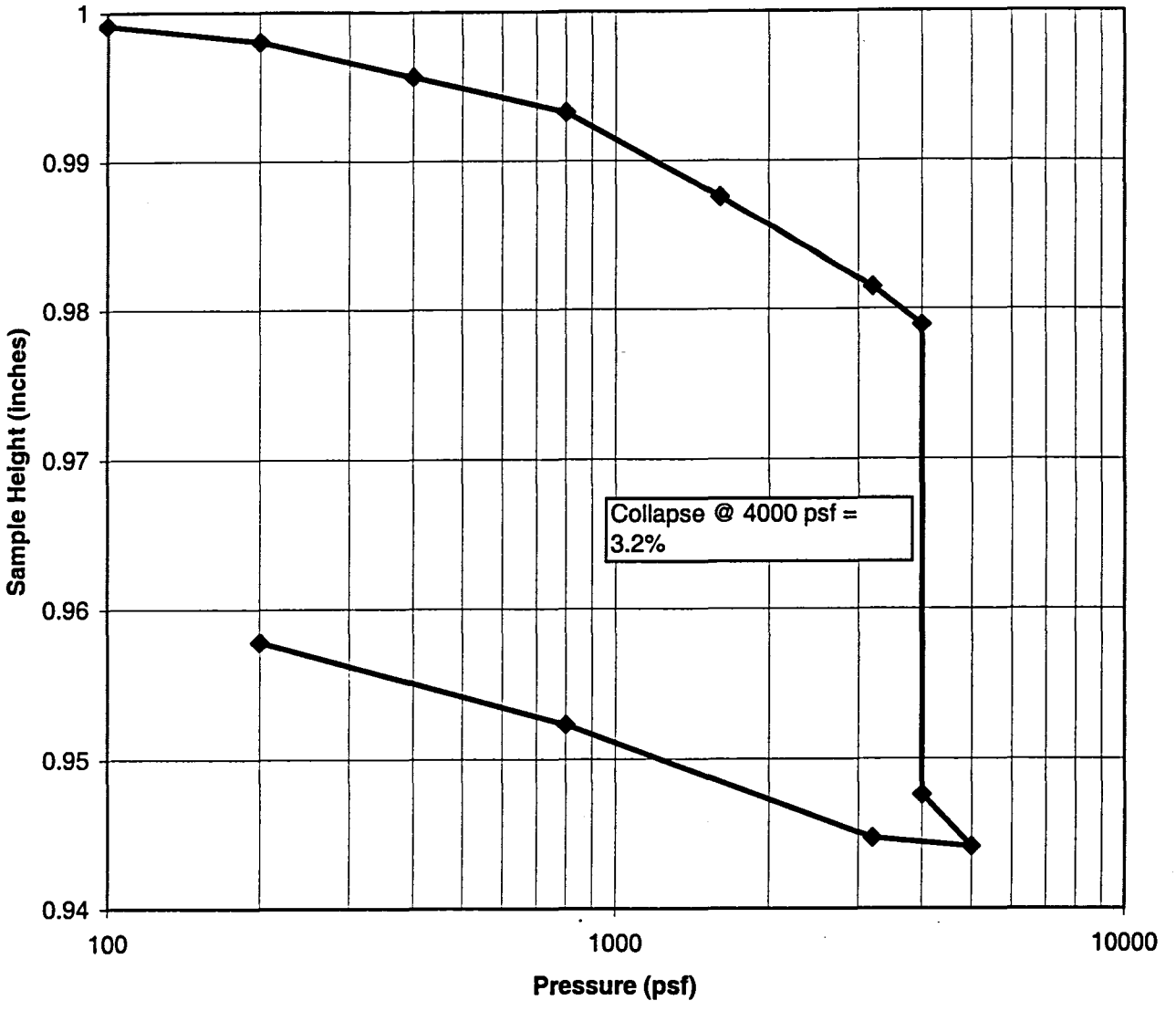
WHITE TANKS FRS #3
15448-005-022

RESPONSE TO WETTING
Boring DMB-14, Sample at 5 - 5.5 feet.



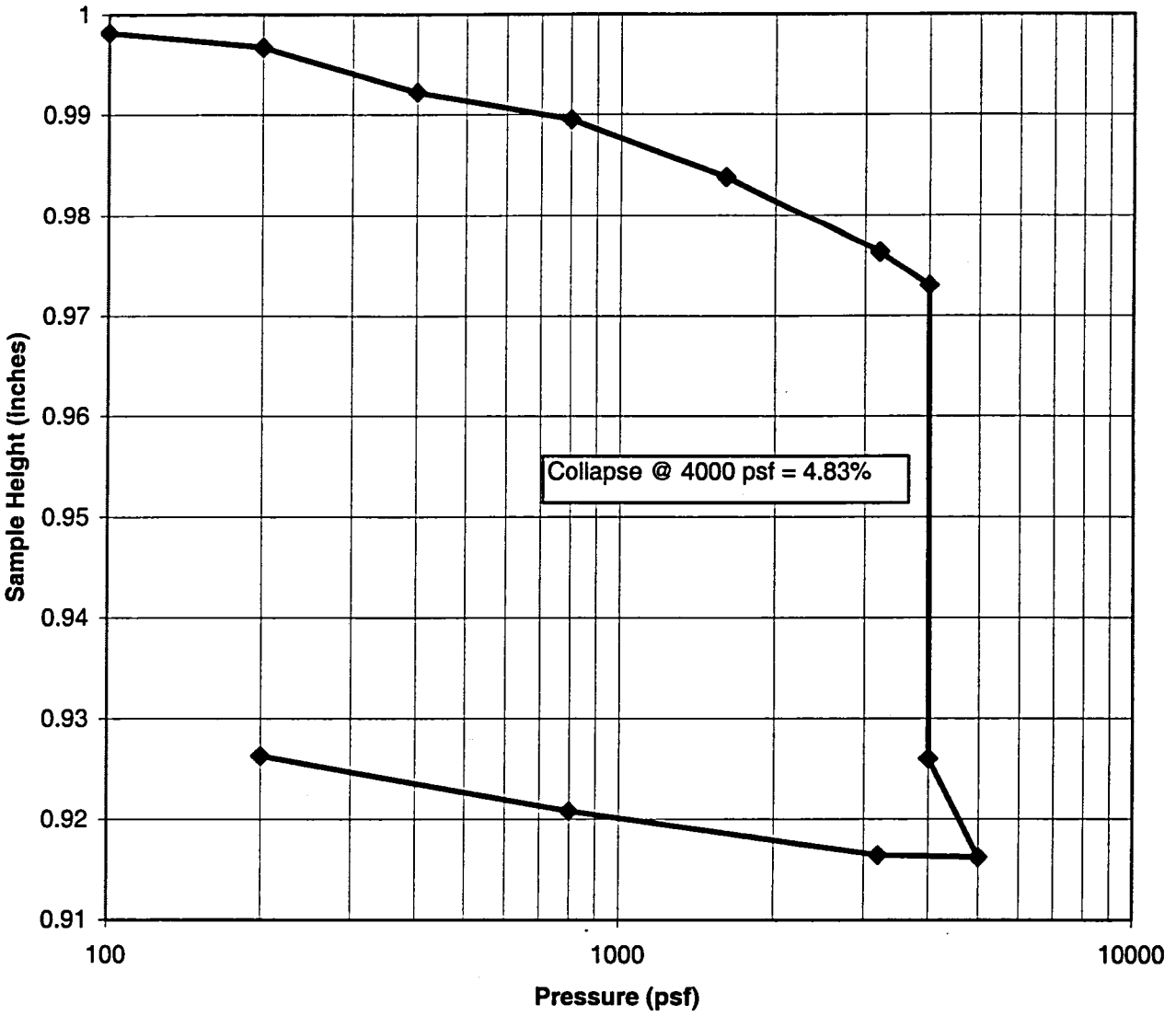
WHITE TANKS FRS #3
15448-005-022

RESPONSE TO WETTING
Boring DMB-18, Sample at 5 - 5.5 feet.



WHITE TANKS FRS #3
15448-005-022

RESPONSE TO WETTING
Boring DMB-19, Sample at 5 - 5.5 feet.



WHITE TANKS FRS #3
15448-005-022

APPENDIX B

BASIN ALTERNATIVES STUDY

BORING LOG

LOCATION OF BORING:	JOB NO.	CLIENT	LOCATION
WHITE TANKS FRS #3	15448-007-058	FCDMC	MARICOPA COUNTY

DRILLING METHOD:	INTERVAL:	DRILLER:	BORING NO.
CME 75 WITH 6-INCH HOLLOW STEM AUGER	0'-31.5'	ATL	B-1
			SHEET 1 OF 1

SAMPLING METHOD:	INTERVAL:
STANDARD PENETRATION TEST WITH SPLIT SPOON (SPT)	5-FOOT INTERVALS

DRILLING	START	FINISH
TIME		
DATE	11/1/99	11/1/99

LOGGED BY: BKW	WATER LEVEL	NA	
CHECKED BY: SGN	TIME		
	DATE		
	CASING DEPTH		

DATUM: APPROX. ELEVATION: feet

SURFACE CONDITIONS: SPARSLY VEGETATED MINIMAL SIGNS OF DISTURBANCE

DEPTH IN FEET	SAMPLER TYPE	SAMPLE NO.	SAMPLE DEPTH (ft)	LABORATORY TESTS: % PASSING #200 SIEVE	LIQUID LIMIT %	PLASTICITY INDEX %	WATER CONTENT %	DRY DENS. (pcf)	BLOWS/ft	GRAPHIC LOG	USCS	DESCRIPTION
											SM	SILTY SAND WITH GRAVEL: Fine, dry, dense, light brown
5	SPT	1	5.0						34			
10	SPT	2	10.0						39			
15	SPT	3	15.0						66			
20	SPT	4	20.0						50/6"			Less gravel at 20 feet
25	SPT	5	25.0						50/6"			
30	SPT	6	30.0	24.5					50/6"			
												Boring terminated at 31.5' below ground surface.
35												

BLGV022 4/18/01

DAMES & MOORE

BORING LOG

LOCATION OF BORING:	JOB NO.	CLIENT FCDMC	LOCATION
WHITE TANKS FRS #3	15448-007-058		MARICOPA COUNTY

DRILLING METHOD:	INTERVAL:	DRILLER:	BORING NO.
CME 75 WITH 6-INCH HOLLOW STEM AUGER	0'-31.5'	ATL	B-2
			SHEET 1 OF 1

SAMPLING METHOD:	INTERVAL:	DRILLING START	DRILLING FINISH
STANDARD PENETRATION TEST WITH SPLIT SPOON (SPT)	5-FOOT INTERVALS	TIME	TIME
		DATE 11/1/99	DATE 11/1/99

LOGGED BY: BKW	WATER LEVEL	NA	
CHECKED BY: SGN	TIME		
	DATE		
	CASING DEPTH		

DATUM: APPROX. ELEVATION: feet

SURFACE CONDITIONS: SPARSLY VEGETATED MINIMAL SIGNS OF DISTURBANCE

DEPTH IN FEET	SAMPLER TYPE	SAMPLE NO.	SAMPLE DEPTH (ft)	% PASSING #200 SIEVE	LIQUID LIMIT %	PLASTICITY INDEX %	WATER CONTENT %	DRY DENS. (pcf)	BLOWS/ft	GRAPHIC LOG	USCS	DESCRIPTION
											SM	SILTY SAND: Dry, hard, brown 1 bag sample from 0-5 feet
5	SPT	1	5.0						50/6"			1 bag sample from 5-10 feet
10	SPT	2	10.0						60			Some gravel 1 bag sample from 10-15 feet
15	SPT	3	15.0	41.4					45			less gravel 1 bag sample from 15-20 feet
20	SPT	4	20.0	24.0	32	9			50/6"			1 bag sample from 20-25 feet
25	SPT	5	25.0						50/6"			1 bag sample from 25-30 feet
30	SPT	6	30.0						50/6"			
												Boring terminated at 31.5' below ground surface.
35												

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DAMES & MOORE

BORING LOG

LOCATION OF BORING:	JOB NO.	CLIENT FCDMC	LOCATION
WHITE TANKS FRS #3	15448-007-058		MARICOPA COUNTY

DRILLING METHOD:	INTERVAL:	DRILLER:	BORING NO.
CME 75 WITH 6-INCH HOLLOW STEM AUGER	0'-31.5'	ATL	B-3
			SHEET 1 OF 1

SAMPLING METHOD:	INTERVAL:
STANDARD PENETRATION TEST WITH SPLIT SPOON (SPT)	5-FOOT INTERVALS

				DRILLING START	DRILLING FINISH
LOGGED BY: BKW	WATER LEVEL	NA		TIME	TIME
CHECKED BY: SGN	TIME				
	DATE			DATE 11/2/99	DATE 11/2/99
	CASING DEPTH				

DATUM: APPROX. ELEVATION: feet

SURFACE CONDITIONS: SPARSLY VEGETATED MINIMAL SIGNS OF DISTURBANCE

DEPTH IN FEET	SAMPLER TYPE	SAMPLE NO.	SAMPLE DEPTH (ft)	LABORATORY TESTS: % PASSING #200 SIEVE	LIQUID LIMIT %	PLASTICITY INDEX %	WATER CONTENT %	DRY DENS. (pcf)	BLOWS/ft	GRAPHIC LOG	USCS	DESCRIPTION
											SM	SILTY SAND: Dry, brown 1 bag sample from 0-5 feet
5	SPT	1	5.0	20.2	NV	NP			11			1 bag sample 5-10 feet
10	SPT	2	10.0						8			More sand 1 bag sample from 10-15 feet
15	SPT	3	15.0						30			Some gravel 1 bag sample from 15-20 feet
20	SPT	4	20.0	26.2					31			SILTY SAND WITH GRAVEL: Little sand, some gravel 1 bag sample from 20-25 feet
25	SPT	5	25.0						69			Light grayish color gravel rock layer 1 bag sample from 25-30 feet
	SPT	6	28.5						51			Light recovery
30												Boring terminated at 30' below ground surface.
35												

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DAMES & MOORE

BORING LOG

LOCATION OF BORING:	JOB NO.	CLIENT FCDMC	LOCATION
WHITE TANKS FRS #3	15448-007-058		MARICOPA COUNTY

DRILLING METHOD:	INTERVAL:	DRILLER:	BORING NO.
CME 75 WITH 6-INCH HOLLOW STEM AUGER	0'-30'	ATL	B-4
			SHEET 1 OF 1

SAMPLING METHOD:	INTERVAL:
STANDARD PENETRATION TEST WITH SPLIT SPOON (SPT)	5-FOOT INTERVALS

			DRILLING START	DRILLING FINISH
LOGGED BY: BKW	WATER LEVEL	NA	TIME 1330	TIME 1530
CHECKED BY: SGN	TIME			
	DATE		DATE 11/2/99	DATE 11/2/99
	CASING DEPTH			

DATUM: APPROX. ELEVATION: feet

SURFACE CONDITIONS: SPARSLY VEGETATED MINIMAL SIGNS OF DISTURBANCE

DEPTH IN FEET	SAMPLER TYPE	SAMPLE NO.	SAMPLE DEPTH (ft)	% PASSING #200 SIEVE	LIQUID LIMIT %	PLASTICITY INDEX %	WATER CONTENT %	DRY DENS. (pcf)	BLOWS/ft	GRAPHIC LOG	USCS	DESCRIPTION
											SC SM	SILTY SAND WITH CLAY, TRACE GRAVEL: Dry, brown 1 bag sample from 0-5 feet
5	SPT	1	5.0	35.4	26	21	5.0		5			1 bag sample from 5-10 feet
10	SPT	2	10.0						50/6"			Some gravel 1 bag sample from 10-15 feet
15	SPT	3	15.0						26			1 bag sample from 15-20 feet
20	SPT	4	20.0	50.8					79		SM ML	SILTY SAND/SANDY SILT: Less gravel, hard 1 bag sample from 20-25 feet
25	SPT	5	25.0						72			1 bag sample from 25-28 feet Increasing silt content
	SPT	6	28.5	52.1					24			Trace gravel
30												Boring terminated at 30' below ground surface.
35												

BLGV022 4/18/01

DAMES & MOORE

BORING LOG

LOCATION OF BORING:	JOB NO.	CLIENT FCDMC	LOCATION
WHITE TANKS FRS #3	15448-007-058		MARICOPA COUNTY

DRILLING METHOD:	INTERVAL:	DRILLER:	BORING NO.
CME 75 WITH 6-INCH HOLLOW STEM AUGER	0'-30'	ATL	B-5
			SHEET 1 OF 1

SAMPLING METHOD:	INTERVAL:
STANDARD PENETRATION TEST WITH SPLIT SPOON (SPT)	5-FOOT INTERVALS

			DRILLING START	DRILLING FINISH
LOGGED BY: BKW	WATER LEVEL	NA	TIME 0900	TIME 1030
CHECKED BY: SGN	TIME			
	DATE		DATE 11/3/99	DATE 11/3/99
DATUM: APPROX. ELEVATION: feet	CASING DEPTH			

SURFACE CONDITIONS: SPARSLY VEGETATED MINIMAL SIGNS OF DISTURBANCE

DEPTH IN FEET	SAMPLER TYPE	SAMPLE NO.	SAMPLE DEPTH (ft)	% PASSING #200 SIEVE	LIQUID LIMIT %	PLASTICITY INDEX %	WATER CONTENT %	DRY DENS. (pcf)	BLOWS/ft	GRAPHIC LOG	USCS	DESCRIPTION
											SC SM	SILTY SAND WITH CLAY AND GRAVEL: Dry, brown 1 bag sample from 0-5 feet
5	SPT	1	5.0	40.9	26	5			8			1 bag sample from 5-10 feet
10	SPT	2	10.0	23.0					43			Some gravel 1 bag sample from 10-15 feet
15	SPT	3	15.0						48			1 bag sample from 15-20 feet
20	SPT	4	20.0						45			1 bag sample from 20-25 feet
25	SPT	5	25.0						50/6"			1 bag sample from 25-28.5 feet
	SPT	6	28.5						83			
30												Boring terminated at 30' below ground surface.
35												

BLGV022 4/18/01

DAMES & MOORE

BORING LOG

LOCATION OF BORING:	JOB NO.	CLIENT FCDMC	LOCATION
WHITE TANKS FRS #3	15448-007-058		MARICOPA COUNTY

DRILLING METHOD:	INTERVAL:	DRILLER:	BORING NO.
CME 75 WITH 6-INCH HOLLOW STEM AUGER	0'-30'	ATL	B-6
			SHEET 1 OF 1

SAMPLING METHOD:	INTERVAL:
STANDARD PENETRATION TEST WITH SPLIT SPOON (SPT)	5-FOOT INTERVALS

			DRILLING START	DRILLING FINISH
LOGGED BY: BKW	WATER LEVEL	NA	TIME 1045	TIME 1200
CHECKED BY: SGN	TIME			
	DATE		DATE 11/3/99	DATE 11/3/99
DATUM: APPROX. ELEVATION: feet	CASING DEPTH			

SURFACE CONDITIONS: SPARSLY VEGETATED MINIMAL SIGN OF DISTURBANCE

DEPTH IN FEET	SAMPLER TYPE	SAMPLE NO.	SAMPLE DEPTH (ft)	LABORATORY TESTS: % PASSING #200 SIEVE	LIQUID LIMIT %	PLASTICITY INDEX %	WATER CONTENT %	DRY DENS. (pcf)	BLOWS/ft	GRAPHIC LOG	USCS	DESCRIPTION
											SM	SILTY SAND: Little sand, dry, brown
5	SPT	1	5.0	44.8					6			
10	SPT	2	10.0	27.0					21			Decreasing silt content 1 bag sample from 10-15 feet
15	SPT	3	15.0						45			Some gravel 1 bag sample from 15-20 feet
20	SPT	4	20.0						48			
25	SPT	5	25.0						50/6"			1 bag sample from 25-30 feet
	SPT	6	28.5						54			
30												Boring terminated at 30' below ground surface.
35												

BLGV022 4/18/01

DAMES & MOORE

TEST PIT LOG

Location:	White Tanks FRS #3 Basin Alternatives	Job No.	15448-007-058	Client	FCDMC	Test Pit No.
Logged By:	BKW/PLG	Checked By:	SGN	Date	11/9/1999	TP-1

DEPTH (feet)	SAMPLE No./Type	USCS SYMBOL	GENERAL DESCRIPTION
0 0.5 1 1.5 2 2.5 3 3.5 4 4.5 5 5.5 6 6.5 7 7.5 8 8.5 9 9.5 10	1/BULK	ML	**SANDY SILT:** Light brown, dry, soft; sand is fine with small coarse fraction (15%), few fine gravels, relatively easy excavation conditions.
10.5 11 11.5 12 12.5 13		ML	**SANDY SILT:** Brown, dry, loose; sand is fine to coarse, few fine to coarse gravels, few cobbles. Moderately cemented, relatively easy excavation conditions.
13.5 14 14.5 15 15.5 16	2/BULK	SM	**SILTY SAND:** Light brown, dry, soft; sand is primarily fine with small coarse fraction (15%), very few fine gravels, relatively easy excavation conditions Excavation terminated at 16 feet.

