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United States Department of Energy

Remedial Action Plan and Site Design for Stabilization of the Inactive Uranium Mill Tailings Site At Grand Junction, Colorado

NON-RECORD

Attachment 5: Summary of Field Investigations
Volume II: Results of Laboratory Analyses, Other Investigations

Final

September 1991

NON-RECORD

Appendix B of the Cooperative Agreement No. DE-FC04-81AL16257

Uranium Mill Tailings Remedial Action Project

TABLE OF CONTENTS

ATTACHMENT 5

SUMMARY OF FIELD INVESTIGATIONS AND LABORATORY DATA

VOLUME 2

Results of Laboratory Analysis
Daniel B. Stevens & Associates, Inc.
"Main Pile Tailings and Vicinity Property Materials"

- compaction tests
- initial moisture content, bulk density, and porosity
- saturated hydraulic conductivity
- particle size analysis
- laboratory methods

Other Investigations
Electro-Magnetic (EM) Conductivity Results
Neutron Probe Moisture Content Determination Results
Radio Isotope Dating of Cheney Disposal Area Groundwater

Figure 3.1 Locations of surface geophysical lines

BORING NO. B-22.5-3

ELEVATION:

LOCATION: offset 33' north 3' east Pg. 30

2:10-3:50

DEPTH (FT)	SYMBOL	SAMPLE	DESCRIPTION	PENETRATION RESISTANCE	IN-SITU DENSITY (PCF)	MOISTURE CONTENT (%)
5			0-29' Mill tailings, CL-SC, clay, low plasticity, sandy, silty, 16-30% sand, purple, firm, moist.			
10			SM-SP layers-interbedded in purple slime.			
15				2/6	3/6	3/6
				3/6	2/6	1/6
20				2/6	1/6	3/6
				2/6	2/6	2/6
25			Free Water 25.0'			
				2/6	3/6	1/6
			29'			
30			Alluvial, GW-GM, gravels, sands, well graded, subround, silty, 13-30% fine brown, very dense, wet.	25/6	50/6	
			Interbedded SP-SM, sand, poorly graded, subround, silty, 13-30% fine, brown, very dense, saturated.	17/6	24/6	27/6
35			Km, Mancos shale, CL-CH, clay, high plasticity, sand, 16-30% sand, gray, very hard, moist.	50/4		
			T.D. 36'			

LOG OF SUBSURFACE EXPLORATION

LINCOLN DeVORE ENGINEERS · GEOLOGISTS

COLORADO: COLORADO SPRINGS, GRAND JUNCTION, PUEBLO,

DATE 4-7-87

JOB NO. 62995-J

BORING NO. B-5-23

ELEVATION:

LOCATION: offset 24' north 5.5' higher elevation
8:55-10:20 breakdown 1:15-1:45 p.m.

DEPTH (FT)	SYMBOL	SAMPLE	DESCRIPTION Pg. 29	PENETRATION RESISTANCE	IN-SITU DENSITY (PCF)	MOISTURE CONTENT (%)
			0-8' Fill (tailings), GM-GW, gravels, well graded, subround, silty, sandy, 13-30% fines, tan, medium dense, moist.	16/6	10/6	bounce
5			SM-SP lenses	3/6	3/6	4/6
			Fill (tailings), slight clayey, SM-SP, sandy, poorly graded, fine grained, subround, slightly clayey, silty 13-30% fine, brown, loose, moist.	3/6	2/6	3/6
			8' Alluvial, GM-GW, gravels, well graded, subround, sandy, silty, 13-30% fine sand, brown, wet.			
10				22/6	18/6	11/6
			Free Water 12.5'			
				22/6	22/6	bounce
15				7/6	13/2	bounce
			Alluvial, SM-SP, sand, poorly graded, fine grained, subround, silty, slightly clayey, 13-30% fine brown, loose moist.	6/6	20/6	50/5
20				25/6	50/4	
			22.0' T.D.			
25						
30						
35						

LOG OF SUBSURFACE EXPLORATION

LINCOLN DeVORE ENGINEERS · GEOLOGISTS

COLORADO: COLORADO SPRINGS, GRAND JUNCTION, PUEBLO,

DATE 4-7-87

JOB NO. 62995-J

BORING NO. B-3-26

ELEVATION:

LOCATION: offset 4' south 2' east 3/10/87 5:00-5:30

DESCRIPTION 7:55-8:45 Pg. 28

DEPTH (FT)	SYMBOL	SAMPLE	DESCRIPTION	PENETRATION RESISTANCE	IN-SITU DENSITY (PCF)	MOISTURE CONTENT (%)
			No samples until 16.5' 0-20' Mill Tailings			
5						
10						
15			Mill tailings, SM-SP, sand, poorly graded, fine grained, subround, silty, 13-30% fine, tan loose, moist.	3/6	3/6	5/6
20			20.0' Alluvial, SM-SP, poorly graded, fine grained, subround, silty, 13030% fines, tan, medium dense, moist.	5/6	9/6	8/6
			Gravels at 22'	18/6	22/6	21/6
25			Free Water 25.0'	8/6	12/6	16/6
30				18/6	12/6	10/6
			T.D. 33.0' Alluvial, GW-GM, gravels, well graded, subround, silty, 13-30% fines, tan, dense, moist.	16/6	18/6	22/6
35						

LOG OF SUBSURFACE EXPLORATION

LINCOLN DeVORE ENGINEERS · GEOLOGISTS

COLORADO: COLORADO SPRINGS, GRAND JUNCTION, PUEBLO,

DATE 4-7-87

JOB NO. 62995-J

BORING NO. B-S-24

ELEVATION:

LOCATION: 6' South offset Pg. 27 3/10/87 2:30-4:50

DEPTH (FT)	SYMBOL	SAMPLE	DESCRIPTION	PENETRATION RESISTANCE	IN-SITU DENSITY (PCF)	MOISTURE CONTENT (%)
			0-5' Fill, gravels, cobbles			
			5-20' Mill tailings, SC-CL, clay, low plasticity, sandy silty, 16-30% sand, purple, firm, moist.			
10			Purple-white.			
15				2/6	2/6	3/6
				1/12	1/6	
20			20.0' Alluvial, SM, sand, poorly graded, fine grained, subround, silty, 13-30% fines, tan, loose, moist.	2/6	4/6	4/6
				20/6	50/4.5	
25			Free Water 25.5' GW-GM, gravels, sand, well graded, subrounded, slightly silty, 6-12% fines, tan, dense, moist.	5/6	11/6	25/6
30			Lenses-sands to gravels.	16/6	50/5	
				11/6	28/6	bounce
35			36.0' **			
			37.'-6" ** Bedrock, Km, Mancos shale, CL-CH, clay, high plasticity, slightly sandy silty, 0-15% sand, gray, very hard, moist.	50/2		

LOG OF SUBSURFACE EXPLORATION

LINCOLN DeVORE ENGINEERS · GEOLOGISTS

COLORADO: COLORADO SPRINGS, GRAND JUNCTION, PUEBLO.

DATE 4-7-87

JOB NO. 62995-J

BORING NO. B-22.5

ELEVATION:

LOCATION: offset 22.5' N 3/10/87 Pg. 26

DEPTH (FT)	SYMBOL	SAMPLE	DESCRIPTION 12:40-2:05	PENETRATION RESISTANCE	IN-SITU DENSITY (PCF)	MOISTURE CONTENT (%)
			Fill, GW-GM, gravels, sandy, well graded, sub-rounded, slightly silty, 6-12% fines, very dense, moist, cobbles.	10/3		
5			Change in end of drive.			
			8.5'	2/6	3/6	4/6
			Mill tailings, CL-SC, clay, low pasticity, sandy, silty, 16-30% sand, purple, loose, damp.			
10				6/6	1/6	2/6
15				1/6	3/6	3/6
				1/6	1/6	
			Purple-white, wet.			
20				2/6	1/6	1/6
			22.0'			
			Alluvial, SM, sand, poorly graded, fine grained, silty, slightly gravelly, subround, 13-30% fines, tan, medium moist. 25.0' Refusal-No water	2/6	4/6	10/6
25			T.D. 25.0'			
30						
35						

LOG OF SUBSURFACE EXPLORATION

LINCOLN DeVORE ENGINEERS · GEOLOGISTS

COLORADO: COLORADO SPRINGS, GRAND JUNCTION, PUEBLO.

DATE 4-7-87

JOB NO. 62995-J

BORING NO. B-21

ELEVATION:

LOCATION: offset 8' to N

3/10/87 8:30 - 10:25

Pg. 25

DEPTH (FT)	SYMBOL	SAMPLE	DESCRIPTION	PENETRATION RESISTANCE	IN-SITU DENSITY (PCF)	MOISTURE CONTENT (%)
			No sample until 14.5'			
			Mill Tailings; fill, CL-SC, clay, sandy, silty, low plasticity, 16-30% sand, purple stiff, moist.			
10			Color change in end of drive, light gray to purple, light green material.			
15			Change in end of drive.	3/6	3/6	6/6
				2/6	3/6	4/6
20				1/12	5/18	
			22.0'			
			Alluvial, SM-SP, sandy, poorly graded, fine grained, subround, silty, 13-30% fine, tan, medium dense, moist.			
25				[illegible]	6/6	16/6
			Free Water 26.5'			
			GW-GM, sandy gravel, well graded, subround, very dense, moist to wet.	20/6	50/5	
30				32/6	25/6	22/6
				4/6	7/6	15/6
35						
			37.5' **			
			Changed drive to 38.5' due to cobbles.			
			T.D. 39.0'	50/4.5"		
40			**Km, Mancos shale, CL-CH clay, slightly sandy silty, 6-20% sandy, high plasticity, gray, moist blocky, very hard.			

LOG OF SUBSURFACE EXPLORATION

LINCOLN DeVORE ENGINEERS · GEOLOGISTS

COLORADO: COLORADO SPRINGS, GRAND JUNCTION, PUEBLO,

DATE 4-7-87

JOB NO. 62995-J

BORING NO. 19-3-3

ELEVATION:

LOCATION: 5' east of 19-3 3/7/87

pg 23 and 24

DEPTH (FT)	SYMBOL	SAMPLE	DESCRIPTION	PENETRATION RESISTANCE	IN-SITU DENSITY (PCF)	MOISTURE CONTENT (%)
			Fill (embankment); sandy gravels, brown, medium dense, dry. Broke hydraulic line at 3:15 p.m. shut down. T.D. 7.0'.	6/6	7/6	11/6
5				6/6	8/6	13/6
			7.0'			
10						
15						
			Mill Tailings; as described, purple slime and sand from 19.5' - 21.0'.			
20				Purple slime 1/6	1/6	2/6
			22.0'			
			Alluvium; sand, gravel and cobbles, red brown, medium dense to dense, moist to saturated.	3/6	7/6	bounce
25			Free Water 26.0'	12/6	14/6	26/6
30				8/6	12/6	37/6
				50/bounce; coarse cobbles		
			T.D. 33'-9	50/3		
35						

LOG OF SUBSURFACE EXPLORATION

LINCOLN DeVORE ENGINEERS · GEOLOGISTS

COLORADO: COLORADO SPRINGS, GRAND JUNCTION, PUEBLO,

DATE 4-7-87

JOB NO. 62995-J

BORING NO. 19-3

ELEVATION:

LOCATION: 10-5' N 3/7/87 pg 22

10:50 - 2:40
Lunch: 11:35 to 1:30

DEPTH (FT)	SYMBOL	SAMPLE	DESCRIPTION	PENETRATION RESISTANCE	IN-SITU DENSITY (PCF)	MOISTURE CONTENT (%)
			Fill (Embankment); sandy gravel, fine to coarse, subround, brown, dry, medium dense, coarse gravels and cobbles throughout.	10/6	12/6	21/6
			4.5'			
5			Mill Tailings; SM, purple, silty, loose, dry, wet to saturated slime at 10.5'.	14/6	15/6	17/6
				2/6	2/6	3/6
10				1/6	1/6	1/6
				1/6	1/6	1/6
15				2/6	2/6	2/6
20				2/6	2/6	2/6
			22.5'			
			Alluvium; SM, very silty, brown, loose, moist to wet, gravelly to cobbley.	6/6	50/bounce	
25			T.D. 25.0' **			
			**Auger refusal at 25.0' on a large cobble (mk).			
30						
35						

LOG OF SUBSURFACE EXPLORATION

LINCOLN DeVORE ENGINEERS · GEOLOGISTS

COLORADO: COLORADO SPRINGS, GRAND JUNCTION, PUEBLO,

DATE 4-7-87

JOB NO. 62975 - J

BORING NO. 17-B

ELEVATION:

3/7/87 pg 21

9:30 - 10:45 a.m.

DEPTH (FT)	SYMBOL	SAMPLE	DESCRIPTION	PENETRATION RESISTANCE	IN-SITU DENSITY (PCF)	MOISTURE CONTENT (%)
			Fill (Embankment); SM, sand, poorly graded, fine gravel with gravels and cobbles primarily coarse gravels.	16/6	17/6	22/6
5				10/6	12/6	bounce
				12/6	18/6	bounce
10				13/6	20/6	20/6
			13.0'			
			Mill Tailings; purple slime, soft, wet sand to clay.	4/6	4/6	6/6
15				2/6	4/6	7/6
20				4/6	4/6	6/6
			21.0' ** T.D. 21.0'			
			** No ground water table terminated due to very coarse material crooked hole.			
25						
30						
35						

LOG OF SUBSURFACE EXPLORATION

LINCOLN DeVORE ENGINEERS · GEOLOGISTS

COLORADO: COLORADO SPRINGS, GRAND JUNCTION, PUEBLO,

DATE 4-7-87

JOB NO. 62995-J

BORING NO. 15-3C

ELEVATION:

LOCATION: 20' north 3/6/87 pg 19 and 20 4:10 - 4:25 p.m.

DEPTH (FT)	SYMBOL	SAMPLE	DESCRIPTION	PENETRATION RESISTANCE	IN-SITU DENSITY (PCF)	MOISTURE CONTENT (%)
			Mill Tailings; SM, sand, poorly graded, mainly fine, scattered gravel upper 3'; drilled 7' on 3/6/87 will resume 3/7/87.	6/6,	7/6/,	9/6
5			Resumed drilling 7:50 a.m. 3/7/87. Start with 10.5'-12.0' sample.	1/6,	1/6,	1/6
				14/6,	9/6,	8/6
			9.0'			
10			Mill Tailings; purple slime and sand; soft, wet to loose and dry.	4/6,	4/6,	3/6
				2/6,	2/6,	4/6
15				4/6,	6/6,	8/6
20				2/6,	4/6,	5/6
			23.0'			
25			Alluvium; SM, sand, poorly graded, fine gravel, silty, brown, medium dense, damp.	6/16,	16/6,	11/6
			∇ FREE WATER 26'	10/6,	10/6,	12/6
			Picking up gravels to cobbles by 28'.			
30				50/6	no sample; cobbles	
			33.0' T.D. 33.0'	13/6,	17/6,	6/6
35						

LOG OF SUBSURFACE EXPLORATION

LINCOLN DeVORE ENGINEERS · GEOLOGISTS

COLORADO: COLORADO SPRINGS, GRAND JUNCTION, PUEBLO,

DATE 4-7-87

JOB NO. 62995-J

BORING NO. 9-C

ELEVATION:

LOCATION:

3/6/87 pg 18
3:05 - 3:45 p.m.

DEPTH (FT)	SYMBOL	SAMPLE	DESCRIPTION	PENETRATION RESISTANCE	IN-SITU DENSITY (PCF)	MOISTURE CONTENT (%)
			Alluvium; SM, sand, fine, silty, brown, loose, moist.	2/6,	2/6,	4/6
			4.5' Alluvium; gravelly sand to sandy gravels, well graded, subround, medium dense, wet to saturated. Free Water 6.0'	7/6,	14/6,	21/6
5				19/6,	19/6,	15/6
10				16 bounce;		cobble
			14.0' Km; Moncos shale, CL/CH, dark gray, very hard, slightly weathered	50/bounce		
15				50/3		
			T.D. 18.0'			
20						
25						
30						

LOG OF SUBSURFACE EXPLORATION

LINCOLN DeVORE ENGINEERS · GEOLOGISTS

COLORADO: COLORADO SPRINGS, GRAND JUNCTION, PUEBLO,

DATE 4-7-87

JOB NO. 62975-J

BORING NO. 21-J (Cont'd)

ELEVATION:

3/6/87 pg. 17

DEPTH (FT)	SYMBOL	SAMPLE	DESCRIPTION	PENETRATION RESISTANCE	IN-SITU DENSITY (PCF)	MOISTURE CONTENT (%)
40			Mill Tailings; SM to SP-SM, sand, poorly graded, fine grained, light yellow brown, medium dense to loose, dry.	5/6,	5/6,	7/6
45				No blow counts		
50			50.0'	3/6,	29/6	
			Alluvium; sandy gravels, well graded, clayey,			
55				8/6,	12/6,	15/6
			56.0 Km; Mancos shale, dark gray, very hard, unweathered.			
			T.D.-57'-7	50/1		

LOG OF SUBSURFACE EXPLORATION

LINCOLN DeVORE ENGINEERS-GEOLOGISTS

COLORADO: COLORADO SPRINGS, GRAND JUNCTION, PUEBLO,

DATE 4-7-87

JOB NO. 62975-J

BORING NO. 21-J

ELEVATION:

9:40- pg. 16
Lunch 11:45-
Resume 1:35-1:50

DEPTH (FT)	SYMBOL	SAMPLE	DESCRIPTION	PENETRATION RESISTANCE	IN-SITU DENSITY (PCF)	MOISTURE CONTENT (%)
			Mill Tailings; SM to SP-SM, sand, poorly graded, fine grained, light yellow brown, medium dense to loose, dry.	9/6,	12/6,	14/6
5				6/6,	7/6,	8/6
				2/6,	4/6,	4/6
10				3/6,	3/6,	4/6
15				3/6,	3/6,	4/6
				3/6,	3/6,	5/6
20				3/6,	4/6,	5/6
				3/6,	4/6,	6/6
25				4/6,	5/6,	7/6
30				5/6,	6/6,	5/6
				5/6,	6/6,	9/6
35				5/6,	7/6,	10/6

LOG OF SUBSURFACE EXPLORATION

LINCOLN DeVORE ENGINEERS · GEOLOGISTS

COLORADO: COLORADO SPRINGS, GRAND JUNCTION, PUEBLO,

DATE 4-7-87

JOB NO. 62975-J

BORING NO. 9-H

ELEVATION:

8:00 - 9:30 a.m.

Pg. 15

DEPTH (FT)	SYMBOL	SAMPLE	DESCRIPTION	PENETRATION RESISTANCE	IN-SITU DENSITY (PCF)	MOISTURE CONTENT (%)
			Mill Tailings; SM, sand, poorly graded, fine grained, silty, purple, medium dense, dry.	10/6,	11/6,	12/6
			4.0'			
5			Mill Tailings; SM, sand, poorly graded, fine grained, light brown, silty to slightly silty, loose, dry.	3/6,	4/6,	8/6
				2/6,	2/6,	2/6
10						
			13.5'; light tan clay, black sand, small layer purple clay.	3/6,	3/6,	3/6
15				3/6,	4/6,	5/6
			16.5'; white, wet, moderately plastic clay.	2/6,	1/6,	1/6
			19.0' Free Water 19.0'			
20			Alluvium; sand and gravel, well graded, red brown, medium dense, saturated.	14/6,	8/6,	8/6
			T.D. 22.5'	11/6,	9/6,	3/6
25						
30						
35						

LOG OF SUBSURFACE EXPLORATION

LINCOLN DeVORE ENGINEERS · GEOLOGISTS

COLORADO: COLORADO SPRINGS, GRAND JUNCTION, PUEBLO,

DATE 4-7-87

JOB NO 62995-J

BORING NO. 6-D

ELEVATION:

3/4/87 pg 9
2:45 - 4:00

DEPTH (FT)	SYMBOL	SAMPLE	DESCRIPTION	PENETRATION RESISTANCE	IN-SITU DENSITY (PCF)	MOISTURE CONTENT (%)
			Mill Tailings; interlayered clay and sand, CL to SM; various colors pink, light brown, loose to medium dense, dry.	4/6,	5/6,	6/6
5				3/6,	5/6,	5/6
				2/6,	2/6,	2/6
10				2/6,	3/6,	11/6
15				4/6,	3/6,	4/6
			19.0'	3/6,	3/6,	6/6
20			Alluvium; sandy gravels, GW-GM, subround, medium dense, wet to saturated.	3/6,	50/7	
			Free Water 23.0'	12/6,	10/6,	8/6
25				50/bounce on a cobble no sample		
30			29.5' ** T.D. 30.0'	14/6,	50/14	
			** Km; Mancos shale; dark gray, very hard, unweathered.			
35						

LOG OF SUBSURFACE EXPLORATION

LINCOLN DeVORE ENGINEERS · GEOLOGISTS

COLORADO: COLORADO SPRINGS, GRAND JUNCTION, PUEBLO,

DATE 4-7-87

JOB NO. 62995-J

BORING NO. 12-CD

ELEVATION:

LOCATION: 18' north pg 10 3/4/87

DEPTH (FT)	SYMBOL	SAMPLE	DESCRIPTION	PENETRATION RESISTANCE	IN-SITU DENSITY (PCF)	MOISTURE CONTENT (%)
			Mill Tailings; SM, sand, poorly graded, silty to silty, mottled, various colorations, purple, light brown, medium dense, dry.	5/6,	5/6,	7/6
5				7/6,	9/6,	8/6
				2/6,	2/6,	2/6
10				50/bounce; cobble size material-no sample		
15			Purple (semi-liquid, viscous) last 3" of 15' sample.	4/6,	3/6,	2/6
				4/6,	5/6,	4/6
20			Stopped drilling at 5:05 on 3/4/87 at 19.5', will resume 3/5/87. On 3/5/87 at 8:05 a.m. continued hole.	9/6,	18/6,	19/6
			Free Water 23.0'	4/6,	5/6,	6/6
25			25.0' Alluvium; sandy gravel, GW-GM; well graded, sub-rounded, red to brown, dense, saturated.	4/6,	4/6,	6/6
30			T.D. 30.0'	27/6	40/6	
35						

LOG OF SUBSURFACE EXPLORATION

LINCOLN DeVORE ENGINEERS · GEOLOGISTS

COLORADO: COLORADO SPRINGS, GRAND JUNCTION, PUEBLO.

DATE 4-7-87

JOB NO. 62975-J

BORING NO. 5-CD

ELEVATION:

3/5/87 pg. 14
3:30 - 5:10 p.m.

DEPTH (FT)	SYMBOL	SAMPLE	DESCRIPTION	PENETRATION RESISTANCE	IN-SITU DENSITY (PCF)	MOISTURE CONTENT (%)
			Fill Embankment; sandy gravels, subrounded, medium dense, dry.	14/6,	24/6	11/6
5			4.5' Mill Tailings; SM to SP-SM, sand, poorly graded, fine grained, silty to slightly silty, mottled, purple to light brown, loose, dry to damp.	3/6,	4/6,	3/6
				2/6,	2/6,	4/6
10			10.0' Alluvium; sandy gravel, GW-GM, well graded, subrounded, medium dense, dry to damp.	16/6,	17/6,	11/6
			Free Water 14.0'	5/6,	6/6,	4/6
15				17/6	33/6	
20				23/6,	20/6,	25/6
			22.0' ** T.D. 22.0'-9 1/2"			
25			** Km; Mancos shale; dark gray, very hard, relatively unweathered, damp.			
30						
35						

LOG OF SUBSURFACE EXPLORATION

LINCOLN DeVORE ENGINEERS · GEOLOGISTS

COLORADO: COLORADO SPRINGS, GRAND JUNCTION, PUEBLO,

JOB NO. 62975-J

DATE 4-7-87

BORING NO. 2-D

ELEVATION:

pg 13 3/5/87
1:55 - 3:15 p.m.

DEPTH (FT)	SYMBOL	SAMPLE	DESCRIPTION	PENETRATION RESISTANCE	IN-SITU DENSITY (PCF)	MOISTURE CONTENT (%)
			Mill Tailings; CL to SC to SM, clay, clayey and silty sand, various colorations, purple, green brown, soft, moist.	4/6,	4/6,	3/6
5				4/6,	2/6,	2/6
			Free Water 8.0'	1/6,	1/6,	2/6
10			10.0' Alluvium; SW-SM, sand, well graded, slightly silty, red brown, loose, saturated, coarser gravels from 13.0'.	3/6,	3/6,	5/6
15				16/6,	17/6,	34/6
				20/bounce		
20			20.0' ** T.D. 21.0'	26/6,	10/6,	10/6
			** Km, Mancos shale; dark gray, very hard, damp to moist.			
25						
30						
35						

LOG OF SUBSURFACE EXPLORATION

LINCOLN DeVORE ENGINEERS · GEOLOGISTS

COLORADO: COLORADO SPRINGS, GRAND JUNCTION, PUEBLO,

DATE 4-7-87

JOB NO. 62995-J

BORING NO. D-4 (4-D)

ELEVATION:

3/4/87
10:00 - 12:25
Pg. 7

DEPTH (FT)	SYMBOL	SAMPLE	DESCRIPTION	PENETRATION RESISTANCE	IN-SITU DENSITY (PCF)	MOISTURE CONTENT (%)
			Mill Tailings; CL-ML, clay, silty, sandy, light green brown, soft, dry.	1/6,	2/6,	2/6
5			5.0'	8/6,	8/6,	13/6
			SP-SM; sand, poorly graded, fine grained, slightly silty, light brown, medium dense, dry. Purple clay at 16.5 to 20.0'	2/6,	3/6,	4/6
10				2/6,	2/6,	3/6
				2/6,	3/6,	4/6
15				4/6,	5/6,	5/6
20			20.0'			
			T.D. 21.5' No Free Water			
25			Alluvial gravels 35% (+#4). Auguer refusal at 21.5'. Pulled out center plug to run geophysical survey, decided to offset hole.			
30						
35						

LOG OF SUBSURFACE EXPLORATION

LINCOLN DeVORE ENGINEERS · GEOLOGISTS

COLORADO: COLORADO SPRINGS, GRAND JUNCTION, PUEBLO,

DATE 4-7-87

JOB NO. 62995-J

BORING NO. 4-D-3

ELEVATION:

LOCATION: 16'-9 east 3/4/87

Pg. 8

DEPTH (FT)	SYMBOL	SAMPLE	DESCRIPTION	PENETRATION RESISTANCE	IN-SITU DENSITY (PCF)	MOISTURE CONTENT (%)
			Mill Tailings, CL to SC; sandy, light green, brown to light purple (10" layer), loose to medium dense, dry, change to a fine sand at 5.0', purple sandy clay and sand.	3/6,	5/6,	5/6
5				4/6,	8/6,	9/6
				2/6,	3/6,	4/6
10				2/6,	2/6,	3/6
				2/6,	4/6,	4/6
15				6/6,	6/6,	4/6
			19.0'			
20			Alluvium; sandy gravels, GW-GM, well graded, subround, medium dense.	16/6,	24/6,	13/6
			Free Water 23.0'	10/6,	19/6,	20/6
25				18/6,	16/6,	18/6
				28/6,	30/6,	23/6
30						
			31.0			
			Km; clay shale, high plastic, dark gray, medium to highly weathered, moist, blocky, bentonite seam.	12/6,	13/6,	17/6
			T.D. 33.0'			
35						

LOG OF SUBSURFACE EXPLORATIO

LINCOLN DeVORE ENGINEERS · GEOLOGISTS

COLORADO: COLORADO SPRINGS, GRAND JUNCTION, PUEBLO,

DATE 4-7-87

JOB NO. 62975-J

BORING NO. 2-DE-3

ELEVATION:

LOCATION: off 10' east 3/3/87

DEPTH (FT)	SYMBOL	SAMPLE	DESCRIPTION Pg. 5	PENETRATION RESISTANCE	IN-SITU DENSITY (PCF)	MOISTURE CONTENT (%)
			Mill Tailings, SP-SM, sand, poorly graded, fine grained, slightly silty, light yellow to brown, loose to medium dense, damp; grades towards an SP-SM, cleaner sand.	5/6,	4/6,	6/6
5				2/6,	6/6,	4/6
				2/6,	2/6,	5/6
10				3/6,	3/6,	3/6
15				1/6,	1/6,	2/6
			17.0'	7/6,	8/6,	8/6
			Alluvium; sands and gravels, coarser with depth. Coarser gravels to cobbles from 18.0'.			
20			Free Water 21.0'	3/6,	3/6,	6/6
				11/6,	12/6,	13/6
25				15/6,	27/6,	35/6
			29.0' Km, Mancos shale, dark gray, very hard, dry, relatively unweathered.			
30			T.D. 30.0'	50/5		
35						

LOG OF SUBSURFACE EXPLORATION

LINCOLN DeVORE ENGINEERS · GEOLOGISTS

COLORADO: COLORADO SPRINGS, GRAND JUNCTION, PUEBLO,

DATE 4-7-87

JOB NO. 62995-J

BORING NO. 2-D

ELEVATION:

LOCATION: 12' north offset

3/4/87
8:45 a.m. - 10
Pg. 6

DEPTH (FT)	SYMBOL	SAMPLE	DESCRIPTION	PENETRATION RESISTANCE	IN-SITU DENSITY (PCF)	MOISTURE CONTENT (%)
			Mill Tailings; SM to SP-SM, sand, very fine to fine grained, silty to slightly silty, yellow brown to yellow green, medium dense, dry.	7/6,	10/6,	11/6
5				3/6,	5/6,	7/6
				3/6,	3/6,	4/6
10				3/6,	3/6,	4/6
15				2/6,	3/6,	4/6
			16.0' Alluvium; sands and gravels, SP-SM to GW-GM coarser with depth.	3/6,	16/6,	10/6
20				3/6,	4/6,	8/6
25				2/6,	2/6,	4/6
				5/6,	11/6,	19/6
30			29.0' Km: mancos shale-residual soil (CH), clay, highly plastic, dark gray, hard, moist, bentonite seam in tip. T.D. 30.0'	28/6,	30/6,	23/6
35						

LOG OF SUBSURFACE EXPLORATION

LINCOLN DeVORE ENGINEERS · GEOLOGISTS

COLORADO: COLORADO SPRINGS, GRAND JUNCTION, PUEBLO,

DATE 4-7-87

JOB NO. 62995-J

BORING NO. 2-F-3

ELEVATION:

LOCATION: 25' east offset 3/3/87

DESCRIPTION Pg. 3

DEPTH (FT)	SYMBOL	SAMPLE	DESCRIPTION	PENETRATION RESISTANCE	IN-SITU DENSITY (PCF)	MOISTURE CONTENT (%)
			Mill Tailings; SP-SM, sand, poorly fine grained, slightly silty, light brown, loose, damp. Picking up clay layers (2-3") wood, plastic.	3/6,	4/6,	4/6
5				4/6,	7/6,	7/6
				3/6,	3/6,	4/6
10				2/6,	3/6,	4/6
15				bouncing on a cobble 4% recovery		
				2/6,	4/6,	6/6
19.5'			Free Water 19.5'			
20			Alluvium; sandy gravels, well graded, slightly silty, medium dense, saturated.	6/6,	10/6,	12/6
25				25/6	22/6,	bounce
27'			Km; mancos shale, dark gray, very hard, dry.			
T.D. 27.8'						

LOG OF SUBSURFACE EXPLORATION

LINCOLN DeVORE ENGINEERS · GEOLOGISTS

COLORADO: COLORADO SPRINGS, GRAND JUNCTION, PUEBLO,

DATE 4-7-87

JOB NO. 62975-J

BORING NO. 1-DE

ELEVATION: 4582.9

LOCATION: N-59,350 E-32,650 3/3/87 2:45 p.m.

DEPTH (FT)	SYMBOL	SAMPLE	DESCRIPTION Pg. 4	PENETRATION RESISTANCE	IN-SITU DENSITY (PCF)	MOISTURE CONTENT (%)
			Mill Tailings; SM, sand, very fine to fine grained, light brown, medium dense, dry.	8/6,	8/6,	9/6
5				2/6,	3/6,	13/6
				3/6,	4/6,	4/6
10			11.0 '	10/6,	12/6,	9/6
			Alluvium; sands, gravels to cobbles by 12.0' SP-SM; sand, mainly five grained, some coarser (+#4), coarser gravels to cobbles by 12.0'. No Free Water	50/bounce		
15			Auger refusal at 14.0'.			
20						
25						

LOG OF SUBSURFACE EXPLORATION

LINCOLN DeVORE ENGINEERS · GEOLOGISTS

COLORADO: COLORADO SPRINGS, GRAND JUNCTION, PUEBLO,

DATE 4-7-87

JOB NO. 62995-J

BORING NO. 2-GH

ELEVATION: 4580.8

LOCATION: N-59,650 E-32,650 3/3/87 9:00-10:30 a.m.

DESCRIPTION Pg. 1

DEPTH (FT)	SYMBOL	SAMPLE	DESCRIPTION	PENETRATION RESISTANCE	IN-SITU DENSITY (PCF)	MOISTURE CONTENT (%)
			Mill Tailings; sand, SP-SM, poorly graded, fine grained, light brown, slightly silty, loose to medium dense, moist, debris in 15' sample; plastic, still primarily very fine to fine grained sand yellow green to orange coloration. Picked up an SC to CL lense at 16.5'; wood debris plastic also.	6/6,	5/6,	5/6
5				2/6,	2/6,	3/6
				2/6,	4/5,	4/6
10				2/6,	2/6,	3/6
				3/6,	3/6,	3/6
15				1/6,	2/6,	4/5
			Free Water 19.5'			
20				1/6,	2/6,	2/6
			23.0' Alluvium; sands and gravels SW-SM to GW-GM, well graded subround, medium dense, saturated heavy cobbles from 25.0'	3/6,	13/6	19/6
25				50/bounce		
			27.0' km; moncos shale, dark gray, T.D. 27.8' very hard, unweathered			
30						

LOG OF SUBSURFACE EXPLORATION

LINCOLN DeVORE ENGINEERS · GEOLOGISTS

COLORADO: COLORADO SPRINGS, GRAND JUNCTION, PUEBLO.

DATE 4-7-87

JOB NO. 62995-J

BORING NO. 2-F

ELEVATION:

LOCATION: 11' east offset 3/3/87

DEPTH (FT)	SYMBOL	SAMPLE	DESCRIPTION Pg. 2	PENETRATION RESISTANCE	IN-SITU DENSITY (PCF)	MOISTURE CONTENT (%)
			Mill Tailings; CL/ML, clay, silty, light brown, loose, damp. Picking up coarse gravels to cobble sized material from 5.0'. Auger refusal at 7.0', large cobbles.	3/6,	3/6,	4/6
5			5.0'	4/6,	12/6,	25/6
			No Free Water T.D. 7.0'			
10						

LOG OF SUBSURFACE EXPLORATION

LINCOLN DeVORE ENGINEERS · GEOLOGISTS

COLORADO: COLORADO SPRINGS, GRAND JUNCTION, PUEBLO,

DATE 4-7-87

JOB NO. 62995-J

BORING NO. 10-CD

ELEVATION:

3/5/87 pg 11

9:00 - 10:20

DEPTH (FT)	SYMBOL	SAMPLE	DESCRIPTION	PENETRATION RESISTANCE	IN-SITU DENSITY (PCF)	MOISTURE CONTENT (%)
			Fill; sandy gravel; GW-GM, coarse gravel to cobbles, red brown, subround, medium dense to dense, damp to moist, smoothed out at 4.0'.	20/6		
			4.0			
5			Possible mill tailings; SP-SM, sand, poorly graded, fine grained, slightly silty, light brown, loose, dry to damp.	3/6,	3/6,	4/6
				1/6,	3/6,	5/6
10				1/6,	1/6,	3/6
			13.0'			
15			Alluvium; GW-GM, sandy gravel, slightly silty, red to brown, subround, medium dense to dense, damp.	28/6	50/12	
			Free Water 17.0'	23/6	50/bounce	
20				23/6,	29/6,	31/6
25			25.0' **	50/7	50/6	
			T.D. 26.5'			
			** Km; Mancos shale, dark gray, very hard.			
30						
35						

LOG OF SUBSURFACE EXPLORATION

LINCOLN DeVORE ENGINEERS · GEOLOGISTS

COLORADO: COLORADO SPRINGS, GRAND JUNCTION, PUEBLO,

DATE 4-7-87

JOB NO. 62995-J

BORING NO. 8-CD

ELEVATION:

LOCATION: 5' offset west

3/5/87 pg 12
11:00 - 1:45 p.m.
brk 12:00 - 1:25 p.m.

DEPTH (FT)	SYMBOL	SAMPLE	DESCRIPTION	PENETRATION RESISTANCE	IN-SITU DENSITY (PCF)	MOISTURE CONTENT (%)
			Fill Embankment; SM; sand, gravelly, brown, medium dense, damp to moist.	5/6,	16/6,	20/6
			4.5'			
5			Mine Tailings; sands and gravels, SM; gravelly, light brown, with some purple slime at 12.0'.	3/6,	6/6,	3/6
				4/6,	5/6,	6/6
10				4/6,	4/6,	6/6
			12.0'			
			Alluvium; sandy gravels, well graded, subround, red brown, dense, wet to saturated.	19/6,	30/6/	bounce
15						
			Free Water 17.0'	26/6,	30/6	bounce
20			Heavy cobble (4"-6") from 21'-22', smooth at 22'.	25/6,	32/6	bounce
			22'-6 **			
			T.D. 22'-8			
25			** Km, Mancos shale, dark gray, very hard, relatively unweathered, dry.			
30						
35						

LOG OF SUBSURFACE EXPLORATION

LINCOLN DeVORE ENGINEERS-GEOLOGISTS

COLORADO: COLORADO SPRINGS, GRAND JUNCTION, PUEBLO,

DATE 4-7-87

JOB NO. 62995-J

BORING NO. B - 17 - B

ELEVATION:

3/11/87 4:00-5:10 p.m.
3/12/87 7:45-8:25 a.m.

Pg. 31

DEPTH (FT)	SYMBOL	SAMPLE	DESCRIPTION	PENETRATION RESISTANCE	IN-SITU DENSITY (PCF)	MOISTURE CONTENT (%)
			No sampling until 16.5'			
			0-21' - Mill Tailings			
10			Mill Tailings, SC/CL, clay, low plastic, silty sandy, 16-30% sand, purple, firm, wet			
			SP/SM layers - still purple slime, damp			
15			21-36' - Alluvial	2/6	3/6	4/6
			SP/SM, sand, poorly graded, fine grained, sub-round, silty, 16-30% fines, brown, loose, moist	2/6	1/6	2/6
20			21'			
			GW/GM, sandy gravels, sand, well graded, subround, 16-30% fines, brown, very dense, saturated	2/6	3/6	4/6
25				50/Bounce		
			Free Water 28' 28'	50/6		
30			KM, Mancos Shale, CL/CH, clay, high plastic, silty sand, 16-30% sand, grey, very high moisture	24/6	16/6	bounce
				50/bounce		
35			36'			
			Bedrock recovered from drill bits	50/1		
			T.D. 37' Total Depth 37.0'			
40						

LOG OF SUBSURFACE EXPLORATION

LINCOLN DeVORE ENGINEERS · GEOLOGISTS

COLORADO: COLORADO SPRINGS, GRAND JUNCTION, PUEBLO,

DATE 4-7-87

JOB NO. 62795-J

BORING NO. C - 13

ELEVATION:

3/12/87 9:15-11:30 a.m.

DEPTH (FT)	SYMBOL	SAMPLE	DESCRIPTION Pg. 32	PENETRATION RESISTANCE	IN-SITU DENSITY (PCF)	MOISTURE CONTENT
			0-25' - Mill Tailings	3/6,	3/6,	4/6
5			Mill Tailings; SC/SM, sand, poorly graded, fine grained, very silty, 31-50% fines, purple, loose, damp	4/6,	8/6,	5/6
			Grey	3/6,	3/6,	3/6
			Moist to wet			
10			Tan sand layer	50/bounce		
			Interbedded tan SM, sand, poorly graded, fine grained, subrounded, very silty, 31-50% fines, tan, medium dense, moist	2/6,	2/6,	2/6
15				3/6,	4/6,	5/6
20				10/6,	14/6,	14/6
				4/6,	4/6,	5/6
25			25' Alluvial, GW/GM, sandy gravels, well graded, subrounded, silty, 13-30% fines, brown, dense, wet	11/6,	5/6,	3/6
			Free Water			
30			Interbedded SM/SP layer	50/bounce		
			SM/SP, sand, slightly gravelly, poorly graded, fine grained, subrounded, silty, 13-30% fines, brown, wet	8/6,	14/6,	20/6
35			35.5'	50/12		

LOG OF SUBSURFACE EXPLORATIC

LINCOLN DeVORE ENGINEERS-GEOLOGISTS

COLORADO: COLORADO SPRINGS, GRAND JUNCTION, PUEBLO,

JOB NO. 62995-J

DATE 4-7-87

BORING NO. C - 13

ELEVATION:

DEPTH (FT)	SYMBOL	SAMPLE	DESCRIPTION Pg. 32 cont'd	PENETRATION RESISTANCE	IN-SITU DENSITY (PCF)	MOISTURE CONTENT (%)
				8/6,	14/6,	20/6
35			35' KM, Mancos Shale, CL/CH, clay, high plastic, sandy, silty, 13-30% fines, grey, very high moisture	50/12		
			38' Total Depth 38.0'			
40						
45						
50						
55						
60						
65						

LOG OF SUBSURFACE EXPLORATION

LINCOLN DeVORE ENGINEERS · GEOLOGISTS

COLORADO: COLORADO SPRINGS, GRAND JUNCTION, PUEBLO.

DATE 4-7-87

JOB NO. 62995-J

BORING NO. C - 1-

ELEVATION:

3/12/87 1:15-2:05 p.m.; 4:25-5:15 p.m.

DEPTH (FT)	SYMBOL	SAMPLE	DESCRIPTION Pg. 33	PENETRATION RESISTANCE	IN-SITU DENSITY (PCF)	MOISTURE CONTENT (%)
			0-23.5' - Tailings			
			Tailings; SM/SP, sand, poorly graded, fine grained, subrounded, silty, gravelly, 16-30% fines, tan, medium dense, damp	5/6,	6/6,	bounce
5			Mill Tailings; SM/SC/CL, sand, poorly graded, fine grained, subrounded, very silty, clayey, 31-50% fines, purple, medium dense, moist	8/6,	10/6,	8/6
			Interbedded purple and tan material	3/6,	3/6,	4/6
10				3/6,	9/6,	15/6
15				1/6,	1/6,	1/6
				3/6,	4/6,	5/6
20				3/6,	4/6,	6/6
			23'	11/6,	9/6,	10/6
25			SM/SP, sand, poorly graded, fine grained, subrounded, silty, 13-30% fines, tan to brown, loose, wet, rootlets	3/6,	3/6,	3/6
			Free Water 26'			
30				3/6,	5/6,	15/6
				50/bounce		
35			35'	50/bounce		

LOG OF SUBSURFACE EXPLORATIC

LINCOLN DeVORE ENGINEERS · GEOLOGISTS

COLORADO: COLORADO SPRINGS, GRAND JUNCTION, PUEBLO.

JOB NO. 62995 -J

DATE 4-7-87

BORING NO. C - 14 (cont'd)

ELEVATION:

3/12/87 1:15-2:05 p.m.; 4:25-5:15 p.m.

DEPTH (FT)	SYMBOL	SAMPLE	DESCRIPTION Pg. 33 cont'd	PENETRATION RESISTANCE	IN-SITU DENSITY (PCF)	MOISTURE CONTENT (%)
			KM, Mancos Shale, CL/CH, clay, high plastic, sandy, silty, 13-30% sands, grey, wet	50/bounce		
35			35'	50/bounce		
			37'			
			T.D. 37' Total Depth 37.0'			
40						
45						
50						
55						
60						
65						

LOG OF SUBSURFACE EXPLORATION

LINCOLN DeVORE ENGINEERS · GEOLOGISTS

COLORADO: COLORADO SPRINGS, GRAND JUNCTION, PUEBLO.

DATE 4-7-87

JOB NO. 62995-J

BORING NO. [illegible]

ELEVATION:

3/12/87 5:30-6:25 p.m.

DEPTH (FT)	SYMBOL	SAMPLE	DESCRIPTION Pg. 34	PENETRATION RESISTANCE	IN-SITU DENSITY (PCF)	MOISTURE CONTENT (%)
			0-18' - Fill Tailings	5/6,	4/6,	4/6
5			SM/SP, sand, poorly graded, fine grained, sub-round, silty, slightly gravelly, 13-30% fines, tan, loose, moist	5/6,	24/6	bounce
			Free Water 8'	36/6,	50/3	
10			GW/GM, sandy gravel, well graded, subrounded, silty, 13-30% fines, brown, very dense, wet			
				50/bounce		
			Interbedded - GW/GM, SM/SP			
15				22/6	21/6,	36/6
			18'	22/6	29/6	36/6
			*			
			T.D. 19'			
20			Total Depth 19.0'			
			* - KM, Mancos Shale, CL/CH, clay, high plastic, silty sand, 13-30% sand, grey, very high moisture			
25						
30						
35						

LOG OF SUBSURFACE EXPLORATION

LINCOLN DeVORE ENGINEERS · GEOLOGISTS

COLORADO: COLORADO SPRINGS, GRAND JUNCTION, PUEBLO,

DATE 4-7-87

JOB NO. 62995-J

BORING NO. B - 29

ELEVATION:

Location: Offset 3' east 3/13/87 1:20-2:20 p.m. 3/17/87 8:20-10:50 a.m.

Pz. 35

DEPTH (FT)	SYMBOL	SAMPLE	DESCRIPTION	PENETRATION RESISTANCE	IN-SITU DENSITY (PCF)	MOISTURE CONTENT (%)
			0-22' - Fill	2/6,	7/6,	9/6
5			Fill; SM/SC, sand, poorly graded, fine grained, subround, silty clayey, 16-30% fines, brown, medium dense, moist, weeds	8/6,	11/6	13/6
				11/6,	13/6,	19/6
10			Slightly gravelly Damp to dry	8/6,	17/6,	22/6
			Asphalt, concrete, wood, etc.	7/6,	12/6,	12/6
15			Fill; CL, clay, non-plastic, sandy, gravelly, 16-30% sands, brown, hard, moist, asphalt, concrete, etc..	50/bounce		
20			Interbedded SM/SC and CL	4/6,	4/6,	5/6
			22'			
25			GW/GM, sandy gravels, well graded, subround, silty, 16-30% fines, brown, dense, saturated Free Water 25'	22/6,	18/6,	21/6
			SP/SM, sand, poorly graded, medium grained, slightly gravelly, subround, slightly silty, 0-15% fines, brown, dense, saturated	22/6,	38/6,	bounce
30			30' Refusal 30'	8/6,	22/6,	bounce
			Total Depth 30.0			
35						

LOG OF SUBSURFACE EXPLORATION

LINCOLN DeVORE ENGINEERS · GEOLOGISTS

COLORADO: COLORADO SPRINGS, GRAND JUNCTION, PUEBLO,

DATE 4-7-87

JOB NO. 62995-J

BORING NO. 5 - 3E

ELEVATION:

3/17/87 1:30-3:30 p.m.

DEPTH (FT)	SYMBOL	SAMPLE	DESCRIPTION Pg. 36	PENETRATION RESISTANCE	IN-SITU DENSITY (PCF)	MOISTURE CONTENT (%)
			0-9' Fill			
			CL/CH, clay, non-plastic, sandy silty, 16-30% sands, brown, firm, moist to wet, slightly gravelly	3/6,	3/6,	4/6
5			Interbedded SC/CM, sand, poorly graded, fine grained, subround, silty, clayey, 16-30% fines, brown, moist to wet	3/6,	3/6,	4/6
				1/6,	1/6,	
			Free Water 9'			
10			GW/GM, sandy gravels, well graded, subround, slightly silty, 0-15% fines, brown, dense, saturated	14/6,	16/6,	18/6
			SP/SM, sand, poorly graded, fine grained, subround slightly silty, slightly gravelly, 0-15% fines, brown, dense, saturated			
15			GW/GM and SP/SM interbedded	12/6,	bounce	
			16'			
			Refusal 16' Total Depth 16.0			

LOG OF SUBSURFACE EXPLORATION

LINCOLN DeVORE ENGINEERS · GEOLOGISTS

COLORADO: COLORADO SPRINGS, GRAND JUNCTION, PUEBLO,

DATE 4-7-87

JOB NO. 62975-J

BORING NO. 11 - 3

ELEVATION:

3/18/87 8:15-10:05 a.m.

DEPTH (FT)	SYMBOL	SAMPLE	DESCRIPTION Pg. 37	PENETRATION RESISTANCE	IN-SITU DENSITY (PCF)	MOISTURE CONTENT (%)
			No sample until 14.5'			
			0-21' Mill Tailings			
5			Mill tailings, SC/CL, clay, low plastic, very silty sandy, 31-50% fines, purple, firm, moist to wet			
			Sandy-silty layers, SM			
10			Change from purple slime to SM/SP, sand in 20.5'-22' drive			
15			SM/SP, sand, silty, poorly graded, fine grained, subround, silty, 16-30% silt, tan, medium dense, moist	2/6,	2/6,	3/6
				1/6,	2/6,	5/6
20			21'	5/6,	6/6,	8/6
			GW/GM, sandy gravels, well graded, subround, slightly silty, 0-15% fines, brown, very dense, moist	36/6,	bounce	
25			25'			
			Refusal 25' Total Depth 25.0'			

LOG OF SUBSURFACE EXPLORATION

LINCOLN DeVORE ENGINEERS · GEOLOGISTS

COLORADO: COLORADO SPRINGS, GRAND JUNCTION, PUEBLO,

DATE 4-7-87

JOB NO. 62995-J

BORING NO. 1[illegible] - [illegible] - [illegible]

ELEVATION:

Location: Offset 14' east
3/18/87 10:15-11:30 a.m.

Pg. 38

DEPTH (FT)	SYMBOL	SAMPLE	DESCRIPTION	PENETRATION RESISTANCE	IN-SITU DENSITY (PCF)	MOISTURE CONT. (%)
			No samples until 14.5'			
			0-21' - Mill Tailings			
5			Mill Tailings; SC/CL, clay, low plastic, very silty sand, 31-50% fines/sands, purple, firm, moist to wet			
			Sandy-silty layers, SM			
10						
				2/6,	3/6,	4/6
15						
				1/6,	1/6,	1/6
20				5/9,	9/6,	bounce
			21'			
			SM/SP, sand, poorly graded, fine grained, sub-round, silty, 16-30% fines, brown, medium dense, moist	50/bounce		
25			Slightly clayey, slightly gravelly			
			Free Water 26'	17/6,	17/6,	20/6
			GW/GM, sandy gravels, well graded, subrounded, slightly silty, 0-15% fines, brown, dense, wet	14/6,	14/6,	bounce
30			Interbedded GW/GM sand, SP/SM			
35						

LOG OF SUBSURFACE EXPLORATIO

LINCOLN DeVORE ENGINEERS · GEOLOGISTS

COLORADO: COLORADO SPRINGS, GRAND JUNCTION, PUEBLO.

JOB NO. 62995-J

DATE 4-7-87

DEPTH (FT)	SYMBOL	SAMPLE	BORING NO. 1[illegible] - [illegible] - [illegible] ELEVATION: DESCRIPTION Pg. 35 cont'd	PENETRATION RESISTANCE	IN-SITU DENSITY (PCF)	MOISTURE CONTENT (%)
				14/6,	18/6,	16/6
35			36' KM, Mancos Shale, CL/CH, high plastic, silty, sandy, 16-30% sand, grey, very high moisture 37'	50/12		
			T.D. 37' Total Depth 37.5'			
40						
45						
50						
55						
60						
65						

LOG OF SUBSURFACE EXPLORATION

LINCOLN DeVORE ENGINEERS · GEOLOGISTS

COLORADO: COLORADO SPRINGS, GRAND JUNCTION, PUEBLO.

JOB NO. 62995-J

DATE 4-7-87

BORING NO. 1F - F

ELEVATION:

3/18/87 2:10-3:45 p.m.

DEPTH (FT)	SYMBOL	SAMPLE	DESCRIPTION Pg. 39	PENETRATION RESISTANCE	IN-SITU DENSITY (PCF)	MOISTURE CONTENT (%)
			0-27' - Mill Tailings	5/6,	6/6,	6/5
5			Mill Tailings; SM/SP, sand, poorly graded, fine grained, subround, silty, 16-30% fines, white to purple, medium dense, moist	3/6,	4/6,	4/5
			Interbedded tan - SM/SP	3/5,	6/6,	10/5
10			Yellowish tan color			
			SC/CL, clay, low plastic, very silty, sandy, 31-50% sands, purple, stiff, moist	5/6,	5/6,	9/5
15			Tan to purple, SM/SP	6/6,	11/6,	13/6
			Interbedded color changes, tan-purple-pink			
			Purple slime to tan, SM/SP with 3" organic layer in between	8/6,	8/6,	10/6
20				4/6,	6/5,	7/6
				3/6,	5/6,	5/6
25						
			27'	4/6,	8/6,	9/6
			SM/SP, sand, poorly graded, fine grained, subrounded, silty, 16-30% fines, brown, dense, moist			
30			Free Water 29'	26/6	bounce	
			GW/GM, sandy gravels, well graded, subround, slightly silty, 0-15% fines, brown, dense, saturated			
35			Black sands			

LOG OF SUBSURFACE EXPLORATION

LINCOLN DeVORE ENGINEERS · GEOLOGISTS	COLORADO: COLORADO SPRINGS, GRAND JUNCTION, PUEBLO,		DATE 4-7-87
		JOB NO. 62995-J	

BORING NO. 15 - F (Cont'd)

ELEVATION:

3/18/87 2:10-3:45 p.m.

DEPTH (FT)	SYMBOL	SAMPLE	DESCRIPTION (Pg. 39 cont'd)	PENETRATION RESISTANCE	IN-SITU DENSITY (PCF)	MOISTURE CONTENT (%)
			KM, Mancos Shale, CL/CH, high plastic, silty, sandy, 16-30% sand, grey, very high moisture	23/6,	15/6,	bounce
35			36'	50/5	bounce	
			37.3'	50/3		
			T.D. 37.3' Total Depth 37.3			
40						
45						
50						
55						
60						
65						

LOG OF SUBSURFACE EXPLORATION

LINCOLN DeVORE ENGINEERS · GEOLOGISTS

COLORADO: COLORADO SPRINGS, GRAND JUNCTION, PUEBLO,

DATE 4-7-87

JOB NO. 62995-J

BORING NO. 7 - C

ELEVATION:

Location: Offset 12' west
3/19/87 8:55-9:45 a.m.

DEPTH (FT)	SYMBOL	SAMPLE	DESCRIPTION Pg. 40	PENETRATION RESISTANCE	IN-SITU DENSITY (PCF)	MOISTURE CONTENT (%)
			0-2' Mill Tailings			
			2'			
			Mill Tailings; SM/SC, sand, poorly graded, fine grained, subround, silty clayey, 16-30% fines, purple, loose, moist	5/6,	5/6,	5/6
5				2/6,	4/6,	9/6
			Free Water 6'			
			Slightly clayey, SP/SM, sand, poorly graded, fine grained, subround, silty, 16-30% fines, brown, loose, moist - - Organics in 4.5-6' drive, SP/SM, rootlets, etc., slightly gravelly	23/6,	41/6,	33/6
10			GW/GM, sandy gravels, well graded, subround, slightly silty, 0-15% fines, brown, very dense,			
			11' saturated	16/6	bounce	
			Interbedded GW/GM and SP/SM			
			Highly weathered, KM, Mancos Shale, CL/CH, clay, high plastic, sandy, silty, 16-30% sand, grey, moist, thin bentonite layer	7/6,	8/6,	10/6
15			*			
			16.5'	50/4		
			T.D. 16.5' Total Depth 16.5'			
20						
			*KM, Mancos Shale, CL/CH, clay, high plastic, sandy, silty, 16-30% sand, grey, wet			
25						
30						
35						

LOG OF SUBSURFACE EXPLORATION

LINCOLN DeVORE ENGINEERS · GEOLOGISTS	COLORADO: COLORADO SPRINGS, GRAND JUNCTION, PUEBLO,		DATE 4-7-87
		JOB NO. 62995-J	

BORING NO. 3E - F

ELEVATION:

Location: east, 98' south off G-29

3/19/87 2:00-2:30 p.m.

Pg. 42

DEPTH (FT)	SYMBOL	SAMPLE	DESCRIPTION	PENETRATION RESISTANCE	IN-SITU DENSITY (PCF)	MOISTURE CONTENT (%)
			0-3' Fill			
			SM/SC, sand, poorly graded, fine grained, sub-round, silty clayey, 16-30% fines, brown, medium dense, damp, slightly gravelly	8/6,	7/6,	6/6
5			CL, clay, medium plastic, silty sand, 16-30% sand, brown, stiff, moist, slightly gravelly	3/6,	6/6,	5/6
			Interbedded SM/SC and CL			
			Concrete, asphalt			
			8'	5/6,	10/3	bounce
			Refusal 8'			
			Total Depth 8.0'			
10						
15						
20						
25						
30						
35						

LOG OF SUBSURFACE EXPLORATION

LINCOLN DeVORE ENGINEERS · GEOLOGISTS

COLORADO: COLORADO SPRINGS, GRAND JUNCTION, PUEBLO,

DATE 4-7-87

JOB NO 62995-J

BORING NO. 33 - F - B

ELEVATION:

Location: Offset 5' south of 33-F

3/19/87

Pg. 43

DEPTH (FT)	SYMBOL	SAMPLE	DESCRIPTION	PENETRATION RESISTANCE	IN-SITU DENSITY (PCF)	MOISTURE CONTENT (%)
			0-22' - Junk Fill			
			Fill; SM/SC, sand, poorly graded, fine grained, subround, slightly gravelly, silty, clayey, 16-30% fines, brown, loose, damp, rootlets	8/6,	5/6,	5/6
5				5/6,	6/6,	7/6
			Fill; CL/CH, clay, low plastic, silty sandy, slightly gravelly, 16-30% sand, brown, medium dense, damp	6/6,	5/6,	8/6
10			Interbedded SM/SC and CL			
			Concrete, asphalt, steel, wood, etc.		7/6,	5/6
				3/6,	3/6,	3/6
15						
				9/6,	4/6,	4/6
20						
				11/6,	19/6,	7/6
			22'			
			Refusal 22' Total Depth 22.0'			
25						
30						
35						

LOG OF SUBSURFACE EXPLORATION

LINCOLN DeVORE ENGINEERS · GEOLOGISTS

COLORADO: COLORADO SPRINGS, GRAND JUNCTION, PUEBLO

DATE 4-7-87

JOB NO. 62995-J

DEPTH (FT)	SYMBOL	SAMPLE	BORING NO. [illegible] - F - [illegible] ELEVATION: 3/19/87 3:30-3:40 p.m. DESCRIPTION Pg. 44	PENETRATION RESISTANCE	IN-SITU DENSITY (PCF)	MOISTURE CONTENT (%)
			No samples until 15'			
2'			Refusal 2'			
			Total Depth 2.0			
5						
10						
15						
20						
25						
30						
35						

LOG OF SUBSURFACE EXPLORATION

LINCOLN DeVORE ENGINEERS · GEOLOGISTS	COLORADO: COLORADO SPRINGS, GRAND JUNCTION, PUEBLO,		DATE 4-7-87
		JOB NO. 62795-J	

DEPTH (FT)	SYMBOL	SAMPLE	BORING NO. [illegible] / ELEVATION: / 3/19/87 3:45-3:50 p.m. / DESCRIPTION Pg. 45	PENETRATION RESISTANCE	IN-SITU DENSITY (PCF)	MOISTURE CONTENT (%)
			0-5' - Junk Fill			
5			5' Refusal 5' Total Depth 5.0			
10						
15						
20						
25						
30						
35						

LOG OF SUBSURFACE EXPLORATION

LINCOLN DeVORE ENGINEERS · GEOLOGISTS	COLORADO: COLORADO SPRINGS, GRAND JUNCTION, PUEBLO,		DATE 4-7-87
		JOB NO 62995-J	

DEPTH (FT)	SYMBOL	SAMPLE	BORING NO. 33 - F - E ELEVATION: 3/19/87 3:55-4:05 p.m. DESCRIPTION Pg. 46	PENETRATION RESISTANCE	IN-SITU DENSITY (PCF)	MOISTURE CONTENT (%)
			No samples until 15'			
			0-9' - Junk Fill			
5						
			9'			
			Refusal 9' Total Depth 9.0'			
10						
15						
20						
25						
30						
35						

LOG OF SUBSURFACE EXPLORATION

LINCOLN DeVORE ENGINEERS · GEOLOGISTS	COLORADO: COLORADO SPRINGS, GRAND JUNCTION, PUEBLO,		DATE 4-7-87
		JOB NO 62995-J	

BORING NO. 33 - F - 7

ELEVATION:

3/19/87 4:15-4:40 p.m.

DEPTH (FT)	SYMBOL	SAMPLE	DESCRIPTION Pg. 47	PENETRATION RESISTANCE	IN-SITU DENSITY (PCF)	MOISTURE CONTENT (%)
			0-18' - Junk Fill			
5			CL, clay, medium plastic, sandy, gravelly, 16-30% sands, brown, film, damp			
			Concrete, asphalt, wood, steel, etc.			
10			SM, sand, poorly graded, fine grained, sub-rounded, slightly gravelly, silty, slightly clayey, 16-30% fines, tan, dense, damp			
15				4/5,	2/6,	5/6
			18'	50/5		
			Refusal 18' Total Depth 18.0'			
20						
25						
30						
35						

LOG OF SUBSURFACE EXPLORATION

LINCOLN DeVORE ENGINEERS · GEOLOGISTS

COLORADO: COLORADO SPRINGS, GRAND JUNCTION, PUEBLO,

DATE 4-7-87

JOB NO. 62995 - J

BORING NO. 34 - 2

ELEVATION:

Location: 6' north, 3' east, 1'6" higher

3/30/87 2:35-3:45 pm

Pg. 48

DEPTH (FT)	SYMBOL	SAMPLE	DESCRIPTION	PENETRATION RESISTANCE	IN-SITU DENSITY (PCF)	MOISTURE CONTENT (%)
			0-8' - Fill			
			Fill; CL/CH, clay, medium plastic, silty, sandy, 16-30% sands, brown, stiff, moist	3/6,	5/6,	6/6
5			Grey, calcium-carbonate, iron	9/6,	14/6,	18/6
			8'			
			Free Water 8.6'	10/4	bounce	
10			Alluvial, SP/SM, sand, poorly graded, medium grained, subround, silty, slightly gravelly, 16-30% fines, brown, dense, saturated	15/6,	24/6,	26/6
			Alluvial, GW/GM, sandy gravel, well graded, subround, slightly silty, 6-12% fines, brown, dense, saturated	5/6,	9/4	bounce
			Interbedded GW/GM and SP/SM	25/6	25/3	bounce
15			15'			
			Refusal 15'			
			Total Depth 15.0			
20						
25						
30						
35						

LOG OF SUBSURFACE EXPLORATION

LINCOLN DeVORE ENGINEERS · GEOLOGISTS

COLORADO: COLORADO SPRINGS, GRAND JUNCTION, PUEBLO.

DATE 4-7-87

JOB NO 62995-J

BORING NO. 3[illegible] - 7

ELEVATION:

Location: Offset 2' east 3/30/87 4:00-4:50 pm

DEPTH (FT)	SYMBOL	SAMPLE	DESCRIPTION Pg. 49	PENETRATION RESISTANCE	IN-SITU DENSITY (PCF)	MOISTURE CONTENT (%)
			0-5' Fill Fill; SM, sand, poorly graded, fine grained, sub-round, slightly clayey, silty, 16-30% fines, brown, loose, moist, rootlets --Alluvial, SM/SP, gravelly sand, poorly graded, medium grained, subround, slightly silty, 0-15% fines, brown, dense, wet	2/6,	2/6,	3/6
5			Free Water 5' 5'	3/6,	12/6,	19/6
			Alluvial, GW/GM, sandy gravels, well graded, sub-round, slightly silty, 0-15% fines, brown, very dense, saturated, claystone fragments, slightly clayey	6/3,	3/3,	1/3
10				10/6,	22/6,	28/6
				19/6,	36/6	
15			16' KM, Mancos Shale, CL/CH, clay, high plastic, slightly sandy, 0-15% sand, black, very high moisture	10/1,	bounce	
			T.D. 17.5' Total Depth 17.5'			
20						
25						
30						
35						

LOG OF SUBSURFACE EXPLORATION

LINCOLN DeVORE ENGINEERS · GEOLOGISTS

COLORADO: COLORADO SPRINGS, GRAND JUNCTION, PUEBLO,

DATE 4-7-87

JOB NO. 62995-J

BORING NO. 40 - 1

ELEVATION:

Location: Offset 28' north

3/31/87 8:30-9:30 a.m.

DEPTH (FT)	SYMBOL	SAMPLE	DESCRIPTION Pg. 50	PENETRATION RESISTANCE	IN-SITU DENSITY (PCF)	MOISTURE CONTENT (%)
			0-5' Fill			
			Fill; CL/CH, clay, high plastic, slightly sandy, 0-15% sand, brown, firm, wet, iron, rootlets	3/6,	3/6,	2/6
			Free Water 5'			
5			5'	7/6,	11/6,	17/6
			Alluvial, GW/GM, sandy gravels, well graded, sub-round, slightly silty, slightly clayey, 6-12% fines, brown, medium dense, saturated	11/6,	10/6,	14/6
10			Alluvial, SM/SP, sand, poorly graded, fine grained, subround, slightly silty, 6-12% fines, brown, medium dense, saturated	25/6,	30/6,	28/6
			Interbedded GW/GM and SM/SP			
15				20/6,	18/6,	38/6
			16'			
			*	50/5		
			T.D. 17' Total Depth 17.0'			
20			*KM, Mancos Shale, CL/CH, clay, high plastic, slightly sandy, 0-15% sand, black, very high moisture			
25						
30						
35						

LOG OF SUBSURFACE EXPLORATION

LINCOLN DeVORE ENGINEERS · GEOLOGISTS

COLORADO: COLORADO SPRINGS, GRAND JUNCTION, PUEBLO.

DATE 4-7-87

JOB NO. 62995-J

BORING NO. [illegible]

ELEVATION:

3/31/87 9:45-10:30 a.m.

DEPTH (FT)	SYMBOL	SAMPLE	DESCRIPTION Pg. 51	PENETRATION RESISTANCE	IN-SITU DENSITY (PCF)	MOISTURE CONTENT
			0-2'-Fill. Fill; CL, clay, medium plastic, sandy, 16-30% sand, brown, stiff, wet, gravels in 1.5-3.0' drive	3/6,	4/6,	12/6
5			Free Water 5'	15/6,	17/6,	23/6
			GW/GM, sandy gravels, well graded, subround, slightly silty, 6-12% fines, brown, dense, saturated			
			SP/SM, sand, poorly graded, subround, slightly silty 6-12% Fines, brown, very dense, saturated	6/6,	24/6,	35/6
10			Interbedded SP/SM and GW/GM			
			12'	50/bounce		
			KM, Mancos Shale, CL/CH, clay, high plastic, sand, 16-30% sand, black, very high moisture			
			14'	50/5		
			T.D. 14' Total Depth 14.0'			
15						
20						
25						
30						
35						

LOG OF SUBSURFACE EXPLORATION

LINCOLN DeVORE ENGINEERS · GEOLOGISTS	COLORADO: COLORADO SPRINGS, GRAND JUNCTION, PUEBLO.		DATE 4-7-87
		JOB NO. 62975-J	

BORING NO. 36 - L

ELEVATION:

3/31/87 10:55-11:20 a.m.

DEPTH (FT)	SYMBOL	SAMPLE	DESCRIPTION Pg. 52	PENETRATION RESISTANCE	IN-SITU DENSITY (PCF)	MOISTURE CONTENT (%)
			0-6' - Fill Fill; SM/SC, sand, poorly graded, fine grained, subround, silty, clayey, 6-30% fines, brown, wet, rootlets	2/6,	1/6,	1/6
5			Free Water 5'	2/18		
			Alluvial, GW/GM, sandy gravels, well graded, subround, slightly silty, 6-12% fines, brown, dense, saturated	18/6,	18/6,	25/6
			9'			
10			KM, Mancos Shale, CL/CH, clay, non-plastic, sandy, 16-30% sand, black, very high moisture	50/3		
			11'			
			T.D. 11' Total Depth 11.0'			
15						
20						
25						
30						
35						

LOG OF SUBSURFACE EXPLORATION

LINCOLN DeVORE ENGINEERS · GEOLOGISTS

COLORADO: COLORADO SPRINGS, GRAND JUNCTION, PUEBLO.

DATE 4-7-87

JOB NO. 62995-J

BORING NO. 37 - 11

ELEVATION:

3/31/87 1:15-2:35 p.m.

DEPTH (FT)	SYMBOL	SAMPLE	DESCRIPTION Pg. 53	PENETRATION RESISTANCE	IN-SITU DENSITY (PCF)	MOISTURE CONTENT (%)
			0-21.5' - Fill			
			Fill; SM/SC, sand, poorly graded, fine grained, slightly gravelly, silty, clayey, 16-30% fines, brown, medium dense, moist, concrete, asphalt, plastic, plastel, etc.	5/6,	4/6,	7/6
5				2/6,	3/6,	4/6
			SP, sand, fine grained, poorly graded, slightly silty, 6-12% fines, tan, medium dense, damp-some purple color material	9/6,	12/6,	14/6
10			Fill; CL, clay, low plastic, sandy, slightly gravelly, 16-30% sand, brown, stiff, damp, odor	8/6,	7/6,	5/6
			Interbedded materials in fill pile			
15				6/6,	11/6,	5/6
				1/8,	1/10	
20				1/6,	2/6,	2/6
			21.5' Alluvial, GW/GM, sandy gravels, well graded, sub-round, slightly silty, 6-12% fines, brown, dense, saturated			
			Free Water 23'	21/3	21/6	bounce
25			26'			
			* 27'	29/6,	50/2	
			T.D. 27' Total Depth 27.0'			
30			*KM, Mancos Shale, CL/CH, clay, low plastic, sandy, 16-30% sand, black, very high moisture			
35						

LOG OF SUBSURFACE EXPLORATION

LINCOLN DeVORE ENGINEERS · GEOLOGISTS

COLORADO: COLORADO SPRINGS, GRAND JUNCTION, PUEBLO,

DATE 4-7-87

JOB NO. 62995-J

BORING NO. C.5 - 3.5

ELEVATION:

3/13/87 8:30-9:35 a.m.

DEPTH (FT)	SYMBOL	SAMPLE	DESCRIPTION Pg. 54	PENETRATION RESISTANCE	IN-SITU DENSITY (PCF)	MOISTURE CONTENT (%)
			0-8' - Tailings			
			Mine Tailings; SM/SC (CL), sand, fine grained, poorly graded, subround, very silty, clayey, 31-50% fines, purple, loose, moist	5/6,	5/6,	5/6
5				4/6,	5/6,	3/6
			8'			
				2/6,	3/6,	1/6
10			Free Water 10'			
			Alluvial; SP/SM, sand, poorly graded, fine grained, subround, silty, 13-30% fines, brown, very low moisture, rootlets	4/6,	5/6,	7/6
15			Slightly gravelly	4/6,	7/6,	14/6
			GW/GM, sandy gravel, well graded, subround, silty, 16-30% fines, brown, medium dense, saturated	10/6,	6/6,	14/6
20			20'			
			* 21'	12/6,	50/6	
			T.D. 21' Total Depth 21.0'			
25			*KM, Mancos Shale, CL/CH, clay, high plastic, sandy, 13-30% sand, grey, very high moisture			
30						
35						

LOG OF SUBSURFACE EXPLORATION

LINCOLN DeVORE ENGINEERS · GEOLOGISTS

COLORADO: COLORADO SPRINGS, GRAND JUNCTION, PUEBLO,

DATE 4-7-87

JOB NO. 62.975-J

GEOTECHNICAL ENGINEERING
PROGRAM
303-491-6081

BORING LOG

INACTIVE SITES PROJECT
GJ-200

JOB NO. GJT NAME Grand Junction DATE STARTED 3/19/80
HOLE NO. 200 ENGINEER G.V. & L. O. DATE COMPLETED 3/19/80
ELEVATION See Figure 5 COORDINATES See Figure 5 N _____ E
DRILLING COMPANY GTL RIG 55 DRILLER Pete/Ed
TYPE OF BORING Hollow stem auger

CLASSIFICATION OF LAYERS (UNIFIED SOIL CLASSIFICATION SYSTEM)

DEPTH From	DEPTH To	SOIL SYMBOL	SOIL DESCRIPTION
0	6"		Cover
6"	13		Tailings, beach sand
13'	18'		Slimes, lavender, black, green seams, moist
18'	19'		Sand, tan and brown, wet
19'	23½		Gravel, medium and coarse, sandy
			Notes:
			1. cobbles/boulders at 23½' Refusal

CLASSIFICATION OF INDIVIDUAL SAMPLES

DEPTH (Top)	BLOW COUNT	TYPE	SYMBOL	MOISTURE				SAND GRADING					BEDROCK			COLOR	COMMENTS
				Dry	Moist	V. Moist	Wet	Fine	Medium	Coarse	Gravel	% Fines (-200)	Sandstone	Siltstone	Claystone		
4'	14/12	CAL	✓		X			X	X							Tan	Tailings
9'	3/12	CAL	✓		X			X	X							Tan	Tailings
14'	8/12	CAL	✓		X		X	X								Lavender	Slimes, thin, green, black
19'	20/5	CAL	✓		X		X	X	X			15				Tan, brown	Sand, silty

CAL – 2" I.D., 2.5" O.D. Drive Sampler SS. – Standard Split Spoon ST. – Shelby Tube

DEPTH TO WATER TABLE AT BORING COMPLETION 16½'

DEPTH TO BEDROCK _____ DEPTH TO WATER TABLE _____ DAYS AFTER COMPLETION _____

GEOTECHNICAL ENGINEERING
PROGRAM
303-491-6031

BORING LOG

INACTIVE SITES PROJECT
GJ-201

NO. GJT NAME Grand Junction DATE STARTED 3/10/80
NO. 201 ENGINEER G.V. & L.O. DATE COMPLETED 3/10/80
ELEVATION See Figure 5 COORDINATES See Figure 5 N E
DRILLING COMPANY GTL RIG 55 DRILLER Pete/Ed
TYPE OF BORING Hollow stem auger

CLASSIFICATION OF LAYERS (UNIFIED SOIL CLASSIFICATION SYSTEM)

DEPTH From	DEPTH To	SOIL SYMBOL	SOIL DESCRIPTION
0	6"		Cover, clay, sandy, moist
6"	18'		Beach sand, moist, thin slimes, 6" @ 13'
18'	19½		Sand, fine & medium, tan, wet
19½	27		Gravel, medium and coarse, sandy
27	29		Bedrock, claystone, hard

CLASSIFICATION OF INDIVIDUAL SAMPLES

DEPTH (Top)	BLOW COUNT	TYPE	SYMBOL	MOISTURE				SAND GRADING					BEDROCK			COLOR	COMMENTS
				Dry	Moist	V. Moist	Wet	Fine	Medium	Coarse	Gravel	% Fines (-200)	Sandstone	Siltstone	Claystone		
4'	7/12	CAL	✓		X			X	X							White	Beach sand
9'	6/12	CAL	✓		X			X	X							"	" "
14'	6/12	CAL	✓		X			X	X							"	" (6"slimes)in
19'	5/12	CAL	—													-	No recovery driv

CAL – 2" I.D., 2.5" O.D. Drive Sampler SS. – Standard Split Spoon ST. – Shelby Tube

DEPTH TO WATER TABLE AT BORING COMPLETION 16½'

DEPTH TO BEDROCK 27

DEPTH TO WATER TABLE _____ DAYS AFTER COMPLETION _____

BORING LOG

303-497-6081

INACTIVE SITES PROJEC
GJ-202

JOB NO. GJT NAME Grand Junction DATE STARTED 3/18/80
HOLE NO. 202 ENGINEER G.V. & L.O. DATE COMPLETED 3/18/80
ELEVATION See Figure 5 COORDINATES See Figure 5 N E
DRILLING COMPANY GTL RIG 55 DRILLER Pete/Ed
TYPE OF BORING Hollow stem auger

CLASSIFICATION OF LAYERS (UNIFIED SOIL CLASSIFICATION SYSTEM)

DEPTH From	DEPTH To	SOIL SYMBOL	SOIL DESCRIPTION
0	8'		Slimes, very soft @ 3' (6" cover, sandy, clay)
3'	8'		Clay, sandy, silty, wet, black stiff
			sandy @ 7' in ST; push
8'	11'		Gravel, sandy, wet
11'	13'		Sand & weathered claystone, wet
1'	24'		Bedrock, claystone, wet, hard to very hard lenses in layer

CLASSIFICATION OF INDIVIDUAL SAMPLES

BLOW COUNT	TYPE	SYMBOL	MOISTURE				SAND GRADING					BEDROCK			COLOR	COMMENTS
			Dry	Moist	V. Moist	Wet	Fine	Medium	Coarse	Gravel	% Fines (-200)	Sandstone	Siltstone	Claystone		(Smells) organics
2/12	CAL	✓				X	X				80				Black	Sandy, silty clay
	ST	—				X	X	X			80				"	" " "
10/3	CAL	✓				X	X				80			X	Grey/Bl	Bedrock, firm
10/2	CAL	—														No recovery

D 2.5" O.D. Drive Sampler SS. — Standard Split Spoon ST. — Shelby Tube

DEPTH TO WATER TABLE AT BORING COMPLETION 6½'

BEDROCK 13'

DEPTH TO WATER TABLE _____ DAYS

PROGRAM
303-431-6081

BORING LOG

INACTIVE SITES PROJECT
GJ-203

JOB NO. GJT NAME Grand Junction DATE STARTED 3/18/80
BORING NO. 203 ENGINEER G. W. & L. O. DATE COMPLETED 3/18/80
LOCATION See Figure 5 COORDINATES See Figure 5 N _____ E
DRILLING COMPANY GTL RIG 55 DRILLER Pete/Ed
TYPE OF BORING Hollow stem auger

CLASSIFICATION OF LAYERS (UNIFIED SOIL CLASSIFICATION SYSTEM)

DEPTH From	DEPTH To	SOIL SYMBOL	SOIL DESCRIPTION
0	6"		Cover, sandy clay
6"	3'		Slimes
3'	12'		Gravel, sandy
12'	14'		Clay, sandy, wet, black, medium stiff
			Notes:
			1. coarse gravel 3'-12' (1/2" ⟶ 2")
			2. caving in, impossible to sample

CLASSIFICATION OF INDIVIDUAL SAMPLES

DEPTH (op)	BLOW COUNT	TYPE	SYMBOL	MOISTURE				SAND GRADING					BEDROCK			COLOR	COMMENTS
				Dry	Moist	V. Moist	Wet	Fine	Medium	Coarse	Gravel	% Fines (-200)	Sandstone	Siltstone	Claystone		(coarse)
4'	11/6	CAL									X						No recovery
	----																----------
1 '	----																----------

CAL — 2" I.D., 2.5" O.D. Drive Sampler SS. — Standard Split Spoon ST. — Shelby Tube

DEPTH TO WATER TABLE AT BORING COMPLETION 7'

DEPTH TO BEDROCK _____ DEPTH TO WATER TABLE _____ DAYS AFTER COMPLETION _____

PROGRAM
303-491-6031

BORING LOG

INACTIVE SITES PROJECT
GJ-204

JOB NO. GJT NAME Grand Junction DATE STARTED 3/18/80
HOLE NO. 204 ENGINEER G.V. & L.O. DATE COMPLETED 3/18/80
ELEVATION See Figure 5 COORDINATES See Figure 5 N _____ E
DRILLING COMPANY GTL RIG 55 DRILLER Pete/Ed
TYPE OF BORING Hollow stem auger

CLASSIFICATION OF LAYERS (UNIFIED SOIL CLASSIFICATION SYSTEM)

DEPTH From	DEPTH To	SOIL SYMBOL	SOIL DESCRIPTION
0	6"		Cover, sandy clay
6"	6'		Slimes, wet @ 5½'
6'	9'		Clay, sandy, black, medium stiff, wet
9'	17'		Gravel, sandy, wet, coarse
17'	18		Sand, medium, coarse
18'	24'		Bedrock, claystone, hard to very hard
			Notes:
			1. yellow and green oxidation occurred on CAL. samples within minutes after exposure to air after last drive

CLASSIFICATION OF INDIVIDUAL SAMPLES

BLOW COUNT	TYPE	SYMBOL	MOISTURE				SAND GRADING					BEDROCK			COLOR	COMMENTS
			Dry	Moist	V. Moist	Wet	Fine	Medium	Coarse	Gravel	% Fines (-200)	Sandstone	Siltstone	Claystone		
6/12	CAL	✓				X	X								Lavender	Slimes
15/6	CAL					X	X	X		X						Gravel, no recovery
----																----
----																----
50/1"	CAL															No recovery

1. 2.5" O.D. Drive Sampler SS. – Standard Split Spoon ST. – Shelby Tube

DEPTH TO WATER TABLE AT BORING COMPLETION 5½'

BEDROCK 18'

DEPTH TO WATER TABLE _____ DAYS AFTER ...

GEOTECHNICAL ENGINEERING PROGRAM
303-491-6081

BORING LOG

INACTIVE SITES PROJECT
GJ-205W

NO. GJT NAME Grand Junction DATE STARTED 3/17/80
E NO. 205W ENGINEER G.V. & L.O. DATE COMPLETED 3/17/80
ELEVATION See Figure 5 COORDINATES See Figure 5 N _____ E
DRILLING COMPANY GTL RIG 55 DRILLER Pete/Ed
TYPE OF BORING Hollow stem auger

CLASSIFICATION OF LAYERS (UNIFIED SOIL CLASSIFICATION SYSTEM)

DEPTH From	DEPTH To	SOIL SYMBOL	SOIL DESCRIPTION
0'	1/2'		6" sandy clay cover
1/2'	1'		Slimes
1'	4'		Dark gray, clay (very sandy)
4'	11'		Pieces of wood (8' deep) and sticks, light gray clay (very sandy)
11'	19'		Gravel (sandy) - Refusal
			Notes:
			1. Well ~ 15'-16' deep - gravel caved in at about 15'

CLASSIFICATION OF INDIVIDUAL SAMPLES

DEPTH (Top)	BLOW COUNT	TYPE	SYMBOL	MOISTURE				SAND GRADING					BEDROCK			COLOR	COMMENTS
				Dry	Moist	V. Moist	Wet	Fine	Medium	Coarse	Gravel	% Fines (-200)	Sandstone	Siltstone	Claystone		
4'	6/12	CAL	✓		X				X	X						Beige	Slimy white calc.
																Yellow	Clayey sand
9'	2/12	CAL	✓				X	X				60				Gray	Wood/organics
																Black	

CAL – 2" I.D., 2.5" O.D. Drive Sampler SS. – Standard Split Spoon ST. – Shelby Tube

DEPTH TO WATER TABLE AT BORING COMPLETION 11'

DEPTH TO BEDROCK _____ DEPTH TO WATER TABLE _____ DAYS AFTER COMPLETION _____

GEOTECHNICAL ENGINEERING PROGRAM
303-431-6051

BORING LOG

INACTIVE SITES PROJECT
GJ-206 W

JOB NO. GJT NAME Grand Junction DATE STARTED 3/17/80
HOLE NO. 206W ENGINEER G.V. & L. O. DATE COMPLETED 3/17/80
ELEVATION See Figure 5 COORDINATES See Figure 5 N _____ E
DRILLING COMPANY GTL RIG 55 DRILLER Pete/Ed
TYPE OF BORING Hollow stem auger

CLASSIFICATION OF LAYERS (UNIFIED SOIL CLASSIFICATION SYSTEM)

DEPTH From	DEPTH To	SOIL SYMBOL	SOIL DESCRIPTION
0	3-6"		3 to 6" of cover, very sandy clay
6"	18'		Beach sand
18'	21'		Gravel
21'	22'		Gravelly sand
22'	26½'		Gravel
26½'	29'		Shale at 26.5'
			Notes:
			1. well installed @ 21 ft.

CLASSIFICATION OF INDIVIDUAL SAMPLES

DEPTH (Top)	BLOW COUNT	TYPE	SYMBOL	MOISTURE				SAND GRADING					BEDROCK			COLOR	COMMENTS
				Dry	Moist	V. Moist	Wet	Fine	Medium	Coarse	Gravel	% Fines (-200)	Sandstone	Siltstone	Claystone		
4'	8/12	CAL	✓		X			X	X			5				Lt.grey to beige	Beach sand
9'	5/12	CAL	✓		X			X	X			5				Same	Beach sand
14'	6/12	CAL	✓		X			X	X			5				"	" "
18'	30/6	CAL	✓				X		X	X	X						Gravel
4'																	No recovery

CAL – 2" I.D., 2.5" O.D. Drive Sampler SS. – Standard Split Spoon ST. – Shelby Tube

DEPTH TO WATER TABLE AT BORING COMPLETION 18'

DEPTH TO BEDROCK 26.5'

DEPTH TO WATER TABLE _____ DAYS AFTER COMPLETION _____

GEOTECHNICAL ENGINEERING
PROGRAM
303-491-6081

BORING LOG

INACTIVE SITES PROJECT
GJ-207W

SITE NO. GJT NAME Grand Junction DATE STARTED 3/17/80
BORING NO. 207W ENGINEER G.V. & L. O. DATE COMPLETED 3/17/80
ELEVATION See Figure 5 COORDINATES See Figure 5 N _____ E
DRILLING COMPANY GTL RIG 55 DRILLER Pete/Ed
TYPE OF BORING Hollow stem auger

CLASSIFICATION OF LAYERS (UNIFIED SOIL CLASSIFICATION SYSTEM)

DEPTH From	DEPTH To	SOIL SYMBOL	SOIL DESCRIPTION
0	6"		Cover, sandy clay, moist, dark brown
6"	15½'		Beach sand, moist, beige
15½'	24'		*Slimes (3 to 6" layers of alternating slimes and fine tailings)
24'	27'		Gravel
27'	28'		Sandstone lenses, hard
28'	29'		Shale, very wet sandy layers
			Notes:
			1. Well approximately @ 29'

CLASSIFICATION OF INDIVIDUAL SAMPLES

DEPTH (Top)	BLOW COUNT	TYPE	SYMBOL	MOISTURE				SAND GRADING					BEDROCK			COLOR	COMMENTS
				Dry	Moist	V. Moist	Wet	Fine	Medium	Coarse	Gravel	% Fines (-200)	Sandstone	Siltstone	Claystone		
4'	8/12	CAL	✓		X			X	X							Beige	Beach sand
9'	6/12	CAL	✓		X			X	X							lt.grey	Beach sand
14'	7/12	CAL	✓		X			X	X							"	Beach sand
19'	6/11	CAL	✓				X	X	X							*	Beach sand
1'	30/5	CAL	✓					X	X								Gravel (dist.)
	30/11	SS	✓				X								X	Gray	Shale *

CAL – 2" I.D., 2.5" O.D. Drive Sampler SS. – Standard Split Spoon ST. – Shelby Tube

DEPTH TO WATER TABLE AT BORING COMPLETION 18'

DEPTH TO BEDROCK 28'

DEPTH TO WATER TABLE _____ DAYS AFTER COMPLETION _____

GEOTECHNICAL ENGINEERING
PROGRAM
303-431-6081

BORING LOG

INACTIVE SITES PROJECT
GJ-209

JOB NO. GJT NAME Grand Junction DATE STARTED 3/18/80
HOLE NO. 209 ENGINEER G.V. & L. O. DATE COMPLETED 3/18/80
ELEVATION See Figure 5 COORDINATES See Figure 5 N _____ E
DRILLING COMPANY GTL RIG 55 DRILLER Pete/Ed
TYPE OF BORING Hollow stem auger

CLASSIFICATION OF LAYERS (UNIFIED SOIL CLASSIFICATION SYSTEM)

DEPTH From	DEPTH To	SOIL SYMBOL	SOIL DESCRIPTION
0	6"		Cover, clay, sandy, moist
6"	3'		Slimes, moist
3'	9'		Beach sand, moist
9	11		Slimes, moist to wet
1	13½		Beach sand transition not well-defined
13½	15½		Dense slimes
5½	16½		Sand, clayey, silty
16'	20'		Gravel, medium and coarse (19-20' cobbles)
1'	22'		Sand, medium and coarse
2'	25½'		Gravel, sandy, coarse and medium
	29½		Bedrock, claystone, dense, very hard
			Notes:
			1. gravel cave-ins, no samples below 14'

CLASSIFICATION OF INDIVIDUAL SAMPLES

DEPTH (ft)	BLOW COUNT	TYPE	SYMBOL	MOISTURE: Dry	Moist	V. Moist	Wet	SAND GRADING: Fine	Medium	Coarse	Gravel	% Fines (-200)	BEDROCK: Sandstone	Siltstone	Claystone	COLOR	COMMENTS
4'	9/12	CAL	✓		X			X								White	Beach sand
9'	4/12	CAL	✓ slimes in head		X			X								"	"
3'	16/6	CAL	✓ slimes 1st tube		X	X		X								Lavender	Dense slimes

L – 2" I.D., 2.5" O.D. Drive Sampler SS. – Standard Split Spoon ST. – Shelby Tube

DEPTH TO WATER TABLE AT BORING COMPLETION 17'

T TO BEDROCK 25½'

DEPTH TO WATER TABLE _____ DAYS AFTER COMPLETION

GEOTECHNICAL ENGINEERING PROGRAM
303-491-6081

BORING LOG

INACTIVE SITES PROJECT
GJ-208 W

JOB NO. GJT NAME Grand Junction DATE STARTED 3/18/80
NO. 208W ENGINEER G.V. & L.O. DATE COMPLETED 3/18/80
LOCATION See Figure 5 COORDINATES See Figure 5 N _____ E
DRILLING COMPANY GTL RIG 55 DRILLER Pete/Ed
TYPE OF BORING Hollow stem auger

CLASSIFICATION OF LAYERS (UNIFIED SOIL CLASSIFICATION SYSTEM)

DEPTH From	DEPTH To	SOIL SYMBOL	SOIL DESCRIPTION
0	6"		Fill, sand, silty, and medium gravel
6"	4½"		Gravel, medium, coarse, sandy
4½'	12'		Sand, silty, tan, moist
12'	13½'		Sand, silty, sl. clayey, moist, black
13½'	23½'		Gravel, medium and coarse, sandy
23½'	29'		Bedrock, claystone, black, hard to very hard lenses
			Notes:
			1. gravel caving in, no sampling below 9'
			2. well installed at 23' deep

CLASSIFICATION OF INDIVIDUAL SAMPLES

DEPTH (top)	BLOW COUNT	TYPE	SYMBOL	MOISTURE				SAND GRADING					BEDROCK			COLOR	COMMENTS
				Dry	Moist	V. Moist	Wet	Fine	Medium	Coarse	Gravel	% Fines (-200)	Sandstone	Siltstone	Claystone		
4'	---																No recovery
9	16/12	CAL			X			X	X							Tan	

AL – 2" I.D., 2.5" O.D. Drive Sampler SS. – Standard Split Spoon ST. – Shelby Tube

DEPTH TO WATER TABLE AT BORING COMPLETION 15'

E H TO BEDROCK 23½'

DEPTH TO WATER TABLE _____ DAYS AFTER COMPLETION _____

GEOTECHNICAL ENGINEERING
PROGRAM
303-491-6081

BORING LOG

INACTIVE SITES PROJECT
[illegible]

DS NO. GOT NAME Grand Junction DATE STARTED 3/18 80
HOLE NO. 210 ENGINEER G.V. & L.O. DATE COMPLETED 3/18 80
ELEVATION See Figure 5 COORDINATES See Figure 5 N _____ E
DRILLING COMPANY GTL RIG 55 DRILLER Pete/Ed
TYPE OF BORING Hollow stem auger

CLASSIFICATION OF LAYERS (UNIFIED SOIL CLASSIFICATION SYSTEM)

DEPTH From	DEPTH To	SOIL SYMBOL	SOIL DESCRIPTION
0	14'		Fill, silty sand, tan, moist
14'	21'		Sandy gravel, medium and coarse, fine pieces red brick
			(coarse gravel and cobbles 16'-19' - very hard)
21'	23'		Bedrock, sandstone
23'	29'		Claystone, black, hard
			Notes:
			1. no samples below 14' - hard to very hard lenses, bedrock and gravel
			2. caved-in @ 13' after drilling
			3. possible perched water in bedrock

CLASSIFICATION OF INDIVIDUAL SAMPLES

DEPTH (Top)	BLOW COUNT	TYPE	SYMBOL	MOISTURE				SAND GRADING					BEDROCK			COLOR	COMMENTS
				Dry	Moist	V. Moist	Wet	Fine	Medium	Coarse	Gravel	% Fines (-200)	Sandstone	Siltstone	Claystone		
4'	5/13	CAL	✓		X			X	X							Tan	Clear to sl. silty
9'	7/12	CAL	✓		X			X	X							Tan	"
14'	35/6	CAL	✓		X	X			X		X					Tan/br	Medium and coarse gravel

CAL – 2" I.D., 2.5" O.D. Drive Sampler SS. – Standard Split Spoon ST. – Shelby Tube

DEPTH TO WATER TABLE AT BORING COMPLETION 14'

DEPTH TO BEDROCK 21'

DEPTH TO WATER TABLE _____ DAYS AFTER COMPLETION _____

GEOTECHNICAL ENGINEERING PROGRAM
303-491-6081

BORING LOG

INACTIVE SITES PROJECT
GJ-211-W

PROJECT NO. GJT NAME Grand Junction DATE STARTED 3/17/80
BORING NO. 211-W ENGINEER G.V. & L.O. DATE COMPLETED 3/17/80
ELEVATION See Figure 5 COORDINATES See Figure 5 N _____ E _____
DRILLING COMPANY GTL RIG 55 DRILLER Pete/Ed
TYPE OF BORING Hollow stem auger

CLASSIFICATION OF LAYERS (UNIFIED SOIL CLASSIFICATION SYSTEM)

DEPTH From	DEPTH To	SOIL SYMBOL	SOIL DESCRIPTION
0	5'		Tailings (fines)
5'	13'		Sandy clay, brown, stiff, dry to moist
13'	19'		Gravel, sandy
			Notes:
			1. Well depth about 15'

CLASSIFICATION OF INDIVIDUAL SAMPLES

DEPTH (Top)	BLOW COUNT	TYPE	SYMBOL	MOISTURE				SAND GRADING					BEDROCK			COLOR	COMMENTS
				Dry	Moist	V. Moist	Wet	Fine	Medium	Coarse	Gravel	% Fines (-200)	Sandstone	Siltstone	Claystone		
4'	7/13	CAL	✓		X			X									Tailings gray and purple
9'	11/12	CAL	✓		X			X									Sandy clay stiff
14'	24/6	CAL	✓		X			X	X		X						Gravel

CAL – 2" I.D., 2.5" O.D. Drive Sampler SS. – Standard Split Spoon ST. – Shelby Tube

DEPTH TO WATER TABLE AT BORING COMPLETION None

DEPTH TO BEDROCK _____ DEPTH TO WATER TABLE _____ DAYS AFTER COMPLETION _____

GEOTECHNICAL ENGINEERING PROGRAM
303-491-6037

BORING LOG

INACTIVE SITES PROJECT
GJ-212-W

JB NO. GJT NAME Grand Junction DATE STARTED 3/17/81
HOLE NO. 212-W ENGINEER G.V. & L. O. DATE COMPLETED 3/17/81
ELEVATION See Figure 5 COORDINATES See Figure 5 N
DRILLING COMPANY GTL RIG 55 DRILLER Pete/Ed
TYPE OF BORING Hollow stem auger

CLASSIFICATION OF LAYERS (UNIFIED SOIL CLASSIFICATION SYSTEM)

DEPTH From	DEPTH To	SOIL SYMBOL	SOIL DESCRIPTION
0	3½		Tailings (fines), light gray
3½	8½		Slimes
8½	12'		Sand (fine and medium), tailings (?) beachsand (?)
12'	15'		Stiff clay - 12' W.T.
15'	19'		Coarse gravel
19'	21'		Bedrock, claystone
			Notes:
			1. gravel caved-in at about 17' or 18'
			2. well approximately 15' deep

CLASSIFICATION OF INDIVIDUAL SAMPLES

DEPTH (Top)	BLOW COUNT	TYPE	SYMBOL	MOISTURE				SAND GRADING					BEDROCK			COLOR	COMMENTS
				Dry	Moist	V. Moist	Wet	Fine	Medium	Coarse	Gravel	% Fines (-200)	Sandstone	Siltstone	Claystone		
4'	4/14	CAL	✓														Tailings, fines dist.
9'		S.T.			X			X	X								Clean sand
14'	7/12	CAL				X		X	X			80					Stiff clay, no recovery
21'	----	CAL															No recovery

CAL – 2" I.D., 2.5" O.D. Drive Sampler SS. – Standard Split Spoon ST. – Shelby Tube

DEPTH TO WATER TABLE AT BORING COMPLETION 12'

DEPTH TO BEDROCK 19' DEPTH TO WATER TABLE DAYS AFTER COMPLETION

PROGRAM
303-491-8081

BORING LOG

INACTIVE SITES PROJECT
GJ-213

JOB NO. GJT NAME Grand Junction DATE STARTED 3/19/80
HOLE NO. 213 ENGINEER G.V. & L. O. DATE COMPLETED 3/19/80
ELEVATION See Figure 5 COORDINATES See Figure 5 N _____ E
DRILLING COMPANY GTL RIG 55 DRILLER Pete/Ed
TYPE OF BORING Hollow stem auger

CLASSIFICATION OF LAYERS (UNIFIED SOIL CLASSIFICATION SYSTEM)

DEPTH From	DEPTH To	SOIL SYMBOL	SOIL DESCRIPTION
0	6"		Cover, clay, sandy, moist
6"	39'		Beach sand
39'	48'		Gravel, coarse and medium, sandy
48'	49'		Bedrock, claystone
			Note:
			1. Sandy 38'-39', wet, coarse and medium, large coarse gravel in drive (high blow count)

CLASSIFICATION OF INDIVIDUAL SAMPLES

DEPTH (ft)	BLOW COUNT	TYPE	SYMBOL	MOISTURE				SAND GRADING					BEDROCK			COLOR	COMMENTS
				Dry	Moist	V. Moist	Wet	Fine	Medium	Coarse	Gravel	% Fines (-200)	Sandstone	Siltstone	Claystone		
	12/12	CAL	✓		X			X	X							White	Beach sand
	8/12	CAL	✓		X			X	X							"	"
	0/12	CAL	✓		X			X	X							"	"
	12/12	CAL	✓		X			X	X							"	"
	13/12	CAL	✓		X			X	X							"	"
	0/12	CAL	✓		X			X	X							"	"
	[illegible]	CAL	✓		X			X	X							"	"
	[illegible]	CAL	✓		X		X		X	X	X						Coarse and med.

[illegible]" O.D. Drive Sampler SS. – Standard Split Spoon ST. – Shelby Tube

DEPTH TO WATER TABLE AT BORING COMPLETION None

BEDROCK 48 DEPTH TO WATER TABLE

COLORADO STATE UNIVERSITY

TECHNICAL ENGINEERING PROGRAM
303-491-6081

BORING LOG

INACTIVE SITES PROJECT
GJ-214

ID. GJT NAME Grand Junction DATE STARTED 3/19/80

E NO. 214 ENGINEER G.V. & L. O. DATE COMPLETED 3/19/80

LEVATION See Figure 5 COORDINATES See Figure 5 N E

RILLING COMPANY GTL RIG 55 DRILLER Pete/Ed

Y OF BORING Hollow stem auger

CLASSIFICATION OF LAYERS (UNIFIED SOIL CLASSIFICATION SYSTEM)

DEPTH From	DEPTH To	SOIL SYMBOL	SOIL DESCRIPTION
0	6"		Cover, clay, sandy, tan
6'	44'		Beach sand, moist
44'	48'		Slimes, moist to wet
48'	51'		Beach sand, moist
51'	52'		Sand, medium and coarse
52'	54½		Gravel, medium and coarse, sandy, cobbles @ 54'
			(Refusal @ 54½')

CLASSIFICATION OF INDIVIDUAL SAMPLES

DEPTH	BLOW COUNT	TYPE	SYMBOL	MOISTURE: Dry	Moist	V. Moist	Wet	SAND GRADING: Fine	Medium	Coarse	Gravel	% Fines (-200)	BEDROCK: Sandstone	Siltstone	Claystone	COLOR	COMMENTS
	12/12	CAL	✓		X			X	X							White	Beach Sand
	7/12	CAL	✓		X			X	X							"	"
	8/12	CAL	✓		X			X	X							"	"
	13/12	CAL	✓		X			X	X							"	"
	13/12	CAL	✓		X			X	X							"	"
	7/12	CAL	✓		X			X	X							"	"
	21/12	CAL	✓		X			X	X							"	"
	/12	CAL	✓		X			X	X							"	"
	/12	CAL	✓ B		X			X	X							Lavender	Dense Slimes
	16/12	CAL	✓ A		X		X	X								White	Beach Sand
	/12	CAL	✓		X	X		X	X							White	Beach Sand

I.D., 2.5" O.D. Drive Sampler SS. – Standard Split Spoon ST. – Shelby Tube

DEPTH TO WATER TABLE AT BORING COMPLETION Dry

E DROCK _____ DEPTH TO WATER TABLE

GEOTECHNICAL ENGINEERING
PROGRAM
303-491-6081

BORING LOG

INACTIVE SITES PROJECT
GJ-216 H

PROJ NO. GJT NAME Grand Junction DATE STARTED 3/19/80
BORING NO. 216W ENGINEER G.V. & L. O. DATE COMPLETED 3/19/80
ELEVATION See Figure 5 COORDINATES See Figure 5 N _____ E
DRILLING COMPANY GTL RIG 55 DRILLER Pete/Ed
TYPE OF BORING Hollow stem auger

CLASSIFICATION OF LAYERS (UNIFIED SOIL CLASSIFICATION SYSTEM)

DEPTH From	DEPTH To	SOIL SYMBOL	SOIL DESCRIPTION
0	6"		Cover, clay, sandy, tan
6"	36½'	NOTE: gravel 35½-36½	Beach sand, moist
36½"	48'		Gravel, med. and coarse, sandy, sand lenses (6 in to 1 foot)
48'	49'		Bedrock, claystone, hard to very hard
			Notes:
			1. Some thin layers of slimes and tailings, but locations not clear
			2. Some slimes on auger in 30'-35' section
			3. Well ~ 38' deep

CLASSIFICATION OF INDIVIDUAL SAMPLES

DEPTH (FT.)	BLOW COUNT	TYPE	SYMBOL	MOISTURE				SAND GRADING					BEDROCK			COLOR	COMMENTS
				Dry	Moist	V. Moist	Wet	Fine	Medium	Coarse	Gravel	% Fines (-200)	Sandstone	Siltstone	Claystone		
4'	10/12	CAL	✓		X			X	X							White	Beach sand
9	8/12	CAL	--		X			X	X							"	No recovery
4	12/12	CAL	✓		X			X	X							"	Beach sand
9'	11/12	CAL	✓		X			X	X							"	"
4'	11/12	CAL	✓		X			X	X							"	"
9'	19/12	CAL	✓		X			X	X							"	"
	7/12	CAL	✓			X	X									"	"

. – 2" I.D., 2.5" O.D. Drive Sampler SS. – Standard Split Spoon ST. – Shelby Tube

DEPTH TO WATER TABLE AT BORING COMPLETION _____

T TO BEDROCK _____ DEPTH TO WATER TABLE _____

BORING LOG

[illegible]
303-491-6081

INACTIVE SITES PROJECT
GJ-216

JOB NO. GJT NAME Grand Junction DATE STARTED 3/19/80
HOLE NO. 216 ENGINEER G.V. & L. O. DATE COMPLETED 3/19/80
ELEVATION See Figure 5 COORDINATES See Figure 5 N _____ E
DRILLING COMPANY GTL RIG 55 DRILLER Pete/Ed
TYPE OF BORING Hollow stem auger

CLASSIFICATION OF LAYERS (UNIFIED SOIL CLASSIFICATION SYSTEM)

DEPTH From	DEPTH To	SOIL SYMBOL	SOIL DESCRIPTION
0	6"		Cover, clay, sandy, moist
6"	3'		Slimes, beach sand
3'	8½'		Slimes, moist to wet, soft, in thin layers
8½'	23		Beach sand, moist
23	27		Beach sand, moist
27	28½		Sand, med. and coarse, moist
28½	29½'		Gravel, med. and coarse
29½			Bedrock, claystone
			Notes:
			1. Slime layers in last 5' of hole - but not well-defined
			2. Alternating beach and slimes - before sand above gravel

CLASSIFICATION OF INDIVIDUAL SAMPLES

BLOW COUNT	TYPE	SYMBOL	MOISTURE				SAND GRADING					BEDROCK			COLOR	COMMENTS
			Dry	Moist	V. Moist	Wet	Fine	Medium	Coarse	Gravel	% Fines (-200)	Sandstone	Siltstone	Claystone		
11/12	CAL	✓		X			X								Lavender	Slimes
13/12	CAL	✓		X			X	X							White	Beach sand
9/12	CAL	✓		X			X	X							"	"
9/12	CAL	✓		X			X	X							"	"
2/12	CAL	✓		X		X	X									

I.D., 2.5" O.D. Drive Sampler SS. – Standard Split Spoon ST. – Shelby Tube

DEPTH TO WATER TABLE [illegible]

BEDROCK _____

GEOTECHNICAL ENGINEERING PROGRAM
303-491-6081

BORING LOG

INACTIVE SITES PROJECT
GJ-2 7

O. GJT NAME Grand Junction DATE STARTED 3/19/80
NO. 217 ENGINEER G.V. & L. O. DATE COMPLETED 3/19/80
ELEVATION See Figure 5 COORDINATES See Figure 5 N E
DRILLING COMPANY GTL RIG 55 DRILLER Pete/Ed
TYPE OF BORING Hollow stem auger

CLASSIFICATION OF LAYERS (UNIFIED SOIL CLASSIFICATION SYSTEM)

DEPTH From	DEPTH To	SOIL SYMBOL	SOIL DESCRIPTION
0	6"		Cover, clay, sandy, moist
6"	2'		Beach sand, moist
2'	26'		Slimes, moist - some gravel
26	27		Sand, med. and coarse
27	33		Gravel, coarse and med.
33'	36		Bedrock, claystone
			Notes:
			1. No sample below 4 feet due to excessive slimes in hole
			2. Slimes wet on drilling, but W.T. is questionable

CLASSIFICATION OF INDIVIDUAL SAMPLES

DEPTH (Top)	BLOW COUNT	TYPE	SYMBOL	MOISTURE				SAND GRADING					BEDROCK			COLOR	COMMENTS
				Dry	Moist	V. Moist	Wet	Fine	Medium	Coarse	Gravel	% Fines (-200)	Sandstone	Siltstone	Claystone		
4'	9/12"	CAL	✓		X			X								Lavender	Slimes

CAL – 2" I.D., 2.5" O.D. Drive Sampler SS – Standard Split Spoon ST. – Shelby Tube

DEPTH TO WATER TABLE AT BORING COMPLETION ?

DEPTH TO BEDROCK 33'

DEPTH TO WATER TABLE _____ DAYS AFTER COMPLETION _____

GEOTECHNICAL ENGINEERING PROGRAM
303-491-6081

BORING LOG

INACTIVE SITES PROJECT
GJ-8.3 W

JB NO. GJT NAME Grand Junction DATE STARTED 3/17/80
HOLE NO. 21PM ENGINEER G.V. & L.O. DATE COMPLETED 3/17/80
ELEVATION See Figure 5 COORDINATES See Figure 5 N E
DRILLING COMPANY GTL RIG 55 DRILLER Pete/Ed
TYPE OF BORING Hollow stem auger

CLASSIFICATION OF LAYERS (UNIFIED SOIL CLASSIFICATION SYSTEM)

DEPTH From	DEPTH To	SOIL SYMBOL	SOIL DESCRIPTION
0	1		Top sandy gravel
1	2½		Gravel and coarse sand
2½	5½		Very soft (brown) silty sand
5½	6½		Gravel, med. and coarse
6½	9½'		6½ soft silty sand, water
9½'	15'		Gravel and cobbles (refusal @ 15')
			Note:
			1. Well approximately 11' deep

CLASSIFICATION OF INDIVIDUAL SAMPLES

DEPTH (Top)	BLOW COUNT	TYPE	SYMBOL	MOISTURE				SAND GRADING					BEDROCK			COLOR	COMMENTS
				Dry	Moist	V. Moist	Wet	Fine	Medium	Coarse	Gravel	% Fines (-200)	Sandstone	Siltstone	Claystone		
4'	15/12	CAL	✓			X		X	X			5					Med. brown, silty
9'	20/6	CAL	✓				X	X	X			-					Trace of gravel
14'																	No sample

CAL – 2" I.D., 2.5" O.D. Drive Sampler SS. – Standard Split Spoon ST. – Shelby Tube

DEPTH TO WATER TABLE AT BORING COMPLETION 6½'

DEPTH TO BEDROCK _____ DEPTH TO WATER TABLE _____ DAYS AFTER COMPLETION _____

GEOTECHNICAL ENGINEERING
PROGRAM
303-491-6081

BORING LOG

INACTIVE SITES PROJECT
GJT-8 PN

DR NO. GJT NAME Grand Junction DATE STARTED 3/19/80
NO. 219W ENGINEER G.V. & L. O. DATE COMPLETED 3/19/80
ELEVATION See Figure 5 COORDINATES See Figure 5 N _____ E
DRILLING COMPANY GTL RIG 55 DRILLER Pete/Ed
TYPE OF BORING Hollow stem auger

CLASSIFICATION OF LAYERS (UNIFIED SOIL CLASSIFICATION SYSTEM)

DEPTH From	DEPTH To	SOIL SYMBOL	SOIL DESCRIPTION
0	6"		Cover, clay, sandy, tan, moist
6"	33½'		Beach sand, white/tan, moist
33½'	35'		Sand, fine, med., moist to v. moist
35'	43'		Gravel, med. and coarse, sandy, moist
			(Refusal @ 43' gravel and cobbles)
			Notes:
			1. Well ~ 38' deep
			2. Some very thin slime lenses, but locations not clear, also some tailings
			3. Some slimes on auger in 30'-35' section

CLASSIFICATION OF INDIVIDUAL SAMPLES

DEPTH (Top)	BLOW COUNT	TYPE	SYMBOL	MOISTURE				SAND GRADING					BEDROCK			COLOR	COMMENTS
				Dry	Moist	V. Moist	Wet	Fine	Medium	Coarse	Gravel	% Fines (-200)	Sandstone	Siltstone	Claystone		
4'	11/12	CAL	✓		X			X	X							White	Beach sand
	13/12	CAL	✓		X			X	X							"	"
14	13/12	CAL	✓		X			X	X							"	"
19'	17/12	CAL	✓		X			X	X							"	"
24	18/12	CAL	✓		X			X	X							"	"
29	11/12	CAL	✓				X	X	X							"	"
3	29/12	CAL	✓		X	X		X	X							"	" some sand

AL – 2" I.D., 2.5" O.D. Drive Sampler SS. – Standard Split Spoon ST. – Shelby Tube

DEPTH TO WATER TABLE AT BORING COMPLETION _____

EPTH TO BEDROCK _____ DEPTH TO WATER TABLE _____ DAYS AFTER COMPLETION _____

GEOTECHNICAL ENGINEERING
PROGRAM
303-491-6081

BORING LOG

INACTIVE SITES PROJECT
GJ-220W

JOB NO. GJT NAME Grand Junction DATE STARTED 3/18/80
HOLE NO. 220W ENGINEER G.V. & L. O. DATE COMPLETED 3/18/80
ELEVATION See Figure 5 COORDINATES See Figure 5 N _____ E
DRILLING COMPANY GTL RIG 55 DRILLER Pete/Ed
TYPE OF BORING Hollow stem auger

CLASSIFICATION OF LAYERS (UNIFIED SOIL CLASSIFICATION SYSTEM)

DEPTH From	DEPTH To	SOIL SYMBOL	SOIL DESCRIPTION
0	6"		Cover, clay, sandy, brown, moist
6"	6'		Slimes, moist to very moist
6'	23½'		Beach sand, moist
23½'	27½'		Slimes, moist
27½	30'		Clay, V. sandy,
30'	43'		Gravel, med. and coarse
43'	50'		Bedrock, claystone, black/grey, moist, hard to very hard
			Notes:
			1. Well ~ 38' deep
			2. Water @ 8', soft slimes (1' layer), break not well-defined

CLASSIFICATION OF INDIVIDUAL SAMPLES

DEPTH (Top)	BLOW COUNT	TYPE	SYMBOL	MOISTURE				SAND GRADING					BEDROCK			COLOR	COMMENTS
				Dry	Moist	V. Moist	Wet	Fine	Medium	Coarse	Gravel	% Fines (-200)	Sandstone	Siltstone	Claystone		
4'	11/12	CAL	✓		X	X		X								Lavender	Slimes
9'	8/12	CAL	✓		X	X		X	X							White	Beach sand
14'	7/12	CAL	✓		X	X		X	X							"	"
19'	8/12	CAL	✓		X	X		X	X							"	"
24'	11/12	CAL	✓		X	X		X	X							"	"
9'	----	ST	✓		X	X		X	X								

CAL – 2" I.D., 2.5" O.D. Drive Sampler SS. – Standard Split Spoon ST. – Shelby Tube

DEPTH TO WATER TABLE AT BORING COMPLETION 30'

DEPTH TO BEDROCK 43'

DEPTH TO WATER TABLE _____ DAYS AFTER COMPLETION _____

GEOTECHNICAL ENGINEERING
PROGRAM
303-491-8081

BORING LOG

INACTIVE SITES PROJECT
GJ-221 W

B NO. GJT NAME Grand Junction DATE STARTED 3/17/80
LE NO. 221W ENGINEER G.V. & L. O. DATE COMPLETED 3/17/80
ELEVATION See Figure 5 COORDINATES See Figure 5 N E
DRILLING COMPANY GTL RIG 55 DRILLER Pete/Ed
TYPE OF BORING Hollow stem auger

CLASSIFICATION OF LAYERS (UNIFIED SOIL CLASSIFICATION SYSTEM)

DEPTH From	DEPTH To	SOIL SYMBOL	SOIL DESCRIPTION
0	6"		Top soil - clayey sand, moist, dark brown
6"	1½'		Sandy gravel
1½	8'		Sand, silty, clayey (SL)
8'	9'		Very wet, sandy clay (slightly silty), dark grey
9'	10'		Gravel at 9', sand also, gravel 10' refusal
			Note:
			1. Well approximately 11' deep

CLASSIFICATION OF INDIVIDUAL SAMPLES

DEPTH (Top)	BLOW COUNT	TYPE	SYMBOL	MOISTURE				SAND GRADING					BEDROCK			COLOR	COMMENTS
				Dry	Moist	V. Moist	Wet	Fine	Medium	Coarse	Gravel	% Fines (-200)	Sandstone	Siltstone	Claystone		
4'	5/12	CAL	✓			X		X	X			15				Dk. bwn	Disturbed
98'	----	SHELBY					X										
14'	No	CAL															Coarse gravel & cobbles

CAL – 2" I.D., 2.5" O.D. Drive Sampler SS. – Standard Split Spoon ST. – Shelby Tube

DEPTH TO WATER TABLE AT BORING COMPLETION 10'

DEPTH TO BEDROCK _____ DEPTH TO WATER TABLE _____ DAYS AFTER COMPLETION _____

PROJECT GRAND JUNCTION

JOB NO. 63-D DATE 7/9/81

RIG TYPE CME-55 C-1

BORING TYPE 6½ HSA

SURFACE ELEV.

DATUM

Depth Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" hammer full drop hammer	Dry Density Lbs. per cu. ft.	% Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0		20"	X	U	7-10-12-12-2			ML	dry to S. moist	silt lo pl purple TAILINGS
		18"	X	U	14-29-21-23-23					
5		16"	X	U	5-10-10-11-12					
		20"	X	U	8-5-8-8-10			SP	dry to S. moist	SAND fred fine NP lite Grey to Grey
10		20"	X	U	7-7-8-10-10				Note: Trace of silt	
		22"	X	U	5-6-7-8-11				Note: some purple silty sand lenses	
15		24"	X	U	6-5-6-7-10					
		21"	X	U	9-12-13-15-13				Note: BROWN, NO PURPLE LENSES	
20		22"	X	U	6-8-10-12-15				Note: Purple other than off white.	
		21"	X	U	9-9-10-11-15				MOIST TO V. MOIST TO SATURATED	
25		20"	X	U	9-11-12-15-12					TAILINGS
		20"	X	U	7-10-14-13-12			SP	MOIST - TO SAT.	SAND fred course NP lens of clay med pl Brown SUBBASE
30		14"	X	U	10-11-14-15-17				Note: Trace CLAY	
		28"	X	U	5-8-9-12-13					
35		21"	X	U	2-6-8-10-20					
		4"		U	[50/4]			CL	MOIST	Shale forming: clay lo-med pl dk grey
40		9"	X	U	40-[50/3]					
		8"	X	S	30-[50/5½]					
45		7"	X	S	[50/5] (Unable to get sample)					
				S	[50/2]					
50										

GROUND WATER

DEPTH	HOUR	DATE
39.0'	2:00	7/9/81

SAMPLE TYPE

A – Auger cuttings B – Block sample
S – 2" O.D. 1.38" I.D. tube sample
U – 3" O.D. 2.42" I.D. tube sample
T – 3" O.D. thin-walled Shelby tube

SERGENT, HAUSKINS & BECKWITH

CONSULTING GEOTECHNICAL ENGINEERS
PHOENIX • ALBUQUERQUE • SANTA FE

PROJECT Canal Smelter Tailings

JOB NO. 6370 DATE 7-8-81

LOG OF TEST BORING NO. 5

R.G. TYPE CME-55

BORING TYPE 6" HSA

SURFACE ELEV.

DATUM

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free fall drop hammer	Dry Density lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
50				S	[50/3]				Saturated	Shale; continued
				S	[50/3]					
									Plug	
55				S	[50/1½]					
										Stopped Auger @ 55' Refusal Sampler @ 55' 1½'

GROUND WATER

DEPTH	HOUR	DATE

SAMPLE TYPE

A – Auger cuttings. B – Block sample
S – 2" O.D. 1.38" I.D. tube sample.
U – 3" O.D. 2.42" I.D. tube sample.
T – 3" O.D. thin walled Shelby tube.

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CONSULTING GEOTECHNICAL ENGINEERS
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PROJECT

JOB NO. FE-62 DATE 7-9-81

LOG OF TEST BORING NO. C-2

RIG TYPE CME 75

BORING TYPE 6¼" HSA

SURFACE ELEV.

DATUM

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot (140 lb. 30" fall drop hammer)	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0		18"	X	4	5-8-12-13-20				MOIST.	SILTY SAND FN. NP. PURPLE w/occ. LENS OF BRN
		19"	X	4	4-7-15-13-13-8		7.5	SP		
5		19"	X	4	6-8-11-12-11		23			
		17½"	X	4	5-6-10-10-11		27			
10		17½"	X	4	5-8-9-8-9		17			
		19"	X	4	6-6-9-7-1				NOTE: V-MOIST FROM 17½'	NOTE: SOME CLAY FROM 12'
15		19"	X	4	7-5-6-6-12					NOTE: TURNS TO GRAY FROM 21'
		20"	X	4	4-4-9-13-16-5					
20		20"	X	4	9-12-18		30			
		20"	X	4	13-8-13-15-16					
25		20"	X	4	5-8-13-27-(50)5"					TAILINGS
		10"	X	4	31-27-26-25-24			SW-SC	MOIST	SAND & GRAVEL SUB.BAS SOME CLAY PRED. MED. GRD. ANG. LOW PI. BROWN W/SOME YELLOW TO DARK GRAY
30		21"	X	4	5-5-8-12-15			SP	SAT	
		20"	X	4	4-6-7-13-13-4					
35		20"	X	4	5-9-12-42-(50)3"					SILTY SAND PRED. P.G. NP BRN.
				S	(50)6"					
40										STOPPED AUG @ 37½' SAMPLER REFUSED @ 38'

GROUND WATER

DEPTH	HOUR	DATE
31'-2"	2:00	7-9-81

SAMPLE TYPE

A – Auger cuttings. B – Block sample
S – 2" O.D. 1.38" I.D. tube sample.
U – 3" O.D. 2.47" I.D. tube sample.

SERGENT, HAUSKINS & BECKWITH

CONSULTING GEOTECHNICAL ENGINEERS

PROJECT [illegible] Tailings

LOG OF TEST BORING NO. [illegible]

JOB NO. [illegible] DATE 7/[illegible]/81

RIG TYPE [illegible]

BORING TYPE [illegible]

SURFACE ELEV.

DATUM

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot (140 lb. 30" free fall drop hammer)	Dry Density (lbs. per cu. ft.)	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0		22"		U	7-9-11-14-21			CL	Dry	Clay w/some Sand, lo pl, lite TAN
								ML	Dry to S. MOIST	
		21"		U	17-20-18-19-21			SM		
5		0"		U	[illegible] 15-13				S. MOIST TO SAT.	Silt, lo pl, Purple
		22"		U	14-18-18-18-20				NOTE: [COLOR IS FOREVER CHANGING]	
10		21"		U	10-12-11-17-7					SAND w/ Trace Silt, Med Fine, NP, Purple
		24"		U	10-13-15-17-19					
15		21"		U	5-7-8-13-21					
		21"		U	12-11-14-13-16					
20		20"		U	4-7-8-11-10					
		22"		U	7-8-10-13-14					
25		20"		U	6-9-8-11-14					
		17"		U	8-11-12-11-14					
30		16"		U	4-6-9-13-17			SP	V. MOIST TO SAT.	TAILINGS SEDIMENTS SAND w/SOME CLAY, NP, Med V. Fine, Black or BROWN
		20"		U	5-6-7-9-13					
35										Stopped Auger @ 32½' ,, Sampler @ 35'

GROUND WATER

DEPTH	HOUR	DATE

SAMPLE TYPE

A – Auger cuttings. B – Block sample
S – 2" O.D. 1.38" I.D. tube sample.
U – 3" O.D. 2.42" I.D. tube sample.

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PROJECT _____ LOG OF TEST BORING NO. D-

JOB NO. 22-632 DATE 7-9-81

RIG TYPE CME 75

BORING TYPE 6 1/2" HSA

SURFACE ELEV. _____

DATUM _____

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0		18"	X	U	5-4-10-14-23				SL. MOIST TO V. MOIST	SILTY SAND FN. NP. LITE GRAY
			X	U	14-20-25-38-33					
		6"	X							
5		19"	X	U	12-11-13-14-16					
		12"	X	U	13-14-19-20-23					
10		22"	X	U	8-10-11-16-26			SP		
		20"	X	U	15-14-19-19-24					
15		25"	X	U	15-11-16-16-23					
		23"	X	U	15-11-16-18-17					
20		23"	X	U	10-8-11-15-16					NOTE: CONS CLAY FROM 22'
		20"	X	U	9-7-8-10-24					
25		18"	X	U	15-14-17-22-24					TAILINGS SUB ZONE
			X		error					
30		14"	X	U	11-12-16-17-21					SILTY SAND SAT. HIGH OF GRVL COBBS NP. BRN.
		20"	X	U	6-7-7-8-12				NOTE: SAT. FROM AT 30'	
35			X	U	12-9-11-11-14			SM.	SATURATED	NOTE: SOME COBBS @ 37½' TO
		0"	X	(50)	5½"			SP		
40										STOPPED AUG. @ 40' REFUSED DRIVER @ 38'
										NOTE: WAS UNABLE TO GET SAMP. @ 1' DUE TO 7' FLU

GROUND WATER

DEPTH	HOUR	DATE

SAMPLE TYPE

A – Auger cuttings. B – Block sample
S – 2" O.D. 1.38" I.D. tube sample.
U – 3" O.D. 2.42" I.D. tube sample.
T – 3" O.D. thin walled Shelby tube.

SERGENT, HAUSKINS & BECKWITH

CONSULTING GEOTECHNICAL ENGINEERS
PHOENIX • ALBUQUERQUE • SANTA FE

PROJECT [illegible] LOG OF TEST BORING NO. [illegible]

JOB NO. [illegible] DATE 7/[illegible]/9

R.G. TYPE [illegible]

BORING TYPE [illegible]

SURFACE ELEV.

DATUM

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0		20"		U	7-6-10-14-20			SP	Dry to S, moist	SAND w/trace clay/silt Pred Fine to V. Fine NP Purplish (color changing)
		18"		U	15-15-15-15-20					
5		20"		U	12-12-12-14-12					
		21"		U	8-8-10-11-12					
10		22"		U	5-6-10-9-13					
		19"		U	8-7-10-11-13					
15		21"		U	10-6-5-11-12				Note: clay pretty much disappears (less than a trace)	
		19"		U	7-7-9-10-11					
20		22"		U	4-6-7-13-14					
		24"		U	8-8-10-12-15					
25		20"		U	10-10-12-11-11					
		20"		U	9-10-12-15-20					
30		21"		U	5-10-11-12-15					
		20"		U	11-9-10-15-10					
35'		22"		U	11-8-10-14-16				Saturated	Note: bright purple v. fine TAILINGS
		23"		U	6-11-10-[50/5]				Saturated	SUBBASE SAND w/some clay Pred v. fine trace organics NP Black to Dk Brown
40'		17"		U	43-43-[50/5]			GP	Saturated	SAND & Gravel mixture SA to Rounded Pred. Fine? NP Grayish brown Shale in Ace.

Stopped Auger @ 35'
Refusal Sampler @ 41'3"

GROUND WATER

DEPTH	HOUR	DATE
37.0'	15:00	7/15/81

SAMPLE TYPE

A – Auger cuttings. B – Block sample
S – 2" O.D. 1.38" I.D. tube sample.
U – 3" O.D. 2.42" I.D. tube sample.
T – 3" O.D. thin-walled Shelby tube.

SERGENT, HAUSKINS & BECKWITH

CONSULTING GEOTECHNICAL ENGINEERS
PHOENIX • ALBUQUERQUE • SANTA FE

PROJECT _____ LOG OF TEST BORING NO. [illegible]

JOB NO. [illegible] DATE 1-10-81

RIG TYPE CME 75

BORING TYPE _____

SURFACE ELEV. _____

DATUM _____

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
1.05-1.5		12"		U	3-10-31-21			SC/SP	SLI MOIST TO MOIST	SILTY SAND FN MR LITE BRN
		6"		U	16-33-42-41 (50)			N/R		
5		19"		U	9-14-17-21-21-23					
		18"		U	10-14-20-21-25					
		17"		U	10-12-16-16-20					
		19"		U	8-8-17-14-18					
		17"		U	10-12-12-14-19					
		22"		U	10-9-12-16-18					
20		20"		U	8-9-8-12-16					
		19"		U	8-8-14-20-31					
25		18"		U	11-21-18-23-27					
		8"		U	16-21-21-23-27					
30		13"		U	9-12-12-14-19					
		22"		U	11-13-14-17-20					
		13"		U	13-11-12-16-19					
		20"		U	8-6-10-17-21					
40		0"		U	4-5-6-10-14			N/R	SAT.	TAILINGS SUB. BASE SILTY SAND SM AMT OF CLAY SOME PEBBS ie. roots FN LO PL to NP BRN.
				U	4-3-3-3-6					

STOPPED AUGERING
" SAMPLER @ 40'

GROUND WATER

DEPTH	HOUR	DATE

SAMPLE TYPE

A – Auger cuttings. B – Block sample. S – 2" O.D. 1.78" I.D. tube sample.

SERGENT, HAUSKINS & BECKWITH

PROJECT [illegible] Junction Tailings

JOB NO. 67-0 DATE 7/10/81

LOG OF TEST BORING NO. [illegible]

RIG TYPE CME-55

BOR NO TYPE 6½ HSA

SURFACE ELEV.

DATUM

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" Free fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0		20"	X	W	4-4-[illegible]-14-[illegible]			SP	DRY TO S. MOIST	SAND w/trace clay. Pred. fine to v. fine NP color of samples change all the time purple-off white, yellowish, lite tan, brown.
		21"	X	W	14-17-17-14-16					
5		18"	X	W	12-12-10-10-11					
		21"	X	W	25-8-9-12-14					
10		20"	X	W	8-8-10-10-12					
		18"	X	W	8-4-6-10-13					
15		24"	X	W	8-7-9-10-13					
		20"	X	W	10-10-10-11-10				Note: amount of clay much less. Practically None.	
20		18"	X	W	3-5-7-10-12					
		20"	X	W	8-8-9-10-13					
25		21"	X	W	8-9-10-12-15					
		19"	X	W	8-9-10-12-14					
30		20"	X	W	8-9-10-15-15					Silt lopi - NP Purple (Bright)
		24"	X	W	9-11-12-15-19					
35		21"	X	W	7-9-9-12-[illegible]				SATURATED	TAILINGS
		22"	X	W	12-10-13-15-15					SILTY SAND SUCCIE Pred. V. Fine NP Brown to BLACK
40		19"	X	W	5-7-8-10-12					
		20"	X	W	5-7-9-12-13			MC		
45		1"	X	W	4-9-14-[50/3]			SP		Auger Refusal @ 50' Sample Refusal @ [illegible] NO PUNE - CAVE
50										

GROUND WATER

DEPTH	HOUR	DATE

SAMPLE TYPE

A - Auger cuttings. B - Block sample. [illegible] - 2" O.D. [illegible] sample

SERGENT, HAUSKINS & [illegible]

PROJECT _____ LOG OF TEST BORING NO. [illegible]

JOB NO. [illegible] DATE 7-10-81

RIG TYPE CME 75

BOR NO. TYPE 6¼" HS

SURFACE ELEV. _____

DATUM _____

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" fixed fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	Remarks	Visual Classification
0		16"		U	8-12-14-15-26			SP	SL. MOIST	CILTY SAND FN. NP. LTE GRAY
				U	75-19-19-25-21			N/R	MOIST	
5		18"		U	9-8-9-13-17					
		14"		U	8-6-10-10-12					
10		15"		U	5-7-8-10-12					
		18"		U	7-6-9-8-12					
15		18"		U	8-10-13-11-13					
		19"		U	9-9-12-15-16					
20		20"		U	10-11-15-16-22					
		18"		U	7-9-14-17-18					
25		16"		U	8-11-13-17-20					
		12"		U	10-9-11-16-21					
30		12"		U	11-13-14-15-21					
		15"		U	12-10-15-19-22					
35		16"		U	11-12-14-19-16					
		20"		U	12-10-17-18-18					
40		20"		U	16-15-18-20-28					
		15"		U	8-10-50 (7")					TAILINGS
45				U	13-8-77-75				SAT	SUB-BASE CLAY SOME DEBRIS ie. ROOT MED. PL. BLACK
				U	(50) 7"				SAT	SILTY SAND & GRAVEL CRS. ANG. NP. BRN

GROUND WATER

DEPTH	HOUR	DATE
45'-3"	4:15	7-10-81

SAMPLE TYPE

A – Auger cuttings. B – Block sample
S – 2" O.D. 1.38" I.D. tube sample.
U – 3" O.D. 2.42" I.D. tube sample.
T – 3" O.D. thin-walled Shelby tube.

STOPPED BECAUSE OF DANGER BUT

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CONSULTING GEOTECHNICAL ENGINEERS
PHOENIX • ALBUQUERQUE • SANTA FE

PROJECT [illegible] LOG OF TEST BORING NO. [illegible]

JOB NO. [illegible] DATE 7/10/7[illegible]

RIG TYPE CME-75

BORING TYPE [illegible]

SURFACE ELEV.

DATUM

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot (140 lb. 30" free fall drop hammer)	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0		21"	X	U	3-11-E-14-22			SP	dry to S. MOIST	SAND w/little clay Prod F to V. FINE NP COLOR - MOTTLED
		14"	X	U	17-15-15-22-23					
5		1.4'	X	T						
		2.0'	X	T						
10		1.9'	X	T (2")						
		—		T	DID NOT TAKE					
15		?	X	T						
		2.1'	X	T						
20		1.7'	X	T					S. MOIST TO MOIST.	
		1.7'	X	T						
25		1.6'	X	T (18")						
		0"		T (0")	REFUSED NO RECOVERY					
30		24"	X	U	8-10-15-19-18					
		24"	X	U	12-13-12-17-19					
35		24"	X	U	11-15-18-22-26					
		23"	X	U	14-15-18-22-26					
40		24"	X	U	15-15-18-21-30					
		22"	X	U	15-14-15-16-22				note V. FINE — MOIST TO V. MOIST	TAILING SUBBASE
45		0"	X	U	7-13-15-15-17				NO RECOVERY	SILTY SAND NP to 10 PI Prod V. Fine Brown
		30"	X	U	12-14-24-20-24				V. MOIST	
50										

GROUND WATER

DEPTH	HOUR	DATE

SAMPLE TYPE

A - Auger cuttings. B - Block sample

S - 3" O.D. 1.38" I.D. (Standard)

U - 3" O.D. 2.42" I.D. (Undisturbed)

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ALBUQUERQUE

PROJECT

JOB NO. DATE

LOG OF TEST BORING NO.

RIG TYPE

BORING TYPE

SURFACE ELEV.

DATUM

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot (140 lb. 30" free fall drop hammer)	Dry Density Lbs. per cu. ft.	Relative Contents Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
50		7"	☒	U	7-12-[50/5]					

STOPPED AUGER @ 50'
Refusal Sampler @ 51'5"

GROUND WATER

DEPTH	HOUR	DATE

SAMPLE TYPE

A – Auger cuttings. B – Block sample
S – 2" O.D. 1.38" I.D. tube sample.
U – 3" O.D. 2.42" I.D. tube sample.

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PROJECT

JOB NO. [illegible] DATE [illegible]

LOG OF TEST BORING NO. [illegible]

RIG TYPE [illegible] 75

BORING TYPE [illegible]

SURFACE ELEV.

DATUM

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot (140 lb. 30" fall drop hammer)	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0		14"	X	U	11-14-25-30-FOX"				MOIST	
			X							
		12"	X	U	25-21-22-F-7-					SILTY SAND FN. NP LTE GRAY
5			X							
		18"	X	U	15-15-11-14			SP		
			X							
		20"	X	U	6-6-7-9-17					
10			X							
		18"	X	U	7-7-8-10-14					
			X							
		24"	X	U	7-8-9-13-11					
			X							
			X	U	7-6-11-15-13					
			X							
		18"	X	U	8-7-10-11-15					
			X							
		20"	X	U	7-9-11-11-16					
			X							
		22"	X	U	10-11-13-11-20					
25			X							
			X	U	10-10-12-11-15					
			X							
			X	U	11-14-15-17-19					
			X							
		14"	X	U	9-10-14-19-20					
			X							
		19"	X	U	9-16-12-21-24-20					
			X							
			X	U	12-16-19-24-32					
		18"	X							NOTE: SOME BURPLE CLAY LENSES FROM 40'
			X	U	15-14-18-12-21					
		20"	X						NOTE: SAT. FROM @ 41½'	
			X							
			X	U	12-11-11-12-13					
		19"	X							
			X	U						TAILINGS
		20"	X		12-11-14-13-19			SP SA	SATURATE	CUD BASE SILTY SAND FN. NP BRN
45			X							
			X		4-3-4-4-24					
			X							
50										STOPPED AUG & SAMP. @ 47½

GROUND WATER

DEPTH	HOUR	DATE

SAMPLE TYPE

A – Auger cuttings. B – Block sample

S – 2" O.D. 1.38" I.D. tube sample.

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PROJECT Grand Junction Tailings

JOB NO. 63-D DATE 7/15/81

LOG OF TEST BORING NO. C-1

RIG TYPE CME-75

BORING TYPE 6½ HSA

SURFACE ELEV.

DATUM

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot (140 lb. 30" free fall drop hammer)	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0		20"	X	u	2-5-11-14-23			SP	DRY TO S. MOIST	SAND w/ trace Cl-/Silt Pred FINE to V. FINE NP OFFWHITE TO LITE PINK
		24"	X	u	21-22-24-26-26					
5		21"	X	u	20-5-7-12-5					Note: color mottled
		19"	X	u	11-8-9-11-17					
10		18"	X	u	7-6-7-10-1					
		22"	X	u	6-7-7-9-11					
15		20"	X	u	6-8-8-10-11					
		21"	X	u	8-8-9-11-14					
20		20"	X	u	7-9-12-11-16					
		22"	X	u	14-15-17-16-19					
25		21"	X	u	10-9-12-15-19					
		21"	X	u	11-13-15-18-21					
30		20"	X	u	9-11-12-9-17				Pock: 4" of Bright Purple Silt	
		21"	X	u	14-12-14-18-21				V. moist	
35		19"	X	u	12-10-12-17-20				Note: SATURATED FINE SAND BRIGHT PURPLE	TAILINGS SUBGRADE
		18"	X	u	16-15-19-23-21					CLAY HI PI GREY TO BLACK
40		24"	X	u	7-10-9-12-16				MOIST	
		30"	X	u	7-9-12-16-18					SAND Pred Coarse NP Dark GREY
45		24"	X	u	2-3-6-7-10			CH		
		20"	X	u	6-10-17-31-50/4			SP	SATURATED	STOPPED AUGER @ 4 Refusal Sampler @ 4 CAVED IN TO 33.0'

GROUND WATER

DEPTH	HOUR	DATE
42.1	9:00	7/11/81

SAMPLE TYPE

A – Auger cuttings. B – Block sample
S – 2" O.D. 1.38" I.D. tube sample.
U – 3" O.D. 2.47" I.D. tube sample.

