APPENDIX C

Laboratory Test Results

TABLE C-I
SUMMARY OF LABORATORY TEST RESULTS

PROJECT NO. 89241.2

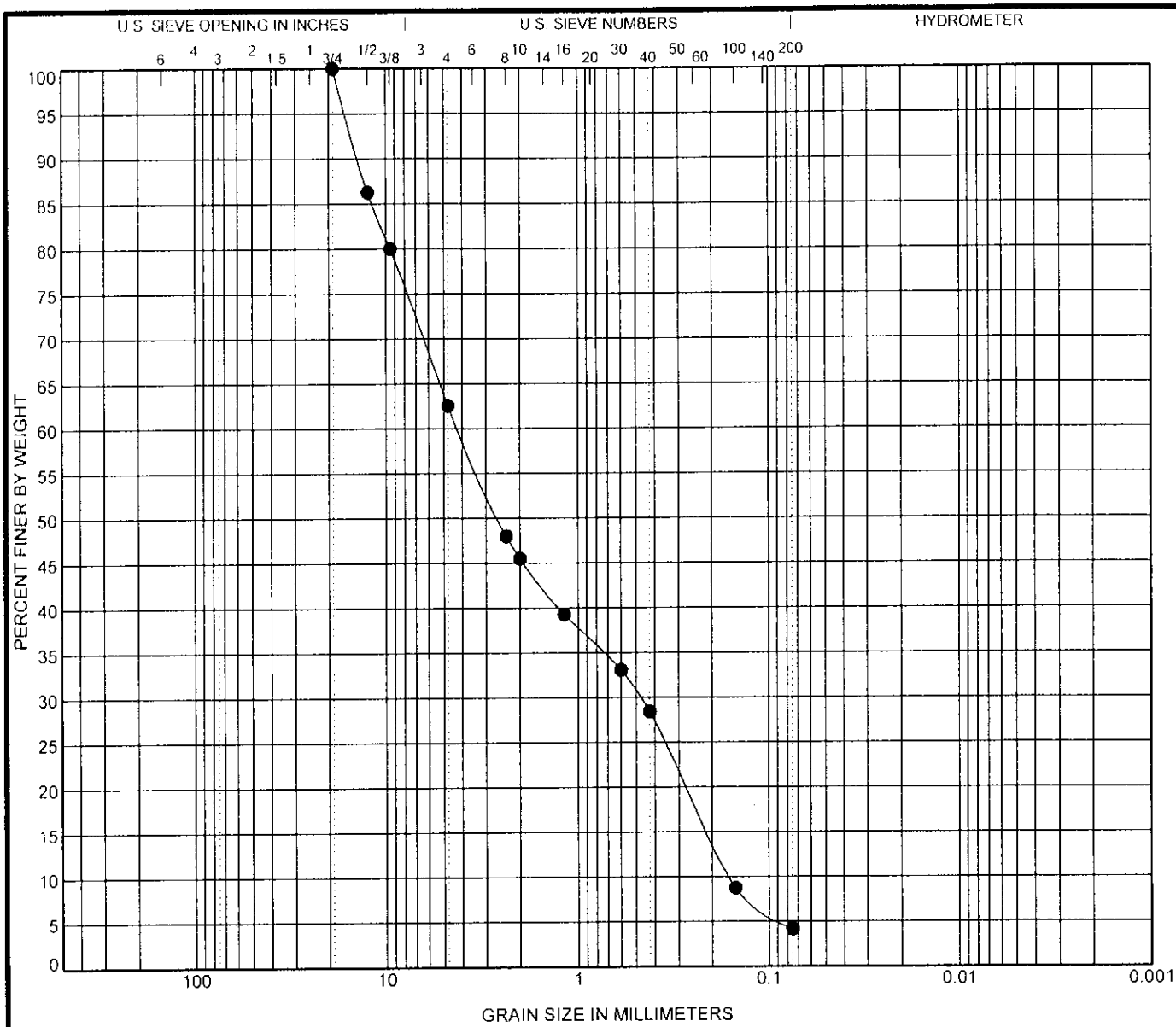
SAMPLE LOCATION		MOISTURE CONTENT	DRY DENSITY	GRADATION		PERCENT PASSING NO. 200 SIEVE	ATTERBERG LIMITS		SWELL / CONSOLIDATION (at 1000 psf surcharge)	WATER SOLUBLE SULFATES	DESCRIPTION
BORING NO.	DEPTH (FEET)	(%)	(PSF)	GRAVEL (%)	SAND (%)		LIQUID LIMIT (%)	PLASTICITY INDEX (%)	(%)	(%)	
TB-1	4	1.6		38	58	4					Gravelly Sand
TB-1	19	7.5	107			41	24	10	-0.6		Clayey Sand
TB-2	3	5.6	94								Silty Sand
TB-2	6	3.2	100								Silty Sand
TB-3	4	4.8	100			53			-3.6		Sandy Clay
TB-4	9	2.3	101								Silty Sand
TB-4	14	3.3	106								Sandy Clay
TB-4	19	3.0	95			29			-2.2		Silty Sand
TB-5	4	2.9	98						-7.1		Silty Sand
TB-6	6	4.4	103								Silty Sand
TB-6	14	4.2	97			49					Silty Sand
TB-6	19	5.2	108				18	5	0.1		Sandy Clay
TB-7	4	2.3	98						-6.2		Silty Sand
TB-7	9	7.5	93						-0.3		Sandy Clay
TB-7	14	3.4	98	0	59	41					Silty Sand
TB-7	19	5.8	92								Sandy Clay
TB-8	3	4.3	92								Silty Sand
TB-9	3	5.8	90			55			-3.6		Sandy Clay
TB-9	6	3.2	101								Silty Sand
TB-9	9	4.2	96	2	56	42			-4.1		Silty Sand
TB-9	14	7.8				63	27	13			Sandy Clay
TB-9	19	4.5	103								Silty Sand
TB-10	9	3.6	98								Silty Sand
TB-10	14	3.8	102								Silty Sand
TB-11	14	2.3	100								Silty Sand
TB-11	19	3.0	95			38	23	2	-0.6		Silty Sand

TABLE C-I
SUMMARY OF LABORATORY TEST RESULTS

PROJECT NO. 89241.2

SAMPLE LOCATION		MOISTURE CONTENT	DRY DENSITY	GRADATION		PERCENT PASSING NO. 200 SIEVE	ATTERBERG LIMITS		SWELL / CONSOLIDATION (at 1000 psf surcharge)	WATER SOLUBLE SULFATES	DESCRIPTION
BORING NO.	DEPTH (FEET)	(%)	(PSF)	GRAVEL (%)	SAND (%)		LIQUID LIMIT (%)	PLASTICITY INDEX (%)	(%)	(%)	
TB-12	4	2.0	104							<0.001	Silty Sand
TB-12	9	3.1	105								Silty Sand
TB-13	3	2.6	92			23					Silty Sand
TB-13	6	3.9	97	1	59	40					Silty Sand
TB-13	9	6.9	98						-9.9		Clayey Sand
TB-13	14	4.8	95	0	50				-3.4		Sand and Silt
TB-13	19	5.8	96								Silty Sand
TB-14	4	5.3	101			60	20	3	-6.4		Sandy Clay
TB-14	14	5.5	102								Silty Sand
TB-15	9	2.0	98							0.005	Silty Sand
TB-15	14	2.0	102						-3.9		Silty Sand
TB-15	19	2.7							-5.0		Silty Sand
TB-16	4	2.6	97			29	21	5	-2.3		Silty Sand
TB-16	19	4.7	98								Silty Sand
TB-17	9	3.9	98								Silty Sand
TB-18	4	4.9	85	0	38	62	21	4	-8.4		Sandy Silt/Clay
TB-18	9	4.3	102								Silty Sand
TB-18	14	3.1	97								Silty Sand
TB-18	19	5.6	102						-1.5		Silty Sand
TB-19	9	3.1	91			64	21	6	-2.9		Sandy Silt/Clay
TB-19	14	6.4	106						-1.9		Silty Sand
TB11-12, 19-20	0-5	9.9*	128*	0	65	35	20	3	-0.1		Clayey Sand
TB 1-2	0-10	9.3*	123*	1	69	30	22	11			Clayey Sand

* Indicates optimum moisture content and maximum dry density by modified Proctor ASTM D1557



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification	Classification	LL	PL	PI	Cc	Cu
TB-1 at a depth of 4 ft.	**Gravelly Sand**				**0.34**	**26.22**

D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
19	**4.203**	**0.478**	**0.16**	**37.5**	**58.4**	**4.2**	

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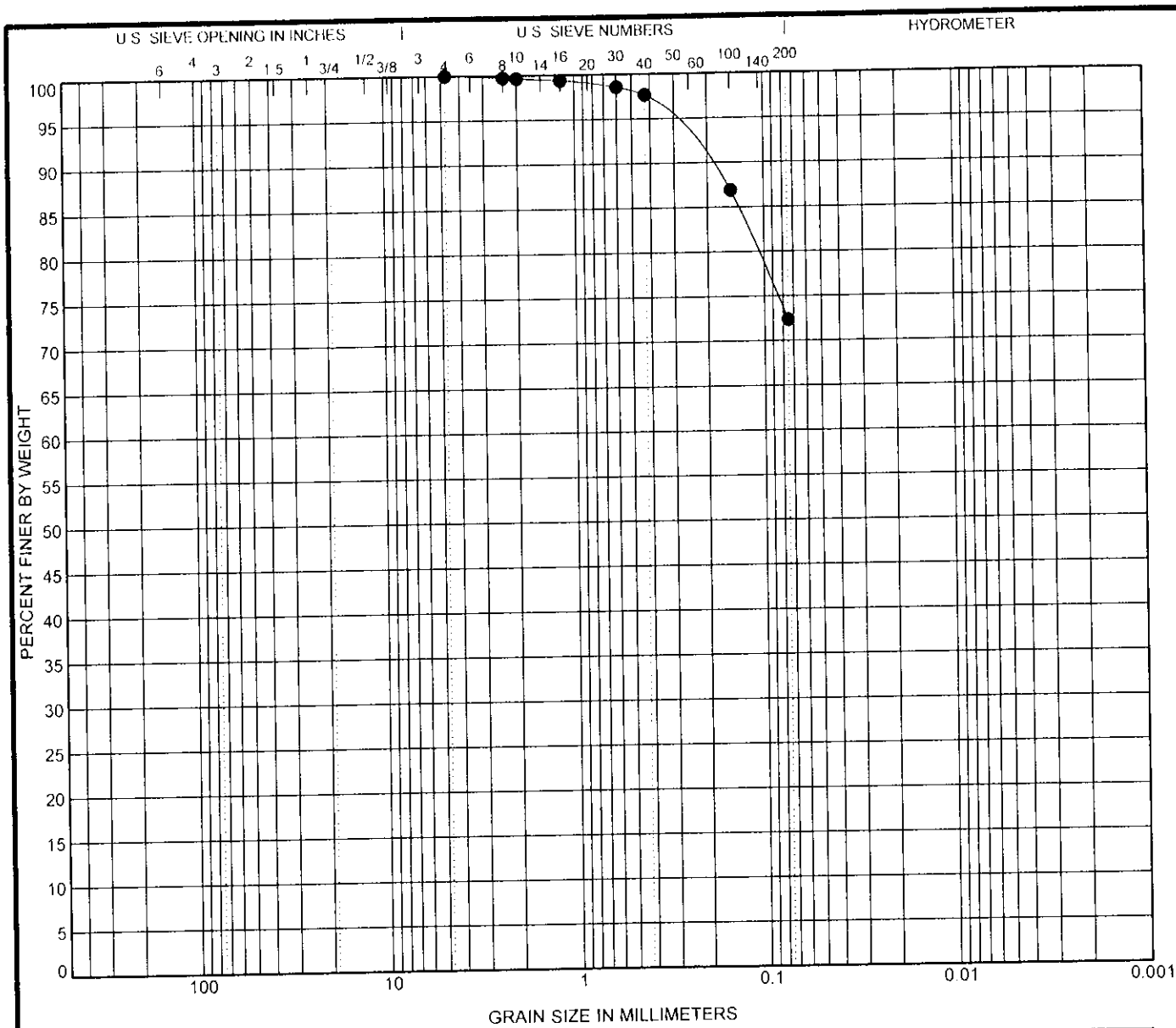
GRAIN SIZE DISTRIBUTION

Project: Piñon Ridge Mill
Location: Montrose County, Colorado
Number: 89241.2

Figure C-1



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification	Classification	LL	PL	PI	Cc	Cu
TB-7 at a depth of 9 ft.	**Sandy Clay**					

	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
	4.75				**0.0**	**27.6**	**72.4**	

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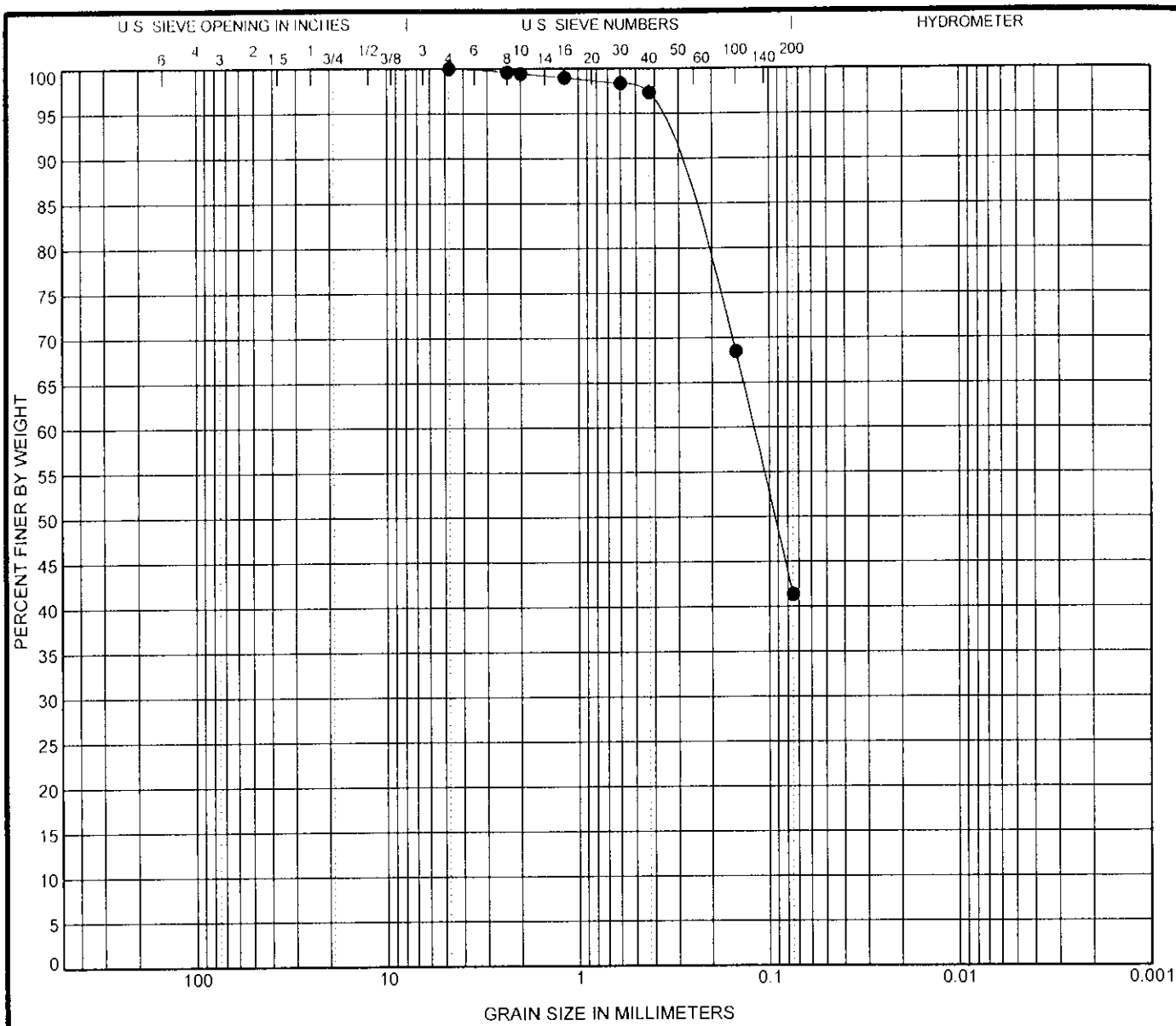
Figure C-2



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification	Classification	LL	PL	PI	Cc	Cu
TB-7 at a depth of 14 ft.	**Silty Sand**					

D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
4.75	**0.121**			**0.0**	**58.6**	**41.4**	

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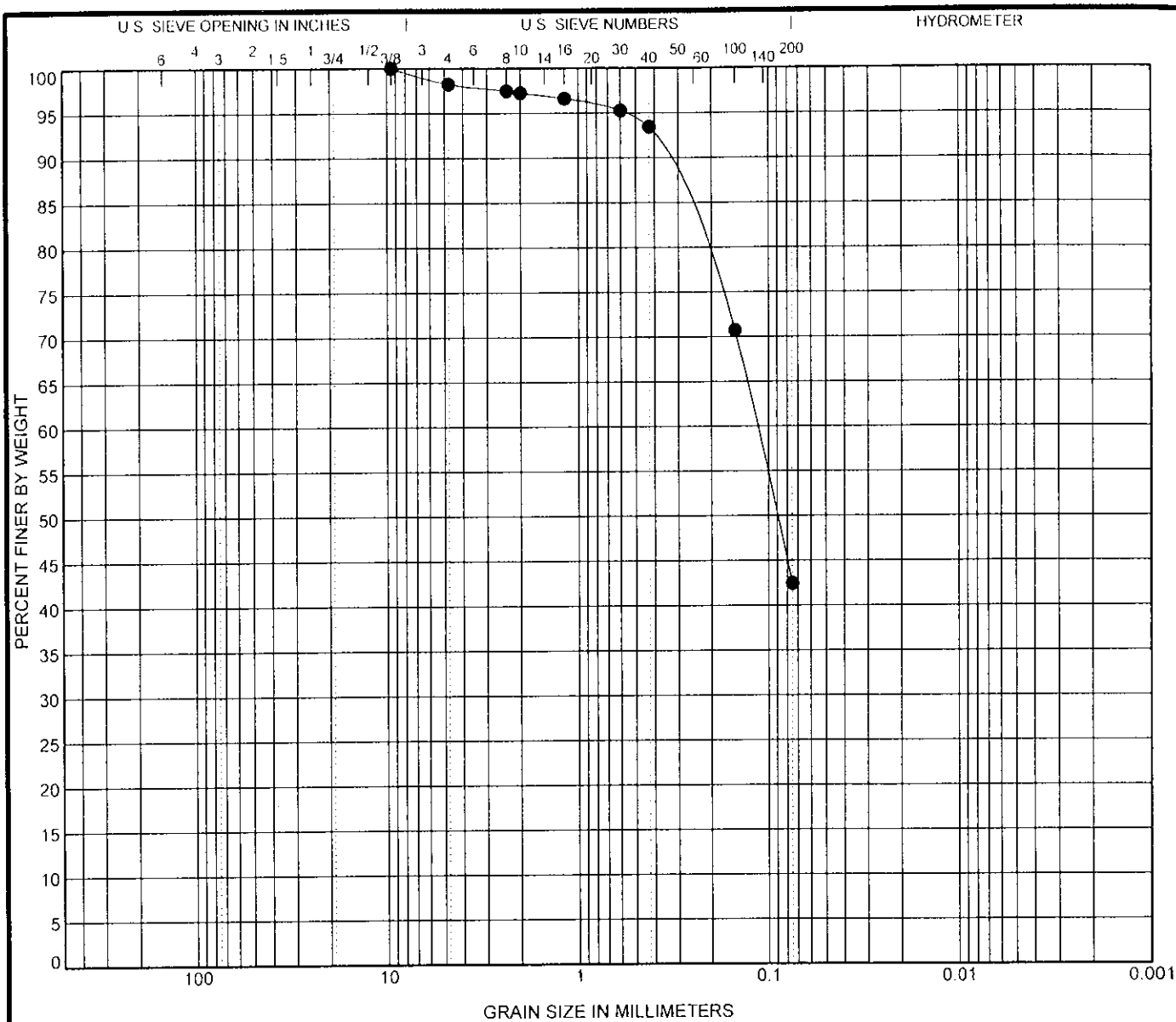
Figure C-3