TEST PIT LOG

Location:	White Tanks FRS #3 Basin Alternatives	Job No.	15448-007-058	Client	FCDMC	Test Pit No.
Logged By:	BKW/PLG	Checked By:	SGN	Date	11/10/1999	TP-2

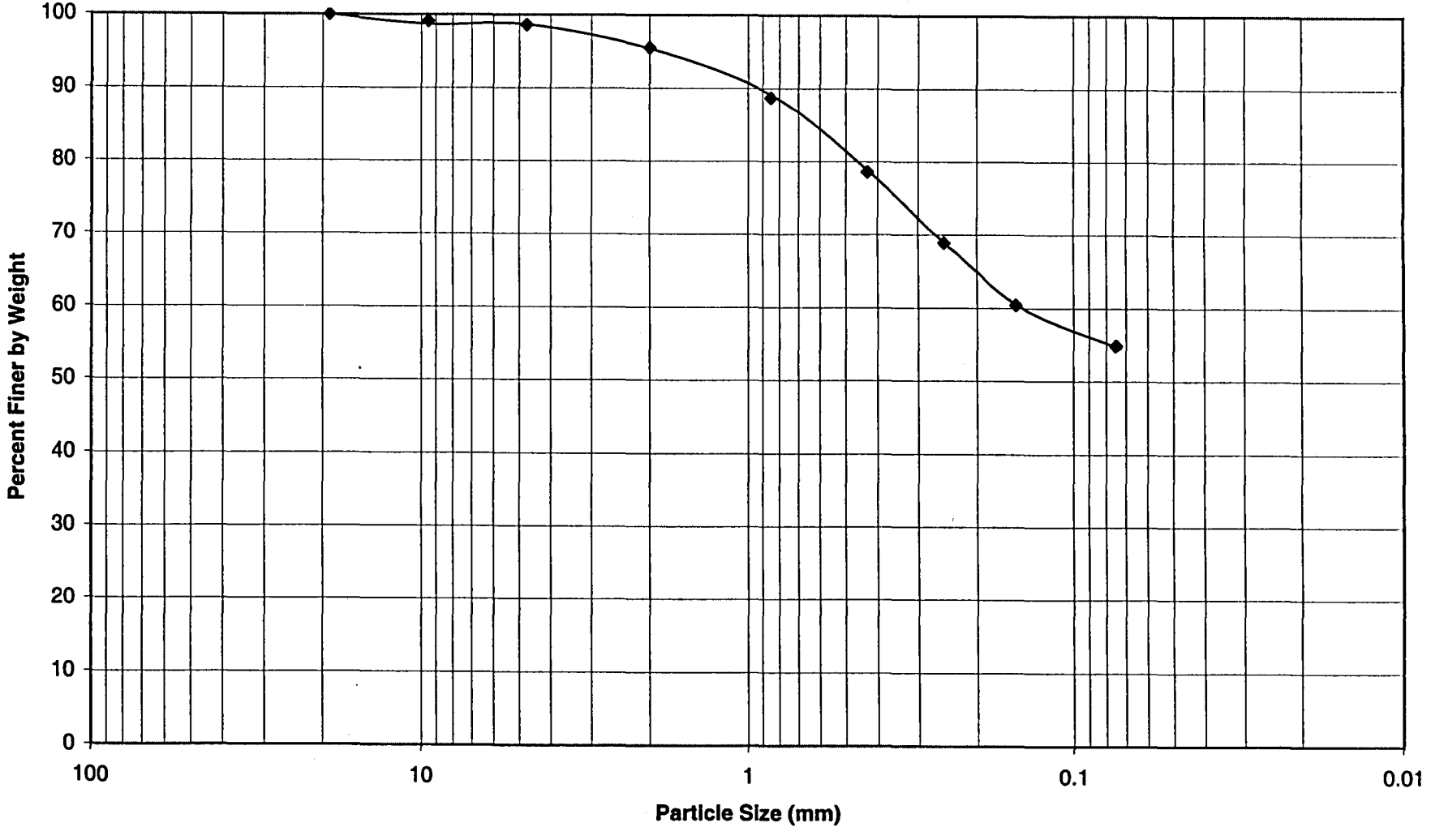
DEPTH (feet)	SAMPLE No./Type	USCS SYMBOL	GENERAL DESCRIPTION
0 0.5 1 1.5 2 2.5 3 3.5 4 4.5 5 5.5 6 6.5 7	1/BULK	CL	**SANDY, LOW-PLASTICITY CLAY:** Light brown, dry, hard; sand if primarily fine to medium with few fine gravels. Moderate effort to excavate.
7.5 8 8.5 9 9.5 10 10.5 11 11.5 12 12.5 13 13.5 14		SW-SM	**WELL-GRADED SAND WITH SILT:** Sand is fine to coarse, gravel is fine to coarse. Many cobbles up to 8".
14.5 15 15.5 16 16.5 17 17.5		SM	**SILTY SAND WITH GRAVEL:** Light brown, dry, dense, sands are fine to coarse, gravels are fine to coarse. Moderate effort to excavate. Excavation terminated at 17.5 feet.

TEST PIT LOG

Location:	White Tanks FRS #3 Basin Alternatives	Job No.	15448-007-058	Client	FCDMC	Test Pit No.
Logged By:	PLG	Checked By:	SGN	Date	11/10/1999	TP-3

DEPTH (feet)	SAMPLE No./Type	USCS SYMBOL	GENERAL DESCRIPTION
0 0.5 1 1.5 2 2.5 3 3.5 4 4.5 5 5.5 6 6.5 7 7.5 8 8.5 9 9.5 10 10.5 11	1/BULK	CL-ML	**SANDY CLAY WITH SILT:** Light brown, dry, medium dense, sand is fine. Relatively easy excavation conditions
11.5 12 12.5 13 13.5 14 14.5 15 15.5 16 16.5 17 17.5	2/BULK	SC-SM	**CLAYEY SAND WITH SILT, GRAVEL & COBBLES:** Dry, light brown, dense; sand is fine to coarse, cobbles are sub-rounded, moderately cemented. Moderate effort to excavate.

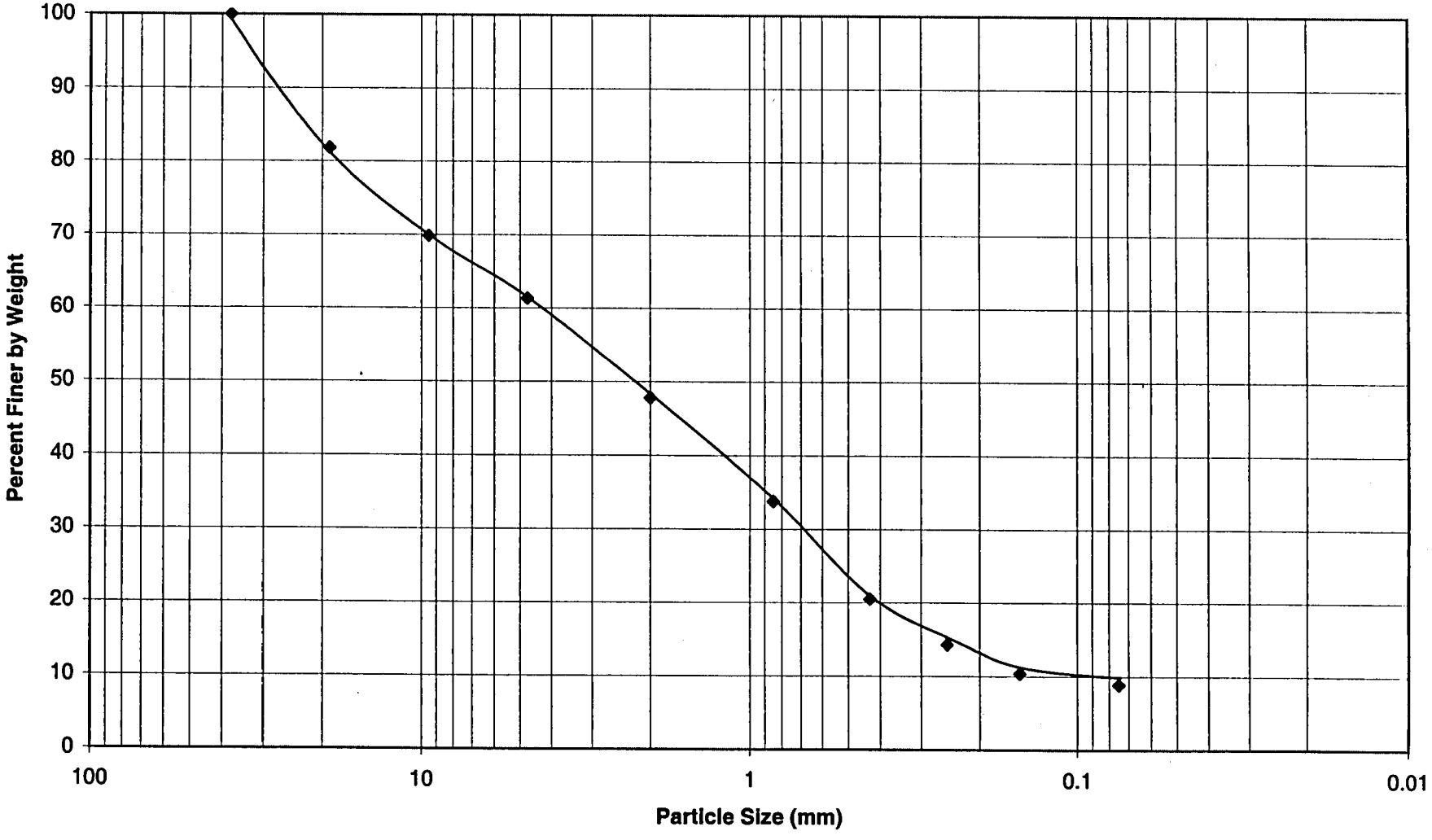
Grain Size Distribution Curve
TEST PIT TP3 0 - 4 FEET



WHITE TANKS FRS #3

15448-007-022

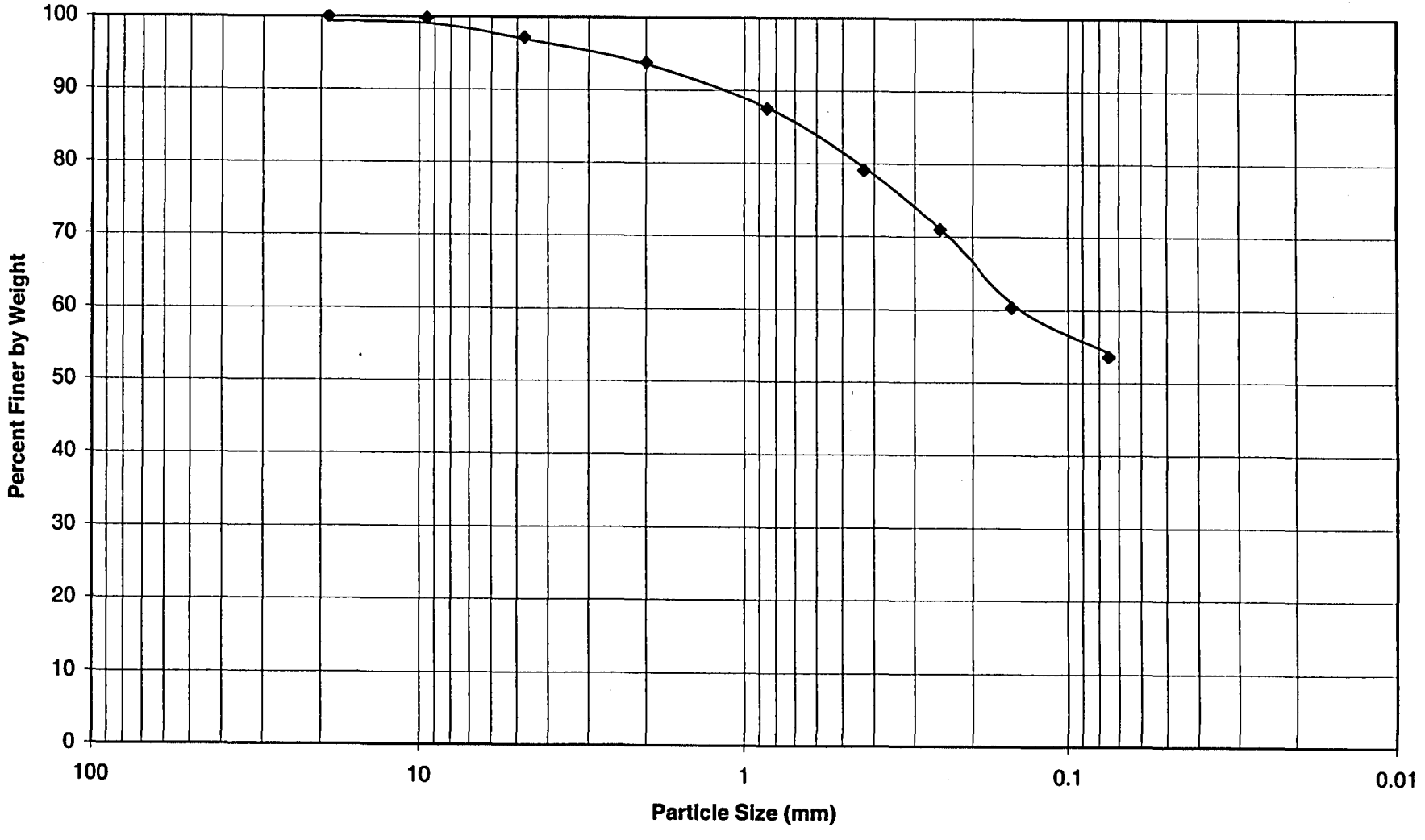
Grain Size Distribution Curve
TEST PIT TP2 16 - 16.5 FEET



WHITE TANKS FRS #3

15448-007-022

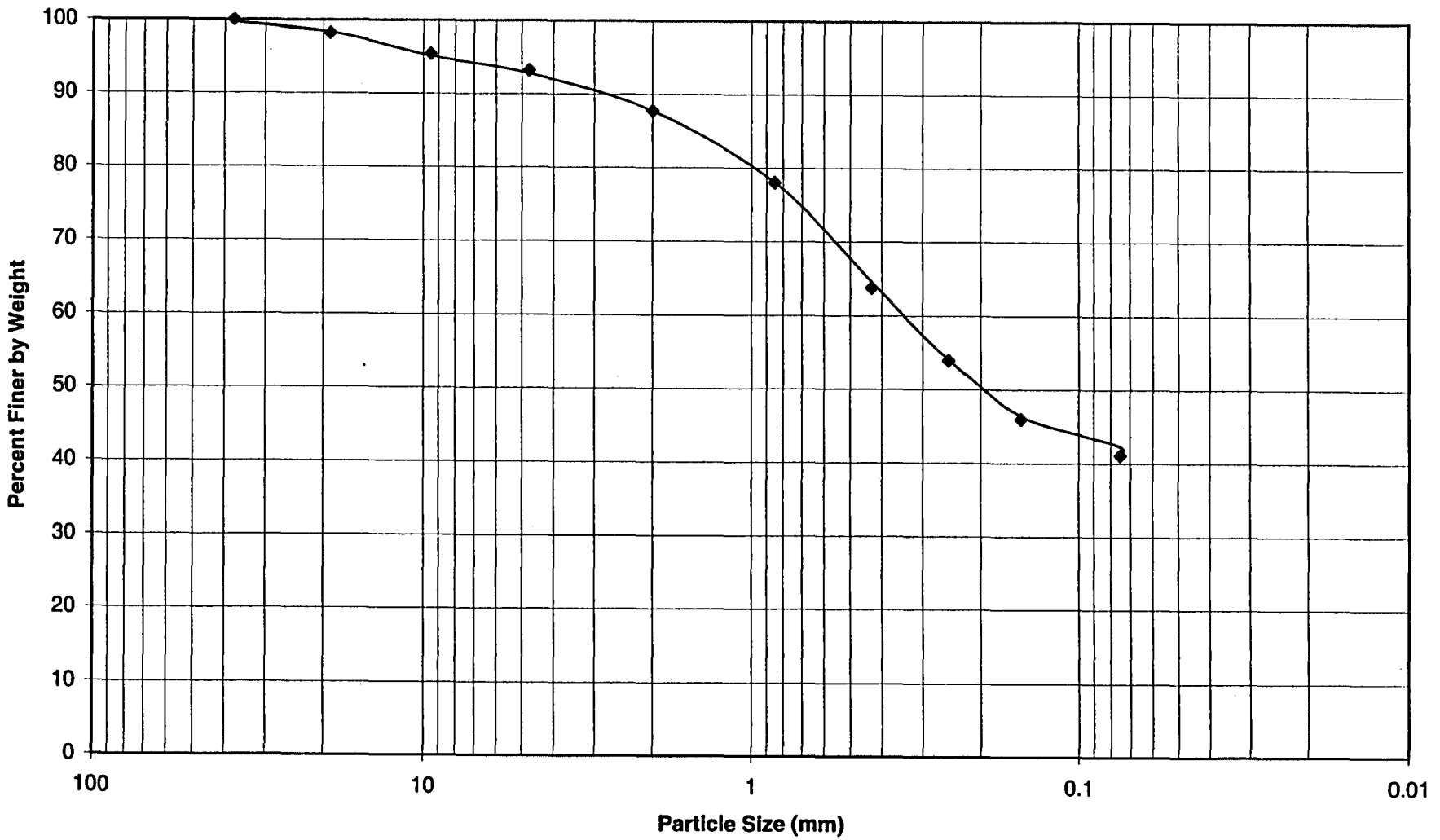
Grain Size Distribution Curve
TEST PIT TP1 13 FEET



