APPENDIX B

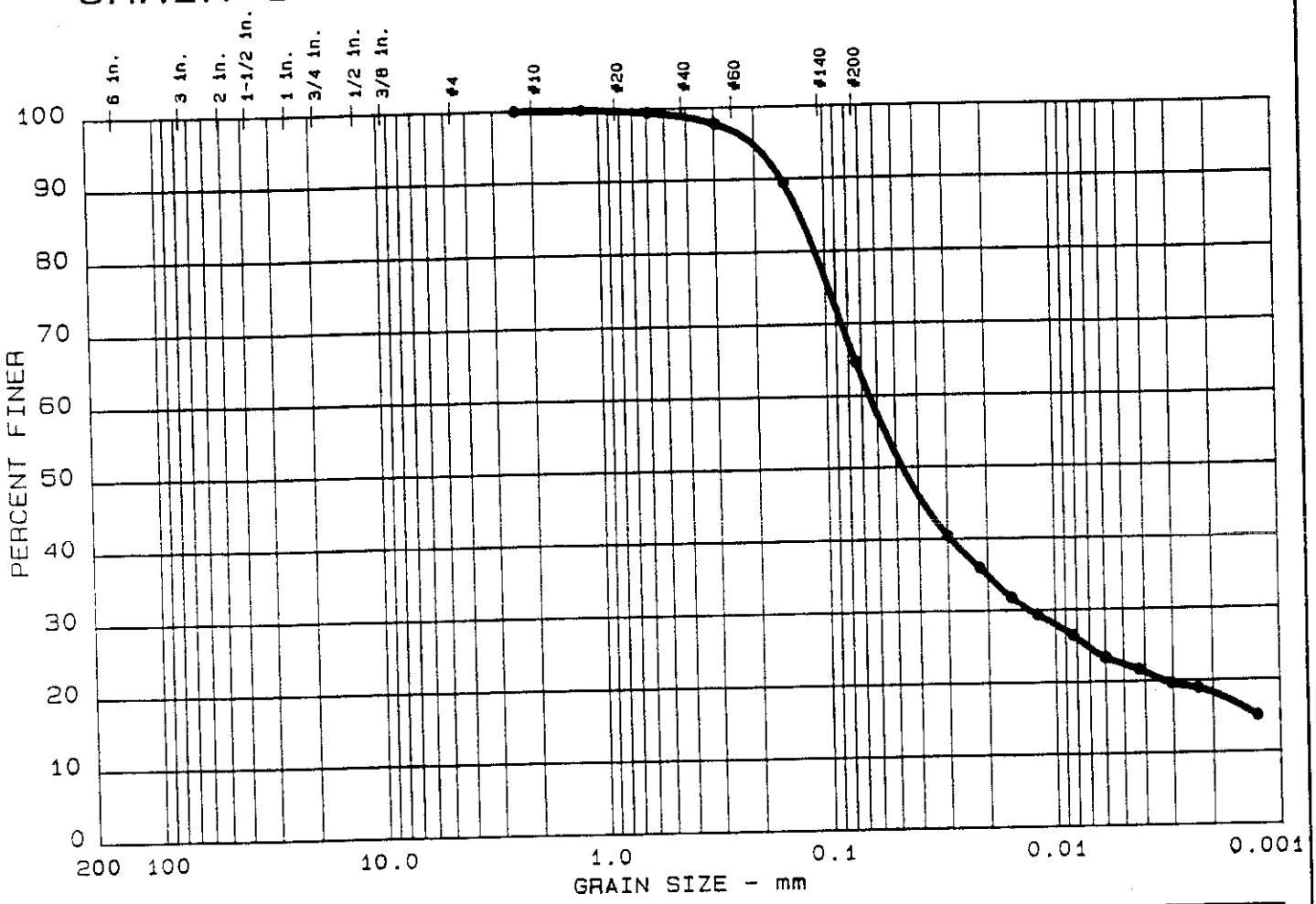
RESUSLTS OF LABORATORY SOILS INDEX TESTING

APPENDIX D

GEI 1993 Laboratory Tests

3. Grain Size Distributions

GRAIN SIZE DISTRIBUTION TEST REPORT



	% +3"	% GRAVEL	% SAND	% FINES
●	0.0	0.0	35.4	64.6

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●	27	2	0.13		0.05	0.013				

MATERIAL DESCRIPTION	USCS	AASHTO
● Sandy silt	ML	

Project No.: 93177
Project: Clemson Dam
● Location: Sample UF-3 Depth 30.4 ft.

Date: September 2, 1993

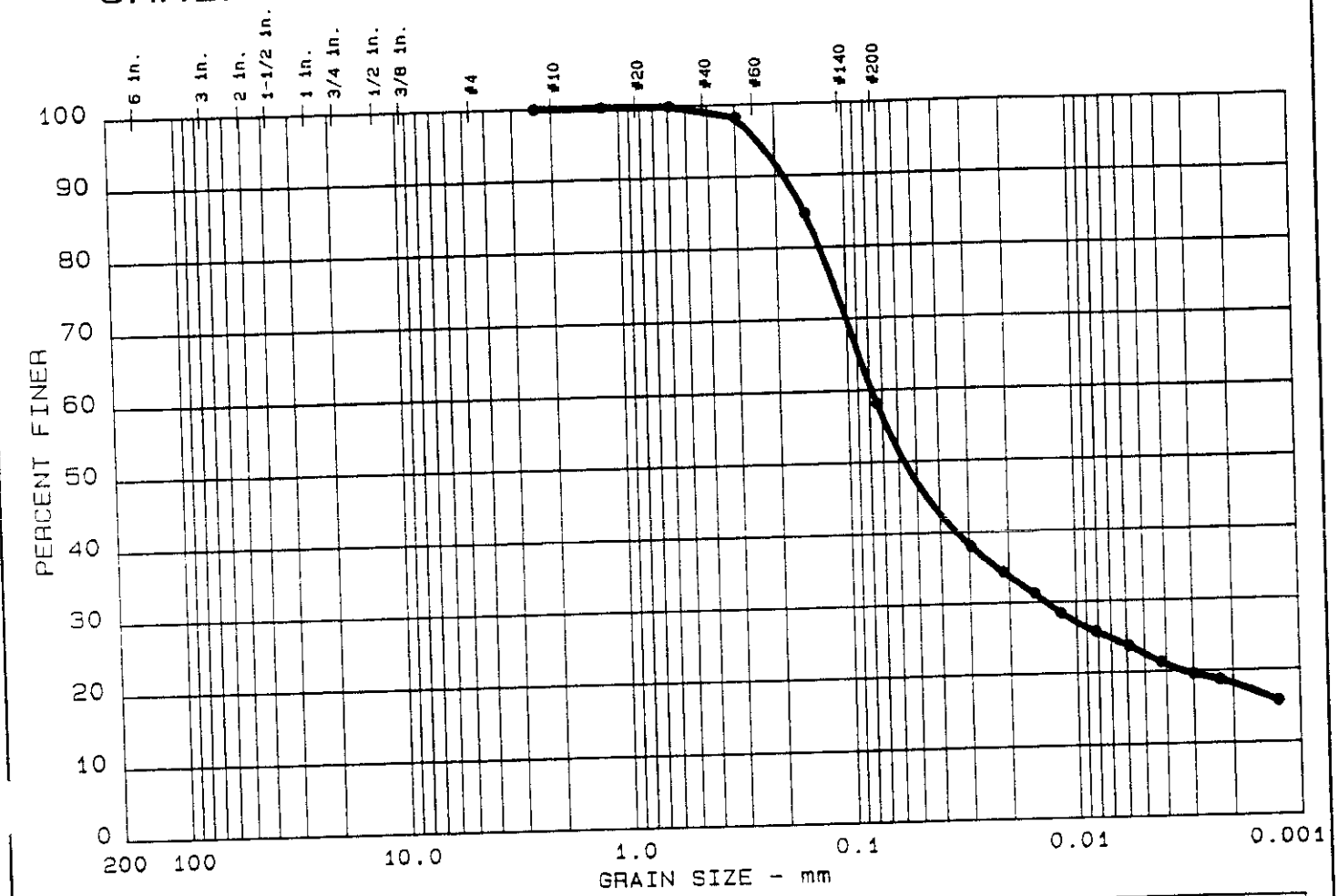
Remarks:
Boring CLD-514

GRAIN SIZE DISTRIBUTION TEST REPORT

GEI CONSULTANTS, INC., WINCHESTER, MA

Figure No. _____

GRAIN SIZE DISTRIBUTION TEST REPORT



	% +3"	% GRAVEL	% SAND	% FINES
●	0.0	0.0	42.0	58.0

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●	27	3	0.15	0.08	0.06	0.014				

MATERIAL DESCRIPTION	USCS	AASHTO
● Sandy silt	ML	

Project No.: 93177
Project: Clemson Dam
● Location: Sample UF-2 Depth 16.3 ft.

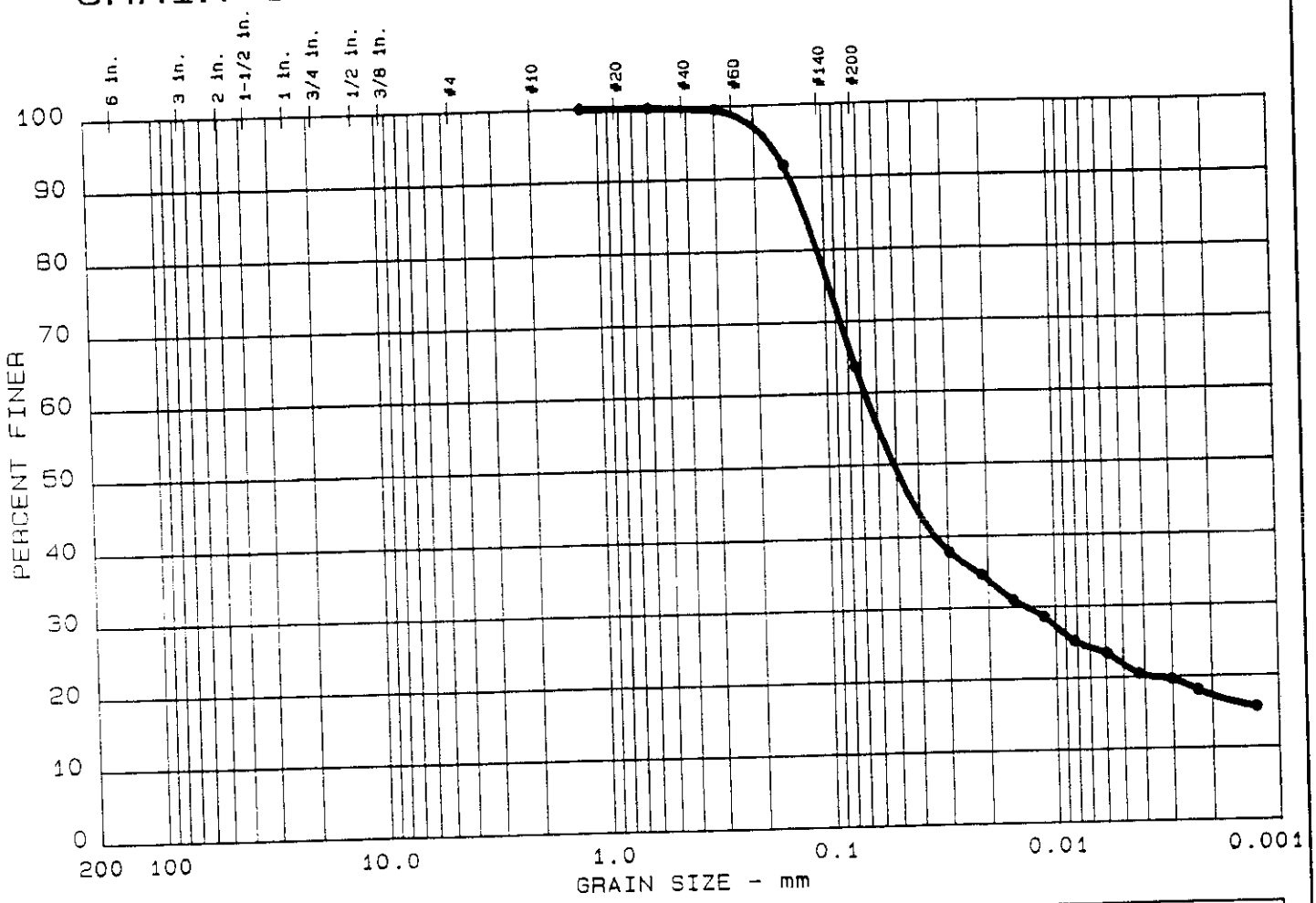
Date: September 2, 1993

Remarks:
Boring CLD-515

GRAIN SIZE DISTRIBUTION TEST REPORT
GEI CONSULTANTS, INC., WINCHESTER, MA

Figure No. _____

GRAIN SIZE DISTRIBUTION TEST REPORT



	% +3"	% GRAVEL	% SAND	% FINES
●	0.0	0.0	36.5	63.5

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●	30	2	0.12		0.05	0.014				

MATERIAL DESCRIPTION	USCS	AASHTO
● Sandy silt	ML	

Project No.: 93177
Project: Clemson Dam
● Location: Sample UF-3 Depth 32.5 ft.

Date: September 2, 1993

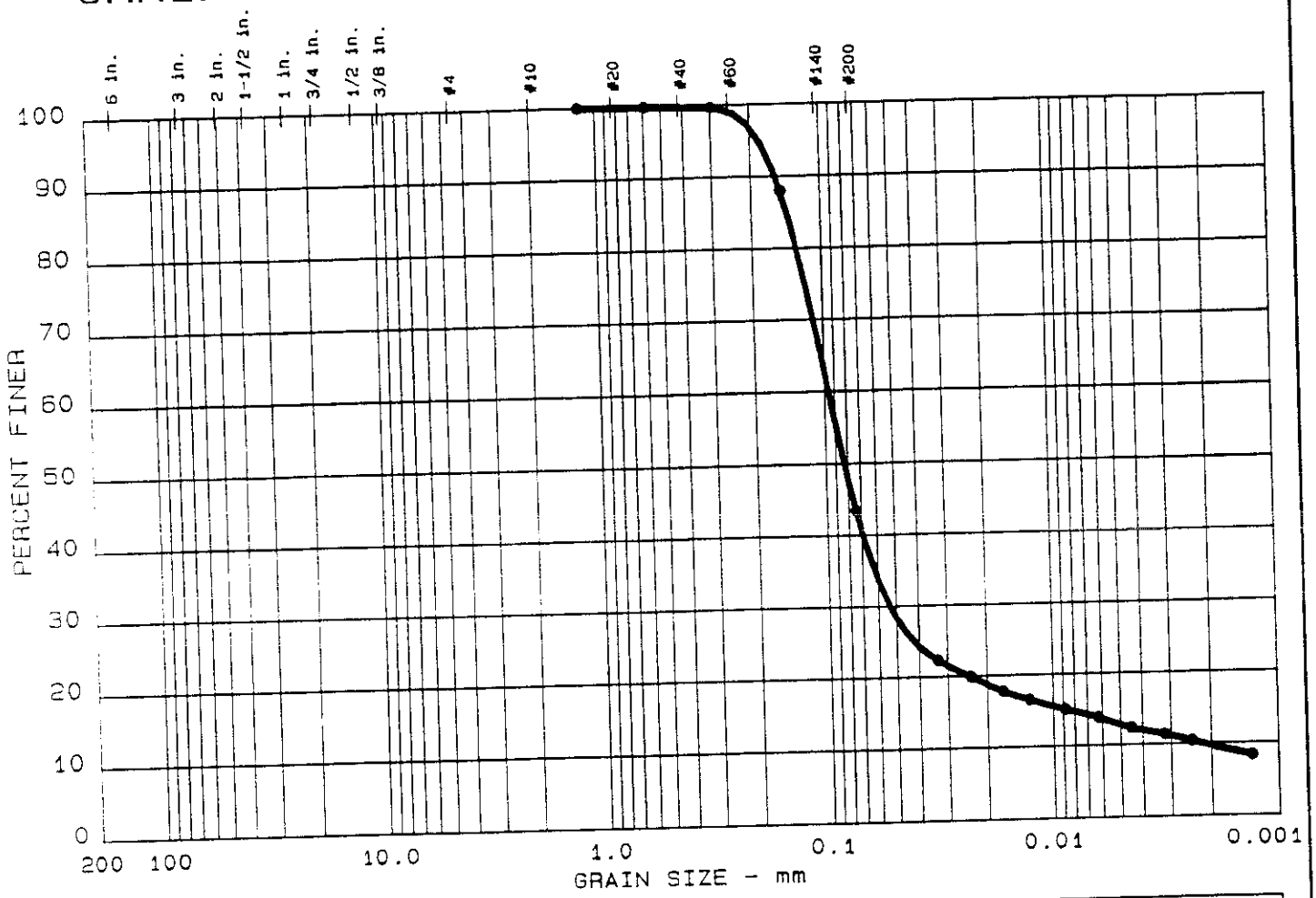
Remarks:
Boring CLD-518

GRAIN SIZE DISTRIBUTION TEST REPORT

GEI CONSULTANTS, INC., WINCHESTER, MA

Figure No. _____

GRAIN SIZE DISTRIBUTION TEST REPORT



	% +3"	% GRAVEL	% SAND	% FINES
●	0.0	0.0	56.7	43.3

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●	28	1	0.14	0.10	0.08	0.053	0.0086	0.0021	13.80	44.7

MATERIAL DESCRIPTION	USCS	AASHTO
● Silty sand	SM	

Project No.: 93177
Project: Clemson Dam
● Location: Sample UF-2 Depth 13.2 ft.

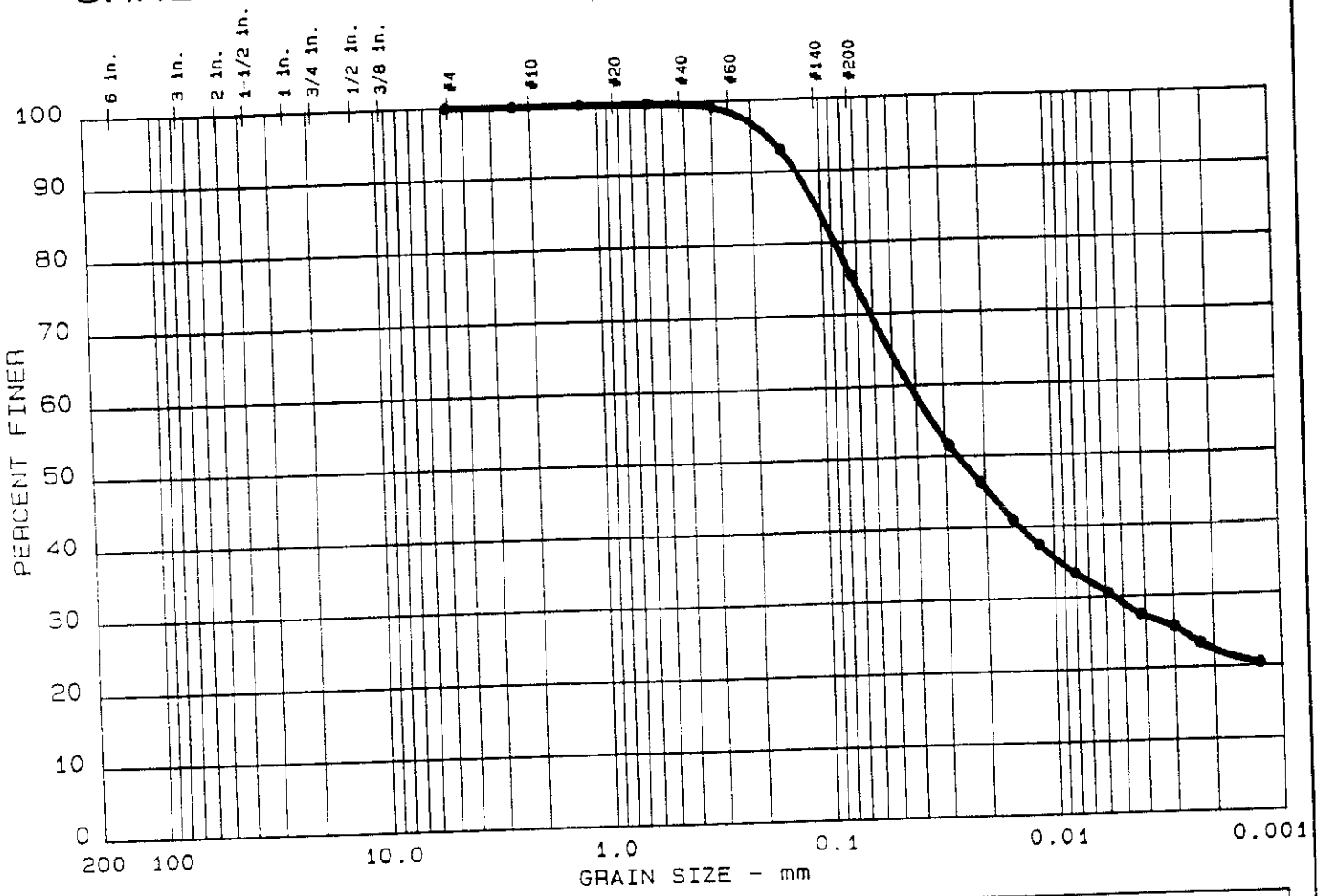
Date: September 2, 1993

Remarks:
Boring CLD-521

GRAIN SIZE DISTRIBUTION TEST REPORT
GEI CONSULTANTS, INC., WINCHESTER, MA

Figure No. _____

GRAIN SIZE DISTRIBUTION TEST REPORT



	% +3"	% GRAVEL	% SAND	% FINES
●	0.0	0.0	24.8	75.2

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●	34	6	0.10		0.03	0.006				

MATERIAL DESCRIPTION	USCS	AASHTO
● Sandy silt	ML	

Project No.: 93177
Project: Clemson Dam
● Location: Sample UF-2 Depth 69.6 ft.

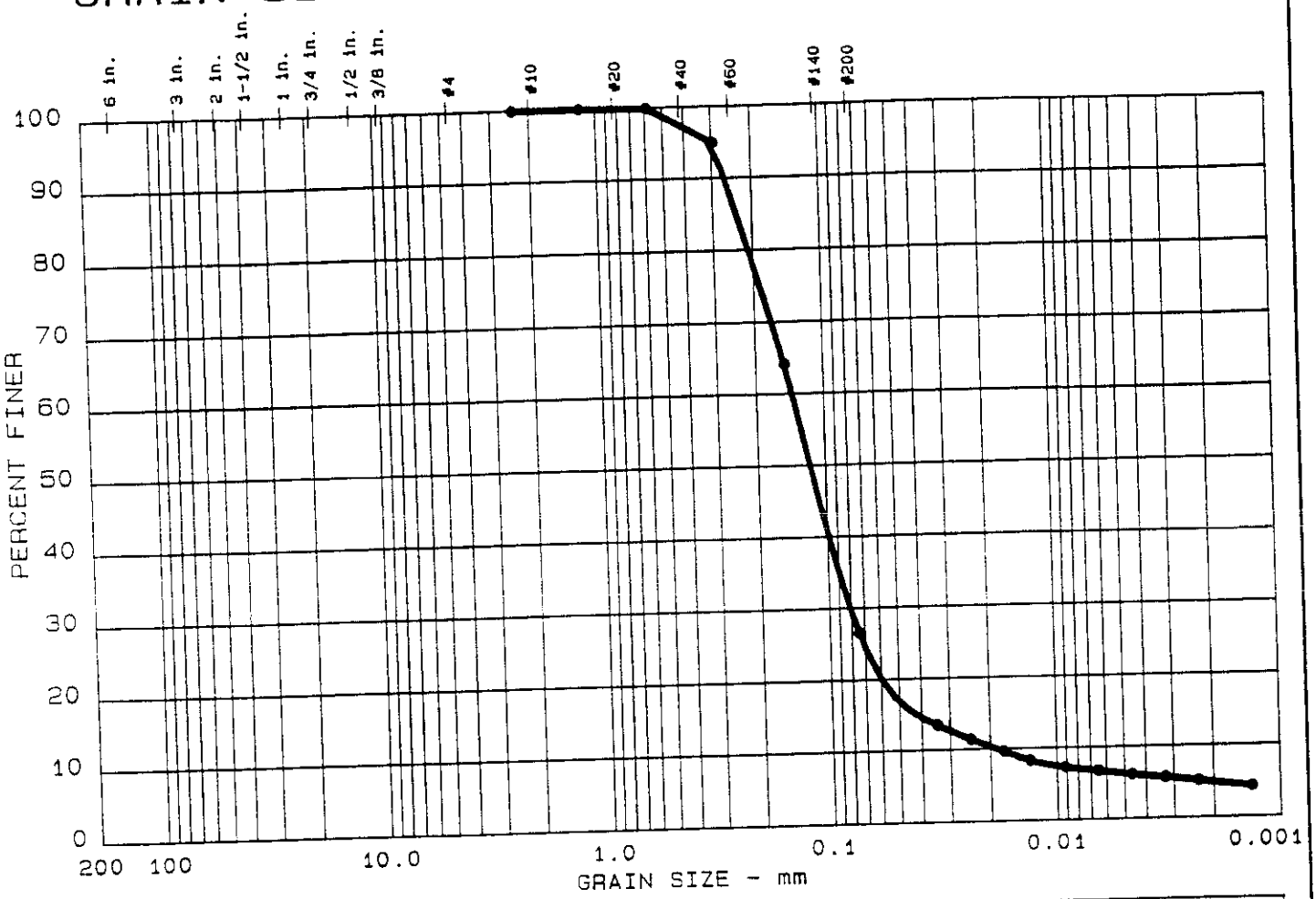
Date: September 2, 1993

Remarks:
Boring CLD-524

GRAIN SIZE DISTRIBUTION TEST REPORT
GEI CONSULTANTS, INC., WINCHESTER, MA

Figure No. _____

GRAIN SIZE DISTRIBUTION TEST REPORT



	% +3"	% GRAVEL	% SAND	% FINES
●	0.0	0.0	73.6	26.4

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●			0.24	0.14	0.12	0.080	0.0413	0.0186	2.49	7.5

MATERIAL DESCRIPTION	USCS	AASHTO
● Silty sand	SM	

Project No.: 93177
Project: Clemson Seismic Evaluation
● Location: Sample UF-3

Remarks:
Boring CUD-533

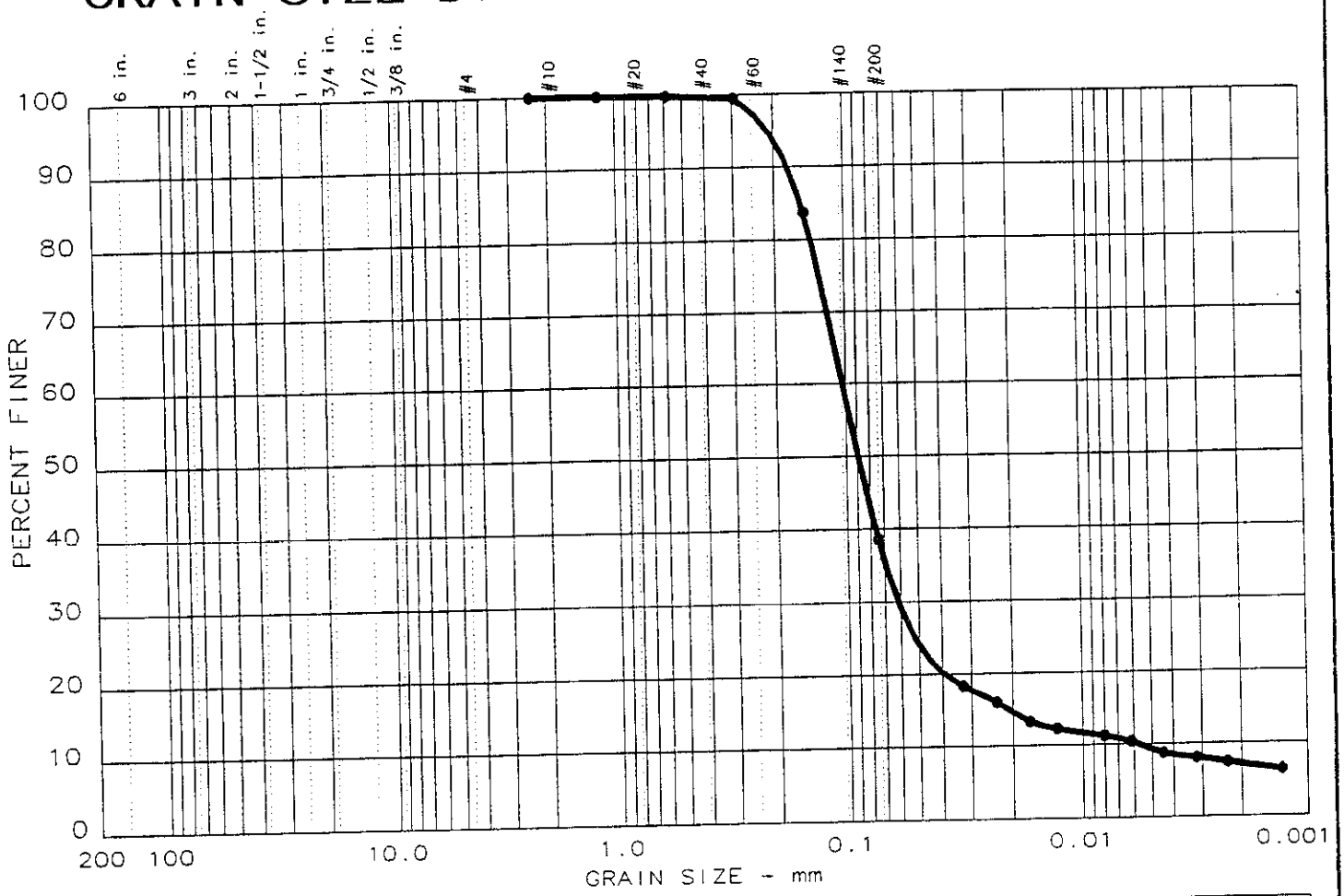
Date: July 22, 1993

GRAIN SIZE DISTRIBUTION TEST REPORT

GEI CONSULTANTS, INC., WINCHESTER, MA

Figure No. _____

GRAIN SIZE DISTRIBUTION TEST REPORT



	Test	% +3"	% GRAVEL	% SAND	% FINES
●	2	0.0	0.0	60.8	39.2

	LL	PI	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
●	26	2	0.15	0.10	0.09	0.061	0.0207	0.0056	6.42	18.3

MATERIAL DESCRIPTION	USCS	AASHTO
● Silty sand	SM	

Project No.: 93177
Project: Clemson Dam
● Location: Batch Mix

Date: October 29, 1993

Remarks:

GRAIN SIZE DISTRIBUTION TEST REPORT

GEI CONSULTANTS, INC., WINCHESTER, MA

Figure No. _____

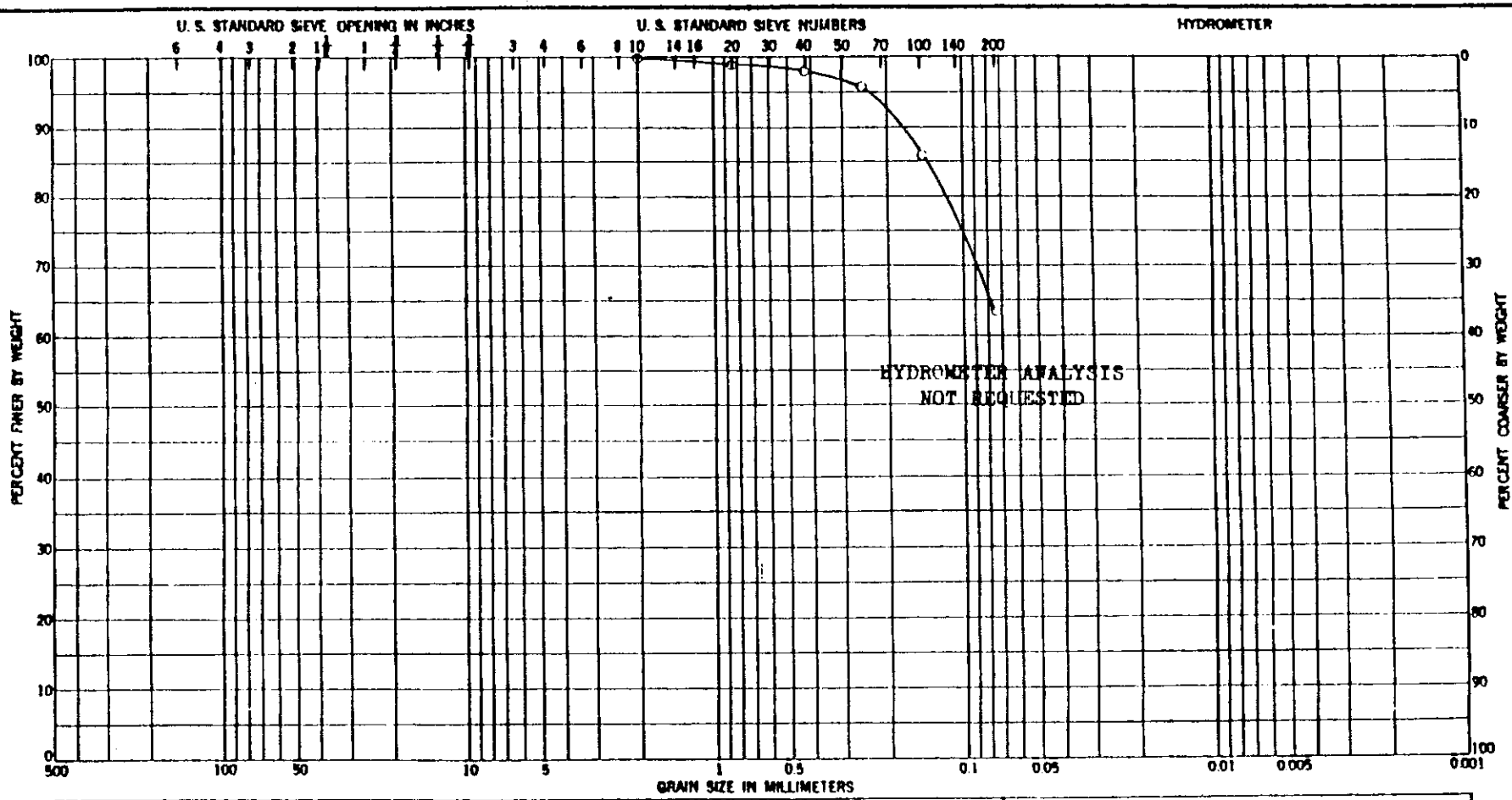
B1 – Index Testing

B1.1 – Prior Grain Size Distribution Analyses and Atterberg Limits Tests

Reference:
(USACE, 1982)
(USACE, 1981)

DEPARTMENT OF THE ARMY, SOUTH ATLANTIC DIVISION LABORATORY
CORPS OF ENGINEERS, 611 SOUTH COBB DRIVE, MARIETTA, GA. 30061

WORK ORDER NO. 2570
Req. No. EN-FS-81-63, Ch 5



Sample No.	Elev or Depth	Classification	Nat w %	LL	PL	PI
6	34.5-36.0'	Brown sandy inorganic silt, low LL (ML) with a trace of mica	40.7	36	31	5

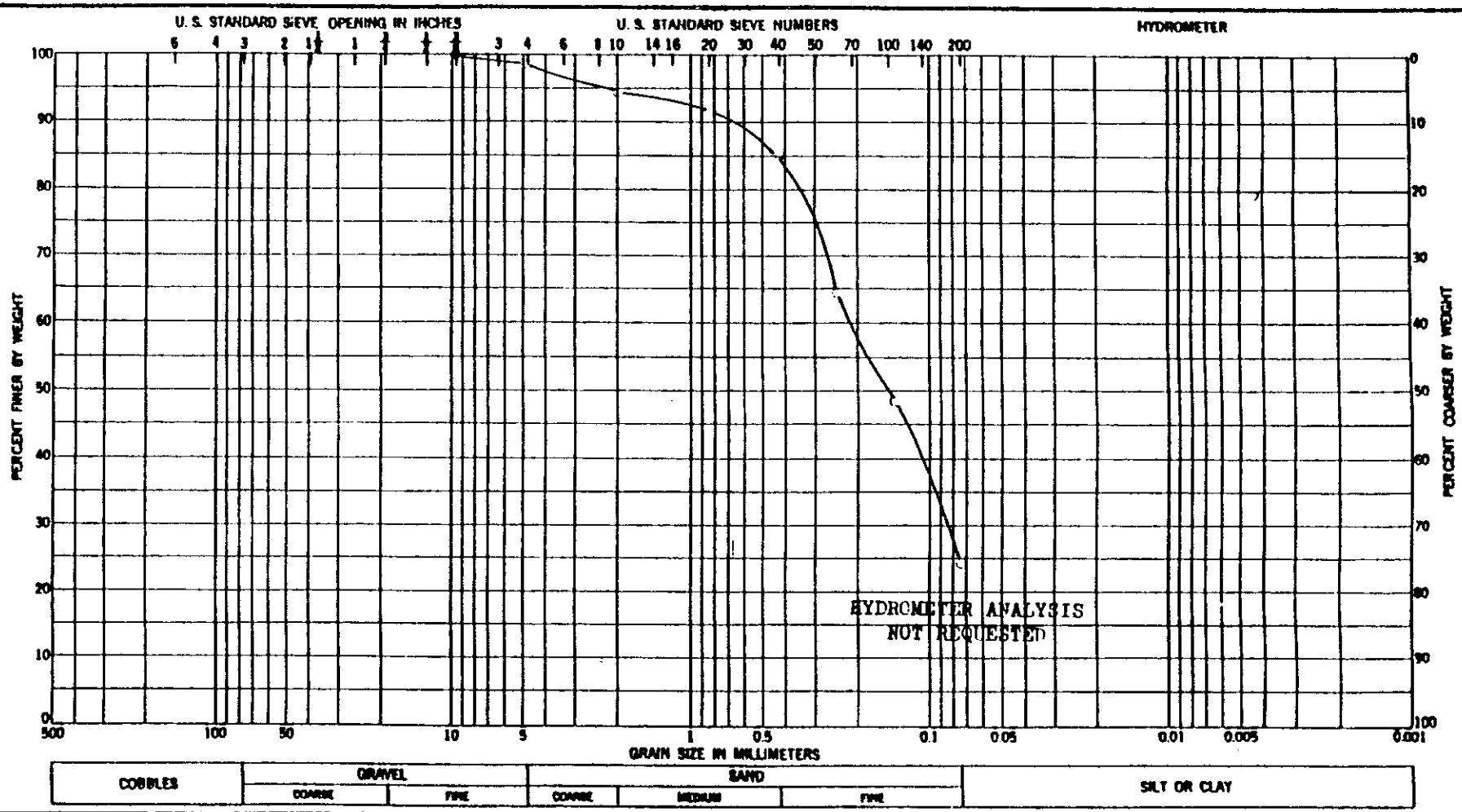
Project: Upper Dam, Hartwell Lake
Clemson, S.C.
Lab No. 146/4919
Area: -
Boring No.: MW-9, Sample No. 6
Date: 21 July 1981

GRADATION CURVES

ENG FORM 1 MAY 69 2087

DEPARTMENT OF THE ARMY, SOUTH ATLANTIC DIVISION LABORATORY
CORPS OF ENGINEERS, 611 SOUTH COBB DRIVE, MARIETTA, GA. 30061

WORK ORDER NO. 2570
Req. No. EN-FS-81-63, Ch 5



Sample No.	Elev or Depth	Visual Classification	Nat w %	LL	PL	PI
10	48.0-49.5'	Tan silty sand (SM) with a trace of gravel	18.4	NP	NP	NP

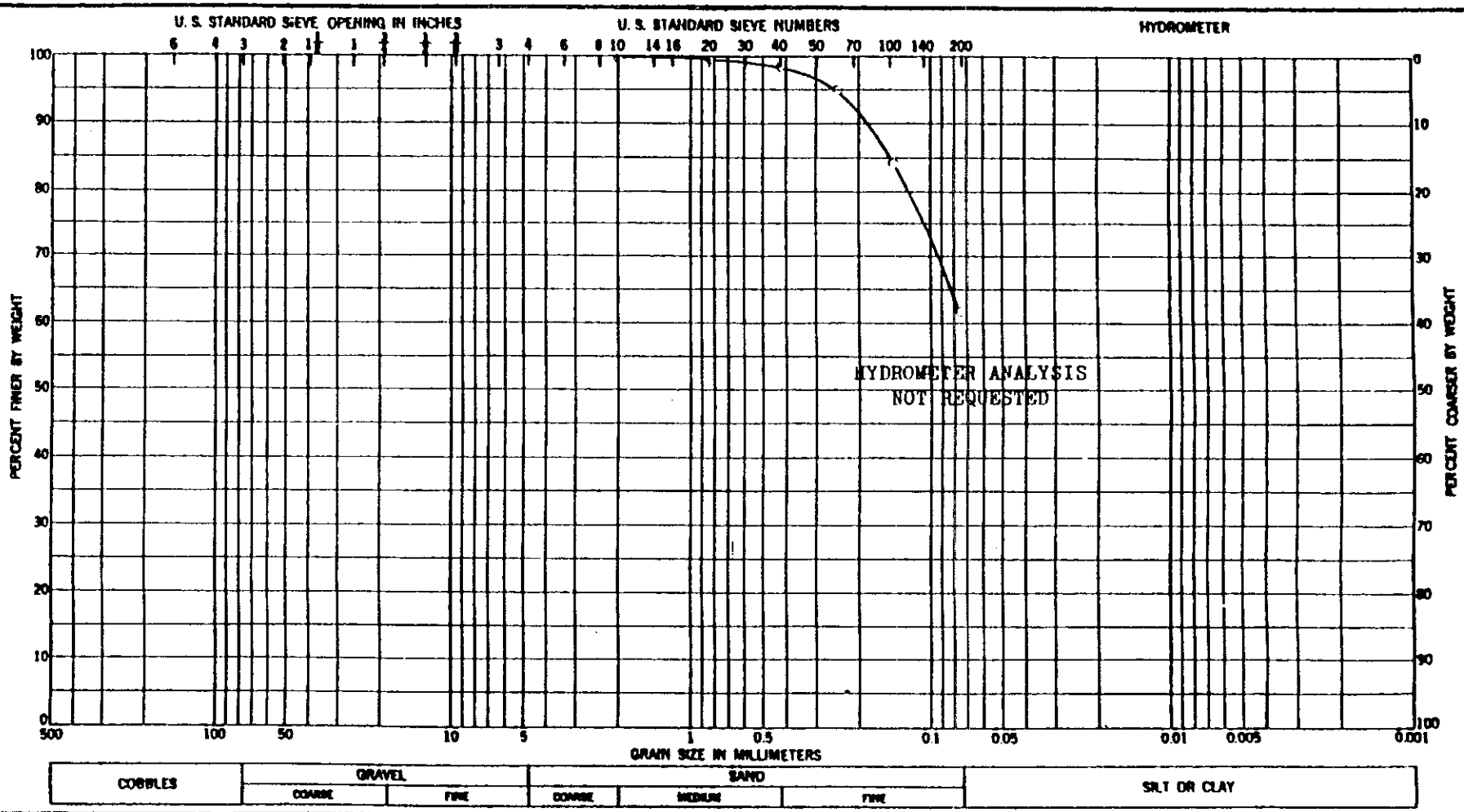
Project: Upper Dam, Hartwell Lake Clemson, S.C.
Lab No. 146/4923
Area: --
Boring No. MW-9, Sample No. 10
Date: 21 July 1981