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PROJECT

JOB NO 52-622 DATE 7-11-8

LOG OF TEST BORING NO. C-2

RIG TYPE CME 75

BORING TYPE 6" HSA

SURFACE ELEV

DATUM

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0		18"		U	4-6-11-14-20					SILTY SAND FN. NP LITE GRY
		19"		U	12-11-10-14-18					
5		17"		U	7-9-12-10-11					
		22"		U	6-6-8-9-14					
10		22"		U	6-6-9-7-11					
		21"		U	5-8-7-9-12					
15		20"		U	5-8-7-9-12					
		24"		U	7-6-8-11-13					
20		22"		U	6-10-9-9-12					
		23"		U	7-7-10-8-12					
		14"		U	8-7-9-12-17					
		16"		U	9-8-13-15-18					
		14"		U	11-10-14-15-17				NOTE: SATURATED FROM 35'	NOTE: SOME PURPLE CLAYEY LENSES FROM 35'
		19"		U	11-8-10-13-16					
		14"		U	9-9-12-29-30					NOTE: 1' LENS OF SAT. SILT SOME @ 36-37' (PURPLE)
		16"		U	10-9-16-12-12				SATURATED	
40				U	8-10-20-(50)4"					SILTY SAND SOME CLAY (W/ BLACK ORG FN. CO PL BRV.
										STOPPED AUG. @ 40' STOPPED SAMP. @ 42'

NOTE: HOLE CALIED TO 33'

GROUND WATER

DEPTH	HOUR	DATE

SAMPLE TYPE

A – Auger cuttings. B – Block sample
S – 2" O.D. 1.38" I.D. tube sample.
U – 3" O.D. 2.42" I.D. tube sample.
T – 3" O.D. thin-walled Shelby tube.

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PROJECT: GRAND JUNCTION TAILINGS

JOB NO. 63-0 DATE 7/11/81

LOG OF TEST BORING NO. S-3

RIG TYPE: CME-55

BORING TYPE: 6½" HSA

SURFACE ELEV.:

DATUM:

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb., 30" free fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	Remarks	Visual Classification
0		19"	X	U	4-4-1-12-14			SP	DRY TO S. MOIST	SAND W/TRACE SILT/CLAY PRED FINE TO V. FINE NP. COLOR MOTTLED - MAINLY CHANGING - WEAKLY PURPLE OR GREY
		16"	X	U	15-16-1-19-19					
5		22"	X	U	10-15-15-15-13					
		20"	X	U	6-7-9-10-12					
10		22"	X	U	6-7-9-10-12					
		27"	X	U	6-7-8-10-12					
15		21"	X	U	7-7-8-10-12					
		19"	X	U	8-7-9-11-12					
20		23"	X	U	8-8-9-11-13					
		19"	X	U	11-11-12-14-16					
25		19"	X	U	11-15-17-17-17					
		15"	X	U	15-18-24-25-25					
30		19"	X	U	15-12-11-14-16				Note: BRIGHT PURPLE, SATURATED V. FINE	
		18"	X	U	12-11-12-18-20					CLAY W/SOME SAND & organic mat to HI PI BLACK
35		21"	X	U	12-12-7-14-15					
		24"	X	U	5-6-10-2-8				moist	
40		20"	X	U	2-5-12-13-18			CH/CH		STOPPED Auger @ 40'4" Refusal Jaws @ 43'4" CAVED TO 33.2'
		0"	X	U	7-[50/4]				NO RECOVERY	
45										

GROUND WATER

DEPTH	HOUR	DATE

SAMPLE TYPE

A – Auger cuttings. B – Block sample
S – 2" O.D. 1.38" I.D. tube sample.
U – 3" O.D. 2.47" I.D. tube sample.

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PROJECT

JOB NO. [illegible] DATE [illegible]

LOG OF TEST BORING NO. [illegible]

RIG TYPE CME 75

BORING TYPE [illegible]

SURFACE ELEV.

DATUM

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free fall drop hammer	Dry Density lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0		19"		U	5-9-12-23					SILTY SAND FIN. CCC. LENSES OF CLAYEY SILTS NP LTG GRAY w/ SOME PURPLE
		19"		U	11-20-27-R					
5		20"		U	10-11-12-13-13					NOTE: CCC. LENS OF CLAY SILTS FROM 5' (PURPLE)
		22"			7-6-8-11-6					
10		20"			6-7-6-9-11					
		18"		U	7-6-7-9-11					
15		17"		U	7-8-7-10-10					
		25"		U	9-21-15-15-15					
20		18"		U	6-9-12-13-16					TAILINGS
				U	50/1"				SAT	SUB BASE SAND GRAVEL & COBBS. NP BRN
25										
30										REFUSED AUG @ 23' 1" SAMPLER @ 22'-7½"

Note: Hole Backfilled

GROUND WATER

DEPTH	HOUR	DATE
9.7		

SAMPLE TYPE

A – Auger cuttings. B – Block sample
S – 2" O.D. 1.38" I.D. tube sample.
U – 3" O.D. 2.87" I.D. tube sample.
T – 3" O.D. thin-walled Shelby tube.

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(20)

PROJECT Grand Rapids Tailings

JOB NO. 63-0 DATE 7/11/81

LOG OF TEST BORING NO. C-1

RIG TYPE CME-55

BORING TYPE 6½ HSA

SURFACE ELEV.

DATUM

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0		20"	X	U	2-3-4-4-10			SP	DRY TO S. MOIST	SAND w/Trace Clay/Silt Med fine to v. Fine NP COLOR - MOTTLED mostly purplish to Grayish
		21"	X	U	10-16-17-18-17					
5		9"	X	U	10-10-10-10-12					
		21"	X	U	10-9-10-11-10					
10		20"	X	U	3-3-4-4-6					
		24"	X	U	6-7-8-11-12					
15		20"	X	U	7-11-12-14-14					
		22"	X	U	11-10-12-15-15					
20		20"	X	U	3-6-7-12-15					SAND w/some clay NP Med fine Brown Note: gravel, SR to Rounded
		21"	X	U	6-7-8-12-15					
25		18"	X	U	13-15-16-21-20				MOIST TO SATURATED	
		20"	X	U	13-14-18-15-17					
30		21"	X	U	6-6-14-27-22			SP		
			X	U	12-12-26-44-37					
35										STOPPED AUGER @ 30' " Sampler @ 35' CAVED TO 25.0'

GROUND WATER

DEPTH	HOUR	DATE

SAMPLE TYPE

A – Auger cuttings. B – Block sample

S – 2" O.D. 1.38" I.D. tube sample.

U – 3" O.D. 2.47" I.D. tube sample.

SERGENT, HAUSKINS & BECKWITH

CONSULTING GEOTECHNICAL ENGINEERS

PROJECT

JOB NO. [illegible] DATE [illegible]

LOG OF TEST BORING NO. D-1

RIG TYPE CME 75

BORING TYPE 6" HSA

SURFACE ELEV.

DATUM

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0		8"	X	T	Pushed 23"				MOIST	SILTY SAND FN. NP PURPLE
		19"	X	T	26"					
5		12"	X	T	34"					
		8"	X	T	30"				MOIST	SAND SOME SILT FN. NP LITE GRAY
10		15"	X	T	34"					
		13"	X	T	26"					
15		16"	X	T	23					
		13"	X	T	24"					
20		16"	X	T	32"					
		12"	X	T	31"					
25		17"	X	T	30"					
		20"	X	T	34"				V-MOIST TO SATURATED	CLAYEY SILT ? SOME FN. SAND LO. PL TO NP PURPLE
30			X	T	1"				SAT.	TAILINGS SUB BASE
				(END)						GRAVEL & COBBS. RND. NP DARK GRAY
										SAMP. REF. @ 32'-2"

GROUND WATER

DEPTH	HOUR	DATE
32'	1:15	7-12-81

SAMPLE TYPE

A – Auger cuttings. B – Block sample
S – 2" O.D. 1.38" I.D. tube sample.
U – 3" O.D. 2.47" I.D. tube sample.
T – 3" O.D. thin walled Shelby tube.

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PROJECT [illegible] SUBSTATION [illegible]

JOB NO. [illegible] DATE 7/11/81

LOG OF TEST BORING NO. D-[illegible]

RIG TYPE CME-55

BORING TYPE [illegible]

SURFACE ELEV.

DATUM

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0		21"	X	u	5-6-10-13-14			ML	dry	SILT to PI = NP Purple
		20"	X	u	17-16-16-19-21					
5		22"	X	u	18-13-14-16-17			SP	dry to S. moist	SAND w/ trace clay/silt Med Fine NP greyish brown
		20"	X	u	8-8-9-11-13					
10		15"	X	u	7-8-7-9-12					
		24"	X	u	10-12-14-20-25				Note: color always changing - mottled	
15		26"	X	u	5-8-9-13-19					
		21"	X	u	13-13-14-17-17					
20		20"	X	u	9-9-10-13-13					
		22"	X	u	9-8-10-14-13				Note: Purple Again	
25		20"	X	u	4-6-6-8-9					
		5"	X	u	6-5-6-8-8					SAND w/ SOME CLAY/SILT Med Fine NP BROWN
30		0"	X	u	5-7-7-8-11		NO RECOVERY		V. MOIST	
		30"	X	u	10-10-14-14-14			SP		Note: Gravel, Rounded
35		30"	X	u	11-17-19-[5-15]					
										Stopped Auger @ 35' Refusal Sampler @ 36'11"

GROUND WATER

DEPTH	HOUR	DATE
35.2'	4:00	7/11/81

SAMPLE TYPE

Auger cuttings. B – Block sample

2" O.D. 1.38" I.D. tube sample.

3" O.D. 2.42" I.D. tube sample.

SERGENT, HAUSKINS & BECKWITH

CONSULTING GEOTECHNICAL ENGINEERS

PROJECT: [illegible]

JOB NO. [illegible] DATE [illegible]

LOG OF TEST BORING NO. [illegible]

RIG TYPE: CME 75

BORING TYPE: [illegible]

SURFACE ELEV.:

DATUM:

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
		17		U	[illegible]				M. DIST	SANDY CLAY LO. TO MED. P.I. (CONSR) BRN.
		19'			1-1 4K-[illegible]					SAND CONS. SILT FN. NP. LIGHT GRAY
5		16"		U	2-9-10-12-15					
		15'		U	6-7-8-5-11					NOTE: OCC. LENS OF PURPLE SLIME FROM 5'
10		22"		U	6-6-10-11-13					
		12"		U	2-6-1-6-10					
15		25"		U	11-8-14-11-16					
		17'		U	8-7-8-13-14					
		20"		U	17-9-13-13-14					
		19'		U	9-6-10-10-17					
		18"		U	9-6-10-13-15					
		17"		U	11-8-11-10-13					
30		25'		U	5-4-5-6-12				MOIST TO SATURATED	SANDY SILT NP PURPLE
		[illegible]			[illegible]					TAILINGS SILT BASE
		24"							V-MOIST	CLAY SOME ORGANICS ie. ROOTS MED. P.I. DARK BROWN TO BLACK
35		17"		U	29-15-18-15-24					
									SATURATED	SILTY SAND FN NP BRN NOTE: SOME OFC GRV. RND.C 37'
										STOPPED AUG @ 35' " SAMP @ 37½

GROUND WATER

DEPTH	HOUR	DATE
[illegible]	[illegible]	[illegible]

SAMPLE TYPE

A – Auger cuttings. B – Block sample
S – 2" O.D. 1.38" I.D. tube sample.
U – 3" O.D. 2.47" I.D. tube sample.

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PROJECT GRAND JUNCTION - TAILINGS

JOB NO. 63-D DATE 7/11/81

LOG OF TEST BORING NO. 5

RIG TYPE CME-55

BORING TYPE 6 1/2 - HSA

SURFACE ELEV.

DATUM

Depth in Feet	Continuous Penetration Resistance	Drophead Log	Sample	Sample Type	Blows per foot 140 lb. 30" free fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0		22"	X	U	4-6-9-14			SP	DRY TO S. MOIST	SAND W/ TRACE CLAY/SILT PRED FINE NP PURPLE
		26"	X	U	9-10-11-12-15					
5		17"	X	U	8-8-8-11-11					
		20"	X	U	8-10-10-14-12					
10		19"	X	U	4-9-11-11-16					
		19"	X	U	7-9-10-12-14					
15		20"	X	U	3-5-8-10-1					
		19"	X	U	8-9-11-11-12					
20		20"	X	U	7-8-9-10-11				Note: BRIGHT	PURPLE
		21"	X	U	7-9-10-14-15					
25		14"	X	U	7-6-10-11-13				Note: TANNISH	
		20"	X	U	8-9-9-11-14				NOTE: PURPLE	
30		21"	X	U	7-7-7-13-15					TAILINGS
		18"	X	U	10-10-11-14-20			SP	V. MOIST	SAND W/ SOME CLAY SILTS PRED COARSE NP BROWN
35										
										STOPPED AUGER 30' TI Sample @ 35'

GROUND WATER

DEPTH	HOUR	DATE

SAMPLE TYPE

A – Auger cuttings. B – Block sample
S – 2" O.D. 1.38" I.D. tube sample.
U – 3" O.D. 2.42" I.D. tube sample.
T – 3" O.D. thin-walled Shelby tube.

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PHOENIX • ALBUQUERQUE • SANTA FE

PROJECT [illegible]

JOB NO. [illegible] DATE [illegible]

LOG OF TEST BORING NO. [illegible]

RIG TYPE [illegible]

BORING TYPE [illegible]

SURFACE ELEV. [illegible]

DATUM [illegible]

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" fall. Ball drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0		25"	X	u	5-6-10-12			SP	S. MOIST	SAND WITH CLAY [illegible] PRED FINE NP GREYISH Note: color changing constant by moisture
		24"	X	u	7-12-12-12-16					
5		21"	X	u	24-9-11-10-[illegible]					
		21"	X	u	7-28-11-12					
10		22"	X	u	12-10-9-11-12					
		25"	X	u	9-10-11-12-14					
15		27"	X	u	24-6-8-13-14					
		22"	X	u	7-10-10-10-13					
20		20"	X	u	5-7-7-10-14					
		19"	X	u	10-12-11-14-18					
25		20"	X	u	11-11-12-12-19					
		21"	X	u	12-13-16-20-20					
30		26"	X	u	9-11-13-14-15					TAILINGS SAND W/SOME CLAY SUBROUND FINE NP Some layers of clayey sand BROWN
		23"	X	u	12-12-15-18-21					
35		20"	X	u	9-9-9-16-17				MOIST TO V. MOIST	
		21"	X	u	10-11-12-15-19			SP		
40		0"	X	u	23-[50/0] N.R.					
45										STOPPED AUGER @ 40' Refusal Sampler @ 40'6" CAVED IN TO 31.7'

GROUND WATER

DEPTH	HOUR	DATE

SAMPLE TYPE

A – Auger cuttings. B – Block sample
S – 3" O.D. 1.38" I.D. tube sample.
U – 3" O.D. 2.42" I.D. tube sample.
T – 3" O.D. thin-walled Shelby tube.

S/B

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PROJECT [illegible] TAILINGS

JOB NO. [illegible] DATE [illegible]

LOG OF TEST BORING NO. D-2

RIG TYPE [illegible]

BORING TYPE [illegible]

SURFACE ELEV.

DATUM

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot (140 lb. 30" free fall drop hammer)	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0		22"	X	U	3-5-1	-13-24		SP	SAMPLE	SAND w/TRACE CLAY [illegible] PRED. FINE NP TAN MOIST. NOTE: COLOR PINKISH CHANGING [illegible]
		20"	X	U	18-19-17-19-17					
5		5"	X	U	15-15-15-15-15					
		0"	X	U	14-14-12-13-13		N.R.			
10		18"	X	U	4-13-[illegible]-13-12					
		20"	X	U	8-7-11-13-13					
15		20"	X	U	4-6-6-7-11					
		21"	X	B	7-8-10-13-16					
20		19"	X	U	9-10-[illegible]-12-12					
		21"	X	U	9-10-12-15-10					
25		19"	X	U	12-10-12-16-18					
		20"	X	U	15-15-18-21-23					
30		20"	X	U	9-12-1-19-19				NOTE: V. MOIST	TAILINGS SUBBASE
		18"	X	U	17-16-19-26-19					GRAVELLY SAND PRED. FINE ROUNDED NP BROWN
35		20"	X	U	7-9-7-13-29				V. MOIST.	
		18"	X	U	19-39-[50/5"]			SP		
40		0"		U	[50/5]		N.R.			Refusal Sampler @ 40'5" Stopped Auger @ 40' CAVED IN TO 31'

GROUND WATER

DEPTH	HOUR	DATE

SAMPLE TYPE

A – Auger cuttings. B – Block sample
S – 2" O.D. 1.38" I.D. tube sample.
U – 3" O.D. 2.42" I.D. tube sample.

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PROJECT _____ LOG OF TEST BORING NO. [illegible]

JOB NO. [illegible] DATE [illegible]

RIG TYPE [illegible]

BOR NO TYPE [illegible]

SURFACE ELEV. _____

DATUM _____

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
		18"		U	7-11½-9-15				MOIST	Sandy [illegible] med. to c. F. (CLOVER) BRN.
		19"		U	16-[illegible]-12-18-[illegible]					SILTY SAND FN. NP. LITE GRAY
5		20"		U	13-9-17-[illegible]-12					
		20"		U	9-7-7-7-11					
10		20"		U	25-7-8-14					
		16"		U	26-7-9-12					
15		19"		U	7-5-11-9-15					
		19"		U	8-5-8-6-12					
		20"		U	7-8-12-13-16					NOTE: SAT. LENS OF SCALE @ 22'-22½' (PURPLE)
		20"		U	5-6-12-12-19					
		20"		U	18-11-12-10-17					
		20"		U	10-9-11-12-16					
30		19"		U	11-8-11-6-14					
				U	8-6-10-11-15				SATURATED	SILT SOME SAND NP PURPLE
35		22'								
		18"		U	5-8-8-7-13-7				V-MOIST	SILTY SAND FN. NP. PURPLE TAILINGS SUB. BASE
				U	10-13-18-20-18				SATURATED	
40				U	4-7-8-7-4					SILTY SAND P.G. NP. BRN. NOTE: 7" CLAY LE @ 38'
										STOPPED AUG. @ 40' " SAMPLER @ 42½

GROUND WATER

DEPTH	HOUR	DATE
[illegible]	[illegible]	[illegible]

SAMPLE TYPE

A – Auger cuttings. B – Block sample
S – 2" O.D. 1.38" I.D. tube sample.
U – 3" O.D. 2.42" I.D. tube sample.

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PROJECT [illegible] LOG OF TEST BORING NO. [illegible]

JOB NO. [illegible] DATE [illegible]

RIG TYPE CME-55

BORING TYPE [illegible]

SURFACE ELEV.

DATUM

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0		20"		S	9-5-6-10-12			SP	S. MOIST	SAND W/ TRACE CLAY/SILT FINE FINE NP GREYISH NOTE: COLOR ALWAYS CHANGING - FILLED
		21"		U	10-10-10-10-13					
5		20"		U	9-9-10-11-11					
		19"		U	8-9-9-10-13					
10		20"		U	34-9-10-12-14					
		20"		U	8-8-8-12-14					
15		20"		U	8-8-8-11-11					
		20"		U	7-7-8-11-15					
20		20"		U	5-9-10-11-14					
		21"		U	8-8-9-13-14					
25		21"		U	11-11-11-16-15					
		21"		U	9-11-16-18-22					
30		20"		U	9-9-11-16-18					
		20"		U	13-15-15-21-24					
35		20"		U	12-12-13-17-20				Note: moist TO V. moist	
		19"		U	13-10-12-14-17					
40		20"		U	4-10-13-13-12			SP	V. MOIST TO SATURATED	SAND W/ SOME CLAY FINE FINE NP to LOW I BLACK NOTE: less clay Trace Rounded Gravel
		20"		U	12-19-13-35-[50/5"]					
45										Refusal Sampler @ 44' Refusal Auger @ 40' CAVED TO 35'

GROUND WATER

DEPTH	HOUR	DATE

SAMPLE TYPE

A – Auger cuttings. B – Block sample
S – 2" O.D. 1.38" I.D. tube sample.
U – 3" O.D. 2.47" I.D. tube sample.

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PROJECT _____ LOG OF TEST BORING NO. C-2

JOB NO. [illegible] DATE 7-[illegible]-[illegible]

R.S. TYPE CME 75

BORING TYPE [illegible]

SURFACE ELEV. _____

DATUM _____

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0		20"		U	3-3-1[illegible]-1[illegible]-12				SL. MOIST	SANDY CLAY (CL)
									MOIST	SILTY SAND
		18"		U	16-15-20-1[illegible]-24					SN.
5										VP.
		16"		U	11-12-12-12-14					LTE. GRAY
					10-7-10-10-15					
		17"								
10		18"		U	10-5-17-11-15					
				U						
		20"			12-8-12-12-17					
15		20"		U	11-1[illegible]-12-12-13					
		17"		U	1[illegible]-5-9-11-13					
20		20"		U	11-9-12-14-16					
				U	10-4-12-18-16					
		17"								
25		19"		U	15-10-16-11-15					
				U	8-7-11-10-17					
		20"								
30		20"		U	15-14-20-21-24					
				U						
		20"			20-15-15-17-23					
35		16"		U	13-15-16-20-2[illegible]					
		20"		U	21-25-24-24-31					
40		16"		U	14-14-19-19-22					
		20"		U	24-19-15-43-(50)3"					
45				U	36-30-15-17-(50)4½"				V. MOIST TO SAT.	TAILINGS SAC BASIN SAND & GRAVEL. CM. AND OR CLAY W.G. SAC RND AIR BRN
				S	27-27-(50)5"					
50										

GROUND WATER

DEPTH	HOUR	DATE

SAMPLE TYPE

A – Auger cuttings. B – Block sample
S – 2" O.D. 1.38" I.D. tube sample.
U – 3" O.D. 2.42" I.D. tube sample.
T – 3" O.D. thin-walled Shelby tube.

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PROJECT GRAND JUNCTION TAILINGS

JOB NO. [illegible] DATE [illegible]

LOG OF TEST BORING NO. C-25

RIG TYPE [illegible]

BORING TYPE [illegible]

SURFACE ELEV.

DATUM

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0		24"	X	U	4-6-10-16-27			SP	S. MOIST TO MOIST	SAND W/ SOME CLAY/SILT PREV FINE NP COLOR: [illegible] USUALLY GREY [illegible] FINKISH
		14"	X	U	17-19-17-19-16					
5		0"	X	U	NO RECOVERY STUCK IN AUGER					
		22"	X	U	22-10-6-8-10					
10		21"	X	U	12-7-5-7-9					
		24"	X	U	6-7-8-10-12					
15		23"	X	U	6-7-7-8-11					Note: Purplish grey
		24"	X	U	7-8-9-10-11					
20		22"	X	U	3-6-8-11-15					TAILINGS
		18"	X	U	8-9-9-10-12					SAND W/ SOME CLAY PREV FINE NP BLACK & BROWN
25		20"	X	U	8-12-13-14-21					
		20"	X	U	11-13-15-18-20					
30		22"	X	U	9-9-10-13-14				V. MOIST	CLAYEY SAND PREV V. FINE NP BROWN
		20"	X	U	6-8-7-12-12			SP		
35		21"	X		6-7-9-9-[50/5]			SC	V. MOIST	
40										STOPPED AUGER @ 35' " SAMPLER @ 37'6" CAVED TO 26'

GROUND WATER

DEPTH	HOUR	DATE

SAMPLE TYPE

A – Auger cuttings. B – Block sample
S – 2" O.D. 1.38" I.D. tube sample.
U – 3" O.D. 2.42" I.D. tube sample.

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CONSULTING GEOTECHNICAL ENGINEERS

PROJECT _____ LOG OF TEST BORING NO. C-2

JOB NO. [illegible] DATE 7-16-[illegible]

RIG TYPE CME 75

BOR NG TYPE [illegible]

SURFACE ELEV. _____

DATUM _____

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot (140 lb., 30" free fall drop hammer)	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0				M					SL. MOIST	SANDY CLAY L.O.A. LTE BRN (COVER)
		20"							MOIST	
				U	22-18-21-22-24					SILTY SAND FN. NP. LITE GRAY
		12"								
5										
		20"		U	11-12-12-14-18					
		19"		U	11-11-14-20-19					
10										
		20"		U	7-8-13-18					
		22"		U	14-17-16-22-26					
15										
		19"		U	11-13-12-15-16					NOTE: SAT. LENS OF SILT SLIME @ 17'-17½ (PURPLE)
		20"			10-9-17-16-16					
20										
		13"		U	7-11-11-13-21					
		19"		U	25-15-16-17-13					
25										
		19"		U	8-10-7-11-12					TAILINGS
		20"							SATURATED	SUB-BASE SANDY SILT SOME CLAY LOW. PI 20 NP BRN.
30				U	7-9-11-17-18					
				U	5-6-46-(50)-47					
										STOPPED AUG 35'
										PLACED ABS. TO 33' SLOTED BOTTOM 7' & WRAPED W/FILTER FABRIC.

GROUND WATER

DEPTH	HOUR	DATE

SAMPLE TYPE

A – Auger cuttings. B – Block sample
S – 2" O.D. 1.38" I.D. tube sample.
[illegible] I.D. tube sample

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PROJECT [illegible] Tailings

JOB NO. [illegible] DATE [illegible]

LOG OF TEST BORING NO. [illegible]

RIG TYPE [illegible]

BORING TYPE [illegible]

SURFACE ELEV.

DATUM

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0		24"	X	U	3-5-12-16-19			SP	SLIGHT TO MOIST	SAND W/TRACE CLAY/SILT FINE FINE NP BRIGHT PURPLE NOTE: COLOR ALWAYS CHANGING - MOIST
		24"	X	U	14-14-22-17-18					
5		22"	X	U	2-4-8-9-11					
		20"	X	U	7-8-9-10-13					
10		20"	X	U	8-9-10-13-14					
		21"	X	U	7-7-9-9-11					
15		17"	X	U	1-2-3-6-8					
		19"	X	U	7-5-5-6-7					
20		20"	X	U	7-11-13-19-24					
		17"	X	U	10-17-18-17-24					
25		20"	X	U	27-17-20-18-23					
		16"	X	U	7-22-28-29-20					TAILINGS SUBBASE
30		17"	X	U	14-21-19-19-19					CLAYEY SAND NP to Low PI BLACK
		17"	X	U	14-17-16-15-12				V. MOIST	
35		15"	X	U	4-5-4-[50/4]			SC		
40										Auger Refusal @ 37'0" Sampler Refused @ 36'10" CAVED TO 27'

GROUND WATER

DEPTH	HOUR	DATE

SAMPLE TYPE

A – Auger cuttings. B – Block sample
S – 2" O.D. 1.38" I.D. tube sample.
U – 3" O.D. 2.42" I.D. tube sample.
[illegible] Stationary Shelby tube

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PROJECT [illegible] LOG OF TEST BORING NO. C-2[illegible]

JOB NO. [illegible] DATE 7-[illegible]

RIG TYPE [illegible]

BORING TYPE [illegible]

SURFACE ELEV.

DATUM

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free fall drop hammer	Dry Density lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0		28"	X	T				SP	S. MOIST	SAND WITH SOME CLAY FINE NP Red Fine Grayish w/ traces of Purple
		28"	X	T						
5		25"	X	T						
		28"	X	T						Note: 6" Sandy Clay Cove
10		27"	X	T						
		28"	X	T						
15		28"	X	T						
		28"	X	T						
20		28"	X	T					Note: lens of Purple Clay	
		20"	X	T (28")						TAILINGS SUBBASE
25		27"	X	T					Note: Some Purple Slime	SAND W/SOME CLAY & TRACE GRAVEL FINE NP BLACK & BROWN
		21"	X	T					MOIST	
30		24"	X	T (6")				SP		Note: Rounded Gravel in 2nd Sample
		7"	X	U 4-4-4 E.(50/5")						
35										Stopped Boring at 32½' Refusal Sampling at 31'5½" CAVED IN TO 25.7'

GROUND WATER

DEPTH	HOUR	DATE

SAMPLE TYPE

A – Auger cuttings. B – Block sample
S – 2" O.D. 1.38" I.D. tube sample.
U – 3" O.D. 2.47" I.D. tube sample.

SERGENT, HAUSKINS & BECKWITH

CONSULTING GEOTECHNICAL ENGINEERS

PROJECT: GRAND SUPERSTITION TAILINGS

JOB NO. 67-0 DATE 7/13/81

LOG OF TEST BORING NO. D-29

RIG TYPE: CME-55

BORING TYPE: 6" HSA

SURFACE ELEV.:

DATUM:

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" drop fall drop hammer	Dry Density Lbs./cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0		20"	X	U	14-7-16-21-31			SP	S. MOIST	SAND W/TRACE CLAY/SILT PRED FINE NP PINKISH-PURPLISH Note: color mottled
5		19"	X	U	21-19-19-21-23					
		24"	X	U	23-12-13-14-15					
		20"	X	U	8-8-8-7-11					
15		22"	X	U	7-6-6-7-1					
		19"	X	U	14-12-13-13-15					
15		18"	X	U	10-11-10-12-13					
		20"	X	U	9-11-12-13-14					
20		20"	X	U	3-4-4-6-7					
		19"	X	U	8-6-6-5-5				Note: SATURATED	Silt NP to low PI Bright Purple TAILINGS
25		6"	X	U	3-2-3-3-2					
		14"	X	U	3-3-4-4-5			ML		Gravelly Sand SUBBASE Pred. Fine Rounded NP BLACK
30			X		2-2-32-(50/4")			SP	MOIST	

Auger Refused @ 34'

Sampler Refused @ 31' 7½"

CAVED TO 22'

GROUND WATER

DEPTH	HOUR	DATE

SAMPLE TYPE

A – Auger cuttings. B – Block sample

S – 2" O.D. 1.38" I.D. tube sample.

U – 3" O.D. 2.42" I.D. tube sample.

T – 3" O.D. thin-walled Shelby tube.

SERGENT, HAUCKINS & BECKWITH

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PHOENIX • ALBUQUERQUE • SANTA FE

PROJECT Grand Junction

JOB NO. 23-0 DATE 7/14/51

LOG OF TEST BORING NO. B-3

RIG TYPE Gm-55

BORING TYPE 6" HSA

SURFACE ELEV.

DATUM

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" head fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0		18	X		6-9-11-15-15			SP	S. MOIST	SAND W/ TRACE CLAY/SILT FINE TO FINE NP GRAY VIS 11 note: Sandy Clay seam note: Trace of Purple note: lens of Purple Silt
		0"	X	W	9-17-17-21-15			N.R.		
5		20"	X	W	12-8-6-7-6					
		20"	X	W	4-5-5-9-8					
10		20"	X	W	6-6-5-8-9			N.R.	MOIST	SILT. 10 PI LIGHT PURPLE
		14"	X	W	23-27-29-30-28			SP		SAND W/ SOME CLAY Med Fine & V. Fine NP TRACE ROUNDED GRAVEL note: 6" lens of clayey S 10 PI, BROWN TAILINGS SUBGRADE
15		8"	X	W	29-9-14-17					
		16"	X	W	15-49-[50/5]			SP		
20		17"	X	W	6-35-[50/5]				MOIST TO SATURATED	
										GRAVELLY SAND Med Coarse Rounded NP BROWN
										STOPPED AUGER @ 20' REFUSED SAMPLER @ 21'5 CAVED TO 16.4'

GROUND WATER

DEPTH	HOUR	DATE
15.0	12:40	7/14/51

SAMPLE TYPE

A – Auger cuttings. B – Block sample

S – 2" O.D. 1.32" I.D. tube sample.

SERGENT, HAUSKINS & BECKWITH

GEOTECHNICAL ENGINEERS

PROJECT GRAND JUNCTION TAILINGS

JOB NO. 63-0 DATE 7/13/81

LOG OF TEST BORING NO. D-3

RIG TYPE CME-55

BORING TYPE 4" HSA

SURFACE ELEV.

DATUM

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot (140 lb. 30" fall drop hammer)	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0		20	X	U	12-10-10-12-8			SP	S. MOIST to	SAND W/TRACE CLAY/SILT PRED V FINE NP PURPLE
		21"	X	U	14-20-22-20-26					
5		19"	X	U	16-13-13-11-13				MOIST	
		22"	X	U	9-9-9-6-4					
10		20"	X	U	9-10-9-9-11					Note: color mottled (Always changing)
		23"	X	U	12-8-10-12-13					
15		18"	X	U	5-5-6-7-12					
		20"	X	U	7-8-9-10-15					
20		21"	X	U	10-10-10-11-16					Note: Purple Slime TAILING SUBSAS
		18"	X	U	11-8-8-11-12					
25		12"	X	U	3-3-3-3-3					GRAVELLY SAND Red Fine Rounded NP BLACK
		16"	X	U	2-3-4-4				MOIST	
30			X	U	2-[50/4]			SP		
35										Auger Refused @ 32' Sampler Refused @ 30'10" CAVED TO 21'

GROUND WATER

DEPTH	HOUR	DATE

SAMPLE TYPE

A – Auger cuttings. B – Block sample

S – 2" O.D. 1.38" I.D. tube sample.

U – 3" O.D. 2.42" I.D. tube sample.

SERGENT, HAUCKINS & BECKWITH

CONSULTING GEOTECHNICAL ENGINEERS

PROJECT: Grand Junction Tailings

JOB NO. [illegible] DATE [illegible]

LOG OF TEST BORING NO. B-2

RIG TYPE: [illegible]

BORING TYPE: [illegible]

SURFACE ELEV.:

DATUM:

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb., 10" fall drop hammer	Dry Density lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0		27"	X	T				SP	DRY TO S. MOIST	SAND W/ TRACE CLAY/SILT PRED FINE TO V FINE NP GREYISH
		13"	X	T					Note: SOME Purple.	Note: Thin Sandy Clay Cover Purple to Grey.
5		28"	X	T	(50")					
		15"	X	T	(11")				Note: color mottled	
10		24"	X	T	(24")					
		16"	X	T	(16")					
15		14"	X	T	(14")				Note: lens of Purple Silt	TAILINGS
								SP	MOIST	SAND W/ TRACE CLAY SOME GRAVEL Pred Fine Rounded to Angular NP Brown, then Black. Note: lens of Pal Pinky
			X	W	18-24-47-45-46					
20			X	W	27-29-16-26-31					
										Stopped Hinge @ 20', 11 Sample @ 22½' CAVED IN TO

GROUND WATER

DEPTH	HOUR	DATE

SAMPLE TYPE

A – Auger cuttings. B – Block sample
S – 3" O.D. 1.38" I.D. tube sample.
U – 3" O.D. 2.47" I.D. tube sample.

SERGENT, HAUSKINS & BECKWITH

CONSULTING GEOTECHNICAL ENGINEERS

PROJECT: GRAND JUNCTION TAILINGS

JOB NO. 62-0 DATE 7/13/81

LOG OF TEST BORING NO. C-33

RIG TYPE: CME-55

BORING TYPE: 6 1/2 HSA

SURFACE ELEV.:

DATUM:

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0		18"	X	u	4-9-12-17-29			SP	DRY TO S. MOIST	SAND W/ TRACE CLAY/SILT PREDF FINE TO V. FINE NP PURPLISH
		20"	X	u	24-19-24-32-28					
5		20"	X	u	4-8-9-10-10					Note: Color changes Changing (mottled) MOSTLY GREYISH
		24"	X	u	8-8-7-9-11					
10		21"	X	u	9-7-9-10-13					
		24"	X	u	7-8-8-10-10					
15		20"	X	u	4-5-7-7-11					
		21"	X	u	5-6-6-6-7					
20		20"	X	u	3-7-8-9-11					
		15"	X	u	9-10-12-16-17					
25		20"	X	u	9-10-10-13-14					
		20"	X	u	9-9-9-15-20				NOTE: PART SATURATED	
30		28"	X	u	6-7-10-11-16			MC	SATURATED	SILT NP PURPLE TAILINGS
			X	u	21-8-45-50/5				V. MOIST	SUBBASE Gravelly Sand Med coarse Rounded NP Blackish NOTE: SHALE NO ACTION 1"
35										Auger Refusal @ 35' Sampler Refusal @ 34'5" CAVED TO 27.6'

GROUND WATER

DEPTH	HOUR	DATE

SAMPLE TYPE

A – Auger cuttings. B – Block sample
S – 2" O.D. 1.38" I.D. tube sample.
U – 3" O.D. 2.42" I.D. tube sample.
T – 3" O.D. thin-walled Shelby tube.

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PROJECT

JOB NO. EE [illegible] DATE 7-16-91

LOG OF TEST BORING NO. B-3

RIG TYPE CME 75

BORING TYPE [illegible]

SURFACE ELEV.

DATUM

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0			U		7-4-10-10-7				SL. MOIST	SANDY CLAY (COVER)
			U		40-29-26-46-27				SL. MOIST	SILTY SAND FN. NP LITE GRAY TO PURPLE
5		20'	U		16-15-16-16-16					TAILINGS
			U		7-7-4-12-16-17				MOIST	SUB-BASE SILTY SAND SOME CLAY & GRV. LO. PL. TO NP BRN.
10			U		1-1-15-8-5-12-11					
15										STOPPED AUG @ 16' " SAMPLER @ 12½
20										
25										

GROUND WATER

DEPTH	HOUR	DATE
	[illegible]	

SAMPLE TYPE

A - Auger cuttings. B - Block sample

S - 2" O.D. 1.38" I.D. tube sample.

U - 3" O.D. 2.42" I.D. tube sample.

SERGENT, HAUSKINS & BECKWITH

CONSULTING GEOTECHNICAL ENGINEERS

PROJECT GRAND JUNCTION TANK 53

JOB NO. [illegible] DATE 7/16/71

LOG OF TEST BORING NO. [illegible]

RIG TYPE [illegible]

BORING TYPE [illegible]

SURFACE ELEV.

DATUM

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free-fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	Remarks	Visual Classification
0		20"	X	U	4-4-5-11-14			SP	Dry to S[illegible]	SAND w/ Trace Clay/SILT Fnd FINE NP [illegible] GREYISH [illegible] 5" [illegible]
5		19"	X	U	8-10-12-14-16					
		17"	X	U	12-13-[illegible]-10-14					
		17"	X	U	5-5-9-7-8					
10		18"	X	U	4-5-4-7-9					
		17"	X	U	5-5-7-10-14					
15		16"	X	U	3-4-7-7-14					
		14"	X	U	9-10-12-16-21					Rock: Purple - [illegible] SOME SATURATED
20		15"	X	U	12-11-12-15-16					
		20"	X	U	11-11-19-23-22					SAND w/ SOME FINE [illegible] Fnd coarse Angular BLACK
25			X	U	11-18-12-34-25			SP	MOIST	
		0"	X	U	13-12-13-13-[50/5"]			NR		
30										

Stabel Height @ 25'
Refusal Service @ 29'11

GROUND WATER

DEPTH	HOUR	DATE

SAMPLE TYPE

A – Auger cuttings. B – Block sample
S – 2" O.D. 1.38" I.D. tube sample.
U – 3" O.D. 2.42" I.D. tube sample.
T – 3" O.D. thin-walled Shelby tube.

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PROJECT _____ LOG OF TEST BORING NO. [illegible]

JOB NO. [illegible] DATE [illegible]

RIG TYPE TMC 75

BORING TYPE [illegible]

SURFACE ELEV. _____

DATUM _____

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot: 140 lb. 30" free fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content: Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0		19"	X	4	3-5-6-13-27			CL	SL. MOIST	SANDY CLAY (CORE) LO. PI. BRN.
								SM	MOIST	
		22"	X	4	30-27-24-20					SANDY SILT FM NP PURPLE
5		0"	X	4	23-11-15-27-39			NR		
		18"	X	4	48-46-(50) 5½"					
10		19"	X	4	39-37-30-26-23					
		20"	X	4	18-12-12-16-15					
15		22"	X	4	11-11-9-12-14					NOTE: CONS. LENSES OF SATURATED SILT SLIMES FROM 16½'
		20"	X	4	8-7-8-7-13					
20		20"	X	4	24-18-19-17-(50) 2"					TAILINGS
		0"	X	4	(50) 7½"			N/R	V-MOIST	SUB-BASE SILTY SAND SOME CLAY & GRV NP TO LO. PI BRN
25			X	5	30-(50) 2"					NOTE: SOME COBBS FROM 22½'
										STOPPED AUG @ 25' SAMPLER REFUSED @ 25'

GROUND WATER

DEPTH	HOUR	DATE

SAMPLE TYPE

A – Auger cuttings. B – Block sample
S – 2" O.D. 1.38" I.D. tube sample.
U – 3" O.D. 2.47" I.D. tube sample.
T – 3" O.D. thin - walled Shelby tube.

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PROJECT [illegible]

JOB NO. [illegible] DATE [illegible]

LOG OF TEST BORING NO. B-37

RIG TYPE [illegible]

BORING TYPE [illegible]

SURFACE ELEV. [illegible]

DATUM [illegible]

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Percent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0		19"		S	5-7-9-17-16			SP	Dry to S. moist	SAND w/ little clay, PREDOM fine NP
		20"		U	8-8-10-11-9				Note: layers of [illegible]	Grey & Purple
5		19"		U	6-9-9-9					Colorimatick, Always Changing
		18"		U	9-8-9-10-N					
10		20"		U	9-10-1-13-24				moist spots	Note: 2" of sandy clay could
		18"		U	15-20-31-23-22					
15		19"		U	4-7-8-9-14					
		20"		U	7-8-9-11-13					
20		21"		U	10-10-11-17-14					
		25"		U	9-10-13-17-18				Note: moist - lenses of silt	
25		20"		U	8-8-10-12-15				Note: saturated, [illegible]	
		2"		U	8-6-5-8-9					CLAY med-H, PI organics BLACK TRACE ROUNDED GRAVEL
30		19"		U	10-4-4-4				V. moist	
				U	48-[50/4]			CH		
35				U	[50/1] NR					
										Stopped Boring @ 35' Refusal Sampler @ 35'1" CAVED TO 29.7'

GROUND WATER

DEPTH	HOUR	DATE

SAMPLE TYPE

A – Auger cuttings. B – Block sample
S – 2" O.D. 1.38" I.D. tube sample.
U – 3" O.D. 2.42" I.D. tube sample.

SERGENT, HAUSKINS & BECKWITH

CONSULTING GEOTECHNICAL ENGINEERS

PROJECT _____ LOG OF TEST BORING NO. B-3

JOB NO. [illegible] DATE 7-15-[illegible]

RIG TYPE CME 75

BORING TYPE [illegible]

SURFACE ELEV. _____

DATUM _____

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0				U	6-7-10-11-17				MOIST	SAND, COAR (LOOSE)
				U	10-12-7-9-30				MOIST	SAND/SILT FM. M.P. PURPLE
		20"								
5				U	13-11-11-12-11					
		20"								
				U	2-12-12-12-30					
		25"								
10				U	7-10-16-21-25					
		20"								
				U	21-21-22-22-29					
		20"								
15				U	11-11-10-16-16					
		20"								
				Q	12 9-4-7-14					NOTE: COAS. SCIME LENSE THAT ARE SATURATED FROM 17' (PRUPURPLE)
		20"								
				U	6 9-15-40-40					TAILINGS
		20"								
		3"		U	(50) 3"				V-MOIST	CUE BASE
25				S	17-30-50(4")					SILTY SAND SOME GRV. FM. MP BRN
										NOTE: SOME 3C COAS MED. COBBS FOR 22½'
										AUG. REFUSED @ 24'
										SAMPLER REFUSED @ 25'-6

GROUND WATER

DEPTH	HOUR	DATE
24'	9:15	7-15-[illegible]

SAMPLE TYPE

A – Auger cuttings. B – Block sample
S – 2" O.D. 1.5" I.D. tube sample.
U – 3" O.D. 2.47" I.D. tube sample.

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PROJECT [illegible]

JOB NO. [illegible] DATE [illegible]

LOG OF TEST BORING NO. B-39

RIG TYPE [illegible]

BORING TYPE [illegible]

SURFACE ELEV. [illegible]

DATUM [illegible]

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
		18"	X	U	5-7-13-20-21			SP	DRY TO S. MOIST	NOTE: 3' SAND + CLAY COVER SAND W/ TRACE CLAY/SILT FINE GRAINED PINK GREY/BROWN PUFF [illegible]
5		17"	X	U	15-16-16-18-23					
		20"	X	U	7-10-10-12-17					
		19"	X	U	13-17-17-14-17					
10		19"	X	U	5-7-13-18-20					
		22"	X	U	11-11-13-13-15					
15		18"	X	U	10-6-11-23-35					
		20"	X	U	21-24-27-22-27					
		18"	X	U	6-8-10-11-18					
		20"	X	U	11-11-10-15-18					
25		20"	X	U	12-14-12-16-17				NOTE: MOIST TO SATURATED	PURPLE
		0"	X	U	6-6-8-10-11				NO RECOVERY	
30		20"	X	U	5-3-5-[illegible]			CH	V. MOIST TO SATURATED	CLAY W/ ORGANICS MED-HIPI BLACK LAYER OF COARSE SAND NP BLACK
		19"	X	U	4-4-3-5-4			SP		SAND MED COARSE NP BLACK
35										STOPPED AUGER @ 32½' " SAMPLER @ 35' CAVED TO 26.4'

GROUND WATER

DEPTH	HOUR	DATE
33.0'	10:20	7/15/71

SAMPLE TYPE

A – Auger cuttings. B – Block sample
S – 2" O.D. 1.38" I.D. tube sample.
U – 3" O.D. 2.42" I.D. tube sample.

SERGENT, HAUSKINS & BECKWITH

CONSULTING GEOTECHNICAL ENGINEERS

PROJECT _____ LOG OF TEST BORING NO. B-4

JOB NO. [illegible] DATE 7-15-[illegible]

RIG TYPE CME 75

BOR NO TYPE [illegible]

SURFACE ELEV. _____

DATUM _____

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0		20"		U	3-7-7-5-12				SLIMEIST	SANDY CLAY (CONCL)
		20"		U	10-20-12-17-17				V-MOIST	SILT SOME SAND NP PURPLE
5		20"		U	7-14-15-17-[illegible]					
		20"		U	14-15-15-22-23					NOTE: CONCENTRATION OF SAT SLIM FROM 8'
10		20"			5-7-5-20					
		20"		U	12-11-7-16-17					
15		20"		U	11-14-17-24-21					
		16"		U	14-14-14-15-16			SP	MOIST	SILTY SAND FN. NP.
20		20"		U	12-15-14-20-20					
		19"		U	15-15-20-15-19				MOIST TO V-MOIST	LITE YELLOW ISH BRN.
25		12"		U	16-8-11-9-9				NOTE: SAT. @ 27'	SANDY SILT OCC LENS. OF SLIME NP PURPLE
		0"		U	10-7-5-6-7			N/R		TAILINGS
30		0"		U	4-75 (50/4")					SUB BASE
		20"		U	4-4-4-6-5					CLAY HI PL. BLACK
										SAND MED. NP. BLACK
										STOPPED AUG @ 32' " SAMPLER @ 34

GROUND WATER

DEPTH	HOUR	DATE
7		

SAMPLE TYPE

A - Auger cuttings. B - Block sample
S - 2" O.D. 1.38" I.D. tube sample.
U - 3" O.D. 2.47" I.D. tube sample.

SERGENT, HAUSKINS & BECKWITH

CONSULTING GEOTECHNICAL ENGINEERS
DENVER • ALBUQUERQUE • SANTA FE

PROJECT Grand Junction Tailings

JOB NO. 63-0 DATE 7/26/81

LOG OF TEST BORING NO. B-4

RIG TYPE CME-55

BORING TYPE 6" HSA

SURFACE ELEV.

DATUM

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot (140 lb., 30" fall, fall drop hammer)	Dry Density lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0		28"		T				SP	DRY to S.MOIST	Note: 4" of Sandy Clay con SAND w/ Trace clay/silt Pred fine NP Purple & grey (Always changing) NOTE: lenses of purple silt w/ trace sand
		7"		T				ML		
5		28"		T					S.MOIST TO MOIST	
		27"		T						
10		14"		T				ML SP		SILT W/ TRACE SAND lenses of silty Sand (interchanging) Pred. Fine NP Purple (DARK & light)
		28"		T					SATURATED	
15		14"		T					MOIST	
		6"		T	(18")				Note: TRACE OF SILTY LENSES	
20		9"		T						SILT W/ SOME SAND SLIMES NP BRIGHT PURPLE
		7"		T	(8")				Note: more silt, slimes	
25		21"		U	48 8 8 15			SP	S.MOIST TO MOIST	SILTY SAND W/ SOME SANDY SILT LENSES PRED FINE NP PURPLE TAILINGS
				U	47 [50/5]					
30										SUBBASE SAND W/ TRACE CLAY PRED FINE NP BROWN NOTE: TRACE Pr...
										STOPPED Temp. @ 25' Perforated Temp. @ 28'5" CAVED TO 19'

GROUND WATER

DEPTH	HOUR	DATE

SAMPLE TYPE

A – Auger cuttings. B – Block sample

S – 2" O.D. 1.38" I.D. tube sample.

U – 3" O.D. 2.47" I.D. tube sample.

SERGENT, HAUSKINS & BECKWITH

CONSULTING GEOTECHNICAL ENGINEERS

PROJECT [illegible]

JOB NO. [illegible] DATE [illegible]

LOG OF TEST BORING NO. [illegible]

RIG TYPE [illegible]

BORING TYPE [illegible]

SURFACE ELEV. [illegible]

DATUM [illegible]

Depth in Ft.	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free fall drop hammer	Dry Density Lb. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0					[illegible]			ML	Moist	Sandy Silt [illegible] clay [illegible] medium [illegible]
				U	[illegible]					
5				U	[illegible]					
				U	1-2-2-7-11					Note: [illegible]
				U	17-17-[illegible]-17-13					
10										
		20"		U	[illegible]					
		21"		U	16-3 3 3-4					
15										
		20"		U	8-11-29-30-29					
		22"		U	30-30 [illegible] 15½"					
20										
		NR		U	12-12-[illegible]					
		[illegible]"		U	12-12-[illegible]				talc substance	
25								SP		Sand, trace silt, [illegible] well, [illegible]
				U	10-15-16-[illegible]					
					[illegible]					
30										
35										Standard [illegible] 27½' Sampler [illegible] 27' 9"
40										

GROUND WATER

DEPTH	HOUR	DATE
[illegible]		

SAMPLE TYPE

A – Auger cuttings. B – Block sample
S – 2" O.D. 1.38" I.D. tube sample.
U – 3" O.D. 2.42" I.D. tube sample.

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PROJECT GRAND JUNCTION TAILINGS

JOB NO. 43-0 DATE 7/21/81

LOG OF TEST BORING NO. B-4

RIG TYPE CME 75

BORING TYPE 6½ HSA

SURFACE ELEV.

DATUM

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0		10"	☒						DRY TO S. MOIST	SAND & GRAVEL & COBBLES W/ TRACE CLAY/SILT PREO FACE ROUNDED NP BROWN
					(31-50/5)			SP		
					NOT TAKEN (COBBLES)					
5										
										STOPPED Auger @ 5'
10									MOVED HOLE -	
									COBBLES @	
15									EDGE OF PILE	
20										
25										

GROUND WATER

DEPTH	HOUR	DATE

SAMPLE TYPE

A – Auger cuttings. B – Block sample

S – 2" O.D. 1.38" I.D. tube sample.

SERGENT, HAUCKINS & BECKWITH

PROJECT [illegible] LOG OF TEST BORING NO. [illegible]

JOB NO. [illegible] DATE 7/21/51

R.G. TYPE [illegible]

BORING TYPE [illegible]

SURFACE ELEV.

DATUM

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0		26"	X	U	16-27-24-24-21			SP	DRY TO S. MOIST	SAND W/TRACE CLAY/SILT PRED FINE NP PURPLISH GREY NOTE: 5" OF SANDY CLAY COVER
		19"	X	U	14-10-17-[50/3]					
5		20"	X	U	19-40-36-29-28			SP	S. MOIST	SAND W/SOME ROUNDED GRAVEL PRED FINE NP BROWN
		12"	X	U	22-21-22-17-15					
10		24"	X	U	15-13-13-13-16					
		20"	X	U	11-9-9-11-15			SP	S. MOIST TO MOIST	SAND W/TRACE CLAY/SILT PRED FINE NP LENSES OF MOIST SILT PURPLE TAILINGS
15		24"	X	U	5-5-6-8-9				Note: [illegible] lenses [illegible] sand [illegible] silt	
		19"	X	U	10-12-15-19-20					
20		20"	X	U	13-21-20-17-17					
		?	X	U	16-16-17-17-18				S. MOIST	SAND PRED. FINE NP BROWN SUBBASE
25		16"	X	U	6-7-[illegible]			SW	Note: GRAVELLY SAND - MOIST TO V. MOIST TO SATURATED	
		8"	X	U	[illegible]-[illegible]/5.4					
		8"	X	U	[illegible]/3				PLUG	

STOPPED HOLE @ 25'

Retrieved Sampler @ 29.5'

GROUND WATER

DEPTH	HOUR	DATE
29.0	9:55	7/21/51

SAMPLE TYPE

A - Auger cuttings. B - Block sample

S - 3" O.D. 1.38" I.D. tube sample.

U - 3" O.D. 2.42" I.D. tube sample.

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PROJECT [illegible]

JOB NO. [illegible] DATE [illegible]

LOG OF TEST BORING NO. [illegible]

RIG TYPE [illegible]

BORING TYPE [illegible]

SURFACE ELEV. [illegible]

DATUM [illegible]

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free-fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0		18"	X	U	[illegible]			ML	dry to sl. moist	Silt some clay trace sand weakly cemented loosened PE yellowish-brown
		NR		U	50/0"					
5		NR	X	U	[illegible]			SF		
		8"	X	U	3-5-4 1-5					
10		23"	X	U	5-U-6-9-8				dry sl. moist	Sand NP medium Hidden
		20"	X	U	[illegible]					
15		17"	X	U	[illegible]			CL	dry to sl. moist	Clay hi PI purple-black
		19"	X	U	[illegible]					
20		3"		U	50/2"			SP	saturated	Sand trace silt poorly graded NP dark gray-brown
				U	50/0"					
25										
30										

Note: cobbles @ 23'

Stopped auger @ 25'
Sampler refused @ 22'6"

Piezometer placed to 22'6" due to caving cobbles
5' of drilled perforations
4 rows —
hole caved to 13'

GROUND WATER

DEPTH	HOUR	DATE
[illegible]	[illegible]	[illegible]

SAMPLE TYPE

A – Auger cuttings. B – Block sample
S – 2" O.D. 1.38" I.D. tube sample.
U – 3" O.D. 2.42" I.D. tube sample.

SERGENT, HAUSKINS & BECKWITH

CONSULTING GEOTECHNICAL ENGINEERS

PROJECT [illegible] JUNCTION TAILINGS

JOB NO. [illegible] DATE 7.21.91

LOG OF TEST BORING NO. B-45

RIG TYPE [illegible]

BORING TYPE [illegible]

SURFACE ELEV.

DATUM

Depth in Ft.	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot (140 lb. 30" free fall drop hammer)	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0		22"		u	12-21-21-28-31			SP	DRY TO S. MOIST	SAND w/ TRACE CLAY/SILT MED FINE TRACE WOOD. NP GRAVEL GREYISH TO BROWN (COVER MATERIAL) NOTE: LIGHT TAN
		0"		u	19-19-25-29-23				NO RECOVERY	
5		8"		u	26-17-15-12-10					
		20"		u	14-10-10-10-15					
10		21"		u	3-5-9-11-11					
		22"		u	14-20-21-22-26					
15		20"		u	9-17-19-11-15				Note: PURPLE, V. FINE (LENS)	
		18"		u	12-14-14-15-14					
20		10"		u	5-6-5-6-6					
		20"		u	5-5-5-9-[50/5]				V. MOIST	TAILINGS
		0"		u	[50/3] N.R.			CH SP	V. MOIST	CLAY HI PI BLACK SUBBASE
		3"		S	[50/4½]			CH	MOIST TO V. MOIST	
30		3"		S	[50/5½]				SATURATED BLACK	SAND FINE. FINE BLACK
										SANDY GRAVEL ANGULAR NP BLACK
										REFUSED AUGER @ 29' REFUSED SAMPLER @ 30' 5½" CAVED TO 13.1'

GROUND WATER

DEPTH	HOUR	DATE
[illegible]	11:49	7/21/91

SAMPLE TYPE

A - Auger cuttings. B - Block sample
S - 2" O.D. 1.5" I.D. tube sample.
[illegible] tube sample.

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CONSULTING GEOTECHNICAL ENGINEERS

PROJECT [illegible]

JOB NO [illegible] DATE 7/21/81 - 7/22/81

LOG OF TEST BORING NO. A4

RIG TYPE [illegible]

BORING TYPE [illegible]

SURFACE ELEV.

DATUM

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0		20"	A	U	[illegible]				[illegible]	Silty sand [illegible] NP [illegible]
		4"		U	[illegible]					
5		20"		U	[illegible]					Sand [illegible] NP [illegible]
		17"		U	[illegible]				moist	
10 15		20" Sal		U	[illegible]					Note: clay [illegible] 12'
		18"		U	[illegible]					Note saturated [illegible] 13'
15		18		U	7-8-8-8-7				[illegible] saturated	Clay some sand hi PI brown - black
		18		U	7-9-7-8-8					
20		18		U	5-3-4-8-6					
		NR		U	50/1"				Saturated	Sand [illegible] clay lo PI brown
25										Note: [illegible] 23'
30										Auger refusal [illegible] = 4' Sampler refusal @ 22'

GROUND WATER

DEPTH	HOUR	DATE
20'	7:30P	7/22/81

SAMPLE TYPE

A – Auger cuttings. B – Block sample
S – 2" O.D. 1.38" I.D. tube sample.
U – 3" O.D. 2.42" I.D. tube sample.

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PROJECT Grand Junction TAILINGS

JOB NO. 63-0 DATE 7/21/81

LOG OF TEST BORING NO. 2-47

RIG TYPE CME-55

BORING TYPE

SURFACE ELEV.

DATUM

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0		20"	X	U	3-9-8-6-7			SP	DRY TO S. MOIST	SAND W/TRACE CLAY/SILT PREDOMINANT NP PURPLE & GREY
		22"	X	U	8-8-6-7-7					
5		20"	X	U	10-6-5-5-7				Note: some impk silt	(SOME LITE GOLDEN BROWN
		22"	X	U	6-8-8-10-11					
10		19"	X	U	6-6-8-10-11					
		21"	X	U	8-8-8-12-16					
15		20"	X	U	6-9-12-15-12					TAILINGS SUBBASE
		19"	X	U	21-31-20-15-17			SP	MOIST	SAND W/ SOME CLAY
20		5"	X	U	6-[50/5]				NOTE: ANG. GRAVEL	PREDOM FINE NP TO LO PI BROWN & BLACK
		5"	X	U	40-[50/3]				NOTE: ROUNDED GRAVEL	
25										STOPPED AUGER @ 22½' Refused Sample @ 23'2"

GROUND WATER

DEPTH	HOUR	DATE
21.0'	1:25	7/21/81

SAMPLE TYPE

A – Auger cuttings. B – Block sample
S – 2" O.D. 1.38" I.D. tube sample.
U – 3" O.D. 2.42" I.D. tube sample.
T – 3" O.D. thin-walled Shelby tube.

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PROJECT [illegible]

JOB NO. [illegible] DATE [illegible]

LOG OF TEST BORING NO. A4

RIG TYPE [illegible]

BORING TYPE [illegible]

SURFACE ELEV. [illegible]

DATUM [illegible]

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free-fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0								SP	[illegible]	Sand [illegible]
		18"	X	U	6-13-3[illegible]-22-18					[illegible]
		20"	X	U	27-16-[illegible]-28-50					[illegible]
5		22"	X	U	[illegible]					[illegible]
		18"	X	U	7-5-4-5-5					
10		18"	X	U	5-6-5-5-6					
		20"	X	U	[illegible]-13-10-1[illegible]					
15		20" 1.5	X	U	[illegible]			CL	[illegible]	Clay [illegible] low PI brown
		NK		U	50/[illegible]			SP	[illegible]	Cobbles [illegible] NP Gel
25										
30										Auger refusal @ [illegible]

GROUND WATER

DEPTH	HOUR	DATE
[illegible]	[illegible]	[illegible]

SAMPLE TYPE

A – Auger cuttings. B – Block sample

S – 2" O.D. 1.38" I.D. tube sample.

U – 3" O.D. 2.42" I.D. tube sample.

SERGENT, HAUSKINS & BECKWITH

CONSULTING GEOTECHNICAL ENGINEERS

PROJECT GRAND JUNCTION TAILINGS

JOB NO. 63-0 DATE 7/21/81

LOG OF TEST BORING NO. B-40

RIG TYPE CME-55

BORING TYPE 6½ HSA

SURFACE ELEV.

DATUM

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0		20"	X	U	7-17-22-27-42			SP	DRY TO S. MOIST	SAND W/ TRACE CLAY/SILT PRED FINE NP PURPLISH to LITE REDDISH BROWN
		20"	X	U	28-27-28-30-31					
5		14"	X	U	30-25-25-30-27					
		20"	X	U	4-11-12-11-15				Note: 4" lens of Bright Purple Sand	
10		19"	X	U	10-9-9-12-11					
		21"	X	U	7-7-7-11-14					
15		14"	X	U	8-8-8-10-13				Note: BRIGHT PURPLE SAND SEAMS (SATURATED)	TAILINGS
		6"	X	U	23-[5/4]			SP	MOIST	SUBBASE SAND W/ SOME CLAY PRED FINE NP BROWN - BLACK
20		8"	X	S	22-43-[50/3"]			GP	SATURATED	
		8"	X	S	43-29-31				Plug	SANDY GRAVEL SA to Rounded Pred Fine NP BROWN
25										Stopped Auger @ 22½' " Sampler @ 24'

GROUND WATER

DEPTH	HOUR	DATE
21.9'	3:22	7/21/81

SAMPLE TYPE

A – Auger cuttings. B – Block sample
S – 2" O.D. 1.38" I.D. tube sample.
U – 3" O.D. 2.42" I.D. tube sample.
T – 3" O.D. thin-walled Shelby tube.

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PROJECT [illegible]

JOB NO. [illegible] DATE [illegible]

LOG OF TEST BORING NO. [illegible]

RIG TYPE [illegible]

BORING TYPE [illegible]

SURFACE ELEV. [illegible]

DATUM [illegible]

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free-fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0								SP	[illegible]	Sand [illegible] NP
		18"	X	U	[illegible]					
		15"	X	U	[illegible]					
5		20"	X	U	[illegible]					[illegible] yellow
		20"	X	U	14-12-13-13-11					
15		18"	X	U	1-9-6-6-1					
		20"	X	U	10-7-10-8-12					Note: [illegible] clay lenses present @ 16
15		14"	X	U	1-10-50/2"				dry [illegible]	
		NR		U	50/6"			GP	dry [illegible]	Cobbles [illegible] NP
										Auger refusal @ 8' Sample refusal @ 17'

GROUND WATER

DEPTH	HOUR	DATE
[illegible]		

SAMPLE TYPE

A – Auger cuttings. B – Block sample
S – 2" O.D. 1.38" I.D. tube sample.
U – 3" O.D. 2.42" I.D. tube sample.
T – 3" O.D. thin-walled Shelby tube.

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PROJECT GRAND JUNCTION TAILINGS

JOB NO. 63-0 DATE 7/21/81

LOG OF TEST BORING NO. B-5

RIG TYPE CME-55

BORING TYPE 6½ HSA

SURFACE ELEV.

DATUM

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot, 140 lb. 30" free fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0		21"		U	4-9-13-14-21			SP	DRY TO S. MOIST	SAND W/ TRACE CLAY/SILT PREDF FINE NP Lite GOLDEN BROWN & PURPLE
		20"		U	17-14-16-22-24					
5		23"		U	9-13-23-9-18				NOTE: SOME PURPLE SLIME SATURATED	
		24"		U	28-25-25-26-28					
10		0"		U	23-21-24-22-16		W.R.		Note: LENSES OF SANDY SILT	
		20"		U	7-6-7-8-10					
15		14"		U	4-4-4-4-4				MOIST TO V. MOIST	TAILINGS
		0"		U	6-8-8-7-8		W.R.	CP/ML	V. MOIST TO SATURATED	SUBBASE SANDY GRAVEL S.A TO Rounded NP BROWN
20				U	5-6-22-20-[50/5½]				PLUG!	
		0"		U	[50/0]					
25										STOPPED AUGER @ 22½' Refusal Sample @ 22½'

GROUND WATER

DEPTH	HOUR	DATE
20.8'	4:44	7/21/81

SAMPLE TYPE

A – Auger cuttings. B – Block sample
S – 2" O.D. 1.38" I.D. tube sample.
U – 3" O.D. 2.42" I.D. tube sample.
T – 3" O.D. thin-walled Shelby tube.

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PROJECT [illegible]

JCE NO. [illegible] DATE [illegible]

LOG OF TEST BORING NO. A5

RIG TYPE [illegible]

BORING TYPE [illegible]

SURFACE ELEV. [illegible]

DATUM [illegible]

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free-fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0		18	X	U	[illegible]	15.7		ML	sl. moist	Silt some clay low [illegible] [illegible]
5		12"	X		11-30-50/4			SM	moist	Silty sand trace clay loose [illegible] brown [illegible]
										Auger refused @ 6' Sampler refused @ 6'

GROUND WATER

DEPTH	HOUR	DATE
None		

SAMPLE TYPE

A – Auger cuttings. B – Block sample

S – 2" O.D. 1.38" I.D. tube sample.

U – 3" O.D. 2.42" I.D. tube sample.

T – 3" O.D. thin-walled Shelby tube.

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PROJECT GRAND JUNCTION TAILINGS

JOB NO. 63-C DATE 7/21/81

LOG OF TEST BORING NO. B-5

RIG TYPE CME-55

BORING TYPE 6 3/4 HSA

SURFACE ELEV.

DATUM

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free-fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0		20"	X	U	15-15-22-41-[50/5]			SP	DRY TO S. MOIST	SAND W/ TRACE CLAY/SILT PRED FINE NP PURPLE & COLPIN BROWN
		22"	X	U	17-27-39-47-46					
5		20"	X	U	10-10-15-14-16				Note: interchanging layers of purple sand & SYA. (MOSTLY SAND)	
		20"	X	U	17-17-24-24-21					
10	7/21 7/22	24"	X	U	7-7-8-13-14					TAILINGS SUBGRADE
		22"	X	U	16-17-11-12-12			SP	MOIST	SAND W/ SOME CLAY & TRACE FINE GRAVEL PRED FINE NP BROWN & BLACK
15		19"	X	U	10-11-12-10-10					
		11"	X	U	22-[50/5½]				PLUG	Note: large gravel S. Angular in BOTTOM 4"
20										STOPPED AUGER @ 15' REFUSED SAMPLE @ 18' 5½"

GROUND WATER

DEPTH	HOUR	DATE
18'3"	7:45	7/22/81

SAMPLE TYPE

A – Auger cuttings. B – Block sample
S – 2" O.D. 1.38" I.D. tube sample.
U – 3" O.D. 2.42" I.D. tube sample.
T – 3" O.D. thin-walled Shelby tube.

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PROJECT [illegible]

JOB NO. [illegible] DATE [illegible]

LOG OF TEST BORING NO. A5

RIG TYPE [illegible]

BORING TYPE [illegible]

SURFACE ELEV. [illegible]

DATUM [illegible]

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free-fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0			X	U	[illegible]			ML	Dry	Silt [illegible]
		20	X	U	[illegible]					
			X							
		23	X	U	[illegible]					
5			X							
		20	X	U	[illegible]					
10										Sample [illegible]
15										

GROUND WATER

DEPTH	HOUR	DATE
None		

SAMPLE TYPE

A – Auger cuttings. B – Block sample
S – 2" O.D. 1.38" I.D. tube sample.
U – 3" O.D. 2.42" I.D. tube sample.
T – 3" O.D. thin-walled Shelby tube.

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PROJECT Grand Junction Tailings

JOB NO. [illegible] DATE [illegible]

LOG OF TEST BORING NO. A-55

RIG TYPE [illegible]

BORING TYPE [illegible]

SURFACE ELEV.

DATUM

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free-fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0		20"		U	15-12-18-23			SP	DRY TO S. MOIST	SAND w/ SOME [illegible] 4" lens of clay [illegible] FINE NP TO LOW PI BROWN & GREYISH w/ Purple TAILINGS
		19"		U	26-26-30-27-25					
5		18"		U	7-10-15-30 [50/5]					
		20"			17-10-13-11-12			SP	S. MOIST TO MOIST	[illegible]
10		18"		U	15-30-20-15-10					CEMENTED SANDSTONE [illegible] FINE ? w/ SOME CLAY NP [illegible] lens of white SILT & MED PI BROWN CLAY (6")
15										STOPPED Auger @ 10' 1" Sampler @ 12½'

GROUND WATER

DEPTH	HOUR	DATE

SAMPLE TYPE

A – Auger cuttings. B – Block sample
S – 2" O.D. 1.38" I.D. tube sample.
U – 3" O.D. 2.42" I.D. tube sample.
T – 3" O.D. thin-walled Shelby tube.

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PROJECT [illegible] Tailings

JOB NO. [illegible] DATE [illegible]

LOG OF TEST BORING NO. B-5

RIG TYPE [illegible]

BORING TYPE [illegible]

SURFACE ELEV.

DATUM

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free-fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0		20"	X	U	5-8-10-11-10-8			SP	[illegible] S. [illegible]	SAND w/ TRACE CLAY/SILT FINE FINE NP TRANSLUCENT PURPLE
		22"	X	U	4-6-8-12-13				NOTE: PURPLE	
5		20"	X	U	4-7-8-9-14				NOTE: [illegible]	
		25"	X	U	13-15-21-19-18				NOTE: [illegible]	
10		30"	X	U	11-14-18-19-16				COLOR CHANGING - PURPLE > TAN	
		24"	X	U	11-11-15-24-22					
15		16"	X	S	5-14-21			SC	[illegible]	TAILINGS SUBGRADE GRAVELLY SAND FINE FINE ANGULAR to S. [illegible] NP BROWN
		14"	X	S	34-35-[50/12]					
20		6"	X	S	41-[50/4]				VARIED	
		7"	X	S	47-[50/4]				PLUG	SANDY GRAVEL S.A to Rounded NP BROWN
25										

PERMED [illegible] @ 25'4"

[illegible] @ 22½'

GROUND WATER

DEPTH	HOUR	DATE

SAMPLE TYPE

A – Auger cuttings. B – Block sample

S – 2" O.D. 1.38" I.D. tube sample.

U – 3" O.D. 2.42" I.D. tube sample.

T – 3" O.D. thin-walled Shelby tube.

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PROJECT Grand Junction Tailings

JOB NO. [illegible] DATE 7/22/81

LOG OF TEST BORING NO. A-5

RIG TYPE [illegible]

BORING TYPE [illegible]

SURFACE ELEV.

DATUM

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free-fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0		18"		U	3-13-14-21-49			CL	DRY TO S.M. DIST	SANDY CLAY MED PL BROWN SOME LENSES OF SAND
		10"		U	36-38-16-35-30				Note TRACE OF TAILINGS	COVER TAILINGS
5		20"		U	5-8-10-11-10			SI	S.M. DIST	SAND W/ TRACE CLAY/SILT MED FINE NP Note TAN
		22"		U	5-5-6-7-8					
10		24"		U	3-4-7-21-30					
		18"		U	74-74-22-15-12					
15		17"		U	2-2-2-4-5			CL	MOIST TO V. MOIST TO SATURATED	TAILINGS SOIL CLAY MED PL OFF WHITE, THIN BLACK
		14"		U	26-22-21-28-[50/5]					
20		3"		U	[50/3]					SANDY GRAVEL FRAGMENTS TO ROUNDED MED BLACK
	5'									

REWORK SAMPLE 20'3"
" Auger @ 22½'

GROUND WATER

DEPTH	HOUR	DATE
16.4'	9:30	7/22/81

SAMPLE TYPE

A – Auger cuttings. B – Block sample
S – 2" O.D. 1.38" I.D. tube sample.
U – 3" O.D. 2.42" I.D. tube sample.
T – 3" O.D. thin-walled Shelby tube.

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PROJECT [illegible]

JOB NO. [illegible] DATE 7/[illegible]/[illegible]

LOG OF TEST BORING NO. A[illegible]

RIG TYPE [illegible]

BORING TYPE [illegible]

SURFACE ELEV. _____

DATUM _____

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0		18"	X	U	15-21-41-[50/4]			SP	DRY DRY TO S. MOIST REAL IRONSTONE CLAY	SANDY CLAY COVER SAND W/ TRACE CLAY/SILT PALE FAWN NP FUSIFIL & TAN (LIGHT, BROWN
		20"	X	U	8-14-15-22-25					
5		19"	X	U	6-9-13-13-12					
		24"	X	U	7-7-8-13-17					
10		20"	X	U	13-10-8-11-9					
		20"	X	U	8-7-6-7-9			SP	MOIST NOTE: NO GRAVELY, MORE CLAY-CLAYEY SAND DRY	TAILINGS GRAVELLY SAND [illegible] PALE COARSE ANGULAR TO S. ANGULAR NP [illegible] TO BROWN SOME ORGANICS
15		2"	X	U	6-6-5-5-5					
		30"	X	U	4-6-10-25-[50/5½]				DRY	
20										STOPPED AUGER REMOVED SAMPLE [illegible]

GROUND WATER

DEPTH	HOUR	DATE
15.9'	12 22	7/21/51

SAMPLE TYPE

A – Auger cuttings. B – Block sample
S – 2" O.D. 1.38" I.D. tube sample.
U – 3" O.D. 2.42" I.D. tube sample.
T – 3" O.D. thin-walled Shelby tube.

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PROJECT [illegible]

JOB NO. [illegible] DATE 7/22/81

LOG OF TEST BORING NO. A-59

RIG TYPE [illegible]

BORING TYPE [illegible]

SURFACE ELEV.

DATUM

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free-fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0		30"	X					SP	[illegible]	SAND W/TRACE CLAY/SILT PRED FINE NP ▲ [illegible]
		3"	X	T (6")				CL	[illegible]	
		16"	X	U	37-32-30-27			SP		
5		20"	X	U	6-12-17-15-16				[illegible]	SANDY CLAY LO-MED PI [illegible] NOTE: SOME GRAVEL
		20"	X	U	10-11-10-11-9					
10		20"	X	U	6-9-6-7-9					
		20"	X	U	5-[illegible]-5-8-10					SAND W/TRACE CLAY/SILT PRED FINE NP COLOR BROWN - LIGHT TAN TRACES SILTSTONE
15		19"	X	U	5-12-29-28-33			SP	[illegible]	
		2"	X	U	20-22-50/3					SAND W/SOME CLAY CLAY CONTENT VARIES PREV TYPES TO SANDY CLAY LENSES PRED FINE NP TO LO PI - MED PI BROWN & BEIGE
20		0"	X	U	8-8-5-5-5			NR	PLUG	
25										STOPPED AT 20' STOPPED SAMPLING AT 22'

GROUND WATER

DEPTH	HOUR	DATE
17.0'	2:00	7/22/81

SAMPLE TYPE

A – Auger cuttings. B – Block sample
S – 2" O.D. 1.38" I.D. tube sample.
U – 3" O.D. 2.42" I.D. tube sample.
T – 3" O.D. thin-walled Shelby tube.

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PROJECT [illegible]

JOB NO. [illegible] DATE [illegible]

LOG OF TEST BORING NO. A6

RIG TYPE [illegible]

BORING TYPE [illegible]

SURFACE ELEV. [illegible]

DATUM [illegible]

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free-fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0		20"	X	U	11-10-13-11-11			ML	[illegible]	[illegible]
		4"			[illegible]					
5										[illegible]
10										[illegible]

GROUND WATER

DEPTH	HOUR	DATE

SAMPLE TYPE

A – Auger cuttings. B – Block sample

S – 2" O.D. 1.38" I.D. tube sample.

U – 3" O.D. 2.42" I.D. tube sample.

T – 3" O.D. thin-walled Shelby tube.

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PROJECT GRAND JUNCTION TRANSIT

JOB NO. [illegible] DATE 7/27/71

LOG OF TEST BORING NO. A6

RIG TYPE [illegible]

BORING TYPE [illegible]

SURFACE ELEV.

DATUM

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free-fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0		20"		U	8-8-14-32-40			SC	MOIST TO = MOIST	NOTE: 1' SOLID CLAYCLOTH SAND W/ TRACE CLAY/SILT MED FINE NP Purple & golden Tan
		19"		U	27-24-28-30-35				MOSTLY PURPLE	
5		18"		U	11-10-10-8-10				MOSTLY GOLDEN TAN	
		21"		U	5-6-7-9-10					
10		24"		U	11-11-11-10-8					
		20"		U	4-5-5-6-6			SC	MOIST TO V. MOIST	TRACE SUBGRADE CLAYEY SAND W/ SOME GRAVEL FINE ANGULAR TO SA. NP TO LO PI BROWN
15		0"		U	2-2-3-4-7 N.R.					
		30"		U	11-12-15-17-17				POROUS CLAY	
20										STANDARD AUGER @ 15' 1" Sample @ 20'
25										

GROUND WATER

DEPTH	HOUR	DATE

SAMPLE TYPE

A – Auger cuttings. B – Block sample
S – 2" O.D. 1.38" I.D. tube sample.
U – 3" O.D. 2.42" I.D. tube sample.
T – 3" O.D. thin-walled Shelby tube.

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PROJECT [illegible]

JOB NO. [illegible] DATE [illegible]

LOG OF TEST BORING NO. A6

RIG TYPE [illegible]

BORING TYPE [illegible]

SURFACE ELEV. [illegible]

DATUM [illegible]

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free-fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0			X	[illegible]				ML	[illegible]	Clayey [illegible] [illegible] [illegible] [illegible]
5										
10										No [illegible] [illegible]

Drilled [illegible] [illegible] [illegible] [illegible]

GROUND WATER

DEPTH	HOUR	DATE
[illegible]		

SAMPLE TYPE

A – Auger cuttings. B – Block sample
S – 2" O.D. 1.38" I.D. tube sample.
U – 3" O.D. 2.42" I.D. tube sample.
T – 3" O.D. thin-walled Shelby tube.

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PROJECT [illegible]

JOB NO. [illegible] DATE [illegible]

LOG OF TEST BORING NO. A-63

RIG TYPE [illegible]

BORING TYPE [illegible]

SURFACE ELEV.

DATUM

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free-fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0		26"	X	U	6-5-17-16-18			SP	DRY TO SLIGHTLY MOIST	SAND W/ TRACE CLAY/SILT FINE TO FINE NP TAN/GOLDEN BROWN
		21"	X	U	15-15-14-16-12					
5		23"	X	U	8-9-6-5-11					
		23"	X	U	6-7-12-12-19					
10		23"	X	U	18-11-12-21-22					
		28"	X	U	19-11-18-19-17					
15		23"	X	U	6-9-12-12-18				NOTE: GREENISH	TAILINGS SUBGRADE
		10"	X	U	10-[50/5¼]			SC	MOIST	CLAYEY SAND FINE TO FINE LOW PI BLACK
20			X	U	[50/5]				SLIGHTLY MOIST	
25										COBBLES/GRAVEL W/SOME SAND ROUNDED FINE NP GREY
										AUGER REFUSED @ 22' SATISFACTORY FIXED @ 20'5"

GROUND WATER

DEPTH	HOUR	DATE

SAMPLE TYPE

A – Auger cuttings. B – Block sample

S – 2" O.D. 1.38" I.D. tube sample.

U – 3" O.D. 2.42" I.D. tube sample.

T – 3" O.D. thin-walled Shelby tube.

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PROJECT [illegible]

JOB NO. [illegible] DATE [illegible]

LOG OF TEST BORING NO. A6

RIG TYPE [illegible]

BORING TYPE [illegible]

SURFACE ELEV. [illegible]

DATUM [illegible]

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free-fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0		4"	X		20 30/2"			GP	[illegible]	[illegible]
5										
10										[illegible]

GROUND WATER

DEPTH	HOUR	DATE
[illegible]		

SAMPLE TYPE

A – Auger cuttings. B – Block sample
S – 2" O.D. 1.38" I.D. tube sample.
U – 3" O.D. 2.42" I.D. tube sample.
T – 3" O.D. thin-walled Shelby tube.

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PROJECT GRAND JUNCTION TAILINGS

JOB NO. [illegible] DATE 7/2/81

LOG OF TEST BORING NO. A-65

RIG TYPE CME-75

BORING TYPE [illegible]

SURFACE ELEV.

DATUM

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free-fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0		24"		U	10-15-12-15	115		SP	DRY TO SLIGHTLY MOIST	SAND W/TRACE CLAY/SILT TREATMENT NP LITE TAN/GOLDEN BROWN
		22"		U	12-9-11-13-14					
5		26"		U	12-11-10-10-7					
		21"		U	7-6-5-4-8					
10		28"		U	8-8-7-7-11					
		26"		U	11-21-21-21-35					
15		24"		U	8-17-19-20-23					
		27"		U	14-14-13-25-21				NOTE: GRADING-LIGHT	
20		21"		U	7-10-9-16-[50/3]			SP	MOIST TO V. MOIST	TAILINGS SURFACE SAND W/SOME CLAY PREP FINE NP BROWN
25										REFUSAL SAMPLER @ 22'3" AUGER @ 22½'

GROUND WATER

DEPTH	HOUR	DATE

SAMPLE TYPE

A – Auger cuttings. B – Block sample
S – 2" O.D. 1.38" I.D. tube sample.
U – 3" O.D. 2.42" I.D. tube sample.
T – 3" O.D. thin-walled Shelby tube.

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PROJECT [illegible]

JOB NO. [illegible] DATE [illegible]

LOG OF TEST BORING NO. A6

RIG TYPE [illegible]

BORING TYPE [illegible]

SURFACE ELEV. [illegible]

DATUM [illegible]

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free-fall drop hammer	Dry Density lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0		22	X	U	12-10-10-12-14			SP		Sand [illegible]
		20	X	U	18-20-22-24-33					
5		21	X	U	16-19-[illegible]-10					
		22	X	U	7-6-[illegible]-5-6					
10		20	X	U	4-6-4-5-5					
		21	X	U	3-11-[illegible]-3-3					
15		18	X	U	[illegible]-2-2-2-1					
20			X	U	1-1-4-[illegible]-1			SP	19 saturated	Sand, [illegible]
				U	37-50/4"					
										Auger [illegible] 20'

GROUND WATER

DEPTH	HOUR	DATE
[illegible]	[illegible]	[illegible]

SAMPLE TYPE

A – Auger cuttings. B – Block sample
S – 2" O.D. 1.38" I.D. tube sample.
U – 3" O.D. 2.42" I.D. tube sample.
T – 3" O.D. thin-walled Shelby tube.

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PROJECT GRAND [illegible] TAILINGS

JOB NO. [illegible] DATE [illegible]

LOG OF TEST BORING NO. B-6

RIG TYPE [illegible]

BORING TYPE [illegible]

SURFACE ELEV.

DATUM

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0		26"		U	17-11-15-19	20		CL SP	DRY TO S. MOIST	SANDY CLAY LO-MED PI BROWN COVER MATERIAL
		0"		U	21-20-22-21	20		NR	S. MOIST	
5		10"		U	10-11-12-13-14				note: SOME GOLDEN BROWN	SAND WITH SOME CLAY/SILT PRED FINE NP PALE TAILINGS
		21"		U	17-14-16-19-20					
10	7/22 7/23	19"		U	7-10-16-22-23					
		19"		U	11-14-18-25-25					
15		19"		U	11-15-14-17-18					
		23"		U	9-9-11-17-23					
20		20"		U	7-9-11-[50/4]			SC	V. MOIST PLUG	CLAYEY SAND PRED FINE NP BROWN note: Cobbles. TAILINGS SUBBASE
25										SAMPLER REFUSAL @ 21'10" AUGER REFUSAL @ 23½'

GROUND WATER

DEPTH	HOUR	DATE

SAMPLE TYPE

A – Auger cuttings. B – Block sample
S – 2" O.D. 1.38" I.D. tube sample.
U – 3" O.D. 2.42" I.D. tube sample.
T – 3" O.D. thin-walled Shelby tube.

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PROJECT [illegible]

JOB NO. [illegible] DATE [illegible]

LOG OF TEST BORING NO. A-[illegible]

RIG TYPE [illegible]

BORING TYPE [illegible]

SURFACE ELEV.

DATUM

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0			X					SP	[illegible]	Sand [illegible] NP [illegible]
		22"	X	U	[illegible]					
		18"	X	U	[illegible]					
5		18"	X	U	[illegible]					
		13"	X	U	[illegible]					
10		24	X	U	[illegible]					
		20"	X	U	[illegible]			SP	[illegible]	Sand [illegible]
15		1.1R	X	U	3-3-3-[illegible]-6				dry	
		10	X	U	[illegible]			CL	[illegible]	
20		3"	X	U	[illegible]					

GROUND WATER

DEPTH	HOUR	DATE
19'	[illegible]	[illegible]

SAMPLE TYPE

A – Auger cuttings. B – Block sample

S – 2" O.D. 1.38" I.D. tube sample.

U – 3" O.D. 2.42" I.D. tube sample.

T – 3" O.D. thin-walled Shelby tube.

SERGENT, HAUSKINS & BECKWITH

CONSULTING GEOTECHNICAL ENGINEERS

PHOENIX • ALBUQUERQUE • SANTA FE

PROJECT Grand Junction Tailings

JOB NO. 67-A DATE 7/27/81

LOG OF TEST BORING NO. B-6

RIG TYPE CME-55

BORING TYPE 6½ HSA

SURFACE ELEV.

DATUM

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0		12"	X	U	15-31-47-[50/5½]			CL	DRY TO S. MOIST	SANDY CLAY W/TRACE ROUNDED GRAVEL LO PI BROWN (COVER MATERIAL)
		21"	X	U	8-14-22-27-35			SP	S. MOIST	
5		19"	X	U	15-15-20-27-33					SAND W/TRACE CLAY/SILT PREDOMINANT FINE SP PURPLE & GOLDEN TAN
		0"	X	U	28-24-23-22-20			N.R.		
10		22"	X	U	5-7-9-8-9					
		21"	X	U	4-4-4-7-7					
15		28"	X	U	4-4-7-8-9					
		27"	X	U	5-4-11-31-50				S. MOIST TO MOIST	
20		12"	X	U	22-25-20-30-19					NOTE: GREYISH TAILINGS SUBCASE
			X	U	11-15-49-[50/4]			SM	V. MOIST	SAND W/SOME CLAY MED TO FINE SP GREY/BLACK
25			X	U	25-[50/3½]			GP	SATURATED PLUG	SANDY GRAVEL MED TO COARSE SP GREY

REFUSAL SAMPLING @ 25'9½"

" AUGER @ 27'

GROUND WATER

DEPTH	HOUR	DATE
20.7'	10:00	7/27/81

SAMPLE TYPE

A – Auger cuttings. B – Block sample
S – 2" O.D. 1.38" I.D. tube sample.
U – 3" O.D. 2.42" I.D. tube sample.
T – 3" O.D. thin-walled Shelby tube.

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PROJECT [illegible]

JOB NO. [illegible] DATE [illegible]

LOG OF TEST BORING NO. A7

RIG TYPE [illegible]

BORING TYPE [illegible]

SURFACE ELEV. [illegible]

DATUM [illegible]

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free-fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0					[illegible]			SC	[illegible]	clayey sand some silt weak [illegible] mod [illegible] violet [illegible]
		21"		U	[illegible]					
		20"		U	[illegible]					
5		23"		U	[illegible]					
		21"		U	[illegible]					
10		20"		U	[illegible]					
		18"		U	[illegible]				[illegible]	
[illegible]		20"		U	[illegible]			SC	Saturated	clayey sand some silt mod [illegible] [illegible] black
		22"		U	[illegible]					
20		[illegible]"			[illegible]					

Stopped auger @ 20'

Sampling [illegible] @ 21'

GROUND WATER

DEPTH	HOUR	DATE
17'	[illegible]	[illegible]

SAMPLE TYPE

A – Auger cuttings. B – Block sample

S – 2" O.D. 1.38" I.D. tube sample.

U – 3" O.D. 2.42" I.D. tube sample.

T – 3" O.D. thin-walled Shelby tube.

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PROJECT GRAND JUNCTION TAILINGS

JOB NO. 67-0 DATE 7/27/81

LOG OF TEST BORING NO. A-7

RIG TYPE CME-55

BORING TYPE 6½ HSA

SURFACE ELEV.

DATUM

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0		20"		U	6-5-8-12-20			CL	DRY TO S. MOIST	SANDY CLAY LO PI BROWN (COVER MATERIAL)
								SP	S. MOIST	
		21"		U	20-30-30-39-34					
5		23"		U	5-9-11-11-13				Note: Brownish	SAND W/TRACE CLAY/SILT PRED FINE NP PURPLE & lite Tan Note: lens of brown clay some cementation
		25"		U	14-10-13-12					
10		17"		U	8-10-14-16-14					
		18"		U	9-12-18-20-19					
15		19"		U	6-5-6-7-10					TAILINGS SUBGRADE
		12"		U	11-22-24-19-20					Sandy clay [illegible] MED PI [illegible]
20		7"		U	27-50+			CH	PLUG	

GROUND WATER

DEPTH	HOUR	DATE
NONE		

SAMPLE TYPE

A – Auger cuttings. B – Block sample
S – 2" O.D. 1.38" I.D. tube sample.
U – 3" O.D. 2.42" I.D. tube sample.
T – 3" O.D. thin-walled Shelby tube.

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CONSULTING GEOTECHNICAL ENGINEERS
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PROJECT [illegible]

JOB NO. [illegible] DATE [illegible]

LOG OF TEST BORING NO. A 7[illegible]

RIG TYPE [illegible]

BORING TYPE [illegible]

SURFACE ELEV. [illegible]

DATUM [illegible]

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free-fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0								[illegible]	[illegible]	[illegible]
		22"		U	8-9-11-13-17					
		19"		U	14-15-17-14-13					
5										
		20"		U	11-1-1-1-2-1					
		23"		U	[illegible]					
10										
		21"		U	1-1-1-1-1-1					
		12"		U	6-1-1-1-9-7					
15										
		21"		U	6-1-1-1-9-9					
		[illegible]		U	9-10-10/4"					
20		NR			[illegible]			[illegible]	[illegible]	[illegible]
		NC		U	[illegible]					

GROUND WATER

DEPTH	HOUR	DATE
22	[illegible]	[illegible]

SAMPLE TYPE

A – Auger cuttings. B – Block sample
S – 2" O.D. 1.38" I.D. tube sample.
U – 3" O.D. 2.42" I.D. tube sample.
T – 3" O.D. thin-walled Shelby tube.

SERGENT, HAUSKINS & BECKWITH

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PROJECT GRAND JUNCTION TAILINGS

JOB NO. 63-P DATE 7/27/81

LOG OF TEST BORING NO. F-73

RIG TYPE CME-55

BORING TYPE 6½ HSA

SURFACE ELEV.

DATUM

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free-fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0		23"	X	U	8-8-10-13-17			CL	DRY	SANDY CLAY LO PI BROWN COVER MATERIAL
		22"	X	U	11-12-11-15-15			SP	DRY TO S. MOIST. Note: Some Golden Tan & GREY	
5		25"	X	U	7-11-10-10-11					SAND W/TRACE CLAY/SILT PRED FINE NP LIGHT BROWN/TAN
		22"	X	U	5-8-9-12-14					
10		23"	X	U	10-9-9-9-9					
		23"	X	U	5-7-9-12-12					
15		22"	X	U	3-6-8-9-9					
		18"	X	U	5-5-6-5-13			SP	Note: Yellowish	TAILINGS
20				U	[50/3]				V. MOIST TO SATURATED Note	SURCHARGE SAND W/SOME CLAY PRED FINE NP TO LO PI BROWN - DARK GREY
25										REFUSAL SAMPLER @ 20'3" " AUGER @ 22'

GROUND WATER

DEPTH	HOUR	DATE

SAMPLE TYPE

A – Auger cuttings. B – Block sample

S – 2" O.D. 1.38" I.D. tube sample.

U – 3" O.D. 2.42" I.D. tube sample.

T – 3" O.D. thin-walled Shelby tube.

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PROJECT [illegible]

JOB NO. [illegible] DATE [illegible]

LOG OF TEST BORING NO. A7

RIG TYPE [illegible]

BORING TYPE [illegible]

SURFACE ELEV. [illegible]

DATUM [illegible]

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb., 30" free-fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0								[illegible]	[illegible]	Sand trace silt poorly graded [illegible] [illegible]
		22"		U	12-16-16-15-17					
		19"		U	11-18-16-[illegible]					
5										
		26"		T						
		4'		T						
10										
		15"		T						
								SF	[illegible]	Clayey sand [illegible] [illegible] [illegible] [illegible]
		17		T						
								SF		
15										
		18"		T						
		5"		[illegible]				[illegible]		
20										Sand [illegible] [illegible] [illegible] [illegible]
25										Clayey sand [illegible] [illegible] [illegible]

PROJECT GRAND JUNCTION TAILINGS

JOB NO. 62-0 DATE 7/23/81

LOG OF TEST BORING NO. D-75

RIG TYPE CME-55

BORING TYPE 6" HSA

SURFACE ELEV.

DATUM

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free-fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0		23"	X	U	7-10-21-24-25			CL	DRY	SANDY CLAY LO PI BROWN COVER MATERIAL
								SP	S. MOIST	
		24"	X	U	17-23-24-23-25				NOTE. LENS OF (3")	
5		11"	X	U	16-9-8-8-8			ML	SILTY CLAY LO PI - PURPLE	SAND W/ TRACE CLAY/SILT FINE FINE NP PURPLE
		24"	X	U	5-6-5-9-9				S. MOIST TO MOIST	
10		20"	X	U	6-6-4-5-5					
		26"	X	U	4-6-6-7-4			SP		SILT W/ SOME SAND NP TO LO PI PURPLE
15		24"	X	U	4-2-2-2-1			ML	S. MOIST	
		22"	X	U	1-2-2-2-7				V. MOIST	NOTE: SLIMES WITH OCCASIONAL LENSES OF SAND
20		10"	X	U	7-15-15-17-17			SP	S. MOIST TO MOIST	SAND W/ TRACE SILT/CLAY FINE FINE NP PURPLE
		0"	X	U	20-22-34-39-49			N.R.		
25			X	U	16-[50/5]			GP	PLUG SATURATED	SILT W/ SOME SAND NP PURPLE MORE SLIMES
										SAND FINE COARSE NP BROWN
										SANDY GRAVEL ROUNDED NP GREYISH BROWN
										REFUSED SAMPLER @ 25'11" STOPPED AUGER @ 25'

GROUND WATER

DEPTH	HOUR	DATE

SAMPLE TYPE

A – Auger cuttings. B – Block sample

S – 2" O.D. 1.38" I.D. tube sample.

U – 3" O.D. 2.42" I.D. tube sample.

SERGENT, HAUSKINS & BECKWITH

CONSULTING GEOTECHNICAL ENGINEERS

PROJECT [illegible]

JOB NO. [illegible] DATE [illegible]

LOG OF TEST BORING NO. [illegible]

RIG TYPE [illegible]

BORING TYPE [illegible]

SURFACE ELEV. [illegible]

DATUM [illegible]

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free-fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0										
		24		U	[illegible]					
		21		U	[illegible]					
5										
		18		U	[illegible]			SF		
		19"		U	[illegible]					
10										
		30"		U	[illegible]					
		[illegible]		U	[illegible]			[illegible]		
15										
		20"		U	[illegible]			SC		
		6"		U	[illegible]			SP		
20		NR		U	[illegible]			GP		
25										
30										
35										

GROUND WATER

DEPTH	HOUR	DATE
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]

SAMPLE TYPE

A – Auger cuttings. B – Block sample

S – 2" O.D. 1.38" I.D. tube sample.

U – 3" O.D. 2.42" I.D. tube sample.

T – 3" O.D. thin-walled Shelby tube.

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CONSULTING GEOTECHNICAL ENGINEERS

PHOENIX • ALBUQUERQUE • SANTA FE

PROJECT Grand Junction Tailings

JOB NO. [illegible] DATE 7/24/81

LOG OF TEST BORING NO. D-77

RIG TYPE [illegible]

BORING TYPE [illegible]

SURFACE ELEV.

DATUM

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free-fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0		23"	X	U	19-2[illegible]-27-29-31			CL	[illegible]	Sandy clay loam [illegible] (over material)
		21"	X	U	17-18-11-15-16				[illegible]	
5		22"	X	U	26-15-13-25-26				[illegible]	Sandy [illegible] clay/silt [illegible]
		[illegible]"	X	U	6-6-[illegible]-9-8					
10		21"	X	U	5-6-10-11-11					
		20"	X	U	6-6-8-9-11					
15		19"	X	U	6-6-7-7-9					
		20"	X	U	6-4-5-15-15				Note 6" of silt	Tailings subbase
20			X	U	6-8-13-15-40			ST	Silt [illegible]	Sand some sandy clay/lenses [illegible]
		0"		U	50/1½				Refusal	
25										Note: only a trace of clay

Refusal [illegible] 23'2½"

" Auger @ 23'0"

GROUND WATER

DEPTH	HOUR	DATE
None		

SAMPLE TYPE

A – Auger cuttings. B – Block sample

S – 2" O.D. 1.38" I.D. tube sample.

U – 3" O.D. 2.42" I.D. tube sample.

T – 3" O.D. thin-walled Shelby tube.

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PHOENIX • ALBUQUERQUE • SANTA FE

PROJECT GRAND JUNCTION TAILINGS

JOB NO. [illegible] DATE 7/24/[illegible]

LOG OF TEST BORING NO. D-7

RIG TYPE [illegible]

BORING TYPE [illegible] HSA

SURFACE ELEV.

DATUM

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0		23"		U	6-10-14-19-29			SP	DRY	SANDY CLAY LOW PZ LITE BROWN (COVER MATERIAL)
		12"		U	24-29-24-30-23				TO S. [illegible]	
5		21"		U	5-8-9-10-11				NOTE: LIGHT PURPLE W/SOME LIGHT [illegible] TAN	SAND W/SOME CLAY/SILT MED FINE NP LTE TAN
		19"		U	7-7-7-9-10					
10		23"		U	12-12-14-16-15					
		22"		U	13-15-17-20-20					
15		24"		U	8-8-8-11-13					
		20"		U	11-11-11-17-17					
20		19"		U	5-7-8-9-12					
		12"		U	7-7-8-9-7					
25		?		U	1-2-2-2-3				NOTE: SANDY SILT & SILTY SAND SLIMES MOIST TO V. MOIST	TAILINGS
		0"		U	[501-] NR.			GP	V. MOIST	SURFACE SAND & GRAVEL W/SOME CLAY LTL FINE ROUNDED TO S. ANGULAR NP
30		10"		S	47-36-31					
				S	[50/-]					
35										

Auger Stopped @ 32½'
Sampler Refusal @ 32½'
Caved to 27' - No Plug

GROUND WATER

DEPTH	HOUR	DATE

SAMPLE TYPE

A – Auger cuttings. B – Block sample
S – 2" O.D. 1.38" I.D. tube sample.
U – 3" O.D. 2.42" I.D. tube sample.
T – 3" O.D. thin-walled Shelby tube.

SERGENT, HAUSKINS & BECKWITH

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PROJECT [illegible]

JOB NO. [illegible] DATE [illegible]

LOG OF TEST BORING NO. D-8C

RIG TYPE CME-55

BORING TYPE [illegible]

SURFACE ELEV.

DATUM

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0		22"	X	U	7-6	7-23	21	CL	[illegible]	SANDY CLAY LO PI LITE BROWN
								SC	[illegible]	
		20"	X	U	20-21	20-19	16			
5		21"	X	U	4-6	9-9	11			
		20"	X	U	8-9	9-10				
10		22"	X	U	9-6	7-7	8			
		20"	X	U	9-8	10-11	12			
15		21"	X	U	7-8	9-10	10			
		19"	X	U	7-6	8-10	11			
20		20"	X	U	2-3	2-2	2	ML	moist to v. moist	SANDY SILT LO PI - NP Purple Slimes TAILINGS SLUDGE
		19"	X	U	1-2-5	50/½				
25			X	U	40	50/5		SP GP	moist [illegible]	SAND Med fine NP Brown
										SANDY GRAVEL Rounded Fine NP Brown
										Refusal Surface 25'11" " Auger @ 27'0"

GROUND WATER

DEPTH	HOUR	DATE

SAMPLE TYPE

A – Auger cuttings. B – Block sample
S – 2" O.D. 1.38" I.D. tube sample.
U – 3" O.D. 2.42" I.D. tube sample.
T – 3" O.D. thin-walled Shelby tube.

SERGENT, HAUSKINS & BECKWITH

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PHOENIX • ALBUQUERQUE • SANTA FE

PROJECT GRAND JUNCTION TAILINGS

JOB NO. 63-D DATE 7/24/81

LOG OF TEST BORING NO. 5

D-81

RIG TYPE CME-55

BORING TYPE 6" HSA

SURFACE ELEV.

DATUM

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free-fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0		21"	X	U	9-15-22-29-34			CL	DRY	SANDY CLAY LO PI LITE BROWN COVER [illegible]
		12"	X	U	19-14-16-19-15				DRY TO SLIGHTLY MOIST	
5		18"	X	U	2-2-4-2-5			ML	MOIST TO V. MOIST	SANDY SILT W/ TRACE CLAY/SILT FINE DRY FAIR ELITE TAN
		15"	X	U	6-7-7-7-9					
10		20"	X	U	8-7-7-6-3					
		21"	X	U	5-8-10-10-7					SANDY SILT / [illegible] LO PI - NP SLIGHTLY PURPLE
15		7"	X	U	3-4-4-3-3					
		7"	X	U	1-1-2-2-4					
20		30"	X	U	12-14-10-15					TAIL SAND
			X	U	19-29-[50/5 1/2]			SP	MOIST	SAND W/ TRACE CLAY
25					[SOFT] NR			GP	MOIST	PINK PINK NP BROWN
										SANDY GRAVEL ROUNDED NP BROWN
										REFUSED SAMPLER @ 25'1" " AUGER @ 26'

GROUND WATER

DEPTH	HOUR	DATE

SAMPLE TYPE

A – Auger cuttings. B – Block sample
S – 2" O.D. 1.38" I.D. tube sample.
U – 3" O.D. 2.42" I.D. tube sample.
T – 3" O.D. thin-walled Shelby tube.

SERGENT, HAUSKINS & BECKWITH

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PROJECT [illegible]

JOB NO. [illegible] DATE [illegible]

LOG OF TEST BORING NO. D 92

R.G TYPE [illegible]

BORING TYPE

SURFACE ELEV.

DATUM

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free-fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
		21"		U	[illegible]			CL		SANDY CLAY LO PI LITE BROWN [illegible]
5		22"		U	18-16-16-19-20					
		4"		U	[illegible]-16-20-15					SAND W/ [illegible] FINE [illegible] PURPLE
		30"		U	11-9-[illegible]-12-11					
10		20"		U	9-8-10-11-11				Note: lite Tan to Grey	
		19"		U	10-[illegible]-12-15-13					
15		21"		U	7-8-9-11-12					
		20"		U	12-10-13-14-17					
		21"		U	8-8-12-17-16					
		20"		U	11-11-9-9-10				Note: lens of Purple Silt	
25		8"		U	2-3-2-4			ML	MOIST TO V. MOIST	SILT - SLIMES LOPI PURPLE
		20"		U	13-35-37-[50/5]			GP	V. MOIST	
30		4"		U	[50/4½]				DROPPED ON GROUND (100FT!)	SANDY GRAVEL ROUNDED NC BROWN

REFUSED SAMPLER @ 30'4½

Stopped Auger @ 30'

CAVED IN TO 20'

GROUND WATER

DEPTH	HOUR	DATE

SAMPLE TYPE

A – Auger cuttings. B – Block sample

S – 2" O.D. 1.38" I.D. tube sample.

U – 3" O.D. 2.42" I.D. tube sample.

T – 3" O.D. thin-walled Shelby tube.

SERGENT, HAUSKINS & BECKWITH

CONSULTING GEOTECHNICAL ENGINEERS

PHOENIX • ALBUQUERQUE • SANTA FE

PROJECT [illegible]

JOB NO. [illegible] DATE [illegible]

LOG OF TEST BORING NO. D-[illegible]

RIG TYPE [illegible]

BORING TYPE [illegible]

SURFACE ELEV. [illegible]

DATUM [illegible]

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free-fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0		20"	X	U	11 [illegible] 19-22-21			[illegible] SP	[illegible] SP [illegible]	[illegible] 20 ft [illegible] LIGHT [illegible] [illegible]
		20"	X	U	12-17-17-26-24					
5		26"	X	U	35-22-15-11-15				[illegible]	SAND WITH [illegible] FEW FINE [illegible] PURPLE
		?	X	U	10-10-7-11-13					
10		24"	X	U	6-8-8-10-11					
		21"	X	U	8-7-7-10-11					
15		22"	X	U	6-8-9-11-14					
		21"	X	U	10-11-14-12-15					
20		19"	X	U	10-13-14-16-16					
		20"	X	U	10-11-13-15-14					
25		21"	X	U	5-8-8-10-12					
		15"	X	U	7-7-7-11-10				[illegible] MOIST	
30				U	30 [illegible]			GP	[illegible]	TRACES SURFACE SANDY GRAVEL ([illegible]) [illegible] [illegible] [illegible]
				U	50/3"					
35										STOPPED DRILLING 32'4" REFUSAL [illegible] @ 32'9"

GROUND WATER

DEPTH	HOUR	DATE

SAMPLE TYPE

A – Auger cuttings. B – Block sample
S – 2" O.D. 1.38" I.D. tube sample.
U – 3" O.D. 2.42" I.D. tube sample.
T – 3" O.D. thin-walled Shelby tube.

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PROJECT GRAND JUNCTION TAILINGS

JOB NO. 65-8 DATE 7/25/81

LOG OF TEST BORING NO. D-84

RIG TYPE CME 55

BORING TYPE 4" HSA

SURFACE ELEV.

DATUM

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0		26"	X	U	8-8-10-17-20			CL	DRY TO SLIGHTLY MOIST	SANDY CLAY LO PI BROWN (LIGHT) (LOWER PORTION)
		18"	X	U	15-10-9-11-14					
5		21"	X	U	13-15-11-14-13					SAND W/ TRACE AMOUNTS OF FINE NP YELLOWISH & LIGHT TAN
		19"	X	U	5-4-7-9-10				NOTE COLOR CHANGES, PURPLE, LITE TAN, GREY	
10		26"	X	U	9-12-12-14-14					
		20"	X	U	?					
15		21"	X	U	7-7-9-9-13					
		23"	X	U	8-8-9-12-14					
20		21"	X	U	7-8-10-13-15					
		18"	X	U	7-8-9-13-14					
25		21"	X	U	7-8-8-10-8					
		24"	X	U	4-4-8-[50/5]			PAL SP	V. MOIST	SILT W/ TRACE SAND NP TO LO PI PURPLE SLIMES
30			X	U	47-[50/4½]				MOIST	
			X	U	35-41-46-[50/5¾]				NOTE GRAVELLY SAND ROUNDED	TAILINGS SWEEPSE
35			X	U	36-[50/5¾]				V. MOIST TO SATURATED	SAND MED FINE NP BROWN
										SANDY GRAVEL SUBROUNDED to ROUNDED FINE NP BROWN
										STOPPED DRILLING 35' REFUSED SAMPLER @ 35' 11½" MOVED TO 28'

GROUND WATER

DEPTH	HOUR	DATE

SAMPLE TYPE

A – Auger cuttings. B – Block sample
S – 2" O.D. 1.38" I.D. tube sample.
U – 3" O.D. 2.42" I.D. tube sample.
T – 3" O.D. thin-walled Shelby tube.

SERGENT, HAUSKINS & BECKWITH

CONSULTING GEOTECHNICAL ENGINEERS
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PROJECT [illegible]

JOB NO. 63-6 DATE 7/25/81

LOG OF TEST BORING NO. D-8

RIG TYPE [illegible]

BORING TYPE [illegible]

SURFACE ELEV.

DATUM

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free-fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	Remarks	Visual Classification
0		21"		U	5-9-11-17-27			CL	DRY	SANDY CLAY LO PI BROWN (COVER MATERIAL)
								SP	SILT TO SILT MOIST	
		17"		U	15-14-8-11-13			ML		
5		20"		U	15-6-5-7-9			SP	MOIST TO V. MOIST	SAND W/TRACE CLAY/SILT PREDO. FINE NP TAN & PURPLE 4" lens of silt - purple
		21"		U	5-5-5-5-12				S. MOIST	
10		20"		U	7-6-7-8-11					
		21"		U	8-7-12-12-10					SANDY SILT LO PI PURPLE - SLIMES
15		19"		U	2-5-4-4-5				lenses of SILT - moist	
		18"		U	4-6-6-5-5					SAND W/TRACE SILT/CLAY FINE NP LITE TAN & PURPLE
20		20"		U	1-2-1-1-2			ML	V. MOIST	
		20"		U	1-4-4-8-[50/3]			SP		SILT W/TRACE SAND (SLIMES) PURPLE TAILINGS
25									MOIST	
										GRAVELLY SAND SUBBASE PREDO FINE S.R. to rounded NP BROWN
										REFUSED SAMPLER @ 24'3" Auger @ 25' CAVED TO 19'

GROUND WATER

DEPTH	HOUR	DATE

SAMPLE TYPE

A – Auger cuttings. B – Block sample
S – 2" O.D. 1.38" I.D. tube sample.
U – 3" O.D. 2.42" I.D. tube sample.
T – 3" O.D. thin-walled Shelby tube.

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PROJECT [illegible]

JOB NO. [illegible] DATE [illegible]

LOG OF TEST BORING NO. B-86

RIG TYPE [illegible]

BORING TYPE [illegible]

SURFACE ELEV. [illegible]

DATUM [illegible]

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free-fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
[illegible]		21"	X	U	[illegible]	[illegible]		[illegible]		[illegible]
		4"	X	U	[illegible]					
								[illegible]		
5		18"	X	U	[illegible]	[illegible]				[illegible]
		18"	X	U	[illegible]	[illegible]			[illegible]	
10		19"	X	U	[illegible]	[illegible]				
		22"	X	U	[illegible]	[illegible]	47			
		17"	X	U	[illegible]	[illegible]	30			[illegible]
		14"	X	U	[illegible]	[illegible]	26	[illegible]		[illegible]
[illegible]		18"	X	U	[illegible]	[illegible]	29			
		18" N.L.	X	U	[illegible]	[illegible]	20	[illegible]	[illegible]	[illegible]
				U	[illegible]			GP		[illegible]
[illegible]										
[illegible]										
25										

GROUND WATER

DEPTH	HOUR	DATE
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]

SAMPLE TYPE

A – Auger cuttings. B – Block sample

S – 2" O.D. 1.38" I.D. tube sample.

U – 3" O.D. 2.42" I.D. tube sample.

T – 3" O.D. thin-walled Shelby tube.

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PROJECT GRAND JUNCTION TRAIN

JOB NO. 67-D DATE 7-2-77

LOG OF TEST BORING NO. D-8

RIG TYPE CME 55

BORING TYPE [illegible]

SURFACE ELEV.

DATUM

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free-fall drop hammer	Dry Density t.b.s. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0								CL	DRY	SANDY CLAY LOW PI BROWN (COVER MATERIAL)
		27"		T				SP	DRY TO SLIGHTLY MOIST	
		7"		T				CL		
5		30"		T					SLIGHTLY MOIST	SAND W/TRACE CLAY/SILT MED FINE DRY GREY - LITE TAN
		19"		T				SP	MOIST SLIMES WATER	
10		8"		T					SLIMES	
		[illegible]		T						SANDY SILT PI 8 TO 10 PI PURPLE SOME SAND LENSES
15		6"		T (2.0")						
		6"		T						
20		30"		T						SAND W/TRACE CLAY/SILT DRY MED FINE PURPLE + LITE TAN DOME SILT LENS
		12"		T					SLIMES TO MOIST	
25		18"		U	4-6-12-12-8					
		20"		U	4-5-19-30-[50/1½]			SP	SLIMES	TAILINGS
30		0"		U	[50/4½] BR				MOIST CLAY	SAND W/TRACE GRAVEL MED FINE DRY BROWN (SUBGRADE)
										STOPPED AUGER @ 30' INSTALLED SIAMVALVE 30'4"

GROUND WATER

DEPTH	HOUR	DATE

SAMPLE TYPE

A – Auger cuttings. B – Block sample
S – 2" O.D. 1.38" I.D. tube sample.
U – 3" O.D. 2.42" I.D. tube sample.
T – 3" O.D. thin-walled Shelby tube.

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PROJECT [illegible]

JOB NO. [illegible] DATE [illegible]

LOG OF TEST BORING NO. B8

RIG TYPE [illegible]

BORING TYPE [illegible]

SURFACE ELEV. [illegible]

DATUM [illegible]

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free-fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0								[illegible]		Silt [illegible]
		20"		U	[illegible]					
		15"		U	[illegible]					
5								SP		
		22"		U	[illegible]			ML		
		18"		U	[illegible]					Sand [illegible]
10		18"		U	[illegible]					
		19"		U	[illegible]					
		8"		U	[illegible]					
								GP		
										Sandy [illegible]
										Auger refusal at 21½'
										Sampling refusal at 16½'
										Terminated at 20½'

GROUND WATER

DEPTH	HOUR	DATE
16'	11:00 A	[illegible]
17½	[illegible]	[illegible]

SAMPLE TYPE

A – Auger cuttings. B – Block sample

S – 2" O.D. 1.38" I.D. tube sample.

U – 3" O.D. 2.42" I.D. tube sample.

T – 3" O.D. thin-walled Shelby tube.

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PROJECT [illegible]

JOB NO. [illegible] DATE [illegible]

LOG OF TEST BORING NO. C-8

RIG TYPE [illegible]

BORING TYPE [illegible]

SURFACE ELEV.

DATUM

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free-fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0		20"	X	U	9-19-14-14-17			CL	[illegible]	SANDY CLAY [illegible]
		[illegible]	X	U	9-8-[illegible]-[50/4"]			[illegible]	[illegible]	[illegible]
5		10"	X	U	[illegible]			[illegible]	[illegible]	[illegible]
				U						[illegible]
10				U						[illegible]
				U						[illegible]
15				U						[illegible]
				U						[illegible]
20										CONDLES @ 6'
										Auger Refusal @ [illegible]
										Sampler " @ [illegible]
										CAVED TO 3.0'

GROUND WATER

DEPTH	HOUR	DATE

SAMPLE TYPE

A – Auger cuttings. B – Block sample
S – 2" O.D. 1.38" I.D. tube sample.
U – 3" O.D. 2.42" I.D. tube sample.
T – 3" O.D. thin-walled Shelby tube.

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PROJECT [illegible]

JOB NO. [illegible] DATE [illegible]

LOG OF TEST BORING NO. [illegible]

RIG TYPE [illegible]

BORING TYPE [illegible]

SURFACE ELEV.

DATUM

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot (140 lb. 30" free-fall drop hammer)	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0		22"	X	U	7-12-12-12-12			CL	[illegible]	[illegible]
			X					SP		
		23"	X	U	7-16-17-17-19			SP	[illegible]	[illegible]
5										[illegible]
10										[illegible]
										SAND W/ SOME GRAVEL FINE ROUNDED NP BROWN
										[illegible]

GROUND WATER

DEPTH	HOUR	DATE

SAMPLE TYPE

A – Auger cuttings. B – Block sample
S – 2" O.D. 1.38" I.D. tube sample.
U – 3" O.D. 2.42" I.D. tube sample.
T – 3" O.D. thin-walled Shelby tube.

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PROJECT [illegible]

JOB NO. [illegible] DATE 7/24/81

LOG OF TEST BORING NO. C-9

RIG TYPE [illegible]

BORING TYPE [illegible]

SURFACE ELEV. [illegible]

DATUM [illegible]

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free fall drop hammer	Dry Density lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0		10"	X	U	13-[illegible]			CL	DRY TO S. MOIST	[illegible] COVER [illegible]
5										
10										REFUSAL [illegible] @ 10" " AUGER @ 2'

GROUND WATER

DEPTH	HOUR	DATE

SAMPLE TYPE

A – Auger cuttings. B – Block sample
S – 2" O.D. 1.38" I.D. tube sample.
U – 3" O.D. 2.42" I.D. tube sample.
T – 3" O.D. thin-walled Shelby tube.

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PROJECT [illegible] JUNCTION TAILINGS

JOB NO. [illegible] DATE [illegible]

LOG OF TEST BORING N

RIG TYPE [illegible]

BORING TYPE [illegible]

SURFACE ELEV.

DATUM

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Cla. efication	REMARKS	VISUAL CLASSIFICATION
0		22"	X	U	14-13-16-19-19			CL	DRY	SANDY CLAY [illegible] PI [illegible] BROWN [illegible]
		21"	X	U	14-9-10-10-13			SP	DRY TO [illegible]	
5		21"	X	U	7-8-8-12-11					[illegible]
		20"	X	U	8-7-7-12-14					
10		20"	X	U	8-7-9-10-12					
		19"	X	U	9-9-10-11-13					
15		20"	X	U	4-3-5-6-9			MC	MOIST TO V. MOIST	SILT W/ TRACE SAND NP PURPLE TAILING
		22"	X	U	6-5-5-9-10				NOTE: SOME SLIVES.	
20		30"	X	U	3-3-4-12-14					
		17"	X	U	10-11-21-[50/2]			SC	MOIST TO V. MOIST PLUG	SAND W/ TRACE CLAY FINE FINE NP BROWN SLUDGE
25				U	[50/2]					

Stopped Auger @ 25'

Refusal Sampler @ 25'

GROUND WATER

DEPTH	HOUR	DATE

SAMPLE TYPE

A – Auger cuttings. B – Block sample

S – 2" O.D. 1.38" I.D. tube sample.

U – 3" O.D. 2.42" I.D. tube sample.

T – 3" O.D. thin-walled Shelby tube.

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PROJECT SAND JUNCTION TAILINGS

ICE NO. 53-6 DATE 7/26/71

LOG OF TEST BORING NO. C-93

RIG TYPE CME-55

BORING TYPE 6 1/2 HSF

SURFACE ELEV.

DATUM

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot (140 lb. 30" free-fall drop hammer)	Dry Density Lbs. per cu. ft.	Moisture Content (Per Cent of Dry Wt)	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0		21"		U	12-12-20-14-15			CL	LOCKY	SANDY CLAY 10-med PI LIGHT BROWN (LOWER MATERIAL)
								SP	SLIGHT MOIST	
		14"		U	12-10-10-14-13					
5		20"		U	7-8-6 8-9					SAND w/TRACE CLAY/SILT FINE FINE NP FLAKY
		20"		U	4-5-9-8-9				NOTE:	
10		22"		U	5-6-9-11-11				SOME LITE. BROWN, TAN	
		19"		U	8-10-11-13-12					
15		20"		U	3-3-5-7-10					
		18"		U	6-7-9-10-7				NOTE: SOME SILT-SLIMES	
20		20"		U	2-2-4-9-11				NOTE: SLIMES	V. MOIST
		20"		U	10-11-14-21-22			SP	MOIST	TAIL SAND SUBA w/TRACE clay NP Med Fine Brown 4" lens of Sandy Clay med PI some clayey Sand lenses
25				U	10-[50/4]				PLUG	
										REFUSED SAMPLER @ 25'10" " Auger @ 26'

GROUND WATER

DEPTH	HOUR	DATE

SAMPLE TYPE

A – Auger cuttings. B – Block sample
S – 2" O.D. 1.38" I.D. tube sample.
U – 3" O.D. 2.42" I.D. tube sample. –Used Shelby tube.

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PROJECT [illegible]

JOB NO. [illegible] DATE [illegible]

LOG OF TEST BORING NO. C 94

RIG TYPE [illegible]

BORING TYPE [illegible]

SURFACE ELEV. [illegible]

DATUM [illegible]

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free-fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0										Silt [illegible]
		24"								
		21"		U	[illegible]					
5									[illegible] saturated	
		19"		U	[illegible]					Sand [illegible]
		18"		U	6-4-6-6-7					
10										
		20"		U	[illegible]					
		21"		U	16-[illegible]-11-17-14					
15										
		20"		U	[illegible]					
		22"		U	6-7-7-8-9					
		21"		U	6-7-[illegible]-14					Clay [illegible]
		20"		U	9-7-5-7-12				moist	
25										
		20"		U	[illegible]-21					
		12"		U	13-[illegible]-50/5½"					
30								GW	Saturated	Sand [illegible]
35										

GROUND WATER

DEPTH	HOUR	DATE
29'	10:05A	7/17/91
28'	12:00	7/17/91

SAMPLE TYPE

A – Auger cuttings. B – Block sample
S – 2" O.D. 1.38" I.D. tube sample.
U – 3" O.D. 2.42" I.D. tube sample.
T – 3" O.D. thin-walled Shelby tube.

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PROJECT [illegible]

JOB NO. [illegible] DATE 7/27/81

LOG OF TEST BORING NO. D-9

RIG TYPE [illegible]
BORING TYPE [illegible]
SURFACE ELEV. [illegible]
DATUM [illegible]

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0		19"	X	U	[illegible]	[illegible]	[illegible]	CL	DRY TO SLIGHTLY MOIST	TAN CLAY, MED FIRM, LIGHT BROWN, [illegible]
		20"	X	U	14-16-15-14-12					
5		15"	X	U	4-6-8-9-11					
		20"	X	U	9-11-11-10-12					TAN OR TAN CLAY/SILT, MED FIRM, NP, LITE TAN/BROWN TO GREY
		18"	X	U	7-8-8-10-7					
		20"	X	U	8-7-9-13-11					
15		19"	X	U	4-7-9-11-15					
		21"	X	U	9-8-12-13-14				NOTE: [illegible]	
		18"	X	U	5-8-13-15-15					
		19"	X	U	10-9-11-14-17					
		17"	X	U	6-11-18-20-19					
		20"	X	U	10-12-12-14-15					SILT - SLIMES, LO PI, Purple
30		0"	X	U	7-9-8-8-9	N.R.			V. MOIST	
		24"	X	U	6-14-16-19-19			ML	MOIST TO V. MOIST TO SATURATED	TAILINGS: SAND W/ SOME CLAY SILT, MED FINE, NP, BROWN
35		28"	X	U	5-8-10-11-14			SP		
		21"	X	U	8-13-14-15-15					
40		30"	X	U	9-20-24-39-[50/3]					NOTE: TRACE OF ROUNDED GRAVEL
45										REFUSAL SAMPLER @ 42' Auger @ 48 (Shale @ 44')

GROUND WATER

DEPTH	HOUR	DATE
30.1	9:55	7/27/81

SAMPLE TYPE

A – Auger cuttings. B – Block sample
S – 2" O.D. 1.38" I.D. tube sample.
U – 3" O.D. 2.42" I.D. tube sample.
R – 3" O.D. thin-walled Shelby tube.

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CONSULTING GEOTECHNICAL ENGINEERS
PHOENIX • ALBUQUERQUE • SANTA FE

PROJECT [illegible]

JOB NO. [illegible] DATE [illegible]

LOG OF TEST BORING NO. D-[illegible]

RIG TYPE [illegible]

BORING TYPE [illegible]

SURFACE ELEV. [illegible]

DATUM [illegible]

Depth	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free-fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0										
5										
10										hole refilled w/ [illegible]
15										
20										
25										
30										
35										
40										
45										Auger stopped [illegible]

GROUND WATER

DEPTH	HOUR	DATE
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]

SAMPLE TYPE

A – Auger cuttings. B – Block sample

S – 2" O.D. 1.38" I.D. tube sample.

U – 3" O.D. 2.42" I.D. tube sample.

T – 3" O.D. thin-walled Shelby tube.

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PROJECT [illegible]

JOB NO. [illegible] DATE 7/28/61

LOG OF TEST BORING NO. [illegible]

D-96

RIG TYPE [illegible]

BORING TYPE [illegible]

SURFACE ELEV. [illegible]

DATUM [illegible]

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0		20"		U	3-[illegible]-12-10			CL	DRY	SANDY CLAY MED PI LIGHT BROWN (COVER MATERIAL)
								SP	DRY TO MOIST	
		18"		U	17-11-15-15-11				SLIGHTLY	
5		21"		U	3-7-[illegible]-11-13					SAND W/ TRACE CLAY/ FINE FINE PI LIGHT TAN & PURPLE
		19"		U	12-14-8-12-17					
10		0"		U	14-14-17-21-25			N.R.		
		0"		U	25-20-20-23-27			N.R.		
15		21"		U	[illegible]-8-9-13-17					
		19"		U	13-15-23-31-38					TRACE SILT
20		20"		U	11-13-15-16-19					SAND W/ TRACE CLAY FINE FINE PI BROWN
		21"		U	16-21-19-15-[illegible]			SP	MOIST	
				U	[50/8]					
										Note: Foundation Ground more clay content
30										Terminated San Miguel Gravel

GROUND WATER

DEPTH	HOUR	DATE

SAMPLE TYPE

A – Auger cuttings B – Block sample

S – 2" O.D. 1.38" I.D. tube sample.

U – 3" O.D. 2.42" I.D. tube sample.

T – 3" O.D. thin-walled Shelby tube.

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PROJECT GRAND JUNCTION TAILINGS

JOB NO. [illegible] DATE 7/27/81

LOG OF TEST BORING NO. B-5

D-97

RIG TYPE [illegible]

BORING TYPE [illegible]

SURFACE ELEV.

DATUM

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot (140 lb. 30" free-fall drop hammer)	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0		20"		U	3-6-11-16-13			CL	DRY	SANDY CLAY RED PR LIGHT BROWN (LOWER PARTS OF)
								SP	DRY TO S MOIST	
		19"		U	4-6-6-8-8					
5		20"		U	8-4-5-5-9					SAND W/ TRACE CLAY/SILT FINE RP Golden Brown, Light Pinkish SOME LIGHT SALT
		19"		U	6-7-9-12-15					
10		18"		U	9-10-12-14-16					
		17"		U	12-14-14-16-20					
15		19"		U	5-7-8-14-19					
		20"		U	11-10-14-20-25					
20		20"		U	8-10-12-15-17					
		21"		U	12-13-15-29-43					
25		17"		U	14-16-22-29-27					TAILINGS SUBBASE
		17"		U	17-17-24-32-25					SAND W/ SOME CLAY RP RED FINE BROWN
30		18"		U	11-12-16-26-32				MOIST TO V. MOIST	
		17"		U	12-9-12-20-34			SP		
35				U	35-[50/4½]			GP	SATURATED	SANDY GRAVEL ROUNDED RP GRAY & BROWN
40										REFUSED SAMPLER @ 35'10" " AUGER @ 37' CAVED TO 28'

GROUND WATER

DEPTH	HOUR	DATE
35.2'	3:00	7/27/81

SAMPLE TYPE

A – Auger cuttings. B – Block sample

S – 2" O.D. 1.38" I.D. tube sample.

U – 3" O.D. 2.42" I.D. tube sample.

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CONSULTING GEOTECHNICAL ENGINEERS

PROJECT [illegible] TAILINGS

JOB NO. [illegible] DATE [illegible]

LOG OF TEST BORING NO. C-99

RIG TYPE [illegible]

BORING TYPE [illegible]

SURFACE ELEV.

DATUM

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0		24"	X	U	2-6-10-14-17			SP	DRY TO SLIGHTLY MOIST	SAND W/ TRACE CLAY/SILT FINE TO FINE NP LIGHT BROWN, [illegible] FINE TUBE
		22"	X	U	13-12-15-17-16					
5		23"	X	U	13-9-9-12-18					
		22"	X	U	12-5-11-16-22					
10		19"	X	U	16-12-16-20-19					
		21"	X	U	13-16-18-21-22					
15		22"	X	U	7-9-12-17-17					
		24"	X	U	15-20-22-25-28				MOIST	
20		23"	X	U	11-16-24-32-29					
		20"	X	U	17-15-18-32-[50/5½]					SILT LOPI PURPLE SLIMES TAILINGS
25		18"	X	U	16-19-23-25-30				V. MOIST	
		17"	X	U	17-21-23-22-22					CLAYEY SAND SUBBASE [illegible] FINE NP BROWN
30		24"	X	U	9-10-10-14-14			ML	V. MOIST	
		23"	X	U	11-10-9-12-14			SP		
		15"	X	U	3-19-[50/4]					

REFUSED SPOON @ 36.4
" AUGER @ 37'
CAVED TO ± 29'
(TAPE BREAKS)

GROUND WATER

DEPTH	HOUR	DATE
±35	5:15	7/27

BOTTOM TAPE [illegible]

SAMPLE TYPE

A – Auger cuttings. B – Block sample
S – 2" O.D. 1.38" I.D. tube sample.
U – 3" O.D. 2.42" I.D. tube sample.
T – 3" O.D. thin-walled Shelby tube.

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PROJECT [illegible] JUNCTION TRAILER

JOB NO. [illegible] DATE 7/27/81

LOG OF TEST BORING NO. [illegible]

RIG TYPE [illegible]

BORING TYPE [illegible] HSA

SURFACE ELEV.

DATUM

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per 6 Inches (140 lb. Hammer, 30" Drop)	Dry Density, Lbs. per Cu. Ft.	Moisture Content, %	Unified Soil Classification	Remarks	Visual Classification
0		24"	X	u	7-8-13-15-22			SP	DRY TO [illegible]	SAND W/ TRACE CLAY/SILT MED FINE NP LITE PURPLE & [illegible] (changing)
		21"	X	u	18-20-20-17-16					
5		23"	X	u	3-4-9-13-16					
		18"	X	u	2-12-14-17-15					
10		22"	X	u	12-14-18-19-19					
		23"	X	u	10-9-12-18-19					
		20"	X	u	6-8-12-16-20					
		22"	X	u	10-11-12-16-23				NOTE: ½" SILT LENS	
20		24	X	u	9-10-11-14-17					
		22"	X	u	9-11-13-15-15					
25		21"	X	u	10-11-13-21-33					
		17"	X	u	19-21-20-26-25					SILT-SUPES LO PI PURPLE LENSES OF SILT SAND MED FINE NP
30		22"	X	u	13-14-17-17-13				MOIST TO V. MOIST	
		27"	X	u	4-5-10-11-12			ML		
35		24"	X	u	6-9-11-13-11			SC	MOIST TO V. MOIST	CLAYEY SAND W/ TRACE MED FINE Angular GRAVEL NP BLACK
		12"	X	u	6-7-6-8-9				NOTE MORE CLAY	
40			X	u	10-9-46 [50/4]					

STOPPED AUGER @ 40'
REMOVED SAMPLER @ 40'10"
CAVED TO APPROX. 30' (TAP)

GROUND WATER

DEPTH	HOUR	DATE

SAMPLE TYPE

A – Auger cuttings. CB – Block sample
S – 2" O.D. 1.38" I.D. tube sample.
U – 3" O.D. 2.42" I.D. tube sample.
T – 3" O.D. thin-walled Shelby tube.

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PROJECT [illegible]

JOB NO. [illegible] DATE 7/2/81

LOG OF TEST BORING NO. D-98

RIG TYPE [illegible]

BORING TYPE [illegible]

SURFACE ELEV.

DATUM

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
		24"	X	U	6-8-10-12-15			CL	DRY TO MOIST	SANDY CLAY LO-MED PL LIGHT [illegible] (COVER [illegible])
		18"	X	U	11-7-7-8-7					
5		19"	X	U	10-6-4-5-5					SAND W/ TRACE [illegible] FINE NP LIGHT-TAN [illegible]
		0"	X	U	5-5-7-7-5			N.R.		
10		18"	X	U	3-3-4-6-7					
		22"	X	U	4-4-4-7-12					
15		20"	X	U	7-13-13-16-19				NOTE: SOME FINES	(LIGHT)
		21"	X	U	14-17-19-30-32					
20		19"	X	U	11-15-18-21-25					TAILINGS SUBBASE
		20"	X	U	13-14-17-38-43					SAND W/ SOME CL FINE F NP DUSTY BROWN
25		21"	X	U	17-15-16-18-19			SP	MOIST TO SATURATED	
		29"	X	U	6-5-9-16-[50/5]					
30				U	[50/2]					SAMPLER REFUSED @ 30 REFUSED DRILLING @ 30'
35										

GROUND WATER

DEPTH	HOUR	DATE
30.4'	9:15	7/2/81

SAMPLE TYPE

A – Auger cuttings. B – Block sample
S – 2" O.D. 1.38" I.D. tube sample.
U – 3" O.D. 2.42" I.D. tube sample.
T – 3" O.D. thin-walled Shelby tube.

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PROJECT [illegible]

JOB NO. [illegible] DATE [illegible]

LOG OF TEST BORING NO. [illegible]

RIG TYPE [illegible]

BORING TYPE [illegible]

SURFACE ELEV.

DATUM

Depth In Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free-fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0		11"	X	U	39-[illegible]			CL/CH	SAMPLE TO PIPEST	CLAY MED PI - HIGH SOME Gravel (Frag to S.Round) SOME Sand - Tailings BROWN'S GRAY
		19½	X	U	5-6-5-7-6					
		18"	X	U	22-3	5-6		SP	[illegible]	SAND W/SOME CLAY FGED FINE MG BROWN
		25"	X	U	4-5-8-14-33					
10										SAMPLED AUGERS 5' " SAMPLE @ 10'

GROUND WATER

DEPTH	HOUR	DATE
5.1'	2:00	7/26/81

SAMPLE TYPE

A – Auger cuttings. B – Block sample
S – 2" O.D. 1.38" I.D. tube sample.
U – 3" O.D. 2.42" I.D. tube sample.
T – 3" O.D. thin-walled Shelby tube.

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PROJECT GRAND [illegible] TRAINING

JOB NO. [illegible] DATE 7/[illegible]

LOG OF TEST BORING NO. [illegible]

RIG TYPE [illegible]

BORING TYPE [illegible]

SURFACE ELEV.

DATUM

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free-fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt	Unified Soil Classification	Remarks	Visual Classification
0		24"		U	12-13-[illegible]-22-20			CL	SLMOIST	SANDY CLAY LO-MED PI BROWN
		20"		U	12-14-15-14-17			SC		
5		18"		U	9-8-9-9-8			CH	MOIST	SAND w/TRACE gravel FRED V. FINE NP GRY
		16"		U	5-3-7-8-8					
10		24"		U	4-2-7-22-22				SATURATED	
		6"		U	45-[50/3]			GP	PLUG SATURATED	CLAY HI PI BROWN NOTE: lens of purple tailings around 6' NOTE: SOME SAND
15										SANDY GRAVEL ROUNDED NP BROWN
										STOPPED AUGER @ 10' REASSED SAMPLER @ 13'5"

GROUND WATER

DEPTH	HOUR	DATE
7.0'	1:00	7/26/71

SAMPLE TYPE

A – Auger cuttings. B – Block sample
S – 2" O.D. 1.38" I.D. tube sample.
U – 3" O.D. 2.42" I.D. tube sample.
T – 3" O.D. thin-walled Shelby tube.

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PROJECT GRAND JUNCTION TANNING

JOB NO. [illegible] DATE [illegible]

LOG OF TEST BORING NO. [illegible]

RIG TYPE [illegible]

BORING TYPE [illegible]

SURFACE ELEV.

DATUM

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free-fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0		17"	X	U	4-6-10-7-6			CL	SLIGHT TO MOIST	SANDY CLAY MED PL LIGHT BROWN / GREY
								SP		
		16"	X	U	6-4-1-5-4			CL		
5		0"	X	U	3-2-1-1-2		NR		VLIGHT	SAND W/ SOME CLAY LENSES OF MED PL CLAY FINE FINE PP BROWN
								SP	SATURATED	
			X	U	5-6-5-6-9					
10										CLAY W/ SOME SAND LO-MED PL BROWN
										SAND W/ TRACE CLAY MED DENSE PP BROWN
										SAMPLES @ 5' [illegible] @ 10'

GROUND WATER

DEPTH	HOUR	DATE

SAMPLE TYPE

A – Auger cuttings. B – Block sample

S – 2" O.D. 1.38" I.D. tube sample.

U – 3" O.D. 2.42" I.D. tube sample.

T – 3" O.D. thin-walled Shelby tube.