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification	Classification	LL	PL	PI	Cc	Cu
TB-9 at a depth of 9 ft.	**Silty Sand**					

	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
	9.5	**0.115**			**1.7**	**55.8**	**42.5**	

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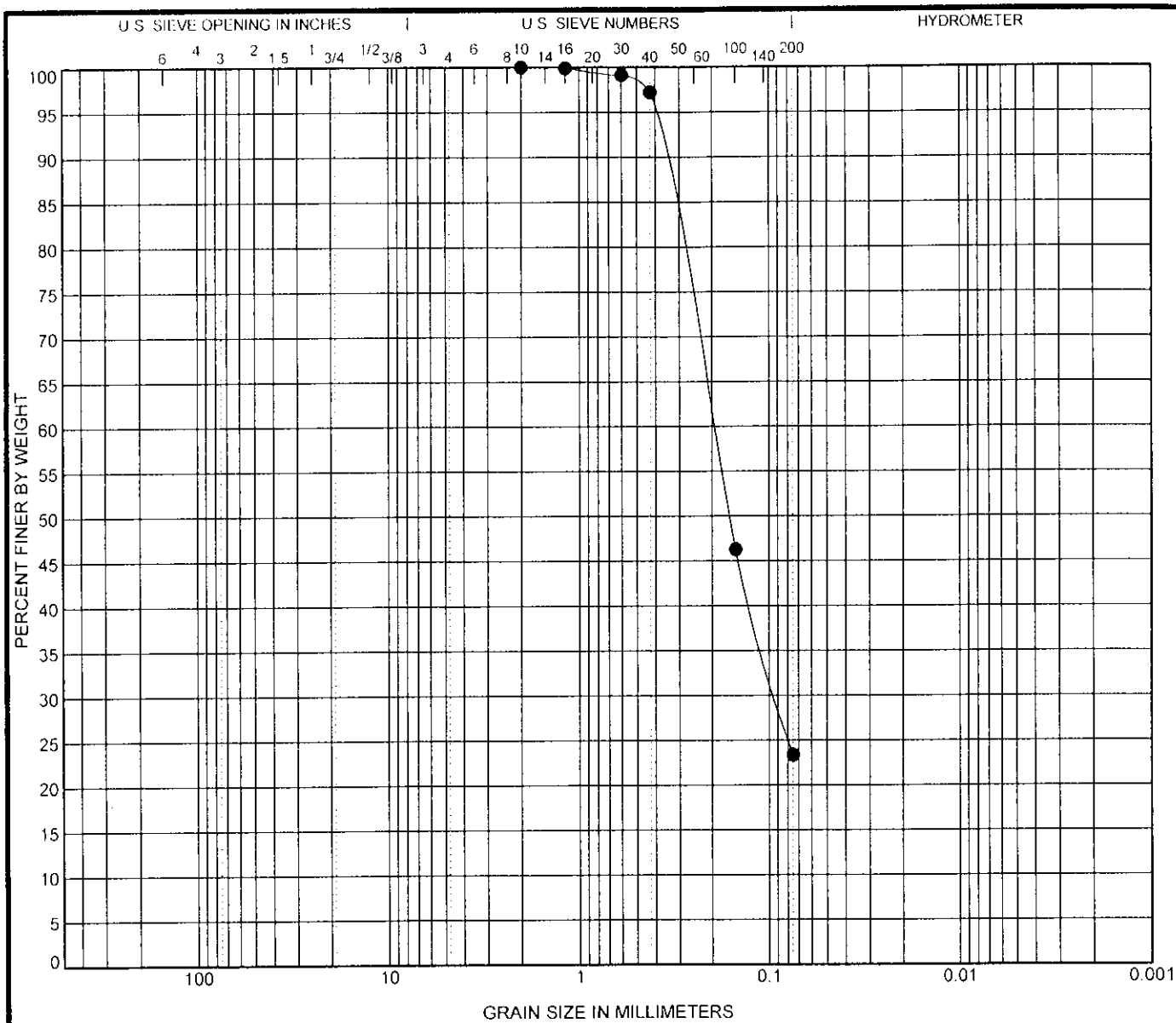
Figure C-4



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification	Classification	LL	PL	PI	Cc	Cu
TB-13 at a depth of 3 ft.	**Silty Sand**					

	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
	2	**0.199**	**0.092**		**0.0**	**76.6**	**23.4**	

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GRAIN SIZE DISTRIBUTION

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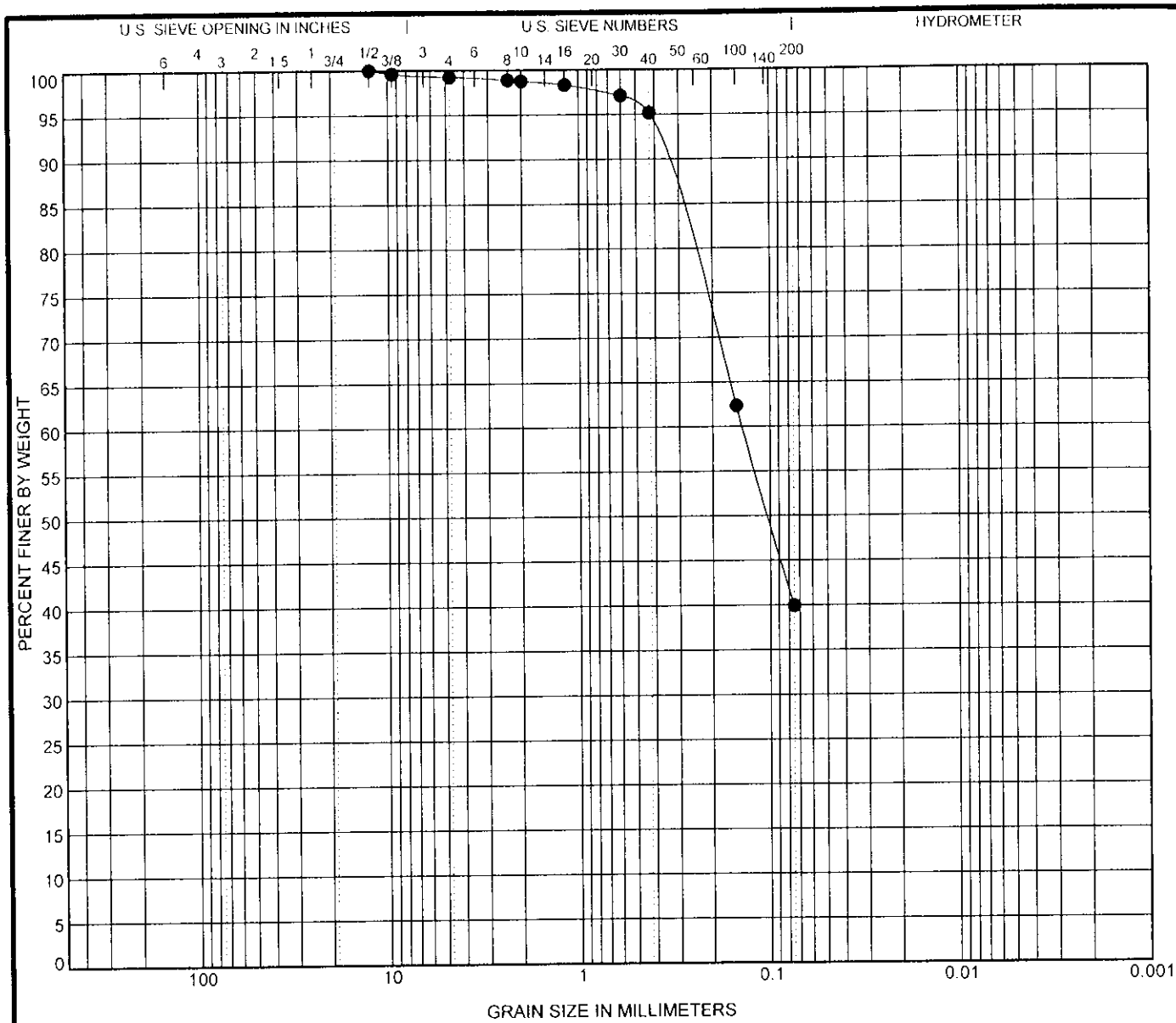
Figure C-5



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification	Classification	LL	PL	PI	Cc	Cu
TB-13 at a depth of 6 ft.	**Silty Sand**					

	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
	12.5	**0.139**			**0.8**	**59.3**	**39.9**	

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GRAIN SIZE DISTRIBUTION

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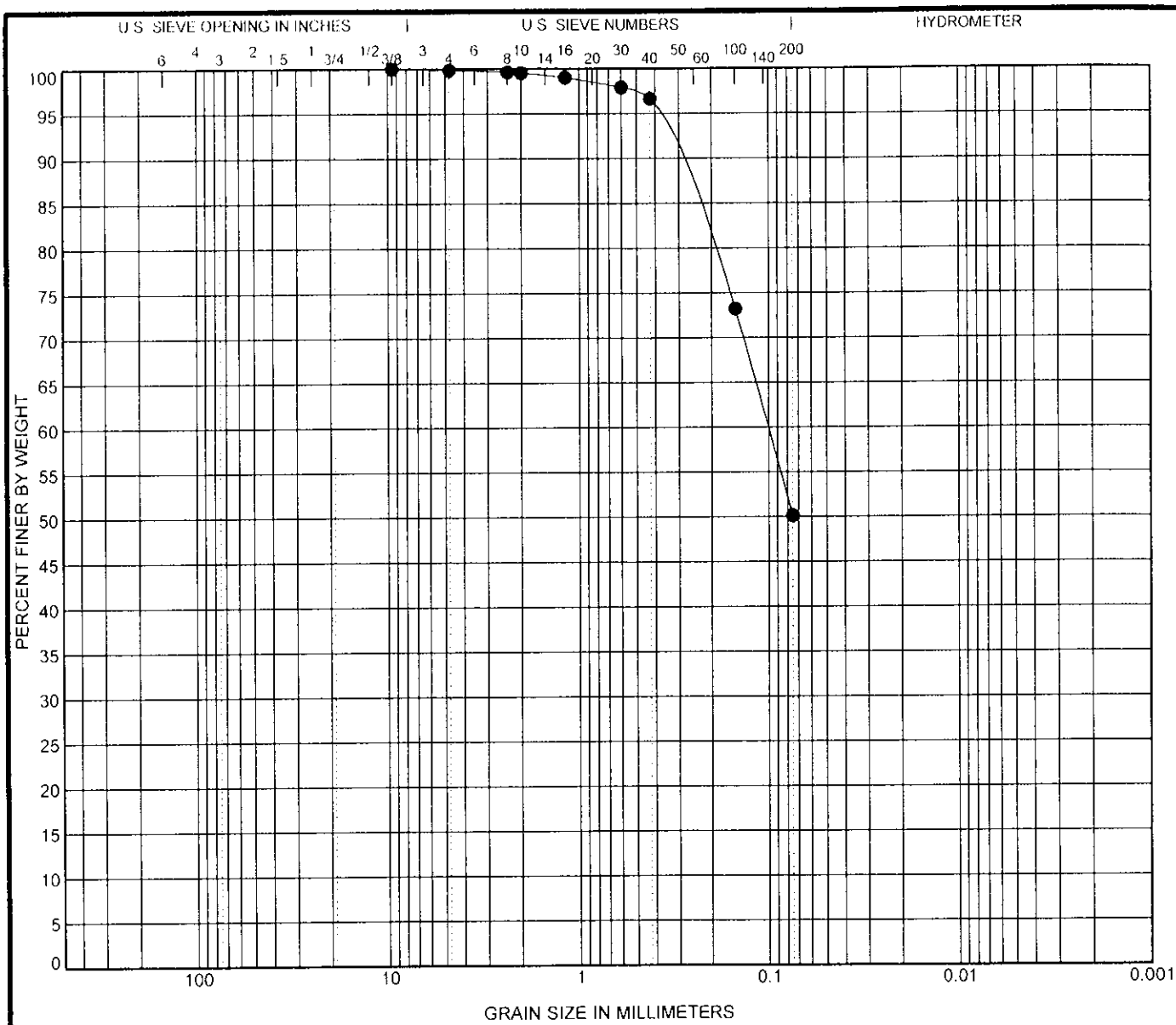
Number: 89241.2

Figure C-6



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification	Classification	LL	PL	PI	Cc	Cu
TB-13 at a depth of 14 ft.	**Sand and Silt**					

	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
	9.5	**0.101**			**0.2**	**49.7**	**50.1**	

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GRAIN SIZE DISTRIBUTION

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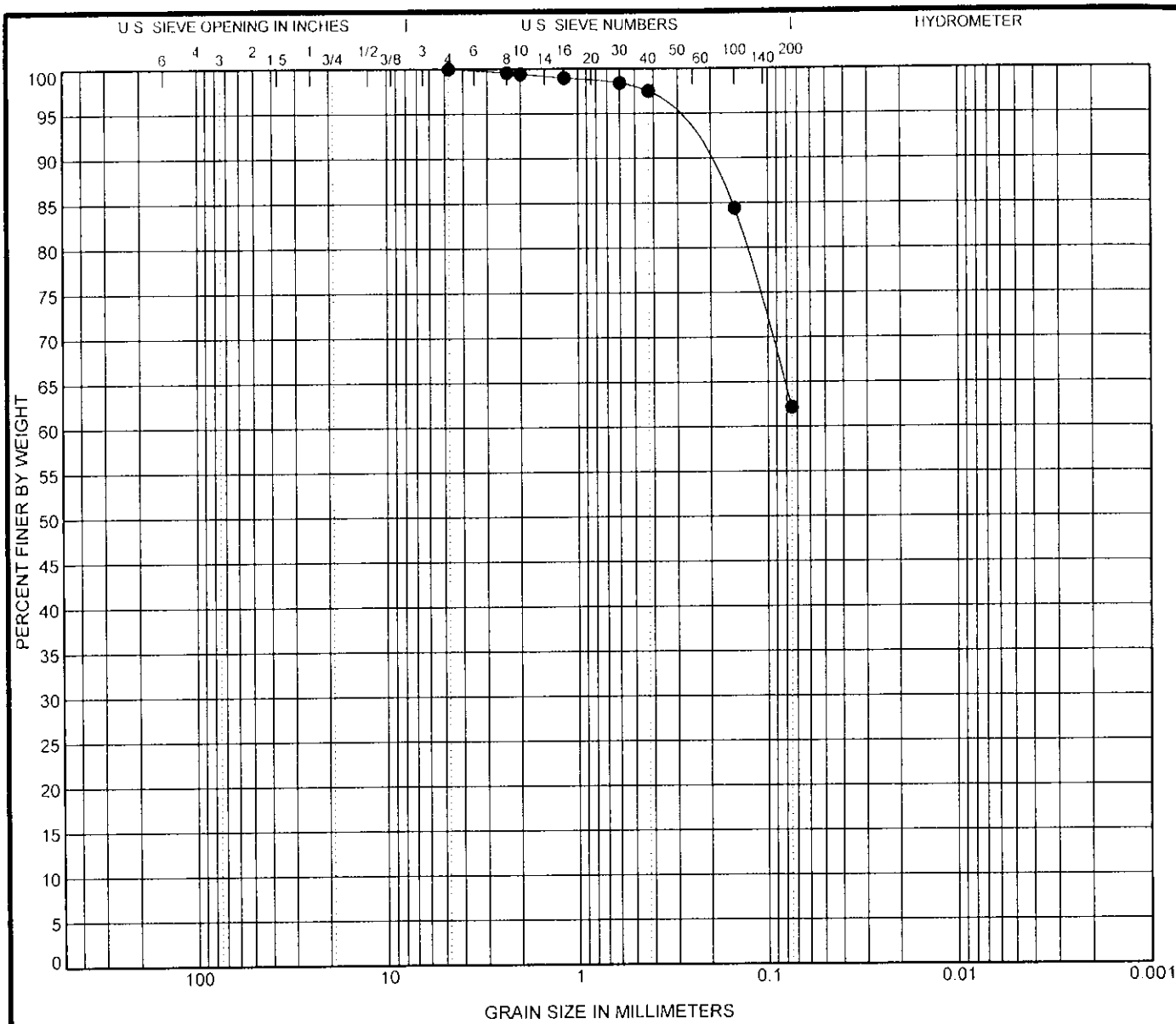
Figure C-7



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification	Classification	LL	PL	PI	Cc	Cu
TB-18 at a depth of 4 ft.	**Sandy Silt and Clay**	**21**	**17**	**4**		

	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
	4.75				**0.0**	**37.8**	**62.2**	

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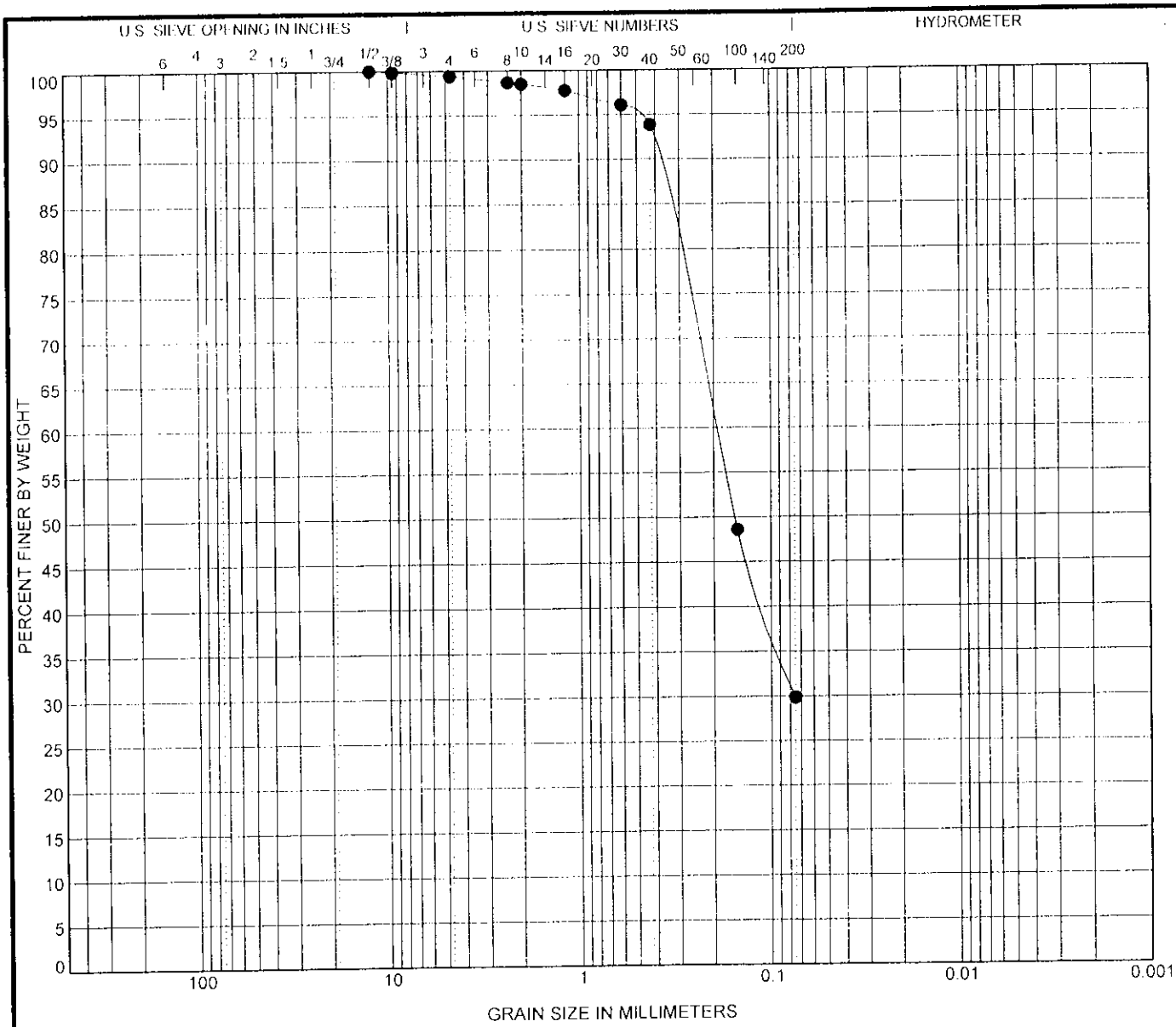
Figure C-8