GRADATION CURVES

ENG FORM 1 MAY 63 2087

DEPARTMENT OF THE ARMY, SOUTH ATLANTIC DIVISION LABORATORY
CORPS OF ENGINEERS, 611 SOUTH COBB DRIVE, MARIETTA, GA. 30061

WORK ORDER NO. 2570
Req. No. EN-FS-81-63, Ch 5



Sample No.	Elev. or Depth	Classification	Nat w %	LL	PL	PI
4	24.0-25.5'	Brown sandy inorganic silt, low LL (ML) with a trace of mica	27.2	36	27	9

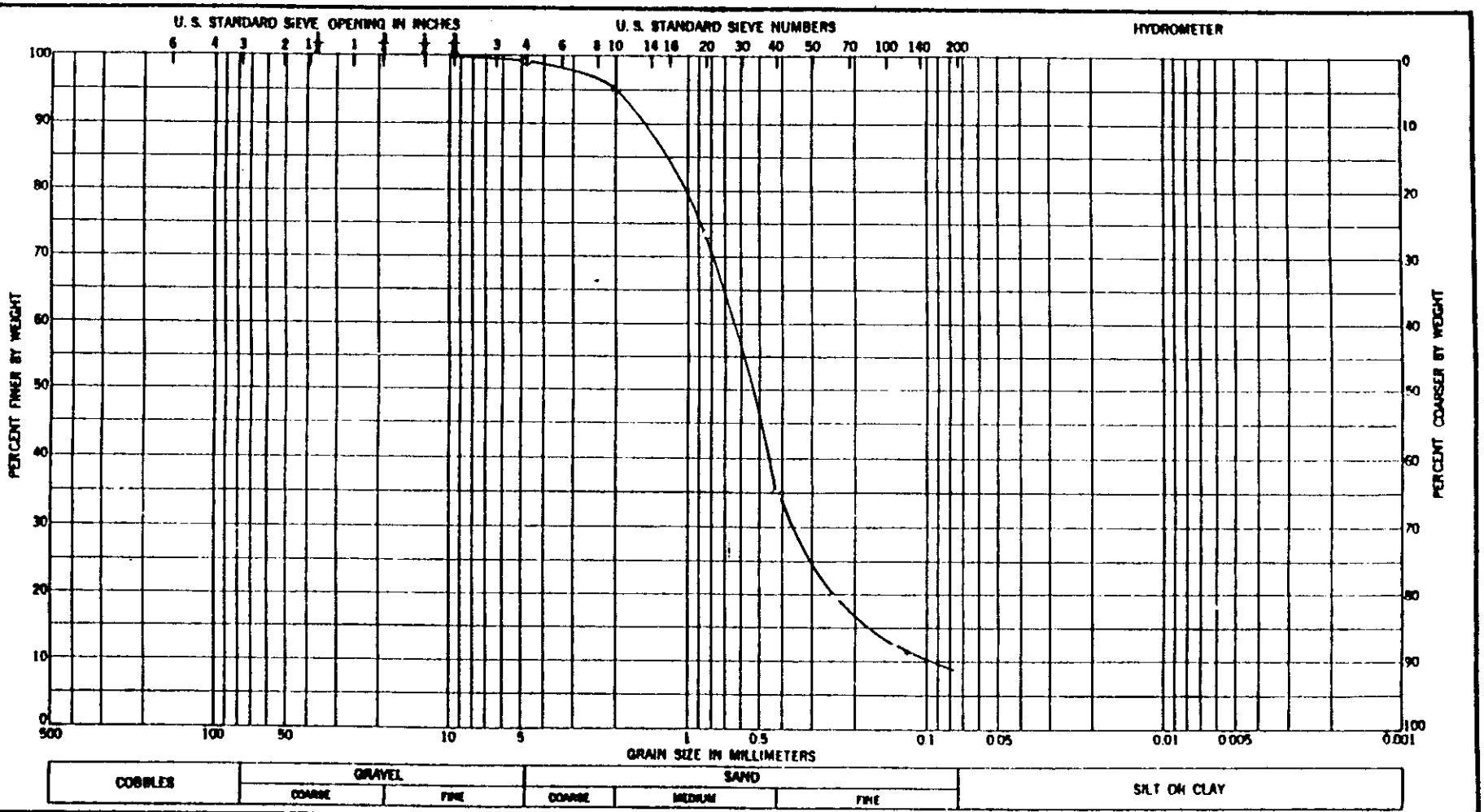
Project: Upper Dam, Hartwell Lake Clemson, S.C.
Lab No. 146/4927
Area: -
Boring No. MW-10, Sample No. 4
Date: 21 July 1981

GRADATION CURVES

ENG FORM 1 MAY 68 2087

DEPARTMENT OF THE ARMY, SOUTH ATLANTIC DIVISION LABORATORY
CORPS OF ENGINEERS, 611 SOUTH COBB DRIVE, MARIETTA, GA. 30061

WORK ORDER NO. 2570
Req. No. EN-FS-81-63, Ch 5



Sample No.	Elev. or Depth	Visual Classification	Nat w %	LL	PL	PI
2	19.5-21.0'	Brown well graded silty sand (SW-SM) with a trace of mica	21.5	NP	NP	NP

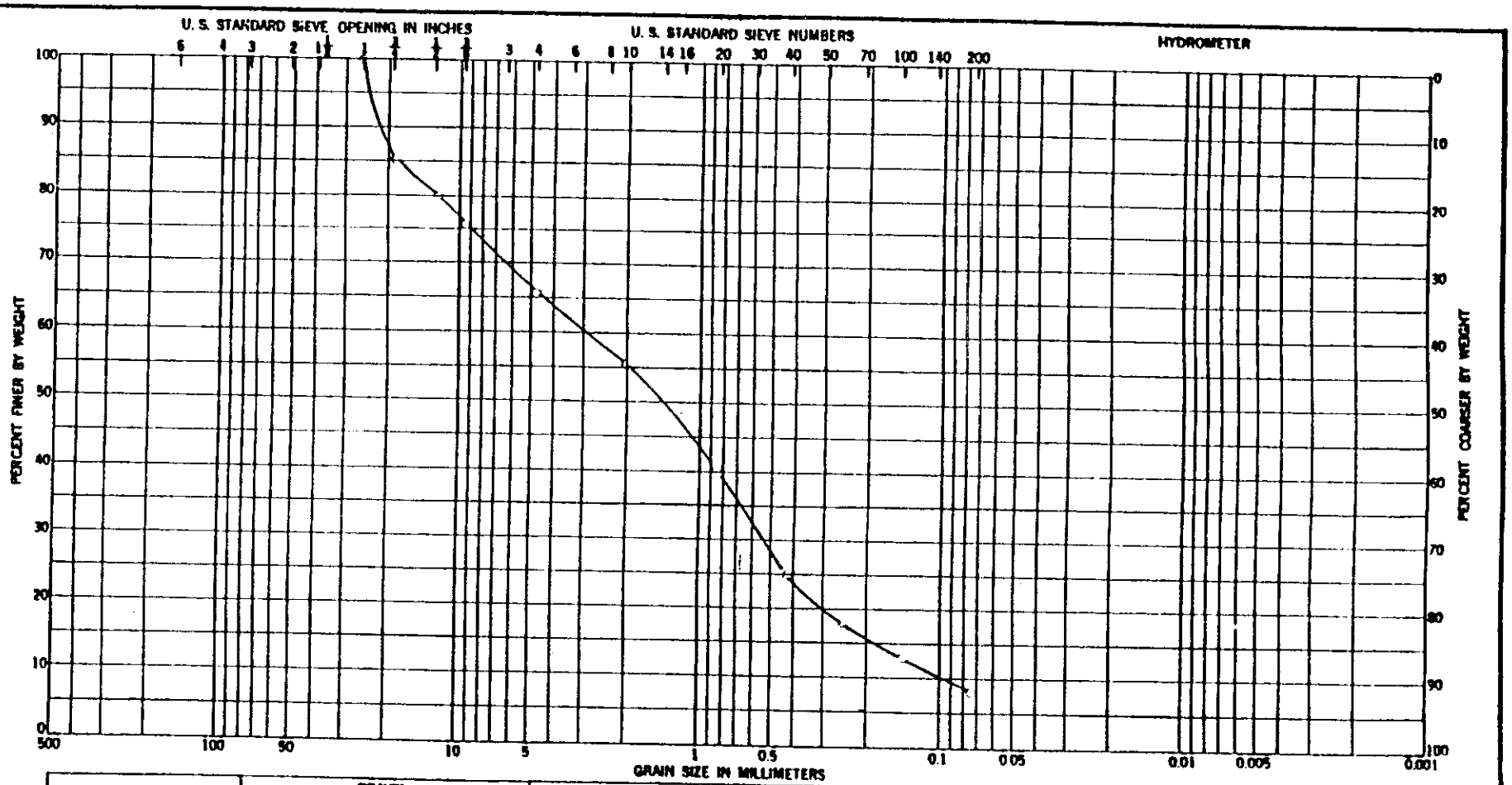
Project: Upper Dam, Hartwell Lake Clemson, S.C.
Lab No. 146/4933
Area: -
Boring No. MW-11, Sample No. 2
Date: 21 July 1981

GRADATION CURVES

ENG FORM 1 MAY 63 2087

DEPARTMENT OF THE ARMY, SOUTH ATLANTIC DIVISION LABORATORY
CORPS OF ENGINEERS, 611 SOUTH COBB DRIVE, MARIETTA, GA. 30061

WORK ORDER NO. 2570
Req. No. EN-FS-81-63 Ch 5



Sample No.	Elev. or Depth	Visual Classification	Nat w %	LL	PL	PI
5	39.0-40.5'	Brown poorly graded silty sand(SP-SM) with some gravel	9.6	NP	NP	NP

Project: Upper Dam, Hartwell Lake Clemson, S.C.

Lab No. 146/4936

Area: -

Boring No. MW-11, Sample No. 5

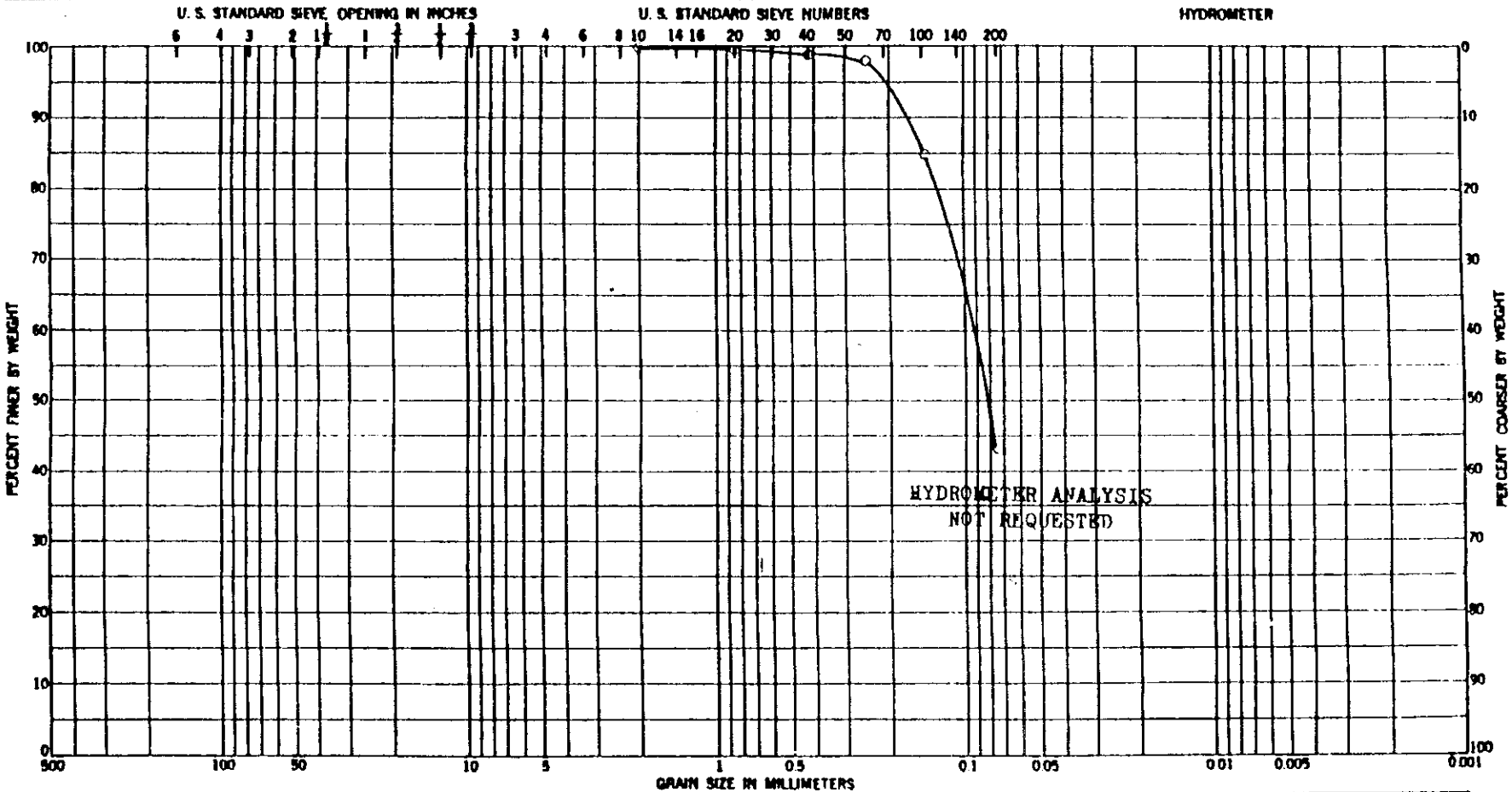
Date: 21 July 1981

GRADATION CURVES

ENG FORM 1 MAY 68 2087

DEPARTMENT OF THE ARMY, SOUTH ATLANTIC DIVISION LABORATORY
CORPS OF ENGINEERS, 611 SOUTH COBB DRIVE, MARIETTA, GA. 30061

WORK ORDER NO. 2570
Req. No. EN-FS-81-63 Ch 5



Sample No.	Elev. or Depth	Visual Classification	Nat w %	LL	PL	PI
4	30.0-31.5'	Brown silty sand (SM) with a trace of mica	33.5	NP	NP	NP

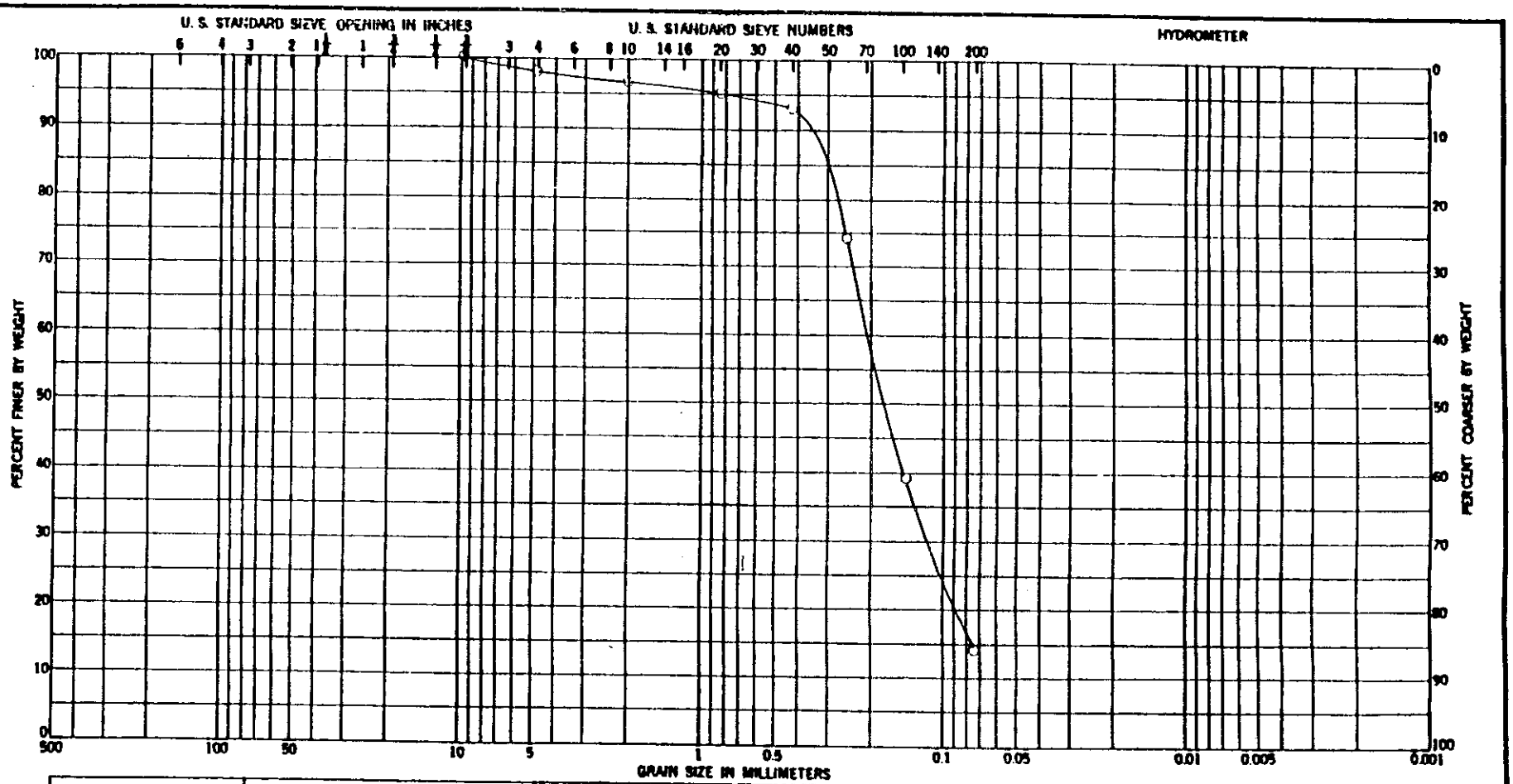
Project: Upper Dam, Hartwell Lake, Clemson, S.C.
Lab No. 146/4940
Area: -
Boring No.: MW-12, Sample No. 4
Date: 21 July 1981

GRADATION CURVES

ENG FORM 1 MAY 69 2087

DEPARTMENT OF THE ARMY, SOUTH ATLANTIC DIVISION LABORATORY
CORPS OF ENGINEERS, 611 SOUTH COBB DRIVE, MARIETTA, GA. 30061

WORK ORDER NO. 2570
Req. No. EN-FS-81-63



Sample No.	Depth	Visual Classification	Nat w %	LL	PL	PI
18	25.5'-27.0'	Brown silty sand (SM) w/a trace of gravel and mica.	23.1	NP	NP	NP

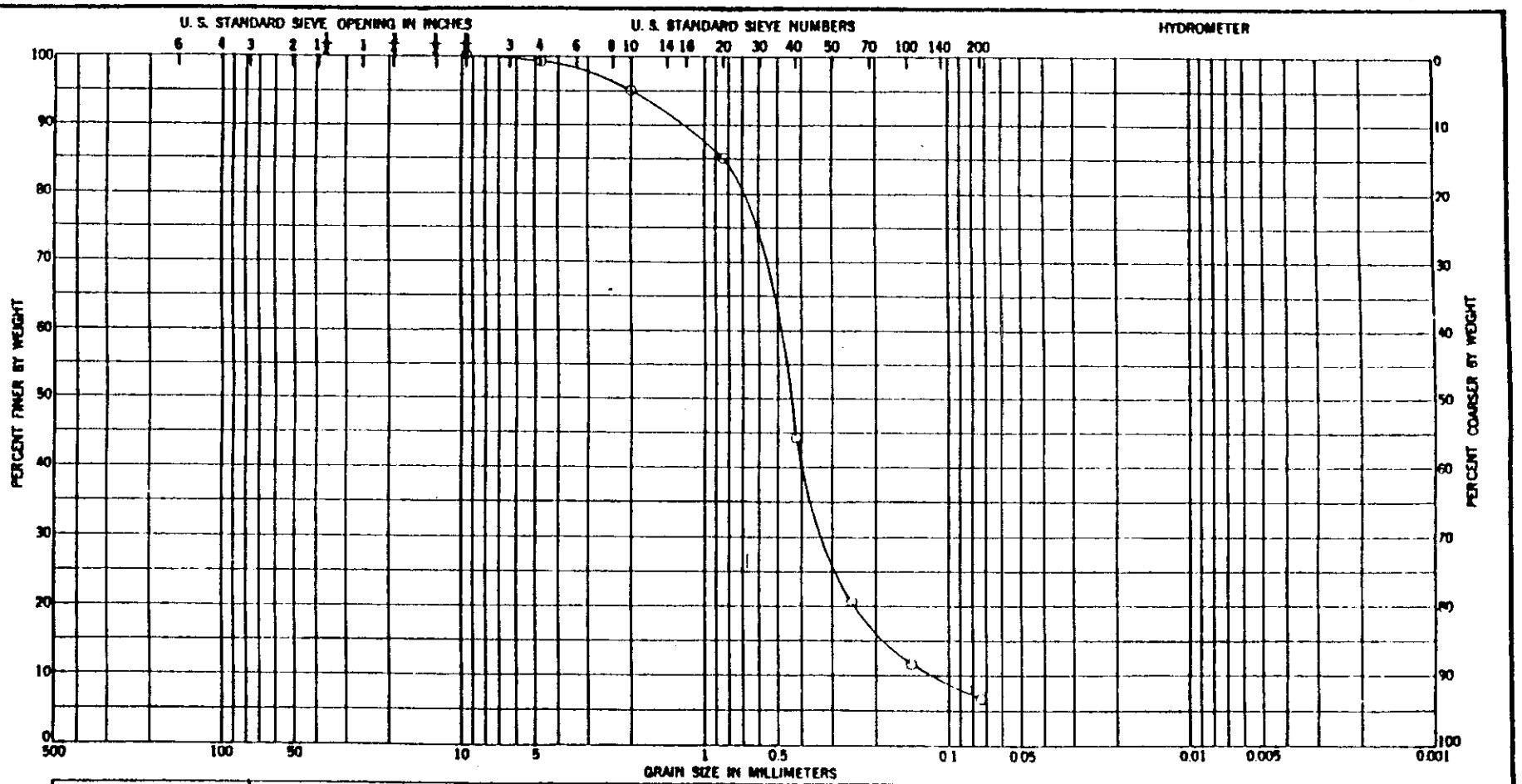
Project: Hartwell Lake Clemson Upper Dam
Lab No. 146/4802
Area
Boring No. PW-3, Sample No. 18
Date: 10 June 81

GRADATION CURVES

ENG FORM 1 MAY 63 2087

DEPARTMENT OF THE ARMY, SOUTH ATLANTIC DIVISION LABORATORY
CORPS OF ENGINEERS, 611 SOUTH COBB DRIVE, MARIETTA, GA. 30061

WORK ORDER NO. 2570
Req. No. EN-FS-81-63



Sample No.	Depth	Visual Classification	Nat w %	LL	PL	PI
23	33.0'-34.5'	Tan poorly graded silty sand w/a trace of gravel and mica.	19.1	NP	NP	NP

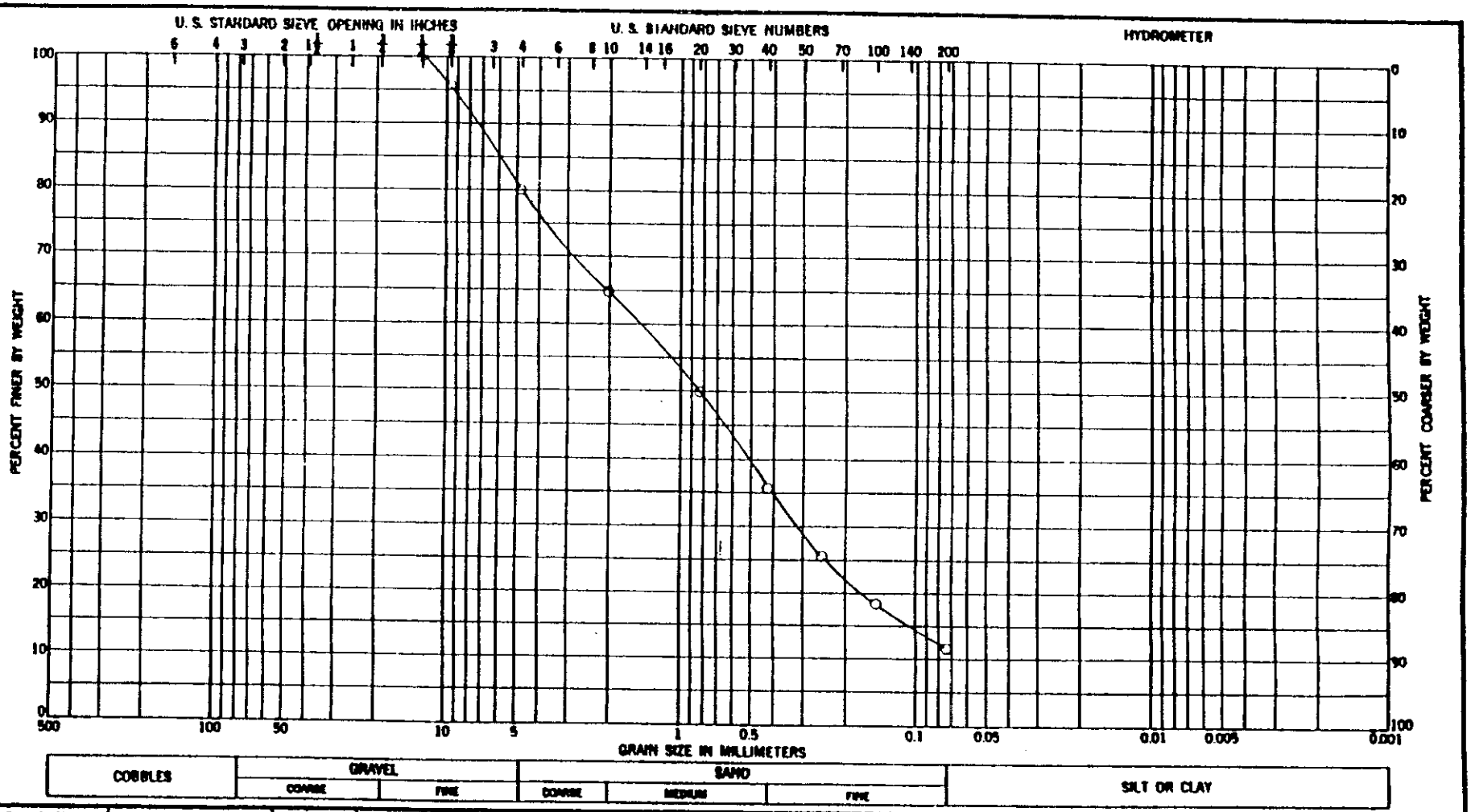
Project: Hartwell Lake EN-FS-81-63
Lab No. 146/4807
Area:
Boring No. PW-3, Sample No. 23
Date: 10 June 81

GRADATION CURVES

ENG FORM 1 MAY 68 2087

DEPARTMENT OF THE ARMY, SOUTH ATLANTIC DIVISION LABORATORY
CORPS OF ENGINEERS, 611 SOUTH COBB DRIVE, MARIETTA, GA. 30061

WORK ORDER NO. 2570
Req. No. EN-FS-81-63



Sample No.	Depth	Visual Classification	Nat w %	LL	PL	PI
28	40.5'-42.0'	Lt. brown poorly graded silty sand (SP-SM) w/some gravel and a trace of mica.	8.2	NP	NP	NP

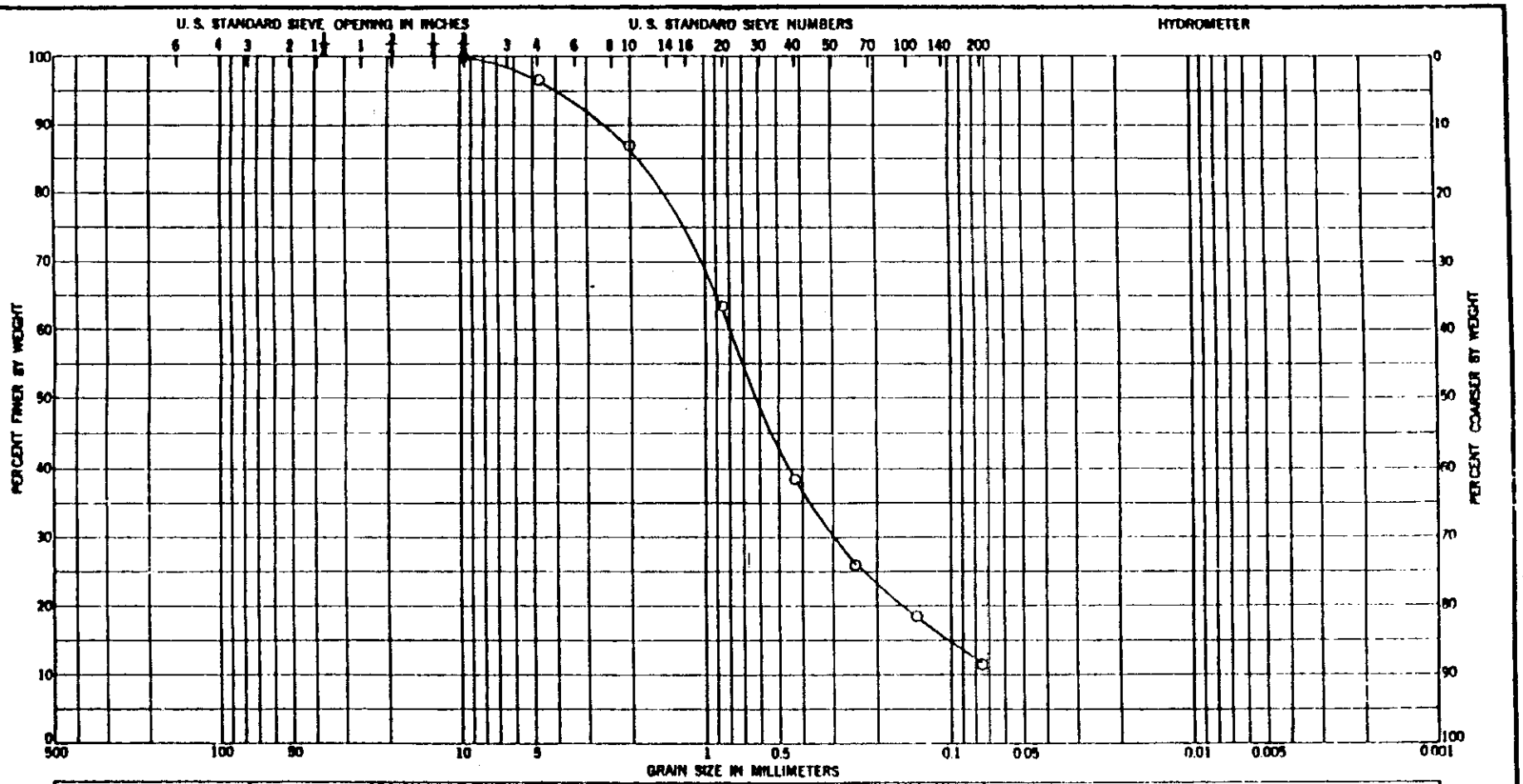
Project: Hartwell Lake Clemson Upper Dam
Lab No. 146/4812
Area:
Boring No. PW-3, Sample No. 28
Date: 10 June 81

GRADATION CURVES

ENG FORM 1 MAY 65 2087

DEPARTMENT OF THE ARMY, SOUTH ATLANTIC DIVISION LABORATORY
CORPS OF ENGINEERS, 611 SOUTH COBB DRIVE, MARIETTA, GA. 30061

WORK ORDER NO. 2570
Req. No. EN-FS-81-63



Sample No.	Depth	Visual Classification	Nat w %	LL	PL	PI
4	33.0'-34.5'	Brown well graded silty sand (SW-SM) w/a trace of gravel.	20.0	NP	NP	NP

Project: Upper Dam, Hartwell Lake Clemson, SC

Lab No. 146/4471

Area:

Boring No. PF-202, Sample No. 4

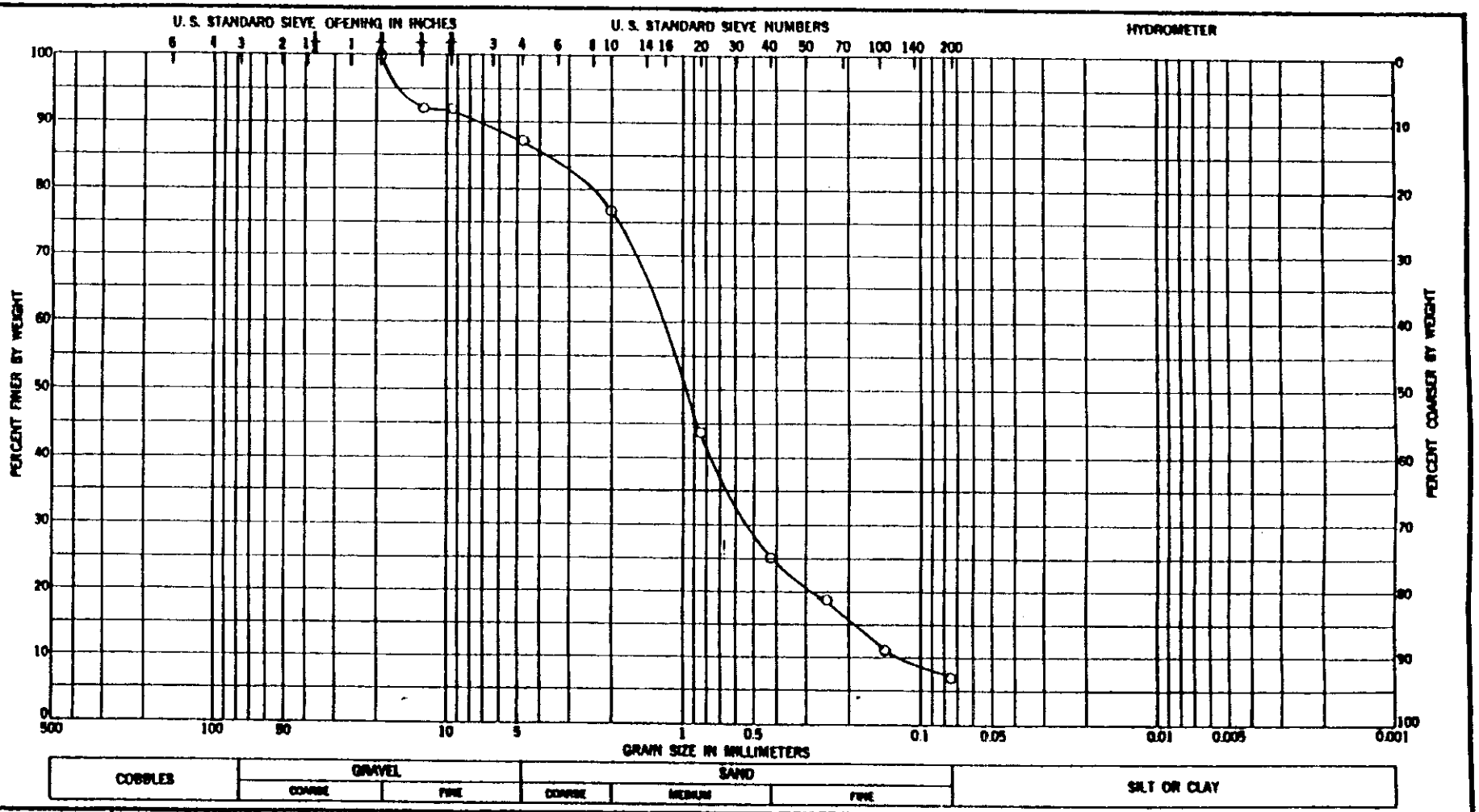
Date: 19 Dec. 1980

GRADATION CURVES

ENG FORM 1 MAY 63 2087

DEPARTMENT OF THE ARMY, SOUTH ATLANTIC DIVISION LABORATORY
CORPS OF ENGINEERS, 611 SOUTH COBB DRIVE, MARIETTA, GA. 30061

WORK ORDER NO. 2570
Req. No. KN-FS-81-63



Sample No.	Depth	Visual Classification	Nat w %	LL	PL	PI
5	42.0'-43.5'	Tan well graded silty sand (SW-SM) w/a little gravel.	10.1	NP	NP	NP

Project: Upper Dam, Hartwell Lake Clemson, SC

Lab No. 146/4472

Area

Boring No. PF-202, Sample No. 5

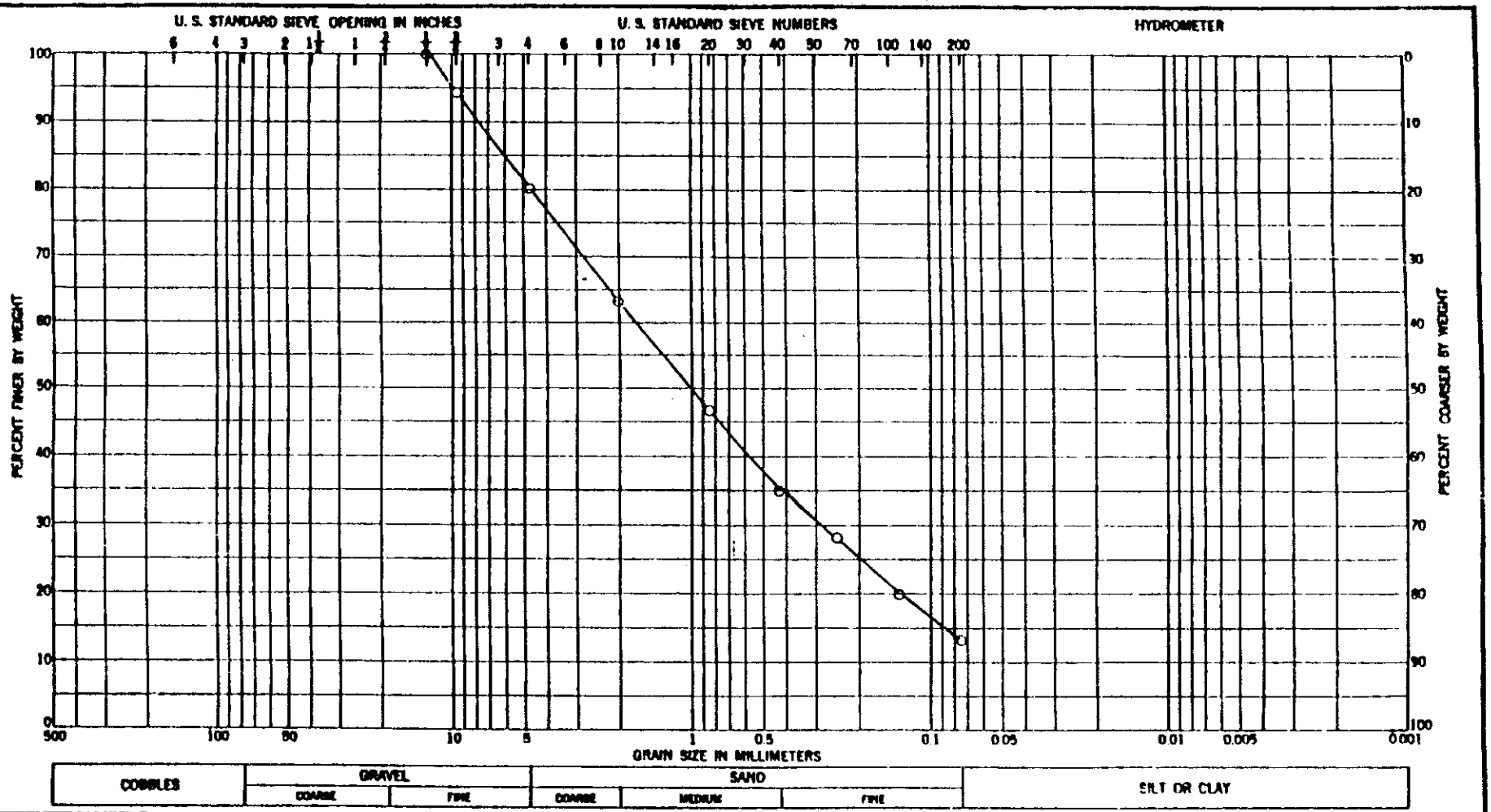
Date 19 Dec. 1980

GRADATION CURVES

ENG FORM 1 MAY 65 2087

DEPARTMENT OF THE ARMY, SOUTH ATLANTIC DIVISION LABORATORY
CORPS OF ENGINEERS, 611 SOUTH COBB DRIVE, MARIETTA, GA. 30061

WORK ORDER NO. 2570
Req. No. EN-FS-81-63



Sample No.	Elev. or Depth	Classification	Nat w %	LL	PL	PI
6	43.5'-45.0'	Tan silty sand (SM) w/some gravel.	11.1	NP	NP	NP

Project: Upper Dam, Hartwell Lake Clemson, SC

Lab No. 146/4473

Area:

Boring No. PF-202, Sample No. 6

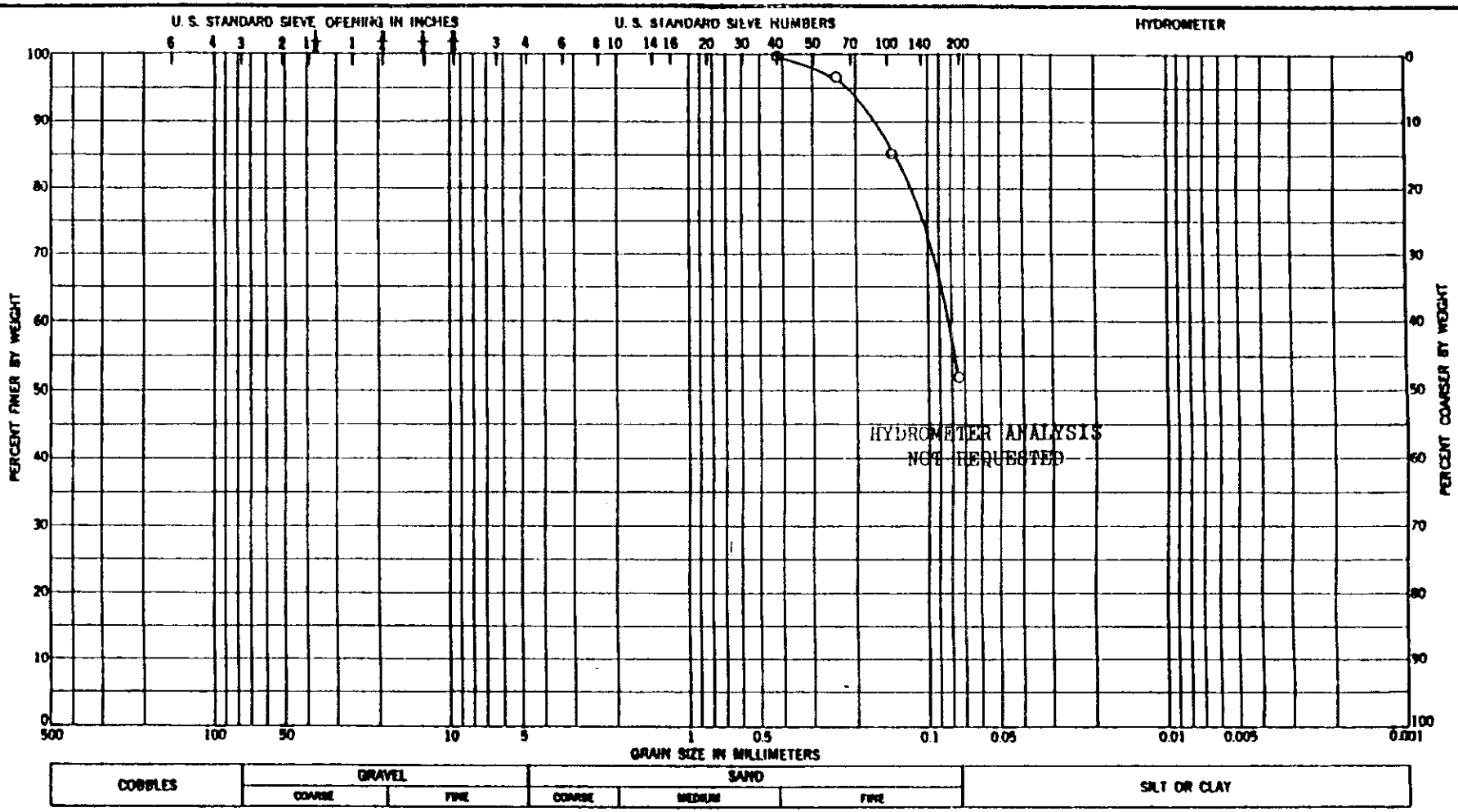
Date: 19 Dec. 1980

GRADATION CURVES

ENG FORM 1 MAY 65 2087

DEPARTMENT OF THE ARMY, SOUTH ATLANTIC DIVISION LABORATORY
CORPS OF ENGINEERS, 611 SOUTH COBB DRIVE, MARIETTA, GA. 30061

WORK ORDER NO. 2570
Req. No. EN-FS-81-63



Sample No.	Elev or Depth	Classification	Nat w %	LL	PL	PI
5	25.5-27.0'	Dark gray sandy inorganic silt, low LL (ML) with a trace of mica	23.6	36	30	6

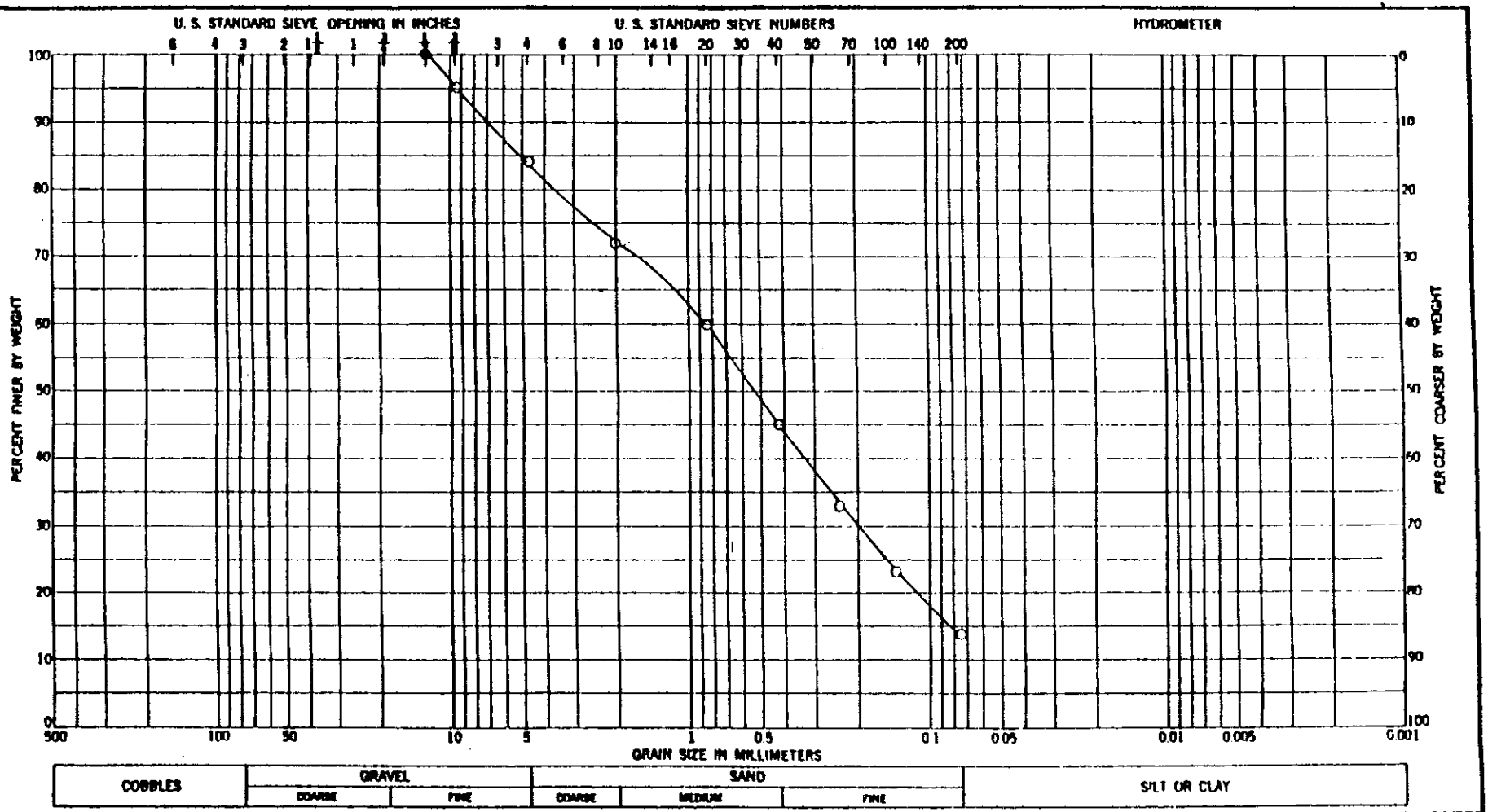
Project: Hartwell Lake ~~Clemson Upper Dam~~
Lab No. 146/4694
Area: --
Boring No. PF-206, Sample No. 5
Date: 23 February 1981

GRADATION CURVES

ENG FORM 1 MAY 68 2087

DEPARTMENT OF THE ARMY, SOUTH ATLANTIC DIVISION LABORATORY
CORPS OF ENGINEERS, 611 SOUTH COBB DRIVE, MARIETTA, GA. 30061

WORK ORDER NO. 2570
Req. No. EN-FS-81-63



Sample No.	Elev. or Depth	Visual Classification	Nat w %	LL	PL	PI
8	42.0-43.5'	Brown silty sand (SM) with a little gravel and a trace of mica	11.1	NP	NP	NP

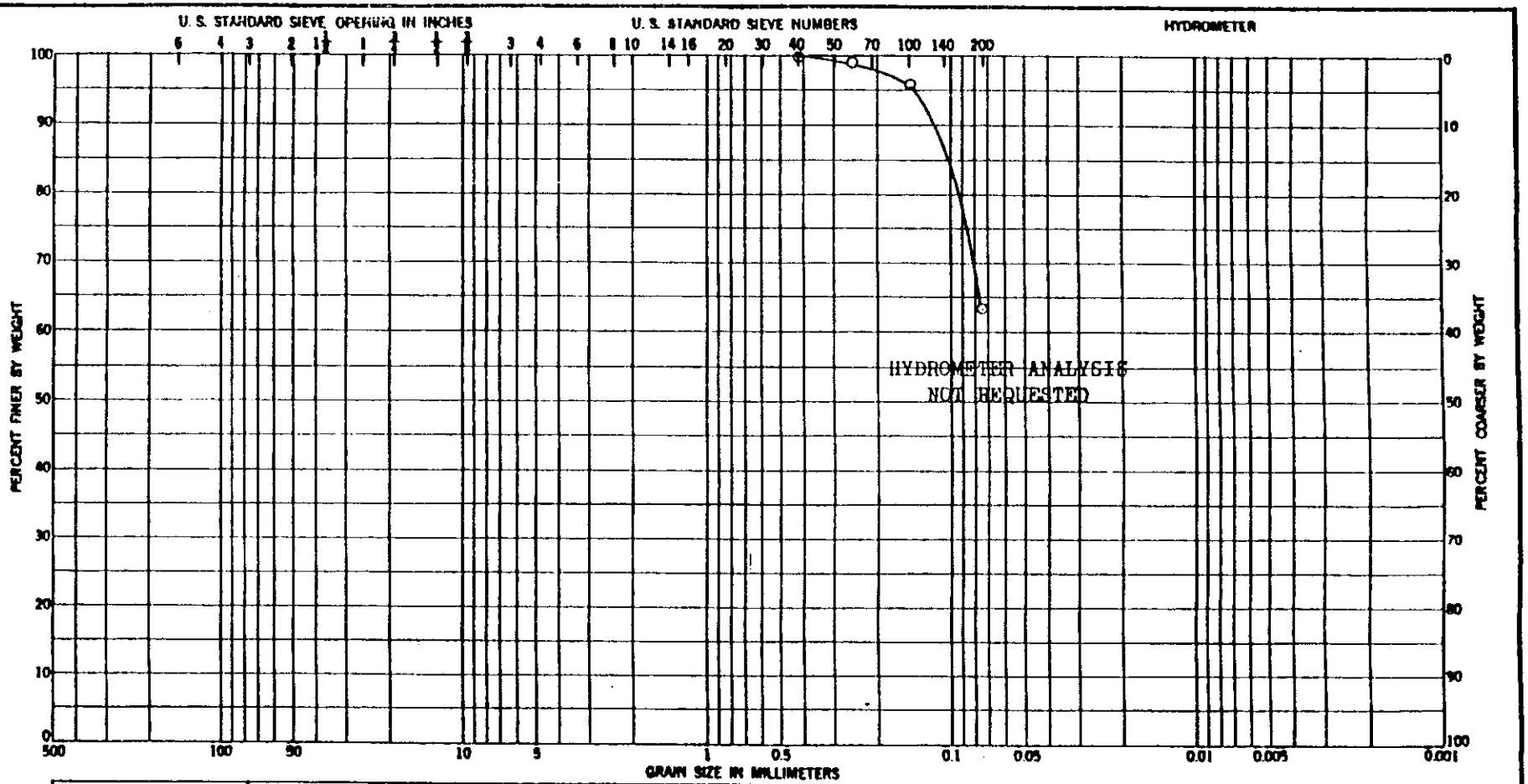
Project: Hartwell Lake Clemson Upper Dam
Lab No. 146/4697
Area: --
Boring No. PF-206, Sample No. 8
Date: 23 February 1981

GRADATION CURVES

ENG FORM 1 MAY 68 2087

DEPARTMENT OF THE ARMY, SOUTH ATLANTIC DIVISION LABORATORY
CORPS OF ENGINEERS, 611 SOUTH COBB DRIVE, MARIETTA, GA. 30061

WORK ORDER NO. 2570
Req. No. EN-FS-81-63



Sample No.	~~Elev.~~ or Depth	Classification	Nat w %	LL	PL	PI
6	31.5-33.0'	Brown sandy clayey inorganic silt, low LL (ML) with a trace of mica	27.1	39	27	12

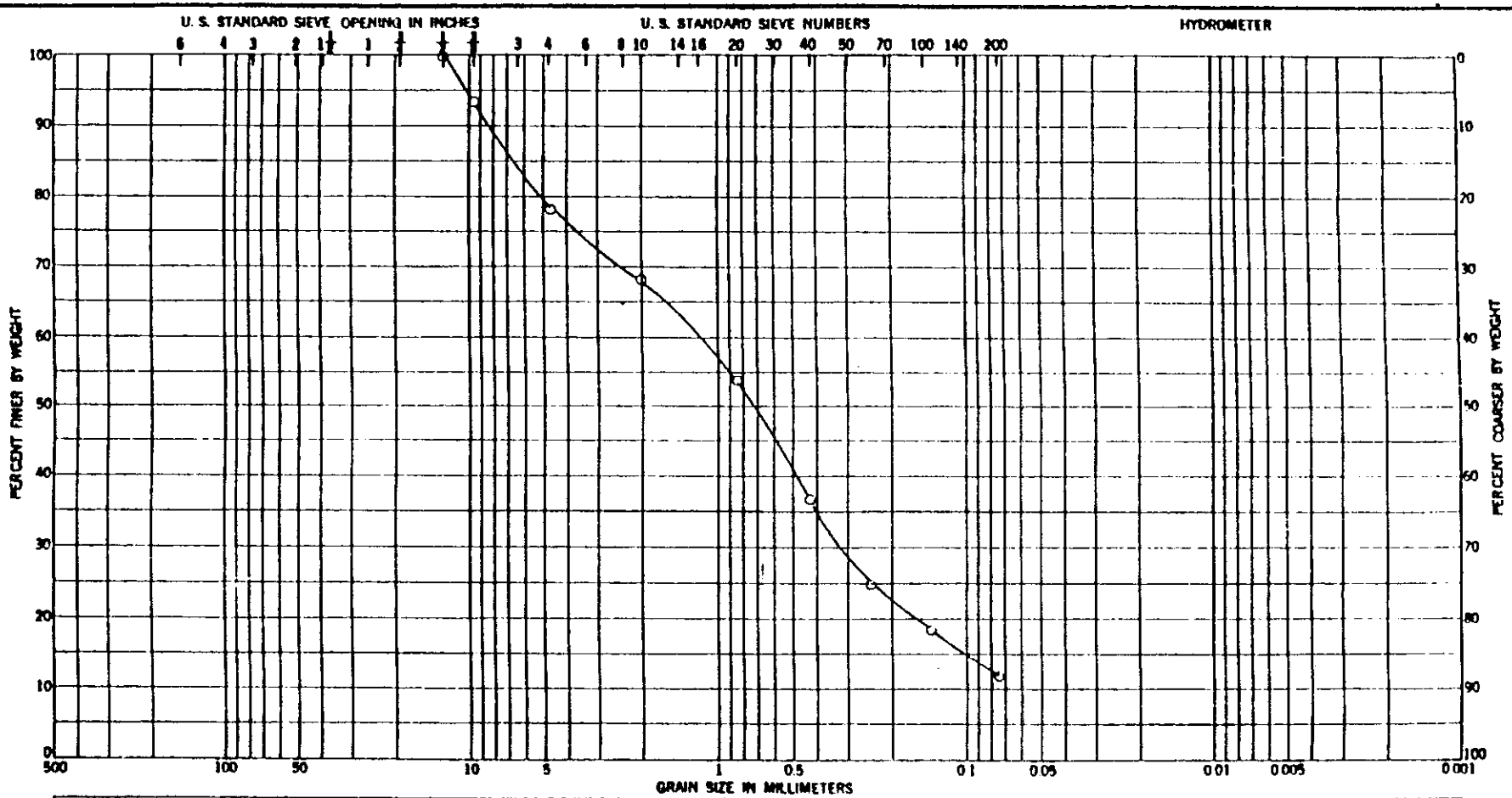
Project: Hartwell Lake Clemson Upper Dam
Lab No 146/4703
Area: --
Boring No. PF-209, Sample No. 6
Date: 23 February 1981

GRADATION CURVES

ENG FORM 1 MAY 65 2087

DEPARTMENT OF THE ARMY, SOUTH ATLANTIC DIVISION LABORATORY
CORPS OF ENGINEERS, 611 SOUTH COBB DRIVE, MARIETTA, GA. 30061

WORK ORDER NO. 2570
Req. No. EN-FS-81-63



Sample No.	Elev. or Depth	Visual Classification	Nat w %	LL	PL	PI
9	43.5-45.0'	Tan well graded silty sand, (SW-SM) with some gravel and a trace of mica	9.4	NP	NP	NP

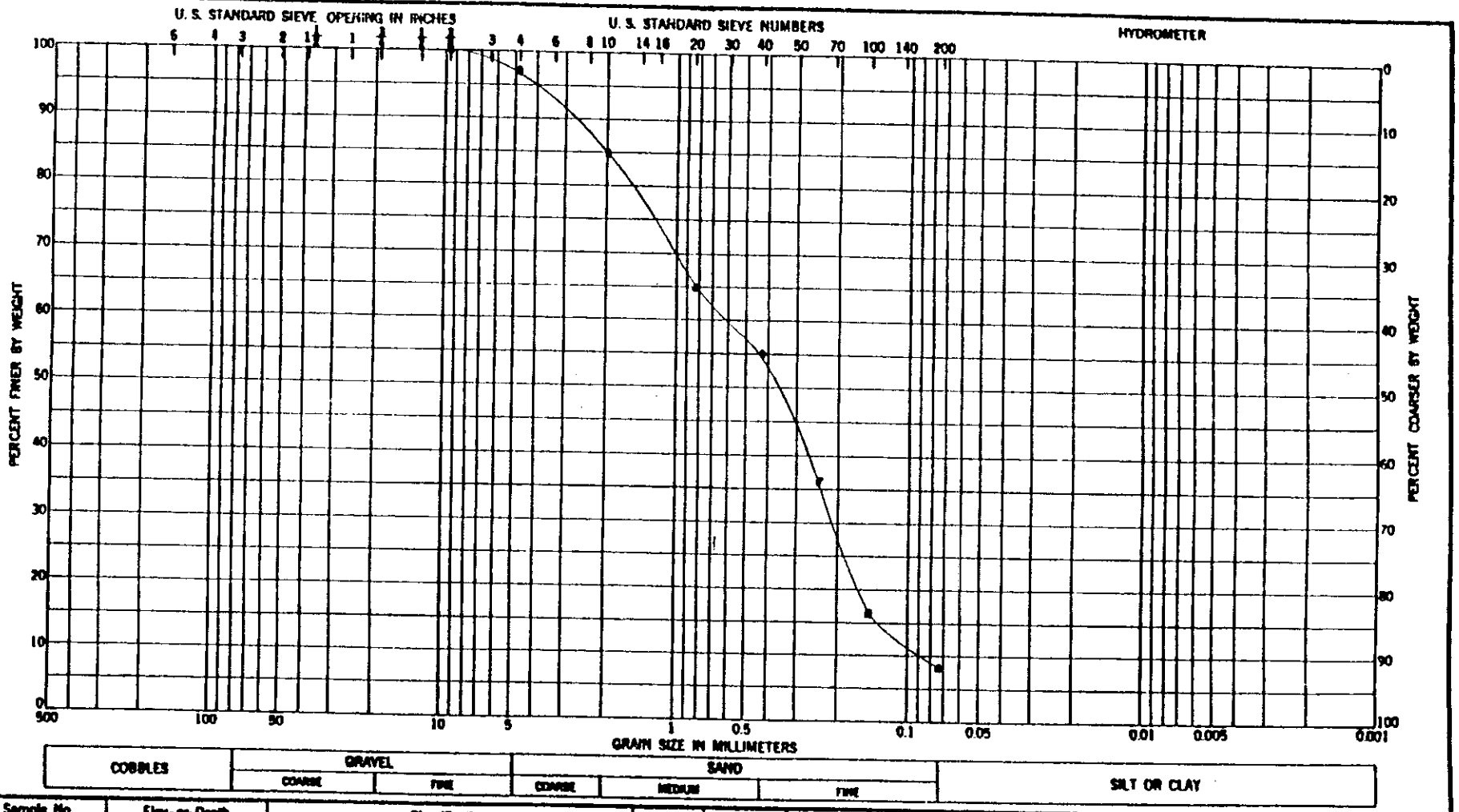
Project: Hartwell Lake Clemson Upper Dam
Lab No. 146/4706
Area: --
Boring No. PF-209, Sample No. 9
Date: 23 February 1981

GRADATION CURVES

ENG FORM 1 MAY 68 2087

DEPARTMENT OF THE ARMY, SOUTH ATLANTIC DIVISION LABORATORY
CORPS OF ENGINEERS, 611 SOUTH COBB DRIVE, MARIETTA, GA. 30061

WORK ORDER NO. 2570
Req. No. EN-FS-81-63, Change #3



Sample No.	Elev. or Depth	Classification	Nat w %	LL	PL	PI
2	35.0-35.8'	Gray and tan poorly graded silty sand (SP-SM) with a trace of gravel sizes	-	NP	NP	NP

Project Hartwell Lake, Clemson Upper Dam
Lab No. 146/4721
Area -
Boring No. PF-202, Sample 2
Date 5 May 1981

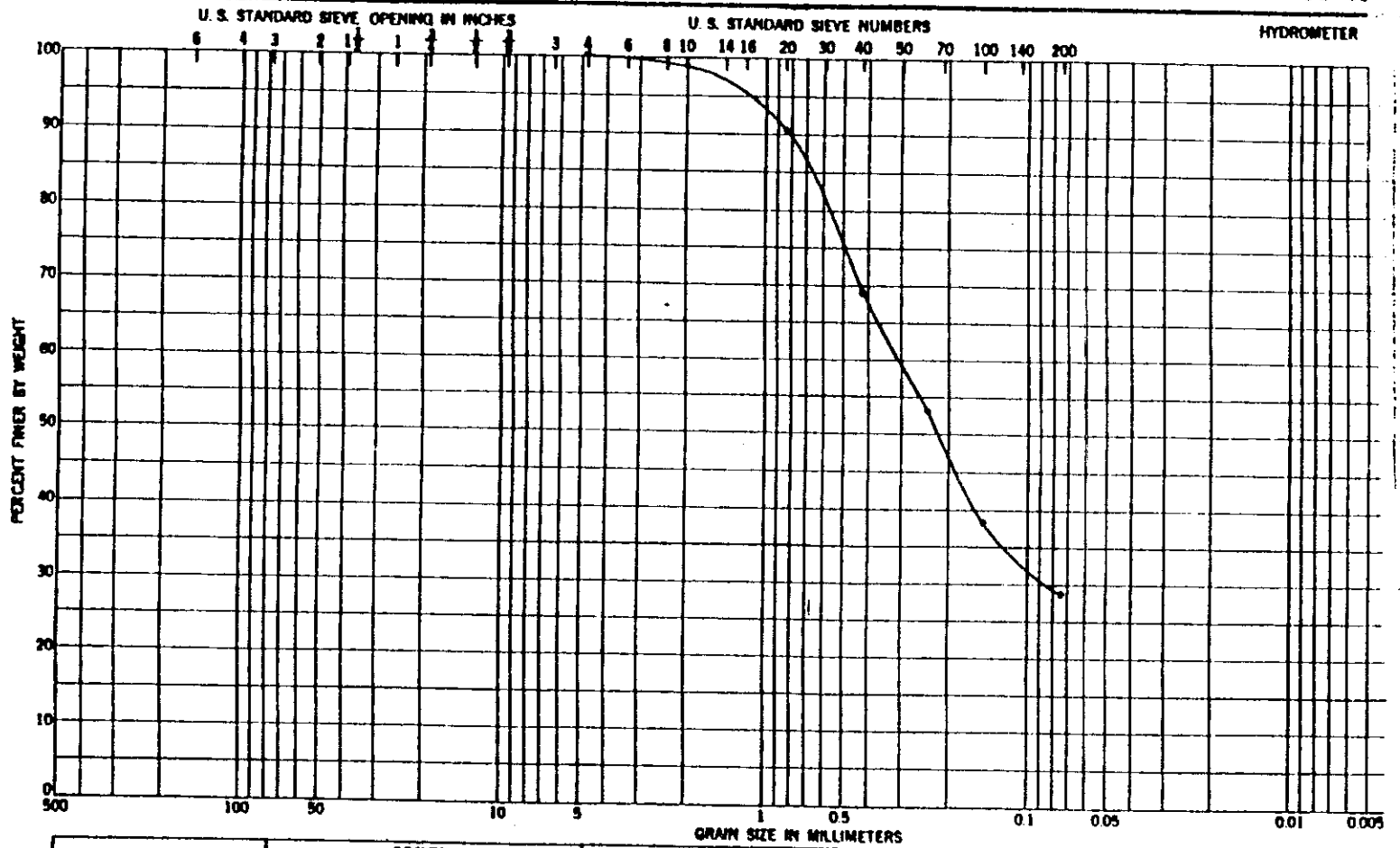
GRADATION CURVES

ENG FORM 1 MAY 69 2087

Classification only

DEPARTMENT OF THE ARMY, SOUTH ATLANTIC DIVISION LABORATORY
CORPS OF ENGINEERS, 611 SOUTH COBB DRIVE, MARIETTA, GA. 30061

WORK ORDER NO. 2570
Req. No. EN-FS-81-6



Sample No.	Elev or Depth	Classification	Nat w %	LL	PL	PI
3	45.0-47.4'	Brown silty sand (SM)	31.4	45	42	3

Project: Hartwell Lake
Clemson Upper D
Lab No. 146/472

Area: -

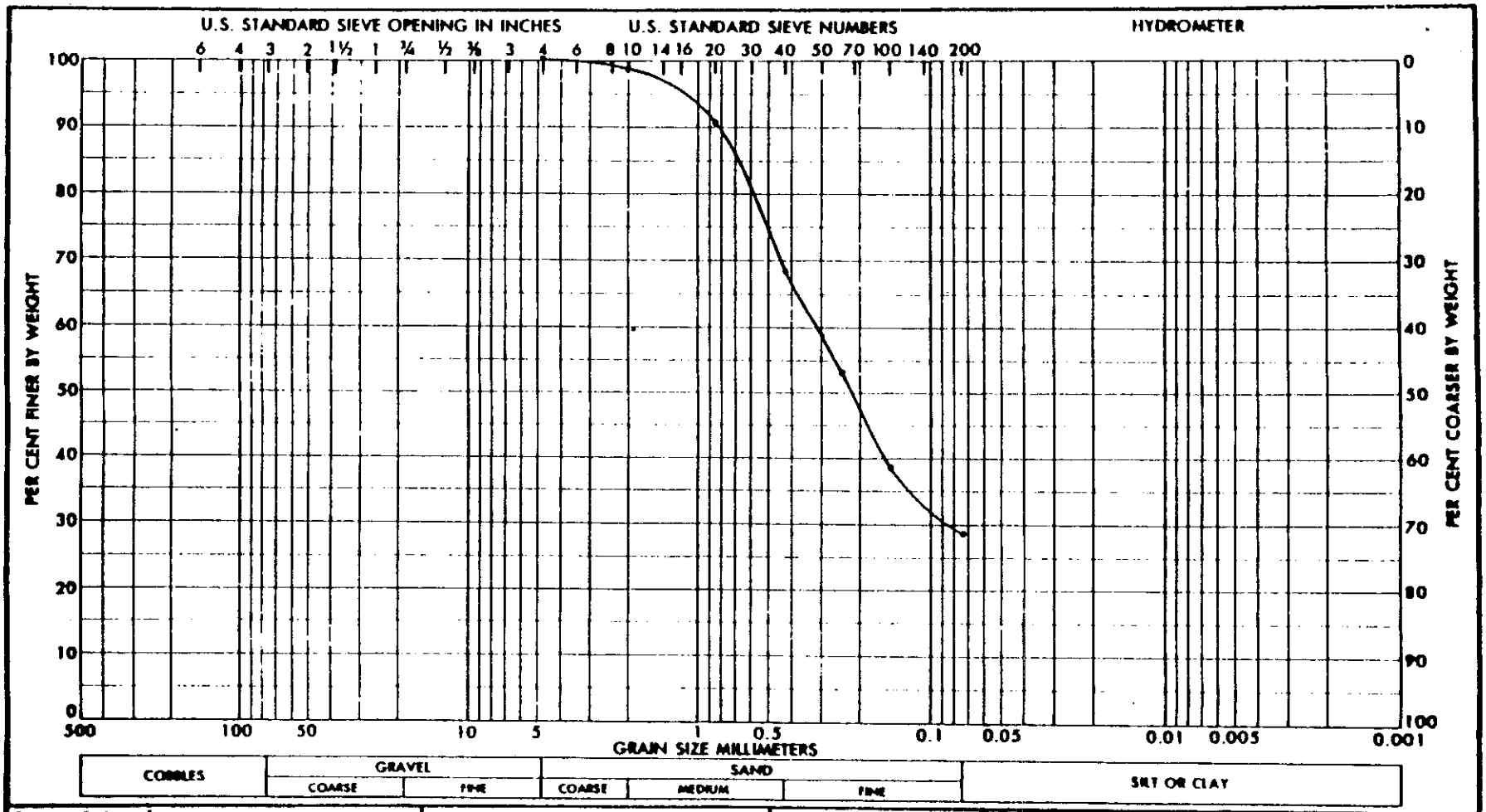
Boring No. PF-202, Samp le. 3

Date: 6 May 1981

GRADATION CURVES

ENG FORM 1 MAY 68 2087

*Pinhole, K_H & $\bar{R}$ Test



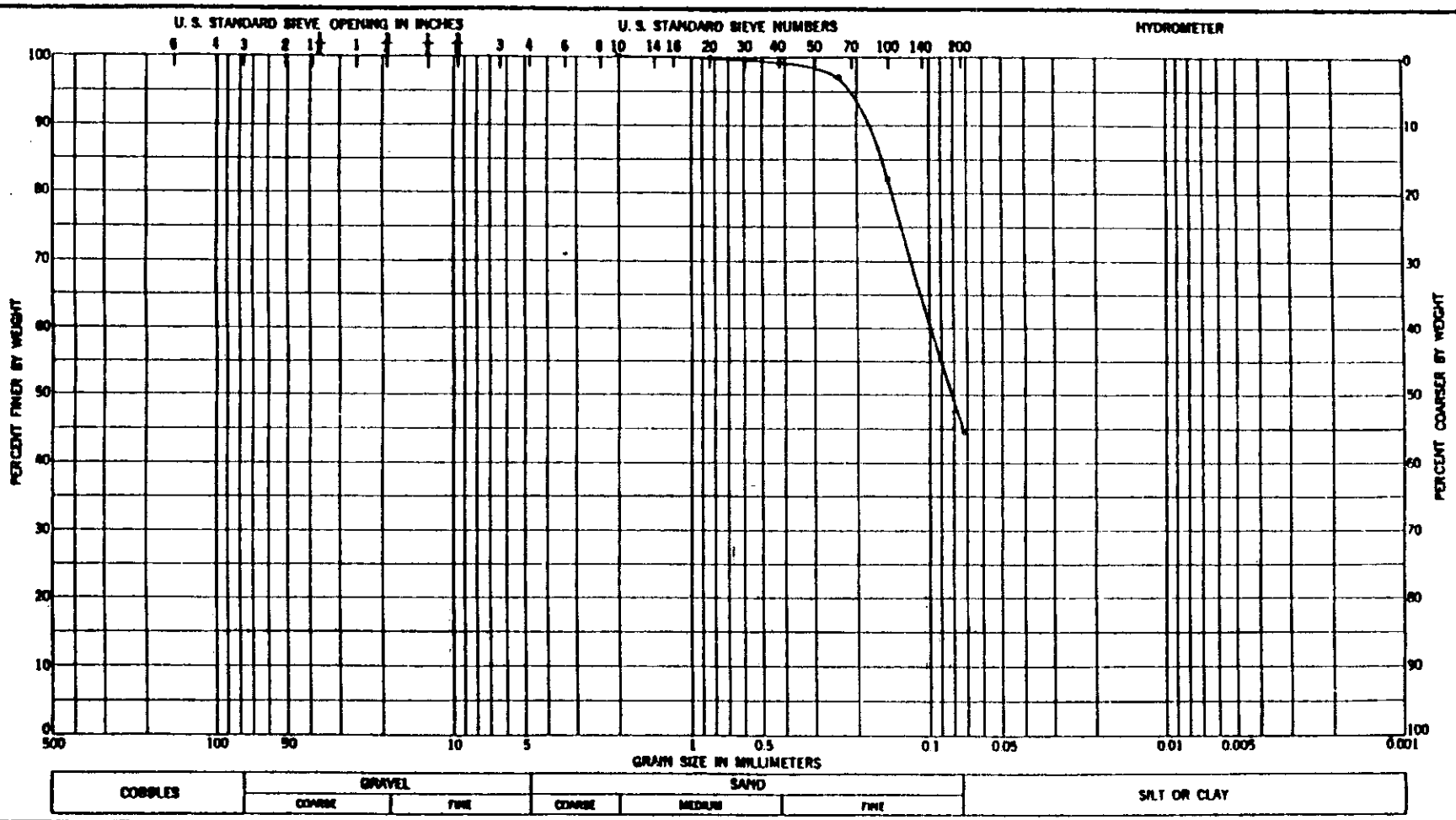
Type of Specimen Undisturbed		Before Test		After Test		PROJECT Hartwell Lake, Clemson Upper Dam	
Diam 1.52 in.	Ht 2.00 in.	Water Content, w_o	32.1 %	w_f	35.1 %	Lab No. 146/4722	
Classification Brown silty sand (SM)		Void Ratio, e_o	.941	e_f	.941	AREA -	
LL 45	G_s 2.68	Saturation, S_o	91.4 %	S_f	100.0 %	BORING NO PF-202	SAMPLE NO. 3
PL 42	D_{10} --	Dry Density, γ_d	86.1 lb/ft^3	K_{20}	1.04 x 10^{-4} cm/sec	DATE 6 May 1981	DEPTH 45.0-47.4'

Variable/xxxxxxxxxxxx PERMEABILITY TEST REPORT (HORIZONTAL)

SAD FORM 1971
21 JULY 1964

DEPARTMENT OF THE ARMY, SOUTH ATLANTIC DIVISION LABORATORY
CORPS OF ENGINEERS, 611 SOUTH COBB DRIVE, MARIETTA, GA. 30061

WORK ORDER NO. 2570
Req. No. EN-FS-81-63, Change #3



Sample No.	Elev. X/X Depth	Classification	Nat w %	LL	PL	PI
2	35.0 - 37.5	Gray silty sand (SM) with a little mica	40.5	NP	NP	NP

Project: Hartwell Lake Clemson Upper Dam Lab No. 146/4728*

Area: --

Boring No. PF-206, Sample No. 2

Date: 7 May 1981

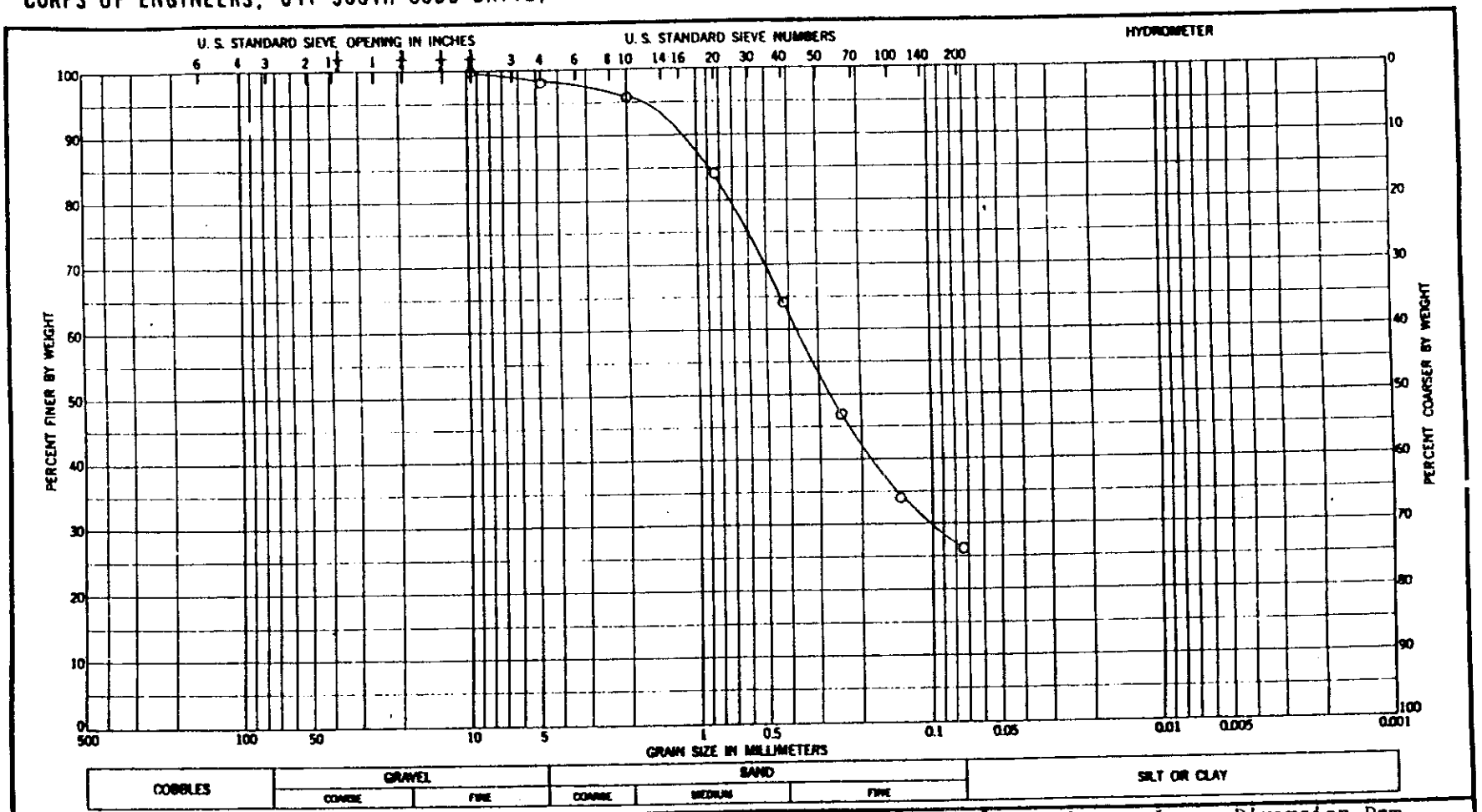
GRADATION CURVES

ENG FORM 1 MAY 63 2087

*CDD and $\bar{R}$ Tests

DEPARTMENT OF THE ARMY, SOUTH ATLANTIC DIVISION LABORATORY
CORPS OF ENGINEERS, 611 SOUTH COBB DRIVE, MARIETTA, GA. 30061

WORK ORDER NO. 2128
Req. No. SAS EN FS-80-62



Sample No.	Depth	Classification	Nat w %	LL	PL	PI
27	39.0-40.5'	Tan silty sand (SM) with a trace of gravel & mica	19.5	NP	NP	NP

Project: Clemson Lower Diversion Dam
Clemson, South Carolina
Lab No. 146/3971
Area: -
Boring No. PF-107, Sample No. 27
Date: 14 January 1980

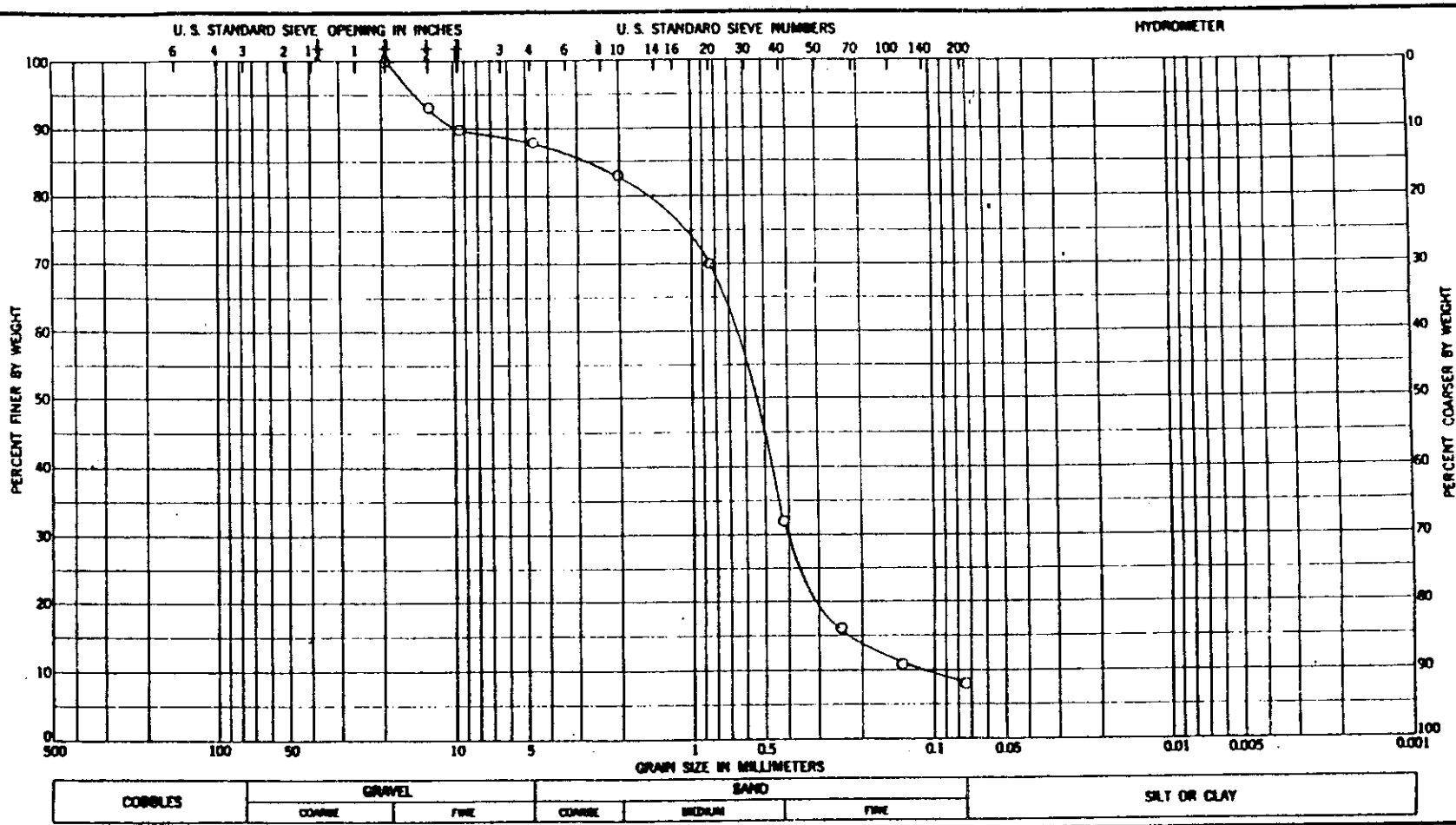
GRADATION CURVES

ENG FORM 1 MAY 63 2087

3974

DEPARTMENT OF THE ARMY, SOUTH ATLANTIC DIVISION LABORATORY
CORPS OF ENGINEERS, 611 SOUTH COBB DRIVE, MARIETTA, GA. 30061

WORK ORDER NO. 2128
Req. No. SAS EN FS 80-62



Sample No.	Elev. or Depth	Classification	Nat w %	LL	PL	PI
30	43.5-45.0'	Tan poorly graded silty sand (SP-SM) with a little gravel and a trace of mica	31.2	NP	NP	NP