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Grand Junction GGJ-1 — **Elevation: 4590.2 ft.**

SUBSURFACE PROFILE: DESCRIPTION	GRAPHIC LOG	DEPTH SCALE	SAMPLES: LOCATION	NUMBER	TYPE	BLOW / FT.	RECOVERY	DENSITY (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS (%)	CIRCULATION (%)	PERMEABILITY (cm/sec)
Firm greyish tan weathered MANCOS SHALE; FILL					ST							
Loose, medium light gray silty SAND, TAILINGS (SP-SM)		5		2	SS	6	18/18					
Becoming loose to firm, gray and tan streaked silty SAND TAILINGS, (SP-SM)		10		3	SS	10	18/18					
		15			ST							
Firm brown sandy SILT (ML)												
Very dense sandy GRAVEL (GM)		20		5	SS	50/6"	6/6					
Borehole completed on October 21, 1982 at a depth of 20.0 ft Groundwater not encountered during drilling.		25										
		30										

Grand Junction GGJ-2 — **Elevation: 4599.8 ft.**

SUBSURFACE PROFILE: DESCRIPTION	GRAPHIC LOG	DEPTH SCALE	SAMPLES: LOCATION	NUMBER	TYPE	BLOW / FT.	RECOVERY	DENSITY (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS (%)	CIRCULATION (%)	PERMEABILITY (cm/sec)
Firm, greyish tan weathered MANCOS SHALE; FILL					ST							
Loose medium light gray silty SAND, increase in moisture and silt content with depth; TAILINGS (SP-SM)		5		2	SS	7	18/18					
		10		3	SS	8	18/18					
Gravel zone												
Very soft lavender clayey SILT; very viscous and sticky; SLIMES (ML)		15			ST			104.1	37	NP		
Loose medium gray silty SAND; TAILINGS (SP-SM)		20		5	SS	8	18/18					
Becoming firm, silty SAND to sandy silt, some iron stain bands 1-2" thick (ML-SM)		25		6	SS	21	18/18					
Dense sandy GRAVEL (GM)		30		7	SS	28	18/18					
Borehole completed on October 21, 1982 at a depth of 33.0 ft Groundwater encountered at 29.8"												

Figure C-8. Geotechnical borehole logs.

Grand Junction GGJ-3

Elevation: 4598.2 ft

SUBSURFACE PROFILE: DESCRIPTION	GRAPHIC LOG	DEPTH SCALE	SAMPLES: LOCATION	NUMBER	TYPE	BLOW / FT.	RECOVERY	DENSITY (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS (%)	CIRCULATION (%)	PERMEABILITY (cm/sec)
Firm grayish tan weathered MANCOS SHALE; FILL					ST			100.9	5.9	KP		2×10^{-3}
Firm medium gray silty SAND TAILINGS (SM)		5		2	SS	12	18/18					
Lavender SILT; SLIMES (ML)												
Alternating gray sandy SILT and silty SAND beds; TAILINGS (SM-ML)		10		3	SS	4	18/18					
Becoming gray silty SAND (SP-SM)		15			ST							
Lavender SILT; SLIMES (ML)												
Very loose to loose alternating gray gravely SILT and silty SAND beds (SM-ML); TAILINGS		20		5	SS	4	18/18					
Very soft lavender clayey SILT, runny; SLIMES (ML)												
Very dense sandy GRAVEL (GW)		25		4	SS	70	18/18					
Borehole completed on October 21, 1982 at a depth of 27 ft. Groundwater not encountered during drilling.		30										

Grand Junction GGJ-4

Elevation 4621.2 ft

SUBSURFACE PROFILE: DESCRIPTION	GRAPHIC LOG	DEPTH SCALE	SAMPLES: LOCATION	NUMBER	TYPE	BLOW / FT.	RECOVERY	DENSITY (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS (%)	CIRCULATION (%)	PERMEABILITY (cm/sec)
Firm grayish tan weathered MANCOS SHALE; FILL				1	ST							
Firm, medium light gray silty SAND; TAILINGS (SP-SM)		5		2	SS	23	18/18					
Becoming loose to firm medium light gray silty SAND (SP-SM)		10		3	SS	9	18/18					
		15			ST			86.4	4.5	KP		1×10^{-3}
Becoming firm gray to tan silty SAND; TAILINGS (SP-SM)		20		5	ST	13	18/18					
		25		6	SS	13	18/18					
		30		7	SS	15	18/18					
				8	SS	19	18/18					

Figure C-8. Geotechnical borehole logs (continued).

Grand Junction GGJ-4 (con't)

SUBSURFACE PROFILE: DESCRIPTION	GRAPHIC LOG	DEPTH SCALE	SAMPLES: LOCATION	NUMBER	TYPE	BLOW / FT.	RECOVERY	DENSITY (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS (%)	CIRCULATION (%)	PERMEABILITY (cm/sec)
Firm, tan to gray silty SAND; TAILINGS (SP-SM)		40		9	SS	23	18/18					
		45		U	ST			91.4	9.7	NP		10^{-4}
		50										
Firm dark brown sandy SILT (ML)												
Dense sandy GRAVEL (GM)		55										
Very soft grayish tan weathered SHALE (ML) (Mancos Shale)				1	SS	50/5	5/5					
Borehole completed on October 22, 1982 at a depth of 59.5ft. Groundwater encountered at 55 ft.		60										

Grand Junction GGJ-5

Elevation 4591.4 ft

SUBSURFACE PROFILE: DESCRIPTION	GRAPHIC LOG	DEPTH SCALE	SAMPLES: LOCATION	NUMBER	TYPE	BLOW / FT.	RECOVERY	DENSITY (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS (%)	CIRCULATION (%)	PERMEABILITY (cm/sec)
Firm gray to dark brown sandy SILT, some clay; FILL					ST							
Loose medium light gray silty SAND; TAILINGS (SP-SM)		5		2	SS	8	18/18					
Firm to stiff, medium light gray silty SAND to sandy SILT TAILINGS (SM-ML)		10		3	SS	8	18/18					
Stiff brown sandy SILT (ML)												
Gravel lense		15		4	SS	15	18/18					
Dense sandy GRAVEL (GM)		20		5	SS	29	18/18					
Borehole completed on October 22, 1982 at a depth of 21'10". Groundwater encountered at 21'2".		25										
		30										

Figure C-8. Geotechnical borehole logs (continued).

Grand Junction GGJ-6 — **Elevation: 4590.3 ft**

Subsurface Profile: Description	Samples: Location Number	Type	Blow / Ft.	Recovery	Density (pcf)	Moisture Content (%)	Atterberg Limits (%)	Circulation (%)	Permeability (cm/sec)
Firm tan to brown weathered MANCOS SHALE, FILL		ST							
Firm medium light gray silty SAND; TAILINGS (SP-SM)	2	SS	21	18/18					
Becoming medium light gray-tan silty SAND (SP-SM)	1	ST			91.4	3.0	NP		4×10^{-3}
Becoming loose to firm medium light gray silty SAND. Thin bands of brown, rust colored SAND (5½" thick) (SP-SM)	4	SS	10	18/18					
Black sandy SILT to silty SAND (ML-SM)	5	SS	2	18/18					
Becoming very loose wet medium brown silty SAND (SM)									
Very dense sandy GRAVEL (GM)	6	SS	60	18/18					
Borehole completed on October 21, 1982 at a depth of 24.5. Groundwater encountered at 21'9".									

Depth scale: 5, 10, 15, 20, 25, 30

Grand Junction GGJ-7 — **Elevation: 4605.6 ft.**

Subsurface Profile: Description	Samples: Location Number	Type	Blow / Ft.	Recovery	Density (pcf)	Moisture Content (%)	Atterberg Limits (%)	Circulation (%)	Permeability (cm/sec)
Firm grayish tan weathered MANCOS SHALE, FILL	1	ST							
Firm, medium gray silty SAND; TAILINGS (SP-SM)	2	SS	11	18/18					
	3	SS	8	18/18					
Becoming loose, lavender to gray silty SAND; TAILINGS (SP-SM)	4	SS	7	18/18					
Firm, tan to brown silty SAND; TAILINGS (SP)	5	ST			91.0	3.2	NP		3×10^{-3}
	6	SS	13	18/18					
Firm, lavender to gray silty SAND to sandy SILT; TAILINGS (SM-ML)	7	SS	12	18/18					
Very hard dark brown to black gravelly silt, some sand (ML)	8	SS	50/5"	18/18		39.2	LL 40 PL 30 PI 10		

Depth scale: 5, 10, 15, 20, 25, 30

Figure C-8. Geotechnical borehole logs (continued).

Grand Junction GGJ-7 (con't)

SUBSURFACE PROFILE: DESCRIPTION	GRAPHIC LOG	DEPTH SCALE	SAMPLES: LOCATION	NUMBER	TYPE	BLOW / FT.	RECOVERY	DENSITY (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS (%)	CIRCULATION (%)	PERMEABILITY (cm/sec)
Very hard dark brown to black gravelly SILT, some SAND (ML)												
Borehole completed on October 22, 1982 at a depth of 38 ft. Groundwater encountered at 35 feet.		40										
		45										

Grand Junction GGJ-8

Elevation: Not surveyed

SUBSURFACE PROFILE: DESCRIPTION	GRAPHIC LOG	DEPTH SCALE	SAMPLES: LOCATION	NUMBER	TYPE	BLOW / FT.	RECOVERY	DENSITY (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS (%)	CIRCULATION (%)	PERMEABILITY (cm/sec)
Firm grayish tan weathered MANCOS SHALE; FILL												
				1	ST							
		5										
Loose tan to gray silty SAND; TAILINGS (SP-SM)				2	SS	6	18/18					
		10										
				3	SS	7	15/18					
Black silty SAND; TAILINGS (SP-SM)		15										
Very soft clayey SILT; SLIMES (ML)				4	ST							
Very dense sandy GRAVEL (GM)		20										
				5	SS	50/5"	5/5					
Borehole completed on October 22, 1982 at 22 ft. Groundwater no encountered during drilling.		25										
		30										
		35										

Figure C-8. Geotechnical borehole logs (continued).

5192

Sheet 1 of 1

Golder Associates

BORING LOG

Job No. 823-2076 Date 10/29/92

Name NUL-UNITEAD Location 6" R.E. - CENTER - DEED

Hole No. GWET-1 Type of Hole Rig CPT 650

Datum GRD SFC Orientation VERT

Coordinates Engr. B. DOTY

Description					
MANDOS! LOWER MAT'L - 6"			UNHAMM W/ COLLAR		HAMMER 6" 5.25' LONG. 3PM 3:09 6" TILOR RC-EMPY
PURPLE TAILS					
TAN-YELLOW & PURPLE ZONES. NOT DRY - MOIST SLIGHTLY.					
21'			3:16 3:18		
26'			24'+7" 25'+2" 25'+7"		GROUT NEED 32.5 gallon → 4.4 ft³
GO TO 6' 4 TO 9"	BRAVEL		3:20		11½'
LOTS OF FINE CHATTER 30'					12'
DRY	MANDOS SHALE				
SAMPLE COLLECTED. 35'					
3:45 BLOW-OUT WATER PRESSURE.			$\frac{\pi}{4}(.5)^2 5' \times \frac{gal}{.1337 ft^3} = 7.4$ gals		
ON 1st PENETRATING GRAVEL, NO ZONE!, HAMMER FLUSHED IN CUTTINGS CLOGGING.			$\frac{\pi}{4}\left[(\frac{6}{12})^2 - (\frac{3}{12})^2\right] \times \frac{1}{12.07} = 1.3$ gal/ft annular		
			5' of 6" hole		
			4½' of 6"-2"		
29' BLANK 4' SLOTTED BELOW DOWN.					.65 gal/½ ft.
COMPLETED 10/29/92 THROUGH 6 5/8" STEEL CASING					

RECEIVED - MKE

JUL 14 1993

UNITRA - S.F.

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Sheet 1 of 1

BORING LOG

Job No. 823-2076 Date 10/26/82

Name NUS-[illegible] Location GJ Pile - River Side

Hole No. GUG-2 Type of Hole HS UGL Rig CP-T650

Datum Ground Orientation VERT

Coordinates Engr. B. Doty

Depth	Description	Blows	Pen.	Rec.	R.Q.	Water Level	Lab Data
1	1' COVER						9:03
2	Yellow Sand						
3	7' Brown						
4							
5	17' Yellow						
6	19' GRAVEL 9:12				39' TO GRAVEL,		
7					CASING 3.5 ABOVE GRND.		
8	21' 6" 9:30				37'-9" TO SAND		
9	23' (9:32)				36'-7" TO BENTONITE		
0	24'						
1	26' - 9:49 11AM						
2							
3	32' - 11:11						
4	34' 11:17 HARD SMOOTH						
5	35'						30'½ TOP GRAVEL
6	37½ SAND Lots Lil. HARD SMOOTH						
7	38						
8	39 SOFT						
9	42 - 11:36 - MALROY SHALE						
0							

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Sheet 1 of 1

BORING LOG

Job No. 823-2076 Date 10/30/92

Name Location NEXT TO -2

Hole No. GW6-3 Type of Hole Rig CP

Datum GRIT Orientation VERT

Coordinates Engr. B DATY

No.	Description	Blows	Pen.	Rec.	R.Q.	Water Level	Remarks
1	6" COVER						7:40 HAMMERING.
2	YELLOW SAND						
3							
4	TAILINGS						95 / .82 / 13
5	-17' NO RETURN AIR HAMMERING						
6	-19'4" GRAVEL						
7							
8	-22' BSIIA AT GAM 8 23						24-8" TRACE - 5 3" TO PD.
9							
10	25' 6" SAT 6" GRAVEL 6" SAT						25 4" TO TOP GRAVEL
11		11/4	(3/12)²				29'-9" TO TOP SAND
12	27' - 8:50				4 ft/sack.		28'-4" TO TOP BENTONITE BALLS
13	30' - 8:55						
14	31½ HOLE						
15	3L : TD 8:20A 10/31/92						
16	5½ sacks -/ 5½ gal sacks ft.						
17	FILL TO WATER LEVEL.						
18							
19							
20							

Holder Associates

BORING LOG

Sheet 1 of 1

Job No. 823-2076 Date 10/31/82

Name NUC-UMMRAD Location [illegible] -2 & -3

Hole No. GWGI-4 Type of Hole Air Rotary Rig CP

Datum Ground Orientation Vert

Coordinates Engr. R [illegible]

Description		Sample No.	Pen.	Rec.	H.A.	Water Level	Lab Data
6" Cover							11:32A
Tailings. Tan	1						25½
	2						
	3						
	4						
	5						
	6				29'-7" 2-3 27'-4"		22'
22' 11:41 - 11:54	7						
Gravel	8						
Dark Rounds	9						
26' TD	0						
Collapse to 20'	1						
Drive 26" A casing to 25½	2						
2' slotted	3						
25½' Blank	4				29'-7" TD		From Table
Screen in 25' Grid	5				28.2 Well Gravel		
					25-7 Top of Screen		
	6				25-5" Top of Bentonite		
	7						
	8						
	9						
	0						

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Sheet 1 of 1

BORING LOG

No. 923-2076 Date [illegible]

Name NUS-[illegible] Location [illegible]

Hole No. [illegible] Type of Hole [illegible] Rig [illegible]

Datum [illegible] Orientation [illegible]

Coordinates Engr. [illegible]

Description	Depth	Blows	Sample	Water	Remarks	Elev.
Bed Soil						12.36
1 - Pumice						
2 - Pumice						
4 I - Clay					Cut off 6' PVC.	
Dso = 2'						
7' Lots of rock					Total Length = 12 + 2 - 1/2	
12'2" - Nodules						
13'2" = TD						12.25
Tube Slotted Bottom 2' of Casing.						
Bailed for 1 hr. Inside Steel						
Pumped for 5 min ~30 min & Came Clean						
~ 7 gpm w/ @ 11'-2" From 1' Above Bottom						
11'-4" to top of Rock.						
10'-10" to top of Sand.						
10'-1" to top of Pertinite Boulders (6' to H_2O)						

H_2S Smell

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Sheet 1 of 1

BORING LOG

Job No. 823-2016 Date 11/5/92

Name NUS-[illegible] Location Next TD-5

Hole No. GW4-6 Type of Hole [illegible] Rig CP

Datum Orientation VERT

Coordinates Engr. B. Dorr

Description								Time
1' Soil								2:02
Gravel								
3' 6" Sand								6½ Sack
3' - Bound Cut .5								+ Solid
7 - Making Water								1' cut-off
3' - 3" TD								
11'-0"	Bottom Well Screen							
6'-5"	Top of Gravel							
6'-2"	Sand							
5'-0"	Bentonite Balls							
Bored off w/ very thick Grout ~4 Gal / Sack								
1 Sack								
PVC came up ~6"								
Pump ~1 GPM for 30 min.								

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Sheet ____ of ____

BORING LOG

Job No. 823-2076 Date 15 Dec. 83

Name NIK – UMTRA Location NE GJ site

Hole No. GW-7 Type of Hole air rotary Rig CP

Datum ground surface Orientation vertical

Coordinates _____ Engr. Finley

Sh. 3 of 5	DESCRIPTION							
0	Dk. brn clayey silt				1 coring		9.4'	
4.5					2		7.2'	
4.5	Sand & Gravel	4.5					16.6'	
		6.5						
7.5							13.5	
8'	Manco Shale	15 E (EOH					18.6	
							5.5	
							12.5	
							18.0	
							7.5	
	4' PVC, 18.5'						5.5	
							7.5	
							13.0	

Sheet 1 of 1

Golder Associates

BORING LOG

Job No. 823-2076 Date 21 Dec 92

Name NUS - UMCA Location Grand Valley By Products Prop.

Hole No. GWC-7-P Type of Hole Groundwater Rig CP

Datum Ground surface Orientation Vertical

Coordinates Engr. D. Findley

Depth	Description	Elev.	Sample No.	Blows	Remarks
0	Sand & Gravel				hole caved with frac & drill & case as we go
	6" 12/21				12' casing
	8" 12/20				8" casing 19.5'
					12 mm fresh well install
17	Mancos Shale				
	EOH 17.5'				casing broke @ well 19' of casing in hole
					SU 2"
	19.7 − 9.9 = 29.6 − 12.9	17.10 − 8.5 = 8.5			19.7 − 2.5 = 16.5
17'	Screen Cap	17.5			

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BORING LOG

Sheet ____ of ____

Job No. 823-2076 Date 4 Jan 83

Name AVCO-UNITEK Location Edmonton's Wrecking Yard

Hole No. GWRS-9 Type of Hole air rotary Rig CP

Datum Ground surface Orientation vertical

Coordinates Engr. D. Findlay

16° 0245

Description	Lab Data
0 silty, fine sandy GRAVEL	lead 12'
0.5 silty clay & sandy sandier w depth	
7.0 GRAVEL	25.5 / 12 / 13.5 steel casing
12.5	30 / 12 / 18 / 12 / 6
16.5 / 17 MANGES	17.5 / 12.3 / 5.2
17	slotted 10.5
2.5	12.3' screen
4.5	18.0 / 7 / 11.0 / 12 / 12 / 19
5.5	18.0
15.5 / 16.5	7.5
10.2	17.5 / 12.3 / 5.2
13.5	10.5
17.5 / 12.3 / 5.2	7.5
16	12.3 / 17.5
17.5	15.0
18' FOIL	18 / 7

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BORING LOG

Sheet ____ of ____

Job No. P23-2026 Date 4 Jan 87

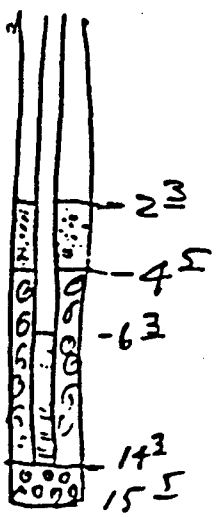
Name NJS - UMTRA Location Fishman's Wrecking Yard

Hole No. GWCT-10 Type of Hole Air Rotary Rig CP

Datum Ground Surface Orientation Vertical

Coordinates ____ Engr. O. Findlay

Depth	Description	Sample No.	Pen.	Rec.	Blows	Well Detail	Lab Data
0	Silty clay with some fine sand				lead	2'	
6	Sand & Gravel				caving in gravels @ 10' spilled from trench & remain. [illegible] drill & drive		
7' ∇						7' screen	
light	lt. brown med.-fn. sand					8' screen section	
13.5	Manos Shale				15.5 to 2.5 = 13.0		22 30 12 15



LOG OF BOREHOLE EGJ-1

LOCATION: Grand Junction Pike
ELEVATION:

FIGURE:
PAGE 1 OF 1

SUBSURFACE PROFILE: DESCRIPTION	GRAPHIC LOG	DEPTH SCALE	SAMPLE	TEST ZONE	PERMEABILITY cm/sec X10⁻⁵	BLOWS/FT.	CIRCULATION (%)	RECOVERY	RQD (%)	DENSITY (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS (%)
0-6" [illegible] clay, [illegible] tan												
Loose, red light gray silty Sand (SM)		5		1, 2		5/6, 6		18/18				
Loose to Firm, Gray & Tan streaked silty SAND (SM)		10		3		7/4, 10		18/18				
red light gray silty SAND (SM)		15		4								
brown SANDY SILTY LAYER ABOVE gravel (ML-SM)												
GRAVEL, sand (GM)				5		50/4		6/6				
EOH on 10-21-82 at [illegible]		20, 25, 30										

REMARKS

Golder Associates

J. Byelle

LOG OF BOREHOLE GGJ-2

LOCATION: Grand Junction P.1e
ELEVATION:

FIGURE:
PAGE 1 OF 1

SUBSURFACE PROFILE: DESCRIPTION	GRAPHIC LOG	DEPTH SCALE	SAMPLE	TEST ZONE	PERMEABILITY cm/sec X10⁻⁶	BLOWS/FT.	CIRCULATION (%)	RECOVERY	RQD (%)	DENSITY (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS (%)
0-6" [illegible]												
Loose, med light grey, silty sand (SM)				1								
			X	2		2/1/5 7		18/18				
		5										
uniform wetness and soil content												
Loose, med grey silty sand (SM)			X	3		3/4/4 8		18/18				
		10										
gravel zone												
slime zone												
Lawerdce, slime very viscous & sticky				4								
		15										
Loose, med grey silty sand (SM)			X	5		2/1/3 6		18/18				
		20										
? dead to red brown: FIRM, silty SAND to sandy SILT BANDS 1-2" thick (ML-SM)			X	6		7/9/12 21		18/18				
		25										
GRAVEL			X	7		5/10/18 28		18/18				
		30										
EOH on 10-21-82 @ 33'												

REMARKS INSTALLED STANDPIPE

LOG OF BOREHOLE EGJ-2

LOCATION: Grand Junction ~~Site~~ Site
ELEVATION:

FIGURE:
PAGE 1 OF 1

SUBSURFACE PROFILE: DESCRIPTION	GRAPHIC LOG	DEPTH SCALE	SAMPLE	TEST ZONE	PERMEABILITY cm/sec X10⁻⁵	BLOWS/FT.	CIRCULATION (%)	RECOVERY	RQD (%)	DENSITY (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS (%)
From grayish tan moving SILTY FILL ~~to gray organic clay~~												
Loose/med. light gray Silty SAND, increase in moisture and silt content with depth; TAILINGS (SP)		5		1	ST							
				2	SS	2/2/2 (7)		18/18				
		10		3	SS	3/4/4 (8)		18/18				
~~Gravel zone~~ Very soft, clayey silt, favorable, ~~slow~~ very resource & sticky; SLIMES		15		4	ST					104.1	37	N.P.*
Loose/med gray silty ~~SAND~~, ~~(SP)~~ TAILINGS (SP)		20		5	SS	3/4/5 (9)		18/18				
Becoming GRAY, silty SAND to ~~tan~~ moist SILT, ~~layers 1-2" thick~~ (ML-SP)		25		6	SS	7/9/12 (21)		18/18				
~~Gravel~~ Dense sandy GRAVEL (GM)		30		7	SS	5/11/17 (28)		18/18				

Borehole completed on October 21, 1982 at a depth of 53 ft. Groundwater encountered at 24'8"

No Plasticity

~~Piezometer~~ Standpipe piezometer installed to 53 ft. in depth

Golder Associates

LOG OF BOREHOLE GGJ-3

LOCATION: Grand Junction Pile
ELEVATION:

FIGURE:
PAGE 1 OF 1

SUBSURFACE PROFILE: DESCRIPTION	GRAPHIC LOG	DEPTH SCALE	SAMPLE	TEST ZONE	PERMEABILITY cm/sec X10^{-8}	BLOWS/FT.	CIRCULATION (%)	RECOVERY	RQD (%)	DENSITY (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS (%)
0-6 [illegible] rocks [illegible]												
Loose, med gray silty SAND (SM)		5	1, 2			8/11/12		18/18				
lavender colored silts												
alt. gray & lavender bands of sandy silt and silty sand (SM-ML)		10	3			8/12/4		18/18				
med gray silty SAND (SM)		15	4									
lavender silts (ML) very												
loose to very loose sandy silt and silty sand alt. bands bleeds to gray color (SM-ML)		20	5			1/1/2/4		18/18				
silts lavender color, very [illegible] (ML)												
sandy layer overtop of gravel Gravel (GM)		25	6			24/24/20		18/18				
EOH on 10-21-82 @ 27'		30										

REMARKS

LOG OF BOREHOLE GAJ-6

LOCATION: Grand Junction File
ELEVATION:

FIGURE:
PAGE 1 OF 1

SUBSURFACE PROFILE: DESCRIPTION	GRAPHIC LOG	DEPTH SCALE	SAMPLE	TEST ZONE	PERMEABILITY cm/sec X10^{-6}	BLOWS/FT.	CIRCULATION (%)	RECOVERY	RQD (%)	DENSITY (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS (%)
0-6" gravel, coarse sand, dark brown				1								
Firm, med light gray silty SAND (SM)		5		2		4/2/4 (2)		18/18				
med light gray-tan silty Sand (SM)		10		3								
Loose to firm med. light gray silty Sand (SM) thin bands of brown, rust colored sand (< 1/4")		15		4		3/4/6 (10)		18/18				
Black sandy silt to silty SAND (ML-SM)		20		5		1/1/1 (2)		18/18				
Very loose, wet, med brown silty SAND (SM)				6		5/2/2 (4)		18/18				
Gravel		25				(60)						
EOH on 10-21-82 at 24.5'		30										

REMARKS

LOG OF BOREHOLE GGJ-5

LOCATION: Grand Junction Pile
ELEVATION:

FIGURE:
PAGE 1 OF 1

SUBSURFACE PROFILE: DESCRIPTION (grp to)	GRAPHIC LOG	DEPTH SCALE	SAMPLE	TEST ZONE	PERMEABILITY cm/sec X10^{-6}	BLOWS/FT.	CIRCULATION (%)	RECOVERY	RQD (%)	DENSITY (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS (%)
0-6" of dark brown sandy silt to clay cover (Hauling Pile)?					①							
med light grey silty sand (SM) TAILINGS					②	4/4/4		18/18				
Loose, med. light grey silty sand (SM)		5				③						
Firm to stiff silty sand to sandy silt, med. light grey (SM-ML)		10		③		4/4/4 ④		18/18				
Stiff to very stiff, med. brown sandy silt (ML) NATURAL MATERIAL		15		④		7/15 15		18/18				
gravel lense, grading changed w/more sand						9/17						
GRAVEL		20		⑤		29		18/18				
EOH on 10-21-82 at 21' 10"		25										
		30										

REMARKS

Golder Associates

LOG OF BOREHOLE

LOCATION: [illegible]
ELEVATION:

FIGURE:
PAGE 1 OF 2

SUBSURFACE PROFILE: DESCRIPTION	GRAPHIC LOG	DEPTH SCALE	SAMPLE	TEST ZONE	PERMEABILITY cm/sec X10^{-6}	BLOWS/FT.	CIRCULATION (%)	RECOVERY	RQD (%)	DENSITY (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS (%)
0-6=8 [illegible] maroon [illegible]												
Firm, med gray silty sand (SM)		5	① ②			4/4/4 (11)		16/16				
more lavender colors												
Loose to Firm lavender to gray silty sand (SM)		10	③			2/4/4 (8)		18/18				
Loose, lavender to gray silty sand (SM)		15	④			2/3/4 (7)		18/18				
Tan, [illegible] SAND												
tan to brown silty sand (SM)		20	⑤									
Firm, tan to gray silty sand (SM)		25	⑥			4/4/5 (13)		19/18				
Firm, lavender to gray silty sand to sandy silt (SM-ML)		30	⑦			4/4/5 (12)		18/18				
Dk brown to black sandy silt + gravel			⑧			2/4/4 (8)		18/18				

REMARKS

LOG OF BOREHOLE EEJ-7

LOCATION: Grand Junction ~~Site~~ Site
ELEVATION:
FIGURE:
PAGE 1 OF 2

SUBSURFACE PROFILE: DESCRIPTION	GRAPHIC LOG	DEPTH SCALE	SAMPLE	TEST ZONE	PERMEABILITY cm/sec X10^{-8}	BLOWS/FT.	CIRCULATION (%)	RECOVERY	Permeability ~~RQD (%)~~	DENSITY (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS (%)
Tan, ~~SILTY~~ fine sand to silty sand ~~(SM)~~ ~~(SP)~~ ~~with some gravel~~												
			①	ST								
Fine, med gray silty sand TAILINGS ~~(SM)~~ (SP) ~~non-cohesive/cohesionless~~		5	②	SS		4/6/11		18/18				
~~Fine to fine silty gray silty sand (SM)~~		10	③	SS		2/4/4		18/18				
Becoming loose, lavender to gray silty ~~SAND (SP)~~; TAILINGS (SP)		15	④	SS		2/6/7		18/18				
~~Fine, [illegible]~~ Fine tan to brown silty ~~SAND (SM)~~; TAILINGS (SP)		20	⑤	ST					5 x10^{-4}	91.0	3.2	N.P.
~~Fine, [illegible] silty sand (SM)~~		25	⑥	SS		6/11/13		18/18				
Fine, lavender to gray silty SAND to sandy ~~SILT (SM)~~; TAILINGS (SM-ML)		30	⑦	SS		4/5/12		18/18				
Very dense dark brown to black silty GRAVEL, some sand (GM)			⑧	SS		12/24/5		18/18				

* Determined on a relatively undisturbed sample by the laboratory

LOG OF BOREHOLE EGJ-7

LOCATION: Grand Junction Pile
ELEVATION:

FIGURE:
PAGE 2 OF 2

SUBSURFACE PROFILE												
DESCRIPTION	GRAPHIC LOG	DEPTH SCALE	SAMPLE	TEST ZONE	PERMEABILITY cm/sec X10^{-5}	BLOWS/FT.	CIRCULATION (%)	RECOVERY	RQD (%)	DENSITY (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS (%)
very dense dark brown to black silty GRAVEL, some sand (GM)												
~~50 HC 38'~~ ~~on 10-22-82~~		40										
Borehole completed on October 22, 1982 at depth of 22 ft. Groundwater encountered at 35 ft		45										

REMARKS
Multiple piezometer installed to 56 ft. in depth

Golder Associates

J. Rozelle

INTRODUCTION

Daniel B. Stephens & Associates, Inc. (DBS&A) was requested by Mr. Bill Parks of Jacobs Engineering Group in Albuquerque, New Mexico to perform laboratory analysis of physical and hydraulic properties as outlined in the written communication of December 8, 1986 (Subcontract No. 34-6704-S-88-0054, Delivery Order 005). The scope of work included the following tasks:

1. Sample Preparation
2. Compaction Tests (ASTM 698)
3. Initial Moisture Content, Dry Bulk Density, and Porosity
4. Saturated Hydraulic Conductivity
5. Moisture Characteristics by the Pressure Plate Method
6. Particle Size Analysis by Sieve and Hydrometer Methods
7. Particle Density by Water Pycnometer Method

SUMMARY

DBS&A has completed the laboratory analyses as sumamrized in Table 1. Table 2 through 8 summarize the soil physical and hydraulic properties. Raw laboratory data are contained in Appendices A through F. Appendix G contains descriptions of the laboratory methods used for this suite of analyses.

Seven primary composite main tailings pile samples were delivered to DBS&A on November 21, 1989, and 5 primary composite vicinity property samples were delivered to DBS&A on January 15, 1989. A standard procter compaction test was performed on a representative sample from each primary sample. This compaction test data (Table 3) was then used to prepare samples for tests listed in Table 1. Samples for testing were repacked to approximately 90% of the maximum dry bulk density and within 0 to -5% of the optimum water content. Duplicate samples were prepared from all primary samples. Duplicate samples from the same primary sample are grouped together in Tables 1 and 2.

The samples were repacked to the specified bulk density by means of a piston (see Appendix G for sample preparation procedure). All samples were packed into 6.2 cm diameter by 1.9 cm brass rings. The thin samples facilitated timely completion of drainage-type tests. However, during testing and moving samples between apparatus, minor sample loss may have occurred. Because

the volume of the sample ring is relatively small, 57.36 cm^3, there are small inherent experimental errors in computations of properties based upon soil mass and volume, such as water content, porosity, and bulk density.

In this report the dry weight obtained at the completion of moisture retention characteristic testing is used in all calculations requiring a dry weight of a sample. Because some sample loss inevitably occurs during the course of the experiment, the use of this dry weight causes the initial water content to be slightly higher, initial densities slightly lower, and porosities slightly higher (Table 4) than true initial values. True values of initial water content and density are very close to optimum water contents and 90% of maximum proctor densities (Table 3). All samples were prepared to achieve these latter water content and density values.

It should also be pointed out that during the transfer of samples 5-1 and 5-2 from permeameters to the pressure plate extractors, a significant amount of soil was accidently lost from the retainer rings. Due to the volume and weight loss, moisture characteristic analyses reported for these samples are based on the final volume and weight of the sample. Jacobs was not charged for these analyses.

Initial dry weights, calculated from optimum water contents and the initial weights of the repacked samples, were not used in D.O. 005 calculations because in DBS&A's judgement those initial dry weights would unfairly shift moisture retention data towards lower saturations. DBS&A laboratory technicians have found that

most sample loss occurs during the transfer of samples out of permeameters and prior to moisture retention characteristic testing. Therefore, the use of the dry weight of samples obtained after the completion of moisture retention testing is more appropriate for moisture retention data analysis than using the higher initial dry weights calculated from packing data.

In order to minimize sample loss in future testing, DBS&A recommends (especially for samples that are difficult to contain) that both saturated hydraulic conductivity tests and the lower pressure steps in moisture retention characteristic testing be conducted in SPOC's. This would eliminate sample loss during the transfer of samples from permeameters to SPOCs. DBS&A also recommends against using the standard pressure plate apparatus except at high pressure steps (greater than 5 bars). Transferring samples in and out of the pressure plate apparatus at each pressure step may result in additional significant sample loss which can be avoided by using SPOC's.

All testing results were evaluated subjectively for consistency and reasonableness. Most of the results appear to be reasonably representative of the textural class and density of the material tested. However, there are some inconsistencies in data sets (in addition to weight loss related problems) which will be discussed below.

In most cases the calculated porosities for main tailings pile samples are less than the saturated volumetric moisture content achieved in moisture retention characteristic testing (Table 6). The only exception being duplicate samples 5-11 and 5-12. In

contrast, agreement between calculated and achieved porosities of vicinity property samples is considerably better than found for main tailings pile samples. The reasons for these discrepancies is not known. However, DBS&A laboratory technicians noted that a thin film of water remained on the upper surface of main tailings pile samples after they were removed from permeameters. In order to eliminate this problem in the future, DBS&A recommends that upon completion of permeability testing, samples (especially tailings) be subjected to a few centimeters of negative head to remove this film of excess water before beginning moisture retention characteristic testing.

Saturated hydraulic conductivity values in general appear reasonable for the textural type and packing density achieved. In the cases where the hydraulic conductivity of one duplicate sample is more than an order of magnitude higher than other duplicates (eq. Samples 5-11 and 5-18) it is probable that the high hydraulic conductivity is an artifact due to preferential flow along the walls of the sample ring. However, it should be noted that some differences in duplicate sample properties are inevitable due to possible slight variability in texture and packing.

In most instances moisture retention characteristic curves also appear to be generally consistent with the texture and packing density of the material tested. Good agreement is generally found between curves for duplicate samples at all pressure steps, except for several main tailings pile duplicates (5-3 and 5-4, 5-11 and 5-12, 5-13 and 5-14) at -15 bars. The significant differences found at this pressure may result from poor hydraulic contact between one

of duplicates (the sample with the higher -15 bar moisture content) and the pressure plate; and/or sample loss which occurred as a result of removing the sample for weighing. DBS&A routinely takes steps to minimize potential hydraulic contact problems by placing heavy lead weights on the top of samples and using silica flour (or diatomaceous earth) and filter paper between the sample and the porous plate. This filter paper (in some cases cheese cloth) also helps to reduce sample loss caused by samples sticking to the ceramic plate. These problems could possibly be minimized even further by utilizing SPOC's to reduce sample disturbance during permeability and low pressure moisture characteristic testing.

Please note that an error was made by DBS&A lab personnel in recording the -0.3 bar pressure step weight of sample 5-1. Fortunately, the general slope of the moisture retention characteristic curve can be determined from adjacent valid data points. Jacobs will not be charged for this pressure plate data point.

Finally, it should be noted that vicinity property samples 5-16 through 5-24 were wet sieved on the No. 200 screen prior to dry sieving. This was done at the request of Jacobs' technical personnel (Telephone Communication of March 13, 1990) when it was noted that dry sieving (only) of tailings materials was not reproducible. At the time of notification, dry sieving and hydrometer analyses had already been completed for main tailings pile samples 5-1 through 5-14. Therefore, these dry sieve values and corresponding hydrometer analyses are listed in this report.

Wet sieve and hydrometer values for these primary main tailings pile samples will be reported under Delivery Order 007.

DBS&A does not assume any repsonsibility for interpretations or analyses based on the data presented in this report, nor can we guarantee that these data are fully representative of the undisturbed materials at the field scale. We recommend that careful evaluation of these laboratory results be made for your particular application.

Table 1. Summary of Tests Performed

Sample No.	Saturated Hydraulic Conductivity	Moisture Characteristics	Initial Moisture Content	Dry Bulk Density	Calculated Porosity	Particle Size Distribution		Particle Density
		Pressure Plate				Sieve	Hydrometer	
5-1	x	x		x	x	x		x
5-2	x	x		x	x	x		x
5-3	x	x	x	x	x	x	x	x
5-4	x	x	x	x	x	x	x	x
5-5	x	x	x	x	x	x		x
5-6	x	x	x	x	x	x		x
5-7	x	x	x	x	x	x		x
5-8	x	x	x	x	x	x		x
5-9	x	x	x	x	x	x		x
5-10	x	x	x	x	x	x		x
5-11	x	x	x	x	x	x	x	x
5-12	x	x	x	x	x	x	x	x
5-13	x	x	x	x	x	x	x	x
5-14	x	x	x	x	x	x	x	x
5-15	x	x	x	x	x	x	x	x
5-16	x	x	x	x	x	x	x	x
5-17	x	x	x	x	x	x	x	x
5-18	x	x	x	x	x	x	x	x

Table 1. Summary of Tests Performed (Continued)

Sample No.	Saturated Hydraulic Conductivity	Moisture Characteristics	Initial Moisture Content	Dry Bulk Density	Calculated Porosity	Particle Size Distribution		Particle Density
		Pressure Plate				Sieve	Hydrometer	
5-19	x	x	x	x	x	x	x	x
5-20	x	x	x	x	x	x	x	x
5-21	x	x	x	x	x	x	x	x
5-22	x	x	x	x	x	x	x	x
5-23	x	x	x	x	x	x	x	x
5-24	x	x	x	x	x	x	x	x

Table 2. Summary of Sample Characteristics

Sample No.	JEG Container Identification	Depth	Color	Visual Texture	ASTM D 2488-84 Classification	Comments
5-1 5-2	GRJ-01 500 (A)		brown	sand	SP	packed with plunger to ρ_b=1.50 g/cc @ w_{opt} =10.6%
5-3 5-4	GRJ-01 501 (B)		grayish-purple	silty sand	SM	packed with plunger to ρ_b=1.46 g/cc @ w_{opt}=19.1%
5-5 5-6	GRJ-01 502 (C)		purplish-brown	silty sand	SM-SP	packed with plunger to ρ_b=1.57 g/cc @ w_{opt} =16.1%
5-7 5-8	GRJ-01 503 (D)		brown	sand	SP	packed with plunger to ρ_b=1.60 g/cc @ w_{opt} =12.7%
5-9 5-10	GRJ-01 601		grayish-brown	sand	SP	packed with plunger to ρ_b=1.70 g/cc @ w_{opt} =12.1%
5-11 5-12	GRJ-01 602		grayish-purple	silty sand	SM	packed with plunger to ρ_b=1.57 g/cc @ w_{opt} =16.6%
5-13 5-14	GRJ-01 603		grayish-purple	silty sand	SM	packed with plunger to ρ_b=1.55 g/cc @ w_{opt} =18.1%
5-15 5-16	Rs-3 Composite	0-46'	brown	sandy silt with clay	ML	packed with plunger to ρ_b=1.69 g/cc @ w_{opt}=13.3%
5-17 5-18	Rs-5 Composite	0-34'	brown	sandy silt with clay	ML	packed with plunger to ρ_b=1.67 g/cc @ w_{opt}=14.2%

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Table 2. Summary of Sample Characteristics (Continued)

Sample No.	JEG Container Identification	Depth	Color	Visual Texture	ASTM D 2488-84 Classification	Comments
5-19 5-20	Rs-6 Composite	0-39'	brown	clayey silt	ML-MH	packed with plunger to ρ_b=1.67 g/cc @ w_{opt}=14.7
5-21 5-22	Rs-7 Composite	0-35'	brown	clayey silt	ML-MH	packed with plunger to ρ_b=1.68 g/cc @ w_{opt}=13.6
5-23 5-24	Rs-10 Composite	0-44'	brown	sandy silt with clay	ML	packed with plunger to ρ_b=1.65 g/cc @ w_{opt}=13.9%

Table 3. Summary of Compaction Data

JEG Container Identification	Maximum Dry Density (g/cc)	Optimum Gravimetric Moisture Content (%,g/g)
GRJ-01 500 A	1.67	10.6
GRJ-01 501 B	1.62	19.1
GRJ-01 502 C	1.74	16.1
GRJ-01 503 D	1.78	12.7
GRJ-01 503 D	1.89	12.1
GRJ-01 601	1.74	16.6
GRJ-01 603	1.72	18.1
Rs-3	1.88	13.6
Rs-5	1.85	14.6
Rs-6	1.86	15.1
Rs-7	1.85	13.9
Rs-10	1.83	14.3

Table 4. Summary of Initial Moisture Content, Dry Bulk Density, and Porosity

Sample No.	Initial Moisture Content Gravimetric (%, g/g)	Initial Moisture Content Volumetric (%, cm^3/cm^3)	Dry Bulk Density (g/cc)	Calculated Porosity (%)
5-1*	--	--	1.69	36.61
5-2*	--	--	1.57	41.22
5-3	23.42	33.01	1.41	48.57
5-4	21.85	31.40	1.44	47.56
5-5	19.75	30.01	1.52	45.16
5-6	19.42	29.85	1.54	44.52
5-7	19.46	29.53	1.52	44.43
5-8	16.93	26.08	1.54	43.57
5-9	16.91	27.49	1.63	38.88
5-10	15.51	25.34	1.63	38.59
5-11	30.60	42.52	1.39	50.01
5-12	24.58	36.51	1.49	46.56
5-13	24.57	35.78	1.46	45.66
5-14	22.57	33.75	1.50	44.20
5-15	15.59	25.80	1.66	37.78
5-16	14.32	23.72	1.66	37.75
5-17	17.90	29.04	1.62	38.08
5-18	17.91	29.16	1.63	37.85
5-19	17.17	28.26	1.65	37.67
5-20	16.98	27.92	1.64	37.72
5-21	16.27	26.83	1.65	36.81
5-22	16.23	26.79	1.65	36.75
5-23	16.91	27.32	1.62	38.10
5-24	16.50	26.65	1.61	38.13

* Due to sample loss after permeability testing, θ_i cannot be accurately determined and ρ_b & n are based on the lesser volumes.

Table 5. Summary of Saturated Hydraulic Conductivity Tests

Sample No.	K_s (cm/sec)	Method of Analysis: Constant Head	Method of Analysis: Falling Head	
5-1	4.5×10^{-3}	x		
5-2	4.5×10^{-3}	x		
5-3	1.5×10^{-5}		x	
5-4	1.4×10^{-5}		x	
5-5	1.9×10^{-4}		x	
5-6	1.6×10^{-4}		x	
5-7	6.5×10^{-4}	x		
5-8	8.2×10^{-4}	x		
5-9	7.1×10^{-4}	x		
5-10	5.0×10^{-4}	x		
5-11	1.8×10^{-3}	x		
5-12	5.1×10^{-5}		x	$\bar{x} = 2.4 \times 10^{-4}$
5-13	3.8×10^{-5}		x	↑ TAILS
5-14	2.6×10^{-5}		x	
5-15	1.2×10^{-4}		x	↓ VP
5-16	9.9×10^{-5}		x	
5-17	8.2×10^{-7}		x	
5-18	5.8×10^{-5}		x	$\bar{x} = 1.0 \times 10^{-5}$
5-19	1.4×10^{-5}		x	
5-20	9.1×10^{-6}		x	
5-21	1.6×10^{-7}		x	
5-22	6.0×10^{-7}		x	
5-23	4.4×10^{-5}		x	
5-24	3.5×10^{-5}		x	

Table 6. Summary of Moisture Characteristics for the Initial Drainage Curve

Sample No.	Pressure Head (-cm of water)	Moisture Content (% cm^3/cm^3)
5-1	0.0	45.66
	112.2	16.49
	305.9	1.98*
	1019.8	6.89
	3059.4	5.19
	7138.6	4.38
	15399.0	3.77
5-2	0.0	45.17
	112.2	20.15
	305.9	8.70
	1019.8	7.04
	3059.4	5.30
	7138.6	4.60
	15399.0	3.66
5-3	0.0	50.36
	112.2	46.27
	305.9	38.91
	1019.8	33.22
	3059.4	25.65
	7138.6	24.33
	15399.0	24.16
5-4	0.0	51.35
	112.2	47.28
	305.9	41.07
	1019.8	34.69
	3059.4	26.20
	7138.6	23.88
	15399.0	17.87
5-5	0.0	47.19
	112.2	30.62
	305.9	25.49
	1019.8	22.00
	3059.4	17.36
	7138.6	16.54
	15399.0	14.28

* measurement error

Table 6. Summary of Moisture Characteristics for the Initial Drainage Curve (Continued)

Sample No.	Pressure Head (-cm of water)	Moisture Content (% cm^3/cm^3)
5-6	0.0	46.71
	112.2	32.16
	305.9	26.47
	1019.8	23.21
	3059.4	18.14
	7138.6	16.53
	15399.0	12.98
5-7	0.0	45.06
	112.2	19.37
	305.9	13.09
	1019.8	10.06
	3059.4	7.57
	7138.6	6.87
	15399.0	6.00
5-8	0.0	46.37
	112.2	24.94
	305.9	14.06
	1019.8	10.98
	3059.4	8.33
	7138.6	7.64
	15399.0	5.95
5-9	0.0	42.21
	112.2	20.98
	305.9	17.69
	1019.8	14.98
	3059.4	11.48
	7138.6	10.25
	15399.0	9.31
5-10	0.0	43.90
	112.2	20.28
	305.9	17.45
	1019.8	14.49
	3059.4	11.33
	7138.6	10.27
	15399.0	8.93

Table 6. Summary of Moisture Characteristics for the Initial Drainage Curve (Continued)

Sample No.	Pressure Head (-cm of water)	Moisture Content (% cm^3/cm^3)
5-11	0.0	48.34
	112.2	34.35
	305.9	32.49
	1019.8	29.72
	3059.4	22.13
	7138.6	20.60
	15399.0	19.38
5-12	0.0	45.27
	112.2	35.60
	305.9	33.56
	1019.8	31.14
	3059.4	25.80
	7138.6	24.46
	15399.0	24.76
5-13	0.0	46.48
	112.2	37.49
	305.9	35.57
	1019.8	32.68
	3059.4	27.95
	7138.6	26.69
	15399.0	25.77
5-14	0.0	47.39
	112.2	39.10
	305.9	35.24
	1019.8	32.05
	3059.4	26.64
	7138.6	24.20
	15399.0	19.45
5-15	0.0	40.69
	102.0	33.11
	305.9	29.70
	1019.8	26.71
	3059.4	26.09
	7138.6	23.80
	15297.0	23.25

Table 6. Summary of Moisture Characteristics for the Initial Drainage Curve (Continued)

Sample No.	Pressure Head (-cm of water)	Moisture Content (% cm^3/cm^3)
5-16	0.0	39.78
	102.0	33.16
	305.9	29.04
	1019.8	25.60
	3059.4	25.50
	7138.6	23.25
	15297.0	22.85
5-17	0.0	37.53
	102.0	33.79
	305.9	31.82
	1019.8	29.36
	3059.4	29.17
	7138.6	27.96
	15297.0	28.00
5-18	0.0	39.84
	102.0	34.27
	305.9	31.93
	1019.8	29.16
	3059.4	28.39
	7138.6	27.35
	15297.0	25.85
5-19	0.0	39.85
	102.0	36.29
	305.9	33.62
	1019.8	30.22
	3059.4	29.38
	7138.6	28.46
	15297.0	27.53
5-20	0.0	39.41
	102.0	36.36
	305.9	33.67
	1019.8	30.29
	3059.4	28.47
	7138.6	26.90
	15297.0	26.50

Table 6. Summary of Moisture Characteristics for the Initial Drainage Curve (Continued)

Sample No.	Pressure Head (-cm of water)	Moisture Content (% cm^3/cm^3)
5-21	0.0	36.72
	102.0	35.57
	305.9	33.26
	1019.8	29.91
	3059.4	26.67
	7138.6	25.14
	15297.0	25.05
5-22	0.0	38.92
	102.0	35.11
	305.9	32.76
	1019.8	29.36
	3059.4	28.40
	7138.6	26.67
	15297.0	25.57
5-23	0.0	39.69
	102.0	34.01
	305.9	30.38
	1019.8	27.05
	3059.4	25.37
	7138.6	24.50
	15297.0	23.12
5-24	0.0	37.69
	102.0	33.41
	305.9	30.45
	1019.8	27.55
	3059.4	25.43
	7138.6	24.57
	15297.0	23.33

Table 7. Summary of Particle Size Characteristics

Sample No.	d_{10} (mm)	d_{50} (mm)	d_{60} (mm)	C_u	C_c
5-1	0.09	0.18	0.21	2.3	1.0
5-2	0.089	0.18	0.22	2.5	1.0
5-3	0.0018	0.13	0.18	100.0	20.3
5-4	0.008	0.14	0.17	21.3	5.8
5-5	*	0.19	0.24	--	--
5-6	*	0.17	0.21	--	--
5-7	0.079	0.17	0.19	2.4	1.1
5-8	*	0.17	0.20	--	--
5-9	*	0.18	0.21	--	--
5-10	0.076	0.19	0.22	2.9	1.2
5-11	0.006	0.16	0.20	33.3	6.7
5-12	0.008	0.12	0.16	20.0	5.1
5-13	0.0075	0.14	0.18	24.0	4.5
5-14	0.0067	0.16	0.21	31.3	4.7
5-15	*	0.026	0.051	--	--
5-16	*	0.030	0.052	--	--
5-17	*	0.016	0.034	--	--
5-18	*	0.017	0.038	--	--
5-19	*	0.010	0.021	--	--
5-20	*	0.010	0.021	--	--
5-21	*	0.012	0.025	--	--
5-22	*	0.013	0.030	--	--
5-23	*	0.043	0.090	--	--
5-24	*	0.038	0.090	--	--

* particle diameters this size and smaller were not achieved in the test period specified

-- values are dependent on particle diameters that were not achieved

$C_u = d_{60}/d_{10}$

$$C_c = \frac{(d_{30})^2}{(d_{10})(d_{60})}$$

Table 8. Summary of Particle Density Tests

Sample No.	Particle Density (g/cc)	Average Particle Density (g/cc)
5-1	2.67	2.66
5-2	2.64	
5-3	2.76	2.74
5-4	2.72	
5-5	2.76	2.77
5-6	2.78	
5-7	2.70	2.73
5-8	2.76	
5-9	2.68	2.66
5-10	2.64	
5-11	2.82	2.78
5-12	2.74	
5-13	2.67	2.68
5-14	2.68	
5-15	2.64	2.66
5-16	2.67	
5-17	2.61	2.62
5-18	2.63	
5-19	2.61	2.64
5-20	2.67	
5-21	2.60	2.61
5-22	2.61	
5-23	2.62	2.61
5-24	2.59	

Appendix A: COMPACTION TESTS

Summary of Compaction Data

JEG Container Identification	Maximum Dry Density (g/cc)	Optimum Gravimetric Moisture Content (%,g/g)
GRJ-01 500 A	1.67	10.6
GRJ-01 501 B	1.62	19.1
GRJ-01 502 C	1.74	16.1
GRJ-01 503 D	1.78	12.7
GRJ-01 503 D	1.89	12.1
GRJ-01 601	1.74	16.6
GRJ-01 603	1.72	18.1
Rs-3	1.88	13.6
Rs-5	1.85	14.6
Rs-6	1.86	15.1
Rs-7	1.85	13.9
Rs-10	1.83	14.3

COMPACTION TEST

JOB NAME: JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER: 89-L-144
SAMPLE NUMBER: GRJ 01 500A
DEPTH: UNKNOWN
TEST DATE: 11/22/89

MOLD VOLUME: 944

DENSITY

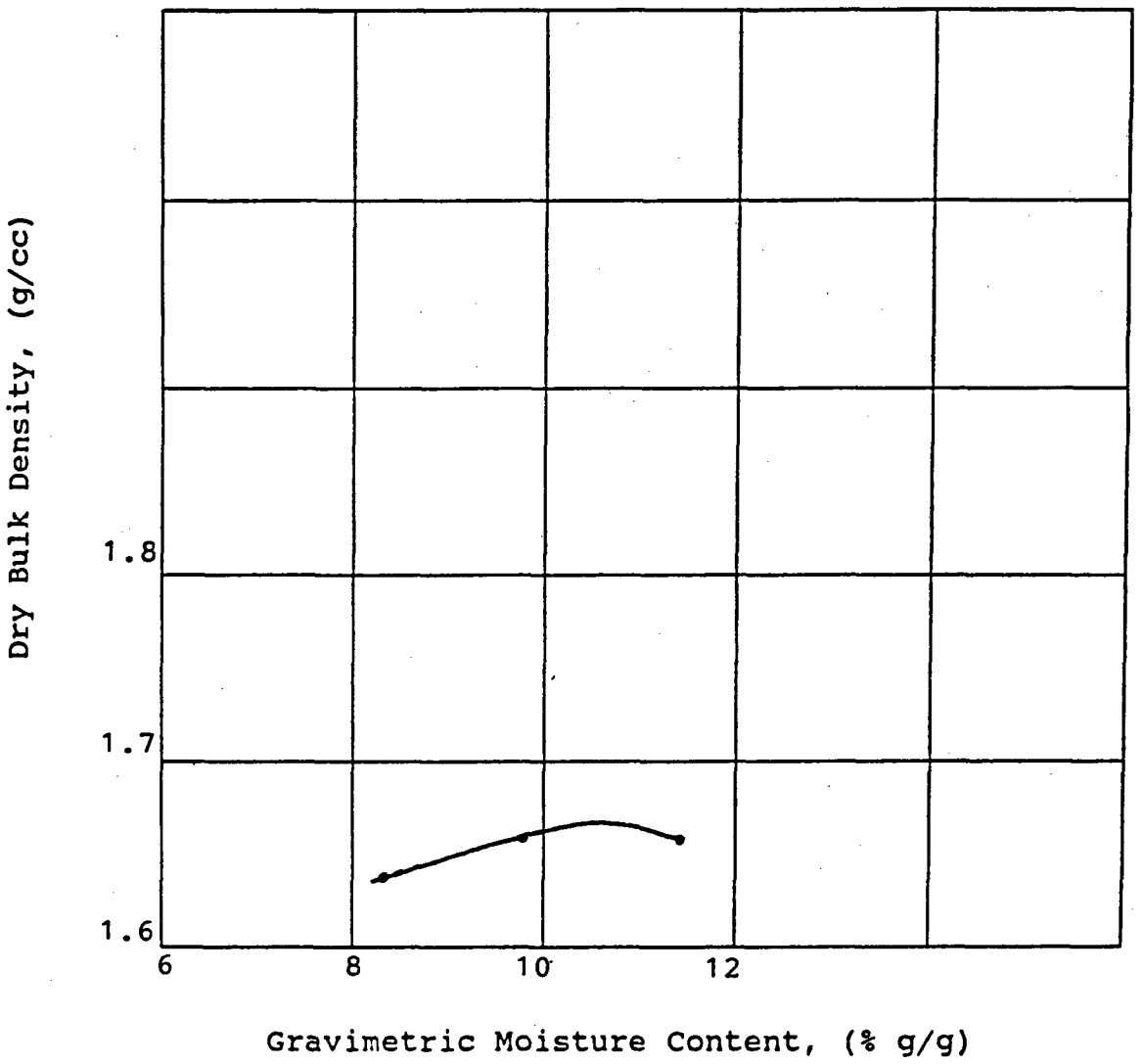
DETERMINATION NUMBER	1	2	3
WT OF PAN (g)	4200	4200	4200
WT. OF COMPACTED SOIL + PAN (g)	5875	5920	5945
WT OF COMPACTED SOIL (g)	1675	1720	1745
WET DENSITY (g/cc)	1.77	1.82	1.85
DRY DENSITY (g/cc)	1.64	1.66	1.66

WATER CONTENT

DETERMINATION NUMBER	1	2	3
WT. OF CONTAINER (g)	131.95	131.77	131.91
WT. OF WET SOIL + CONTAINER (g)	151.44	152.28	153.77
WT. OF DRY SOIL + CONTAINER (g)	149.95	150.44	151.54
WATER CONTENT (%)	8.3	9.9	11.4

LABORATORY ANALYSIS PERFORMED BY: L. Simpson
CALCULATIONS MADE BY: L. Simpson
CHECKED BY: S. Stoller

Compaction Test Data



TEST METHOD: ASTM D698-78 (A)

LAYERS: 3 HAMMER: 5.5 lb. ENERGY: 12,400 ft-lb/cu. ft.
BLOWS: 25/layer FALL: 12 in.

Symbol	Sample No.	Classification	Optimum Moisture Content (% g/g)	Maximum Dry Density (g/cc)
•	GRJ - 01 500 A	Sand	10.6	1.67

COMPACTION TEST

JOB NAME: JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER: 89-L-144
SAMPLE NUMBER: GRJ 01 501B
DEPTH: UNKNOWN
TEST DATE: 11/22/89

MOLD VOLUME: 944

DENSITY

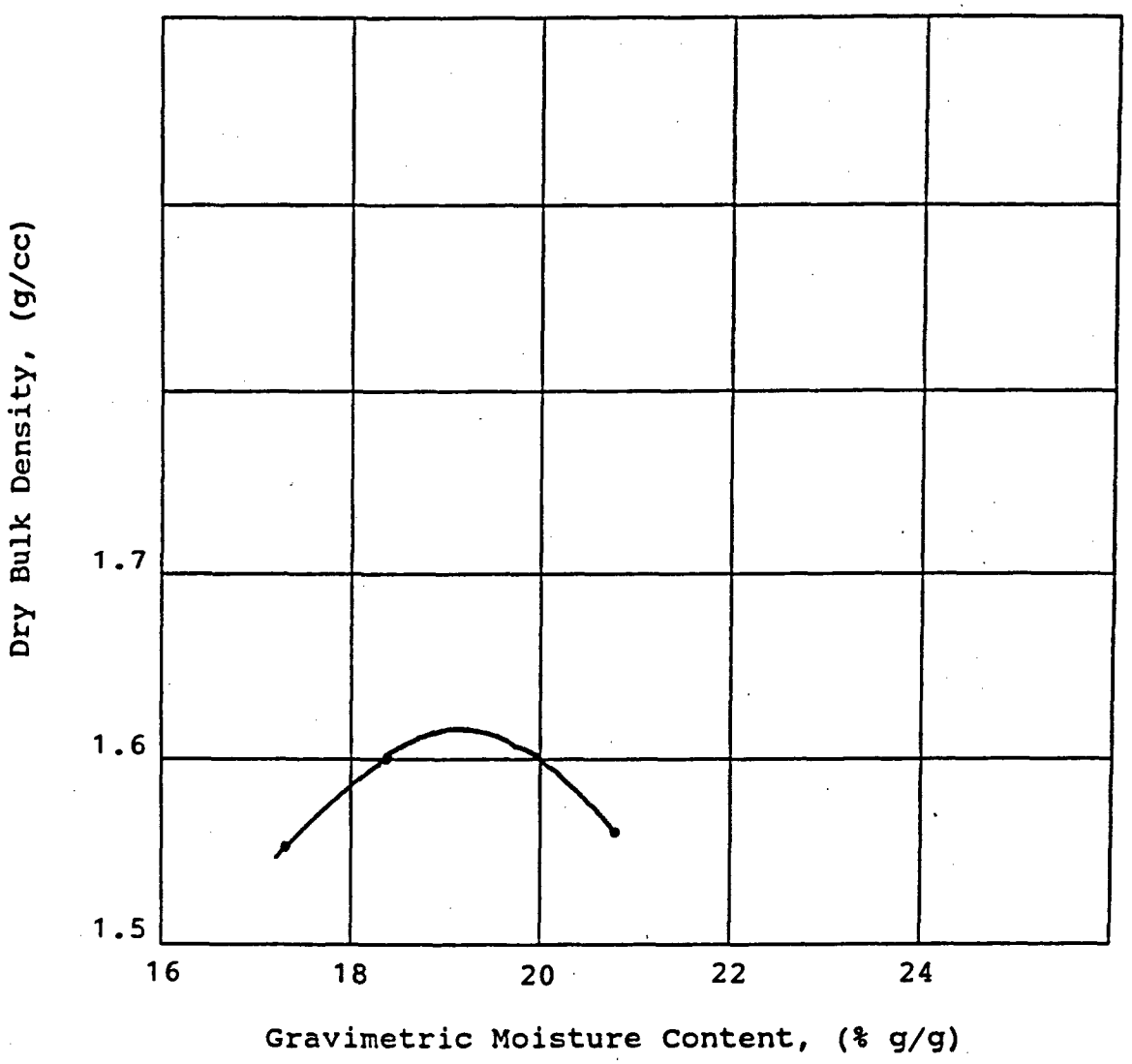
DETERMINATION NUMBER	1	2	3
WT OF PAN (g)	4200	4200	4200
WT. OF COMPACTED SOIL + PAN (g)	5982	5983	5920
WT OF COMPACTED SOIL (g)	1782	1783	1720
WET DENSITY (g/cc)	1.89	1.89	1.82
DRY DENSITY (g/cc)	1.56	1.60	1.55

WATER CONTENT

DETERMINATION NUMBER	1	2	3
WT. OF CONTAINER (g)	131.99	132.14	131.37
WT. OF WET SOIL + CONTAINER (g)	151.81	146.74	144.18
WT. OF DRY SOIL + CONTAINER (g)	148.39	144.47	142.29
WATER CONTENT (%)	20.9	18.4	17.3

LABORATORY ANALYSIS PERFORMED BY: L. Simpson
CALCULATIONS MADE BY: L. Simpson
CHECKED BY: S. Stoller

Compaction Test Data



TEST METHOD: ASTM D698-78 (A)

LAYERS: 3 HAMMER: 5.5 lb. ENERGY: 12,400 ft-lb/cu. ft.
BLOWS: 25/layer FALL: 12 in.

Symbol	Sample No.	Classification	Optimum Moisture Content (% g/g)	Maximum Dry Density (g/cc)
•	GRJ - 01 501 B	Sandy Loam	19.1	1.62

COMPACTION TEST

JOB NAME: JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER: 89-L-144
SAMPLE NUMBER: GRJ 01 502C
DEPTH: UNKNOWN
TEST DATE: 11/22/89

MOLD VOLUME: 944

DENSITY

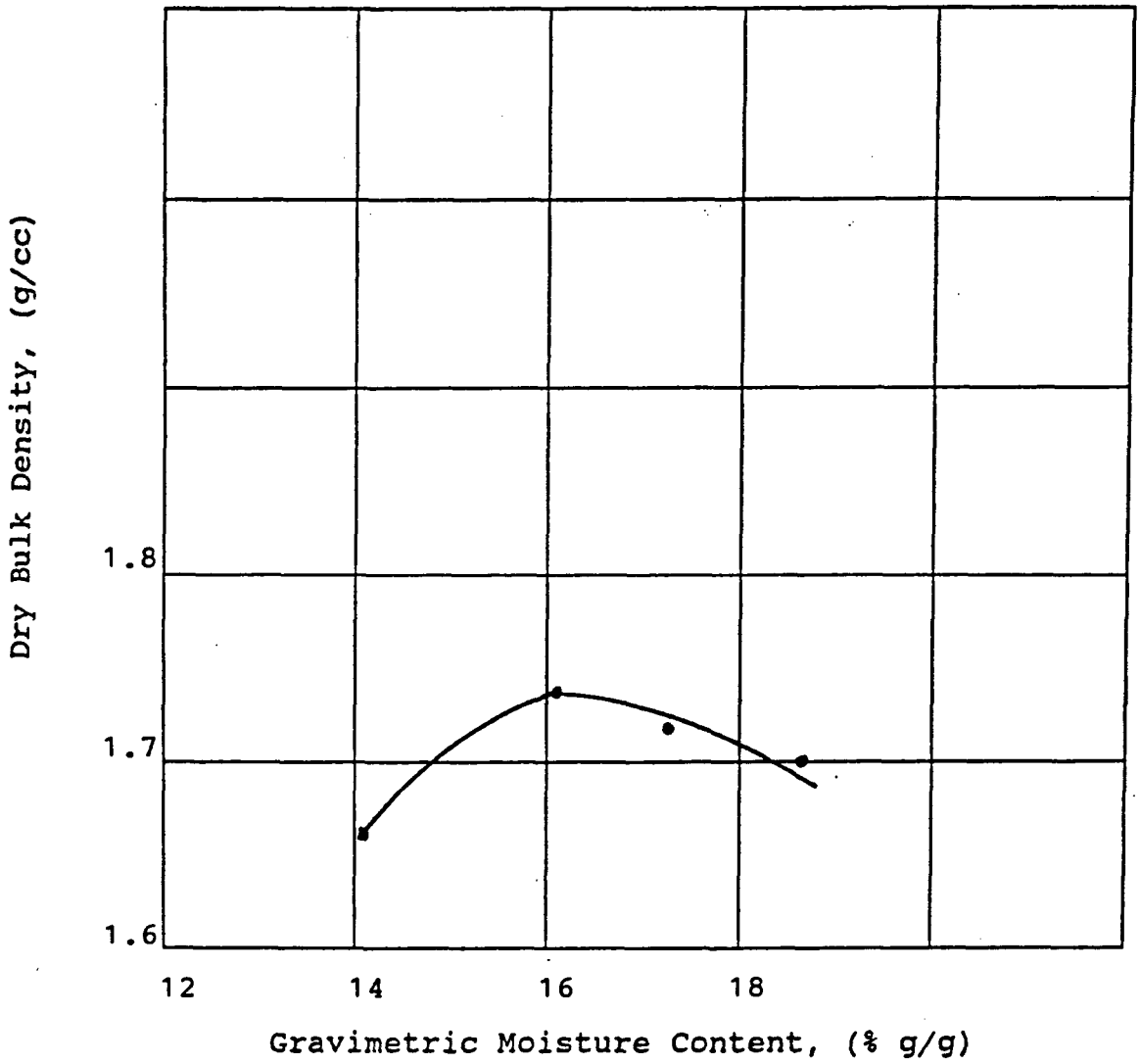
DETERMINATION NUMBER	1	2	3	4
WT OF PAN (g)	4200	4200	4200	4200
WT. OF COMPACTED SOIL + PAN (g)	5990	6107	6109	6105
WT OF COMPACTED SOIL (g)	1790	1907	1909	1905
WET DENSITY (g/cc)	1.90	2.02	2.02	2.02
DRY DENSITY (g/cc)	1.66	1.74	1.72	1.70

WATER CONTENT

DETERMINATION NUMBER	1	2	3	3
WT. OF CONTAINER (g)	131.75	131.76	132.00	131.79
WT. OF WET SOIL + CONTAINER (g)	157.10	163.54	160.91	161.50
WT. OF DRY SOIL + CONTAINER (g)	153.97	159.13	156.66	156.81
WATER CONTENT (%)	14.1	16.1	17.2	18.7

LABORATORY ANALYSIS PERFORMED BY: K. Turnham
CALCULATIONS MADE BY: L. Simpson
CHECKED BY: S. Stoller

Compaction Test Data



TEST METHOD: ASTM D698-78 (A)

LAYERS: 3 HAMMER: 5.5 lb. ENERGY: 12,400 ft-lb/cu. ft.
BLOWS: 25/layer FALL: 12 in.

Symbol	Sample No.	Classification	Optimum Moisture Content (% g/g)	Maximum Dry Density (g/cc)
•	GRJ - 01 502 C	Sand	16.1	1.74

COMPACTION TEST

JOB NAME: JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER: 89-L-144
SAMPLE NUMBER: GRJ 01 503D
DEPTH: UNKNOWN
TEST DATE: 11/27/89

MOLD VOLUME: 944

DENSITY

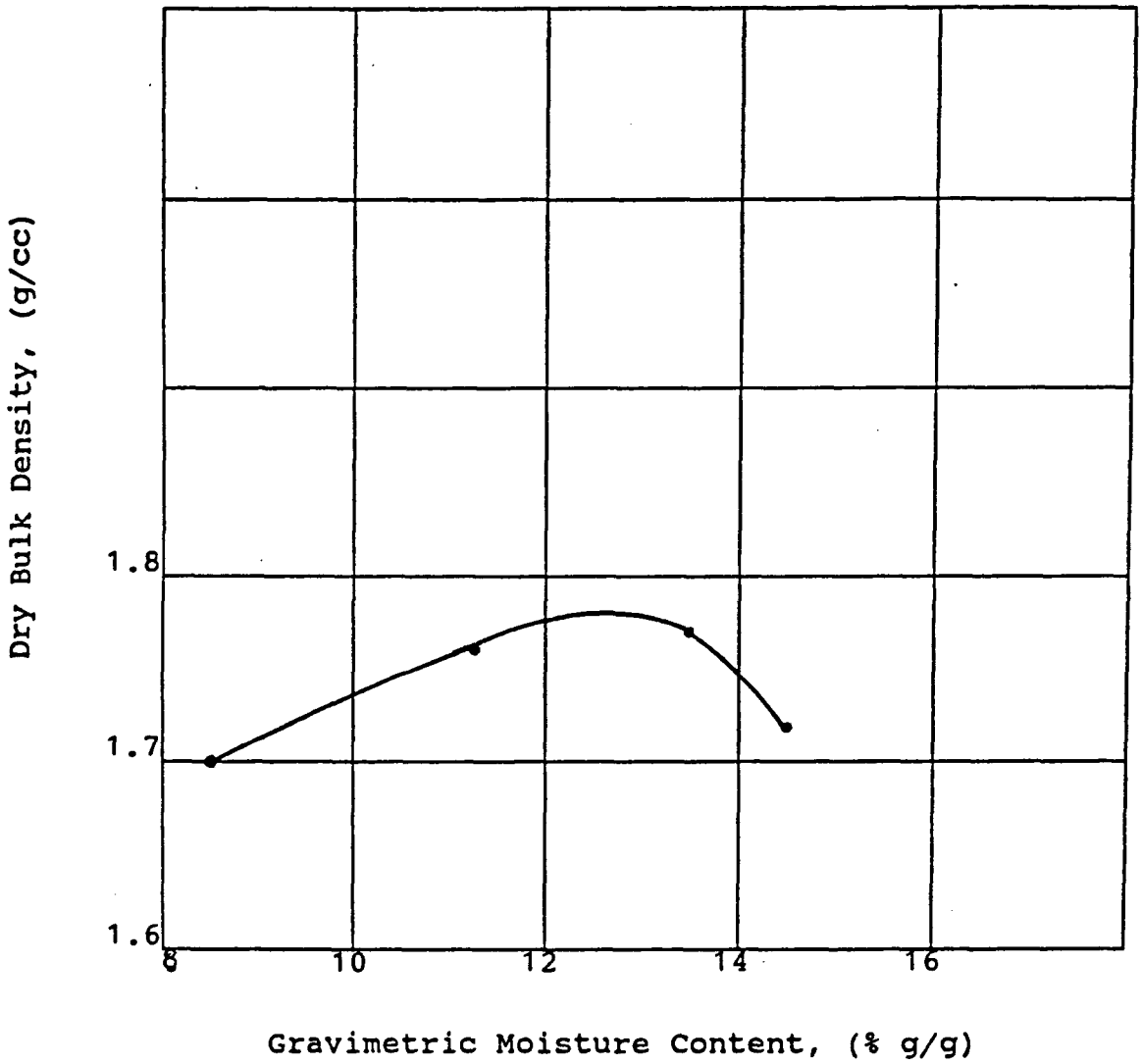
DETERMINATION NUMBER	1	2	3	4
WT OF PAN (g)	4200	4200	4200	4200
WT. OF COMPACTED SOIL + PAN (g)	5940	6050	6100	6055
WT OF COMPACTED SOIL (g)	1740	1850	1900	1855
WET DENSITY (g/cc)	1.84	1.96	2.01	1.97
DRY DENSITY (g/cc)	1.70	1.76	1.77	1.72

WATER CONTENT

DETERMINATION NUMBER	1	2	3	3
WT. OF CONTAINER (g)	131.64	132.50	131.90	132.40
WT. OF WET SOIL + CONTAINER (g)	148.73	151.20	150.40	153.70
WT. OF DRY SOIL + CONTAINER (g)	147.40	149.30	148.20	151.00
WATER CONTENT (%)	8.4	11.3	13.5	14.5

LABORATORY ANALYSIS PERFORMED BY: L. Simpson
CALCULATIONS MADE BY: L. Simpson
CHECKED BY: S. Stoller

Compaction Test Data



TEST METHOD: ASTM D698-78 (A)

LAYERS: 3 HAMMER: 5.5 lb. ENERGY: 12,400 ft-lb/cu. ft.
BLOWS: 25/layer FALL: 12 in.

Symbol	Sample No.	Classification	Optimum Moisture Content (% g/g)	Maximum Dry Density (g/cc)
•	GRJ - 01 503 D	Sand	12.7	1.78

COMPACTION TEST

JOB NAME: JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER: 89-L-144
SAMPLE NUMBER: GRJ 01 601
DEPTH: UNKNOWN
TEST DATE: 11/27/89

MOLD VOLUME: 944

DENSITY

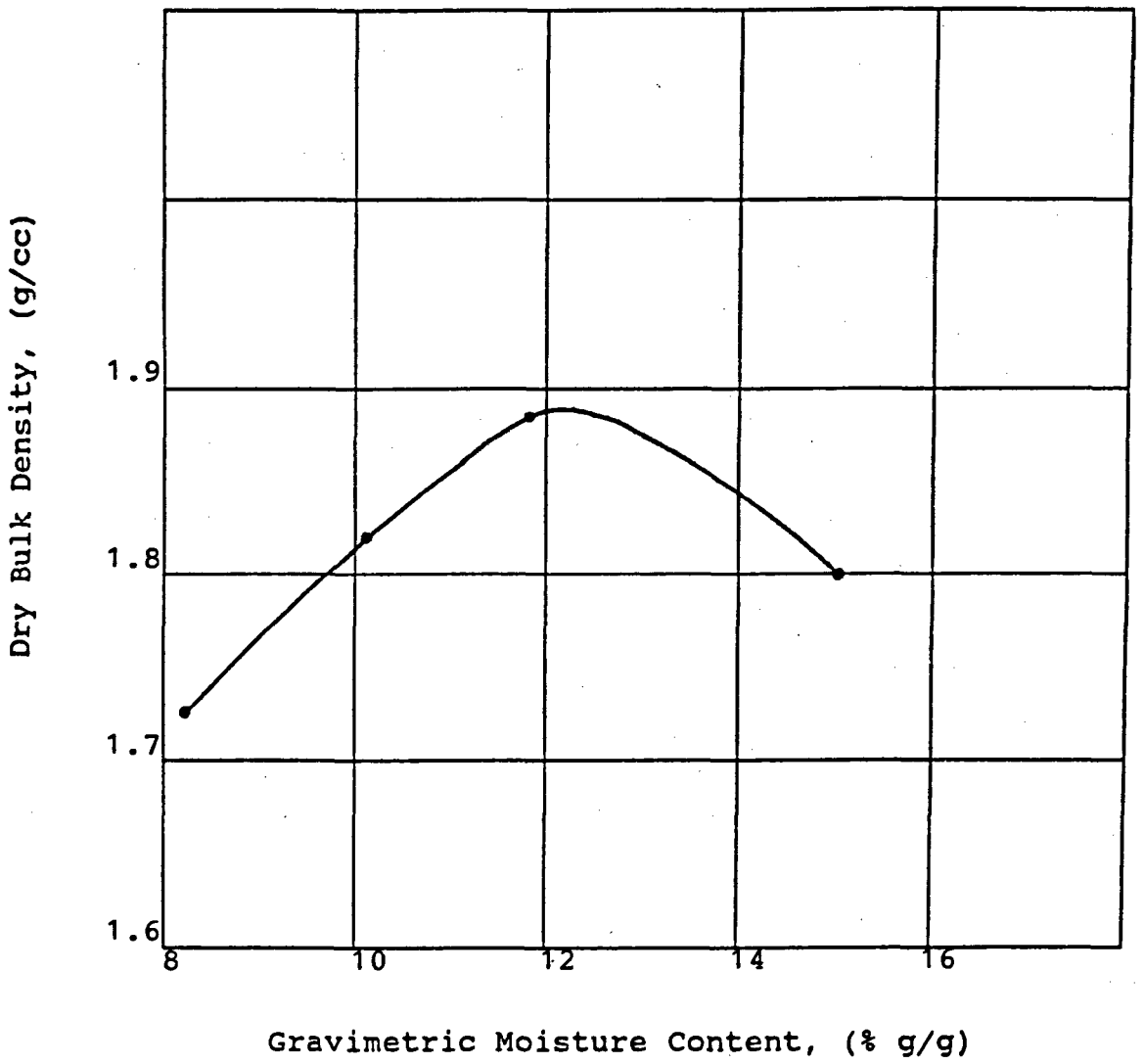
DETERMINATION NUMBER	1	2	3	4
WT OF PAN (g)	4200	4200	4200	4200
WT. OF COMPACTED SOIL + PAN (g)	5966	6095	6180	6154
WT OF COMPACTED SOIL (g)	1766	1895	1980	1954
WET DENSITY (g/cc)	1.87	2.01	2.10	2.07
DRY DENSITY (g/cc)	1.73	1.82	1.88	1.80

WATER CONTENT

DETERMINATION NUMBER	1	2	3	3
WT. OF CONTAINER (g)	132.02	131.90	131.40	131.80
WT. OF WET SOIL + CONTAINER (g)	159.80	157.00	156.90	167.70
WT. OF DRY SOIL + CONTAINER (g)	157.70	154.70	154.20	163.00
WATER CONTENT (%)	8.2	10.1	11.8	15.1

LABORATORY ANALYSIS PERFORMED BY: K. Turnham
CALCULATIONS MADE BY: L. Simpson
CHECKED BY: S. Stoller

Compaction Test Data



TEST METHOD: ASTM D698-78 (A)

LAYERS: 3 HAMMER: 5.5 lb. ENERGY: 12,400 ft-lb/cu. ft.
BLOWS: 25/layer FALL: 12 in.

Symbol	Sample No.	Classification	Optimum Moisture Content (% g/g)	Maximum Dry Density (g/cc)
•	GRJ - 01 601	Sand	12.1	1.89

COMPACTION TEST

JOB NAME: JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER: 89-L-144
SAMPLE NUMBER: GRJ 01 602
DEPTH: UNKNOWN
TEST DATE: 11/27/89

MOLD VOLUME: 944

DENSITY

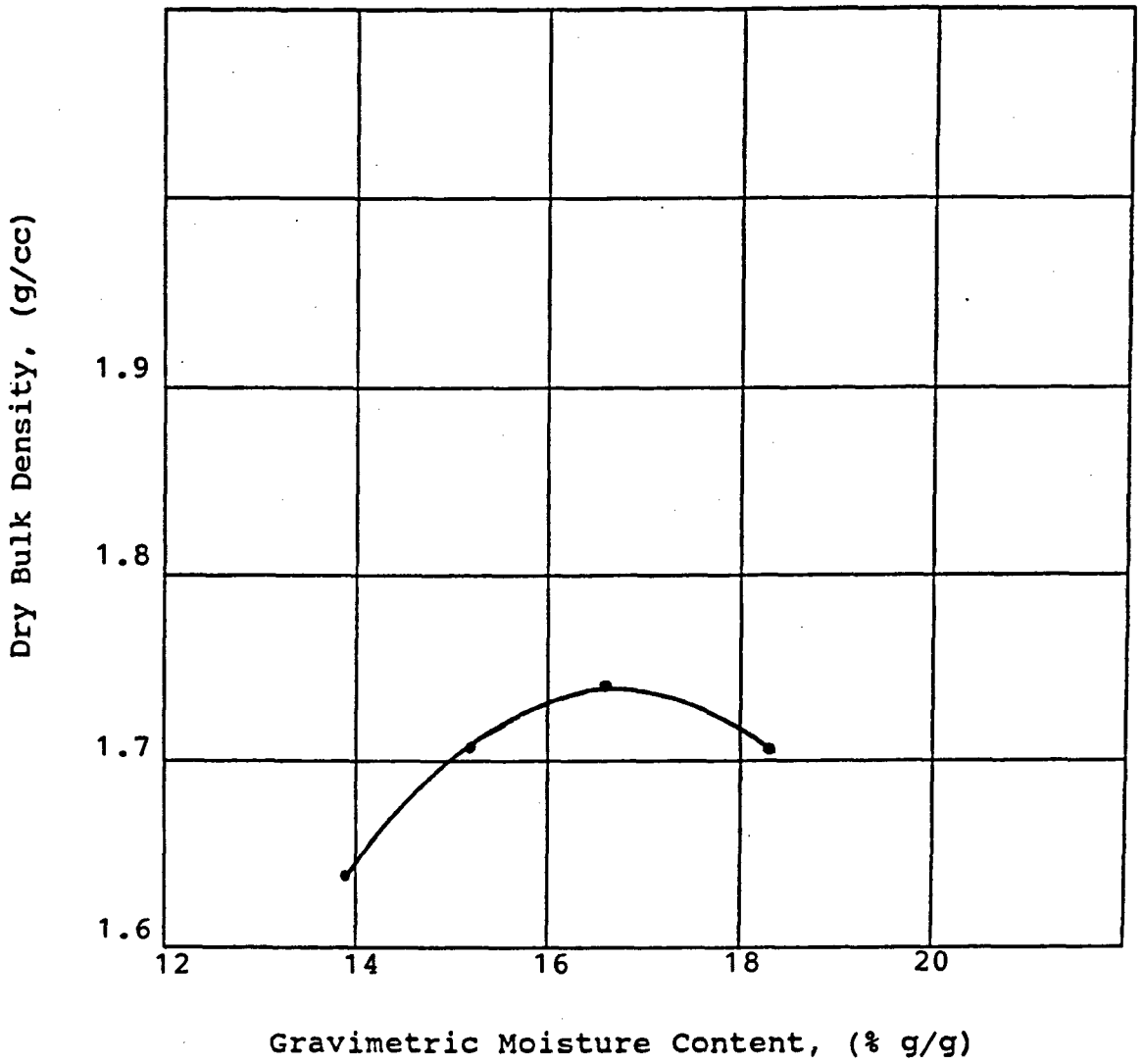
DETERMINATION NUMBER	1	2	3	4
WT OF PAN (g)	4200	4200	4200	4200
WT. OF COMPACTED SOIL + PAN (g)	6055	5963	6120	6110
WT OF COMPACTED SOIL (g)	1855	1763	1920	1910
WET DENSITY (g/cc)	1.97	1.87	2.03	2.02
DRY DENSITY (g/cc)	1.71	1.64	1.74	1.71

WATER CONTENT

DETERMINATION NUMBER	1	2	3	3
WT. OF CONTAINER (g)	132.20	131.40	132.00	132.00
WT. OF WET SOIL + CONTAINER (g)	159.05	157.70	155.20	155.20
WT. OF DRY SOIL + CONTAINER (g)	155.50	154.50	151.90	151.60
WATER CONTENT (%)	15.2	13.9	16.6	18.4

LABORATORY ANALYSIS PERFORMED BY: K. Turnham
CALCULATIONS MADE BY: L. Simpson
CHECKED BY: S. Stoller

Compaction Test Data



TEST METHOD: ASTM D698-78 (A)

LAYERS: 3 HAMMER: 5.5 lb. ENERGY: 12,400 ft-lb/cu. ft.
BLOWS: 25/layer FALL: 12 in.

Symbol	Sample No.	Classification	Optimum Moisture Content (% g/g)	Maximum Dry Density (g/cc)
•	GRJ - 01 602	Loamy Sand	16.6	1.74

COMPACTION TEST

JOB NAME: JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER: 89-L-144
SAMPLE NUMBER: GRJ 01 603
DEPTH: UNKNOWN
TEST DATE: 11/22/89

MOLD VOLUME: 944

DENSITY

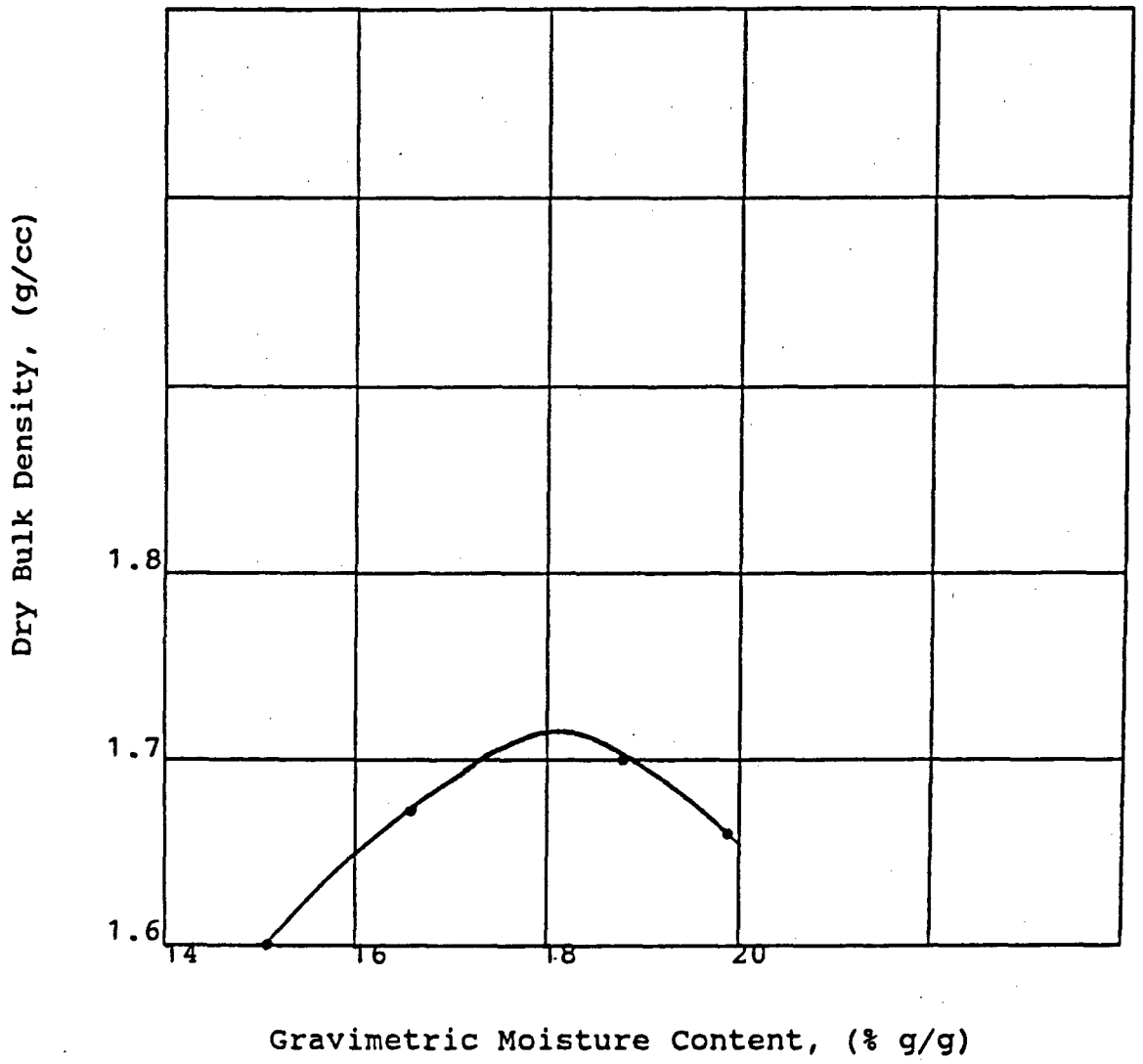
DETERMINATION NUMBER	1	2	3	4
WT OF PAN (g)	4200	4200	4200	4200
WT. OF COMPACTED SOIL + PAN (g)	6080	6038	5940	6110
WT OF COMPACTED SOIL (g)	1880	1838	1740	1910
WET DENSITY (g/cc)	1.99	1.95	1.84	2.02
DRY DENSITY (g/cc)	1.66	1.67	1.60	1.70

WATER CONTENT

DETERMINATION NUMBER	1	2	3	4
WT. OF CONTAINER (g)	132.31	131.29	131.85	131.63
WT. OF WET SOIL + CONTAINER (g)	162.66	151.04	145.55	151.35
WT. OF DRY SOIL + CONTAINER (g)	157.63	148.23	143.75	148.22
WATER CONTENT (%)	19.9	16.6	15.1	18.9

LABORATORY ANALYSIS PERFORMED BY: K. Turnham, L. Simpson
CALCULATIONS MADE BY: L. Simpson
CHECKED BY: S. Stoller

Compaction Test Data



TEST METHOD: ASTM D698-78 (A)

LAYERS: 3 HAMMER: 5.5 lb. ENERGY: 12,400 ft-lb/cu. ft.
BLOWS: 25/layer FALL: 12 in.

Symbol	Sample No.	Classification	Optimum Moisture Content (% g/g)	Maximum Dry Density (g/cc)
•	GRJ - 01 603	Sandy Loam	18.1	1.72

COMPACTION TEST

JOB NAME: JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER: 89-L-144
SAMPLE NUMBER: Rs-3
DEPTH: 0-46 FT.
TEST DATE: 01/15/90

MOLD VOLUME: 944 (cc)

DENSITY

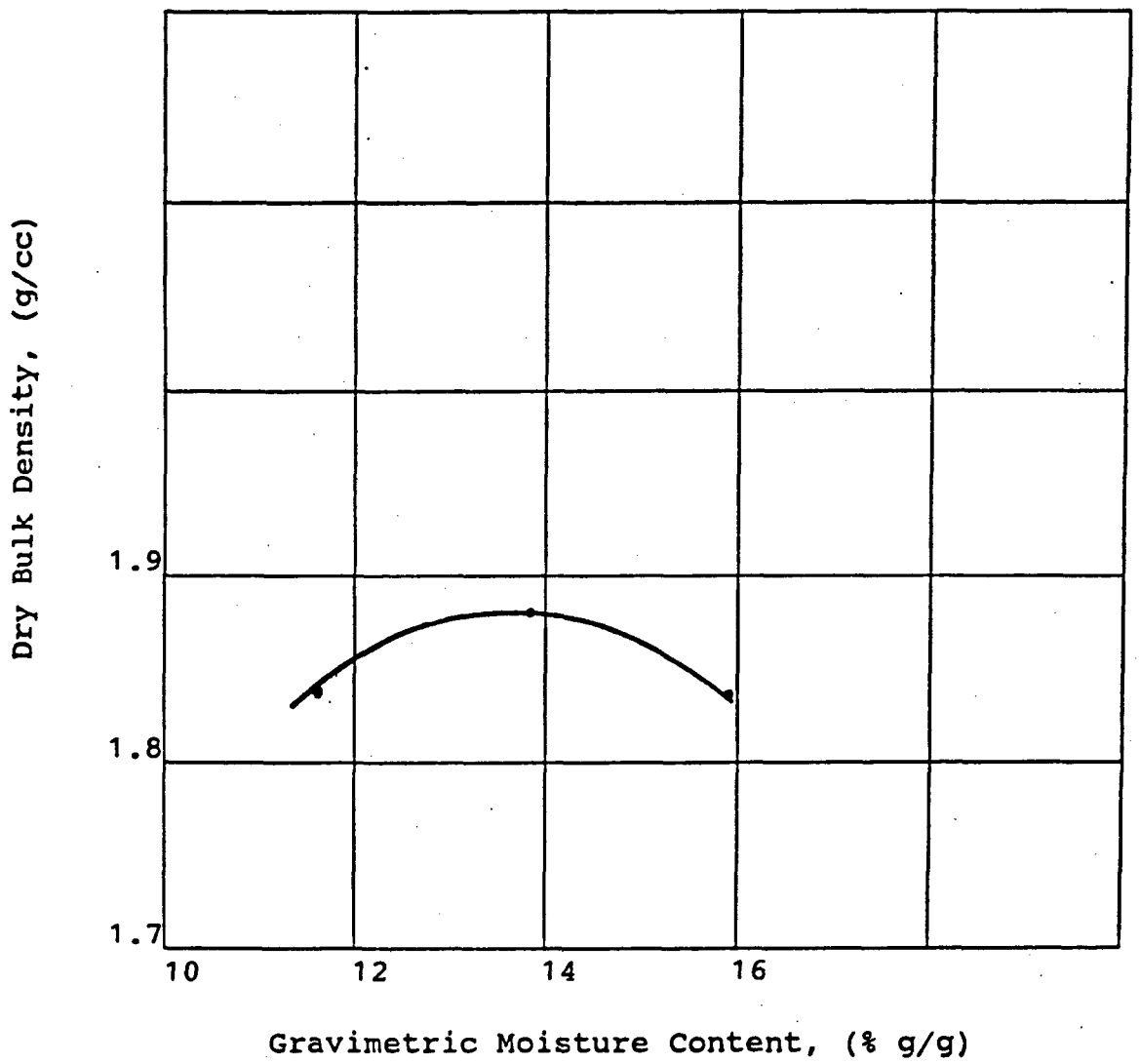
DETERMINATION NUMBER	1	2	3	4
WT OF PAN (g)	4200	4200	4200	4200
WT. OF COMPACTED SOIL + PAN (g)	5490	6133	6220	6210
WT OF COMPACTED SOIL (g)	1290	1933	2020	2010
WET DENSITY (g/cc)	1.37	2.05	2.14	2.13
DRY DENSITY (g/cc)	1.26	1.84	1.88	1.84

WATER CONTENT

DETERMINATION NUMBER	1	2	3	4
WT. OF CONTAINER (g)	132.03	132.35	132.03	131.76
WT. OF WET SOIL + CONTAINER (g)	164.46	166.04	168.91	162.92
WT. OF DRY SOIL + CONTAINER (g)	161.93	162.55	164.45	158.64
WATER CONTENT (%)	8.5	11.6	13.8	15.9

LABORATORY ANALYSIS PERFORMED BY: K. Turnham
CALCULATIONS MADE BY: L. Simpson
CHECKED BY: S. Stoller

Compaction Test Data



TEST METHOD: ASTM D698-78 (A)

LAYERS: 3 HAMMER: 5.5 lb. ENERGY: 12,400 ft-lb/cu. ft.
BLOWS: 25/layer FALL: 12 in.

Symbol	Sample No.	Classification	Optimum Moisture Content (% g/g)	Maximum Dry Density (g/cc)
•	Rs-3	Loam	13.6	1.88

COMPACTION TEST

JOB NAME: JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER: 89-L-144
SAMPLE NUMBER: Rs-5
DEPTH: 0-34 FT.
TEST DATE: 01/22/90

MOLD VOLUME: 944

DENSITY

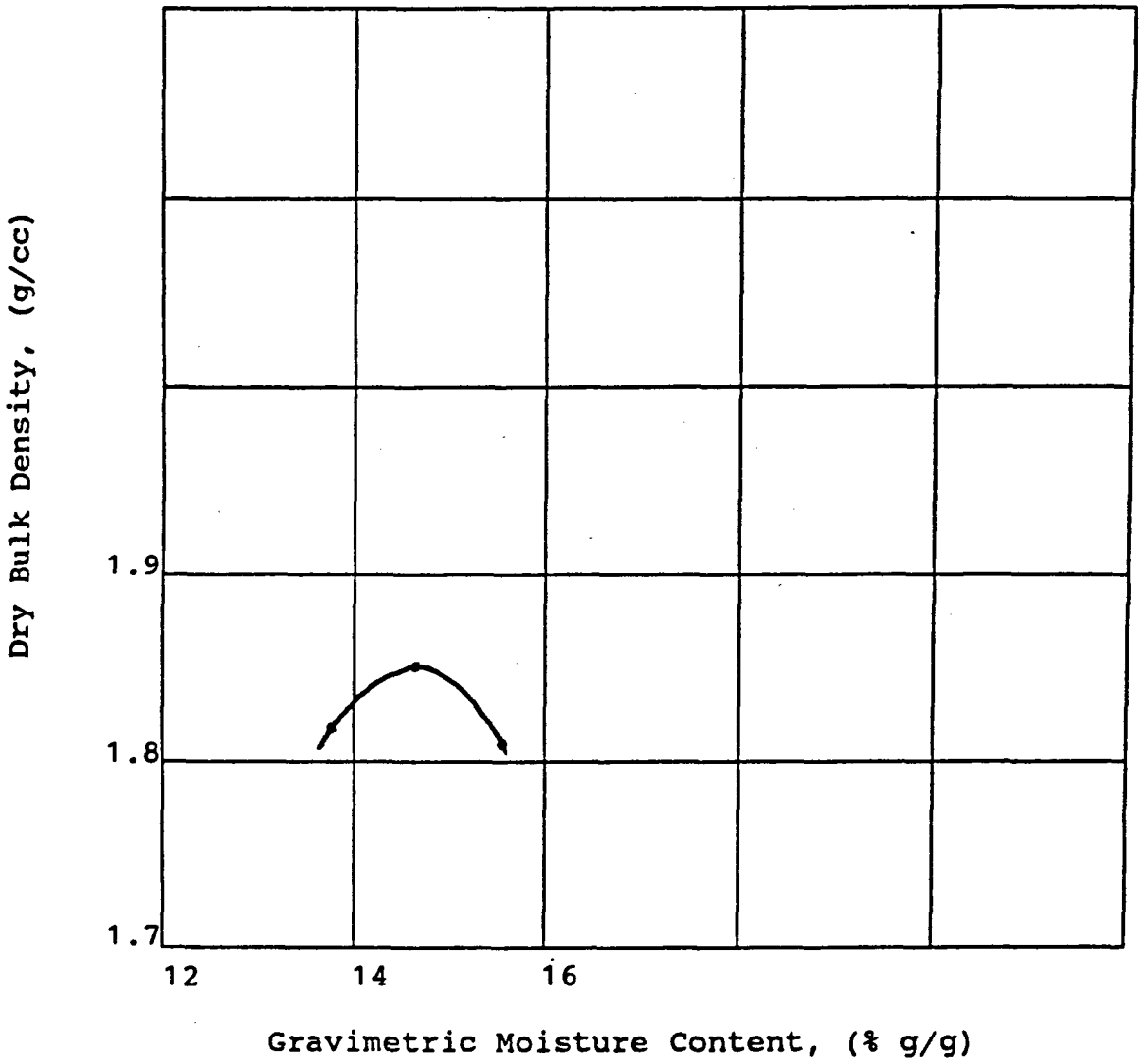
DETERMINATION NUMBER	1	2	3
WT OF PAN (g)	4200	4200	4200
WT. OF COMPACTED SOIL + PAN (g)	6175	6160	6205
WT OF COMPACTED SOIL (g)	1975	1960	2005
WET DENSITY (g/cc)	2.09	2.08	2.12
DRY DENSITY (g/cc)	1.81	1.82	1.85

WATER CONTENT

DETERMINATION NUMBER	1	2	3
WT. OF CONTAINER (g)	132.02	130.83	131.15
WT. OF WET SOIL + CONTAINER (g)	143.59	140.47	140.72
WT. OF DRY SOIL + CONTAINER (g)	142.03	139.30	139.50
WATER CONTENT (%)	15.6	13.8	14.6

LABORATORY ANALYSIS PERFORMED BY: L. Simpson, M. Burkhard
CALCULATIONS MADE BY: L. Simpson
CHECKED BY: S. Stoller

Compaction Test Data



TEST METHOD: ASTM D698-78 (A)

LAYERS: 3 HAMMER: 5.5 lb. ENERGY: 12,400 ft-lb/cu. ft.
BLOWS: 25/layer FALL: 12 in.

Symbol	Sample No.	Classification	Optimum Moisture Content (% g/g)	Maximum Dry Density (g/cc)
•	Rs-5	Loam	14.6	1.85

COMPACTION TEST

JOB NAME: JACOBS ENGINEERING - WORK O
JOB NUMBER: 89-L-144
SAMPLE NUMBER: Rs-6
DEPTH: 0-39 FT.
TEST DATE: 01/19/90

MOLD VOLUME: 944 (cc)

DENSITY

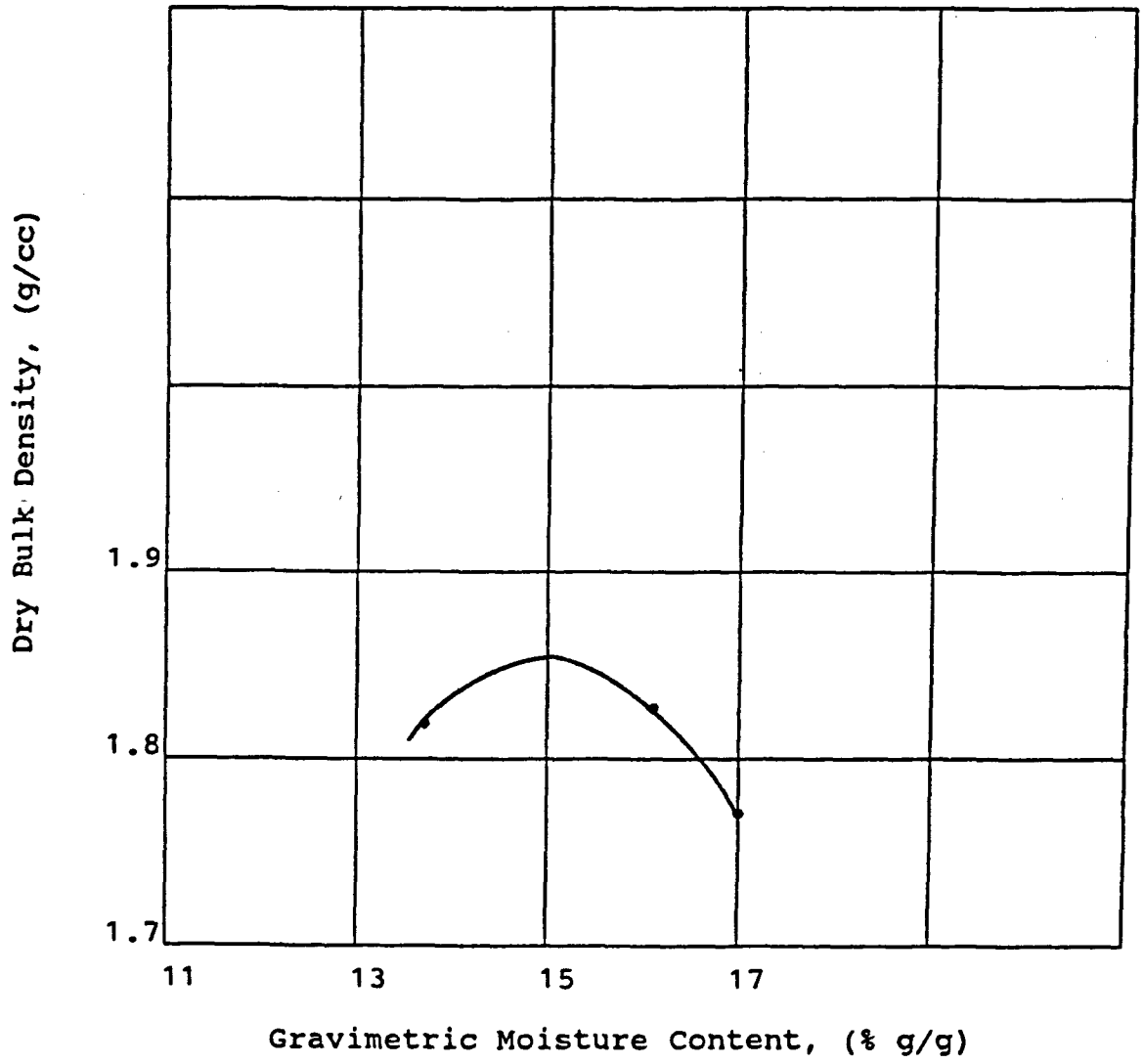
DETERMINATION NUMBER	1	2	3
WT OF PAN (g)	4200	4200	4200
WT. OF COMPACTED SOIL + PAN (g)	6155	6200	6150
WT OF COMPACTED SOIL (g)	1955	2000	1950
WET DENSITY (g/cc)	2.07	2.12	2.07
DRY DENSITY (g/cc)	1.82	1.83	1.77

WATER CONTENT

DETERMINATION NUMBER	1	2	3
WT. OF CONTAINER (g)	132.46	131.72	132.29
WT. OF WET SOIL + CONTAINER (g)	154.29	148.40	147.40
WT. OF DRY SOIL + CONTAINER (g)	151.66	146.09	145.21
WATER CONTENT (%)	13.7	16.1	17.0

LABORATORY ANALYSIS PERFORMED BY: L. Simpson
CALCULATIONS MADE BY: L. Simpson
CHECKED BY: S. Stoller

Compaction Test Data



TEST METHOD: ASTM D698-78 (A)

LAYERS: 3 HAMMER: 5.5 lb. ENERGY: 12,400 ft-lb/cu. ft.
BLOWS: 25/layer FALL: 12 in.

Symbol	Sample No.	Classification	Optimum Moisture Content (% g/g)	Maximum Dry Density (g/cc)
•	Rs-6	Clay Loam	15.1	1.86

COMPACTION TEST

JOB NAME: JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER: 89-L-144
SAMPLE NUMBER: Rs-7
DEPTH: 0-35 FT.
TEST DATE: 01/22/90

MOLD VOLUME: 944

DENSITY

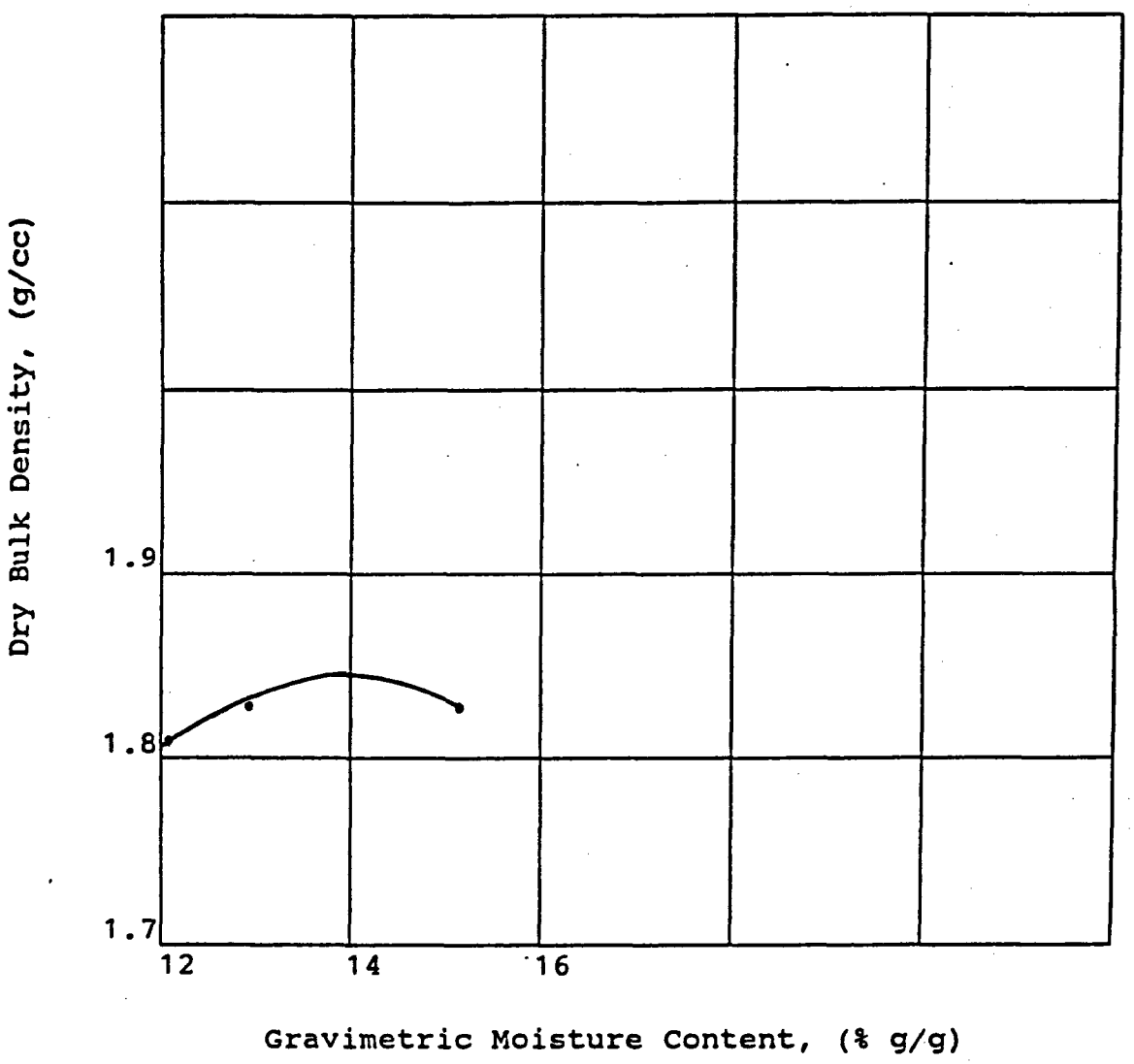
DETERMINATION NUMBER	1	2	3
WT OF PAN (g)	4200	4200	4200
WT. OF COMPACTED SOIL + PAN (g)	6110	6153	6183
WT OF COMPACTED SOIL (g)	1910	1953	1983
WET DENSITY (g/cc)	2.02	2.07	2.10
DRY DENSITY (g/cc)	1.81	1.83	1.83

WATER CONTENT

DETERMINATION NUMBER	1	2	3
WT. OF CONTAINER (g)	131.59	131.83	132.46
WT. OF WET SOIL + CONTAINER (g)	143.76	145.02	152.44
WT. OF DRY SOIL + CONTAINER (g)	142.45	143.52	149.82
WATER CONTENT (%)	12.1	12.8	15.1

LABORATORY ANALYSIS PERFORMED BY: M. Burkhard
CALCULATIONS MADE BY: L. Simpson
CHECKED BY: S. Stoller

Compaction Test Data



TEST METHOD: ASTM D698-78 (A)

LAYERS: 3 HAMMER: 5.5 lb. ENERGY: 12,400 ft-lb/cu. ft.
BLOWS: 25/layer FALL: 12 in.

Symbol	Sample No.	Classification	Optimum Moisture Content (% g/g)	Maximum Dry Density (g/cc)
•	Rs-7	Clay Loam	13.9	1.85

COMPACTION TEST

JOB NAME: JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER: 89-L-144
SAMPLE NUMBER: Rs-10
DEPTH: 0-44 FT.
TEST DATE: 01/23/90

MOLD VOLUME: 944

DENSITY

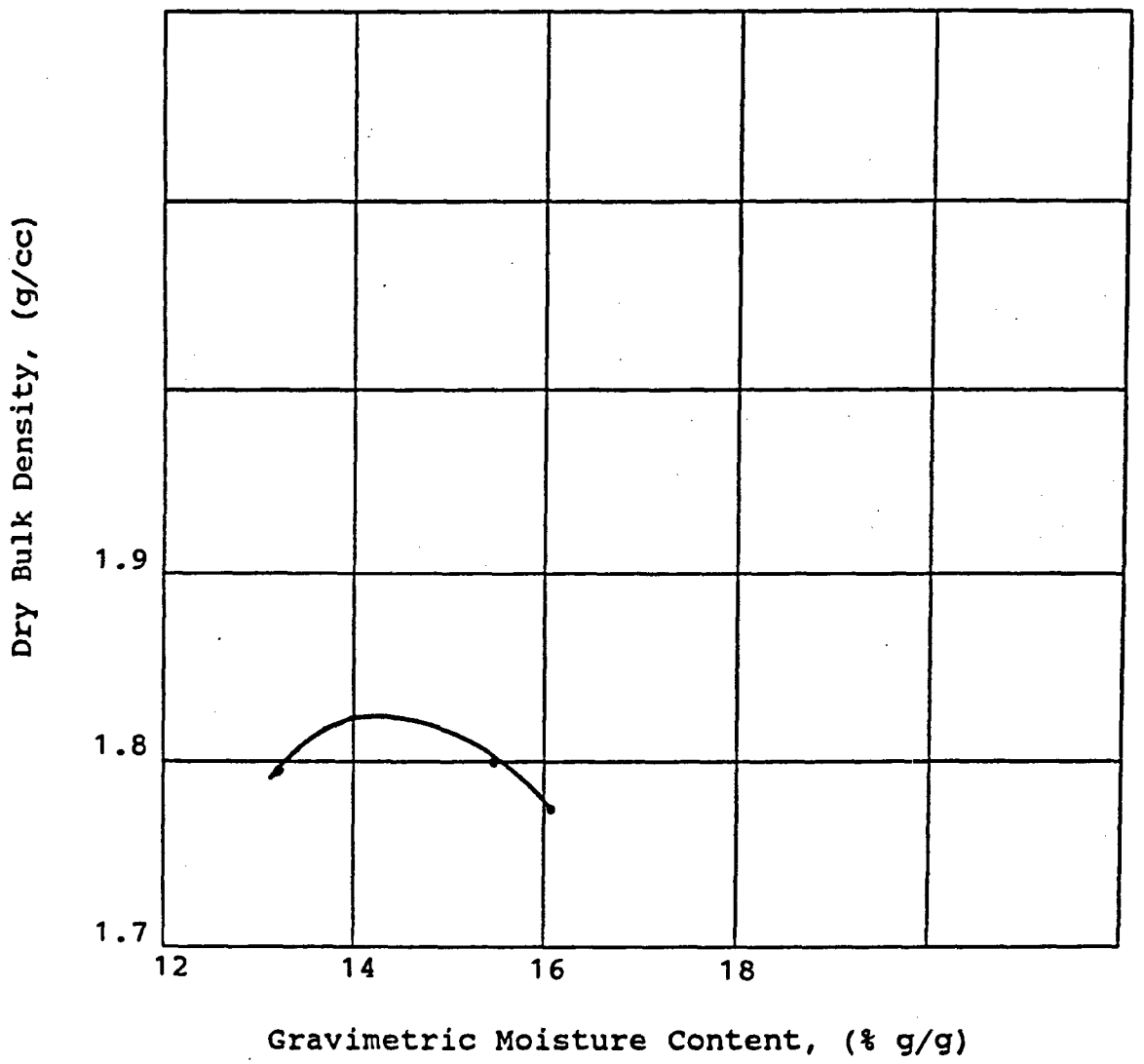
DETERMINATION NUMBER	1	2	3
WT OF PAN (g)	4200	4200	4200
WT. OF COMPACTED SOIL + PAN (g)	6110	6165	6145
WT OF COMPACTED SOIL (g)	1910	1965	1945
WET DENSITY (g/cc)	2.02	2.08	2.06
DRY DENSITY (g/cc)	1.79	1.80	1.77

WATER CONTENT

DETERMINATION NUMBER	1	2	3
WT. OF CONTAINER (g)	131.83	132.03	131.77
WT. OF WET SOIL + CONTAINER (g)	139.71	140.13	144.96
WT. OF DRY SOIL + CONTAINER (g)	138.79	139.05	143.13
WATER CONTENT (%)	13.2	15.4	16.1

LABORATORY ANALYSIS PERFORMED BY: L. Simpson
CALCULATIONS MADE BY: L. Simpson
CHECKED BY: S. Stoller

Compaction Test Data



TEST METHOD: ASTM D698-78 (A)

LAYERS: 3 HAMMER: 5.5 lb. ENERGY: 12,400 ft-lb/cu. ft.
BLOWS: 25/layer FALL: 12 in.

Symbol	Sample No.	Classification	Optimum Moisture Content (% g/g)	Maximum Dry Density (g/cc)
•	Rs-10	Loam	14.3	1.83

Appendix B: INITIAL MOISTURE CONTENT, BULK DENSITY, AND POROSITY

Summary of Initial Moisture Content, Dry Bulk Density, and Porosity

Sample No.	Initial Moisture Content Gravimetric (%, g/g)	Initial Moisture Content Volumetric (%, cm^3/cm^3)	Dry Bulk Density (g/cc)	Calculated Porosity (%)
5-1*	--	--	1.68	37.08
5-2*	--	--	1.60	39.39
5-3	23.42	33.01	1.41	48.57
5-4	21.85	31.40	1.44	47.56
5-5	19.75	30.01	1.52	45.16
5-6	19.42	29.85	1.54	44.52
5-7	19.46	29.53	1.52	44.43
5-8	16.93	26.08	1.54	43.57
5-9	16.91	27.49	1.63	38.88
5-10	15.51	25.34	1.63	38.59
5-11	30.60	42.52	1.39	50.01
5-12	24.58	36.51	1.49	46.56
5-13	24.57	35.78	1.46	45.66
5-14	22.57	33.75	1.50	44.20
5-15	15.59	25.80	1.66	37.78
5-16	14.32	23.72	1.66	37.75
5-17	17.90	29.04	1.62	38.08
5-18	17.91	29.16	1.63	37.85
5-19	17.17	28.26	1.65	37.67
5-20	16.98	27.92	1.64	37.72
5-21	16.27	26.83	1.65	36.81
5-22	16.23	26.79	1.65	36.75
5-23	16.91	27.32	1.62	38.10
5-24	16.50	26.65	1.61	38.13

* Due to sample loss after permeability testing, θ_i cannot be accurately determined and ρ_b & n are based on the lesser volumes.

DATA FOR INITIAL MOISTURE CONTENT,
BULK DENSITY, AND POROSITY

JOB NAME:	JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER:	89-L-144
SAMPLE NUMBER:	5-1
RING NUMBER:	T-1
DEPTH:	UNKNOWN

FIELD WEIGHT OF SAMPLE (W/PAN AND RING):	107.60 (g)
TARE WEIGHT, RING:	29.17 (g)
TARE WEIGHT, PAN:	0.00 (g)
SAMPLE VOLUME:	47.14 (cc)
NEW SAMPLE VOLUME:	35.83 (cc)
DATE AND TIME INTO OVEN:	01/30/90 @ 1200
DATE AND TIME OUT OF OVEN:	01/31/90 @ 0830
DRY WEIGHT OF SAMPLE:	60.42 (g)
DRY BULK DENSITY:	1.69 (g/cc)
PARTICLE DENSITY:	2.66 (g/cc)
(METHOD: WATER PYCNOMETER)	
CALCULATED POROSITY:	36.61 (% vol)
INITIAL MOISTURE CONTENT (VOLUMETRIC):	-- (% vol)
INITIAL MOISTURE CONTENT (GRAVIMETRIC):	-- (%)

COMMENTS:

LABORATORY ANALYSIS PERFORMED BY:	L. Simpson
CALCULATIONS MADE BY:	L. Simpson
CHECKED BY:	S. Stoller

DATA FOR INITIAL MOISTURE CONTENT,
BULK DENSITY, AND POROSITY

JOB NAME: JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER: 89-L-144
SAMPLE NUMBER: 5-2
RING NUMBER: T-2
DEPTH: UNKNOWN

FIELD WEIGHT OF SAMPLE (W/PAN AND RING): 106.53 (g)
TARE WEIGHT, RING: 28.59 (g)
TARE WEIGHT, PAN: 0.00 (g)
SAMPLE VOLUME: 47.14 (cc)
NEW SAMPLE VOLUME: 41.49 (cc)
DATE AND TIME INTO OVEN: 01/30/90 @ 1200
DATE AND TIME OUT OF OVEN: 01/31/90 @ 0830

DRY WEIGHT OF SAMPLE: 65.11 (g)
DRY BULK DENSITY: 1.57 (g/cc)
PARTICLE DENSITY: 2.67 (g/cc)
(METHOD: WATER PYCNOMETER)

CALCULATED POROSITY: 41.22 (% vol)

INITIAL MOISTURE CONTENT (VOLUMETRIC): -- (% vol)

INITIAL MOISTURE CONTENT (GRAVIMETRIC): -- (%)

COMMENTS:

LABORATORY ANALYSIS PERFORMED BY: L. Simpson
CALCULATIONS MADE BY: L. Simpson
CHECKED BY: S. Stoller

DATA FOR INITIAL MOISTURE CONTENT,
BULK DENSITY, AND POROSITY

JOB NAME:	JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER:	89-L-144
SAMPLE NUMBER:	5-3
RING NUMBER:	T-3
DEPTH:	UNKNOWN

FIELD WEIGHT OF SAMPLE (W/PAN AND RING):	112.09 (g)
TARE WEIGHT, RING:	30.10 (g)
TARE WEIGHT, PAN:	0.00 (g)
SAMPLE VOLUME:	47.14 (cc)
DATE AND TIME INTO OVEN:	01/30/90 @ 1200
DATE AND TIME OUT OF OVEN:	01/31/90 @ 0830
DRY WEIGHT OF SAMPLE:	66.43 (g)
DRY BULK DENSITY:	1.41 (g/cc)
PARTICLE DENSITY:	2.74 (g/cc)
(METHOD: WATER PYCNOMETER)	
CALCULATED POROSITY:	48.57 (% vol)
INITIAL MOISTURE CONTENT (VOLUMETRIC):	33.01 (% vol)
INITIAL MOISTURE CONTENT (GRAVIMETRIC):	23.42 (%)

COMMENTS:

LABORATORY ANALYSIS PERFORMED BY:	L. Simpson
CALCULATIONS MADE BY:	L. Simpson
CHECKED BY:	S. Stoller

DATA FOR INITIAL MOISTURE CONTENT,
BULK DENSITY, AND POROSITY

JOB NAME:	JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER:	89-L-144
SAMPLE NUMBER:	5-4
RING NUMBER:	T-4
DEPTH:	UNKNOWN

FIELD WEIGHT OF SAMPLE (W/PAN AND RING):	108.05 (g)
TARE WEIGHT, RING:	28.81 (g)
TARE WEIGHT, PAN:	0.00 (g)
SAMPLE VOLUME:	45.26 (cc)
DATE AND TIME INTO OVEN:	01/30/90 @ 1200
DATE AND TIME OUT OF OVEN:	01/31/90 @ 0830
DRY WEIGHT OF SAMPLE:	65.03 (g)
DRY BULK DENSITY:	1.44 (g/cc)
PARTICLE DENSITY:	2.74 (g/cc)
(METHOD: WATER PYCNOMETER)	
CALCULATED POROSITY:	47.56 (% vol)
INITIAL MOISTURE CONTENT (VOLUMETRIC):	31.40 (% vol)
INITIAL MOISTURE CONTENT (GRAVIMETRIC):	21.85 (%)

COMMENTS:

LABORATORY ANALYSIS PERFORMED BY:	L. Simpson
CALCULATIONS MADE BY:	L. Simpson
CHECKED BY:	S. Stoller

DATA FOR INITIAL MOISTURE CONTENT,
BULK DENSITY, AND POROSITY

JOB NAME:	JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER:	89-L-144
SAMPLE NUMBER:	5-5
RING NUMBER:	T-5
DEPTH:	UNKNOWN

FIELD WEIGHT OF SAMPLE (W/PAN AND RING):	125.10 (g)
TARE WEIGHT, RING:	32.47 (g)
TARE WEIGHT, PAN:	0.00 (g)
SAMPLE VOLUME:	50.92 (cc)
DATE AND TIME INTO OVEN:	01/30/90 @ 1200
DATE AND TIME OUT OF OVEN:	01/31/90 @ 0830
DRY WEIGHT OF SAMPLE:	77.35 (g)
DRY BULK DENSITY:	1.52 (g/cc)
PARTICLE DENSITY:	2.77 (g/cc)
(METHOD: WATER PYCNOMETER)	
CALCULATED POROSITY:	45.16 (% vol)
INITIAL MOISTURE CONTENT (VOLUMETRIC):	30.01 (% vol)
INITIAL MOISTURE CONTENT (GRAVIMETRIC):	19.75 (%)

COMMENTS:

LABORATORY ANALYSIS PERFORMED BY:	L. Simpson
CALCULATIONS MADE BY:	L. Simpson
CHECKED BY:	S. Stoller

DATA FOR INITIAL MOISTURE CONTENT,
BULK DENSITY, AND POROSITY

JOB NAME: JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER: 89-L-144
SAMPLE NUMBER: 5-6
RING NUMBER: T-6
DEPTH: UNKNOWN

FIELD WEIGHT OF SAMPLE (W/PAN AND RING): 115.32 (g)
TARE WEIGHT, RING: 28.80 (g)
TARE WEIGHT, PAN: 0.00 (g)
SAMPLE VOLUME: 47.14 (cc)
DATE AND TIME INTO OVEN: 01/30/90 @ 1200
DATE AND TIME OUT OF OVEN: 01/31/90 @ 0830

DRY WEIGHT OF SAMPLE: 72.45 (g)
DRY BULK DENSITY: 1.54 (g/cc)
PARTICLE DENSITY: 2.77 (g/cc)
(METHOD: WATER PYCNOMETER)

CALCULATED POROSITY: 44.52 (% vol)

INITIAL MOISTURE CONTENT (VOLUMETRIC): 29.85 (% vol)

INITIAL MOISTURE CONTENT (GRAVIMETRIC): 19.42 (%)

COMMENTS:

LABORATORY ANALYSIS PERFORMED BY: L. Simpson
CALCULATIONS MADE BY: L. Simpson
CHECKED BY: S. Stoller

DATA FOR INITIAL MOISTURE CONTENT,
BULK DENSITY, AND POROSITY

JOB NAME: JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER: 89-L-144
SAMPLE NUMBER: 5-7
RING NUMBER: T-7
DEPTH: UNKNOWN

FIELD WEIGHT OF SAMPLE (W/PAN AND RING): 114.96 (g)
TARE WEIGHT, RING: 29.52 (g)
TARE WEIGHT, PAN: 0.00 (g)
SAMPLE VOLUME: 47.14 (cc)
DATE AND TIME INTO OVEN: 01/30/90 @ 1200
DATE AND TIME OUT OF OVEN: 01/31/90 @ 0830

DRY WEIGHT OF SAMPLE: 71.52 (g)
DRY BULK DENSITY: 1.52 (g/cc)
PARTICLE DENSITY: 2.73 (g/cc)
(METHOD: WATER PYCNOMETER)

CALCULATED POROSITY: 44.43 (% vol)

INITIAL MOISTURE CONTENT (VOLUMETRIC): 29.53 (% vol)

INITIAL MOISTURE CONTENT (GRAVIMETRIC): 19.46 (%)

COMMENTS:

LABORATORY ANALYSIS PERFORMED BY: L. Simpson
CALCULATIONS MADE BY: L. Simpson
CHECKED BY: S. Stoller

DATA FOR INITIAL MOISTURE CONTENT,
BULK DENSITY, AND POROSITY

JOB NAME: JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER: 89-L-144
SAMPLE NUMBER: 5-8
RING NUMBER: T-8
DEPTH: UNKNOWN

FIELD WEIGHT OF SAMPLE (W/PAN AND RING): 124.35 (g)
TARE WEIGHT, RING: 32.63 (g)
TARE WEIGHT, PAN: 0.00 (g)
SAMPLE VOLUME: 50.92 (cc)
DATE AND TIME INTO OVEN: 01/30/90 @ 1200
DATE AND TIME OUT OF OVEN: 01/31/90 @ 0830

DRY WEIGHT OF SAMPLE: 78.44 (g)
DRY BULK DENSITY: 1.54 (g/cc)
PARTICLE DENSITY: 2.73 (g/cc)
(METHOD: WATER PYCNOMETER)

CALCULATED POROSITY: 43.57 (% vol)

INITIAL MOISTURE CONTENT (VOLUMETRIC): 26.08 (% vol)

INITIAL MOISTURE CONTENT (GRAVIMETRIC): 16.93 (%)

COMMENTS:

LABORATORY ANALYSIS PERFORMED BY: L. Simpson
CALCULATIONS MADE BY: L. Simpson
CHECKED BY: S. Stoller

DATA FOR INITIAL MOISTURE CONTENT,
BULK DENSITY, AND POROSITY

JOB NAME:	JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER:	89-L-144
SAMPLE NUMBER:	5-9
RING NUMBER:	T-9
DEPTH:	UNKNOWN

FIELD WEIGHT OF SAMPLE (W/PAN AND RING):	119.46 (g)
TARE WEIGHT, RING:	29.86 (g)
TARE WEIGHT, PAN:	0.00 (g)
SAMPLE VOLUME:	47.14 (cc)
DATE AND TIME INTO OVEN:	01/30/90 @ 1200
DATE AND TIME OUT OF OVEN:	01/31/90 @ 0830
DRY WEIGHT OF SAMPLE:	76.64 (g)
DRY BULK DENSITY:	1.63 (g/cc)
PARTICLE DENSITY:	2.66 (g/cc)
(METHOD: WATER PYCNOMETER)	
CALCULATED POROSITY:	38.88 (% vol)
INITIAL MOISTURE CONTENT (VOLUMETRIC):	27.49 (% vol)
INITIAL MOISTURE CONTENT (GRAVIMETRIC):	16.91 (%)

COMMENTS:

LABORATORY ANALYSIS PERFORMED BY:	L. Simpson
CALCULATIONS MADE BY:	L. Simpson
CHECKED BY:	S. Stoller

DATA FOR INITIAL MOISTURE CONTENT,
BULK DENSITY, AND POROSITY

JOB NAME:	JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER:	89-L-144
SAMPLE NUMBER:	5-10
RING NUMBER:	T-10
DEPTH:	UNKNOWN

FIELD WEIGHT OF SAMPLE (W/PAN AND RING):	114.28 (g)
TARE WEIGHT, RING:	28.88 (g)
TARE WEIGHT, PAN:	0.00 (g)
SAMPLE VOLUME:	45.26 (cc)
DATE AND TIME INTO OVEN:	01/30/90 @ 1200
DATE AND TIME OUT OF OVEN:	01/31/90 @ 0830
DRY WEIGHT OF SAMPLE:	73.93 (g)
DRY BULK DENSITY:	1.63 (g/cc)
PARTICLE DENSITY:	2.66 (g/cc)
(METHOD: WATER PYCNOMETER)	
CALCULATED POROSITY:	38.59 (% vol)
INITIAL MOISTURE CONTENT (VOLUMETRIC):	25.34 (% vol)
INITIAL MOISTURE CONTENT (GRAVIMETRIC):	15.51 (%)

COMMENTS:

LABORATORY ANALYSIS PERFORMED BY:	L. Simpson
CALCULATIONS MADE BY:	L. Simpson
CHECKED BY:	S. Stoller

DATA FOR INITIAL MOISTURE CONTENT,
BULK DENSITY, AND POROSITY

JOB NAME: JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER: 89-L-144
SAMPLE NUMBER: 5-11
RING NUMBER: T-11
DEPTH: UNKNOWN

FIELD WEIGHT OF SAMPLE (W/PAN AND RING):	117.55 (g)
TARE WEIGHT, RING:	28.56 (g)
TARE WEIGHT, PAN:	0.00 (g)
SAMPLE VOLUME:	49.03 (cc)
DATE AND TIME INTO OVEN:	01/30/90 @ 1200
DATE AND TIME OUT OF OVEN:	01/31/90 @ 0830
DRY WEIGHT OF SAMPLE:	68.14 (g)
DRY BULK DENSITY:	1.39 (g/cc)
PARTICLE DENSITY:	2.78 (g/cc)
(METHOD: WATER PYCNOMETER)	
CALCULATED POROSITY:	50.01 (% vol)
INITIAL MOISTURE CONTENT (VOLUMETRIC):	42.52 (% vol)
INITIAL MOISTURE CONTENT (GRAVIMETRIC):	30.60 (%)

COMMENTS:

LABORATORY ANALYSIS PERFORMED BY: L. Simpson
CALCULATIONS MADE BY: L. Simpson
CHECKED BY: S. Stoller

DATA FOR INITIAL MOISTURE CONTENT,
BULK DENSITY, AND POROSITY

JOB NAME:	JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER:	89-L-144
SAMPLE NUMBER:	5-12
RING NUMBER:	T-12
DEPTH:	UNKNOWN

FIELD WEIGHT OF SAMPLE (W/PAN AND RING):	117.06 (g)
TARE WEIGHT, RING:	29.82 (g)
TARE WEIGHT, PAN:	0.00 (g)
SAMPLE VOLUME:	47.14 (cc)
DATE AND TIME INTO OVEN:	01/30/90 @ 1200
DATE AND TIME OUT OF OVEN:	01/31/90 @ 0830
DRY WEIGHT OF SAMPLE:	70.03 (g)
DRY BULK DENSITY:	1.49 (g/cc)
PARTICLE DENSITY:	2.78 (g/cc)
(METHOD: WATER PYCNOMETER)	
CALCULATED POROSITY:	46.56 (% vol)
INITIAL MOISTURE CONTENT (VOLUMETRIC):	36.51 (% vol)
INITIAL MOISTURE CONTENT (GRAVIMETRIC):	24.58 (%)

COMMENTS:

LABORATORY ANALYSIS PERFORMED BY:	L. Simpson
CALCULATIONS MADE BY:	L. Simpson
CHECKED BY:	S. Stoller

DATA FOR INITIAL MOISTURE CONTENT,
BULK DENSITY, AND POROSITY

JOB NAME:	JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER:	89-L-144
SAMPLE NUMBER:	5-13
RING NUMBER:	T-13
DEPTH:	UNKNOWN

FIELD WEIGHT OF SAMPLE (W/PAN AND RING):	123.04 (g)
TARE WEIGHT, RING:	30.67 (g)
TARE WEIGHT, PAN:	0.00 (g)
SAMPLE VOLUME:	50.92 (cc)
DATE AND TIME INTO OVEN:	01/30/90 @ 1200
DATE AND TIME OUT OF OVEN:	01/31/90 @ 0830
DRY WEIGHT OF SAMPLE:	74.15 (g)
DRY BULK DENSITY:	1.46 (g/cc)
PARTICLE DENSITY:	2.68 (g/cc)
(METHOD: WATER PYCNOMETER)	
CALCULATED POROSITY:	45.66 (% vol)
INITIAL MOISTURE CONTENT (VOLUMETRIC):	35.78 (% vol)
INITIAL MOISTURE CONTENT (GRAVIMETRIC):	24.57 (%)

COMMENTS:

LABORATORY ANALYSIS PERFORMED BY:	L. Simpson
CALCULATIONS MADE BY:	L. Simpson
CHECKED BY:	S. Stoller

DATA FOR INITIAL MOISTURE CONTENT,
BULK DENSITY, AND POROSITY

JOB NAME:	JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER:	89-L-144
SAMPLE NUMBER:	5-14
RING NUMBER:	T-14
DEPTH:	UNKNOWN

FIELD WEIGHT OF SAMPLE (W/PAN AND RING):	116.85 (g)
TARE WEIGHT, RING:	30.45 (g)
TARE WEIGHT, PAN:	0.00 (g)
SAMPLE VOLUME:	47.14 (cc)
DATE AND TIME INTO OVEN:	01/30/90 @ 1200
DATE AND TIME OUT OF OVEN:	01/31/90 @ 0830
DRY WEIGHT OF SAMPLE:	70.49 (g)
DRY BULK DENSITY:	1.50 (g/cc)
PARTICLE DENSITY:	2.68 (g/cc)
(METHOD: WATER PYCNOMETER)	
CALCULATED POROSITY:	44.20 (% vol)
INITIAL MOISTURE CONTENT (VOLUMETRIC):	33.75 (% vol)
INITIAL MOISTURE CONTENT (GRAVIMETRIC):	22.57 (%)

COMMENTS:

LABORATORY ANALYSIS PERFORMED BY:	L. Simpson
CALCULATIONS MADE BY:	L. Simpson
CHECKED BY:	S. Stoller

DATA FOR INITIAL MOISTURE CONTENT,
BULK DENSITY, AND POROSITY

JOB NAME:	JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER:	89-L-144
SAMPLE NUMBER:	5-15
RING NUMBER:	T-1
DEPTH:	0-46 FT.