WHITE TANKS FRS #3

15448-007-022

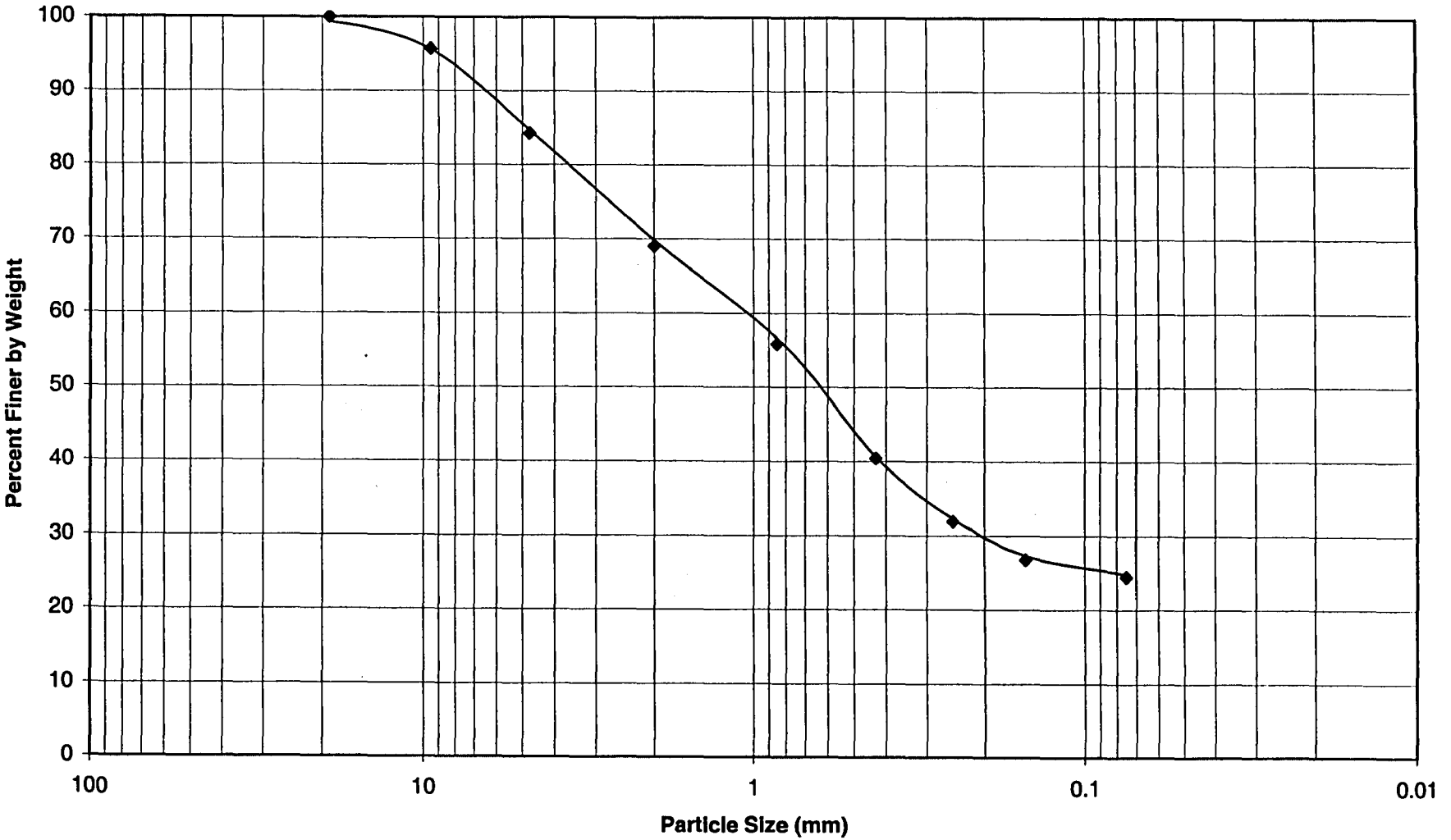
Grain Size Distribution Curve
TEST PIT TP1 0 - 4 FEET



WHITE TANKS FRS #3

15448-007-022

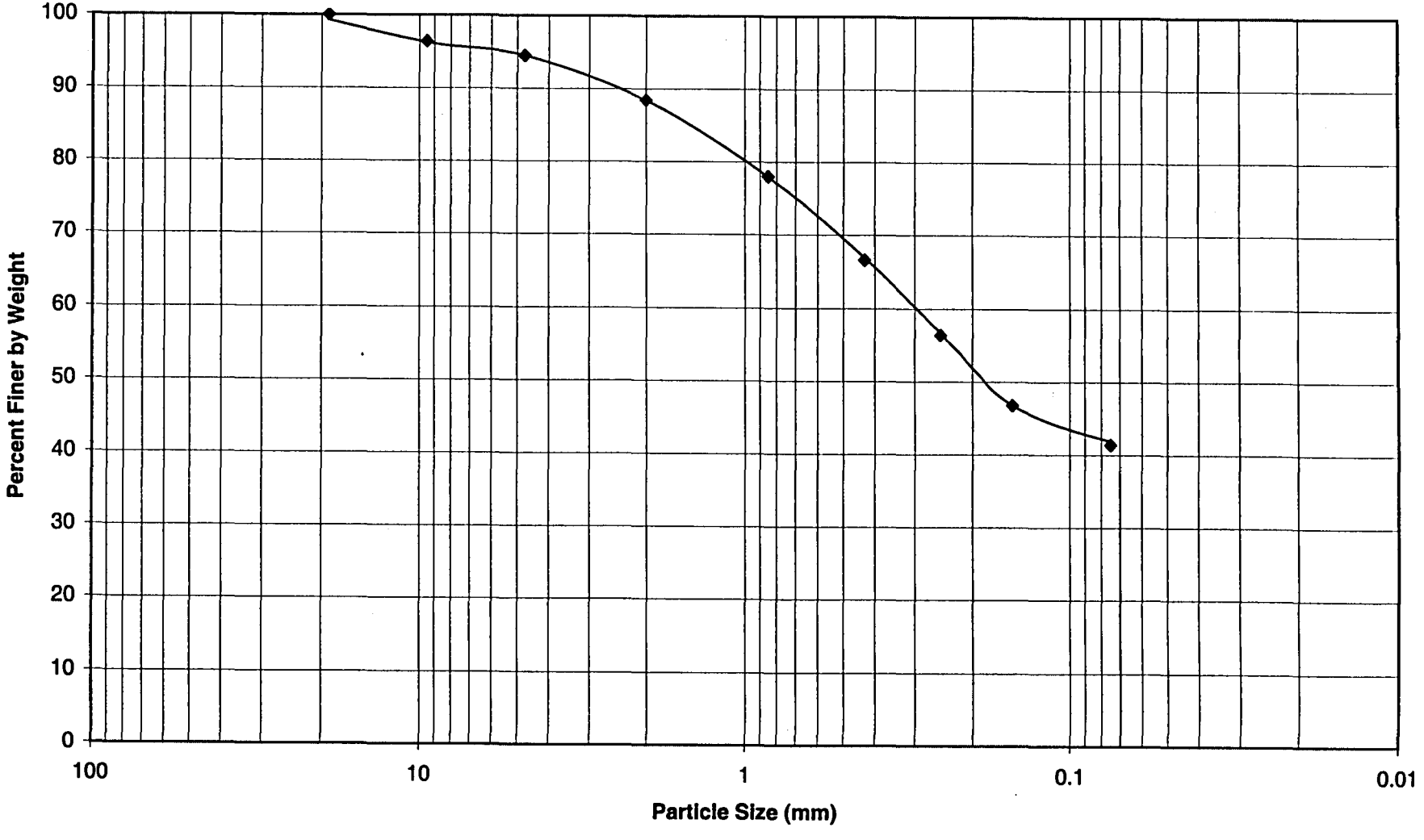
Grain Size Distribution Curve
B1 30 - 31.5 FEET



WHITE TANKS FRS #3

15448-007-022

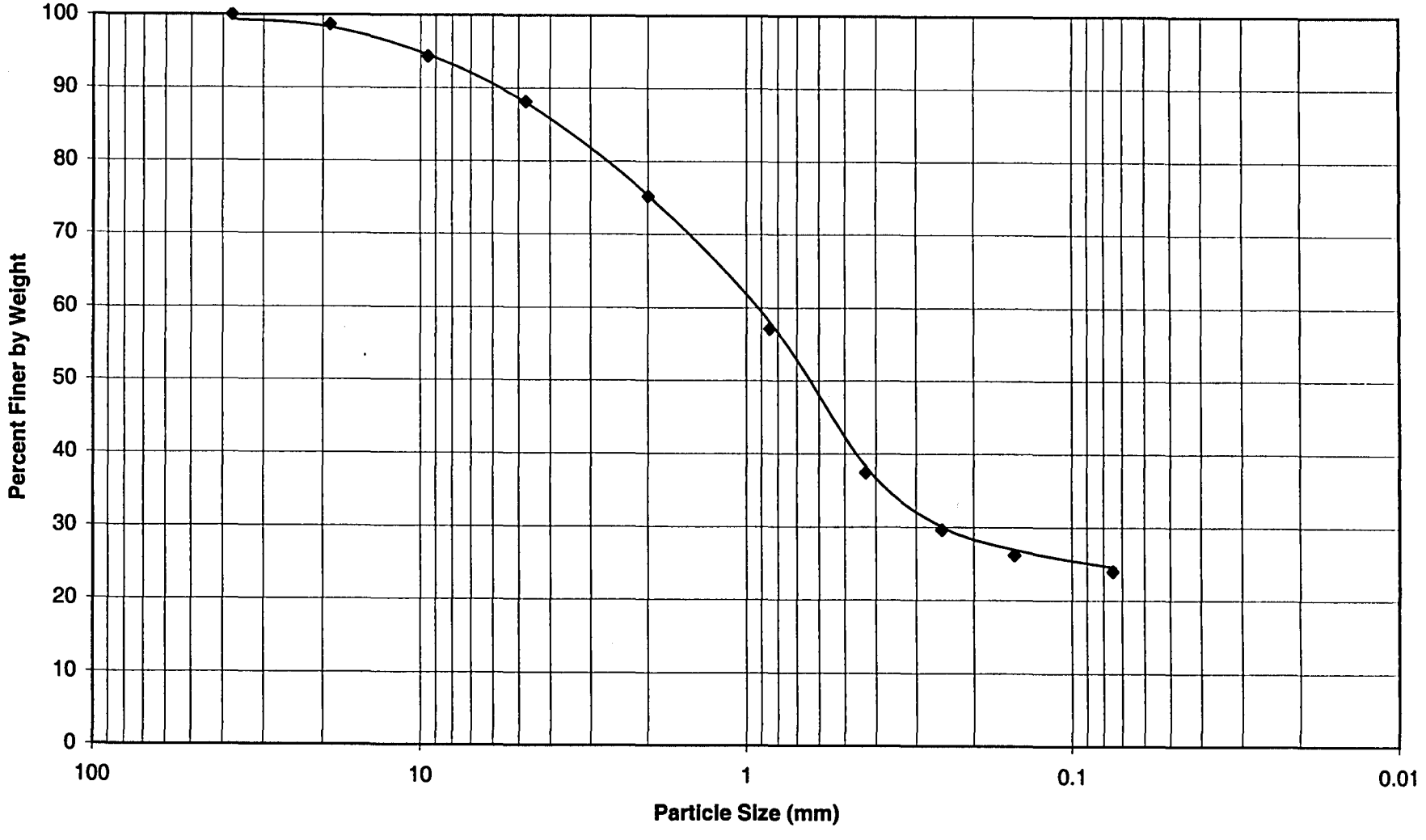
Grain Size Distribution Curve
B2 15 - 16.5 FEET



WHITE TANKS FRS #3

15448-007-022

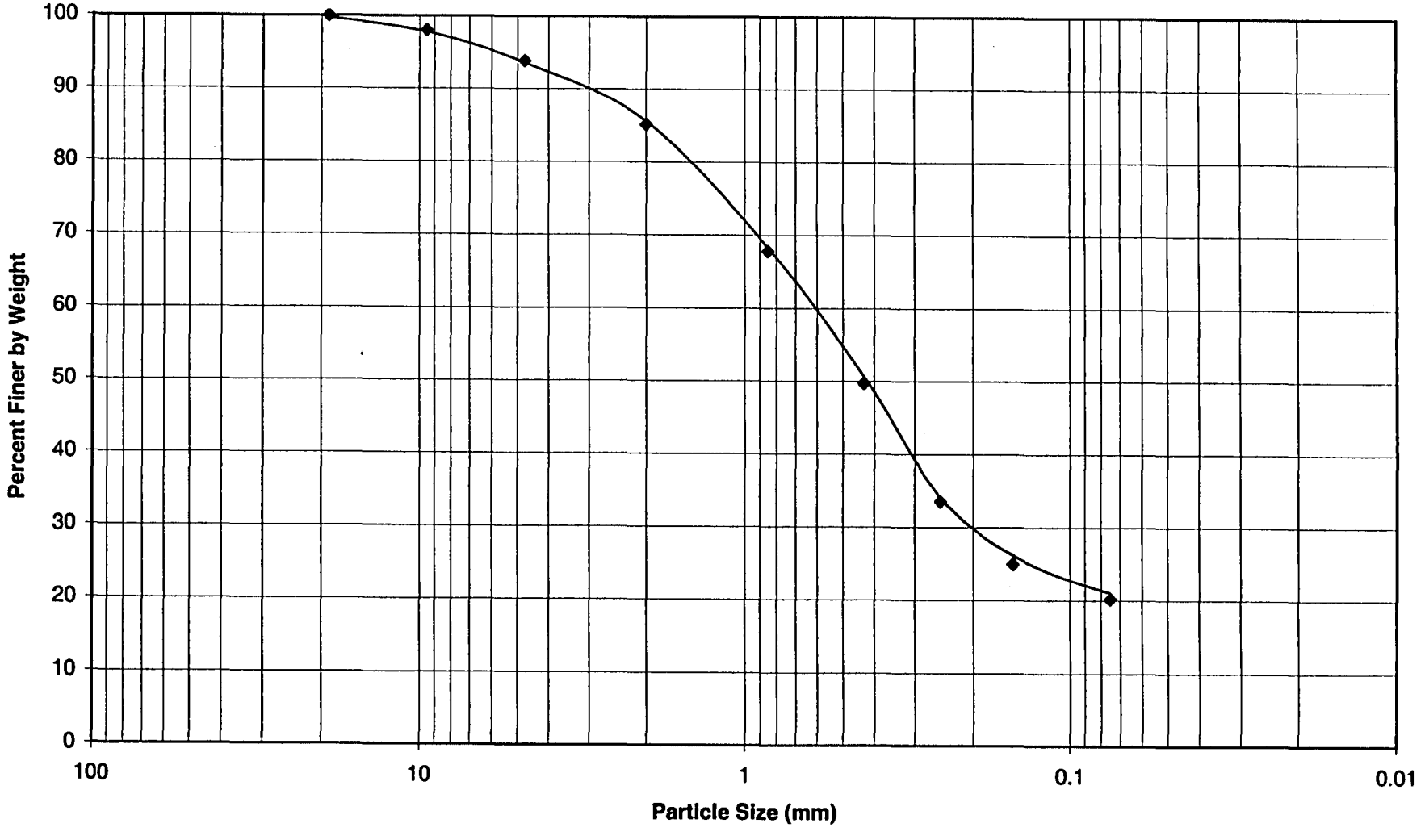
Grain Size Distribution Curve
B2 20 - 21.5 FEET



WHITE TANKS FRS #3

15448-007-022

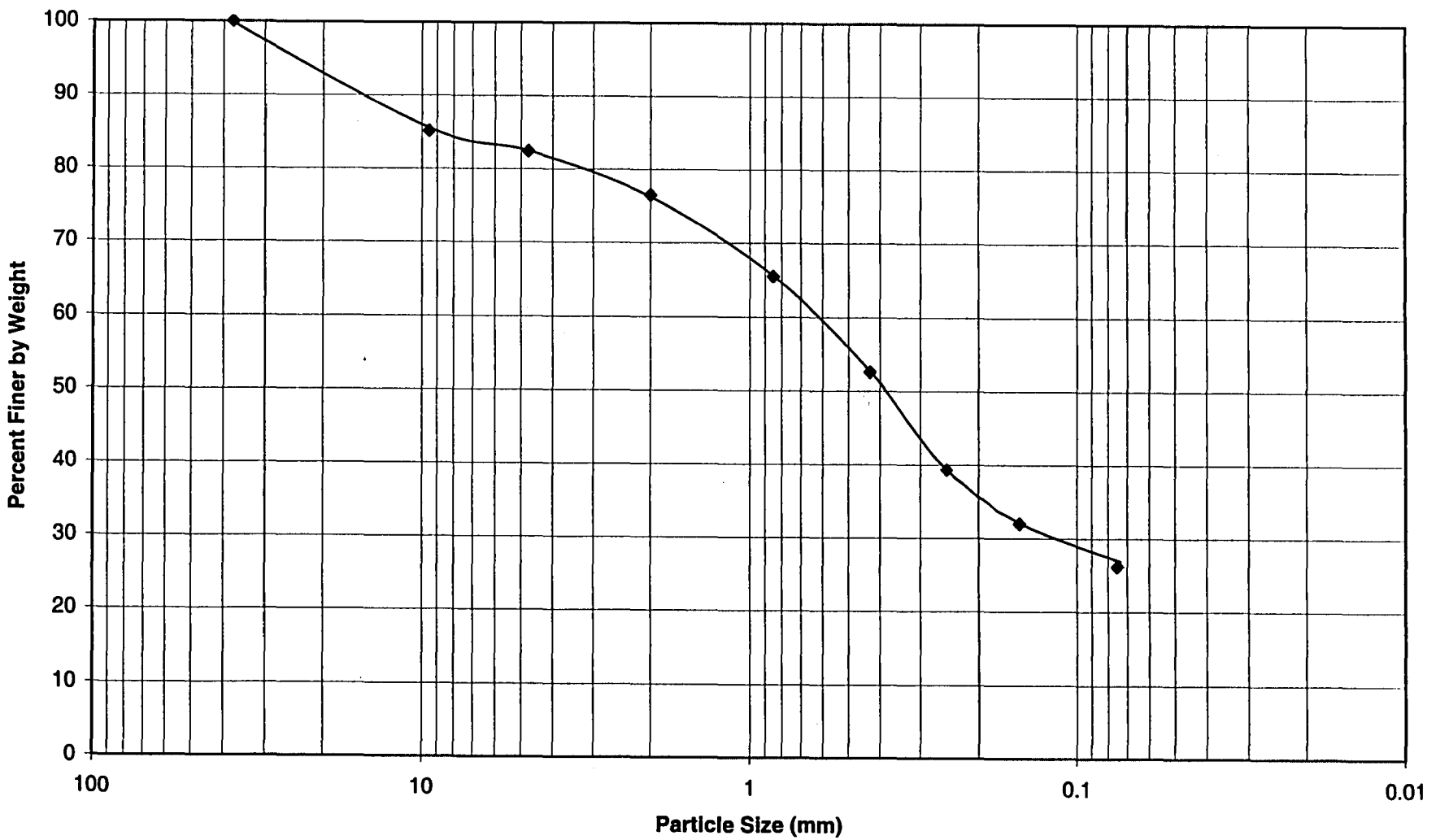
Grain Size Distribution Curve
B3 5 - 6.5 FEET



WHITE TANKS FRS #3

15448-007-022

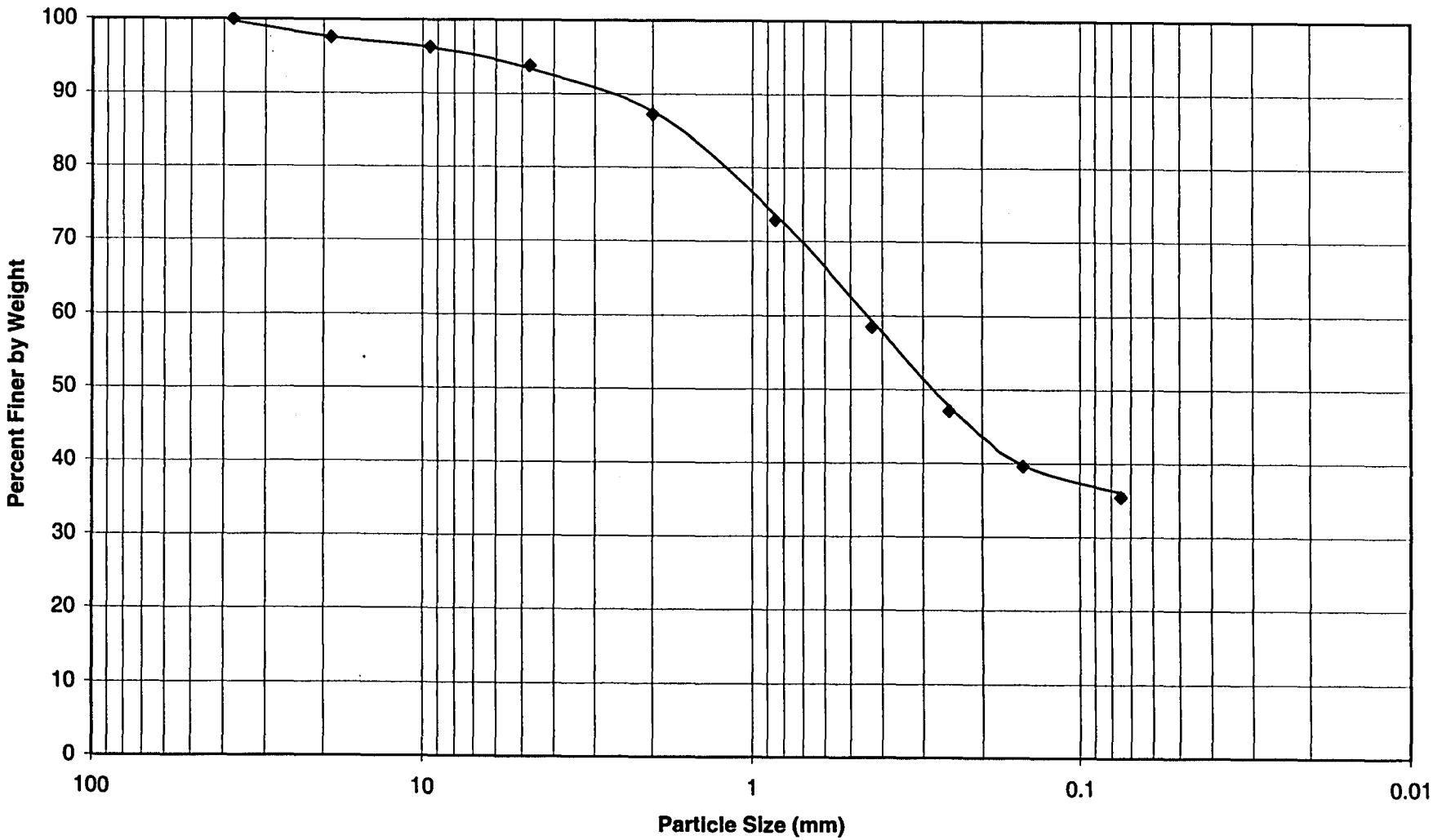
Grain Size Distribution Curve
B3 20 - 21.5 FEET