Project: Clemson Lower Diversion Dam
Clemson, South Carolina

Lab No. 146/3974

Area: -

Boring No.: PF-107, Sample No. 30

Date: 14 January 1980

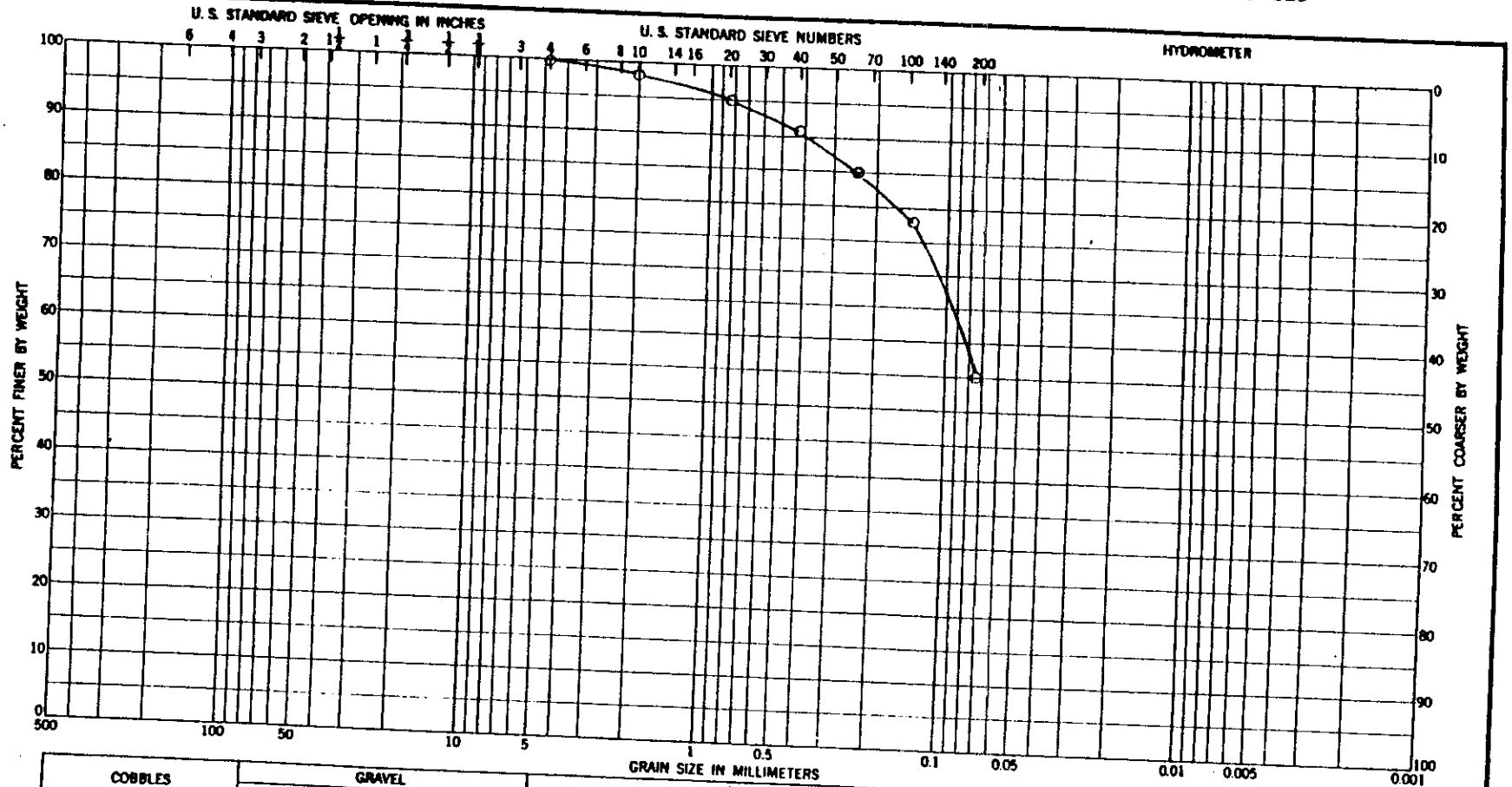
GRADATION CURVES

ENG FORM 1 MAY 63 2087

20

DEPARTMENT OF THE ARMY, SOUTH ATLANTIC DIVISION LABORATORY
CORPS OF ENGINEERS, 611 SOUTH COBB DRIVE, MARIETTA, GA. 30061

WORK ORDER NO. 2305
Req. No. SAS EN FS 80-125



Sample No.	Depth	Classification	Nat w %	LL	PL	PI
9	22.5-24.0'	Lt. Brown clayey sand (SC)	25.6	30*	22	8*
		* Plots near "A" line				

GRADATION CURVES

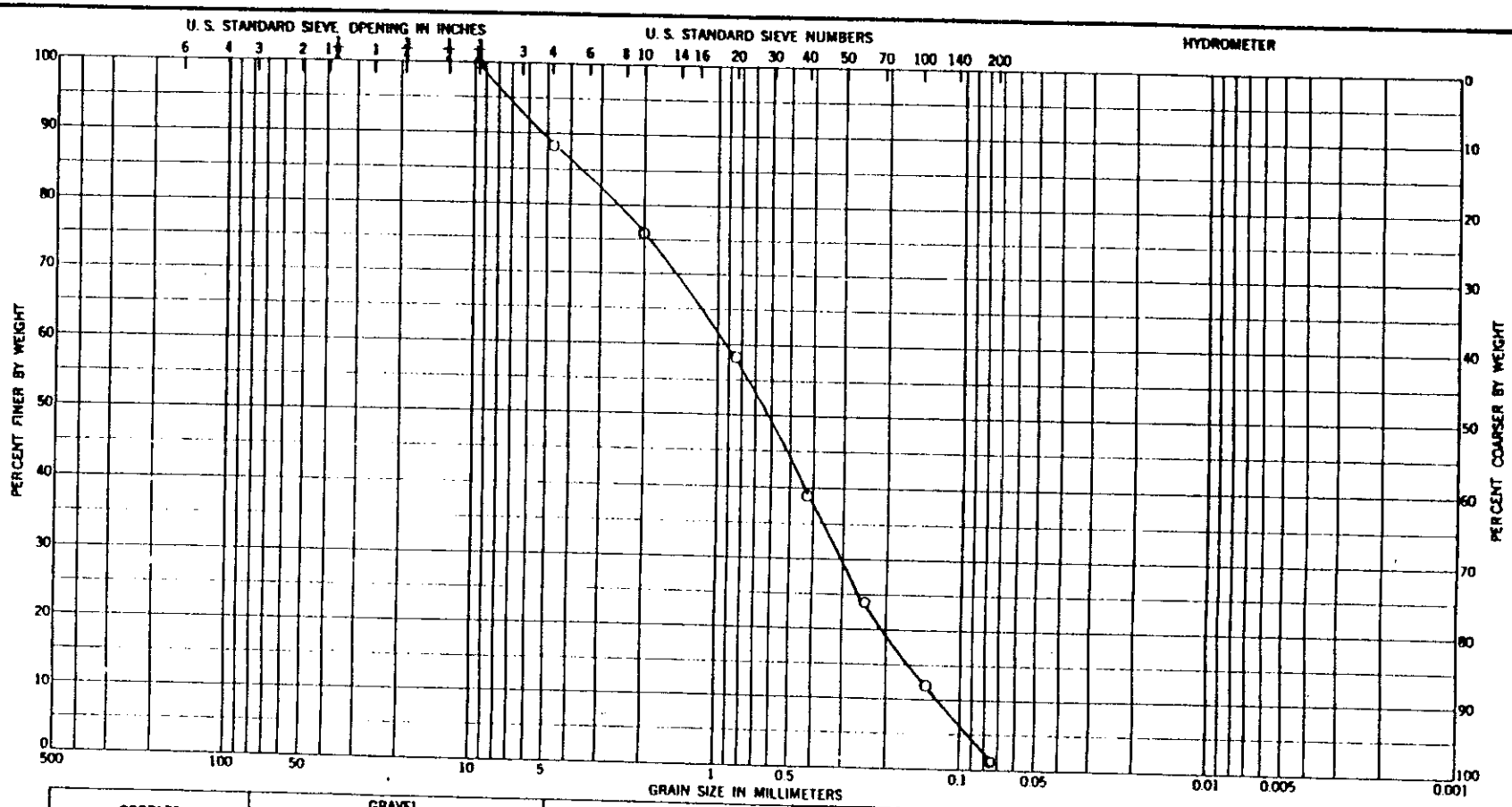
Project Clemson Lower Dam
Lab No. 146/4065
Area -
Boring No. PF-128, Sample No. 9
Date 27 May 1980

ENG FORM 1 MAY 83 2087

46

DEPARTMENT OF THE ARMY, SOUTH ATLANTIC DIVISION LABORATORY
CORPS OF ENGINEERS, 611 SOUTH COBB DRIVE, MARIETTA, GA. 30061

WORK ORDER NO. 2305
Req. No. SAS EN FS 80-125



Sample No.	Depth	Visual Classification	Nat w %	LL	PL	PI
11	48.0-49.5'	Tan poorly graded sand (SP) w/a little weathered rock fragments	4.2	NP	NP	NP

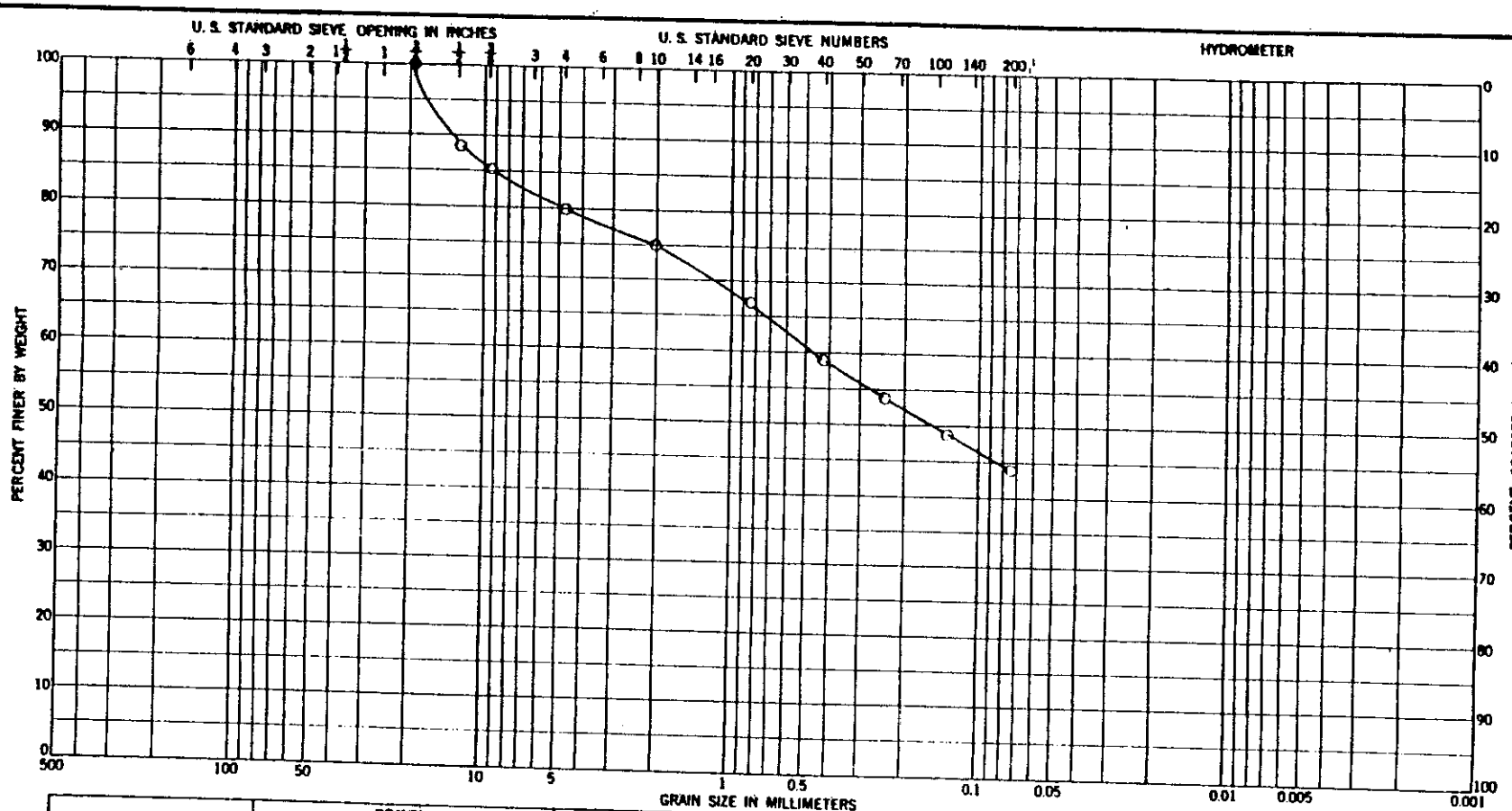
Project Clemson Lower Dam
Lab No. 146/4067
Area -
Boring No. PF-128, Sample No. 11
Date 27 May 1980

GRADATION CURVES

ENG FORM 1 MAY 63 2087

DEPARTMENT OF THE ARMY, SOUTH ATLANTIC DIVISION LABORATORY
CORPS OF ENGINEERS, 611 SOUTH COBB DRIVE, MARIETTA, GA. 30061

WORK ORDER NO. 2305
Req. No. SAS EN FS 80-125



Sample No.	Depth	Visual Classification	Nat w %	LL	PL	PI
9	24.0-25.5'	Reddish brown silty sand (SM) w/some weathered rock fragments	12.8	NP	NP	NP

Project: Clemson Lower Dam
Lab No. 146/4077
Area: -
Boring No. PF-131, Sample No. 9
Date: 27 May 1980

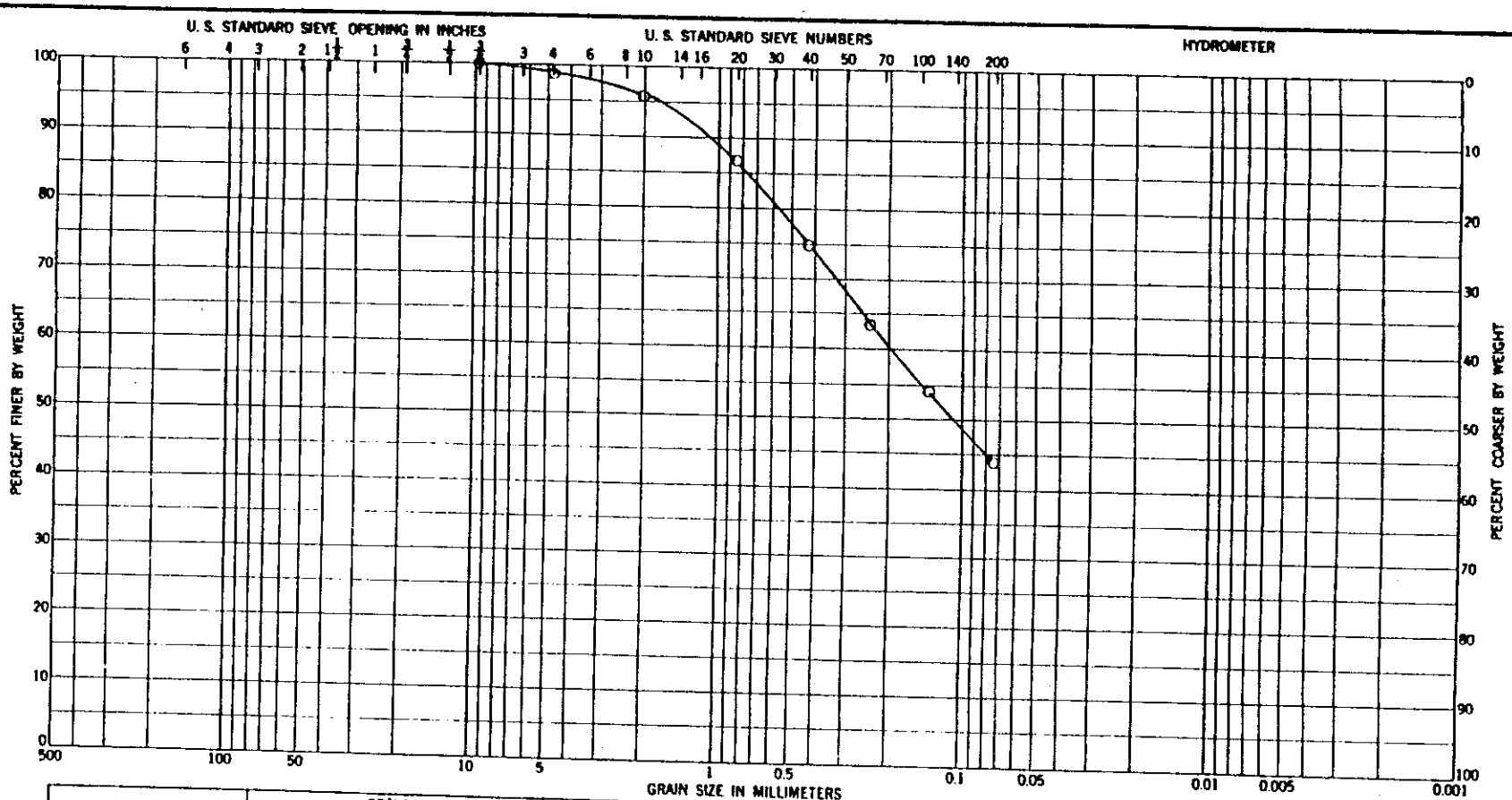
GRADATION CURVES

ENG FORM 1 MAY 63 2087

50

DEPARTMENT OF THE ARMY, SOUTH ATLANTIC DIVISION LABORATORY
CORPS OF ENGINEERS, 611 SOUTH COBB DRIVE, MARIETTA, GA. 30061

WORK ORDER NO. 2305
Req. No. SAS EN FS 80-125



Sample No.	Depth	Classification	Nat w %	LL	PL	PI
11	27.0-28.5'	Dark brown clayey sand (SC) w/a trace of mica & gravel	29.2	38*	24	14*
		* Plots near "A" line				

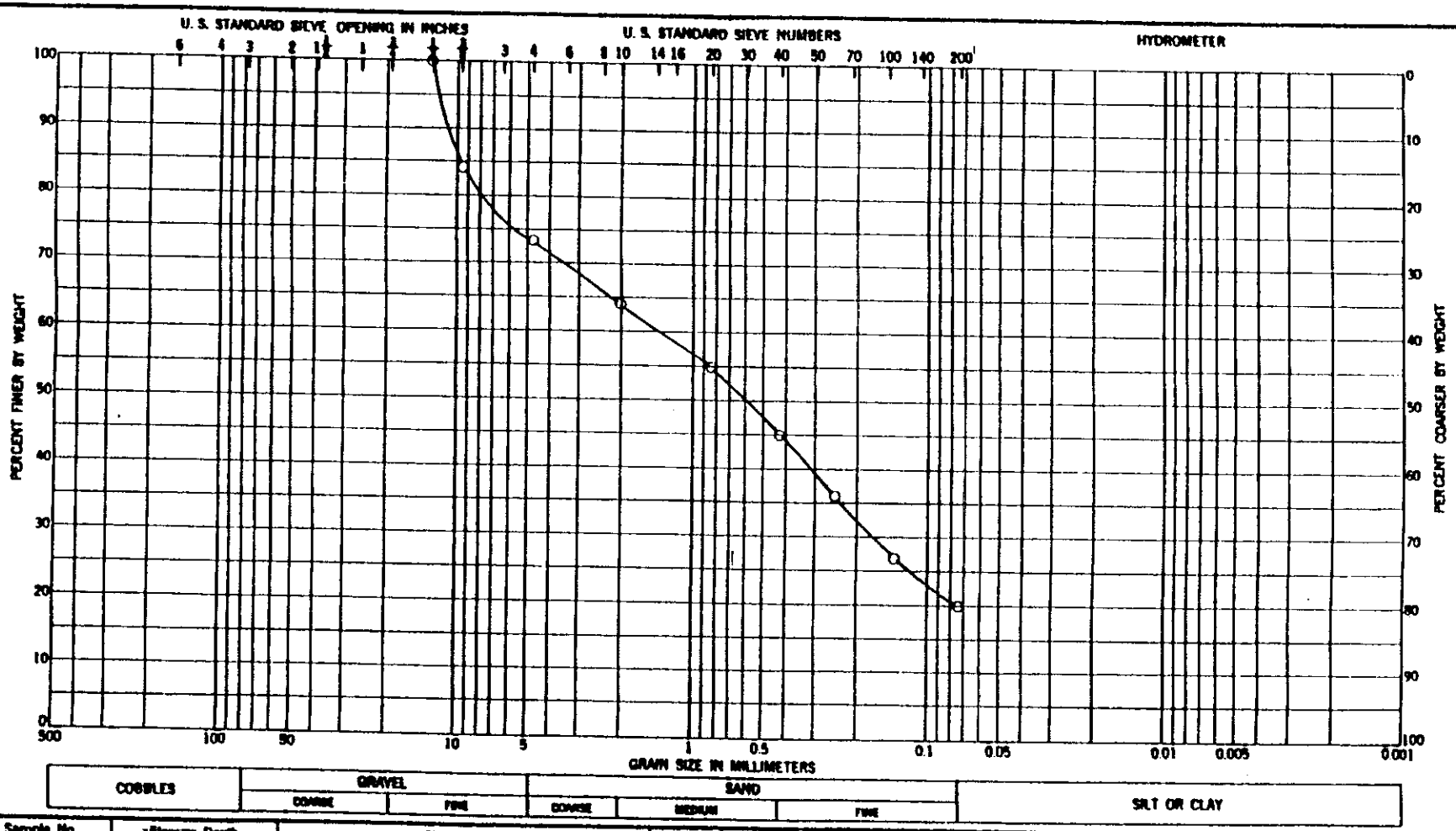
GRADATION CURVES

Project Clemson Lower Dam
Lab No. 146/4079
Area -
Boring No. PF-131, Sample No. 11
Date 27 May 1980

ENG FORM 1 MAY 63 2087

DEPARTMENT OF THE ARMY, SOUTH ATLANTIC DIVISION LABORATORY
CORPS OF ENGINEERS, 611 SOUTH COBB DRIVE, MARIETTA, GA. 30061

WORK ORDER NO. 2305
Req. No. EN-FS-80-125, Change #4



Sample No.	Depth	Classification	Nat w %	LL	PL	PI
10	37.5-39.0'	Light brown silty sand (SM) with some gravel and a trace of mica	12.4	26	25	1

Project: Clemson Lower Dam
Lab No. 146/4176
Area: --
Boring No.: PF-136, Sample No. 10
Date: 23 September 1980

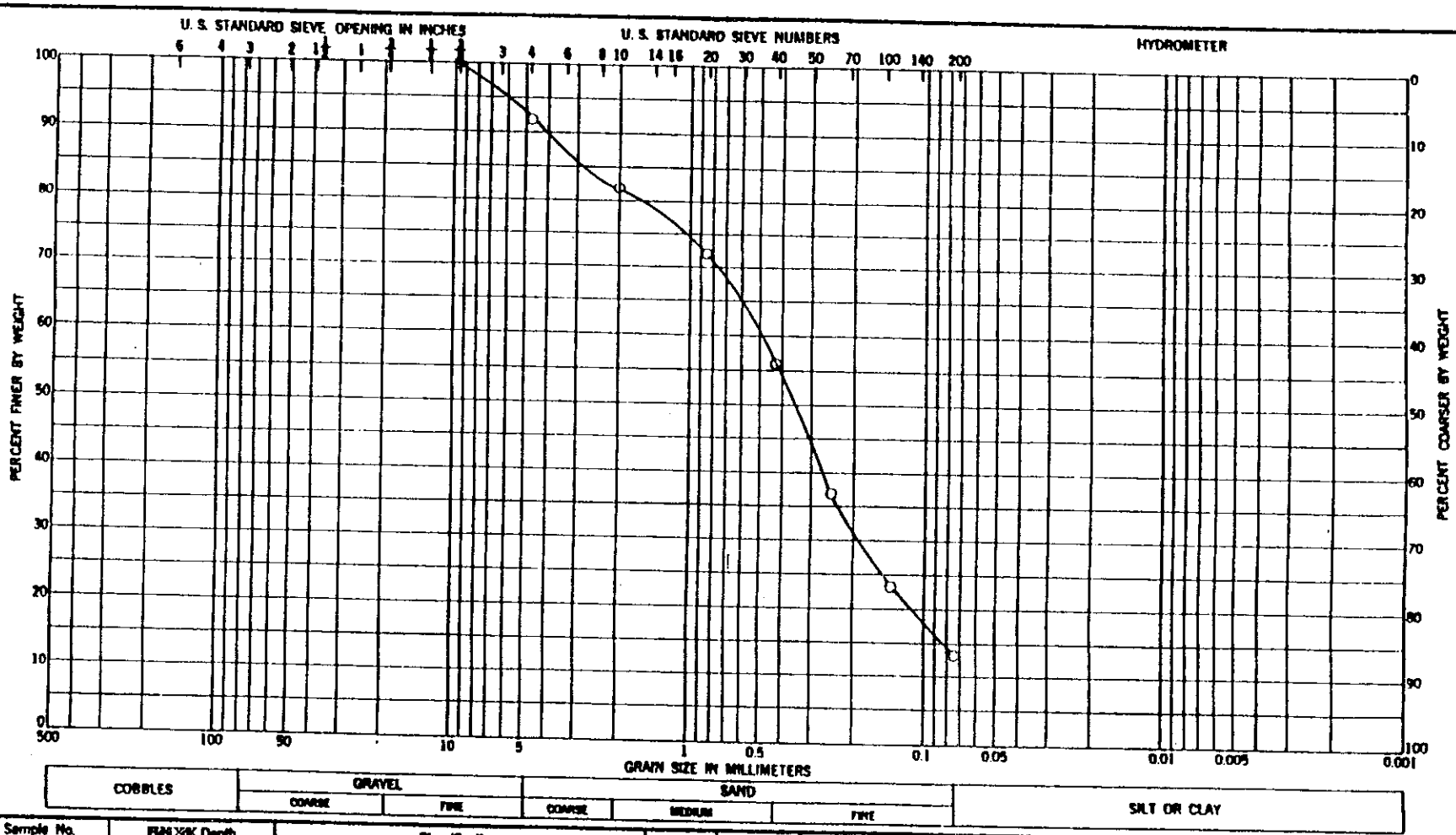
GRADATION CURVES

ENG FORM MAY 68 2087

54

DEPARTMENT OF THE ARMY, SOUTH ATLANTIC DIVISION LABORATORY
CORPS OF ENGINEERS, 611 SOUTH COBB DRIVE, MARIETTA, GA. 30061

WORK ORDER NO. 2305
Req. No. EN-FS-80-125, Change #4



Sample No.	Elev. or Depth	Classification	Nat w %	LL	PL	PI
11	46.5-48.0'	Light brown silty sand (SM) with a trace of gravel (approximately 70% mica)	15.3	NP	NP	NP

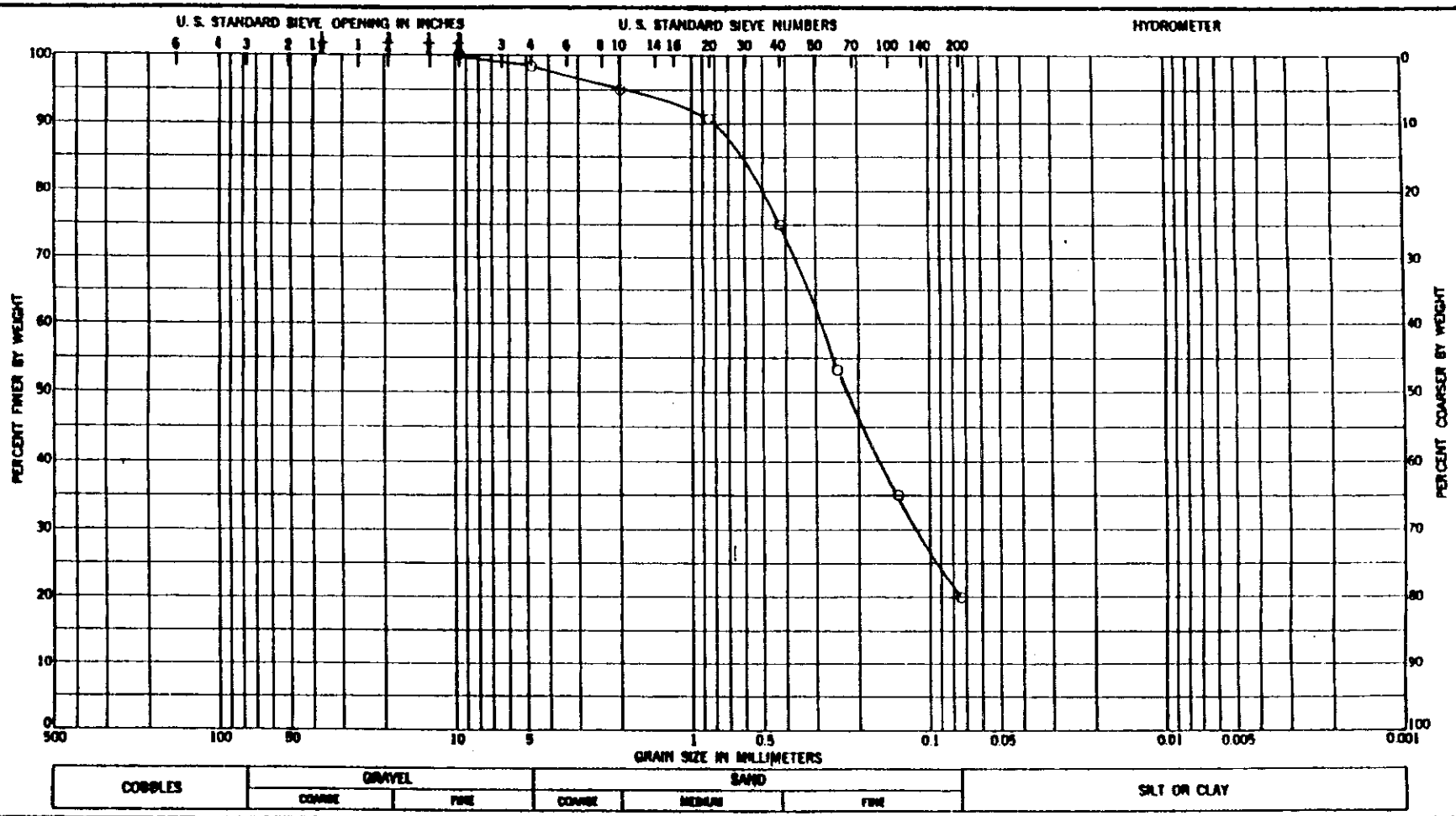
Project Clemson Lower Dam
Lab No. 146/4177
Area -
Boring No. PF-136, Sample No. 11
Date 23 September 1980

GRADATION CURVES

ENG FORM 1 MAY 63 2087

DEPARTMENT OF THE ARMY, SOUTH ATLANTIC DIVISION LABORATORY
CORPS OF ENGINEERS, 611 SOUTH COBB DRIVE, MARIETTA, GA. 30061

WORK ORDER NO. 2305
Req. No. EN-FS-80-125, Change #4



Sample No.	Elev. or Depth	Classification	Nat w %	LL	PL	PI
12	48.0-49.5'	Light brown silty sand (SM) with a trace of gravel and some mica	10.3	43	35	8

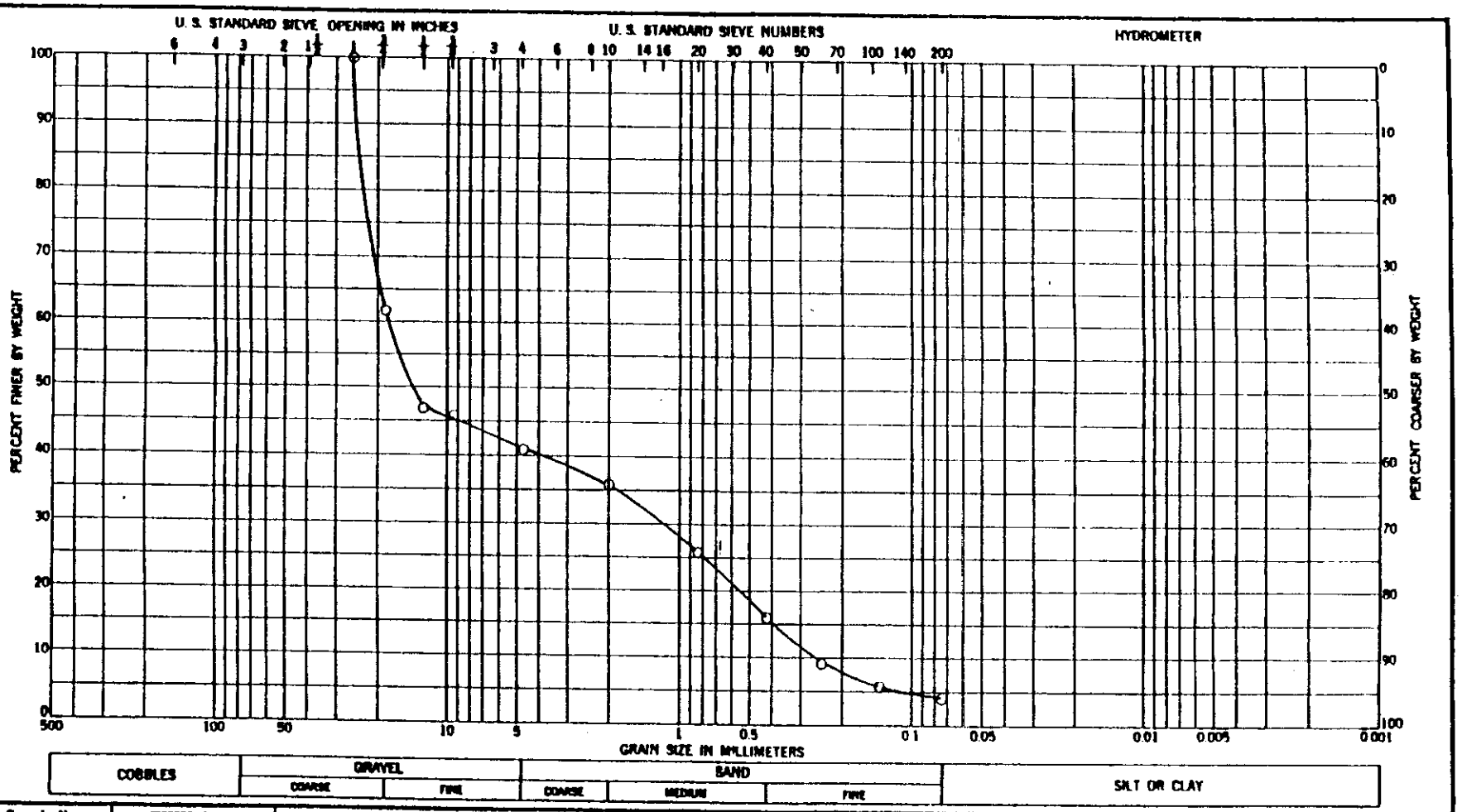
Project Clemson Lower Dam
Lab No. 146/4178
Area -
Boring No. PF-136, Sample No. 12
Date 23 September 1980

GRADATION CURVES

ENG FORM 1 MAY 68 2087

DEPARTMENT OF THE ARMY, SOUTH ATLANTIC DIVISION LABORATORY
CORPS OF ENGINEERS, 611 SOUTH COBB DRIVE, MARIETTA, GA. 30061

WORK ORDER NO. 2305
Req. No. EN-FS-80-125, Change #4



Sample No.	Elev. or Depth	Classification	Nat w %	LL	PL	PI
8	43.5-45.0'	Tan poorly graded gravel (GP)	8.8	NP	NP	NP

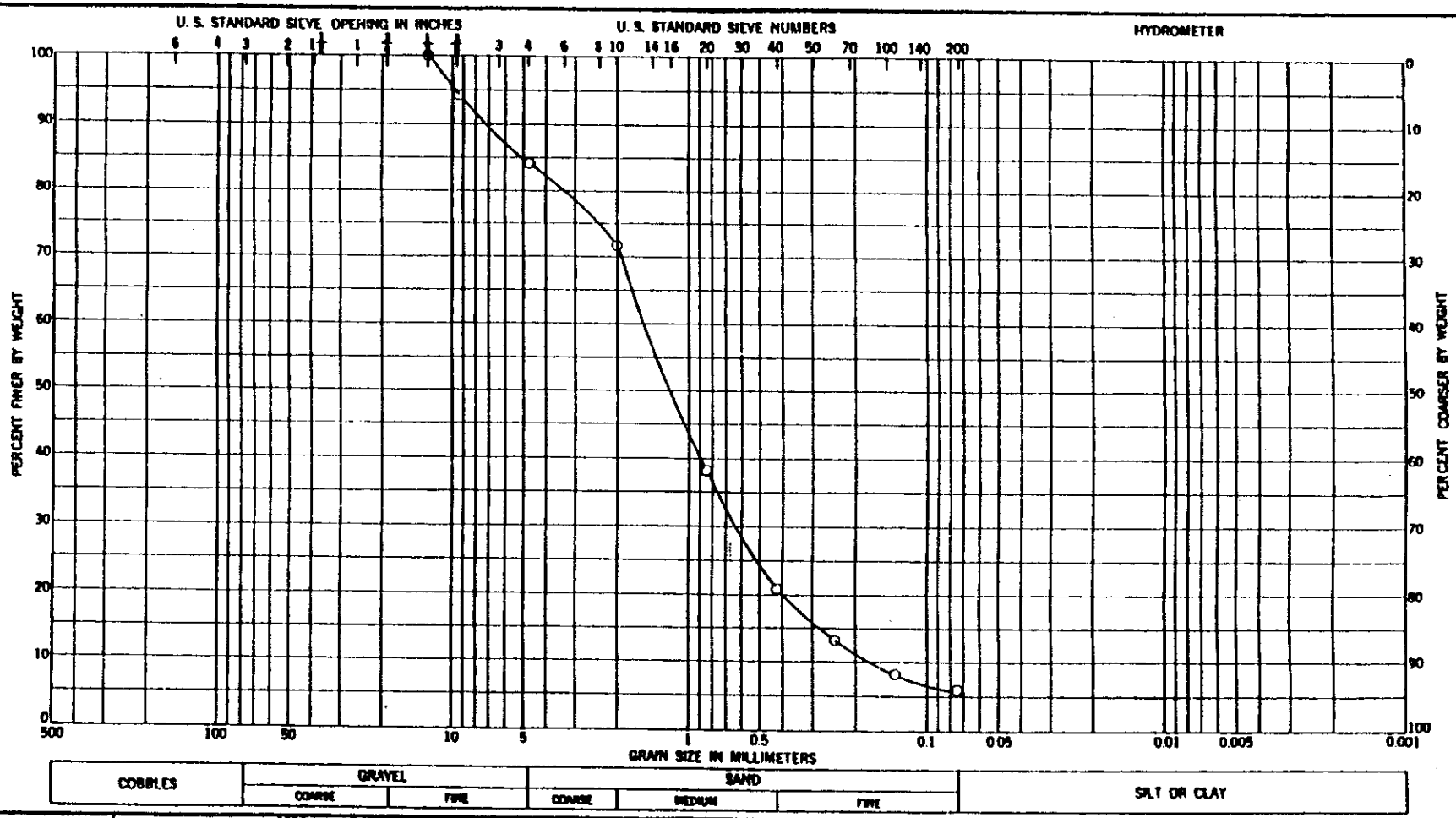
Project: Clemson Lower Dam
Lab No. 146/4238
Area: --
Boring No.: PW-1, Sample No. 8
Date: 23 September 1980

GRADATION CURVES

ENG FORM 1 MAY 65 2087

DEPARTMENT OF THE ARMY, SOUTH ATLANTIC DIVISION LABORATORY
CORPS OF ENGINEERS, 611 SOUTH COBB DRIVE, MARIETTA, GA. 30061

WORK ORDER NO. 2305
Req. No. EN-FS-80-125, Change #4



Sample No.	Elev/or Depth	Visual Classification	Nat w %	LL	PL	PI
9	45.0-46.5'	Brown poorly graded silty sand (SP-SM) with a little gravel	11.9	NP	NP	NP

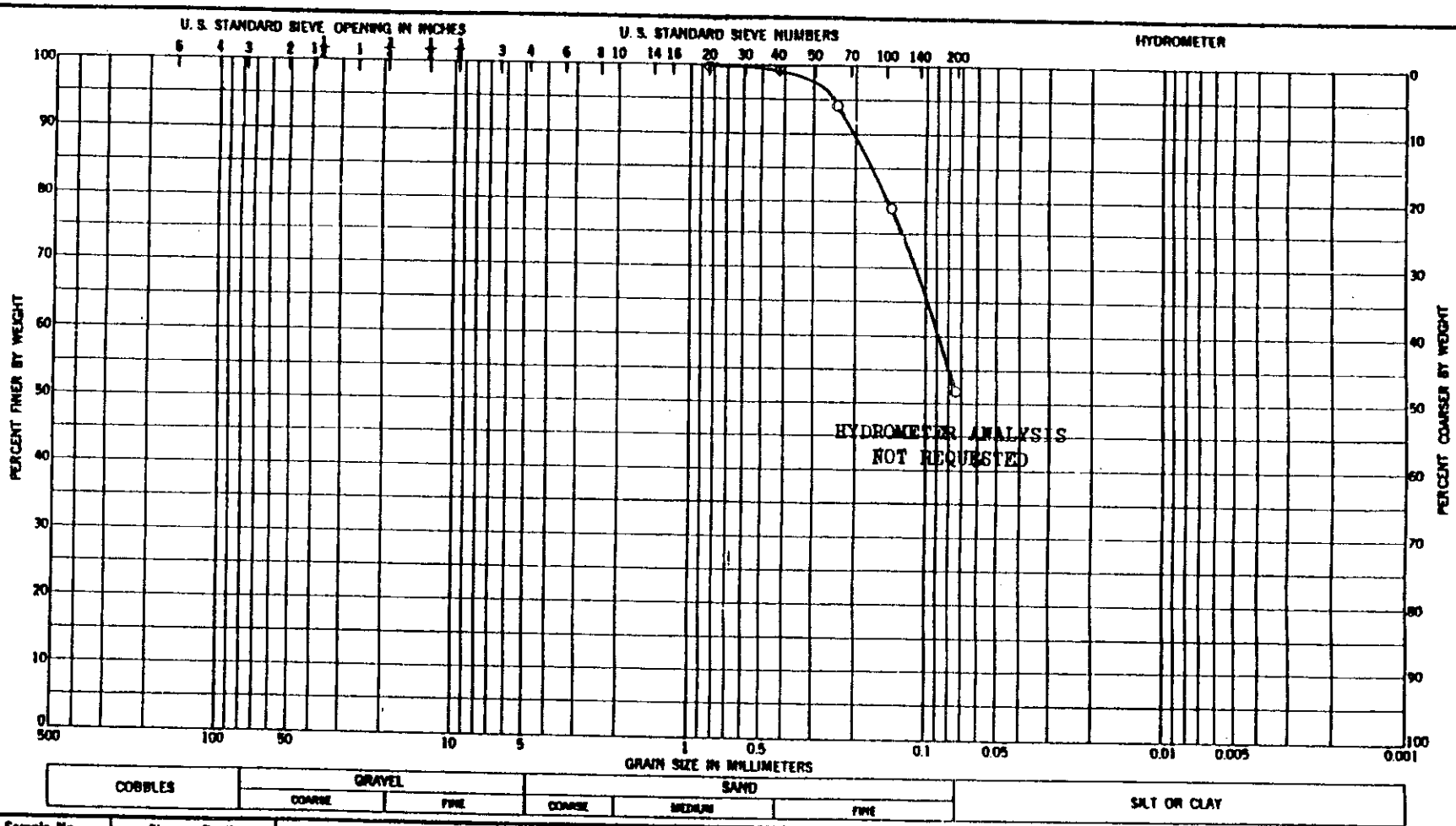
Project Clemson Lower Dam
Lab No. 146/4239
Area --
Boring No. PW-1, Sample No. 9
Date 23 September 1980