FIELD WEIGHT OF SAMPLE (W/PAN AND RING):	119.36 (g)
TARE WEIGHT, RING:	29.18 (g)
TARE WEIGHT, PAN:	0.00 (g)
SAMPLE VOLUME:	47.14 (cc)
DATE AND TIME INTO OVEN:	03/19/90 @ 1145
DATE AND TIME OUT OF OVEN:	03/20/90 @ 930
DRY WEIGHT OF SAMPLE:	78.02 (g)
DRY BULK DENSITY:	1.66 (g/cc)
PARTICLE DENSITY:	2.66 (g/cc)
(METHOD: WATER PYCNOMETER)	
CALCULATED POROSITY:	37.78 (% vol)
INITIAL MOISTURE CONTENT (VOLUMETRIC):	25.80 (% vol)
INITIAL MOISTURE CONTENT (GRAVIMETRIC):	15.59 (%)

COMMENTS:

LABORATORY ANALYSIS PERFORMED BY:	L. Simpson
CALCULATIONS MADE BY:	L. Simpson
CHECKED BY:	S. Stoller

DATA FOR INITIAL MOISTURE CONTENT,
BULK DENSITY, AND POROSITY

JOB NAME: JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER: 89-L-144
SAMPLE NUMBER: 5-16
RING NUMBER: T-2
DEPTH: 0-46 FT.

FIELD WEIGHT OF SAMPLE (W/PAN AND RING): 117.83 (g)
TARE WEIGHT, RING: 28.59 (g)
TARE WEIGHT, PAN: 0.00 (g)
SAMPLE VOLUME: 47.14 (cc)
DATE AND TIME INTO OVEN: 03/19/90 @ 1145
DATE AND TIME OUT OF OVEN: 03/20/90 @ 930

DRY WEIGHT OF SAMPLE: 78.06 (g)
DRY BULK DENSITY: 1.66 (g/cc)
PARTICLE DENSITY: 2.66 (g/cc)
(METHOD: WATER PYCNOMETER)

CALCULATED POROSITY: 37.75 (% vol)

INITIAL MOISTURE CONTENT (VOLUMETRIC): 23.72 (% vol)

INITIAL MOISTURE CONTENT (GRAVIMETRIC): 14.32 (%)

COMMENTS:

LABORATORY ANALYSIS PERFORMED BY: L. Simpson
CALCULATIONS MADE BY: L. Simpson
CHECKED BY: S. Stoller

DATA FOR INITIAL MOISTURE CONTENT,
BULK DENSITY, AND POROSITY

JOB NAME: JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER: 89-L-144
SAMPLE NUMBER: 5-17
RING NUMBER: T-3
DEPTH: 0-34 FT.

FIELD WEIGHT OF SAMPLE (W/PAN AND RING): 120.26 (g)
TARE WEIGHT, RING: 30.10 (g)
TARE WEIGHT, PAN: 0.00 (g)
SAMPLE VOLUME: 47.14 (cc)
DATE AND TIME INTO OVEN: 03/19/90 @ 1145
DATE AND TIME OUT OF OVEN: 03/20/90 @ 930

DRY WEIGHT OF SAMPLE: 76.47 (g)
DRY BULK DENSITY: 1.62 (g/cc)
PARTICLE DENSITY: 2.62 (g/cc)
(METHOD: WATER PYCNOMETER)

CALCULATED POROSITY: 38.08 (% vol)

INITIAL MOISTURE CONTENT (VOLUMETRIC): 29.04 (% vol)

INITIAL MOISTURE CONTENT (GRAVIMETRIC): 17.90 (%)

COMMENTS:

LABORATORY ANALYSIS PERFORMED BY: L. Simpson
CALCULATIONS MADE BY: L. Simpson
CHECKED BY: S. Stoller

DATA FOR INITIAL MOISTURE CONTENT,
BULK DENSITY, AND POROSITY

JOB NAME: JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER: 89-L-144
SAMPLE NUMBER: 5-18
RING NUMBER: T-4
DEPTH: 0-34 FT.

FIELD WEIGHT OF SAMPLE (W/PAN AND RING): 115.71 (g)
TARE WEIGHT, RING: 28.81 (g)
TARE WEIGHT, PAN: 0.00 (g)
SAMPLE VOLUME: 45.26 (cc)
DATE AND TIME INTO OVEN: 03/19/90 @ 1145
DATE AND TIME OUT OF OVEN: 03/20/90 @ 930

DRY WEIGHT OF SAMPLE: 73.70 (g)
DRY BULK DENSITY: 1.63 (g/cc)
PARTICLE DENSITY: 2.62 (g/cc)
(METHOD: WATER PYCNOMETER)

CALCULATED POROSITY: 37.85 (% vol)

INITIAL MOISTURE CONTENT (VOLUMETRIC): 29.16 (% vol)

INITIAL MOISTURE CONTENT (GRAVIMETRIC): 17.91 (%)

COMMENTS:

LABORATORY ANALYSIS PERFORMED BY: L. Simpson
CALCULATIONS MADE BY: L. Simpson
CHECKED BY: S. Stoller

DATA FOR INITIAL MOISTURE CONTENT,
BULK DENSITY, AND POROSITY

JOB NAME:	JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER:	89-L-144
SAMPLE NUMBER:	5-19
RING NUMBER:	T-5
DEPTH:	0-39 FT.

FIELD WEIGHT OF SAMPLE (W/PAN AND RING):	130.66 (g)
TARE WEIGHT, RING:	32.48 (g)
TARE WEIGHT, PAN:	0.00 (g)
SAMPLE VOLUME:	50.92 (cc)
DATE AND TIME INTO OVEN:	03/19/90 @ 1145
DATE AND TIME OUT OF OVEN:	03/20/90 @ 930
DRY WEIGHT OF SAMPLE:	83.79 (g)
DRY BULK DENSITY:	1.65 (g/cc)
PARTICLE DENSITY:	2.64 (g/cc)
(METHOD: WATER PYCNOMETER)	
CALCULATED POROSITY:	37.67 (% vol)
INITIAL MOISTURE CONTENT (VOLUMETRIC):	28.26 (% vol)
INITIAL MOISTURE CONTENT (GRAVIMETRIC):	17.17 (%)

COMMENTS:

LABORATORY ANALYSIS PERFORMED BY:	L. Simpson
CALCULATIONS MADE BY:	L. Simpson
CHECKED BY:	S. Stoller

DATA FOR INITIAL MOISTURE CONTENT,
BULK DENSITY, AND POROSITY

JOB NAME:	JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER:	89-L-144
SAMPLE NUMBER:	5-20
RING NUMBER:	T-6
DEPTH:	0-39 FT.

FIELD WEIGHT OF SAMPLE (W/PAN AND RING):	119.45 (g)
TARE WEIGHT, RING:	28.78 (g)
TARE WEIGHT, PAN:	0.00 (g)
SAMPLE VOLUME:	47.14 (cc)
DATE AND TIME INTO OVEN:	03/19/90 @ 1145
DATE AND TIME OUT OF OVEN:	03/20/90 @ 930
DRY WEIGHT OF SAMPLE:	77.51 (g)
DRY BULK DENSITY:	1.64 (g/cc)
PARTICLE DENSITY:	2.64 (g/cc)
(METHOD: WATER PYCNOMETER)	
CALCULATED POROSITY:	37.72 (% vol)
INITIAL MOISTURE CONTENT (VOLUMETRIC):	27.92 (% vol)
INITIAL MOISTURE CONTENT (GRAVIMETRIC):	16.98 (%)

COMMENTS:

LABORATORY ANALYSIS PERFORMED BY:	L. Simpson
CALCULATIONS MADE BY:	L. Simpson
CHECKED BY:	S. Stoller

DATA FOR INITIAL MOISTURE CONTENT,
BULK DENSITY, AND POROSITY

JOB NAME:	JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER:	89-L-144
SAMPLE NUMBER:	5-21
RING NUMBER:	T-7
DEPTH:	0-35 FT.

FIELD WEIGHT OF SAMPLE (W/PAN AND RING):	119.93 (g)
TARE WEIGHT, RING:	29.53 (g)
TARE WEIGHT, PAN:	0.00 (g)
SAMPLE VOLUME:	47.14 (cc)
DATE AND TIME INTO OVEN:	03/19/90 @ 1145
DATE AND TIME OUT OF OVEN:	03/20/90 @ 930
DRY WEIGHT OF SAMPLE:	77.75 (g)
DRY BULK DENSITY:	1.65 (g/cc)
PARTICLE DENSITY:	2.61 (g/cc)
(METHOD: WATER PYCNOMETER)	
CALCULATED POROSITY:	36.81 (% vol)
INITIAL MOISTURE CONTENT (VOLUMETRIC):	26.83 (% vol)
INITIAL MOISTURE CONTENT (GRAVIMETRIC):	16.27 (%)

COMMENTS:

LABORATORY ANALYSIS PERFORMED BY:	L. Simpson
CALCULATIONS MADE BY:	L. Simpson
CHECKED BY:	S. Stoller

DATA FOR INITIAL MOISTURE CONTENT,
BULK DENSITY, AND POROSITY

JOB NAME:	JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER:	89-L-144
SAMPLE NUMBER:	5-22
RING NUMBER:	T-8
DEPTH:	0-35 FT.

FIELD WEIGHT OF SAMPLE (W/PAN AND RING):	130.32 (g)
TARE WEIGHT, RING:	32.62 (g)
TARE WEIGHT, PAN:	0.00 (g)
SAMPLE VOLUME:	50.92 (cc)
DATE AND TIME INTO OVEN:	03/19/90 @ 1145
DATE AND TIME OUT OF OVEN:	03/20/90 @ 930
DRY WEIGHT OF SAMPLE:	84.06 (g)
DRY BULK DENSITY:	1.65 (g/cc)
PARTICLE DENSITY:	2.61 (g/cc)
(METHOD: WATER PYCNOMETER)	
CALCULATED POROSITY:	36.75 (% vol)
INITIAL MOISTURE CONTENT (VOLUMETRIC):	26.79 (% vol)
INITIAL MOISTURE CONTENT (GRAVIMETRIC):	16.23 (%)

COMMENTS:

LABORATORY ANALYSIS PERFORMED BY:	L. Simpson
CALCULATIONS MADE BY:	L. Simpson
CHECKED BY:	S. Stoller

DATA FOR INITIAL MOISTURE CONTENT,
BULK DENSITY, AND POROSITY

JOB NAME: JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER: 89-L-144
SAMPLE NUMBER: 5-23
RING NUMBER: T-9
DEPTH: 0-44 FT.

FIELD WEIGHT OF SAMPLE (W/PAN AND RING): 118.89 (g)
TARE WEIGHT, RING: 29.85 (g)
TARE WEIGHT, PAN: 0.00 (g)
SAMPLE VOLUME: 47.14 (cc)
DATE AND TIME INTO OVEN: 03/19/90 @ 1145
DATE AND TIME OUT OF OVEN: 03/20/90 @ 930

DRY WEIGHT OF SAMPLE: 76.16 (g)
DRY BULK DENSITY: 1.62 (g/cc)
PARTICLE DENSITY: 2.61 (g/cc)
(METHOD: WATER PYCNOMETER)

CALCULATED POROSITY: 38.10 (% vol)

INITIAL MOISTURE CONTENT (VOLUMETRIC): 27.32 (% vol)

INITIAL MOISTURE CONTENT (GRAVIMETRIC): 16.91 (%)

COMMENTS:

LABORATORY ANALYSIS PERFORMED BY: L. Simpson
CALCULATIONS MADE BY: L. Simpson
CHECKED BY: S. Stoller

DATA FOR INITIAL MOISTURE CONTENT,
BULK DENSITY, AND POROSITY

JOB NAME: JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER: 89-L-144
SAMPLE NUMBER: 5-24
RING NUMBER: T-10
DEPTH: 0-44 FT.

FIELD WEIGHT OF SAMPLE (W/PAN AND RING): 114.04 (g)
TARE WEIGHT, RING: 28.89 (g)
TARE WEIGHT, PAN: 0.00 (g)
SAMPLE VOLUME: 45.26 (cc)
DATE AND TIME INTO OVEN: 03/19/90 @ 1145
DATE AND TIME OUT OF OVEN: 03/20/90 @ 930

DRY WEIGHT OF SAMPLE: 73.09 (g)
DRY BULK DENSITY: 1.61 (g/cc)
PARTICLE DENSITY: 2.61 (g/cc)
(METHOD: WATER PYCNOMETER)

CALCULATED POROSITY: 38.13 (% vol)

INITIAL MOISTURE CONTENT (VOLUMETRIC): 26.65 (% vol)

INITIAL MOISTURE CONTENT (GRAVIMETRIC): 16.50 (%)

COMMENTS:

LABORATORY ANALYSIS PERFORMED BY: L. Simpson
CALCULATIONS MADE BY: L. Simpson
CHECKED BY: S. Stoller

Appendix C: SATURATED HYDRAULIC CONDUCTIVITY

Summary of Saturated Hydraulic Conductivity Tests

Sample No.	K_s (cm/sec)	Method of Analysis: Constant Head	Method of Analysis: Falling Head
5-1	4.5×10^{-3}	x	
5-2	4.5×10^{-3}	x	
5-3	1.5×10^{-5}		x
5-4	1.4×10^{-5}		x
5-5	1.9×10^{-4}		x
5-6	1.6×10^{-4}		x
5-7	6.5×10^{-4}	x	
5-8	8.2×10^{-4}	x	
5-9	7.1×10^{-4}	x	
5-10	5.0×10^{-4}	x	
5-11	1.8×10^{-3}	x	
5-12	5.1×10^{-5}		x
5-13	3.8×10^{-5}		x
5-14	2.6×10^{-5}		x
5-15	1.2×10^{-4}		x
5-16	9.9×10^{-5}		x
5-17	8.2×10^{-7}		x
5-18	5.8×10^{-5}		x
5-19	1.4×10^{-5}		x
5-20	9.1×10^{-6}		x
5-21	1.6×10^{-7}		x
5-22	6.0×10^{-7}		x
5-23	4.4×10^{-5}		x
5-24	3.5×10^{-5}		x

CONSTANT HEAD PERMEAMETER DATA

JOB NAME: JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER: 89-L-144
SAMPLE NUMBER: 5-1
RING NUMBER: T-1
DEPTH: UNKNOWN
TYPE OF WATER USED: 0.01N CaCl2
SAMPLE LENGTH: 2.5 (cm)
SAMPLE RADIUS: 2.5 (cm)
SAMPLE X-SECTIONAL AREA: 18.857 (sq. cm)

DATE (1989)	TIME (DAY)	TEMP (C)	RESERVOIR HEAD(CM)	SAMPLE HEAD(CM)	FLOW VOL(CC)	ELAPSED TIME(SEC)	K SAT (CM/SEC)	K SAT @ 20 (CM/SEC)
12/26	8:46	19.5	0.0	1.4	11.2	320	3.3E-03	3.3E-03
12/27	10:45	20.0	0.0	2.2	5.8	105	3.3E-03	3.3E-03
12/28	8:52	20.0	0.0	2.4	19.0	210	5.0E-03	5.0E-03
12/29	8:36	20.0	0.0	2.5	9.4	90	5.5E-03	5.5E-03
12/30	12:07	19.5	0.0	1.5	3.6	60	5.3E-[illegible]	[illegible]-03

AVERAGE K SAT: 4.5E-03 (CM/SEC)

COMMENTS:

LABORATORY ANALYSIS BY: M. Burkhard
CALCULATIONS MADE BY: L. Simpson
CHECKED BY: S. Stoller

CONSTANT HEAD PERMEAMETER DATA

JOB NAME: JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER: 89-L-144
SAMPLE NUMBER: 5-2
RING NUMBER: T-2
DEPTH: UNKNOWN
TYPE OF WATER USED: 0.01N CaCl2
SAMPLE LENGTH: 2.5 (cm)
SAMPLE RADIUS: 2.5 (cm)
SAMPLE X-SECTIONAL AREA: 18.857 (sq. cm)

DATE (1989)	TIME (DAY)	TEMP (C)	RESERVOIR HEAD(CM)	SAMPLE HEAD(CM)	FLOW VOL(CC)	ELAPSED TIME(SEC)	K SAT (CM/SEC)	K SAT @ 20 (CM/SEC)
12/26	8:45	19.5	0.0	1.5	9.4	242	3.4E-03	3.5E-03
12/27	10:46	20.0	0.0	2.4	8.0	120	3.7E-03	3.7E-03
12/28	8:52	20.0	0.0	2.6	13.2	205	3.3E-03	3.3E-03
12/29	8:42	20.0	0.0	2.7	20.0	110	8.9E-03	8.9E-03
12/30	12:11	19.5	0.0	1.8	6.8	80	6.3E-03	6.3E-03

AVERAGE K SAT: 4.5E-03 (CM/SEC)

COMMENTS:

LABORATORY ANALYSIS BY: M. Burkhard
CALCULATIONS MADE BY: L. Simpson
CHECKED BY: S. Stoller

FALLING HEAD TEST DATA

JOB NAME: JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER: 89-L-144
SAMPLE NUMBER: 5-3
RING NUMBER: T-3
DEPTH: UNKNOWN
TYPE OF WATER USED: 0.01N CaCl2 SOLUTION
SAMPLE X-SECTION AREA: 18.857 (sq. cm)
STANDPIPE X-SECTION AREA: 0.636 (sq. cm)
SAMPLE LENGTH: 2.5 (cm)

DATE (1989)	TIME (HOURS	DEL T (SEC)	TEMP (C)	RESERVOIR HEAD(CM)	SAMPLE HEAD(CM)	K SAT (CM/SEC)	K SAT @ 20 C (CM/SEC)
TEST # 1:							
12/29	9:22:02		20.5	0.0	80.0		
	9:51:45	1783	20.5	0.0	60.0	1.4E-05	1.3E-05
TEST # 2:							
12/30	11:58:05		19.5	0.0	64.0		
	12:20:22	1337	19.5	0.0	49.4	1.6E-05	1.6E-05

AVERAGE K SAT: 1.5E-05 (CM/SEC)

COMMENTS:

LABORATORY ANALYSIS BY: M. Burkhard
CALCULATIONS MADE BY: L. Simpson
CHECKED BY: S. Stoller

FALLING HEAD TEST DATA

JOB NAME: JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER: 89-L-144
SAMPLE NUMBER: 5-4
RING NUMBER: T-4
DEPTH: UNKNOWN
TYPE OF WATER USED: 0.01N CaCl2 SOLUTION
SAMPLE X-SECTION AREA: 18.857 (sq. cm)
STANDPIPE X-SECTION AREA: 0.636 (sq. cm)
SAMPLE LENGTH: 2.5 (cm)

DATE (1989)	TIME (HOURS	DEL T (SEC)	TEMP (C)	RESERVOIR HEAD(CM)	SAMPLE HEAD(CM)	K SAT (CM/SEC)	K SAT @ 20 C (CM/SEC)
TEST # 1:							
12/29	9:21:27		20.5	0.0	81.0		
	9:52:44	1877	20.5	0.0	61.0	1.3E-05	1.3E-05
TEST # 2:							
12/30	11:57:43		19.5	0.0	62.4		
	12:19:47	1324	19.5	0.0	48.7	1.6E-05	1.6E-05

AVERAGE K SAT: 1.4E-05 (CM/SEC)

COMMENTS:

LABORATORY ANALYSIS BY: M. Burkhard
CALCULATIONS MADE BY: L. Simpson
CHECKED BY: S. Stoller

FALLING HEAD TEST DATA

JOB NAME: JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER: 89-L-144
SAMPLE NUMBER: 5-5
RING NUMBER: T-5
DEPTH: UNKNOWN
TYPE OF WATER USED: 0.01N CaCl2 SOLUTION
SAMPLE X-SECTION AREA: 18.857 (sq. cm)
STANDPIPE X-SECTION AREA: 0.636 (sq. cm)
SAMPLE LENGTH: 2.5 (cm)

DATE (1989)	TIME (HOURS	DEL T (SEC)	TEMP (C)	RESERVOIR HEAD(CM)	SAMPLE HEAD(CM)	K SAT (CM/SEC)	K SAT @ 20 C (CM/SEC)
TEST # 1:							
12/29	9:18:30		20.5	0.0	60.0		
	9:31:20	770	20.5	0.0	12.0	1.8E-04	1.7E-04
TEST # 2:							
12/30	11:54:49		19.5	0.0	60.0		
	12:00:06	317	19.5	0.0	28.0	2.0E-04	2.0E-04

AVERAGE K SAT: 1.9E-04 (CM/SEC)

COMMENTS:

LABORATORY ANALYSIS BY: M. Burkhard
CALCULATIONS MADE BY: L. Simpson
CHECKED BY: S. Stoller

FALLING HEAD TEST DATA

JOB NAME: JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER: 89-L-144
SAMPLE NUMBER: 5-6
RING NUMBER: T-6
DEPTH: UNKNOWN
TYPE OF WATER USED: 0.01N CaCl2 SOLUTION
SAMPLE X-SECTION AREA: 18.857 (sq. cm)
STANDPIPE X-SECTION AREA: 0.636 (sq. cm)
SAMPLE LENGTH: 2.5 (cm)

DATE (1989)	TIME (HOURS	DEL T (SEC)	TEMP (C)	RESERVOIR HEAD(CM)	SAMPLE HEAD(CM)	K SAT (CM/SEC)	K SAT @ 20 C (CM/SEC)
TEST # 1:							
12/29	9:19:04		20.5	0.0	62.0		
	9:30:58	714	20.5	0.0	17.0	1.5E-04	1.5E-04
TEST # 2:							
12/30	11:55:10		19.5	0.0	60.0		
	12:00:59	349	19.5	0.0	30.0	1.7E-04	1.7E-04

AVERAGE K SAT: 1.6E-04 (CM/SEC)

COMMENTS:

LABORATORY ANALYSIS BY: M. Burkhard
CALCULATIONS MADE BY: L. Simpson
CHECKED BY: S. Stoller

CONSTANT HEAD PERMEAMETER DATA

JOB NAME: JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER: 89-L-144
SAMPLE NUMBER: 5-7
RING NUMBER: T-7
DEPTH: UNKNOWN
TYPE OF WATER USED: 0.01N CaCl2
SAMPLE LENGTH: 2.5 (cm)
SAMPLE RADIUS: 2.5 (cm)
SAMPLE X-SECTIONAL AREA: 18.857 (sq. cm)

DATE (1989)	TIME (DAY)	TEMP (C)	RESERVOIR HEAD(CM)	SAMPLE HEAD(CM)	FLOW VOL(CC)	ELAPSED TIME(SEC)	K SAT (CM/SEC)	K SAT @ 20 (CM/SEC)
12/26	9:08	19.5	0.0	1.2	5.8	935	6.9E-04	6.9E-04
12/27	10:55	20.0	0.0	2.4	5.1	425	6.6E-04	6.6E-04
12/28	9:07	20.0	0.0	3.5	8.1	465	6.6E-04	6.6E-04
12/29	8:54	20.0	0.0	3.6	10.4	645	5.9E-04	5.9E-04

AVERAGE K SAT: 6.5E-04 (CM/SEC)

COMMENTS:

LABORATORY ANALYSIS BY: M. Burkhard
CALCULATIONS MADE BY: L. Simpson
CHECKED BY: S. Stoller

CONSTANT HEAD PERMEAMETER DATA

JOB NAME: JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER: 89-L-144
SAMPLE NUMBER: 5-8
RING NUMBER: T-8
DEPTH: UNKNOWN
TYPE OF WATER USED: 0.01N CaCl2
SAMPLE LENGTH: 2.5 (cm)
SAMPLE RADIUS: 2.5 (cm)
SAMPLE X-SECTIONAL AREA: 18.857 (sq. cm)

DATE (1989)	TIME (DAY)	TEMP (C)	RESERVOIR HEAD(CM)	SAMPLE HEAD(CM)	FLOW VOL(CC)	ELAPSED TIME(SEC)	K SAT (CM/SEC)	K SAT @ 20 (CM/SEC)
12/26	9:08	19.5	0.0	1.2	6.7	1000	7.4E-04	7.5E-04
12/27	11:00	20.0	0.0	2.2	9.2	690	8.0E-04	8.0E-04
12/28	9:11	20.0	0.0	3.3	7.3	330	8.9E-04	8.9E-04
12/29	8:55	20.0	0.0	3.4	10.1	477	8.3E-04	8.3E-04

AVERAGE K SAT: 8.2E-04 (CM/SEC)

COMMENTS:

LABORATORY ANALYSIS BY: M. Burkhard
CALCULATIONS MADE BY: L. Simpson
CHECKED BY: S. Stoller

CONSTANT HEAD PERMEAMETER DATA

JOB NAME: JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER: 89-L-144
SAMPLE NUMBER: 5-9
RING NUMBER: T-9
DEPTH: UNKNOWN
TYPE OF WATER USED: 0.01N CaCl2
SAMPLE LENGTH: 2.5 (cm)
SAMPLE RADIUS: 2.5 (cm)
SAMPLE X-SECTIONAL AREA: 18.857 (sq. cm)

DATE (1989)	TIME (DAY)	TEMP (C)	RESERVOIR HEAD(CM)	SAMPLE HEAD(CM)	FLOW VOL(CC)	ELAPSED TIME(SEC)	K SAT (CM/SEC)	K SAT @ 20 (CM/SEC)
12/26	9:10	19.5	0.0	1.3	5.4	1260	4.4[illegible]	
12/27	11:00	20.0	0.0	2.2	9.1	725	7.6[illegible]	
12/28	9:16	20.0	0.0	3.4	8.2	390	8.2E[illegible]	
12/29	9:06	20.0	0.0	3.5	4.8	220	8.3E-04	[illegible]

AVERAGE K SAT: 7.1E-04 (CM/SEC)

COMMENTS:

LABORATORY ANALYSIS BY: M. Burkhard
CALCULATIONS MADE BY: L. Simpson
CHECKED BY: S. Stoller

CONSTANT HEAD PERMEAMETER DATA

JOB NAME: JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER: 89-L-144
SAMPLE NUMBER: 5-10
RING NUMBER: T-10
DEPTH: UNKNOWN
TYPE OF WATER USED: 0.01N CaCl2
SAMPLE LENGTH: 2.5 (cm)
SAMPLE RADIUS: 2.5 (cm)
SAMPLE X-SECTIONAL AREA: 18.857 (sq. cm)

DATE (1989)	TIME (DAY)	TEMP (C)	RESERVOIR HEAD(CM)	SAMPLE HEAD(CM)	FLOW VOL(CC)	ELAPSED TIME(SEC)	K SAT (CM/SEC)	K SAT @ 20 (CM/SEC)
12/26	9:10	19.5	0.0	1.4	5.8	1120	4.9E-04	4.9E-04
12/27	10:54	20.0	0.0	2.6	6.1	570	5.5E-04	5.5E-04
12/28	8:58	20.0	0.0	3.0	7.8	660	5.2E-04	5.2E-04
12/29	8:37	20.0	0.0	3.1	7.8	760	4.4E-04	4.4E-04

AVERAGE K SAT: 5.0E-04 (CM/SEC)

COMMENTS:

LABORATORY ANALYSIS BY: M. Burkhard
CALCULATIONS MADE BY: L. Simpson
CHECKED BY: S. Stoller

CONSTANT HEAD PERMEAMETER DATA

JOB NAME: JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER: 89-L-144
SAMPLE NUMBER: 5-11
RING NUMBER: T-11
DEPTH: UNKNOWN
TYPE OF WATER USED: 0.01N CaCl2
SAMPLE LENGTH: 2.5 (cm)
SAMPLE RADIUS: 2.5 (cm)
SAMPLE X-SECTIONAL AREA: 18.857 (sq. cm)

DATE (1989)	TIME (DAY)	TEMP (C)	RESERVOIR HEAD(CM)	SAMPLE HEAD(CM)	FLOW VOL(CC)	ELAPSED TIME(SEC)	K SAT (CM/SEC)	K SAT @ 20 (CM/SEC)
12/26	9:11	19.5	0.0	0.9	8.3	950	1.3E-03	1.3E-03
12/27	10:54	20.0	0.0	2.2	5.8	135	2.6E-03	2.6E-03
12/28	8:58	20.0	0.0	2.7	7.5	210	1.8E-03	1.7E-03
12/29	8:53	20.0	0.0	2.8	9.7	335	1.4E-03	1.4E-03

AVERAGE K SAT: 1.8E-03 (CM/SEC)

COMMENTS:

LABORATORY ANALYSIS BY: M. Burkhard
CALCULATIONS MADE BY: L. Simpson
CHECKED BY: S. Stoller

FALLING HEAD TEST DATA

JOB NAME: JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER: 89-L-144
SAMPLE NUMBER: 5-12
RING NUMBER: T-12
DEPTH: UNKNOWN
TYPE OF WATER USED: 0.01N CaCl2 SOLUTION
SAMPLE X-SECTION AREA: 18.857 (sq. cm)
STANDPIPE X-SECTION AREA: 0.636 (sq. cm)
SAMPLE LENGTH: 2.5 (cm)

DATE (1989)	TIME (HOURS	DEL T (SEC)	TEMP (C)	RESERVOIR HEAD(CM)	SAMPLE HEAD(CM)	K SAT (CM/SEC)	K SAT @ 20 C (CM/SEC)
TEST # 1:							
12/28	9:39:36		20.0	0.0	78.0		
	10:04:15	1479	20.0	0.0	32.0	5.1E-05	5.1E-05
TEST # 2:							
12/29	9:20:30		20.5	0.0	74.0		
	9:47:10	1600	20.5	0.0	28.0	5.1E-05	5.1E-05

AVERAGE K SAT: 5.1E-05 (CM/SEC)

COMMENTS:

LABORATORY ANALYSIS BY: M. Burkhard
CALCULATIONS MADE BY: L. Simpson
CHECKED BY: S. Stoller

FALLING HEAD TEST DATA

JOB NAME: JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER: 89-L-144
SAMPLE NUMBER: 5-13
RING NUMBER: T-13
DEPTH: UNKNOWN
TYPE OF WATER USED: 0.01N CaCl2 SOLUTION
SAMPLE X-SECTION AREA: 18.857 (sq. cm)
STANDPIPE X-SECTION AREA: 0.636 (sq. cm)
SAMPLE LENGTH: 2.5 (cm)

DATE (1989)	TIME (HOURS	DEL T (SEC)	TEMP (C)	RESERVOIR HEAD(CM)	SAMPLE HEAD(CM)	K SAT (CM/SEC)	K SAT @ 20 C (CM/SEC)
TEST # 1:							
12/28	9:40:03		20.0	0.0	77.0		
	10:04:30	1467	20.0	0.0	39.8	3.8E-05	3.8E-05
TEST # 2:							
12/29	9:20:09		20.5	0.0	74.0		
	9:49:03	1734	20.5	0.0	33.4	3.9E-05	3.8E-05

AVERAGE K SAT: 3.8E-05 (CM/SEC)

COMMENTS:

LABORATORY ANALYSIS BY: M. Burkhard
CALCULATIONS MADE BY: L. Simpson
CHECKED BY: S. Stoller

FALLING HEAD TEST DATA

JOB NAME: JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER: 89-L-144
SAMPLE NUMBER: 5-14
RING NUMBER: T-14
DEPTH: UNKNOWN
TYPE OF WATER USED: 0.01N CaCl2 SOLUTION
SAMPLE X-SECTION AREA: 18.857 (sq. cm)
STANDPIPE X-SECTION AREA: 0.636 (sq. cm)
SAMPLE LENGTH: 2.5 (cm)

DATE (1989)	TIME (HOURS	DEL T (SEC)	TEMP (C)	RESERVOIR HEAD(CM)	SAMPLE HEAD(CM)	K SAT (CM/SEC)	K SAT @ 20 C (CM/SEC)
TEST # 1:							
12/29	9:22:30		20.5	0.0	78.0		
	9:49:55	1645	20.5	0.0	50.0	2.3E-05	2.2E-05
TEST # 2:							
12/30	11:58:48		19.5	0.0	53.0		
	12:21:04	1336	19.5	0.0	33.0	3.0E-05	3.0E-05

AVERAGE K SAT: 2.6E-05 (CM/SEC)

COMMENTS:

LABORATORY ANALYSIS BY: M. Burkhard
CALCULATIONS MADE BY: L. Simpson
CHECKED BY: S. Stoller

FALLING HEAD TEST DATA

JOB NAME: JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER: 89-L-144
SAMPLE NUMBER: 5-15
RING NUMBER: T-1
DEPTH: 0-46 FT.
TYPE OF WATER USED: 0.01N CaCl2 SOLUTION
SAMPLE X-SECTION AREA: 18.857 (sq. cm)
STANDPIPE X-SECTION AREA: 0.636 (sq. cm)
SAMPLE LENGTH: 2.5 (cm)

DATE (1990)	TIME (HOURS	DEL T (SEC)	TEMP (C)	RESERVOIR HEAD(CM)	SAMPLE HEAD(CM)	K SAT (CM/SEC)	K SAT @ 20 C (CM/SEC)
TEST # 1:							
02/12	9:16:32		18.0	0.0	81.0		
02/12	9:41:15	1483	18.0	0.0	11.0	1.1E-04	1.2E-04
TEST # 2:							
02/13	10:19:53		18.0	0.0	80.0		
02/13	10:37:55	1082	18.0	0.0	18.0	1.2E-04	1.2E-04

AVERAGE K SAT: 1.2E-04 (CM/SEC)

COMMENTS:

LABORATORY ANALYSIS BY: L. Simpson
CALCULATIONS MADE BY: L. Simpson
CHECKED BY: S. Stoller

FALLING HEAD TEST DATA

JOB NAME: JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER: 89-L-144
SAMPLE NUMBER: 5-16
RING NUMBER: T-2
DEPTH: 0-46 FT.
TYPE OF WATER USED: 0.01N CaCl2 SOLUTION
SAMPLE X-SECTION AREA: 18.857 (sq. cm)
STANDPIPE X-SECTION AREA: 0.636 (sq. cm)
SAMPLE LENGTH: 2.5 (cm)

DATE (1990)	TIME (HOURS	DEL T (SEC)	TEMP (C)	RESERVOIR HEAD(CM)	SAMPLE HEAD(CM)	K SAT (CM/SEC)	K SAT @ 20 C (CM/SEC)
TEST # 1:							
02/13	10:20:14		18.0	0.0	79.0		
02/13	11:01:30	2476	18.0	0.0	5.3	9.2E-05	9.6E-05
TEST # 2:							
02/14	8:37:52		17.5	0.0	84.0		
02/14	9:33:20	3328	17.5	0.0	1.8	9.7E-05	1.0E-04

AVERAGE K SAT: 9.9E-05 (CM/SEC)

COMMENTS:

LABORATORY ANALYSIS BY: L. Simpson
CALCULATIONS MADE BY: L. Simpson
CHECKED BY: S. Stoller

FALLING HEAD TEST DATA

JOB NAME: JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER: 89-L-144
SAMPLE NUMBER: 5-17
RING NUMBER: T-3
DEPTH: 0-34 FT.
TYPE OF WATER USED: 0.01N CaCl2 SOLUTION
SAMPLE X-SECTION AREA: 18.857 (sq. cm)
STANDPIPE X-SECTION AREA: 0.636 (sq. cm)
SAMPLE LENGTH: 2.5 (cm)

DATE (1990)	TIME (HOURS	DEL T (SEC)	TEMP (C)	RESERVOIR HEAD(CM)	SAMPLE HEAD(CM)	K SAT (CM/SEC)	K SAT @ 20 C (CM/SEC)
TEST # 1:							
02/15	8:26		18.5	0.0	84.6		
02/16	8:47	87660	19.0	0.0	35.7	8.3E-07	8.5E-07
TEST # 2:							
02/16	9:00		19.0	0.0	86.1		
02/16	13:25	15900	20.0	0.0	74.3	7.8E-07	7.9E-07

AVERAGE K SAT: 8.2E-07 (CM/SEC)

COMMENTS:

LABORATORY ANALYSIS BY: L. Simpson
CALCULATIONS MADE BY: L. Simpson
CHECKED BY: S. Stoller

FALLING HEAD TEST DATA

JOB NAME: JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER: 89-L-144
SAMPLE NUMBER: 5-18
RING NUMBER: T-4
DEPTH: 0-34 FT.
TYPE OF WATER USED: 0.01N CaCl2 SOLUTION
SAMPLE X-SECTION AREA: 18.857 (sq. cm)
STANDPIPE X-SECTION AREA: 0.636 (sq. cm)
SAMPLE LENGTH: 2.4 (cm)

DATE (1990)	TIME (HOURS	DEL T (SEC)	TEMP (C)	RESERVOIR HEAD(CM)	SAMPLE HEAD(CM)	K SAT (CM/SEC)	K SAT @ 20 C (CM/SEC)
TEST # 1:							
02/13	10:21:05		18.0	0.0	80.0		
02/13	11:02:00	2455	18.0	0.0	15.8	5.3E-05	5.6E-05
TEST # 2:							
02/14	8:38:38		17.5	0.0	83.0		
02/14	9:33:30	3292	17.5	0.0	8.0	5.8E-05	6.0E-05

AVERAGE K SAT: 5.8E-05 (CM/SEC)

COMMENTS:

LABORATORY ANALYSIS BY: L. Simpson
CALCULATIONS MADE BY: L. Simpson
CHECKED BY: S. Stoller

FALLING HEAD TEST DATA

JOB NAME: JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER: 89-L-144
SAMPLE NUMBER: 5-19
RING NUMBER: T-5
DEPTH: 0-39 FT.
TYPE OF WATER USED: 0.01N CaCl2 SOLUTION
SAMPLE X-SECTION AREA: 18.857 (sq. cm)
STANDPIPE X-SECTION AREA: 0.636 (sq. cm)
SAMPLE LENGTH: 2.7 (cm)

DATE (1990)	TIME (HOURS	DEL T (SEC)	TEMP (C)	RESERVOIR HEAD(CM)	SAMPLE HEAD(CM)	K SAT (CM/SEC)	K SAT @ 20 C (CM/SEC)
TEST # 1:							
02/12 9:19:50			18.0	0.0	80.0		
02/12 13:44:00		15850	17.5	0.0	10.6	1.2E-05	1.2E-05
TEST # 2:							
02/13 10:21:25			18.0	0.0	83.0		
02/13 13:08:00		9995	17.0	0.0	17.3	1.4E-05	1.5E-05

AVERAGE K SAT: 1.4E-05 (CM/SEC)

COMMENTS:

LABORATORY ANALYSIS BY: L. Simpson
CALCULATIONS MADE BY: L. Simpson
CHECKED BY: S. Stoller

FALLING HEAD TEST DATA

JOB NAME: JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER: 89-L-144
SAMPLE NUMBER: 5-20
RING NUMBER: T-6
DEPTH: 0-39 FT.
TYPE OF WATER USED: 0.01N CaCl2 SOLUTION
SAMPLE X-SECTION AREA: 18.857 (sq. cm)
STANDPIPE X-SECTION AREA: 0.636 (sq. cm)
SAMPLE LENGTH: 2.5 (cm)

DATE (1990)	TIME (HOURS	DEL T (SEC)	TEMP (C)	RESERVOIR HEAD(CM)	SAMPLE HEAD(CM)	K SAT (CM/SEC)	K SAT @ 20 C (CM/SEC)
TEST # 1:							
02/15 8:26:25			18.5	0.0	80.4		
02/15 12:40:00		15215	19.0	0.0	16.4	8.8E-06	9.0E-06
TEST # 2:							
02/16 9:01:30			19.0	0.0	81.0		
02/16 13:22:00		15630	20.0	0.0	14.9	9.1E-06	9.2E-06

AVERAGE K SAT: 9.1E-06 (CM/SEC)

COMMENTS:

LABORATORY ANALYSIS BY: L. Simpson
CALCULATIONS MADE BY: L. Simpson
CHECKED BY: S. Stoller

FALLING HEAD TEST DATA

JOB NAME: JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER: 89-L-144
SAMPLE NUMBER: 5-21
RING NUMBER: T-7
DEPTH: 0-35 FT.
TYPE OF WATER USED: 0.01N CaCl2 SOLUTION
SAMPLE X-SECTION AREA: 18.857 (sq. cm)
STANDPIPE X-SECTION AREA: 0.636 (sq. cm)
SAMPLE LENGTH: 2.5 (cm)

DATE (1990)	TIME (HOURS	DEL T (SEC)	TEMP (C)	RESERVOIR HEAD(CM)	SAMPLE HEAD(CM)	K SAT (CM/SEC)	K SAT @ 20 C (CM/SEC)
TEST # 1:							
02/12	9:21:45		18.0	0.0	84.3		
02/13	8:32:00	83415	16.5	0.0	71.8	1.6E-07	1.7E-07
TEST # 2:							
02/13	10:22		18.0	0.0	83.4		
02/14	8:22	79200	17.0	0.0	72.4	1.5E-07	1.6E-07

AVERAGE K SAT: 1.6E-07 (CM/SEC)

COMMENTS:

LABORATORY ANALYSIS BY: L. Simpson
CALCULATIONS MADE BY: L. Simpson
CHECKED BY: S. Stoller

FALLING HEAD TEST DATA

JOB NAME: JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER: 89-L-144
SAMPLE NUMBER: 5-22
RING NUMBER: T-8
DEPTH: 0-35 FT.
TYPE OF WATER USED: 0.01N CaCl2 SOLUTION
SAMPLE X-SECTION AREA: 18.857 (sq. cm)
STANDPIPE X-SECTION AREA: 0.636 (sq. cm)
SAMPLE LENGTH: 2.7 (cm)

DATE (1990)	TIME (HOURS	DEL T (SEC)	TEMP (C)	RESERVOIR HEAD(CM)	SAMPLE HEAD(CM)	K SAT (CM/SEC)	K SAT @ 20 C (CM/SEC)
TEST # 1:							
02/12	9:22:25		18.0	0.0	81.0		
02/13	8:32:00	83375	16.5	0.0	47.1	5.9E-07	6.3E-07
TEST # 2:							
02/13	10:22		18.0	0.0	83.7		
02/14	8:23	79260	17.0	0.0	51.9	5.5E-07	5.8E-07

AVERAGE K SAT: 6.0E-07 (CM/SEC)

COMMENTS:

LABORATORY ANALYSIS BY: L. Simpson
CALCULATIONS MADE BY: L. Simpson
CHECKED BY: S. Stoller

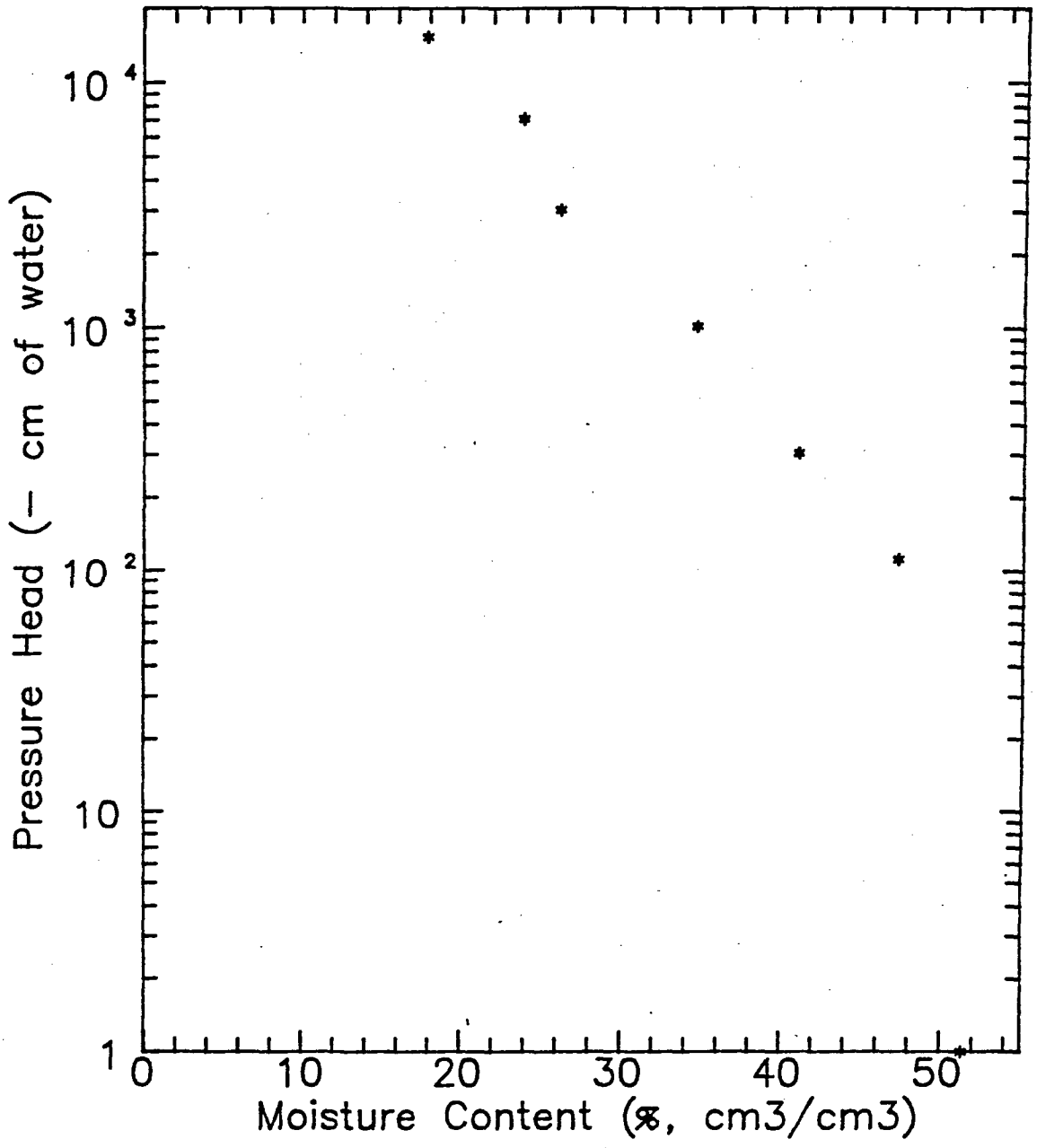
MOISTURE RETENTION DATA - 15 BAR PRESSURE PLATE
(PORE SIZE DISTRIBUTION)

JOB NAME: JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER: 89-L-144
SAMPLE NUMBER: 5-4
RING NUMBER: T-4
DEPTH: UNKNOWN
SAMPLE VOLUME: 45.26 (cc)
SATURATED WEIGHT AT 0 CM TENSION
(WITH CAP AND RING): 117.08 (g)
TARE RING: 28.81 (g)
TARE CAP: 0.00 (g)
DRY WEIGHT OF SAMPLE: 65.03 (g)
SATURATED MOISTURE CONTENT: 51.35 (% vol)
INITIAL VOLUME OF WATER IN SAMPLE: 23.24 (cc)

DATE (1990)	TIME	PRESSURE (BAR)	WEIGHT W/RING(G)	CHANGE WT (G)	CHANGES WT (G)	MOISTURE CONTENT (% VOL)
12/31	0600	0.0	117.08	--	--	51.35
01/04	1525	0.1	115.24	1.84	1.84	47.28
01/10	0915	0.3	112.43	2.81	4.65	41.07
01/15	1615	1.0	109.54	2.89	7.54	34.69
01/21	1330	3.0	105.70	3.84	11.38	26.20
01/26	0930	7.0	104.65	1.05	12.43	23.88
01/30	1200	15.1	101.93	2.72	15.15	17.87

COMMENTS: Assume density of water is 1.0 g/cc

LABORATORY ANALYSIS PERFORMED BY: L. Simpson
CALCULATION MADE BY: L. Simpson
CHECKED BY: S. Stoller



Pressure Head vs. Moisture Content, Sample No. 5-4

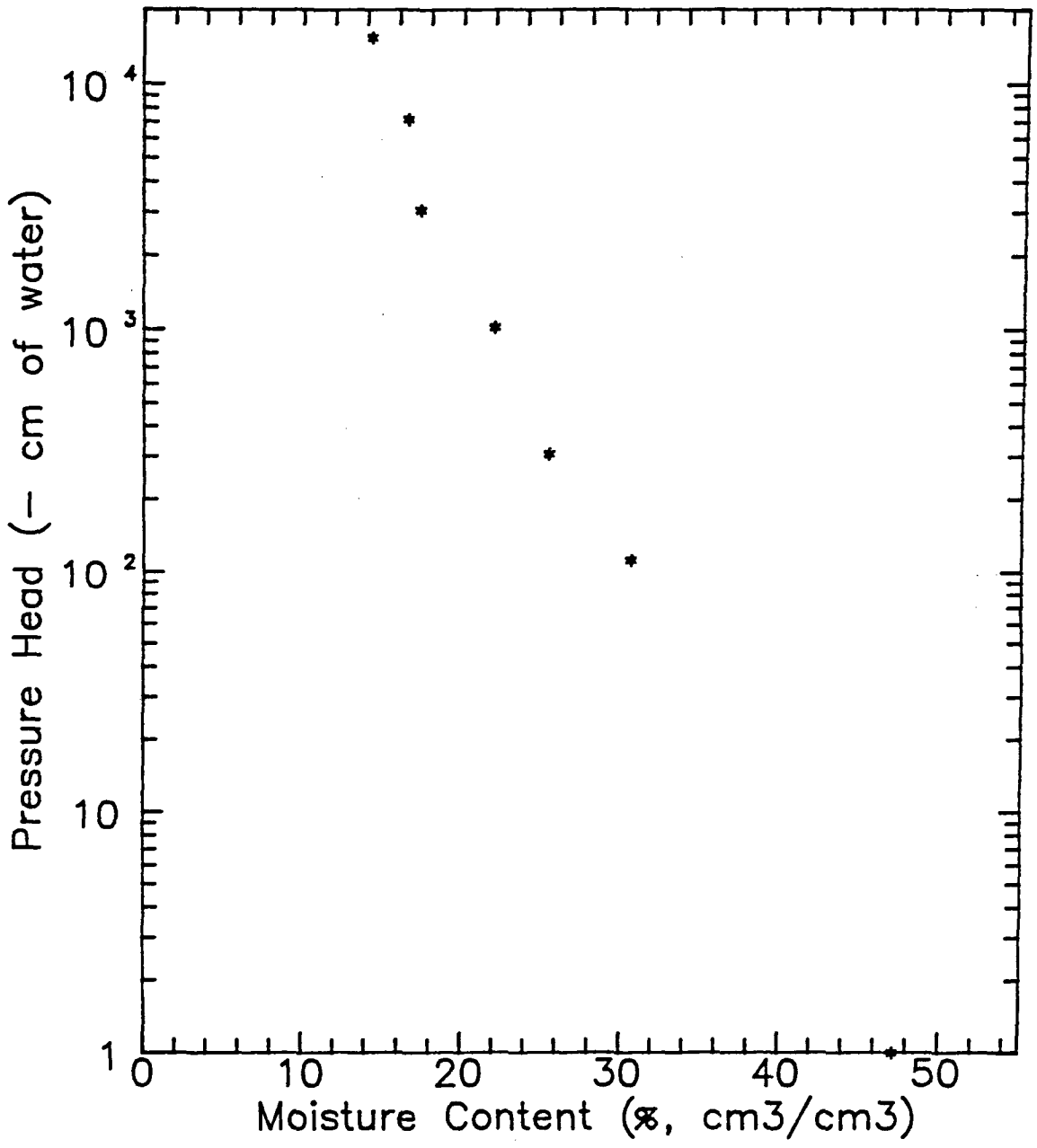
MOISTURE RETENTION DATA - 15 BAR PRESSURE PLATE
(PORE SIZE DISTRIBUTION)

JOB NAME: JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER: 89-L-144
SAMPLE NUMBER: 5-5
RING NUMBER: T-5
DEPTH: UNKNOWN
SAMPLE VOLUME: 50.92 (cc)
SATURATED WEIGHT AT 0 CM TENSION
(WITH CAP AND RING): 133.85 (g)
TARE RING: 32.47 (g)
TARE CAP: 0.00 (g)
DRY WEIGHT OF SAMPLE: 77.35 (g)
SATURATED MOISTURE CONTENT: 47.19 (% vol)
INITIAL VOLUME OF WATER IN SAMPLE: 24.03 (cc)

DATE (1990)	TIME	PRESSURE (BAR)	WEIGHT W/RING(G)	CHANGE WT (G)	CHANGES WT (G)	MOISTURE CONTENT (% VOL)
12/31	0600	0.0	133.85	--	--	47.19
01/04	1525	0.1	125.41	8.44	8.44	30.62
01/10	0915	0.3	122.80	2.61	11.05	25.49
01/15	1615	1.0	121.02	1.78	12.83	22.00
01/21	1330	3.0	118.66	2.36	15.19	17.36
01/26	0930	7.0	118.24	0.42	15.61	16.54
01/30	1200	15.1	117.09	1.15	16.76	14.28

COMMENTS: Assume density of water is 1.0 g/cc

LABORATORY ANALYSIS PERFORMED BY: L. Simpson
CALCULATION MADE BY: L. Simpson
CHECKED BY: S. Stoller



Pressure Head vs. Moisture Content, Sample No. 5–5

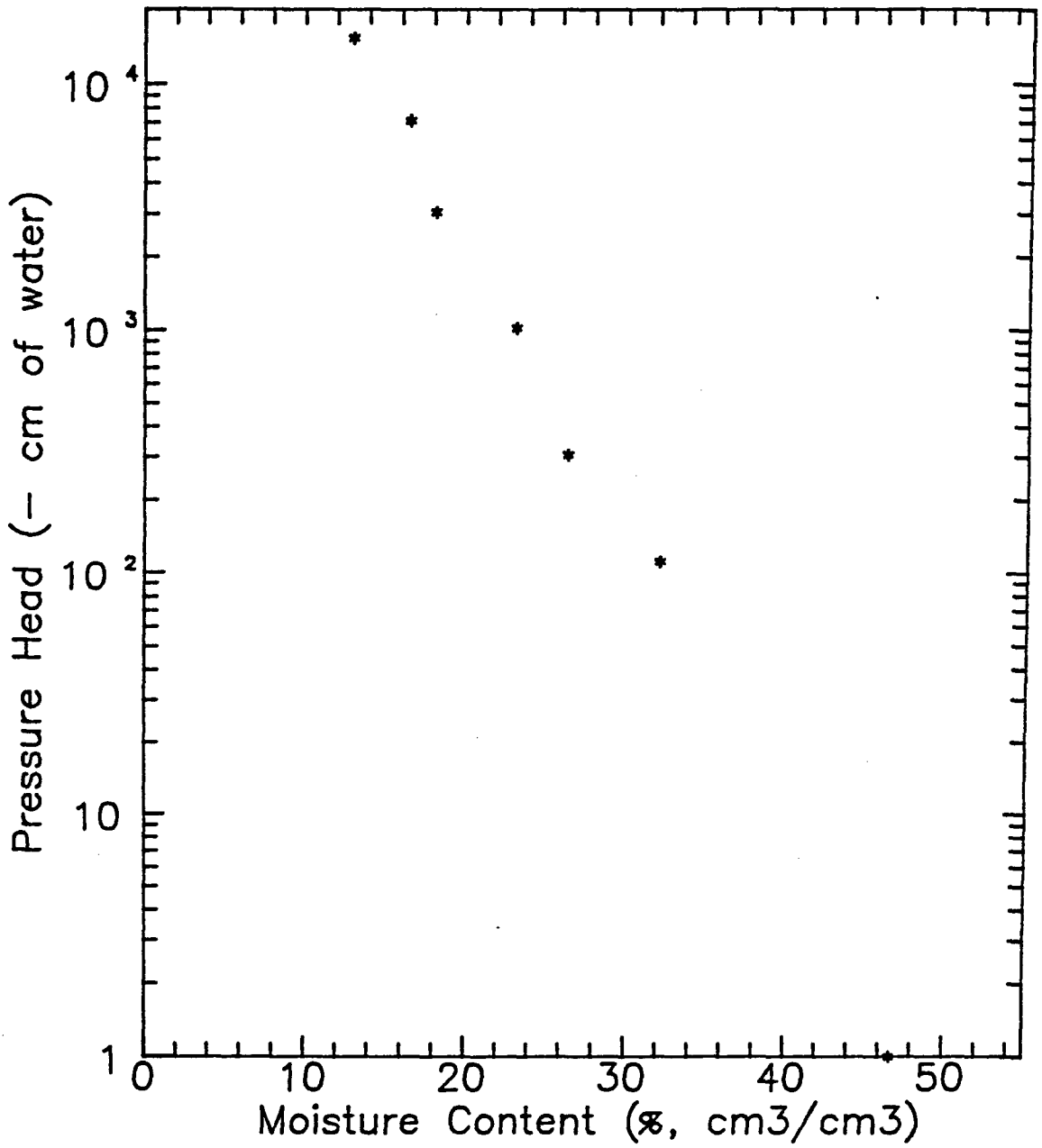
MOISTURE RETENTION DATA - 15 BAR PRESSURE PLATE
(PORE SIZE DISTRIBUTION)

JOB NAME: JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER: 89-L-144
SAMPLE NUMBER: 5-6
RING NUMBER: T-6
DEPTH: UNKNOWN
SAMPLE VOLUME: 47.14 (cc)
SATURATED WEIGHT AT 0 CM TENSION
(WITH CAP AND RING): 123.27 (g)
TARE RING: 28.80 (g)
TARE CAP: 0.00 (g)
DRY WEIGHT OF SAMPLE: 72.45 (g)
SATURATED MOISTURE CONTENT: 46.71 (% vol)
INITIAL VOLUME OF WATER IN SAMPLE: 22.02 (cc)

DATE (1990)	TIME	PRESSURE (BAR)	WEIGHT W/RING(G)	CHANGE WT (G)	CHANGES WT (G)	MOISTURE CONTENT (% VOL)
12/31	0600	0.0	123.27	--	--	46.71
01/04	1525	0.1	116.41	6.86	6.86	32.16
01/10	0915	0.3	113.73	2.68	9.54	26.47
01/15	1615	1.0	112.19	1.54	11.08	23.21
01/21	1330	3.0	109.80	2.39	13.47	18.14
01/26	0930	7.0	109.04	0.76	14.23	16.53
01/30	1200	15.1	107.37	1.67	15.90	12.98

COMMENTS: Assume density of water is 1.0 g/cc

LABORATORY ANALYSIS PERFORMED BY: L. Simpson
CALCULATION MADE BY: L. Simpson
CHECKED BY: S. Stoller



Pressure Head vs. Moisture Content, Sample No. 5-6

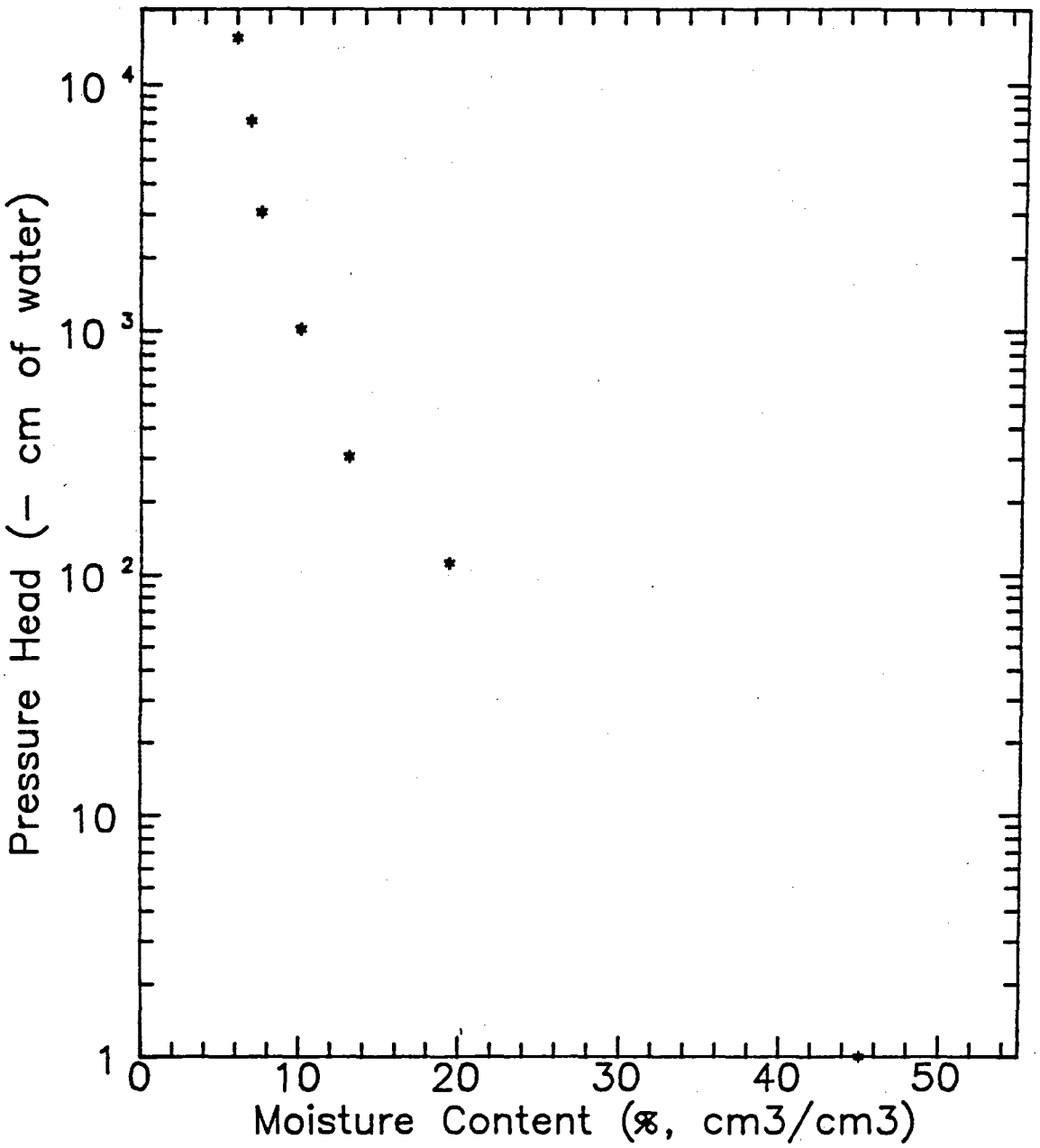
MOISTURE RETENTION DATA - 15 BAR PRESSURE PLATE
(PORE SIZE DISTRIBUTION)

JOB NAME: JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER: 89-L-144
SAMPLE NUMBER: 5-7
RING NUMBER: T-7
DEPTH: UNKNOWN
SAMPLE VOLUME: 47.14 (cc)
SATURATED WEIGHT AT 0 CM TENSION
(WITH CAP AND RING): 122.28 (g)
TARE RING: 29.52 (g)
TARE CAP: 0.00 (g)
DRY WEIGHT OF SAMPLE: 71.52 (g)
SATURATED MOISTURE CONTENT: 45.06 (% vol)
INITIAL VOLUME OF WATER IN SAMPLE: 21.24 (cc)

DATE (1990)	TIME	PRESSURE (BAR)	WEIGHT W/RING(G)	CHANGE WT (G)	CHANGES WT (G)	MOISTURE CONTENT (% VOL)
12/31	0600	0.0	122.28	--	--	45.06
01/04	1525	0.1	110.17	12.11	12.11	19.37
01/10	0915	0.3	107.21	2.96	15.07	13.09
01/15	1615	1.0	105.78	1.43	16.50	10.06
01/21	1330	3.0	104.61	1.17	17.67	7.57
01/26	0930	7.0	104.28	0.33	18.00	6.87
01/30	1200	15.1	103.87	0.41	18.41	6.00

COMMENTS: Assume density of water is 1.0 g/cc

LABORATORY ANALYSIS PERFORMED BY: L. Simpson
CALCULATION MADE BY: L. Simpson
CHECKED BY: S. Stoller



Pressure Head vs. Moisture Content, Sample No. 5–7

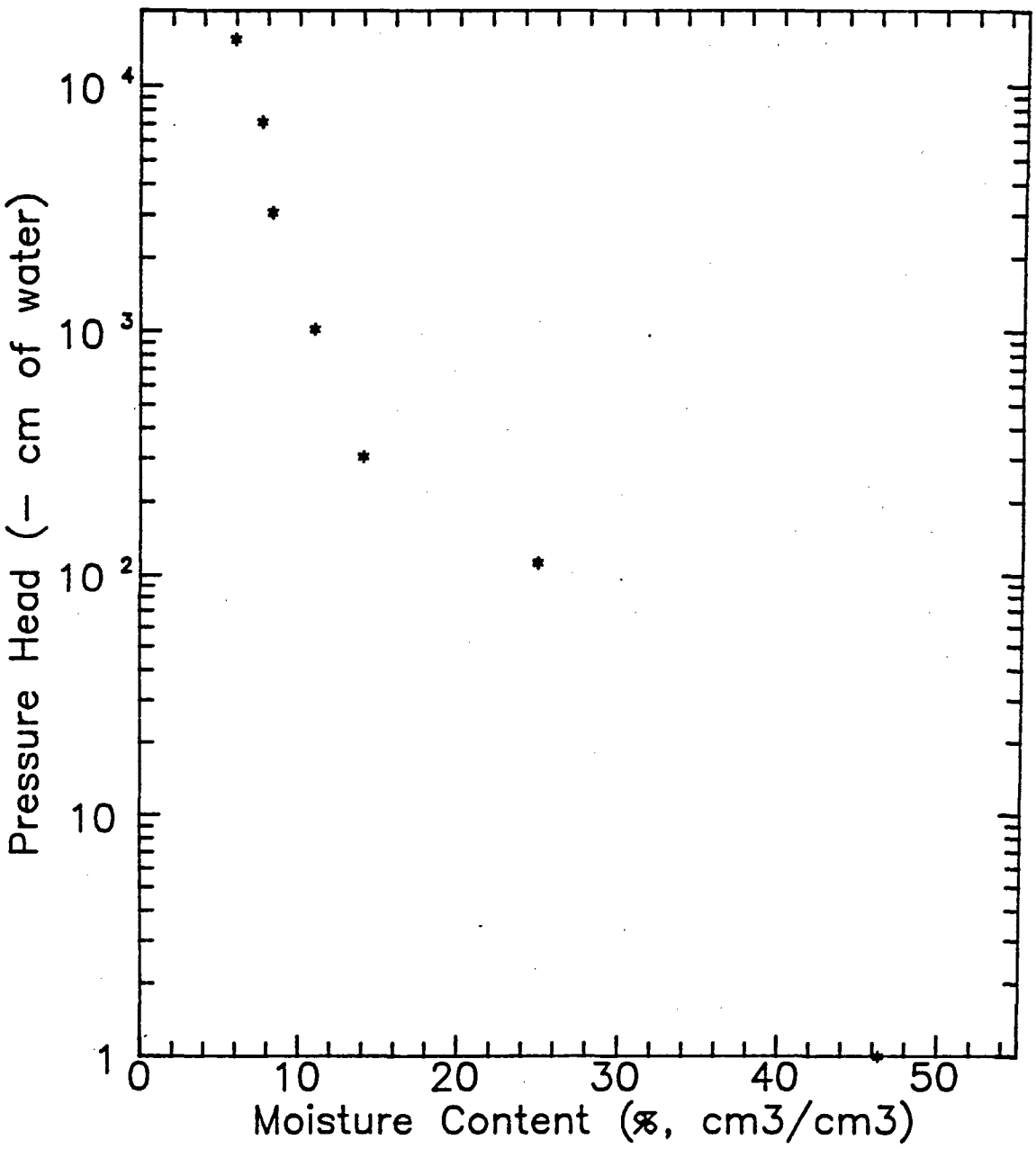
MOISTURE RETENTION DATA - 15 BAR PRESSURE PLATE
(PORE SIZE DISTRIBUTION)

JOB NAME: JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER: 89-L-144
SAMPLE NUMBER: 5-8
RING NUMBER: T-8
DEPTH: UNKNOWN
SAMPLE VOLUME: 50.92 (cc)
SATURATED WEIGHT AT 0 CM TENSION
(WITH CAP AND RING): 134.68 (g)
TARE RING: 32.63 (g)
TARE CAP: 0.00 (g)
DRY WEIGHT OF SAMPLE: 78.44 (g)
SATURATED MOISTURE CONTENT: 46.37 (% vol)
INITIAL VOLUME OF WATER IN SAMPLE: 23.61 (cc)

DATE (1990)	TIME	PRESSURE (BAR)	WEIGHT W/RING(G)	CHANGE WT (G)	CHANGES WT (G)	MOISTURE CONTENT (% VOL)
12/31	0600	0.0	134.68	--	--	46.37
01/04	1525	0.1	123.77	10.91	10.91	24.94
01/10	0915	0.3	118.23	5.54	16.45	14.06
01/15	1615	1.0	116.66	1.57	18.02	10.98
01/21	1330	3.0	115.31	1.35	19.37	8.33
01/26	0930	7.0	114.96	0.35	19.72	7.64
01/30	1200	15.1	114.10	0.86	20.58	5.95

COMMENTS: Assume density of water is 1.0 g/cc

LABORATORY ANALYSIS PERFORMED BY: L. Simpson
CALCULATION MADE BY: L. Simpson
CHECKED BY: S. Stoller



Pressure Head vs. Moisture Content, Sample No. 5-8

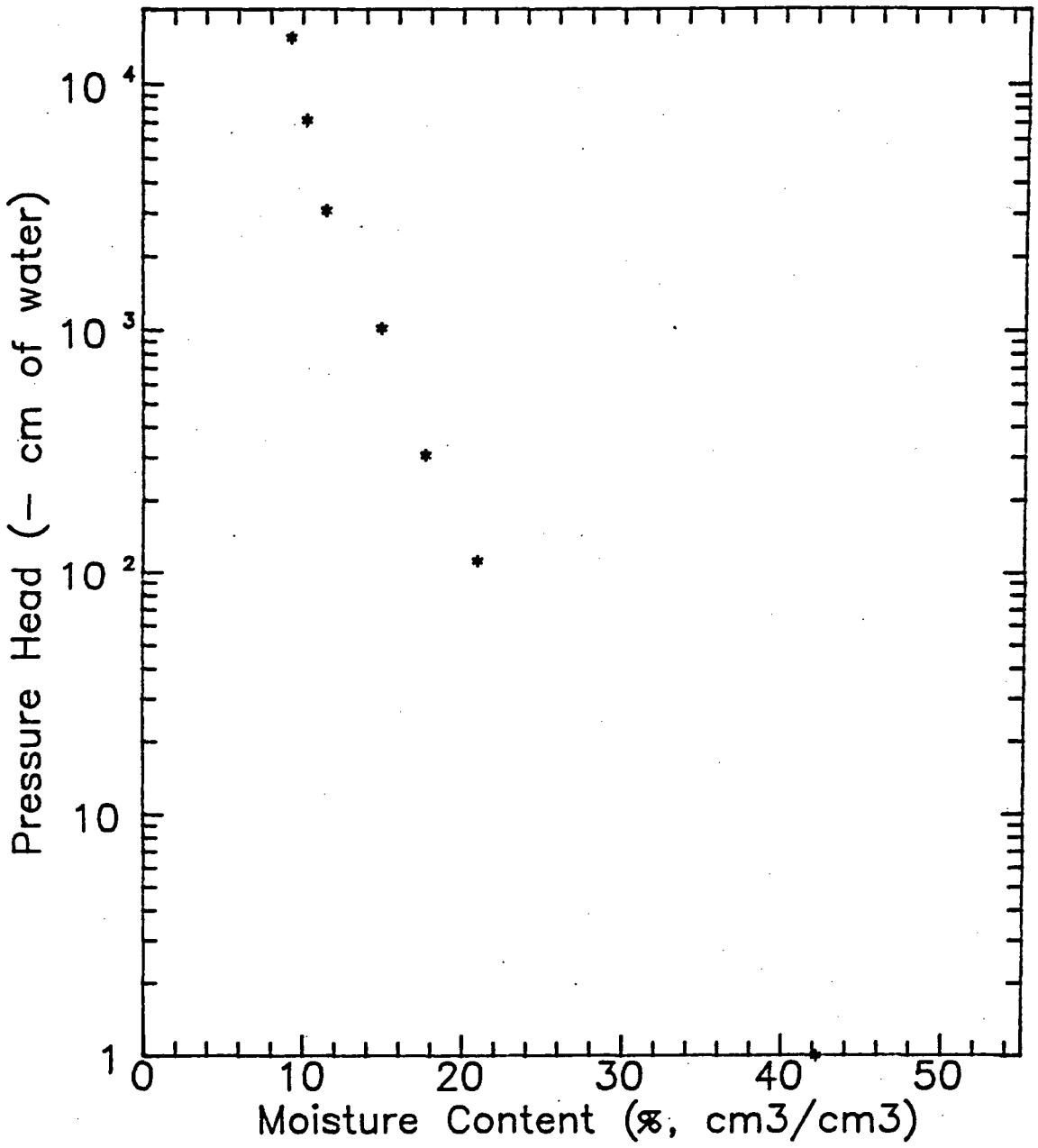
MOISTURE RETENTION DATA - 15 BAR PRESSURE PLATE
(PORE SIZE DISTRIBUTION)

JOB NAME: JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER: 89-L-144
SAMPLE NUMBER: 5-9
RING NUMBER: T-9
DEPTH: UNKNOWN
SAMPLE VOLUME: 47.14 (cc)
SATURATED WEIGHT AT 0 CM TENSION
(WITH CAP AND RING): 126.40 (g)
TARE RING: 29.86 (g)
TARE CAP: 0.00 (g)
DRY WEIGHT OF SAMPLE: 76.64 (g)
SATURATED MOISTURE CONTENT: 42.21 (% vol)
INITIAL VOLUME OF WATER IN SAMPLE: 19.90 (cc)

DATE (1990)	TIME	PRESSURE (BAR)	WEIGHT W/RING(G)	CHANGE WT (G)	CHANGES WT (G)	MOISTURE CONTENT (% VOL)
12/31	0600	0.0	126.40	--	--	42.21
01/04	1525	0.1	116.39	10.01	10.01	20.98
01/10	0915	0.3	114.84	1.55	11.56	17.69
01/15	1615	1.0	113.56	1.28	12.84	14.98
01/21	1330	3.0	111.91	1.65	14.49	11.48
01/26	0930	7.0	111.33	0.58	15.07	10.25
01/30	1200	15.1	110.89	0.44	15.51	9.31

COMMENTS: Assume density of water is 1.0 g/cc

LABORATORY ANALYSIS PERFORMED BY: L. Simpson
CALCULATION MADE BY: L. Simpson
CHECKED BY: S. Stoller



Pressure Head vs. Moisture Content, Sample No. 5–9

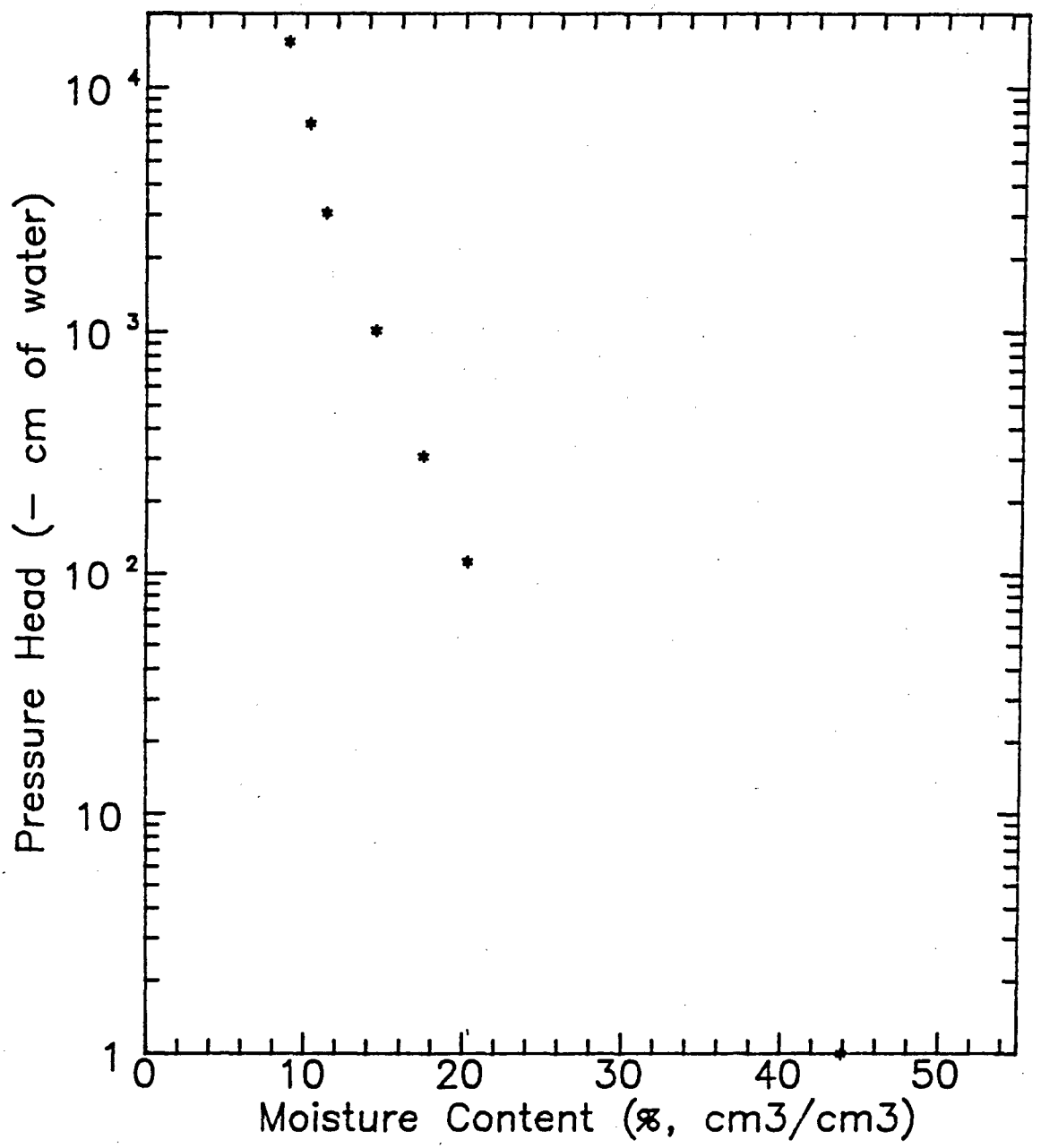
MOISTURE RETENTION DATA - 15 BAR PRESSURE PLATE
(PORE SIZE DISTRIBUTION)

JOB NAME: JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER: 89-L-144
SAMPLE NUMBER: 5-10
RING NUMBER: T-10
DEPTH: UNKNOWN
SAMPLE VOLUME: 45.26 (cc)
SATURATED WEIGHT AT 0 CM TENSION
(WITH CAP AND RING): 122.68 (g)
TARE RING: 28.88 (g)
TARE CAP: 0.00 (g)
DRY WEIGHT OF SAMPLE: 73.93 (g)
SATURATED MOISTURE CONTENT: 43.90 (% vol)
INITIAL VOLUME OF WATER IN SAMPLE: 19.87 (cc)

DATE (1990)	TIME	PRESSURE (BAR)	WEIGHT W/RING(G)	CHANGE WT (G)	CHANGES WT (G)	MOISTURE CONTENT (% VOL)
12/31	0600	0.0	122.68	--	--	43.90
01/04	1525	0.1	111.99	10.69	10.69	20.28
01/10	0915	0.3	110.71	1.28	11.97	17.45
01/15	1615	1.0	109.37	1.34	13.31	14.49
01/21	1330	3.0	107.94	1.43	14.74	11.33
01/26	0930	7.0	107.46	0.48	15.22	10.27
01/30	1200	15.1	106.85	0.61	15.83	8.93

COMMENTS: Assume density of water is 1.0 g/cc

LABORATORY ANALYSIS PERFORMED BY: L. Simpson
CALCULATION MADE BY: L. Simpson
CHECKED BY: S. Stoller



Pressure Head vs. Moisture Content, Sample No. 5–10

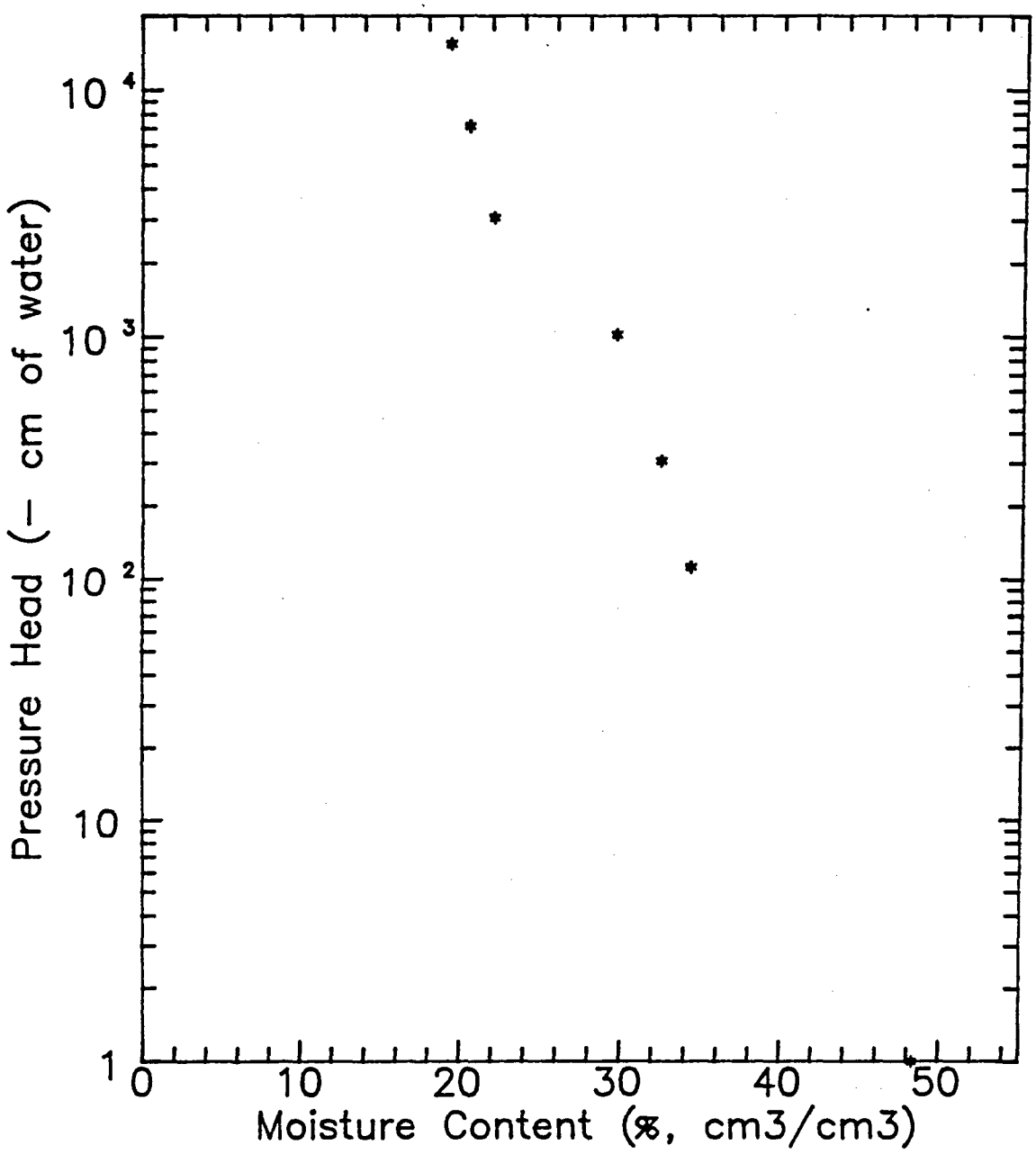
MOISTURE RETENTION DATA - 15 BAR PRESSURE PLATE
(PORE SIZE DISTRIBUTION)

JOB NAME: JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER: 89-L-144
SAMPLE NUMBER: 5-11
RING NUMBER: T-11
DEPTH: UNKNOWN
SAMPLE VOLUME: 49.03 (cc)
SATURATED WEIGHT AT 0 CM TENSION
(WITH CAP AND RING): 120.40 (g)
TARE RING: 28.56 (g)
TARE CAP: 0.00 (g)
DRY WEIGHT OF SAMPLE: 68.14 (g)
SATURATED MOISTURE CONTENT: 48.34 (% vol)
INITIAL VOLUME OF WATER IN SAMPLE: 23.70 (cc)

DATE (1990)	TIME	PRESSURE (BAR)	WEIGHT W/RING(G)	CHANGE WT (G)	CHANGES WT (G)	MOISTURE CONTENT (% VOL)
12/31	0600	0.0	120.40	--	--	48.34
01/04	1525	0.1	113.54	6.86	6.86	34.35
01/10	0915	0.3	112.63	0.91	7.77	32.49
01/15	1615	1.0	111.27	1.36	9.13	29.72
01/21	1330	3.0	107.55	3.72	12.85	22.13
01/26	0930	7.0	106.80	0.75	13.60	20.60
01/30	1200	15.1	106.20	0.60	14.20	19.38

COMMENTS: Assume density of water is 1.0 g/cc

LABORATORY ANALYSIS PERFORMED BY: L. Simpson
CALCULATION MADE BY: L. Simpson
CHECKED BY: S. Stoller



Pressure Head vs. Moisture Content, Sample No. 5-11

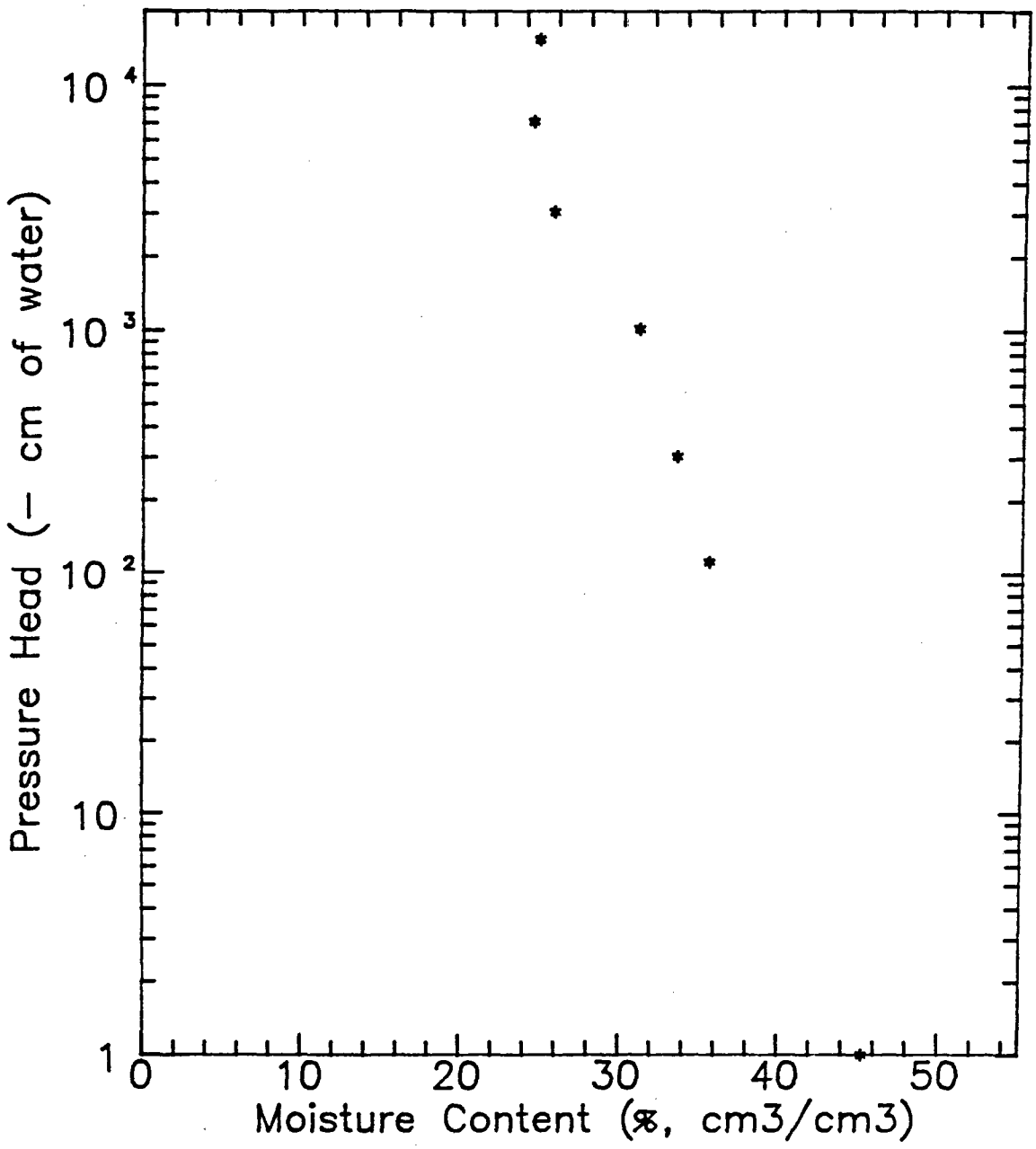
MOISTURE RETENTION DATA - 15 BAR PRESSURE PLATE
(PORE SIZE DISTRIBUTION)

JOB NAME: JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER: 89-L-144
SAMPLE NUMBER: 5-12
RING NUMBER: T-12
DEPTH: UNKNOWN
SAMPLE VOLUME: 47.14 (cc)
SATURATED WEIGHT AT 0 CM TENSION
(WITH CAP AND RING): 121.19 (g)
TARE RING: 29.82 (g)
TARE CAP: 0.00 (g)
DRY WEIGHT OF SAMPLE: 70.03 (g)
SATURATED MOISTURE CONTENT: 45.27 (% vol)
INITIAL VOLUME OF WATER IN SAMPLE: 21.34 (cc)

DATE (1990)	TIME	PRESSURE (BAR)	WEIGHT W/RING(G)	CHANGE WT (G)	CHANGES WT (G)	MOISTURE CONTENT (% VOL)
12/31	0600	0.0	121.19	--	--	45.27
01/04	1525	0.1	116.63	4.56	4.56	35.60
01/10	0915	0.3	115.67	0.96	5.52	33.56
01/15	1615	1.0	114.53	1.14	6.66	31.14
01/21	1330	3.0	112.01	2.52	9.18	25.80
01/26	0930	7.0	111.38	0.63	9.81	24.46
01/30	1200	15.1	111.52	-0.14	9.67	24.76

COMMENTS: Assume density of water is 1.0 g/cc

LABORATORY ANALYSIS PERFORMED BY: L. Simpson
CALCULATION MADE BY: L. Simpson
CHECKED BY: S. Stoller



Pressure Head vs. Moisture Content, Sample No. 5–12

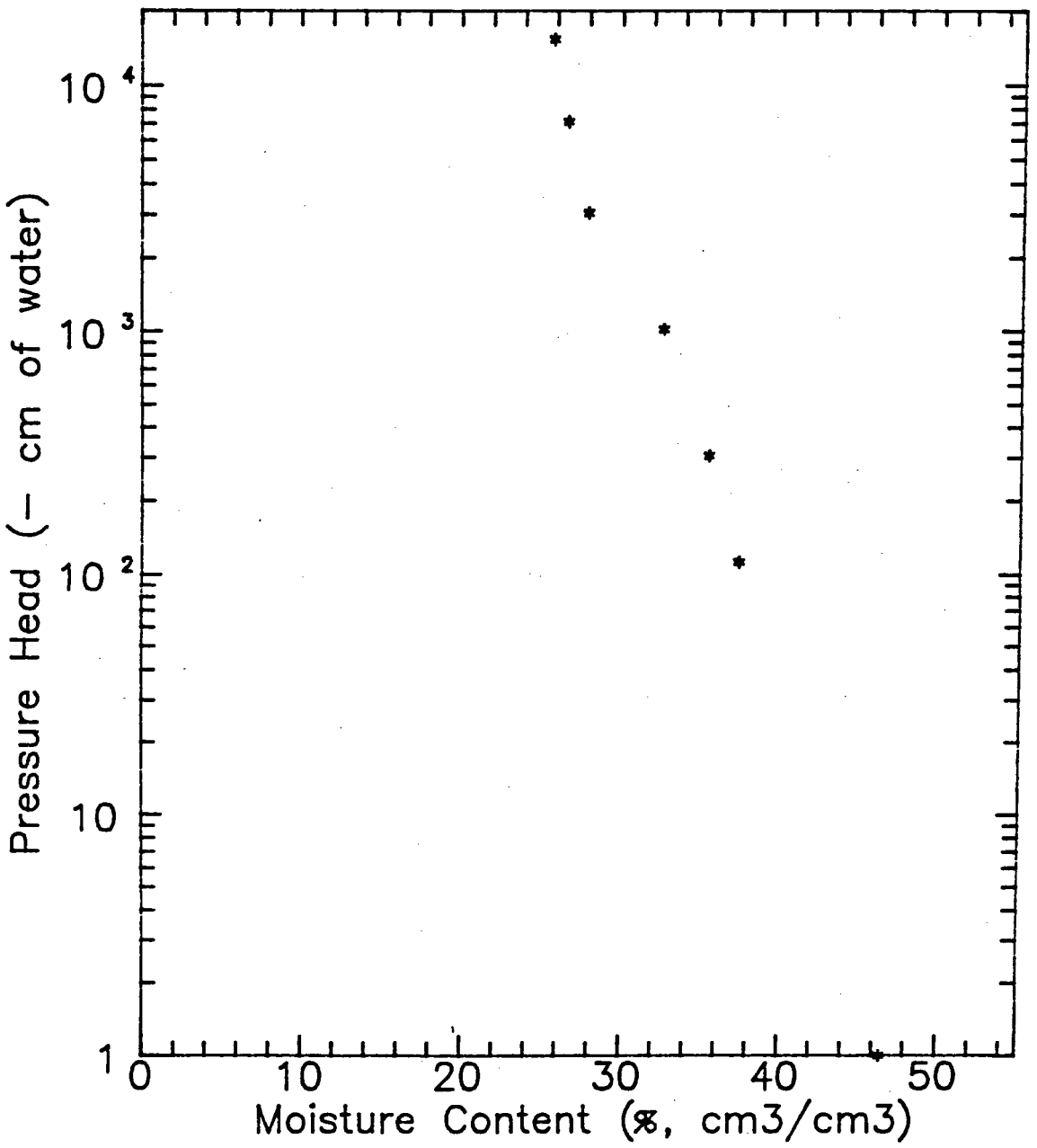
MOISTURE RETENTION DATA - 15 BAR PRESSURE PLATE
(PORE SIZE DISTRIBUTION)

JOB NAME: JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER: 89-L-144
SAMPLE NUMBER: 5-13
RING NUMBER: T-13
DEPTH: UNKNOWN
SAMPLE VOLUME: 50.92 (cc)
SATURATED WEIGHT AT 0 CM TENSION
(WITH CAP AND RING): 128.49 (g)
TARE RING: 30.67 (g)
TARE CAP: 0.00 (g)
DRY WEIGHT OF SAMPLE: 74.15 (g)
SATURATED MOISTURE CONTENT: 46.48 (% vol)
INITIAL VOLUME OF WATER IN SAMPLE: 23.67 (cc)

DATE (1990)	TIME	PRESSURE (BAR)	WEIGHT W/RING(G)	CHANGE WT (G)	CHANGES WT (G)	MOISTURE CONTENT (% VOL)
12/31	0600	0.0	128.49	--	--	46.48
01/04	1525	0.1	123.91	4.58	4.58	37.49
01/10	0915	0.3	122.93	0.98	5.56	35.57
01/15	1615	1.0	121.46	1.47	7.03	32.68
01/21	1330	3.0	119.05	2.41	9.44	27.95
01/26	0930	7.0	118.41	0.64	10.08	26.69
01/30	1200	15.1	117.94	0.47	10.55	25.77

COMMENTS: Assume density of water is 1.0 g/cc

LABORATORY ANALYSIS PERFORMED BY: L. Simpson
CALCULATION MADE BY: L. Simpson
CHECKED BY: S. Stoller



Pressure Head vs. Moisture Content, Sample No. 5-13

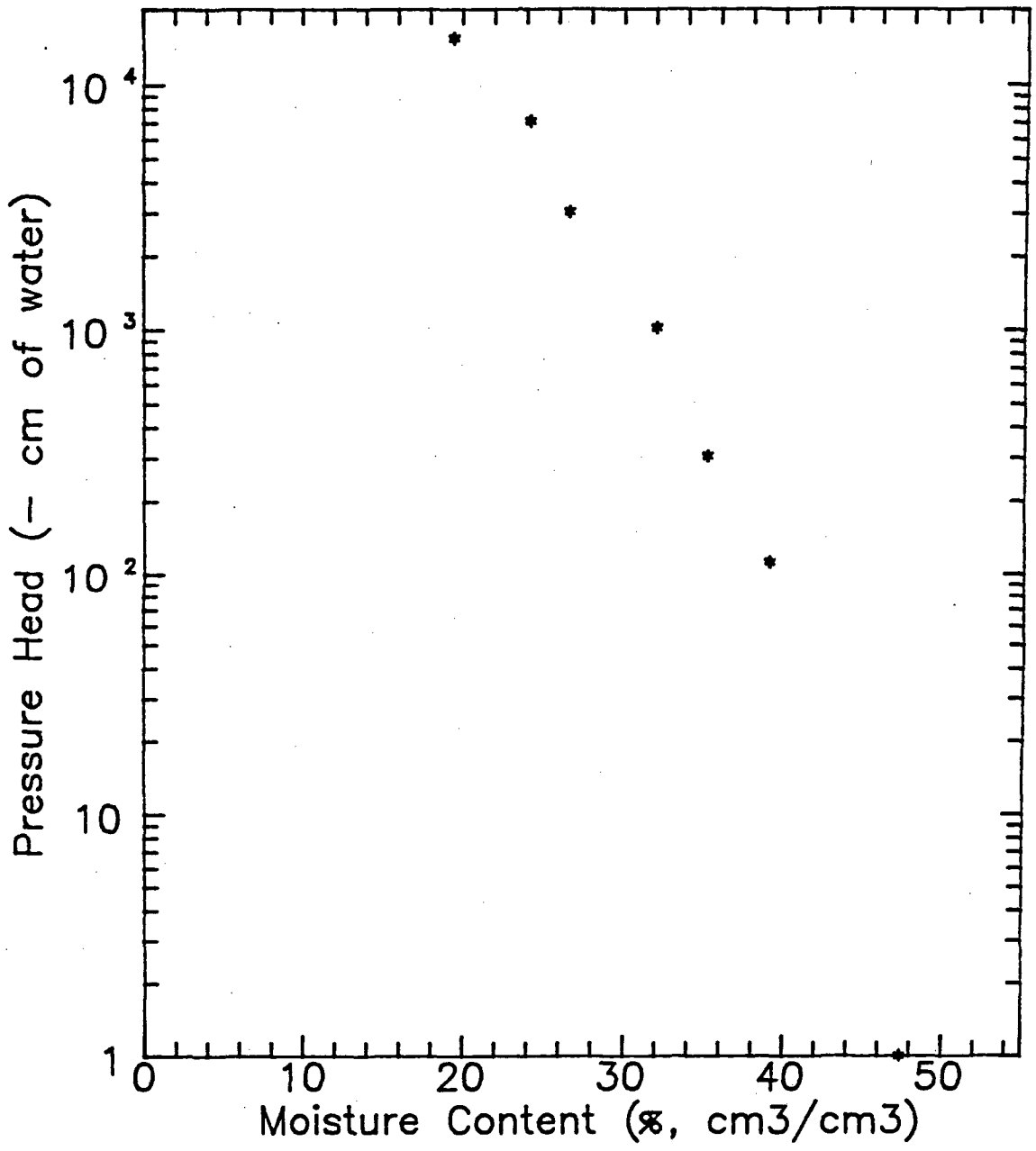
MOISTURE RETENTION DATA - 15 BAR PRESSURE PLATE
(PORE SIZE DISTRIBUTION)

JOB NAME: JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER: 89-L-144
SAMPLE NUMBER: 5-14
RING NUMBER: T-14
DEPTH: UNKNOWN
SAMPLE VOLUME: 47.14 (cc)
SATURATED WEIGHT AT 0 CM TENSION
(WITH CAP AND RING): 123.28 (g)
TARE RING: 30.45 (g)
TARE CAP: 0.00 (g)
DRY WEIGHT OF SAMPLE: 70.49 (g)
SATURATED MOISTURE CONTENT: 47.39 (% vol)
INITIAL VOLUME OF WATER IN SAMPLE: 22.34 (cc)

DATE (1990)	TIME	PRESSURE (BAR)	WEIGHT W/RING(G)	CHANGE WT (G)	CHANGES WT (G)	MOISTURE CONTENT (% VOL)
12/31	0600	0.0	123.28	--	--	47.39
01/04	1525	0.1	119.37	3.91	3.91	39.10
01/10	0915	0.3	117.55	1.82	5.73	35.24
01/15	1615	1.0	116.05	1.50	7.23	32.05
01/21	1330	3.0	113.50	2.55	9.78	26.64
01/26	0930	7.0	112.35	1.15	10.93	24.20
01/30	1200	15.1	110.11	2.24	13.17	19.45

COMMENTS: Assume density of water is 1.0 g/cc

LABORATORY ANALYSIS PERFORMED BY: L. Simpson
CALCULATION MADE BY: L. Simpson
CHECKED BY: S. Stoller



Pressure Head vs. Moisture Content, Sample No. 5–14

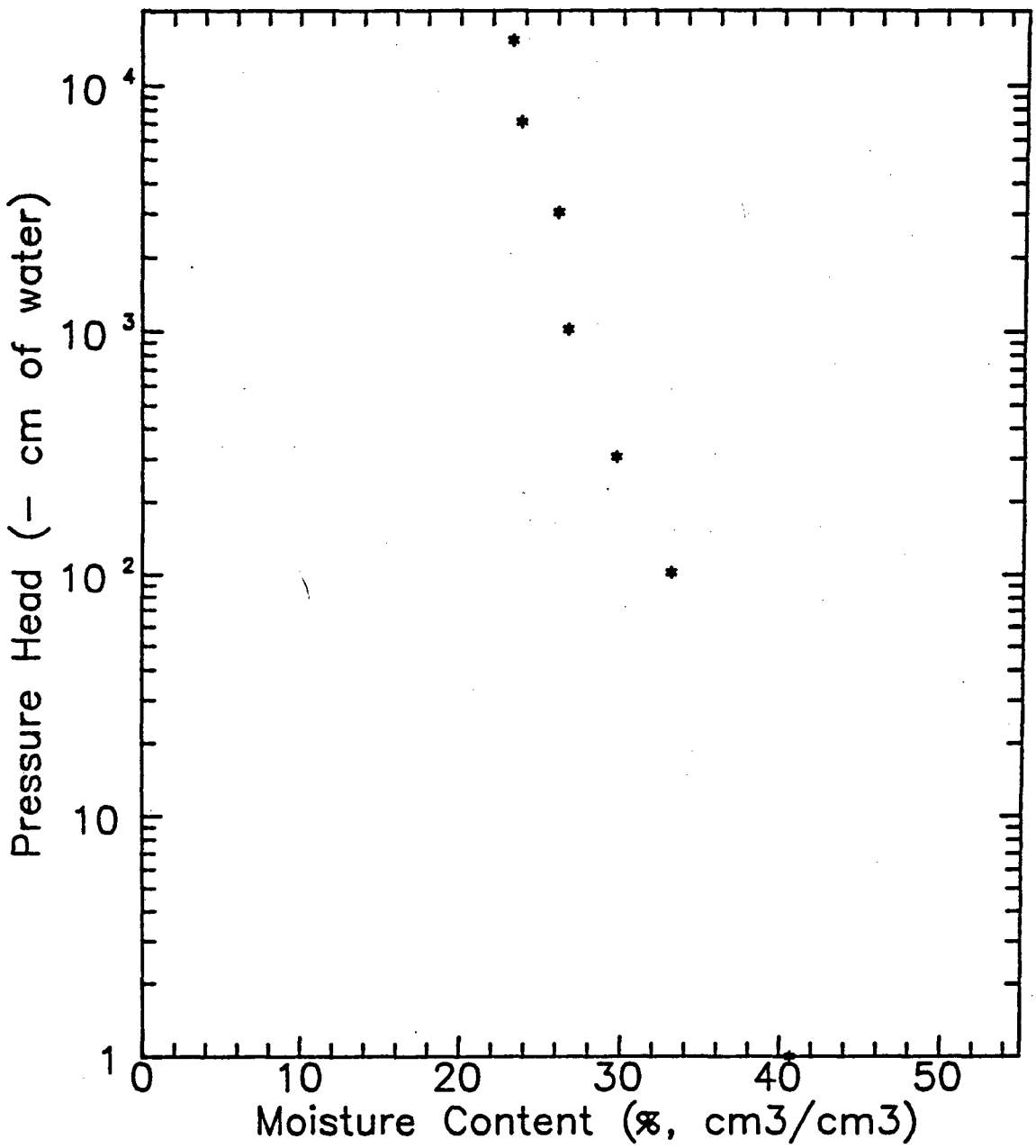
MOISTURE RETENTION DATA - 15 BAR PRESSURE PLATE
(PORE SIZE DISTRIBUTION)

JOB NAME: JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER: 89-L-144
SAMPLE NUMBER: 5-15
RING NUMBER: T-1
DEPTH: 0-46 FT.
SAMPLE VOLUME: 47.14 (cc)
SATURATED WEIGHT AT 0 CM TENSION
(WITH CAP AND RING): 126.38 (g)
TARE RING: 29.18 (g)
TARE CAP: 0.00 (g)
DRY WEIGHT OF SAMPLE: 78.02 (g)
SATURATED MOISTURE CONTENT: 40.69 (% vol)
INITIAL VOLUME OF WATER IN SAMPLE: 19.18 (cc)

DATE (1990)	TIME	PRESSURE (BAR)	WEIGHT W/RING(G)	CHANGE WT (G)	CHANGES WT (G)	MOISTURE CONTENT (% VOL)
02/16	1530	0.0	126.38	--	--	40.69
02/21	1500	0.1	122.81	3.57	3.57	33.11
02/26	1130	0.3	121.20	1.61	5.18	29.70
03/04	1030	1.0	119.79	1.41	6.59	26.71
03/09	930	3.0	119.50	0.29	6.88	26.09
03/13	1430	7.0	118.42	1.08	7.96	23.80
03/19	1130	15.0	118.16	0.26	8.22	23.25

COMMENTS: Assume density of water is 1.0 g/cc

LABORATORY ANALYSIS PERFORMED BY: L. Simpson
CALCULATION MADE BY: L. Simpson
CHECKED BY: S. Stoller



Pressure Head vs. Moisture Content, Sample No. 5–15

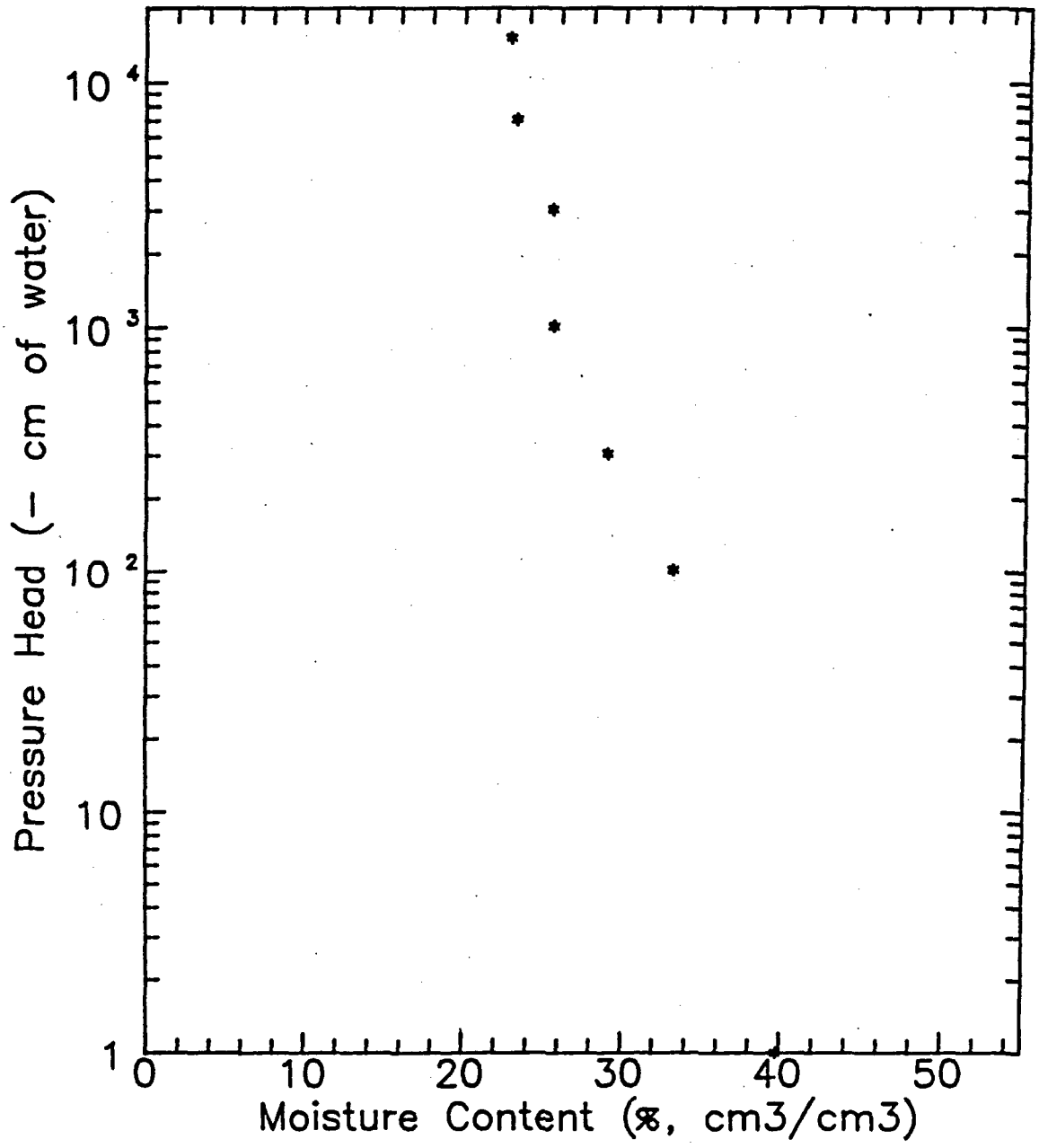
MOISTURE RETENTION DATA - 15 BAR PRESSURE PLATE
(PORE SIZE DISTRIBUTION)

JOB NAME: JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER: 89-L-144
SAMPLE NUMBER: 5-16
RING NUMBER: T-2
DEPTH: 0-46 FT.
SAMPLE VOLUME: 47.14 (cc)
SATURATED WEIGHT AT 0 CM TENSION
(WITH CAP AND RING): 125.40 (g)
TARE RING: 28.59 (g)
TARE CAP: 0.00 (g)
DRY WEIGHT OF SAMPLE: 78.06 (g)
SATURATED MOISTURE CONTENT: 39.78 (% vol)
INITIAL VOLUME OF WATER IN SAMPLE: 18.75 (cc)

DATE (1990)	TIME	PRESSURE (BAR)	WEIGHT W/RING(G)	CHANGE WT (G)	CHANGES WT (G)	MOISTURE CONTENT (% VOL)
02/16	1530	0.0	125.40	--	--	39.78
02/21	1500	0.1	122.28	3.12	3.12	33.16
02/26	1130	0.3	120.34	1.94	5.06	29.04
03/04	1030	1.0	118.72	1.62	6.68	25.60
03/09	930	3.0	118.67	0.05	6.73	25.50
03/13	1430	7.0	117.61	1.06	7.79	23.25
03/19	1130	15.0	117.42	0.19	7.98	22.85

COMMENTS: Assume density of water is 1.0 g/cc

LABORATORY ANALYSIS PERFORMED BY: L. Simpson
CALCULATION MADE BY: L. Simpson
CHECKED BY: S. Stoller



Pressure Head vs. Moisture Content, Sample No. 5–16

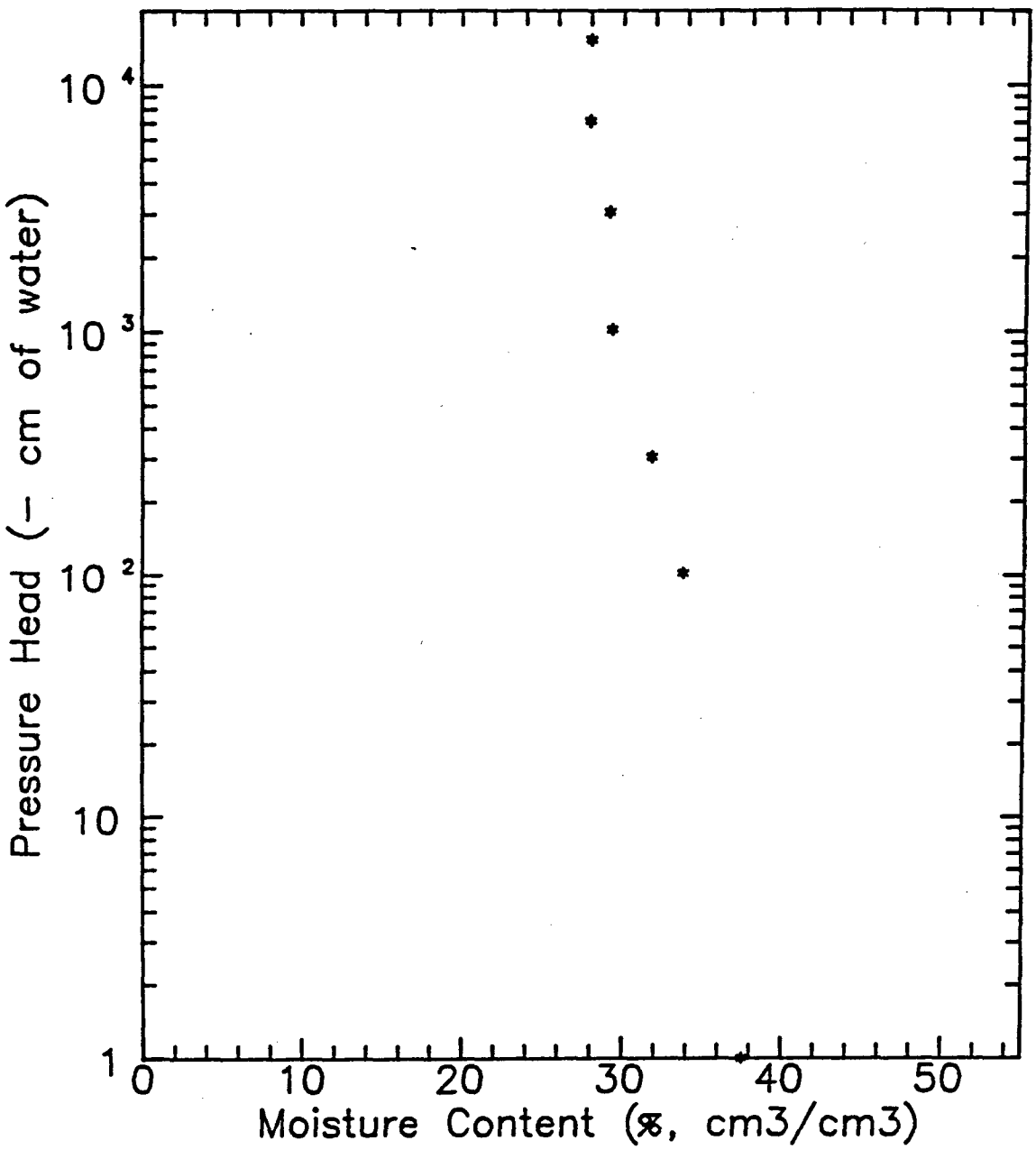
MOISTURE RETENTION DATA - 15 BAR PRESSURE PLATE
(PORE SIZE DISTRIBUTION)

JOB NAME: JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER: 89-L-144
SAMPLE NUMBER: 5-17
RING NUMBER: T-3
DEPTH: 0-34 FT.
SAMPLE VOLUME: 47.14 (cc)
SATURATED WEIGHT AT 0 CM TENSION
(WITH CAP AND RING): 124.26 (g)
TARE RING: 30.10 (g)
TARE CAP: 0.00 (g)
DRY WEIGHT OF SAMPLE: 76.47 (g)
SATURATED MOISTURE CONTENT: 37.53 (% vol)
INITIAL VOLUME OF WATER IN SAMPLE: 17.69 (cc)

DATE (1990)	TIME	PRESSURE (BAR)	WEIGHT W/RING(G)	CHANGE WT (G)	CHANGES WT (G)	MOISTURE CONTENT (% VOL)
02/16	1530	0.0	124.26	--	--	37.53
02/21	1500	0.1	122.50	1.76	1.76	33.79
02/26	1130	0.3	121.57	0.93	2.69	31.82
03/04	1030	1.0	120.41	1.16	3.85	29.36
03/09	930	3.0	120.32	0.09	3.94	29.17
03/13	1430	7.0	119.75	0.57	4.51	27.96
03/19	1130	15.0	119.77	-0.02	4.49	28.00

COMMENTS: Assume density of water is 1.0 g/cc

LABORATORY ANALYSIS PERFORMED BY: L. Simpson
CALCULATION MADE BY: L. Simpson
CHECKED BY: S. Stoller



Pressure Head vs. Moisture Content, Sample No. 5–17

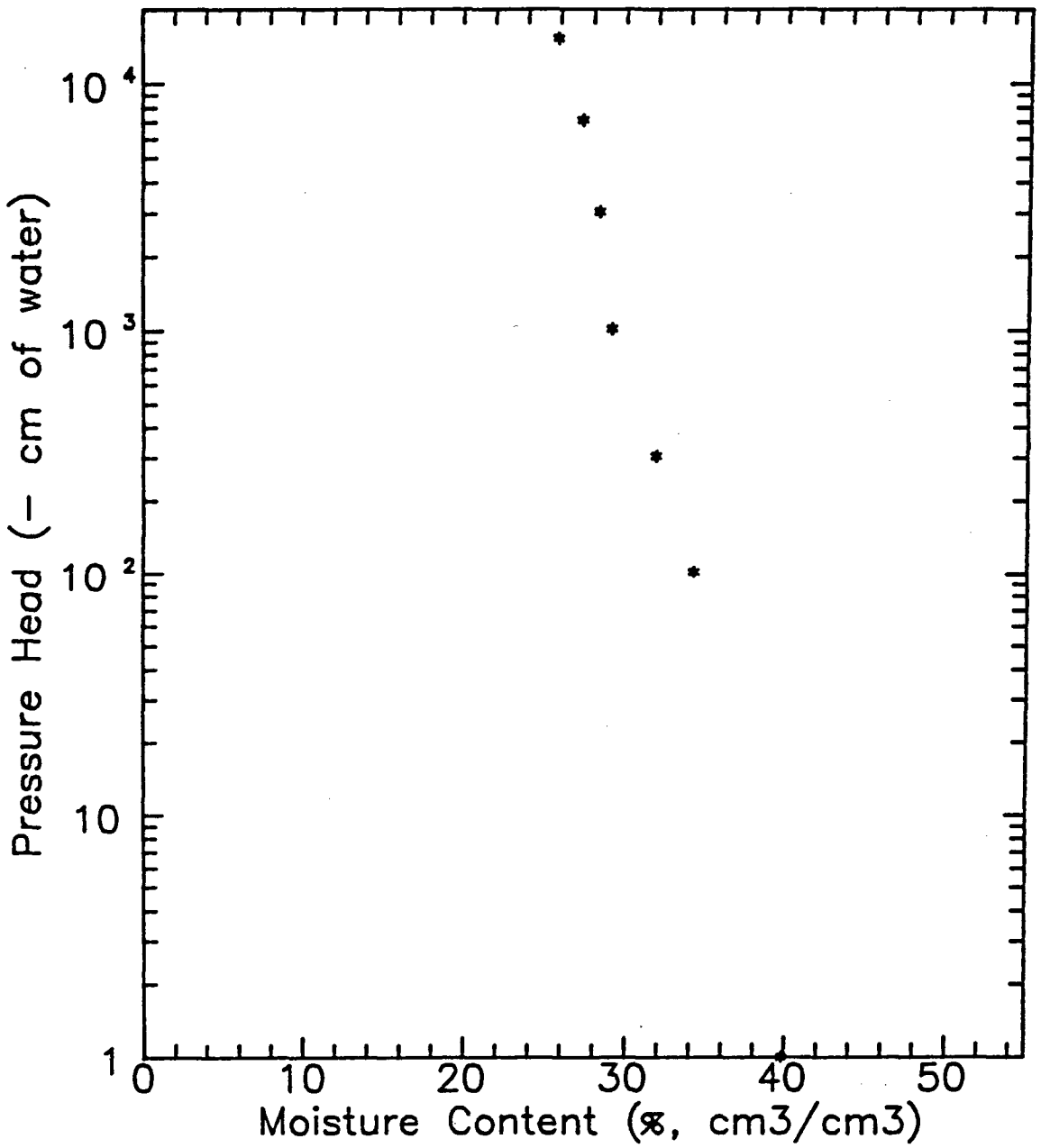
MOISTURE RETENTION DATA - 15 BAR PRESSURE PLATE
(PORE SIZE DISTRIBUTION)

JOB NAME: JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER: 89-L-144
SAMPLE NUMBER: 5-18
RING NUMBER: T-4
DEPTH: 0-34 FT.
SAMPLE VOLUME: 45.26 (cc)
SATURATED WEIGHT AT 0 CM TENSION
(WITH CAP AND RING): 120.54 (g)
TARE RING: 28.81 (g)
TARE CAP: 0.00 (g)
DRY WEIGHT OF SAMPLE: 73.70 (g)
SATURATED MOISTURE CONTENT: 39.84 (% vol)
INITIAL VOLUME OF WATER IN SAMPLE: 18.03 (cc)

DATE (1990)	TIME	PRESSURE (BAR)	WEIGHT W/RING(G)	CHANGE WT (G)	CHANGES WT (G)	MOISTURE CONTENT (% VOL)
02/16	1530	0.0	120.54	--	--	39.84
02/21	1500	0.1	118.02	2.52	2.52	34.27
02/26	1130	0.3	116.96	1.06	3.58	31.93
03/04	1030	1.0	115.71	1.25	4.83	29.16
03/09	930	3.0	115.36	0.35	5.18	28.39
03/13	1430	7.0	114.89	0.47	5.65	27.35
03/19	1130	15.0	114.21	0.68	6.33	25.85

COMMENTS: Assume density of water is 1.0 g/cc

LABORATORY ANALYSIS PERFORMED BY: L. Simpson
CALCULATION MADE BY: L. Simpson
CHECKED BY: S. Stoller



Pressure Head vs. Moisture Content, Sample No. 5-18

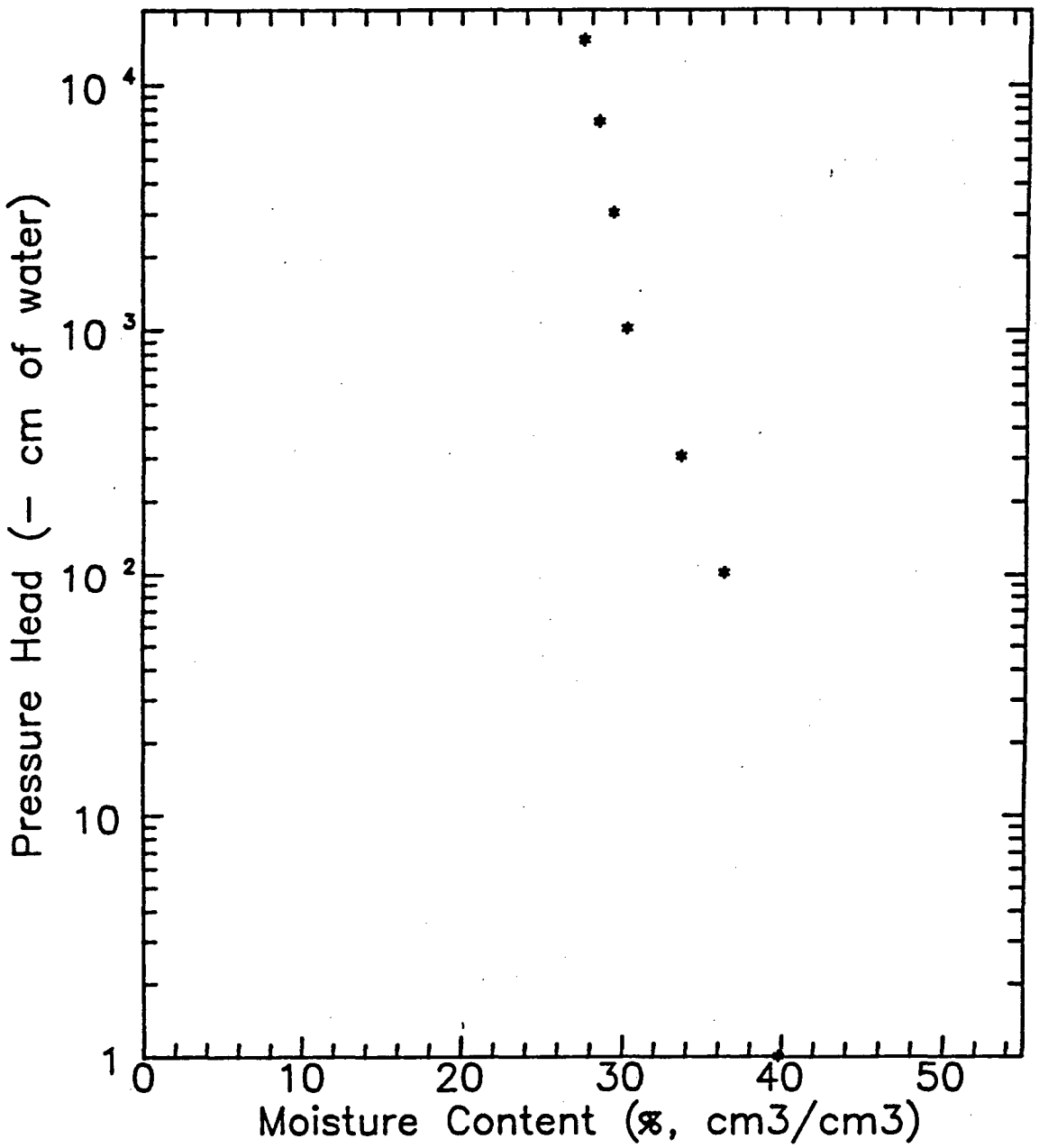
MOISTURE RETENTION DATA - 15 BAR PRESSURE PLATE
(PORE SIZE DISTRIBUTION)

JOB NAME: JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER: 89-L-144
SAMPLE NUMBER: 5-19
RING NUMBER: T-5
DEPTH: 0-39 FT.
SAMPLE VOLUME: 50.92 (cc)
SATURATED WEIGHT AT 0 CM TENSION
(WITH CAP AND RING): 136.56 (g)
TARE RING: 32.48 (g)
TARE CAP: 0.00 (g)
DRY WEIGHT OF SAMPLE: 83.79 (g)
SATURATED MOISTURE CONTENT: 39.85 (% vol)
INITIAL VOLUME OF WATER IN SAMPLE: 20.29 (cc)

DATE (1990)	TIME	PRESSURE (BAR)	WEIGHT W/RING(G)	CHANGE WT (G)	CHANGES WT (G)	MOISTURE CONTENT (% VOL)
02/16	1530	0.0	136.56	--	--	39.85
02/21	1500	0.1	134.75	1.81	1.81	36.29
02/26	1130	0.3	133.39	1.36	3.17	33.62
03/04	1030	1.0	131.66	1.73	4.90	30.22
03/09	930	3.0	131.23	0.43	5.33	29.38
03/13	1430	7.0	130.76	0.47	5.80	28.46
03/19	1130	15.0	130.29	0.47	6.27	27.53

COMMENTS: Assume density of water is 1.0 g/cc

LABORATORY ANALYSIS PERFORMED BY: L. Simpson
CALCULATION MADE BY: L. Simpson
CHECKED BY: S. Stoller



Pressure Head vs. Moisture Content, Sample No. 5-19

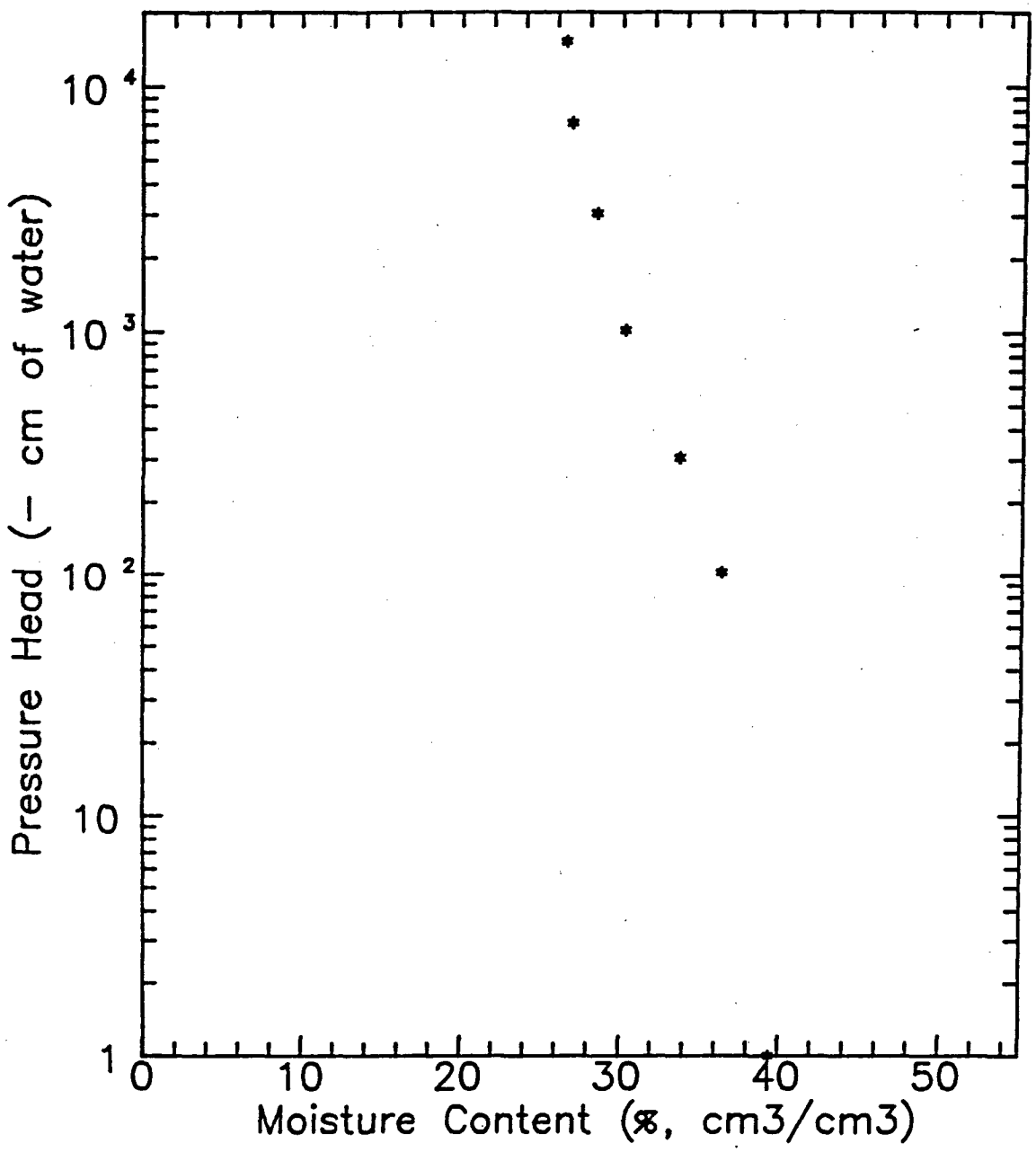
MOISTURE RETENTION DATA - 15 BAR PRESSURE PLATE
(PORE SIZE DISTRIBUTION)

JOB NAME: JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER: 89-L-144
SAMPLE NUMBER: 5-20
RING NUMBER: T-6
DEPTH: 0-39 FT.
SAMPLE VOLUME: 47.14 (cc)
SATURATED WEIGHT AT 0 CM TENSION
(WITH CAP AND RING): 124.87 (g)
TARE RING: 28.78 (g)
TARE CAP: 0.00 (g)
DRY WEIGHT OF SAMPLE: 77.51 (g)
SATURATED MOISTURE CONTENT: 39.41 (% vol)
INITIAL VOLUME OF WATER IN SAMPLE: 18.58 (cc)

DATE (1990)	TIME	PRESSURE (BAR)	WEIGHT W/RING(G)	CHANGE WT (G)	CHANGES WT (G)	MOISTURE CONTENT (% VOL)
02/16	1530	0.0	124.87	--	--	39.41
02/21	1500	0.1	123.43	1.44	1.44	36.36
02/26	1130	0.3	122.16	1.27	2.71	33.67
03/04	1030	1.0	120.57	1.59	4.30	30.29
03/09	930	3.0	119.71	0.86	5.16	28.47
03/13	1430	7.0	118.97	0.74	5.90	26.90
03/19	1130	15.0	118.78	0.19	6.09	26.50

COMMENTS: Assume density of water is 1.0 g/cc

LABORATORY ANALYSIS PERFORMED BY: L. Simpson
CALCULATION MADE BY: L. Simpson
CHECKED BY: S. Stoller



Pressure Head vs. Moisture Content, Sample No. 5–20

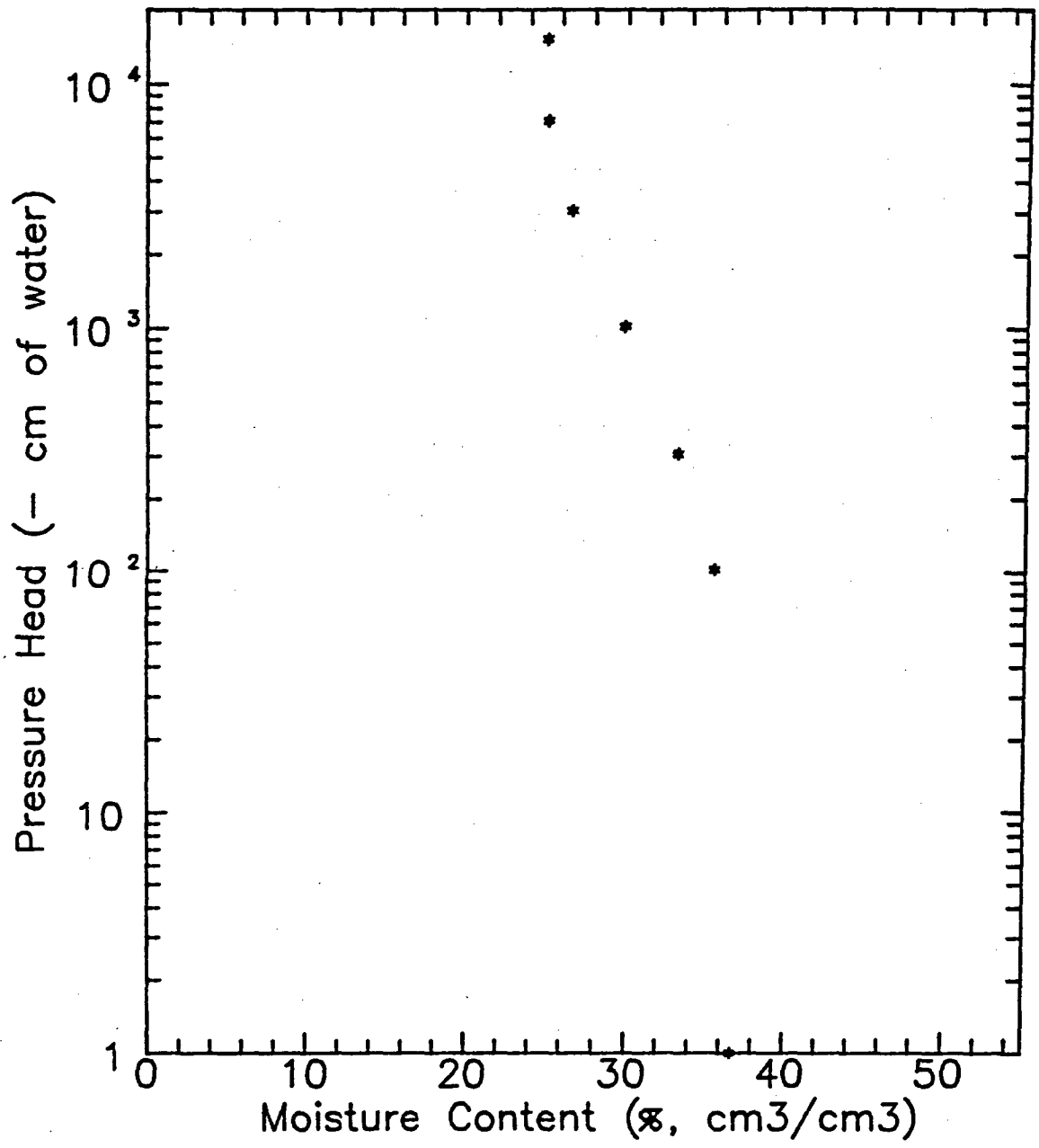
MOISTURE RETENTION DATA - 15 BAR PRESSURE PLATE
(PORE SIZE DISTRIBUTION)