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification	Classification	LL	PL	PI	Cc	Cu
TB 1-2 at a depth of 0-5 ft.	**Clayey Sand**	**22**	**11**	**11**		

	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
	12.5	**0.195**	**0.075**		**0.6**	**69.5**	**29.9**	

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GRAIN SIZE DISTRIBUTION

Project: Piñon Ridge Mill
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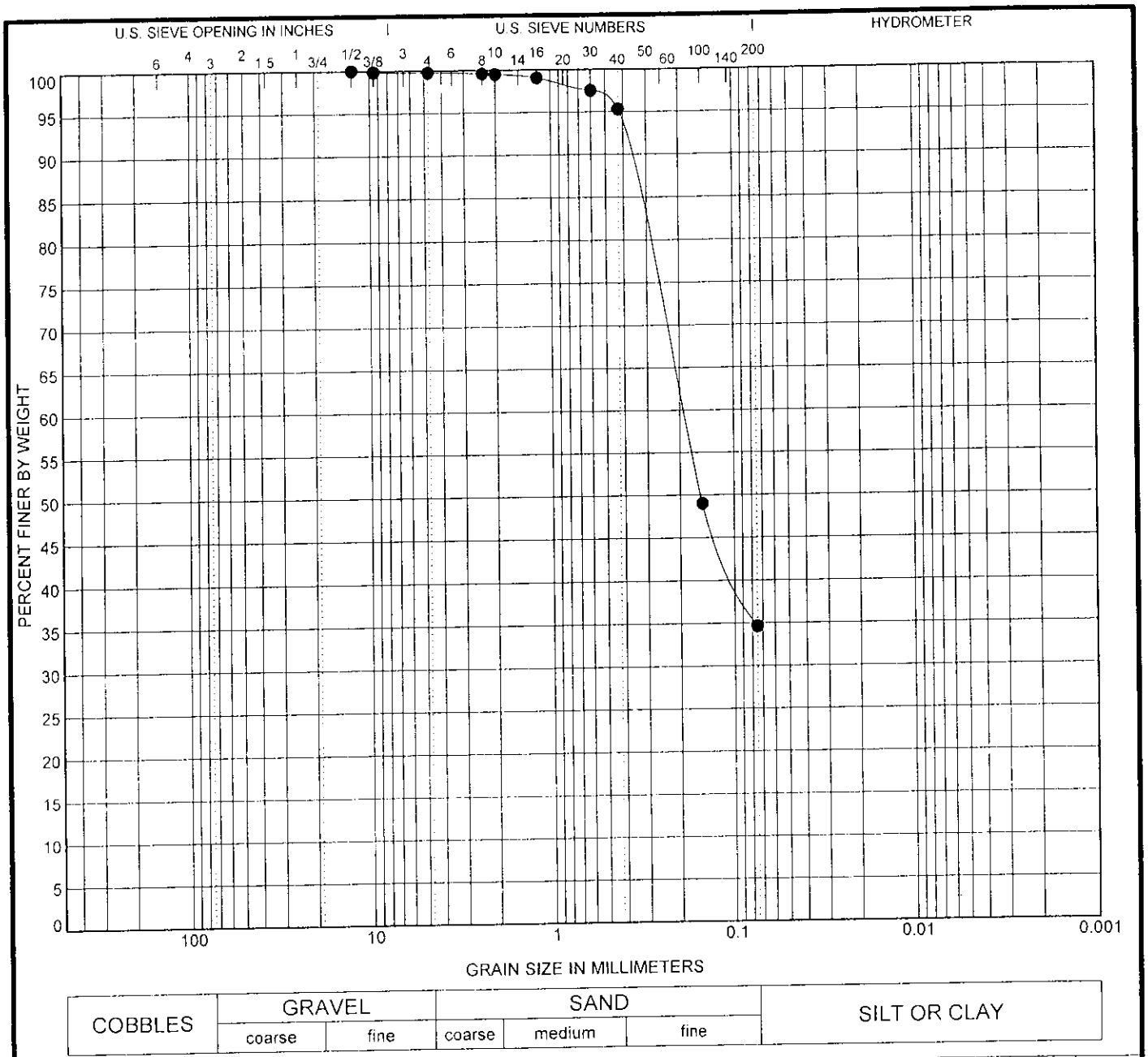
Figure C-9



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification	Classification	LL	PL	PI	Cc	Cu
TB 11-12 19-20 at a depth of 0-5 ft.	**Clayey Sand**	**20**	**17**	**3**		

D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
12.5	**0.192**			**0.2**	**65.1**	**34.6**	

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GRAIN SIZE DISTRIBUTION

Project: Piñon Ridge Mill
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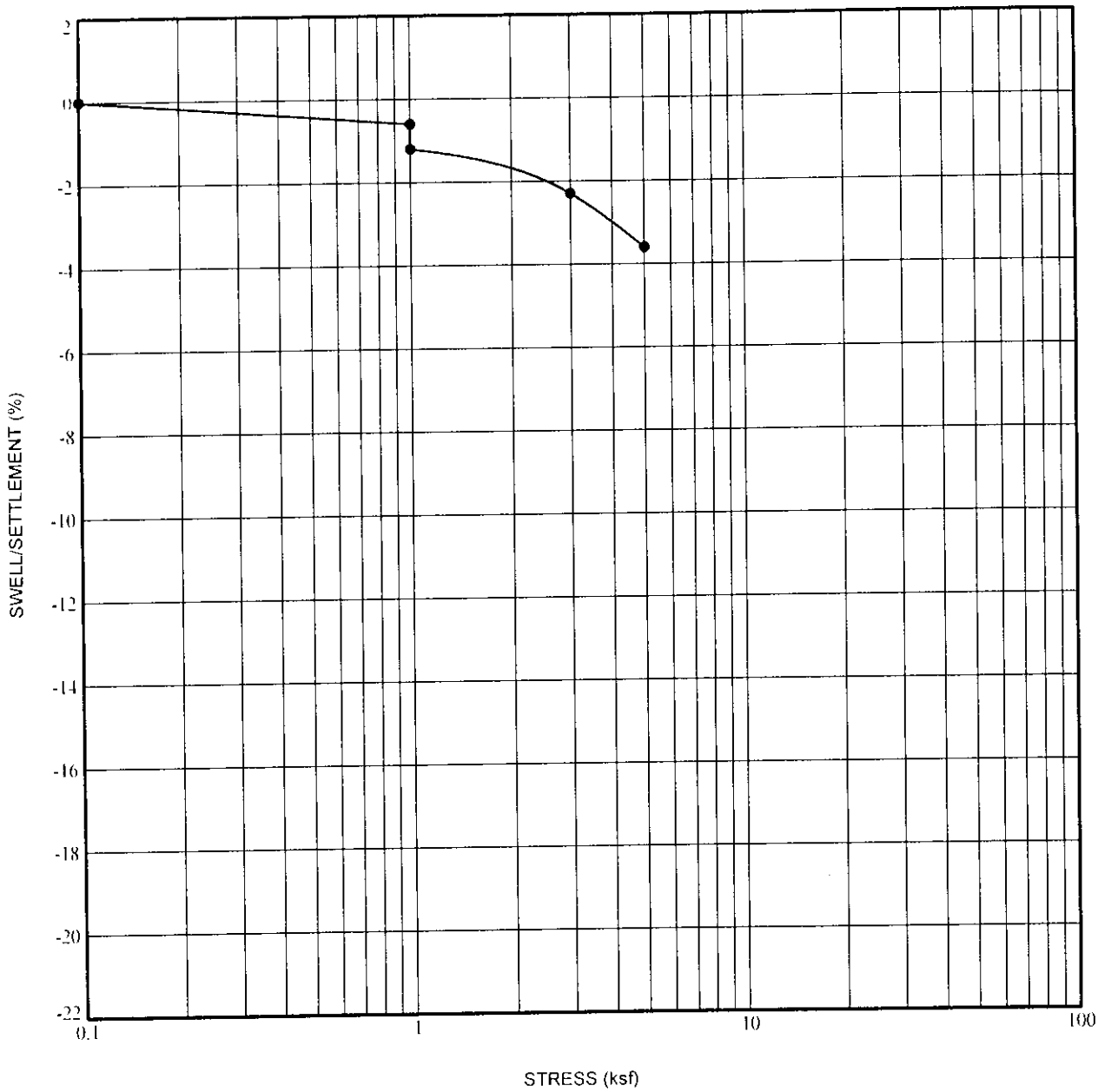
Figure C-10



Location: TB-1

Depth: 19.0 feet

Water Added at 1,000 psf

Volume Change at Wetting = -0.6 %

Soil Type: Clayey Sand

Moisture Content = 7.5 %

Dry Unit Weight = 107.0 pcf

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Date:	June, 2008		

SWELL/SETTLEMENT TEST

Piñon Ridge Mill
Montrose County, Colorado

Figure C-11

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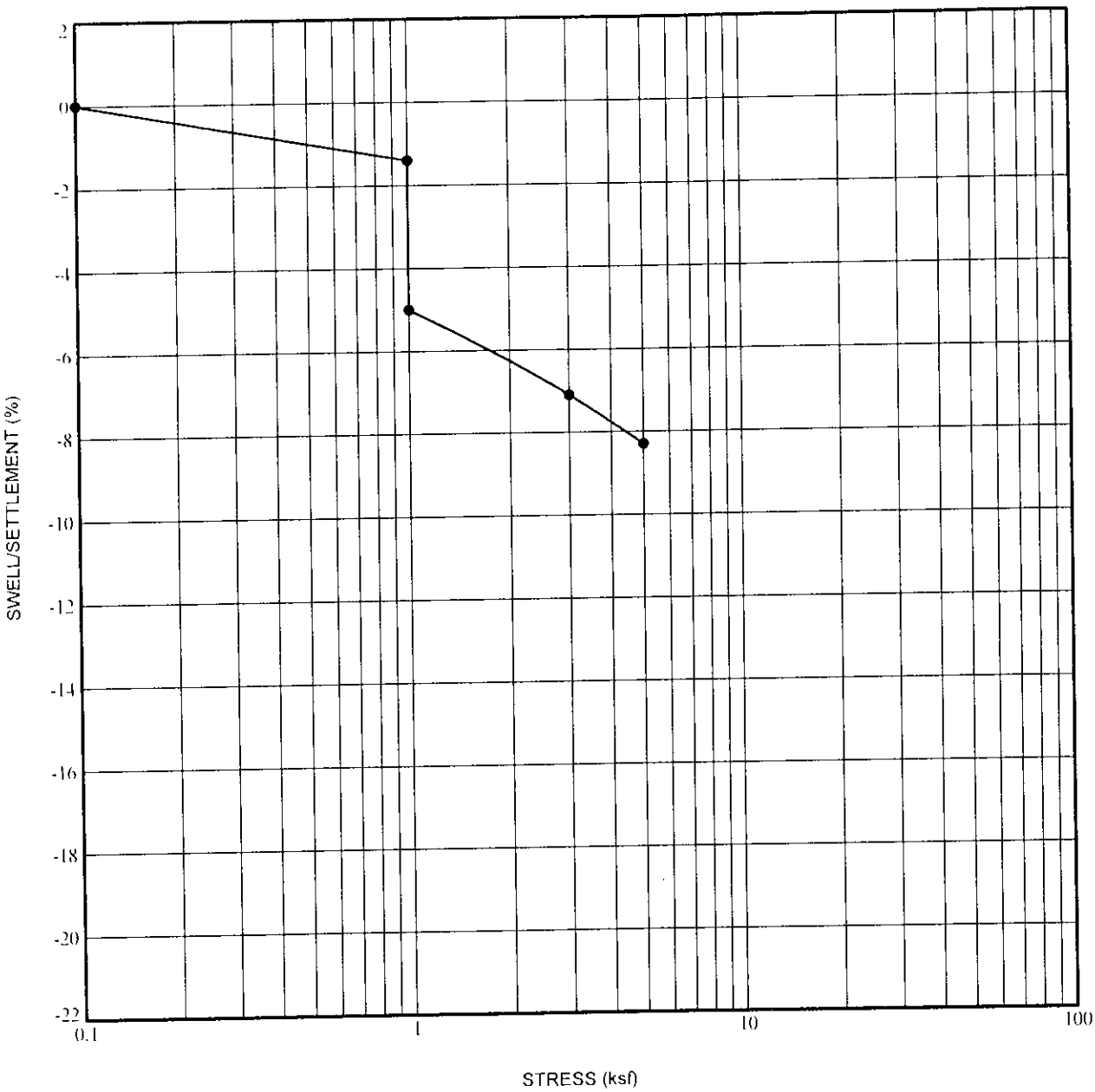

Location: TB-3

Depth: 4.0 feet

Water Added at 1.000 psf

Volume Change at Wetting = -3.6 %

Soil Type: Sandy Clay

Moisture Content = 4.8 %

Dry Unit Weight = 100.4 pcf

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SWELL/SETTLEMENT TEST

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Figure C-12

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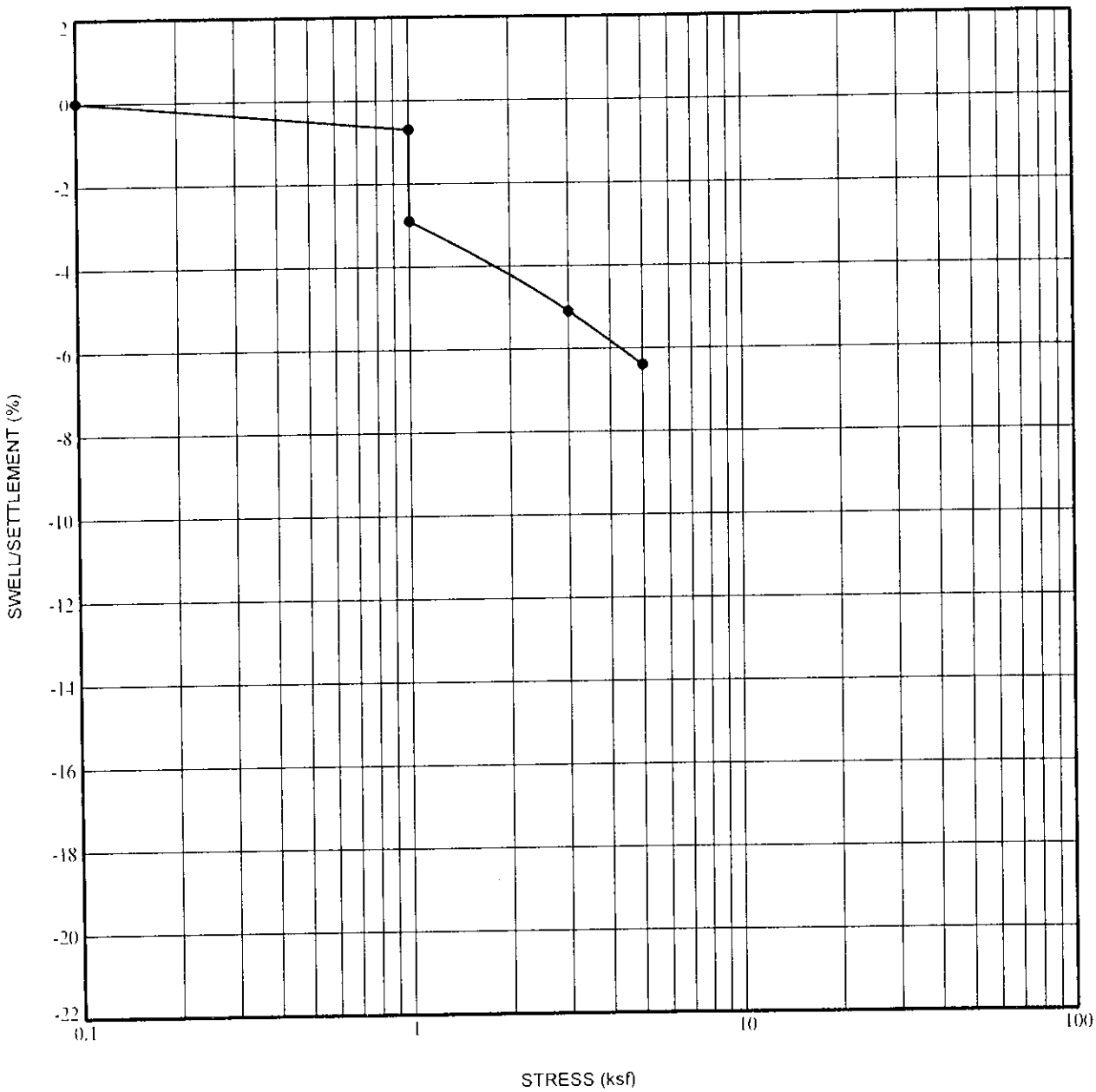

Location: TB-4

Depth: 19.0 feet

Water Added at 1,000 psf

Volume Change at Wetting = -2.2 %

Soil Type: Silty Sand

Moisture Content = 3.0 %

Dry Unit Weight = 78.8 pcf

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SWELL/SETTLEMENT TEST

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Figure C-13

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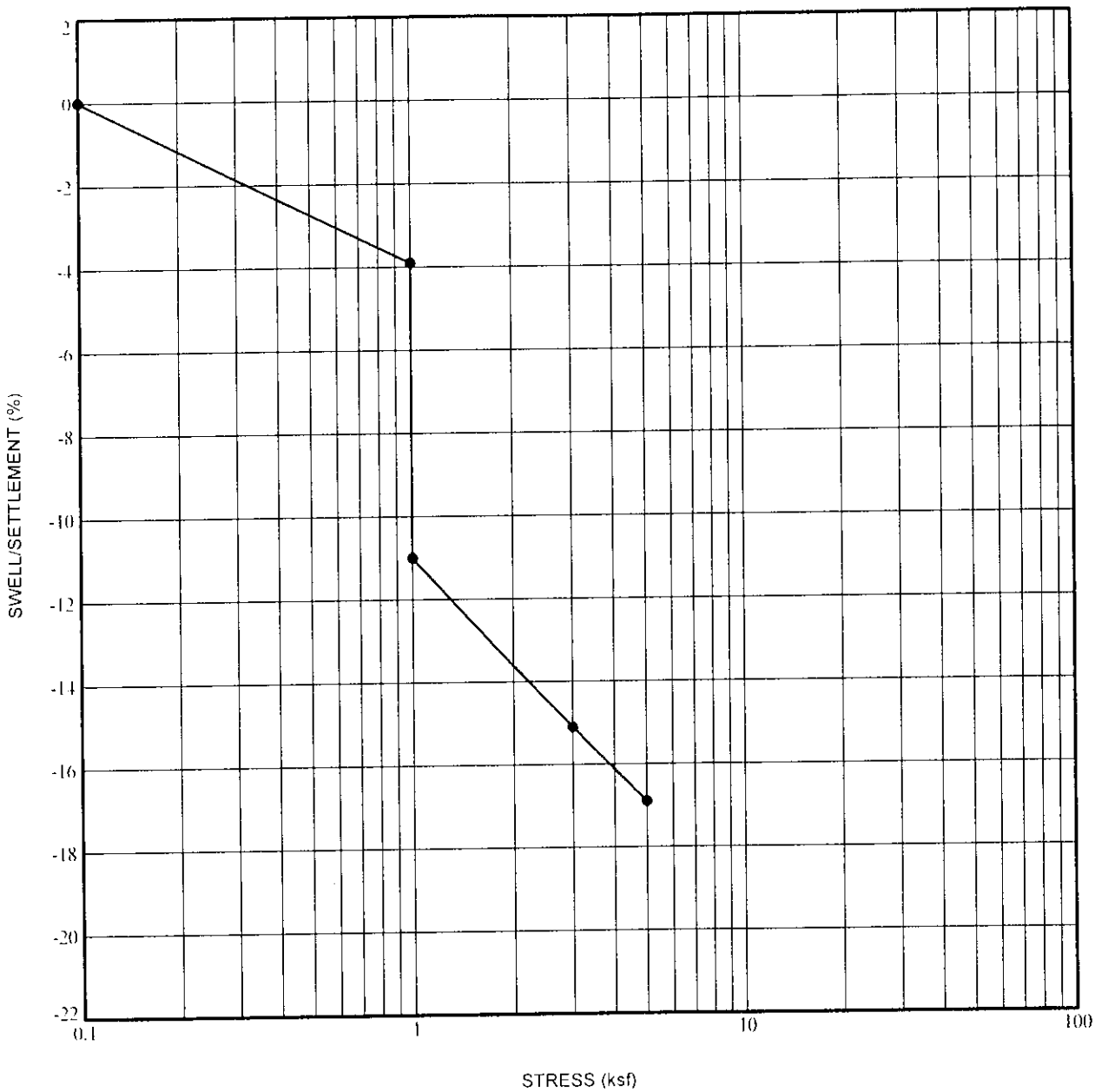