GRADATION CURVES

ENG FORM 1 MAY 69 2087

DEPARTMENT OF THE ARMY, SOUTH ATLANTIC DIVISION LABORATORY
CORPS OF ENGINEERS, 611 SOUTH COBB DRIVE, MARIETTA, GA. 30061

WORK ORDER NO. 2305
Req. No. EN-FS-80-125, Change #4



Sample No.	Depth	Classification	Nat w %	LL	PL	PI
9	25.5-27.0'	Tan sandy, inorganic silt, low LL (ML)	23.7	30	24	6

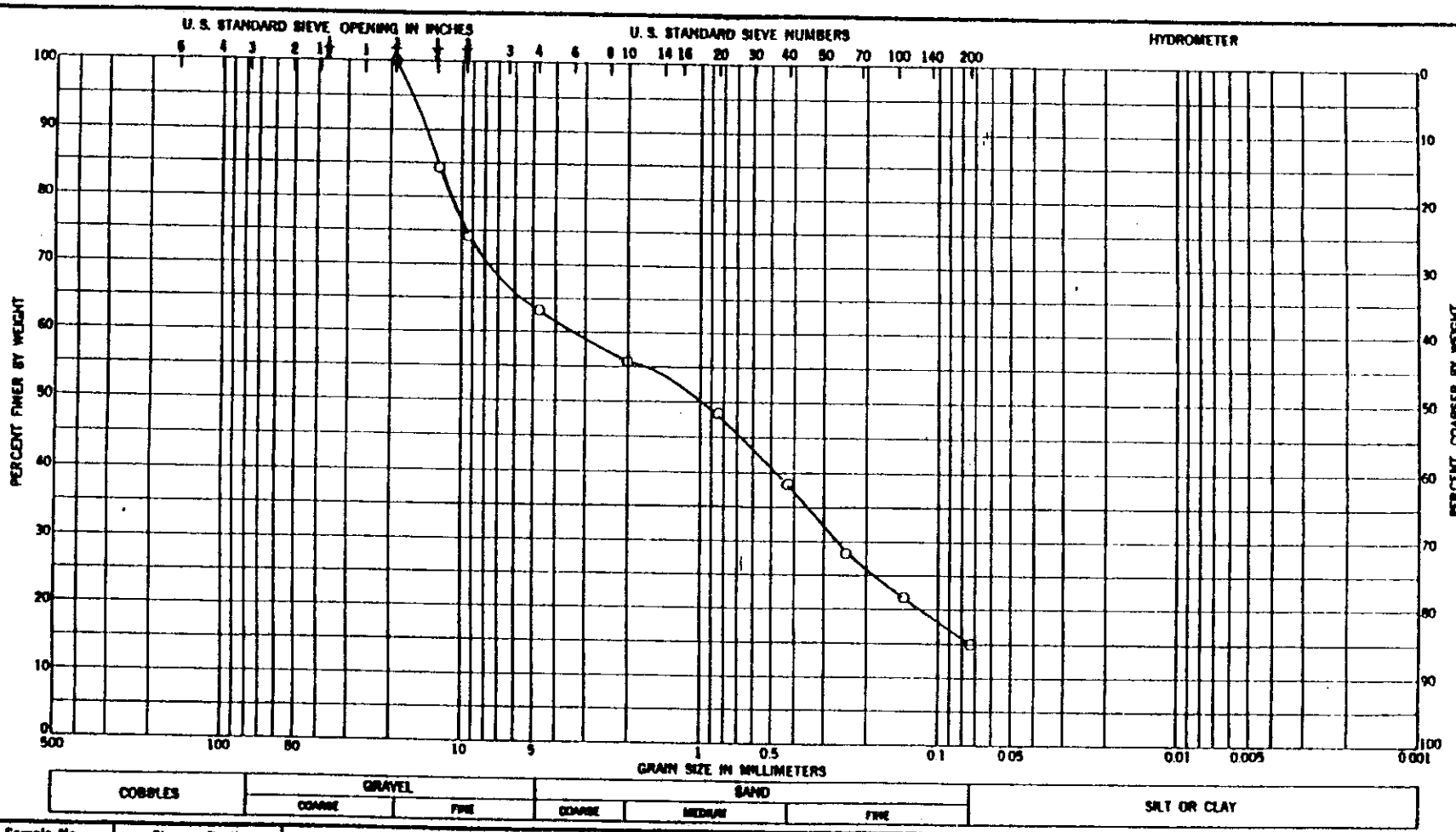
Project Clemson Lower Dam
Lab No. 146/4248
Area -
Boring No. PW-2, Sample No. 9
Date 23 September 1980

GRADATION CURVES

ENG FORM 1 MAY 68 2087

DEPARTMENT OF THE ARMY, SOUTH ATLANTIC DIVISION LABORATORY
CORPS OF ENGINEERS, 611 SOUTH COBB DRIVE, MARIETTA, GA. 30061

WORK ORDER NO. 2305
Req. No. EN-FS-80-125, Change #4



Sample No.	Size or Depth	Visual Classification	Nat w %	LL	PL	PI
12	46.5-48.0'	Tan gravelly silty sand (SM)	10.8	NP	NP	NP

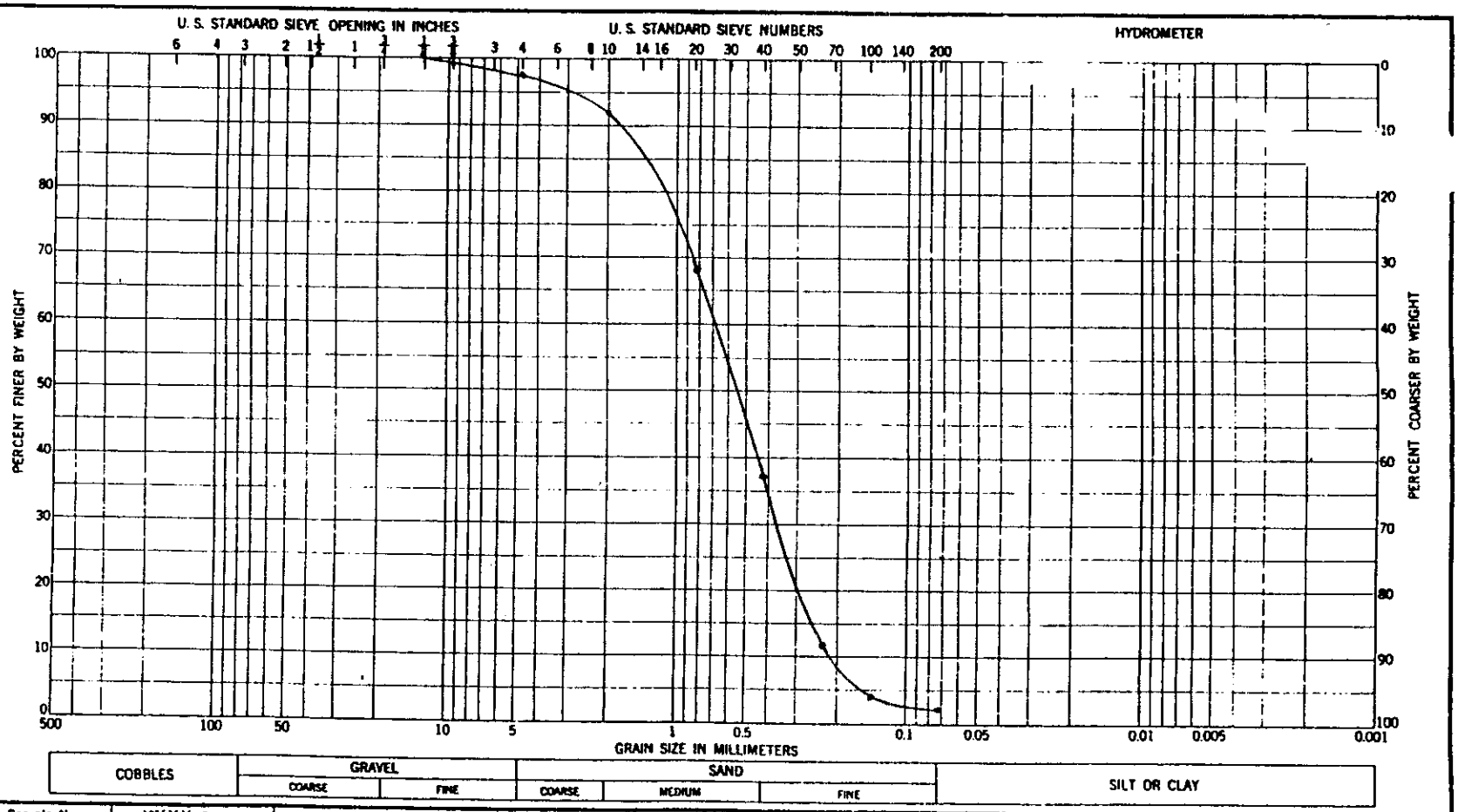
Project: Clemson Lower Dam
Lab No 146/4251
Area: -
Boring No. PW-2, Sample No. 12
Date: 23 September 1980

GRADATION CURVES

ENG FORM 1 MAY 63 2087

DEPARTMENT OF THE ARMY, SOUTH ATLANTIC DIVISION LABORATORY
CORPS OF ENGINEERS, 611 SOUTH COBB DRIVE, MARIETTA, GA. 30061

WORK ORDE
Req. No. SAS 0-125, CH #4



Sample No.	~~Elev.~~ Depth	Classification	Nat w %	LL	PL	PI
1	44.0' - 43.2'	Tan poorly graded sand (SP) w/a trace of gravel	7.4	NP	NP	NP

Project: Hartwell Lake
Clemson Lower Dam
Lab. No. 146/4165

Area: ---

Boring No. PF-128, Sample No. 1

Date: 23 September 1980

GRADATION CURVES

ENG FORM 1 MAY 63 2087

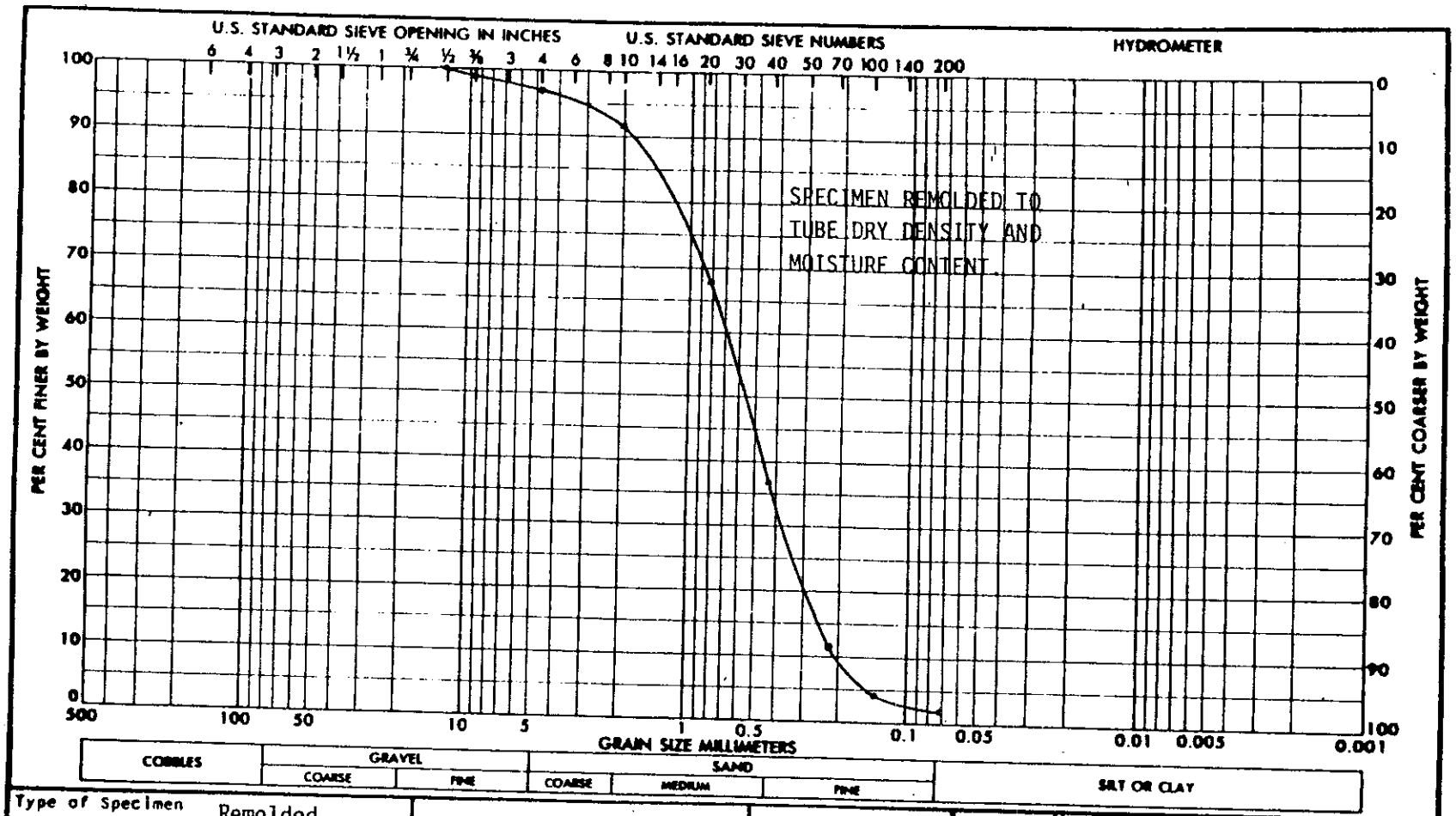
* R̄ & Permeability Tests

193

2.

DEPARTMENT OF THE ARMY, SOUTH ATLANTIC DIVISION LABORATORY,
CORPS OF ENGINEERS, 611 SOUTH COBB DRIVE, MARIETTA, GA. 30061

WORK ORDER NO. 2305
REQ. NO. SAS-ENG-FS-80-125, CH #4



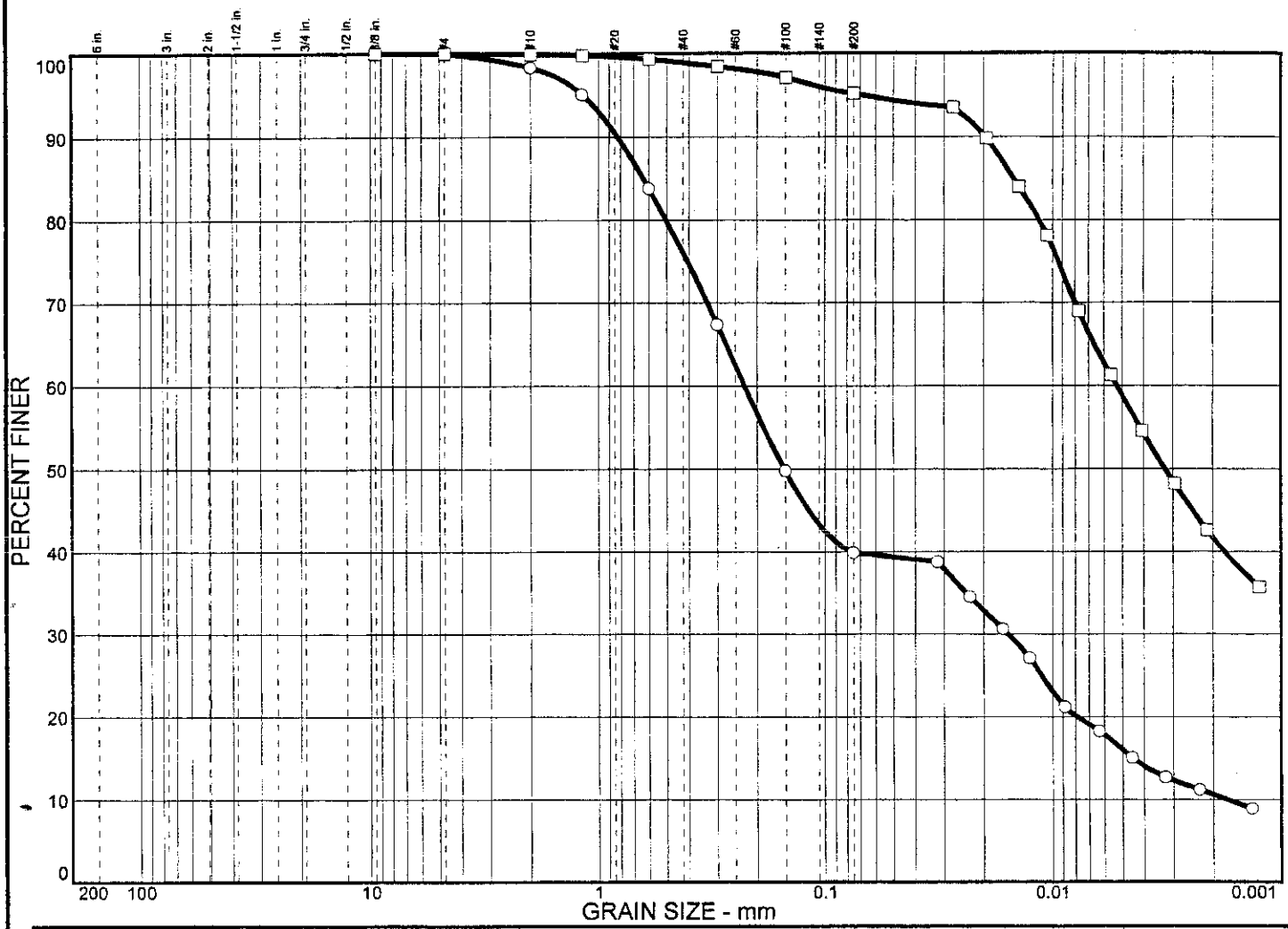
Type of Specimen	Remolded	Before Test		After Test		PROJECT	Hartwell Lake Clemson Lower Dam Lab. No. 146/4165
Diam 1.52 in.	Ht 2.50 in.	Water Content, w_o	6.9 %	w_f	28.6 %		
Classification	Tan, poorly graded sand (SP) w/trace of gravel	Void Ratio, e_o	.779	e_f	.779	AREA	---
LL NP	G_s 2.72	Saturation, S_o	24.1 %	S_f	100.0 %	BORING NO. PF-128	SAMPLE NO. 1
PL NP	D_{10} 0.21 mm	Dry Density, γ_d	95.4 lb/ft³	K_{20}	5.7 X10⁻⁴ cm/sec	DATE 23 September 80	DEPTH 41.0'-43.2'

Variable/Constant Head **PERMEABILITY TEST REPORT**

SAD FORM 1971
21 JULY 1964

B1.2 – Upper Dam Grain Size Distribution Analyses

GRAIN SIZE DISTRIBUTION TEST REPORT



	% + 3"	% GRAVEL	% SAND	% SILT	% CLAY
○	0.0	0.0	60.1	39.9	
□	0.0	0.0	4.8	95.2	

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			0.635	0.227	0.151	0.0157	0.0045	0.0017	0.63	131.16
□	56	32	0.0149	0.0053	0.0032					

MATERIAL DESCRIPTION	USCS	AASHTO
○ Silty SAND	SM	
□ Elastic SILT	MH	

Project No. 01282 **Client:** US Army Corps of Engineers Savannah District

Project: Design of Seismic Remediation for Clemson Diversion Dams

○ **Source:** CUD-601 **Sample No.:** S1 **Elev./Depth:** 15.0-16.5 ft.

□ **Source:** CUD-601 **Sample No.:** S8(new) **Elev./Depth:** 25.5-27.0 ft.

Remarks:

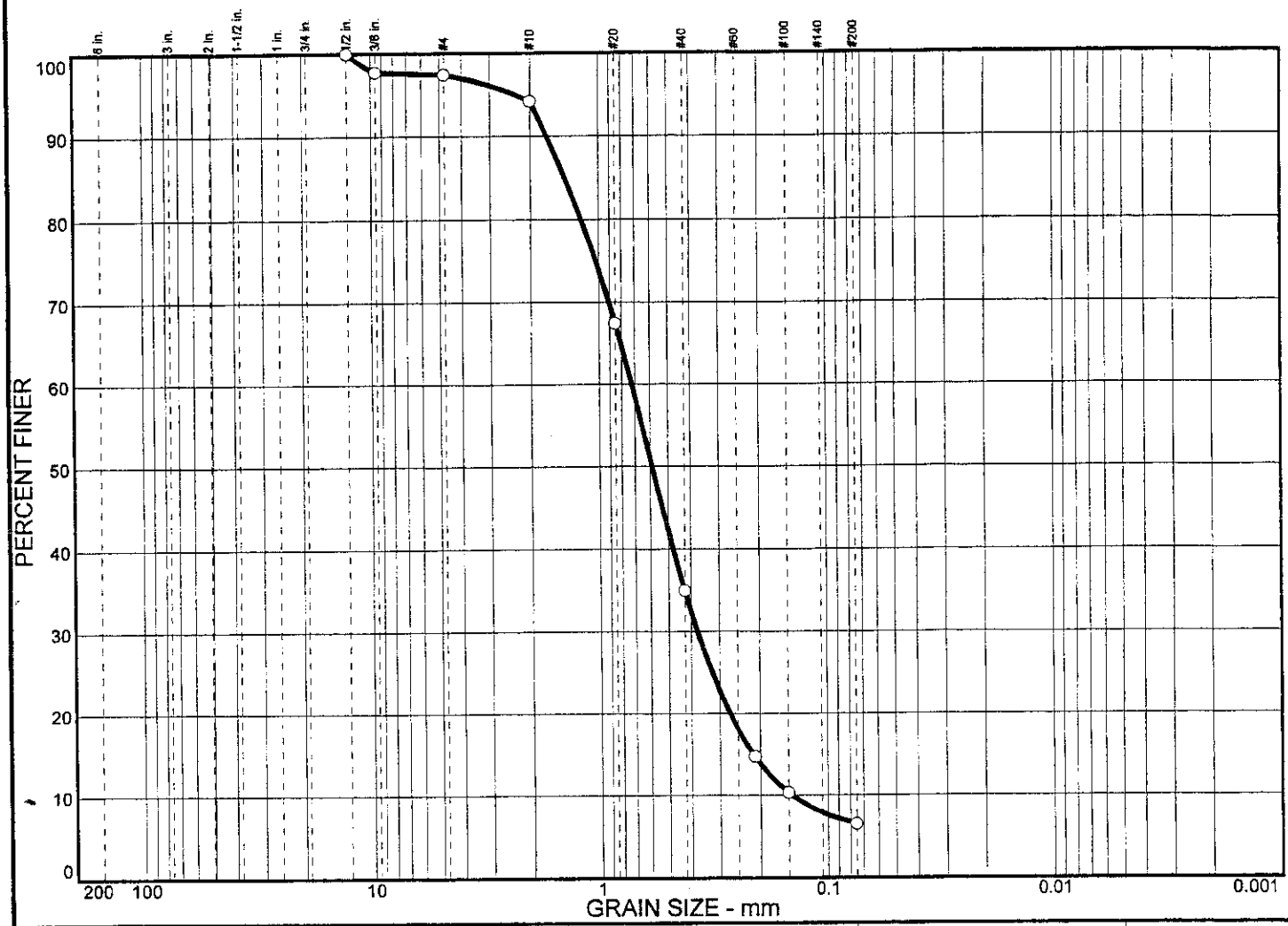
○ ASTM D422, Sample Received on 12/10/01, Tech. Responsibility: T. Moline.

□ ASTM D422, Sample Received on 12/10/01, Tech. Responsibility: T. Moline.

GEI Consultants, Inc.

Fig.

GRAIN SIZE DISTRIBUTION TEST REPORT



	% + 3"	% GRAVEL	% SAND	% SILT	% CLAY
○	0.0	2.6	90.9	6.5	

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			1.41	0.722	0.588	0.374	0.214	0.145	1.33	4.97

MATERIAL DESCRIPTION	USCS	AASHTO
○ Narrowly graded SAND with silt	SP-SM	

Project No. 01282 **Client:** US Army Corps of Engineers Savannah District

Project: Design of Seismic Remediation for Clemson Diversion Dams

○ **Source:** CUD-602 **Sample No.:** S12 **Elev./Depth:** 31.5-33.0 ft.

Remarks:

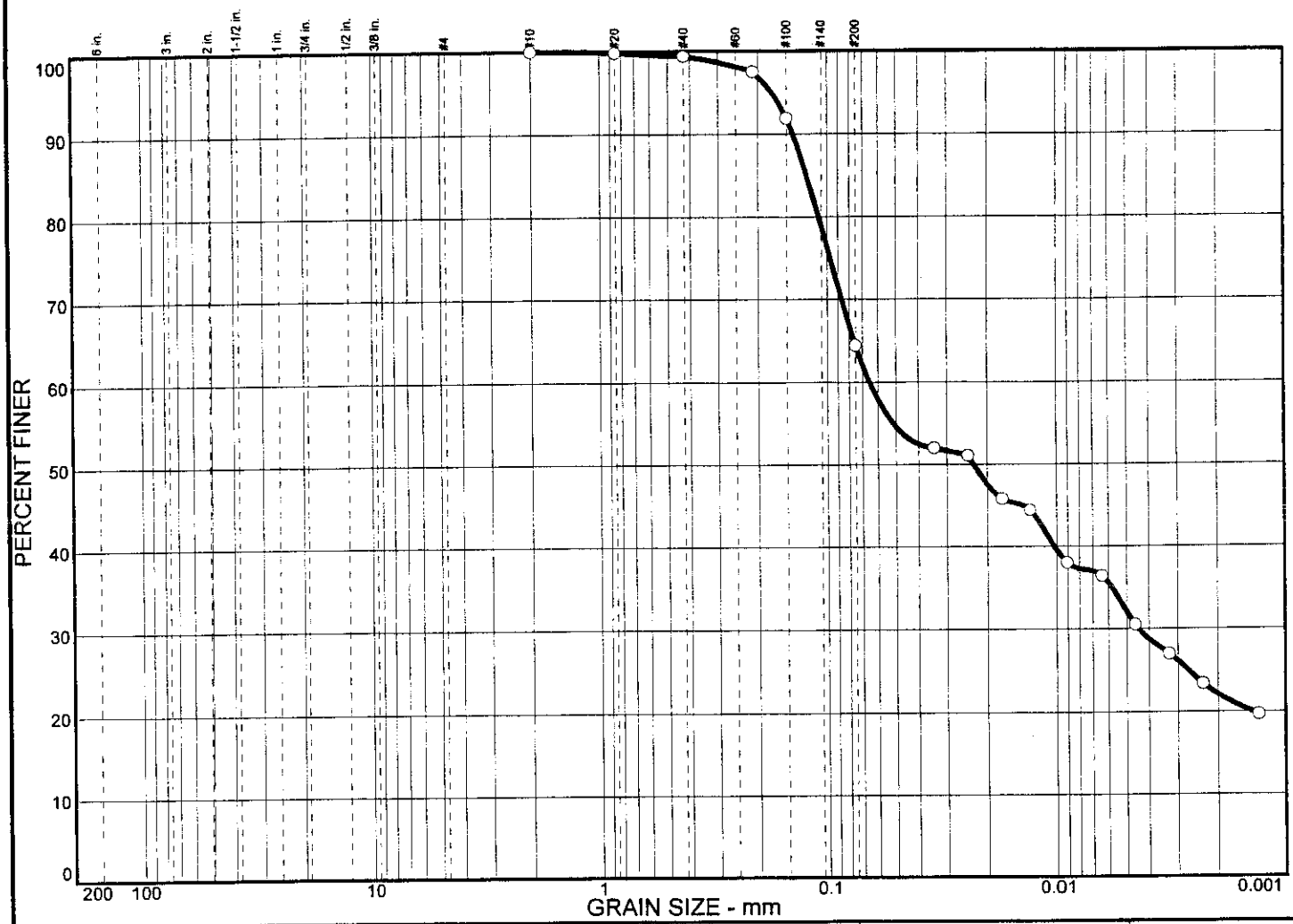
○ ASTM D422, Sample Received on 12/10/01,

Tech. Responsibility: T. Moline.

GEI Consultants, Inc.

Fig.

GRAIN SIZE DISTRIBUTION TEST REPORT



	% + 3"	% GRAVEL	% SAND	% SILT	% CLAY
○	0.0	0.0	35.5	64.5	

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	NV	NP	0.122	0.0649	0.0229	0.0044				

MATERIAL DESCRIPTION	USCS	AASHTO
○ Sandy SILT	ML	

Project No. 01282 **Client:** US Army Corps of Engineers Savannah District

Project: Design of Seismic Remediation for Clemson Diversion Dams

○ **Source:** CUD-604 **Sample No.:** S7 **Elev./Depth:** 24.0-25.5 ft.

Remarks:

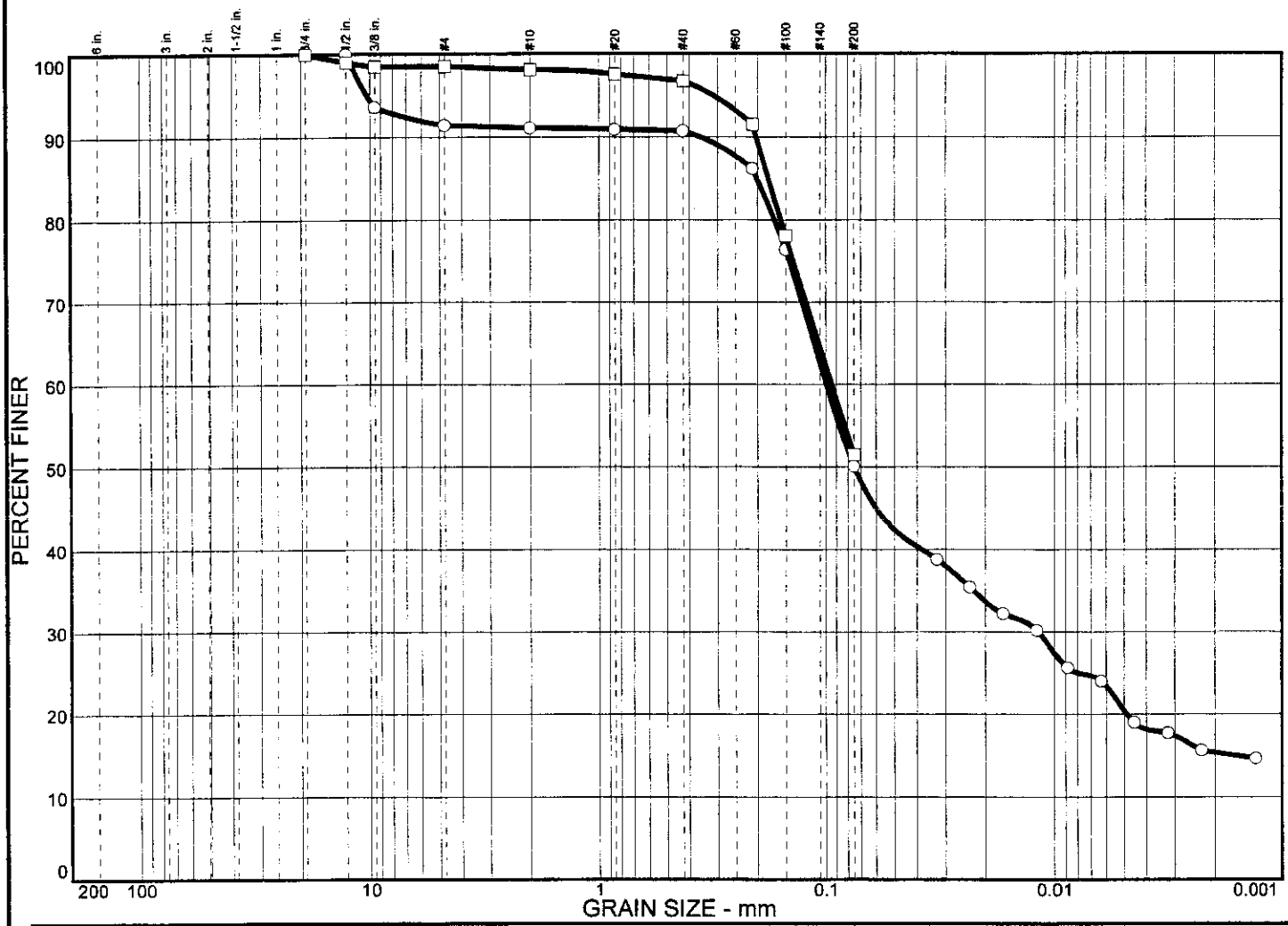
○ ASTM D422, Sample Received on 12/10/01,

Tech. Responsibility: T. Moline.

GEI Consultants, Inc.

Fig.

GRAIN SIZE DISTRIBUTION TEST REPORT



	% + 3"	% GRAVEL	% SAND	% SILT	% CLAY
○	0.0	8.6	41.3	50.1	
□	0.0	1.5	47.0	51.5	

X	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	NV	NP	0.200	0.0991	0.0747	0.0117	0.0016			
□			0.178	0.0939						

MATERIAL DESCRIPTION	USCS	AASHTO
○ Sandy SILT	ML	
□ Sandy SILT	ML	

Project No. 01282 **Client:** US Army Corps of Engineers Savannah District

Project: Design of Seismic Remediation for Clemson Diversion Dams

○ **Source:** CUD-605 **Sample No.:** S3 **Elev./Depth:** 23.5-25.0 ft.

□ **Source:** CUD-605 **Sample No.:** S8 **Elev./Depth:** 31.0-32.5 ft.

Remarks:

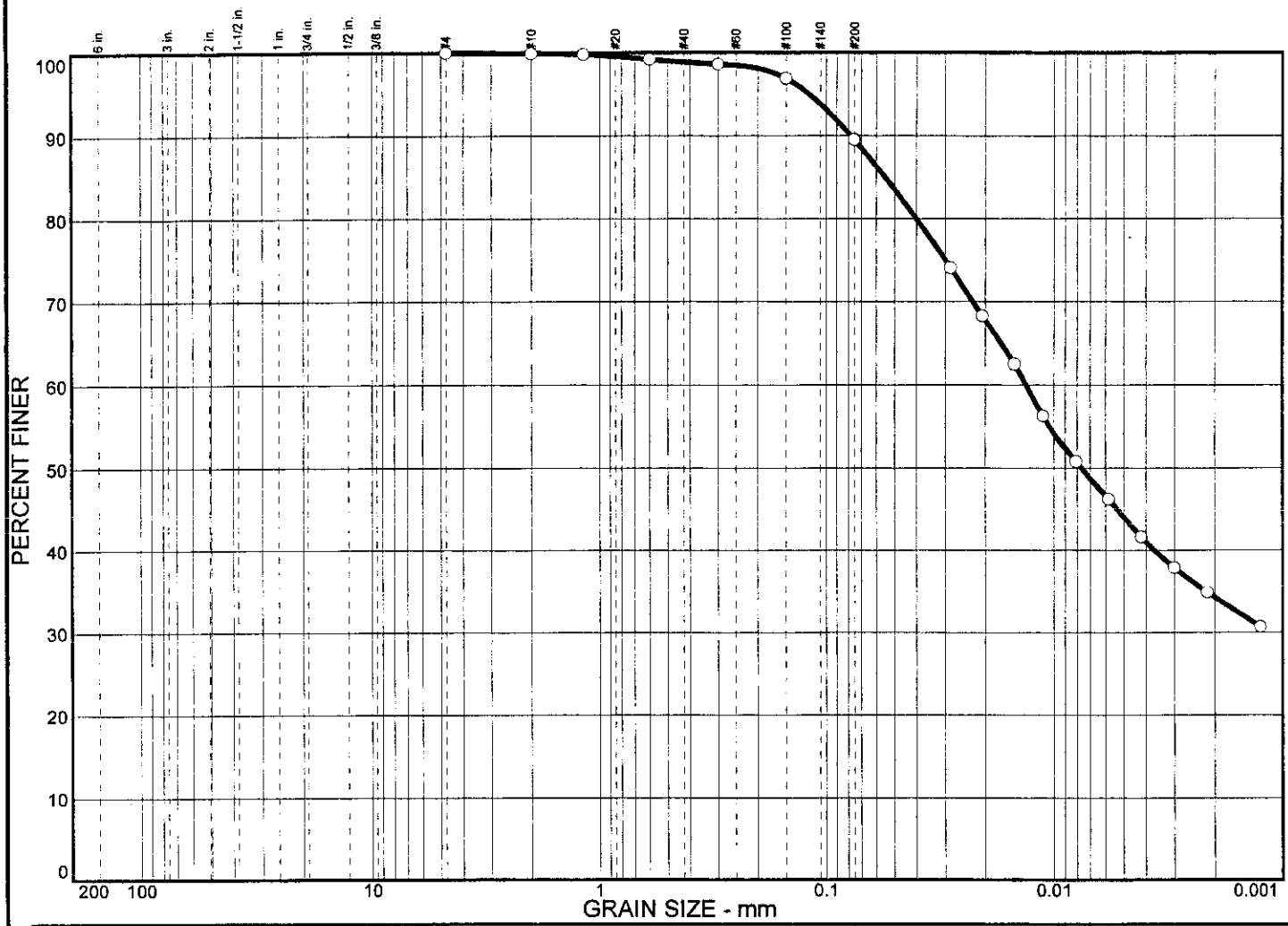
○ ASTM D422, Sample Received on 12/10/01, Tech. Responsibility: T. Moline.

□ ASTM D422, Sample Received on 12/10/01, Tech. Responsibility: T. Moline.

GEI Consultants, Inc.

Fig.

GRAIN SIZE DISTRIBUTION TEST REPORT



	% + 3"	% GRAVEL	% SAND	% SILT	% CLAY
○	0.0	0.0	10.5	89.5	

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	42	25	0.0548	0.0133	0.0076					

MATERIAL DESCRIPTION	USCS	AASHTO
○ Lean CLAY	CL	

Project No. 01282 **Client:** US Army Corps of Engineers Savannah District

Project: Design of Seismic Remediation for Clemson Diversion Dams

○ **Source:** CUD-609 **Sample No.:** S7Top 12" **Elev./Depth:** 29.0-30.4 ft.

Remarks:

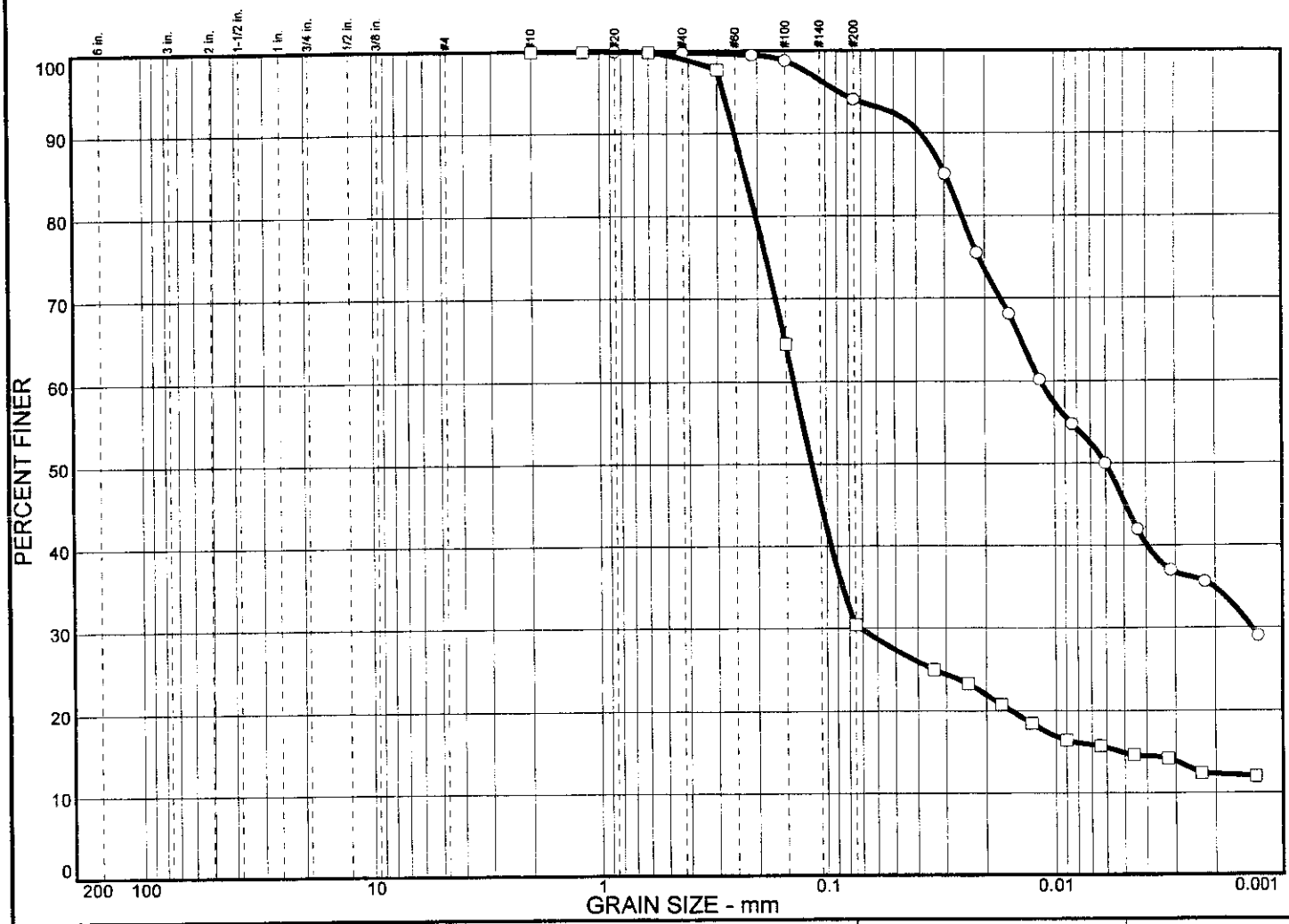
○ ASTM D422, Sample Received on 12/10/01,

Tech. Responsibility: T. Moline.