JOB NAME: JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER: 89-L-144
SAMPLE NUMBER: 5-21
RING NUMBER: T-7
DEPTH: 0-35 FT.
SAMPLE VOLUME: 47.14 (cc)
SATURATED WEIGHT AT 0 CM TENSION
(WITH CAP AND RING): 124.59 (g)
TARE RING: 29.53 (g)
TARE CAP: 0.00 (g)
DRY WEIGHT OF SAMPLE: 77.75 (g)
SATURATED MOISTURE CONTENT: 36.72 (% vol)
INITIAL VOLUME OF WATER IN SAMPLE: 17.31 (cc)

DATE (1990)	TIME	PRESSURE (BAR)	WEIGHT W/RING(G)	CHANGE WT (G)	CHANGES WT (G)	MOISTURE CONTENT (% VOL)
02/16	1530	0.0	124.59	--	--	36.72
02/21	1500	0.1	124.05	0.54	0.54	35.57
02/26	1130	0.3	122.96	1.09	1.63	33.26
03/04	1030	1.0	121.38	1.58	3.21	29.91
03/09	930	3.0	119.85	1.53	4.74	26.67
03/13	1430	7.0	119.13	0.72	5.46	25.14
03/19	1130	15.0	119.09	0.04	5.50	25.05

COMMENTS: Assume density of water is 1.0 g/cc

LABORATORY ANALYSIS PERFORMED BY: L. Simpson
CALCULATION MADE BY: L. Simpson
CHECKED BY: S. Stoller



Pressure Head vs. Moisture Content, Sample No. 5–21

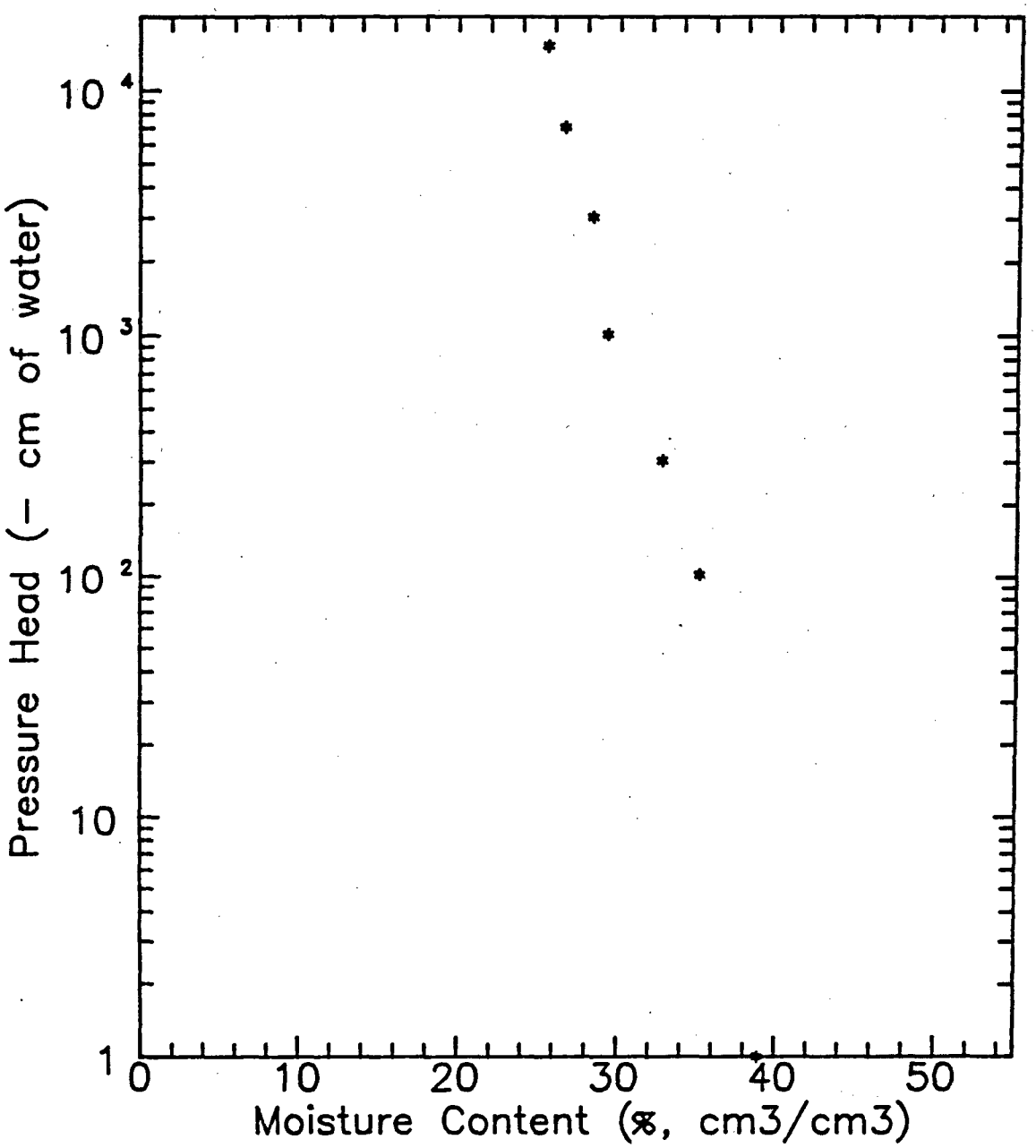
MOISTURE RETENTION DATA - 15 BAR PRESSURE PLATE
(PORE SIZE DISTRIBUTION)

JOB NAME: JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER: 89-L-144
SAMPLE NUMBER: 5-22
RING NUMBER: T-8
DEPTH: 0-35 FT.
SAMPLE VOLUME: 50.92 (cc)
SATURATED WEIGHT AT 0 CM TENSION
(WITH CAP AND RING): 136.50 (g)
TARE RING: 32.62 (g)
TARE CAP: 0.00 (g)
DRY WEIGHT OF SAMPLE: 84.06 (g)
SATURATED MOISTURE CONTENT: 38.92 (% vol)
INITIAL VOLUME OF WATER IN SAMPLE: 19.82 (cc)

DATE (1990)	TIME	PRESSURE (BAR)	WEIGHT W/RING(G)	CHANGE WT (G)	CHANGES WT (G)	MOISTURE CONTENT (% VOL)
02/16	1530	0.0	136.50	--	--	38.92
02/21	1500	0.1	134.56	1.94	1.94	35.11
02/26	1130	0.3	133.36	1.20	3.14	32.76
03/04	1030	1.0	131.63	1.73	4.87	29.36
03/09	930	3.0	131.14	0.49	5.36	28.40
03/13	1430	7.0	130.26	0.88	6.24	26.67
03/19	1130	15.0	129.70	0.56	6.80	25.57

COMMENTS: Assume density of water is 1.0 g/cc

LABORATORY ANALYSIS PERFORMED BY: L. Simpson
CALCULATION MADE BY: L. Simpson
CHECKED BY: S. Stoller



Pressure Head vs. Moisture Content, Sample No. 5-22

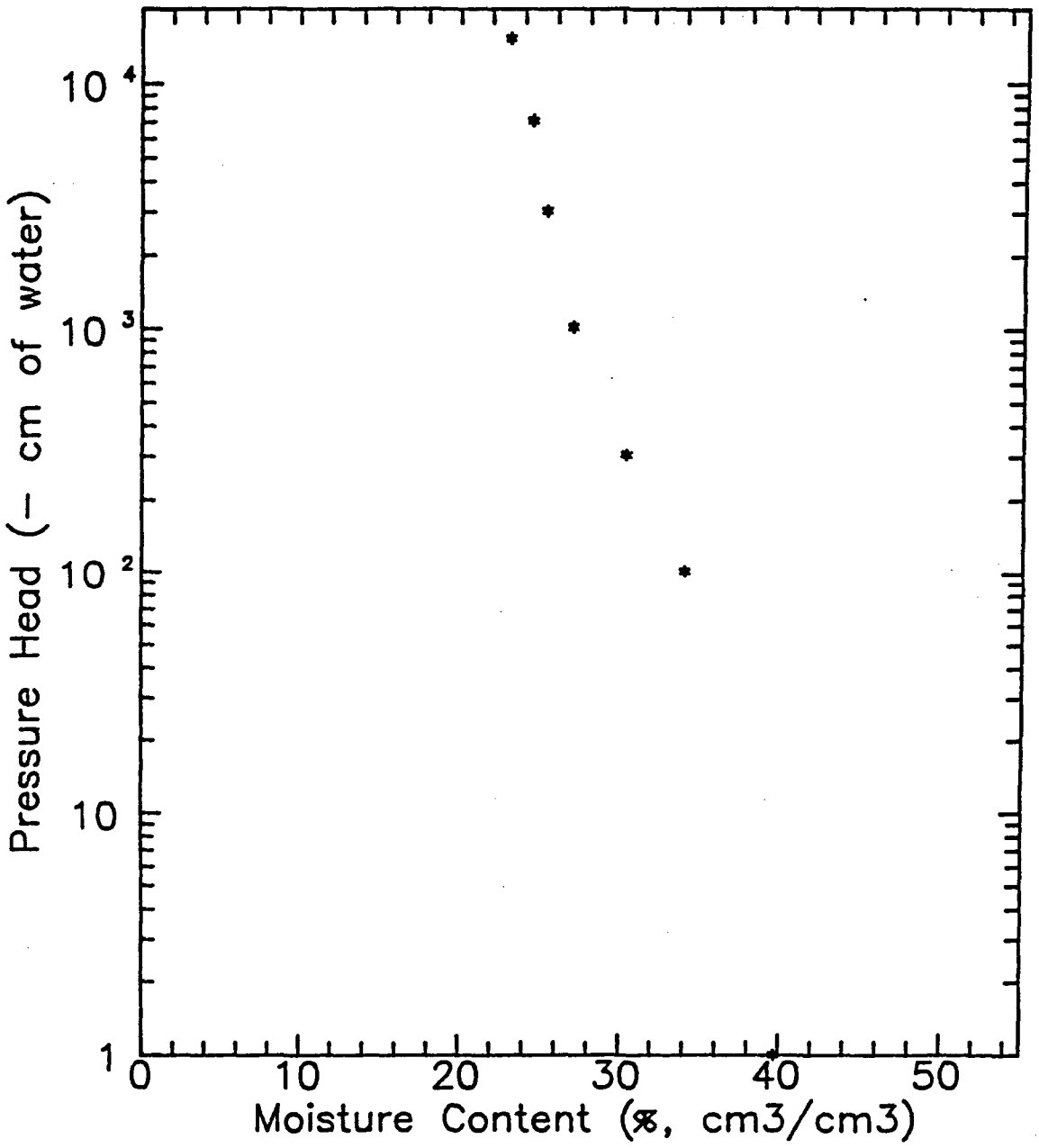
MOISTURE RETENTION DATA - 15 BAR PRESSURE PLATE
(PORE SIZE DISTRIBUTION)

JOB NAME: JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER: 89-L-144
SAMPLE NUMBER: 5-23
RING NUMBER: T-9
DEPTH: 0-44 FT.
SAMPLE VOLUME: 47.14 (cc)
SATURATED WEIGHT AT 0 CM TENSION
(WITH CAP AND RING): 124.72 (g)
TARE RING: 29.85 (g)
TARE CAP: 0.00 (g)
DRY WEIGHT OF SAMPLE: 76.16 (g)
SATURATED MOISTURE CONTENT: 39.69 (% vol)
INITIAL VOLUME OF WATER IN SAMPLE: 18.71 (cc)

DATE (1990)	TIME	PRESSURE (BAR)	WEIGHT W/RING(G)	CHANGE WT (G)	CHANGES WT (G)	MOISTURE CONTENT (% VOL)
02/16	1530	0.0	124.72	--	--	39.69
02/21	1500	0.1	122.04	2.68	2.68	34.01
02/26	1130	0.3	120.33	1.71	4.39	30.38
03/04	1030	1.0	118.76	1.57	5.96	27.05
03/09	930	3.0	117.97	0.79	6.75	25.37
03/13	1430	7.0	117.56	0.41	7.16	24.50
03/19	1130	15.0	116.91	0.65	7.81	23.12

COMMENTS: Assume density of water is 1.0 g/cc

LABORATORY ANALYSIS PERFORMED BY: L. Simpson
CALCULATION MADE BY: L. Simpson
CHECKED BY: S. Stoller



Pressure Head vs. Moisture Content, Sample No. 5-23

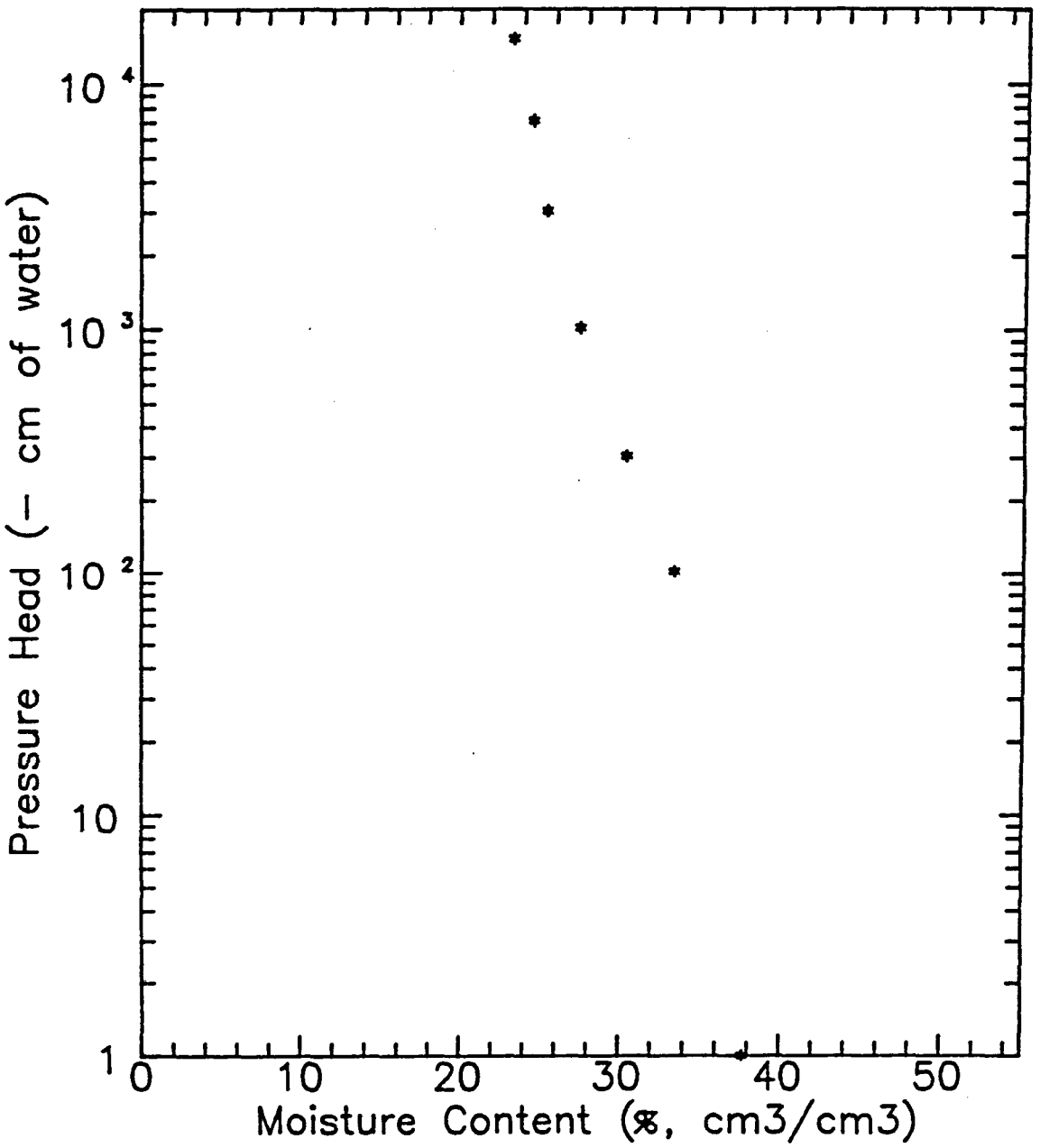
MOISTURE RETENTION DATA - 15 BAR PRESSURE PLATE
(PORE SIZE DISTRIBUTION)

JOB NAME: JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER: 89-L-144
SAMPLE NUMBER: 5-24
RING NUMBER: T-10
DEPTH: 0-44 FT.
SAMPLE VOLUME: 45.26 (cc)
SATURATED WEIGHT AT 0 CM TENSION
(WITH CAP AND RING): 119.04 (g)
TARE RING: 28.89 (g)
TARE CAP: 0.00 (g)
DRY WEIGHT OF SAMPLE: 73.09 (g)
SATURATED MOISTURE CONTENT: 37.69 (% vol)
INITIAL VOLUME OF WATER IN SAMPLE: 17.06 (cc)

DATE (1990)	TIME	PRESSURE (BAR)	WEIGHT W/RING(G)	CHANGE WT (G)	CHANGES WT (G)	MOISTURE CONTENT (% VOL)
02/16	1530	0.0	119.04	--	--	37.69
02/21	1500	0.1	117.10	1.94	1.94	33.41
02/26	1130	0.3	115.76	1.34	3.28	30.45
03/04	1030	1.0	114.45	1.31	4.59	27.55
03/09	930	3.0	113.49	0.96	5.55	25.43
03/13	1430	7.0	113.10	0.39	5.94	24.57
03/19	1130	15.0	112.54	0.56	6.50	23.33

COMMENTS: Assume density of water is 1.0 g/cc

LABORATORY ANALYSIS PERFORMED BY: L. Simpson
CALCULATION MADE BY: L. Simpson
CHECKED BY: S. Stoller



Pressure Head vs. Moisture Content, Sample No. 5–24

Summary of Particle Size Characteristics

Sample No.	d_{10} (mm)	d_{50} (mm)	d_{60} (mm)	C_u	C_c
5-1	0.09	0.18	0.21	2.3	1.0
5-2	0.089	0.18	0.22	2.5	1.0
5-3	0.0018	0.13	0.18	100.0	20.3
5-4	0.008	0.14	0.17	21.3	5.8
5-5	*	0.19	0.24	--	--
5-6	*	0.17	0.21	--	--
5-7	0.079	0.17	0.19	2.4	1.1
5-8	*	0.17	0.20	--	--
5-9	*	0.18	0.21	--	--
5-10	0.076	0.19	0.22	2.9	1.2
5-11	0.006	0.16	0.20	33.3	6.7
5-12	0.008	0.12	0.16	20.0	5.1
5-13	0.0075	0.14	0.18	24.0	4.5
5-14	0.0067	0.16	0.21	31.3	4.7
5-15	*	0.026	0.051	-	-
5-16	*	0.030	0.052	-	-
5-17	*	0.016	0.034	-	-
5-18	*	0.017	0.038	-	-
5-19	*	0.010	0.021	-	-
5-20	*	0.010	0.021	-	-
5-21	*	0.012	0.025	-	-
5-22	*	0.013	0.030	-	-
5-23	*	0.043	0.090	-	-
5-24	*	0.038	0.090	-	-

* particle diameters this size and smaller were not achieved in the test period specified

-- values are dependent on particle diameters that were not achieved

$$C_u = d_{60}/d_{10}$$

$$C_c = \frac{(d_{30})^2}{(d_{10})(d_{60})}$$

SIEVE ANALYSIS DATA

JOB NAME: JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER: 89-L-144
TEST DATE: 01/31/90
SAMPLE NUMBER: 5-1
DEPTH: UNKNOWN

TOTAL WEIGHT OF SAMPLE: 123.09 (g)

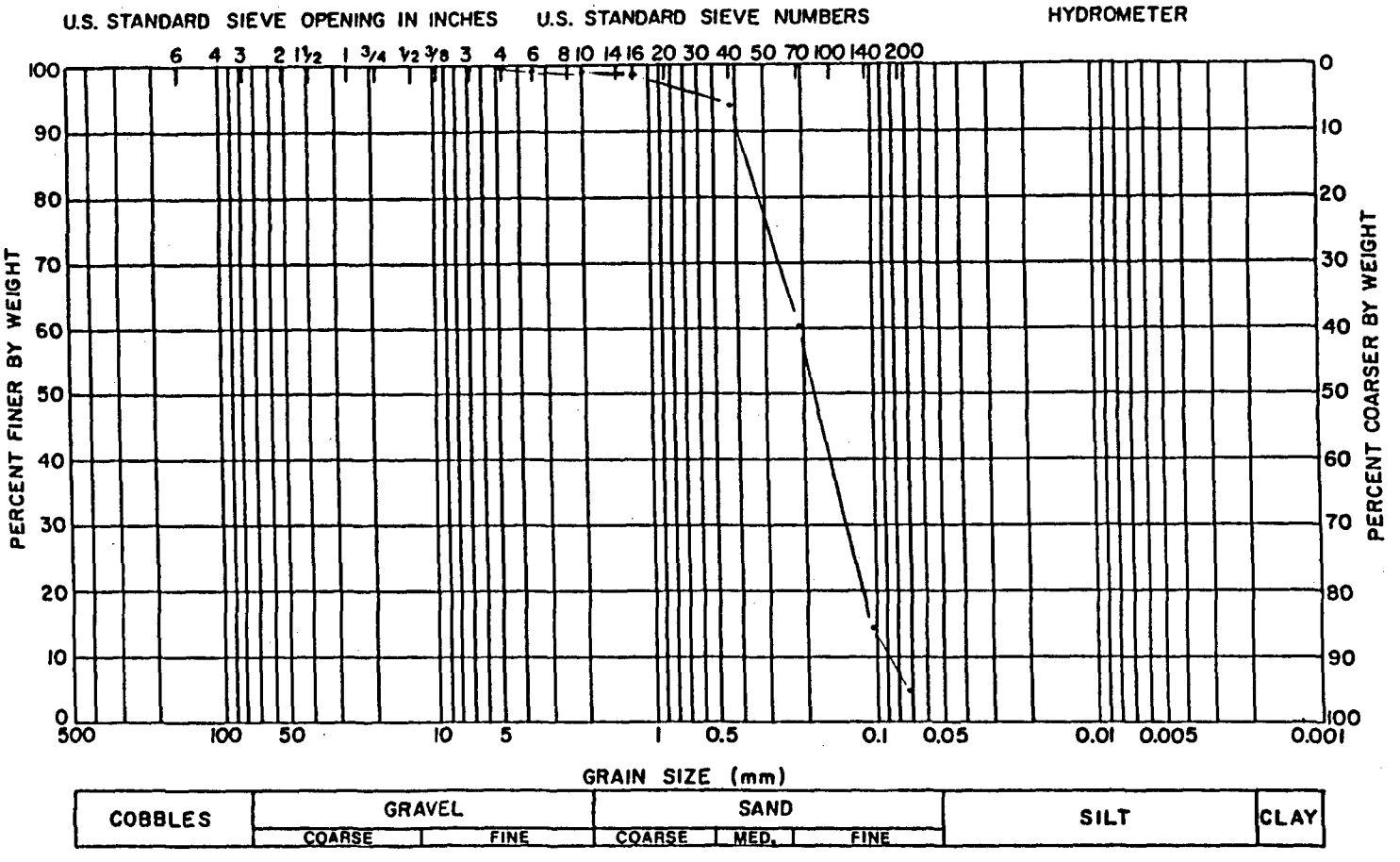
SIEVE NUMBER	DIAMETER (mm)	WT. RETAINED	CUM WT. RETAINED	WT. PASSING	% PASSING	LOG DIAMETER
4	4.750	0.86	0.86	122.23	99.30	0.677
6	3.350	0.55	1.41	121.68	98.85	0.525
10	2.000	0.28	1.69	121.40	98.63	0.301
16	1.180	0.45	2.14	120.95	98.26	0.072
40	0.425	5.27	7.41	115.68	93.98	-0.372
70	0.212	41.71	49.12	73.97	60.09	-0.674
140	0.106	56.84	105.96	17.13	13.92	-0.975
200	0.075	11.45	117.41	5.68	4.61	-1.125
pan		5.16	122.57	0.52		

d10: 0.09 (mm) d50: 0.18 (mm)
d16: 0.11 (mm) d60: 0.21 (mm)
d30: 0.14 (mm) d84: 0.35 (mm)

MEDIAN PARTICLE DIAMETER (d50): 0.18
UNIFORMITY COEFFICIENT, Cu (d60/d10): 2.3
COEFFICIENT OF CURVATURE, Cc, [(d30)**2/(d10*d60)]: 1.0
MEAN PARTICLE DIAMETER, [(d16+d50+d84)/3]: 0.21

COMMENTS:

LABORATORY ANALYSIS PERFORMED BY: L. Simpson
CALCULATIONS MADE BY: L. Simpson
CHECKED BY: S. Stoller



USDA PARTICLE SIZE LIMIT CLASSIFICATION

Θ_i = 38.21	d_{10} = 0.09	d_{50} = 0.18	d_{60} = 0.21	C_u = 2.3	C_c = 1.0
SAMPLE NUMBER		DEPTH	CLASSIFICATION (USDA TEXTURE TRIANGLE)		
5-1		unknown	Sand		

DANIEL B. STEPHENS & ASSOCIATES, INC.

SIEVE ANALYSIS DATA

JOB NAME: JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER: 89-L-144
TEST DATE: 01/31/90
SAMPLE NUMBER: 5-2
DEPTH: UNKNOWN

TOTAL WEIGHT OF SAMPLE: 125.69 (g)

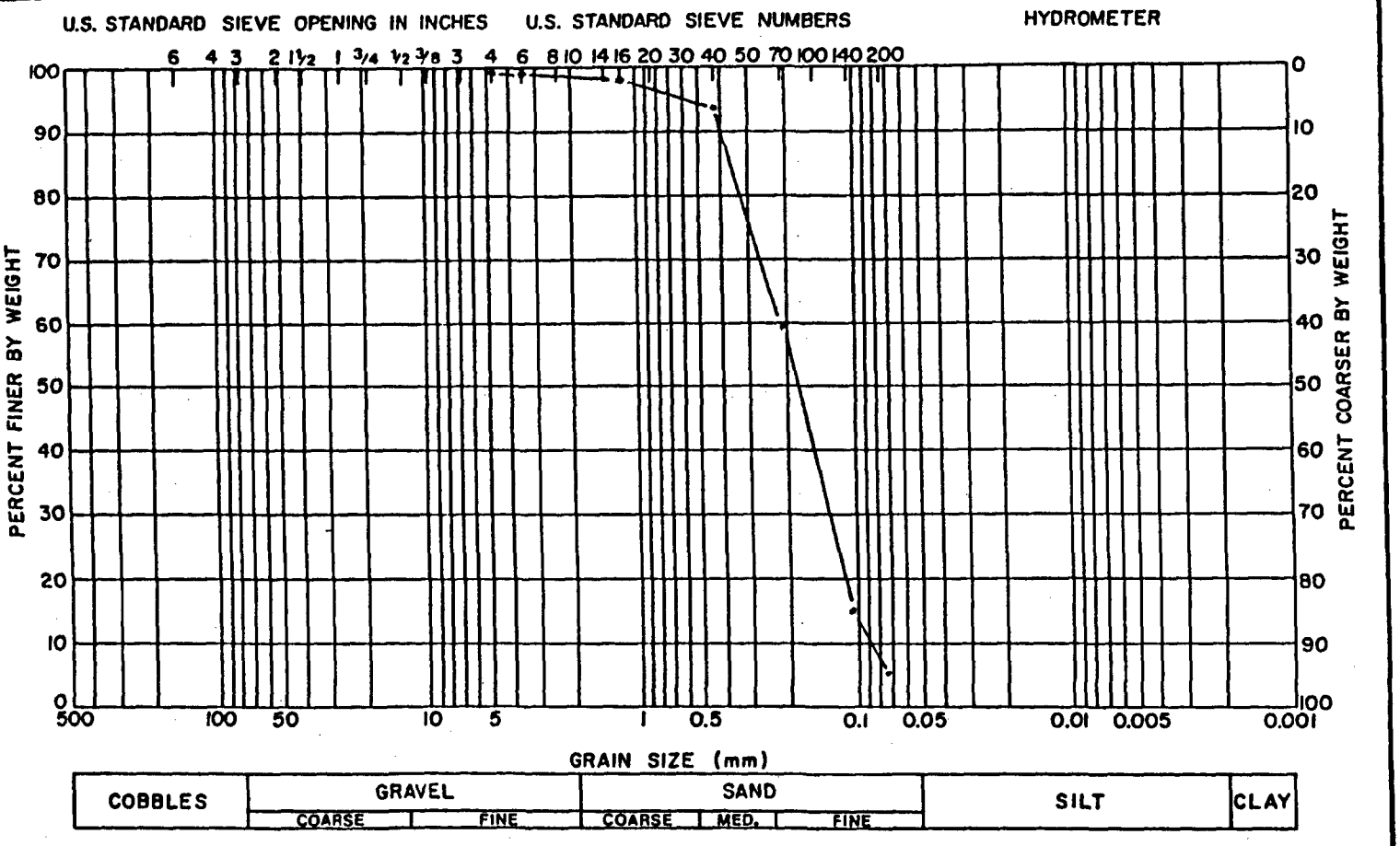
SIEVE NUMBER	DIAMETER (mm)	WT. RETAINED	CUM WT. RETAINED	WT. PASSING	% PASSING	LOG DIAMETER
4	4.750	1.06	1.06	124.63	99.16	0.677
6	3.350	0.49	1.55	124.14	98.77	0.525
10	2.000	0.46	2.01	123.68	98.40	0.301
16	1.180	0.64	2.65	123.04	97.89	0.072
40	0.425	5.51	8.16	117.53	93.51	-0.372
70	0.212	42.61	50.77	74.92	59.61	-0.674
140	0.106	56.46	107.23	18.46	14.69	-0.975
200	0.075	12.78	120.01	5.68	4.52	-1.125
pan		5.04	125.05	0.64		

d10: 0.089 (mm) d50: 0.18 (mm)
d16: 0.11 (mm) d60: 0.22 (mm)
d30: 0.14 (mm) d84: 0.36 (mm)

MEDIAN PARTICLE DIAMETER (d50): 0.18
UNIFORMITY COEFFICIENT, Cu (d60/d10): 2.5
COEFFICIENT OF CURVATURE, Cc, [(d30)**2/(d10*d60)]: 1.0
MEAN PARTICLE DIAMETER, [(d16+d50+d84)/3]: 0.22

COMMENTS:

LABORATORY ANALYSIS PERFORMED BY: L. Simpson
CALCULATIONS MADE BY: L. Simpson
CHECKED BY: S. Stoller



USDA PARTICLE SIZE LIMIT CLASSIFICATION

θ_1 = 27.22	d_{10} = 0.089	d_{50} = 0.18	d_{60} = 0.22	C_u = 2.5	C_c = 1.0
SAMPLE NUMBER		DEPTH	CLASSIFICATION (USDA TEXTURE TRIANGLE)		
5-2		unknown	Sand		

DANIEL B. STEPHENS & ASSOCIATES, INC.

SIEVE ANALYSIS DATA

JOB NAME: JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER: 89-L-144
TEST DATE: 01/31/90
SAMPLE NUMBER: 5-3
DEPTH: UNKNOWN

TOTAL WEIGHT OF SAMPLE: 122.50 (g)

SIEVE NUMBER	DIAMETER (mm)	WT. RETAINED	CUM WT. RETAINED	WT. PASSING	% PASSING	LOG DIAMETER
4	4.750	0.71	0.71	121.79	99.42	0.677
6	3.350	0.44	1.15	121.35	99.06	0.525
10	2.000	0.11	1.26	121.24	98.97	0.301
16	1.180	0.39	1.65	120.85	98.65	0.072
40	0.425	13.71	15.36	107.14	87.46	-0.372
70	0.212	28.80	44.16	78.34	63.95	-0.674
140	0.106	25.18	69.34	53.16	43.40	-0.975
200	0.075	23.97	93.31	29.19	23.83	-1.125
pan		28.28	121.59	0.91		

d10: 0.0018 (mm) d50: 0.13 (mm)
d16: 0.016 (mm) d60: 0.18 (mm)
d30: 0.081 (mm) d84: 0.37 (mm)

MEDIAN PARTICLE DIAMETER (d50): 0.13
UNIFORMITY COEFFICIENT, Cu (d60/d10): 100.0
COEFFICIENT OF CURVATURE, Cc, [(d30)**2/(d10*d60)]: 20.3
MEAN PARTICLE DIAMETER, [(d16+d50+d84)/3]: 0.17

COMMENTS:

LABORATORY ANALYSIS PERFORMED BY: L. Simpson
CALCULATIONS MADE BY: L. Simpson
CHECKED BY: S. Stoller

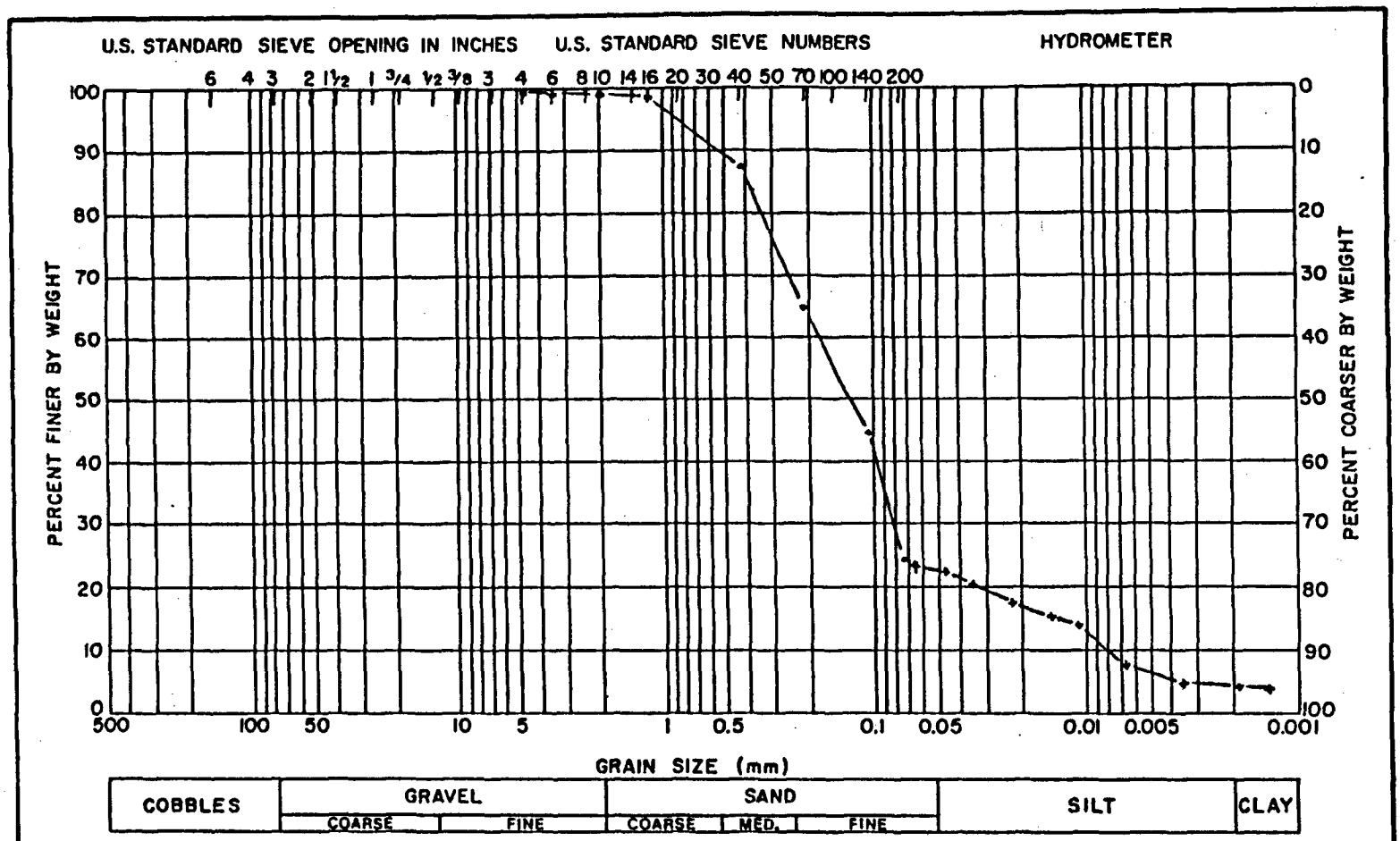
HYDROMETER DATA

JOB NAME:	JACOBS ENGINEERING - WORK ORDER #5		
JOB NUMBER:	89-L-144	TEST DATE:	02/01/90
SAMPLE NUMBER:	5-3	DEPTH:	UNKNOWN
TYPE OF WATER USED:	DISTILLED	INITIAL WT:	28.14 (g)
REACTION WITH H2O2:	NONE	TOTAL SAMPLE WT:	122.50 (g)
DISPERSANT:	(NaPO3)6	START TIME:	8:54

DATE (1990)	TIME (MIN)	TEMP (C)	R (g/l)	Rl (g/l)	Rcorr (g/l)	L (CM)	D (MM)	P (%)	%FINER
02/01	0.25	17.0	31.5	3.0	28.5	11.1	0.09457	101.27932	23.26531
	0.50	17.0	31.0	3.0	28.0	11.2	0.06712	99.50249	22.85714
	1.00	17.0	30.0	3.0	27.0	11.4	0.04781	95.94883	22.04082
	2.00	17.0	27.5	3.0	24.5	11.8	0.03441	87.06468	20.00000
	5.00	17.0	24.0	3.0	21.0	12.4	0.02228	74.62687	17.14286
	10.00	17.0	22.0	3.0	19.0	12.7	0.01596	67.51955	15.51020
	20.50	17.0	20.0	3.0	17.0	13.0	0.01129	60.41222	13.87755
	60.00	17.0	12.0	3.0	9.0	14.3	0.00693	31.98294	7.34694
	120.00	17.0	9.0	3.0	6.0	14.8	0.00498	21.32196	4.89796
	240.00	17.0	8.0	3.0	5.0	15.0	0.00354	17.76830	4.08163
	463.00	17.5	7.5	2.5	5.0	15.1	0.00254	17.76830	4.08163
	752.00	17.5	7.5	2.5	5.0	15.1	0.00199	17.76830	4.08163
02/02	1432.00	17.0	9.0	4.5	4.5	14.8	0.00144	15.99147	3.67347

COMMENTS: Assume mean particle density is 2.65 g/cc

LABORATORY ANALYSIS PERFORMED BY: L. Simpson
CALCULATIONS MADE BY: L. Simpson
CHECKED BY: S. Stoller



USDA PARTICLE SIZE LIMIT CLASSIFICATION

θ_i = 33.01	d_{10} = 0.008	d_{50} = 0.13	d_{60} = 0.18	C_u = 100	C_c = 20.3
SAMPLE NUMBER		DEPTH	CLASSIFICATION (USDA TEXTURE TRIANGLE)		
5-3		unknown	Sandy Loam		

DANIEL B. STEPHENS & ASSOCIATES, INC.

SIEVE ANALYSIS DATA

JOB NAME: JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER: 89-L-144
TEST DATE: 01/31/90
SAMPLE NUMBER: 5-4
DEPTH: UNKNOWN

TOTAL WEIGHT OF SAMPLE: 126.55 (g)

SIEVE NUMBER	DIAMETER (mm)	WT. RETAINED	CUM WT. RETAINED	WT. PASSING	% PASSING	LOG DIAMETER
4	4.750	0.57	0.57	125.98	99.55	0.677
6	3.350	0.09	0.66	125.89	99.48	0.525
10	2.000	0.29	0.95	125.60	99.25	0.301
16	1.180	0.59	1.54	125.01	98.78	0.072
40	0.425	13.37	14.91	111.64	88.22	-0.372
70	0.212	24.78	39.69	86.86	68.64	-0.674
140	0.106	36.53	76.22	50.33	39.77	-0.975
200	0.075	26.09	102.31	24.24	19.15	-1.125
pan		22.39	124.70	1.85		

d10: 0.008 (mm) d50: 0.14 (mm)
d16: 0.045 (mm) d60: 0.17 (mm)
d30: 0.089 (mm) d84: 0.37 (mm)

MEDIAN PARTICLE DIAMETER (d50): 0.14
UNIFORMITY COEFFICIENT, Cu (d60/d10): 21.3
COEFFICIENT OF CURVATURE, Cc, [(d30)**2/(d10*d60)]: 5.8
MEAN PARTICLE DIAMETER, [(d16+d50+d84)/3]: 0.19

COMMENTS:

LABORATORY ANALYSIS PERFORMED BY: L. Simpson
CALCULATIONS MADE BY: L. Simpson
CHECKED BY: S. Stoller

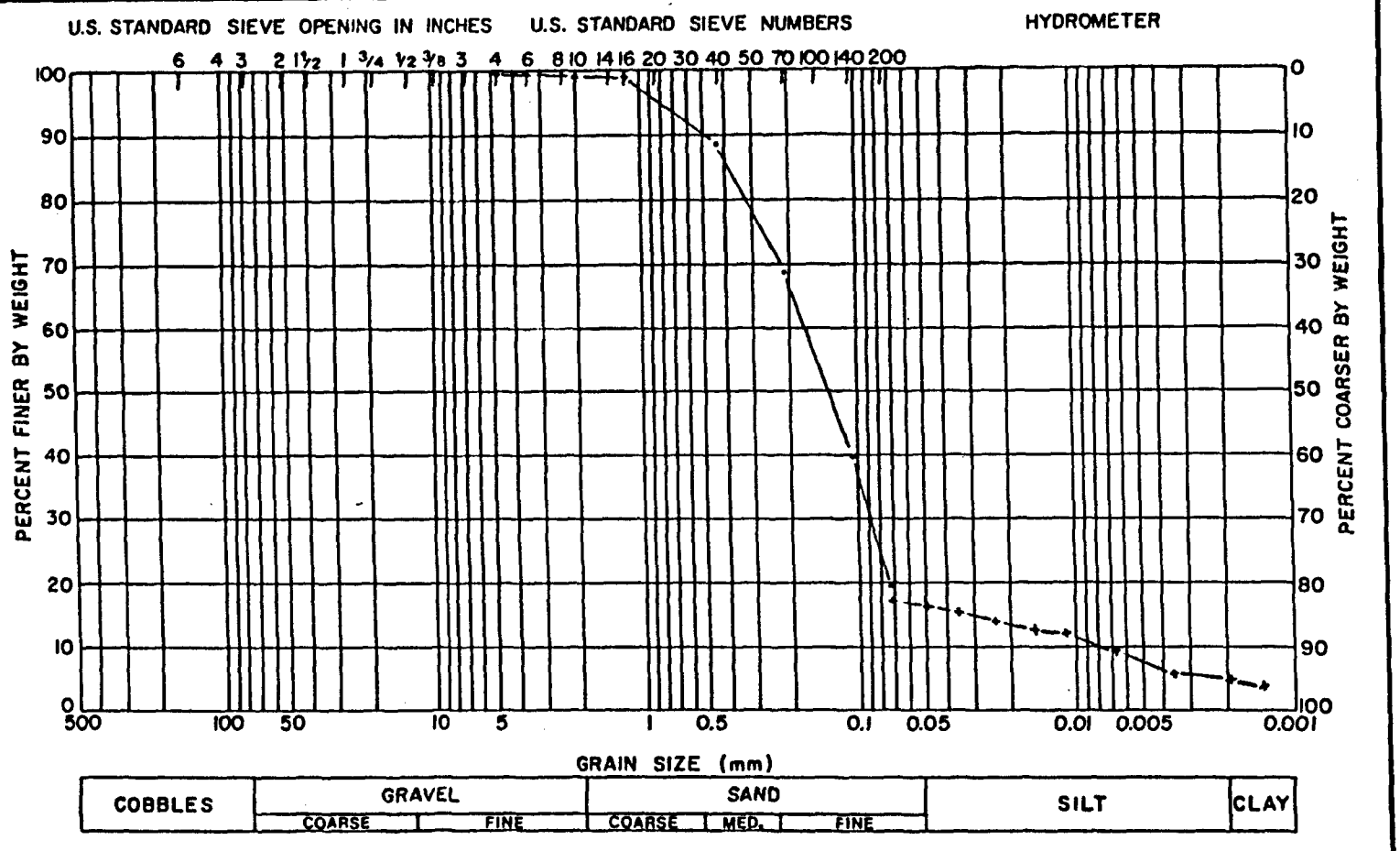
HYDROMETER DATA

JOB NAME: JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER: 89-L-144
TEST DATE: 02/01/90
SAMPLE NUMBER: 5-4
DEPTH: UNKNOWN
TYPE OF WATER USED: DISTILLED
INITIAL WT: 22.33 (g)
REACTION WITH H202: NONE
TOTAL SAMPLE WT: 126.50 (g)
DISPERSANT: (NaPO3)6
START TIME: 9:00

DATE (1990)	TIME (MIN)	TEMP (C)	R (g/l)	Rl (g/l)	Rcorr (g/l)	L (CM)	D (MM)	P (%)	%FINER
02/01	0.25	17.0	25.5	3.0	22.5	12.1	0.09866	100.76131	17.78656
	0.50	17.0	24.5	3.0	21.5	12.3	0.07023	96.28303	16.99605
	1.00	17.0	24.0	3.0	21.0	12.4	0.04983	94.04389	16.60079
	2.00	17.0	22.0	3.0	19.0	12.7	0.03570	85.08733	15.01976
	5.00	17.0	20.0	3.0	17.0	13.0	0.02287	76.13077	13.43874
	10.00	17.0	19.0	3.0	16.0	13.2	0.01627	71.65249	12.64822
	20.50	17.0	18.0	3.0	15.0	13.3	0.01143	67.17421	11.85771
	60.00	17.0	15.0	3.0	12.0	13.8	0.00681	53.73936	9.48617
	120.00	17.0	13.0	3.0	10.0	14.2	0.00487	44.78280	7.90514
	240.00	17.0	10.0	3.0	7.0	14.7	0.00350	31.34796	5.53360
	458.00	17.5	9.0	2.5	6.5	14.8	0.00253	29.10882	5.13834
	747.00	17.5	8.5	2.5	6.0	14.9	0.00199	26.86968	4.74308
02/02	1427.00	17.0	9.0	4.5	4.5	14.8	0.00144	20.15226	3.55731

COMMENTS: Assume mean particle density is 2.65 g/cc

LABORATORY ANALYSIS PERFORMED BY: L. Simpson
CALCULATIONS MADE BY: L. Simpson
CHECKED BY: S. Stoller



USDA PARTICLE SIZE LIMIT CLASSIFICATION

θ_1 = 31.40	d_{10} = 0.008	d_{50} = 0.14	d_{60} = 0.17	C_u = 21.3	C_c = 5.8
SAMPLE NUMBER		DEPTH	CLASSIFICATION (USDA TEXTURE TRIANGLE)		
5-4		unknown	Sandy Loam		

DANIEL B. STEPHENS & ASSOCIATES, INC.

SIEVE ANALYSIS DATA

JOB NAME: JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER: 89-L-144
TEST DATE: 02/01/90
SAMPLE NUMBER: 5-5
DEPTH: UNKNOWN

TOTAL WEIGHT OF SAMPLE: 120.15 (g)

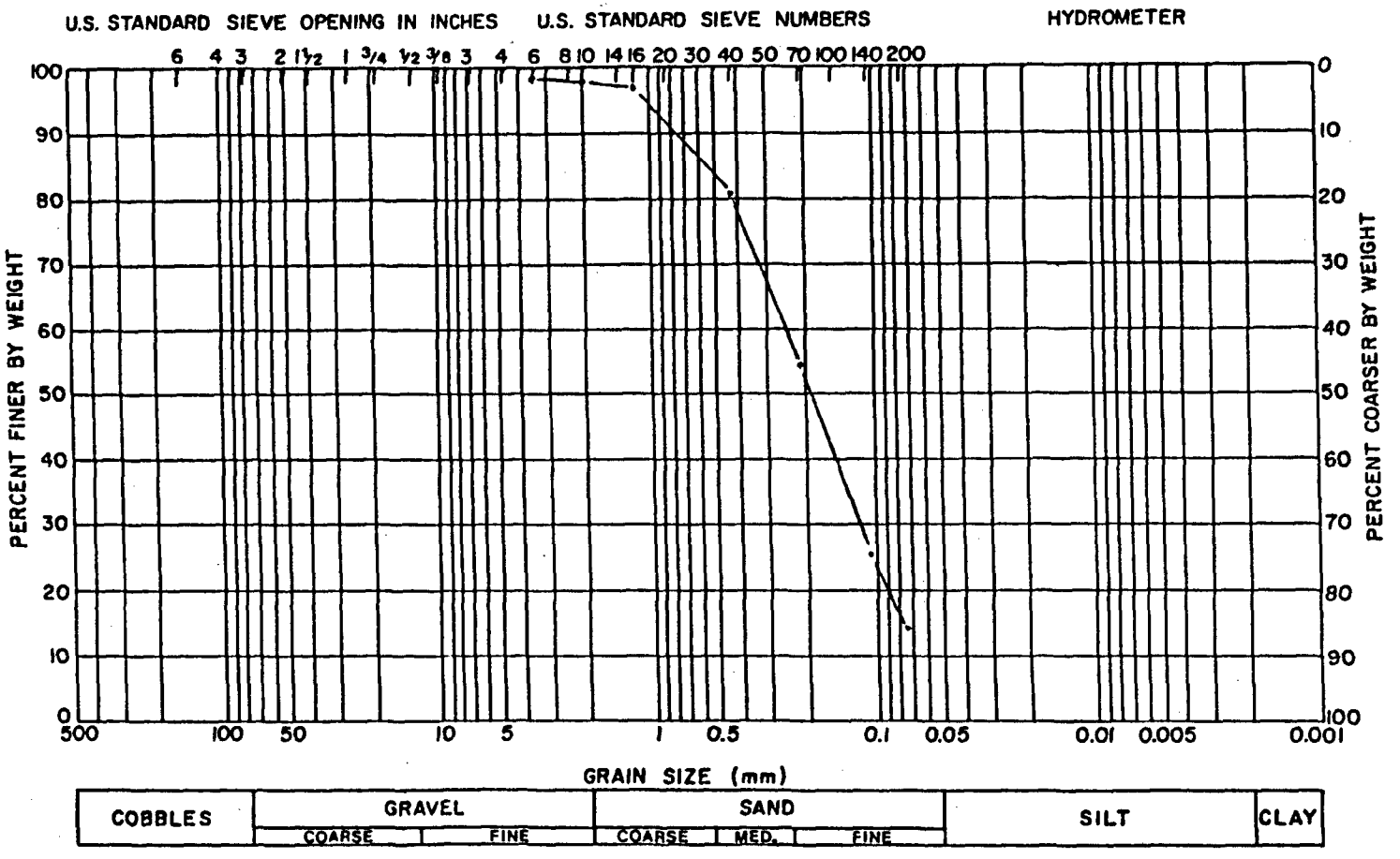
SIEVE NUMBER	DIAMETER (mm)	WT. RETAINED	CUM WT. RETAINED	WT. PASSING	% PASSING	LOG DIAMETER
4	4.750	0.00	0.00	120.15	100.00	0.677
6	3.350	2.21	2.21	117.94	98.16	0.525
10	2.000	0.55	2.76	117.39	97.70	0.301
16	1.180	1.27	4.03	116.12	96.65	0.072
40	0.425	19.22	23.25	96.90	80.65	-0.372
70	0.212	31.21	54.46	65.69	54.67	-0.674
140	0.106	33.57	88.03	32.12	26.73	-0.975
200	0.075	15.30	103.33	16.82	14.00	-1.125
pan		15.96	119.29	0.86		

d10: -- (mm) d50: 0.19 (mm)
d16: 0.080 (mm) d60: 0.24 (mm)
d30: 0.120 (mm) d84: 0.50 (mm)

MEDIAN PARTICLE DIAMETER (d50): 0.19
UNIFORMITY COEFFICIENT, Cu (d60/d10): --
COEFFICIENT OF CURVATURE, Cc, [(d30)**2/(d10*d60)]: --
MEAN PARTICLE DIAMETER, [(d16+d50+d84)/3]: 0.26

COMMENTS:

LABORATORY ANALYSIS PERFORMED BY: L. Simpson
CALCULATIONS MADE BY: L. Simpson
CHECKED BY: S. Stoller



USDA PARTICLE SIZE LIMIT CLASSIFICATION

θ_1 = 30.01	d_{10} = --	d_{50} = 0.19	d_{60} = 0.24	C_u = --	C_c = --
SAMPLE NUMBER		DEPTH	CLASSIFICATION (USDA TEXTURE TRIANGLE)		
5-5		unknown	Sand		

DANIEL B. STEPHENS & ASSOCIATES, INC.

SIEVE ANALYSIS DATA

JOB NAME: JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER: 89-L-144
TEST DATE: 02/01/90
SAMPLE NUMBER: 5-6
DEPTH: UNKNOWN

TOTAL WEIGHT OF SAMPLE: 120.15 (g)

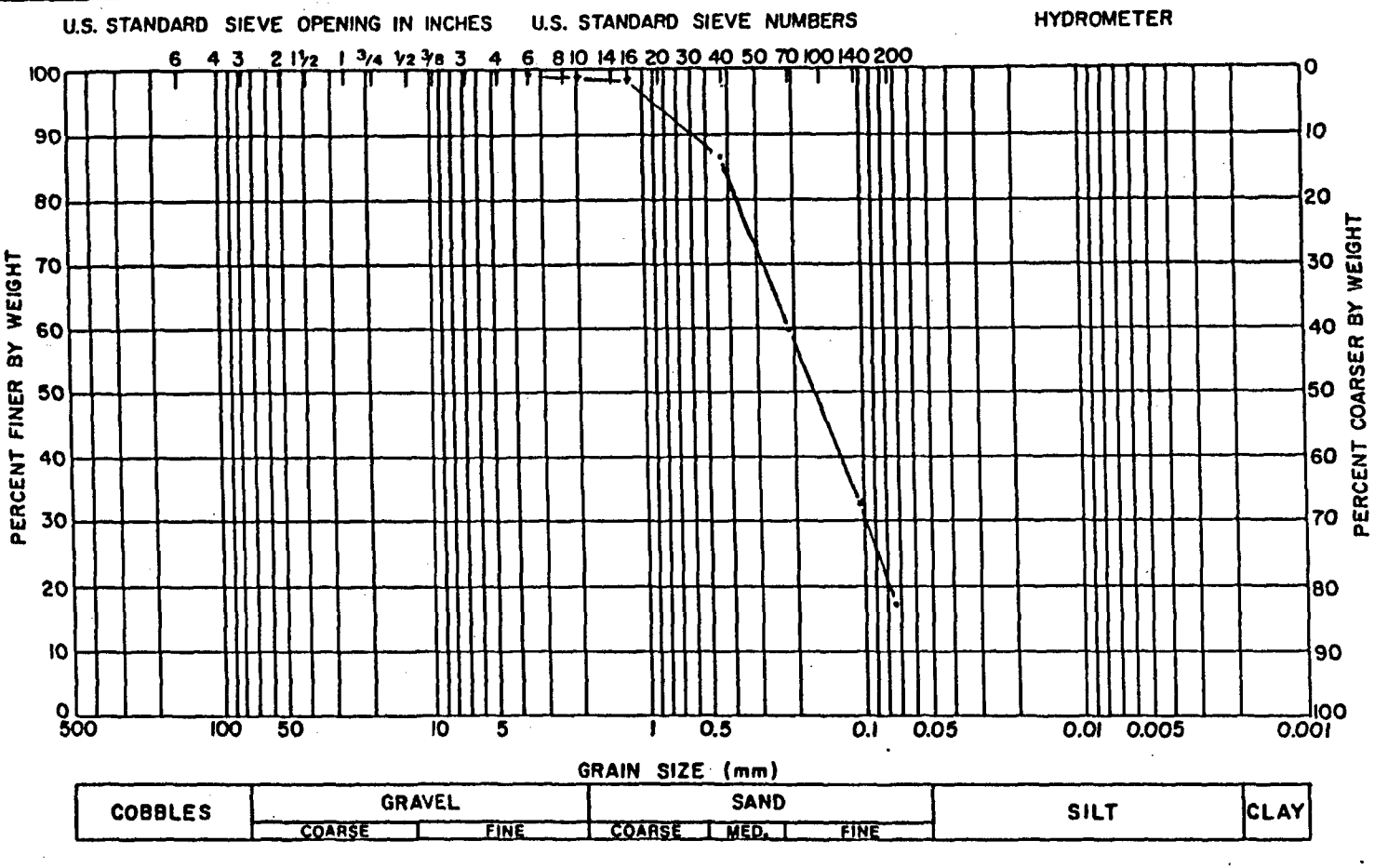
SIEVE NUMBER	DIAMETER (mm)	WT. RETAINED	CUM WT. RETAINED	WT. PASSING	% PASSING	LOG DIAMETER
4	4.750	0.00	0.00	120.15	100.00	0.677
6	3.350	0.59	0.59	119.56	99.51	0.525
10	2.000	0.64	1.23	118.92	98.98	0.301
16	1.180	0.81	2.04	118.11	98.30	0.072
40	0.425	13.93	15.97	104.18	86.71	-0.372
70	0.212	32.42	48.39	71.76	59.73	-0.674
140	0.106	33.34	81.73	38.42	31.98	-0.975
200	0.075	17.41	99.14	21.01	17.49	-1.125
pan		20.02	119.16	0.99		

d10: -- (mm) d50: 0.17 (mm)
d16: -- (mm) d60: 0.21 (mm)
d30: 0.10 (mm) d84: 0.40 (mm)

MEDIAN PARTICLE DIAMETER (d50): 0.17
UNIFORMITY COEFFICIENT, Cu (d60/d10): --
COEFFICIENT OF CURVATURE, Cc, [(d30)**2/(d10*d60)]: --
MEAN PARTICLE DIAMETER, [(d16+d50+d84)/3]: --

COMMENTS:

LABORATORY ANALYSIS PERFORMED BY: L. Simpson
CALCULATIONS MADE BY: L. Simpson
CHECKED BY: S. Stoller



USDA PARTICLE SIZE LIMIT CLASSIFICATION

Θ_i = 29.85	d_{10} = --	d_{50} = 0.17	d_{60} = 0.21	C_u = --	C_c = --
SAMPLE NUMBER		DEPTH	CLASSIFICATION (USDA TEXTURE TRIANGLE)		
5-6		unknown	Sand		

DANIEL B. STEPHENS & ASSOCIATES, INC.

SIEVE ANALYSIS DATA

JOB NAME: JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER: 89-L-144
TEST DATE: 02/01/90
SAMPLE NUMBER: 5-7
DEPTH: UNKNOWN

TOTAL WEIGHT OF SAMPLE: 119.34 (g)

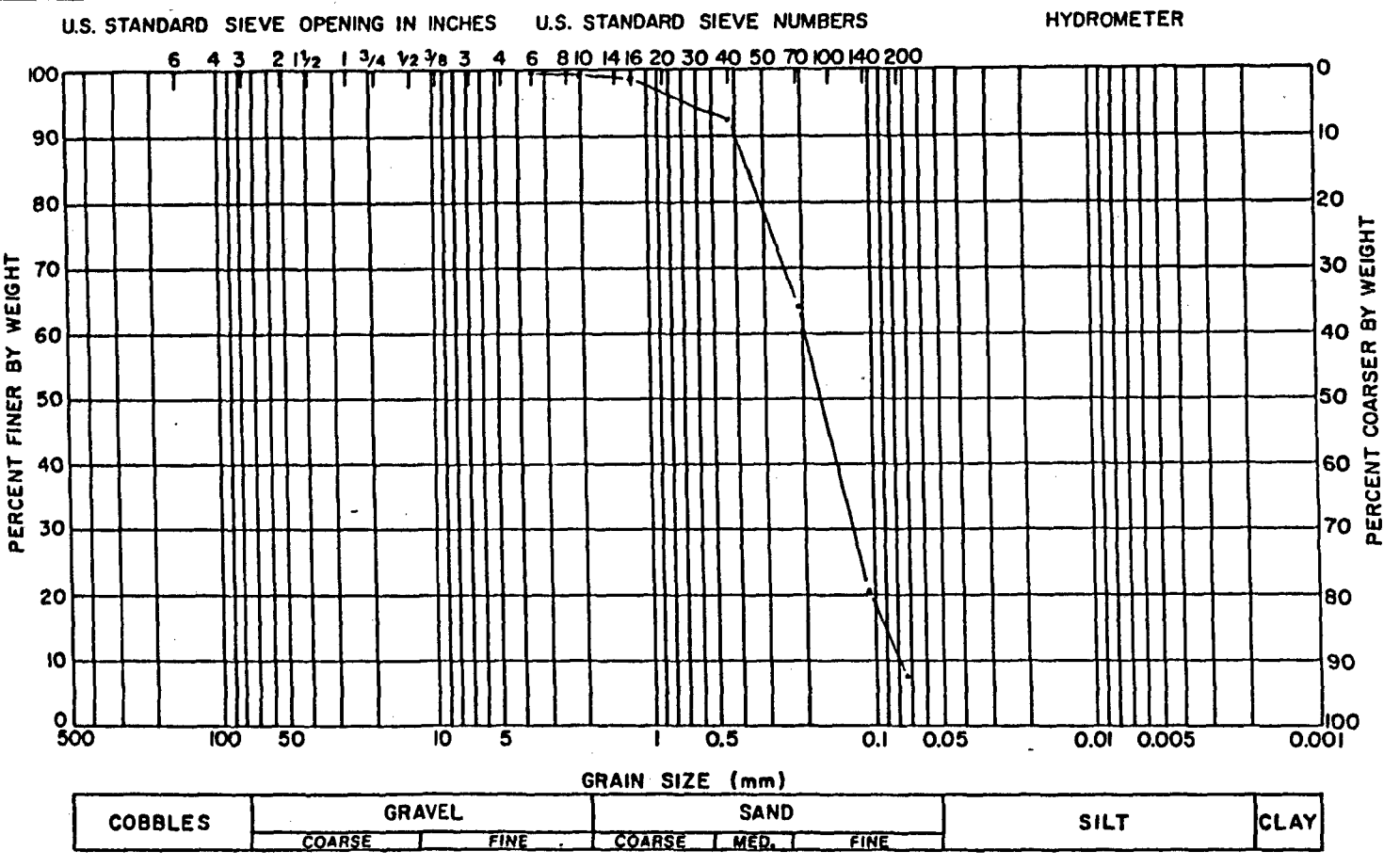
SIEVE NUMBER	DIAMETER (mm)	WT. RETAINED	CUM WT. RETAINED	WT. PASSING	% PASSING	LOG DIAMETER
4	4.750	0.00	0.00	119.34	100.00	0.677
6	3.350	0.49	0.49	118.85	99.59	0.525
10	2.000	0.32	0.81	118.53	99.32	0.301
16	1.180	0.67	1.48	117.86	98.76	0.072
40	0.425	7.50	8.98	110.36	92.48	-0.372
70	0.212	33.74	42.72	76.62	64.20	-0.674
140	0.106	52.37	95.09	24.25	20.32	-0.975
200	0.075	15.02	110.11	9.23	7.73	-1.125
pan		8.63	118.74	0.60		

d10: 0.079 (mm) d50: 0.17 (mm)
d16: 0.092 (mm) d60: 0.19 (mm)
d30: 0.130 (mm) d84: 0.34 (mm)

MEDIAN PARTICLE DIAMETER (d50): 0.17
UNIFORMITY COEFFICIENT, Cu (d60/d10): 2.4
COEFFICIENT OF CURVATURE, Cc, [(d30)**2/(d10*d60)]: 1.1
MEAN PARTICLE DIAMETER, [(d16+d50+d84)/3]: 0.20

COMMENTS:

LABORATORY ANALYSIS PERFORMED BY: L. Simpson
CALCULATIONS MADE BY: L. Simpson
CHECKED BY: S. Stoller



USDA PARTICLE SIZE LIMIT CLASSIFICATION

θ_i = 29.53	d_{10} = 0.079	d_{50} = 0.17	d_{60} = 0.19	C_u = 2.4	C_c = 1.1
SAMPLE NUMBER		DEPTH	CLASSIFICATION (USDA TEXTURE TRIANGLE)		
5-7		unknown	Sand		

DANIEL B. STEPHENS & ASSOCIATES, INC.

SIEVE ANALYSIS DATA

JOB NAME: JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER: 89-L-144
TEST DATE: 02/01/90
SAMPLE NUMBER: 5-8
DEPTH: UNKNOWN

TOTAL WEIGHT OF SAMPLE: 121.49 (g)

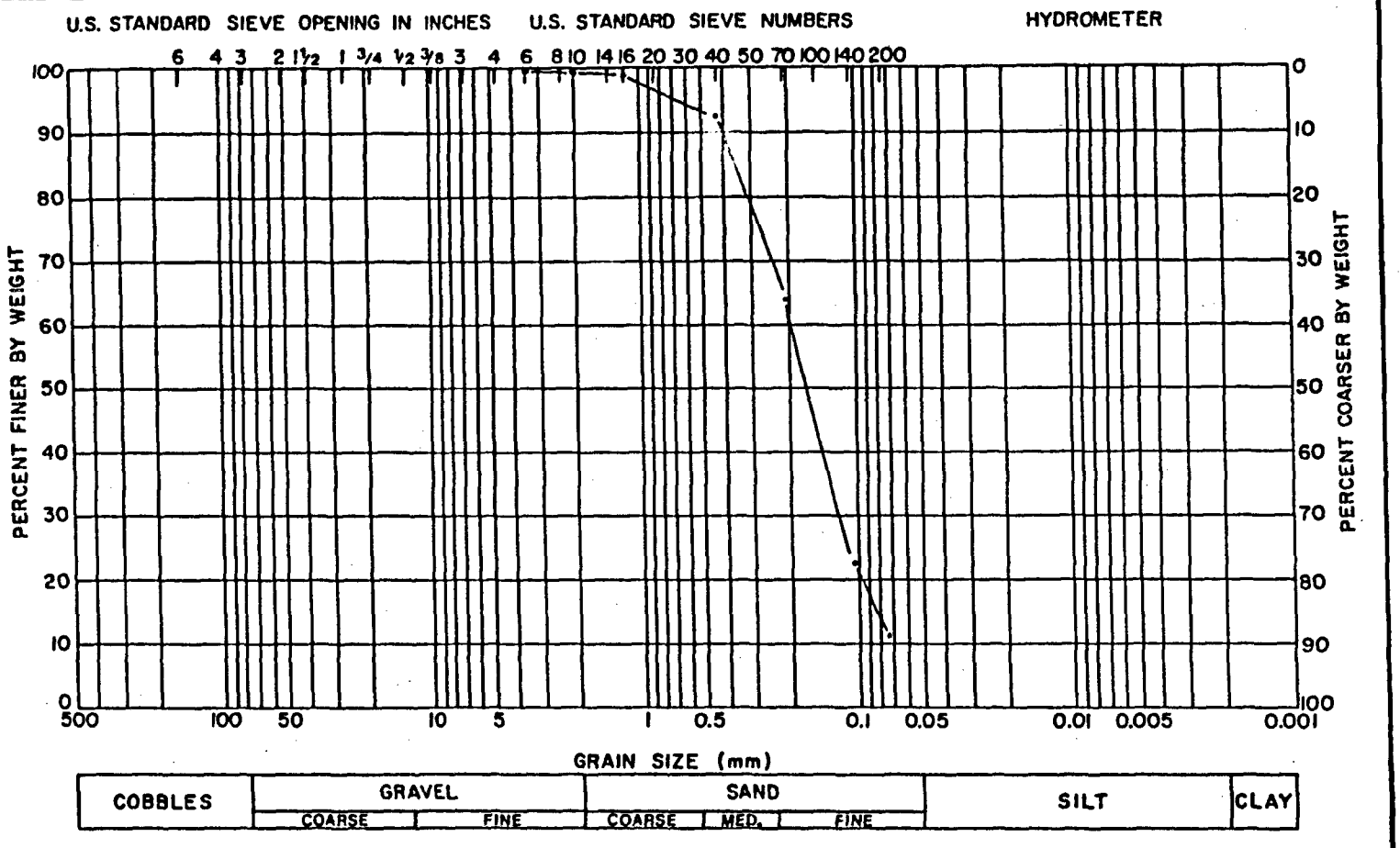
SIEVE NUMBER	DIAMETER (mm)	WT. RETAINED	CUM WT. RETAINED	WT. PASSING	% PASSING	LOG DIAMETER
4	4.750	0.00	0.00	121.49	100.00	0.677
6	3.350	0.43	0.43	121.06	99.65	0.525
10	2.000	0.26	0.69	120.80	99.43	0.301
16	1.180	0.55	1.24	120.25	98.98	0.072
40	0.425	7.88	9.12	112.37	92.49	-0.372
70	0.212	34.93	44.05	77.44	63.74	-0.674
140	0.106	49.97	94.02	27.47	22.61	-0.975
200	0.075	14.07	108.09	13.40	11.03	-1.125
pan		12.88	120.97	0.52		

d10: -- (mm) d50: 0.17 (mm)
d16: 0.085 (mm) d60: 0.20 (mm)
d30: 0.120 (mm) d84: 0.34 (mm)

MEDIAN PARTICLE DIAMETER (d50): 0.17
UNIFORMITY COEFFICIENT, Cu (d60/d10): --
COEFFICIENT OF CURVATURE, Cc, [(d30)**2/(d10*d60)]: --
MEAN PARTICLE DIAMETER, [(d16+d50+d84)/3]: 0.20

COMMENTS:

LABORATORY ANALYSIS PERFORMED BY: L. Simpson
CALCULATIONS MADE BY: L. Simpson
CHECKED BY: S. Stoller



USDA PARTICLE SIZE LIMIT CLASSIFICATION

θ_i = 26.08	d_{10} = --	d_{50} = 0.17	d_{60} = 0.20	C_u = --	C_c = --
SAMPLE NUMBER		DEPTH	CLASSIFICATION (USDA TEXTURE TRIANGLE)		
5-8		unknown	Sand		

DANIEL B. STEPHENS & ASSOCIATES, INC.

SIEVE ANALYSIS DATA

JOB NAME: JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER: 89-L-144
TEST DATE: 02/01/90
SAMPLE NUMBER: 5-9
DEPTH: UNKNOWN

TOTAL WEIGHT OF SAMPLE: 120.23 (g)

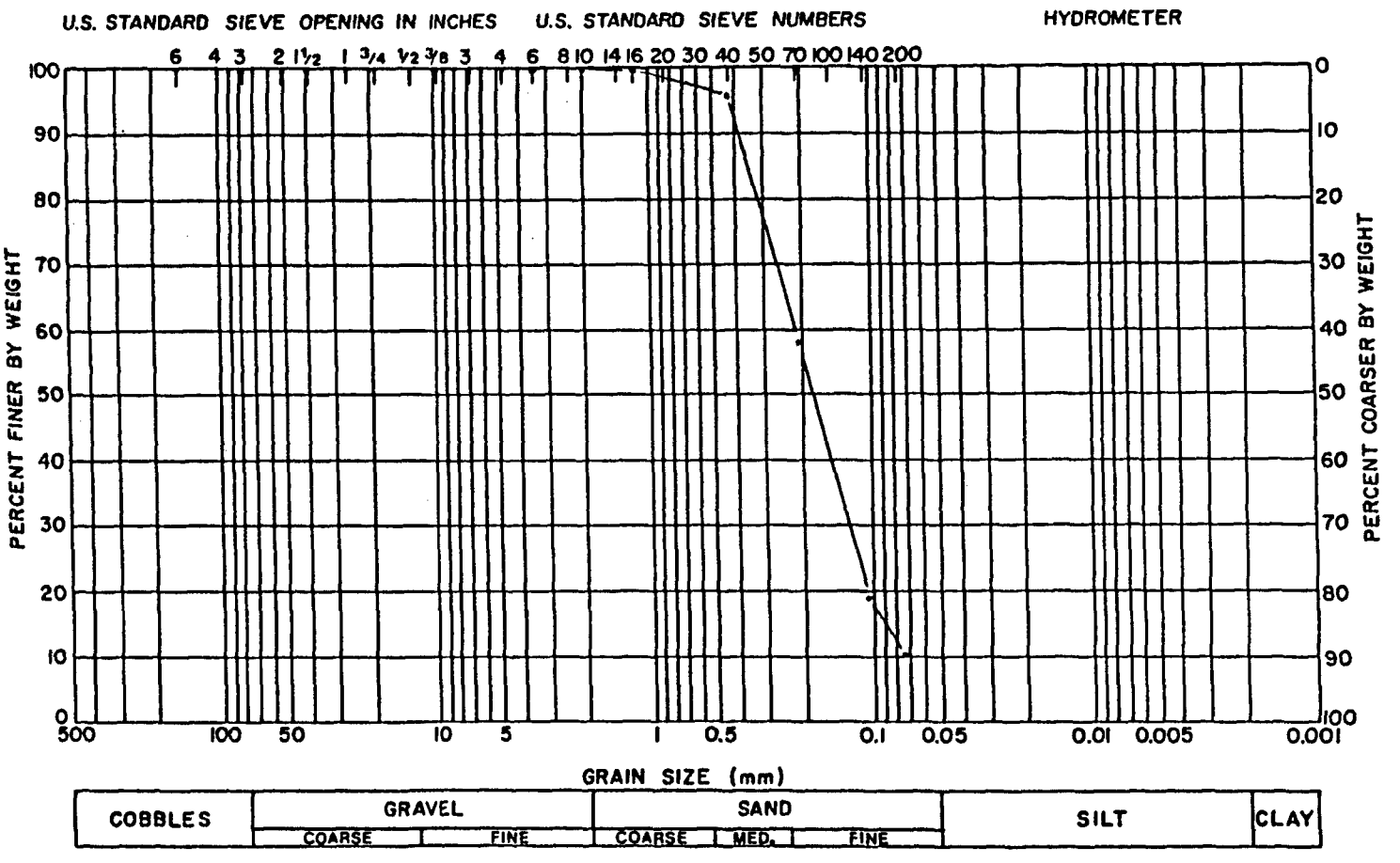
SIEVE NUMBER	DIAMETER (mm)	WT. RETAINED	CUM WT. RETAINED	WT. PASSING	% PASSING	LOG DIAMETER
4	4.750	0.00	0.00	120.23	100.00	0.677
6	3.350	0.08	0.08	120.15	99.93	0.525
10	2.000	0.00	0.08	120.15	99.93	0.301
16	1.180	0.12	0.20	120.03	99.83	0.072
40	0.425	4.91	5.11	115.12	95.75	-0.372
70	0.212	45.08	50.19	70.04	58.26	-0.674
140	0.106	47.11	97.30	22.93	19.07	-0.975
200	0.075	10.68	107.98	12.25	10.19	-1.125
pan		11.51	119.49	0.74		

d10: -- (mm) d50: 0.18 (mm)
d16: 0.092 (mm) d60: 0.21 (mm)
d30: 0.130 (mm) d84: 0.34 (mm)

MEDIAN PARTICLE DIAMETER (d50): 0.18
UNIFORMITY COEFFICIENT, Cu (d60/d10): --
COEFFICIENT OF CURVATURE, Cc, [(d30)**2/(d10*d60)]: --
MEAN PARTICLE DIAMETER, [(d16+d50+d84)/3]: 0.20

COMMENTS:

LABORATORY ANALYSIS PERFORMED BY: L. Simpson
CALCULATIONS MADE BY: L. Simpson
CHECKED BY: S. Stoller



USDA PARTICLE SIZE LIMIT CLASSIFICATION

θ_i = 27.49	d_{10} = --	d_{50} = 0.18	d_{60} = 0.21	C_u = --	C_c = --
SAMPLE NUMBER		DEPTH	CLASSIFICATION (USDA TEXTURE TRIANGLE)		
5-9		unknown	Sand		

DANIEL B. STEPHENS & ASSOCIATES, INC.

SIEVE ANALYSIS DATA

JOB NAME: JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER: 89-L-144
TEST DATE: 02/01/90
SAMPLE NUMBER: 5-10
DEPTH: UNKNOWN

TOTAL WEIGHT OF SAMPLE: 126.34 (g)

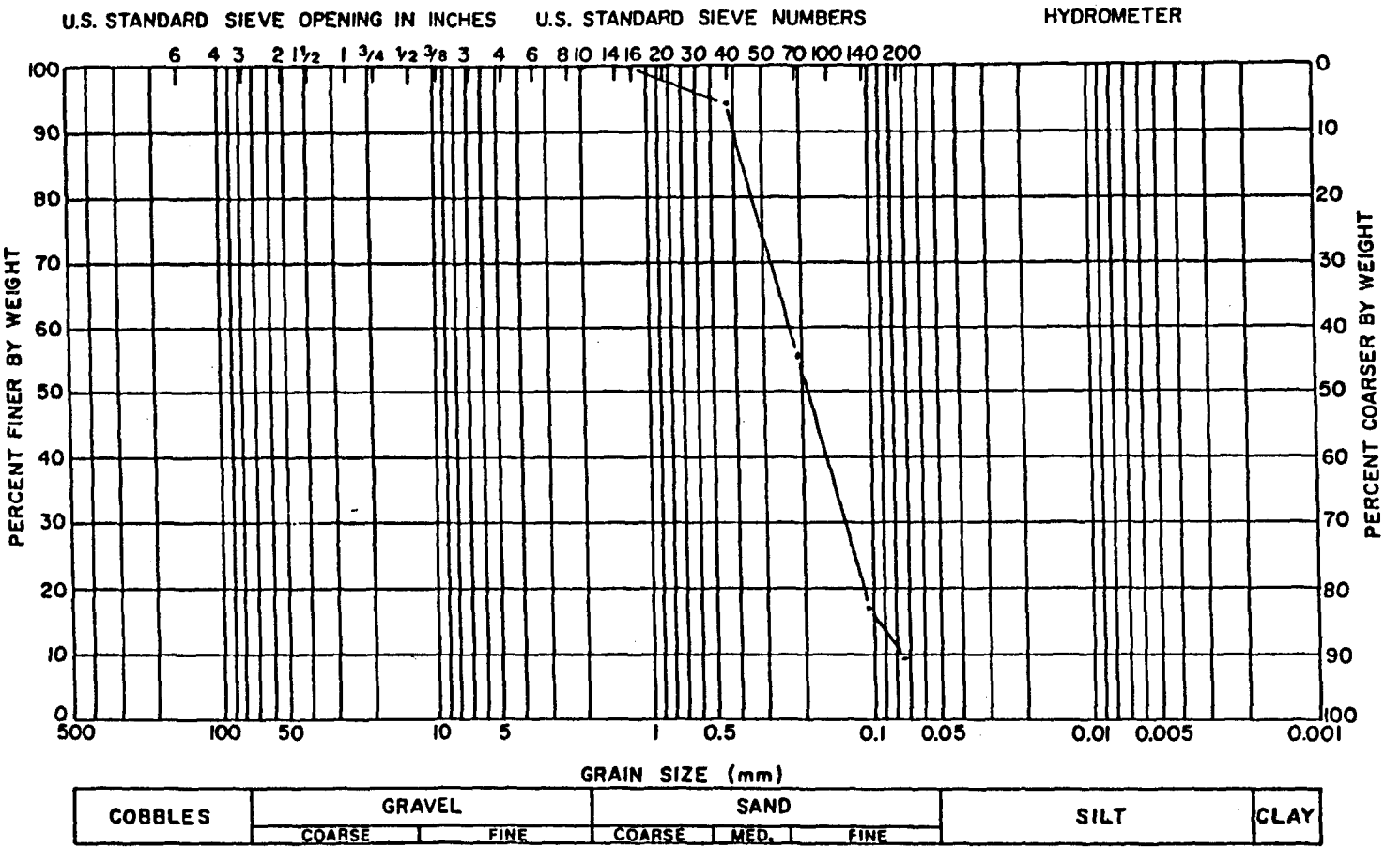
SIEVE NUMBER	DIAMETER (mm)	WT. RETAINED	CUM WT. RETAINED	WT. PASSING	% PASSING	LOG DIAMETER
4	4.750	0.00	0.00	126.34	100.00	0.677
6	3.350	0.06	0.06	126.28	99.95	0.525
10	2.000	0.03	0.09	126.25	99.93	0.301
16	1.180	0.17	0.26	126.08	99.79	0.072
40	0.425	6.82	7.08	119.26	94.40	-0.372
70	0.212	48.42	55.50	70.84	56.07	-0.674
140	0.106	48.75	104.25	22.09	17.48	-0.975
200	0.075	10.30	114.55	11.79	9.33	-1.125
pan		11.00	125.55	0.79		

d10:	0.076 (mm)	d50:	0.19 (mm)
d16:	0.100 (mm)	d60:	0.22 (mm)
d30:	0.140 (mm)	d84:	0.36 (mm)

MEDIAN PARTICLE DIAMETER (d50): 0.19
UNIFORMITY COEFFICIENT, Cu (d60/d10): 2.9
COEFFICIENT OF CURVATURE, Cc, [(d30)**2/(d10*d60)]: 1.2
MEAN PARTICLE DIAMETER, [(d16+d50+d84)/3]: 0.22

COMMENTS:

LABORATORY ANALYSIS PERFORMED BY: L. Simpson
CALCULATIONS MADE BY: L. Simpson
CHECKED BY: S. Stoller



USDA PARTICLE SIZE LIMIT CLASSIFICATION

θ_1 = 25.34	d_{10} = 0.076	d_{50} = 0.19	d_{60} = 0.22	C_u = 2.9	C_c = 1.2
SAMPLE NUMBER		DEPTH	CLASSIFICATION (USDA TEXTURE TRIANGLE)		
5-10		unknown	Sand		

DANIEL B. STEPHENS & ASSOCIATES, INC.

SIEVE ANALYSIS DATA

JOB NAME: JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER: 89-L-144
TEST DATE: 01/31/90
SAMPLE NUMBER: 5-11
DEPTH: UNKNOWN

TOTAL WEIGHT OF SAMPLE: 125.19 (g)

SIEVE NUMBER	DIAMETER (mm)	WT. RETAINED	CUM WT. RETAINED	WT. PASSING	% PASSING	LOG DIAMETER
4	4.750	0.00	0.00	125.19	100.00	0.677
6	3.350	0.16	0.16	125.03	99.87	0.525
10	2.000	0.01	0.17	125.02	99.86	0.301
16	1.180	0.08	0.25	124.94	99.80	0.072
40	0.425	15.44	15.69	109.50	87.47	-0.372
70	0.212	31.63	47.32	77.87	62.20	-0.674
140	0.106	31.54	78.86	46.33	37.01	-0.975
200	0.075	20.49	99.35	25.84	20.64	-1.125
pan		24.00	123.35	1.84		

d10: 0.006 (mm) d50: 0.16 (mm)
d16: 0.040 (mm) d60: 0.20 (mm)
d30: 0.090 (mm) d84: 0.38 (mm)

MEDIAN PARTICLE DIAMETER (d50): 0.16
UNIFORMITY COEFFICIENT, Cu (d60/d10): 33.3
COEFFICIENT OF CURVATURE, Cc, [(d30)**2/(d10*d60)]: 6.7
MEAN PARTICLE DIAMETER, [(d16+d50+d84)/3]: 0.19

COMMENTS:

LABORATORY ANALYSIS PERFORMED BY: L. Simpson
CALCULATIONS MADE BY: L. Simpson
CHECKED BY: S. Stoller

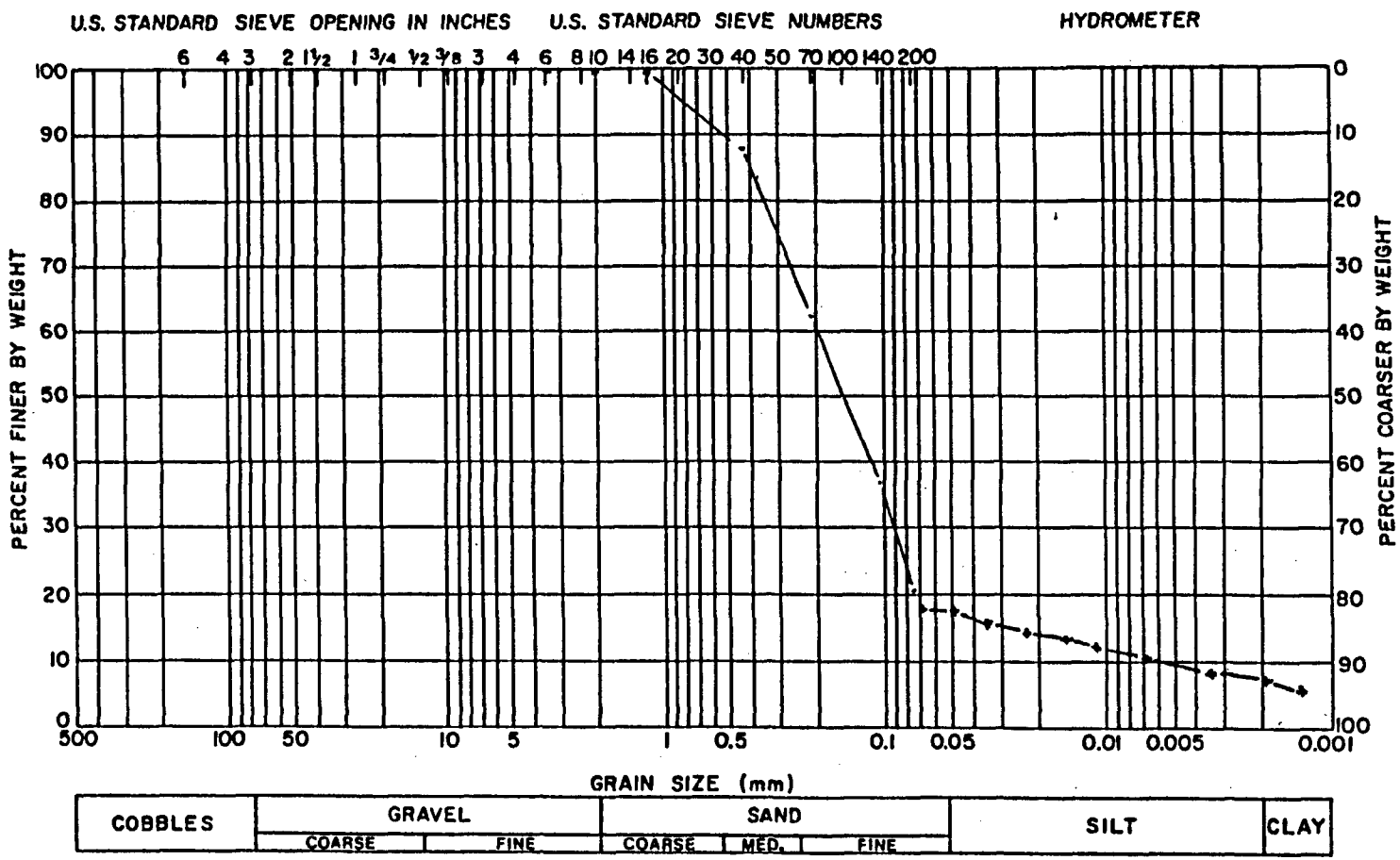
HYDROMETER DATA

JOB NAME: JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER: 89-L-144 TEST DATE: 02/01/90
SAMPLE NUMBER: 5-11 DEPTH: UNKNOWN
TYPE OF WATER USED: DISTILLED INITIAL WT: 23.13 (g)
REACTION WITH H2O2: NONE TOTAL SAMPLE WT: 125.19 (g)
DISPERSANT: (NaPO3)6 START TIME: 9:06

DATE (1990)	TIME (MIN)	TEMP (C)	R (g/l)	Rl (g/l)	Rcorr (g/l)	L (CM)	D (MM)	P (%)	%FINER
02/01	0.25	17.0	27.0	3.0	24.0	11.9	0.09766	103.76135	19.17086
	0.50	17.0	25.5	3.0	22.5	12.1	0.06976	97.27626	17.97268
	1.00	17.0	24.5	3.0	21.5	12.3	0.04966	92.95288	17.17390
	2.00	17.0	22.5	3.0	19.5	12.6	0.03558	84.30610	15.57632
	5.00	17.0	21.0	3.0	18.0	12.9	0.02272	77.82101	14.37815
	10.00	17.0	19.5	3.0	16.5	13.1	0.01622	71.33593	13.17997
	20.50	17.0	18.0	3.0	15.0	13.3	0.01143	64.85084	11.98179
	61.00	17.0	16.0	3.0	13.0	13.7	0.00671	56.20406	10.38422
	120.00	17.0	15.0	3.0	12.0	13.8	0.00481	51.88067	9.58543
	240.00	17.0	13.0	3.0	10.0	14.2	0.00344	43.23390	7.98786
	453.00	17.5	12.0	2.5	9.5	14.3	0.00251	41.07220	7.58847
	745.00	17.5	13.0	4.0	9.0	14.2	0.00194	38.91051	7.18907
02/02	1422.00	17.0	11.5	4.5	7.0	14.4	0.00143	30.26373	5.59150

COMMENTS: Assume mean particle density is 2.65 g/cc

LABORATORY ANALYSIS PERFORMED BY: L. Simpson
CALCULATIONS MADE BY: L. Simpson
CHECKED BY: S. Stoller



USDA PARTICLE SIZE LIMIT CLASSIFICATION

θ_i = 42.52	d_{10} = 0.006	d_{50} = 0.16	d_{60} = 0.20	C_u = 33.3	C_c = 6.7
SAMPLE NUMBER		DEPTH	CLASSIFICATION (USDA TEXTURE TRIANGLE)		
5-11		unknown	Loamy Sand		

DANIEL B. STEPHENS & ASSOCIATES, INC.

SIEVE ANALYSIS DATA

JOB NAME: JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER: 89-L-144
TEST DATE: 01/31/90
SAMPLE NUMBER: 5-12
DEPTH: UNKNOWN

TOTAL WEIGHT OF SAMPLE: 119.62 (g)

SIEVE NUMBER	DIAMETER (mm)	WT. RETAINED	CUM WT. RETAINED	WT. PASSING	% PASSING	LOG DIAMETER
4	4.750	0.00	0.00	119.62	100.00	0.677
6	3.350	0.21	0.21	119.41	99.82	0.525
10	2.000	0.08	0.29	119.33	99.76	0.301
16	1.180	0.16	0.45	119.17	99.62	0.072
40	0.425	7.79	8.24	111.38	93.11	-0.372
70	0.212	25.12	33.36	86.26	72.11	-0.674
140	0.106	34.50	67.86	51.76	43.27	-0.975
200	0.075	22.28	90.14	29.48	24.64	-1.125
pan		28.50	118.64	0.98		

d10: 0.008 (mm) d50: 0.12 (mm)
d16: 0.011 (mm) d60: 0.16 (mm)
d30: 0.081 (mm) d84: 0.31 (mm)

MEDIAN PARTICLE DIAMETER (d50): 0.12
UNIFORMITY COEFFICIENT, Cu (d60/d10): 20.0
COEFFICIENT OF CURVATURE, Cc, [(d30)**2/(d10*d60)]: 5.1
MEAN PARTICLE DIAMETER, [(d16+d50+d84)/3]: 0.15

COMMENTS:

LABORATORY ANALYSIS PERFORMED BY: L. Simpson
CALCULATIONS MADE BY: L. Simpson
CHECKED BY: S. Stoller

HYDROMETER DATA

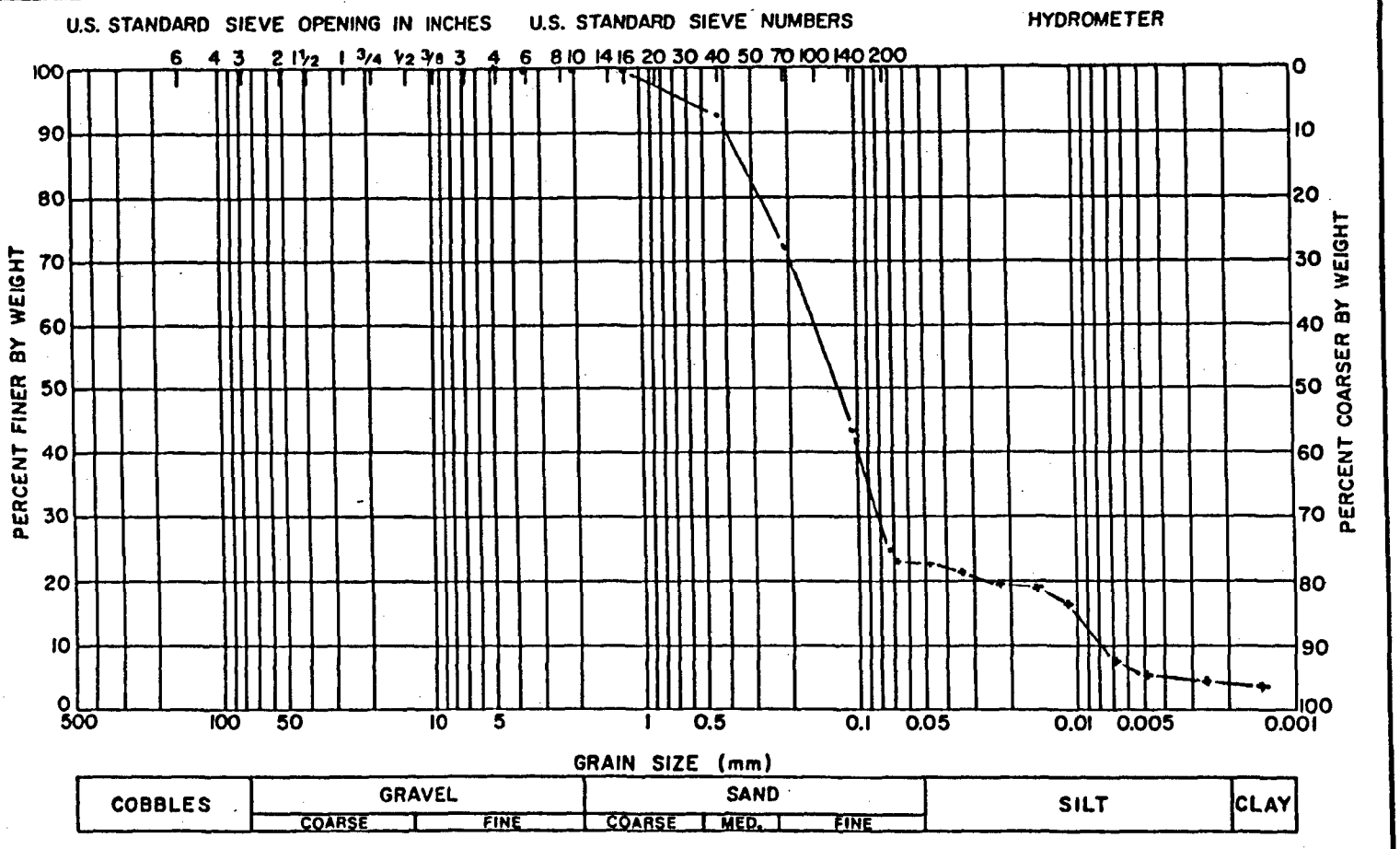
JOB NAME: JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER: 89-L-144
SAMPLE NUMBER: 5-12
TYPE OF WATER USED: DISTILLED
REACTION WITH H2O2: NONE
DISPERSANT: (NaPO3)6

TEST DATE: 02/01/90
DEPTH: UNKNOWN
INITIAL WT: 28.07 (g)
TOTAL SAMPLE WT: 119.62 (g)
START TIME: 9:12

DATE (1990)	TIME (MIN)	TEMP (C)	R (g/l)	Rl (g/l)	Rcorr (g/l)	L (CM)	D (MM)	P (%)	%FINER
02/01	0.25	17.0	31.5	3.0	28.5	11.1	0.09457	101.53188	23.82545
	0.50	17.0	30.5	3.0	27.5	11.3	0.06736	97.96936	22.98947
	1.00	17.0	30.0	3.0	27.0	11.4	0.04781	96.18810	22.57148
	2.00	17.0	28.0	3.0	25.0	11.7	0.03429	89.06306	20.89952
	5.00	17.0	26.0	3.0	23.0	12.0	0.02199	81.93801	19.22755
	10.00	17.0	25.0	3.0	22.0	12.2	0.01565	78.37549	18.39157
	20.00	17.0	22.5	3.0	19.5	12.6	0.01125	69.46918	16.30162
	60.00	17.0	12.0	3.0	9.0	14.3	0.00693	32.06270	7.52383
	121.00	17.0	9.0	3.0	6.0	14.8	0.00496	21.37513	5.01588
	240.00	17.0	8.0	3.0	5.0	15.0	0.00354	17.81261	4.17990
	448.00	17.5	7.5	2.5	5.0	15.1	0.00258	17.81261	4.17990
	740.00	17.5	9.0	4.0	5.0	14.8	0.00199	17.81261	4.17990
02/02	1417.00	17.0	9.0	4.5	4.5	14.8	0.00145	16.03135	3.76191

COMMENTS: Assume mean particle density is 2.65 g/cc

LABORATORY ANALYSIS PERFORMED BY: L. Simpson
CALCULATIONS MADE BY: L. Simpson
CHECKED BY: S. Stoller



USDA PARTICLE SIZE LIMIT CLASSIFICATION

θ_i = 36.51	d_{10} = 0.008	d_{50} = 0.12	d_{60} = 0.16	C_u = 20.0	C_c = 5.1
SAMPLE NUMBER		DEPTH	CLASSIFICATION (USDA TEXTURE TRIANGLE)		
5-12		unknown	Loamy Sand		

DANIEL B. STEPHENS & ASSOCIATES, INC.

SIEVE ANALYSIS DATA

JOB NAME: JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER: 89-L-144
TEST DATE: 01/31/90
SAMPLE NUMBER: 5-13
DEPTH: UNKNOWN

TOTAL WEIGHT OF SAMPLE: 123.12 (g)

SIEVE NUMBER	DIAMETER (mm)	WT. RETAINED	CUM WT. RETAINED	WT. PASSING	% PASSING	LOG DIAMETER
4	4.750	0.56	0.56	122.56	99.55	0.677
6	3.350	0.44	1.00	122.12	99.19	0.525
10	2.000	0.30	1.30	121.82	98.94	0.301
16	1.180	0.68	1.98	121.14	98.39	0.072
40	0.425	13.05	15.03	108.09	87.79	-0.372
70	0.212	30.17	45.20	77.92	63.29	-0.674
140	0.106	25.59	70.79	52.33	42.50	-0.975
200	0.075	18.68	89.47	33.65	27.33	-1.125
pan		31.97	121.44	1.68		

d10: 0.0075 (mm) d50: 0.14 (mm)
d16: 0.013 (mm) d60: 0.18 (mm)
d30: 0.078 (mm) d84: 0.38 (mm)

MEDIAN PARTICLE DIAMETER (d50): 0.14
UNIFORMITY COEFFICIENT, Cu (d60/d10): 24.0
COEFFICIENT OF CURVATURE, Cc, [(d30)**2/(d10*d60)]: 4.5
MEAN PARTICLE DIAMETER, [(d16+d50+d84)/3]: 0.18

COMMENTS:

LABORATORY ANALYSIS PERFORMED BY: L. Simpson
CALCULATIONS MADE BY: L. Simpson
CHECKED BY: S. Stoller

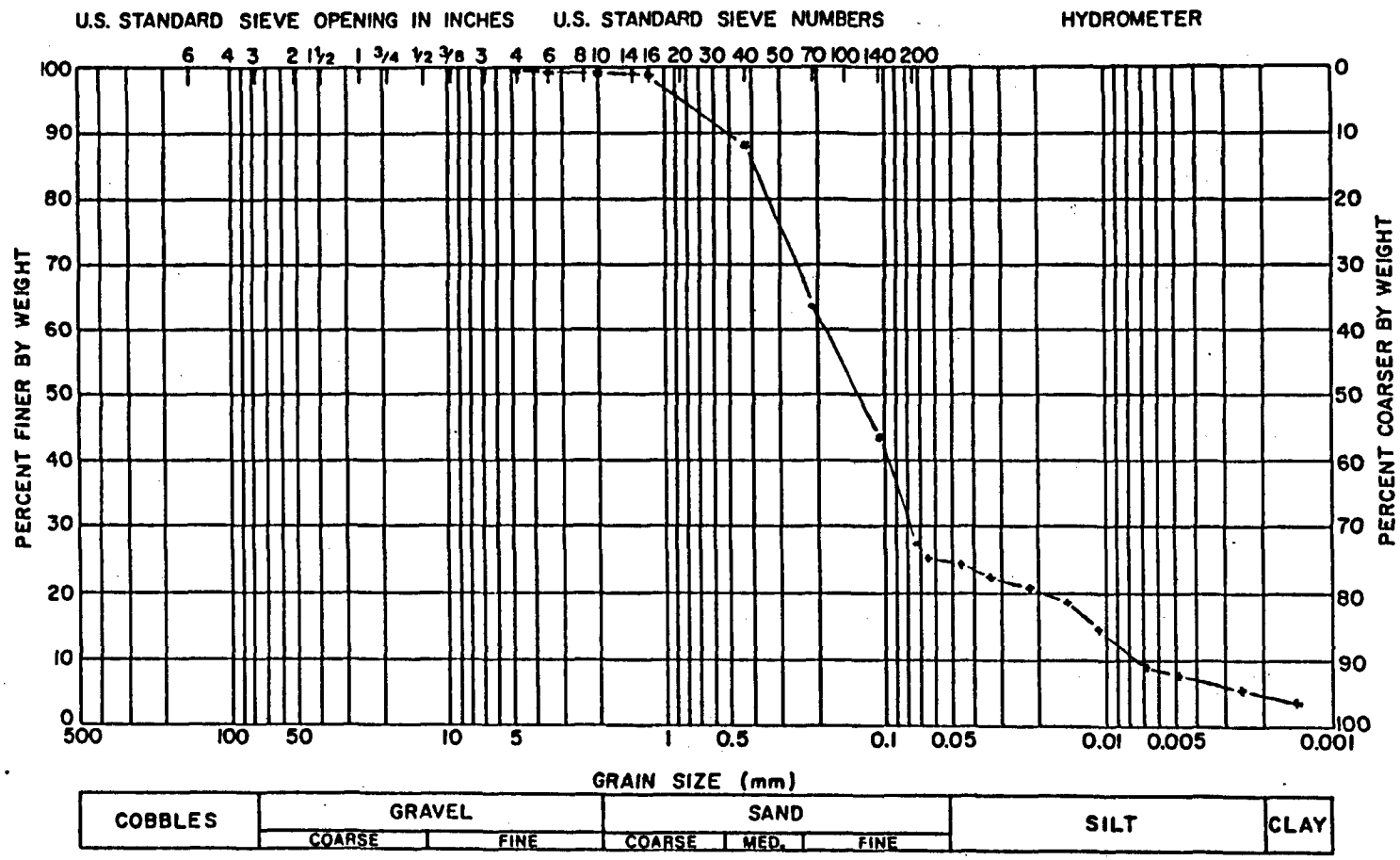
HYDROMETER DATA

JOB NAME: JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER: 89-L-144
TEST DATE: 02/01/90
SAMPLE NUMBER: 5-13
DEPTH: UNKNOWN
TYPE OF WATER USED: DISTILLED
INITIAL WT: 31.81 (g)
REACTION WITH H202: NONE
TOTAL SAMPLE WT: 123.12 (g)
DISPERSANT: (NaPO3)6
START TIME: 9:18

DATE (1990)	TIME (MIN)	TEMP (C)	R (g/l)	Rl (g/l)	Rcorr (g/l)	L (CM)	D (MM)	P (%)	%FINER
02/01	0.25	17.0	35.0	3.0	32.0	10.6	0.09210	100.59730	25.99090
	0.50	17.0	34.0	3.0	31.0	10.7	0.06563	97.45363	25.17869
	1.00	17.0	32.5	3.0	29.5	11.0	0.04694	92.73813	23.96036
	2.00	17.0	30.0	3.0	27.0	11.4	0.03380	84.87897	21.92982
	5.00	17.0	28.0	3.0	25.0	11.7	0.02169	78.59164	20.30539
	10.00	17.0	26.0	3.0	23.0	12.0	0.01555	72.30431	18.68096
	20.00	17.0	20.5	3.0	17.5	12.9	0.01140	55.01415	14.21378
	60.00	17.0	14.0	3.0	11.0	14.0	0.00685	34.58032	8.93437
	120.00	17.0	12.0	3.0	9.0	14.3	0.00490	28.29299	7.30994
	240.00	17.0	10.0	3.0	7.0	14.7	0.00350	22.00566	5.68551
	442.00	17.5	9.0	2.5	6.5	14.8	0.00258	20.43383	5.27940
	735.00	17.5	10.0	4.0	6.0	14.7	0.00199	18.86199	4.87329
02/02	1412.00	17.0	9.0	4.5	4.5	14.8	0.00145	14.14649	3.65497

COMMENTS: Assume mean particle density is 2.65 g/cc

LABORATORY ANALYSIS PERFORMED BY: L. Simpson
CALCULATIONS MADE BY: L. Simpson
CHECKED BY: S. Stoller



USDA PARTICLE SIZE LIMIT CLASSIFICATION

θ_1 = 35.78	d_{10} = 0.0075	d_{50} = 0.14	d_{60} = 0.18	C_u = 24	C_c = 4.5
SAMPLE NUMBER		DEPTH	CLASSIFICATION (USDA TEXTURE TRIANGLE)		
5-13		unknown	Sandy Loam		

DANIEL B. STEPHENS & ASSOCIATES, INC.

SIEVE ANALYSIS DATA

JOB NAME: JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER: 89-L-144
TEST DATE: 01/31/90
SAMPLE NUMBER: 5-14
DEPTH: UNKNOWN

TOTAL WEIGHT OF SAMPLE: 120.17 (g)

SIEVE NUMBER	DIAMETER (mm)	WT. RETAINED	CUM WT. RETAINED	WT. PASSING	% PASSING	LOG DIAMETER
4	4.750	0.00	0.00	120.17	100.00	0.677
6	3.350	0.48	0.48	119.69	99.60	0.525
10	2.000	0.24	0.72	119.45	99.40	0.301
16	1.180	0.45	1.17	119.00	99.03	0.072
40	0.425	14.65	15.82	104.35	86.84	-0.372
70	0.212	31.78	47.60	72.57	60.39	-0.674
140	0.106	25.00	72.60	47.57	39.59	-0.975
200	0.075	14.55	87.15	33.02	27.48	-1.125
pan		31.68	118.83	1.34		

d10: 0.0067 (mm) d50: 0.16 (mm)
d16: 0.011 (mm) d60: 0.21 (mm)
d30: 0.081 (mm) d84: 0.41 (mm)

MEDIAN PARTICLE DIAMETER (d50): 0.16
UNIFORMITY COEFFICIENT, Cu (d60/d10): 31.3
COEFFICIENT OF CURVATURE, Cc, [(d30)**2/(d10*d60)]: 4.7
MEAN PARTICLE DIAMETER, [(d16+d50+d84)/3]: 0.19

COMMENTS:

LABORATORY ANALYSIS PERFORMED BY: L. Simpson
CALCULATIONS MADE BY: L. Simpson
CHECKED BY: S. Stoller

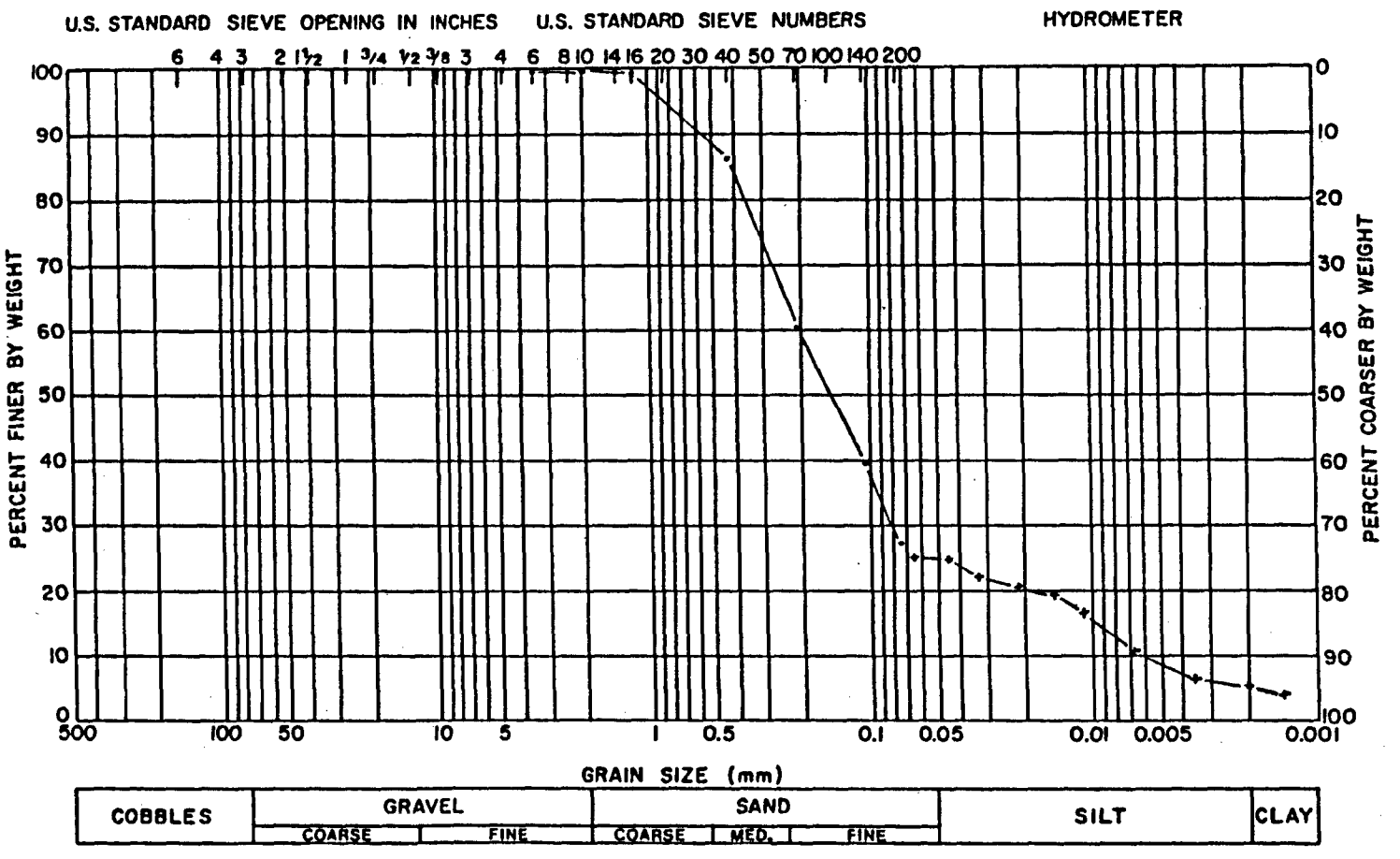
HYDROMETER DATA

JOB NAME:	JACOBS ENGINEERING - WORK ORDER #5		
JOB NUMBER:	89-L-144	TEST DATE:	02/01/90
SAMPLE NUMBER:	5-14	DEPTH:	UNKNOWN
TYPE OF WATER USED:	DISTILLED	INITIAL WT:	31.62 (g)
REACTION WITH H2O2:	NONE	TOTAL SAMPLE WT:	120.17 (g)
DISPERSANT:	(NaPO3)6	START TIME:	9:24

DATE (1990)	TIME (MIN)	TEMP (C)	R (g/l)	Rl (g/l)	Rcorr (g/l)	L (CM)	D (MM)	P (%)	%FINER
02/01	0.25	17.0	35.0	3.0	32.0	10.6	0.09210	101.20177	26.62894
	0.50	17.0	34.0	3.0	31.0	10.7	0.06563	98.03922	25.79679
	1.00	17.0	32.5	3.0	29.5	11.0	0.04694	93.29538	24.54856
	2.00	17.0	30.5	3.0	27.5	11.3	0.03368	86.97027	22.88425
	5.00	17.0	28.0	3.0	25.0	11.7	0.02169	79.06388	20.80386
	10.00	17.0	26.0	3.0	23.0	12.0	0.01555	72.73877	19.13955
	20.00	17.0	23.0	3.0	20.0	12.5	0.01122	63.25111	16.64309
	60.00	17.0	15.5	3.0	12.5	13.8	0.00679	39.53194	10.40193
	120.00	17.0	12.5	3.0	9.5	14.3	0.00488	30.04428	7.90547
	240.00	17.0	10.0	3.0	7.0	14.7	0.00350	22.13789	5.82508
	438.00	17.5	9.0	2.5	6.5	14.8	0.00259	20.55661	5.40900
	730.00	17.5	10.0	4.0	6.0	14.7	0.00200	18.97533	4.99293
02/02	1407.00	17.0	9.0	4.5	4.5	14.8	0.00145	14.23150	3.74470

COMMENTS: Assume mean particle density is 2.65 g/cc

LABORATORY ANALYSIS PERFORMED BY: L. Simpson
CALCULATIONS MADE BY: L. Simpson
CHECKED BY: S. Stoller



USDA PARTICLE SIZE LIMIT CLASSIFICATION

θ_1 = 33.75	d_{10} = 0.0067	d_{50} = 0.16	d_{60} = 0.21	C_u = 31.3	C_c = 4.7
SAMPLE NUMBER		DEPTH	CLASSIFICATION (USDA TEXTURE TRIANGLE)		
5-14		unknown	Sandy Loam		

DANIEL B. STEPHENS & ASSOCIATES, INC.

WET/DRY SIEVE ANALYSIS DATA

JOB NAME: JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER: 89-L-144
TEST DATE: 04/90
SAMPLE NUMBER: 5-15
DEPTH: 0-46 FT.

TOTAL WEIGHT OF SAMPLE: 170.95 (g)

SIEVE NUMBER	DIAMETER (mm)	WT. RETAINED	CUM WT. RETAINED	WT. PASSING	% PASSING	LOG DIAMETER
4	4.750	0.00	0.00	170.95	100.00	0.677
6	3.350	4.69	4.69	166.26	97.26	0.525
10	2.000	7.39	12.08	158.87	92.93	0.301
16	1.180	6.57	18.65	152.30	89.09	0.072
40	0.425	7.75	26.40	144.55	84.56	-0.372
70	0.212	10.87	37.27	133.68	78.20	-0.674
140	0.106	13.91	51.18	119.77	70.06	-0.975
200	0.075	7.79	58.97	111.98	65.50	-1.125
pan		111.86	170.83	0.12		

d10: -- (mm) d50: 0.026 (mm)
d16: -- (mm) d60: 0.051 (mm)
d30: 0.0056 (mm) d84: 0.42 (mm)

MEDIAN PARTICLE DIAMETER (d50): 0.026
UNIFORMITY COEFFICIENT, Cu (d60/d10): --
COEFFICIENT OF CURVATURE, Cc, [(d30)**2/(d10*d60)]: --
MEAN PARTICLE DIAMETER, [(d16+d50+d84)/3]: --

COMMENTS:

LABORATORY ANALYSIS PERFORMED BY: L. Simpson, K. Evans
CALCULATIONS MADE BY: L. Simpson
CHECKED BY: D. Hammermeister

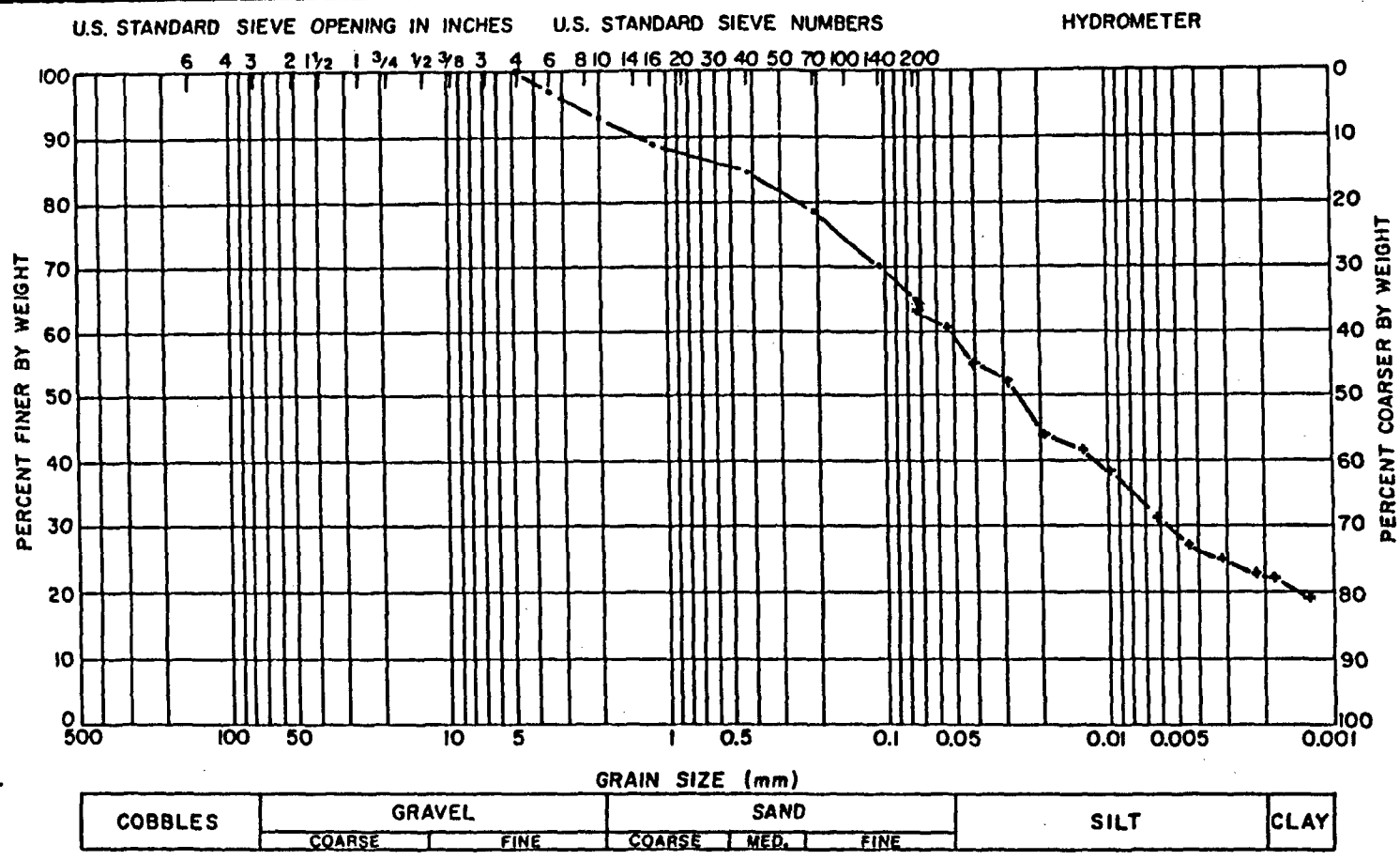
HYDROMETER DATA

JOB NAME:	JACOBS ENGINEERING - WORK ORDER #5	TEST DATE:	04/27/90
JOB NUMBER:	89-L-144	DEPTH:	0-46 FT.
SAMPLE NUMBER:	5-15	INITIAL WT:	54.77 (g)
TYPE OF WATER USED:	DISTILLED	TOTAL SAMPLE WT:	170.95 (g)
REACTION WITH H202:	VERY MILD	TOTAL WT PASSING #200:	111.98 (g)
DISPERSANT:	(NaPO3)6	START TIME:	8:42

DATE (1990)	TIME (MIN)	TEMP (C)	R (g/l)	Rl (g/l)	Rcorr (g/l)	L (CM)	D (MM)	P (%)	%FINER
04/27	0.25	20.0	54.0	1.0	53.0	7.4	0.07472	96.76830	63.38763
	0.50	20.0	52.0	1.0	51.0	7.8	0.05399	93.11667	60.99564
	1.00	20.0	47.0	1.0	46.0	8.6	0.04014	83.98758	55.01568
	2.00	20.0	45.0	1.0	44.0	8.9	0.02892	80.33595	52.62369
	5.00	20.0	38.0	1.0	37.0	10.1	0.01943	67.55523	44.25174
	10.00	20.0	36.0	1.0	35.0	10.4	0.01396	63.90360	41.85975
	20.50	20.0	33.0	1.0	32.0	10.9	0.00998	58.42615	38.27177
	60.00	20.0	27.0	1.0	26.0	11.9	0.00609	47.47124	31.09582
	120.00	20.0	24.0	1.5	22.5	12.4	0.00439	41.08088	26.90984
	240.00	20.0	22.0	1.0	21.0	12.7	0.00315	38.34216	25.11585
	493.00	20.0	20.0	1.0	19.0	13.0	0.00222	34.69052	22.72387
	723.00	20.5	19.5	1.0	18.5	13.1	0.00183	33.77762	22.12587
04/28	1495.00	20.0	17.0	1.0	16.0	13.5	0.00130	29.21307	19.13589

COMMENTS: Assume mean particle density is 2.65 g/cc

LABORATORY ANALYSIS PERFORMED BY: L. Simpson
CALCULATIONS MADE BY: L. Simpson
CHECKED BY: D. Hammermeister



USDA PARTICLE SIZE LIMIT CLASSIFICATION

θ_i = 25.80%	d_{10} = *	d_{50} = 0.026	d_{60} = 0.051	C_u = _	C_c = _
SAMPLE NUMBER		DEPTH	CLASSIFICATION (USDA TEXTURE TRIANGLE)		
5-15		0-46 Ft.	Loam		

DANIEL B. STEPHENS & ASSOCIATES, INC.

WET/DRY SIEVE ANALYSIS DATA

JOB NAME: JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER: 89-L-144
TEST DATE: 04/90
SAMPLE NUMBER: 5-16
DEPTH: 0-46 FT.

TOTAL WEIGHT OF SAMPLE: 153.21 (g)

SIEVE NUMBER	DIAMETER (mm)	WT. RETAINED	CUM WT. RETAINED	WT. PASSING	% PASSING	LOG DIAMETER
4	4.750	0.00	0.00	153.21	100.00	0.677
6	3.350	5.41	5.41	147.80	96.47	0.525
10	2.000	6.00	11.41	141.80	92.55	0.301
16	1.180	5.64	17.05	136.16	88.87	0.072
40	0.425	6.90	23.95	129.26	84.37	-0.372
70	0.212	8.96	32.91	120.30	78.52	-0.674
140	0.106	10.68	43.59	109.62	71.55	-0.975
200	0.075	6.22	49.81	103.40	67.49	-1.125
pan		103.54	153.35	-0.14		

d10: -- (mm) d50: 0.030 (mm)
d16: -- (mm) d60: 0.052 (mm)
d30: 0.0056 (mm) d84: 0.42 (mm)

MEDIAN PARTICLE DIAMETER (d50): 0.030
UNIFORMITY COEFFICIENT, Cu (d60/d10): --
COEFFICIENT OF CURVATURE, Cc, [(d30)**2/(d10*d60)]: --
MEAN PARTICLE DIAMETER, [(d16+d50+d84)/3]: --

COMMENTS:

LABORATORY ANALYSIS PERFORMED BY: K. Evans
CALCULATIONS MADE BY: L. Simpson
CHECKED BY: D. Hammermeister

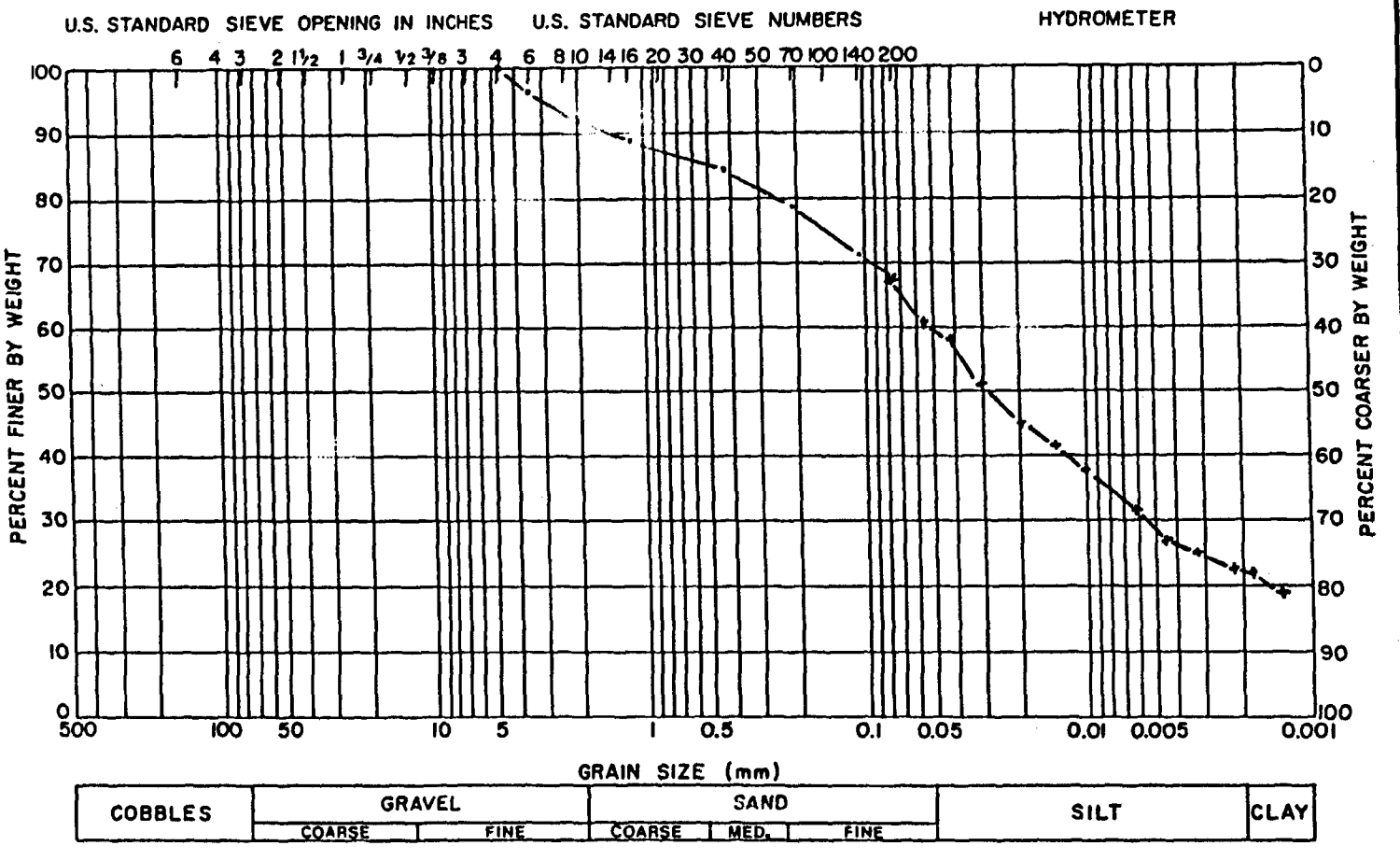
HYDROMETER DATA

JOB NAME:	JACOBS ENGINEERING - WORK ORDER #5	TEST DATE:	04/27/90
JOB NUMBER:	89-L-144	DEPTH:	0-46 FT.
SAMPLE NUMBER:	5-16	INITIAL WT:	50.38 (g)
TYPE OF WATER USED:	DISTILLED	TOTAL SAMPLE WT:	153.21 (g)
REACTION WITH H2O2:	VERY MILD	TOTAL WT PASSING #200:	103.40 (g)
DISPERSANT:	(NaPO3)6	START TIME:	8:48

DATE (1990)	TIME (MIN)	TEMP (C)	R (g/l)	Rl (g/l)	Rcorr (g/l)	L (CM)	D (MM)	P (%)	%FINER
04/27	0.25	20.0	51.0	1.0	50.0	7.9	0.07715	99.24573	66.98002
	0.50	20.0	47.0	1.0	46.0	8.6	0.05676	91.30607	61.62162
	1.00	20.0	44.0	1.0	43.0	9.1	0.04127	85.35133	57.60282
	2.00	20.0	39.0	1.0	38.0	9.9	0.03047	75.42676	50.90481
	5.00	20.0	35.0	1.0	34.0	10.6	0.01990	67.48710	45.54641
	10.00	20.0	32.0	1.0	31.0	11.1	0.01439	61.53235	41.52761
	20.50	20.0	29.0	1.0	28.0	11.5	0.01027	55.57761	37.50881
	60.00	20.0	24.5	1.0	23.5	12.3	0.00619	46.64549	31.48061
	120.00	20.0	21.5	1.5	20.0	12.8	0.00447	39.69829	26.79201
	240.00	20.0	19.5	1.0	18.5	13.1	0.00320	36.72092	24.78261
	488.00	20.0	18.0	1.0	17.0	13.3	0.00226	33.74355	22.77321
	719.00	20.5	17.0	1.0	16.0	13.5	0.00187	31.75863	21.43361
04/28	1490.00	20.0	15.0	1.0	14.0	13.8	0.00132	27.78881	18.75441

COMMENTS: Assume mean particle density is 2.65 g/cc

LABORATORY ANALYSIS PERFORMED BY: L. Simpson
CALCULATIONS MADE BY: L. Simpson
CHECKED BY: D. Hammermeister



USDA PARTICLE SIZE LIMIT CLASSIFICATION

θ_1 = 23.72%	d_{10} = *	d_{50} = 0.030	d_{60} = 0.052	C_u = -	C_c = -
SAMPLE NUMBER		DEPTH	CLASSIFICATION (USDA TEXTURE TRIANGLE)		
5-16		0-46 Ft.	Loam		

DANIEL B. STEPHENS & ASSOCIATES, INC.

WET/DRY SIEVE ANALYSIS DATA

JOB NAME: JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER: 89-L-144
TEST DATE: 04/90
SAMPLE NUMBER: 5-17
DEPTH: 0-34 FT.

TOTAL WEIGHT OF SAMPLE: 168.45 (g)

SIEVE NUMBER	DIAMETER (mm)	WT. RETAINED	CUM WT. RETAINED	WT. PASSING	% PASSING	LOG DIAMETER
4	4.750	0.00	0.00	168.45	100.00	0.677
6	3.350	4.41	4.41	164.04	97.38	0.525
10	2.000	4.19	8.60	159.85	94.89	0.301
16	1.180	4.71	13.31	155.14	92.10	0.072
40	0.425	7.14	20.45	148.00	87.86	-0.372
70	0.212	10.92	31.37	137.08	81.38	-0.674
140	0.106	14.20	45.57	122.88	72.95	-0.975
200	0.075	6.55	52.12	116.33	69.06	-1.125
pan		116.23	168.35	0.10		

d10: -- (mm) d50: 0.016 (mm)
d16: -- (mm) d60: 0.034 (mm)
d30: 0.0037 (mm) d84: 0.28 (mm)

MEDIAN PARTICLE DIAMETER (d50): 0.016
UNIFORMITY COEFFICIENT, Cu (d60/d10): --
COEFFICIENT OF CURVATURE, Cc, [(d30)**2/(d10*d60)]: --
MEAN PARTICLE DIAMETER, [(d16+d50+d84)/3]: --

COMMENTS:

LABORATORY ANALYSIS PERFORMED BY: K. Evans
CALCULATIONS MADE BY: L. Simpson
CHECKED BY: D. Hammermeister

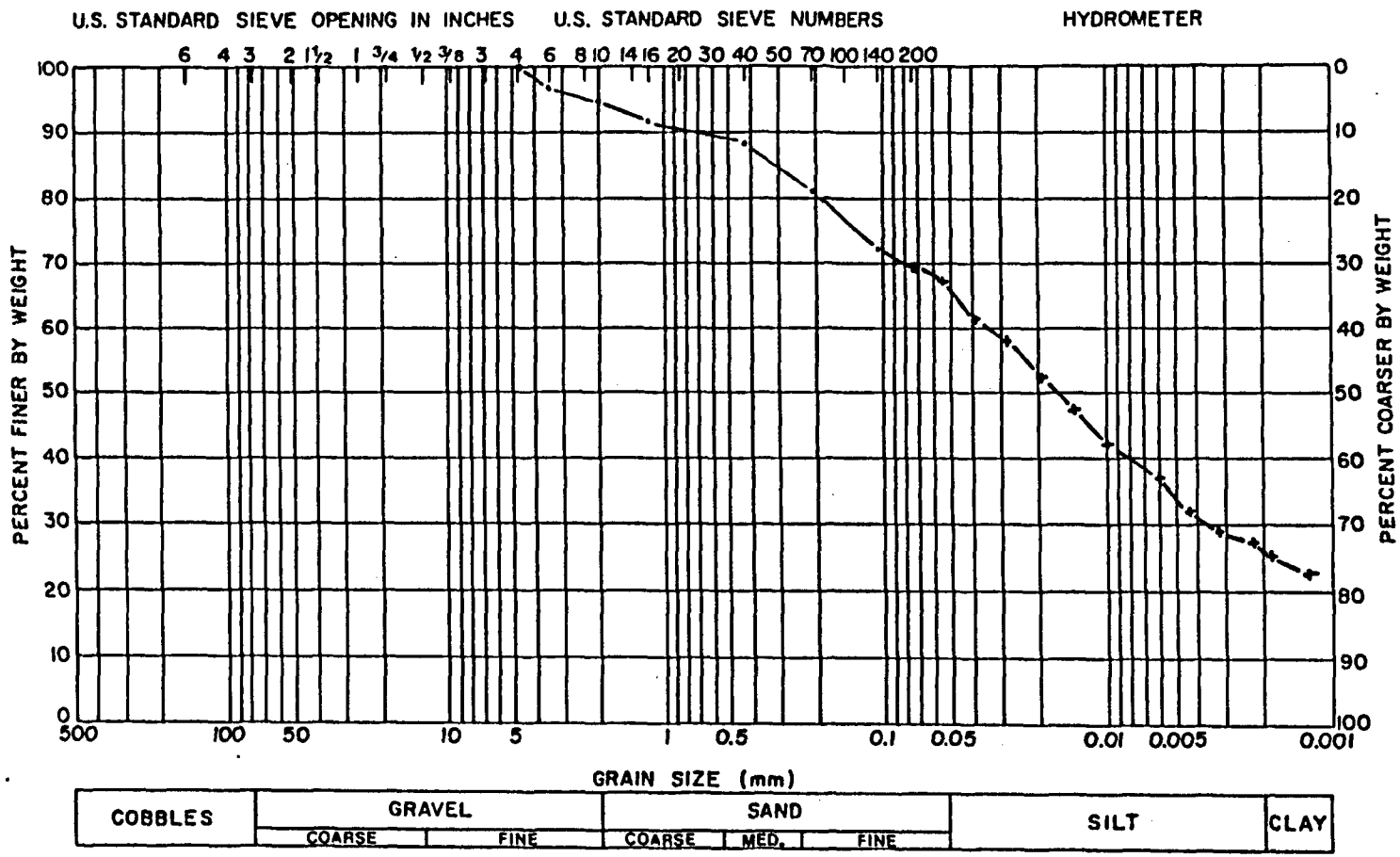
HYDROMETER DATA

JOB NAME:	JACOBS ENGINEERING - WORK ORDER #5	TEST DATE:	04/27/90
JOB NUMBER:	89-L-144	DEPTH:	0-34 FT.
SAMPLE NUMBER:	5-17	INITIAL WT:	52.57 (g)
TYPE OF WATER USED:	DISTILLED	TOTAL SAMPLE WT:	168.45 (g)
REACTION WITH H2O2:	VERY MILD	TOTAL WT PASSING #200:	116.33 (g)
DISPERSANT:	(NaPO3)6	START TIME:	8:54

DATE (1990)	TIME (MIN)	TEMP (C)	R (g/l)	Rl (g/l)	Rcorr (g/l)	L (CM)	D (MM)	P (%)	%FINER
04/27	0.25	20.0	54.0	1.0	53.0	7.4	0.07472	100.81796	69.62394
	0.50	20.0	52.0	1.0	51.0	7.8	0.05399	97.01351	66.99662
	1.00	20.0	48.0	1.0	47.0	8.4	0.03975	89.40460	61.74199
	2.00	20.0	45.0	1.0	44.0	8.9	0.02892	83.69793	57.80101
	5.00	20.0	41.0	1.0	40.0	9.6	0.01895	76.08902	52.54637
	10.00	20.0	37.0	1.0	36.0	10.2	0.01385	68.48012	47.29173
	20.50	20.0	33.5	1.0	32.5	10.8	0.00994	61.82233	42.69393
	60.00	20.0	29.0	1.0	28.0	11.5	0.00601	53.26232	36.78246
	120.00	20.0	26.0	1.5	24.5	12.0	0.00434	46.60453	32.18465
	240.00	20.0	23.0	1.0	22.0	12.5	0.00313	41.84896	28.90050
	483.00	20.0	21.5	1.0	20.5	12.8	0.00223	38.99562	26.93002
	714.00	20.5	20.5	1.0	19.5	12.9	0.00183	37.09340	25.61636
04/28	1485.00	20.0	18.0	1.0	17.0	13.3	0.00130	32.33784	22.33221

COMMENTS: Assume mean particle density is 2.65 g/cc

LABORATORY ANALYSIS PERFORMED BY: L. Simpson
CALCULATIONS MADE BY: L. Simpson
CHECKED BY: D. Hammermeister



USDA PARTICLE SIZE LIMIT CLASSIFICATION

θ_i = 29.04%	d_{10} = *	d_{50} = 0.016	d_{60} = 0.034	C_u = -	C_c = -
SAMPLE NUMBER		DEPTH	CLASSIFICATION (USDA TEXTURE TRIANGLE)		
5-17		0-34 Ft.	Loam		

DANIEL B. STEPHENS & ASSOCIATES, INC.