WHITE TANKS FRS #3

15448-007-022

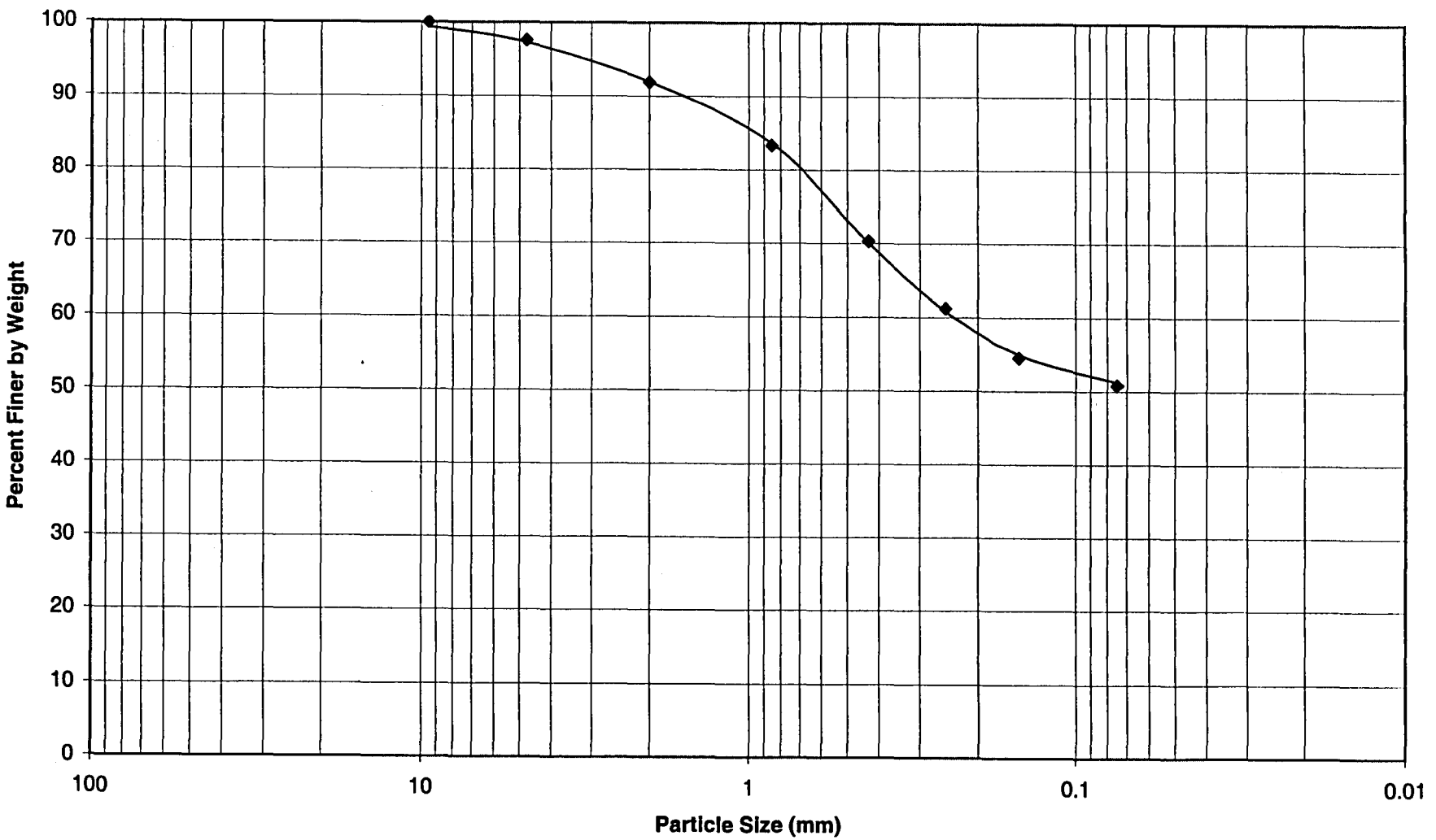
Grain Size Distribution Curve
B4 5 - 6.5 FEET



WHITE TANKS FRS #3

15448-007-022

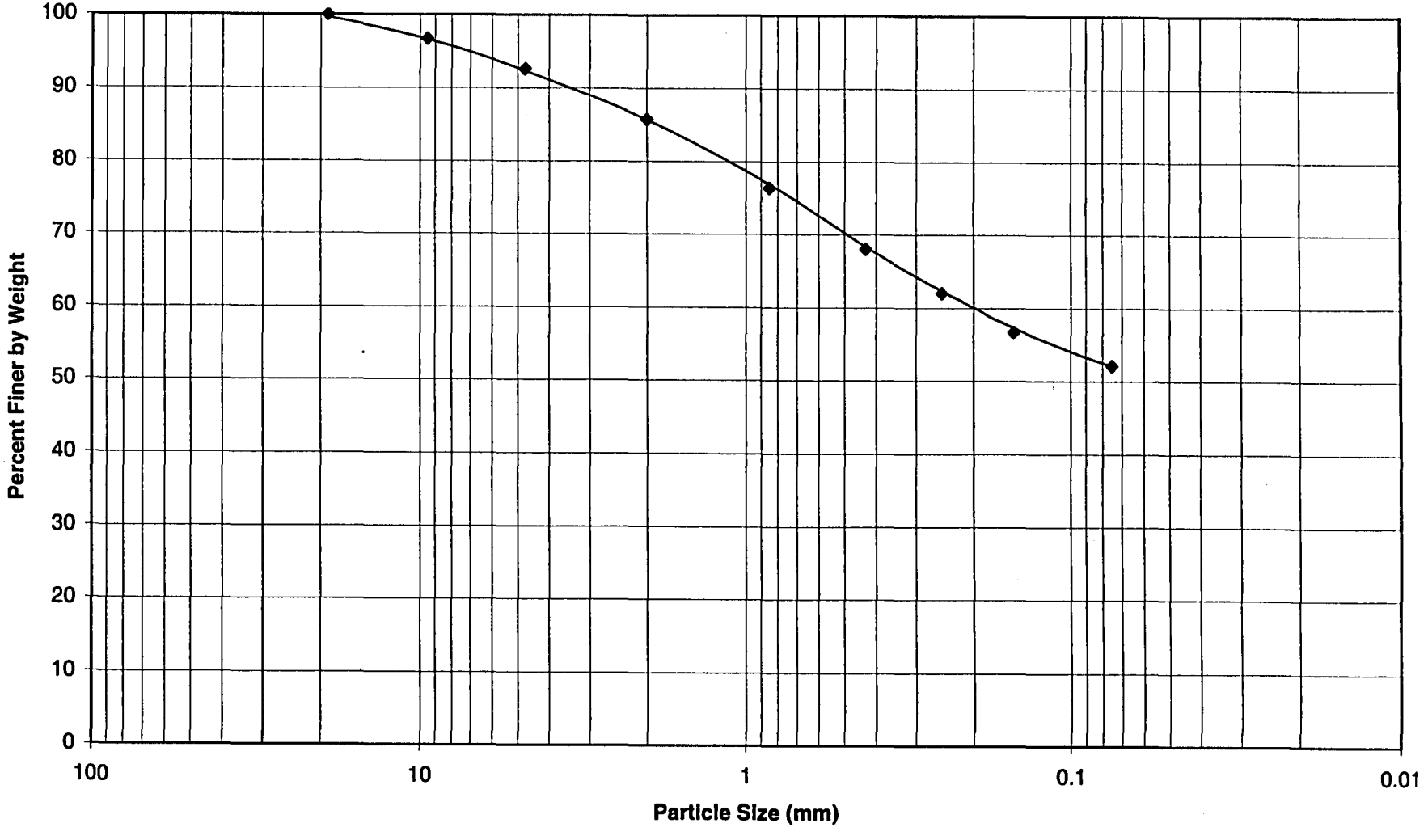
Grain Size Distribution Curve
B4 20 - 21.5 FEET



WHITE TANKS FRS #3

15448-007-022

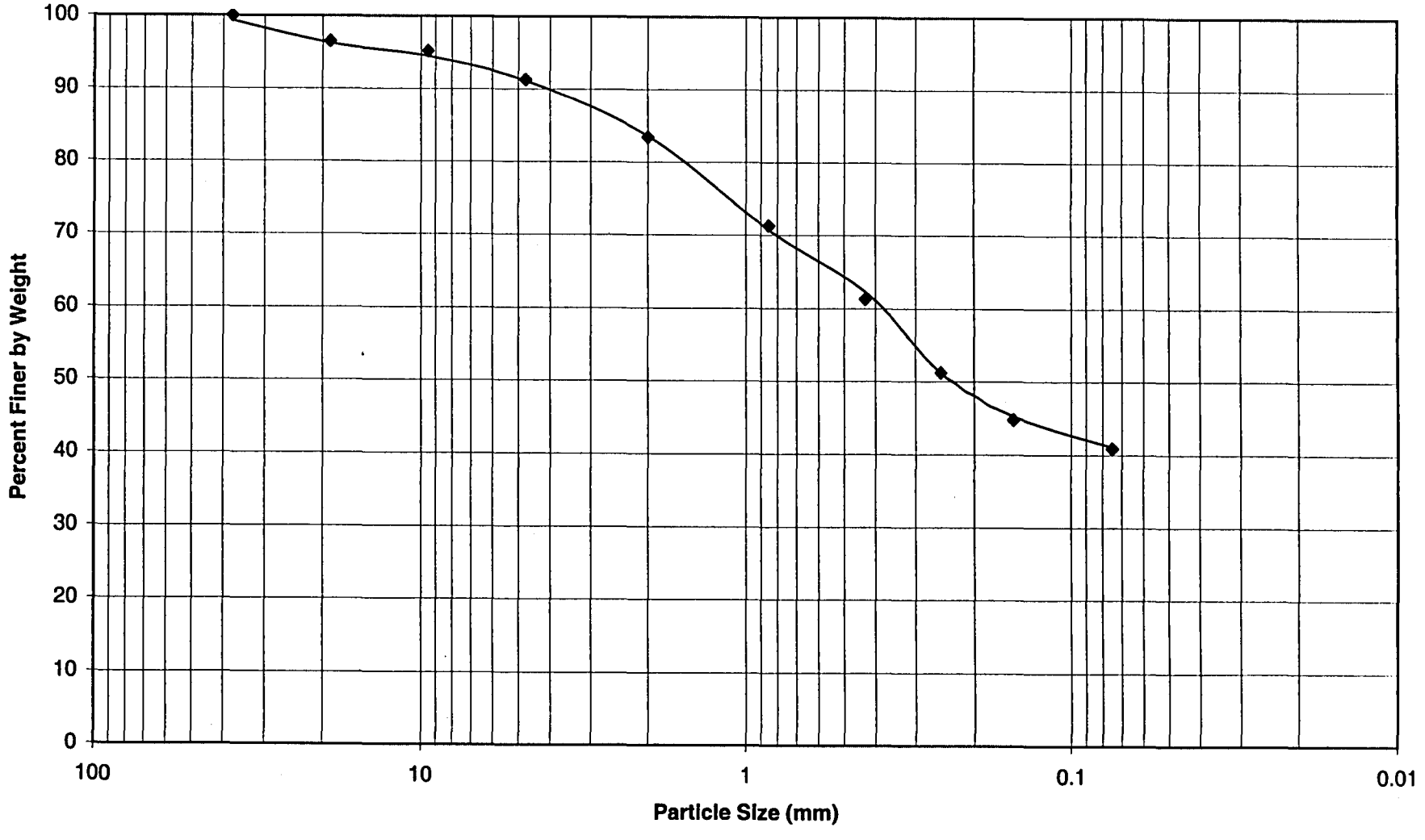
Grain Size Distribution Curve
B4 28.5 - 30 FEET



WHITE TANKS FRS #3

15448-007-022

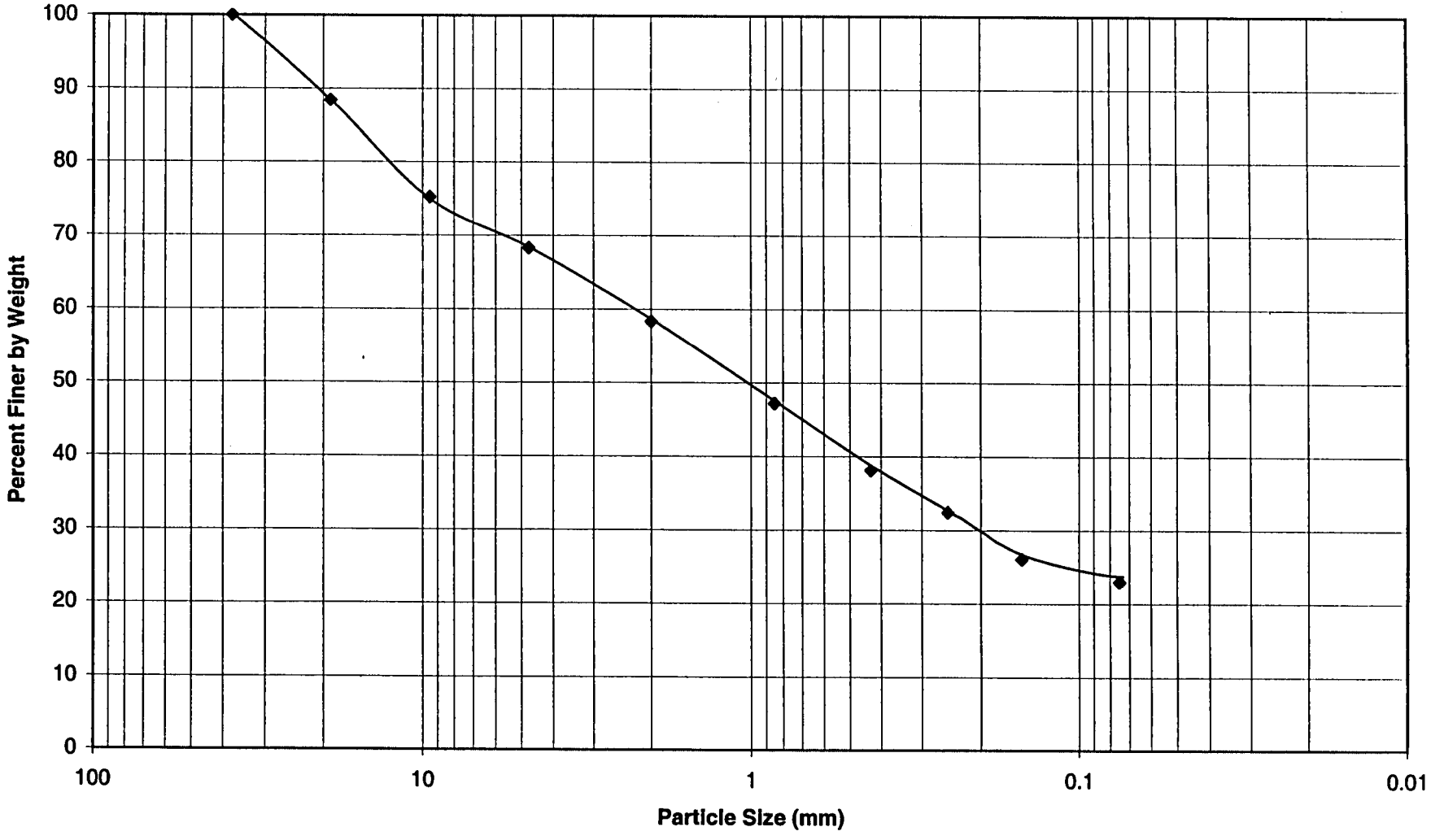
Grain Size Distribution Curve
B5 5 - 6.5 FEET



WHITE TANKS FRS #3

15448-007-022

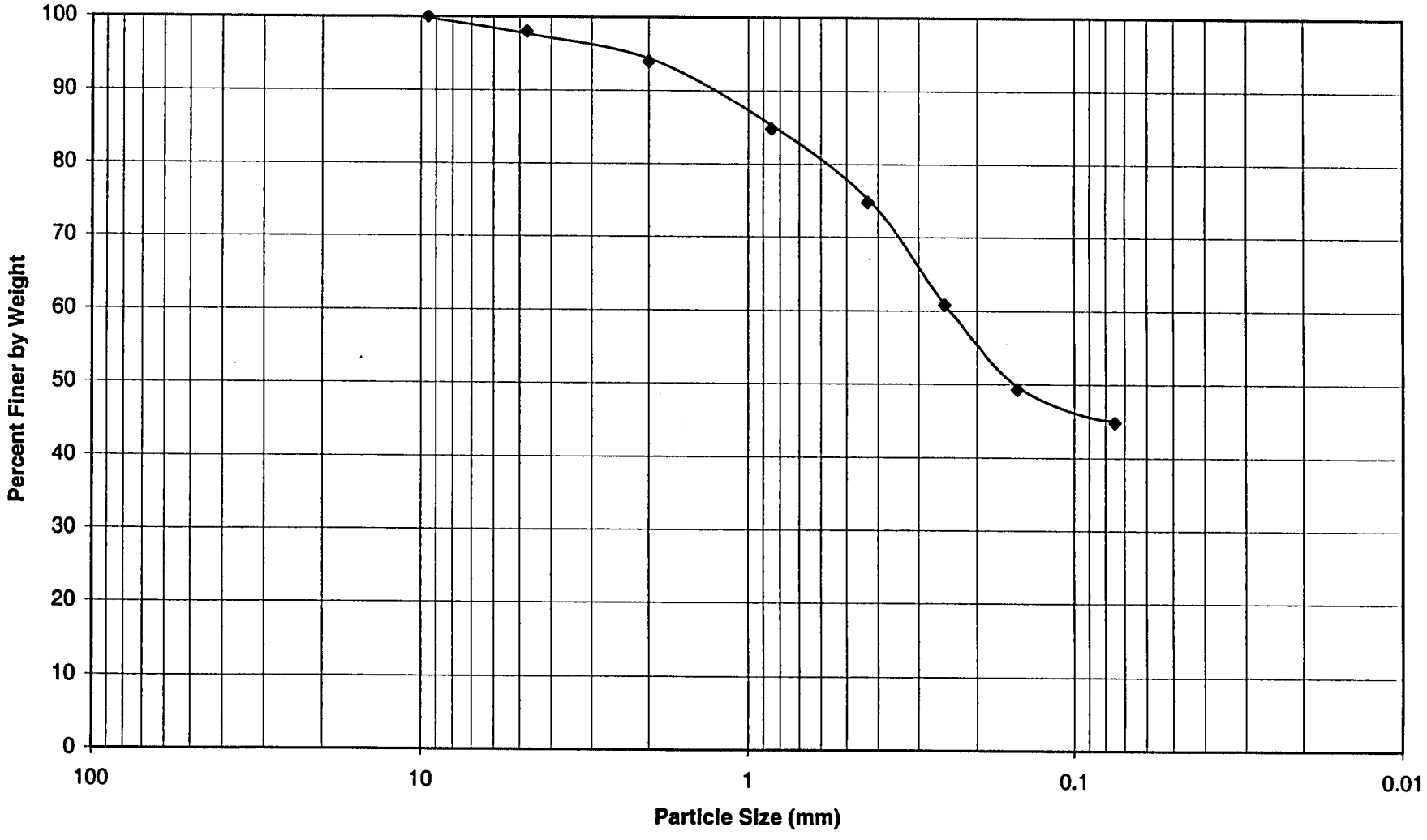
Grain Size Distribution Curve
B5 10 - 11.5 FEET