GEI Consultants, Inc.

Fig.

GRAIN SIZE DISTRIBUTION TEST REPORT



	% + 3"	% GRAVEL	% SAND	% SILT	% CLAY
○	0.0	0.0	5.9	94.1	
□	0.0	0.0	69.6	30.4	

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	43	27	0.0297	0.0114	0.0060	0.0014				
□	25	NP	0.226	0.138	0.116	0.0713	0.0052			

MATERIAL DESCRIPTION	USCS	AASHTO
○ SILT	ML	
□ Silty SAND	SM	

Project No. 01282 **Client:** US Army Corps of Engineers Savannah District

Project: Design of Seismic Remediation for Clemson Diversion Dams

○ **Source:** CUD-610 **Sample No.:** S12 **Elev./Depth:** 31.5-33.0 ft

□ **Source:** CUD-610 **Sample No.:** S15 **Elev./Depth:** 36.0-37.5ft

Remarks:

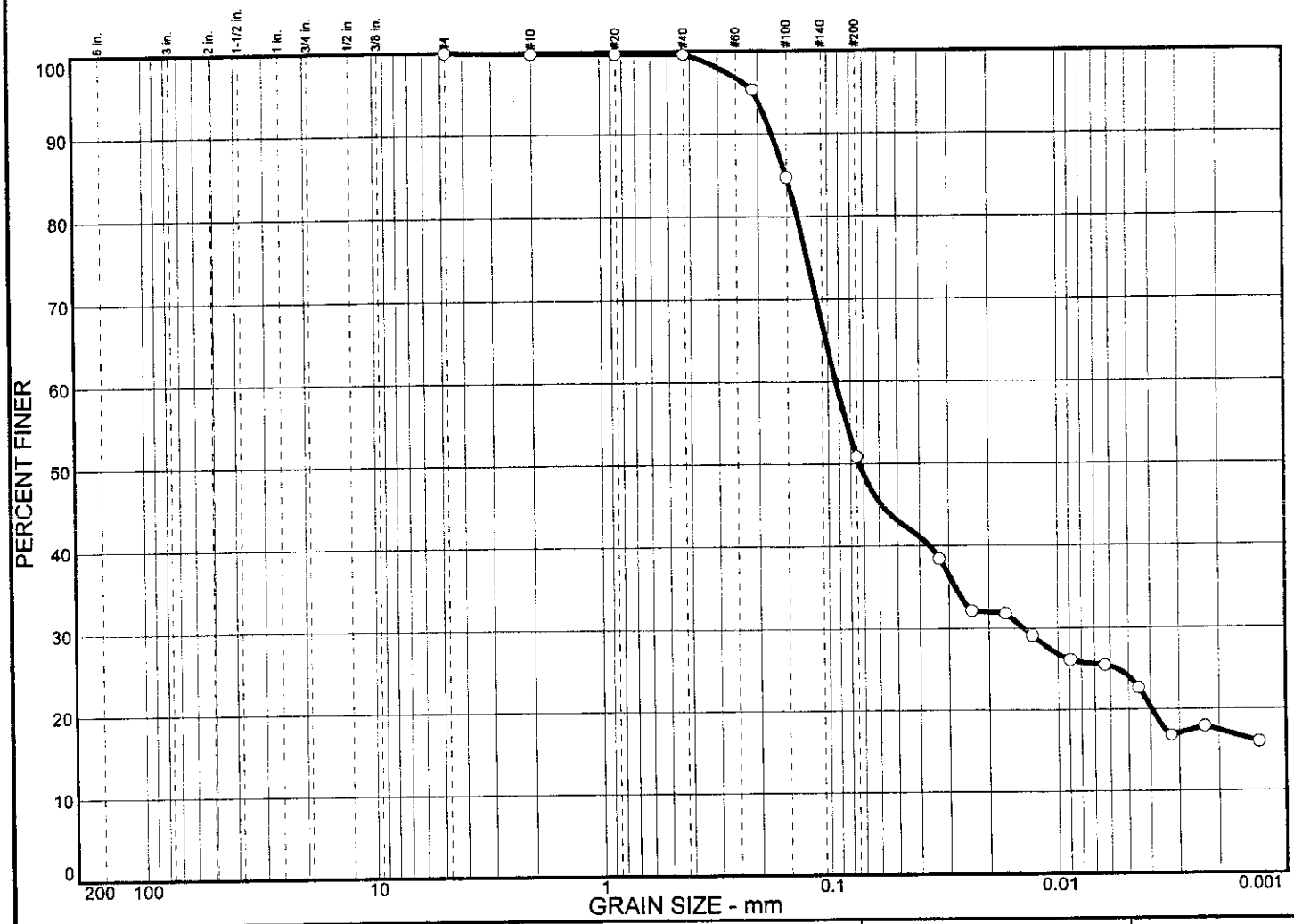
○ ASTM D422, Sample Received on 12/10/01, Tech. Responsibility: T. Moline.

□ ASTM D422, Sample Received on 12/10/01, Tech. Responsibility: T. Moline.

GEI Consultants, Inc.

Fig.

GRAIN SIZE DISTRIBUTION TEST REPORT



	% + 3"	% GRAVEL	% SAND	% SILT	% CLAY
○	0.0	0.0	49.1	50.9	

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	28	25	0.151	0.0925	0.0730	0.0141				

MATERIAL DESCRIPTION	USCS	AASHTO
○ Sandy Organic SILT	OL	

Project No. 01282 **Client:** US Army Corps of Engineers Savannah District

Project: Design of Seismic Remediation for Clemson Diversion Dams

○ **Source:** CUD-621A **Sample No.:** T2 **Elev./Depth:** 24-26 ft.

Remarks:

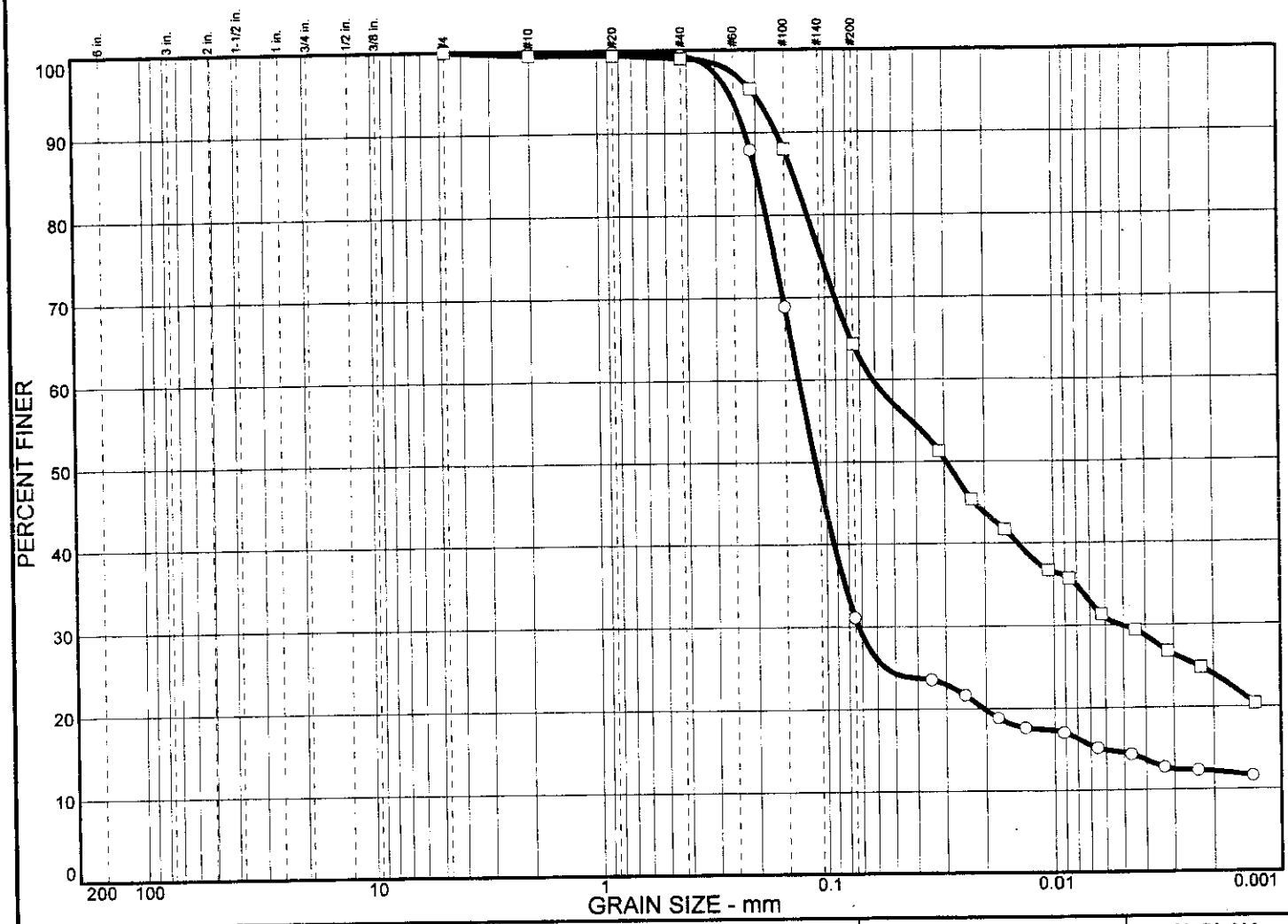
○ ASTM D422, Sample Received on 12/10/01,

Tech. Responsibility: T. Moline.

GEI Consultants, Inc.

Fig.

GRAIN SIZE DISTRIBUTION TEST REPORT



	% + 3"	% GRAVEL	% SAND	% SILT	% CLAY
○	0.0	0.0	68.9	31.1	
□	0.0	0.0	35.6	64.4	

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	NV	NP	0.197	0.131	0.111	0.0724	0.0063			
□	37	29	0.136	0.0611	0.0294	0.0051				

MATERIAL DESCRIPTION	USCS	AASHTO
○ Silty SAND	SM	
□ Sandy Organic SILT	OL	

Project No. 01282 **Client:** US Army Corps of Engineers Savannah District

Project: Design of Seismic Remediation for Clemson Diversion Dams

○ **Source:** CUD-622A **Sample No.:** T4 **Elev./Depth:** 21-23 ft.

□ **Source:** CUD-622A **Sample No.:** T5(1 of 2) **Elev./Depth:** 23-25 ft.

Remarks:

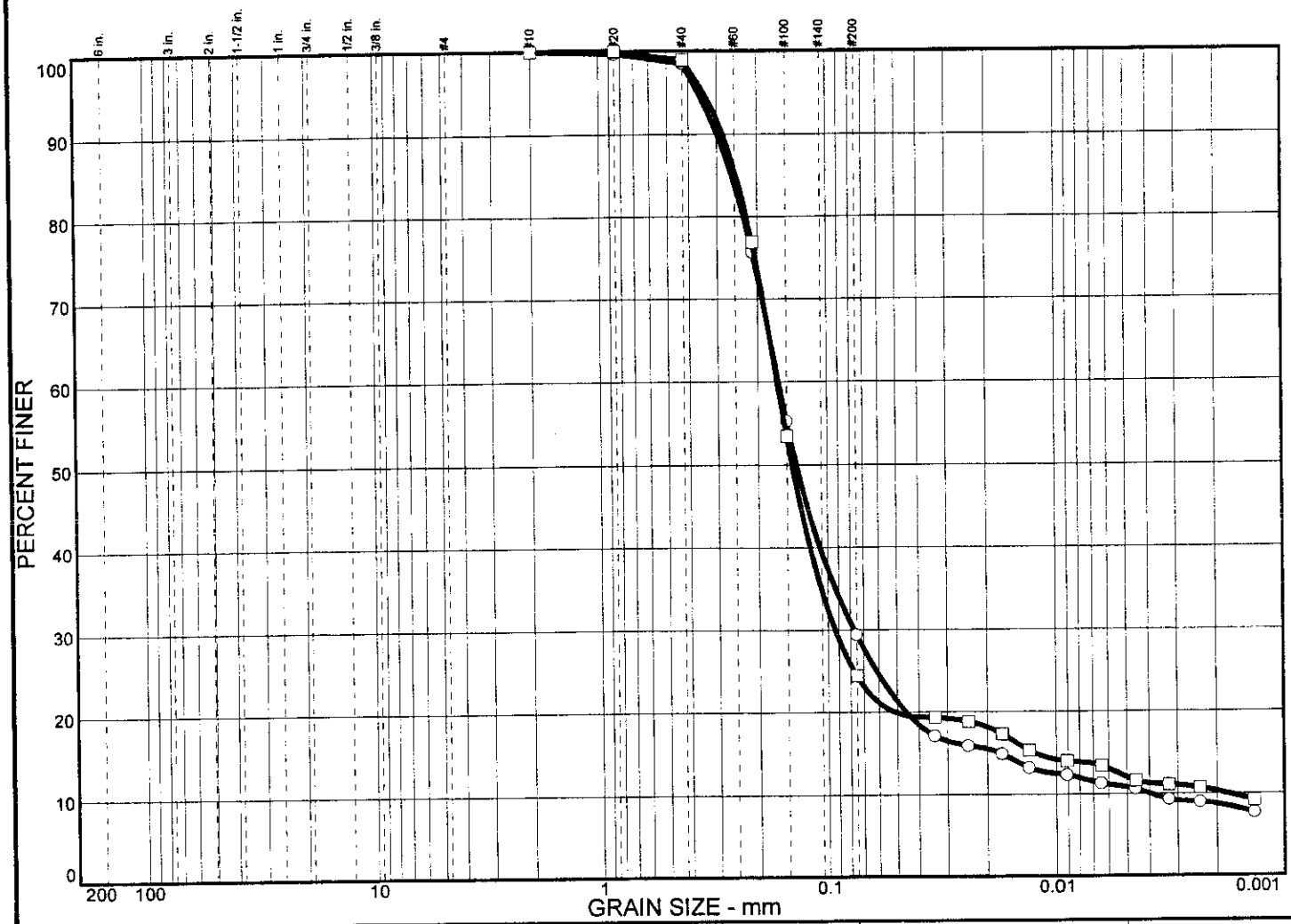
○ ASTM D422, Sample Received on 12/10/01, Tech. Responsibility: T. Moline.

□ ASTM D422, Sample Received on 12/10/01, Tech. Responsibility: T. Moline.

GEI Consultants, Inc.

Fig.

GRAIN SIZE DISTRIBUTION TEST REPORT



	% + 3"	% GRAVEL	% SAND	% SILT	% CLAY
○	0.0	0.0	70.6	29.4	
□	0.0	0.0	75.6	24.4	

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			0.257	0.162	0.136	0.0769	0.0176	0.0039	9.24	41.16
□			0.246	0.165	0.142	0.0929	0.0125	0.0018	29.42	92.25

MATERIAL DESCRIPTION	USCS	AASHTO
○ Silty SAND	SM	
□ Silty SAND	SM	

Project No. 01282 **Client:** US Army Corps of Engineers Savannah District

Project: Design of Seismic Remediation for Clemson Diversion Dams

○ **Source:** CUD-623A **Sample No.:** T2 **Elev./Depth:** 28-30 ft.

□ **Source:** CUD-623A **Sample No.:** T4(1 of 2) **Elev./Depth:** 32-34 ft.

Remarks:

○ ASTM D422, Sample Received on 12/10/01, Tech. Responsibility: T. Moline.

□ ASTM D422, Sample Received on 12/10/01, Tech. Responsibility: T. Moline.

GEI Consultants, Inc.

Fig.

GRAIN SIZE DISTRIBUTION TEST REPORT

	% + 3"	% GRAVEL	% SAND	% SILT	% CLAY
○	0.0	0.0	27.5	72.5	
□	0.0	0.0	42.7	57.3	

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	39	23	0.140	0.0216	0.0091	0.0014				
□	29	21	0.169	0.0821	0.0547	0.0091				

MATERIAL DESCRIPTION	USCS	AASHTO
○ Lean CLAY with sand	CL	
□ Sandy lean CLAY	CL	

Project No. 01282 **Client:** US Army Corps of Engineers Savannah District

Project: Design of Seismic Remediation for Clemson Diversion Dams

○ **Source:** CUD-624A **Sample No.:** T3(1 of 2) **Elev./Depth:** 28-29 ft.

□ **Source:** CUD-624A **Sample No.:** T3(2 of 2) **Elev./Depth:** 29-30 ft.

Remarks:

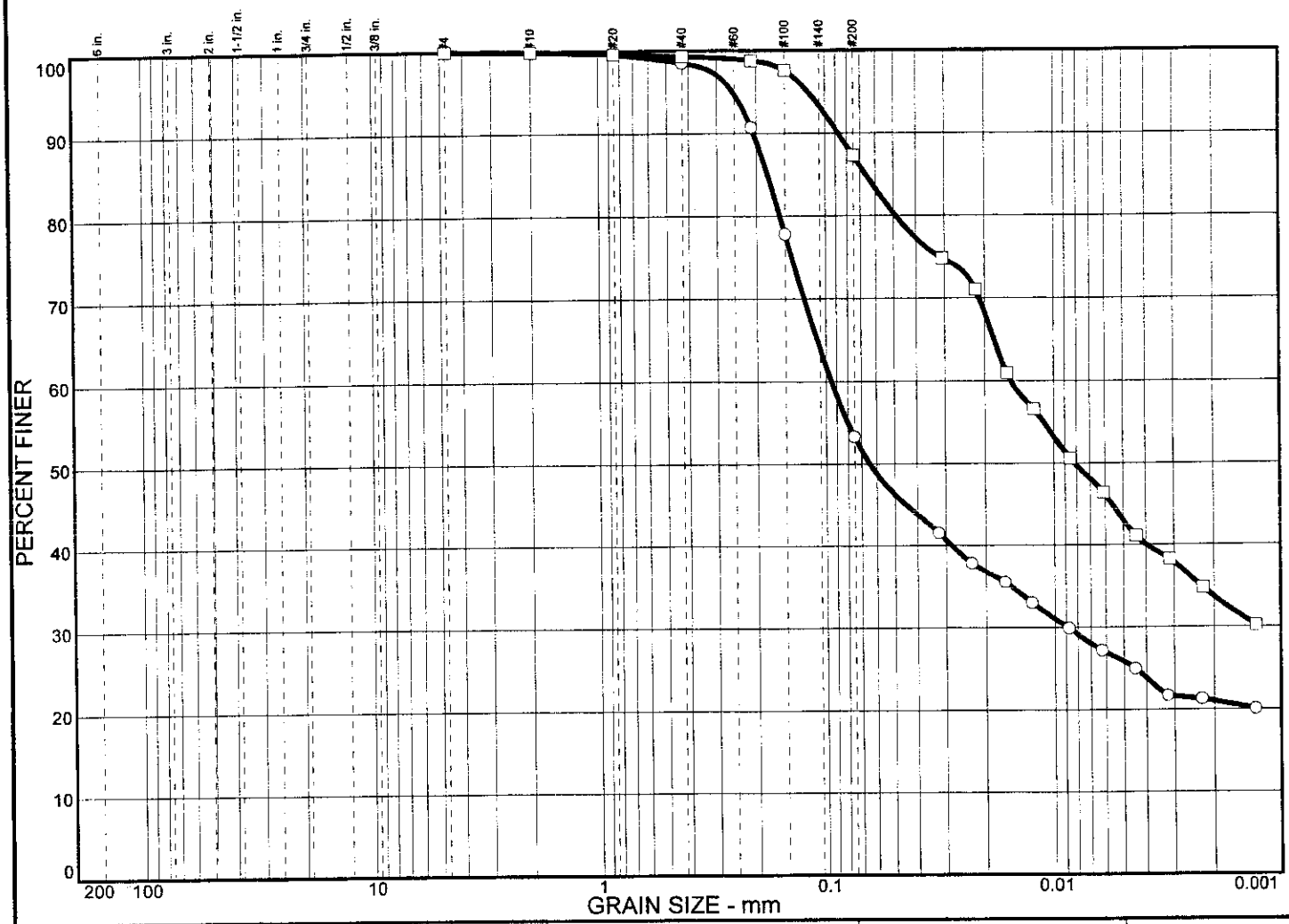
○ ASTM D422, Sample Received on 12/10/01, Tech. Responsibility: T. Moline.

□ ASTM D422, Sample Received on 12/10/01, Tech. Responsibility: T. Moline.

GEI Consultants, Inc.

Fig.

GRAIN SIZE DISTRIBUTION TEST REPORT



	% + 3"	% GRAVEL	% SAND	% SILT	% CLAY
○	0.0	0.0	46.7	53.3	
□	0.0	0.0	12.7	87.3	

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	28	20	0.179	0.0945	0.0643	0.0088				
□	44	25	0.0660	0.0153	0.0082					

MATERIAL DESCRIPTION	USCS	AASHTO
○ Sandy lean CLAY	CL	
□ Lean CLAY	CL	

Project No. 01282 **Client:** US Army Corps of Engineers Savannah District

Project: Design of Seismic Remediation for Clemson Diversion Dams

○ **Source:** CUD-624A **Sample No.:** T4(1 of 2) **Elev./Depth:** 30-31 ft.

□ **Source:** CUD-624A **Sample No.:** T4(2 of 2) **Elev./Depth:** 31-32 ft.

Remarks:

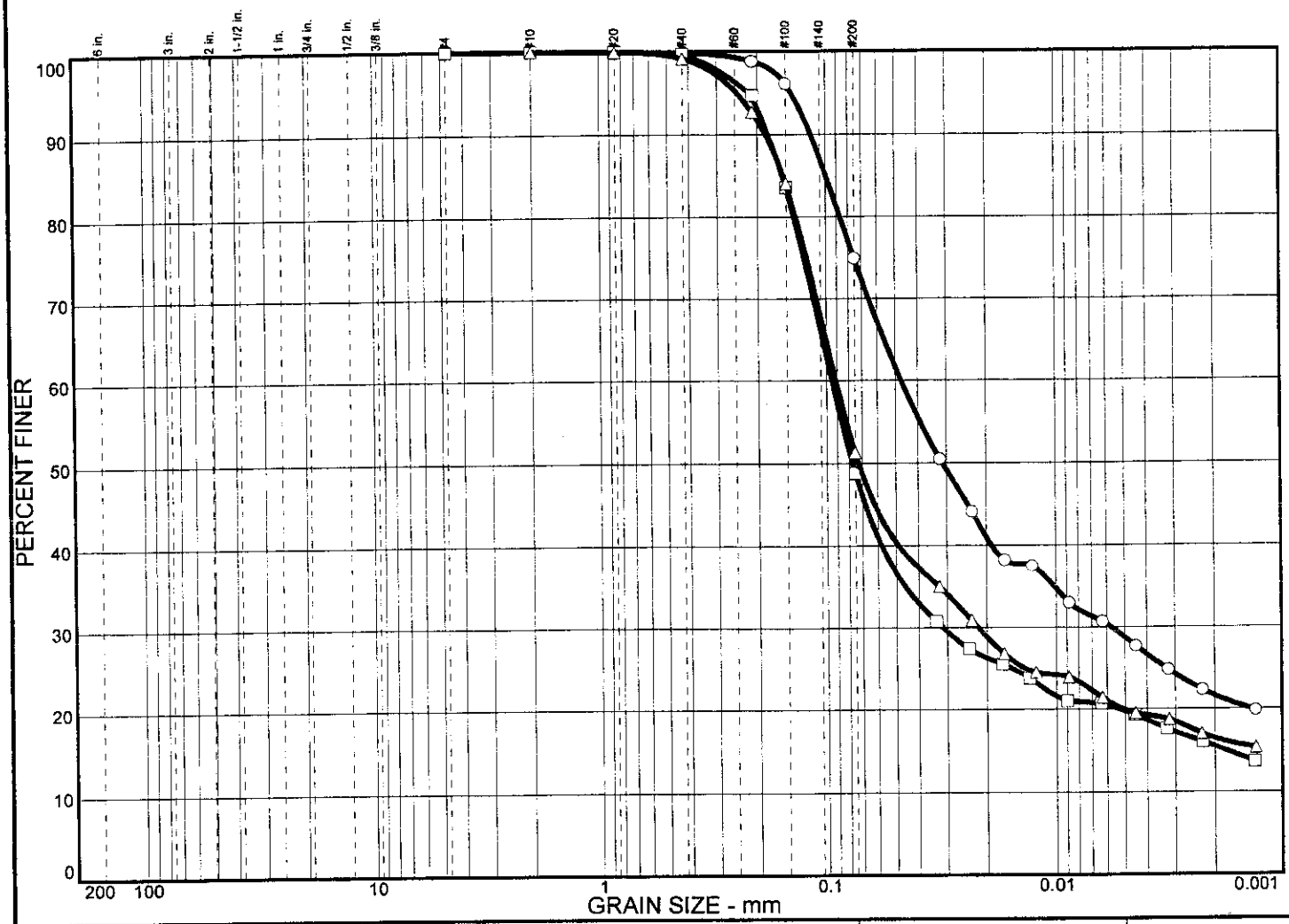
○ ASTM D422, Sample Received on 12/10/01, Tech. Responsibility: T. Moline

□ ASTM D422, Sample Received on 12/10/01, Tech. Responsibility: T. Moline.

GEI Consultants, Inc.

Fig.

GRAIN SIZE DISTRIBUTION TEST REPORT



	% + 3"	% GRAVEL	% SAND	% SILT	% CLAY
○	0.0	0.0	25.1	74.9	
□	0.0	0.0	51.2	48.8	
△	0.0	0.0	48.7	51.3	

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	33	28	0.0995	0.0470	0.0312	0.0057				
□	NV	NP	0.155	0.0945	0.0771	0.0313	0.0018			
△	31	28	0.154	0.0909	0.0725	0.0218				

MATERIAL DESCRIPTION	USCS	AASHTO
○ SILT with sand	ML	
□ Silty SAND	SM	
△ Sandy SILT	ML	

Project No. 01282 **Client:** US Army Corps of Engineers Savannah District

Project: Design of Seismic Remediation for Clemson Diversion Dams

○ **Source:** CUD-622A **Sample No.:** T6 **Elev./Depth:** 25-27 ft.

□ **Source:** CUD-622A **Sample No.:** T7 **Elev./Depth:** 27-29 ft.

△ **Source:** CUD-622A **Sample No.:** T8 **Elev./Depth:** 29-31 ft.

Remarks:

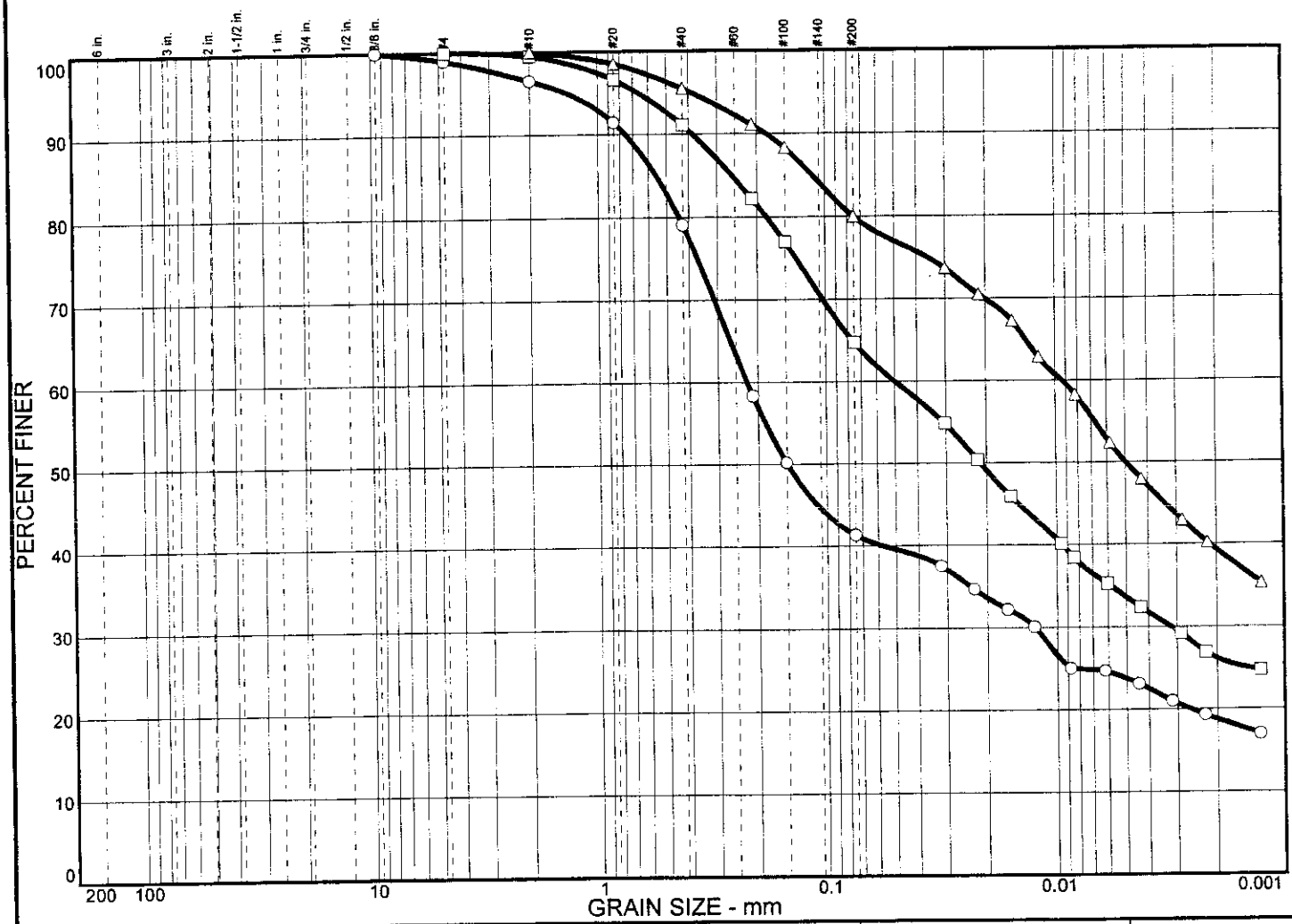
○ ASTM D422, Sample Received on 12/10/01, Tech. Responsibility: T. Moline.

□ ASTM D422, Sample Received on 12/10/01, Tech. Responsibility: T. Moline.

GEI Consultants, Inc.

Fig.

GRAIN SIZE DISTRIBUTION TEST REPORT



	% + 3"	% GRAVEL	% SAND	% SILT	% CLAY
○	0.0	1.0	57.7	41.3	
□	0.0	0.0	35.2	64.8	
△	0.0	0.0	20.0	80.0	

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	27	17	0.553	0.222	0.149	0.0124				
□	34	26	0.257	0.0497	0.0213	0.0032				
△	54	31	0.114	0.0093	0.0050					

MATERIAL DESCRIPTION	USCS	AASHTO
○ Clayey SAND	SC	
□ Sandy SILT	ML	
△ Elastic SILT with sand	MH	

Project No. 01282 **Client:** US Army Corps of Engineers Savannah District

Project: Design of Seismic Remediation for Clemson Diversion Dams

○ **Source:** CUD-624A **Sample No.:** T1 **Elev./Depth:** 24-26 ft

□ **Source:** CUD-624A **Sample No.:** T2(1 of 2) **Elev./Depth:** 26-27 ft.

△ **Source:** CUD-624A **Sample No.:** T2(2 of 2) **Elev./Depth:** 27-28 ft.

Remarks:

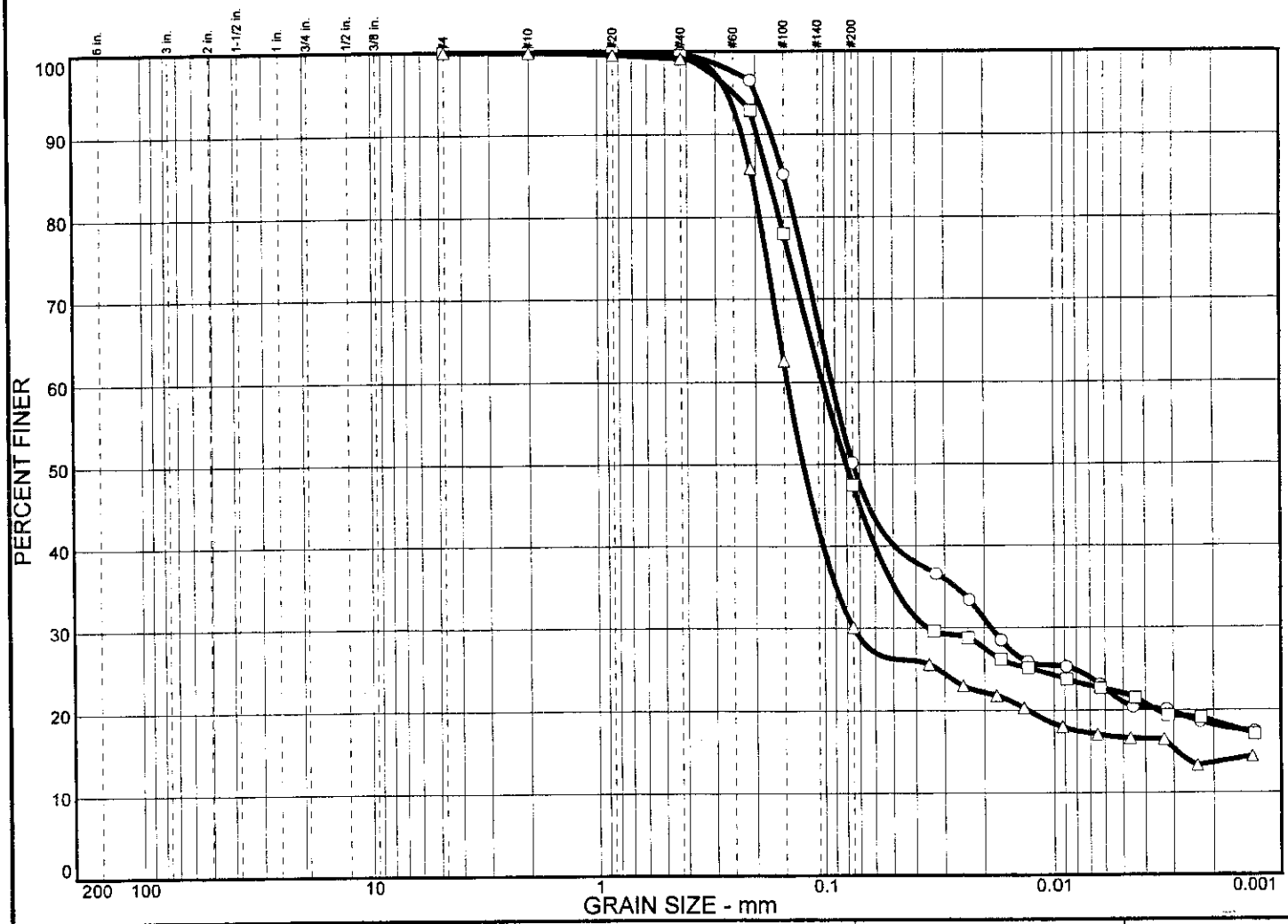
○ ASTM D422, Sample Received on 12/10/01, Tech. Responsibility: T. Moline.

□ ASTM D422, Sample Received on 12/10/01, Tech. Responsibility: T. Moline.

GEI Consultants, Inc.

Fig.

GRAIN SIZE DISTRIBUTION TEST REPORT



	% + 3"	% GRAVEL	% SAND	% SILT	% CLAY
○	0.0	0.0	49.8	50.2	
□	0.0	0.0	52.5	47.5	
△	0.0	0.0	69.9	30.1	

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	28	25	0.149	0.0925	0.0746	0.0186				
□		NP	0.175	0.101	0.0801	0.0354				
△		NP	0.207	0.145	0.123	0.0746	0.0029			

MATERIAL DESCRIPTION	USCS	AASHTO
○ Sandy SILT	ML	
□ Silty SAND	SM	
△ Silty SAND	SM	

Project No. 01282 **Client:** US Army Corps of Engineers Savannah District

Project: Design of Seismic Remediation for Clemson Diversion Dams

○ **Source:** CUD-624A **Sample No.:** T6Top 8" **Elev./Depth:** 34.0-34.7 ft.

□ **Source:** CUD-624A **Sample No.:** T6Bot 16" **Elev./Depth:** 34.7-36.0 ft

△ **Source:** CUD-624A **Sample No.:** T7 **Elev./Depth:** 36-38 ft.

Remarks:

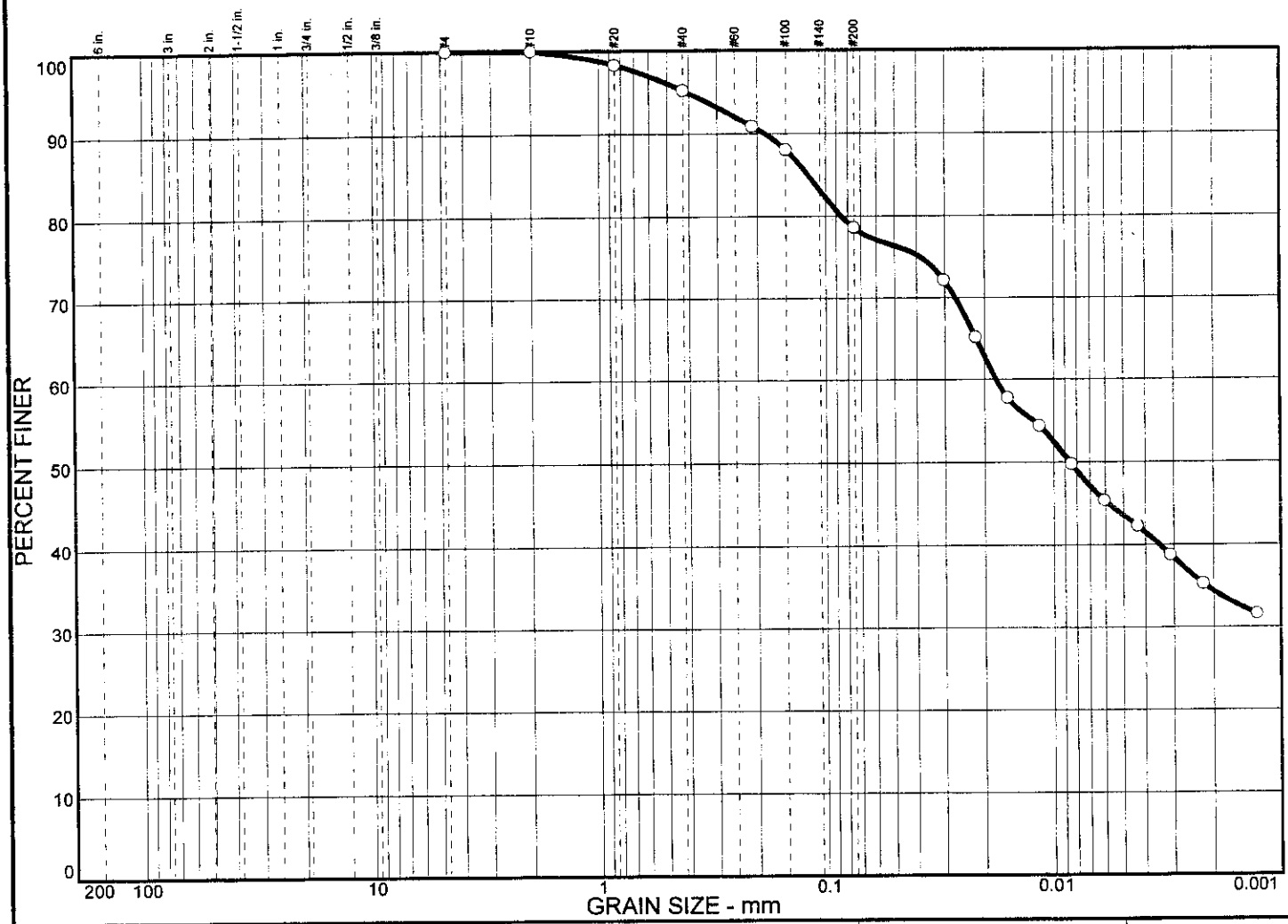
○ ASTM D422, Sample Received on 12/10/01, Tech. Responsibility: T. Moline.

□ ASTM D422, Sample Received on 12/10/01, Tech. Responsibility: T. Moline.

GEI Consultants, Inc.

Fig.

GRAIN SIZE DISTRIBUTION TEST REPORT



	% + 3"	% GRAVEL	% SAND	% SILT	% CLAY
○	0.0	0.0	21.4	78.6	

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	43	26	0.119	0.0178	0.0085					

MATERIAL DESCRIPTION	USCS	AASHTO
○ Lean CLAY with Sand	CL	

Project No. 01282 **Client:** US Army Corps of Engineers Savannah District

Project: Design of Seismic Remediation for Clemson Diversion Dams

○ **Source:** CUD-624B **Sample No.:** T1(2 of 2) **Elev./Depth:** 26-28 ft.