Location: TB-5

Depth: 4.0 feet

Water Added at 1,000 psf

Volume Change at Wetting = -7.1 %

Soil Type: Silty Sand

Moisture Content = 2.9 %

Dry Unit Weight = 98.1 pcf

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SWELL/SETTLEMENT TEST

Piñon Ridge Mill
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Figure C-14

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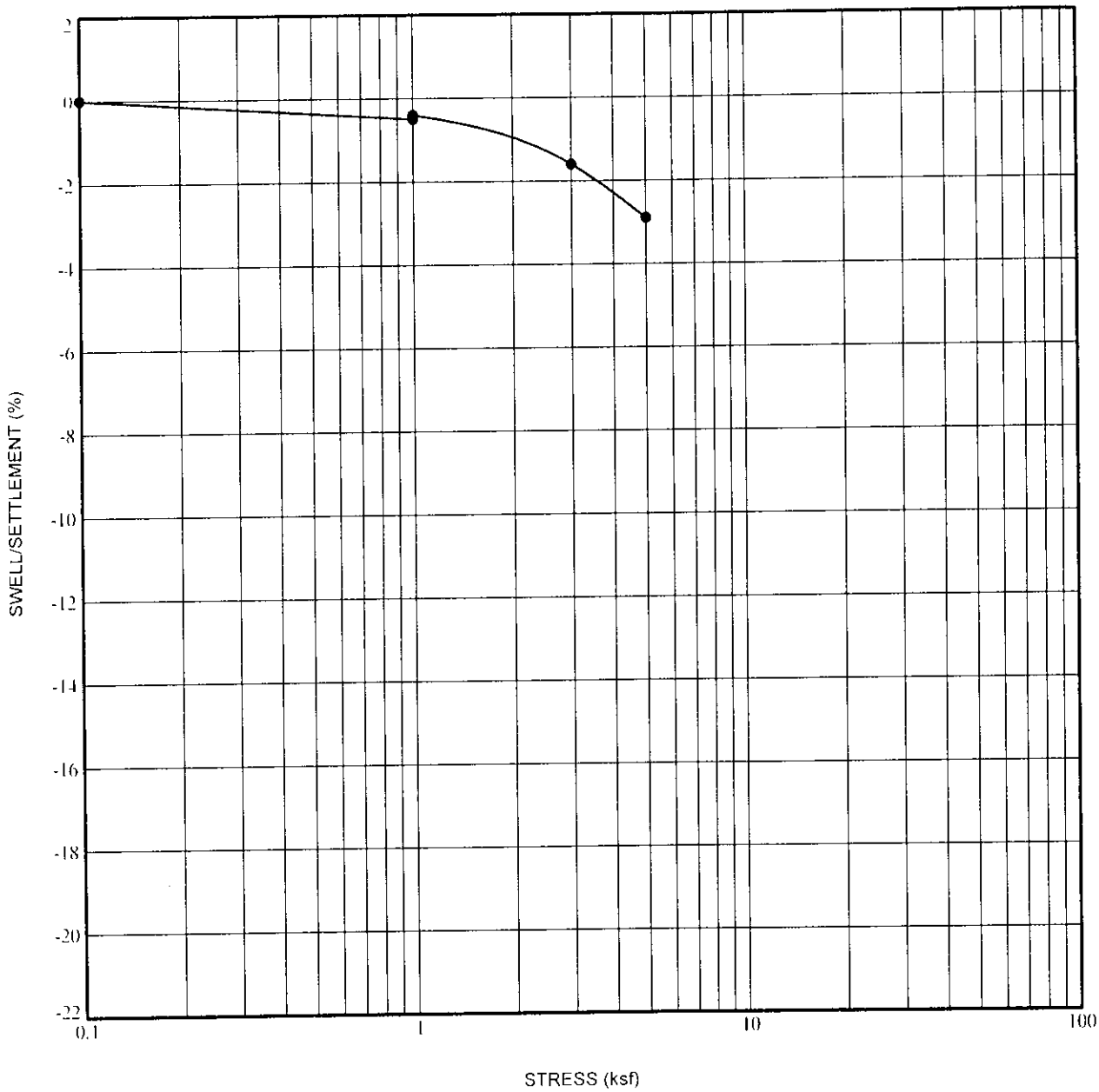

Location: TB-6

Depth: 19.0 feet

Water Added at 1,000 psf

Volume Change at Wetting = 0.1 %

Soil Type: Sandy Clay

Moisture Content = 5.2 %

Dry Unit Weight = 107.7 pcf

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SWELL/SETTLEMENT TEST

Piñon Ridge Mill
Montrose County, Colorado

Figure C-15

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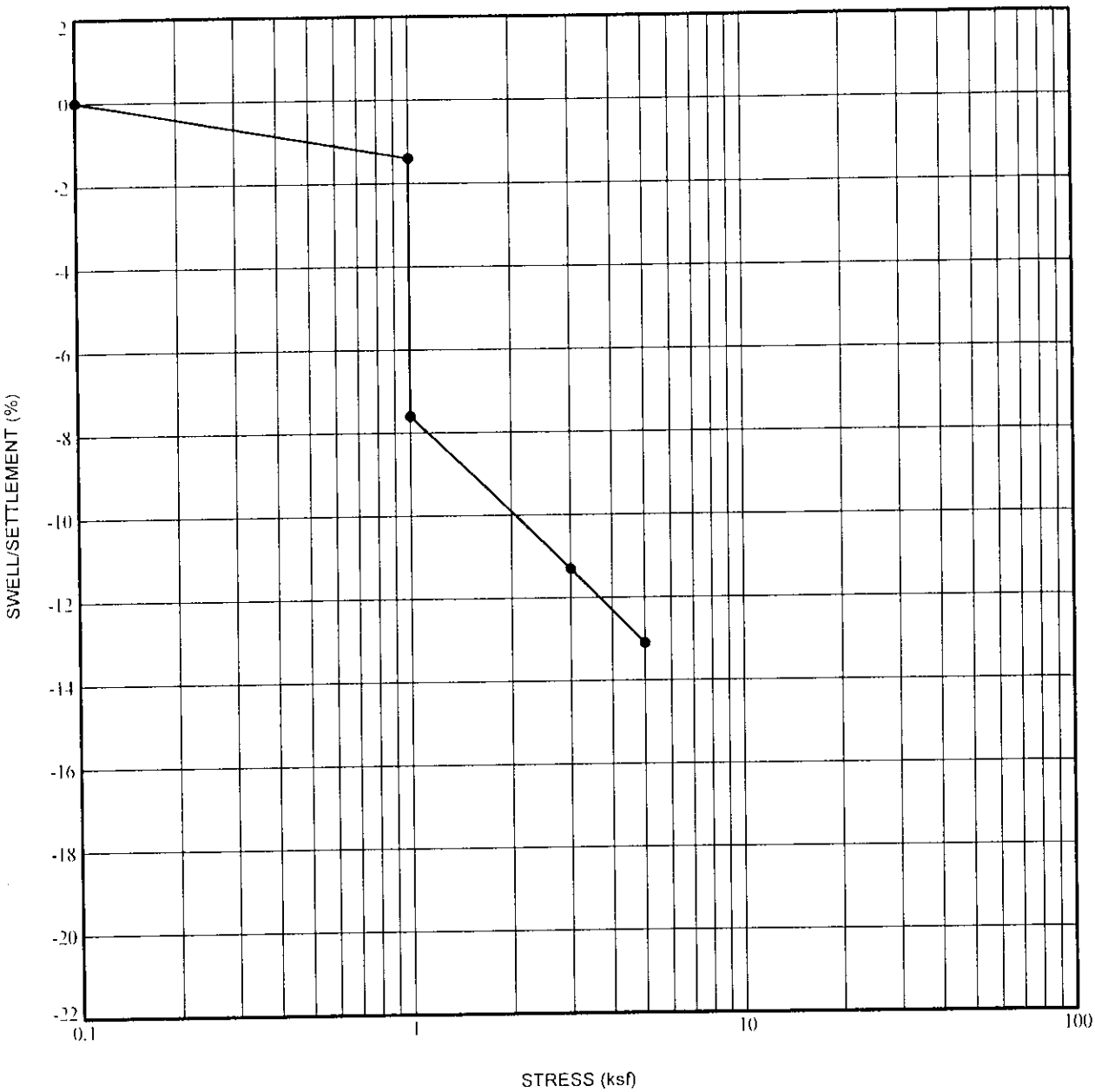

Location: TB-7

Depth: 4.0 feet

Water Added at 1,000 psf

Volume Change at Wetting = -6.2 %

Soil Type: Silty Sand

Moisture Content = 2.3 %

Dry Unit Weight = 97.7 pcf

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SWELL/SETTLEMENT TEST

Piñon Ridge Mill
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Figure C-16

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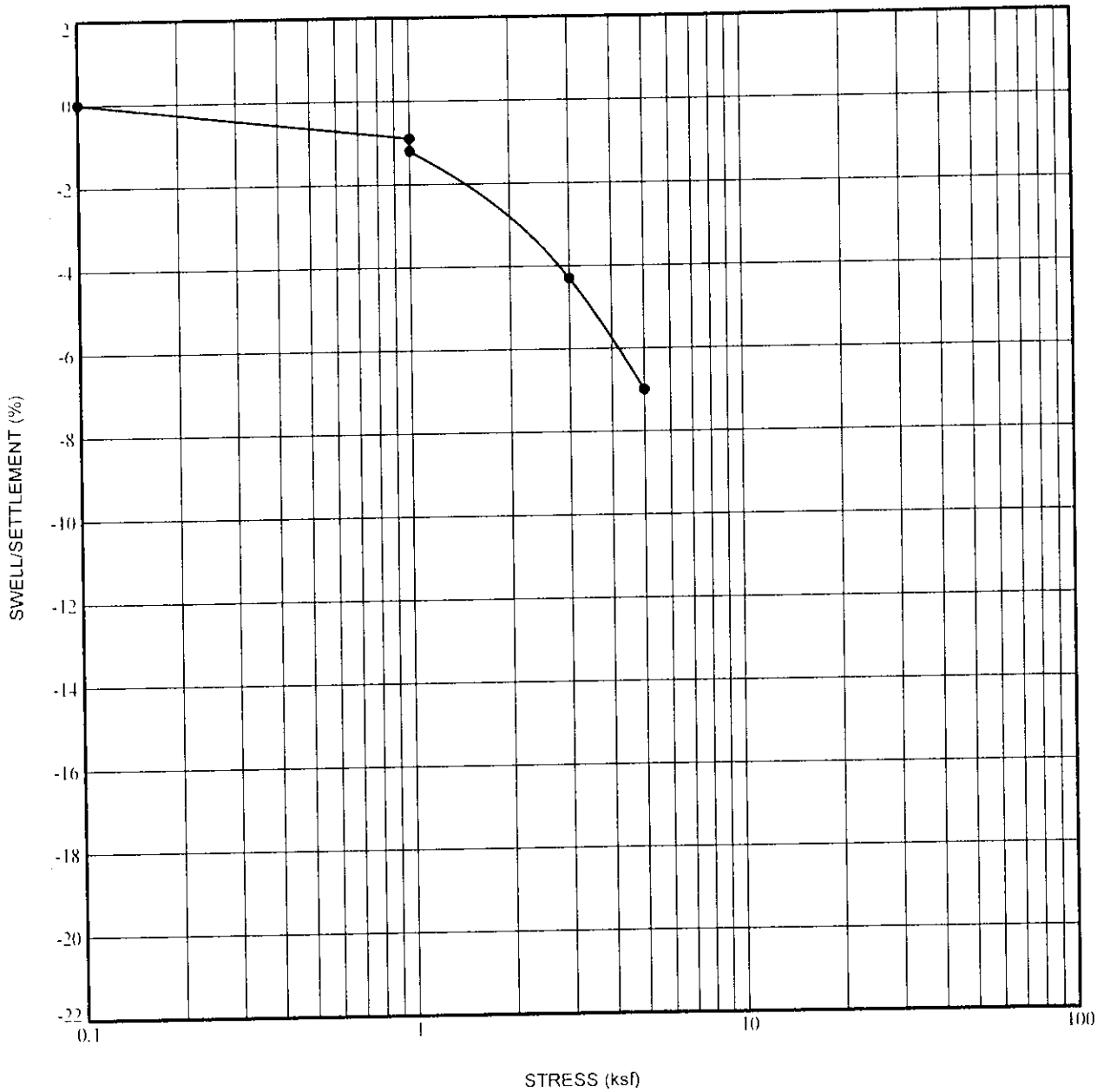

Location: TB-7

Depth: 9.0 feet

Water Added at 1,000 psf

Volume Change at Wetting = -0.3 %

Soil Type: Sandy Clay

Moisture Content = 7.5 %

Dry Unit Weight = 92.6 pcf

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SWELL/SETTLEMENT TEST

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Figure C-17

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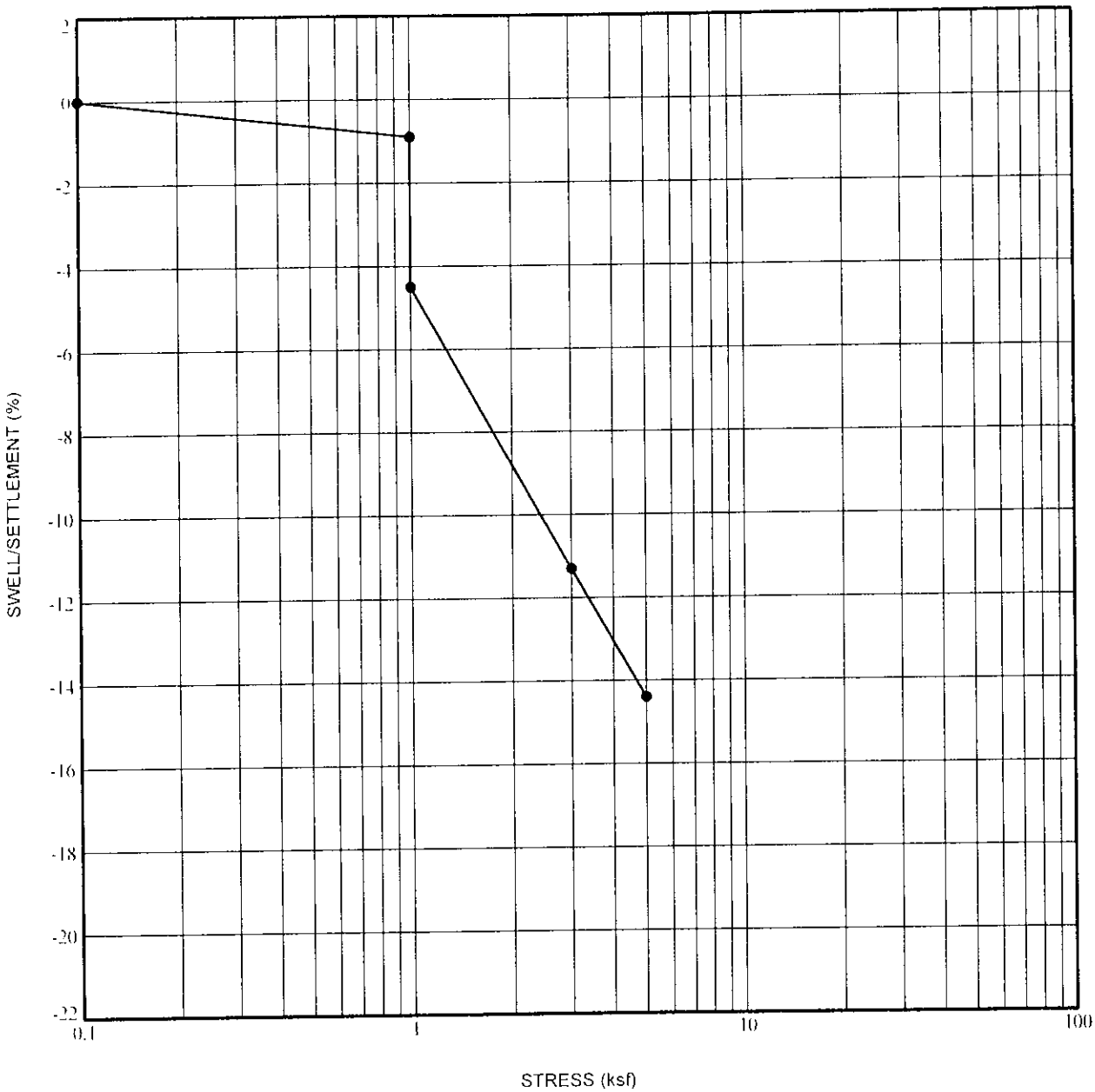

Location: TB-9

Depth: 3.0 feet

Water Added at 1,000 psf

Volume Change at Wetting = -3.6 %

Soil Type: Sandy Clay

Moisture Content = 5.8 %

Dry Unit Weight = 89.7 pcf

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SWELL/SETTLEMENT TEST

Piñon Ridge Mill
Montrose County, Colorado

Figure C-18

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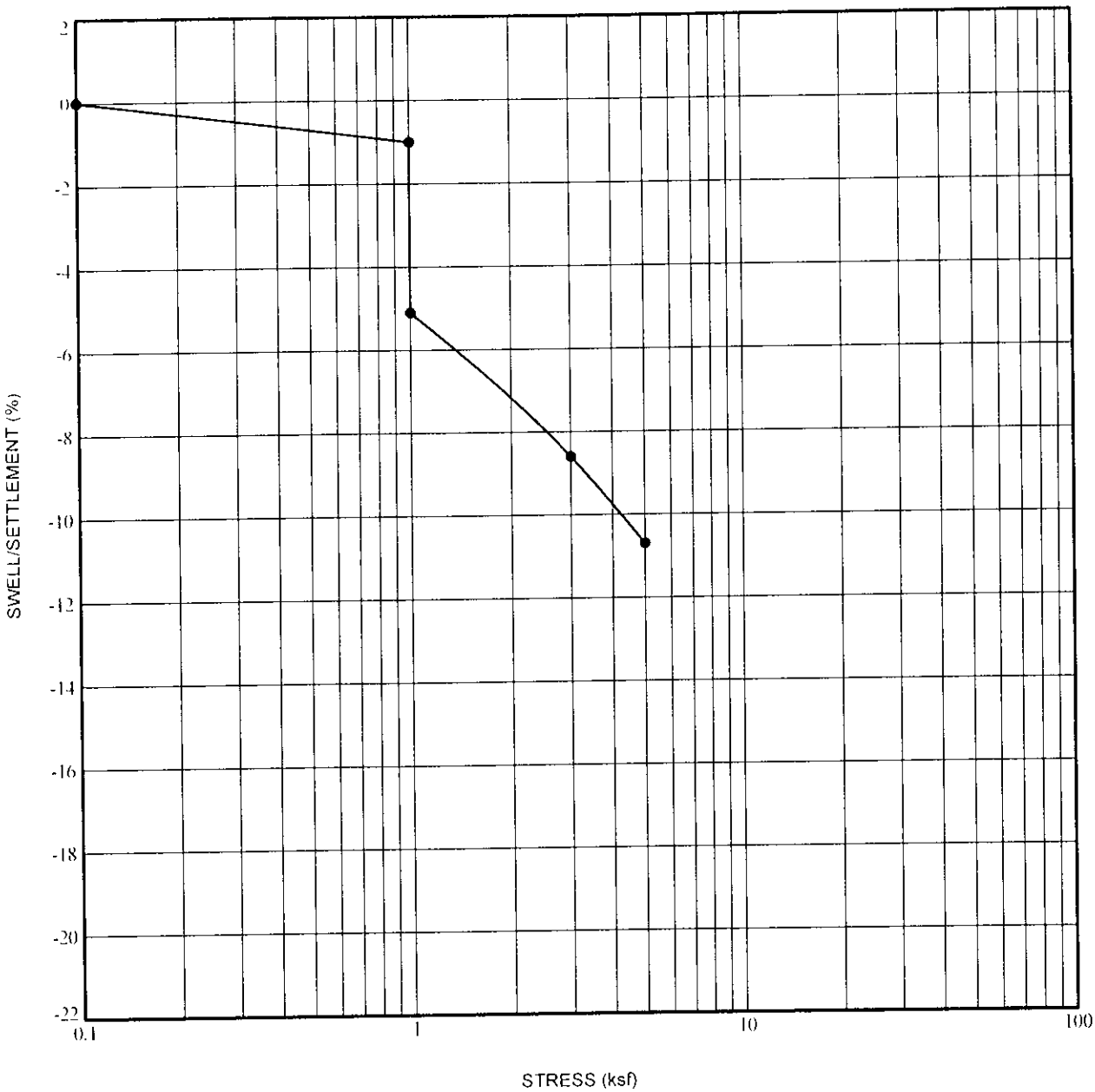