WET/DRY SIEVE ANALYSIS DATA

JOB NAME: JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER: 89-L-144
TEST DATE: 04/90
SAMPLE NUMBER: 5-18
DEPTH: 0-34 FT.

TOTAL WEIGHT OF SAMPLE: 153.92 (g)

SIEVE NUMBER	DIAMETER (mm)	WT. RETAINED	CUM WT. RETAINED	WT. PASSING	% PASSING	LOG DIAMETER
4	4.750	0.00	0.00	153.92	100.00	0.677
6	3.350	4.56	4.56	149.36	97.04	0.525
10	2.000	4.04	8.60	145.32	94.41	0.301
16	1.180	3.98	12.58	141.34	91.83	0.072
40	0.425	6.11	18.69	135.23	87.86	-0.372
70	0.212	9.52	28.21	125.71	81.67	-0.674
140	0.106	12.73	40.94	112.98	73.40	-0.975
200	0.075	6.12	47.06	106.86	69.43	-1.125
pan		107.09	154.15	-0.23		

d10: -- (mm) d50: 0.017 (mm)
d16: -- (mm) d60: 0.038 (mm)
d30: 0.0032 (mm) d84: 0.26 (mm)

MEDIAN PARTICLE DIAMETER (d50): 0.017
UNIFORMITY COEFFICIENT, Cu (d60/d10): --
COEFFICIENT OF CURVATURE, Cc, [(d30)**2/(d10*d60)]: --
MEAN PARTICLE DIAMETER, [(d16+d50+d84)/3]: --

COMMENTS:

LABORATORY ANALYSIS PERFORMED BY: L. Simpson
CALCULATIONS MADE BY: L. Simpson
CHECKED BY: D. Hammermeister

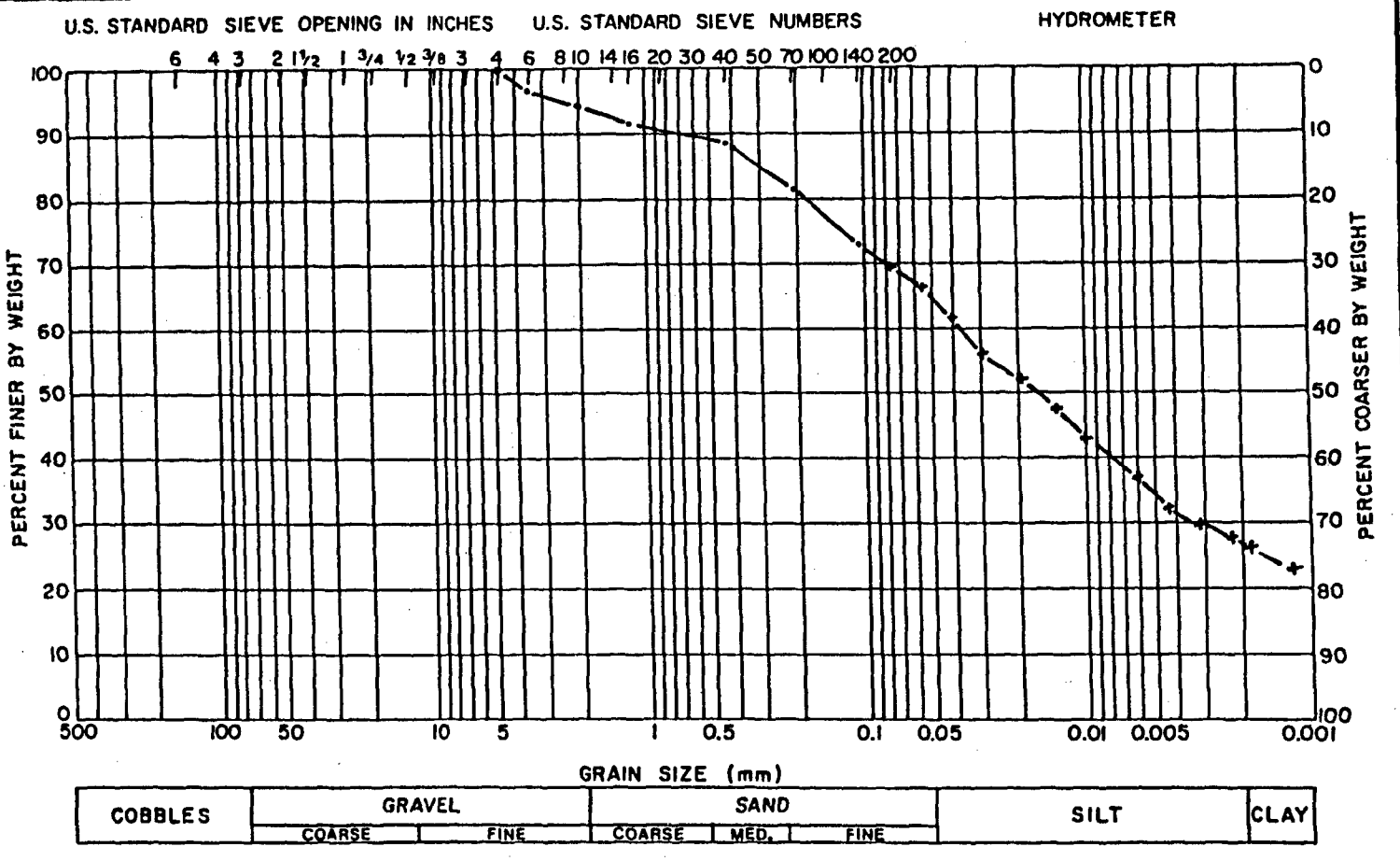
HYDROMETER DATA

JOB NAME:	JACOBS ENGINEERING - WORK ORDER #5	TEST DATE:	04/27/90
JOB NUMBER:	89-L-144	DEPTH:	0-34 FT.
SAMPLE NUMBER:	5-18	INITIAL WT:	50.22 (g)
TYPE OF WATER USED:	DISTILLED	TOTAL SAMPLE WT:	153.92 (g)
REACTION WITH H2O2:	VERY MILD	TOTAL WT PASSING #200:	106.86 (g)
DISPERSANT:	(NaPO3)6	START TIME:	9:00

DATE (1990)	TIME (MIN)	TEMP (C)	R (g/l)	Rl (g/l)	Rcorr (g/l)	L (CM)	D (MM)	P (%)	%FINER
04/27	0.25	20.0	51.0	1.0	50.0	7.9	0.07715	99.56193	69.12154
	0.50	20.0	49.0	1.0	48.0	8.3	0.05567	95.57945	66.35668
	1.00	20.0	46.0	1.0	45.0	8.8	0.04052	89.60573	62.20939
	2.00	20.0	42.0	1.0	41.0	9.4	0.02970	81.64078	56.67966
	5.00	20.0	39.0	1.0	38.0	9.9	0.01927	75.66706	52.53237
	10.00	20.0	35.5	1.0	34.5	10.5	0.01402	68.69773	47.69386
	20.50	20.0	32.0	1.0	31.0	11.1	0.01005	61.72840	42.85536
	60.00	20.0	28.0	1.0	27.0	11.7	0.00605	53.76344	37.32563
	120.00	20.0	25.0	1.5	23.5	12.2	0.00437	46.79411	32.48712
	240.00	20.0	22.5	1.0	21.5	12.6	0.00314	42.81163	29.72226
	478.00	20.0	21.0	1.0	20.0	12.9	0.00225	39.82477	27.64862
	710.00	20.5	20.0	1.0	19.0	13.0	0.00184	37.83353	26.26619
04/28	1480.00	20.0	17.5	1.0	16.5	13.4	0.00130	32.85544	22.81011

COMMENTS: Assume mean particle density is 2.65 g/cc

LABORATORY ANALYSIS PERFORMED BY: L. Simpson
CALCULATIONS MADE BY: L. Simpson
CHECKED BY: D. Hammermeister



USDA PARTICLE SIZE LIMIT CLASSIFICATION

θ_i = 29.16%	d_{10} = *	d_{50} = 0.017	d_{60} = 0.038	C_u = _	C_c = _
SAMPLE NUMBER		DEPTH	CLASSIFICATION (USDA TEXTURE TRIANGLE)		
5-18		0-34 Ft.	Loam		

DANIEL B. STEPHENS & ASSOCIATES, INC.

WET/DRY SIEVE ANALYSIS DATA

JOB NAME: JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER: 89-L-144
TEST DATE: 04/90
SAMPLE NUMBER: 5-19
DEPTH: 0-39 FT.

TOTAL WEIGHT OF SAMPLE: 147.61 (g)

SIEVE NUMBER	DIAMETER (mm)	WT. RETAINED	CUM WT. RETAINED	WT. PASSING	% PASSING	LOG DIAMETER
4	4.750	0.00	0.00	147.61	100.00	0.677
6	3.350	2.63	2.63	144.98	98.22	0.525
10	2.000	3.26	5.89	141.72	96.01	0.301
16	1.180	3.65	9.54	138.07	93.54	0.072
40	0.425	4.59	14.13	133.48	90.43	-0.372
70	0.212	6.91	21.04	126.57	85.75	-0.674
140	0.106	10.68	31.72	115.89	78.51	-0.975
200	0.075	5.14	36.86	110.75	75.03	-1.125
pan		110.79	147.65	-0.04		

d10: -- (mm) d50: 0.010 (mm)
d16: -- (mm) d60: 0.021 (mm)
d30: 0.0018 (mm) d84: 0.20 (mm)

MEDIAN PARTICLE DIAMETER (d50): 0.010
UNIFORMITY COEFFICIENT, Cu (d60/d10): --
COEFFICIENT OF CURVATURE, Cc, [(d30)**2/(d10*d60)]: --
MEAN PARTICLE DIAMETER, [(d16+d50+d84)/3]: --

COMMENTS:

LABORATORY ANALYSIS PERFORMED BY: K. Evans
CALCULATIONS MADE BY: L. Simpson
CHECKED BY: D. Hammermeister

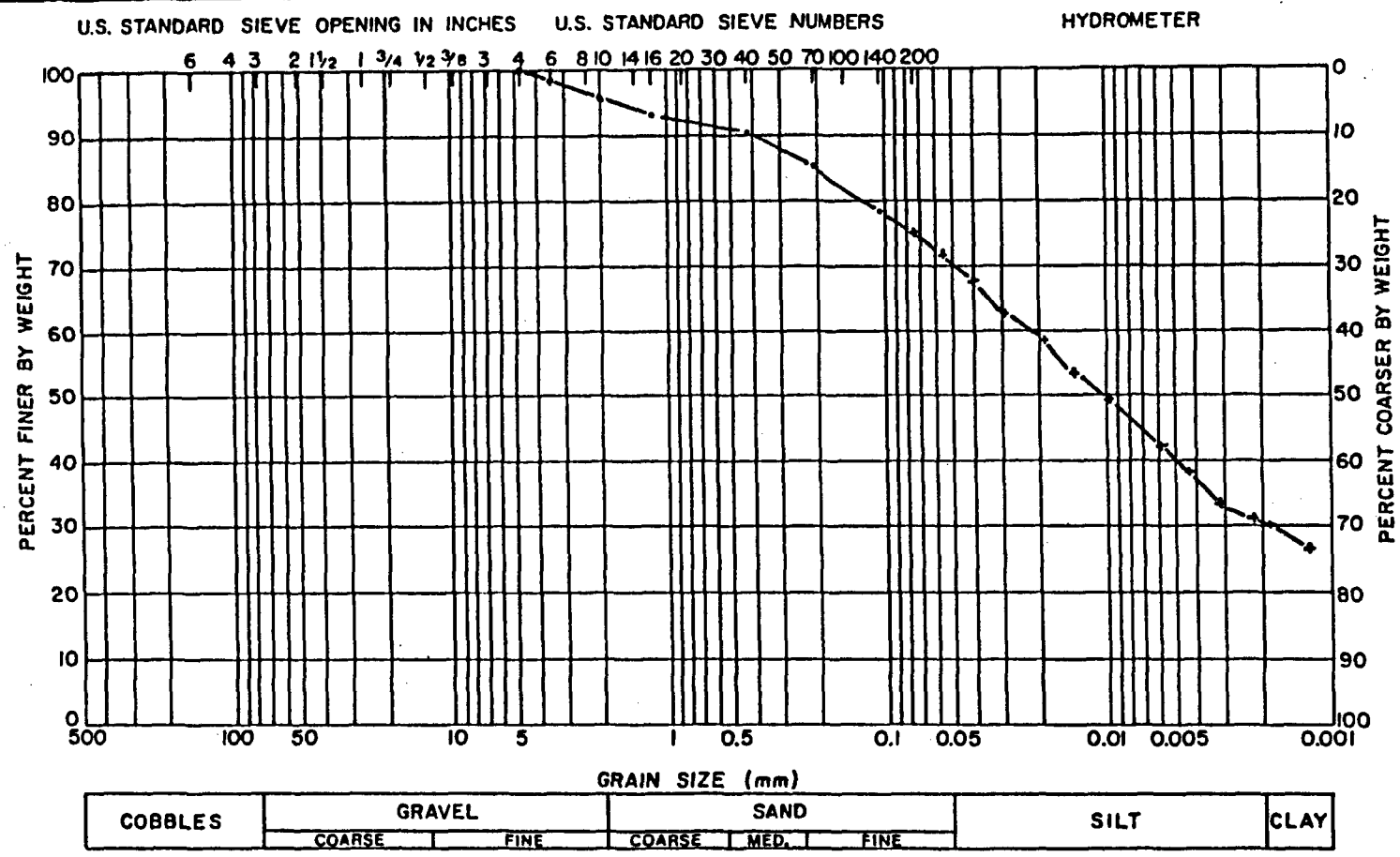
HYDROMETER DATA

JOB NAME:	JACOBS ENGINEERING - WORK ORDER #5	TEST DATE:	04/27/90
JOB NUMBER:	89-L-144	DEPTH:	0-39 FT.
SAMPLE NUMBER:	5-19	INITIAL WT:	51.01 (g)
TYPE OF WATER USED:	DISTILLED	TOTAL SAMPLE WT:	147.61 (g)
REACTION WITH H2O2:	VERY MILD	TOTAL WT PASSING #200:	110.75 (g)
DISPERSANT:	(NaPO3)6	START TIME:	9:06

DATE (1990)	TIME (MIN)	TEMP (C)	R (g/l)	Rl (g/l)	Rcorr (g/l)	L (CM)	D (MM)	P (%)	%FINER
04/27	0.25	20.0	52.0	1.0	51.0	7.8	0.07635	99.98040	75.01408
	0.50	20.0	50.0	1.0	49.0	8.1	0.05511	96.05960	72.07235
	1.00	20.0	47.0	1.0	46.0	8.6	0.04014	90.17840	67.65976
	2.00	20.0	44.0	1.0	43.0	9.1	0.02918	84.29720	63.24717
	5.00	20.0	41.0	1.0	40.0	9.6	0.01895	78.41600	58.83458
	10.00	20.0	37.5	1.0	36.5	10.2	0.01379	71.55460	53.68655
	20.50	20.0	34.5	1.0	33.5	10.6	0.00986	65.67340	49.27396
	60.00	20.0	30.0	1.0	29.0	11.4	0.00596	56.85160	42.65507
	120.00	20.5	27.0	1.5	25.5	11.9	0.00428	49.99020	37.50704
	240.00	20.0	24.0	1.0	23.0	12.4	0.00311	45.08920	33.82988
	473.00	20.0	22.5	1.0	21.5	12.6	0.00224	42.14860	31.62358
	706.00	20.5	21.5	1.0	20.5	12.8	0.00183	40.18820	30.15272
04/28	1475.00	20.0	19.0	1.0	18.0	13.2	0.00129	35.28720	26.47556

COMMENTS: Assume mean particle density is 2.65 g/cc

LABORATORY ANALYSIS PERFORMED BY: L. Simpson
CALCULATIONS MADE BY: L. Simpson
CHECKED BY: D. Hammermeister



USDA PARTICLE SIZE LIMIT CLASSIFICATION

θ_i = 28.26%	d_{10} = *	d_{50} = 0.010	d_{60} = 0.021	C_u = -	C_c = -
SAMPLE NUMBER		DEPTH	CLASSIFICATION (USDA TEXTURE TRIANGLE)		
5-19		0-39 Ft.	Clay Loam		

DANIEL B. STEPHENS & ASSOCIATES, INC.

WET/DRY SIEVE ANALYSIS DATA

JOB NAME: JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER: 89-L-144
TEST DATE: 04/90
SAMPLE NUMBER: 5-20
DEPTH: 0-39 FT.

TOTAL WEIGHT OF SAMPLE: 146.52 (g)

SIEVE NUMBER	DIAMETER (mm)	WT. RETAINED	CUM WT. RETAINED	WT. PASSING	% PASSING	LOG DIAMETER
4	4.750	0.00	0.00	146.52	100.00	0.677
6	3.350	2.83	2.83	143.69	98.07	0.525
10	2.000	2.97	5.80	140.72	96.04	0.301
16	1.180	3.16	8.96	137.56	93.88	0.072
40	0.425	4.67	13.63	132.89	90.70	-0.372
70	0.212	6.75	20.38	126.14	86.09	-0.674
140	0.106	10.73	31.11	115.41	78.77	-0.975
200	0.075	5.30	36.41	110.11	75.15	-1.125
pan		110.09	146.50	0.02		

d10: -- (mm) d50: 0.010 (mm)
d16: -- (mm) d60: 0.021 (mm)
d30: 0.0020 (mm) d84: 0.18 (mm)

MEDIAN PARTICLE DIAMETER (d50): 0.010
UNIFORMITY COEFFICIENT, Cu (d60/d10): --
COEFFICIENT OF CURVATURE, Cc, [(d30)**2/(d10*d60)]: --
MEAN PARTICLE DIAMETER, [(d16+d50+d84)/3]: --

COMMENTS:

LABORATORY ANALYSIS PERFORMED BY: K. Evans
CALCULATIONS MADE BY: L. Simpson
CHECKED BY: D. Hammermeister

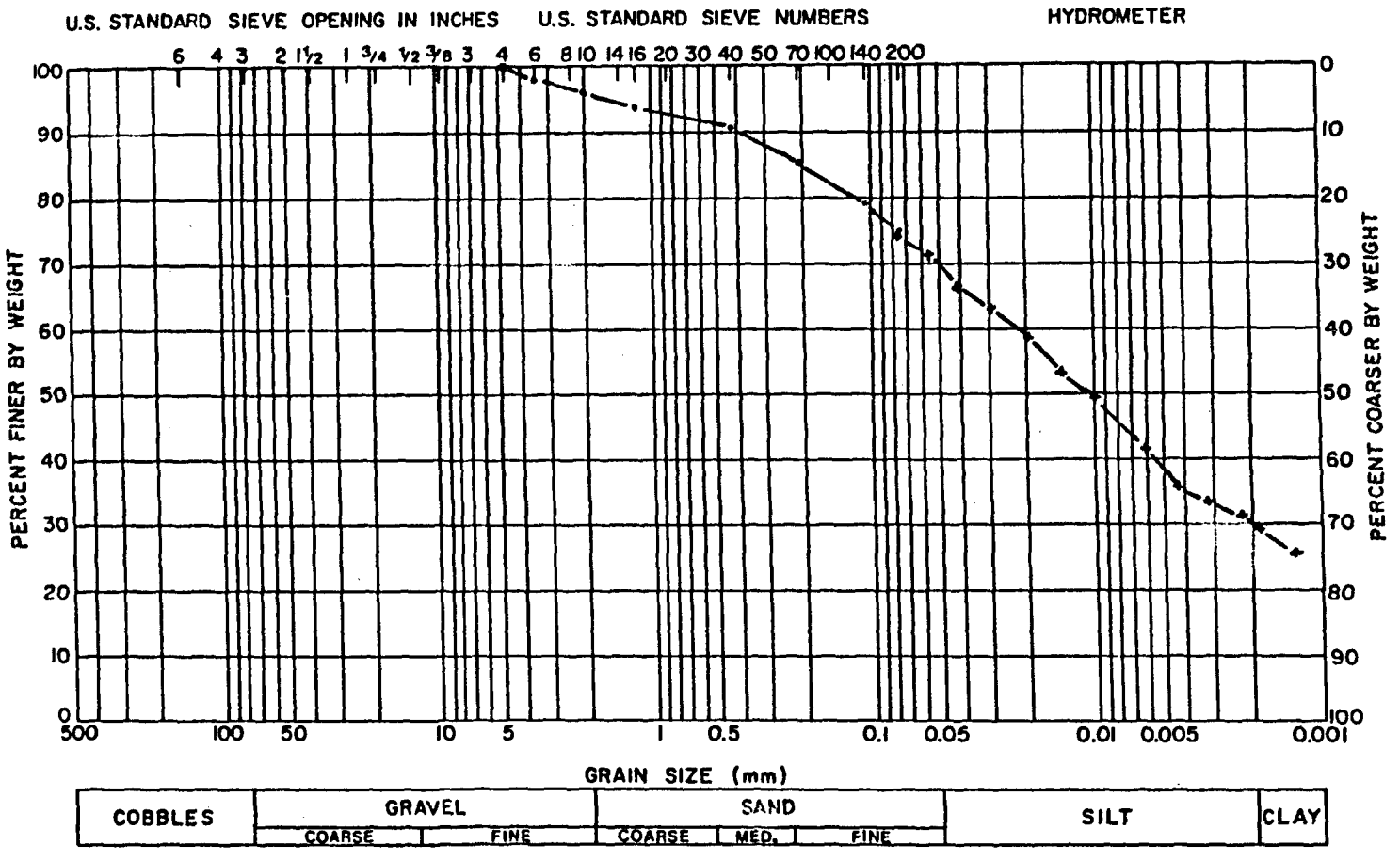
HYDROMETER DATA

JOB NAME:	JACOBS ENGINEERING - WORK ORDER #5	TEST DATE:	04/27/90
JOB NUMBER:	89-L-144	DEPTH:	0-39 FT.
SAMPLE NUMBER:	5-20	INITIAL WT:	49.37 (g)
TYPE OF WATER USED:	DISTILLED	TOTAL SAMPLE WT:	146.52 (g)
REACTION WITH H2O2:	VERY MILD	TOTAL WT PASSING #200:	110.11 (g)
DISPERSANT:	(NaPO3)6	START TIME:	9:12

DATE (1990)	TIME (MIN)	TEMP (C)	R (g/l)	Rl (g/l)	Rcorr (g/l)	L (CM)	D (MM)	P (%)	%FINER
04/27	0.25	20.0	50.0	1.0	49.0	8.1	0.07794	99.25056	74.58694
	0.50	20.0	48.0	1.0	47.0	8.4	0.05622	95.19951	71.54258
	1.00	20.0	45.0	1.0	44.0	8.9	0.04089	89.12295	66.97603
	2.00	20.0	42.5	1.0	41.5	9.3	0.02957	84.05915	63.17057
	5.00	20.0	39.5	1.0	38.5	9.8	0.01919	77.98258	58.60403
	10.00	20.0	36.0	1.0	35.0	10.4	0.01396	70.89326	53.27639
	20.50	20.0	33.5	1.0	32.5	10.8	0.00994	65.82945	49.47093
	60.00	20.0	28.5	1.0	27.5	11.6	0.00603	55.70184	41.86002
	120.00	20.5	25.0	1.5	23.5	12.2	0.00434	47.59976	35.77129
	240.00	20.0	23.0	1.0	22.0	12.5	0.00313	44.56147	33.48802
	468.00	20.0	21.5	1.0	20.5	12.8	0.00226	41.52319	31.20474
	701.00	20.5	20.5	1.0	19.5	12.9	0.00185	39.49767	29.68256
04/28	1470.00	20.0	18.0	1.0	17.0	13.3	0.00130	34.43387	25.87710

COMMENTS: Assume mean particle density is 2.65 g/cc

LABORATORY ANALYSIS PERFORMED BY: L. Simpson
CALCULATIONS MADE BY: L. Simpson
CHECKED BY: D. Hammermeister



USDA PARTICLE SIZE LIMIT CLASSIFICATION

θ_i = 27.92%	d_{10} = *	d_{50} = 0.010	d_{60} = 0.021	C_u = -	C_c = -
SAMPLE NUMBER		DEPTH	CLASSIFICATION (USDA TEXTURE TRIANGLE)		
5-20		0-39 Ft.	Clay Loam		

DANIEL B. STEPHENS & ASSOCIATES, INC.

WET/DRY SIEVE ANALYSIS DATA

JOB NAME: JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER: 89-L-144
TEST DATE: 04/90
SAMPLE NUMBER: 5-21
DEPTH: 0-35 FT.

TOTAL WEIGHT OF SAMPLE: 161.99 (g)

SIEVE NUMBER	DIAMETER (mm)	WT. RETAINED	CUM WT. RETAINED	WT. PASSING	% PASSING	LOG DIAMETER
4	4.750	0.00	0.00	161.99	100.00	0.677
6	3.350	1.76	1.76	160.23	98.91	0.525
10	2.000	2.87	4.63	157.36	97.14	0.301
16	1.180	3.99	8.62	153.37	94.68	0.072
40	0.425	7.43	16.05	145.94	90.09	-0.372
70	0.212	9.76	25.81	136.18	84.07	-0.674
140	0.106	12.06	37.87	124.12	76.62	-0.975
200	0.075	5.88	43.75	118.24	72.99	-1.125
pan		118.06	161.81	0.18		

d10: -- (mm) d50: 0.012 (mm)
d16: -- (mm) d60: 0.025 (mm)
d30: 0.0020 (mm) d84: 0.21 (mm)

MEDIAN PARTICLE DIAMETER (d50): 0.012
UNIFORMITY COEFFICIENT, Cu (d60/d10): --
COEFFICIENT OF CURVATURE, Cc, [(d30)**2/(d10*d60)]: --
MEAN PARTICLE DIAMETER, [(d16+d50+d84)/3]: --

COMMENTS:

LABORATORY ANALYSIS PERFORMED BY: K. Evans
CALCULATIONS MADE BY: L. Simpson
CHECKED BY: D. Hammermeister

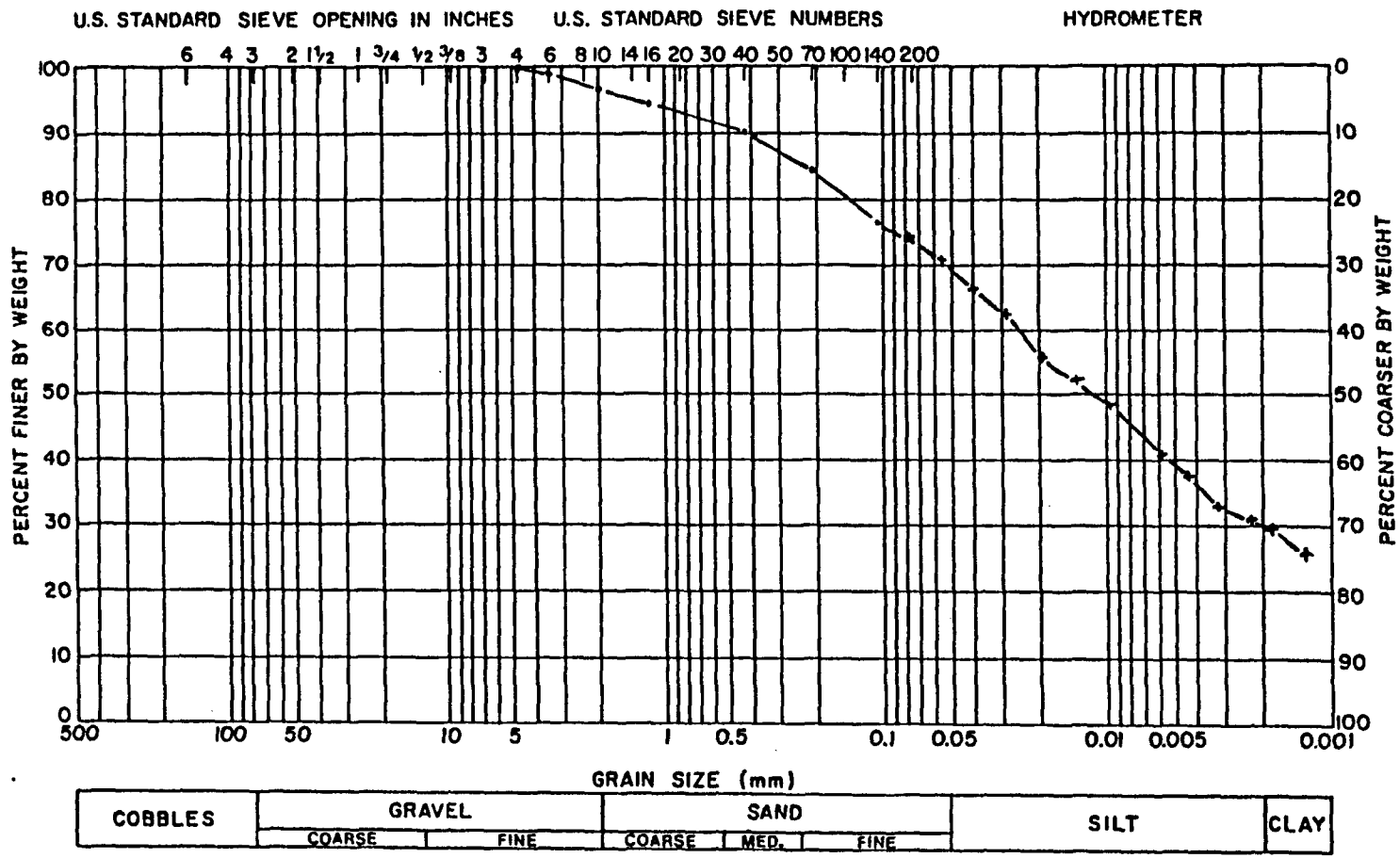
HYDROMETER DATA

JOB NAME:	JACOBS ENGINEERING - WORK ORDER #5	TEST DATE:	04/27/90
JOB NUMBER:	89-L-144	DEPTH:	0-35 FT.
SAMPLE NUMBER:	5-21	INITIAL WT:	50.27 (g)
TYPE OF WATER USED:	DISTILLED	TOTAL SAMPLE WT:	161.99 (g)
REACTION WITH H2O2:	VERY MILD	TOTAL WT PASSING #200:	118.24 (g)
DISPERSANT:	(NaPO3)6	START TIME:	9:18

DATE (1990)	TIME (MIN)	TEMP (C)	R (g/l)	Rl (g/l)	Rcorr (g/l)	L (CM)	D (MM)	P (%)	%FINER
04/27	0.25	20.0	52.0	1.0	51.0	7.8	0.07635	101.45216	74.05212
	0.50	20.0	50.0	1.0	49.0	8.1	0.05511	97.47364	71.14812
	1.00	20.0	47.0	1.0	46.0	8.6	0.04014	91.50587	66.79211
	2.00	20.0	44.0	1.0	43.0	9.1	0.02918	85.53809	62.43610
	5.00	20.0	40.0	1.0	39.0	9.7	0.01911	77.58106	56.62809
	10.00	20.0	37.0	1.0	36.0	10.2	0.01385	71.61329	52.27209
	20.50	20.0	34.5	1.0	33.5	10.6	0.00986	66.64014	48.64208
	60.00	20.0	29.5	1.5	28.0	11.5	0.00598	55.69922	40.65607
	120.00	20.5	27.0	1.5	25.5	11.9	0.00428	50.72608	37.02606
	240.00	20.0	24.0	1.0	23.0	12.4	0.00311	45.75293	33.39605
	463.00	20.0	22.5	1.0	21.5	12.6	0.00226	42.76905	31.21805
	697.00	20.5	21.5	1.0	20.5	12.8	0.00184	40.77979	29.76605
04/28	1465.00	20.0	19.0	1.0	18.0	13.2	0.00130	35.80664	26.13604

COMMENTS: Assume mean particle density is 2.65 g/cc

LABORATORY ANALYSIS PERFORMED BY: L. Simpson
CALCULATIONS MADE BY: L. Simpson
CHECKED BY: D. Hammermeister



USDA PARTICLE SIZE LIMIT CLASSIFICATION

θ_1 = 26.83%	d_{10} = *	d_{50} = 0.012	d_{60} = 0.025	C_u = –	C_c = –
SAMPLE NUMBER		DEPTH	CLASSIFICATION (USDA TEXTURE TRIANGLE)		
5-21		0-35 Ft.	Clay Loam		

DANIEL B. STEPHENS & ASSOCIATES, INC.

WET/DRY SIEVE ANALYSIS DATA

JOB NAME: JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER: 89-L-144
TEST DATE: 04/90
SAMPLE NUMBER: 5-22
DEPTH: 0-35 FT.

TOTAL WEIGHT OF SAMPLE: 154.26 (g)

SIEVE NUMBER	DIAMETER (mm)	WT. RETAINED	CUM WT. RETAINED	WT. PASSING	% PASSING	LOG DIAMETER
4	4.750	0.00	0.00	154.26	100.00	0.677
6	3.350	2.83	2.83	151.43	98.17	0.525
10	2.000	3.63	6.46	147.80	95.81	0.301
16	1.180	4.57	11.03	143.23	92.85	0.072
40	0.425	7.15	18.18	136.08	88.21	-0.372
70	0.212	9.15	27.33	126.93	82.28	-0.674
140	0.106	11.00	38.33	115.93	75.15	-0.975
200	0.075	5.36	43.69	110.57	71.68	-1.125
pan		110.42	154.11	0.15		

d10: -- (mm) d50: 0.013 (mm)
d16: -- (mm) d60: 0.030 (mm)
d30: 0.0023 (mm) d84: 0.30 (mm)

MEDIAN PARTICLE DIAMETER (d50): 0.013
UNIFORMITY COEFFICIENT, Cu (d60/d10): --
COEFFICIENT OF CURVATURE, Cc, [(d30)**2/(d10*d60)]: --
MEAN PARTICLE DIAMETER, [(d16+d50+d84)/3]: --

COMMENTS:

LABORATORY ANALYSIS PERFORMED BY: K. Evans
CALCULATIONS MADE BY: L. Simpson
CHECKED BY: D. Hammermeister

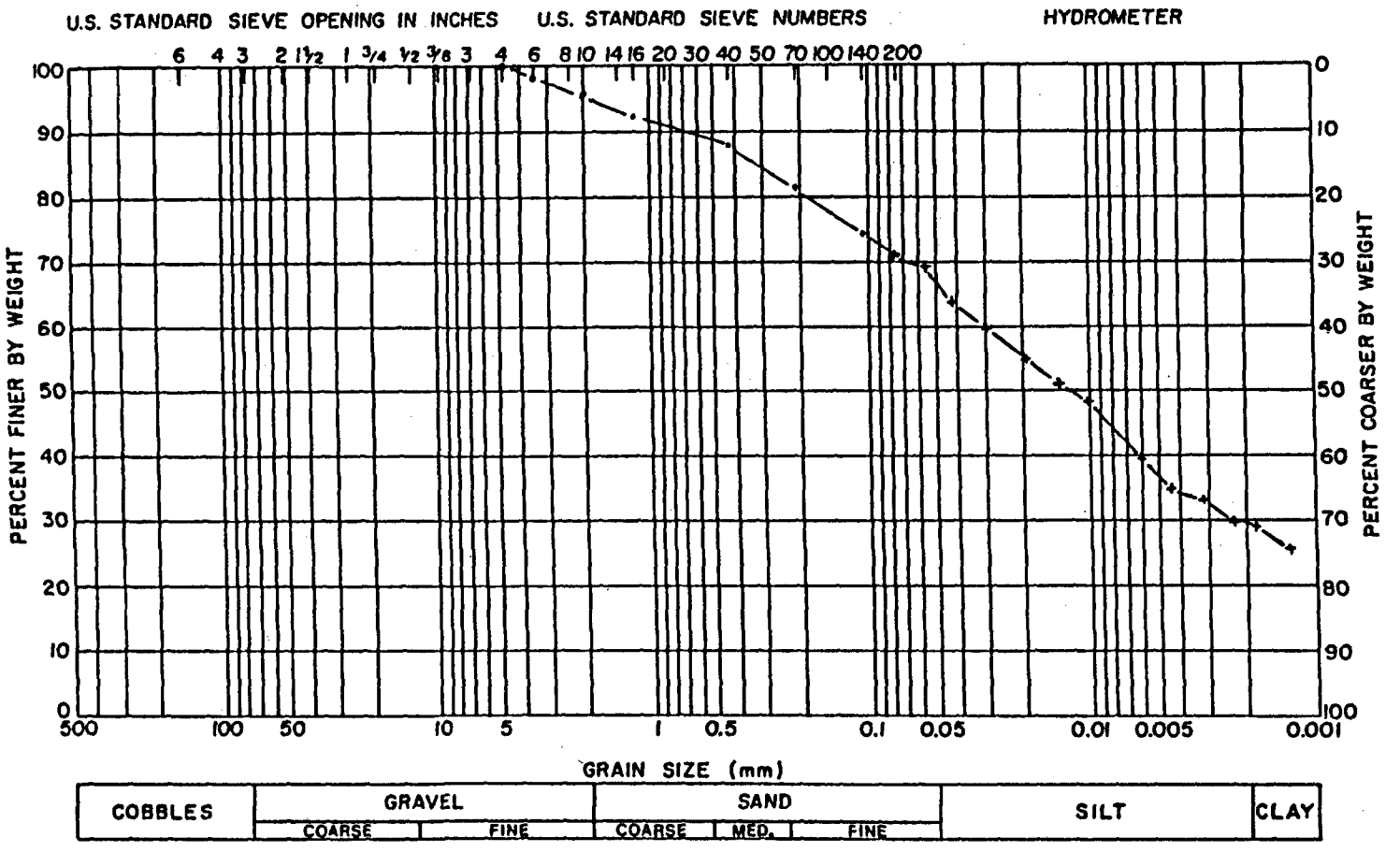
HYDROMETER DATA

JOB NAME:	JACOBS ENGINEERING - WORK ORDER #5	TEST DATE:	04/27/90
JOB NUMBER:	89-L-144	DEPTH:	0-35 FT.
SAMPLE NUMBER:	5-22	INITIAL WT:	47.91 (g)
TYPE OF WATER USED:	DISTILLED	TOTAL SAMPLE WT:	154.26 (g)
REACTION WITH H202:	VERY MILD	TOTAL WT PASSING #200:	110.57 (g)
DISPERSANT:	(NaPO3)6	START TIME:	9:24

DATE (1990)	TIME (MIN)	TEMP (C)	R (g/l)	Rl (g/l)	Rcorr (g/l)	L (CM)	D (MM)	P (%)	%FINER
04/27	0.25	20.0	49.0	1.0	48.0	8.3	0.07873	100.18785	71.81234
	0.50	20.0	47.0	1.0	46.0	8.6	0.05676	96.01336	68.82015
	1.00	20.0	44.0	1.0	43.0	9.1	0.04127	89.75162	64.33188
	2.00	20.0	41.0	1.0	40.0	9.6	0.02996	83.48988	59.84361
	5.00	20.0	38.0	1.0	37.0	10.1	0.01943	77.22814	55.35534
	10.00	20.0	35.0	1.0	34.0	10.6	0.01407	70.96640	50.86707
	20.00	20.0	33.0	1.0	32.0	10.9	0.01010	66.79190	47.87489
	60.00	20.0	28.0	1.5	26.5	11.7	0.00605	55.31204	39.64639
	120.00	20.5	25.0	1.5	23.5	12.2	0.00434	49.05030	35.15812
	240.00	20.0	23.0	1.0	22.0	12.5	0.00313	45.91943	32.91399
	458.00	20.0	21.0	1.0	20.0	12.9	0.00229	41.74494	29.92181
	693.00	20.5	20.5	1.0	19.5	12.9	0.00186	40.70131	29.17376
04/28	1460.00	20.0	18.0	1.0	17.0	13.3	0.00131	35.48320	25.43354

COMMENTS: Assume mean particle density is 2.65 g/cc

LABORATORY ANALYSIS PERFORMED BY: L. Simpson
CALCULATIONS MADE BY: L. Simpson
CHECKED BY: D. Hammermeister



USDA PARTICLE SIZE LIMIT CLASSIFICATION

θ_i = 26.79%	d_{10} = *	d_{50} = 0.013	d_{60} = 0.030	C_u = -	C_c = -
SAMPLE NUMBER		DEPTH	CLASSIFICATION (USDA TEXTURE TRIANGLE)		
5-22		0-35 Ft.	Clay Loam		

DANIEL B. STEPHENS & ASSOCIATES, INC.

WET/DRY SIEVE ANALYSIS DATA

JOB NAME: JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER: 89-L-144
TEST DATE: 04/90
SAMPLE NUMBER: 5-23
DEPTH: 0-44 FT.

TOTAL WEIGHT OF SAMPLE: 147.59 (g)

SIEVE NUMBER	DIAMETER (mm)	WT. RETAINED	CUM WT. RETAINED	WT. PASSING	% PASSING	LOG DIAMETER
4	4.750	0.00	0.00	147.59	100.00	0.677
6	3.350	4.39	4.39	143.20	97.03	0.525
10	2.000	4.21	8.60	138.99	94.17	0.301
16	1.180	4.86	13.46	134.13	90.88	0.072
40	0.425	11.90	25.36	122.23	82.82	-0.372
70	0.212	15.67	41.03	106.56	72.20	-0.674
140	0.106	14.70	55.73	91.86	62.24	-0.975
200	0.075	6.12	61.85	85.74	58.09	-1.125
pan		85.73	147.58	0.01		

d10: -- (mm) d50: 0.043 (mm)
d16: -- (mm) d60: 0.090 (mm)
d30: 0.0070 (mm) d84: 0.52 (mm)

MEDIAN PARTICLE DIAMETER (d50): 0.043
UNIFORMITY COEFFICIENT, Cu (d60/d10): --
COEFFICIENT OF CURVATURE, Cc, [(d30)**2/(d10*d60)]: --
MEAN PARTICLE DIAMETER, [(d16+d50+d84)/3]: --

COMMENTS:

LABORATORY ANALYSIS PERFORMED BY: L. Simpson
CALCULATIONS MADE BY: L. Simpson
CHECKED BY: D. Hammermeister

FALLING HEAD TEST DATA

JOB NAME: JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER: 89-L-144
SAMPLE NUMBER: 5-23
RING NUMBER: T-9
DEPTH: 0-44 FT.
TYPE OF WATER USED: 0.01N CaCl2 SOLUTION
SAMPLE X-SECTION AREA: 18.857 (sq. cm)
STANDPIPE X-SECTION AREA: 0.636 (sq. cm)
SAMPLE LENGTH: 2.5 (cm)

DATE (1990)	TIME (HOURS	DEL T (SEC)	TEMP (C)	RESERVOIR HEAD(CM)	SAMPLE HEAD(CM)	K SAT (CM/SEC)	K SAT @ 20 C (CM/SEC)
TEST # 1:							
02/14 8:39:38			17.5	0.0	82.0		
02/14 9:34:00		3262	17.5	0.0	15.9	4.2E-05	4.5E-05
TEST # 2:							
02/15 8:26:52			18.5	0.0	81.0		
02/15 10:31:00		7448	19.0	0.0	1.8	4.3E-05	4.4E-05

AVERAGE K SAT: 4.4E-05 (CM/SEC)

COMMENTS:

LABORATORY ANALYSIS BY: L. Simpson
CALCULATIONS MADE BY: L. Simpson
CHECKED BY: S. Stoller

FALLING HEAD TEST DATA

JOB NAME: JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER: 89-L-144
SAMPLE NUMBER: 5-24
RING NUMBER: T-10
DEPTH: 0-44 FT.
TYPE OF WATER USED: 0.01N CaCl2 SOLUTION
SAMPLE X-SECTION AREA: 18.857 (sq. cm)
STANDPIPE X-SECTION AREA: 0.636 (sq. cm)
SAMPLE LENGTH: 2.4 (cm)

DATE (1990)	TIME (HOURS	DEL T (SEC)	TEMP (C)	RESERVOIR HEAD(CM)	SAMPLE HEAD(CM)	K SAT (CM/SEC)	K SAT @ 20 C (CM/SEC)
TEST # 1:							
02/13 10:23:15			18.0	0.0	80.0		
02/13 11:21:55		3520	18.0	0.0	19.0	3.3E-05	3.4E-05
TEST # 2:							
02/14 8:40:00			17.5	0.0	82.0		
02/14 9:34:30		3270	17.5	0.0	20.7	3.4E-05	3.6E-05

AVERAGE K SAT: 3.5E-05 (CM/SEC)

COMMENTS:

LABORATORY ANALYSIS BY: L. Simpson
CALCULATIONS MADE BY: L. Simpson
CHECKED BY: S. Stoller

Appendix D: MOISTURE CHARACTERISTICS

Summary of Moisture Characteristics for the Initial Drainage Curve

Sample No.	Pressure Head (-cm of water)	Moisture Content (% cm^3/cm^3)
5-1	0.0	45.66
	112.2	16.49
	305.9	1.98*
	1019.8	6.89
	3059.4	5.19
	7138.6	4.38
	15399.0	3.77
5-2	0.0	45.17
	112.2	20.15
	305.9	8.70
	1019.8	7.04
	3059.4	5.30
	7138.6	4.60
	15399.0	3.66
5-3	0.0	50.36
	112.2	46.27
	305.9	38.91
	1019.8	33.22
	3059.4	25.65
	7138.6	24.33
	15399.0	24.16
5-4	0.0	51.35
	112.2	47.28
	305.9	41.07
	1019.8	34.69
	3059.4	26.20
	7138.6	23.88
	15399.0	17.87
5-5	0.0	47.19
	112.2	30.62
	305.9	25.49
	1019.8	22.00
	3059.4	17.36
	7138.6	16.54
	15399.0	14.28

* measurement error

Summary of Moisture Characteristics
for the Initial Drainage Curve (Continued)

Sample No.	Pressure Head (-cm of water)	Moisture Content (% cm^3/cm^3)
5-6	0.0	46.71
	112.2	32.16
	305.9	26.47
	1019.8	23.21
	3059.4	18.14
	7138.6	16.53
	15399.0	12.98
5-7	0.0	45.06
	112.2	19.37
	305.9	13.09
	1019.8	10.06
	3059.4	7.57
	7138.6	6.87
	15399.0	6.00
5-8	0.0	46.37
	112.2	24.94
	305.9	14.06
	1019.8	10.98
	3059.4	8.33
	7138.6	7.64
	15399.0	5.95
5-9	0.0	42.21
	112.2	20.98
	305.9	17.69
	1019.8	14.98
	3059.4	11.48
	7138.6	10.25
	15399.0	9.31
5-10	0.0	43.90
	112.2	20.28
	305.9	17.45
	1019.8	14.49
	3059.4	11.33
	7138.6	10.27
	15399.0	8.93

Summary of Moisture Characteristics
for the Initial Drainage Curve (Continued)

Sample No.	Pressure Head (-cm of water)	Moisture Content (% cm^3/cm^3)
5-11	0.0	48.34
	112.2	34.35
	305.9	32.49
	1019.8	29.72
	3059.4	22.13
	7138.6	20.60
	15399.0	19.38
5-12	0.0	45.27
	112.2	35.60
	305.9	33.56
	1019.8	31.14
	3059.4	25.80
	7138.6	24.46
	15399.0	24.76
5-13	0.0	46.48
	112.2	37.49
	305.9	35.57
	1019.8	32.68
	3059.4	27.95
	7138.6	26.69
	15399.0	25.77
5-14	0.0	47.39
	112.2	39.10
	305.9	35.24
	1019.8	32.05
	3059.4	26.64
	7138.6	24.20
	15399.0	19.45
5-15	0.0	40.69
	102.0	33.11
	305.9	29.70
	1019.8	26.71
	3059.4	26.09
	7138.6	23.80
	15297.0	23.25

Summary of Moisture Characteristics
for the Initial Drainage Curve (Continued)

Sample No.	Pressure Head (-cm of water)	Moisture Content (% cm^3/cm^3)
5-16	0.0	39.78
	102.0	33.16
	305.9	29.04
	1019.8	25.60
	3059.4	25.50
	7138.6	23.25
	15297.0	22.85
5-17	0.0	37.53
	102.0	33.79
	305.9	31.82
	1019.8	29.36
	3059.4	29.17
	7138.6	27.96
	15297.0	28.00
5-18	0.0	39.84
	102.0	34.27
	305.9	31.93
	1019.8	29.16
	3059.4	28.39
	7138.6	27.35
	15297.0	25.85
5-19	0.0	39.85
	102.0	36.29
	305.9	33.62
	1019.8	30.22
	3059.4	29.38
	7138.6	28.46
	15297.0	27.53
5-20	0.0	39.41
	102.0	36.36
	305.9	33.67
	1019.8	30.29
	3059.4	28.47
	7138.6	26.90
	15297.0	26.50

Summary of Moisture Characteristics
for the Initial Drainage Curve (Continued)

Sample No.	Pressure Head (-cm of water)	Moisture Content (% cm^3/cm^3)
5-21	0.0	36.72
	102.0	35.57
	305.9	33.26
	1019.8	29.91
	3059.4	26.67
	7138.6	25.14
	15297.0	25.05
5-22	0.0	38.92
	102.0	35.11
	305.9	32.76
	1019.8	29.36
	3059.4	28.40
	7138.6	26.67
	15297.0	25.57
5-23	0.0	39.69
	102.0	34.01
	305.9	30.38
	1019.8	27.05
	3059.4	25.37
	7138.6	24.50
	15297.0	23.12
5-24	0.0	37.69
	102.0	33.41
	305.9	30.45
	1019.8	27.55
	3059.4	25.43
	7138.6	24.57
	15297.0	23.33

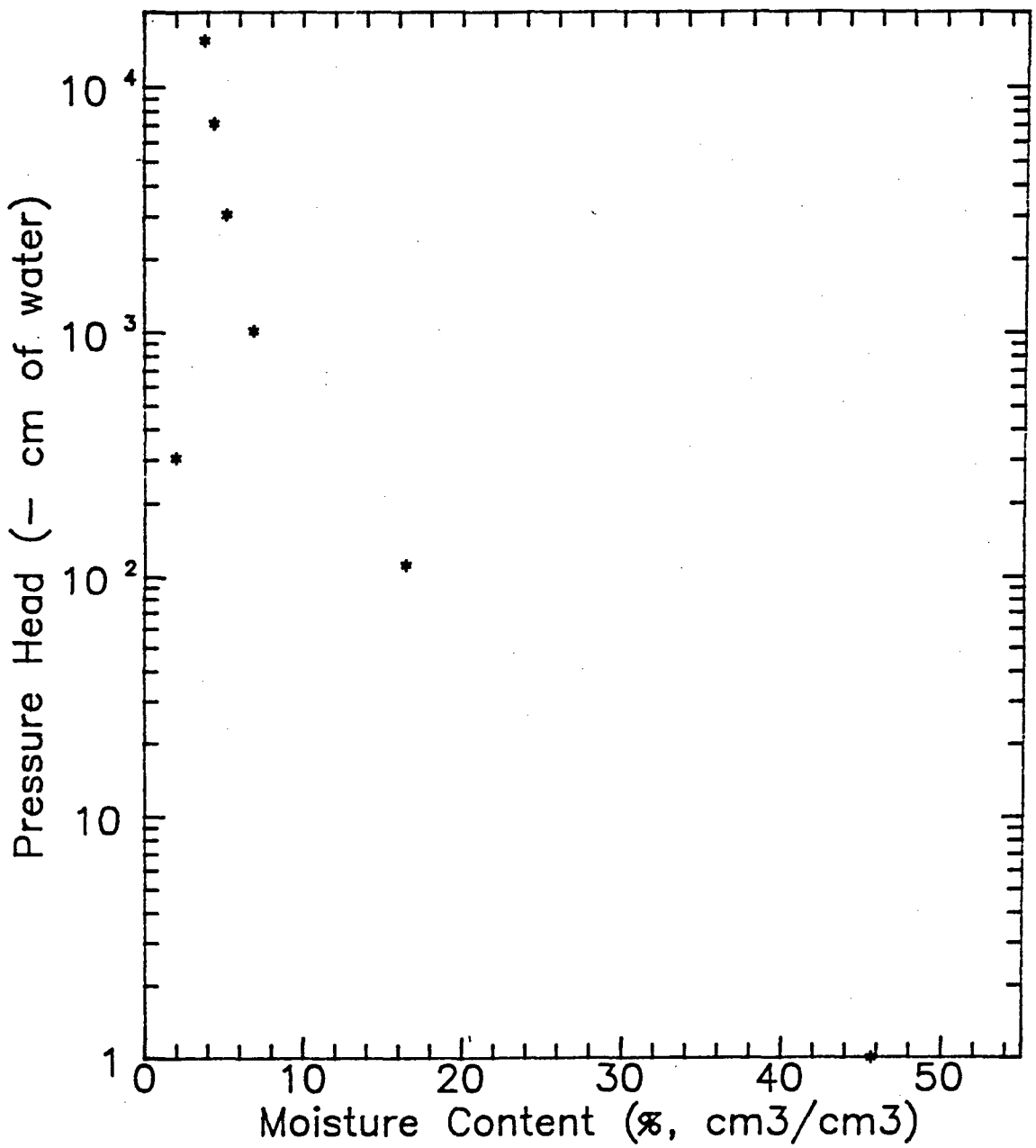
MOISTURE RETENTION DATA - 15 BAR PRESSURE PLATE
(PORE SIZE DISTRIBUTION)

JOB NAME: JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER: 89-L-144
SAMPLE NUMBER: 5-1
RING NUMBER: T-1
DEPTH: UNKNOWN
SAMPLE VOLUME: 35.83 (cc)
SATURATED WEIGHT AT 0 CM TENSION
(WITH CAP AND RING): 105.95 (g)
TARE RING: 29.17 (g)
TARE CAP: 0.00 (g)
DRY WEIGHT OF SAMPLE: 60.42 (g)
SATURATED MOISTURE CONTENT: 45.66 (% vol)
INITIAL VOLUME OF WATER IN SAMPLE: 16.36 (cc)

DATE (1990)	TIME	PRESSURE (BAR)	WEIGHT W/RING(G)	CHANGE WT (G)	CHANGES WT (G)	MOISTURE CONTENT (% VOL)
12/31	0600	0.0	105.95	--	--	45.66
01/04	1525	0.1	95.50	10.45	10.45	16.49
01/10	0915	0.3	90.30	5.20	15.65	1.98
01/15	1615	1.0	92.06	-1.76	13.89	6.89
01/21	1330	3.0	91.45	0.61	14.50	5.19
01/26	0930	7.0	91.16	0.29	14.79	4.38
01/30	1200	15.1	90.94	0.22	15.01	3.77

COMMENTS: Assume density of water is 1.0 g/cc

LABORATORY ANALYSIS PERFORMED BY: L. Simpson
CALCULATION MADE BY: L. Simpson
CHECKED BY: S. Stoller



Pressure Head vs. Moisture Content, Sample No. 5-1

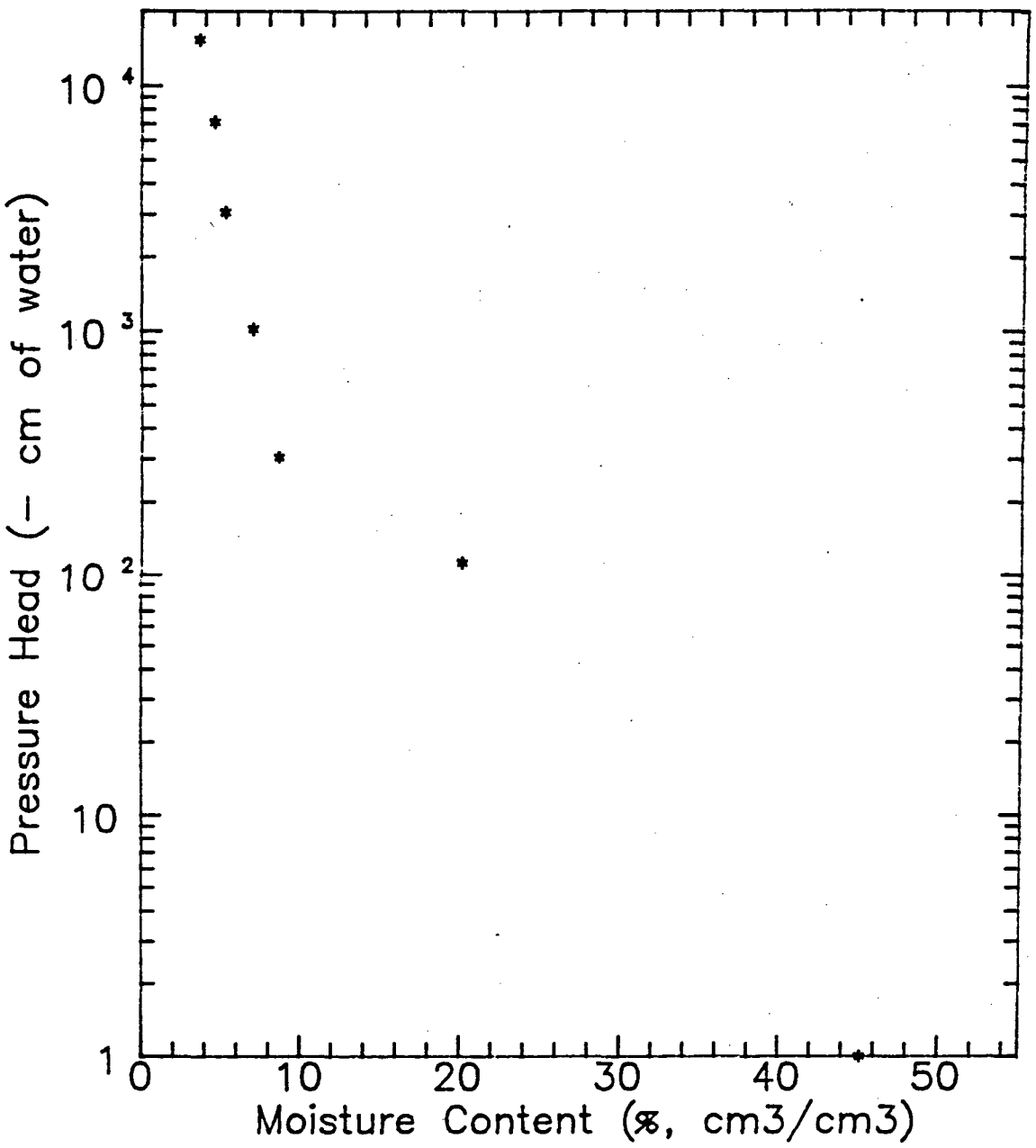
MOISTURE RETENTION DATA - 15 BAR PRESSURE PLATE
(PORE SIZE DISTRIBUTION)

JOB NAME: JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER: 89-L-144
SAMPLE NUMBER: 5-2
RING NUMBER: T-2
DEPTH: UNKNOWN
SAMPLE VOLUME: 41.49 (cc)
SATURATED WEIGHT AT 0 CM TENSION
(WITH CAP AND RING): 112.44 (g)
TARE RING: 28.59 (g)
TARE CAP: 0.00 (g)
DRY WEIGHT OF SAMPLE: 65.11 (g)
SATURATED MOISTURE CONTENT: 45.17 (% vol)
INITIAL VOLUME OF WATER IN SAMPLE: 18.74 (cc)

DATE (1990)	TIME	PRESSURE (BAR)	WEIGHT W/RING(G)	CHANGE WT (G)	CHANGES WT (G)	MOISTURE CONTENT (% VOL)
12/31	0600	0.0	112.44	--	--	45.17
01/04	1525	0.1	102.06	10.38	10.38	20.15
01/10	0915	0.3	97.31	4.75	15.13	8.70
01/15	1615	1.0	96.62	0.69	15.82	7.04
01/21	1330	3.0	95.90	0.72	16.54	5.30
01/26	0930	7.0	95.61	0.29	16.83	4.60
01/30	1200	15.1	95.22	0.39	17.22	3.66

COMMENTS: Assume density of water is 1.0 g/cc

LABORATORY ANALYSIS PERFORMED BY: L. Simpson
CALCULATION MADE BY: L. Simpson
CHECKED BY: S. Stoller



Pressure Head vs. Moisture Content, Sample No. 5-2

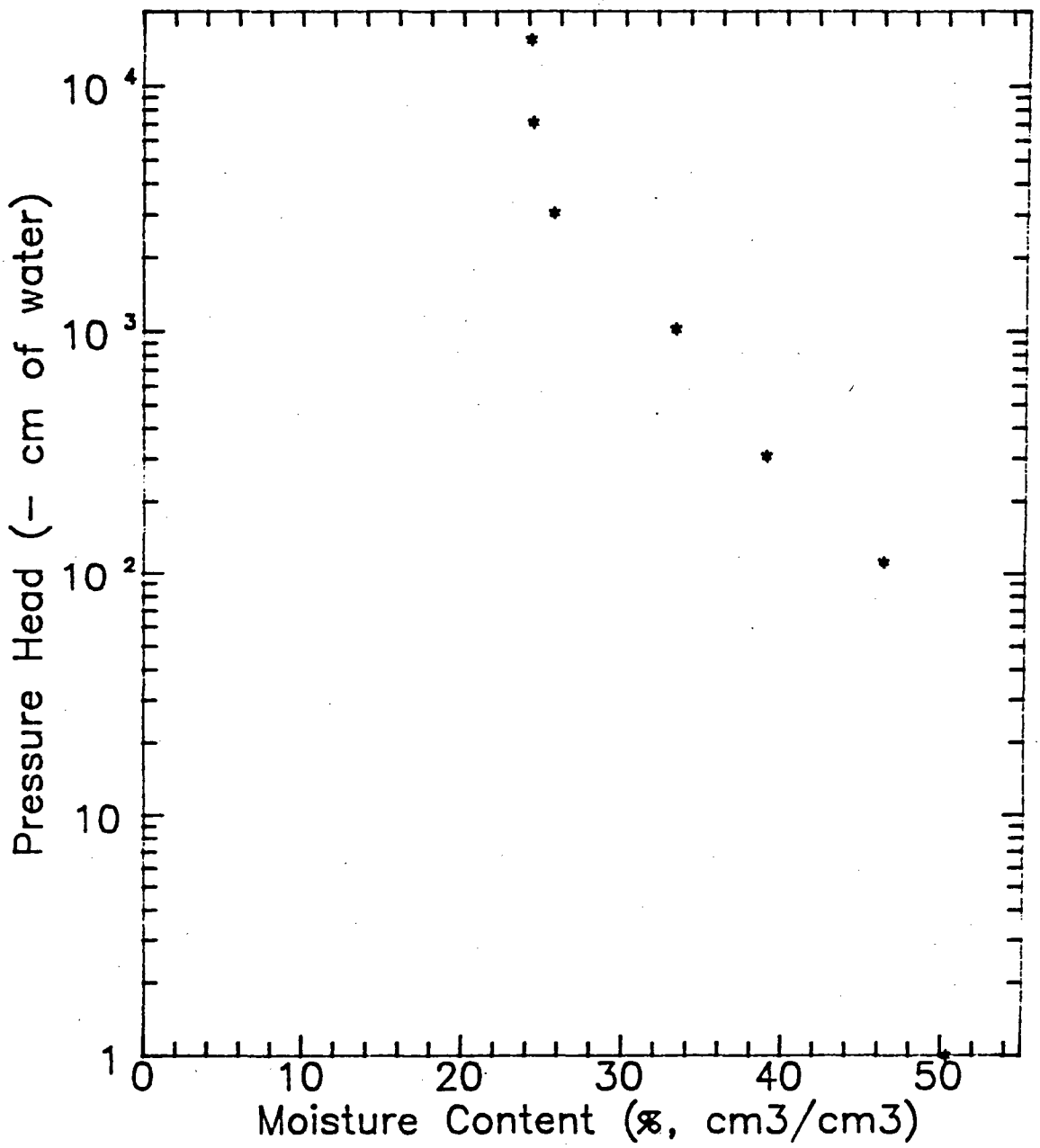
MOISTURE RETENTION DATA - 15 BAR PRESSURE PLATE
(PORE SIZE DISTRIBUTION)

JOB NAME: JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER: 89-L-144
SAMPLE NUMBER: 5-3
RING NUMBER: T-3
DEPTH: UNKNOWN
SAMPLE VOLUME: 47.14 (cc)
SATURATED WEIGHT AT 0 CM TENSION
(WITH CAP AND RING): 120.27 (g)
TARE RING: 30.10 (g)
TARE CAP: 0.00 (g)
DRY WEIGHT OF SAMPLE: 66.43 (g)
SATURATED MOISTURE CONTENT: 50.36 (% vol)
INITIAL VOLUME OF WATER IN SAMPLE: 23.74 (cc)

DATE (1990)	TIME	PRESSURE (BAR)	WEIGHT W/RING(G)	CHANGE WT (G)	CHANGES WT (G)	MOISTURE CONTENT (% VOL)
12/31	0600	0.0	120.27	--	--	50.36
01/04	1525	0.1	118.34	1.93	1.93	46.27
01/10	0915	0.3	114.87	3.47	5.40	38.91
01/15	1615	1.0	112.19	2.68	8.08	33.22
01/21	1330	3.0	108.62	3.57	11.65	25.65
01/26	0930	7.0	108.00	0.62	12.27	24.33
01/30	1200	15.1	107.92	0.08	12.35	24.16

COMMENTS: Assume density of water is 1.0 g/cc

LABORATORY ANALYSIS PERFORMED BY: L. Simpson
CALCULATION MADE BY: L. Simpson
CHECKED BY: S. Stoller



Pressure Head vs. Moisture Content, Sample No. 5–3

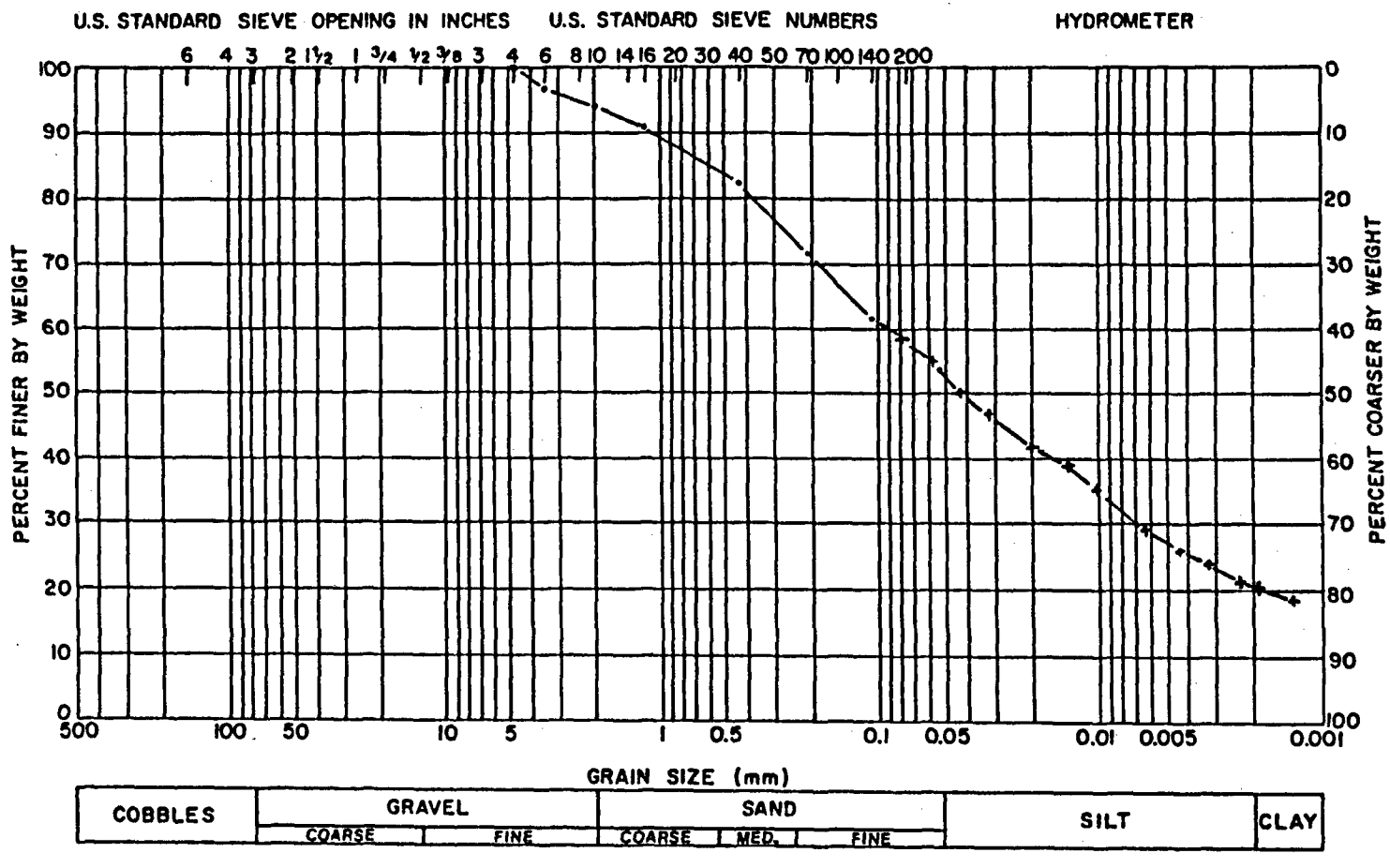
HYDROMETER DATA

JOB NAME:	JACOBS ENGINEERING - WORK ORDER #5	TEST DATE:	04/27/90
JOB NUMBER:	89-L-144	DEPTH:	0-44 FT.
SAMPLE NUMBER:	5-23	INITIAL WT:	44.07 (g)
TYPE OF WATER USED:	DISTILLED	TOTAL SAMPLE WT:	147.59 (g)
REACTION WITH H202:	VERY MILD	TOTAL WT PASSING #200:	85.74 (g)
DISPERSANT:	(NaPO3)6	START TIME:	9:30

DATE (1990)	TIME (MIN)	TEMP (C)	R (g/l)	Rl (g/l)	Rcorr (g/l)	L (CM)	D (MM)	P (%)	%FINER
04/27	0.25	20.0	45.0	1.0	44.0	8.9	0.08179	99.84116	58.00109
	0.50	20.0	43.0	1.0	42.0	9.3	0.05889	95.30293	55.36468
	1.00	20.0	39.0	1.0	38.0	9.9	0.04309	86.22646	50.09185
	2.00	20.0	36.5	1.0	35.5	10.3	0.03109	80.55366	46.79634
	5.00	20.0	33.0	1.0	32.0	10.9	0.02020	72.61175	42.18261
	10.00	20.0	30.5	1.0	29.5	11.3	0.01455	66.93896	38.88710
	20.00	20.0	27.5	1.0	26.5	11.8	0.01051	60.13161	34.93248
	60.00	20.0	23.5	1.5	22.0	12.4	0.00624	49.92058	29.00055
	120.00	20.5	21.0	1.5	19.5	12.9	0.00445	44.24779	25.70503
	240.00	20.0	19.0	1.0	18.0	13.2	0.00321	40.84411	23.72772
	453.00	20.0	17.0	1.0	16.0	13.5	0.00236	36.30588	21.09131
	689.00	20.5	16.5	1.0	15.5	13.6	0.00191	35.17132	20.43220
04/28	1455.00	20.0	15.0	1.0	14.0	13.8	0.00134	31.76764	18.45489

COMMENTS: Assume mean particle density is 2.65 g/cc

LABORATORY ANALYSIS PERFORMED BY: L. Simpson
CALCULATIONS MADE BY: L. Simpson
CHECKED BY: D. Hammermeister



USDA PARTICLE SIZE LIMIT CLASSIFICATION

θ_1 = 27.32%	d_{10} = *	d_{50} = 0.043	d_{60} = 0.090	C_u = -	C_c = -
SAMPLE NUMBER		DEPTH	CLASSIFICATION (USDA TEXTURE TRIANGLE)		
5-23		0-44 Ft.	Loam		

DANIEL B. STEPHENS & ASSOCIATES, INC.

WET/DRY SIEVE ANALYSIS DATA

JOB NAME: JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER: 89-L-144
TEST DATE: 04/90
SAMPLE NUMBER: 5-24
DEPTH: 0-44 FT.

TOTAL WEIGHT OF SAMPLE: 145.74 (g)

SIEVE NUMBER	DIAMETER (mm)	WT. RETAINED	CUM WT. RETAINED	WT. PASSING	% PASSING	LOG DIAMETER
4	4.750	0.00	0.00	145.74	100.00	0.677
6	3.350	2.98	2.98	142.76	97.96	0.525
10	2.000	3.80	6.78	138.96	95.35	0.301
16	1.180	5.41	12.19	133.55	91.64	0.072
40	0.425	11.91	24.10	121.64	83.46	-0.372
70	0.212	15.58	39.68	106.06	72.77	-0.674
140	0.106	14.74	54.42	91.32	62.66	-0.975
200	0.075	5.94	60.36	85.38	58.58	-1.125
pan		85.38	145.74	0.00		

d10: -- (mm) d50: 0.038 (mm)
d16: -- (mm) d60: 0.090 (mm)
d30: 0.0071 (mm) d84: 0.43 (mm)

MEDIAN PARTICLE DIAMETER (d50): 0.038
UNIFORMITY COEFFICIENT, Cu (d60/d10): --
COEFFICIENT OF CURVATURE, Cc, [(d30)**2/(d10*d60)]: --
MEAN PARTICLE DIAMETER, [(d16+d50+d84)/3]: --

COMMENTS:

LABORATORY ANALYSIS PERFORMED BY: K. Evans
CALCULATIONS MADE BY: L. Simpson
CHECKED BY: D. Hammermeister

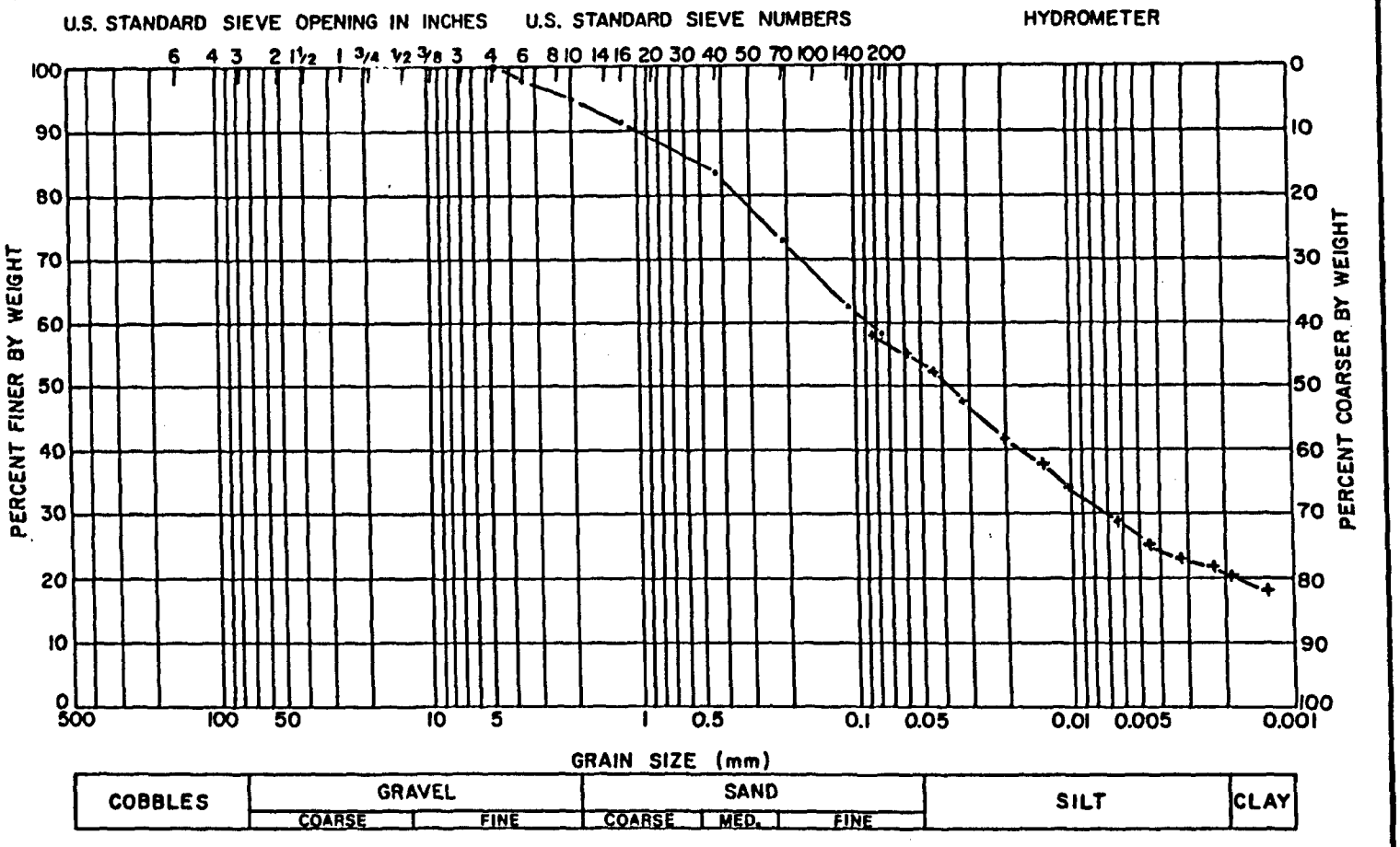
HYDROMETER DATA

JOB NAME:	JACOBS ENGINEERING - WORK ORDER #5	TEST DATE:	04/27/90
JOB NUMBER:	89-L-144	DEPTH:	0-44 FT.
SAMPLE NUMBER:	5-24	INITIAL WT:	43.53 (g)
TYPE OF WATER USED:	DISTILLED	TOTAL SAMPLE WT:	145.74 (g)
REACTION WITH H202:	VERY MILD	TOTAL WT PASSING #200:	85.38 (g)
DISPERSANT:	(NaPO3)6	START TIME:	9:36

DATE (1990)	TIME (MIN)	TEMP (C)	R (g/l)	Rl (g/l)	Rcorr (g/l)	L (CM)	D (MM)	P (%)	%FINER
04/27	0.25	20.0	44.0	1.0	43.0	9.1	0.08254	98.78245	57.87049
	0.50	20.0	42.0	1.0	41.0	9.4	0.05941	94.18792	55.17884
	1.00	20.0	40.0	1.0	39.0	9.7	0.04273	89.59338	52.48719
	2.00	20.0	36.0	1.0	35.0	10.4	0.03122	80.40432	47.10389
	5.00	20.0	32.5	1.0	31.5	11.0	0.02028	72.36389	42.39350
	10.00	20.0	29.0	1.0	28.0	11.5	0.01471	64.32346	37.68311
	20.00	20.0	26.5	1.0	25.5	12.0	0.01058	58.58029	34.31855
	60.00	20.0	23.0	1.5	21.5	12.5	0.00626	49.39122	28.93525
	120.00	20.5	20.0	1.5	18.5	13.0	0.00448	42.49943	24.89777
	240.00	20.0	18.0	1.0	17.0	13.3	0.00323	39.05353	22.87903
	448.00	20.0	17.0	1.0	16.0	13.5	0.00238	36.75626	21.53321
	684.00	20.5	16.0	1.0	15.0	13.7	0.00192	34.45899	20.18738
04/28	1450.00	20.0	14.0	1.0	13.0	14.0	0.00135	29.86446	17.49573

COMMENTS: Assume mean particle density is 2.65 g/cc

LABORATORY ANALYSIS PERFORMED BY: L. Simpson
CALCULATIONS MADE BY: L. Simpson
CHECKED BY: D. Hammermeister



USDA PARTICLE SIZE LIMIT CLASSIFICATION

θ_1 = 26.65%	d_{10} = *	d_{50} = 0.038	d_{60} = 0.090	C_u = -	C_c = -
SAMPLE NUMBER		DEPTH	CLASSIFICATION (USDA TEXTURE TRIANGLE)		
5-24		0-44 Ft.	Loam		

DANIEL B. STEPHENS & ASSOCIATES, INC.

INTRODUCTION

Daniel B. Stephens & Associates, Inc. (DBS&A) was requested by Mr. Augustine Archuleta of Jacobs Engineering Group in Albuquerque, New Mexico to perform laboratory analysis of physical and hydraulic properties outlined in the communication of March 19, 1990 (Subcontract No. 34-6704-S-88-0054, Delivery order 007). The scope of work included the following tasks:

1. Particle Size Analysis (Dry Sieve)
2. Particle Size Analysis (Wet/Dry Sieve and Hydration)

SUMMARY

DBS&A has completed the laboratory analyses of particle size distributions as summarized in Table 1. Tables 2 and 3 summarize the results of these analyses. Raw laboratory data sheets for these analyses are contained in Appendix A and B. Descriptions of the laboratory methods used for these tests are given in Appendix C.

All tailings and vicinity property samples were prepared from composite borehole samples in five gallon containers supplied by Jacobs. Geochem material samples were prepared from composite sample material remaining from Jacobs Delivery Order 003.

Dry sieve analyses were conducted previously on the majority of the samples tested in this present program. These previous dry sieve analyses have been reported in final laboratory reports for Delivery orders 003 and 005. Additional dry sieve analyses as requested in this present Delivery Order (007) are summarized in Table 3. As expected, comparisons of dry sieve analyses with wet/dry sieve analyses for the same samples show significant differences.

All testing results were evaluated subjectively for consistency and reasonableness. The results appear to be reasonably representative of the material tested. However, DBS&A does not assume any responsibility for interpretations or analyses based on the data presented in this report, nor can we guarantee that these data are fully representative of the undisturbed materials at the field site. We recommend that careful evaluation

of these laboratory results be made for your particular application.

Table 1. Summary of Tests Performed

Laboratory Sample No.	JEG Container Identification	Particle Size Distribution		
		Dry Sieve	Wet/Dry Sieve	Hydrometer
Tailings				
5-1 & 2	500 (A)		X	X
5-3 & 4	501 (B)		X	X
5-5 & 6	502 (C)		X	X
5-7 & 8	503 (D)		X	X
5-9 & 10	601		X	X
5-11 & 12	602		X	X
5-13 & 14	603		X	X
604 Composite			X	X
640 Composite			X	X
641 Composite			X	X
642 Composite			X	X
643 Composite			X	X
644 Composite			X	X
645 Composite			X	X
646 Composite			X	X
V-P Materials				
Rs-3		X	X	X
Rs-4			X	X
Rs-5		X	X	X
Rs-6		X	X	X
Rs-7		X	X	X
Rs-8			X	X
Rs-9			X	X
Rs-10		X	X	X
Geochem Materials				
3-1, 2, 3 & 4	GRJ-03 5'-Mancos (-CL, -GC)		X	X
3-5, 6	GRJ-03 5'-Mancos (-CL, -GC) + 10% Mancos Weathered Shale		X	X
3-7, *, 9 & 10	GRJ-03 Topsoil 1'-5'		X	X
3-11 & 12	GRJ-03 Screened Alluvium		X	X
3-13 & 14	GRJ-01 502 (C)		X	X

DANIEL B. STEPHENS & ASSOCIATES, INC.

Table 2. Summary of Particle Size Characteristics

Laboratory Sample No.	d_{10} (mm)	d_{50} (mm)	d_{60} (mm)	C_u	C_c
Tailings					
5-1 & 2	0.072	0.17	0.20	2.78	1.17
5-3 & 4	*	0.040	0.079	--	--
5-5 & 6	*	0.083	0.11	--	--
5-7 & 8	0.0013	0.12	0.18	138.46	47.12
5-9 & 10	0.0080	0.16	0.20	25.00	7.56
5-11 & 12	*	0.041	0.090	--	--
5-13 & 14	0.0023	0.050	0.098	42.61	0.14
604 W	0.0030	0.12	0.16	53.33	13.33
640 Comp	0.0051	0.13	0.16	31.37	8.04
641 Comp	0.059	0.17	0.21	3.56	1.16
642 Comp	0.042	0.17	0.21	5.00	1.63
643 Comp	0.090	0.14	0.18	20.00	3.57
644 Comp	0.020	0.0099	0.021	10.50	0.36
645 Comp	*	0.026	0.073	--	--
646 Comp	0.0060	0.15	0.18	30.00	7.67
VP Materials					
Rs-3	0.0020	0.27	2.4	1200.00	0.27
Rs-4	*	0.043	0.089	--	--
Rs-5	*	0.17	0.80	--	--
Rs-6	*	0.035	0.076	--	--
Rs-7	*	0.037	0.070	--	--
Rs-8	*	0.092	0.22	--	--
Rs-9	*	0.092	0.12	--	--
Rs-10	0.0022	0.40	4.0	1818.18	0.18
Geochem Materials					
3-1, 2, 3 & 4	0.0031	0.33	0.72	232.26	1.61
3-5, 6	*	0.17	0.36	--	--
3-7, 8, 9 & 10	*	0.023	0.051	--	--
3-11 & 12	*	0.16	0.26	--	--
3-13 & 14	0.0015	0.19	0.31	206.67	3.44

* Diameter was not reached with test(s) specified.

-- Values are dependent on diameters that were not reached.

Table 3. Summary of Particle Size Characteristics for Dry Sieve Analyses

Laboratory Sample No.	d_{10} (mm)	d_{50} (mm)	d_{60} (mm)	C_u	C_c
Rs-3	0.13	2.5	4.0	31	1.5
Rs-5	0.090	1.4	1.8	20	1.7
Rs-6	*	0.82	1.2	--	--
Rs-7	0.080	1.2	1.7	21	1.6
Rs-10	0.088	1.6	3.9	44	0.70

APPENDIX A:

WET/DRY SIEVE AND HYDROMETER TEST DATA

Summary of Particle Size Characteristics

Laboratory Sample No.	d_{10} (mm)	d_{50} (mm)	d_{60} (mm)	C_u	C_c
Tailings					
5-1 & 2	0.072	0.17	0.20	2.78	1.17
5-3 & 4	*	0.040	0.079	--	--
5-5 & 6	*	0.083	0.11	--	--
5-7 & 8	0.0013	0.12	0.18	138.46	47.12
5-9 & 10	0.0080	0.16	0.20	25.00	7.56
5-11 & 12	*	0.041	0.090	--	--
5-13 & 14	0.0023	0.050	0.098	42.61	0.14
604 W	0.0030	0.12	0.16	53.33	13.33
640 Comp	0.0051	0.13	0.16	31.37	8.04
641 Comp	0.059	0.17	0.21	3.56	1.16
642 Comp	0.042	0.17	0.21	5.00	1.63
643 Comp	0.090	0.14	0.18	20.00	3.57
644 Comp	0.020	0.0099	0.021	10.50	0.36
645 Comp	*	0.026	0.073	--	--
646 Comp	0.0060	0.15	0.18	30.00	7.67
VP Materials					
Rs-3	0.0020	0.27	2.4	1200.00	0.27
Rs-4	*	0.043	0.089	--	--
Rs-5	*	0.17	0.80	--	--
Rs-6	*	0.035	0.076	--	--
Rs-7	*	0.037	0.070	--	--
Rs-8	*	0.092	0.22	--	--
Rs-9	*	0.092	0.12	--	--
Rs-10	0.0022	0.40	4.0	1818.18	0.18
Geochem Materials					
3-1, 2, 3 & 4	0.0031	0.33	0.72	232.26	1.61
3-5, 6	*	0.17	0.36	--	--
3-7, 8, 9 & 10	*	0.023	0.051	--	--
3-11 & 12	*	0.16	0.26	--	--
3-13 & 14	0.0015	0.19	0.31	206.67	3.44

* Diameter was not reached with test(s) specified.

-- Values are dependent on diameters that were not reached.

WET/DRY SIEVE ANALYSIS DATA

JOB NAME: JACOBS ENGINEERING - WORK ORDER #7
JOB NUMBER: 90-L-030
TEST DATE: 03/22/90
SAMPLE NUMBER: 5-1&2
DEPTH: N/A

TOTAL WEIGHT OF SAMPLE: 145.39 (g)

SIEVE NUMBER	DIAMETER (mm)	WT. RETAINED	CUM WT. RETAINED	WT. PASSING	% PASSING	LOG DIAMETER
4	4.750	0.00	0.00	145.39	100.00	0.677
6	3.350	0.30	0.30	145.09	99.79	0.525
10	2.000	0.06	0.36	145.03	99.75	0.301
16	1.180	0.23	0.59	144.80	99.59	0.072
40	0.425	3.96	4.55	140.84	96.87	-0.372
70	0.212	48.50	53.05	92.34	63.51	-0.674
140	0.106	62.35	115.40	29.99	20.63	-0.975
200	0.075	13.47	128.87	16.52	11.36	-1.125
pan		16.57	145.44	-0.05		

d10: 0.072 (mm) d50: 0.17 (mm)
d16: 0.090 (mm) d60: 0.20 (mm)
d30: 0.13 (mm) d84: 0.33 (mm)

MEDIAN PARTICLE DIAMETER (d50): 0.17
UNIFORMITY COEFFICIENT, Cu (d60/d10): 2.78
COEFFICIENT OF CURVATURE, Cc, [(d30)**2/(d10*d60)]: 1.17
MEAN PARTICLE DIAMETER,. [(d16+d50+d84)/3]: 0.20

COMMENTS:

LABORATORY ANALYSIS PERFORMED BY: L. Simpson
CALCULATIONS MADE BY: L. Simpson
CHECKED BY: D. Hammermeister

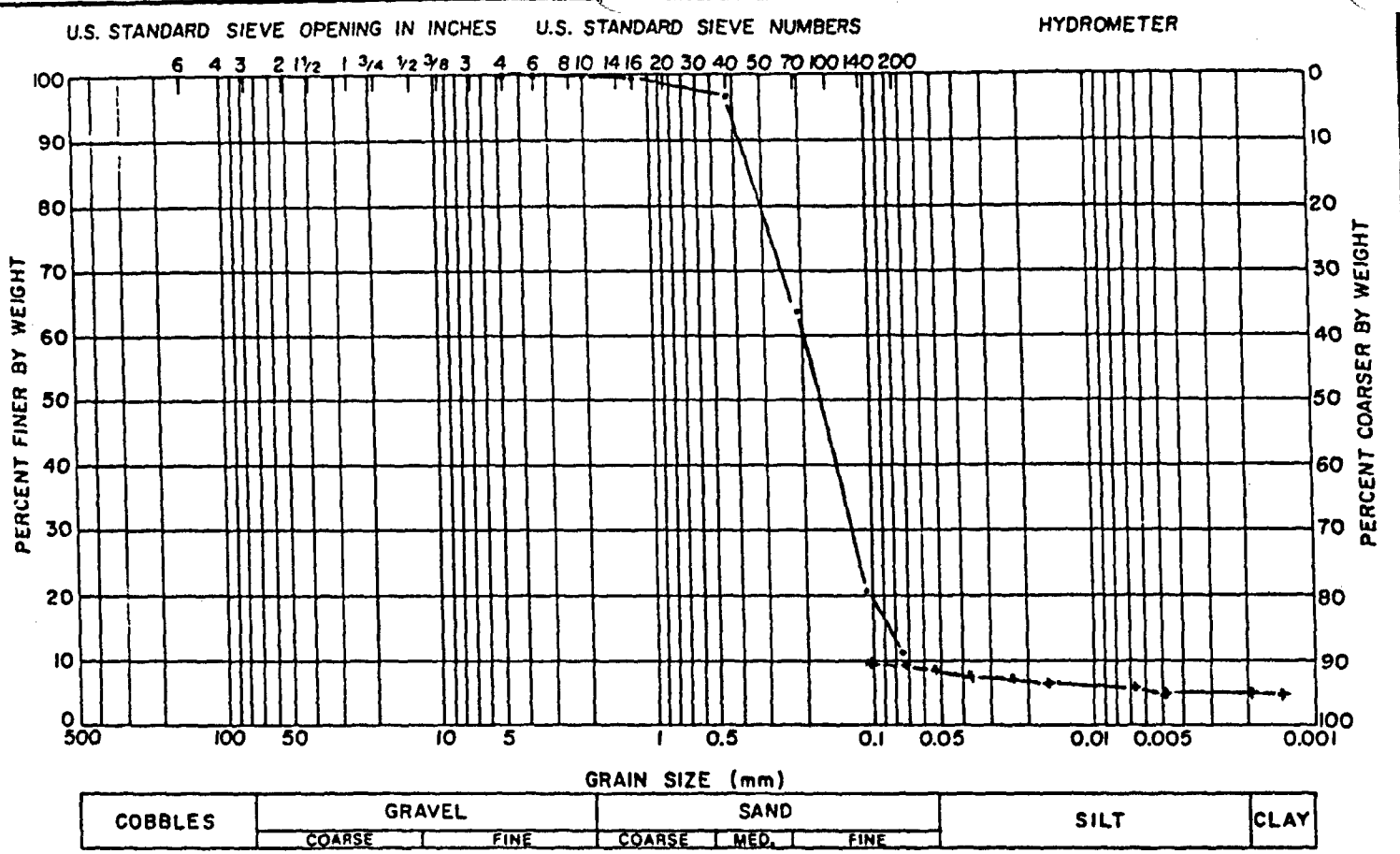
HYDROMETER DATA

JOB NAME:	JACOBS ENGINEERING - WORK ORDER #7	TEST DATE:	04/02/90
JOB NUMBER:	90-L-030	DEPTH:	N/A
SAMPLE NUMBER:	5-1&2	INITIAL WT:	16.66 (g)
TYPE OF WATER USED:	DISTILLED	TOTAL SAMPLE WT:	145.39 (g)
REACTION WITH H2O2:	NONE	TOTAL WT PASSING #200:	16.52 (g)
DISPERSANT:	(NaPO3)6	START TIME:	9:08

DATE (1990)	TIME (MIN)	TEMP (C)	R (g/l)	Rl (g/l)	Rcorr (g/l)	L (CM)	D (MM)	P (%)	%FINER
04/02	0.25	19.0	15.5	1.0	14.5	13.8	0.10275	87.03481	9.88937
	0.50	19.0	15.0	1.0	14.0	13.8	0.07287	84.03361	9.54835
	1.00	19.0	13.0	1.0	12.0	14.2	0.05213	72.02881	8.18430
	2.00	19.0	11.5	1.0	10.5	14.4	0.03718	63.02521	7.16127
	5.00	19.0	11.0	1.0	10.0	14.5	0.02358	60.02401	6.82025
	10.00	19.0	10.0	1.0	9.0	14.7	0.01677	54.02161	6.13823
	20.00	19.0	10.0	1.0	9.0	14.7	0.01186	54.02161	6.13823
	60.00	19.0	9.0	1.0	8.0	14.8	0.00688	48.01921	5.45620
	120.00	19.0	8.0	1.0	7.0	15.0	0.00489	42.01681	4.77418
	240.00	19.0	8.0	1.0	7.0	15.0	0.00346	42.01681	4.77418
	462.00	19.0	8.0	1.0	7.0	15.0	0.00249	42.01681	4.77418
	747.00	19.0	8.0	1.0	7.0	15.0	0.00196	42.01681	4.77418
04/03	1397.00	19.0	7.0	1.0	6.0	15.2	0.00144	36.01441	4.09215

COMMENTS: Assume mean particle density is 2.65 g/cc

LABORATORY ANALYSIS PERFORMED BY: M. Burkhard
CALCULATIONS MADE BY: L. Simpson
CHECKED BY: D. Hammermeister



USDA PARTICLE SIZE LIMIT CLASSIFICATION

θ_1 = -	d_{10} = 0.072	d_{50} = 0.17	d_{60} = 0.20	C_u = 2.8	C_c = 1.2
SAMPLE NUMBER		DEPTH	CLASSIFICATION (USDA TEXTURE TRIANGLE)		
5-1 & 5-2		N/A	Sand		

DANIEL B. STEPHENS & ASSOCIATES, INC.

WET/DRY SIEVE ANALYSIS DATA

JOB NAME: JACOBS ENGINEERING - WORK ORDER #7
JOB NUMBER: 90-L-030
TEST DATE: 03/22/90
SAMPLE NUMBER: 5-3&4
DEPTH: N/A

TOTAL WEIGHT OF SAMPLE: 139.11 (g)

SIEVE NUMBER	DIAMETER (mm)	WT. RETAINED	CUM WT. RETAINED	WT. PASSING	% PASSING	LOG DIAMETER
4	4.750	0.00	0.00	139.11	100.00	0.677
6	3.350	0.29	0.29	138.82	99.79	0.525
10	2.000	0.28	0.57	138.54	99.59	0.301
16	1.180	0.21	0.78	138.33	99.44	0.072
40	0.425	1.16	1.94	137.17	98.61	-0.372
70	0.212	8.20	10.14	128.97	92.71	-0.674
140	0.106	29.13	39.27	99.84	71.77	-0.975
200	0.075	13.25	52.52	86.59	62.25	-1.125
pan		86.54	139.06	0.05		

d10: -- (mm) d50: 0.040 (mm)
d16: 0.0014 (mm) d60: 0.079 (mm)
d30: 0.0063 (mm) d84: 0.16 (mm)

MEDIAN PARTICLE DIAMETER (d50): 0.040
UNIFORMITY COEFFICIENT, Cu (d60/d10): --
COEFFICIENT OF CURVATURE, Cc, [(d30)**2/(d10*d60)]: --
MEAN PARTICLE DIAMETER, [(d16+d50+d84)/3]: 0.07

COMMENTS:

LABORATORY ANALYSIS PERFORMED BY: L. Simpson
CALCULATIONS MADE BY: L. Simpson
CHECKED BY: D. Hammermeister

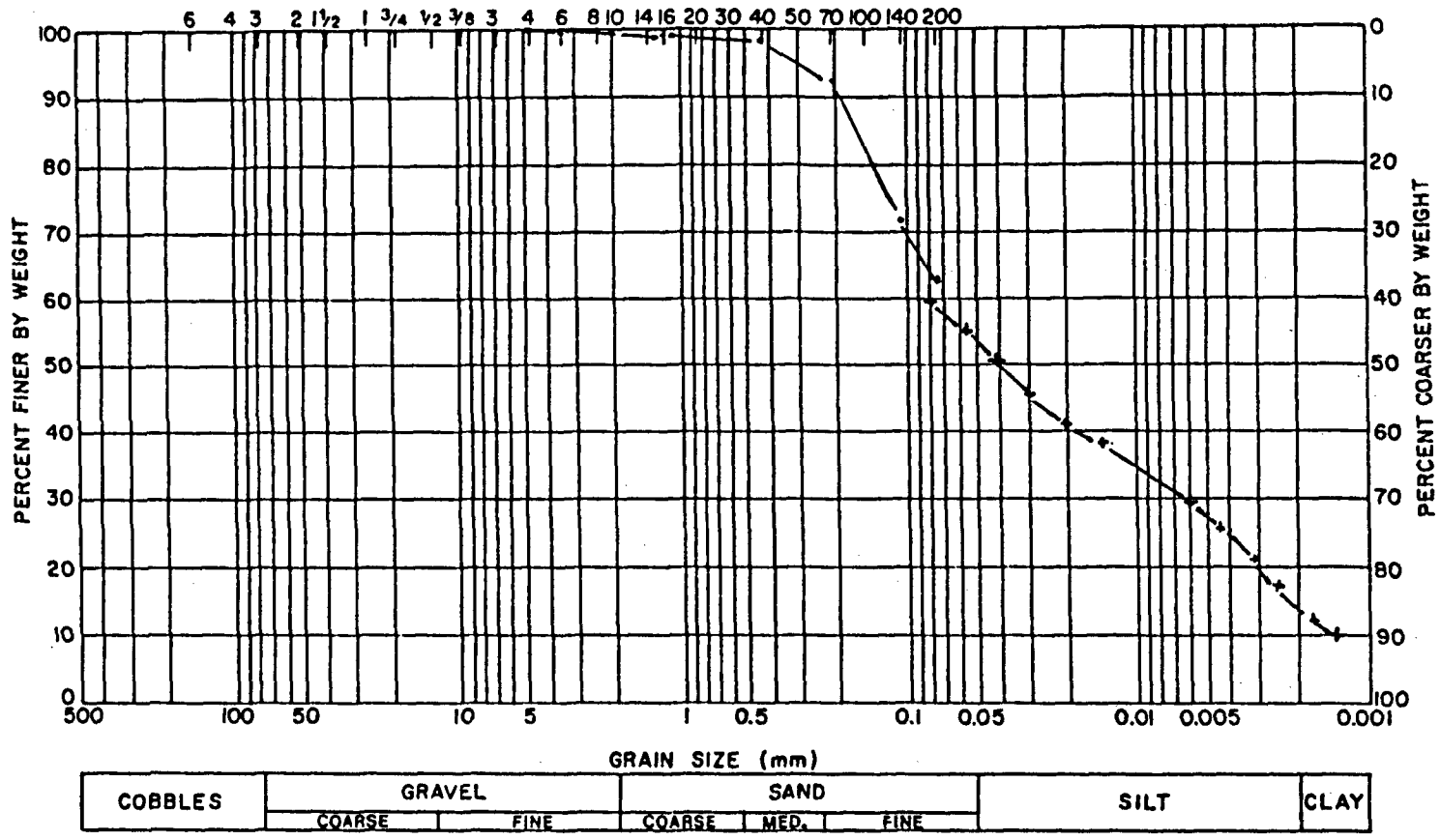
HYDROMETER DATA

JOB NAME:	JACOBS ENGINEERING - WORK ORDER #7	TEST DATE:	03/30/90
JOB NUMBER:	90-L-030	DEPTH:	N/A
SAMPLE NUMBER:	5-3&4	INITIAL WT:	49.62 (g)
TYPE OF WATER USED:	DISTILLED	TOTAL SAMPLE WT:	139.11 (g)
REACTION WITH H2O2:	NONE	TOTAL WT PASSING #200:	86.59 (g)
DISPERSANT:	(NaPO3)6	START TIME:	10:09

DATE (1990)	TIME (MIN)	TEMP (C)	R (g/l)	Rl (g/l)	Rcorr (g/l)	L (CM)	D (MM)	P (%)	%FINER
03/30	0.25	19.0	51.0	3.5	47.5	7.9	0.07805	95.72753	59.58628
	0.50	19.0	47.5	3.5	44.0	8.5	0.05715	88.67392	55.19571
	1.00	19.0	44.5	3.5	41.0	9.0	0.04156	82.62797	51.43236
	2.00	19.0	40.5	3.5	37.0	9.7	0.03044	74.56671	46.41457
	5.00	19.0	35.5	3.5	32.0	10.5	0.02005	64.49012	40.14233
	10.00	19.0	33.0	2.5	30.5	10.9	0.01445	61.46715	38.26066
	20.00	19.0	30.0	2.5	27.5	11.4	0.01045	55.42120	34.49732
	60.00	19.0	26.0	2.5	23.5	12.0	0.00620	47.35994	29.47953
	120.00	18.5	22.5	3.0	19.5	12.6	0.00452	39.29867	24.46173
	240.00	18.5	19.5	3.0	16.5	13.1	0.00325	33.25272	20.69839
	383.00	19.0	17.0	3.0	14.0	13.5	0.00260	28.21443	17.56227
03/31	881.00	19.0	13.0	3.0	10.0	14.2	0.00176	20.15316	12.54448
	1503.00	19.0	11.0	3.0	8.0	14.5	0.00136	16.12253	10.03558

COMMENTS: Assume mean particle density is 2.65 g/cc

LABORATORY ANALYSIS PERFORMED BY: M. Burkhard
CALCULATIONS MADE BY: L. Simpson
CHECKED BY: D. Hammermeister



USDA PARTICLE SIZE LIMIT CLASSIFICATION

θ_1 = -	d_{10} = --	d_{50} = 0.040	d_{60} = 0.079	C_u = --	C_c = --
SAMPLE NUMBER		DEPTH	CLASSIFICATION (USDA TEXTURE TRIANGLE)		
5-3 & 5-4		N/A	Loam		

DANIEL B. STEPHENS & ASSOCIATES, INC.

WET/DRY SIEVE ANALYSIS DATA

JOB NAME: JACOBS ENGINEERING - WORK ORDER #7
JOB NUMBER: 90-L-030
TEST DATE: 03/23/90
SAMPLE NUMBER: 5-5&6
DEPTH: N/A

TOTAL WEIGHT OF SAMPLE: 145.13 (g)

SIEVE NUMBER	DIAMETER (mm)	WT. RETAINED	CUM WT. RETAINED	WT. PASSING	% PASSING	LOG DIAMETER
4	4.750	0.00	0.00	145.13	100.00	0.677
6	3.350	1.53	1.53	143.60	98.95	0.525
10	2.000	0.87	2.40	142.73	98.35	0.301
16	1.180	1.01	3.41	141.72	97.65	0.072
40	0.425	5.48	8.89	136.24	93.87	-0.372
70	0.212	22.96	31.85	113.28	78.05	-0.674
140	0.106	32.08	63.93	81.20	55.95	-0.975
200	0.075	13.49	77.42	67.71	46.65	-1.125
pan		67.68	145.10	0.03		

d10: -- (mm) d50: 0.083 (mm)
d16: 0.0023 (mm) d60: 0.11 (mm)
d30: 0.019 (mm) d84: 0.28 (mm)

MEDIAN PARTICLE DIAMETER (d50): 0.083
UNIFORMITY COEFFICIENT, Cu (d60/d10): --
COEFFICIENT OF CURVATURE, Cc, [(d30)**2/(d10*d60)]: --
MEAN PARTICLE DIAMETER, [(d16+d50+d84)/3]: 0.12

COMMENTS:

LABORATORY ANALYSIS PERFORMED BY: M. Burkhard
CALCULATIONS MADE BY: L. Simpson
CHECKED BY: D. Hammermeister

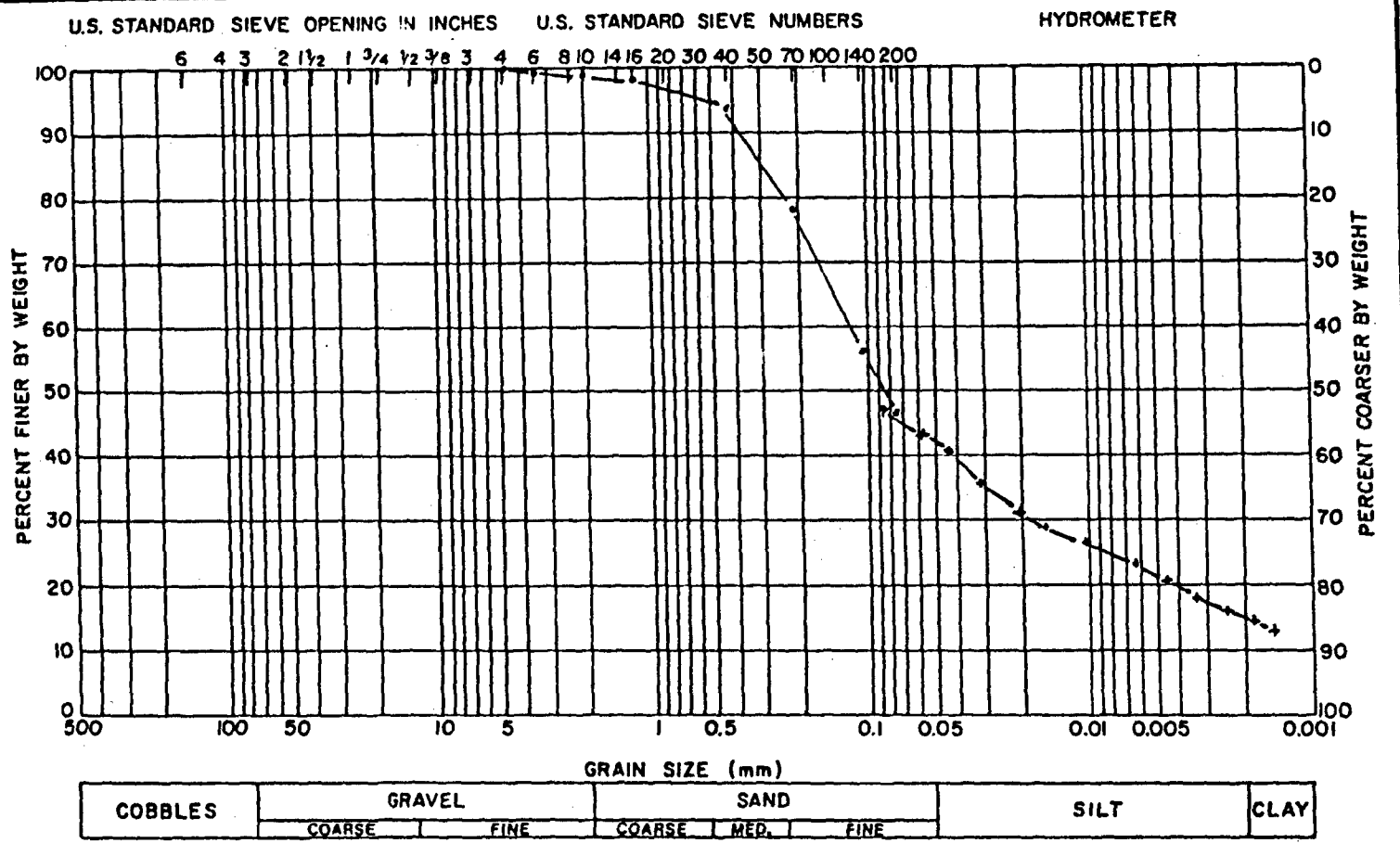
HYDROMETER DATA

JOB NAME:	JACOBS ENGINEERING - WORK ORDER #7	TEST DATE:	04/02/90
JOB NUMBER:	90-L-030	DEPTH:	N/A
SAMPLE NUMBER:	5-5&6	INITIAL WT:	50.08 (g)
TYPE OF WATER USED:	DISTILLED	TOTAL SAMPLE WT:	145.13 (g)
REACTION WITH H2O2:	NONE	TOTAL WT PASSING #200:	67.71 (g)
DISPERSANT:	(NaPO3)6	START TIME:	9:14

DATE (1990)	TIME (MIN)	TEMP (C)	R (g/l)	Rl (g/l)	Rcorr (g/l)	L (CM)	D (MM)	P (%)	%FINER
04/02	0.25	19.0	53.0	1.0	52.0	7.6	0.07642	103.83387	48.44340
	0.50	19.0	48.0	1.0	47.0	8.4	0.05687	93.84984	43.78538
	1.00	19.0	44.0	1.0	43.0	9.1	0.04175	85.86262	40.05897
	2.00	19.0	39.5	1.0	38.5	9.8	0.03070	76.87700	35.86675
	5.00	19.0	35.0	1.0	34.0	10.6	0.02013	67.89137	31.67453
	10.00	19.0	32.5	1.0	31.5	11.0	0.01451	62.89936	29.34552
	20.00	19.0	30.0	1.0	29.0	11.4	0.01045	57.90735	27.01651
	60.00	19.0	26.0	1.0	25.0	12.0	0.00620	49.92013	23.29010
	120.00	19.0	24.0	1.0	23.0	12.4	0.00445	45.92652	21.42689
	240.00	19.0	20.5	1.0	19.5	12.9	0.00322	38.93770	18.16628
	458.00	19.0	18.5	1.0	17.5	13.3	0.00236	34.94409	16.30307
	743.00	19.0	17.0	1.0	16.0	13.5	0.00187	31.94888	14.90566
04/03	1392.00	19.0	14.0	1.0	13.0	14.0	0.00139	25.95847	12.11085

COMMENTS: Assume mean particle density is 2.65 g/cc

LABORATORY ANALYSIS PERFORMED BY: M. Burkhard
CALCULATIONS MADE BY: L. Simpson
CHECKED BY: D. Hammermeister



USDA PARTICLE SIZE LIMIT CLASSIFICATION

θ_i = -	d_{10} = -	d_{50}=0.083	d_{60}= 0.11	C_u = --	C_c = --
SAMPLE NUMBER		DEPTH	CLASSIFICATION (USDA TEXTURE TRIANGLE)		
5-5 & 5-6		N/A	Sandy Loam		

DANIEL B. STEPHENS & ASSOCIATES, INC.

WET/DRY SIEVE ANALYSIS DATA

JOB NAME: JACOBS ENGINEERING - WORK ORDER #7
JOB NUMBER: 90-L-030
TEST DATE: 03/19/90
SAMPLE NUMBER: 5-7&8
DEPTH: N/A

TOTAL WEIGHT OF SAMPLE: 204.55 (g)

SIEVE NUMBER	DIAMETER (mm)	WT. RETAINED	CUM WT. RETAINED	WT. PASSING	% PASSING	LOG DIAMETER
4	4.750	0.46	0.46	204.09	99.78	0.677
6	3.350	0.39	0.85	203.70	99.58	0.525
10	2.000	0.63	1.48	203.07	99.28	0.301
16	1.180	0.78	2.26	202.29	98.90	0.072
40	0.425	8.50	10.76	193.79	94.74	-0.372
70	0.212	53.02	63.78	140.77	68.82	-0.674
140	0.106	75.59	139.37	65.18	31.87	-0.975
200	0.075	20.47	159.84	44.71	21.86	-1.125
pan		44.72	204.56	-0.01		

d10: 0.0013 (mm) d50: 0.12 (mm)
d16: 0.046 (mm) d60: 0.18 (mm)
d30: 0.105 (mm) d84: 0.32 (mm)

MEDIAN PARTICLE DIAMETER (d50): 0.12
UNIFORMITY COEFFICIENT, Cu (d60/d10): 138.46
COEFFICIENT OF CURVATURE, Cc, [(d30)**2/(d10*d60)]: 47.12
MEAN PARTICLE DIAMETER, [(d16+d50+d84)/3]: 0.16

COMMENTS:

LABORATORY ANALYSIS PERFORMED BY: L. Simpson
CALCULATIONS MADE BY: L. Simpson
CHECKED BY: D. Hammermeister

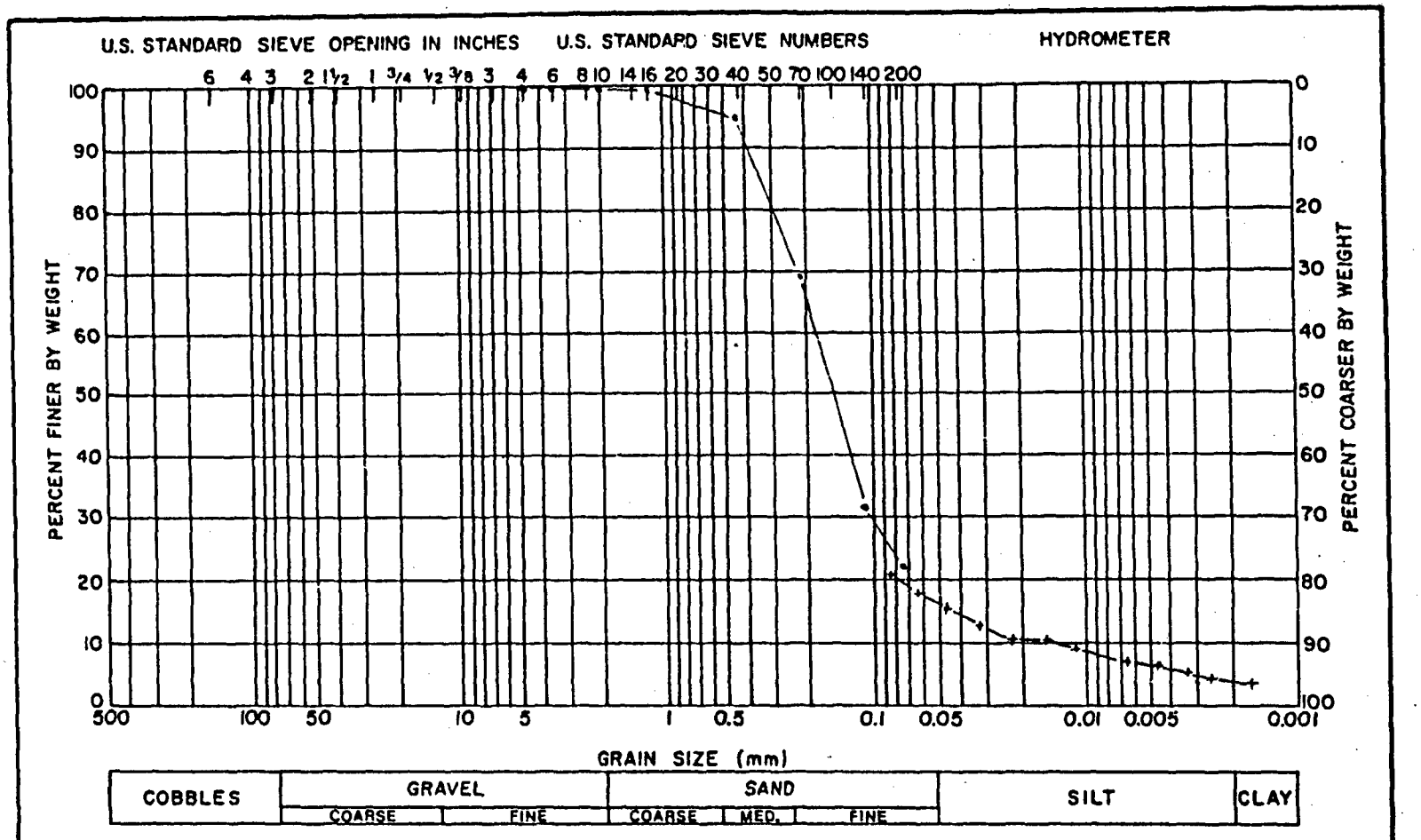
HYDROMETER DATA

JOB NAME:	JACOBS ENGINEERING - WORK ORDER #7	TEST DATE:	04/03/90
JOB NUMBER:	90-L-030	DEPTH:	N/A
SAMPLE NUMBER:	5-7&8	INITIAL WT:	44.66 (g)
TYPE OF WATER USED:	DISTILLED	TOTAL SAMPLE WT:	204.55 (g)
REACTION WITH H2O2:	NONE	TOTAL WT PASSING #200:	44.71 (g)
DISPERSANT:	(NaPO3)6	START TIME:	8:55

DATE (1990)	TIME (MIN)	TEMP (C)	R (g/l)	Rl (g/l)	Rcorr (g/l)	L (CM)	D (MM)	P (%)	%FINER
04/03	0.25	19.0	43.0	1.5	41.5	9.3	0.08425	92.92432	20.31115
	0.50	19.0	40.0	1.5	38.5	9.7	0.06114	86.20690	18.84288
	1.00	19.0	33.0	1.5	31.5	10.9	0.04571	70.53292	15.41690
	2.00	19.0	27.0	1.5	25.5	11.9	0.03375	57.09807	12.48035
	5.00	19.0	24.0	1.5	22.5	12.4	0.02178	50.38065	11.01207
	10.00	19.0	22.5	1.5	21.0	12.6	0.01555	47.02194	10.27793
	20.50	19.0	20.5	2.0	18.5	12.9	0.01100	41.42409	9.05437
	60.00	19.0	17.0	2.0	15.0	13.5	0.00657	33.58710	7.34138
	120.00	19.0	15.0	2.0	13.0	13.8	0.00470	29.10882	6.36253
	240.00	19.0	13.0	2.0	11.0	14.2	0.00337	24.63054	5.38368
	460.00	19.0	12.0	2.0	10.0	14.3	0.00244	22.39140	4.89425
04/04	1400.00	19.0	10.0	2.0	8.0	14.7	0.00142	17.91312	3.91540

COMMENTS: Assume mean particle density is 2.65 g/cc

LABORATORY ANALYSIS PERFORMED BY: L. Simpson
CALCULATIONS MADE BY: L. Simpson
CHECKED BY: D. Hammermeister



USDA PARTICLE SIZE LIMIT CLASSIFICATION

θ_i = -	d_{10} = 0.0013	d_{50} = 0.12	d_{60} = 0.18	C_u = 140	C_c = 47
SAMPLE NUMBER		DEPTH	CLASSIFICATION (USDA TEXTURE TRIANGLE)		
5-7 & 5-8		N/A	Loamy Sand		

DANIEL B. STEPHENS & ASSOCIATES, INC.

WET/DRY SIEVE ANALYSIS DATA

JOB NAME: JACOBS ENGINEERING - WORK ORDER #7
JOB NUMBER: 90-L-030
TEST DATE: 03/23/90
SAMPLE NUMBER: 5-9&10
DEPTH: N/A

TOTAL WEIGHT OF SAMPLE: 143.26 (g)

SIEVE NUMBER	DIAMETER (mm)	WT. RETAINED	CUM WT. RETAINED	WT. PASSING	% PASSING	LOG DIAMETER
4	4.750	0.00	0.00	143.26	100.00	0.677
6	3.350	0.17	0.17	143.09	99.88	0.525
10	2.000	0.22	0.39	142.87	99.73	0.301
16	1.180	0.36	0.75	142.51	99.48	0.072
40	0.425	4.12	4.87	138.39	96.60	-0.372
70	0.212	45.85	50.72	92.54	64.60	-0.674
140	0.106	50.02	100.74	42.52	29.68	-0.975
200	0.075	10.59	111.33	31.93	22.29	-1.125
pan		31.87	143.20	0.06		

d10: 0.0080 (mm) d50: 0.16 (mm)
d16: 0.050 (mm) d60: 0.20 (mm)
d30: 0.11 (mm) d84: 0.32 (mm)

MEDIAN PARTICLE DIAMETER (d50): 0.16
UNIFORMITY COEFFICIENT, Cu (d60/d10): 25.00
COEFFICIENT OF CURVATURE, Cc, [(d30)**2/(d10*d60)]: 7.56
MEAN PARTICLE DIAMETER, [(d16+d50+d84)/3]: 0.18

COMMENTS:

LABORATORY ANALYSIS PERFORMED BY: M. Burkhard
CALCULATIONS MADE BY: L. Simpson
CHECKED BY: D. Hammermeister

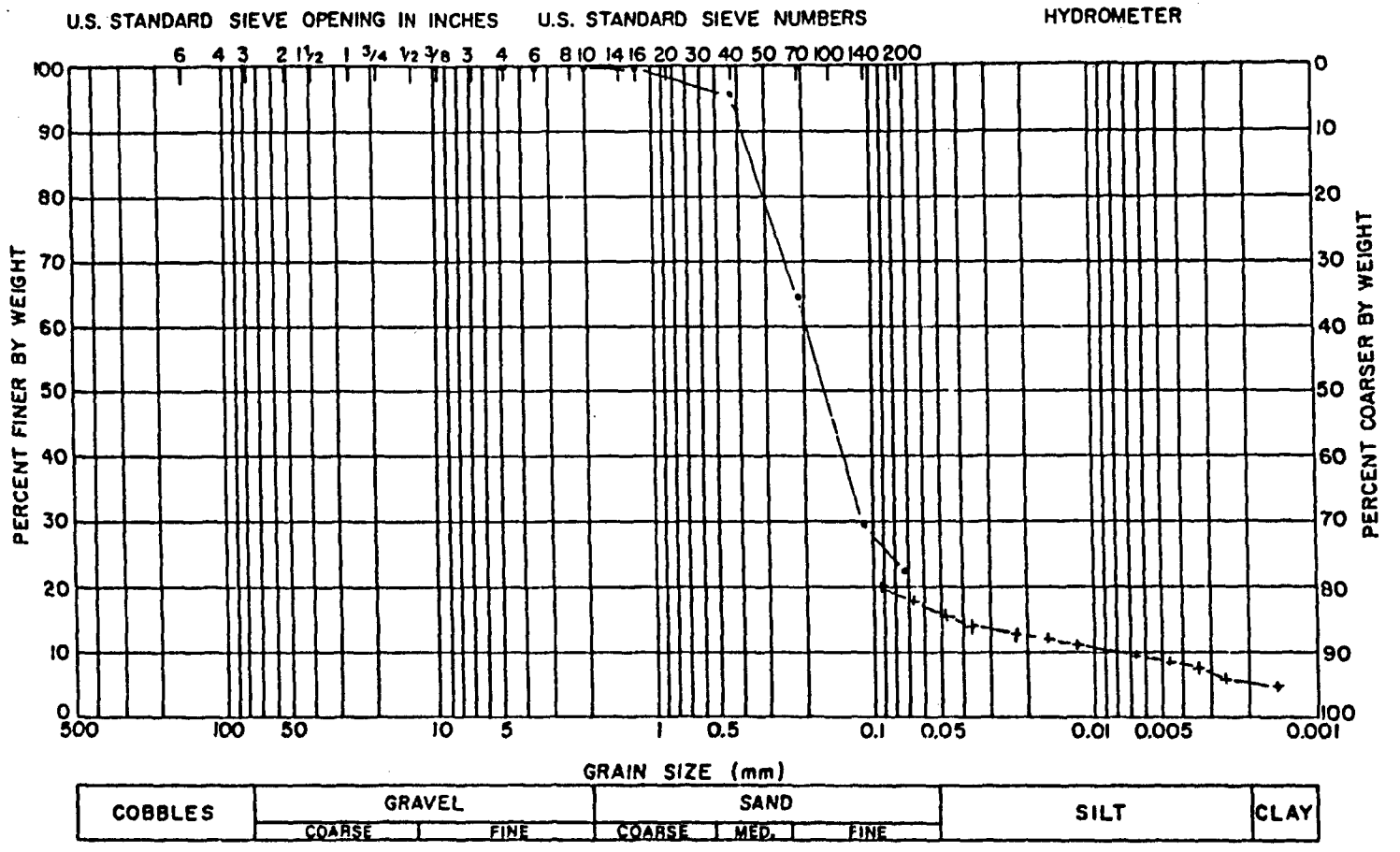
HYDROMETER DATA

JOB NAME:	JACOBS ENGINEERING - WORK ORDER #7	TEST DATE:	04/03/90
JOB NUMBER:	90-L-030	DEPTH:	N/A
SAMPLE NUMBER:	5-9&10	INITIAL WT:	31.75 (g)
TYPE OF WATER USED:	DISTILLED	TOTAL SAMPLE WT:	143.26 (g)
REACTION WITH H202:	NONE	TOTAL WT PASSING #200:	31.93 (g)
DISPERSANT:	(NaPO3)6	START TIME:	9:01

DATE (1990)	TIME (MIN)	TEMP (C)	R (g/l)	Rl (g/l)	Rcorr (g/l)	L (CM)	D (MM)	P (%)	%FINER
04/03	0.25	19.0	30.0	1.5	28.5	11.4	0.09345	89.76378	20.00668
	0.50	19.0	27.0	1.5	25.5	11.9	0.06749	80.31496	17.90072
	1.00	19.0	23.5	1.5	22.0	12.4	0.04886	69.29134	15.44376
	2.00	19.0	22.0	1.5	20.5	12.7	0.03489	64.56693	14.39077
	5.00	19.0	20.0	1.5	18.5	13.0	0.02235	58.26772	12.98679
	10.00	19.0	19.0	2.0	17.0	13.2	0.01590	53.54331	11.93381
	20.50	19.0	18.0	2.0	16.0	13.3	0.01118	50.39370	11.23182
	60.00	19.0	15.0	2.0	13.0	13.8	0.00665	40.94488	9.12586
	120.00	19.0	13.5	2.0	11.5	14.1	0.00475	36.22047	8.07287
	240.00	19.0	12.0	2.0	10.0	14.3	0.00338	31.49606	7.01989
	455.00	19.0	10.5	2.0	8.5	14.6	0.00248	26.77165	5.96691
04/04	1395.00	19.0	8.0	2.0	6.0	15.0	0.00144	18.89764	4.21193

COMMENTS: Assume mean particle density is 2.65 g/cc

LABORATORY ANALYSIS PERFORMED BY: L. Simpson
CALCULATIONS MADE BY: L. Simpson
CHECKED BY: D. Hammermeister



USDA PARTICLE SIZE LIMIT CLASSIFICATION

θ_i = -	d_{10} = 0.0080	d_{50} = 0.16	d_{60} = 0.20	C_u = 25	C_c = 7.6
SAMPLE NUMBER		DEPTH	CLASSIFICATION (USDA TEXTURE TRIANGLE)		
5-9 & 5-10		N/A	Loamy Sand		

DANIEL B. STEPHENS & ASSOCIATES, INC.

WET/DRY SIEVE ANALYSIS DATA

JOB NAME: JACOBS ENGINEERING - WORK ORDER #7
JOB NUMBER: 90-L-030
TEST DATE: 03/19/90
SAMPLE NUMBER: 5-11&12
DEPTH: N/A

TOTAL WEIGHT OF SAMPLE: 187.34 (g)

SIEVE NUMBER	DIAMETER (mm)	WT. RETAINED	CUM WT. RETAINED	WT. PASSING	% PASSING	LOG DIAMETER
4	4.750	0.00	0.00	187.34	100.00	0.677
6	3.350	0.10	0.10	187.24	99.95	0.525
10	2.000	0.02	0.12	187.22	99.94	0.301
16	1.180	0.12	0.24	187.10	99.87	0.072
40	0.425	1.33	1.57	185.77	99.16	-0.372
70	0.212	18.71	20.28	167.06	89.17	-0.674
140	0.106	47.39	67.67	119.67	63.88	-0.975
200	0.075	18.28	85.95	101.39	54.12	-1.125
pan		101.31	187.26	0.08		

d10: -- (mm) d50: 0.041 (mm)
d16: 0.0017 (mm) d60: 0.090 (mm)
d30: 0.0061 (mm) d84: 0.18 (mm)

MEDIAN PARTICLE DIAMETER (d50): 0.041
UNIFORMITY COEFFICIENT, Cu (d60/d10): --
COEFFICIENT OF CURVATURE, Cc, [(d30)**2/(d10*d60)]: --
MEAN PARTICLE DIAMETER, [(d16+d50+d84)/3]: 0.07

COMMENTS:

LABORATORY ANALYSIS PERFORMED BY: L. Simpson
CALCULATIONS MADE BY: L. Simpson
CHECKED BY: D. Hammermeister

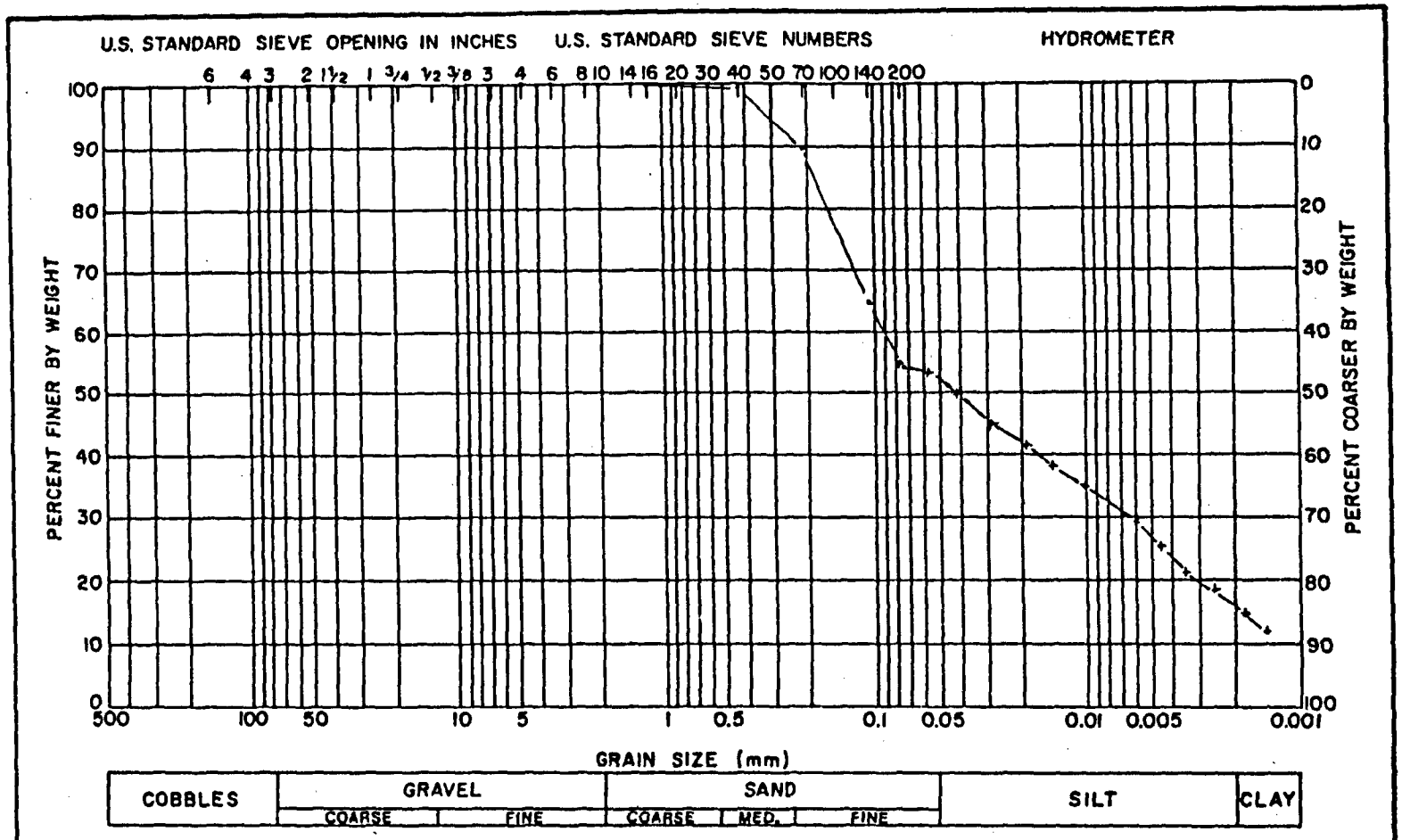
HYDROMETER DATA

JOB NAME:	JACOBS ENGINEERING - WORK ORDER #7	TEST DATE:	04/02/90
JOB NUMBER:	90-L-030	DEPTH:	N/A
SAMPLE NUMBER:	5-11&12	INITIAL WT:	50.44 (g)
TYPE OF WATER USED:	DISTILLED	TOTAL SAMPLE WT:	187.34 (g)
REACTION WITH H2O2:	NONE	TOTAL WT PASSING #200:	101.39 (g)
DISPERSANT:	(NaPO3)6	START TIME:	9:20

DATE (1990)	TIME (MIN)	TEMP (C)	R (g/l)	Rl (g/l)	Rcorr (g/l)	L (CM)	D (MM)	P (%)	%FINER
04/02	0.25	19.0	52.5	1.0	51.5	7.7	0.07683	102.10151	55.25820
	0.50	19.0	50.5	1.0	49.5	8.0	0.05547	98.13640	53.11225
	1.00	19.0	47.0	1.0	46.0	8.6	0.04061	91.19746	49.35684
	2.00	19.0	43.5	1.0	42.5	9.2	0.02965	84.25852	45.60143
	5.00	19.0	40.0	1.0	39.0	9.7	0.01933	77.31959	41.84602
	10.00	19.0	36.5	1.0	35.5	10.3	0.01407	70.38065	38.09061
	20.00	19.0	33.5	1.0	32.5	10.8	0.01018	64.43299	34.87168
	62.00	19.0	28.5	1.0	27.5	11.6	0.00600	54.52022	29.50681
	120.00	19.0	25.0	1.0	24.0	12.2	0.00442	47.58128	25.75140
	240.00	19.0	21.0	1.0	20.0	12.9	0.00321	39.65107	21.45950
	455.00	19.0	19.0	1.0	18.0	13.2	0.00236	35.68596	19.31355
	738.00	19.0	16.5	1.0	15.5	13.6	0.00188	30.72958	16.63111
04/03	1387.00	19.0	13.0	1.0	12.0	14.2	0.00140	23.79064	12.87570

COMMENTS: Assume mean particle density is 2.65 g/cc

LABORATORY ANALYSIS PERFORMED BY: M. Burkhard
CALCULATIONS MADE BY: L. Simpson
CHECKED BY: D. Hammermeister



USDA PARTICLE SIZE LIMIT CLASSIFICATION

θ_1 = -	d_{10} = -	d_{50} = 0.041	d_{60} = 0.090	C_u = -	C_c = -
SAMPLE NUMBER		DEPTH	CLASSIFICATION (USDA TEXTURE TRIANGLE)		
5-11 & 5-12		N/A	Loam		

DANIEL B. STEPHENS & ASSOCIATES, INC.