Remarks:

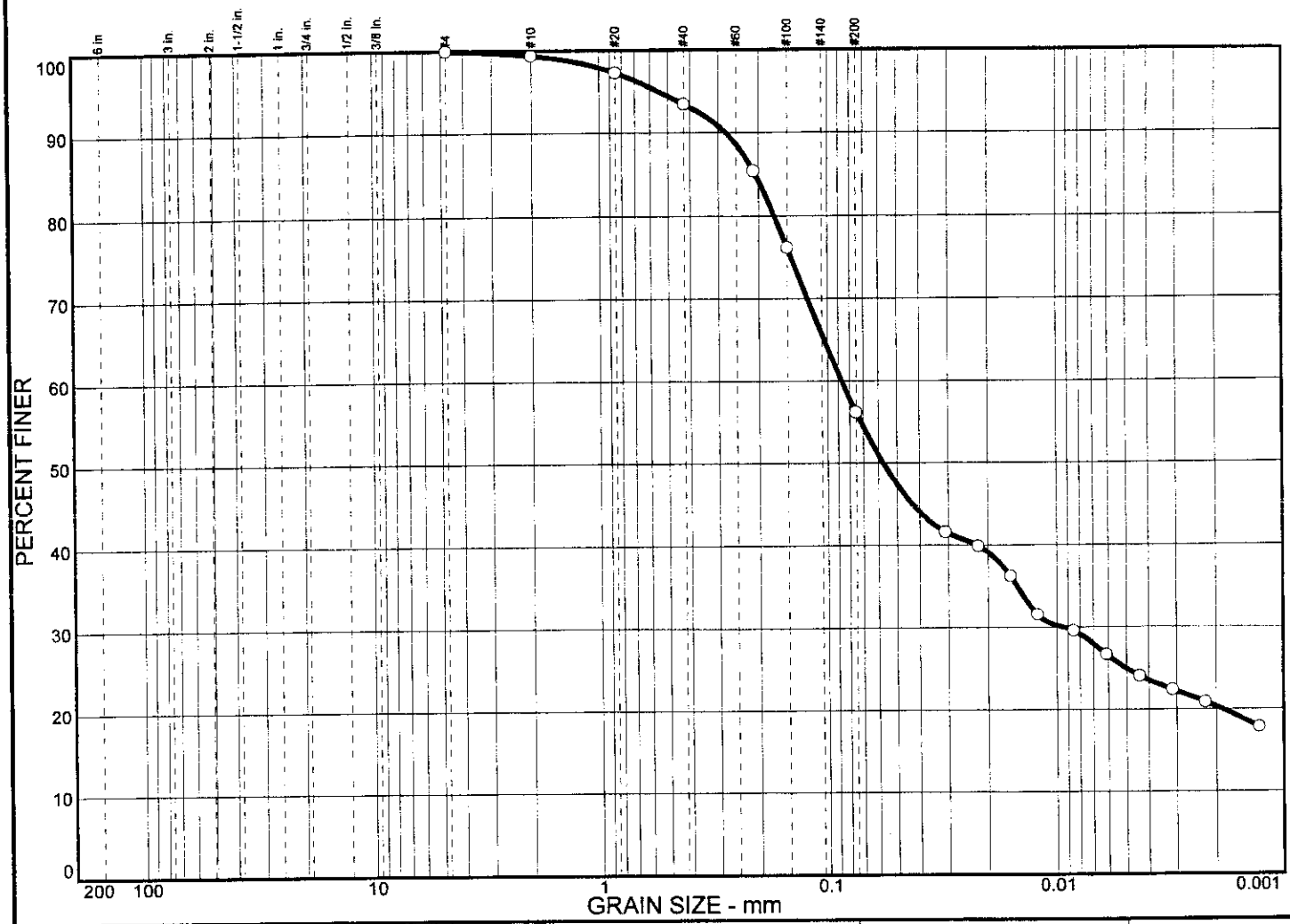
○ ASTM D422, Sample Received on 12/10/01,

Tech. Responsibility: T. Moline.

GEI Consultants, Inc.

Fig.

GRAIN SIZE DISTRIBUTION TEST REPORT



	% + 3"	% GRAVEL	% SAND	% SILT	% CLAY
○	0.0	0.0	43.8	56.2	

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	36	25	0.206	0.0866	0.0571	0.0094				

MATERIAL DESCRIPTION	USCS	AASHTO
○ Sandy SILT	ML	

Project No. 01282 **Client:** US Army Corps of Engineers Savannah District

Project: Design of Seismic Remediation for Clemson Diversion Dams

○ **Source:** CUD-624C **Sample No.:** T1 **Elev./Depth:** 26-28 ft.

Remarks:

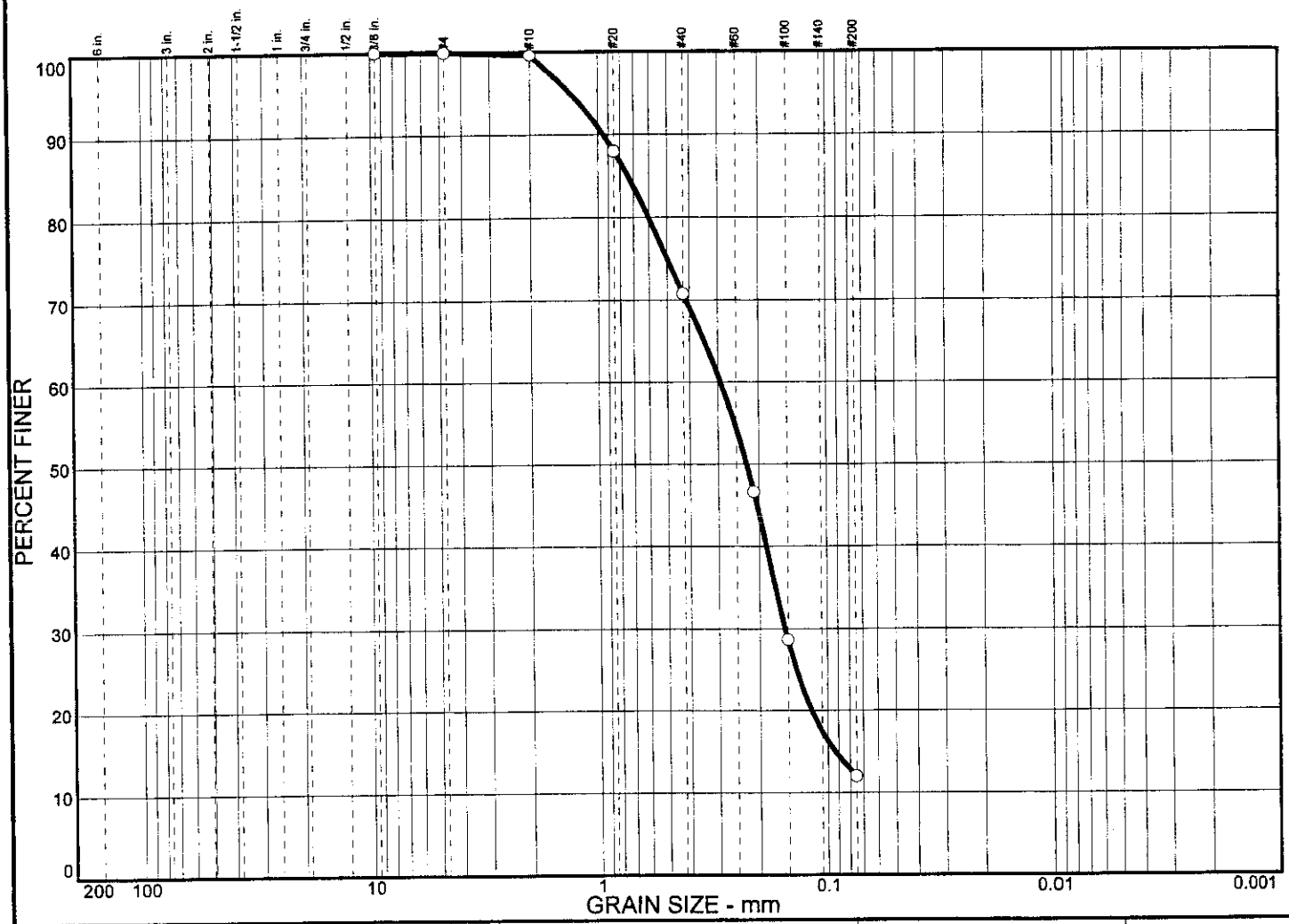
○ ASTM D422, Sample Received on 12/10/01, TTech. Responsibility: T. Moline.

GEI Consultants, Inc.

Fig.

B1.3 – Lower Dam Grain Size Distribution Analyses

GRAIN SIZE DISTRIBUTION TEST REPORT



	% + 3"	% GRAVEL	% SAND	% SILT	% CLAY
○	0.0	0.0	88.0	12.0	

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			0.739	0.291	0.225	0.154	0.0929			

MATERIAL DESCRIPTION	USCS	AASHTO
○ Narrowly graded SAND with silt	SP-SM	

Project No. 01282 **Client:** US Army Corps of Engineers Savannah District

Project: Design of Seismic Remediation for Clemson Diversion Dams

○ **Source:** CLD-603 **Sample No.:** S9 **Elev./Depth:** 42.0-43.5 ft.

Remarks:

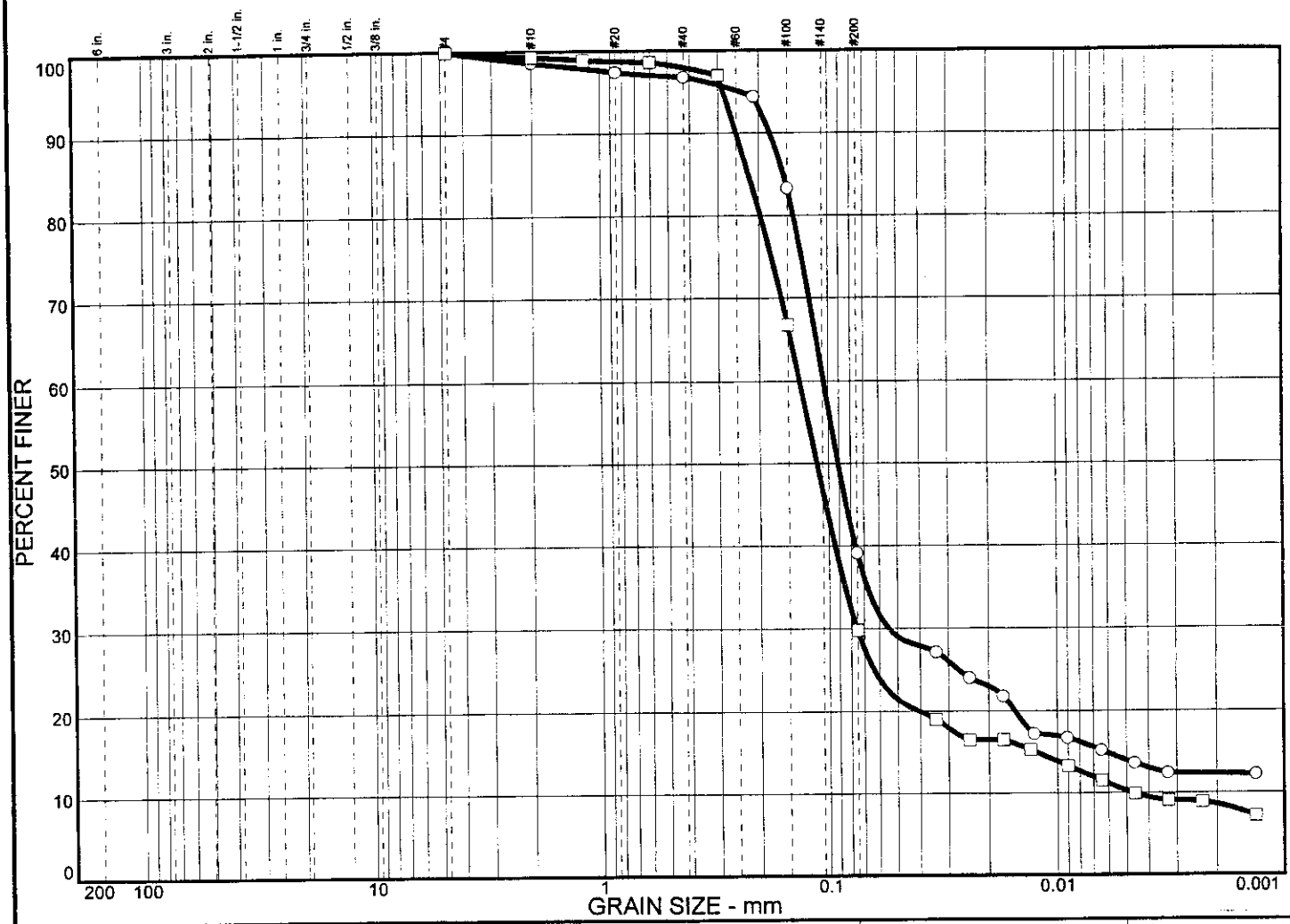
○ ASTM D422, Sample Received on 12/10/01,

Tech. Responsibility: T. Moline.

GEI Consultants, Inc.

Fig.

GRAIN SIZE DISTRIBUTION TEST REPORT



	% + 3"	% GRAVEL	% SAND	% SILT	% CLAY
○	0.0	0.0	60.9	39.1	
□	0.0	0.0	70.2	29.8	

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			0.156	0.104	0.0905	0.0545	0.0062			
□	24	NP	0.221	0.133	0.112	0.0754	0.0123	0.0047	9.10	28.31

MATERIAL DESCRIPTION	USCS	AASHTO
○ Silty SAND	SM	
□ Silty SAND	SM	

Project No. 01282 **Client:** US Army Corps of Engineers Savannah District

Project: Design of Seismic Remediation for Clemson Diversion Dams

○ **Source:** CLD-605 **Sample No.:** S10 **Elev./Depth:** 33.5-35.0 ft.

□ **Source:** CLD-605 **Sample No.:** S11 **Elev./Depth:** 35-36.5 ft.

Remarks:

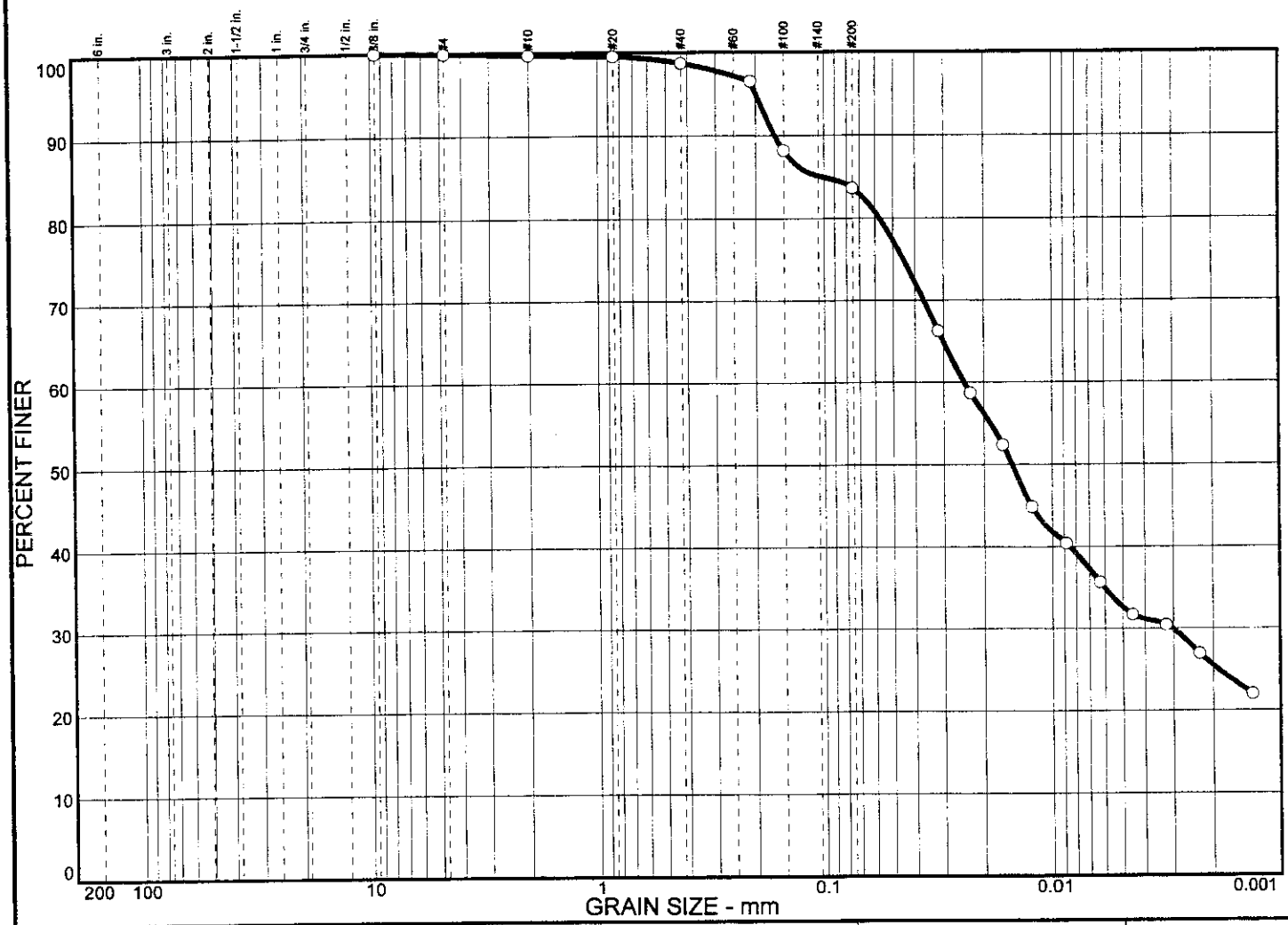
○ ASTM D422, Sample Received on 12/10/01, Tech. Responsibility: T. Moline.

□ ASTM D422, Sample Received on 12/10/01, Tech. Responsibility: T. Moline.

GEI Consultants, Inc.

Fig.

GRAIN SIZE DISTRIBUTION TEST REPORT



	% + 3"	% GRAVEL	% SAND	% SILT	% CLAY
○	0.0	0.1	16.3	83.6	

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	38	28	0.102	0.0244	0.0150	0.0030				

MATERIAL DESCRIPTION	USCS	AASHTO
○ SILT with sand	ML	

Project No. 01282 **Client:** US Army Corps of Engineers Savannah District

Project: Design of Seismic Remediation for Clemson Diversion Dams

○ **Source:** CLD-609 **Sample No.:** S11 **Elev./Depth:** 30-31.5 ft.

Remarks:

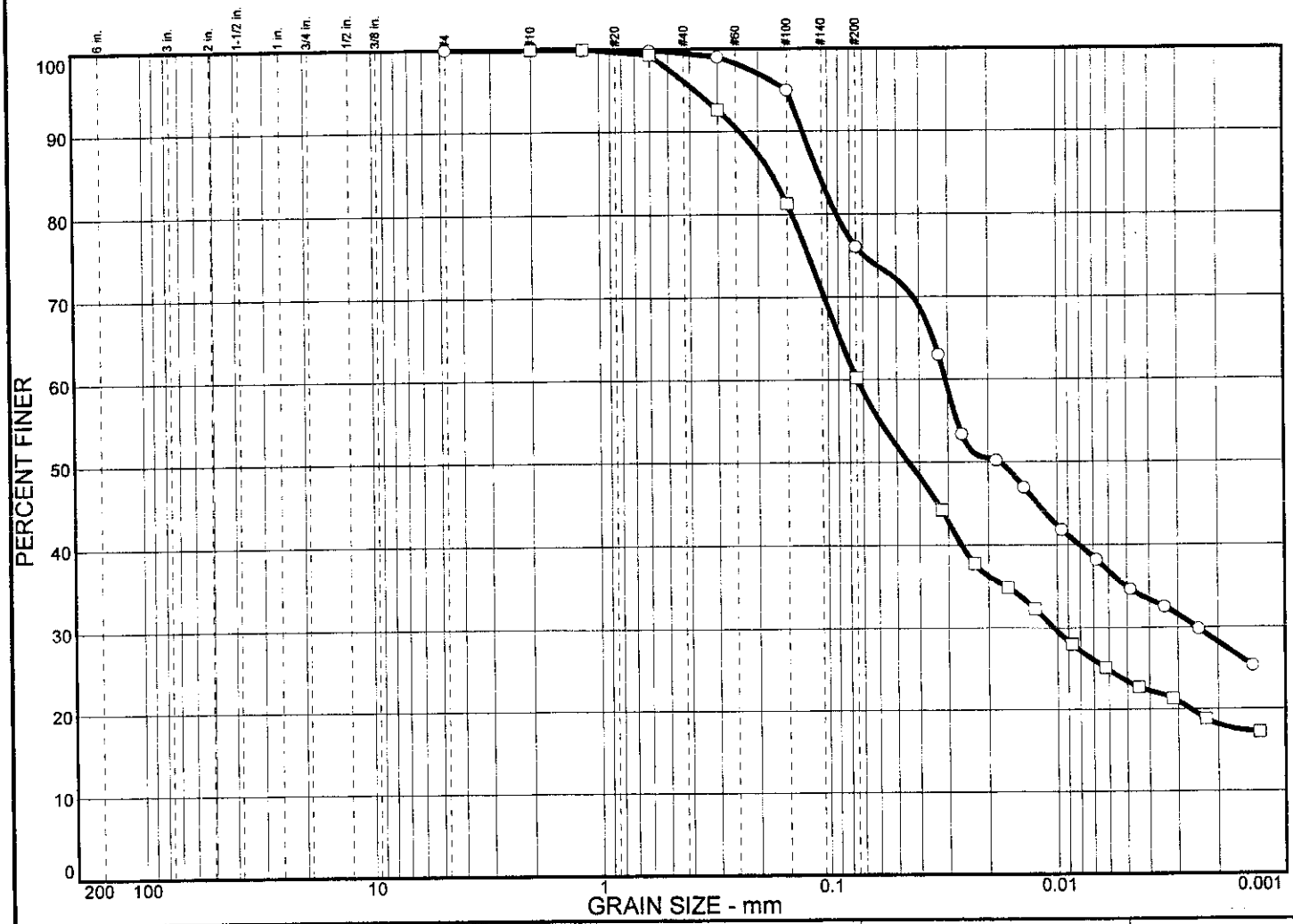
○ ASTM D422, Sample Received on 12/10/01,

Tech. Responsibility: T. Moline.

GEI Consultants, Inc.

Fig.

GRAIN SIZE DISTRIBUTION TEST REPORT



	% + 3"	% GRAVEL	% SAND	% SILT	% CLAY
○	0.0	0.0	23.9	76.1	
□	0.0	0.0	39.7	60.3	

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	37	21	0.109	0.0306	0.0179	0.0025				
□	30	26	0.176	0.0741	0.0443	0.0104				

MATERIAL DESCRIPTION	USCS	AASHTO
○ Lean CLAY with sand	CL	
□ Sandy SILT	ML	

Project No. 01282 **Client:** US Army Corps of Engineers Savannah District

Project: Design of Seismic Remediation for Clemson Diversion Dams

○ **Source:** CLD-610 **Sample No.:** S6 **Elev./Depth:** 22.5-24.0 ft.

□ **Source:** CLD-610 **Sample No.:** S10 **Elev./Depth:** 28.5-30.0 ft.

Remarks:

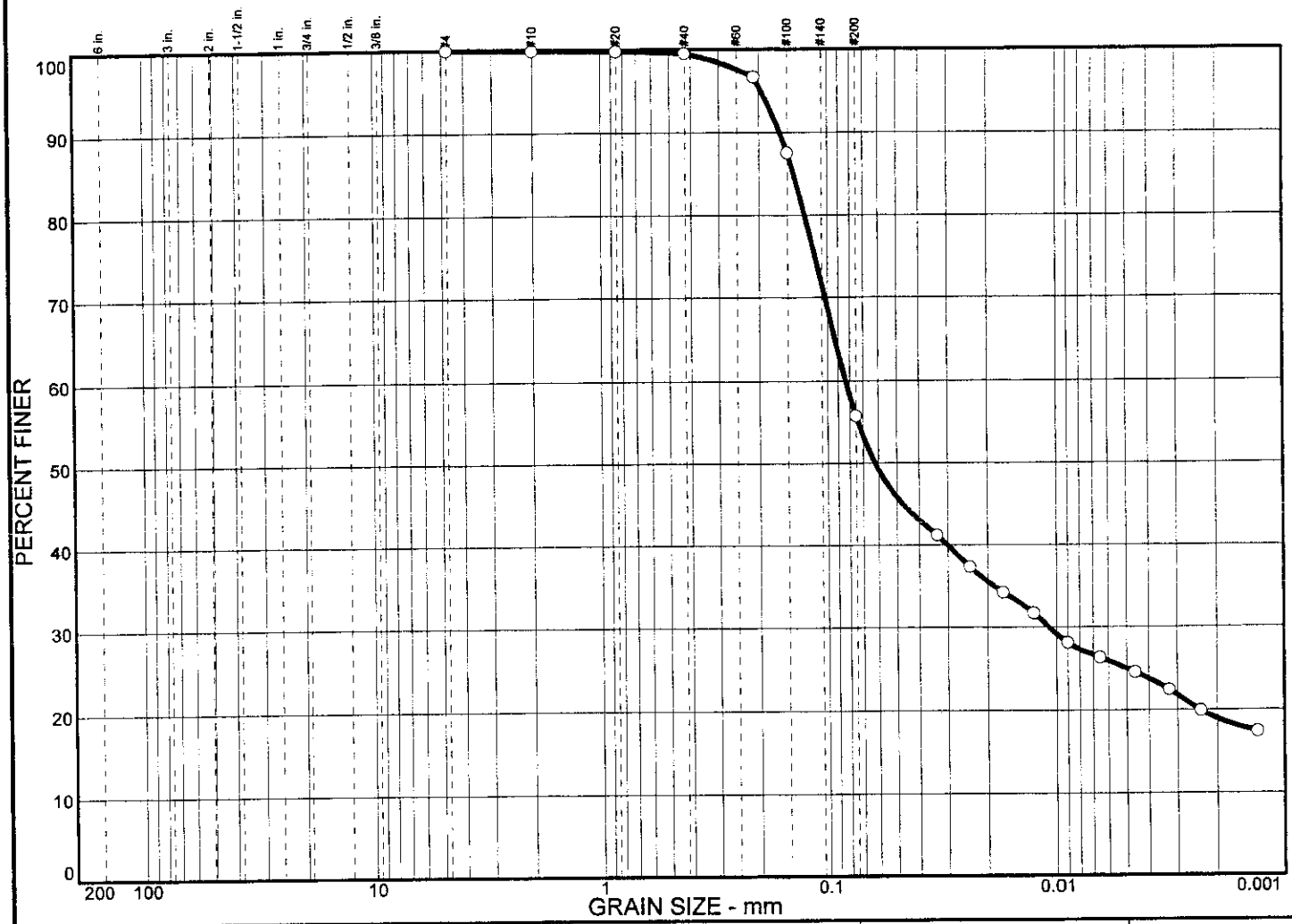
○ ASTM D422, Sample Received on 12/10/01, Tech. Responsibility: T. Moline.

□ ASTM D422, Sample Received on 12/10/01, Tech. Responsibility: T. Moline.

GEI Consultants, Inc.

Fig.

GRAIN SIZE DISTRIBUTION TEST REPORT



	% + 3"	% GRAVEL	% SAND	% SILT	% CLAY
○	0.0	0.0	44.2	55.8	

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	NV	NP	0.141	0.0832	0.0620	0.0108				

MATERIAL DESCRIPTION	USCS	AASHTO
○ Sandy SILT	ML	

Project No. 01282 **Client:** US Army Corps of Engineers Savannah District

Project: Design of Seismic Remediation for Clemson Diversion Dams

○ **Source:** CLD-613 **Sample No.:** T7 **Elev./Depth:** 27-29 ft.

Remarks:

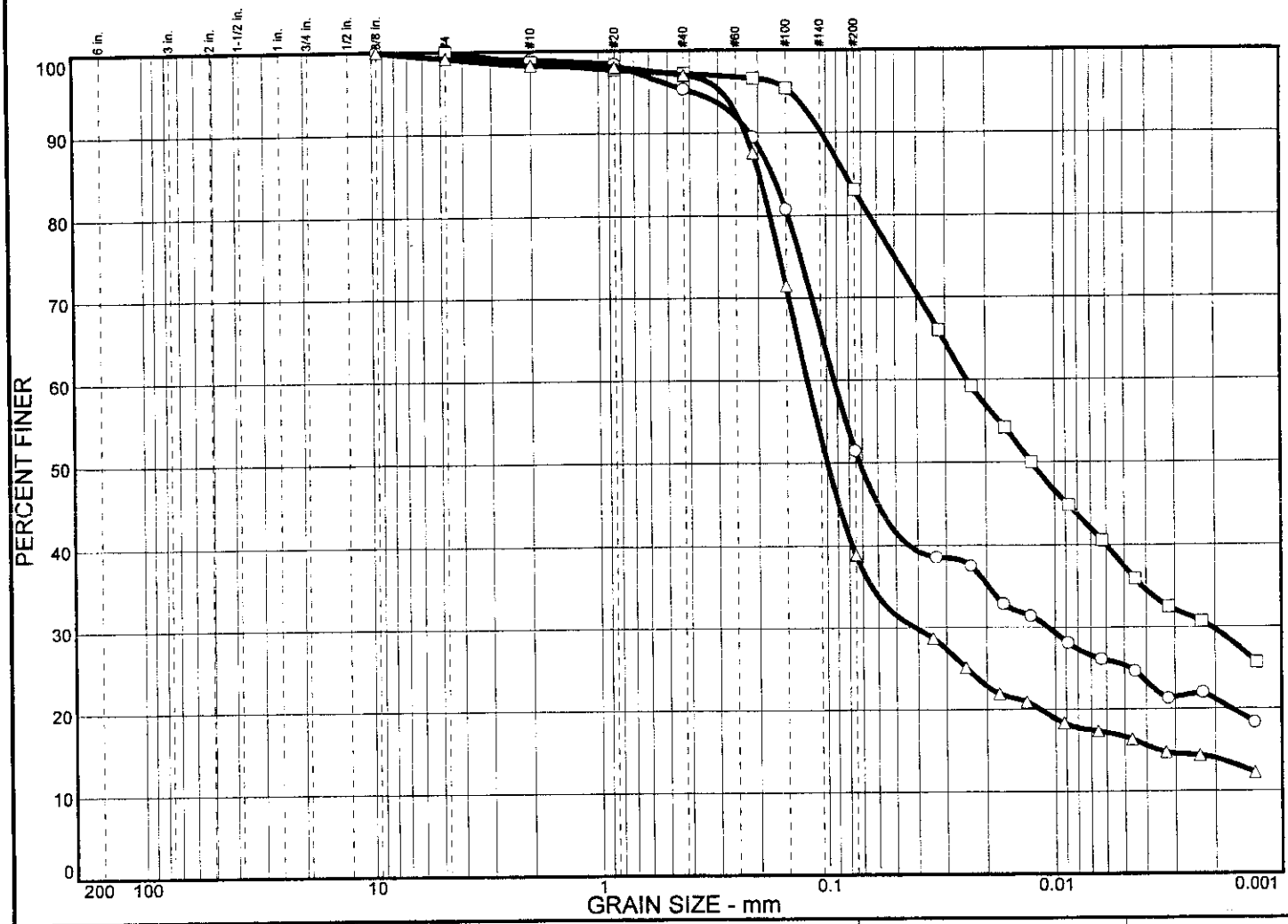
○ ASTM D422, Sample Received on 12/10/01,

Tech. Responsibility: T. Moline.

GEI Consultants, Inc.

Fig.

GRAIN SIZE DISTRIBUTION TEST REPORT



	% + 3"	% GRAVEL	% SAND	% SILT	% CLAY
○	0.0	0.8	47.7	51.5	
□	0.0	0.0	16.9	83.1	
△	0.0	0.8	60.3	38.9	

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	NV	NP	0.172	0.0926	0.0718	0.0107				
□	48	32	0.0820	0.0240	0.0126	0.0021				
△	NV	NP	0.197	0.121	0.0994	0.0410	0.0036			

MATERIAL DESCRIPTION	USCS	AASHTO
○ Sandy SILT	ML	
□ SILT with Sand	ML	
△ Silty SAND	SM	

Project No. 01282 **Client:** US Army Corps of Engineers Savannah District

Project: Design of Seismic Remediation for Clemson Diversion Dams

○ **Source:** CLD-621A **Sample No.:** S1Bot12"&S2 **Elev./Depth:** 25.7-29.0 ft.

□ **Source:** CLD-621A **Sample No.:** T3(2 of 2) **Elev./Depth:** 30-31.3 ft.

△ **Source:** CLD-621A **Sample No.:** U2 & T5 **Elev./Depth:** 32-36 ft.

Remarks:

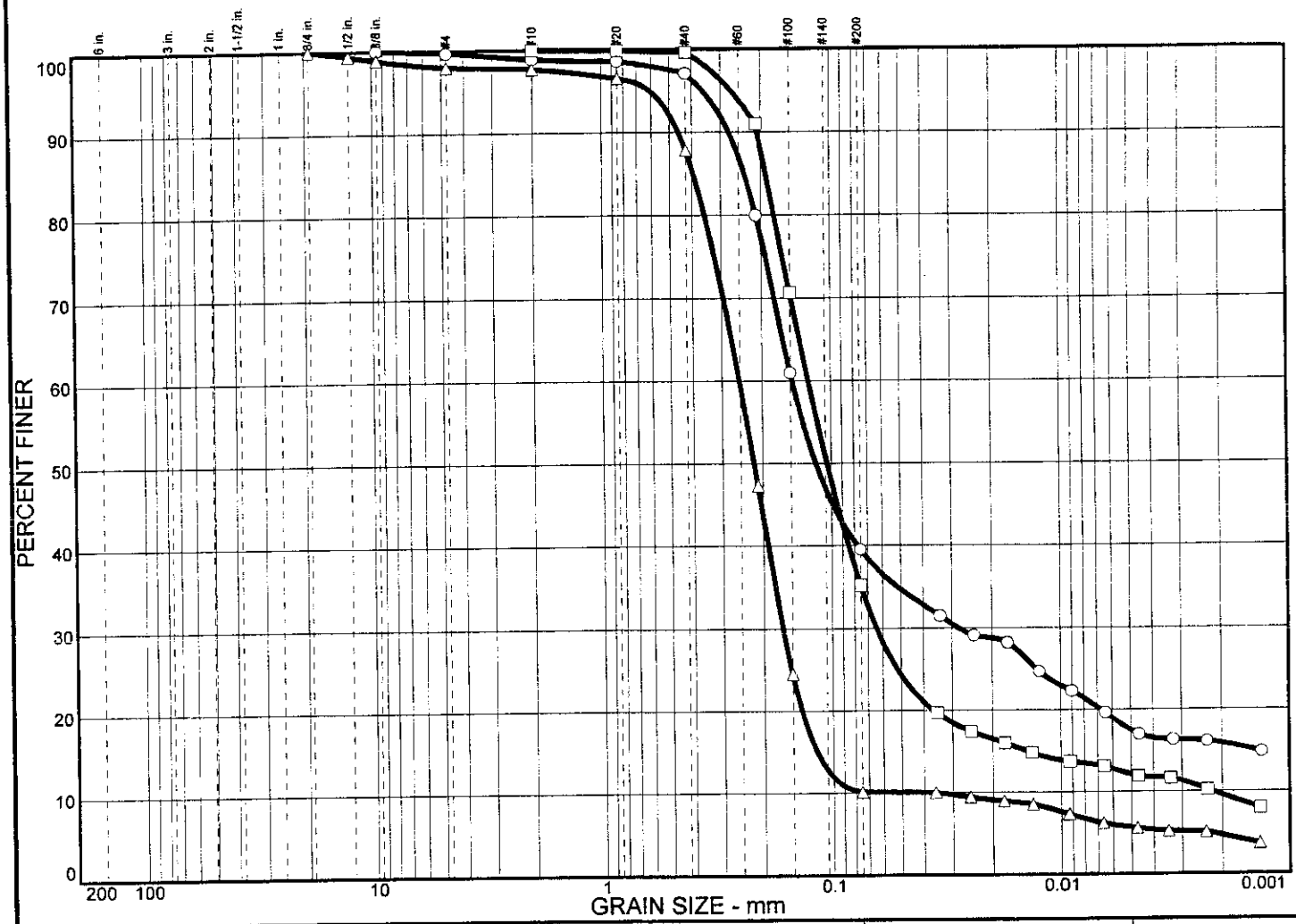
○ ASTM D422, Sample Received on 12/10/01, Tech. Responsibility: T. Moline.

□ ASTM D422, Sample Received on 12/10/01, Tech. Responsibility: T. Moline.

GEI Consultants, Inc.

Fig.

GRAIN SIZE DISTRIBUTION TEST REPORT



	% + 3"	% GRAVEL	% SAND	% SILT	% CLAY
○	0.0	0.3	60.2	39.5	
□	0.0	0.0	64.8	35.2	
△	0.0	2.0	87.9	10.1	

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	NV	NP	0.236	0.147	0.116	0.0280	0.0014			
□			0.190	0.125	0.104	0.0639	0.0141	0.0022	14.71	56.34
△			0.394	0.251	0.218	0.165	0.117	0.0356	3.03	7.07

MATERIAL DESCRIPTION	USCS	AASHTO
○ Silty SAND	SM	
□ Silty SAND	SM	
△ Narrowly Graded SAND with Silt	SP-SM	

Project No. 01282 **Client:** US Army Corps of Engineers Savannah District

Project: Design of Seismic Remediation for Clemson Diversion Dams

○ **Source:** CLD-622A **Sample No.:** S1-S3 **Elev./Depth:** 27-33 ft.

□ **Source:** CLD-622A **Sample No.:** S4-S6 **Elev./Depth:** 33-39 ft.

△ **Source:** CLD-622A **Sample No.:** S8-S11 **Elev./Depth:** 41-49 ft.

Remarks:

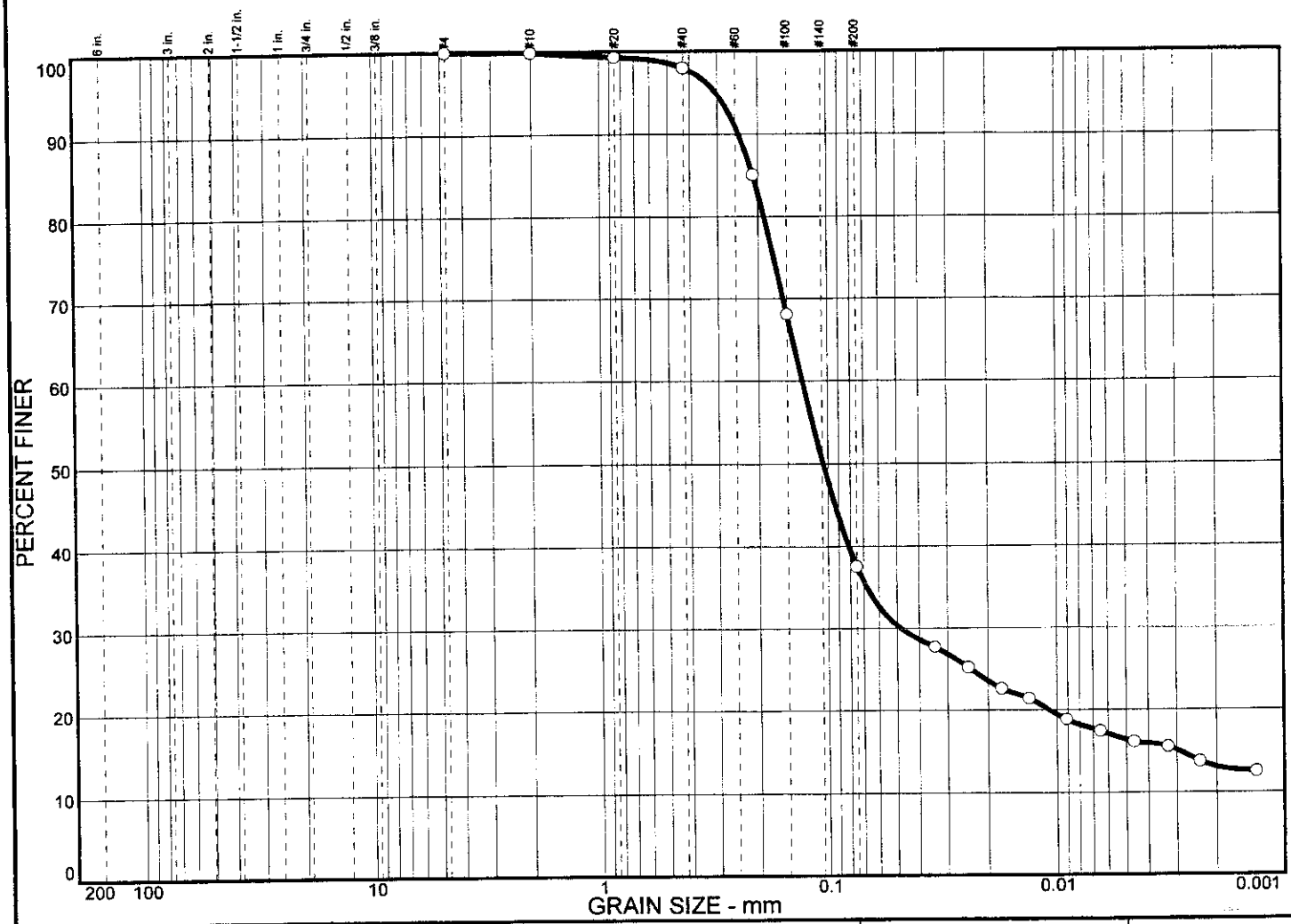
○ ASTM D422, Sample Received on 12/10/01, Tech. Responsibility: T. Moline.

□ ASTM D422, Sample Received on 12/10/01, Tech. Responsibility: T. Moline.

GEI Consultants, Inc.

Fig.

GRAIN SIZE DISTRIBUTION TEST REPORT



	% + 3"	% GRAVEL	% SAND	% SILT	% CLAY
○	0.0	0.0	62.4	37.6	

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	NV	NP	0.209	0.129	0.105	0.0480	0.0029			

MATERIAL DESCRIPTION	USCS	AASHTO
○ Silty SAND	SM	

Project No. 01282 **Client:** US Army Corps of Engineers Savannah District

Project: Design of Seismic Remediation for Clemson Diversion Dams

○ **Source:** CLD-622B **Sample No.:** S1-S3 **Elev./Depth:** 27-33 ft.

Remarks:

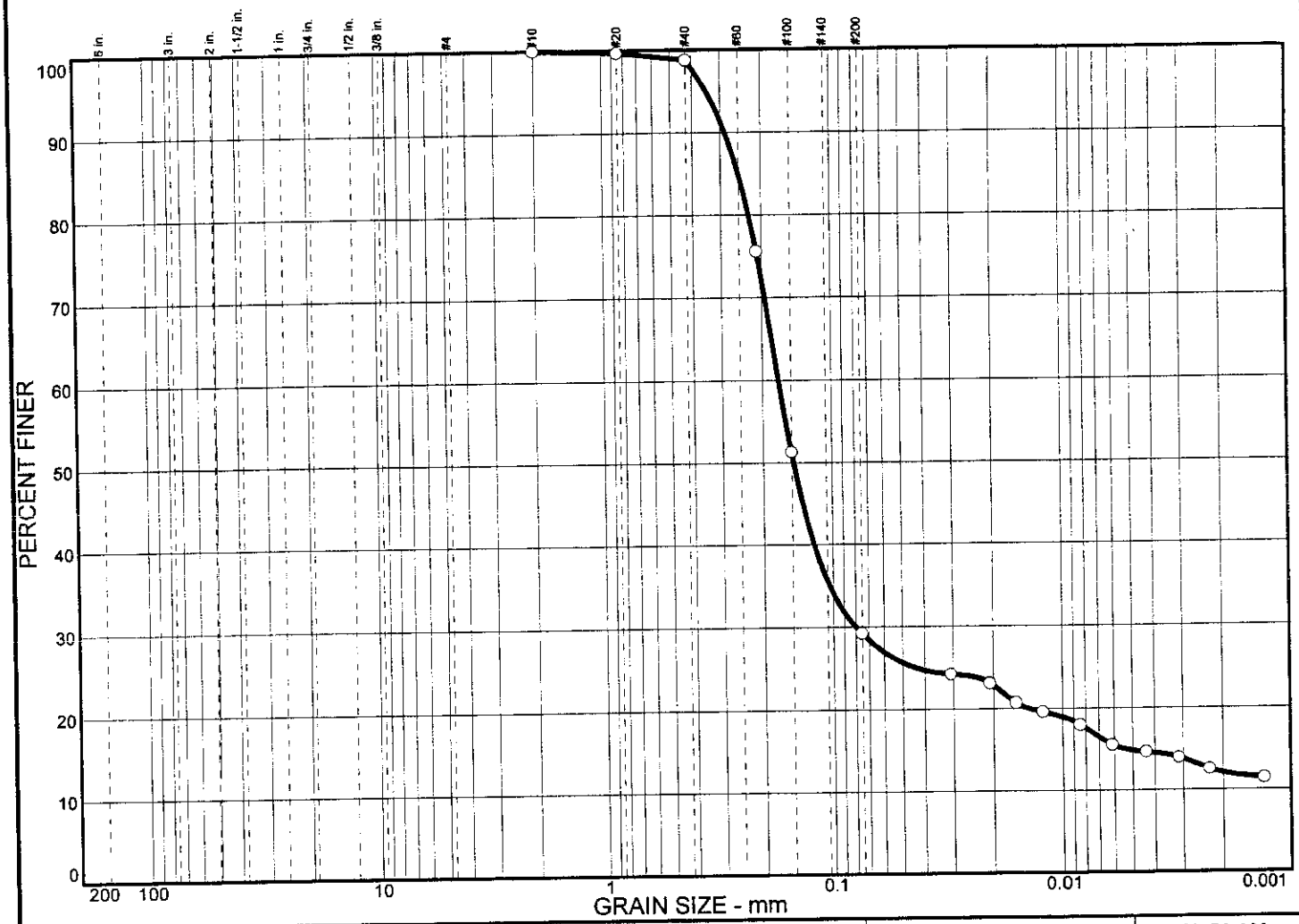
○ ASTM D422, Sample Received on 12/10/01,

Tech. Responsibility: T. Moline.