Location: TB-9

Depth: 9.0 feet

Water Added at 1,000 psf

Volume Change at Wetting = -4.1 %

Soil Type: Silty Sand

Moisture Content = 4.2 %

Dry Unit Weight = 96.5 pcf

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SWELL/SETTLEMENT TEST

Piñon Ridge Mill
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Figure C-19

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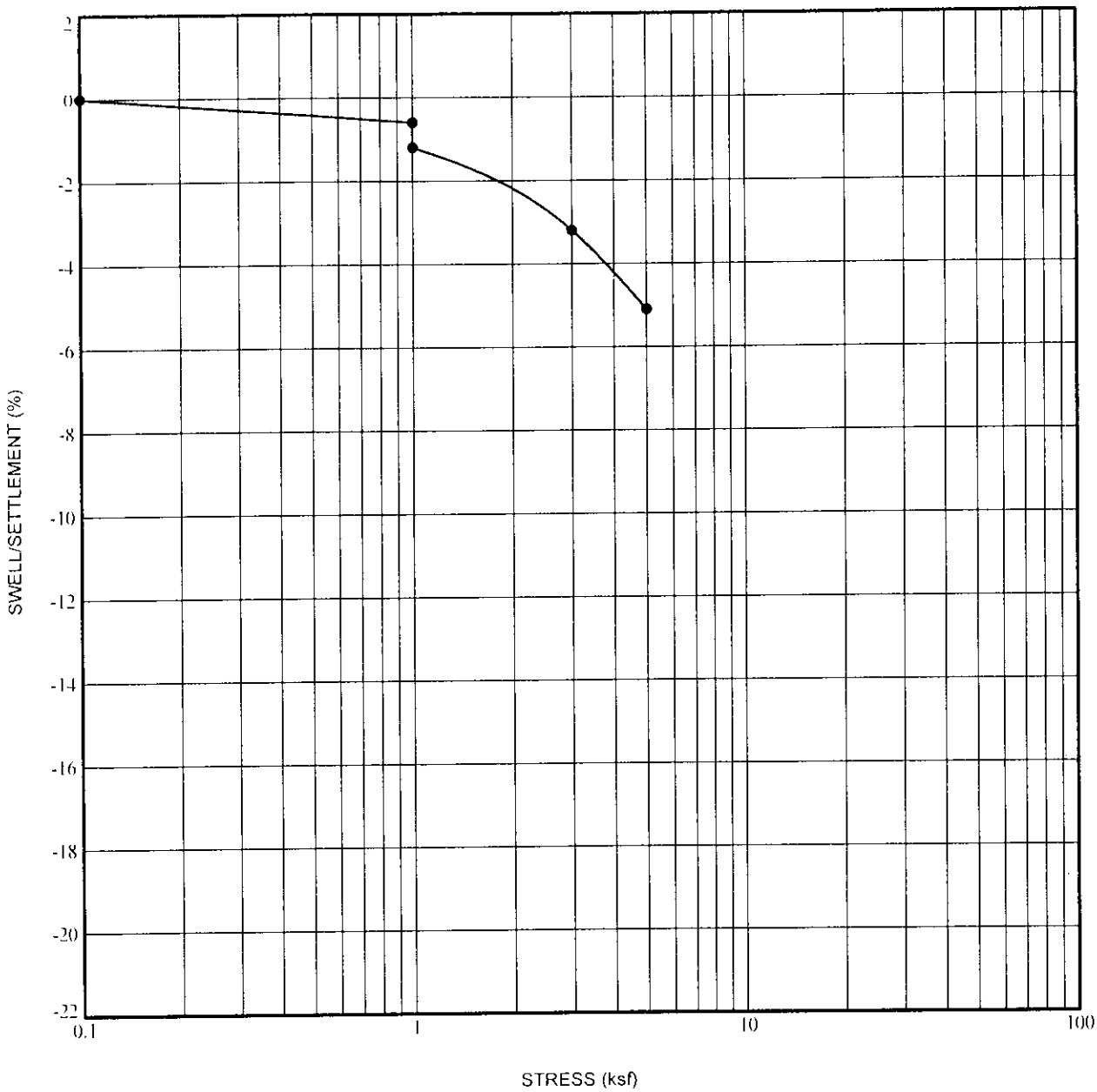

Location: TB-11

Depth: 19.0 feet

Water Added at 1,000 psf

Volume Change at Wetting = -0.6 %

Soil Type: Silty Sand

Moisture Content = 3.0 %

Dry Unit Weight = 95.4 pcf

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Date: June, 2008	89241.2

SWELL/SETTLEMENT TEST

Piñon Ridge Mill
Montrose County, Colorado

Figure C-20

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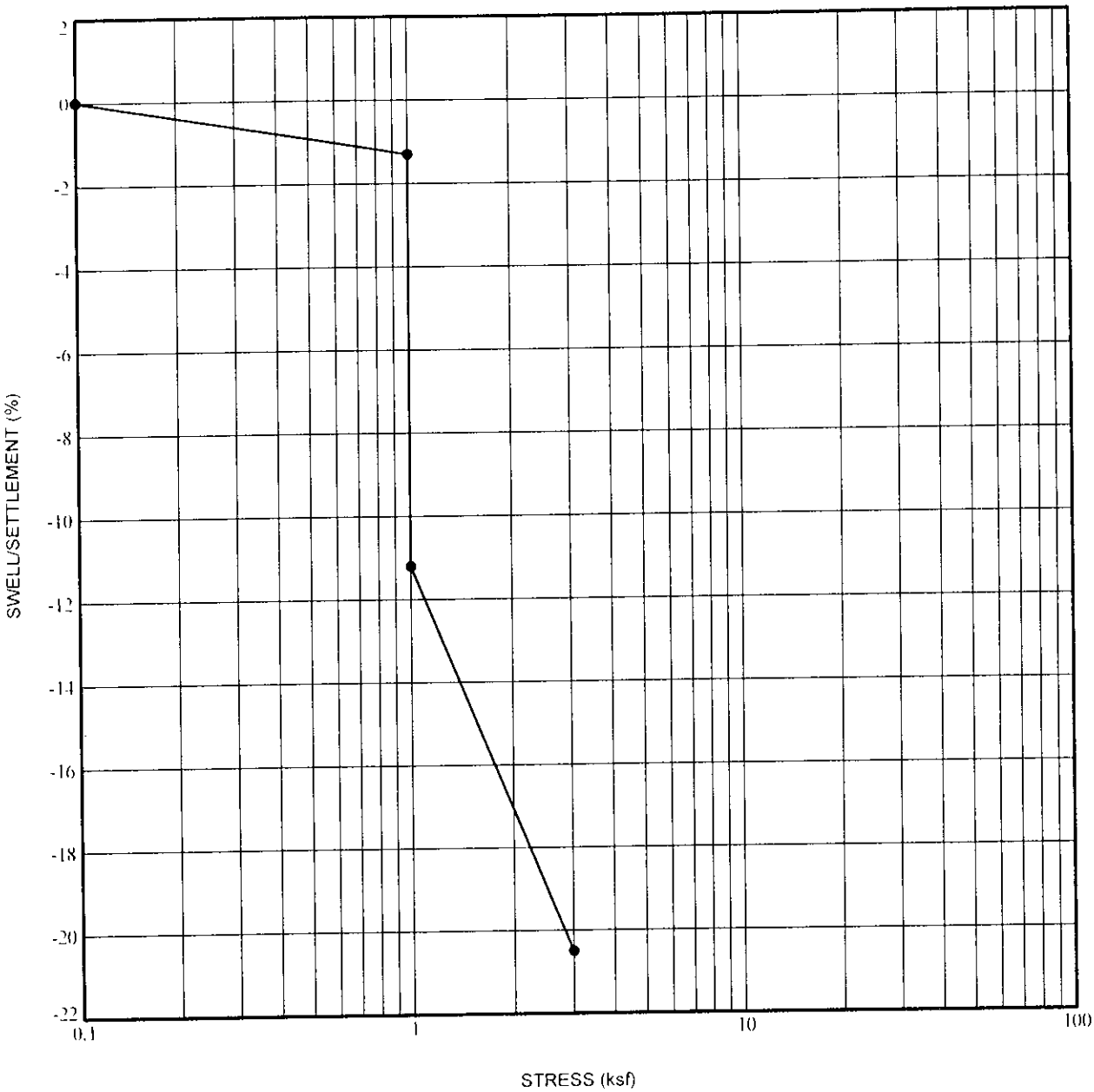

Location: TB-13

Depth: 9.0 feet

Water Added at 1.000 psf

Volume Change at Wetting = -9.9 %

Soil Type: Clayey Sand

Moisture Content = 6.9 %

Dry Unit Weight = 98.2 pcf

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SWELL/SETTLEMENT TEST

Piñon Ridge Mill
Montrose County, Colorado

Figure C-21

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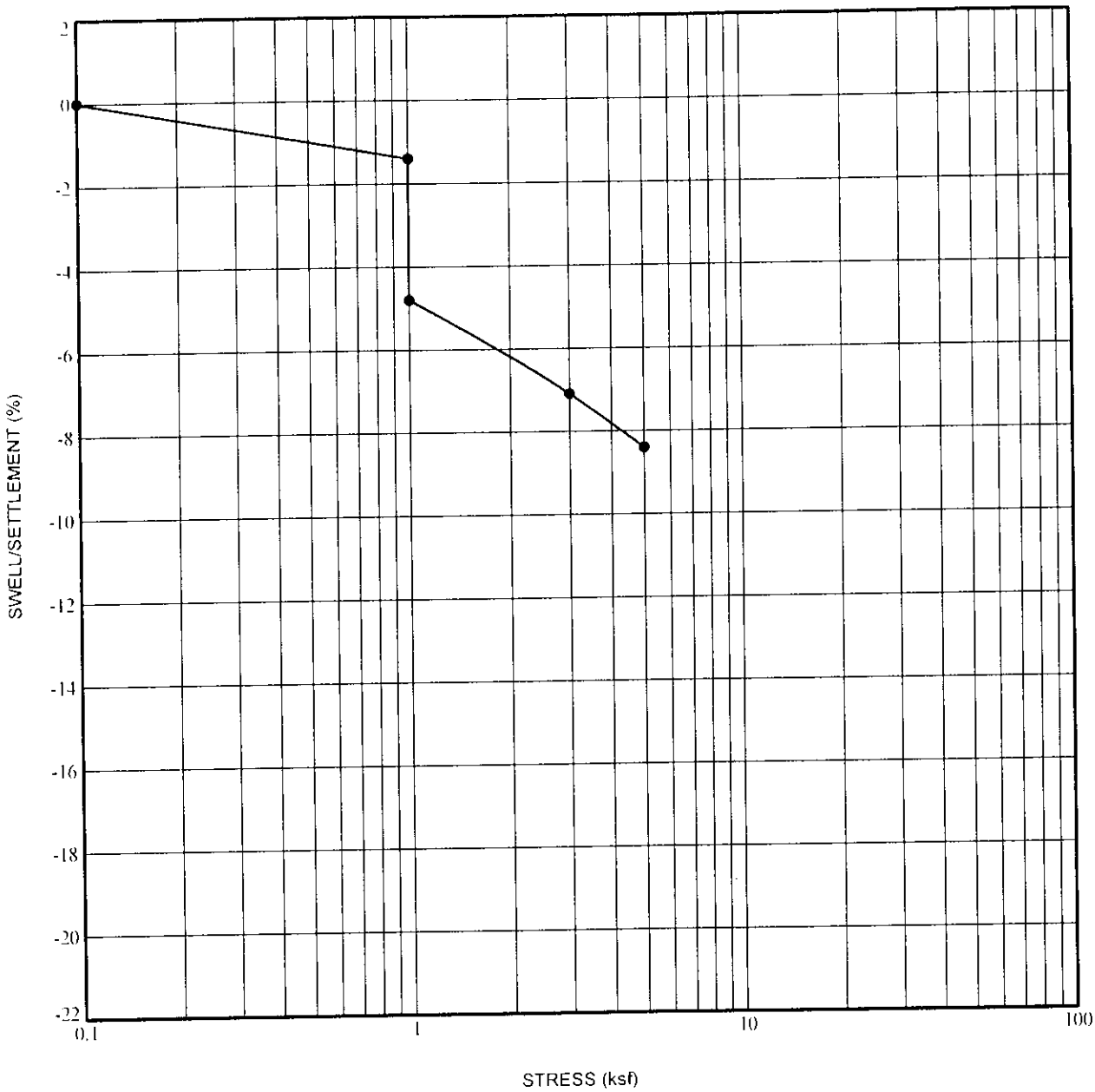

Location: TB-13

Depth: 14.0 feet

Water Added at 1,000 psf

Volume Change at Wetting = -3.4 %

Soil Type: Sand And Silt

Moisture Content = 4.8 %

Dry Unit Weight = 95.1 pcf

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SWELL/SETTLEMENT TEST

Piñon Ridge Mill
Montrose County, Colorado

Figure C-22

CONSOLID 89241.1 PINON RIDGE MILL.GPJ 6/2/2008
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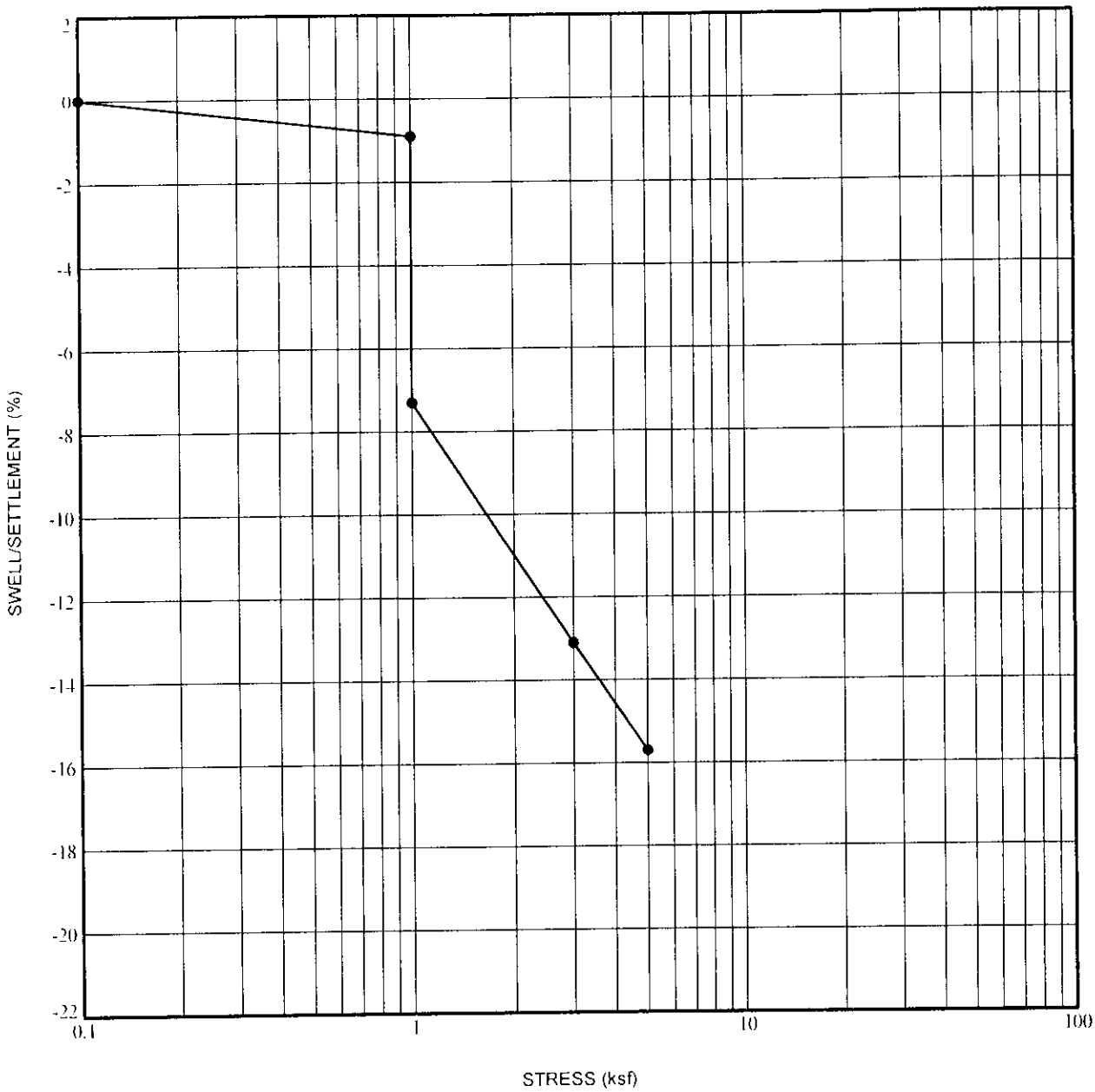