WET/DRY SIEVE ANALYSIS DATA

JOB NAME: JACOBS ENGINEERING - WORK ORDER #7
JOB NUMBER: 90-L-030
TEST DATE: 03/22/90
SAMPLE NUMBER: 5-13&14
DEPTH: N/A

TOTAL WEIGHT OF SAMPLE: 138.11 (g)

SIEVE NUMBER	DIAMETER (mm)	WT. RETAINED	CUM WT. RETAINED	WT. PASSING	% PASSING	LOG DIAMETER
4	4.750	8.32	8.32	129.79	93.98	0.677
6	3.350	0.50	8.82	129.29	93.61	0.525
10	2.000	0.17	8.99	129.12	93.49	0.301
16	1.180	0.12	9.11	129.00	93.40	0.072
40	0.425	1.34	10.45	127.66	92.43	-0.372
70	0.212	15.83	26.28	111.83	80.97	-0.674
140	0.106	26.64	52.92	85.19	61.68	-0.975
200	0.075	8.21	61.13	76.98	55.74	-1.125
pan		76.88	138.01	0.10		

d10: 0.0023 (mm) d50: 0.050 (mm)
d16: 0.0032 (mm) d60: 0.098 (mm)
d30: 0.0057 (mm) d84: 0.26 (mm)

MEDIAN PARTICLE DIAMETER (d50): 0.050
UNIFORMITY COEFFICIENT, Cu (d60/d10): 42.61
COEFFICIENT OF CURVATURE, Cc, [(d30)**2/(d10*d60)]: 0.14
MEAN PARTICLE DIAMETER, [(d16+d50+d84)/3]: 0.10

COMMENTS:

LABORATORY ANALYSIS PERFORMED BY: L. Simpson
CALCULATIONS MADE BY: L. Simpson
CHECKED BY: D. Hammermeister

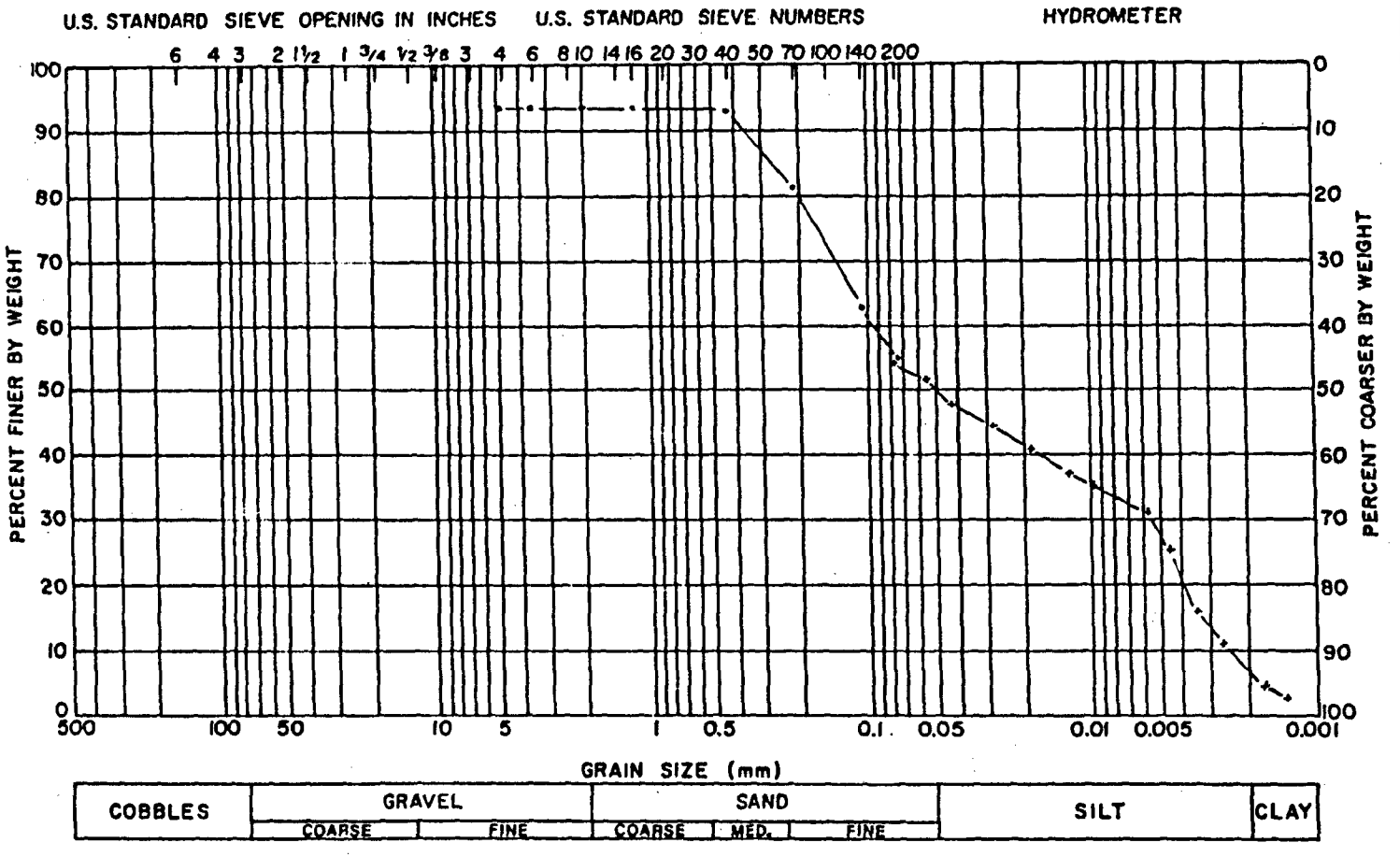
HYDROMETER DATA

JOB NAME:	JACOBS ENGINEERING - WORK ORDER #7	TEST DATE:	03/30/90
JOB NUMBER:	90-L-030	DEPTH:	N/A
SAMPLE NUMBER:	5-13&14	INITIAL WT:	51.23 (g)
TYPE OF WATER USED:	DISTILLED	TOTAL SAMPLE WT:	138.11 (g)
REACTION WITH H2O2:	NONE	TOTAL WT PASSING #200:	76.98 (g)
DISPERSANT:	(NaPO3)6	START TIME:	10:03

DATE (1990)	TIME (MIN)	TEMP (C)	R (g/l)	Rl (g/l)	Rcorr (g/l)	L (CM)	D (MM)	P (%)	%FINER
3/30	0.25	19.0	52.0	2.5	49.5	7.8	0.07724	96.62307	53.85594
	0.50	19.0	50.0	2.5	47.5	8.1	0.05576	92.71911	51.67994
	1.00	19.0	47.0	2.5	44.5	8.6	0.04061	86.86317	48.41595
	2.00	19.0	44.0	2.5	41.5	9.1	0.02952	81.00722	45.15195
	5.00	19.0	41.5	3.5	38.0	9.5	0.01909	74.17529	41.34396
	10.00	19.0	38.5	3.5	35.0	10.0	0.01384	68.31934	38.07996
	20.00	19.0	36.5	2.5	34.0	10.3	0.00995	66.36736	36.99196
	60.00	19.0	31.0	2.5	28.5	11.2	0.00599	55.63147	31.00797
	120.00	18.5	26.5	3.0	23.5	12.0	0.00440	45.87156	25.56797
	240.00	18.5	18.0	3.0	15.0	13.3	0.00329	29.27972	16.31998
	388.00	19.0	13.0	3.0	10.0	14.2	0.00265	19.51981	10.87999
3/31	886.00	19.0	7.0	3.0	4.0	15.2	0.00181	7.80793	4.35200
	1508.00	19.0	5.0	3.0	2.0	15.5	0.00140	3.90396	2.17600

COMMENTS: Assume mean particle density is 2.65 g/cc

LABORATORY ANALYSIS PERFORMED BY: M. Burkhard
CALCULATIONS MADE BY: K. Evans
CHECKED BY: D. Hammermeister



USDA PARTICLE SIZE LIMIT CLASSIFICATION

θ_i = -	d_{10}= 0.0023	d_{50}= 0.050	d_{60}= 0.098	C_u = 43	C_c = 0.14
SAMPLE NUMBER		DEPTH	CLASSIFICATION (USDA TEXTURE TRIANGLE)		
5-13 & 5-14		N/A	Loam		

DANIEL B. STEPHENS & ASSOCIATES, INC.

WET/DRY SIEVE ANALYSIS DATA

JOB NAME: JACOBS ENGINEERING - WORK ORDER #7
JOB NUMBER: 90-L-030
TEST DATE: 03/23/90
SAMPLE NUMBER: 604 composite
DEPTH: N/A

TOTAL WEIGHT OF SAMPLE: 147.84 (g)

SIEVE NUMBER	DIAMETER (mm)	WT. RETAINED	CUM WT. RETAINED	WT. PASSING	% PASSING	LOG DIAMETER
4	4.750	0.00	0.00	147.84	100.00	0.677
6	3.350	0.00	0.00	147.84	100.00	0.525
10	2.000	0.06	0.06	147.78	99.96	0.301
16	1.180	0.12	0.18	147.66	99.88	0.072
40	0.425	2.65	2.83	145.01	98.09	-0.372
70	0.212	35.42	38.25	109.59	74.13	-0.674
140	0.106	52.00	90.25	57.59	38.95	-0.975
200	0.075	13.71	103.96	43.88	29.68	-1.125
pan		43.86	147.82	0.02		

d10:	0.0030 (mm)	d50:	0.12 (mm)
d16:	0.013 (mm)	d60:	0.16 (mm)
d30:	0.080 (mm)	d84:	0.27 (mm)

MEDIAN PARTICLE DIAMETER (d50): 0.12
UNIFORMITY COEFFICIENT, Cu (d60/d10): 53.33
COEFFICIENT OF CURVATURE, Cc, [(d30)**2/(d10*d60)]: 13.33
MEAN PARTICLE DIAMETER, [(d16+d50+d84)/3]: 0.13

COMMENTS:

LABORATORY ANALYSIS PERFORMED BY: M. Burkhard
CALCULATIONS MADE BY: S. Stoller
CHECKED BY: D. Hammermeister

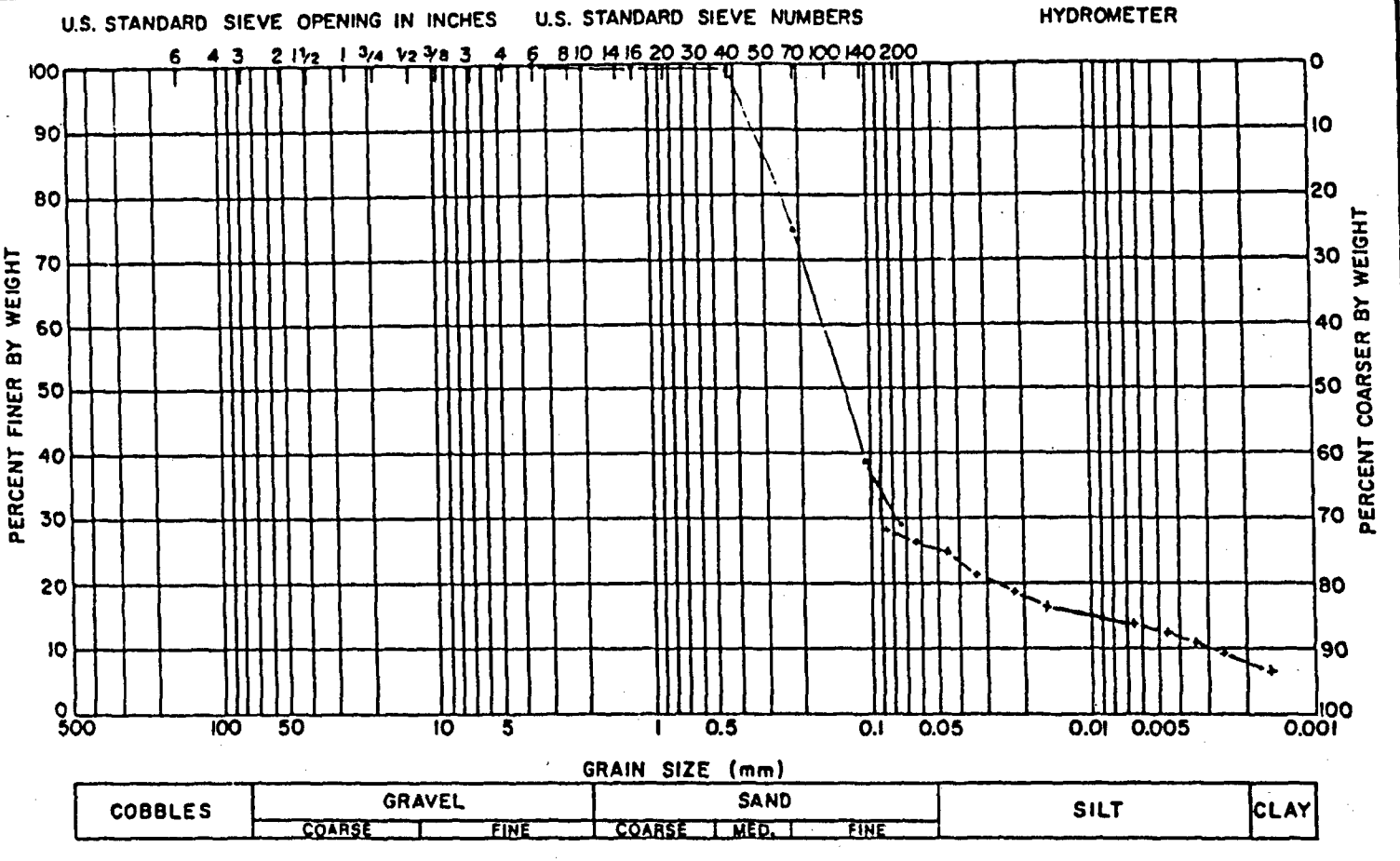
HYDROMETER DATA

JOB NAME:	JACOBS ENGINEERING - WORK ORDER #7	TEST DATE:	4/03/90
JOB NUMBER:	90-L-030	DEPTH:	N/A
SAMPLE NUMBER:	604 composite	INITIAL WT:	43.68 (g)
TYPE OF WATER USED:	DISTILLED	TOTAL SAMPLE WT:	147.84 (g)
REACTION WITH H2O2:	V. MILD	TOTAL WT PASSING #200:	43.88 (g)
DISPERSANT:	(NaPO3)6	START TIME:	9:07

DATE (1990)	TIME (MIN)	TEMP (C)	R (g/l)	Rl (g/l)	Rcorr (g/l)	L (CM)	D (MM)	P (%)	%FINER
4/3	0.25	19.0	43.5	2.0	41.5	9.2	0.08388	95.00916	28.19942
	0.50	19.0	41.0	2.0	39.0	9.6	0.06062	89.28571	26.50066
	1.00	19.0	37.0	2.0	35.0	10.2	0.04431	80.12821	23.78264
	2.00	19.0	33.0	2.0	31.0	10.9	0.03232	70.97070	21.06462
	5.00	19.0	30.0	2.0	28.0	11.4	0.02090	64.10256	19.02611
	10.00	19.0	27.5	2.0	25.5	11.8	0.01504	58.37912	17.32735
	20.50	19.0	26.0	2.0	24.0	12.0	0.01061	54.94505	16.30810
	60.00	19.0	22.0	2.0	20.0	12.7	0.00637	45.78755	13.59008
	120.00	19.0	20.0	2.0	18.0	13.0	0.00456	41.20879	12.23107
	240.00	19.0	17.5	2.0	15.5	13.4	0.00328	35.48535	10.53231
	450.00	19.0	15.5	2.0	13.5	13.8	0.00242	30.90659	9.17330
4/4	1390.00	19.0	12.0	2.0	10.0	14.3	0.00141	22.89377	6.79504

COMMENTS: Assume mean particle density is 2.65 g/cc

LABORATORY ANALYSIS PERFORMED BY: L. Simpson
CALCULATIONS MADE BY: K. Evans
CHECKED BY: D. Hammermeister



USDA PARTICLE SIZE LIMIT CLASSIFICATION

θ_i =	d_{10}= 0.0030	d_{50}= 0.12	d_{60}= 0.16	C_u = 53	C_c = 13
SAMPLE NUMBER		DEPTH	CLASSIFICATION (USDA TEXTURE TRIANGLE)		
604 Composite		N/A	Sandy Loam		

DANIEL B. STEPHENS & ASSOCIATES, INC.

WET/DRY SIEVE ANALYSIS DATA

JOB NAME: JACOBS ENGINEERING - WORK ORDER #7
JOB NUMBER: 90-L-030
TEST DATE: 03/26/90
SAMPLE NUMBER: 640 composite
DEPTH: N/A

TOTAL WEIGHT OF SAMPLE: 129.09 (g)

SIEVE NUMBER	DIAMETER (mm)	WT. RETAINED	CUM WT. RETAINED	WT. PASSING	% PASSING	LOG DIAMETER
4	4.750	0.00	0.00	129.09	100.00	0.677
6	3.350	0.00	0.00	129.09	100.00	0.525
10	2.000	0.00	0.00	129.09	100.00	0.301
16	1.180	0.13	0.13	128.96	99.90	0.072
40	0.425	3.11	3.24	125.85	97.49	-0.372
70	0.212	30.16	33.40	95.69	74.13	-0.674
140	0.106	50.01	83.41	45.68	35.39	-0.975
200	0.075	13.09	96.50	32.59	25.25	-1.125
pan		32.47	128.97	0.12		

d10:	0.0051 (mm)	d50:	0.13 (mm)
d16:	0.023 (mm)	d60:	0.16 (mm)
d30:	0.081 (mm)	d84:	0.27 (mm)

MEDIAN PARTICLE DIAMETER (d50): 0.13
UNIFORMITY COEFFICIENT, Cu (d60/d10): 31.37
COEFFICIENT OF CURVATURE, Cc, [(d30)**2/(d10*d60)]: 8.04
MEAN PARTICLE DIAMETER, [(d16+d50+d84)/3]: 0.14

COMMENTS:

LABORATORY ANALYSIS PERFORMED BY: M. Burkhard
CALCULATIONS MADE BY: S. Stoller
CHECKED BY: D. Hammermeister

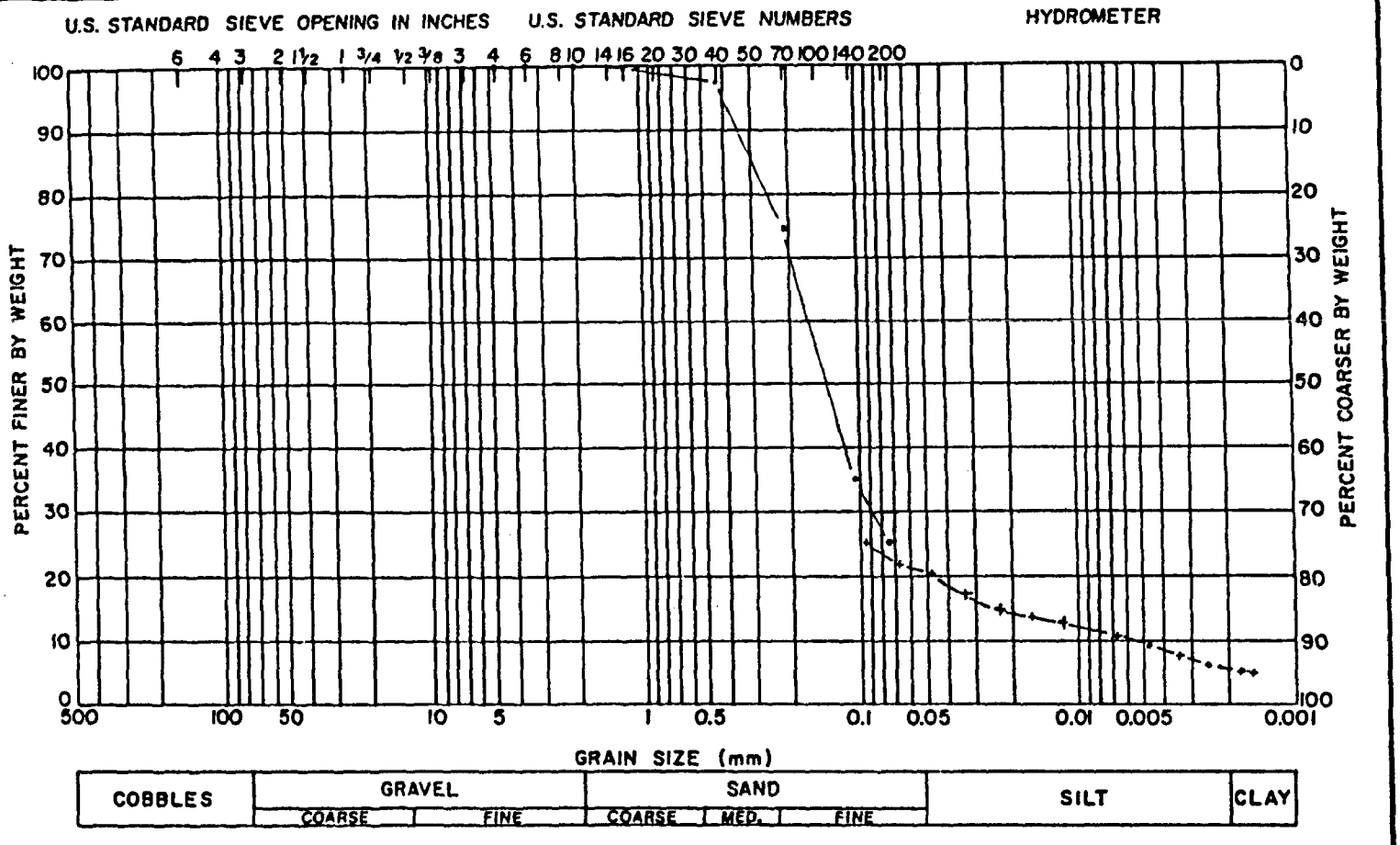
HYDROMETER DATA

JOB NAME:	JACOBS ENGINEERING - WORK ORDER #7	TEST DATE:	4/05/90
JOB NUMBER:	90-L-030	DEPTH:	N/A
SAMPLE NUMBER:	640 composite	INITIAL WT:	32.11 (g)
TYPE OF WATER USED:	DISTILLED	TOTAL SAMPLE WT:	129.09 (g)
REACTION WITH H2O2:	V. MILD	TOTAL WT PASSING #200:	32.59 (g)
DISPERSANT:	(NaPO3)6	START TIME:	8:24

DATE (1990)	TIME (MIN)	TEMP (C)	R (g/l)	Rl (g/l)	Rcorr (g/l)	L (CM)	D (MM)	P (%)	%FINER
4/5	0.25	18.5	32.5	2.0	30.5	11.0	0.09228	94.98599	23.98012
	0.50	18.5	30.5	2.0	28.5	11.3	0.06622	88.75740	22.40765
	1.00	18.5	27.5	2.0	25.5	11.8	0.04783	79.41451	20.04895
	2.00	18.5	24.5	2.0	22.5	12.3	0.03452	70.07163	17.69025
	5.00	18.5	22.0	2.0	20.0	12.7	0.02220	62.28589	15.72467
	10.00	18.5	20.5	2.0	18.5	12.9	0.01585	57.61445	14.54532
	20.50	18.5	19.0	2.0	17.0	13.2	0.01117	52.94301	13.36597
	60.00	19.0	17.0	2.5	14.5	13.5	0.00657	45.15727	11.40038
	120.00	19.0	14.5	2.5	12.0	13.9	0.00472	37.37154	9.43480
	240.00	19.0	12.5	2.0	10.5	14.3	0.00337	32.70009	8.25545
	486.00	19.0	11.0	2.5	8.5	14.5	0.00239	26.47150	6.68298
	822.00	19.0	9.0	2.0	7.0	14.8	0.00186	21.80006	5.50363
4/6	1430.00	19.0	8.5	2.0	6.5	14.9	0.00141	20.24291	5.11052

COMMENTS: Assume mean particle density is 2.65 g/cc

LABORATORY ANALYSIS PERFORMED BY: L. Simpson
CALCULATIONS MADE BY: K. Evans
CHECKED BY: D. Hammermeister



USDA PARTICLE SIZE LIMIT CLASSIFICATION

θ_i = -	d_{10} = 0.0051	d_{50} = 0.13	d_{60} = 0.16	C_u = 31	C_c = 8.0
SAMPLE NUMBER		DEPTH	CLASSIFICATION (USDA TEXTURE TRIANGLE)		
640 Composite		N/A	Loamy Sand		

DANIEL B. STEPHENS & ASSOCIATES, INC.

WET/DRY SIEVE ANALYSIS DATA

JOB NAME: JACOBS ENGINEERING - WORK ORDER #7
JOB NUMBER: 90-L-030
TEST DATE: 03/26/90
SAMPLE NUMBER: 641 composite
DEPTH: N/A

TOTAL WEIGHT OF SAMPLE: 139.50 (g)

SIEVE NUMBER	DIAMETER (mm)	WT. RETAINED	CUM WT. RETAINED	WT. PASSING	% PASSING	LOG DIAMETER
4	4.750	0.00	0.00	139.50	100.00	0.677
6	3.350	0.00	0.00	139.50	100.00	0.525
10	2.000	0.09	0.09	139.41	99.94	0.301
16	1.180	0.65	0.74	138.76	99.47	0.072
40	0.425	7.76	8.50	131.00	93.91	-0.372
70	0.212	50.55	59.05	80.45	57.67	-0.674
140	0.106	51.74	110.79	28.71	20.58	-0.975
200	0.075	10.90	121.69	17.81	12.77	-1.125
pan		17.56	139.25	0.25		

d10: 0.059 (mm) d50: 0.17 (mm)
d16: 0.089 (mm) d60: 0.21 (mm)
d30: 0.12 (mm) d84: 0.35 (mm)

MEDIAN PARTICLE DIAMETER (d50): 0.17
UNIFORMITY COEFFICIENT, Cu (d60/d10): 3.56
COEFFICIENT OF CURVATURE, Cc, [(d30)**2/(d10*d60)]: 1.16
MEAN PARTICLE DIAMETER, [(d16+d50+d84)/3]: 0.20

COMMENTS:

LABORATORY ANALYSIS PERFORMED BY: M. Burkhard
CALCULATIONS MADE BY: S. Stoller
CHECKED BY: D. Hammermeister

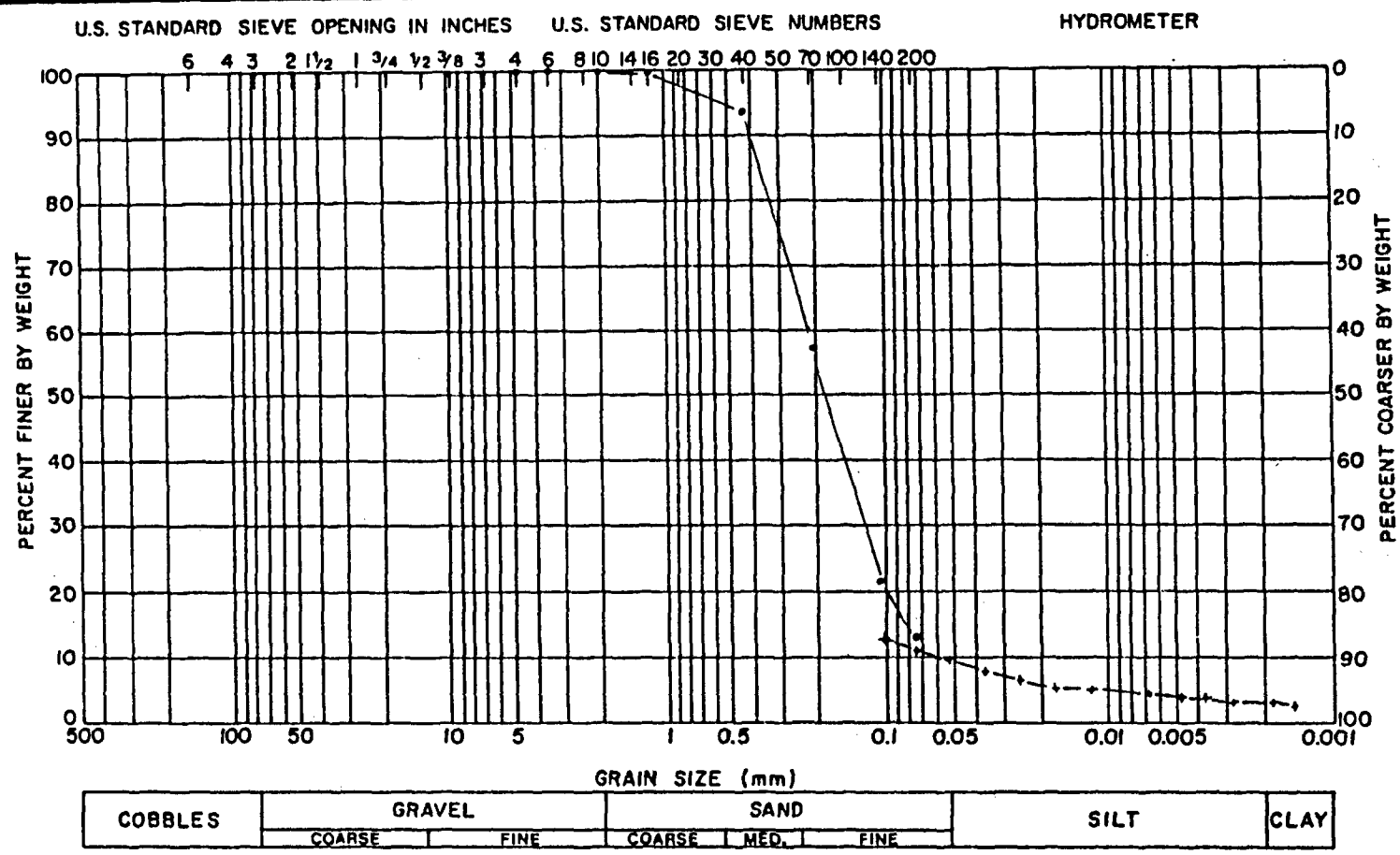
HYDROMETER DATA

JOB NAME:	JACOBS ENGINEERING - WORK ORDER #7	TEST DATE:	4/05/90
JOB NUMBER:	90-L-030	DEPTH:	N/A
SAMPLE NUMBER:	641 composite	INITIAL WT:	17.41 (g)
TYPE OF WATER USED:	DISTILLED	TOTAL SAMPLE WT:	139.50 (g)
REACTION WITH H2O2:	V. MILD	TOTAL WT PASSING #200:	17.81 (g)
DISPERSANT:	(NaPO3)6	START TIME:	8:30

DATE (1990)	TIME (MIN)	TEMP (C)	R (g/l)	Rl (g/l)	Rcorr (g/l)	L (CM)	D (MM)	P (%)	%FINER
4/5	0.25	18.5	18.5	2.0	16.5	13.3	0.10148	94.77312	12.09971
	0.50	18.5	17.0	2.0	15.0	13.5	0.07242	86.15738	10.99973
	1.00	18.5	15.5	2.0	13.5	13.8	0.05167	77.54164	9.89976
	2.00	18.5	13.0	2.0	11.0	14.2	0.03708	63.18208	8.06647
	5.00	18.5	12.0	2.0	10.0	14.3	0.02358	57.43825	7.33316
	10.00	18.5	11.0	2.0	9.0	14.5	0.01677	51.69443	6.59984
	20.50	18.5	10.0	2.0	8.0	14.7	0.01178	45.95060	5.86653
	60.00	19.0	9.5	2.5	7.0	14.7	0.00687	40.20678	5.13321
	120.00	19.0	9.0	2.5	6.5	14.8	0.00487	37.33487	4.76655
	240.00	19.0	8.0	2.0	6.0	15.0	0.00346	34.46295	4.39989
	481.00	19.0	7.0	2.5	4.5	15.2	0.00246	25.84721	3.29992
	817.00	19.0	7.0	2.0	5.0	15.2	0.00189	28.71913	3.66658
4/6	1425.00	19.0	6.5	2.0	4.5	15.2	0.00143	25.84721	3.29992

COMMENTS: Assume mean particle density is 2.65 g/cc

LABORATORY ANALYSIS PERFORMED BY: L. Simpson
CALCULATIONS MADE BY: K. Evans
CHECKED BY: D. Hammermeister



USDA PARTICLE SIZE LIMIT CLASSIFICATION

θ_i = -	d_{10} = 0.059	d_{50} = 0.17	d_{60} = 0.21	C_u = 36	C_c = 1.2
SAMPLE NUMBER		DEPTH	CLASSIFICATION (USDA TEXTURE TRIANGLE)		
641 Composite		N/A	Sand		

DANIEL B. STEPHENS & ASSOCIATES, INC.

WET/DRY SIEVE ANALYSIS DATA

JOB NAME: JACOBS ENGINEERING - WORK ORDER #7
JOB NUMBER: 90-L-030
TEST DATE: 03/26/90
SAMPLE NUMBER: 642 composite
DEPTH: N/A

TOTAL WEIGHT OF SAMPLE: 138.26 (g)

SIEVE NUMBER	DIAMETER (mm)	WT. RETAINED	CUM WT. RETAINED	WT. PASSING	% PASSING	LOG DIAMETER
4	4.750	1.31	1.31	136.95	99.05	0.677
6	3.350	0.48	1.79	136.47	98.71	0.525
10	2.000	0.16	1.95	136.31	98.59	0.301
16	1.180	0.45	2.40	135.86	98.26	0.072
40	0.425	6.67	9.07	129.19	93.44	-0.372
70	0.212	47.26	56.33	81.93	59.26	-0.674
140	0.106	50.07	106.40	31.86	23.04	-0.975
200	0.075	10.07	116.47	21.79	15.76	-1.125
pan		21.56	138.03	0.23		

d10: 0.042 (mm) d50: 0.17 (mm)
d16: 0.078 (mm) d60: 0.21 (mm)
d30: 0.12 (mm) d84: 0.35 (mm)

MEDIAN PARTICLE DIAMETER (d50): 0.17
UNIFORMITY COEFFICIENT, Cu (d60/d10): 5.00
COEFFICIENT OF CURVATURE, Cc, [(d30)**2/(d10*d60)]: 1.63
MEAN PARTICLE DIAMETER, [(d16+d50+d84)/3]: 0.20

COMMENTS:

LABORATORY ANALYSIS PERFORMED BY: M. Burkhard
CALCULATIONS MADE BY: S. Stoller
CHECKED BY: D. Hammermeister

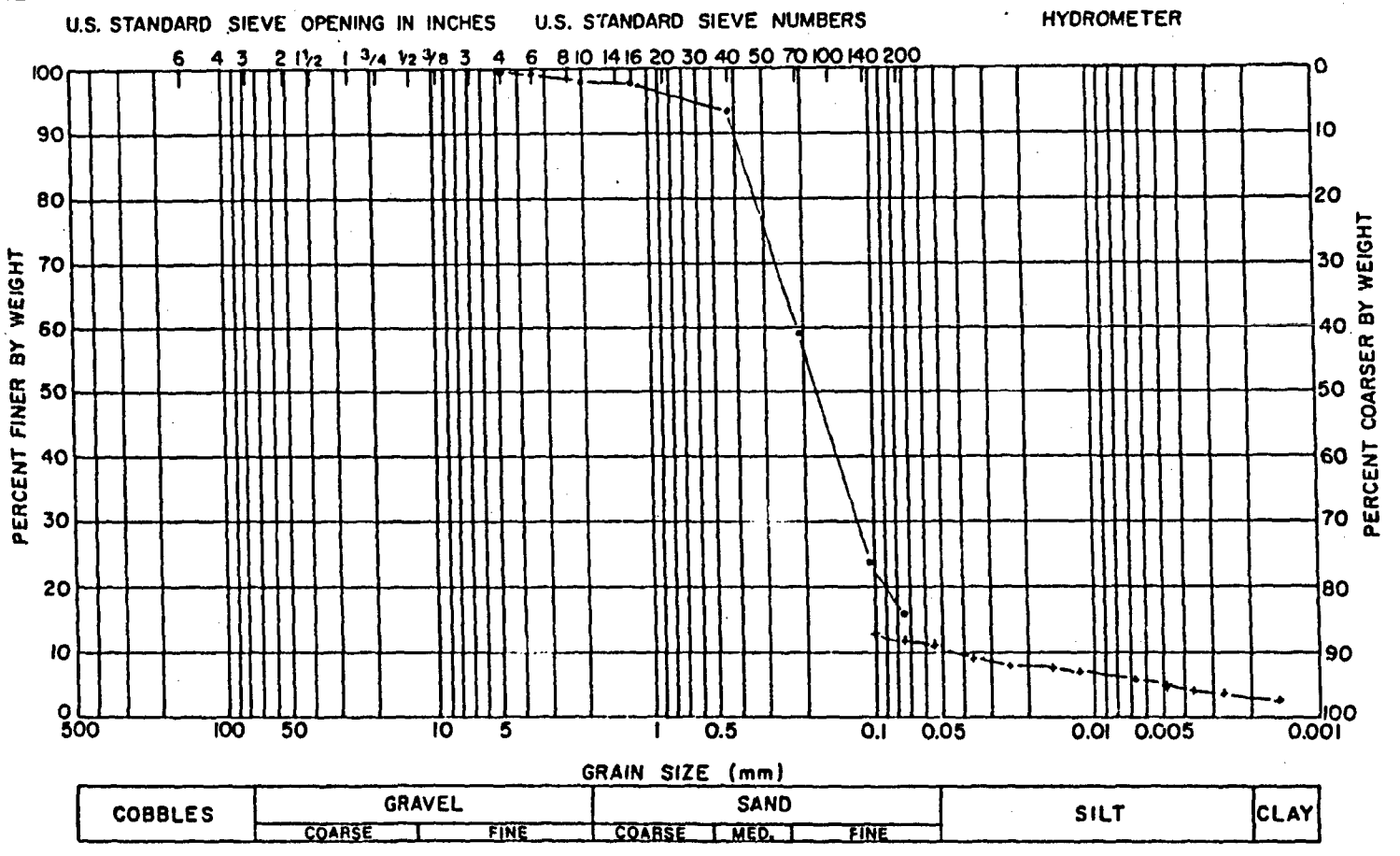
HYDROMETER DATA

JOB NAME:	JACOBS ENGINEERING - WORK ORDER #7	TEST DATE:	04/03/90
JOB NUMBER:	90-L-030	DEPTH:	N/A
SAMPLE NUMBER:	642 composite	INITIAL WT:	21.44 (g)
TYPE OF WATER USED:	DISTILLED	TOTAL SAMPLE WT:	138.26 (g)
REACTION WITH H202:	NONE	TOTAL WT PASSING #200:	21.79 (g)
DISPERSANT:	(NaPO3)6	START TIME:	9:13

DATE (1990)	TIME (MIN)	TEMP (C)	R (g/l)	Rl (g/l)	Rcorr (g/l)	L (CM)	D (MM)	P (%)	%FINER
4/3	0.25	19.0	20.0	2.0	18.0	13.0	0.09996	83.95522	13.23148
	0.50	19.0	18.0	2.0	16.0	13.3	0.07156	74.62687	11.76131
	1.00	19.0	17.0	2.0	15.0	13.5	0.05091	69.96269	11.02623
	2.00	19.0	15.0	2.0	13.0	13.8	0.03644	60.63433	9.55607
	5.00	19.0	13.5	2.0	11.5	14.1	0.02325	53.63806	8.45345
	10.00	19.0	13.0	2.0	11.0	14.2	0.01649	51.30597	8.08590
	20.50	19.0	12.0	2.0	10.0	14.3	0.01158	46.64179	7.35082
	60.00	19.0	10.5	2.0	8.5	14.6	0.00683	39.64552	6.24820
	120.00	19.0	9.5	2.0	7.5	14.7	0.00485	34.98134	5.51312
	240.00	19.0	8.0	2.0	6.0	15.0	0.00346	27.98507	4.41049
	445.00	19.0	7.5	2.0	5.5	15.1	0.00255	25.65299	4.04295
4/4	1385.00	19.0	6.0	2.0	4.0	15.3	0.00146	18.65672	2.94033

COMMENTS: Assume mean particle density is 2.65 g/cc

LABORATORY ANALYSIS PERFORMED BY: L. Simpson
CALCULATIONS MADE BY: K. Evans
CHECKED BY: D. Hammermeister



USDA PARTICLE SIZE LIMIT CLASSIFICATION

θ_i = -	d_{10} = 0.042	d_{50} = 0.17	d_{60} = 0.21	C_u = 5.0	C_c = 1.6
SAMPLE NUMBER		DEPTH	CLASSIFICATION (USDA TEXTURE TRIANGLE)		
642 Composite		N/A	Sand		

DANIEL B. STEPHENS & ASSOCIATES, INC.

WET/DRY SIEVE ANALYSIS DATA

JOB NAME: JACOBS ENGINEERING - WORK ORDER #7
JOB NUMBER: 90-L-030
TEST DATE: 03/26/90
SAMPLE NUMBER: 643 composite
DEPTH: N/A

TOTAL WEIGHT OF SAMPLE: 135.55 (g)

SIEVE NUMBER	DIAMETER (mm)	WT. RETAINED	CUM WT. RETAINED	WT. PASSING	% PASSING	LOG DIAMETER
4	4.750	0.00	0.00	135.55	100.00	0.677
6	3.350	0.07	0.07	135.48	99.95	0.525
10	2.000	0.09	0.16	135.39	99.88	0.301
16	1.180	0.52	0.68	134.87	99.50	0.072
40	0.425	6.31	6.99	128.56	94.84	-0.372
70	0.212	35.42	42.41	93.14	68.71	-0.674
140	0.106	40.49	82.90	52.65	38.84	-0.975
200	0.075	12.25	95.15	40.40	29.80	-1.125
pan		40.25	135.40	0.15		

d10:	0.0090 (mm)	d50:	0.14 (mm)
d16:	0.024 (mm)	d60:	0.18 (mm)
d30:	0.076 (mm)	d84:	0.34 (mm)

MEDIAN PARTICLE DIAMETER (d50): 0.14
UNIFORMITY COEFFICIENT, Cu (d60/d10): 20.00
COEFFICIENT OF CURVATURE, Cc, [(d30)**2/(d10*d60)]: 3.57
MEAN PARTICLE DIAMETER, [(d16+d50+d84)/3]: 0.17

COMMENTS:

LABORATORY ANALYSIS PERFORMED BY: M. Burkhard
CALCULATIONS MADE BY: S. Stoller
CHECKED BY: D. Hammermeister

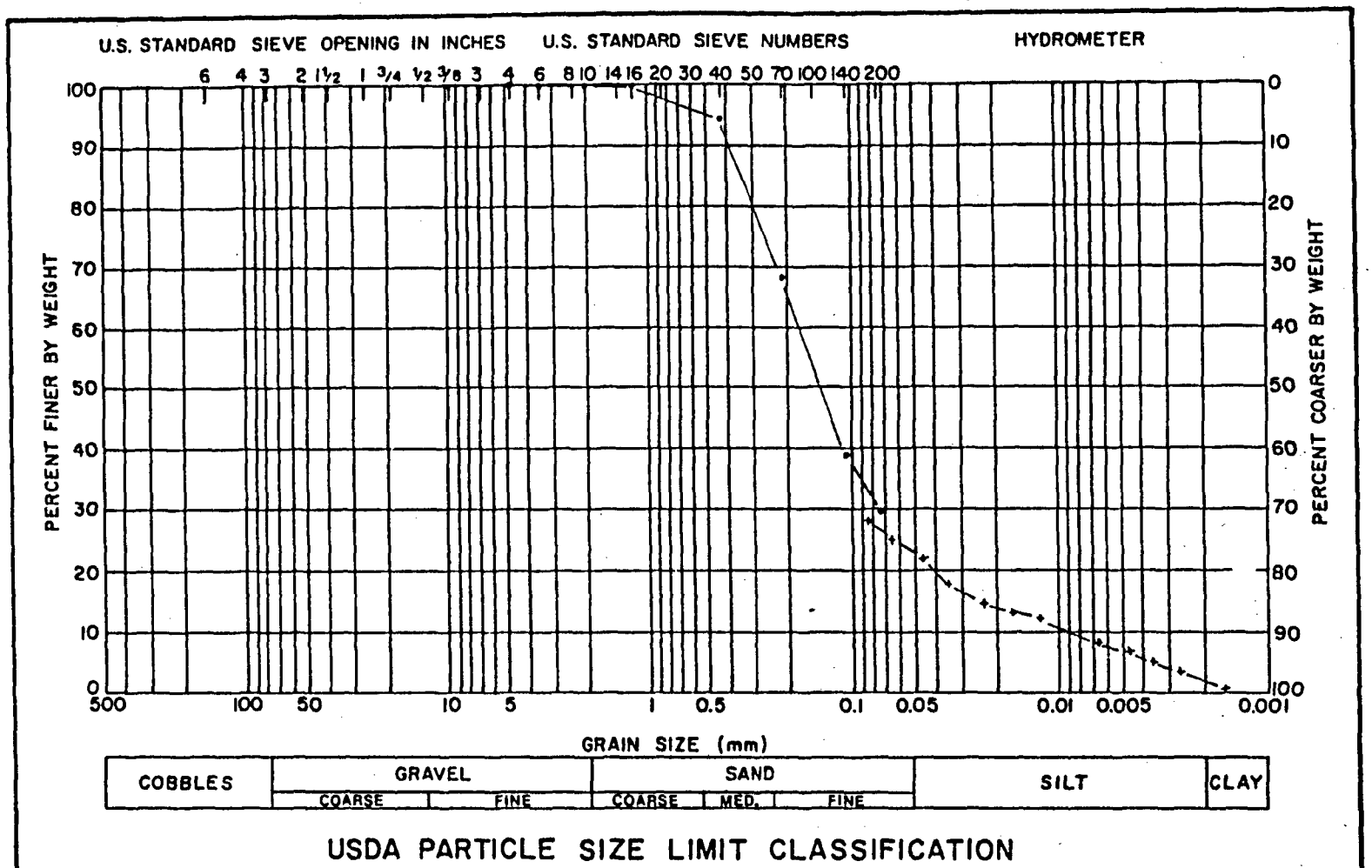
HYDROMETER DATA

JOB NAME:	JACOBS ENGINEERING - WORK ORDER #7	TEST DATE:	04/03/90
JOB NUMBER:	90-L-030	DEPTH:	N/A
SAMPLE NUMBER:	643 composite	INITIAL WT:	40.13 (g)
TYPE OF WATER USED:	DISTILLED	TOTAL SAMPLE WT:	135.55 (g)
REACTION WITH H202:	NONE	TOTAL WT PASSING #200:	40.40 (g)
DISPERSANT:	(NaPO3)6	START TIME:	9:19

DATE (1990)	TIME (MIN)	TEMP (C)	R (g/l)	Rl (g/l)	Rcorr (g/l)	L (CM)	D (MM)	P (%)	%FINER
4/3	0.25	19.0	38.5	2.0	36.5	10.0	0.08755	90.95440	27.10850
	0.50	19.0	36.5	2.0	34.5	10.3	0.06291	85.97060	25.62311
	1.00	19.0	31.5	2.0	29.5	11.1	0.04622	73.51109	21.90961
	2.00	19.0	26.5	2.0	24.5	12.0	0.03386	61.05158	18.19612
	5.00	19.0	22.0	2.0	20.0	12.7	0.02207	49.83803	14.85397
	10.00	19.0	19.0	2.0	17.0	13.2	0.01590	42.36232	12.62588
	20.50	19.0	18.0	2.0	16.0	13.3	0.01118	39.87042	11.88318
	60.00	19.0	14.0	2.0	12.0	14.0	0.00669	29.90282	8.91238
	120.00	19.0	12.5	2.0	10.5	14.3	0.00477	26.16496	7.79834
	240.00	19.0	10.0	2.0	8.0	14.7	0.00342	19.93521	5.94159
	440.00	19.0	7.0	2.0	5.0	15.2	0.00257	12.45951	3.71349
4/4	1380.00	19.0	3.0	2.0	1.0	15.8	0.00148	2.49190	0.74270

COMMENTS: Assume mean particle density is 2.65 g/cc

LABORATORY ANALYSIS PERFORMED BY: L. Simpson
CALCULATIONS MADE BY: K. Evans
CHECKED BY: D. Hammermeister



USDA PARTICLE SIZE LIMIT CLASSIFICATION

θ_1 = -	d_{10}= 0.0090	d_{50}= 0.14	d_{60}= 0.18	C_u = 20	C_c = 3.6
SAMPLE NUMBER		DEPTH	CLASSIFICATION (USDA TEXTURE TRIANGLE)		
643 Composite		N/A	Loamy Sand		

DANIEL B. STEPHENS & ASSOCIATES, INC.

WET/DRY SIEVE ANALYSIS DATA

JOB NAME: JACOBS ENGINEERING - WORK ORDER #7
JOB NUMBER: 90-L-030
TEST DATE: 03/26/90
SAMPLE NUMBER: 644 composite
DEPTH: N/A

TOTAL WEIGHT OF SAMPLE: 130.79 (g)

SIEVE NUMBER	DIAMETER (mm)	WT. RETAINED	CUM WT. RETAINED	WT. PASSING	% PASSING	LOG DIAMETER
4	4.750	0.00	0.00	130.79	100.00	0.677
6	3.350	0.03	0.03	130.76	99.98	0.525
10	2.000	0.09	0.12	130.67	99.91	0.301
16	1.180	0.07	0.19	130.60	99.85	0.072
40	0.425	0.62	0.81	129.98	99.38	-0.372
70	0.212	4.25	5.06	125.73	96.13	-0.674
140	0.106	14.15	19.21	111.58	85.31	-0.975
200	0.075	10.59	29.80	100.99	77.22	-1.125
pan		100.98	130.78	0.01		

d10: 0.0020 (mm) d50: 0.0099 (mm)
d16: 0.0026 (mm) d60: 0.021 (mm)
d30: 0.0039 (mm) d84: 0.10 (mm)

MEDIAN PARTICLE DIAMETER (d50): 0.0099
UNIFORMITY COEFFICIENT, Cu (d60/d10): 10.50
COEFFICIENT OF CURVATURE, Cc, [(d30)**2/(d10*d60)]: 0.36
MEAN PARTICLE DIAMETER, [(d16+d50+d84)/3]: 0.04

COMMENTS:

LABORATORY ANALYSIS PERFORMED BY: M. Burkhard
CALCULATIONS MADE BY: S. Stoller
CHECKED BY: D. Hammermeister

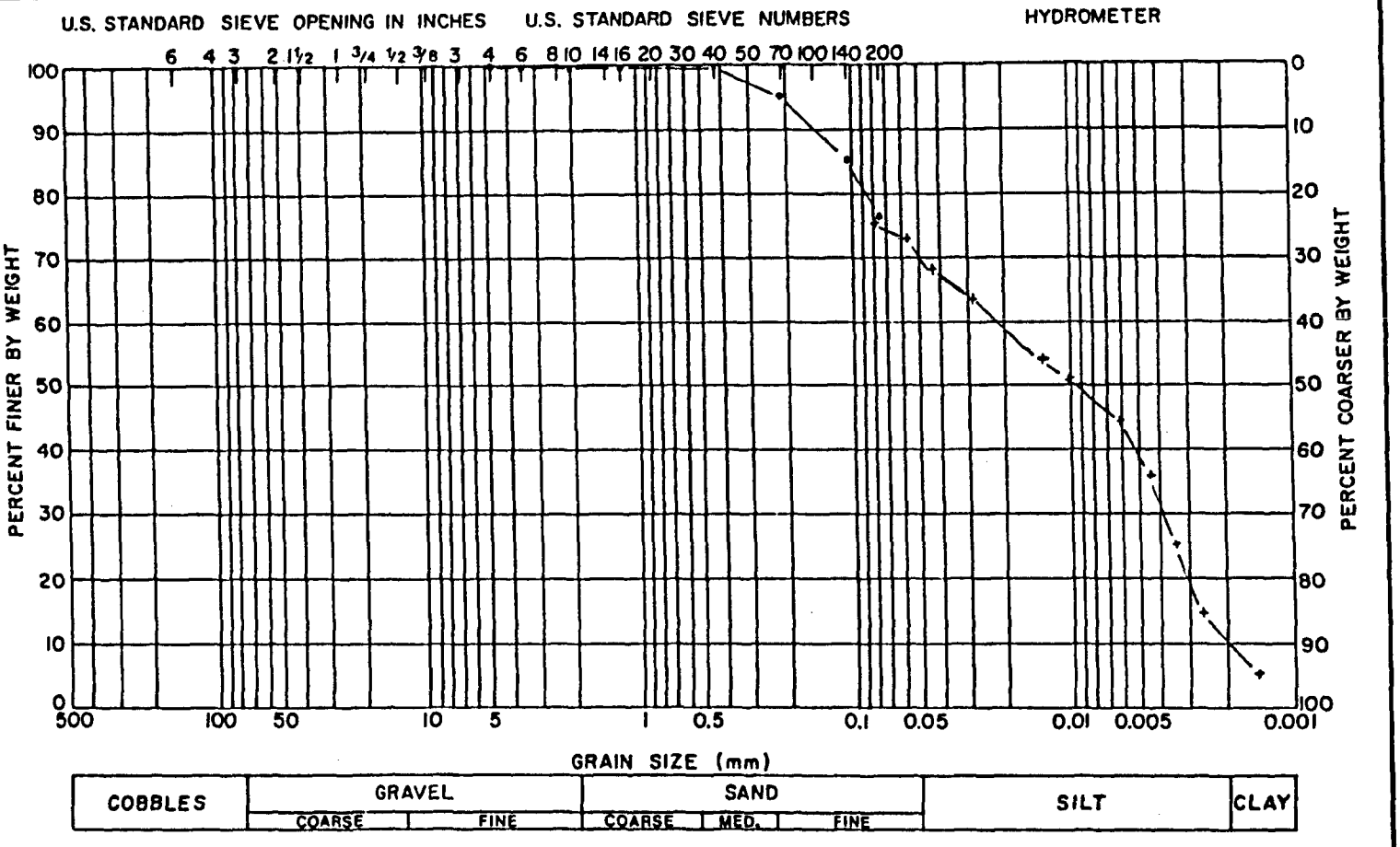
HYDROMETER DATA

JOB NAME:	JACOBS ENGINEERING - WORK ORDER #7	TEST DATE:	04/03/90
JOB NUMBER:	90-L-030	DEPTH:	N/A
SAMPLE NUMBER:	644 composite	INITIAL WT:	50.66 (g)
TYPE OF WATER USED:	DISTILLED	TOTAL SAMPLE WT:	130.79 (g)
REACTION WITH H2O2:	NONE	TOTAL WT PASSING #200:	100.99 (g)
DISPERSANT:	(NaPO3)6	START TIME:	9:25

DATE (1990)	TIME (MIN)	TEMP (C)	R (g/l)	Rl (g/l)	Rcorr (g/l)	L (CM)	D (MM)	P (%)	%FINER
4/3	0.25	19.0	52.0	2.0	50.0	7.8	0.07724	98.69720	76.20942
	0.50	19.0	50.0	2.0	48.0	8.1	0.05576	94.74931	73.16104
	1.00	19.0	47.0	2.0	45.0	8.6	0.04061	88.82748	68.58848
	2.00	19.0	44.0	2.0	42.0	9.1	0.02952	82.90565	64.01591
	5.00	19.0	41.0	2.0	39.0	9.6	0.01917	76.98381	59.44335
	10.00	19.0	38.5	2.0	36.5	10.0	0.01384	72.04895	55.63288
	20.00	19.0	35.0	2.0	33.0	10.6	0.01007	65.14015	50.29822
	60.00	19.0	31.0	2.0	29.0	11.2	0.00599	57.24437	44.20146
	121.00	19.0	26.0	2.0	24.0	12.0	0.00437	47.37465	36.58052
	240.00	19.0	19.0	2.0	17.0	13.2	0.00325	33.55705	25.91120
	435.00	19.0	12.0	2.0	10.0	14.3	0.00251	19.73944	15.24188
4/4	1375.00	19.0	6.0	2.0	4.0	15.3	0.00146	7.89578	6.09675

COMMENTS: Assume mean particle density is 2.65 g/cc

LABORATORY ANALYSIS PERFORMED BY: L. Simpson
CALCULATIONS MADE BY: K. Evans
CHECKED BY: D. Hammermeister



USDA PARTICLE SIZE LIMIT CLASSIFICATION

θ_i = -	d_{10}= 0.0020	d_{50}= 0.0099	d_{60}= 0.021	C_u = 10	C_c = 0.36
SAMPLE NUMBER		DEPTH	CLASSIFICATION (USDA TEXTURE TRIANGLE)		
644 Composite		N/A	Silt Loam		

DANIEL B. STEPHENS & ASSOCIATES, INC.

WET/DRY SIEVE ANALYSIS DATA

JOB NAME: JACOBS ENGINEERING - WORK ORDER #7
JOB NUMBER: 90-L-030
TEST DATE: 03/26/90
SAMPLE NUMBER: 645 composite
DEPTH: N/A

TOTAL WEIGHT OF SAMPLE: 154.30 (g)

SIEVE NUMBER	DIAMETER (mm)	WT. RETAINED	CUM WT. RETAINED	WT. PASSING	% PASSING	LOG DIAMETER
3/4	19.000	20.96	20.96	133.34	86.42	1.279
3/8	9.500	0.00	20.96	133.34	86.42	0.978
4	4.750	1.89	22.85	131.45	85.19	0.677
6	3.350	1.10	23.95	130.35	84.48	0.525
10	2.000	1.72	25.67	128.63	83.36	0.301
16	1.180	1.11	26.78	127.52	82.64	0.072
40	0.425	2.76	29.54	124.76	80.86	-0.372
70	0.212	5.27	34.81	119.49	77.44	-0.674
140	0.106	14.88	49.69	104.61	67.80	-0.975
200	0.075	8.60	58.29	96.01	62.22	-1.125
pan		95.89	154.18	0.12		

d10: -- (mm) d50: 0.026 (mm)
d16: 0.0017 (mm) d60: 0.073 (mm)
d30: 0.0067 (mm) d84: 2.7 (mm)

MEDIAN PARTICLE DIAMETER (d50): 0.026
UNIFORMITY COEFFICIENT, Cu (d60/d10): --
COEFFICIENT OF CURVATURE, Cc, [(d30)**2/(d10*d60)]: --
MEAN PARTICLE DIAMETER, [(d16+d50+d84)/3]: 0.91

COMMENTS:

LABORATORY ANALYSIS PERFORMED BY: M. Burkhard
CALCULATIONS MADE BY: S. Stoller
CHECKED BY: D. Hammermeister

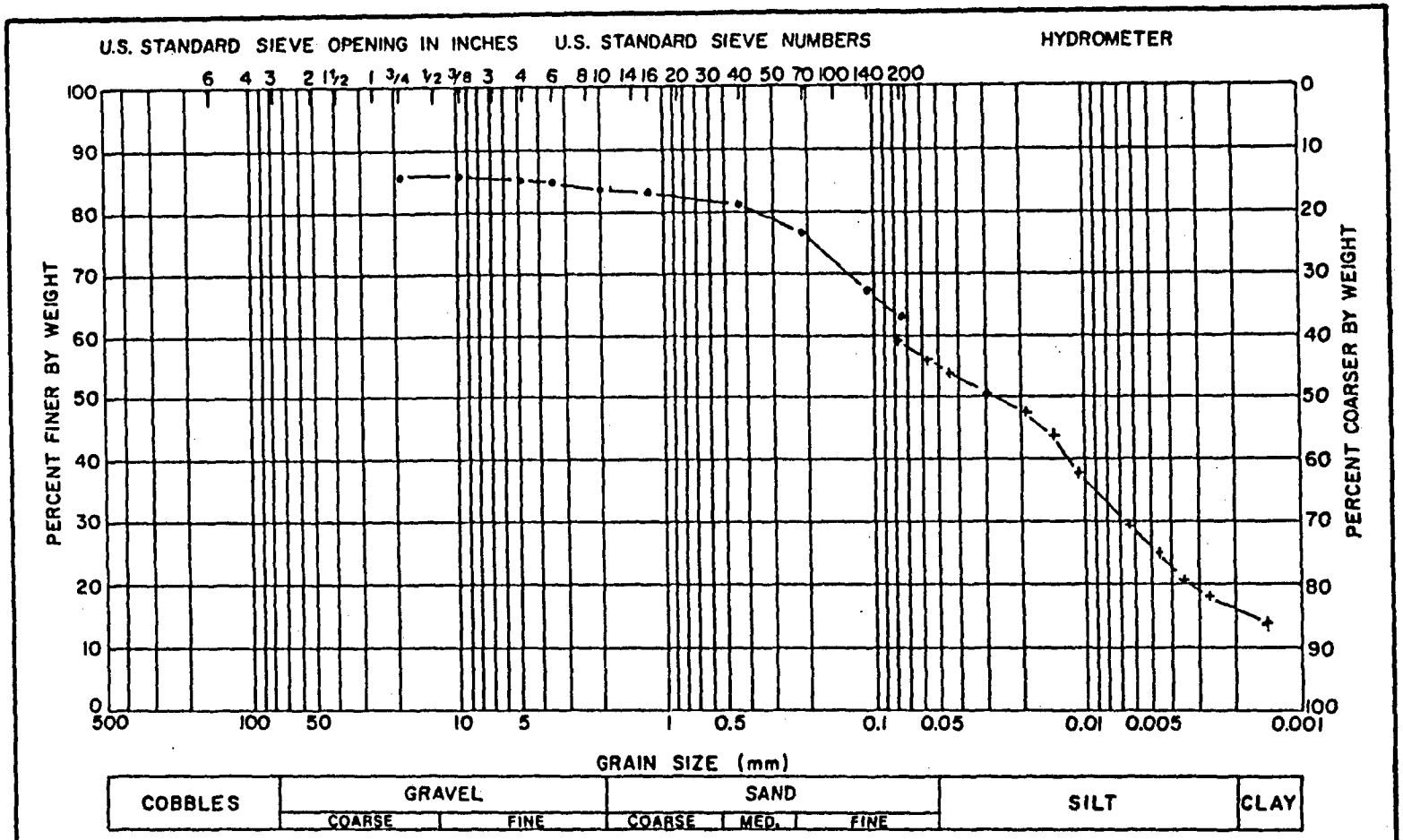
HYDROMETER DATA

JOB NAME:	JACOBS ENGINEERING - WORK ORDER #7	TEST DATE:	04/03/90
JOB NUMBER:	90-L-030	DEPTH:	N/A
SAMPLE NUMBER:	645 composite	INITIAL WT:	50.39 (g)
TYPE OF WATER USED:	DISTILLED	TOTAL SAMPLE WT:	154.30 (g)
REACTION WITH H202:	NONE	TOTAL WT PASSING #200:	96.01 (g)
DISPERSANT:	(NaPO3)6	START TIME:	9:31

DATE (1990)	TIME (MIN)	TEMP (C)	R (g/l)	Rl (g/l)	Rcorr (g/l)	L (CM)	D (MM)	P (%)	%FINER
4/3	0.25	19.0	50.0	2.0	48.0	8.1	0.07885	95.25700	59.27171
	0.50	19.0	48.0	2.0	46.0	8.4	0.05687	91.28795	56.80205
	1.00	19.0	46.0	2.0	44.0	8.8	0.04099	87.31891	54.33240
	2.00	19.0	42.5	2.0	40.5	9.3	0.02992	80.37309	50.01050
	5.00	19.0	41.0	2.0	39.0	9.6	0.01917	77.39631	48.15826
	10.00	19.0	37.5	2.0	35.5	10.2	0.01396	70.45049	43.83637
	20.00	19.0	33.0	2.0	31.0	10.9	0.01022	61.52014	38.27964
	60.00	19.0	26.0	2.0	24.0	12.0	0.00620	47.62850	29.63585
	120.00	19.0	22.0	2.0	20.0	12.7	0.00450	39.69041	24.69654
	240.00	19.0	19.0	2.0	17.0	13.2	0.00325	33.73685	20.99206
	430.00	19.0	17.0	2.0	15.0	13.5	0.00246	29.76781	18.52241
4/4	1370.00	19.0	14.0	2.0	12.0	14.0	0.00140	23.81425	14.81793

COMMENTS: Assume mean particle density is 2.65 g/cc

LABORATORY ANALYSIS PERFORMED BY: L. Simpson
CALCULATIONS MADE BY: K. Evans
CHECKED BY: D. Hammermeister



USDA PARTICLE SIZE LIMIT CLASSIFICATION

θ_i = -	d_{10} = -	d_{50} = 0.026	d_{60} = 0.073	C_u = -	C_c = -
SAMPLE NUMBER		DEPTH	CLASSIFICATION (USDA TEXTURE TRIANGLE)		
645 Composite		N/A	Loam		

DANIEL B. STEPHENS & ASSOCIATES, INC.

WET/DRY SIEVE ANALYSIS DATA

JOB NAME: JACOBS ENGINEERING - WORK ORDER #7
JOB NUMBER: 90-L-030
TEST DATE: 03/26/90
SAMPLE NUMBER: 646 composite
DEPTH: N/A

TOTAL WEIGHT OF SAMPLE: 146.87 (g)

SIEVE NUMBER	DIAMETER (mm)	WT. RETAINED	CUM WT. RETAINED	WT. PASSING	% PASSING	LOG DIAMETER
3/8	9.500	2.59	2.59	144.28	98.24	0.978
4	4.750	0.00	2.59	144.28	98.24	0.677
6	3.350	0.85	3.44	143.43	97.66	0.525
10	2.000	0.46	3.90	142.97	97.34	0.301
16	1.180	0.76	4.66	142.21	96.83	0.072
40	0.425	6.21	10.87	136.00	92.60	-0.372
70	0.212	39.21	50.08	96.79	65.90	-0.674
140	0.106	48.17	98.25	48.62	33.10	-0.975
200	0.075	11.80	110.05	36.82	25.07	-1.125
pan		36.76	146.81	0.06		

d10: 0.0060 (mm) d50: 0.15 (mm)
d16: 0.030 (mm) d60: 0.18 (mm)
d30: 0.091 (mm) d84: 0.33 (mm)

MEDIAN PARTICLE DIAMETER (d50): 0.15
UNIFORMITY COEFFICIENT, Cu (d60/d10): 30.00
COEFFICIENT OF CURVATURE, Cc, [(d30)**2/(d10*d60)]: 7.67
MEAN PARTICLE DIAMETER, [(d16+d50+d84)/3]: 0.17

COMMENTS:

LABORATORY ANALYSIS PERFORMED BY: M. Burkhard
CALCULATIONS MADE BY: S. Stoller
CHECKED BY: D. Hammermeister

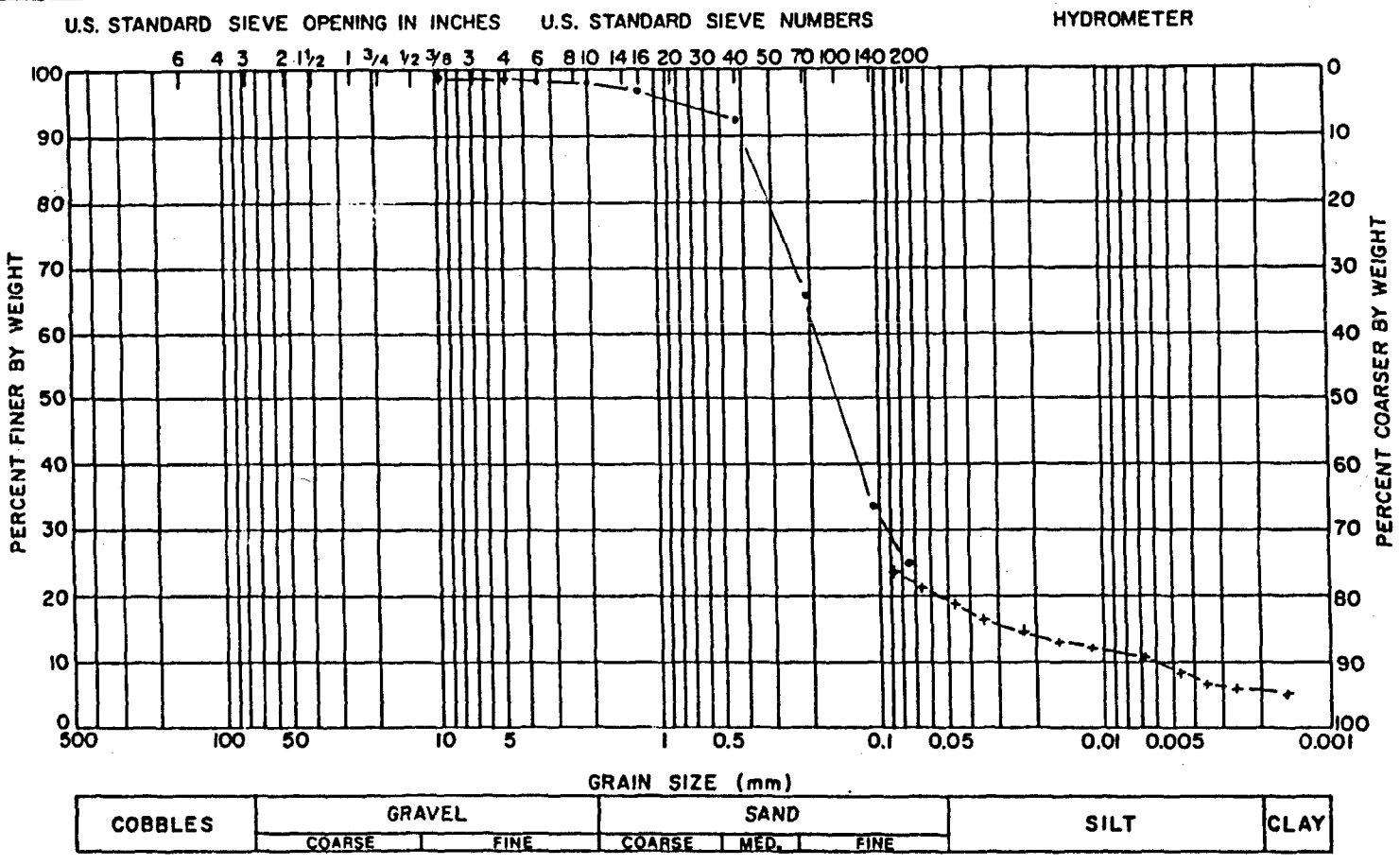
HYDROMETER DATA

JOB NAME:	JACOBS ENGINEERING - WORK ORDER #7	TEST DATE:	04/03/90
JOB NUMBER:	90-L-030	DEPTH:	N/A
SAMPLE NUMBER:	646 composite	INITIAL WT:	36.59 (g)
TYPE OF WATER USED:	DISTILLED	TOTAL SAMPLE WT:	146.87 (g)
REACTION WITH H202:	NONE	TOTAL WT PASSING #200:	36.82 (g)
DISPERSANT:	(NaPO3)6	START TIME:	9:37

DATE (1990)	TIME (MIN)	TEMP (C)	R (g/l)	Rl (g/l)	Rcorr (g/l)	L (CM)	D (MM)	P (%)	%FINER
4/3	0.25	19.0	36.0	2.0	34.0	10.4	0.08932	92.92156	23.29524
	0.50	19.0	33.0	2.0	31.0	10.9	0.06464	84.72260	21.23978
	1.00	19.0	30.0	2.0	28.0	11.4	0.04673	76.52364	19.18432
	2.00	19.0	27.0	2.0	25.0	11.9	0.03375	68.32468	17.12885
	5.00	19.0	24.0	2.0	22.0	12.4	0.02178	60.12572	15.07339
	10.00	19.0	22.0	2.0	20.0	12.7	0.01560	54.65974	13.70308
	20.00	19.0	20.0	2.0	18.0	13.0	0.01118	49.19377	12.33277
	60.00	19.0	17.0	2.0	15.0	13.5	0.00657	40.99481	10.27731
	120.00	19.0	15.0	2.0	13.0	13.8	0.00470	35.52883	8.90700
	240.00	19.0	13.5	2.0	11.5	14.1	0.00336	31.42935	7.87927
	425.00	19.0	12.0	2.0	10.0	14.3	0.00254	27.32987	6.85154
4/4	1365.00	19.0	10.0	2.0	8.0	14.7	0.00144	21.86390	5.48123

COMMENTS: Assume mean particle density is 2.65 g/cc

LABORATORY ANALYSIS PERFORMED BY: L. Simpson
CALCULATIONS MADE BY: K. Evans
CHECKED BY: D. Hammermeister



USDA PARTICLE SIZE LIMIT CLASSIFICATION

θ_1 = -	d_{10}= 0.0060	d_{50}= 0.15	d_{60}= 0.18	C_u = 30	C_c = 7.7
SAMPLE NUMBER		DEPTH	CLASSIFICATION (USDA TEXTURE TRIANGLE)		
646 Composite		N/A	Loamy Sand		

DANIEL B. STEPHENS & ASSOCIATES, INC.

WET/DRY SIEVE ANALYSIS DATA

JOB NAME: JACOBS ENGINEERING - WORK ORDER #7
JOB NUMBER: 90-L-030
TEST DATE: 03/16/90
SAMPLE NUMBER: Rs-3 composite
DEPTH: N/A

TOTAL WEIGHT OF SAMPLE: 640.05 (g)

SIEVE NUMBER	DIAMETER (mm)	WT. RETAINED	CUM WT. RETAINED	WT. PASSING	% PASSING	LOG DIAMETER
3/4	19.000	33.38	33.38	606.67	94.78	1.279
3/8	9.500	115.84	149.22	490.83	76.69	0.978
4	4.750	62.29	211.51	428.54	66.95	0.677
6	3.350	30.28	241.79	398.26	62.22	0.525
10	2.000	19.72	261.51	378.54	59.14	0.301
16	1.180	14.71	276.22	363.83	56.84	0.072
40	0.425	24.06	300.28	339.77	53.08	-0.372
70	0.212	31.32	331.60	308.45	48.19	-0.674
140	0.106	37.12	368.72	271.33	42.39	-0.975
200	0.075	16.82	385.54	254.51	39.76	-1.125
pan		253.78	639.32	0.73		

d10: 0.0020 (mm) d50: 0.27 (mm)
d16: 0.0070 (mm) d60: 2.4 (mm)
d30: 0.036 (mm) d84: 13 (mm)

MEDIAN PARTICLE DIAMETER (d50): 0.27
UNIFORMITY COEFFICIENT, Cu (d60/d10): 1200.00
COEFFICIENT OF CURVATURE, Cc, [(d30)**2/(d10*d60)]: 0.27
MEAN PARTICLE DIAMETER, [(d16+d50+d84)/3]: 4.43

COMMENTS:

LABORATORY ANALYSIS PERFORMED BY: L. Simpson
CALCULATIONS MADE BY: L. Simpson
CHECKED BY: D. Hammermeister

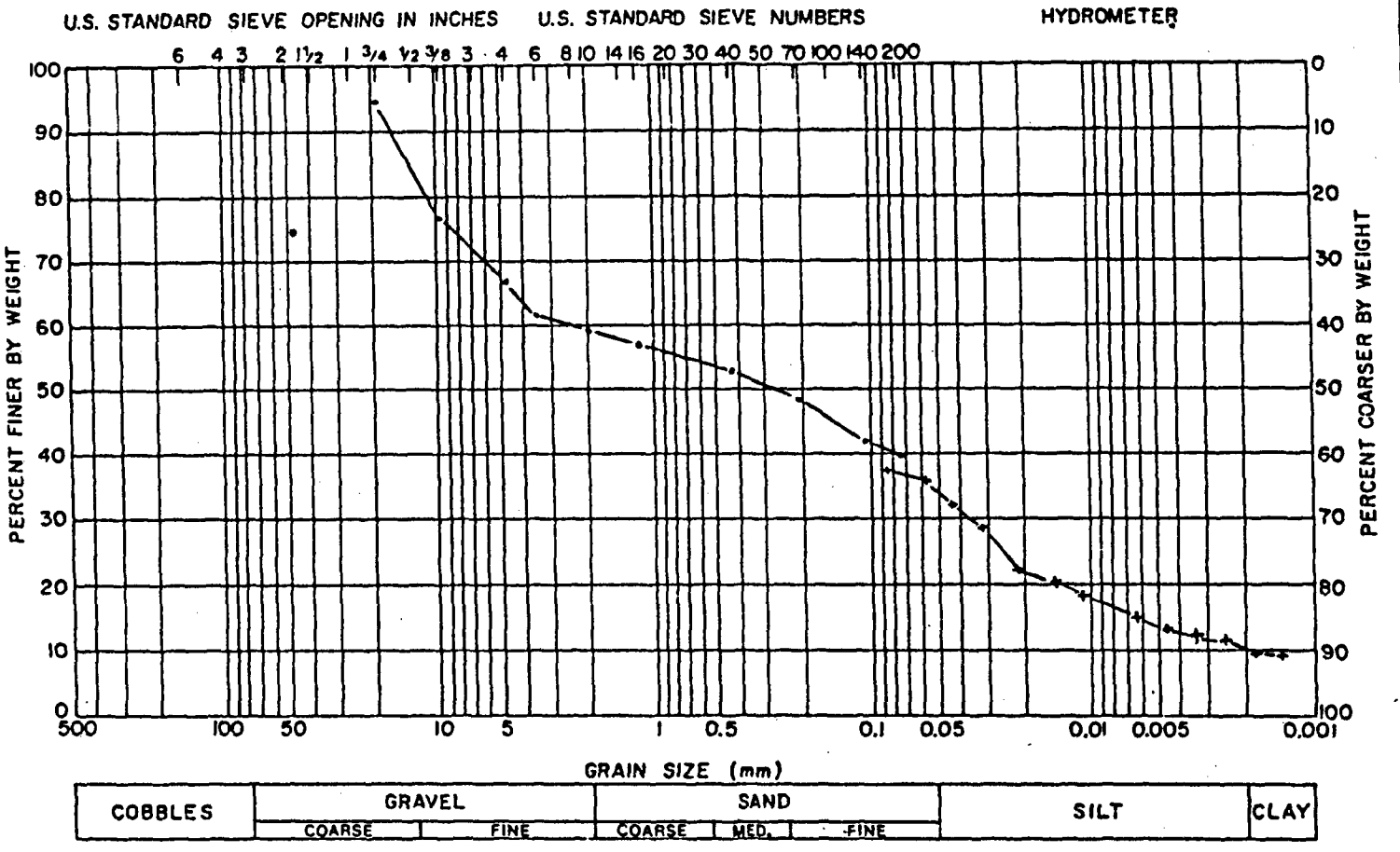
HYDROMETER DATA

JOB NAME:	JACOBS ENGINEERING - WORK ORDER #7	TEST DATE:	4/10/90
JOB NUMBER:	90-L-030	DEPTH:	N/A
SAMPLE NUMBER:	Rs-3 composite	INITIAL WT:	47.65 (g)
TYPE OF WATER USED:	DISTILLED	TOTAL SAMPLE WT:	640.05 (g)
REACTION WITH H2O2:	SLIGHT	TOTAL WT PASSING #200:	254.51 (g)
DISPERSANT:	(NaPO3)6	START TIME:	8:42

DATE (1990)	TIME (MIN)	TEMP (C)	R (g/l)	Rl (g/l)	Rcorr (g/l)	L (CM)	D (MM)	P (%)	%FINER
4/10	0.25	18.5	47.0	2.0	45.0	8.6	0.08168	94.43861	37.55265
	0.50	18.5	45.0	2.0	43.0	8.9	0.05885	90.24134	35.88364
	1.00	18.5	41.0	2.0	39.0	9.6	0.04311	81.84680	32.54563
	2.00	18.5	36.0	2.0	34.0	10.4	0.03176	71.35362	28.37311
	5.00	18.5	29.0	2.0	27.0	11.5	0.02117	56.66317	22.53159
	10.00	18.5	26.5	2.0	24.5	12.0	0.01523	51.41658	20.44533
	20.50	18.5	23.5	2.0	21.5	12.4	0.01085	45.12067	17.94182
	63.00	18.5	20.0	2.0	18.0	13.0	0.00633	37.77545	15.02106
	123.00	18.5	17.5	2.0	15.5	13.4	0.00460	32.52886	12.93480
	240.00	19.0	16.5	2.0	14.5	13.6	0.00330	30.43022	12.10030
	472.00	19.0	15.0	2.0	13.0	13.8	0.00237	27.28227	10.84854
	857.00	19.0	13.5	2.0	11.5	14.1	0.00178	24.13431	9.59679
4/11	1412.00	19.0	13.0	2.0	11.0	14.2	0.00139	23.08499	9.17954

COMMENTS: Assume mean particle density is 2.65 g/cc

LABORATORY ANALYSIS PERFORMED BY: L. Simpson
CALCULATIONS MADE BY: K. Evans
CHECKED BY: D. Hammermeister



USDA PARTICLE SIZE LIMIT CLASSIFICATION

θ_i = --	d_{10} = 0.0020	d_{50} = 0.27	d_{60} = 2.4	C_u = 1200	C_c = 0.27
SAMPLE NUMBER		DEPTH	CLASSIFICATION (USDA TEXTURE TRIANGLE)		
Rs-3 Composite		N/A	Gravelly Loam		

DANIEL B. STEPHENS & ASSOCIATES, INC.

WET/DRY SIEVE ANALYSIS DATA

JOB NAME: JACOBS ENGINEERING - WORK ORDER #7
JOB NUMBER: 90-L-030
TEST DATE: 03/27/90
SAMPLE NUMBER: Rs-4 composite
DEPTH: N/A

TOTAL WEIGHT OF SAMPLE: 151.93 (g)

SIEVE NUMBER	DIAMETER (mm)	WT. RETAINED	CUM WT. RETAINED	WT. PASSING	% PASSING	LOG DIAMETER
3/8	9.500	10.05	10.05	141.88	93.39	0.978
4	4.750	11.17	21.22	130.71	86.03	0.677
6	3.350	7.09	28.31	123.62	81.37	0.525
10	2.000	4.31	32.62	119.31	78.53	0.301
16	1.180	2.64	35.26	116.67	76.79	0.072
40	0.425	4.91	40.17	111.76	73.56	-0.372
70	0.212	7.07	47.24	104.69	68.91	-0.674
140	0.106	9.82	57.06	94.87	62.44	-0.975
200	0.075	5.50	62.56	89.37	58.82	-1.125
pan		89.30	151.86	0.07		

d10: -- (mm) d50: 0.043 (mm)
d16: -- (mm) d60: 0.089 (mm)
d30: 0.0060 (mm) d84: 5.0 (mm)

MEDIAN PARTICLE DIAMETER (d50): 0.043
UNIFORMITY COEFFICIENT, Cu (d60/d10): --
COEFFICIENT OF CURVATURE, Cc, [(d30)**2/(d10*d60)]: --
MEAN PARTICLE DIAMETER, [(d16+d50+d84)/3]: --

COMMENTS:

LABORATORY ANALYSIS PERFORMED BY: S. Stoller
CALCULATIONS MADE BY: S. Stoller
CHECKED BY: D. Hammermeister

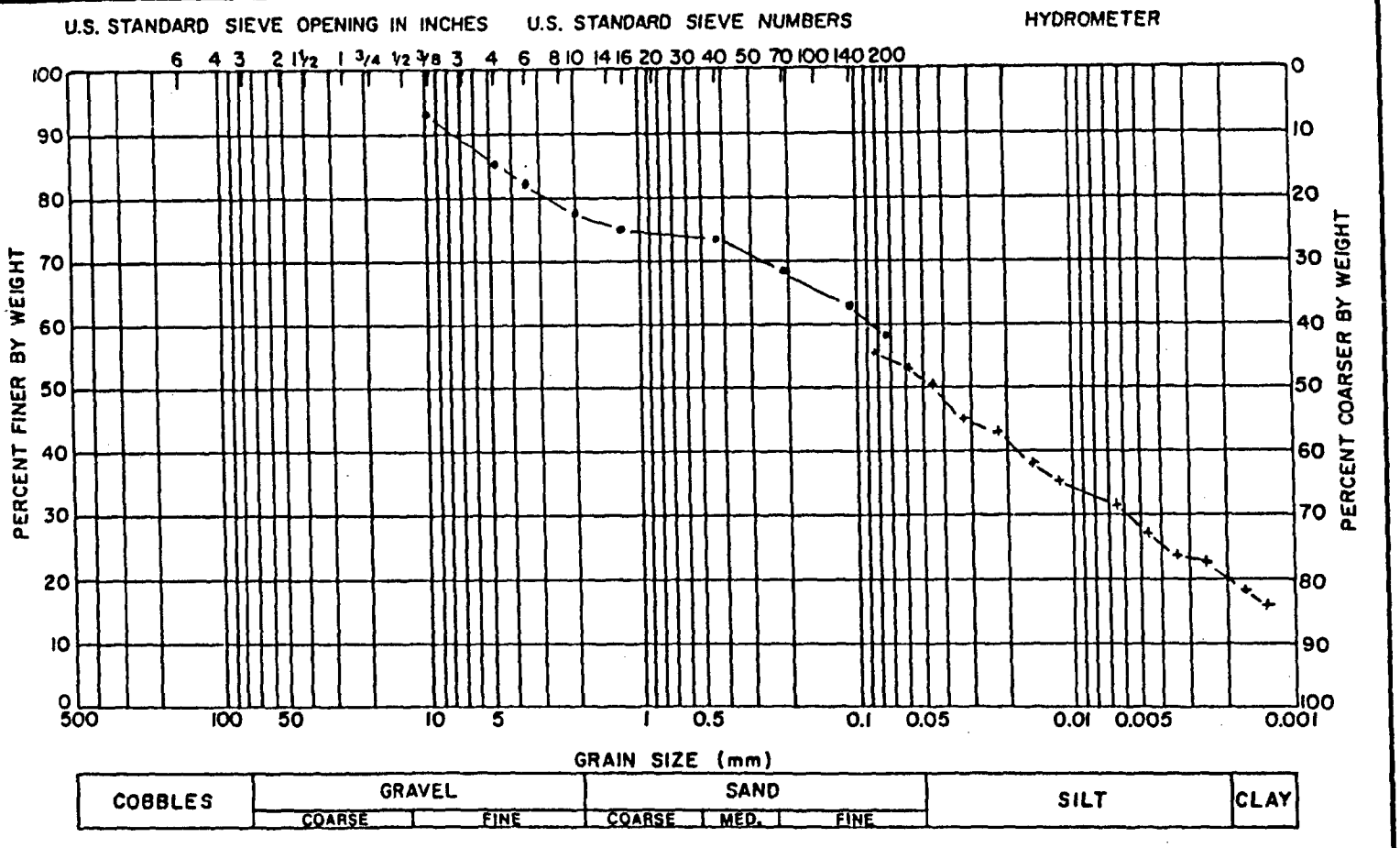
HYDROMETER DATA

JOB NAME:	JACOBS ENGINEERING - WORK ORDER #7	TEST DATE:	4/10/90
JOB NUMBER:	90-L-030	DEPTH:	N/A
SAMPLE NUMBER:	Rs-4 composite	INITIAL WT:	45.59 (g)
TYPE OF WATER USED:	DISTILLED	TOTAL SAMPLE WT:	151.93 (g)
REACTION WITH H202:	V. SLIGHT	TOTAL WT PASSING #200:	89.36 (g)
DISPERSANT:	(NaPO3)6	START TIME:	8:48

DATE (1990)	TIME (MIN)	TEMP (C)	R (g/l)	Rl (g/l)	Rcorr (g/l)	L (CM)	D (MM)	P (%)	%FINER
4/10	0.25	18.5	46.0	2.0	44.0	8.8	0.08245	96.51239	56.76527
	0.50	18.5	43.0	2.0	41.0	9.3	0.05992	89.93200	52.89491
	1.00	18.5	41.0	2.0	39.0	9.6	0.04311	85.54508	50.31467
	2.00	18.5	38.0	2.0	36.0	10.1	0.03126	78.96469	46.44431
	5.00	18.5	35.0	2.0	33.0	10.6	0.02025	72.38429	42.57395
	10.00	18.5	32.0	2.0	30.0	11.1	0.01465	65.80390	38.70359
	20.50	18.5	29.5	2.0	27.5	11.5	0.01042	60.32025	35.47829
	60.00	18.5	25.5	2.0	23.5	12.1	0.00626	51.54639	30.31781
	120.00	18.5	23.0	2.0	21.0	12.5	0.00450	46.06273	27.09252
	240.00	19.0	20.0	2.0	18.0	13.0	0.00323	39.48234	23.22216
	467.00	19.0	19.0	2.0	17.0	13.2	0.00233	37.28888	21.93204
	852.00	19.0	17.0	2.0	15.0	13.5	0.00174	32.90195	19.35180
4/11	1407.00	19.0	16.0	2.0	14.0	13.7	0.00137	30.70849	18.06168

COMMENTS: Assume mean particle density is 2.65 g/cc

LABORATORY ANALYSIS PERFORMED BY: L. Simpson
CALCULATIONS MADE BY: K. Evans
CHECKED BY: D. Hammermeister



USDA PARTICLE SIZE LIMIT CLASSIFICATION

θ_i = -	d_{10} = -	d_{50} = 0.043	d_{60} = 0.089	C_u = -	C_c = -
SAMPLE NUMBER		DEPTH	CLASSIFICATION (USDA TEXTURE TRIANGLE)		
Rs-4 Composite		N/A	Silt Loam		

DANIEL B. STEPHENS & ASSOCIATES, INC.

WET/DRY SIEVE ANALYSIS DATA

JOB NAME: JACOBS ENGINEERING - WORK ORDER #7
JOB NUMBER: 90-L-030
TEST DATE: 03/16/90
SAMPLE NUMBER: Rs-5 composite
DEPTH: N/A

TOTAL WEIGHT OF SAMPLE: 615.82 (g)

SIEVE NUMBER	DIAMETER (mm)	WT. RETAINED	CUM WT. RETAINED	WT. PASSING	% PASSING	LOG DIAMETER
3/4	19.000	126.63	126.63	489.19	79.44	1.279
3/8	9.500	40.88	167.51	448.31	72.80	0.978
4	4.750	30.12	197.63	418.19	67.91	0.677
6	3.350	14.52	212.15	403.67	65.55	0.525
10	2.000	12.96	225.11	390.71	63.45	0.301
16	1.180	10.02	235.13	380.69	61.82	0.072
40	0.425	23.74	258.87	356.95	57.96	-0.372
70	0.212	36.58	295.45	320.37	52.02	-0.674
140	0.106	38.20	333.65	282.17	45.82	-0.975
200	0.075	15.31	348.96	266.86	43.33	-1.125
pan		266.73	615.69	0.13		

d10: -- (mm) d50: 0.17 (mm)
d16: 0.0033 (mm) d60: 0.80 (mm)
d30: 0.022 (mm) d84: -- (mm)

MEDIAN PARTICLE DIAMETER (d50): 0.17
UNIFORMITY COEFFICIENT, Cu (d60/d10): --
COEFFICIENT OF CURVATURE, Cc, [(d30)**2/(d10*d60)]: --
MEAN PARTICLE DIAMETER, [(d16+d50+d84)/3]: --

COMMENTS:

LABORATORY ANALYSIS PERFORMED BY: L. Simpson
CALCULATIONS MADE BY: L. Simpson
CHECKED BY: D. Hammermeister

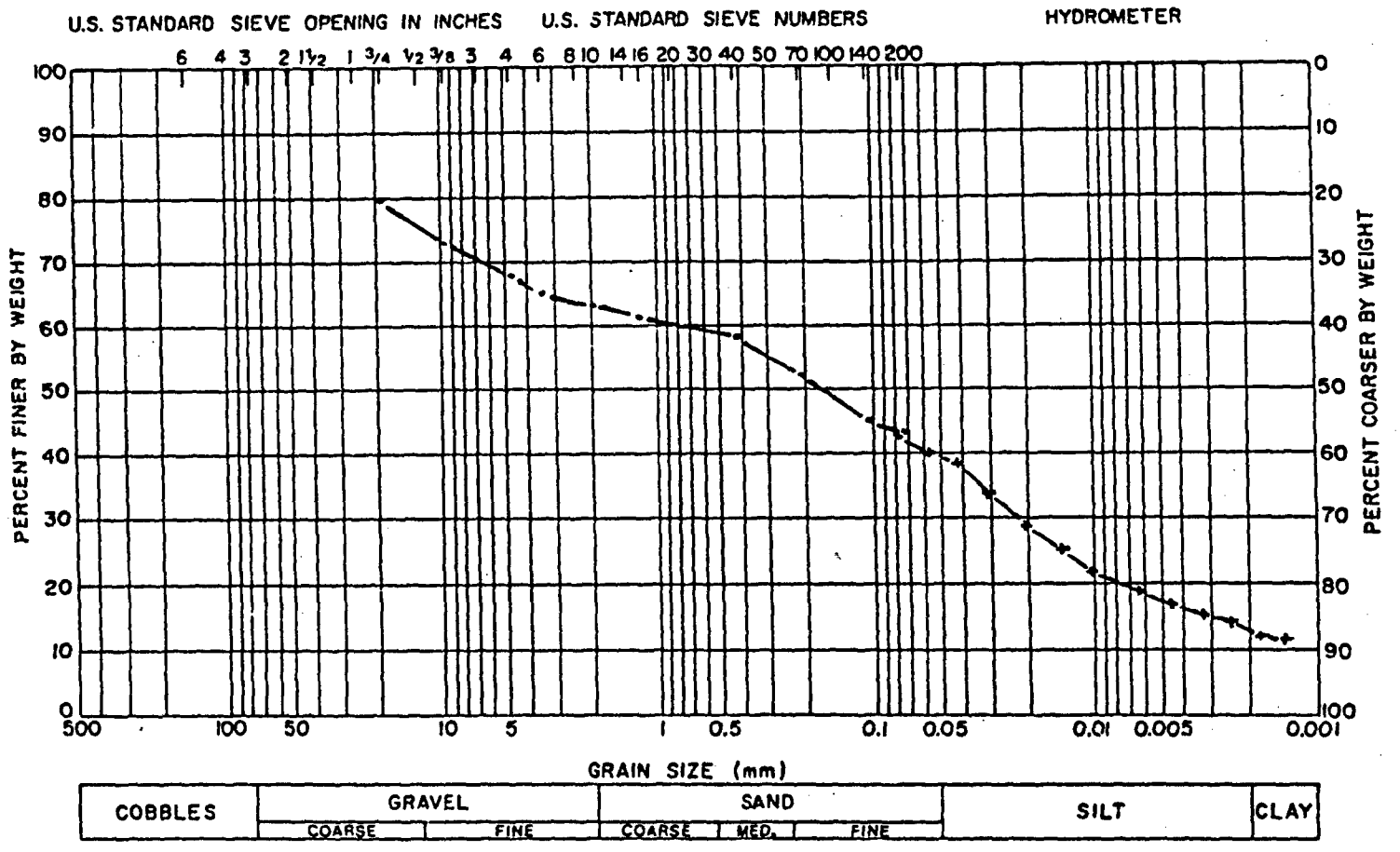
HYDROMETER DATA

JOB NAME:	JACOBS ENGINEERING - WORK ORDER #7	TEST DATE:	4/10/90
JOB NUMBER:	90-L-030	DEPTH:	N/A
SAMPLE NUMBER:	Rs-5 composite	INITIAL WT:	48.63 (g)
TYPE OF WATER USED:	DISTILLED	TOTAL SAMPLE WT:	615.82 (g)
REACTION WITH H2O2:	SLIGHT	TOTAL WT PASSING #200:	266.86 (g)
DISPERSANT:	(NaPO3)6	START TIME:	8:54

DATE (1990)	TIME (MIN)	TEMP (C)	R (g/l)	Rl (g/l)	Rcorr (g/l)	L (CM)	D (MM)	P (%)	%FINER
4/10	0.25	18.5	50.0	2.0	48.0	8.1	0.07931	98.70450	42.77270
	0.50	18.5	47.0	2.0	45.0	8.6	0.05776	92.53547	40.09941
	1.00	18.5	45.0	2.0	43.0	8.9	0.04161	88.42278	38.31721
	2.00	18.5	40.0	2.0	38.0	9.7	0.03075	78.14107	33.86172
	5.00	18.5	34.0	2.0	32.0	10.7	0.02040	65.80300	28.51513
	10.00	18.5	30.0	2.0	28.0	11.4	0.01486	57.57763	24.95074
	20.50	18.5	27.0	2.0	25.0	11.9	0.01060	51.40860	22.27745
	60.00	18.5	23.0	2.0	21.0	12.5	0.00637	43.18322	18.71306
	120.00	18.5	21.0	2.0	19.0	12.9	0.00456	39.07053	16.93086
	246.00	19.0	19.5	2.0	17.5	13.1	0.00320	35.98602	15.59421
	462.00	19.0	17.5	2.0	15.5	13.4	0.00236	31.87333	13.81202
	847.00	19.0	16.0	2.0	14.0	13.7	0.00176	28.78881	12.47537
4/11	1402.00	19.0	15.0	2.0	13.0	13.8	0.00138	26.73247	11.58427

COMMENTS: Assume mean particle density is 2.65 g/cc

LABORATORY ANALYSIS PERFORMED BY: L. Simpson
CALCULATIONS MADE BY: K. Evans
CHECKED BY: D. Hammermeister



USDA PARTICLE SIZE LIMIT CLASSIFICATION

θ_i = --	d_{10} = --	d_{50} = 0.17	d_{60} = 0.80	C_u = --	C_c = --
SAMPLE NUMBER		DEPTH	CLASSIFICATION (USDA TEXTURE TRIANGLE)		
Rs-5 Composite		N/A	Gravelly Loam		

DANIEL B. STEPHENS & ASSOCIATES, INC.

WET/DRY SIEVE ANALYSIS DATA

JOB NAME: JACOBS ENGINEERING - WORK ORDER #7
JOB NUMBER: 90-L-030
TEST DATE: 03/16/90
SAMPLE NUMBER: Rs-6 composite
DEPTH: N/A

TOTAL WEIGHT OF SAMPLE: 597.91 (g)

SIEVE NUMBER	DIAMETER (mm)	WT. RETAINED	CUM WT. RETAINED	WT. PASSING	% PASSING	LOG DIAMETER
3/4	19.000	0.00	0.00	597.91	100.00	1.279
3/8	9.500	85.31	85.31	512.60	85.73	0.978
4	4.750	34.99	120.30	477.61	79.88	0.677
6	3.350	17.45	137.75	460.16	76.96	0.525
10	2.000	11.32	149.07	448.84	75.07	0.301
16	1.180	8.68	157.75	440.16	73.62	0.072
40	0.425	13.95	171.70	426.21	71.28	-0.372
70	0.212	22.47	194.17	403.74	67.53	-0.674
140	0.106	32.53	226.70	371.21	62.08	-0.975
200	0.075	14.40	241.10	356.81	59.68	-1.125
pan		356.93	598.03	-0.12		

d10: -- (mm) d50: 0.035 (mm)
d16: -- (mm) d60: 0.076 (mm)
d30: 0.0074 (mm) d84: 9.0 (mm)

MEDIAN PARTICLE DIAMETER (d50): 0.035
UNIFORMITY COEFFICIENT, Cu (d60/d10): --
COEFFICIENT OF CURVATURE, Cc, [(d30)**2/(d10*d60)]: --
MEAN PARTICLE DIAMETER, [(d16+d50+d84)/3]: --

COMMENTS:

LABORATORY ANALYSIS PERFORMED BY: L. Simpson
CALCULATIONS MADE BY: L. Simpson
CHECKED BY: D. Hammermeister

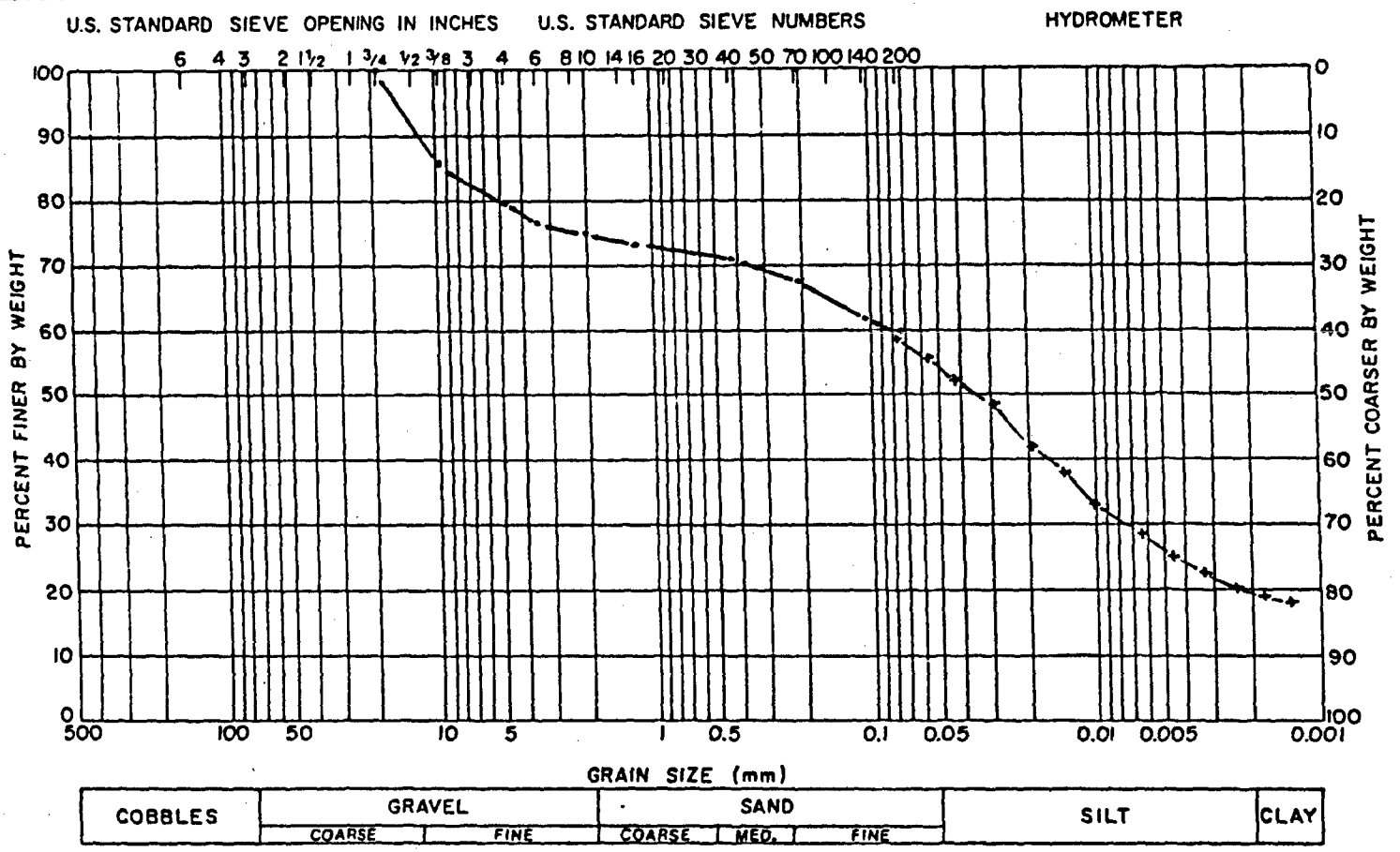
HYDROMETER DATA

JOB NAME:	JACOBS ENGINEERING - WORK ORDER #7	TEST DATE:	4/10/90
JOB NUMBER:	90-L-030	DEPTH:	N/A
SAMPLE NUMBER:	Rs-6 composite	INITIAL WT:	51.51 (g)
TYPE OF WATER USED:	DISTILLED	TOTAL SAMPLE WT:	597.91 (g)
REACTION WITH H202:	SLIGHT	TOTAL WT PASSING #200:	356.81 (g)
DISPERSANT:	(NaPO3)6	START TIME:	9:00

DATE (1990)	TIME (MIN)	TEMP (C)	R (g/l)	Rl (g/l)	Rcorr (g/l)	L (CM)	D (MM)	P (%)	%FINER
4/10	0.25	18.5	52.0	2.0	50.0	7.8	0.07769	97.06853	57.92682
	0.50	18.5	50.0	2.0	48.0	8.1	0.05608	93.18579	55.60974
	1.00	18.5	47.0	2.0	45.0	8.6	0.04084	87.36168	52.13413
	2.00	18.5	43.5	2.0	41.5	9.2	0.02983	80.56688	48.07926
	5.00	18.5	38.0	2.0	36.0	10.1	0.01977	69.88934	41.70731
	10.00	18.5	34.0	2.0	32.0	10.7	0.01443	62.12386	37.07316
	20.50	18.5	31.0	2.0	29.0	11.2	0.01030	56.29975	33.59755
	60.00	18.5	26.0	2.0	24.0	12.0	0.00624	46.59289	27.80487
	120.00	18.5	23.5	2.0	21.5	12.4	0.00449	41.73947	24.90853
	242.00	19.0	22.0	2.0	20.0	12.7	0.00317	38.82741	23.17073
	457.00	19.0	19.5	2.0	17.5	13.1	0.00235	33.97399	20.27439
	842.00	19.0	18.0	2.0	16.0	13.3	0.00174	31.06193	18.53658
4/11	1397.00	19.0	17.0	2.0	15.0	13.5	0.00136	29.12056	17.37804

COMMENTS: Assume mean particle density is 2.65 g/cc

LABORATORY ANALYSIS PERFORMED BY: L. Simpson
CALCULATIONS MADE BY: K. Evans
CHECKED BY: D. Hammermeister



USDA PARTICLE SIZE LIMIT CLASSIFICATION

θ_i = --	d_{10} = --	d_{50} = 0.035	d_{60} = 0.076	C_u = --	C_c = --
SAMPLE NUMBER		DEPTH	CLASSIFICATION (USDA TEXTURE TRIANGLE)		
Rs-6 Composite		N/A	Gravelly Loam		

DANIEL B. STEPHENS & ASSOCIATES, INC.

WET/DRY SIEVE ANALYSIS DATA

JOB NAME: JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER: 89-L-144
TEST DATE: 03/16/90
SAMPLE NUMBER: Rs-7 composite
DEPTH: N/A

TOTAL WEIGHT OF SAMPLE: 606.82 (g)

SIEVE NUMBER	DIAMETER (mm)	WT. RETAINED	CUM WT. RETAINED	WT. PASSING	% PASSING	LOG DIAMETER
3/4	19.000	0.00	0.00	606.82	100.00	1.279
3/8	9.500	27.71	27.71	579.11	95.43	0.978
4	4.750	34.19	61.90	544.92	89.80	0.677
6	3.350	26.26	88.16	518.66	85.47	0.525
10	2.000	18.50	106.66	500.16	82.42	0.301
16	1.180	13.73	120.39	486.43	80.16	0.072
40	0.425	23.30	143.69	463.13	76.32	-0.372
70	0.212	34.54	178.23	428.59	70.63	-0.674
140	0.106	41.20	219.43	387.39	63.84	-0.975
200	0.075	17.06	236.49	370.33	61.03	-1.125
pan		369.92	606.41	0.41		

d10: -- (mm) d50: 0.037 (mm)
d16: -- (mm) d60: 0.070 (mm)
d30: 0.0080 (mm) d84: 2.8 (mm)

MEDIAN PARTICLE DIAMETER (d50): 0.037
UNIFORMITY COEFFICIENT, Cu (d60/d10): --
COEFFICIENT OF CURVATURE, Cc, [(d30)**2/(d10*d60)]: --
MEAN PARTICLE DIAMETER, [(d16+d50+d84)/3]: --

COMMENTS:

LABORATORY ANALYSIS PERFORMED BY: L. Simpson
CALCULATIONS MADE BY: L. Simpson
CHECKED BY: D. Hammermeister

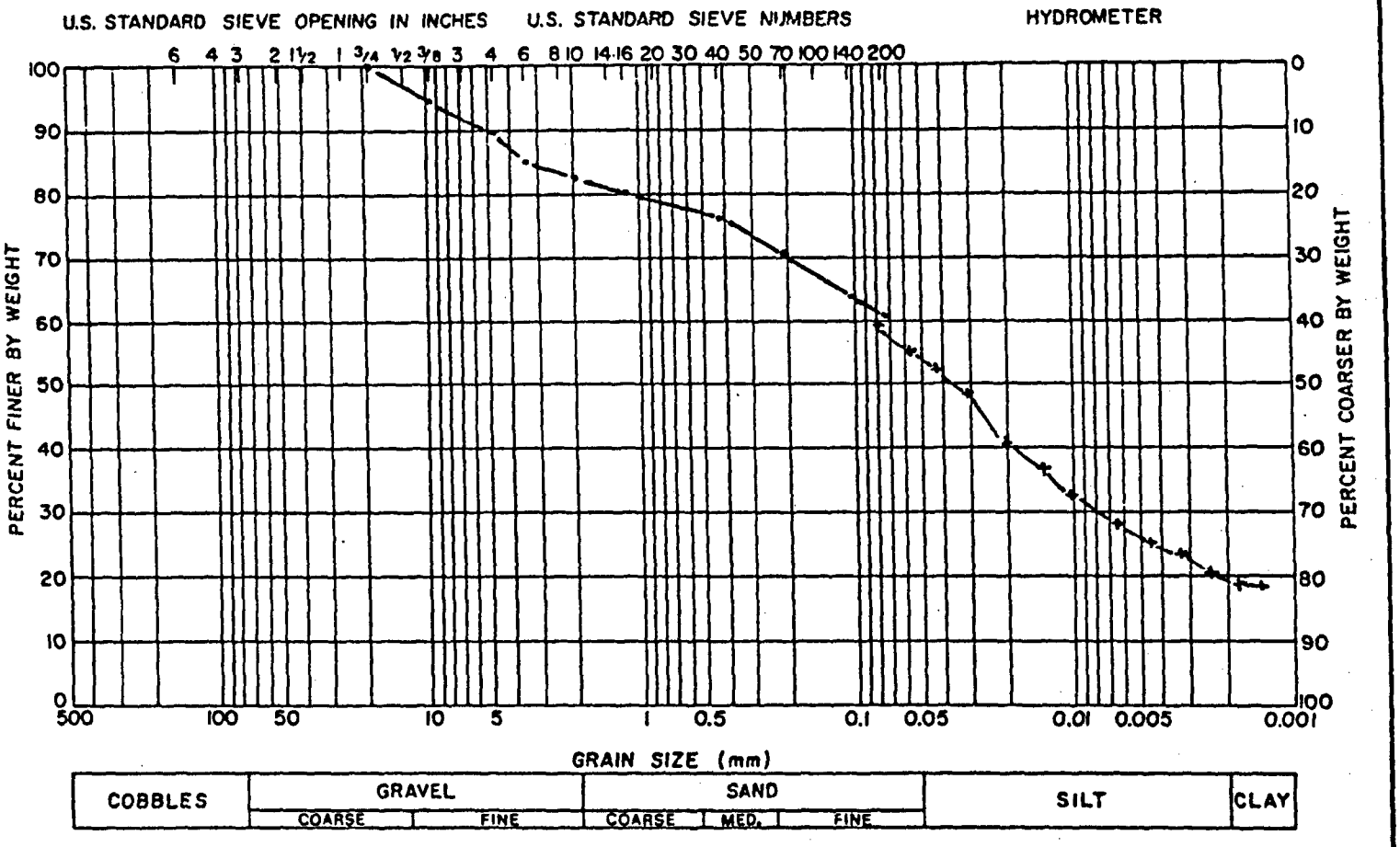
HYDROMETER DATA

JOB NAME:	JACOBS ENGINEERING - WORK ORDER #7	TEST DATE:	4/10/90
JOB NUMBER:	90-L-030	DEPTH:	N/A
SAMPLE NUMBER:	Rs-7 composite	INITIAL WT:	48.56 (g)
TYPE OF WATER USED:	DISTILLED	TOTAL SAMPLE WT:	606.82 (g)
REACTION WITH H2O2:	NONE	TOTAL WT PASSING #200:	370.33 (g)
DISPERSANT:	(NaPO3)6	START TIME:	9:06

DATE (1990)	TIME (MIN)	TEMP (C)	R (g/l)	Rl (g/l)	Rcorr (g/l)	L (CM)	D (MM)	P (%)	%FINER
4/10	0.25	18.5	49.0	2.0	47.0	8.3	0.08011	96.78748	59.06745
	0.50	18.5	46.0	2.0	44.0	8.8	0.05830	90.60956	55.29718
	1.00	18.5	44.0	2.0	42.0	9.1	0.04199	86.49094	52.78367
	2.00	18.5	40.0	2.0	38.0	9.7	0.03075	78.25371	47.75666
	5.00	18.5	34.0	2.0	32.0	10.7	0.02040	65.89786	40.21613
	10.00	18.5	31.0	2.0	29.0	11.2	0.01475	59.71993	36.44587
	20.50	18.5	28.0	2.0	26.0	11.7	0.01053	53.54201	32.67561
	60.00	18.5	24.0	2.0	22.0	12.4	0.00632	45.30478	27.64859
	120.00	18.5	22.0	2.0	20.0	12.7	0.00453	41.18616	25.13508
	240.00	19.0	20.5	2.0	18.5	12.9	0.00322	38.09720	23.24995
	452.00	19.0	18.0	2.0	16.0	13.3	0.00238	32.94893	20.10807
	837.00	19.0	16.5	2.0	14.5	13.6	0.00177	29.85997	18.22294
4/11	1392.00	19.0	16.0	2.0	14.0	13.7	0.00137	28.83031	17.59456

COMMENTS: Assume mean particle density is 2.65 g/cc

LABORATORY ANALYSIS PERFORMED BY: L. Simpson
CALCULATIONS MADE BY: K. Evans
CHECKED BY: D. Hammermeister



USDA PARTICLE SIZE LIMIT CLASSIFICATION

θ_1 = --	d_{10} = --	d_{50} = 0.037	d_{60} = 0.070	C_u = --	C_c = --
SAMPLE NUMBER		DEPTH	CLASSIFICATION (USDA TEXTURE TRIANGLE)		
Rs-7 Composite		N/A	Gravelly Loam		

DANIEL B. STEPHENS & ASSOCIATES, INC.

WET/DRY SIEVE ANALYSIS DATA

JOB NAME: JACOBS ENGINEERING - WORK ORDER #7
JOB NUMBER: 90-L-030
TEST DATE: 03/27/90
SAMPLE NUMBER: Rs-8 composite
DEPTH: N/A

TOTAL WEIGHT OF SAMPLE: 156.38 (g)

SIEVE NUMBER	DIAMETER (mm)	WT. RETAINED	CUM WT. RETAINED	WT. PASSING	% PASSING	LOG DIAMETER
3/4	19.000	0.00	0.00	156.38	100.00	1.279
3/8	9.500	13.02	13.02	143.36	91.67	0.978
4	4.750	16.42	29.44	126.94	81.17	0.677
6	3.350	8.07	37.51	118.87	76.01	0.525
10	2.000	5.11	42.62	113.76	72.75	0.301
16	1.180	4.01	46.63	109.75	70.18	0.072
40	0.425	7.22	53.85	102.53	65.56	-0.372
70	0.212	9.84	63.69	92.69	59.27	-0.674
140	0.106	11.98	75.67	80.71	51.61	-0.975
200	0.075	5.87	81.54	74.84	47.86	-1.125
pan		74.38	155.92	0.46		

d10:	-- (mm)	d50:	0.092 (mm)
d16:	0.0018 (mm)	d60:	0.22 (mm)
d30:	0.012 (mm)	d84:	5.6 (mm)

MEDIAN PARTICLE DIAMETER (d50): 0.092
UNIFORMITY COEFFICIENT, Cu (d60/d10): --
COEFFICIENT OF CURVATURE, Cc, [(d30)**2/(d10*d60)]: --
MEAN PARTICLE DIAMETER, [(d16+d50+d84)/3]: 1.90

COMMENTS:

LABORATORY ANALYSIS PERFORMED BY: S. Stoller
CALCULATIONS MADE BY: S. Stoller
CHECKED BY: D. Hammermeister

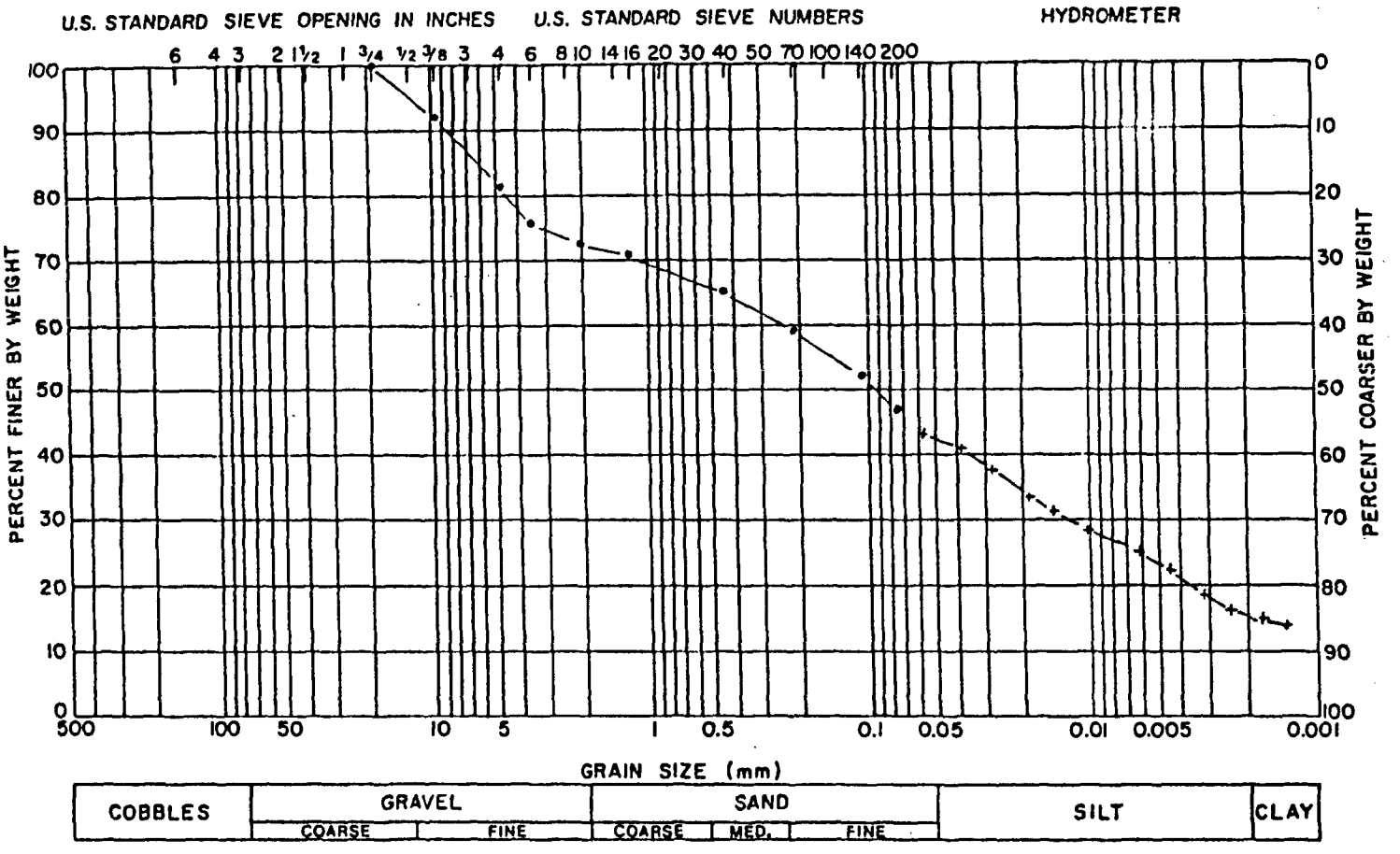
HYDROMETER DATA

JOB NAME:	JACOBS ENGINEERING - WORK ORDER #7	TEST DATE:	4/10/90
JOB NUMBER:	90-L-030	DEPTH:	N/A
SAMPLE NUMBER:	Rs-8 composite	INITIAL WT:	56.95 (g)
TYPE OF WATER USED:	DISTILLED	TOTAL SAMPLE WT:	156.38 (g)
REACTION WITH H2O2:	V. SLIGHT	TOTAL WT PASSING #200:	74.84 (g)
DISPERSANT:	(NaPO3)6	START TIME:	9:12

DATE (1990)	TIME (MIN)	TEMP (C)	R (g/l)	Rl (g/l)	Rcorr (g/l)	L (CM)	D (MM)	P (%)	%FINER
4/10	0.50	18.5	53.0	2.0	51.0	7.6	0.05435	89.55224	42.85772
	1.00	18.5	50.0	2.0	48.0	8.1	0.03965	84.28446	40.33667
	2.00	18.5	47.0	2.0	45.0	8.6	0.02888	79.01668	37.81563
	5.00	18.5	41.5	2.0	39.5	9.5	0.01920	69.35909	33.19372
	10.00	18.5	39.0	2.0	37.0	9.9	0.01386	64.96927	31.09285
	20.00	18.5	36.0	2.0	34.0	10.4	0.01004	59.70149	28.57181
	60.00	18.5	31.0	2.0	29.0	11.2	0.00602	50.92186	24.37007
	120.00	18.5	28.0	2.0	26.0	11.7	0.00435	45.65408	21.84903
	240.00	19.0	25.0	2.0	23.0	12.2	0.00312	40.38630	19.32799
	447.00	19.0	22.5	2.0	20.5	12.6	0.00233	35.99649	17.22712
	832.00	19.0	20.5	2.0	18.5	12.9	0.00173	32.48464	15.54643
4/11	1387.00	19.0	19.0	2.0	17.0	13.2	0.00135	29.85075	14.28591

COMMENTS: Assume mean particle density is 2.65 g/cc

LABORATORY ANALYSIS PERFORMED BY: L. Simpson
CALCULATIONS MADE BY: K. Evans
CHECKED BY: D. Hammermeister



USDA PARTICLE SIZE LIMIT CLASSIFICATION

θ_1 = -	d_{10} = -	d_{50} = 0.092	d_{60} = 0.22	C_u = -	C_c = -
SAMPLE NUMBER		DEPTH	CLASSIFICATION (USDA TEXTURE TRIANGLE)		
Rs-8 Composite		N/A	Sandy Loam with Gravel		

DANIEL B. STEPHENS & ASSOCIATES, INC.

WET/DRY SIEVE ANALYSIS DATA

JOB NAME: JACOBS ENGINEERING - WORK ORDER #7
JOB NUMBER: 90-L-030
TEST DATE: 03/27/90
SAMPLE NUMBER: Rs-9 composite
DEPTH: N/A

TOTAL WEIGHT OF SAMPLE: 131.42 (g)

SIEVE NUMBER	DIAMETER (mm)	WT. RETAINED	CUM WT. RETAINED	WT. PASSING	% PASSING	LOG DIAMETER
3/4	19.000	0.00	0.00	131.42	100.00	1.279
3/8	9.500	16.57	16.57	114.85	87.39	0.978
4	4.750	6.48	23.05	108.37	82.46	0.677
6	3.350	4.31	27.36	104.06	79.18	0.525
10	2.000	3.57	30.93	100.49	76.46	0.301
16	1.180	2.15	33.08	98.34	74.83	0.072
40	0.425	4.41	37.49	93.93	71.47	-0.372
70	0.212	7.26	44.75	86.67	65.95	-0.674
140	0.106	8.89	53.64	77.78	59.18	-0.975
200	0.075	4.31	57.95	73.47	55.90	-1.125
pan		73.30	131.25	0.17		

d10: -- (mm) d50: 0.042 (mm)
d16: -- (mm) d60: 0.12 (mm)
d30: 0.0081 (mm) d84: 6.0 (mm)

MEDIAN PARTICLE DIAMETER (d50): 0.042
UNIFORMITY COEFFICIENT, Cu (d60/d10): --
COEFFICIENT OF CURVATURE, Cc, [(d30)**2/(d10*d60)]: --
MEAN PARTICLE DIAMETER, [(d16+d50+d84)/3]: --

COMMENTS:

LABORATORY ANALYSIS PERFORMED BY: S. Stoller
CALCULATIONS MADE BY: S. Stoller
CHECKED BY: D. Hammermeister

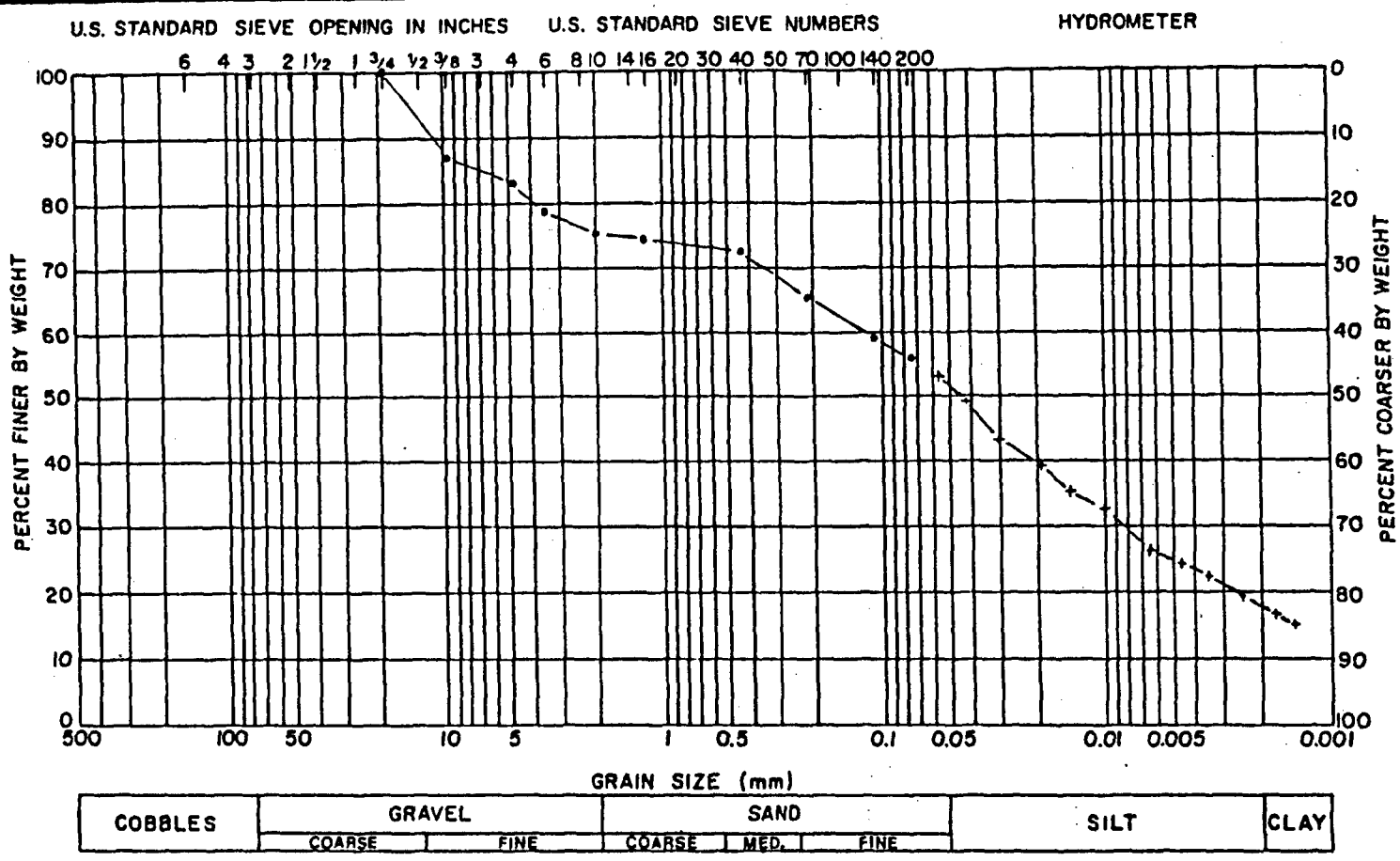
HYDROMETER DATA

JOB NAME:	JACOBS ENGINEERING - WORK ORDER #7	TEST DATE:	4/10/90
JOB NUMBER:	90-L-030	DEPTH:	N/A
SAMPLE NUMBER:	Rs-9 composite	INITIAL WT:	50.61 (g)
TYPE OF WATER USED:	DISTILLED	TOTAL SAMPLE WT:	131.42 (g)
REACTION WITH H2O2:	V. SLIGHT	TOTAL WT PASSING #200:	73.47 (g)
DISPERSANT:	(NaPO3)6	START TIME:	9:18

DATE (1990)	TIME (MIN)	TEMP (C)	R (g/l)	Rl (g/l)	Rcorr (g/l)	L (CM)	D (MM)	P (%)	%FINER
4/10	0.50	18.5	50.0	2.0	48.0	8.1	0.05608	94.84292	53.02168
	1.00	18.5	47.0	2.0	45.0	8.6	0.04084	88.91523	49.70782
	2.00	18.5	42.0	2.0	40.0	9.4	0.03022	79.03576	44.18473
	5.00	18.5	37.5	2.0	35.5	10.2	0.01985	70.14424	39.21395
	10.00	18.5	34.5	2.0	32.5	10.6	0.01437	64.21656	35.90010
	20.00	18.5	31.5	2.0	29.5	11.1	0.01039	58.28888	32.58624
	60.00	18.5	27.0	2.0	25.0	11.9	0.00620	49.39735	27.61546
	120.00	18.5	24.0	2.0	22.0	12.4	0.00447	43.46967	24.30160
	240.00	19.0	22.0	2.0	20.0	12.7	0.00319	39.51788	22.09237
	442.00	19.0	20.0	2.0	18.0	13.0	0.00238	35.56609	19.88313
	827.00	19.0	18.0	2.0	16.0	13.3	0.00176	31.61431	17.67389
4/11	1382.00	19.0	17.0	2.0	15.0	13.5	0.00137	29.63841	16.56927

COMMENTS: Assume mean particle density is 2.65 g/cc

LABORATORY ANALYSIS PERFORMED BY: L. Simpson
CALCULATIONS MADE BY: K. Evans
CHECKED BY: D. Hammermeister



USDA PARTICLE SIZE LIMIT CLASSIFICATION

θ_i = -	d_{10} = -	d_{50} = 0.042	d_{60} = 0.12	C_u = -	C_c = -
SAMPLE NUMBER		DEPTH	CLASSIFICATION (USDA TEXTURE TRIANGLE)		
Rs-9 Composite		N/A	Sandy Clay Loam with Gravel		

DANIEL B. STEPHENS & ASSOCIATES, INC.

WET/DRY SIEVE ANALYSIS DATA

JOB NAME: JACOBS ENGINEERING - WORK ORDER #7
JOB NUMBER: 90-L-030
TEST DATE: 03/16/90
SAMPLE NUMBER: Rs-10 composite
DEPTH: N/A

TOTAL WEIGHT OF SAMPLE: 619.33 (g)

SIEVE NUMBER	DIAMETER (mm)	WT. RETAINED	CUM WT. RETAINED	WT. PASSING	% PASSING	LOG DIAMETER
3/4	19.000	96.46	96.46	522.87	84.43	1.279
3/8	9.500	99.75	196.21	423.12	68.32	0.978
4	4.750	38.74	234.95	384.38	62.06	0.677
6	3.350	21.66	256.61	362.72	58.57	0.525
10	2.000	12.54	269.15	350.18	56.54	0.301
16	1.180	10.95	280.10	339.23	54.77	0.072
40	0.425	24.77	304.87	314.46	50.77	-0.372
70	0.212	35.05	339.92	279.41	45.11	-0.674
140	0.106	36.22	376.14	243.19	39.27	-0.975
200	0.075	14.31	390.45	228.88	36.96	-1.125
pan		228.79	619.24	0.09		

d10: 0.0022 (mm) d50: 0.40 (mm)
d16: 0.0071 (mm) d60: 4.0 (mm)
d30: 0.040 (mm) d84: 18.0 (mm)

MEDIAN PARTICLE DIAMETER (d50): 0.40
UNIFORMITY COEFFICIENT, Cu (d60/d10): 1818.18
COEFFICIENT OF CURVATURE, Cc, [(d30)**2/(d10*d60)]: 0.18
MEAN PARTICLE DIAMETER, [(d16+d50+d84)/3]: 6.14

COMMENTS:

LABORATORY ANALYSIS PERFORMED BY: L. Simpson
CALCULATIONS MADE BY: L. Simpson
CHECKED BY: D. Hammermeister

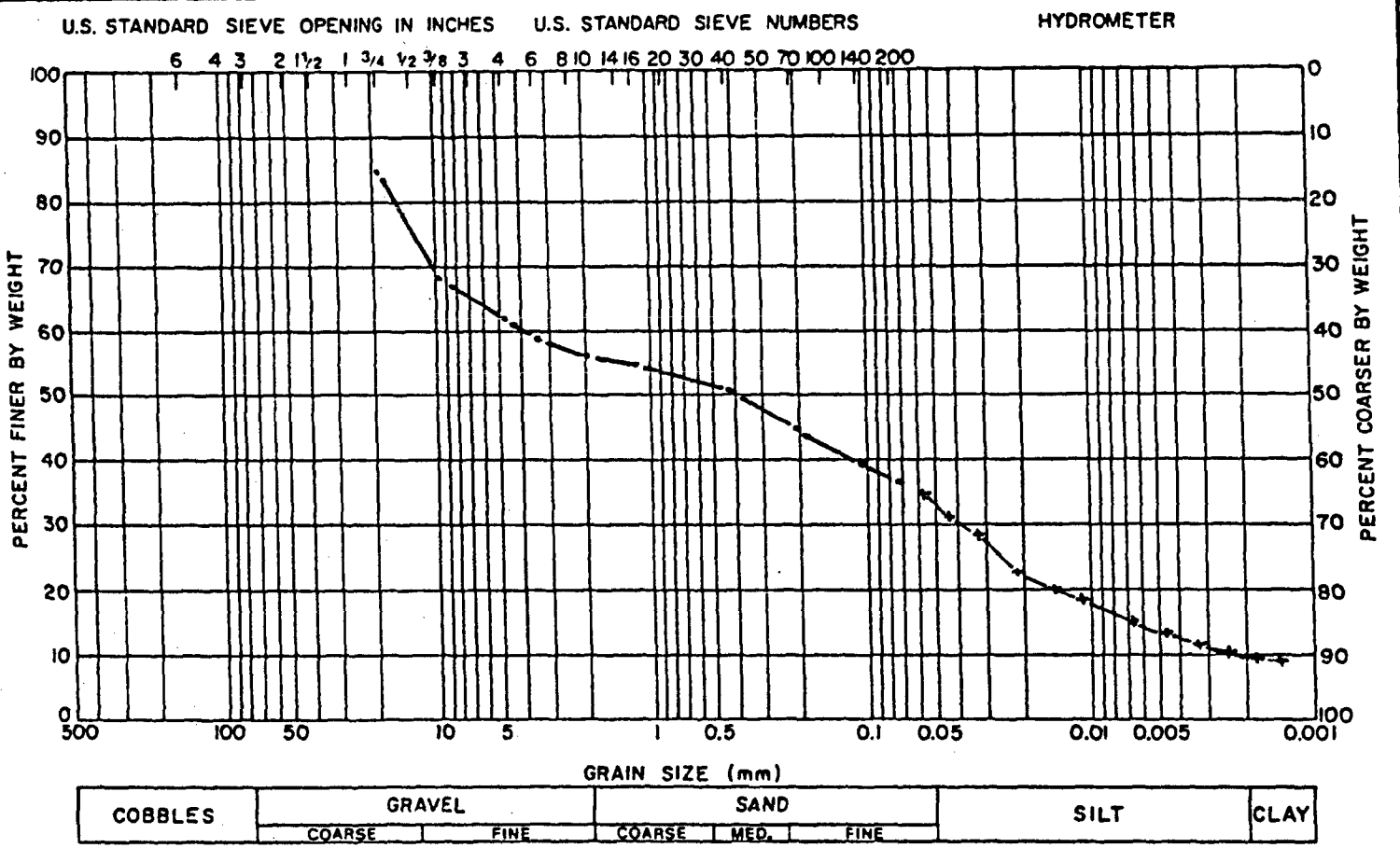
HYDROMETER DATA

JOB NAME:	JACOBS ENGINEERING - WORK ORDER #7	TEST DATE:	4/10/90
JOB NUMBER:	90-L-030	DEPTH:	N/A
SAMPLE NUMBER:	Rs-10 composite	INITIAL WT:	45.12 (g)
TYPE OF WATER USED:	DISTILLED	TOTAL SAMPLE WT:	619.33 (g)
REACTION WITH H2O2:	NONE	TOTAL WT PASSING #200:	228.88 (g)
DISPERSANT:	(NaPO3)6	START TIME:	9:24

DATE (1990)	TIME (MIN)	TEMP (C)	R (g/l)	Rl (g/l)	Rcorr (g/l)	L (CM)	D (MM)	P (%)	%FINER
4/10	0.50	18.5	45.0	2.0	43.0	8.9	0.05885	95.30142	35.21965
	1.00	18.5	40.0	2.0	38.0	9.7	0.04348	84.21986	31.12435
	2.00	18.5	36.0	2.0	34.0	10.4	0.03176	75.35461	27.84810
	5.00	18.5	30.0	2.0	28.0	11.4	0.02102	62.05674	22.93373
	10.00	18.5	26.5	2.0	24.5	12.0	0.01523	54.29965	20.06701
	20.00	18.5	24.0	2.0	22.0	12.4	0.01095	48.75887	18.01936
	60.00	18.5	20.0	2.0	18.0	13.0	0.00649	39.89362	14.74311
	120.00	18.5	18.0	2.0	16.0	13.3	0.00465	35.46099	13.10499
	240.00	19.0	16.0	2.0	14.0	13.7	0.00331	31.02837	11.46686
	437.00	19.0	14.5	2.0	12.5	13.9	0.00247	27.70390	10.23827
	822.00	19.0	13.5	2.0	11.5	14.1	0.00181	25.48759	9.41921
4/11	1377.00	19.0	13.0	2.0	11.0	14.2	0.00140	24.37943	9.00968

COMMENTS: Assume mean particle density is 2.65 g/cc

LABORATORY ANALYSIS PERFORMED BY: L. Simpson
CALCULATIONS MADE BY: K. Evans
CHECKED BY: D. Hammermeister



USDA PARTICLE SIZE LIMIT CLASSIFICATION

θ_i = --	d_{10}= 0.0022	d_{50}= 0.40	d_{60}= 4.0	C_u = 1800	C_c = 0.18
SAMPLE NUMBER		DEPTH	CLASSIFICATION (USDA TEXTURE TRIANGLE)		
Rs-10 Composite		N/A	Gravelly Loam		

DANIEL B. STEPHENS & ASSOCIATES, INC.