WHITE TANKS FRS #3

15448-007-022

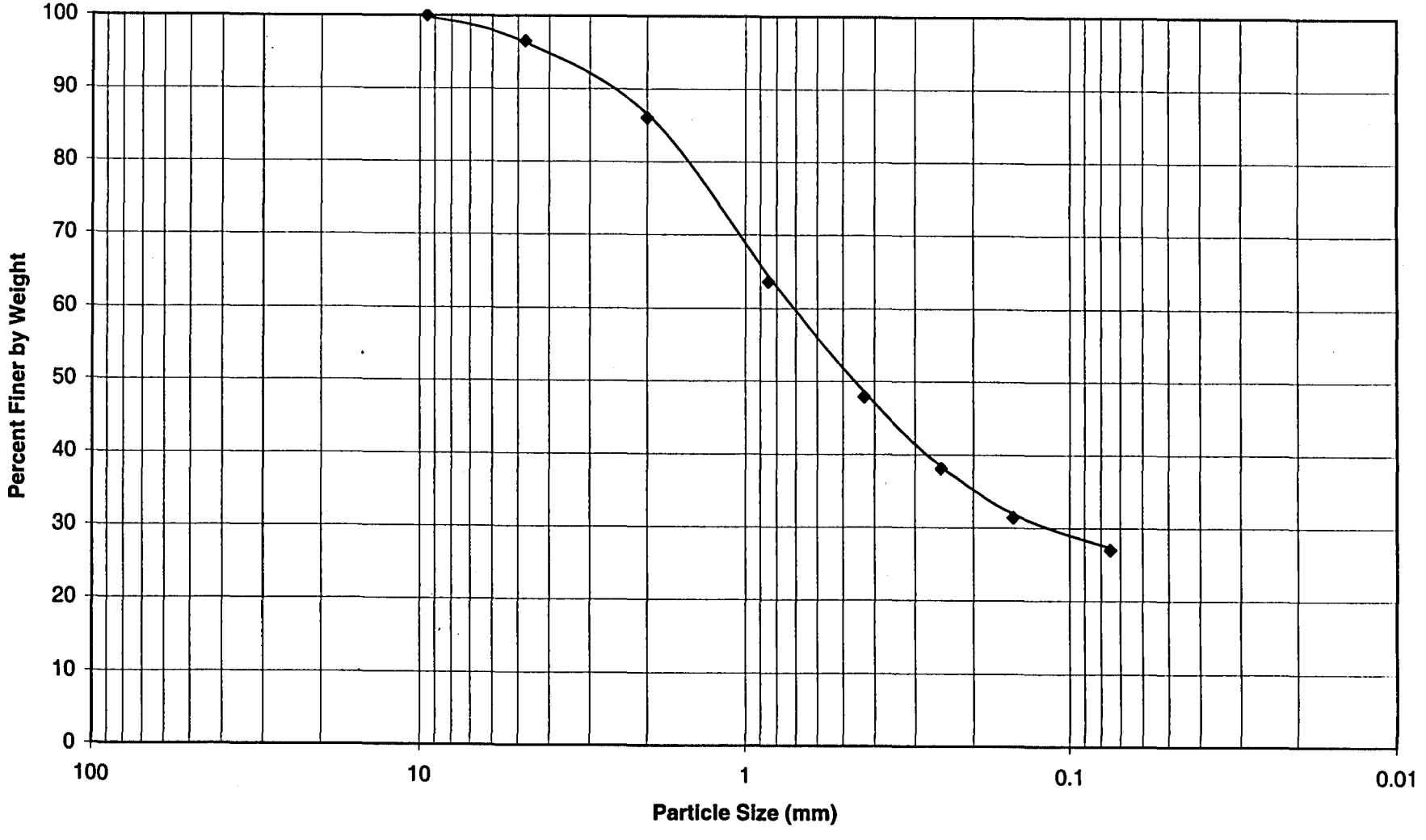
Grain Size Distribution Curve
B6 5 - 6.5 FEET



WHITE TANKS FRS #3

15448-007-022

Grain Size Distribution Curve
B6 10 - 11.5 FEET



WHITE TANKS FRS #3

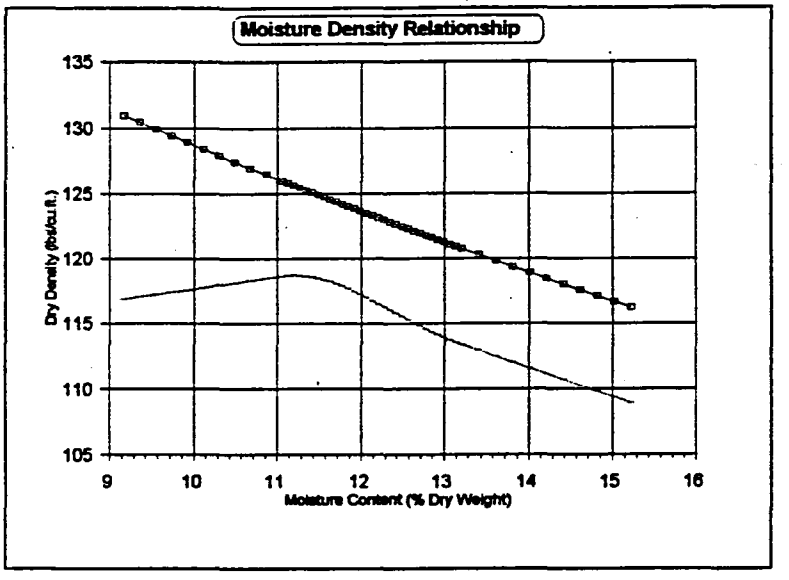
15448-007-022

ATL, INC.
CONSTRUCTION QUALITY CONTROL
GEOTECHNICAL CONSULTANTS

PHOENIX – CORPORATE OFFICE
2912 W. Clarendon • Phoenix, AZ 85017
(602) 241-1097 • Fax (602) 277-1306

Summary of Moisture Density Relationship Tests

Client:	Dames & Moore	Job No.	199072
Address:	7500 N. Dreamy Draw Drive, Ste.145	Lab No.	99-1051
	Phoenix, AZ 85020	Type of Rammer:	Hand
		Sample Date:	11/9/99
Project:	White Tanks - FRS #3 - FCDMC	Material Description:	Brown, silty sand w/ gravel
		Material Source:	Test Pit No.: 1
Test Designation:	ASTM D698		Depth: 8' - 8.5'
Test Method:	A	Report Date:	11/19/99
Tested By:	MC		



Bulk Specific Gravity for Rock Correction (+#4): 2.600 estimate
Specific Gravity Used For Zero Air Voids Curve Calculation: 2.600

Test No.	1	2	3	4
Dry Density (lbs/cu.ft.)	116.9	118.7	113.4	108.9
Moisture Content (%)	9.2	11.1	13.2	15.2

Maximum Dry Density (lbs/cu.ft.): **118.7**
Optimum Moisture Content (% of Dry Weight): **11.2**

Percent of retained Oversize reflects only this sample and the technician will determine the actual pecent retained in the field

Percent of Retained Oversized Particles (LAB):
Maximum Dry Density For Oversize Particles (D4718):
Corrected Moisture Content For Oversized Particles (D4718):

Remarks:

Respectfully Submitted:
ATL, INC.

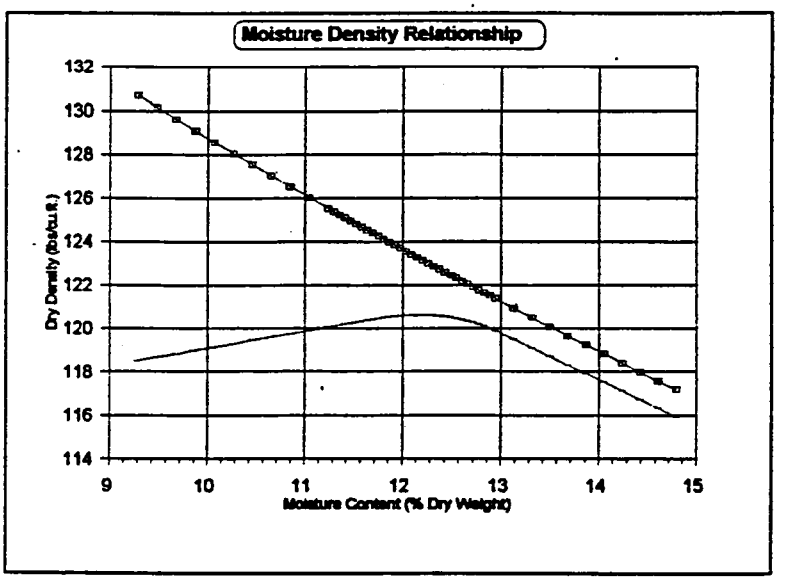
Ammi Osorio
Laboratory Engineer

ATL, INC.
CONSTRUCTION QUALITY CONTROL
GEOTECHNICAL CONSULTANTS

PHOENIX – CORPORATE OFFICE
2912 W. Clarendon • Phoenix AZ 85017
(602) 241-1097 • Fax (602) 277-1306

Summary of Moisture Density Relationship Tests

Client:	Dames & Moore	Job No.	199072
Address:	7500 N. Dreamy Draw Drive, Ste.145	Lab No.	99-1052
	Phoenix, AZ 85020	Type of Rammer:	Hand
		Sample Date:	11/10/99
Project:	White Tanks - FRS #3 - FCDMC	Material Description:	Brown, sandy silt with gravel
		Material Source:	Test Pit No.: 2
Test Designation:	ASTM D698		Depth: 11' - 11.5'
Test Method:	A	Report Date:	11/19/99
Tested By:	MC		



Bulk Specific Gravity for Rock Correction (+#4): 2.600 estimate
Specific Gravity Used For Zero Air Voids Curve Calculation: 2.600

Test No.	1	2	3	4
Dry Density (lbs/cu.ft.)	118.5	120.1	119.9	115.9
Moisture Content (%)	9.3	11.2	12.9	14.8

Maximum Dry Density (lbs/cu.ft.): 120.6
Optimum Moisture Content (% of Dry Weight): 12.2

Percent of retained Oversize reflects only this sample and the technician will determine the actual pecent retained in the field

Percent of Retained Oversized Particles (LAB):
Maximum Dry Density For Oversize Particles (D4718):
Corrected Moisture Content For Oversized Particles (D4718):

Remarks:

Respectfully Submitted:
ATL, INC.

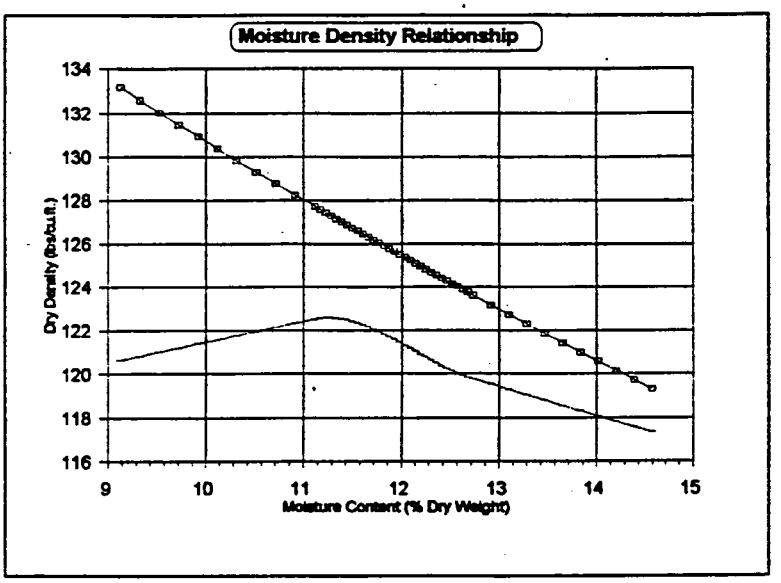
Ammi Osorio
Laboratory Engineer

ATL, INC.
CONSTRUCTION QUALITY CONTROL
GEOTECHNICAL CONSULTANTS

PHOENIX – CORPORATE OFFICE
2912 W. Clarendon • Phoenix, AZ 85017
(602) 241-1097 • Fax (602) 277-1306

Summary of Moisture Density Relationship Tests

Client:	Dames & Moore	Job No.	199072
Address:	7500 N. Dreamy Draw Drive, Ste.145 Phoenix, AZ 85020	Lab No.	99-1053
		Type of Rammer:	Hand
		Sample Date:	11/10/99
Project:	White Tanks - FRS #3 - FCDMC	Material Description:	Brown, sandy silt with gravel
		Material Source:	Test Pit No.: 3
Test Designation:	ASTM D698		Depth: 19' - 20'
Test Method:	A	Report Date:	11/19/99
Tested By:	MC		



Bulk Specific Gravity for Rock Correction (+#4): 2.650 estimate
Specific Gravity Used For Zero Air Voids Curve Calculation: 2.650

Test No.	1	2	3	4
Dry Density (lbs/cu.ft.)	120.6	122.5	119.8	117.3
Moisture Content (%)	9.1	11.1	12.7	14.6

Maximum Dry Density (lbs/cu.ft.): **122.6**
Optimum Moisture Content (% of Dry Weight): **11.3**

Percent of retained Oversize reflects only this sample and the technician will determine the actual pecent retained in the field

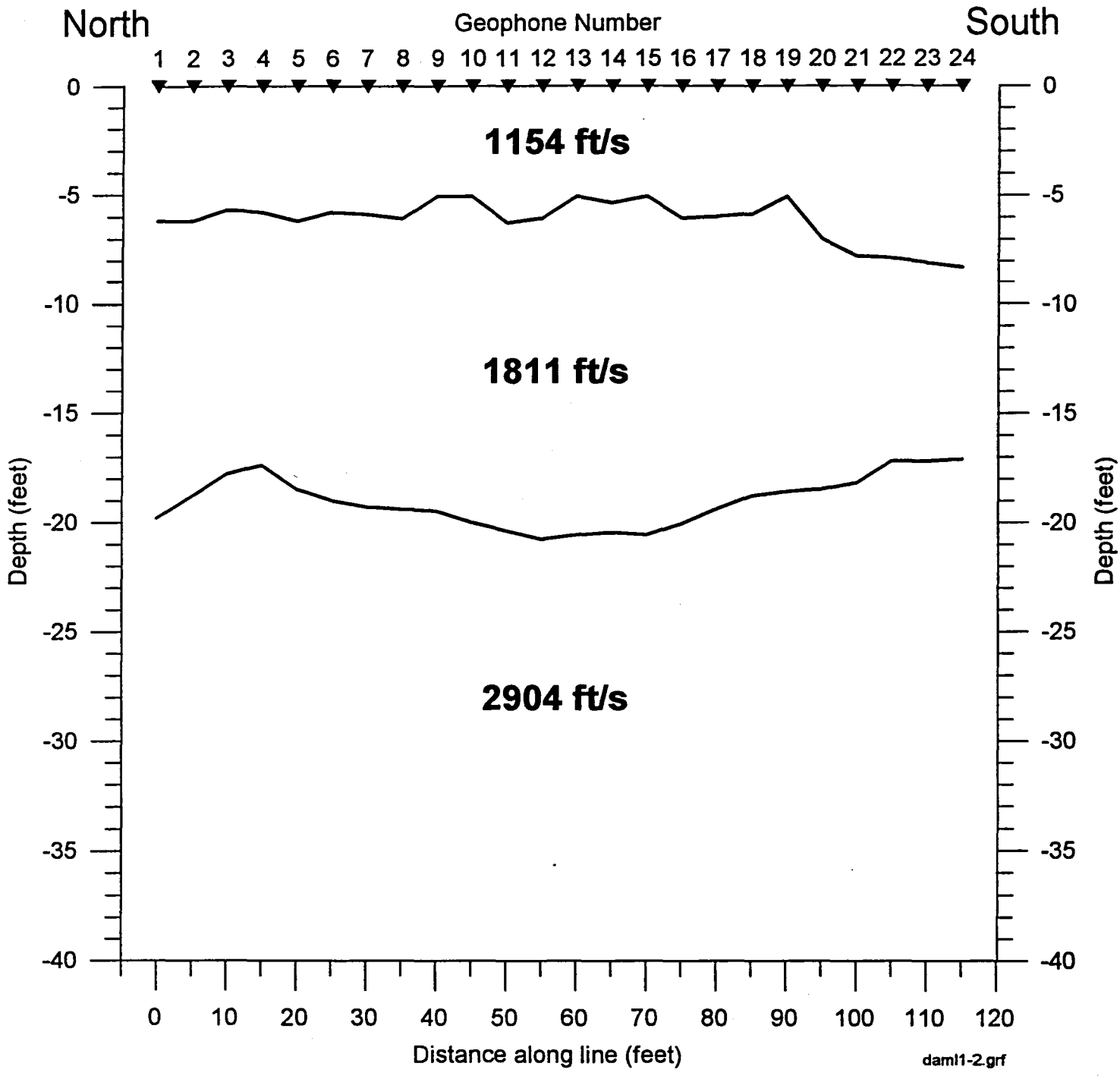
Percent of Retained Oversized Particles (LAB):
Maximum Dry Density For Oversize Particles (D4718):
Corrected Moisture Content For Oversized Particles (D4718):

Remarks:

Respectfully Submitted:
ATL, INC.