Location: TB-14

Depth: 4.0 feet

Water Added at 1,000 psf

Volume Change at Wetting = -6.4 %

Soil Type: Sandy Clay

Moisture Content = 5.3 %

Dry Unit Weight = 100.6 pcf

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SWELL/SETTLEMENT TEST

Piñon Ridge Mill
Montrose County, Colorado

Figure C-23

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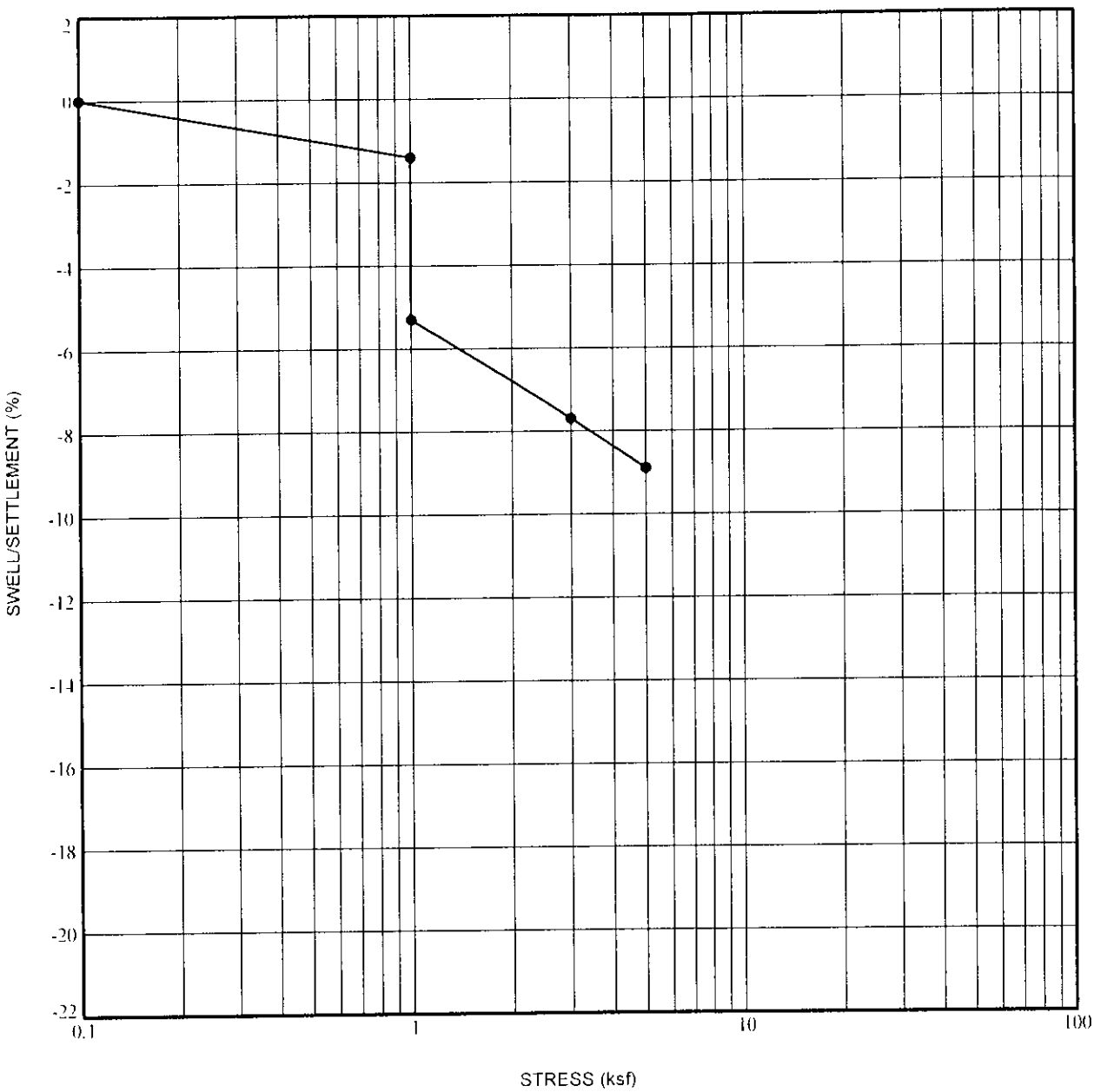

Location: TB-15

Depth: 14.0 feet

Water Added at 1,000 psf

Volume Change at Wetting = -3.9 %

Soil Type: Silty Sand

Moisture Content = 2.0 %

Dry Unit Weight = 102.4 pcf

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SWELL/SETTLEMENT TEST

Piñon Ridge Mill
Montrose County, Colorado

Figure C-24

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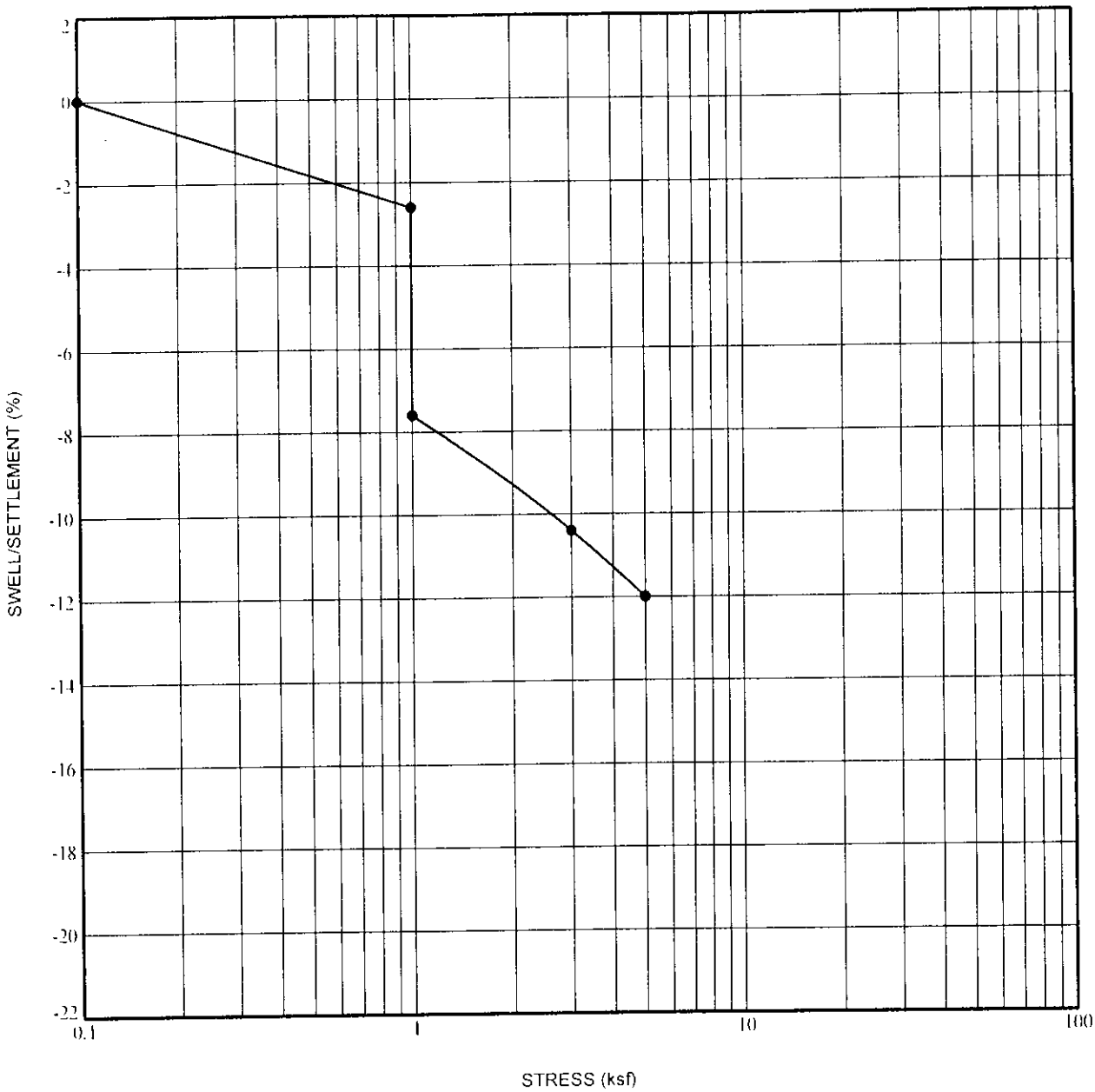

Location: TB-15

Depth: 19.0 feet

Water Added at 1,000 psf

Volume Change at Wetting = -5.0 %

Soil Type: Silty Sand

Moisture Content = 2.7 %

Dry Unit Weight = pcf

KLEINFELDER Bright People. Right Solutions		**SWELL/SETTLEMENT TEST** Piñon Ridge Mill Montrose County, Colorado	Figure C-25
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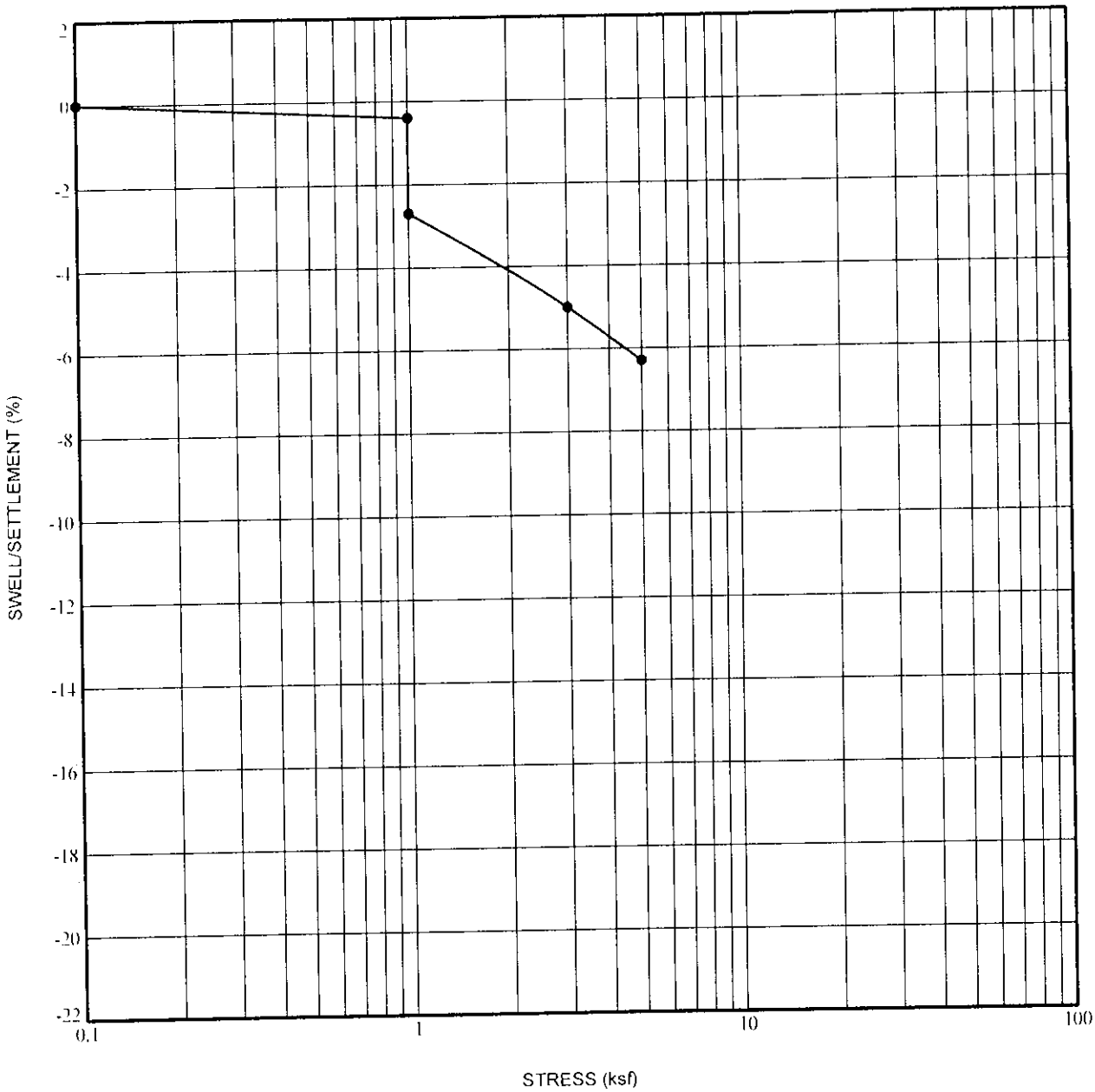

Location: TB-16

Depth: 4.0 feet

Water Added at 1,000 psf

Volume Change at Wetting = -2.3 %

Soil Type: Silty Sand

Moisture Content = 2.6 %

Dry Unit Weight = 96.7 pcf

KLEINFELDER Bright People. Right Solutions		**SWELL/SETTLEMENT TEST** Piñon Ridge Mill Montrose County, Colorado	Figure C-26
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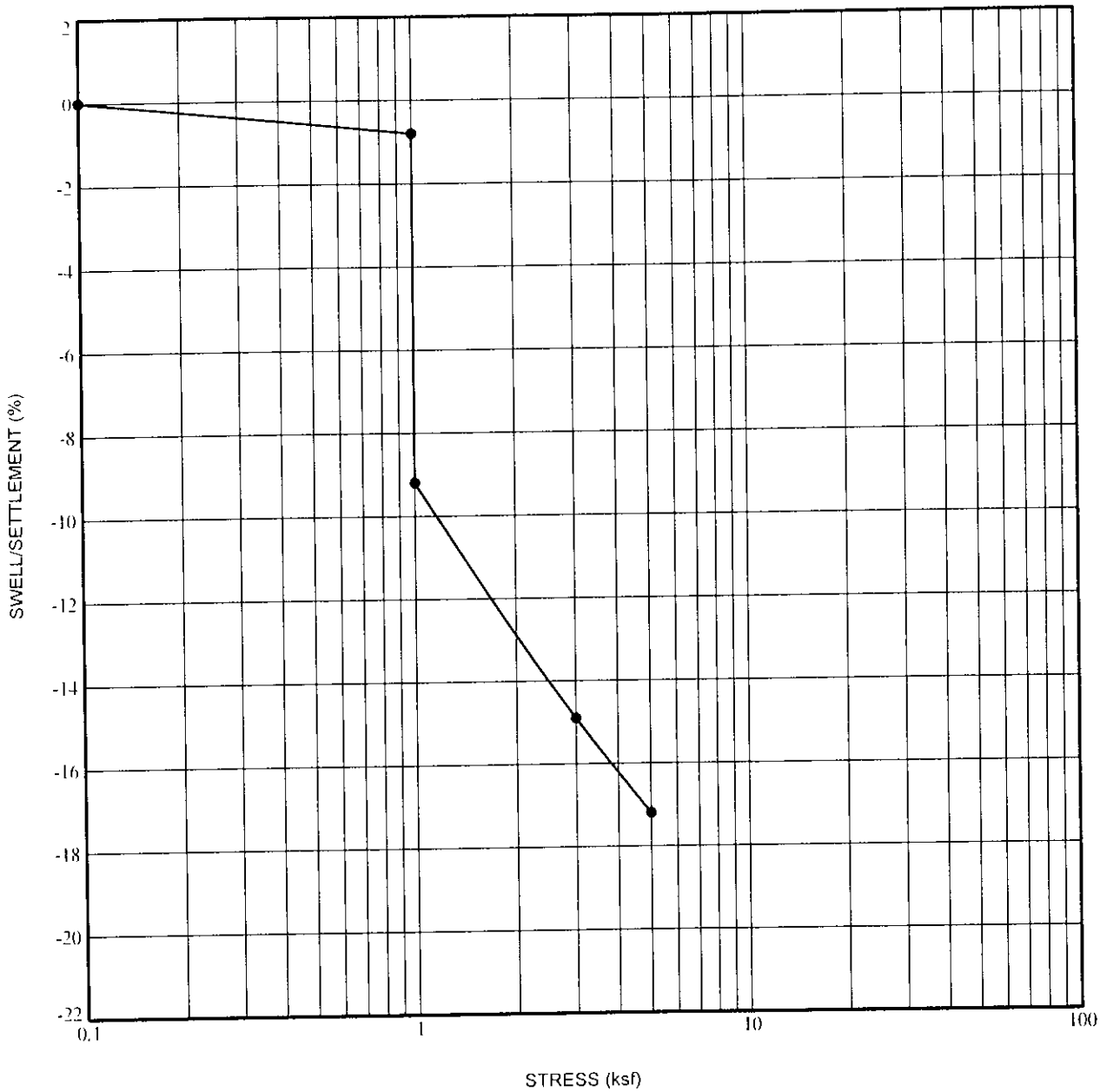

Location: TB-18

Depth: 4.0 feet

Water Added at 1,000 psf

Volume Change at Wetting = -8.4 %

Soil Type: Sandy Silt And Clay

Moisture Content = 4.9 %

Dry Unit Weight = 85.0 pcf

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SWELL/SETTLEMENT TEST

Piñon Ridge Mill
Montrose County, Colorado

Figure C-27

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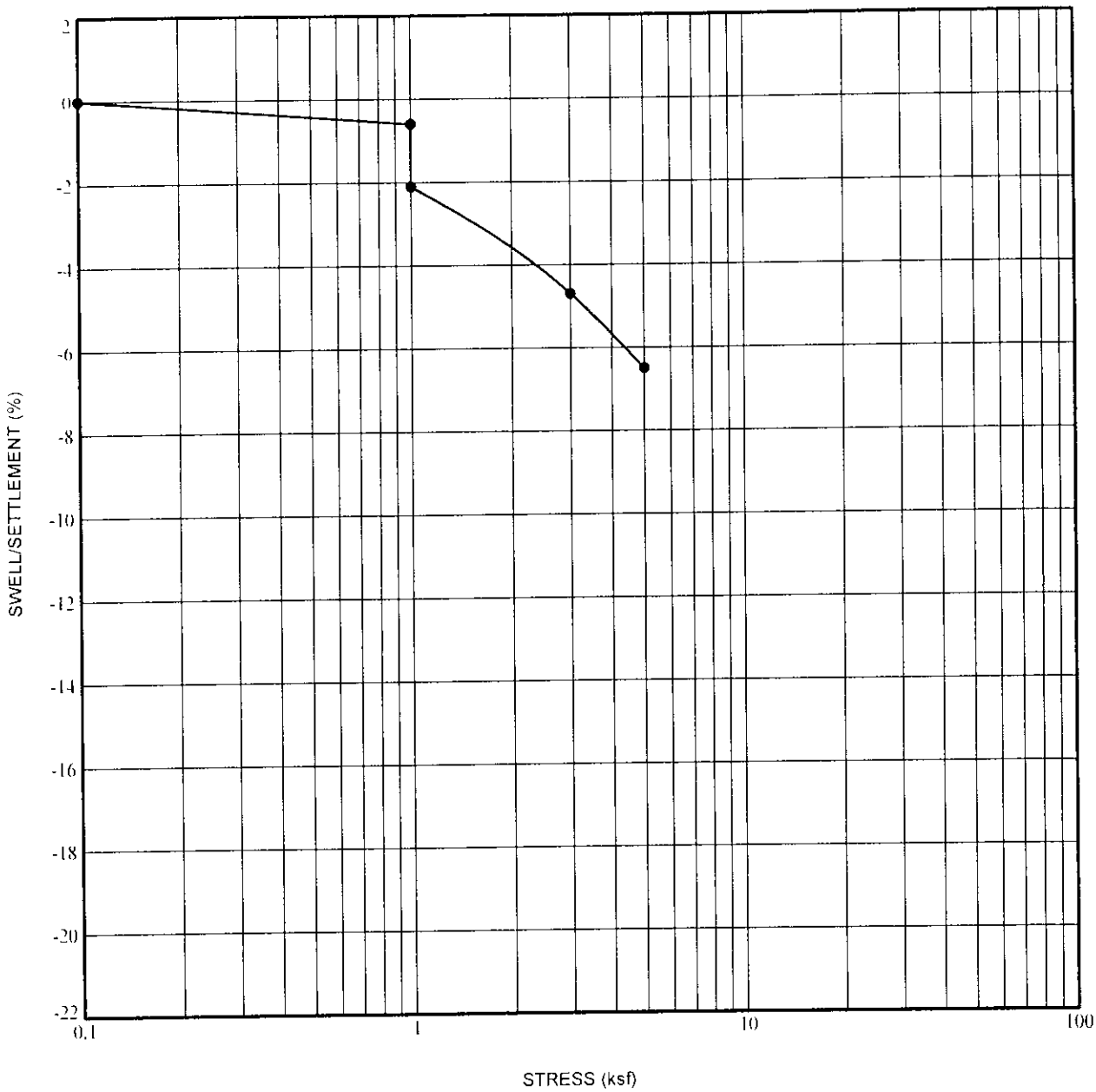

Location: TB-18

Depth: 19.0 feet

Water Added at 1,000 psf

Volume Change at Wetting = -1.5 %

Soil Type: Silty Sand

Moisture Content = 5.6 %

Dry Unit Weight = 101.9 pcf

KLEINFELDER Bright People. Right Solutions	**SWELL/SETTLEMENT TEST** Piñon Ridge Mill Montrose County, Colorado	Figure C-28
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Date: June, 2008	89241.2	