WET/DRY SIEVE ANALYSIS DATA

JOB NAME: JACOBS ENGINEERING - WORK ORDER #7
JOB NUMBER: 90-L-030
TEST DATE: 03/27/90
SAMPLE NUMBER: 3-1,2,3&4
DEPTH: N/A

TOTAL WEIGHT OF SAMPLE: 129.75 (g)

SIEVE NUMBER	DIAMETER (mm)	WT. RETAINED	CUM WT. RETAINED	WT. PASSING	% PASSING	LOG DIAMETER
4	4.750	0.00	0.00	129.75	100.00	0.677
6	3.350	13.40	13.40	116.35	89.67	0.525
10	2.000	16.05	29.45	100.30	77.30	0.301
16	1.180	14.99	44.44	85.31	65.75	0.072
40	0.425	17.17	61.61	68.14	52.52	-0.372
70	0.212	11.31	72.92	56.83	43.80	-0.674
140	0.106	10.36	83.28	46.47	35.82	-0.975
200	0.075	4.18	87.46	42.29	32.59	-1.125
pan		42.11	129.57	0.18		

d10:	0.0031 (mm)	d50:	0.33 (mm)
d16:	0.010 (mm)	d60:	0.72 (mm)
d30:	0.060 (mm)	d84:	2.70 (mm)

MEDIAN PARTICLE DIAMETER (d50): 0.33
UNIFORMITY COEFFICIENT, Cu (d60/d10): 232.26
COEFFICIENT OF CURVATURE, Cc, [(d30)**2/(d10*d60)]: 1.61
MEAN PARTICLE DIAMETER, [(d16+d50+d84)/3]: 1.01

COMMENTS:

LABORATORY ANALYSIS PERFORMED BY: S. Stoller
CALCULATIONS MADE BY: S. Stoller
CHECKED BY: D. Hammermeister

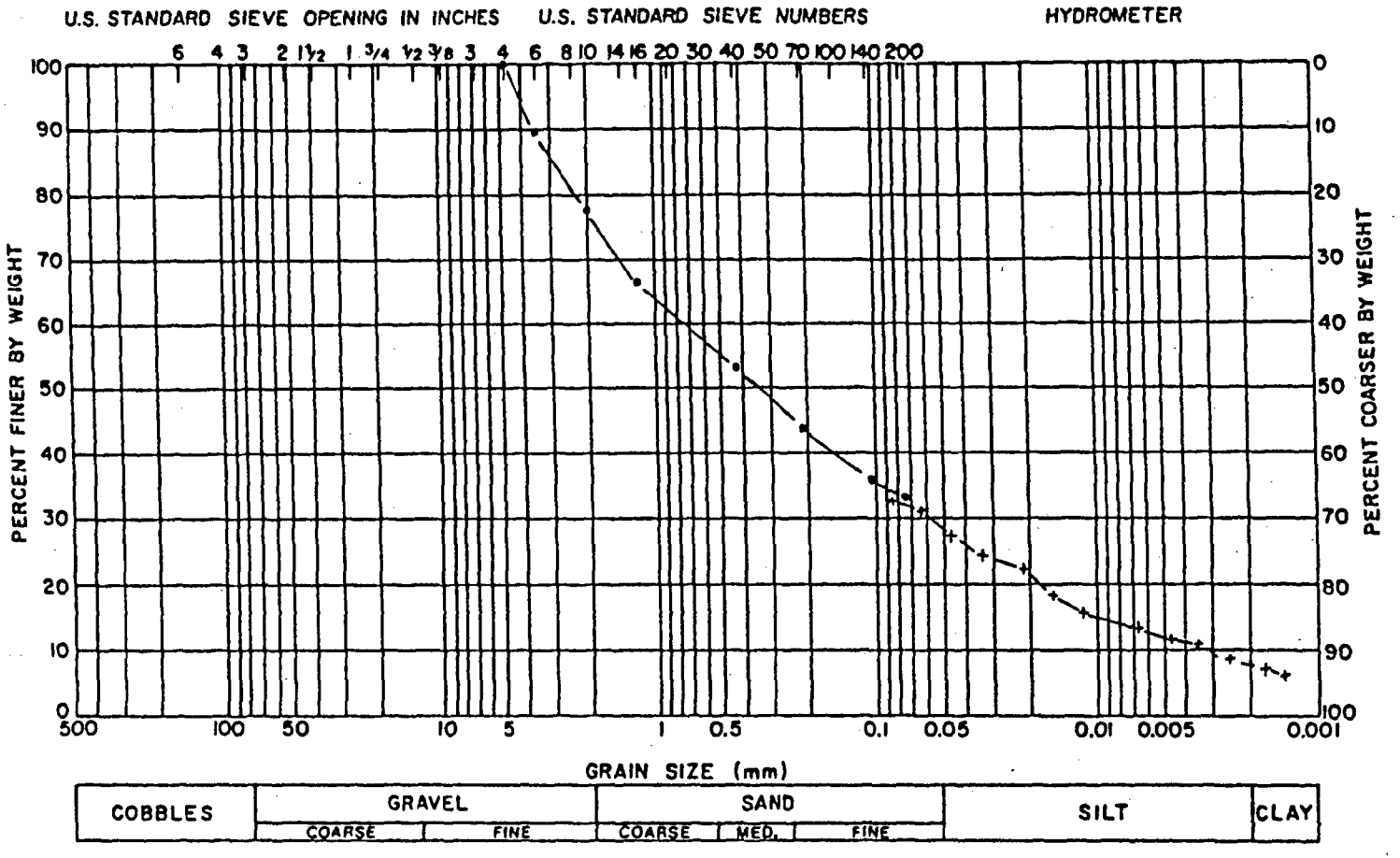
HYDROMETER DATA

JOB NAME:	JACOBS ENGINEERING - WORK ORDER #7	TEST DATE:	04/05/90
JOB NUMBER:	90-L-030	DEPTH:	N/A
SAMPLE NUMBER:	3-1,2,3&4	INITIAL WT:	41.05 (g)
TYPE OF WATER USED:	DISTILLED	TOTAL SAMPLE WT:	129.75 (g)
REACTION WITH H2O2:	NONE	TOTAL WT PASSING #200:	42.29 (g)
DISPERSANT:	(NaPO3)6	START TIME:	8:36

DATE (1990)	TIME (MIN)	TEMP (C)	R (g/l)	Rl (g/l)	Rcorr (g/l)	L (CM)	D (MM)	P (%)	%FINER
4/5	0.25	18.5	42.5	2.0	40.5	9.3	0.08511	98.66017	32.15675
	0.50	18.5	40.5	2.0	38.5	9.7	0.06123	93.78806	30.56876
	1.00	18.5	37.5	2.0	35.5	10.2	0.04439	86.47990	28.18678
	2.00	18.5	33.5	2.0	31.5	10.8	0.03238	76.73569	25.01081
	5.00	18.5	29.0	2.0	27.0	11.5	0.02117	65.77345	21.43783
	10.00	18.5	26.0	2.0	24.0	12.0	0.01528	58.46529	19.05585
	20.50	18.5	23.0	2.0	21.0	12.5	0.01089	51.15713	16.67387
	60.00	19.0	20.0	2.5	17.5	13.0	0.00645	42.63094	13.89489
	120.00	19.0	18.0	2.5	15.5	13.3	0.00462	37.75883	12.30691
	240.00	19.0	16.0	2.0	14.0	13.7	0.00331	34.10475	11.11591
	476.00	19.0	14.0	2.5	11.5	14.0	0.00238	28.01462	9.13093
	812.00	19.0	13.0	2.0	11.0	14.2	0.00183	26.79659	8.73393
4/6	1420.00	19.0	12.0	2.0	10.0	14.3	0.00139	24.36054	7.93994

COMMENTS: Assume mean particle density is 2.65 g/cc

LABORATORY ANALYSIS PERFORMED BY: L. Simpson
CALCULATIONS MADE BY: K. Evans
CHECKED BY: D. Hammermeister



USDA PARTICLE SIZE LIMIT CLASSIFICATION

θ_i = -	d_{10}= 0.0031	d_{50}= 0.33	d_{60}= 0.72	C_u = 230	C_c = 1.6
SAMPLE NUMBER		DEPTH	CLASSIFICATION (USDA TEXTURE TRIANGLE)		
3-1, 3-2, 3-3, 3-4		N/A	Sandy Loam		

DANIEL B. STEPHENS & ASSOCIATES, INC.

WET/DRY SIEVE ANALYSIS DATA

JOB NAME: JACOBS ENGINEERING - WORK ORDER #7
JOB NUMBER: 90-L-030
TEST DATE: 03/27/90
SAMPLE NUMBER: 3-5&6
DEPTH: N/A

TOTAL WEIGHT OF SAMPLE: 143.74 (g)

SIEVE NUMBER	DIAMETER (mm)	WT. RETAINED	CUM WT. RETAINED	WT. PASSING	% PASSING	LOG DIAMETER
4	4.750	0.00	0.00	143.74	100.00	0.677
6	3.350	11.08	11.08	132.66	92.29	0.525
10	2.000	12.12	23.20	120.54	83.86	0.301
16	1.180	13.72	36.92	106.82	74.31	0.072
40	0.425	17.63	54.55	89.19	62.05	-0.372
70	0.212	13.96	68.51	75.23	52.34	-0.674
140	0.106	13.01	81.52	62.22	43.29	-0.975
200	0.075	5.55	87.07	56.67	39.43	-1.125
pan		56.21	143.28	0.46		

d10:	-- (mm)	d50:	0.17 (mm)
d16:	0.0050 (mm)	d60:	0.36 (mm)
d30:	0.022 (mm)	d84:	2.1 (mm)

MEDIAN PARTICLE DIAMETER (d50): 0.17
UNIFORMITY COEFFICIENT, Cu (d60/d10): --
COEFFICIENT OF CURVATURE, Cc, [(d30)**2/(d10*d60)]: --
MEAN PARTICLE DIAMETER, [(d16+d50+d84)/3]: 0.76

COMMENTS:

LABORATORY ANALYSIS PERFORMED BY: S. Stoller
CALCULATIONS MADE BY: S. Stoller
CHECKED BY: D. Hammermeister

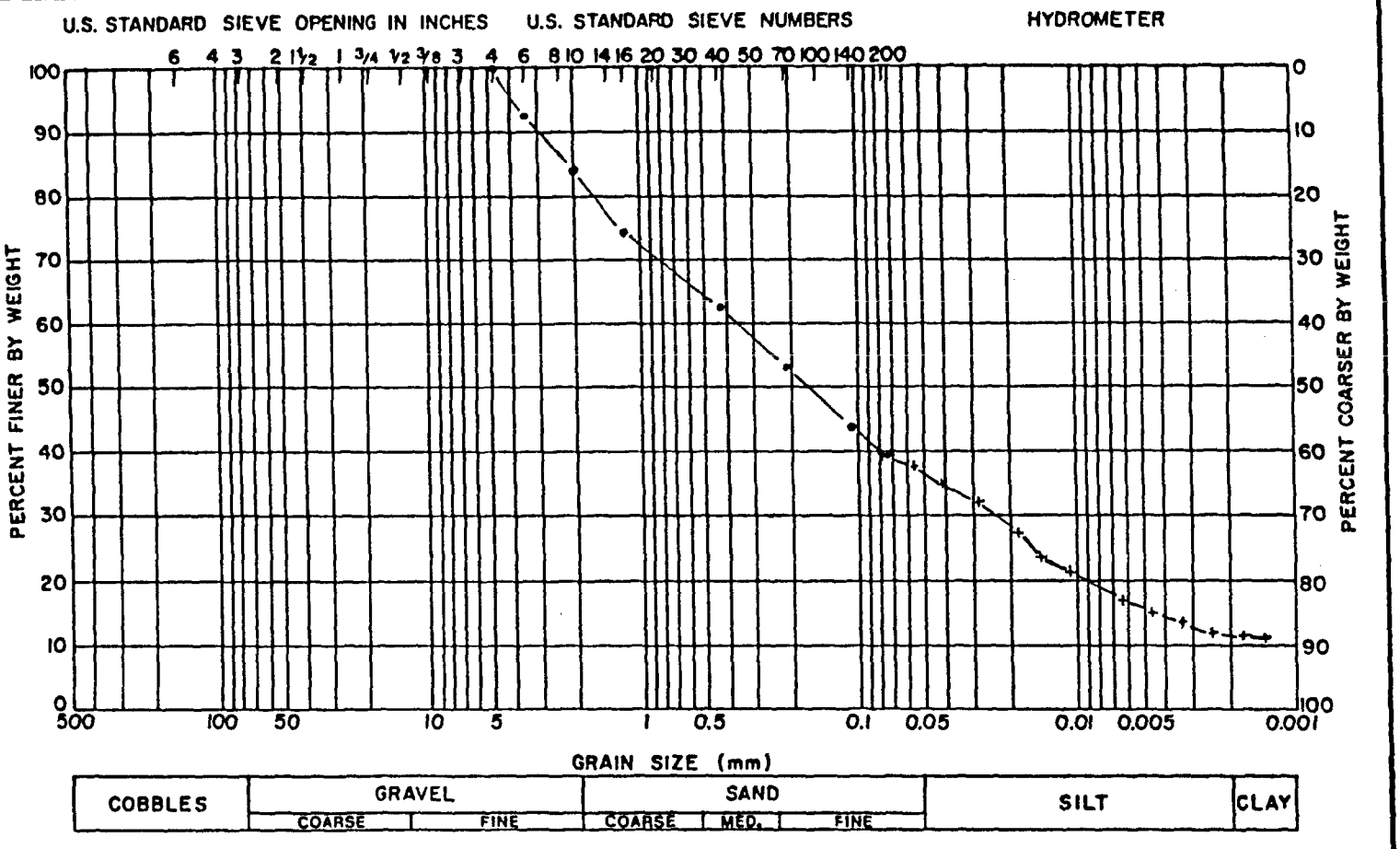
HYDROMETER DATA

JOB NAME:	JACOBS ENGINEERING - WORK ORDER #7	TEST DATE:	04/05/90
JOB NUMBER:	90-L-030	DEPTH:	N/A
SAMPLE NUMBER:	3-5&6	INITIAL WT:	52.40 (g)
TYPE OF WATER USED:	DISTILLED	TOTAL SAMPLE WT:	143.74 (g)
REACTION WITH H2O2:	NONE	TOTAL WT PASSING #200:	56.67 (g)
DISPERSANT:	(NaPO3)6	START TIME:	8:42

DATE (1990)	TIME (MIN)	TEMP (C)	R (g/l)	Rl (g/l)	Rcorr (g/l)	L (CM)	D (MM)	P (%)	%FINER
4/5	0.25	18.5	54.5	2.0	52.5	7.4	0.07561	100.19084	39.50059
	0.50	18.5	52.5	2.0	50.5	7.7	0.05464	96.37405	37.99581
	1.00	18.5	47.5	2.0	45.5	8.5	0.04064	86.83206	34.23385
	2.00	18.5	43.5	2.0	41.5	9.2	0.02983	79.19847	31.22428
	5.00	18.5	38.0	2.0	36.0	10.1	0.01977	68.70229	27.08612
	10.00	18.5	34.5	2.0	32.5	10.6	0.01437	62.02290	24.45275
	20.50	18.5	31.0	2.0	29.0	11.2	0.01030	55.34351	21.81937
	60.00	19.0	26.0	2.5	23.5	12.0	0.00620	44.84733	17.68122
	120.00	19.0	23.5	2.5	21.0	12.4	0.00446	40.07634	15.80024
	240.00	19.0	21.0	2.0	19.0	12.9	0.00321	36.25954	14.29545
	471.00	19.0	19.0	2.5	16.5	13.2	0.00232	31.48855	12.41447
	807.00	19.0	17.5	2.0	15.5	13.4	0.00179	29.58015	11.66208
4/6	1415.00	19.0	16.5	2.0	14.5	13.6	0.00136	27.67176	10.90969

COMMENTS: Assume mean particle density is 2.65 g/cc

LABORATORY ANALYSIS PERFORMED BY: L. Simpson
CALCULATIONS MADE BY: K. Evans
CHECKED BY: D. Hammermeister



USDA PARTICLE SIZE LIMIT CLASSIFICATION

θ_i = -	d_{10} = -	d_{50} = 0.17	d_{60} = 0.36	C_u = -	C_c = -
SAMPLE NUMBER		DEPTH	CLASSIFICATION (USDA TEXTURE TRIANGLE)		
3-5 & 3-6		N/A	Sandy Loam		

DANIEL B. STEPHENS & ASSOCIATES, INC.

WET/DRY SIEVE ANALYSIS DATA

JOB NAME: JACOBS ENGINEERING - WORK ORDER #7
JOB NUMBER: 90-L-030
TEST DATE: 03/27/90
SAMPLE NUMBER: 3-7,8,9&10
DEPTH: N/A

TOTAL WEIGHT OF SAMPLE: 144.45 (g)

SIEVE NUMBER	DIAMETER (mm)	WT. RETAINED	CUM WT. RETAINED	WT. PASSING	% PASSING	LOG DIAMETER
4	4.750	0.00	0.00	144.45	100.00	0.677
6	3.350	3.71	3.71	140.74	97.43	0.525
10	2.000	4.10	7.81	136.64	94.59	0.301
16	1.180	4.12	11.93	132.52	91.74	0.072
40	0.425	6.49	18.42	126.03	87.25	-0.372
70	0.212	12.23	30.65	113.80	78.78	-0.674
140	0.106	13.46	44.11	100.34	69.46	-0.975
200	0.075	7.78	51.89	92.56	64.08	-1.125
pan		92.77	144.66	-0.21		

d10: -- (mm) d50: 0.023 (mm)
d16: -- (mm) d60: 0.051 (mm)
d30: 0.0022 (mm) d84: 0.33 (mm)

MEDIAN PARTICLE DIAMETER (d50): 0.023
UNIFORMITY COEFFICIENT, Cu (d60/d10): --
COEFFICIENT OF CURVATURE, Cc, [(d30)**2/(d10*d60)]: --
MEAN PARTICLE DIAMETER, [(d16+d50+d84)/3]: --

COMMENTS:

LABORATORY ANALYSIS PERFORMED BY: S. Stoller
CALCULATIONS MADE BY: S. Stoller
CHECKED BY: D. Hammermeister

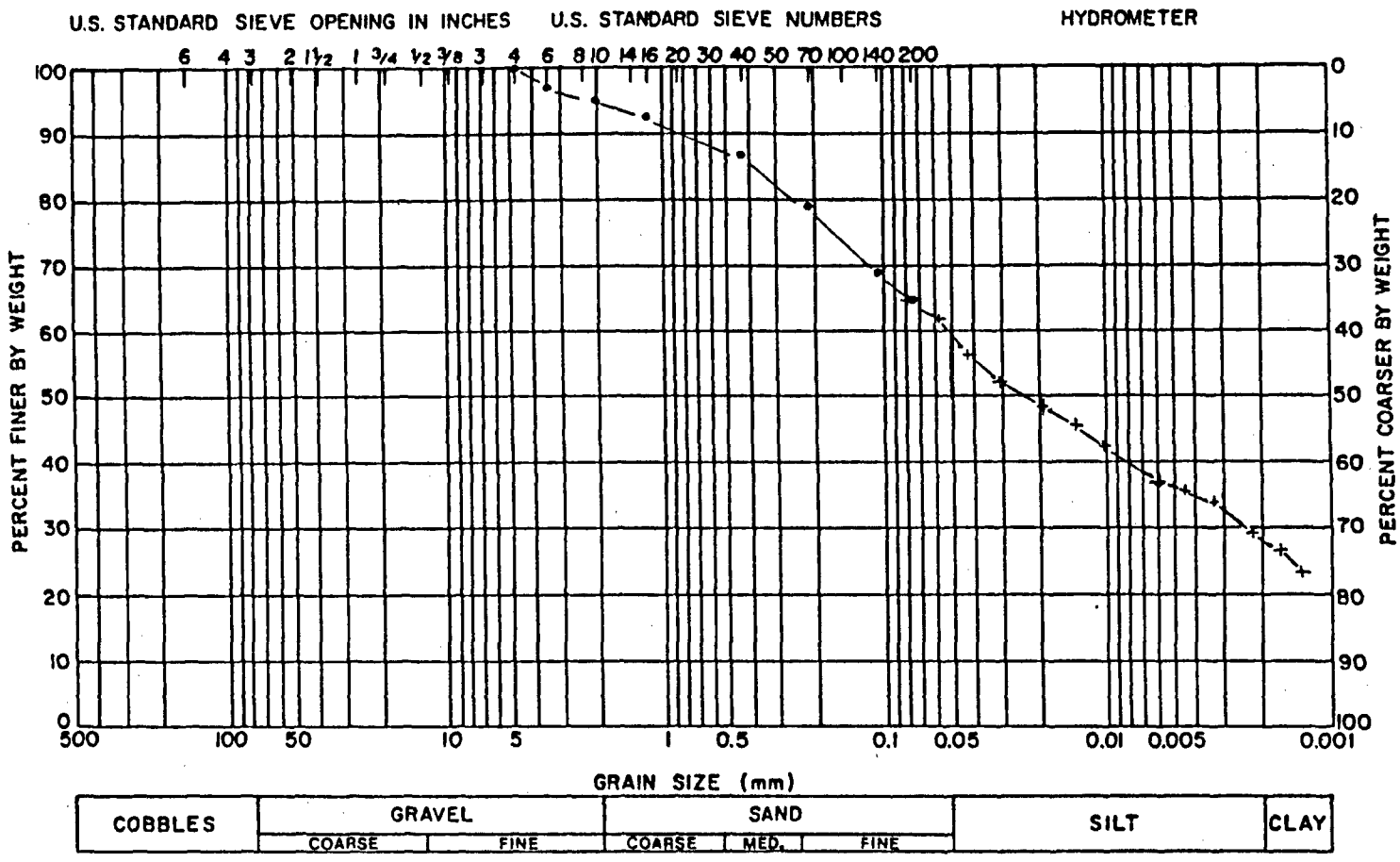
HYDROMETER DATA

JOB NAME:	JACOBS ENGINEERING - WORK ORDER #7	TEST DATE:	04/05/90
JOB NUMBER:	90-L-030	DEPTH:	N/A
SAMPLE NUMBER:	3-7,8,9&10	INITIAL WT:	47.43 (g)
TYPE OF WATER USED:	DISTILLED	TOTAL SAMPLE WT:	144.45 (g)
REACTION WITH H2O2:	SLIGHT	TOTAL WT PASSING #200:	92.56 (g)
DISPERSANT:	(NaPO3)6	START TIME:	8:48

DATE (1990)	TIME (MIN)	TEMP (C)	R (g/l)	Rl (g/l)	Rcorr (g/l)	L (CM)	D (MM)	P (%)	%FINER
4/5	0.25	18.5	50.0	2.0	48.0	8.1	0.07931	101.20177	64.84760
	0.50	18.5	48.0	2.0	46.0	8.4	0.05720	96.98503	62.14562
	1.00	18.5	44.0	2.0	42.0	9.1	0.04199	88.55155	56.74165
	2.00	18.5	40.5	2.0	38.5	9.7	0.03062	81.17225	52.01318
	5.00	18.5	38.0	2.0	36.0	10.1	0.01977	75.90133	48.63570
	10.00	18.5	36.0	2.0	34.0	10.4	0.01420	71.68459	45.93372
	20.00	18.5	34.0	2.0	32.0	10.7	0.01020	67.46785	43.23173
	60.00	19.0	31.0	2.5	28.5	11.2	0.00599	60.08855	38.50326
	120.00	19.0	29.0	2.5	26.5	11.5	0.00430	55.87181	35.80128
	240.00	19.0	27.0	2.0	25.0	11.9	0.00308	52.70926	33.77479
	467.00	19.0	24.5	2.5	22.0	12.3	0.00225	46.38415	29.72182
	802.00	19.0	22.0	2.0	20.0	12.7	0.00174	42.16740	27.01983
4/6	1410.00	19.0	19.5	2.0	17.5	13.1	0.00134	36.89648	23.64235

COMMENTS: Assume mean particle density is 2.65 g/cc

LABORATORY ANALYSIS PERFORMED BY: L. Simpson
CALCULATIONS MADE BY: K. Evans
CHECKED BY: D. Hammermeister



USDA PARTICLE SIZE LIMIT CLASSIFICATION

θ_i = -	d_{10} = -	d_{50} = 0.023	d_{60} = 0.051	C_u = -	C_c = -
SAMPLE NUMBER		DEPTH	CLASSIFICATION (USDA TEXTURE TRIANGLE)		
3-7, 3-8, 3-9, 3-10		N/A	Clay Loam		

DANIEL B. STEPHENS & ASSOCIATES, INC.

WET/DRY SIEVE ANALYSIS DATA

JOB NAME: JACOBS ENGINEERING - WORK ORDER #7
JOB NUMBER: 90-L-030
TEST DATE: 03/27/90
SAMPLE NUMBER: 3-11&12
DEPTH: N/A

TOTAL WEIGHT OF SAMPLE: 126.94 (g)

SIEVE NUMBER	DIAMETER (mm)	WT. RETAINED	CUM WT. RETAINED	WT. PASSING	% PASSING	LOG DIAMETER
4	4.750	0.00	0.00	126.94	100.00	0.677
6	3.350	5.13	5.13	121.81	95.96	0.525
10	2.000	8.26	13.39	113.55	89.45	0.301
16	1.180	8.68	22.07	104.87	82.61	0.072
40	0.425	16.49	38.56	88.38	69.62	-0.372
70	0.212	18.57	57.13	69.81	54.99	-0.674
140	0.106	15.97	73.10	53.84	42.41	-0.975
200	0.075	5.66	78.76	48.18	37.95	-1.125
pan		48.05	126.81	0.13		

d10: -- (mm) d50: 0.16 (mm)
d16: 0.0051 (mm) d60: 0.26 (mm)
d30: 0.030 (mm) d84: 1.3 (mm)

MEDIAN PARTICLE DIAMETER (d50): 0.16
UNIFORMITY COEFFICIENT, Cu (d60/d10): --
COEFFICIENT OF CURVATURE, Cc, [(d30)**2/(d10*d60)]: --
MEAN PARTICLE DIAMETER, [(d16+d50+d84)/3]: 0.49

COMMENTS:

LABORATORY ANALYSIS PERFORMED BY: S. Stoller
CALCULATIONS MADE BY: S. Stoller
CHECKED BY: D. Hammermeister

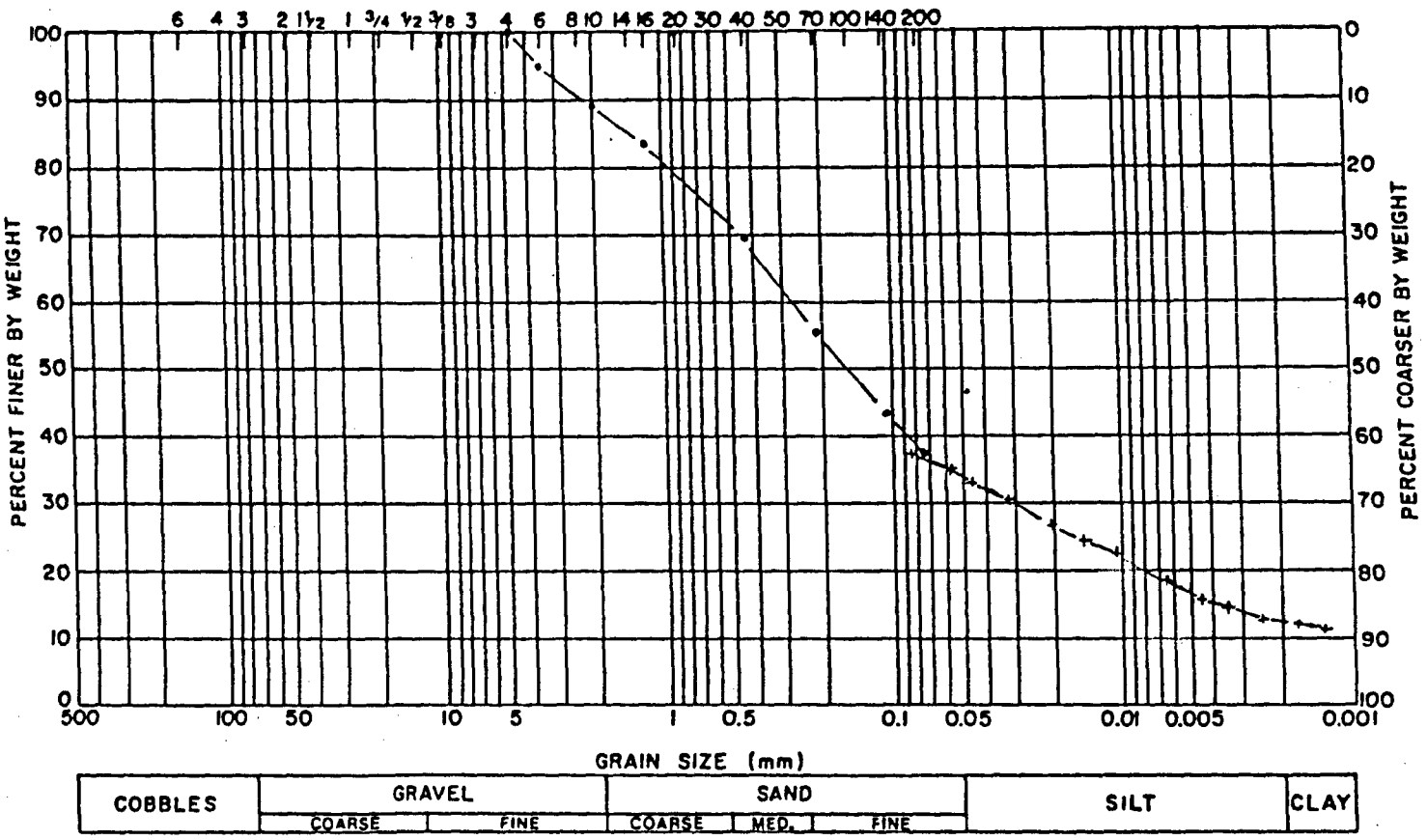
HYDROMETER DATA

JOB NAME:	JACOBS ENGINEERING - WORK ORDER #7	TEST DATE:	04/05/90
JOB NUMBER:	90-L-030	DEPTH:	N/A
SAMPLE NUMBER:	3-11&12	INITIAL WT:	46.40 (g)
TYPE OF WATER USED:	DISTILLED	TOTAL SAMPLE WT:	126.94 (g)
REACTION WITH H202:	NONE	TOTAL WT PASSING #200:	48.18 (g)
DISPERSANT:	(NaPO3)6	START TIME:	8:54

DATE (1990)	TIME (MIN)	TEMP (C)	R (g/l)	Rl (g/l)	Rcorr (g/l)	L (CM)	D (MM)	P (%)	%FINER
4/5	0.25	18.5	48.5	2.0	46.5	8.3	0.08050	100.21552	38.03674
	0.50	18.5	46.5	2.0	44.5	8.7	0.05803	95.90517	36.40075
	1.00	18.5	43.0	2.0	41.0	9.3	0.04237	88.36207	33.53777
	2.00	18.5	39.0	2.0	37.0	9.9	0.03100	79.74138	30.26579
	5.00	18.5	35.0	2.0	33.0	10.6	0.02025	71.12069	26.99381
	10.00	18.5	32.0	2.0	30.0	11.1	0.01465	64.65517	24.53983
	20.00	18.5	29.0	2.0	27.0	11.5	0.01058	58.18966	22.08585
	60.00	19.0	26.0	2.5	23.5	12.0	0.00620	50.64655	19.22287
	121.00	19.0	23.0	2.5	20.5	12.5	0.00446	44.18103	16.76888
	240.00	19.0	21.0	2.0	19.0	12.9	0.00321	40.94828	15.54189
	463.00	19.0	19.0	2.5	16.5	13.2	0.00234	35.56034	13.49691
	797.00	19.0	17.5	2.0	15.5	13.4	0.00180	33.40517	12.67891
4/6	1405.00	19.0	16.0	2.0	14.0	13.7	0.00137	30.17241	11.45192

COMMENTS: Assume mean particle density is 2.65 g/cc

LABORATORY ANALYSIS PERFORMED BY: L. Simpson
CALCULATIONS MADE BY: K. Evans
CHECKED BY: D. Hammermeister



USDA PARTICLE SIZE LIMIT CLASSIFICATION

θ_i = -	d_{10} = -	d_{50} = 0.16	d_{60} = 0.26	C_u = -	C_c = -
SAMPLE NUMBER		DEPTH	CLASSIFICATION (USDA TEXTURE TRIANGLE)		
3-11 & 3-12		N/A	Sandy Loam		

DANIEL B. STEPHENS & ASSOCIATES, INC.

WET/DRY SIEVE ANALYSIS DATA

JOB NAME: JACOBS ENGINEERING - WORK ORDER #7
JOB NUMBER: 90-L-030
TEST DATE: 03/27/90
SAMPLE NUMBER: 3-13&14
DEPTH: N/A

TOTAL WEIGHT OF SAMPLE: 137.96 (g)

SIEVE NUMBER	DIAMETER (mm)	WT. RETAINED	CUM WT. RETAINED	WT. PASSING	% PASSING	LOG DIAMETER
4	4.750	0.00	0.00	137.96	100.00	0.677
6	3.350	7.11	7.11	130.85	94.85	0.525
10	2.000	9.18	16.29	121.67	88.19	0.301
16	1.180	11.08	27.37	110.59	80.16	0.072
40	0.425	19.15	46.52	91.44	66.28	-0.372
70	0.212	19.80	66.32	71.64	51.93	-0.674
140	0.106	17.02	83.34	54.62	39.59	-0.975
200	0.075	6.20	89.54	48.42	35.10	-1.125
pan		48.23	137.77	0.19		

d10: 0.0015 (mm) d50: 0.19 (mm)
d16: 0.0052 (mm) d60: 0.31 (mm)
d30: 0.040 (mm) d84: 1.5 (mm)

MEDIAN PARTICLE DIAMETER (d50): 0.19
UNIFORMITY COEFFICIENT, Cu (d60/d10): 206.67
COEFFICIENT OF CURVATURE, Cc, [(d30)**2/(d10*d60)]: 3.44
MEAN PARTICLE DIAMETER, [(d16+d50+d84)/3]: 0.57

COMMENTS:

LABORATORY ANALYSIS PERFORMED BY: S. Stoller
CALCULATIONS MADE BY: S. Stoller
CHECKED BY: D. Hammermeister

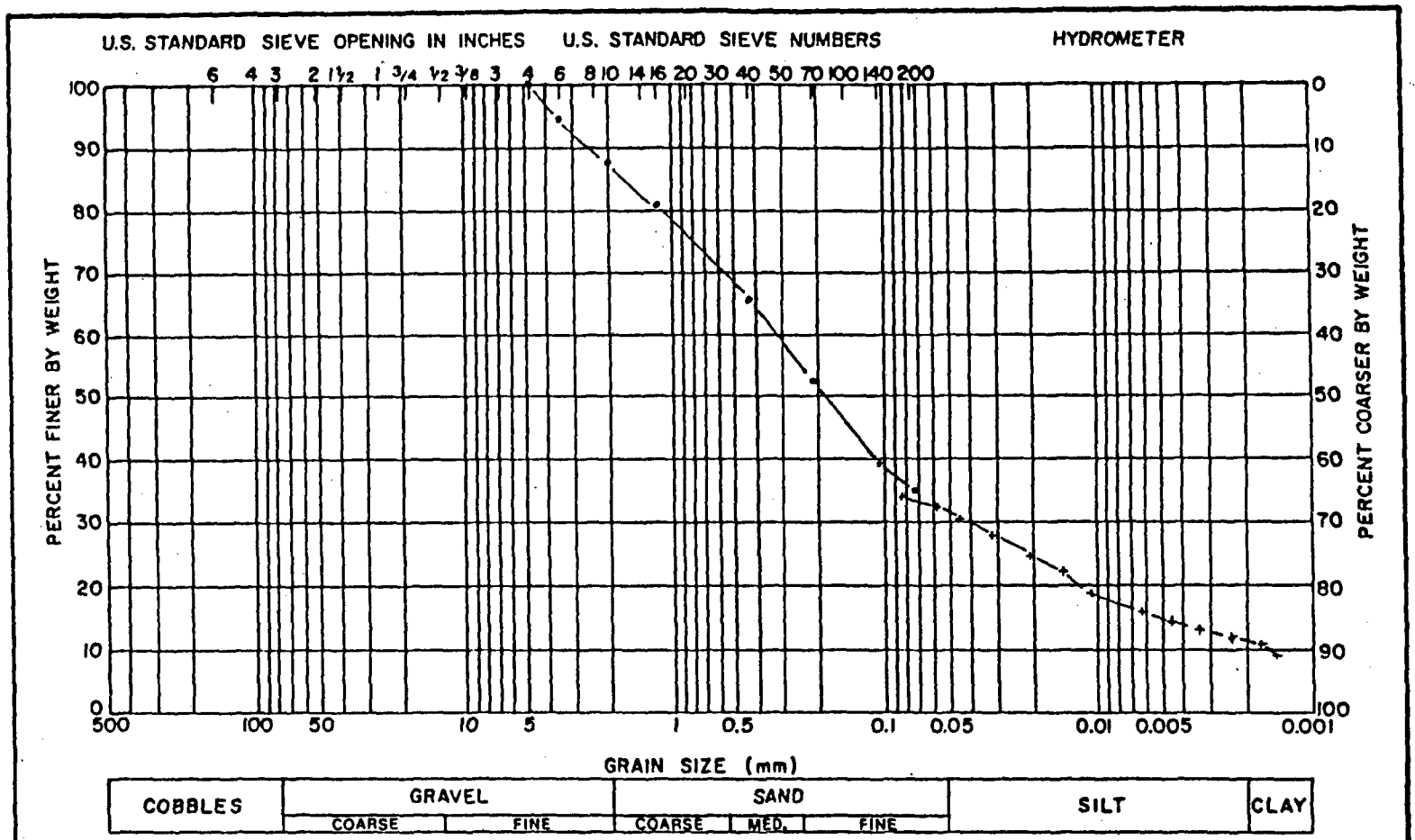
HYDROMETER DATA

JOB NAME:	JACOBS ENGINEERING - WORK ORDER #7	TEST DATE:	04/05/90
JOB NUMBER:	90-L-030	DEPTH:	N/A
SAMPLE NUMBER:	3-13&14	INITIAL WT:	45.86 (g)
TYPE OF WATER USED:	DISTILLED	TOTAL SAMPLE WT:	137.96 (g)
REACTION WITH H2O2:	SLIGHT	TOTAL WT PASSING #200:	48.42 (g)
DISPERSANT:	(NaPO3)6	START TIME:	9:00

DATE (1990)	TIME (MIN)	TEMP (C)	R (g/l)	Rl (g/l)	Rcorr (g/l)	L (CM)	D (MM)	P (%)	%FINER
4/5	0.25	18.5	46.5	2.0	44.5	8.7	0.08207	97.03445	34.05631
	0.50	18.5	45.0	2.0	43.0	8.9	0.05885	93.76363	32.90834
	1.00	18.5	41.5	2.0	39.5	9.5	0.04293	86.13171	30.22976
	2.00	18.5	38.5	2.0	36.5	10.0	0.03113	79.59006	27.93383
	5.00	18.5	34.0	2.0	32.0	10.7	0.02040	69.77758	24.48993
	10.00	18.5	31.0	2.0	29.0	11.2	0.01475	63.23594	22.19400
	20.00	19.0	28.0	2.5	25.5	11.7	0.01060	55.60401	19.51541
	60.00	19.0	24.5	2.5	22.0	12.3	0.00627	47.97209	16.83683
	120.00	19.0	22.5	2.5	20.0	12.6	0.00449	43.61099	15.30621
	240.00	19.0	20.0	2.0	18.0	13.0	0.00323	39.24989	13.77559
	459.00	19.0	18.5	2.5	16.0	13.3	0.00235	34.88879	12.24496
	792.00	19.0	16.0	2.0	14.0	13.7	0.00182	30.52769	10.71434
4/6	1400.00	19.0	15.0	2.0	13.0	13.8	0.00138	28.34714	9.94903

COMMENTS: Assume mean particle density is 2.65 g/cc

LABORATORY ANALYSIS PERFORMED BY: L. Simpson
CALCULATIONS MADE BY: K. Evans
CHECKED BY: D. Hammermeister



USDA PARTICLE SIZE LIMIT CLASSIFICATION

θ_i = -	d_{10} = 0.0015	d_{50} = 0.19	d_{60} = 0.31	C_u = 206.67	C_c = 3.44
SAMPLE NUMBER		DEPTH	CLASSIFICATION (USDA TEXTURE TRIANGLE)		
3-13 & 3-14		N/A	Sandy Loam		

DANIEL B. STEPHENS & ASSOCIATES, INC.

APPENDIX B:

DRY SIEVE TEST DATA

Summary of Particle Size Characteristics

for Dry Sieve Analyses

Laboratory Sample No.	d_{10} (mm)	d_{50} (mm)	d_{60} (mm)	C_u	C_c
Rs-3	0.13	2.5	4.0	31	1.5
Rs-5	0.090	1.4	1.8	20	1.7
Rs-6	*	0.82	1.2	--	--
Rs-7	0.080	1.2	1.7	21	1.6
Rs-10	0.088	1.6	3.9	44	0.70

SIEVE ANALYSIS DATA

JOB NAME: JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER: 89-L-144
TEST DATE: 03/07/90
SAMPLE NUMBER: Rs-3
DEPTH: UNKNOWN

TOTAL WEIGHT OF SAMPLE: 125.50 (g)

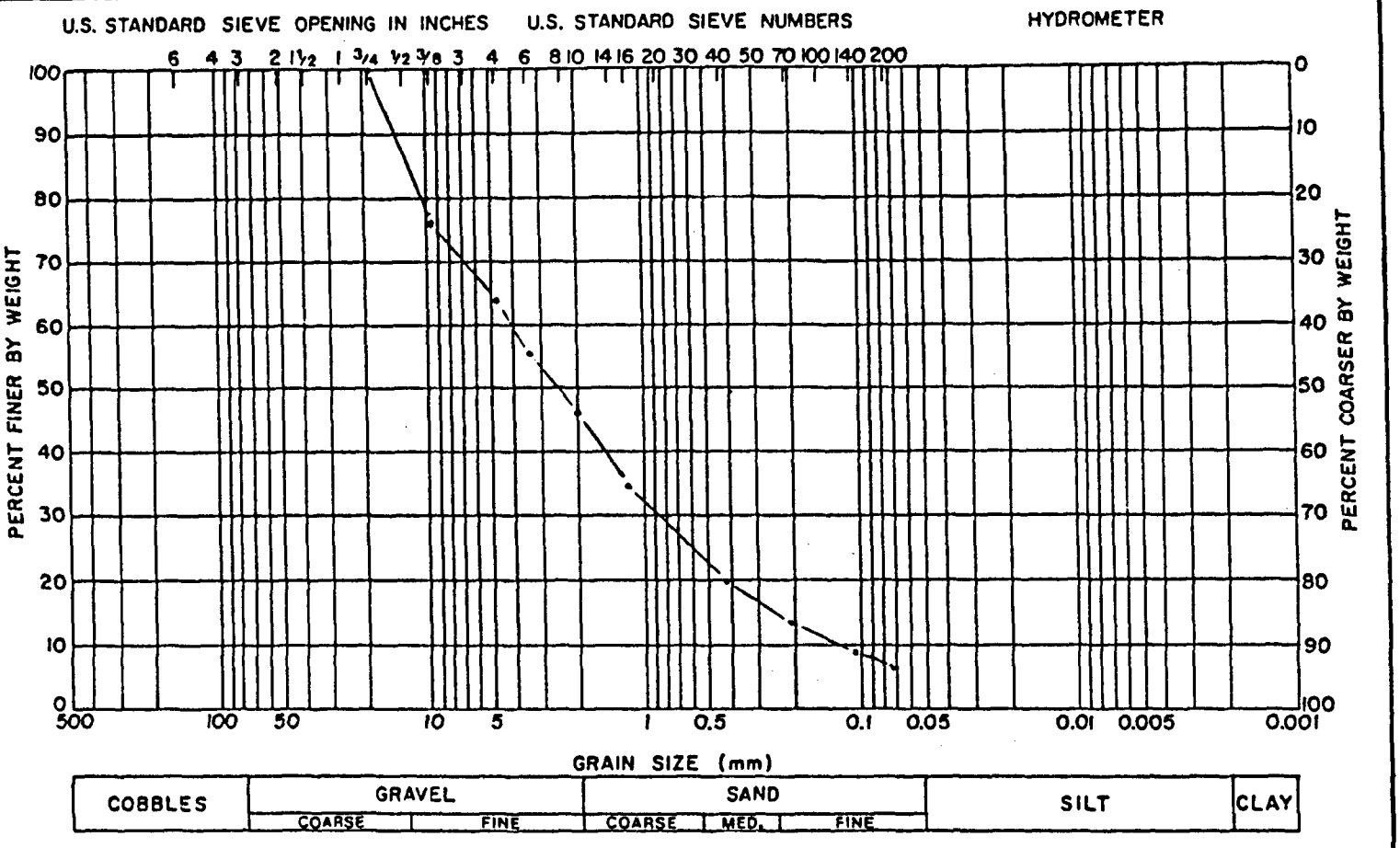
SIEVE NUMBER	DIAMETER (mm)	WT. RETAINED	CUM WT. RETAINED	WT. PASSING	% PASSING	LOG DIAMETER
3/4	19.000	0.00	0.00	125.50	100.00	1.279
3/8	9.500	29.69	29.69	95.81	76.34	0.978
4	4.750	16.34	46.03	79.47	63.32	0.677
6	3.350	9.33	55.36	70.14	55.89	0.525
10	2.000	11.82	67.18	58.32	46.47	0.301
16	1.180	15.33	82.51	42.99	34.25	0.072
40	0.425	18.22	100.73	24.77	19.74	-0.372
70	0.212	7.83	108.56	16.94	13.50	-0.674
140	0.106	5.99	114.55	10.95	8.73	-0.975
200	0.075	2.53	117.08	8.42	6.71	-1.125
pan		8.01	125.09	0.41		

d10: 0.13 (mm) d50: 2.5 (mm)
d16: 0.29 (mm) d60: 4.0 (mm)
d30: 0.88 (mm) d84: 12 (mm)

MEDIAN PARTICLE DIAMETER (d50): 2.50
UNIFORMITY COEFFICIENT, Cu (d60/d10): 30.8
COEFFICIENT OF CURVATURE, Cc, [(d30)**2/(d10*d60)]: 1.5
MEAN PARTICLE DIAMETER, [(d16+d50+d84)/3]: 4.93

COMMENTS:

LABORATORY ANALYSIS PERFORMED BY: L. Simpson
CALCULATIONS MADE BY: L. Simpson
CHECKED BY: S. Stoller



USDA PARTICLE SIZE LIMIT CLASSIFICATION

θ_i = --	d_{10} = 0.13	d_{50} = 2.5	d_{60} = 4.0	C_u = 31	C_c = 1.5
SAMPLE NUMBER		DEPTH	CLASSIFICATION (USDA TEXTURE TRIANGLE)		
Rs-3		N/A	Gravelly Sand		

DANIEL B. STEPHENS & ASSOCIATES, INC.

SIEVE ANALYSIS DATA

JOB NAME: JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER: 89-L-144
TEST DATE: 03/07/90
SAMPLE NUMBER: Rs-5
DEPTH: UNKNOWN

TOTAL WEIGHT OF SAMPLE: 133.80 (g)

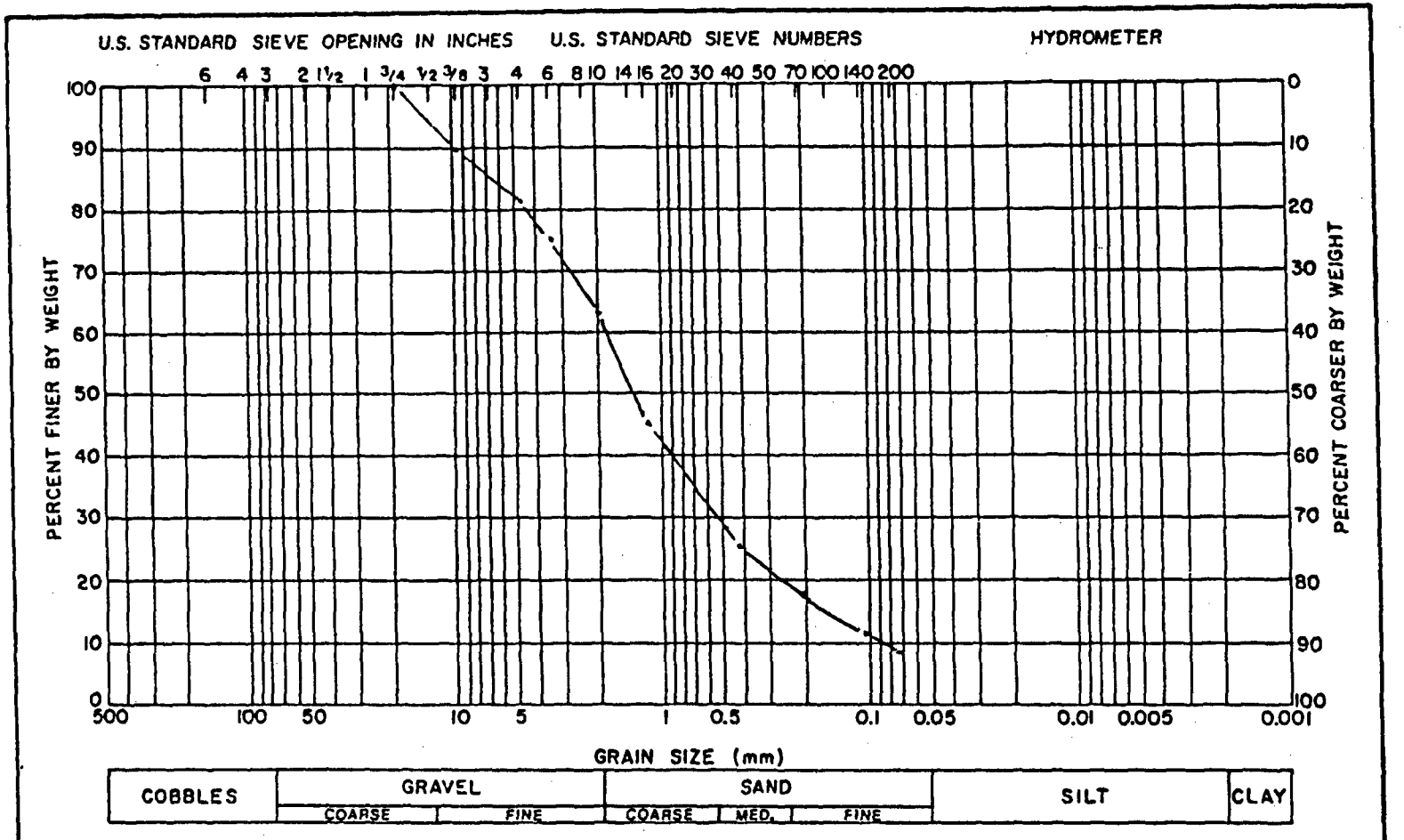
SIEVE NUMBER	DIAMETER (mm)	WT. RETAINED	CUM WT. RETAINED	WT. PASSING	% PASSING	LOG DIAMETER
3/4	19.000	0.00	0.00	133.80	100.00	1.279
3/8	9.500	13.63	13.63	120.17	89.81	0.978
4	4.750	11.21	24.84	108.96	81.43	0.677
6	3.350	8.81	33.65	100.15	74.85	0.525
10	2.000	15.73	49.38	84.42	63.09	0.301
16	1.180	23.42	72.80	61.00	45.59	0.072
40	0.425	26.12	98.92	34.88	26.07	-0.372
70	0.212	11.53	110.45	23.35	17.45	-0.674
140	0.106	8.59	119.04	14.76	11.03	-0.975
200	0.075	3.67	122.71	11.09	8.29	-1.125
pan		10.71	133.42	0.38		

d10:	0.090 (mm)	d50:	1.4 (mm)
d16:	0.17 (mm)	d60:	1.8 (mm)
d30:	0.53 (mm)	d84:	6.0 (mm)

MEDIAN PARTICLE DIAMETER (d50): 1.40
UNIFORMITY COEFFICIENT, Cu (d60/d10): 20.0
COEFFICIENT OF CURVATURE, Cc, [(d30)**2/(d10*d60)]: 1.7
MEAN PARTICLE DIAMETER, [(d16+d50+d84)/3]: 2.52

COMMENTS:

LABORATORY ANALYSIS PERFORMED BY: L. Simpson
CALCULATIONS MADE BY: L. Simpson
CHECKED BY: S. Stoller



USDA PARTICLE SIZE LIMIT CLASSIFICATION

θ_i = Rs-5	d_{10} = 0.090	d_{50} = 1.4	d_{60} = 1.8	C_u = 20	C_c = 1.7
SAMPLE NUMBER		DEPTH	CLASSIFICATION (USDA TEXTURE TRIANGLE)		
Rs-5		N/A	Gravelly Sand		

DANIEL B. STEPHENS & ASSOCIATES, INC.

SIEVE ANALYSIS DATA

JOB NAME: JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER: 89-L-144
TEST DATE: 03/08/90
SAMPLE NUMBER: Rs-6
DEPTH: UNKNOWN

TOTAL WEIGHT OF SAMPLE: 131.03 (g)

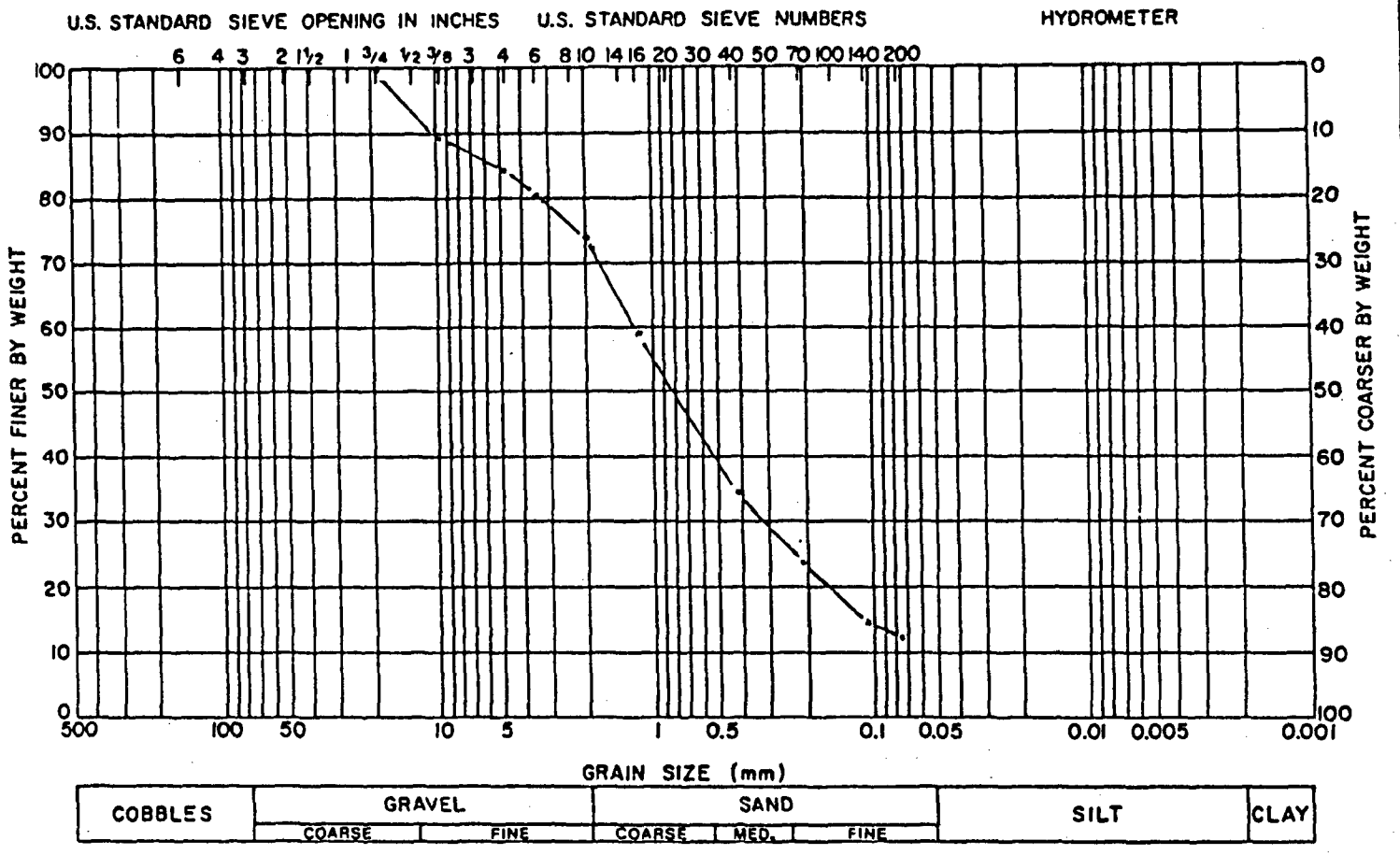
SIEVE NUMBER	DIAMETER (mm)	WT. RETAINED	CUM WT. RETAINED	WT. PASSING	% PASSING	LOG DIAMETER
3/4	19.000	0.00	0.00	131.03	100.00	1.279
3/8	9.500	13.94	13.94	117.09	89.36	0.978
4	4.750	6.87	20.81	110.22	84.12	0.677
6	3.350	4.67	25.48	105.55	80.55	0.525
10	2.000	8.89	34.37	96.66	73.77	0.301
16	1.180	19.65	54.02	77.01	58.77	0.072
40	0.425	31.99	86.01	45.02	34.36	-0.372
70	0.212	14.52	100.53	30.50	23.28	-0.674
140	0.106	10.43	110.96	20.07	15.32	-0.975
200	0.075	4.16	115.12	15.91	12.14	-1.125
pan		15.39	130.51	0.52		

d10: -- (mm) d50: 0.82 (mm)
d16: 0.11 (mm) d60: 1.2 (mm)
d30: 0.32 (mm) d84: 4.7 (mm)

MEDIAN PARTICLE DIAMETER (d50): 0.82
UNIFORMITY COEFFICIENT, Cu (d60/d10): --
COEFFICIENT OF CURVATURE, Cc, [(d30)**2/(d10*d60)]: --
MEAN PARTICLE DIAMETER, [(d16+d50+d84)/3]: 1.88

COMMENTS:

LABORATORY ANALYSIS PERFORMED BY: L. Simpson
CALCULATIONS MADE BY: L. Simpson
CHECKED BY: S. Stoller



USDA PARTICLE SIZE LIMIT CLASSIFICATION

θ_i = --	d_{10} = *	d_{50} = 0.82	d_{60} = 1.2	C_u = --	C_c = --
SAMPLE NUMBER		DEPTH	CLASSIFICATION (USDA TEXTURE TRIANGLE)		
RS-6		N/A	Gravelly Loam		

DANIEL B. STEPHENS & ASSOCIATES, INC.

SIEVE ANALYSIS DATA

JOB NAME: JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER: 89-L-144
TEST DATE: 03/08/90
SAMPLE NUMBER: Rs-7
DEPTH: UNKNOWN

TOTAL WEIGHT OF SAMPLE: 117.54 (g)

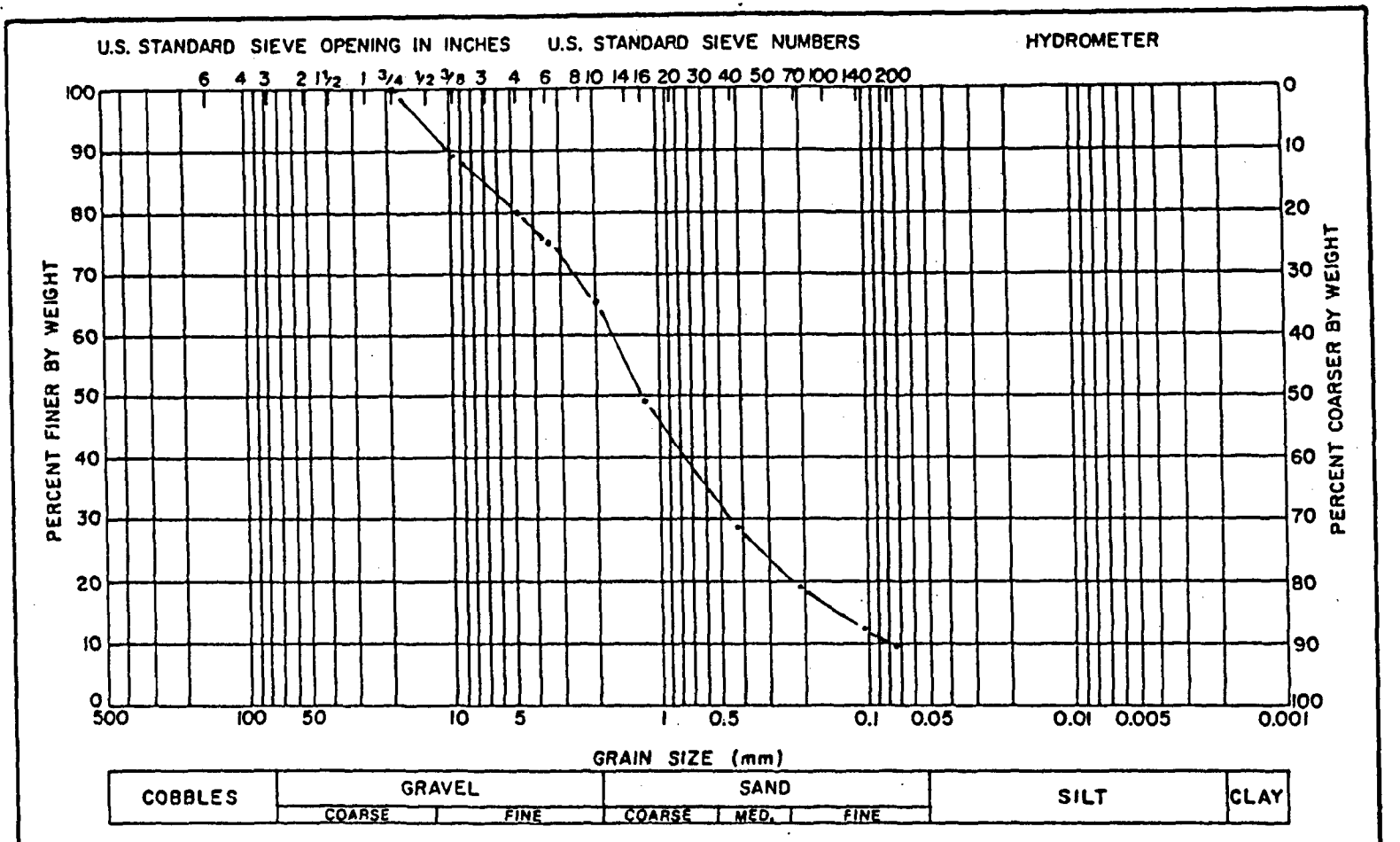
SIEVE NUMBER	DIAMETER (mm)	WT. RETAINED	CUM WT. RETAINED	WT. PASSING	% PASSING	LOG DIAMETER
3/4	19.000	0.00	0.00	117.54	100.00	1.279
3/8	9.500	12.75	12.75	104.79	89.15	0.978
4	4.750	10.75	23.50	94.04	80.01	0.677
6	3.350	5.96	29.46	88.08	74.94	0.525
10	2.000	10.88	40.34	77.20	65.68	0.301
16	1.180	19.15	59.49	58.05	49.39	0.072
40	0.425	24.42	83.91	33.63	28.61	-0.372
70	0.212	11.26	95.17	22.37	19.03	-0.674
140	0.106	7.94	103.11	14.43	12.28	-0.975
200	0.075	3.16	106.27	11.27	9.59	-1.125
pan		10.58	116.85	0.69		

d10:	0.080 (mm)	d50:	1.2 (mm)
d16:	0.16 (mm)	d60:	1.7 (mm)
d30:	0.46 (mm)	d84:	6.5 (mm)

MEDIAN PARTICLE DIAMETER (d50): 1.20
UNIFORMITY COEFFICIENT, Cu (d60/d10): 21.3
COEFFICIENT OF CURVATURE, Cc, [(d30)**2/(d10*d60)]: 1.6
MEAN PARTICLE DIAMETER, [(d16+d50+d84)/3]: 2.62

COMMENTS:

LABORATORY ANALYSIS PERFORMED BY: L. Simpson
CALCULATIONS MADE BY: L. Simpson
CHECKED BY: S. Stoller



USDA PARTICLE SIZE LIMIT CLASSIFICATION

θ_1 = --	d_{10} = 0.080	d_{50} = 1.2	d_{60} = 1.7	C_u = 21	C_c = 1.6
SAMPLE NUMBER		DEPTH	CLASSIFICATION (USDA TEXTURE TRIANGLE)		
Rs-7		N/A	Gravelly Loam		

DANIEL B. STEPHENS & ASSOCIATES, INC.

SIEVE ANALYSIS DATA

JOB NAME: JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER: 89-L-144
TEST DATE: 03/09/90
SAMPLE NUMBER: Rs-10
DEPTH: UNKNOWN

TOTAL WEIGHT OF SAMPLE: 135.80 (g)

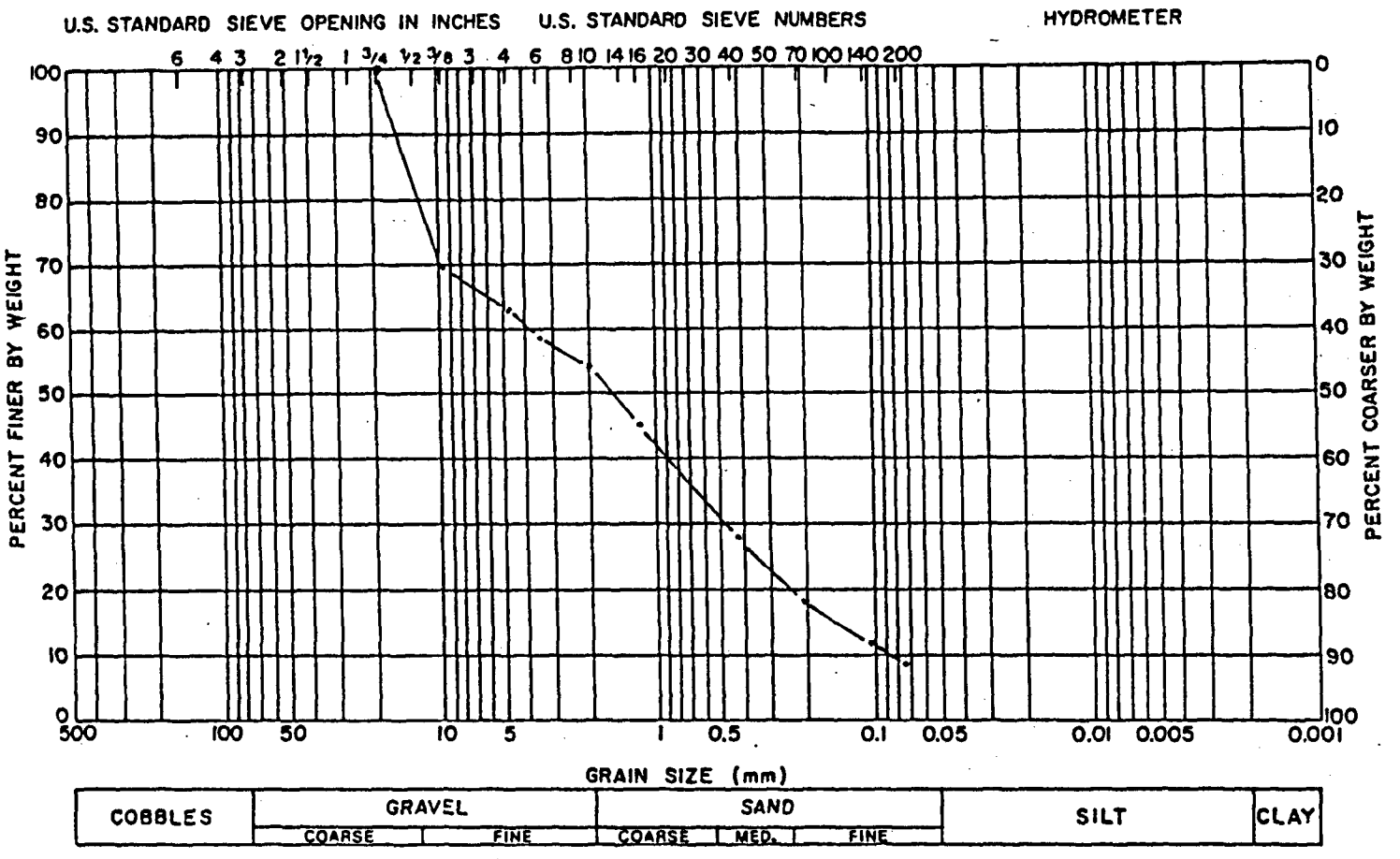
SIEVE NUMBER	DIAMETER (mm)	WT. RETAINED	CUM WT. RETAINED	WT. PASSING	% PASSING	LOG DIAMETER
3/4	19.000	0.00	0.00	135.80	100.00	1.279
3/8	9.500	40.99	40.99	94.81	69.82	0.978
4	4.750	9.41	50.40	85.40	62.89	0.677
6	3.350	6.11	56.51	79.29	58.39	0.525
10	2.000	5.62	62.13	73.67	54.25	0.301
16	1.180	12.26	74.39	61.41	45.22	0.072
40	0.425	23.44	97.83	37.97	27.96	-0.372
70	0.212	13.00	110.83	24.97	18.39	-0.674
140	0.106	9.43	120.26	15.54	11.44	-0.975
200	0.075	3.50	123.76	12.04	8.87	-1.125
pan		11.61	135.37	0.43		

d10: 0.088 (mm) d50: 1.6 (mm)
d16: 0.17 (mm) d60: 3.9 (mm)
d30: 0.49 (mm) d84: 14 (mm)

MEDIAN PARTICLE DIAMETER (d50): 1.60
UNIFORMITY COEFFICIENT, Cu (d60/d10): 44.3
COEFFICIENT OF CURVATURE, Cc, [(d30)**2/(d10*d60)]: 0.7
MEAN PARTICLE DIAMETER, [(d16+d50+d84)/3]: 5.26

COMMENTS:

LABORATORY ANALYSIS PERFORMED BY: L. Simpson
CALCULATIONS MADE BY: L. Simpson
CHECKED BY: S. Stoller



USDA PARTICLE SIZE LIMIT CLASSIFICATION

θ_i = --	d_{10} = 0.088	d_{50} = 1.6	d_{60} = 3.9	C_u = 44	C_c = 0.7
SAMPLE NUMBER		DEPTH	CLASSIFICATION (USDA TEXTURE TRIANGLE)		
Rs-10		N/A	Gravelly Loam		

DANIEL B. STEPHENS & ASSOCIATES, INC.

APPENDIX C:

LABORATORY METHODS

PARTICLE SIZE DISTRIBUTION

(Sieve Analysis)

Method

Methods and procedures outlined under ASTM standard D 422-63(72) are followed to determine the particle size distribution of particles larger than 75 μm using the mechanical sieve technique. Distribution of particles smaller than 75 μm are determined using the hydrometer sedimentation analysis.

Laboratory Procedure

A soil sample is separated into a series of fractions from 4.75 mm (No. 4) to 0.075 mm (No. 200) by mechanical sieve procedures. The sieve operates by means of lateral and vertical jarring motions shaking the soil sample through a series of finer sieves. Mechanical sieving is considered complete when less than 1% of the mass fraction passes a sieve during a one minute hand sieving test.

Calculations

A plot of the particle size distribution curve is developed from the mass retained on each sieve and data from the hydrometer analysis. This plot is used to estimate the d_{10}, d_{16}, d_{30}, d_{50}, d_{60}, and d_{84} diameters (d_x is the diameter of a particle of which

x percent of the sample mass is finer). These soil particles diameters are used to calculate the uniformity coefficient, Cu:

$$C_u = d_{60}/d_{10}$$

the coefficient of curvature, C_c:

$$C_c = (d_{30})^2/(d_{10} * d_{60})$$

and the mean particle diameter, $\bar{d}$:

$$\bar{d} = (d_{16} + d_{50} + d_{84})/3$$

PARTICLE SIZE DISTRIBUTION
(Wet Sieve Analysis)

Method

Methods and procedures outlined in Lambe's Soil Testing for Engineers are followed for the initial wet sieve, and the methods and procedures under ASTM standard D 422-63(72) are followed to determine the particle size distribution of particles larger than 75 μm using the mechanical sieve technique. Distribution of particles smaller than 75 μm are determined using the hydrometer sedimentation analysis.

Laboratory Procedure

Water is added to a soil sample, and the sample is soaked for a minimum of 2 hours. The slurry is then washed through a No. 200 sieve. A hydrometer is performed on the soil passing through the sieve. The soil retained on the sieve is oven dried. The oven-dried soil sample is separated into a series of fractions from 4.75 mm (No. 4) to 0.075 mm (No. 200) by mechanical sieve procedures. The sieve operates by means of lateral and vertical jarring motions shaking the soil sample through a series of finer sieves. Mechanical sieving is considered complete when less than 1% of the mass fraction passes a sieve during a one minute hand sieving test.

Calculations

A plot of the particle size distribution curve is developed from the mass retained on each sieve and data from the hydrometer analysis. This plot is used to estimate the d_{10}, d_{16}, d_{30}, d_{50}, d_{60},

and d_{84} diameters (d_x is the diameter of a particle of which x percent of the sample mass is finer). These soil particles diameters are used to calculate the uniformity coefficient, Cu:

$$C_u = d_{60}/d_{10}$$

the coefficient of curvature, C_c:

$$C_c = (d_{30})^2/(d_{10} * d_{60})$$

and the mean particle diameter, $\bar{d}$:

$$\bar{d} = (d_{16} + d_{50} + d_{84})/3$$

PARTICLE SIZE DISTRIBUTION

(Hydrometer Analysis)

Method

Methods and procedures outlined under ASTM standard D 422-63(72) are followed to determine the particle size distribution of particles smaller than 75 μm using the hydrometer sedimentation analysis. Distribution of particles larger than 75 μm are determined using the sieve analysis.

Laboratory Procedures

A soil sample of approximately 50 grams for silts and clays, or 100 grams for sands is mixed in a mixer for a minimum of 3 minutes in a solution of sodium hexametaphosphate. The mixture is then soaked for a minimum of 16 hours in a hydrometer jar. At the end of the soaking period, the sample is dispersed further by shaking the sample in the jar and distilled water is added until the total volume is 1000 ml. The glass cylinder is turned upside down and back for one minute to complete agitation. Hydrometer readings are taken at ASTM recommended times for a period of 24 hours.

Calculations

The percentage of soil remaining in solution at the level at which the hydrometer measures, P, is calculated as follows:

$$P = (Ra/W) \times 100$$

where

P = percentage of soil remaining in suspension at the level at which the hydrometer measures the density of the suspension

R = hydrometer reading with composite correction applied

a = correction factor for particle density other than 2.65 applied to the readings of the 152H hydrometer [ASTM D 422-63 (72)]

W = oven-dry mass of the soil sample

The diameter of a particle corresponding to the above calculated percentage is calculated as follows:

$$D = K \sqrt{L/T}$$

where

D = diameter of the particle (mm)

K = a constant depending on temperature and the specific gravity of the soil particles [ASTM D 422-63(72)]

L = distance from the suspension surface to the level where the suspension is being measured (cm)

T = time since the beginning of sedimentation (min)

A plot of the particle size distribution curve is developed

from the above data and data from the sieve analysis. However, only the points less than 75ìm diameter are plotted from the hydrometer data. This plot is used to estimate the d_{10}, d_{16}, d_{30}, d_{50}, d_{60}, and d_{84} diameters (d_x is the diameter of a particle of which x percent of the sample mass is finer). These soil particles diameters are used to calculate the uniformity coefficient, Cu:

$$C_u = d_{60}/d_{10}$$

the coefficient of curvature, C_c:

$$C_c = (d_{30})^2/(d_{10} \times d_{60})$$

and the mean particle diameter, d:

$$\bar{d} = (d_{16} + d_{50} + d_{84})/3$$

Appendix F: PARTICLE DENSITY

Summary of Particle Density Tests

Sample No.	Particle Density (g/cc)	Average Particle Density (g/cc)
5-1	2.67	2.66
5-2	2.64	
5-3	2.76	2.74
5-4	2.72	
5-5	2.76	2.77
5-6	2.78	
5-7	2.70	2.73
5-8	2.76	
5-9	2.68	2.66
5-10	2.64	
5-11	2.82	2.78
5-12	2.74	
5-13	2.67	2.68
5-14	2.68	
5-15	2.64	2.66
5-16	2.67	
5-17	2.61	2.62
5-18	2.63	
5-19	2.61	2.64
5-20	2.67	
5-21	2.60	2.61
5-22	2.61	
5-23	2.62	2.61
5-24	2.59	

PARTICLE DENSITY

JOB NAME: JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER: 89-L-144
SAMPLE NUMBER: 5-1
DEPTH: N/A
DATE: 1/08/90

	TRIAL 1	TRIAL 2
WEIGHT OF PYCNOMETER FILLED W/ AIR (g):	91.48	56.40
WEIGHT OF PYCNOMETER FILLED W/ SOIL (g):	145.90	111.36
WEIGHT OF PYCNOMETER FILLED W/ SOIL & WATER (g):	373.66	339.54
WEIGHT OF PYCNOMETER FILLED W/ WATER (g):	339.50	305.17
OBSERVED TEMPERATURE (deg C):	38.00	32.00
DENSITY OF WATER AT OBSERVED TEMPERATURE (g/cc):	0.9930	0.9951
PARTICLE DENSITY (g/cc):	2.67	2.65
CORRECTION FACTOR, K:	0.9948	0.9969
PARTICLE DENSITY AT 20C (g/cc):	2.68	2.66

AVERAGE PARTICLE DENSITY (g/cc) = 2.67

COMMENTS:

LABORATORY ANALYSIS PERFORMED BY: K. Turnham
CALCULATIONS MADE BY: M. Burkhard
CHECKED BY: S. Stoller

PARTICLE DENSITY

JOB NAME: JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER: 89-L-144
SAMPLE NUMBER: 5-2
DEPTH: N/A
DATE: 1/08/90

	TRIAL 1	TRIAL 2
WEIGHT OF PYCNOMETER FILLED W/ AIR (g):	91.48	56.40
WEIGHT OF PYCNOMETER FILLED W/ SOIL (g):	143.53	110.73
WEIGHT OF PYCNOMETER FILLED W/ SOIL & WATER (g):	372.17	338.72
WEIGHT OF PYCNOMETER FILLED W/ WATER (g):	339.90	304.80
OBSERVED TEMPERATURE (deg C):	33.00	37.00
DENSITY OF WATER AT OBSERVED TEMPERATURE (g/cc):	0.9947	0.9934
PARTICLE DENSITY (g/cc):	2.62	2.65
CORRECTION FACTOR, K:	0.9965	0.9952
PARTICLE DENSITY AT 20C (g/cc):	2.63	2.66

AVERAGE PARTICLE DENSITY (g/cc) = 2.64

COMMENTS:

LABORATORY ANALYSIS PERFORMED BY: K. Turnham
CALCULATIONS MADE BY: M. Burkhard
CHECKED BY: S. Soller

PARTICLE DENSITY

JOB NAME: JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER: 89-L-144
SAMPLE NUMBER: 5-3
DEPTH: N/A
DATE: 1/05/90

	TRIAL 1	TRIAL 2
WEIGHT OF PYCNOMETER FILLED W/ AIR (g):	91.48	56.40
WEIGHT OF PYCNOMETER FILLED W/ SOIL (g):	142.70	106.20
WEIGHT OF PYCNOMETER FILLED W/ SOIL & WATER (g):	372.50	336.70
WEIGHT OF PYCNOMETER FILLED W/ WATER (g):	339.82	304.87
OBSERVED TEMPERATURE (deg C):	35.00	36.00
DENSITY OF WATER AT OBSERVED TEMPERATURE (g/cc):	0.9941	0.9937
PARTICLE DENSITY (g/cc):	2.75	2.75
CORRECTION FACTOR, K:	0.9959	0.9955
PARTICLE DENSITY AT 20C (g/cc):	2.76	2.77

AVERAGE PARTICLE DENSITY (g/cc) = 2.76

COMMENTS:

LABORATORY ANALYSIS PERFORMED BY: K. Turnham
CALCULATIONS MADE BY: M. Burkhard
CHECKED BY: S. Stoller

PARTICLE DENSITY

JOB NAME: JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER: 89-L-144
SAMPLE NUMBER: 5-4
DEPTH: N/A
DATE: 1/08/90

	TRIAL 1	TRIAL 2
WEIGHT OF PYCNOMETER FILLED W/ AIR (g):	91.48	56.40
WEIGHT OF PYCNOMETER FILLED W/ SOIL (g):	146.60	109.26
WEIGHT OF PYCNOMETER FILLED W/ SOIL & WATER (g):	374.22	338.13
WEIGHT OF PYCNOMETER FILLED W/ WATER (g):	339.40	304.61
OBSERVED TEMPERATURE (deg C):	39.00	39.00
DENSITY OF WATER AT OBSERVED TEMPERATURE (g/cc):	0.9926	0.9926
PARTICLE DENSITY (g/cc):	2.70	2.71
CORRECTION FACTOR, K:	0.9944	0.9944
PARTICLE DENSITY AT 20C (g/cc):	2.71	2.73

AVERAGE PARTICLE DENSITY (g/cc) = 2.72

COMMENTS:

LABORATORY ANALYSIS PERFORMED BY: K. Turnham
CALCULATIONS MADE BY: M. Burkhard
CHECKED BY: S. Stoller

PARTICLE DENSITY

JOB NAME: JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER: 89-L-144
SAMPLE NUMBER: 5-5
DEPTH: N/A
DATE: 1/05/90

	TRIAL 1	TRIAL 2
WEIGHT OF PYCNOMETER FILLED W/ AIR (g):	91.48	56.40
WEIGHT OF PYCNOMETER FILLED W/ SOIL (g):	147.61	109.53
WEIGHT OF PYCNOMETER FILLED W/ SOIL & WATER (g):	375.13	338.47
WEIGHT OF PYCNOMETER FILLED W/ WATER (g):	339.40	304.52
OBSERVED TEMPERATURE (deg C):	39.00	40.00
DENSITY OF WATER AT OBSERVED TEMPERATURE (g/cc):	0.9926	0.9922
PARTICLE DENSITY (g/cc):	2.73	2.75
CORRECTION FACTOR, K:	0.9944	0.9940
PARTICLE DENSITY AT 20C (g/cc):	2.75	2.77

AVERAGE PARTICLE DENSITY (g/cc) = 2.76

COMMENTS:

LABORATORY ANALYSIS PERFORMED BY: K. Turnham
CALCULATIONS MADE BY: M. Burkhard
CHECKED BY: S. Stoller

PARTICLE DENSITY

JOB NAME: JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER: 89-L-144
SAMPLE NUMBER: 5-6
DEPTH: N/A
DATE: 1/08/90

	TRIAL 1	TRIAL 2
WEIGHT OF PYCNOMETER FILLED W/ AIR (g):	91.48	56.40
WEIGHT OF PYCNOMETER FILLED W/ SOIL (g):	147.96	106.57
WEIGHT OF PYCNOMETER FILLED W/ SOIL & WATER (g):	375.60	336.83
WEIGHT OF PYCNOMETER FILLED W/ WATER (g):	339.40	304.61
OBSERVED TEMPERATURE (deg C):	39.00	39.00
DENSITY OF WATER AT OBSERVED TEMPERATURE (g/cc):	0.9926	0.9926
PARTICLE DENSITY (g/cc):	2.76	2.77
CORRECTION FACTOR, K:	0.9944	0.9944
PARTICLE DENSITY AT 20C (g/cc):	2.78	2.79

AVERAGE PARTICLE DENSITY (g/cc) = 2.78

COMMENTS:

LABORATORY ANALYSIS PERFORMED BY: K. Turnham
CALCULATIONS MADE BY: M. Burkhard
CHECKED BY: S. Stoller

PARTICLE DENSITY

JOB NAME: JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER: 89-L-144
SAMPLE NUMBER: 5-7
DEPTH: N/A
DATE: 1/04/89

	TRIAL 1	TRIAL 2
WEIGHT OF PYCNOMETER FILLED W/ AIR (g):	91.50	56.40
WEIGHT OF PYCNOMETER FILLED W/ SOIL (g):	145.40	109.10
WEIGHT OF PYCNOMETER FILLED W/ SOIL & WATER (g):	373.80	338.20
WEIGHT OF PYCNOMETER FILLED W/ WATER (g):	339.80	304.95
OBSERVED TEMPERATURE (deg C):	34.00	35.00
DENSITY OF WATER AT OBSERVED TEMPERATURE (g/cc):	0.9944	0.9941
PARTICLE DENSITY (g/cc):	2.69	2.69
CORRECTION FACTOR, K:	0.9962	0.9959
PARTICLE DENSITY AT 20C (g/cc):	2.70	2.71

AVERAGE PARTICLE DENSITY (g/cc) = 2.70

COMMENTS:

LABORATORY ANALYSIS PERFORMED BY: K. Turnham
CALCULATIONS MADE BY: M. Burkhard
CHECKED BY: S. Stoller

PARTICLE DENSITY

JOB NAME: JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER: 89-L-144
SAMPLE NUMBER: 5-8
DEPTH: N/A
DATE: 1/05/90

	TRIAL 1	TRIAL 2
WEIGHT OF PYCNOMETER FILLED W/ AIR (g):	91.48	56.40
WEIGHT OF PYCNOMETER FILLED W/ SOIL (g):	156.52	107.42
WEIGHT OF PYCNOMETER FILLED W/ SOIL & WATER (g):	381.43	337.60
WEIGHT OF PYCNOMETER FILLED W/ WATER (g):	339.90	305.05
OBSERVED TEMPERATURE (deg C):	33.00	34.00
DENSITY OF WATER AT OBSERVED TEMPERATURE (g/cc):	0.9947	0.9944
PARTICLE DENSITY (g/cc):	2.75	2.75
CORRECTION FACTOR, K:	0.9965	0.9962
PARTICLE DENSITY AT 20C (g/cc):	2.76	2.76

AVERAGE PARTICLE DENSITY (g/cc) = 2.76

COMMENTS:

LABORATORY ANALYSIS PERFORMED BY: K. Turnham
CALCULATIONS MADE BY: M. Burkhard
CHECKED BY: S. Stoller

PARTICLE DENSITY

JOB NAME: JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER: 89-L-144
SAMPLE NUMBER: 5-9
DEPTH: N/A
DATE: 1/08/90

	TRIAL 1	TRIAL 2
WEIGHT OF PYCNOMETER FILLED W/ AIR (g):	91.48	56.40
WEIGHT OF PYCNOMETER FILLED W/ SOIL (g):	151.19	108.74
WEIGHT OF PYCNOMETER FILLED W/ SOIL & WATER (g):	377.00	337.63
WEIGHT OF PYCNOMETER FILLED W/ WATER (g):	339.65	304.70
OBSERVED TEMPERATURE (deg C):	36.00	38.00
DENSITY OF WATER AT OBSERVED TEMPERATURE (g/cc):	0.9937	0.9930
PARTICLE DENSITY (g/cc):	2.65	2.68
CORRECTION FACTOR, K:	0.9955	0.9948
PARTICLE DENSITY AT 20C (g/cc):	2.67	2.69

AVERAGE PARTICLE DENSITY (g/cc) = 2.68

COMMENTS:

LABORATORY ANALYSIS PERFORMED BY: K. Turnham
CALCULATIONS MADE BY: M. Burkhard
CHECKED BY: S. Stoller

PARTICLE DENSITY

JOB NAME: JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER: 89-L-144
SAMPLE NUMBER: 5-10
DEPTH: N/A
DATE: 1/04/90

	TRIAL 1	TRIAL 2
WEIGHT OF PYCNOMETER FILLED W/ AIR (g):	91.48	56.40
WEIGHT OF PYCNOMETER FILLED W/ SOIL (g):	154.56	111.08
WEIGHT OF PYCNOMETER FILLED W/ SOIL & WATER (g):	378.92	338.63
WEIGHT OF PYCNOMETER FILLED W/ WATER (g):	339.65	304.70
OBSERVED TEMPERATURE (deg C):	36.00	38.00
DENSITY OF WATER AT OBSERVED TEMPERATURE (g/cc):	0.9937	0.9930
PARTICLE DENSITY (g/cc):	2.63	2.62
CORRECTION FACTOR, K:	0.9955	0.9948
PARTICLE DENSITY AT 20C (g/cc):	2.64	2.63

AVERAGE PARTICLE DENSITY (g/cc) = 2.64

COMMENTS:

LABORATORY ANALYSIS PERFORMED BY: K. Turnham
CALCULATIONS MADE BY: M. Burkhard
CHECKED BY: S. Stoller

PARTICLE DENSITY

JOB NAME: JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER: 89-L-144
SAMPLE NUMBER: 5-11
DEPTH: N/A
DATE: 1/05/90

	TRIAL 1	TRIAL 2
WEIGHT OF PYCNOMETER FILLED W/ AIR (g):	91.48	56.40
WEIGHT OF PYCNOMETER FILLED W/ SOIL (g):	141.00	119.50
WEIGHT OF PYCNOMETER FILLED W/ SOIL & WATER (g):	371.70	345.90
WEIGHT OF PYCNOMETER FILLED W/ WATER (g):	339.75	305.10
OBSERVED TEMPERATURE (deg C):	35.00	33.00
DENSITY OF WATER AT OBSERVED TEMPERATURE (g/cc):	0.9941	0.9947
PARTICLE DENSITY (g/cc):	2.80	2.81
CORRECTION FACTOR, K:	0.9959	0.9965
PARTICLE DENSITY AT 20C (g/cc):	2.81	2.82

AVERAGE PARTICLE DENSITY (g/cc) = 2.82

COMMENTS:

LABORATORY ANALYSIS PERFORMED BY: K. Turnham
CALCULATIONS MADE BY: M. Burkhard
CHECKED BY: S. Stoller

PARTICLE DENSITY

JOB NAME: JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER: 89-L-144
SAMPLE NUMBER: 5-12
DEPTH: N/A
DATE: 1/05/90

	TRIAL 1	TRIAL 2
WEIGHT OF PYCNOMETER FILLED W/ AIR (g):	91.48	56.40
WEIGHT OF PYCNOMETER FILLED W/ SOIL (g):	144.19	111.84
WEIGHT OF PYCNOMETER FILLED W/ SOIL & WATER (g):	373.06	339.73
WEIGHT OF PYCNOMETER FILLED W/ WATER (g):	339.50	304.52
OBSERVED TEMPERATURE (deg C):	38.00	40.00
DENSITY OF WATER AT OBSERVED TEMPERATURE (g/cc):	0.9930	0.9922
PARTICLE DENSITY (g/cc):	2.73	2.72
CORRECTION FACTOR, K:	0.9948	0.9940
PARTICLE DENSITY AT 20C (g/cc):	2.75	2.74

AVERAGE PARTICLE DENSITY (g/cc) = 2.74

COMMENTS:

LABORATORY ANALYSIS PERFORMED BY: K. Turnham
CALCULATIONS MADE BY: M. Burkhard
CHECKED BY: S. Stoller

PARTICLE DENSITY

JOB NAME: JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER: 89-L-144
SAMPLE NUMBER: 5-13
DEPTH: N/A
DATE: 1/08/90

	TRIAL 1	TRIAL 2
WEIGHT OF PYCNOMETER FILLED W/ AIR (g):	91.48	56.40
WEIGHT OF PYCNOMETER FILLED W/ SOIL (g):	148.83	111.25
WEIGHT OF PYCNOMETER FILLED W/ SOIL & WATER (g):	375.82	339.08
WEIGHT OF PYCNOMETER FILLED W/ WATER (g):	339.82	304.80
OBSERVED TEMPERATURE (deg C):	34.00	37.00
DENSITY OF WATER AT OBSERVED TEMPERATURE (g/cc):	0.9944	0.9934
PARTICLE DENSITY (g/cc):	2.67	2.65
CORRECTION FACTOR, K:	0.9962	0.9952
PARTICLE DENSITY AT 20C (g/cc):	2.68	2.66

AVERAGE PARTICLE DENSITY (g/cc) = 2.67

COMMENTS:

LABORATORY ANALYSIS PERFORMED BY: K. Turnham
CALCULATIONS MADE BY: M. Burkhard
CHECKED BY: S. Stoller

PARTICLE DENSITY

JOB NAME: JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER: 89-L-144
SAMPLE NUMBER: 5-14
DEPTH: N/A
DATE: 1/08/90

	TRIAL 1	TRIAL 2
WEIGHT OF PYCNOMETER FILLED W/ AIR (g):	91.48	56.40
WEIGHT OF PYCNOMETER FILLED W/ SOIL (g):	146.12	107.46
WEIGHT OF PYCNOMETER FILLED W/ SOIL & WATER (g):	373.86	336.96
WEIGHT OF PYCNOMETER FILLED W/ WATER (g):	339.65	304.80
OBSERVED TEMPERATURE (deg C):	36.00	37.00
DENSITY OF WATER AT OBSERVED TEMPERATURE (g/cc):	0.9937	0.9934
PARTICLE DENSITY (g/cc):	2.66	2.68
CORRECTION FACTOR, K:	0.9955	0.9952
PARTICLE DENSITY AT 20C (g/cc):	2.67	2.70

AVERAGE PARTICLE DENSITY (g/cc) = 2.68

COMMENTS:

LABORATORY ANALYSIS PERFORMED BY: K. Turnham
CALCULATIONS MADE BY: M. Burkhard
CHECKED BY: S. Stoller

PARTICLE DENSITY

JOB NAME: JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER: 89-L-144
SAMPLE NUMBER: 5-15
DEPTH: 0-46 FT.
DATE: 2/8/90

	TRIAL 1	TRIAL 2
WEIGHT OF PYCNOMETER FILLED W/ AIR (g):	91.49	102.76
WEIGHT OF PYCNOMETER FILLED W/ SOIL (g):	144.42	153.20
WEIGHT OF PYCNOMETER FILLED W/ SOIL & WATER (g):	371.56	381.59
WEIGHT OF PYCNOMETER FILLED W/ WATER (g):	338.85	350.05
OBSERVED TEMPERATURE (deg C):	45.00	44.50
DENSITY OF WATER AT OBSERVED TEMPERATURE (g/cc):	0.9902	0.9905
PARTICLE DENSITY (g/cc):	2.59	2.64
CORRECTION FACTOR, K:	0.9920	0.9923
PARTICLE DENSITY AT 20C (g/cc):	2.61	2.66

AVERAGE PARTICLE DENSITY (g/cc) = 2.64

COMMENTS:

LABORATORY ANALYSIS PERFORMED BY: L. Simpson
CALCULATIONS MADE BY: L. Simpson
CHECKED BY: S. Stoller

PARTICLE DENSITY

JOB NAME: JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER: 89-L-144
SAMPLE NUMBER: 5-16
DEPTH: 0-46 FT.
DATE: 2/8/90

	TRIAL 1	TRIAL 2
WEIGHT OF PYCNOMETER FILLED W/ AIR (g):	100.84	103.99
WEIGHT OF PYCNOMETER FILLED W/ SOIL (g):	151.90	159.01
WEIGHT OF PYCNOMETER FILLED W/ SOIL & WATER (g):	379.14	384.95
WEIGHT OF PYCNOMETER FILLED W/ WATER (g):	347.25	350.45
OBSERVED TEMPERATURE (deg C):	53.00	53.00
DENSITY OF WATER AT OBSERVED TEMPERATURE (g/cc):	0.9867	0.9867
PARTICLE DENSITY (g/cc):	2.63	2.65
CORRECTION FACTOR, K:	0.9885	0.9885
PARTICLE DENSITY AT 20C (g/cc):	2.66	2.68

AVERAGE PARTICLE DENSITY (g/cc) = 2.67

COMMENTS:

LABORATORY ANALYSIS PERFORMED BY: L. Simpson
CALCULATIONS MADE BY: L. Simpson
CHECKED BY: S. Stoller

PARTICLE DENSITY

JOB NAME: JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER: 89-L-144
SAMPLE NUMBER: 5-17
DEPTH: 0-34 FT.
DATE: 2/8/90

	TRIAL 1	TRIAL 2
WEIGHT OF PYCNOMETER FILLED W/ AIR (g):	91.48	102.74
WEIGHT OF PYCNOMETER FILLED W/ SOIL (g):	150.77	153.24
WEIGHT OF PYCNOMETER FILLED W/ SOIL & WATER (g):	375.27	381.15
WEIGHT OF PYCNOMETER FILLED W/ WATER (g):	338.80	349.80
OBSERVED TEMPERATURE (deg C):	45.50	47.00
DENSITY OF WATER AT OBSERVED TEMPERATURE (g/cc):	0.9900	0.9894
PARTICLE DENSITY (g/cc):	2.57	2.61
CORRECTION FACTOR, K:	0.9918	0.9912
PARTICLE DENSITY AT 20C (g/cc):	2.59	2.63

AVERAGE PARTICLE DENSITY (g/cc) = 2.61

COMMENTS:

LABORATORY ANALYSIS PERFORMED BY: L. Simpson
CALCULATIONS MADE BY: L. Simpson
CHECKED BY: S. Stoller

PARTICLE DENSITY

JOB NAME: JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER: 89-L-144
SAMPLE NUMBER: 5-18
DEPTH: 0-34 FT.
DATE: 2/9/90

	TRIAL 1	TRIAL 2
WEIGHT OF PYCNOMETER FILLED W/ AIR (g):	100.84	103.99
WEIGHT OF PYCNOMETER FILLED W/ SOIL (g):	151.24	156.34
WEIGHT OF PYCNOMETER FILLED W/ SOIL & WATER (g):	379.85	384.45
WEIGHT OF PYCNOMETER FILLED W/ WATER (g):	348.55	352.00
OBSERVED TEMPERATURE (deg C):	41.00	38.00
DENSITY OF WATER AT OBSERVED TEMPERATURE (g/cc):	0.9919	0.9930
PARTICLE DENSITY (g/cc):	2.62	2.61
CORRECTION FACTOR, K:	0.9937	0.9948
PARTICLE DENSITY AT 20C (g/cc):	2.63	2.62

AVERAGE PARTICLE DENSITY (g/cc) = 2.63

COMMENTS:

LABORATORY ANALYSIS PERFORMED BY: L. Simpson
CALCULATIONS MADE BY: L. Simpson
CHECKED BY: S. Stoller

PARTICLE DENSITY

JOB NAME: JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER: 89-L-144
SAMPLE NUMBER: 5-19
DEPTH: 0-39 FT.
DATE: 2/9/90

	TRIAL 1	TRIAL 2
WEIGHT OF PYCNOMETER FILLED W/ AIR (g):	91.49	102.76
WEIGHT OF PYCNOMETER FILLED W/ SOIL (g):	143.75	155.85
WEIGHT OF PYCNOMETER FILLED W/ SOIL & WATER (g):	371.28	383.49
WEIGHT OF PYCNOMETER FILLED W/ WATER (g):	338.95	350.65
OBSERVED TEMPERATURE (deg C):	44.00	39.00
DENSITY OF WATER AT OBSERVED TEMPERATURE (g/cc):	0.9907	0.9926
PARTICLE DENSITY (g/cc):	2.60	2.60
CORRECTION FACTOR, K:	0.9925	0.9944
PARTICLE DENSITY AT 20C (g/cc):	2.62	2.61

AVERAGE PARTICLE DENSITY (g/cc) = 2.61

COMMENTS:

LABORATORY ANALYSIS PERFORMED BY: L. Simpson
CALCULATIONS MADE BY: L. Simpson
CHECKED BY: S. Stoller

PARTICLE DENSITY

JOB NAME: JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER: 89-L-144
SAMPLE NUMBER: 5-20
DEPTH: 0-39 FT.
DATE: 2/9/90

	TRIAL 1	TRIAL 2
WEIGHT OF PYCNOMETER FILLED W/ AIR (g):	103.98	100.97
WEIGHT OF PYCNOMETER FILLED W/ SOIL (g):	154.61	151.04
WEIGHT OF PYCNOMETER FILLED W/ SOIL & WATER (g):	383.02	379.81
WEIGHT OF PYCNOMETER FILLED W/ WATER (g):	351.30	348.50
OBSERVED TEMPERATURE (deg C):	45.00	43.00
DENSITY OF WATER AT OBSERVED TEMPERATURE (g/cc):	0.9902	0.9911
PARTICLE DENSITY (g/cc):	2.65	2.64
CORRECTION FACTOR, K:	0.9920	0.9929
PARTICLE DENSITY AT 20C (g/cc):	2.67	2.66

AVERAGE PARTICLE DENSITY (g/cc) = 2.67

COMMENTS:

LABORATORY ANALYSIS PERFORMED BY: L. Simpson
CALCULATIONS MADE BY: L. Simpson
CHECKED BY: S. Stoller

PARTICLE DENSITY

JOB NAME: JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER: 89-L-144
SAMPLE NUMBER: 5-21
DEPTH: 0-35 FT.
DATE: 2/9/90

	TRIAL 1	TRIAL 2
WEIGHT OF PYCNOMETER FILLED W/ AIR (g):	102.74	91.47
WEIGHT OF PYCNOMETER FILLED W/ SOIL (g):	157.39	143.44
WEIGHT OF PYCNOMETER FILLED W/ SOIL & WATER (g):	383.73	371.45
WEIGHT OF PYCNOMETER FILLED W/ WATER (g):	350.00	339.40
OBSERVED TEMPERATURE (deg C):	45.00	39.00
DENSITY OF WATER AT OBSERVED TEMPERATURE (g/cc):	0.9902	0.9926
PARTICLE DENSITY (g/cc):	2.59	2.58
CORRECTION FACTOR, K:	0.9920	0.9944
PARTICLE DENSITY AT 20C (g/cc):	2.61	2.60

AVERAGE PARTICLE DENSITY (g/cc) = 2.60

COMMENTS:

LABORATORY ANALYSIS PERFORMED BY: L. Simpson
CALCULATIONS MADE BY: L. Simpson
CHECKED BY: S. Stoller

PARTICLE DENSITY

JOB NAME: JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER: 89-L-144
SAMPLE NUMBER: 5-22
DEPTH: 0-35 FT.
DATE: 2/9/90

	TRIAL 1	TRIAL 2
WEIGHT OF PYCNOMETER FILLED W/ AIR (g):	100.84	100.97
WEIGHT OF PYCNOMETER FILLED W/ SOIL (g):	151.33	151.87
WEIGHT OF PYCNOMETER FILLED W/ SOIL & WATER (g):	379.41	379.89
WEIGHT OF PYCNOMETER FILLED W/ WATER (g):	348.05	348.60
OBSERVED TEMPERATURE (deg C):	46.00	42.00
DENSITY OF WATER AT OBSERVED TEMPERATURE (g/cc):	0.9898	0.9915
PARTICLE DENSITY (g/cc):	2.61	2.57
CORRECTION FACTOR, K:	0.9916	0.9933
PARTICLE DENSITY AT 20C (g/cc):	2.63	2.59

AVERAGE PARTICLE DENSITY (g/cc) = 2.61

COMMENTS:

LABORATORY ANALYSIS PERFORMED BY: L. Simpson
CALCULATIONS MADE BY: L. Simpson
CHECKED BY: S. Stoller

PARTICLE DENSITY

JOB NAME: JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER: 89-L-144
SAMPLE NUMBER: 5-23
DEPTH: 0-44 FT.
DATE: 2/9/90

	TRIAL 1	TRIAL 2
WEIGHT OF PYCNOMETER FILLED W/ AIR (g):	103.98	102.74
WEIGHT OF PYCNOMETER FILLED W/ SOIL (g):	152.01	155.80
WEIGHT OF PYCNOMETER FILLED W/ SOIL & WATER (g):	381.21	382.24
WEIGHT OF PYCNOMETER FILLED W/ WATER (g):	351.45	349.45
OBSERVED TEMPERATURE (deg C):	44.00	50.00
DENSITY OF WATER AT OBSERVED TEMPERATURE (g/cc):	0.9907	0.9881
PARTICLE DENSITY (g/cc):	2.60	2.59
CORRECTION FACTOR, K:	0.9925	0.9899
PARTICLE DENSITY AT 20C (g/cc):	2.62	2.62

AVERAGE PARTICLE DENSITY (g/cc) = 2.62

COMMENTS:

LABORATORY ANALYSIS PERFORMED BY: L. Simpson
CALCULATIONS MADE BY: L. Simpson
CHECKED BY: S. Stoller

PARTICLE DENSITY

JOB NAME: JACOBS ENGINEERING - WORK ORDER #5
JOB NUMBER: 89-L-144
SAMPLE NUMBER: 5-24
DEPTH: 0-44 FT.
DATE: 2/9/90

	TRIAL 1	TRIAL 2
WEIGHT OF PYCNOMETER FILLED W/ AIR (g):	100.82	100.96
WEIGHT OF PYCNOMETER FILLED W/ SOIL (g):	151.91	152.01
WEIGHT OF PYCNOMETER FILLED W/ SOIL & WATER (g):	379.63	379.62
WEIGHT OF PYCNOMETER FILLED W/ WATER (g):	348.20	348.30
OBSERVED TEMPERATURE (deg C):	45.00	45.00
DENSITY OF WATER AT OBSERVED TEMPERATURE (g/cc):	0.9902	0.9902
PARTICLE DENSITY (g/cc):	2.57	2.56
CORRECTION FACTOR, K:	0.9920	0.9920
PARTICLE DENSITY AT 20C (g/cc):	2.59	2.58

AVERAGE PARTICLE DENSITY (g/cc) = 2.59

COMMENTS:

LABORATORY ANALYSIS PERFORMED BY: L. Simpson
CALCULATIONS MADE BY: L. Simpson
CHECKED BY: S. Stoller

Appendix G: LABORATORY METHODS

SAMPLE PREPARATION

(Piston Method)

Method

Soil is repacked in a ring sample to a prescribed bulk density using a free-falling piston of known weight.[1]

Laboratory Procedures

Water is added to the soil sample to obtain the desired moisture content. Determining the moist amount of soil required to pack the sample ring to the desired bulk density. Place the sample ring and attached piston ring on a plastic sheet. Pour the required amount of soil in to the rings. Insert the piston into the piston ring and compress the soil.

Calculations

The amount of moist soil to be packed at the desired bulk density is calculated as follows:

$$M = \rho_b \ (1 + w) \ V_T$$

where

M = mass of the moist soil (g)

ρ_b = desired bulk density (g/cc)

w = gravimetric moisture content (% g/g)

V_T = total volume of the sample ring (cc)

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[1] Klute, A. 1986, Water Retention: Laboratory Methods. Methods of Soil Analysis, Part 1, ed. A. Klute. American Society of Agronomy, Madison Wis., pp. 635-662.

COMPACTION TEST

Method

Methods and procedures outlined under ASTM standard D698-78 are followed to determine the relationship between the moisture content and the bulk density of soils. Test Method A (ASTM D698-78) was employed to perform the compaction test, which utilizes a 5.5 lb hammer dropped from a height of 12 inches with a 4-in mold and material passing the No. 4 sieve.

Laboratory Procedures

A representative sample is selected from material passing through the No. 4 sieve to provide at least 1100 grams of material for each specimen. If the sample is too damp, the moisture content is reduced by air drying. After drying, the aggregates are broken up with a mortar and pestal in such a manner as to avoid reducing the natural size of the particles.

A series of at least four specimens of varying water content is prepared such that the different moisture contents will bracket the optimum moisture content. The specimens are thoroughly mixed to ensure even distribution of moisture. They are then placed in covered containers and allowed to equilibrate following the guidelines shown in Table 1.

Table 1. Standing Time

Classification ASTM D2487	Minimum Standing Time (hrs)
GW, GP, SW, SP	no requirement
GM, SM	3
ML, CL, OL, GC, SC	18
MH, CH, OH, PT	36

Each specimen is compacted in three layers of approximately equal height with a manual hammer at 25 blows per layer. The third compacted layer shall be slightly above the top of the mold, but not exceeding 6mm. During compaction the mold shall rest on a uniform rigid foundation.

Following compaction, the extension collar is removed and the top of the specimen is carefully trimmed with a straightedge. The specimen is removed from the mold and the mass is determined. Using a representative sub-specimen, the moisture content is determined in accordance with ASTM standard D2216 or D4643.

Calculations

The wet density, moisture content, and dry density of each compacted specimen is calculated as follows:

$$\rho_m = M_{cs}/V$$

$$w = [(M_m - M_d)/M_d] \times 100$$

$$\rho_b = [\rho_m/(w + 100)] \times 100$$

where

ρ_m = wet density of compacted specimen (g/cm^3)

M_{cs} = mass of compacted specimen (g)

V = volume of mold (cm^3)

w = gravimetric moisture content of compacted specimen (% 1/g)

M_m = mass of moist specimen (g)

M_d = mass of oven-dried specimen (g)

ρ_b = dry density of compacted specimen (g/cm^3)

From the data obtained from each specimen, dry density vs. moisture content are plotted with a smooth curve connecting the points. The moisture content corresponding to the apex of the curve is the "optimum gravimetric moisture content". The corresponding density is the "maximum density".

The gravimetric moisture content may be converted to volumetric moisture content by the following equation:

$$\theta = w(\rho_b/\rho_w)$$

where

θ = volumetric moisture content (% v/v)

w = gravimetric moisture content (% g/g)

ρ_b = dry bulk density corresponding to gravimetric moisture content (g/cm^3)

ρ_w = density of water (usually assumed to be 1) (g/cm^3)

INITIAL MOISTURE CONTENT

(Oven Drying Method)

Method

Methods and procedures outlined under ASTM standard D 2216-80 are followed to determine the moisture content of a soil by the oven drying method. The oven drying method does not give true representative results for materials containing significant amounts of halloysite, montmorillonite, or gypsum minerals; highly organic soils; or materials in which the pore water contains dissolved solids.

Laboratory Procedure

To prepare disturbed samples, a sample is selected from the material after it has been thoroughly mixed. The mass of the selected sample follows the guidelines in Table 1.

To prepare core samples, a ring is pushed into the core and the sample is carved out of the core. The sample is visually checked to be sure it is representative of the core.

TABLE 1. Test Specimen Masses

Sieve Retaining Not More Than About 10% of Sample	Recommended Mass of Moist Specimen (g)
2.00 mm (No. 10)	100 to 200
4.75 mm (No. 4)	300 to 500
19.00 mm (3/4 in.)	500 to 1000

The moist sample is placed in a dry container of known mass. The masses of the sample and of the container are determined and recorded. The sample and the container are placed in a drying oven maintained at 110° ± 5° C and dried to a constant mass. The time required to obtain a constant mass will vary depending on the type of material, the size of the specimen, and the oven type and capacity. Weights are recorded on a daily basis, but, in most cases, drying a test specimen overnight (about 24 hours) is sufficient.

Calculations

The initial moisture content on a percent volume basis is calculated as follows: [1]

$$\theta_i = \frac{(M_i - M_f)}{(V_T \times q)} * 100$$

where

θ_i = initial moisture content (% volume)

M_i = initial mass of soil & water (g)

M_f = final mass of soil (g)

V_T = total volume of sample (cc)

ρ = density of pores fluid in the soil when initial mass was determined (g/cc). The density of the pore fluid initially present in the sample is assumed to be 1.0 g/cc

[1] Gardner, Walter H. 1986. Water Content. Methods of Soil Analysis, Part 1, ed. A. Klute. American Society of Agronomy, Madison Wis., pp 493-545.

The initial moisture content determined on a percent weight basis is according to:

$$w = \frac{(M_i - M_f)}{M_f} * 100$$

where

w = initial moisture content (%)

M_i = initial mass of soil only (g)

M_f = final mass of soil only (g)

[1] Gardner, Walter H. 1986. Water Content. Methods of Soil Analysis, Part 1, ed. A. Klute. American Society of Agronomy, Madison Wis., pp 493-545.

BULK DENSITY

Method

Bulk density is calculated from the initial soil sample volume and oven dried mass of the soil sample.

Laboratory Procedures

The volume of the soil sample is calculated from geometric measurements of the sample. The sample mass is determined from methods outlined in ASTM D2216-80 (oven drying) or ASTM D4643-87 (microwave oven drying).

Calculations

The bulk density is calculated as follows:

$$\rho_b = M_D/V_T$$

where

ρ_b = dry bulk density (g/cc)

M_D = mass of oven dried soil sample (g)

V_T = total volume of soil sample (cc)

POROSITY

(Particle Density Method)

Method

Porosity can be calculated from dry bulk density and particle density. The particle density method is based on sample geometry and mass relationships.

Laboratory Procedures

Bulk density is calculated by the sample geometry and sample mass determined by oven drying, as described in the section outlining the bulk density determination. Particle density is determined from measurements following the procedures outlined in the particle density principles and methods.

Calculations

Porosity is calculated as follows:

$$n = [1 - (\rho_b/\rho_s)] \times 100$$

where

n = porosity (%)

ρ_b = bulk density (g/cc)

ρ_s = particle density (g/cc)

SATURATED HYDRAULIC CONDUCTIVITY

(Constant Head Method)

Method

Methods and procedures outlined under ASTM standard D2434-68 are followed to determine the saturated hydraulic conductivity by the constant head method. Measurements of hydraulic conductivity of saturated soils are based on the direct application of Darcy's equation. The constant heads permeameter is best suited for materials with a saturated hydraulic conductivity in the range of 1 to 10^{-5} cm/sec.

Laboratory Procedures

A soil sample, of length L and cross-sectional area A, is placed in a sample holder, which prevents soil loss or volume change. The soil sample is saturated using vacuum flooding techniques. After saturation, a constant head differential is maintained across the sample. Periodic readings of the volumetric outflow are taken until stable values for saturated volumetric conductivity, K_s, are obtained. Figure 1 shows the constant head apparatus used.

The temperature of the water is measured with a thermometer. Correction to 20°C of the kinematic viscosity of the fluid are applied to the reported saturated hydraulic conductivity.

Calculations

Darcy's equation is used to calculate the saturated hydraulic conductivity as follows:

$$K_s = [Q/A][\Delta L/\Delta H][\nu_T/\nu_{20}]$$

where

K_s = saturated hydraulic conductivity @ 20°C (cm/sec)

Q = volumetric outflow from soil sample (cm^3/sec)

A = cross-sectional area of the soil sample (cm^2)

ΔL = length of the soil sample (cm)

ΔH = head differential across the soil sample (cm)

ν_T = kinematic viscosity of water at the measured temperature (m^2/sec)

ν_{20} = kinematic viscosity of water at 20°C (m^2/sec)

SATURATED HYDRAULIC CONDUCTIVITY

(Falling Head Method)

Method

Methods and procedures outlined in Methods of Soil Analysis (1986) are followed to determine the saturated hydraulic conductivity by the falling head method. Saturated hydraulic conductivity determined by the falling head method is based on a simple boundary valve problem that describes one-dimensional transient flow across a soil sample. The falling head method is best suited for soil with a saturated hydraulic conductivity in the range of 10^{-3} to 10^{-7} cm/sec.

Laboratory Procedures

A soil sample, of length L and cross-sectional area A, is placed in a sample holder, which prevents soil loss or volume change. The soil sample is saturated in a 0.01N $CaCl_2$ solution. It is saturated either in a tray filled with the solution or in the apparatus itself. This same solution is used throughout the test. After saturation, a standpipe is connected, and the rate of water drop in the standpipe is recorded. Figure 1 shows the falling head apparatus used.

The temperature of the water is measured with a thermometer. Corrections to 20°C of the kinematic viscosity of the fluid are applied to the reported saturated hydraulic conductivity.

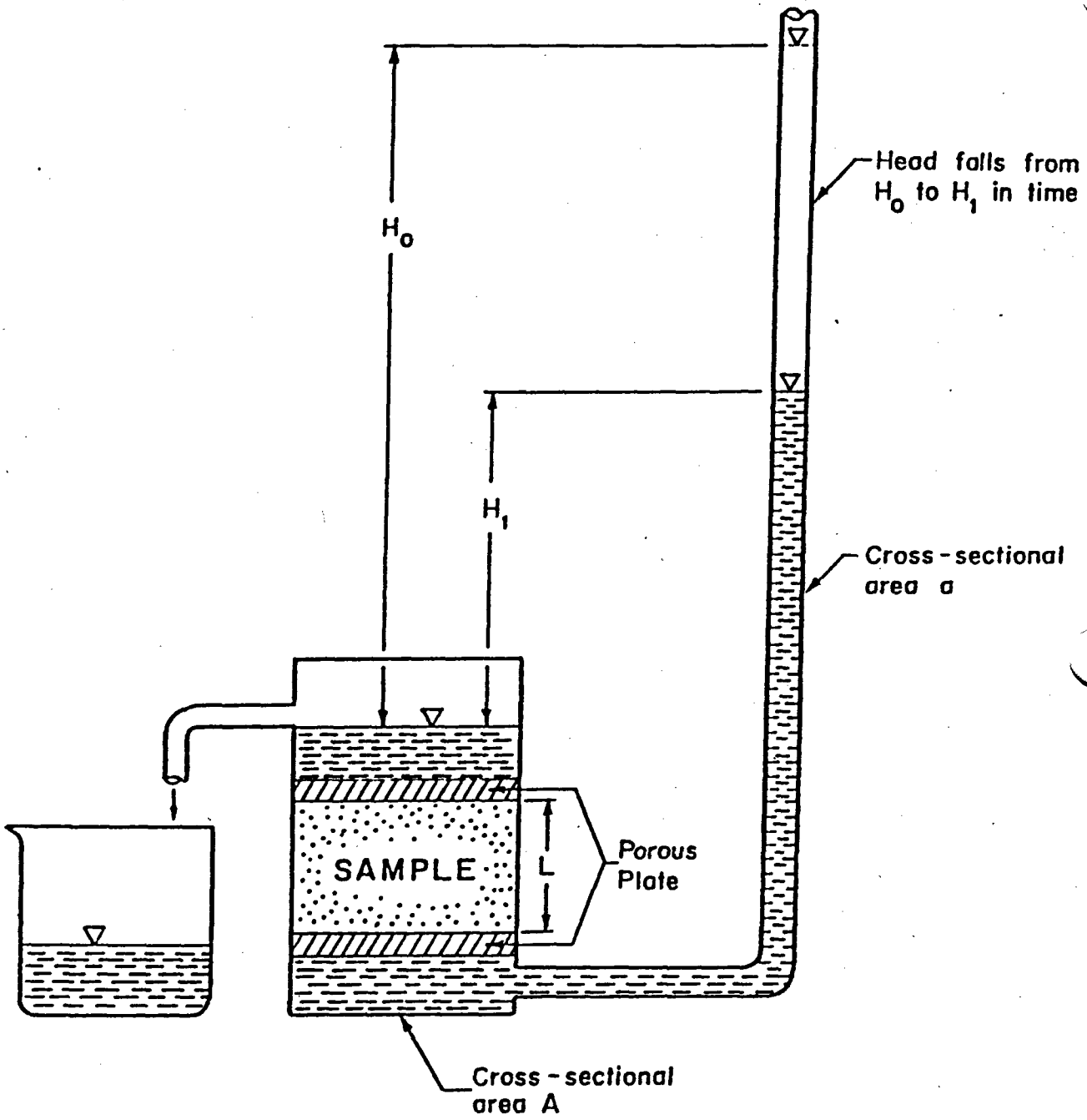

Figure 1. Falling Head Apparatus

Calculations

The head measured in the stand pipe, of cross-sectional area a, is allowed to fall from H_0 to H_1 during time t. The saturated hydraulic conductivity is calculated as follows:

$$K_s = [aL/At] \ln[H_0/H_1][\nu_T/\nu_{20}]$$

where

K_s = saturated hydraulic conductivity at 20°C (cm/sec)

a = cross-sectional area of the stand pipe (cm^2)

L = length of the soil sample (cm)

A = cross-sectional area of the soil sample (cm^2)

t = time for head to fall from H_0 to H_1 (sec)

H_0 = head at experiment start (cm)

H_1 = head at experiment end (cm)

ν_T = kinematic viscosity of water at the measured temperature (m^2/sec)

ν_{20} = kinematic viscosity of water at 20°C (m^2/sec)

MOISTURE RETENTION CHARACTERISTICS

(15-Bar Pressure Plate Method)

Method

Methods and procedures outlined under ASTM standard D 2325-68 (81) are followed to determine the moisture retention characteristics in the 1 to 15 bar suction range. Moisture retention characteristics are obtained using a pressure plate extractor (Soil Moisture Inc., Santa Barbara, CA, Model 1500), with a 1, 3, or 15 bar ceramic plate. Pressure is provided by high pressure nitrogen from cylinders.

Laboratory Procedure

The porous ceramic plate is placed in a shallow pan with de-aired distilled water and allowed to stand overnight. The plate is then removed from the pan and placed in the extractor. De-aired distilled water is poured over the plate to the limit allowed by the rubber skirt, which generally just submerges the plate. The pressure plate is sealed and pressure brought to 50% of the plate's maximum rated pressure. This pressure is maintained until outflow ceases. The extractor is opened and any excess water around the plate is removed.

The soil samples in their sample rings are then placed on the plate, assuring that good hydraulic contact is established. The extractor is then sealed and the pressure brought to the level

desired. The pressure is maintained until outflow ceases. The extractor is then opened and the samples weighed quickly on an electronic top-loading balance. Subsequently, the samples are returned to the extractor, and the pressure is increased to the next increment.

Calculations

The decrease in mass of the water in the sample during a period of applied pressure is converted to an equivalent decrease in volume of water according to:

$$V_w = m_w/\rho_w \qquad (1)$$

where

V_w = equivalent volume of water (cc)

m_w = mass of water loss (g)

ρ_w = density of water at temperature of experiment (g/cc)

Volumes of water calculated from equation 1 are then used to calculate the moisture content at that pressure as follows:

$$\theta_p = (V_i - \Sigma V_w)/V_T \times 100 \qquad (2)$$

where

θ_p = moisture content at pressure p (% vol)

V_i = initial volume of water in the sample (cc)

ΣV_w = cumulative water volume change (cc)

V_T = total volume of the sample (cc)

only the points less than 75μm diameter are plotted from the hydrometer data. This plot is used to estimate the d_{10}, d_{16}, d_{30}, d_{50}, d_{60}, and d_{84} diameters (d_x is the diameter of a particle of which x percent of the sample mass is finer). These soil particles diameters are used to calculate the uniformity coefficient, Cu:

$$Cu = d_{60}/d_{10}$$

the coefficient of curvature, C_c:

$$C_c = (d_{30})^2/(d_{10} \times d_{60})$$

and the mean particle diameter, $\bar{d}$:

$$\bar{d} = (d_{16} + d_{50} + d_{84})/3$$

PARTICLE SIZE DISTRIBUTION

(Sieve Analysis)

Method

Methods and procedures outlined under ASTM standard D 422-63(72) are followed to determine the particle size distribution of particles larger than 75 μm using the mechanical sieve technique. Distribution of particles smaller than 75 μm are determined using the hydrometer sedimentation analysis.

Laboratory Procedure

A soil sample is separated into a series of fractions from 4.75 mm (No. 4) to 0.075 mm (No. 200) by mechanical sieve procedures. The sieve operates by means of lateral and vertical jarring motions shaking the soil sample through a series of finer sieves. Mechanical sieving is considered complete when less than 1% of the mass fraction passes a sieve during a one minute hand sieving test.

Calculations

A plot of the particle size distribution curve is developed from the mass retained on each sieve and data from the hydrometer analysis. This plot is used to estimate the d_{10}, d_{16}, d_{30}, d_{50}, d_{60}, and d_{84} diameters (d_x is the diameter of a particle of which

x percent of the sample mass is finer). These soil particles diameters are used to calculate the uniformity coefficient, Cu:

$$Cu = d_{60}/d_{10}$$

the coefficient of curvature, C_c:

$$C_c = (d_{30})^2/(d_{10} * d_{60})$$

and the mean particle diameter, $\bar{d}$:

$$\bar{d} = (d_{16} + d_{50} + d_{84})/3$$

PARTICLE SIZE DISTRIBUTION

(Hydrometer Analysis)

Method

Methods and procedures outlined under ASTM standard D 422-63(72) are followed to determine the particle size distribution of particles smaller than 75 μm using the hydrometer sedimentation analysis. Distribution of particles larger than 75 μm are determined using the sieve analysis.

Laboratory Procedures

A soil sample of approximately 50 grams for silts and clays, or 100 grams for sands is mixed in a mixer for a minimum of 3 minutes in a solution of sodium hexametaphosphate. The mixture is then soaked for a minimum of 16 hours in a hydrometer jar. At the end of the soaking period, the sample is dispersed further by shaking the sample in the jar and distilled water is added until the total volume is 1000 ml. The glass cylinder is turned upside down and back for one minute to complete agitation. Hydrometer readings are taken at ASTM recommended times for a period of 24 hours.

Calculations

The percentage of soil remaining in solution at the level at which the hydrometer measures, P, is calculated as follows:

$$P = (Ra/W) \times 100$$

where

P = percentage of soil remaining in suspension at the level at which the hydrometer measures the density of the suspension

R = hydrometer reading with composite correction applied

a = correction factor for particle density other than 2.65 applied to the readings of the 152H hydrometer [ASTM D 422-63 (72)]

W = oven-dry mass of the soil sample

The diameter of a particle corresponding to the above calculated percentage is calculated as follows:

$$D = K \sqrt{L/T}$$

where

D = diameter of the particle (mm)

K = a constant depending on temperature and the specific gravity of the soil particles [ASTM D 422-63(72)]

L = distance from the suspension surface to the level where the suspension is being measured (cm)

T = time since the beginning of sedimentation (min)

A plot of the particle size distribution curve is developed from the above data and data from the sieve analysis. However,

PARTICLE DENSITY

(Water Pycnometer Method)

Method

Methods and procedures, outlined under ASTM standard D 854-83 are followed to determine the particle density (specific gravity) of soils that pass through the No.4 sieve using the water pycnometer method. The water pycnometer method is appropriate for most soils except those which contain extraneous matter (such as cement, lime, etc.), water soluble matter (such as sodium chloride), and soil containing matter with a specific gravity less than one.

Laboratory Procedures

A clean, dry pycnometer including its stopper is weighed. A pycnometer is a volumetric flask having a capacity of at least 100 mls or a smaller specific-gravity flask fitted with a ground-glass stopper that is pierced lengthwise by a capillary opening. A soil sample, containing its natural moisture or oven-dried, is added. The oven-dried weight of the soil samples shall be at least 25 g when using the volumetric flask and at least 10 g when using the specific-gravity flask. Clay soil samples shall be dispersed in distilled water following methods outlined in ASTM standard D422 (Method of Particle Size Analysis of Soils). The outside and neck of the pycnometer are cleaned of any soil that may have spilled during transfer, and pycnometer, stopper, and

contents are weighed. The pycnometer is then filled about half full with distilled water, washing into the flask any soil adhering to the inside of the neck. Any entrapped air is removed by gently boiling the soil and water for a minimum of 10 minutes with frequent gentle agitation of the contents. The pycnometer and contents are then cooled to room temperature by placement of the flask in a water bath. Distilled water is added to fill the pycnometer to a prescribed volume, and the outside is thoroughly dried. The pycnometer and its contents are weighed, and the temperature observed.

The soil-water mixture is removed from the pycnometer, and the flask is thoroughly washed. The weight of the pycnometer filled with distilled water at the observed temperature is determined from the calibration curve of the pycnometer.

Calibration curves are obtained for each pycnometer by obtaining at least three sets of temperature and weight measurements about 4°C apart within the temperature range of 20° to 30°C. Each set represents the coordinates for a point on the calibration curve. To obtain the calibration curve, a clean pycnometer is filled with de-aired distilled water so that the meniscus is at the calibration mark. Then, heat is applied to the pycnometer and the weight and temperature are recorded, making sure the water level is at the calibration mark. After several readings have been taken temperature vs. weight of pycnometer and water are plotted. Then, a best fit curve is drawn through the points.

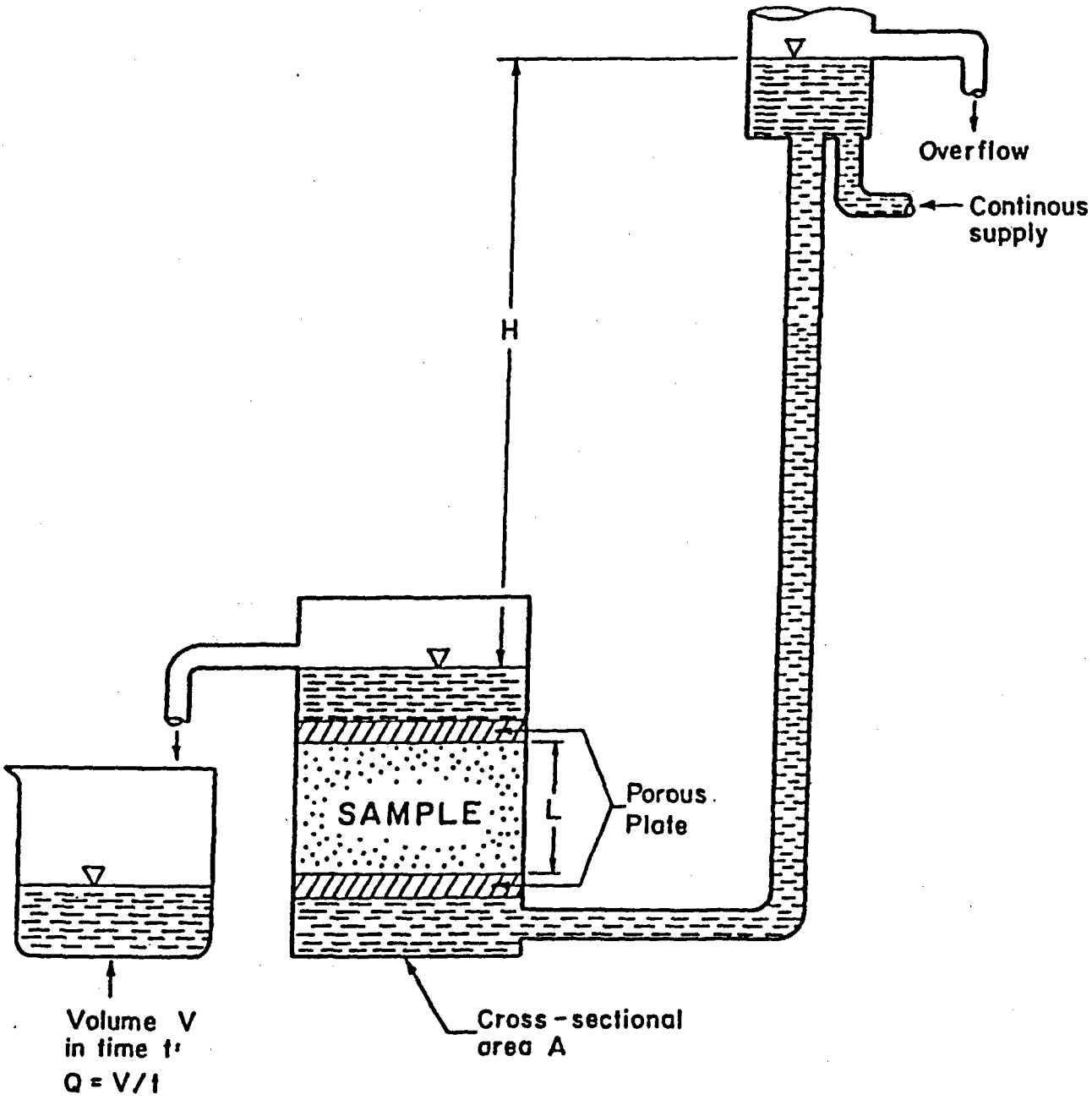

Figure 1. Constant Head Apparatus

Calculations

The particle density is calculated as follows:

$$\rho_s = \rho_w \frac{(M_s - M_a)}{(M_s - M_a) - (M_{sw} - M_w)}$$

where

ρ_s = particle density (g/cc)

ρ_w = density of water at observed temperature (g/cc)

M_s = mass of pycnometer plus oven-dried soil (g)

M_a = mass of pycnometer filled with air (g)

M_{sw} = mass of pycnometer filled with soil and water (g)

M_w = mass of pycnometer filled with water at observed temperature (g)

DANIEL B. STEPHENS & ASSOCIATES, INC.

EXPENSES

NAME Annette L. Montoya PERIOD May

DATE	ITEM	METHOD OF PAYMENT*	PROJECT BILLED TO	AMOUNT
5/11/90	slides. 21 miles	1	Admin	5.04

*Method of Payment:
(1) Cash - Reimbursible
(2) Petty Cash
(3) Chase Master Card
(4) Internal Cost (Field Vehicle)
(5) Store Established Charge
(6) AVIS Charges
(7) Thunderbird Travel

576

Conductivity Data, Neutron Probe Data and Radio Isotope Dating of Cheney Disposal Area Groundwater Data are kept on file at the Department of Energy's Albuquerque Operations Office.

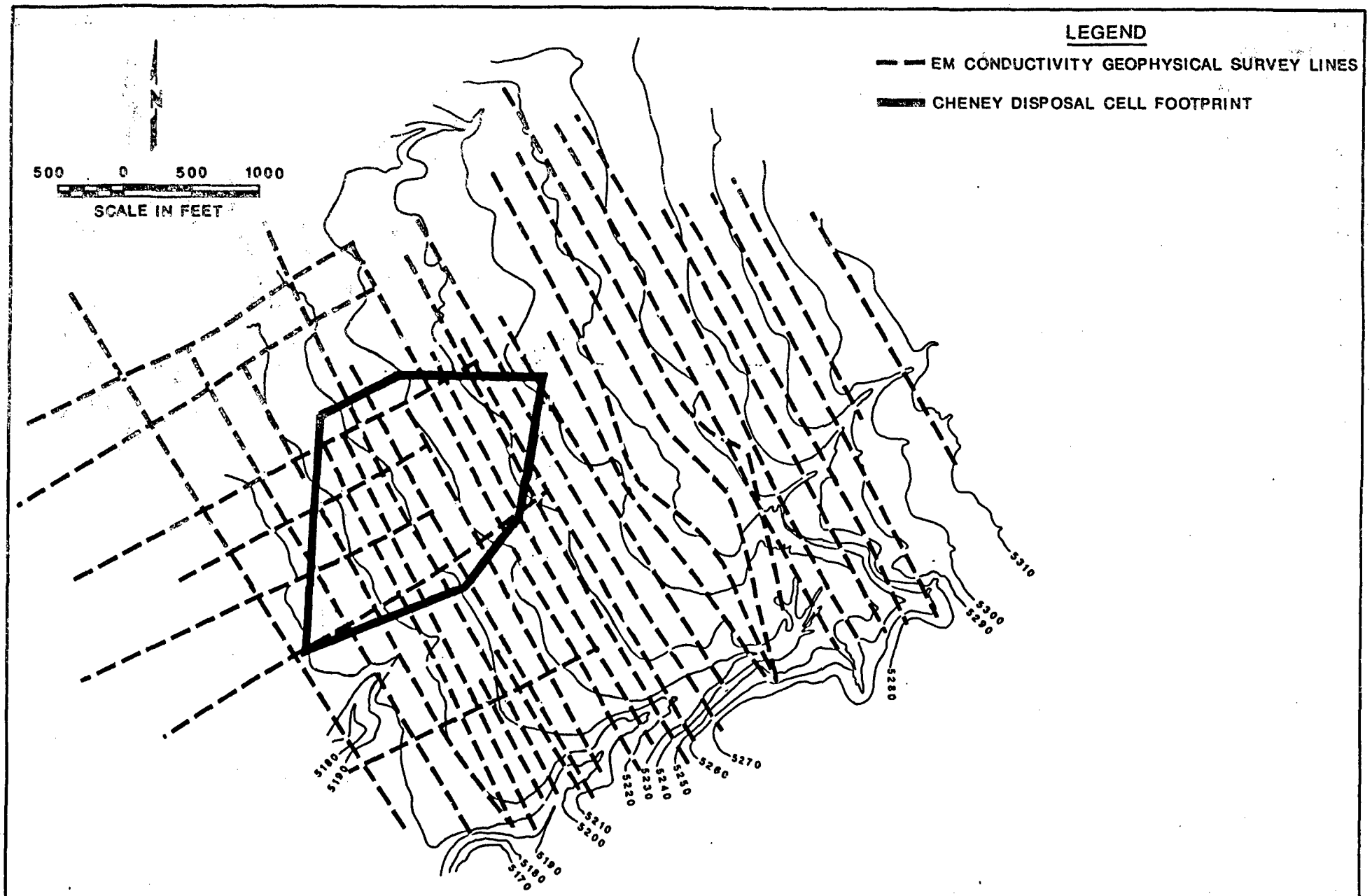

FIGURE 3.1
LOCATIONS OF SU[illegible]E GEOPHYSICAL LINES