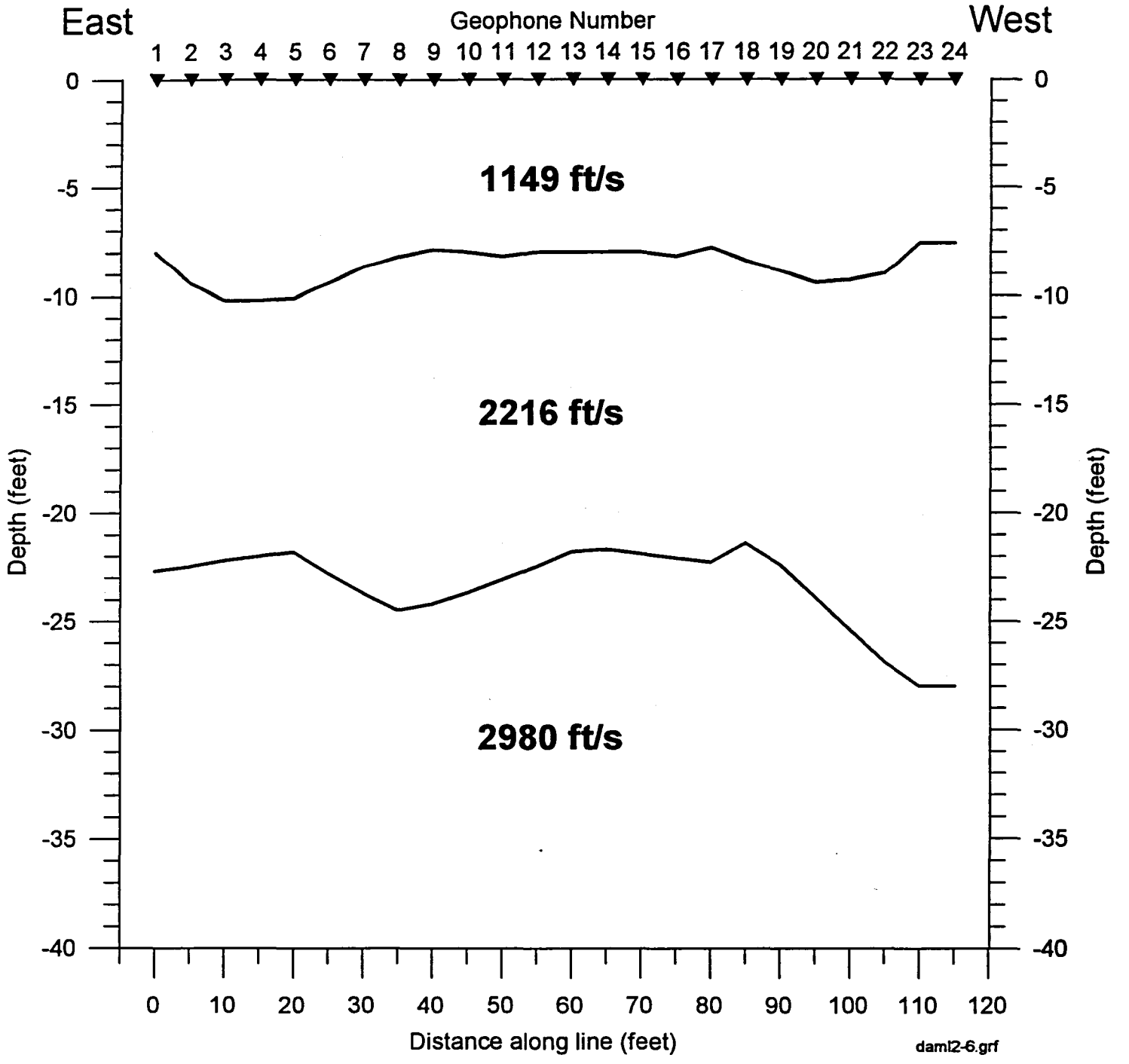
Ammi Osorio
Laboratory Engineer

Maricopa County Dam Site
Refraction Seismic Line 1



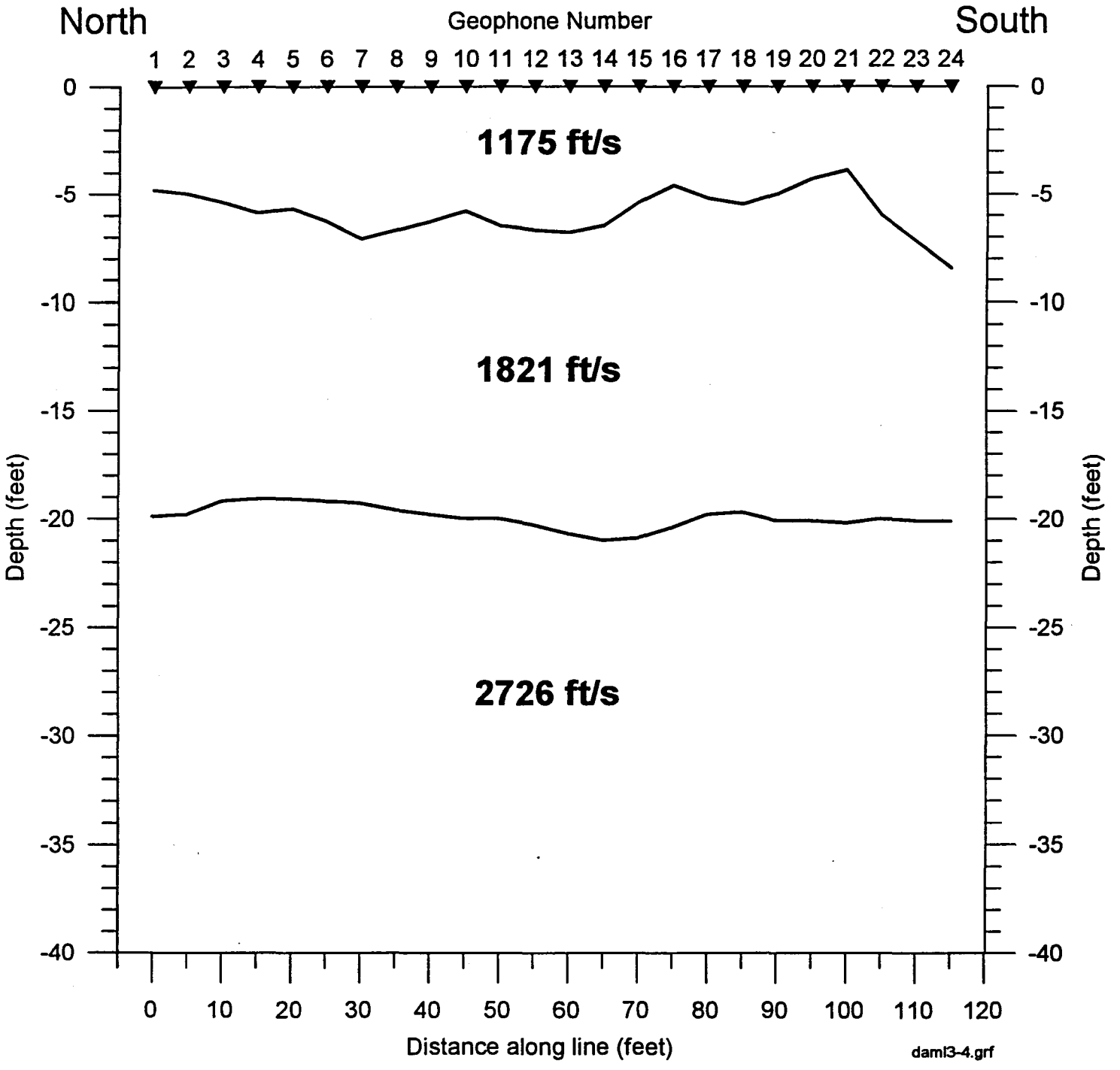
Hasbrouck Geophysics, Inc.
Montrose, Colorado
November 1999

Maricopa County Dam Site
Refraction Seismic Line 2



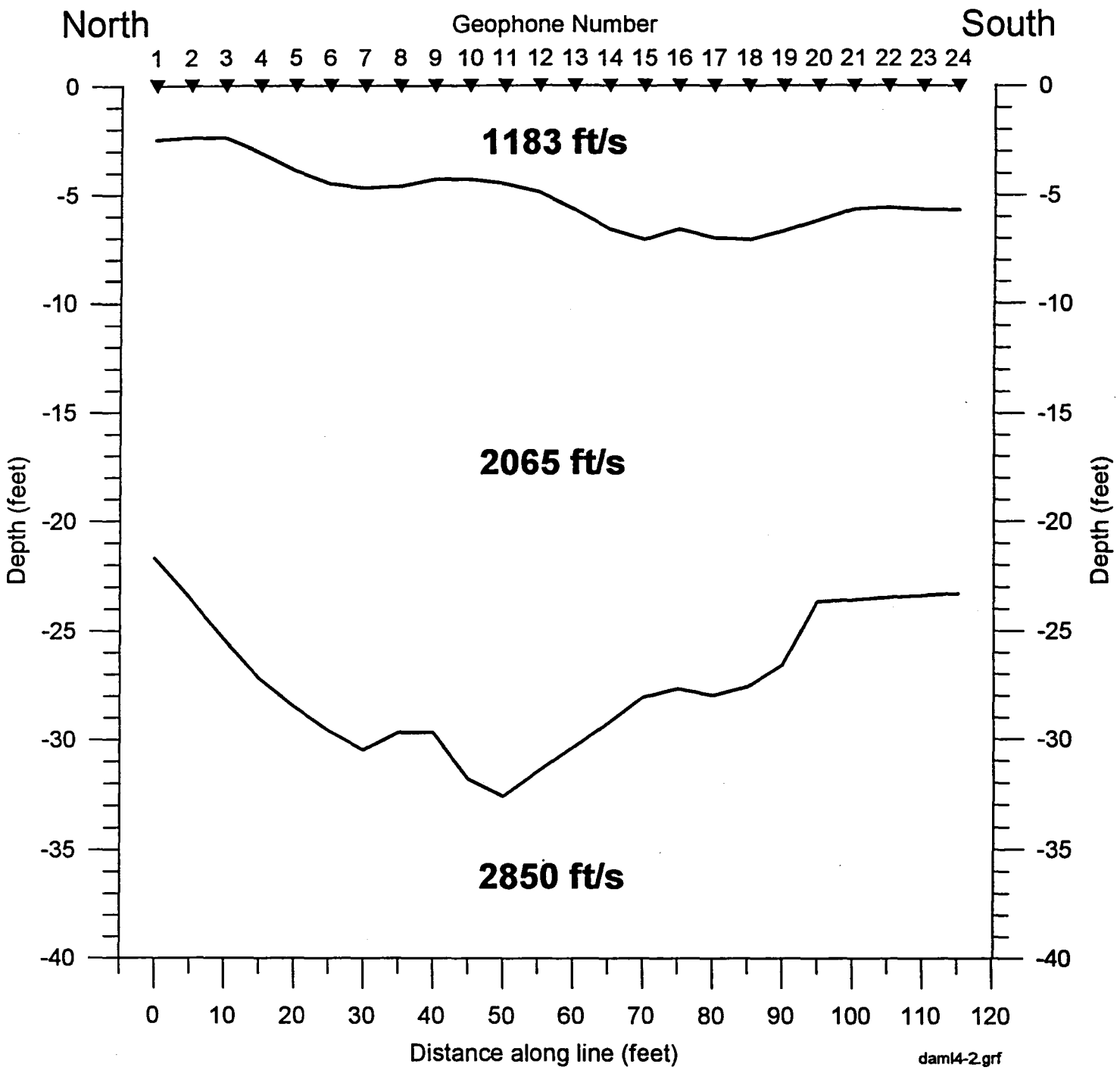
Hasbrouck Geophysics, Inc.
Montrose, Colorado
November 1999

Maricopa County Dam Site
Refraction Seismic Line 3



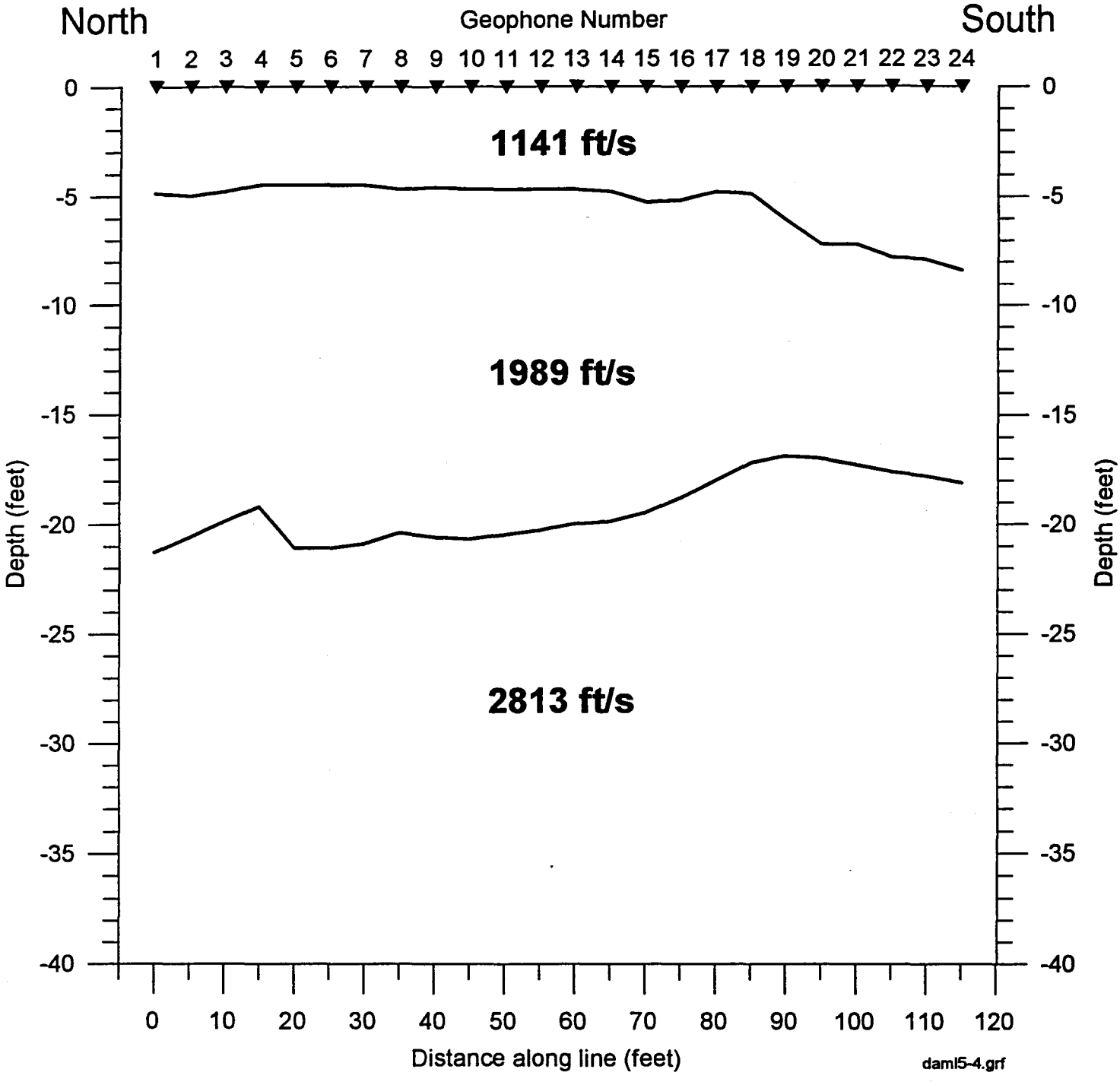
Hasbrouck Geophysics, Inc.
Montrose, Colorado
November 1999

Maricopa County Dam Site
Refraction Seismic Line 4



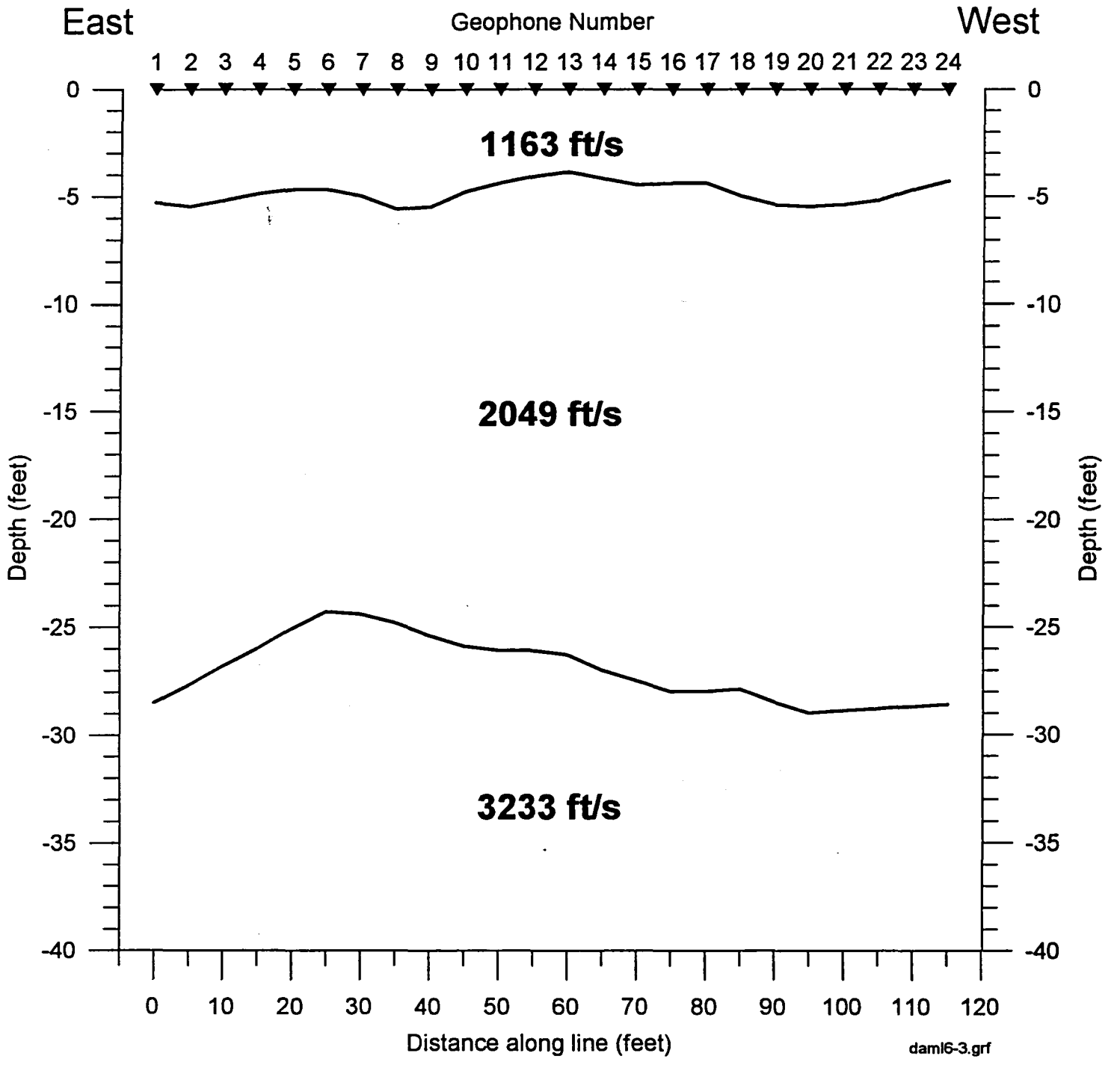
Hasbrouck Geophysics, Inc.
Montrose, Colorado
November 1999