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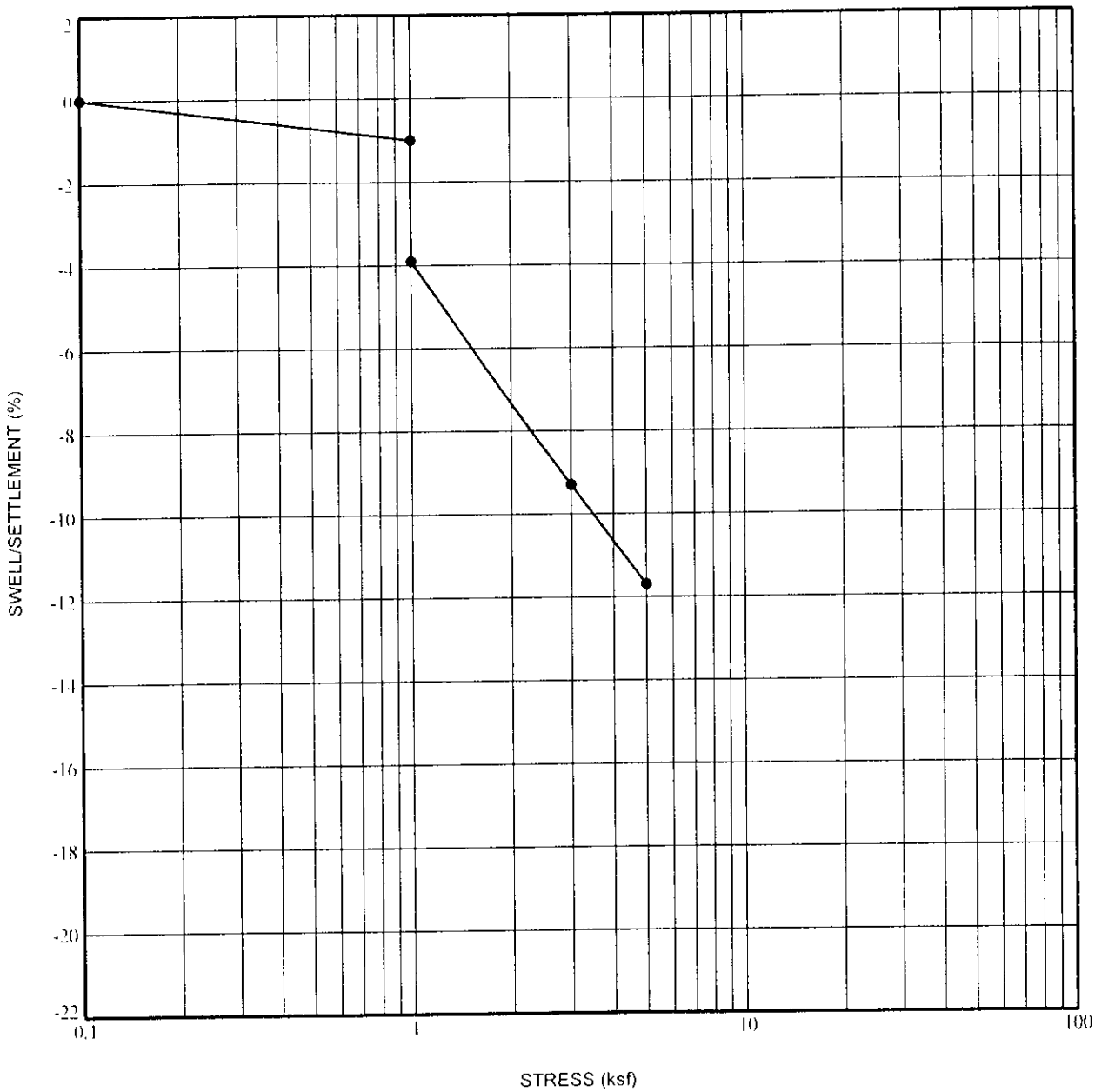

Location: TB-19

Depth: 9.0 feet

Water Added at 1,000 psf

Volume Change at Wetting = -2.9 %

Soil Type: Sandy Silt And Clay

Moisture Content = 3.1 %

Dry Unit Weight = 91.4 pcf

KLEINFELDER Bright People. Right Solutions		**SWELL/SETTLEMENT TEST** Piñon Ridge Mill Montrose County, Colorado	Figure C-29
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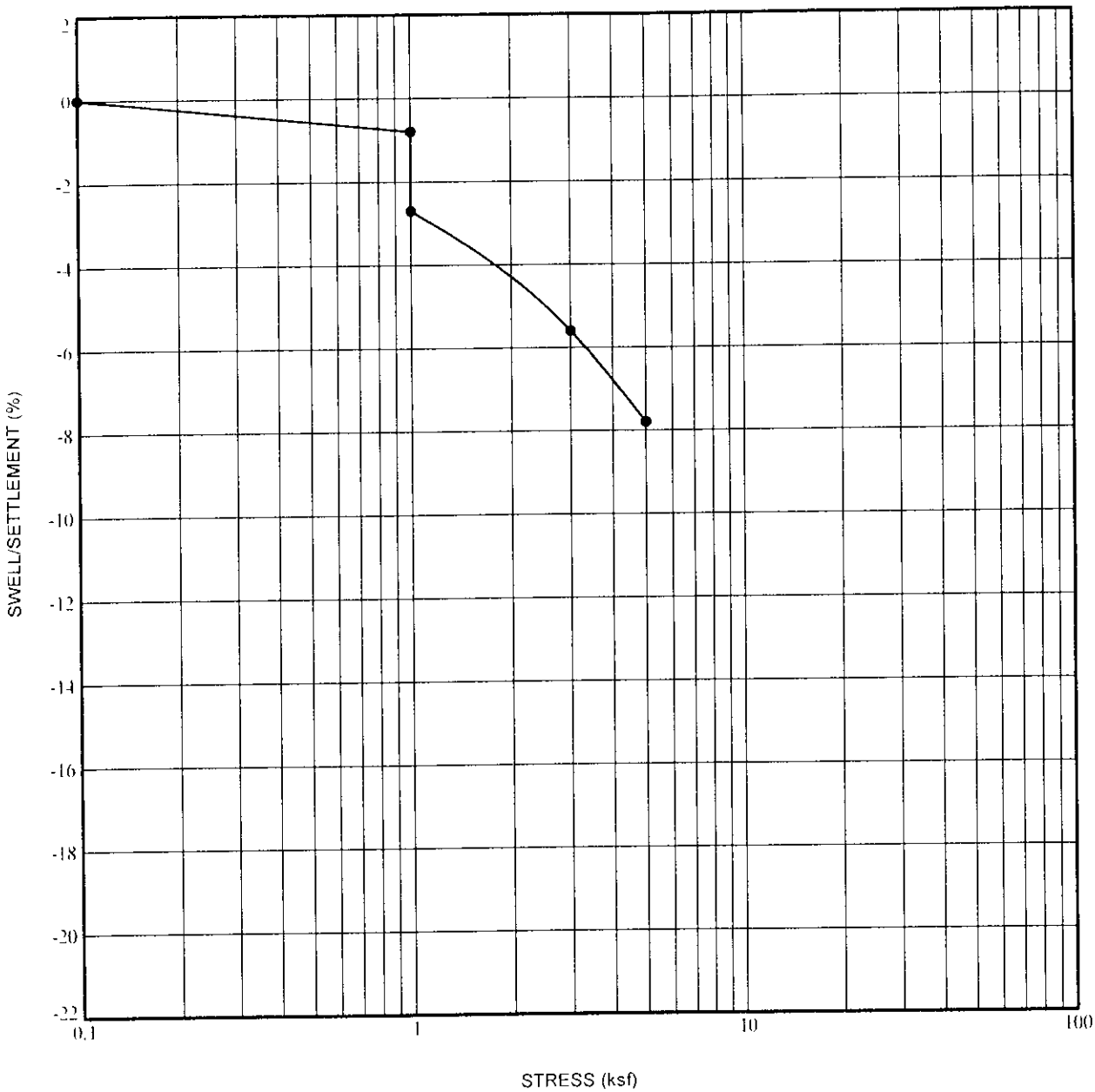

Location: TB-19

Depth: 14.0 feet

Water Added at 1,000 psf

Volume Change at Wetting = -1.9 %

Soil Type: Silty Sand

Moisture Content = 6.4 %

Dry Unit Weight = 106.0 pcf

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SWELL/SETTLEMENT TEST

Piñon Ridge Mill
Montrose County, Colorado

Figure C-30

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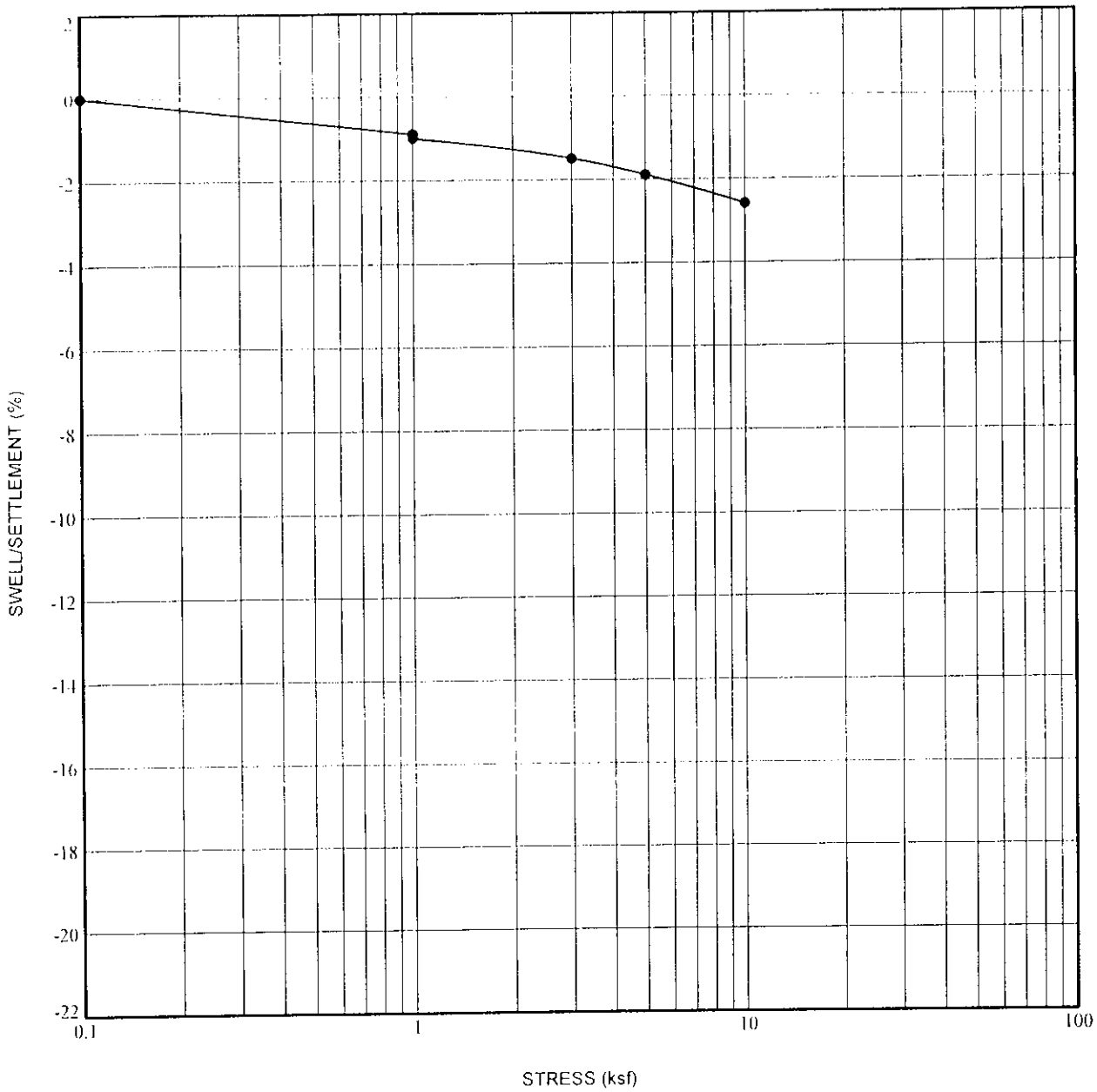

Location: TB 11-12 19-20

Depth: 0-5 feet

Water Added at 1,000 psf

Volume Change at Wetting = -0.1 %

Soil Type: Clayey Sand

Moisture Content = 9.7 %

Dry Unit Weight = 121.6 pcf

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SWELL/SETTLEMENT TEST

Piñon Ridge Mill
Montrose County, Colorado

Figure C-31

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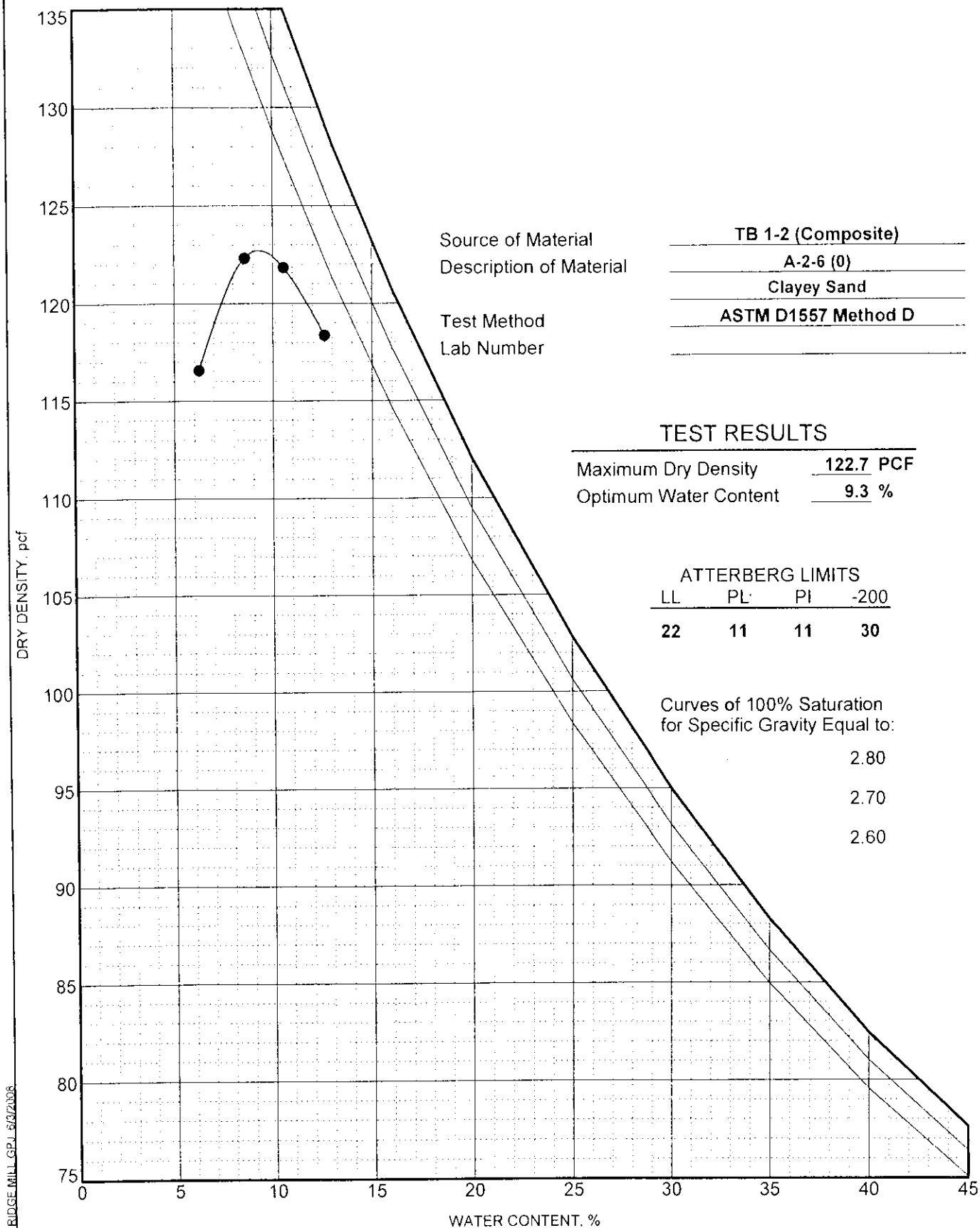

Source of Material	TB 1-2 (Composite)
Description of Material	A-2-6 (0)
	Clayey Sand
Test Method	ASTM D1557 Method D
Lab Number	

TEST RESULTS

Maximum Dry Density	122.7	PCF
Optimum Water Content	9.3	%

ATTERBERG LIMITS

LL	PL	PI	-200
22	11	11	30

Curves of 100% Saturation for Specific Gravity Equal to:

2.80

2.70

2.60

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MOISTURE-DENSITY RELATIONSHIP

Piñon Ridge Mill
Montrose County, Colorado

Figure C-32

PROCTOR 89241.1 PINON RIDGE MILL.GPJ 6/3/2008

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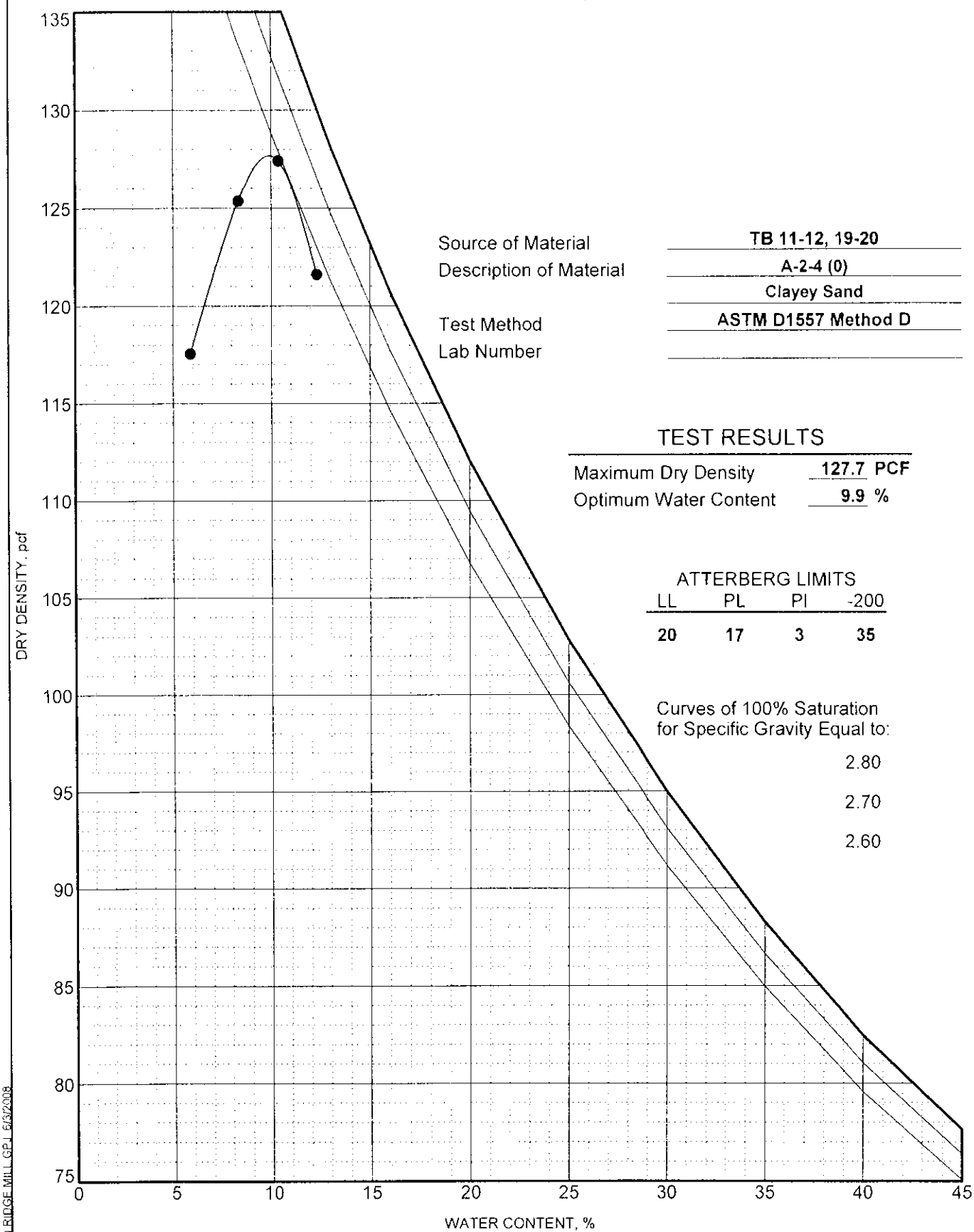

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Date: June, 2008

Project Number: 89241.2

MOISTURE-DENSITY RELATIONSHIP

Piñon Ridge Mill
Montrose County, Colorado

Figure C-33

PROCTOR 89241.1 PINON RIDGE MILL.GPJ 6/3/2008

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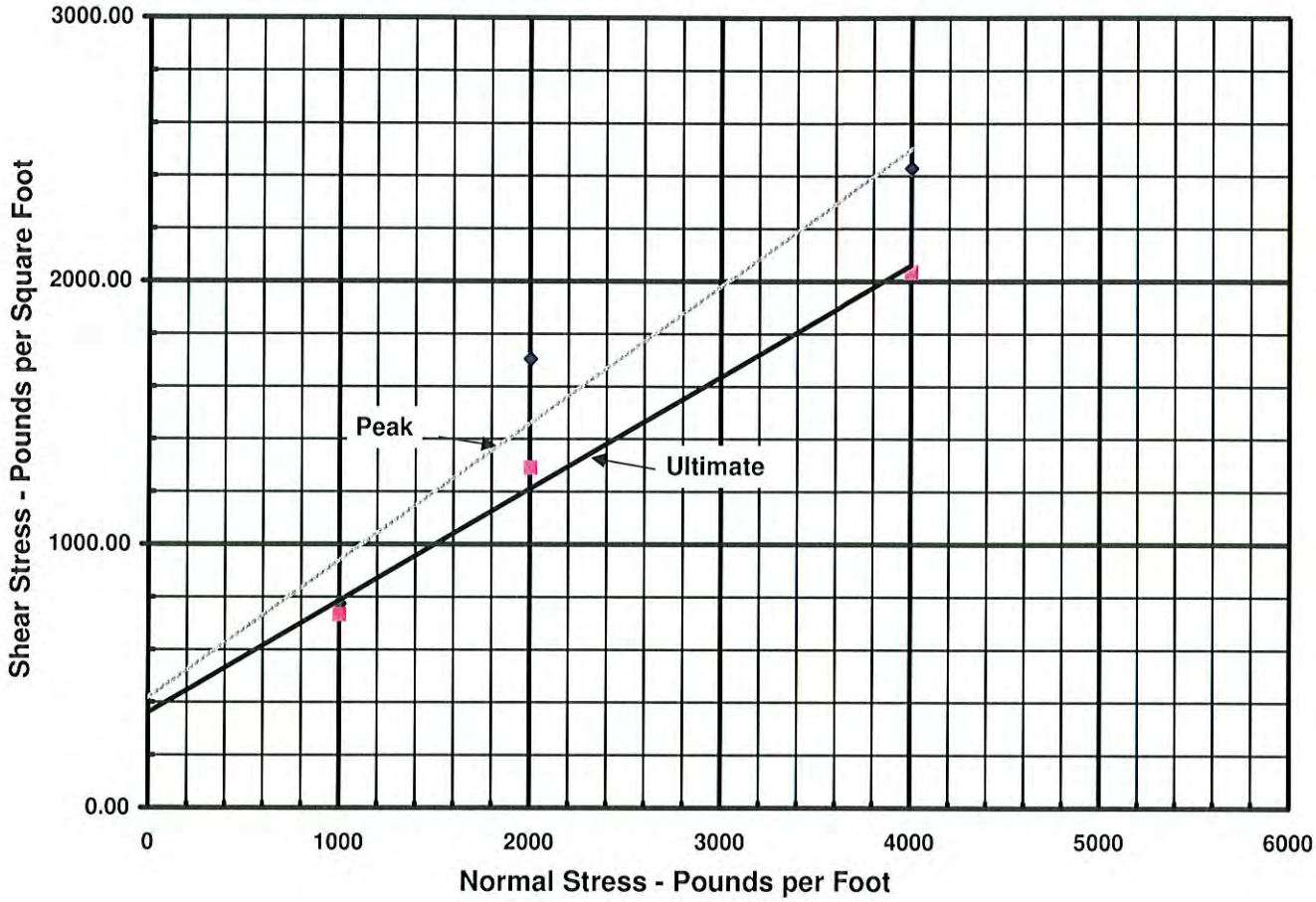
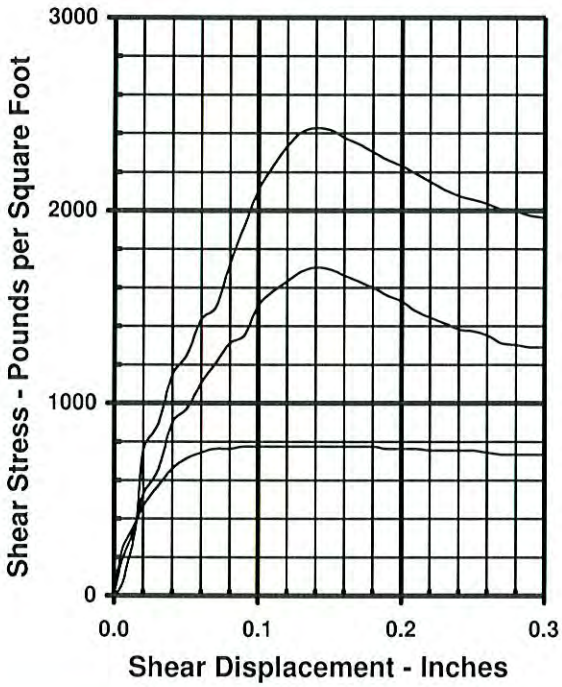




Sample **6594**
Location **TB-1+ 2 @ 0'-10'**
Soil Type **Clayey sand (SC) - Brown**

Test Method **ASTM D-3080**

Normal Stress, psf	500	1000	2000	4000
Peak Shear Stress, psf	NA	775	1705	2428
Ultimate Shear Stress, psf	NA	734	1291	2035
Displacement Rate, in/min	NA	0.010	0.010	0.010
Starting Dry Density, pcf	NA	115.4	115.4	115.4
Starting Wet Density, pcf	NA	125.8	125.8	125.8
Starting Water Content, %	NA	9.02%	9.02%	9.02%

	Peak	Ultimate
Friction Angle:	27.7	23.0
Cohesion, psf:	413	362

TESTED BY B.K. TEST DATE 12/12/07

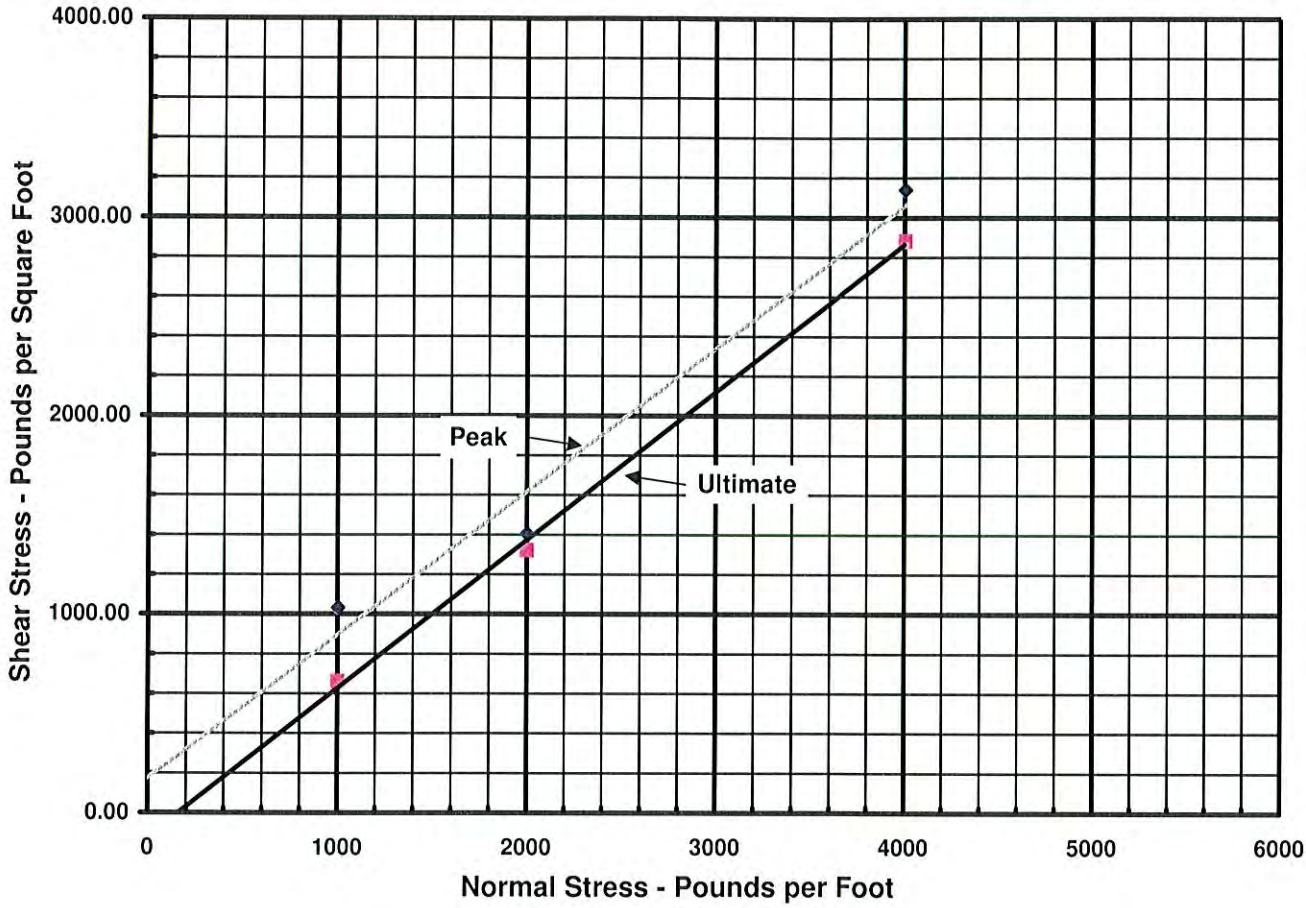
KLEINFELDER

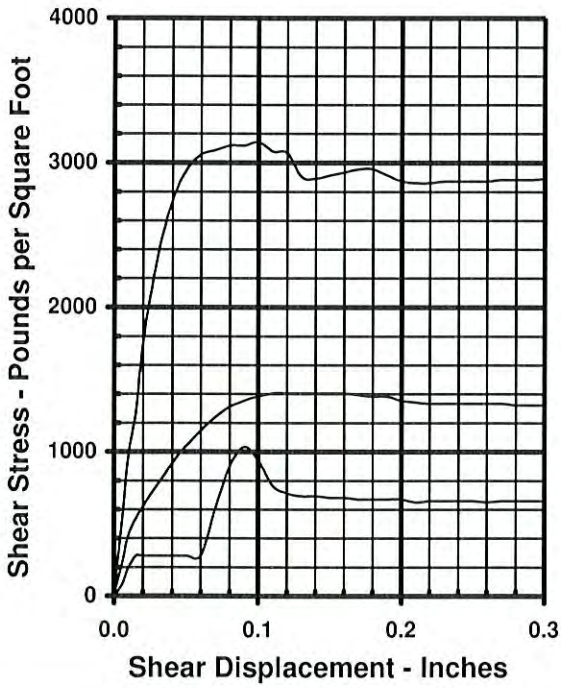
Checked By: JE	Drafted By: B.K. Garceau
Project Number: 89241.2	Date: July 31, 08

DIRECT SHEAR TEST

Pinon Ridge Mill
Montrose County, CO

Figure
C-34





Sample **6594**
Location **TB-11, 12, 19, 20 @ 0'-5'**
Soil Type **Clayey sand (SC)**

Test Method **ASTM D-3080**

Normal Stress, psf	500	1000	2000	4000
Peak Shear Stress, psf	NA	1033	1405	3141
Ultimate Shear Stress, psf	NA	661	1322	2882
Displacement Rate, in/min	NA	0.010	0.010	0.010
Starting Dry Density, pcf	NA	120.2	120.2	120.2
Starting Wet Density, pcf	NA	131.4	131.4	131.4
Starting Water Content, %	NA	9.31%	9.31%	9.31%

	Peak	Ultimate
Friction Angle:	37.0	36.7
Cohesion, psf:	80	0

TESTED BY BK TEST DATE 12/11/07

KLEINFELDER

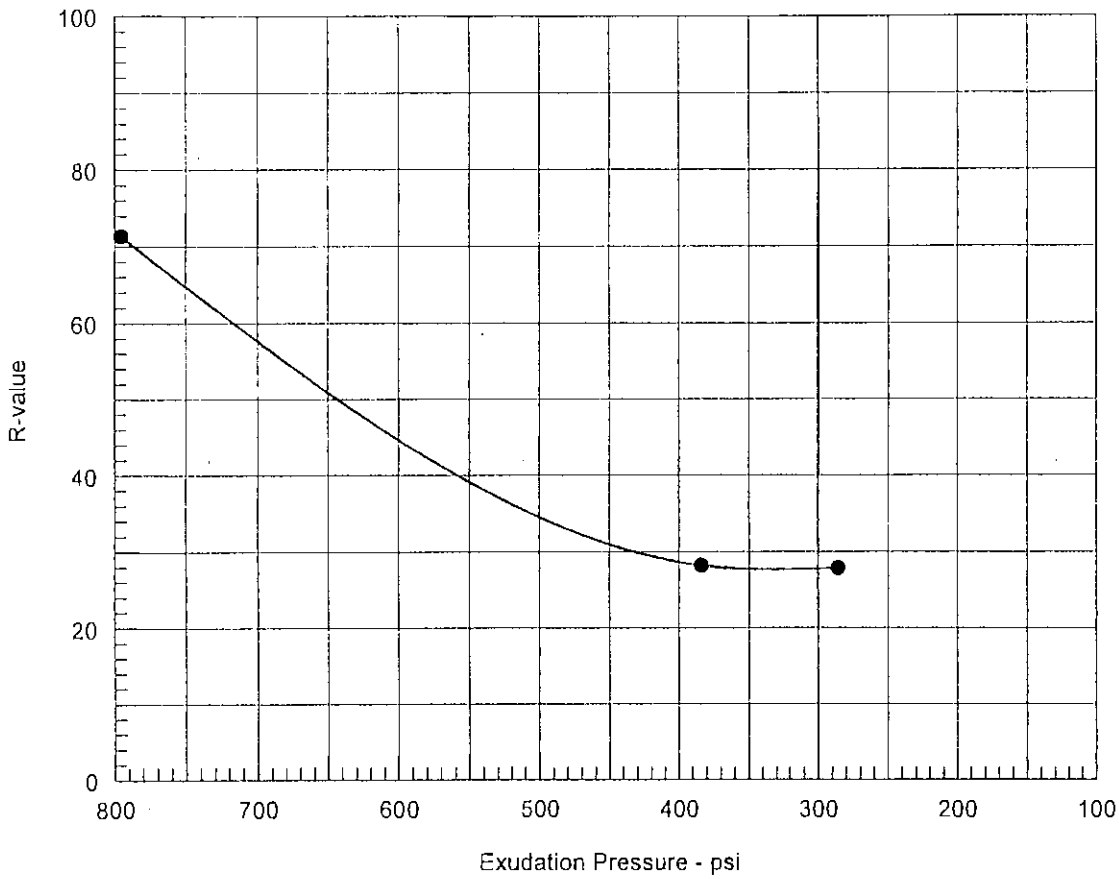
Checked By: JE	Drafted By: B.K. Garceau
Project Number: 89241.2	Date: July 31, 08

DIRECT SHEAR TEST

Pinon Ridge Mill
Montrose County, CO

Figure
C-35

R-VALUE TEST REPORT



Resistance R-Value and Expansion Pressure - Cal Test 301

No.	Compact. Pressure psi	Density pcf	Moist. %	Expansion Pressure psi	Horizontal Press. psi @ 160 psi	Sample Height in.	Exud. Pressure psi	R Value	R Value Corr.
1	300	125.7	8.9	0.00	29	2.50	796	71	71
2	260	128.7	10.1	0.00	93	2.52	384	28	28
3	250	123.6	10.9	0.00	95	2.56	286	27	28

Test Results	Material Description
R-value at 300 psi exudation pressure = 28	Silty sand - Brown

Project No.: 89241.2
Project: Pinon Ridge Mill
Location: PB-1 @ 0'-10'
Sample Number: 6594 **Depth:** 0'-10'
Date: 4/11/08

Tested by: BK
Checked by: JE
Remarks:

R-VALUE TEST REPORT

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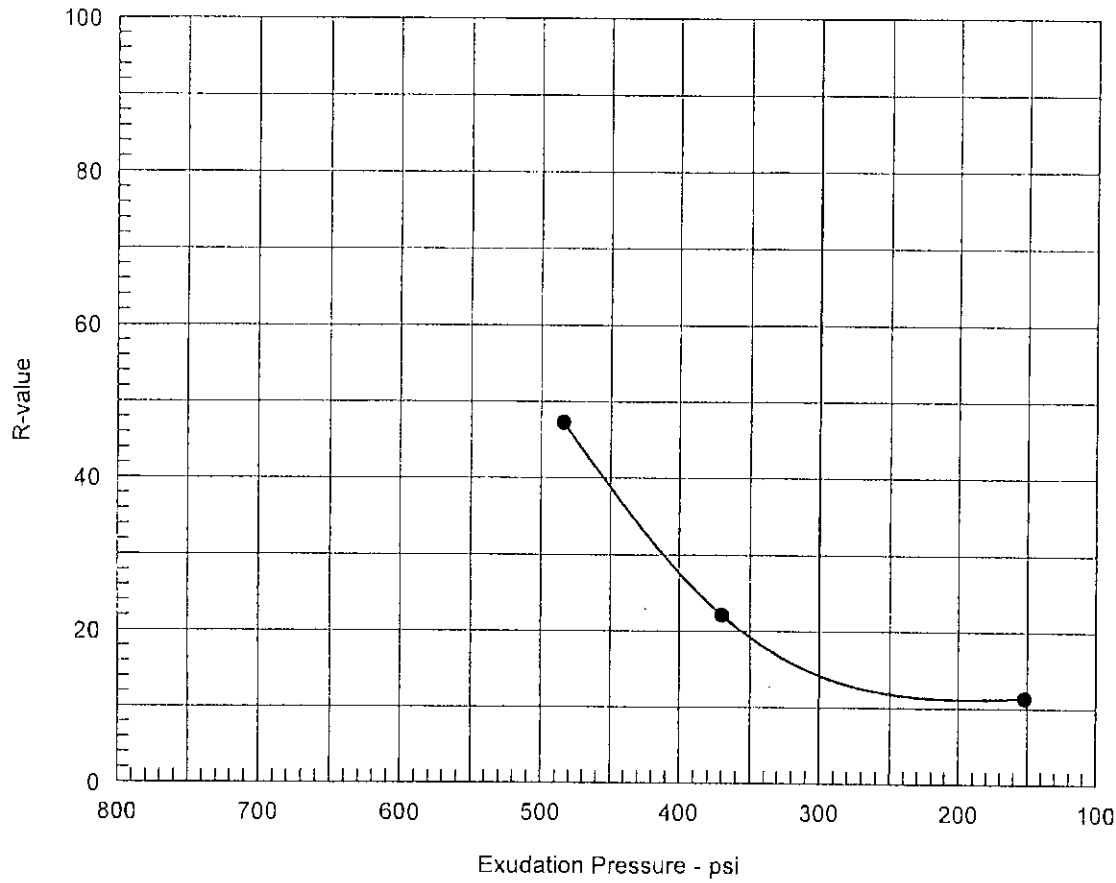
R-VALUE TEST REPORT



Resistance R-Value and Expansion Pressure - Cal Test 301

No.	Compact. Pressure psi	Density pcf	Moist. %	Expansion Pressure psi	Horizontal Press. psi @ 160 psi	Sample Height in.	Exud. Pressure psi	R Value	R Value Corr.
1	300	125.0	9.8	0.00	62	2.47	484	47	47
2	280	126.1	10.8	0.00	105	2.50	370	22	22
3	110	119.0	12.9	0.00	128	2.56	152	11	11

Test Results	Material Description
R-value at 300 psi exudation pressure = 14	Sandy lean clay - Brown

Project No.: 89241.2
Project: Pinon Ridge Mill
Location: PB-5 @ 0'-10'
Sample Number: 6594 **Depth:** 0'-10'
Date: 4/11/08

Tested by: BK
Checked by: JE
Remarks:

R-VALUE TEST REPORT

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