Maricopa County Dam Site
Refraction Seismic Line 5



Hasbrouck Geophysics, Inc.
Montrose, Colorado
November 1999

Maricopa County Dam Site
Refraction Seismic Line 6

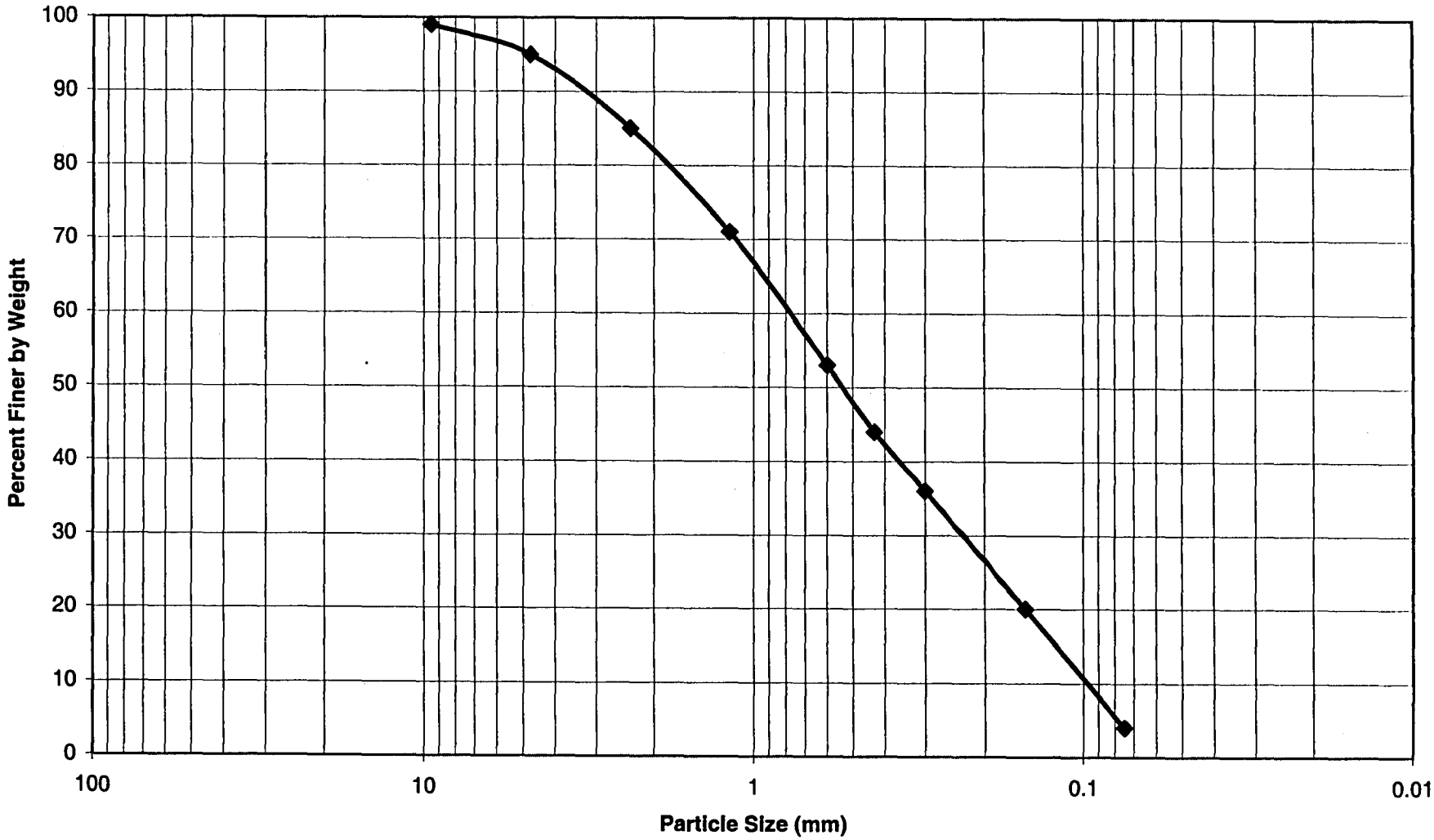


Hasbrouck Geophysics, Inc.
Montrose, Colorado
November 1999

APPENDIX C

INTERIM DAM SAFETY PROJECT

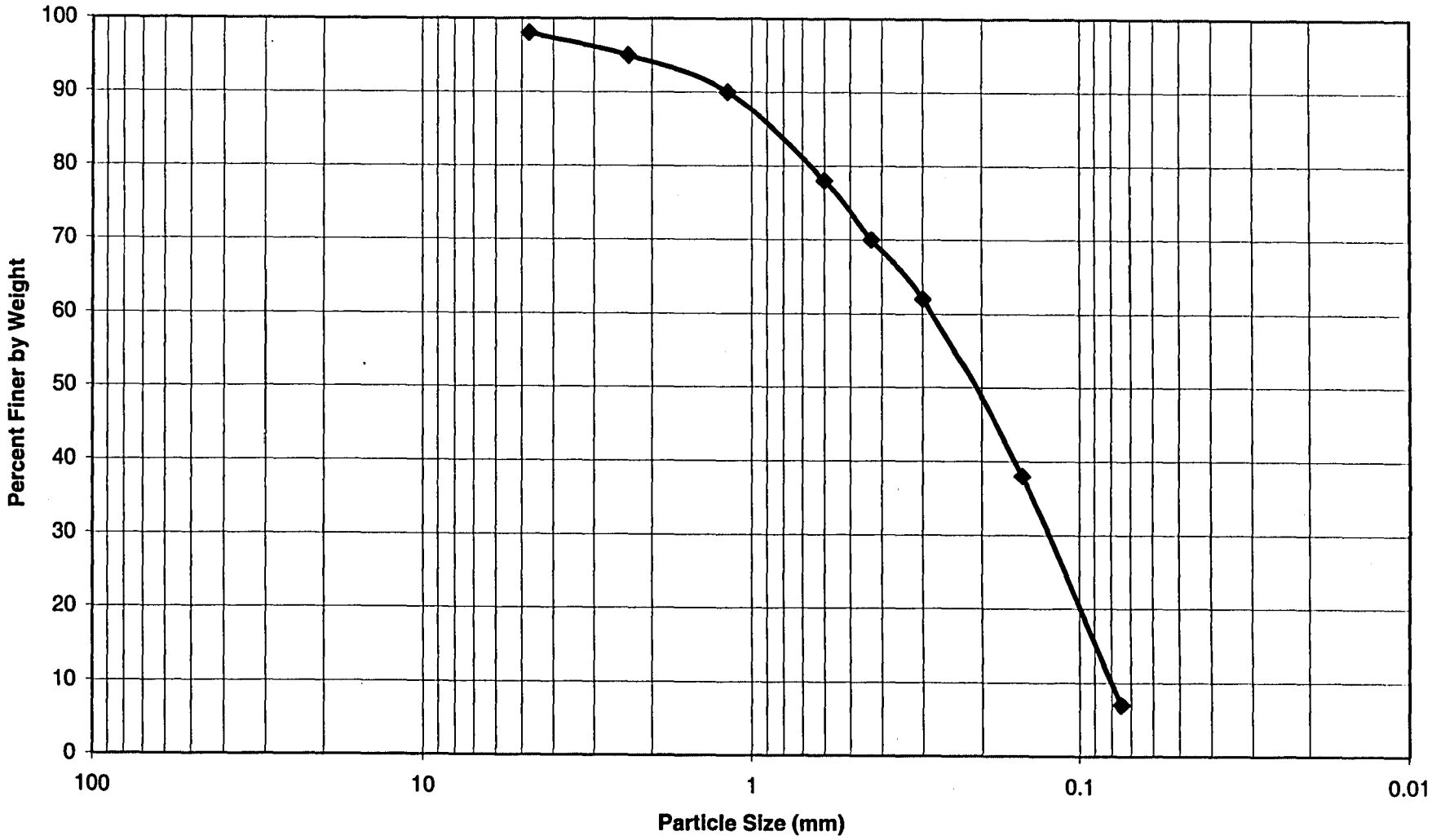
Grain Size Distribution Curve
Test Pit A



WHITE TANKS FRS #3

15448-007-022

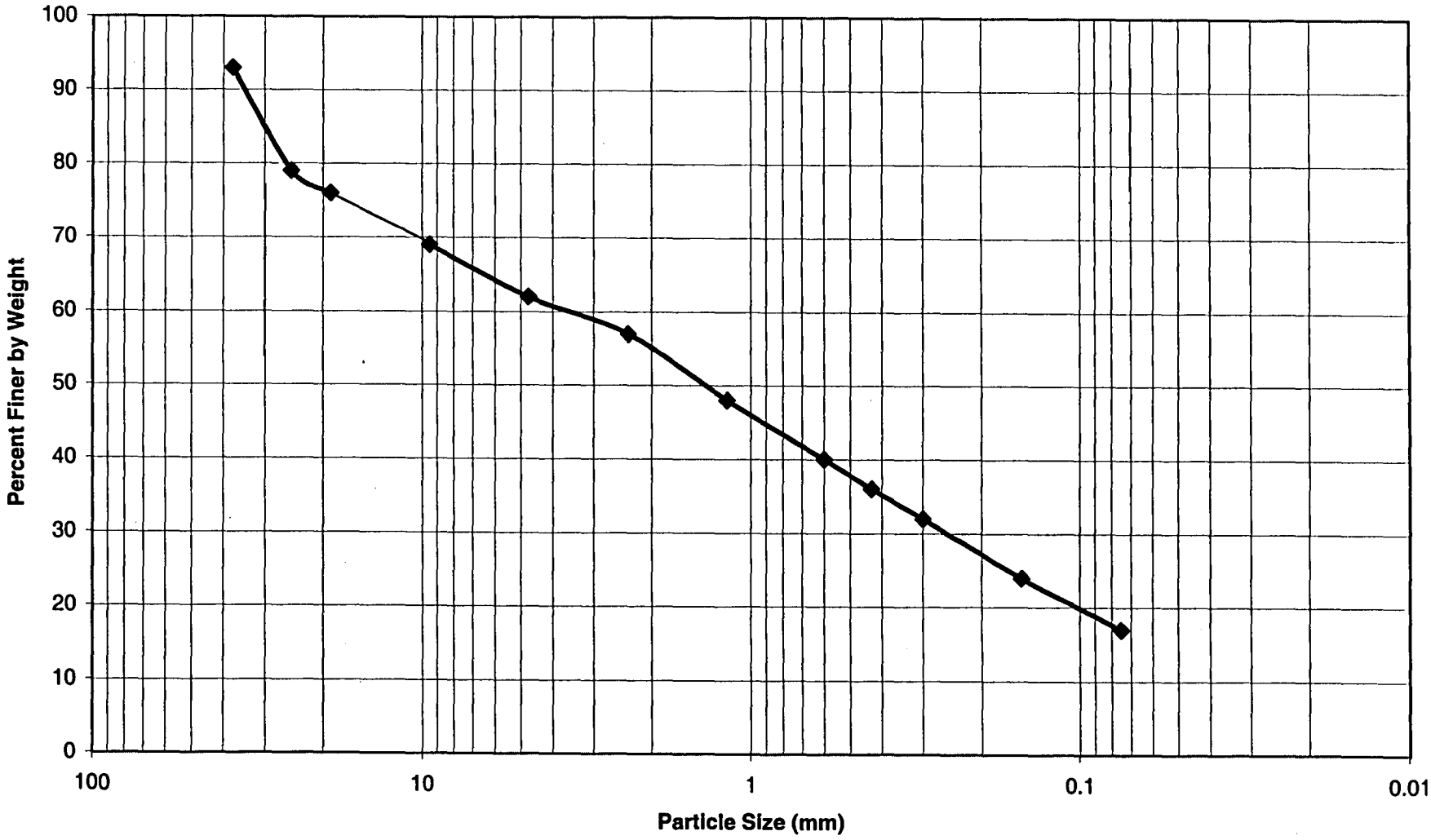
Grain Size Distribution Curve
Test Pit B



WHITE TANKS FRS #3

15448-007-022

Grain Size Distribution Curve
Test Pit C



WHITE TANKS FRS #3

15448-007-022

APPENDIX D

FILTER INVESTIGATION

BORING LOG

LOCATION OF BORING:	JOB NO.	CLIENT FCDMC	LOCATION BUCKEYE, AZ
STA. 57+30 WHITE TANKS DAM	15448-007-058		

DRILLING METHOD:	INTERVAL:	DRILLER:	BORING NO.
CME 75 WITH 3 3/4-INCH HOLLOW STEM AUGER	0'-31.5'	ATL	57+30
			SHEET 1 OF 1

SAMPLING METHOD:	INTERVAL:
STANDARD PENETRATION TEST WITH SPLIT SPOON (SPT)	5-FOOT INTERVALS

			DRILLING START	DRILLING FINISH
WATER LEVEL	NA		TIME	TIME
TIME				
DATE			DATE 11/1/99	DATE 11/1/99
CASING DEPTH				

LOGGED BY: BKW

CHECKED BY: SGN

DATUM: APPROX. ELEVATION: feet

SURFACE CONDITIONS:

DEPTH IN FEET	SAMPLER TYPE	SAMPLE NO.	SAMPLE DEPTH (ft)	% PASSING #200 SIEVE	LIQUID LIMIT %	PLASTICITY INDEX %	WATER CONTENT %	DRY DENS. (pcf)	BLOWS/ft	GRAPHIC LOG	USCS	DESCRIPTION
											GP	SANDY GRAVEL:
5	SPT	1	5.0						9			2 bag sample from 5 to 10 feet
10	SPT	2	10.0						7			1 bag sample from 10 to 15 feet
15	SPT	3	15.0						9			Less sand, more cobbles and rock at depth (from bag samples)
												1 bag sample from 15 to 20 feet
20	SPT	4	20.0						13			
												1 bag sample from 20 to 25 feet
25	SPT	5	25.0						15			1 bag sample from 25 to 30 feet
30	SPT	6	30.0						18		ML	Through dam fill into native ground silt, brown, dry
												Boring terminated at 31.5' below ground surface.
35												

BLGV022 5/2/00

DAMES & MOORE

BORING LOG

LOCATION OF BORING:	JOB NO.	CLIENT	LOCATION
STA. 58+00 WHITE TANKS DAM	15448-007-058	FCDMC	BUCKEYE, AZ

DRILLING METHOD:	INTERVAL:	DRILLER:	BORING NO.
CME 75 WITH 3 3/4-INCH HOLLOW STEM AUGER	0'-31.5'	ATL	58+00
			SHEET 1 OF 1

SAMPLING METHOD:	INTERVAL:
STANDARD PENETRATIN TEST WITH SPLIT SPOON (SPT)	5-FOOT INTERVALS

DRILLING	START	FINISH
TIME		
DATE	11/1/99	11/1/99

LOGGED BY: BKW	WATER LEVEL	NA	
CHECKED BY: SGN	TIME		
	DATE		
	CASING DEPTH		

DATUM: APPROX. ELEVATION: feet

SURFACE CONDITIONS:

DEPTH IN FEET	SAMPLER TYPE	SAMPLE NO.	SAMPLE DEPTH (ft)	LABORATORY TESTS: % PASSING #200 SIEVE	LIQUID LIMIT %	PLASTICITY INDEX %	WATER CONTENT %	DRY DENS. (pcf)	BLOWS/ft	GRAPHIC LOG	USCS	DESCRIPTION
											GP	SANDY GRAVEL: 4" max round 1 bag sample 0-5 feet
5	SPT	1	5.0						6			No recovery 1 bag sample 5-10 feet
10	SPT	2	10.0						10			No recovery
15	SPT	3	15.0						17			No recovery
20	SPT	4	20.0						12			No recovery
25	SPT	5	25.0						19			No recovery
30	SPT	6	30.0						50/6"			No recovery
												Boring terminated at 31.5' below ground surface.
35												

BLGV022 5/2/00

DAMES & MOORE

BORING LOG

LOCATION OF BORING:	JOB NO.	CLIENT	LOCATION
STA. 59+00 WHITE TANKS DAM	15448-007-058	FCDMC	BUCKEYE, AZ

DRILLING METHOD:	INTERVAL:	DRILLER:	BORING NO.
CME 75 WITH 3 3/4-INCH HOLLOW STEM AUGER	0'-31.5'	ATL	59+00
			SHEET 1 OF 1

SAMPLING METHOD:	INTERVAL:
STANDARD PENETRATIN TEST WITH SPLIT SPOON (SPT)	5-FOOT INTERVALS

DRILLING	START	FINISH
TIME		
DATE	11/1/99	11/1/99

LOGGED BY: BKW	WATER LEVEL	NA	
CHECKED BY: SGN	TIME		
	DATE		
	CASING DEPTH		

DATUM: APPROX. ELEVATION: feet

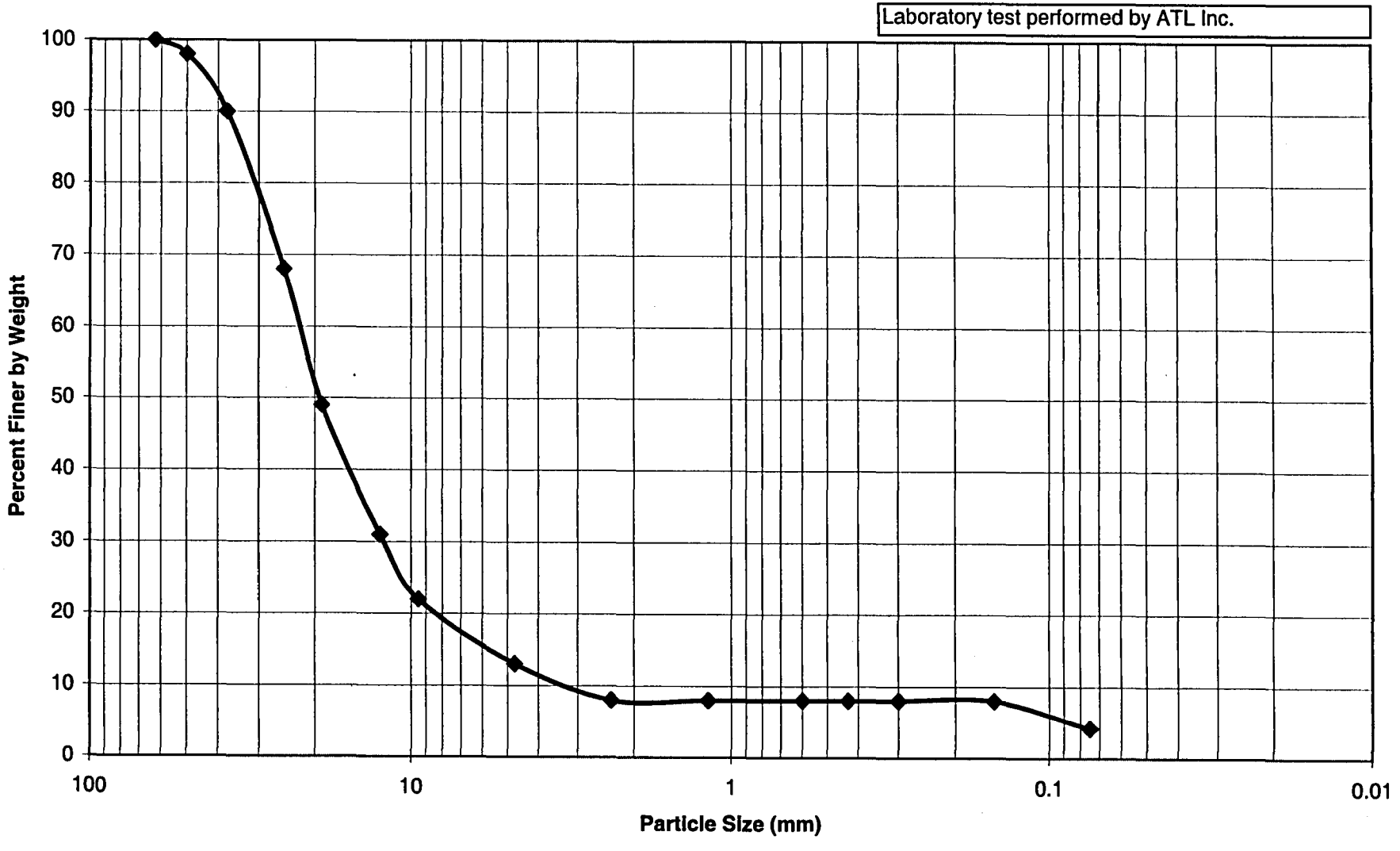
SURFACE CONDITIONS:

DEPTH IN FEET	SAMPLER TYPE	SAMPLE NO.	SAMPLE DEPTH (ft)	% PASSING #200 SIEVE	LIQUID LIMIT %	PLASTICITY INDEX %	WATER CONTENT %	DRY DENS. (pcf)	BLOWS/ft	GRAPHIC LOG	USCS	DESCRIPTION
											GP	SANDY GRAVEL: 3" max rounded 1 bag sample 0-5 feet
5	SPT	1	5.0						5			No recovery
10	SPT	2	10.0						5			No recovery
15	SPT	3	15.0						11			No recovery
20	SPT	4	20.0						15			No recovery 1 bag sample 20-25 feet
25	SPT	5	25.0						12			No recovery
30	SPT	6	30.0						50/6"			No recovery
												Boring terminated at 31.5' below ground surface.
35												

BLGV022 5/2/00

DAMES & MOORE

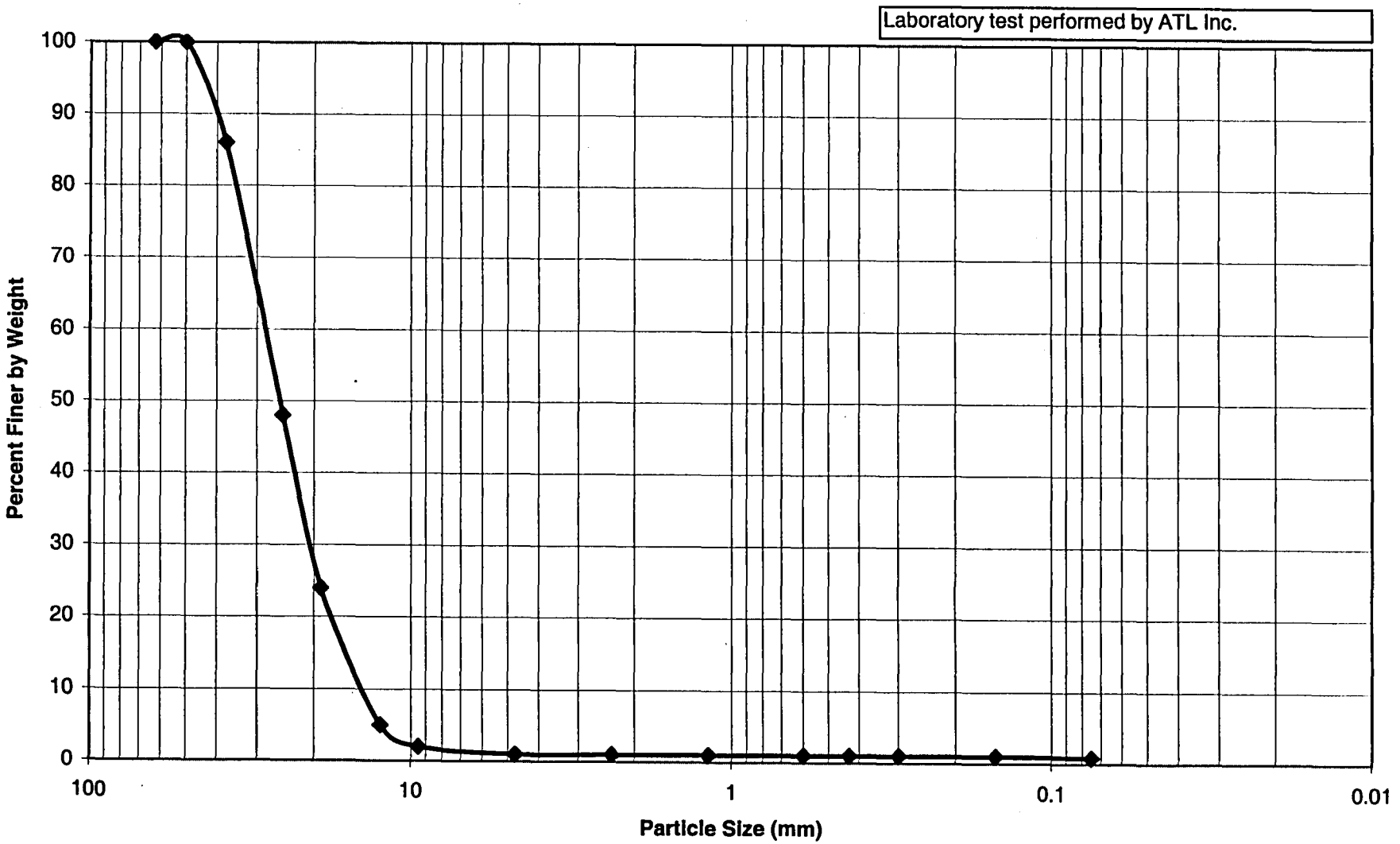
Grain Size Distribution Curve
Boring 57+30 @ 5 - 10 Feet



WHITE TANKS FRS #3

15448-007-022

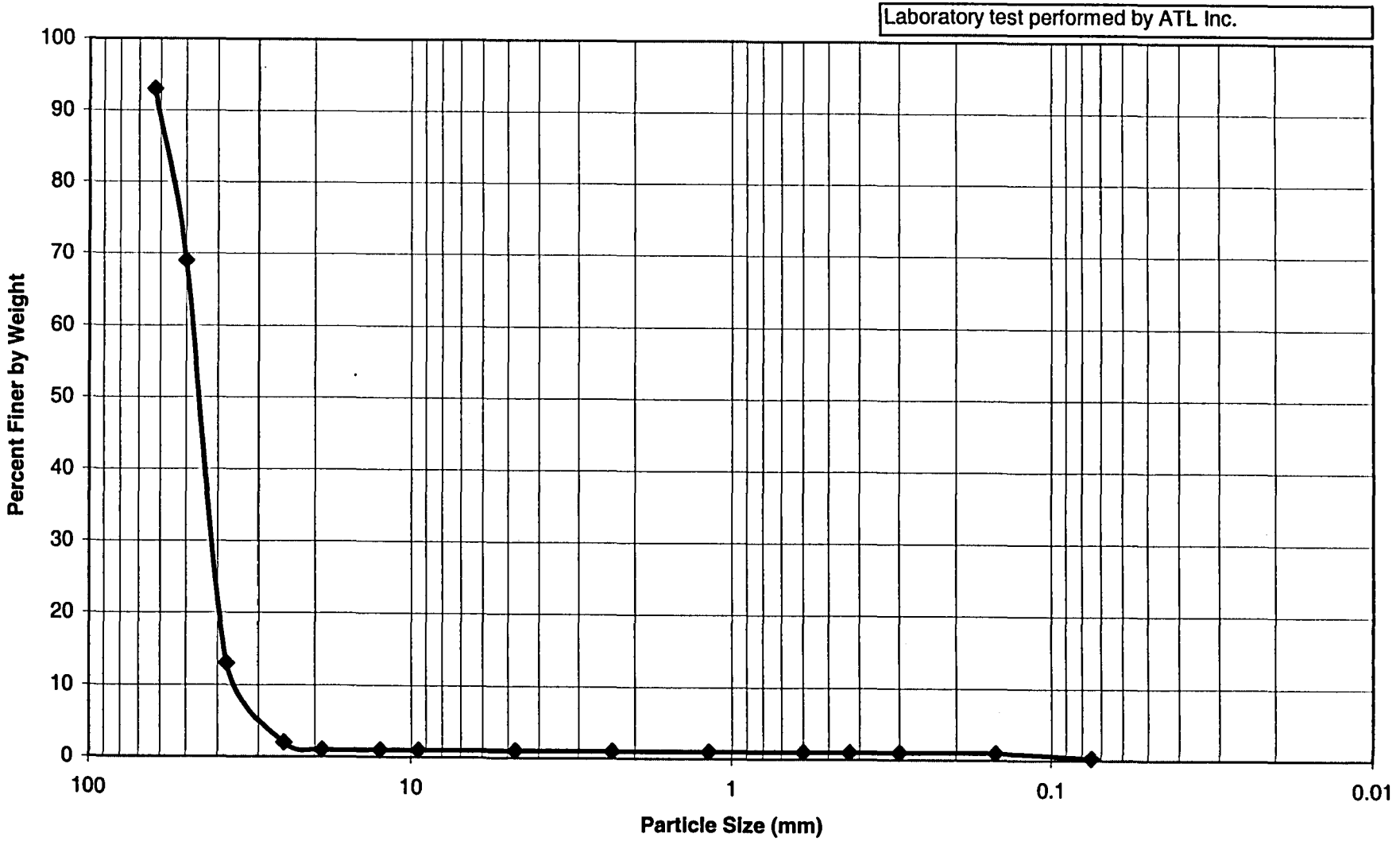
Grain Size Distribution Curve
Boring 57+30 @ 20 - 25 Feet



WHITE TANKS FRS #3

15448-007-022

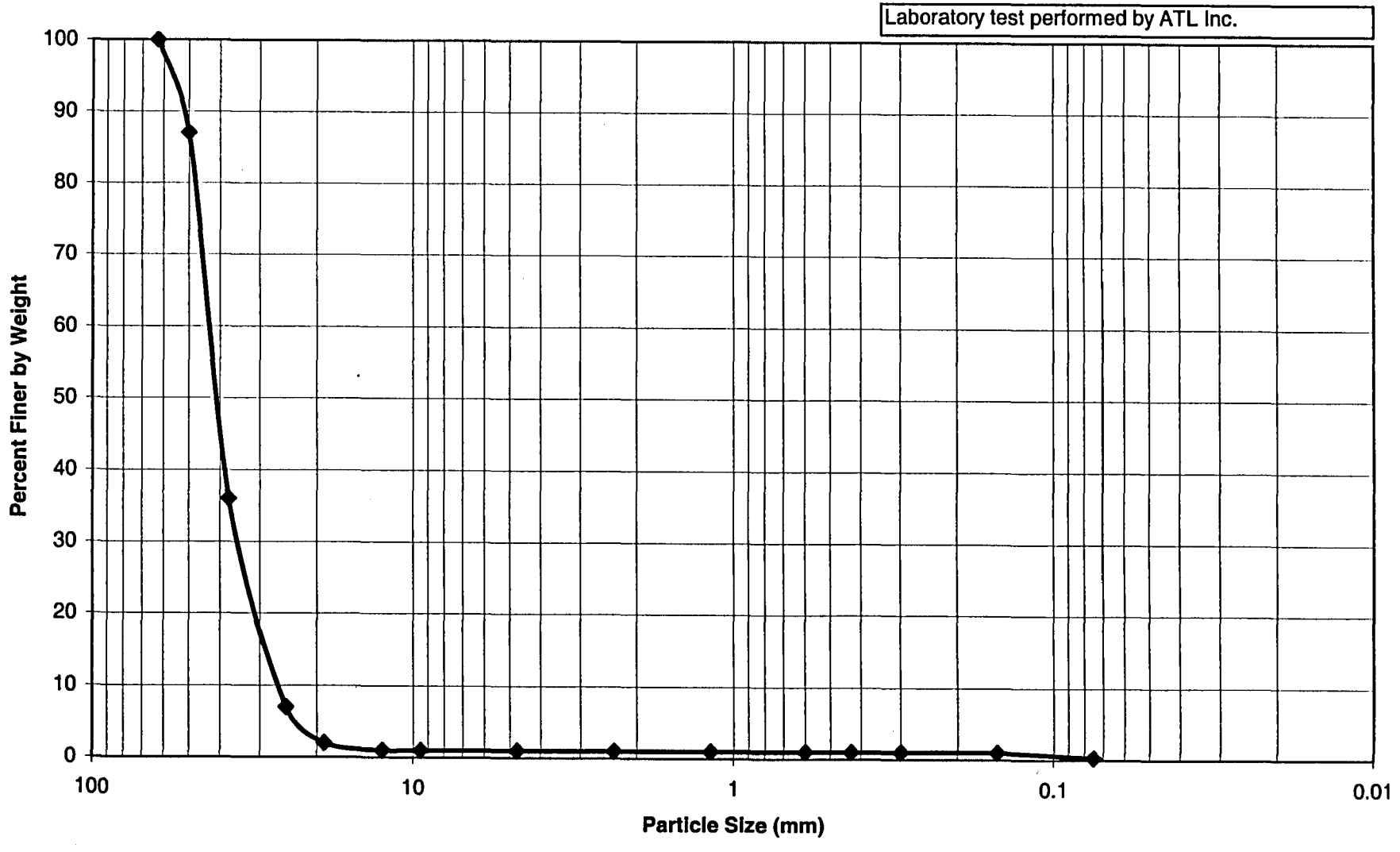
Grain Size Distribution Curve
Boring 58+00 @ 5 - 10 Feet



WHITE TANKS FRS #3

15448-007-022

Grain Size Distribution Curve
Boring 59+00 @ 15 - 20 Feet

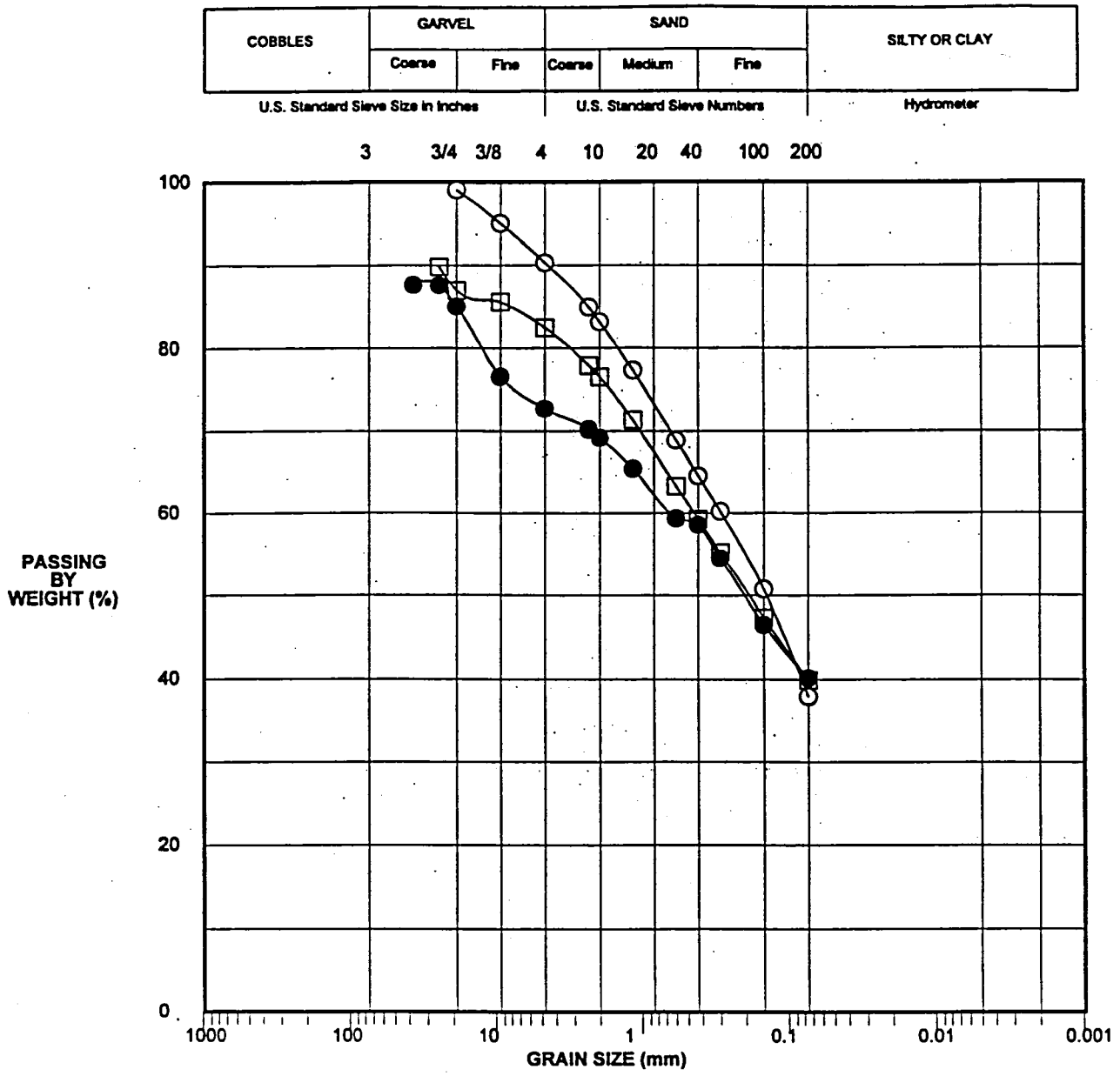


WHITE TANKS FRS #3

15448-007-022

APPENDIX E

CRACK INVESTIGATION



GRAIN SIZE DISTRIBUTION

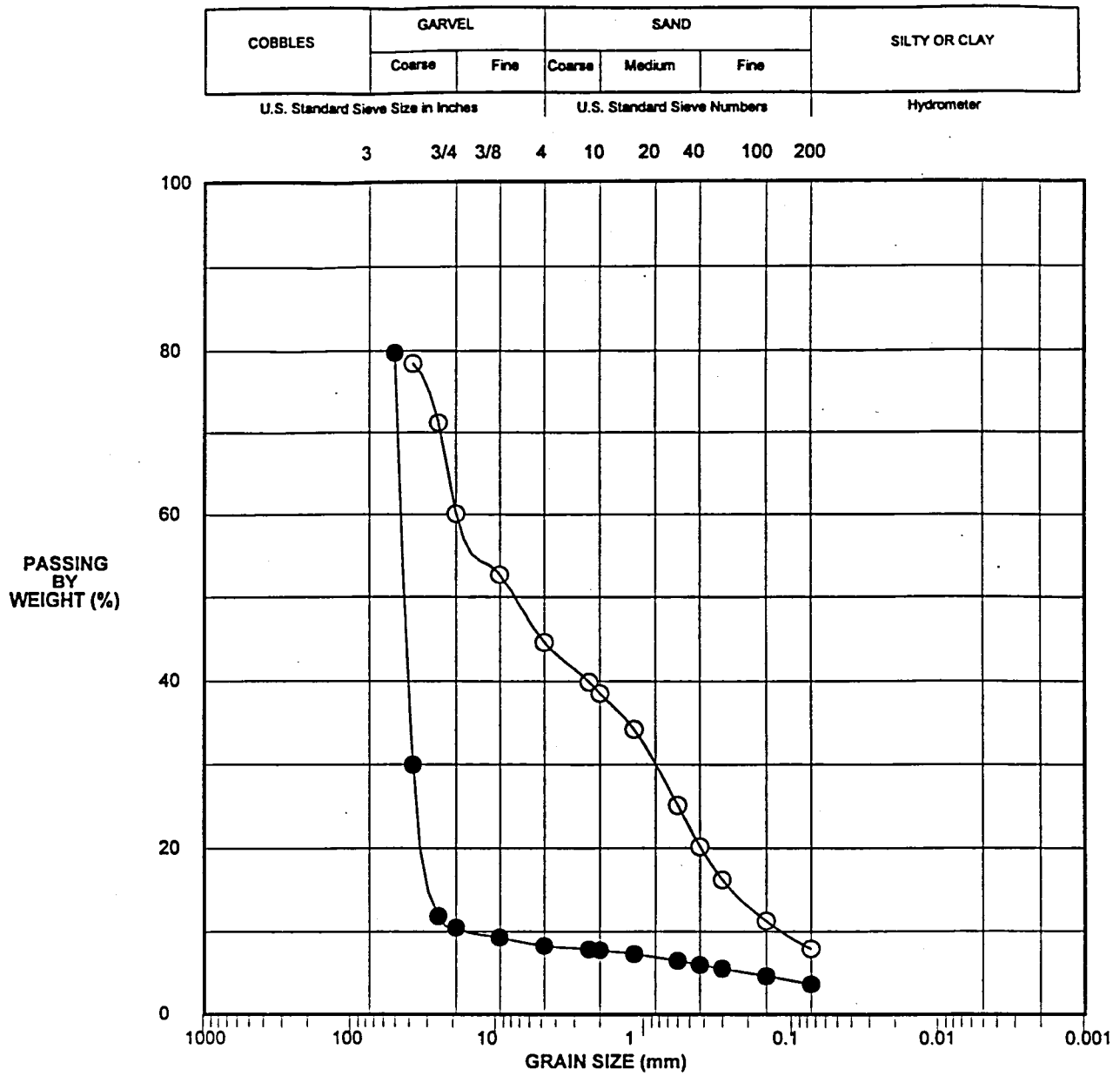
SYMBOL	BORING NO.	DEPTH (ft)	DESCRIPTION	% GRAVEL	% SAND	% FINES
○	E	5	Crack Investigation Test Pit	9.6	52.2	38.2
●	D	5	Filter Investigation Test Pit - South Sidewall	27.2	32.5	40.3
□	D	8	Filter Investigation Test Pit - North Sidewall	17.4	42.5	40.1

Note: Samples obtained during Crack & Filter Investigation, March 2000.

REMARKS:

ATL, INC.
CONSTRUCTION QUALITY ASSURANCE
GEOTECHNICAL/ENVIRONMENTAL CONSULTANTS

WHITE TANKS DAM



GRAIN SIZE DISTRIBUTION

SYMBOL	BORING NO.	DEPTH (ft)	DESCRIPTION	% GRAVEL	% SAND	% FINES
○	D	5	Filter Material	55.3	0.0	44.7
●	D	5	Drain Material	91.7	4.6	3.6

Note: Samples obtained during Crack & Filter Investigation, March 2000.

REMARKS:

ATL, INC.
CONSTRUCTION QUALITY ASSURANCE
GEOTECHNICAL/ENVIRONMENTAL CONSULTANTS

White Tanks Dam