GEI Consultants, Inc.

Fig.

GRAIN SIZE DISTRIBUTION TEST REPORT



	% + 3"	% GRAVEL	% SAND	% SILT	% CLAY
○	0.0	0.0	70.8	29.2	

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			0.250	0.170	0.147	0.0798	0.0054			

MATERIAL DESCRIPTION	USCS	AASHTO
○ Silty SAND	SM	

Project No. 01282 **Client:** US Army Corps of Engineers Savannah District

Project: Design of Seismic Remediation for Clemson Diversion Dams

○ **Source:** CLD-622C **Sample No.:** T1 **Elev./Depth:** 28-30 ft.

Remarks:

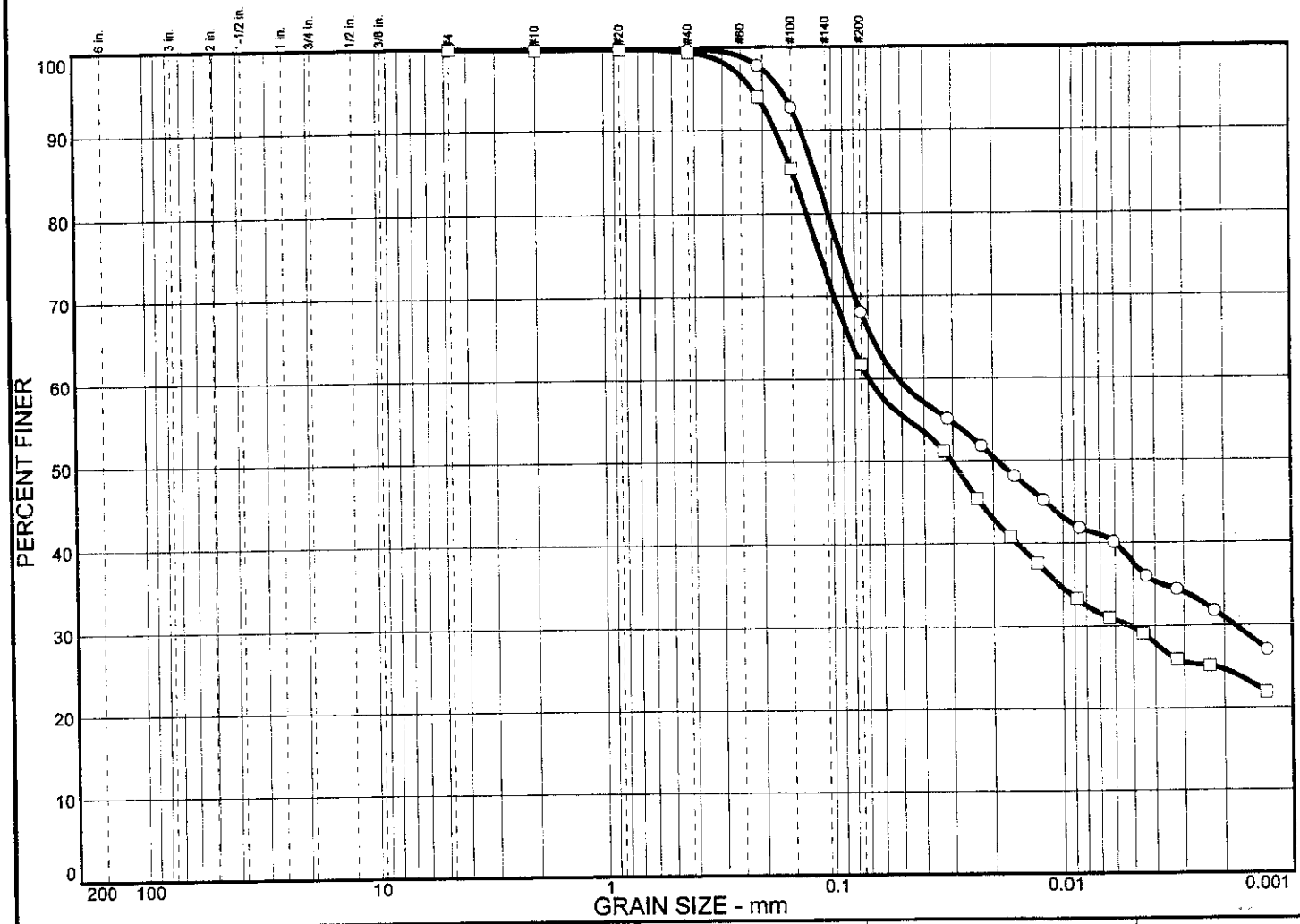
○ ASTM D422, Sample Received on 12/10/01,

Tech. Responsibility: T. Moline.

GEI Consultants, Inc.

Fig.

GRAIN SIZE DISTRIBUTION TEST REPORT



	% + 3"	% GRAVEL	% SAND	% SILT	% CLAY
○	0.0	0.0	31.9	68.1	
□	0.0	0.0	38.2	61.8	

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	35	18	0.118	0.0515	0.0192	0.0018				
□	33	27	0.148	0.0691	0.0305	0.0052				

MATERIAL DESCRIPTION	USCS	AASHTO
○ Sandy lean CLAY	CL	
□ Sandy SILT	ML	

Project No. 01282 **Client:** US Army Corps of Engineers Savannah District

Project: Design of Seismic Remediation for Clemson Diversion Dams

○ **Source:** CLD-623A **Sample No.:** S3 & T4 **Elev./Depth:** 24-27 ft.

□ **Source:** CLD-623A **Sample No.:** S5 & S6 **Elev./Depth:** 29-33 ft.

Remarks:

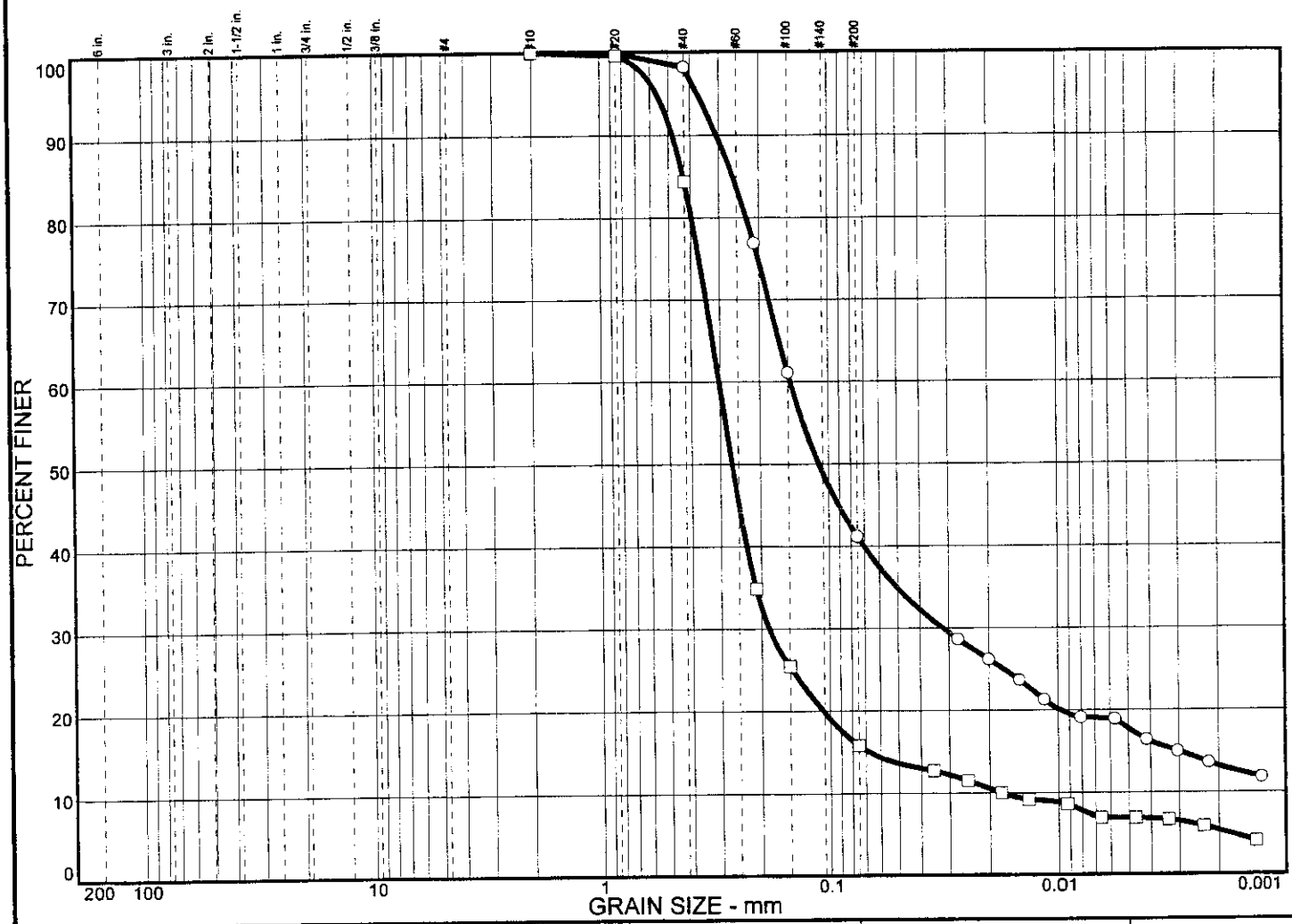
○ ASTM D422, Sample Received on 12/10/01, Tech. Responsibility: T. Moline.

□ ASTM D422, Sample Received on 12/10/01, Tech. Responsibility: T. Moline.

GEI Consultants, Inc.

Fig.

GRAIN SIZE DISTRIBUTION TEST REPORT



	% + 3"	% GRAVEL	% SAND	% SILT	% CLAY
○	0.0	0.0	58.8	41.2	
□	0.0	0.0	84.2	15.8	

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○			0.260	0.146	0.110	0.0317	0.0030			
□			0.430	0.303	0.266	0.184	0.0675	0.0178	6.31	17.02

MATERIAL DESCRIPTION	USCS	AASHTO
○ Silty SAND	SM	
□ Silty SAND	SM	

Project No. 01282 **Client:** US Army Corps of Engineers Savannah District

Project: Design of Seismic Remediation for Clemson Diversion Dams

○ **Source:** CLD-623A **Sample No.:** S7-S9 **Elev./Depth:** 33-39 ft.

□ **Source:** CLD-623A **Sample No.:** S12 **Elev./Depth:** 43-45 ft.

Remarks:

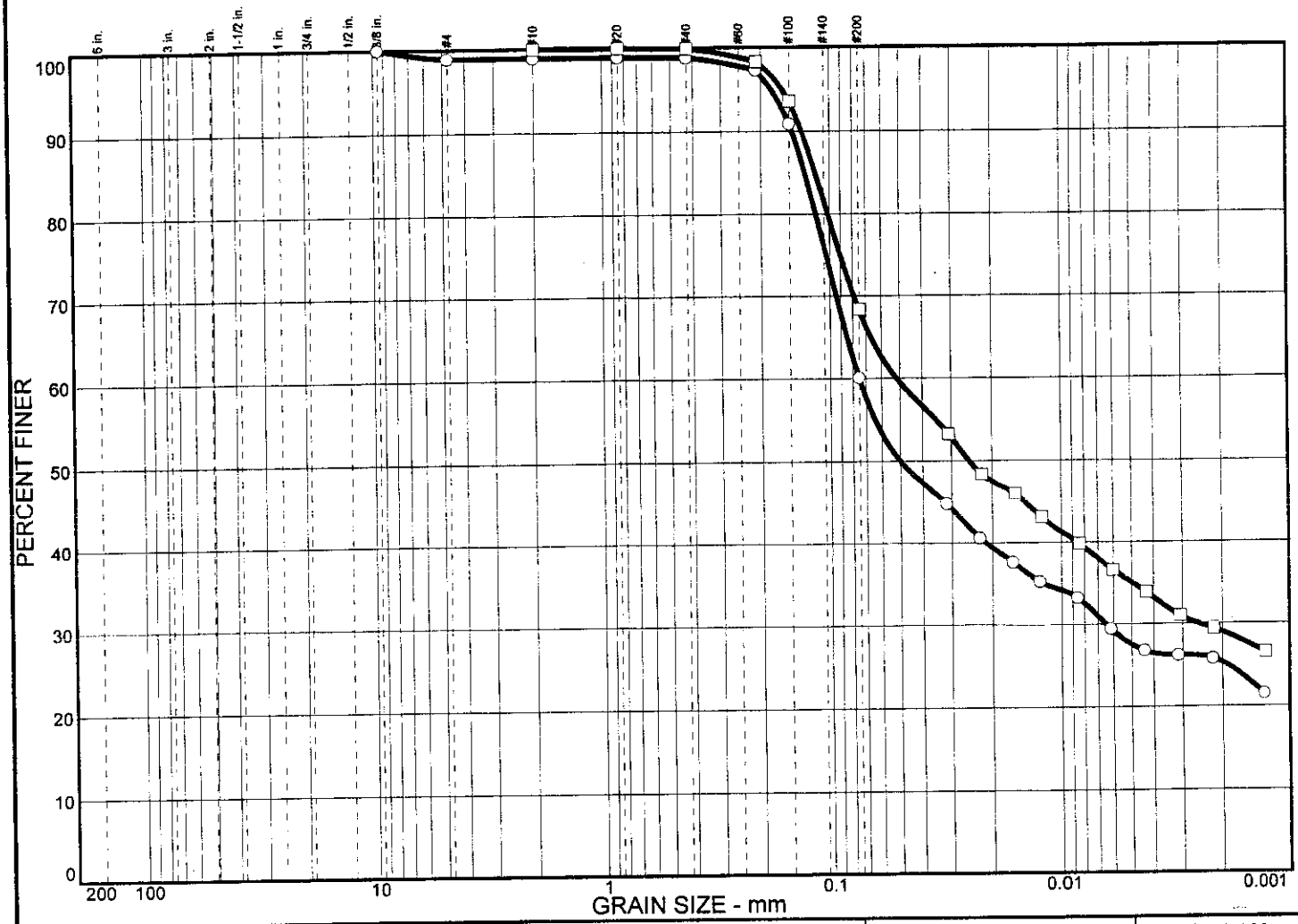
○ ASTM D422, Sample Received on 12/10/01,
Tech. Responsibility: T. Moline.

□ ASTM D422, Sample Recieved on 12/10/01
Tech. Responsibility: T. Moline.

GEI Consultants, Inc.

Fig.

GRAIN SIZE DISTRIBUTION TEST REPORT



	% + 3"	% GRAVEL	% SAND	% SILT	% CLAY
○	0.0	1.1	38.8	60.1	
□	0.0	0.0	31.6	68.4	

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	27	18	0.128	0.0748	0.0497	0.0065				
□	32	18	0.115	0.0515	0.0250	0.0025				

MATERIAL DESCRIPTION	USCS	AASHTO
○ Sandy lean CLAY	CL	
□ Sandy lean CLAY	CL	

Project No. 01282 **Client:** US Army Corps of Engineers Savannah District

Project: Design of Seismic Remediation for Clemson Diversion Dams

○ **Source:** CLD-623B **Sample No.:** S2Top 16" **Elev./Depth:** 22.0-23.5 ft.

□ **Source:** CLD-623B **Sample No.:** S2Bot&S3 **Elev./Depth:** 23.5-26.0 ft.

Remarks:

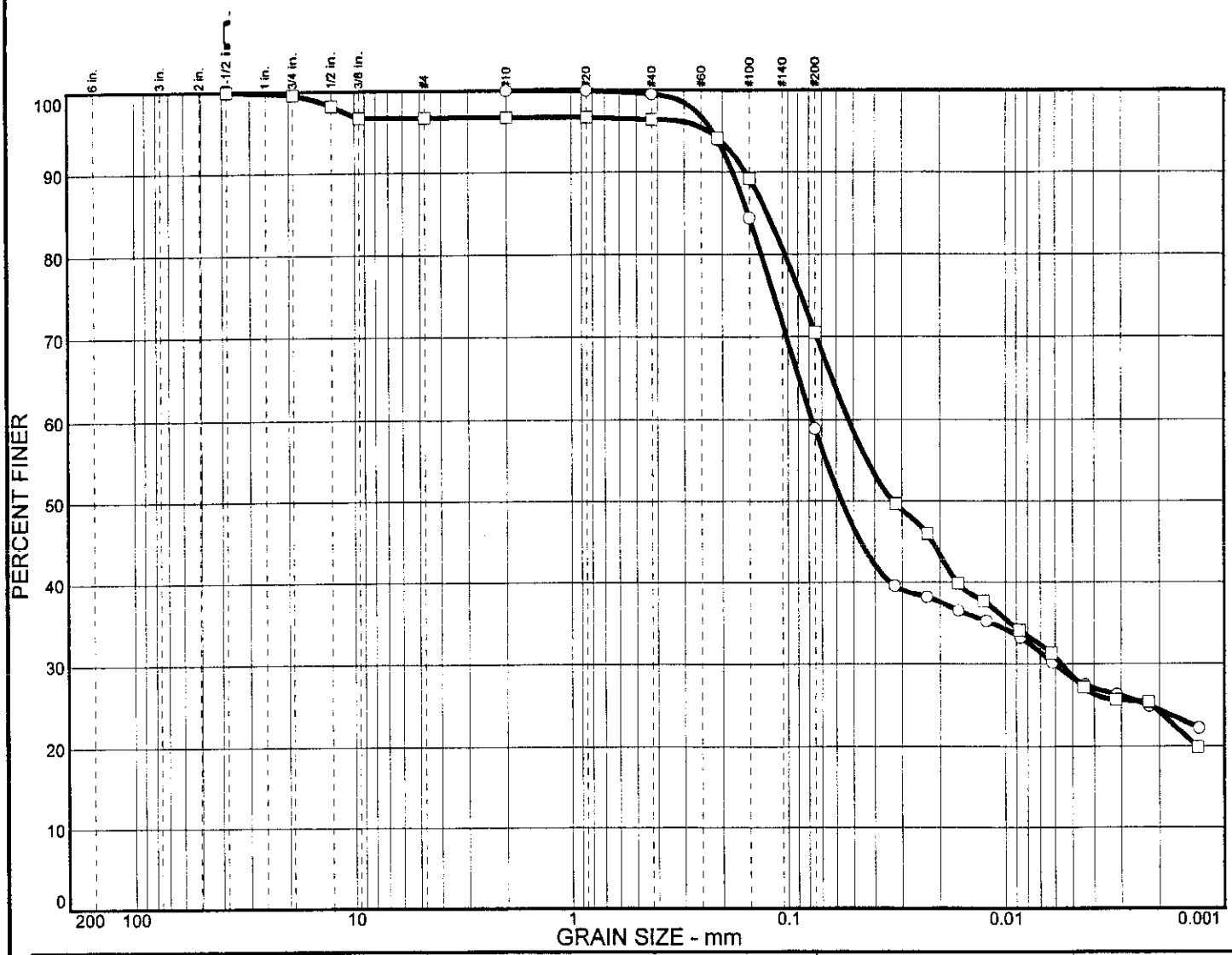
○ ASTM D422, Sample Received on 12/10/01, Tech. Responsibility: T. Moline.

□ ASTM D422, Sample Received on 12/10/01, Tech. Responsibility: T. Moline.

GEI Consultants, Inc.

Fig.

GRAIN SIZE DISTRIBUTION TEST REPORT



	% + 3"	% GRAVEL	% SAND	% SILT	% CLAY
○	0.0	0.0	41.1	58.9	
□	0.0	3.3	26.2	70.5	

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	33	23	0.153	0.0774	0.0565	0.0060				
□	37	23	0.124	0.0526	0.0329	0.0056				

MATERIAL DESCRIPTION	USCS	AASHTO
○ Sandy lean CLAY	CL	
□ Lean clay with SAND	CL	

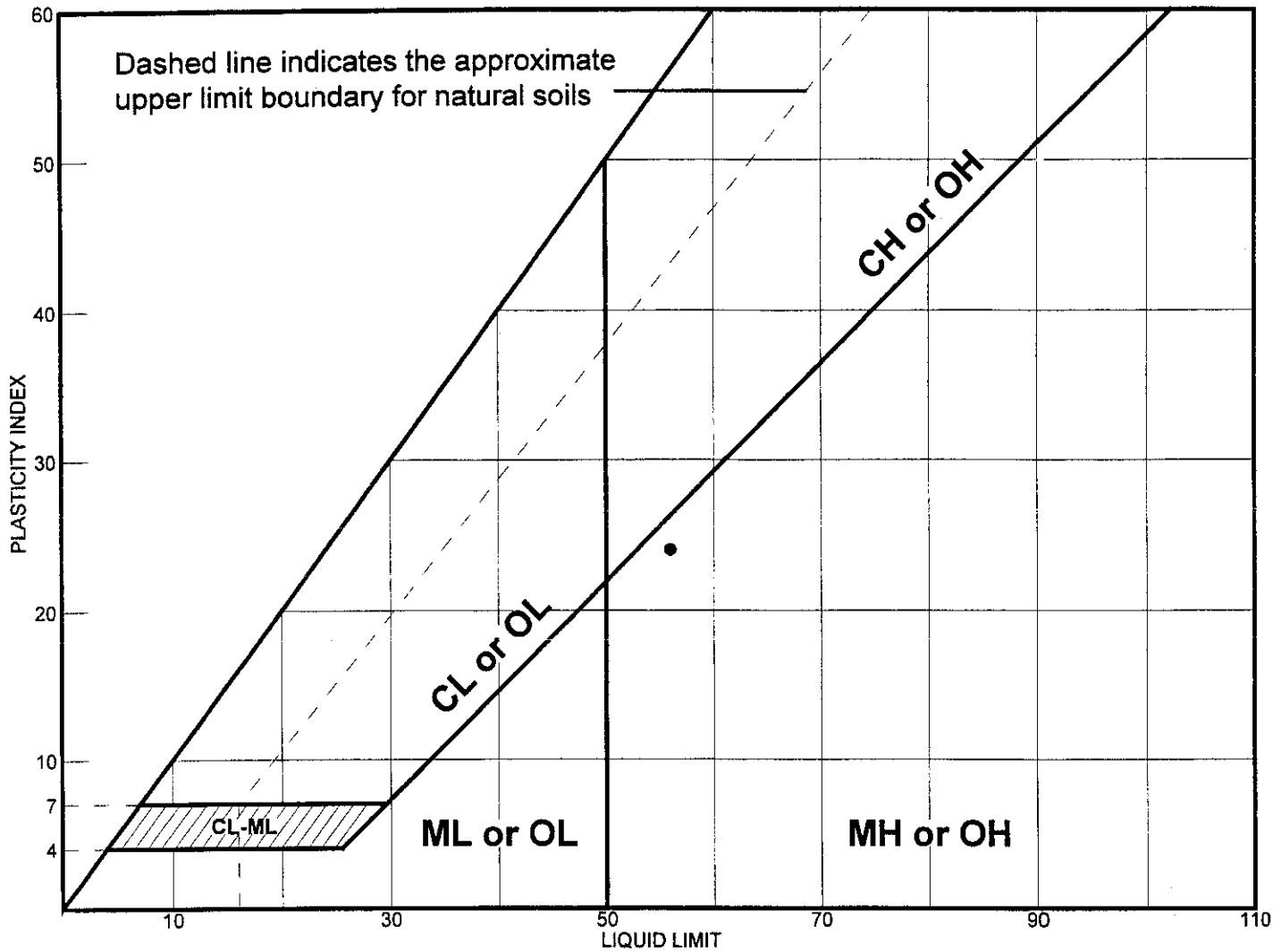
Project No. 01282 **Client:** US Army Corps of Engineers Savannah District

Remarks:

○ ASTM D422, Sample Received

B1.4 – Upper Dam Atterberg Limits Tests

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Elastic SILT	56	32	24	98.9	95.2	MH

Project No. 01282 **Client:** US Army Corps of Engineers Savannah District

Project: Design of Seismic Remediation for Clemson Diversion Dams

● **Source:** CUD-601 **Sample No.:** S8(new) **Elev./Depth:** 25.5-27.0 ft.

Remarks:

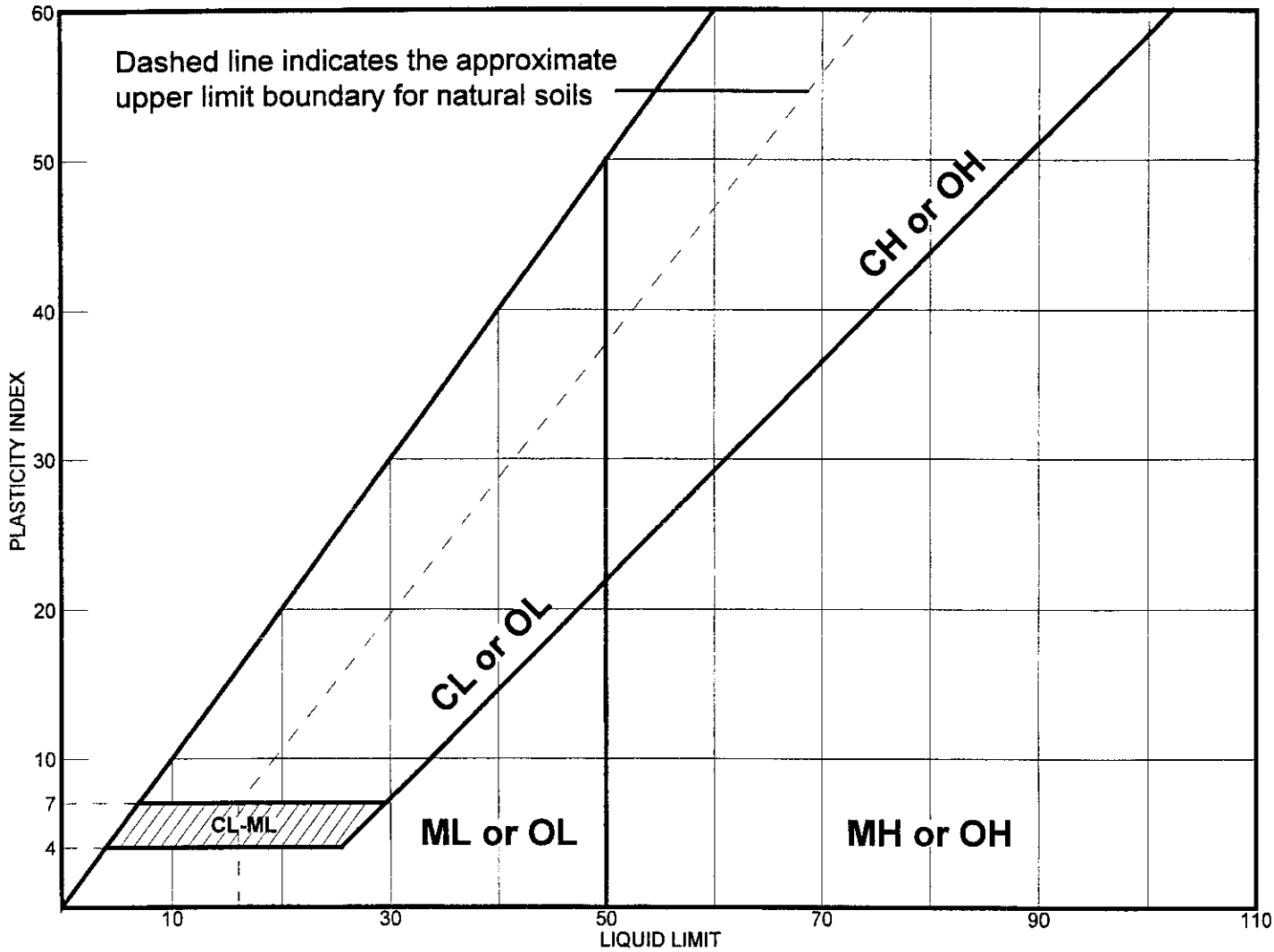
● ASTM D4318, Sample Received on 12/10/01, Tech. Responsibility: T. Moline.

LIQUID AND PLASTIC LIMITS TEST REPORT

GEI Consultants, Inc.

Fig.

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Sandy SILT	NV	NP	NP	99.4	64.5	ML

Project No. 01282 **Client:** US Army Corps of Engineers Savannah District

Project: Design of Seismic Remediation for Clemson Diversion Dams

● **Source:** CUD-604 **Sample No.:** S7 **Elev./Depth:** 24.0-25.5 ft.

Remarks:

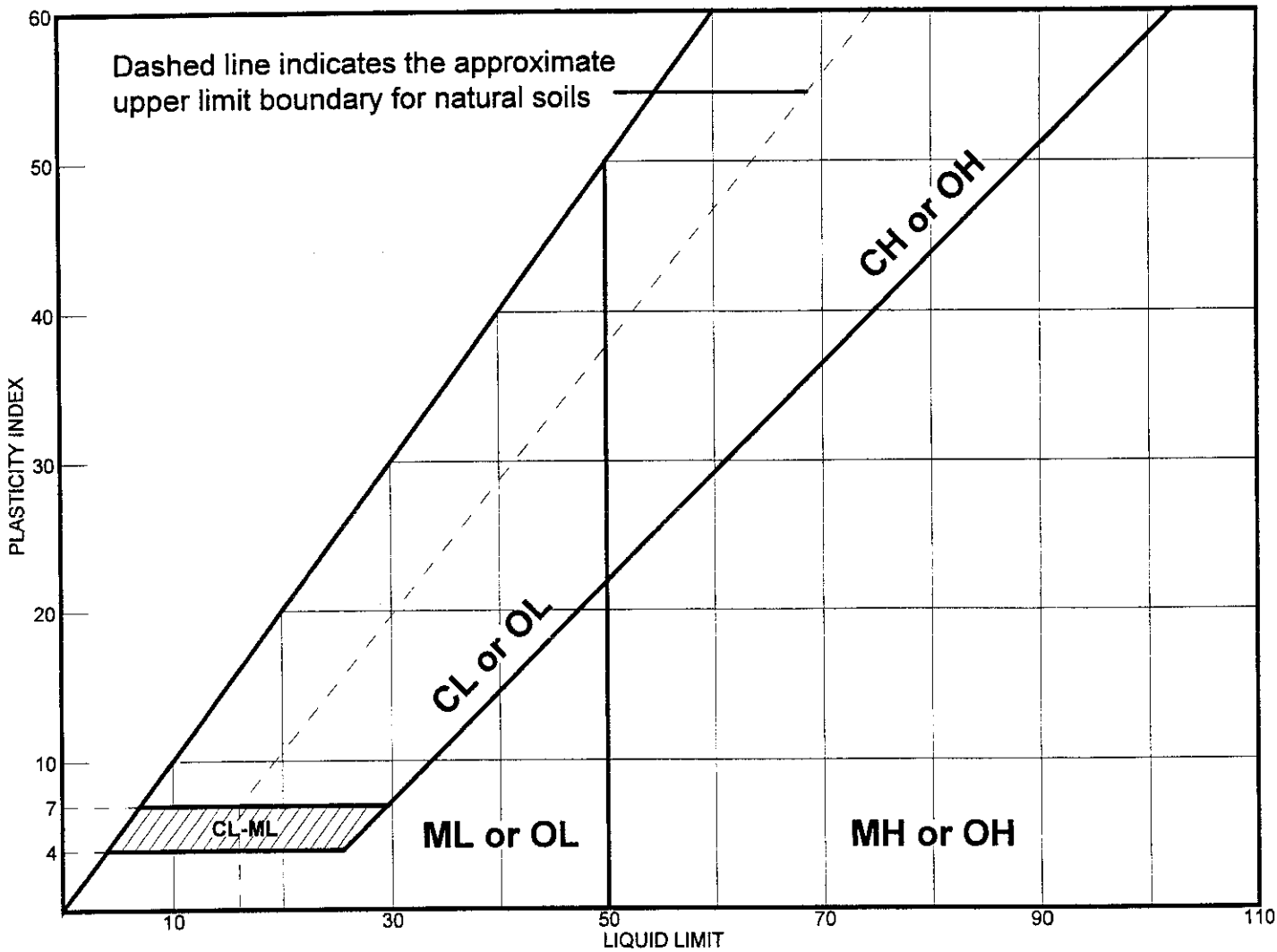
● ASTM D422, Sample Received on 12/10/01
Tech. Responsibility: T. Moline.

LIQUID AND PLASTIC LIMITS TEST REPORT

GEI Consultants, Inc.

Fig.

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Sandy SILT	NV	NP	NP	90.7	50.1	ML

Project No. 01282 **Client:** US Army Corps of Engineers Savannah District

Project: Design of Seismic Remediation for Clemson Diversion Dams

● **Source:** CUD-605 **Sample No.:** S3 **Elev./Depth:** 23.5-25.0 ft.

Remarks:

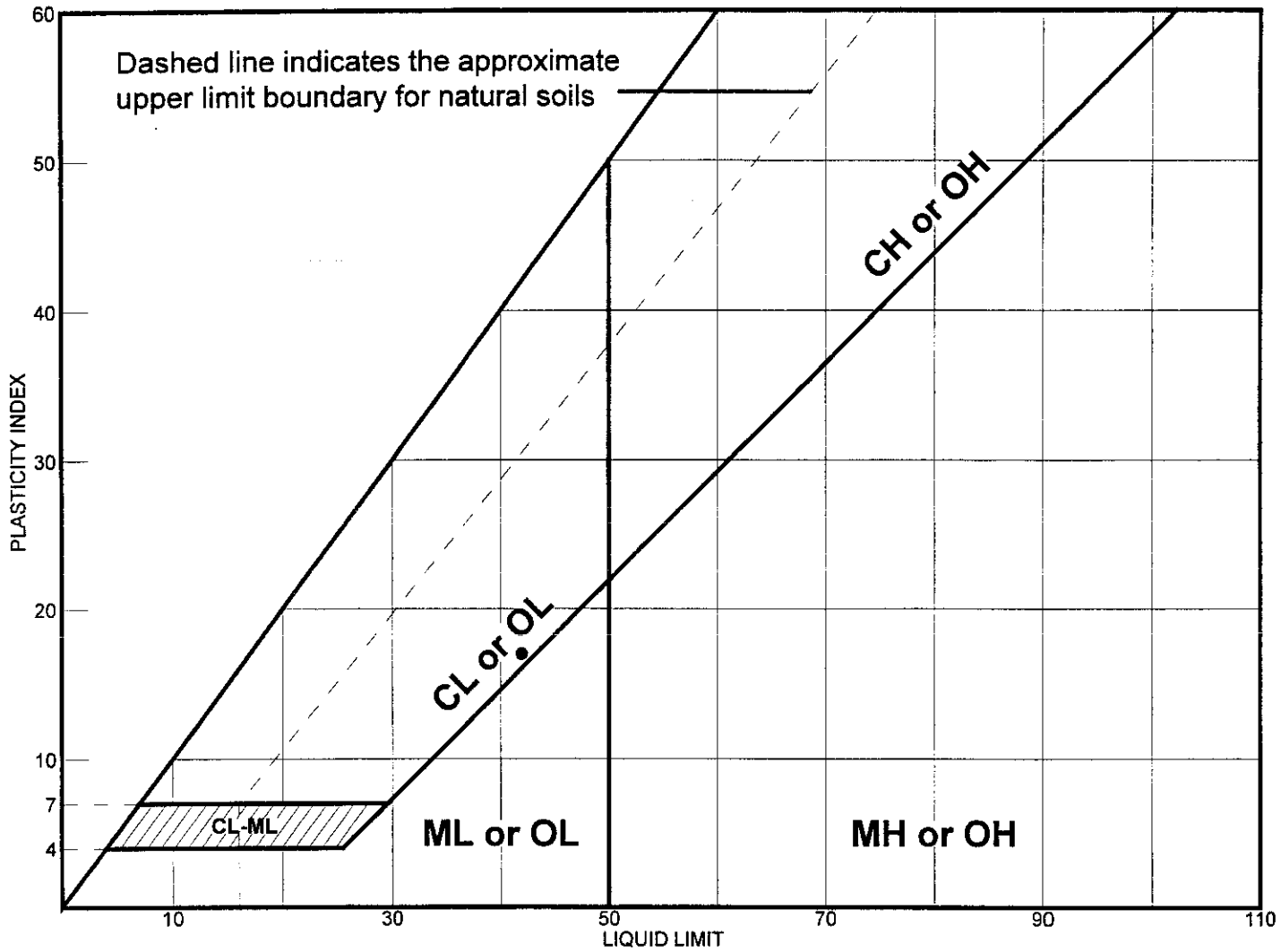
● ASTM D4318, Sample Received on 12/10/01, Tech. Responsibility: T. Moline.

LIQUID AND PLASTIC LIMITS TEST REPORT

GEI Consultants, Inc.

Fig.

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Lean CLAY	42	25	17	98.9	89.5	CL

Project No. 01282 **Client:** US Army Corps of Engineers Savannah District

Project: Design of Seismic Remediation for Clemson Diversion Dams

● **Source:** CUD-609 **Sample No.:** S7Top 12" **Elev./Depth:** 29.0-30.4 ft.

Remarks:

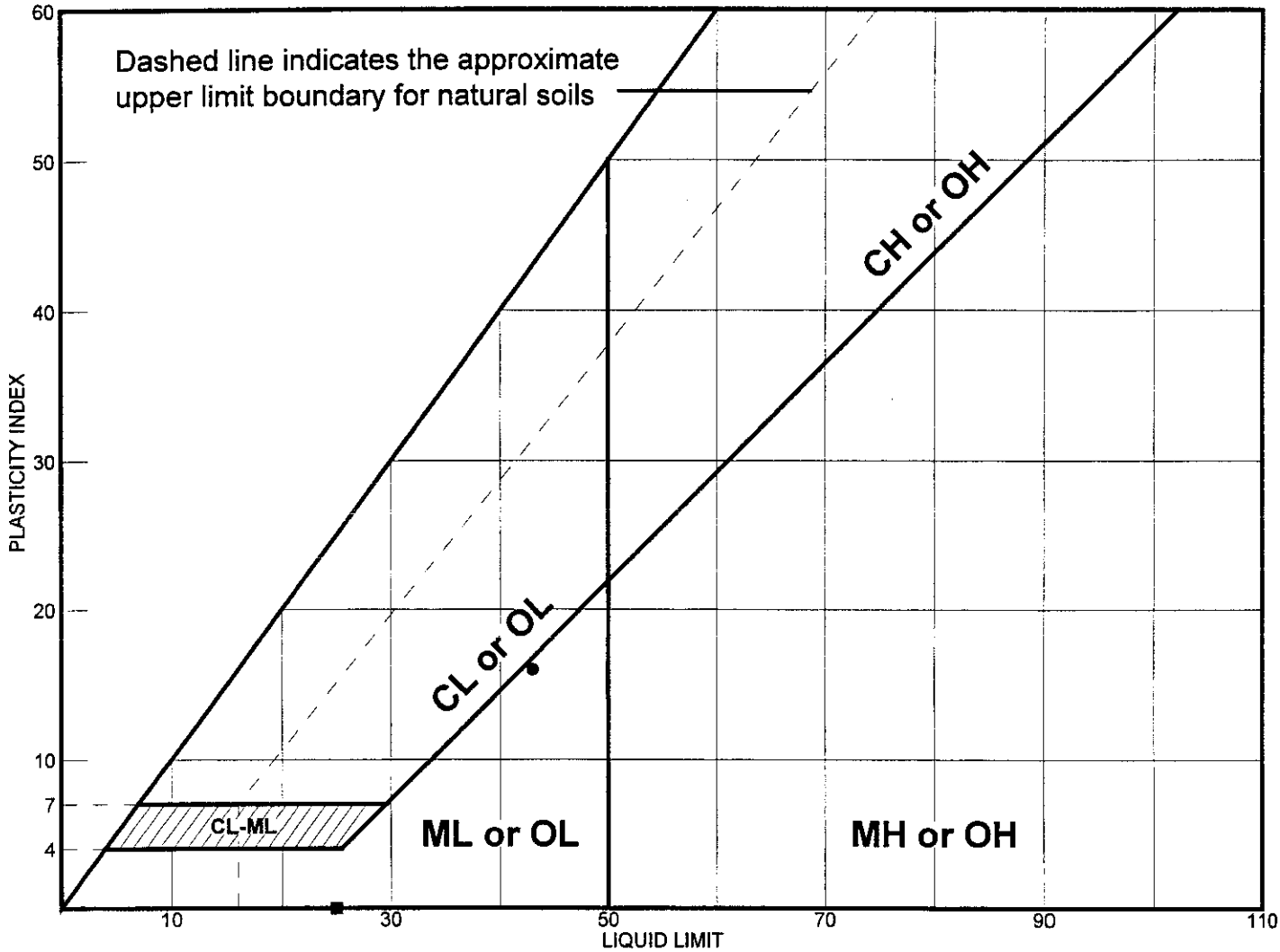
● ASTM D4318, Sample Received on 12/10/01, Tech. Responsibility: T. Moline.

LIQUID AND PLASTIC LIMITS TEST REPORT

GEI Consultants, Inc.

Fig.

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	SILT	43	27	16	99.8	94.1	ML
■	Silty SAND	25	NP	NP	99.1	30.4	SM

Project No. 01282 **Client:** US Army Corps of Engineers Savannah District

Project: Design of Seismic Remediation for Clemson Diversion Dams

● **Source:** CUD-610 **Sample No.:** S12 **Elev./Depth:** 31.5-33.0 ft

■ **Source:** CUD-610 **Sample No.:** S15 **Elev./Depth:** 36.0-37.5ft

Remarks:

● ASTM D4318, Sample Received on 12/10/01, Tech. Responsibility: T. Moline.

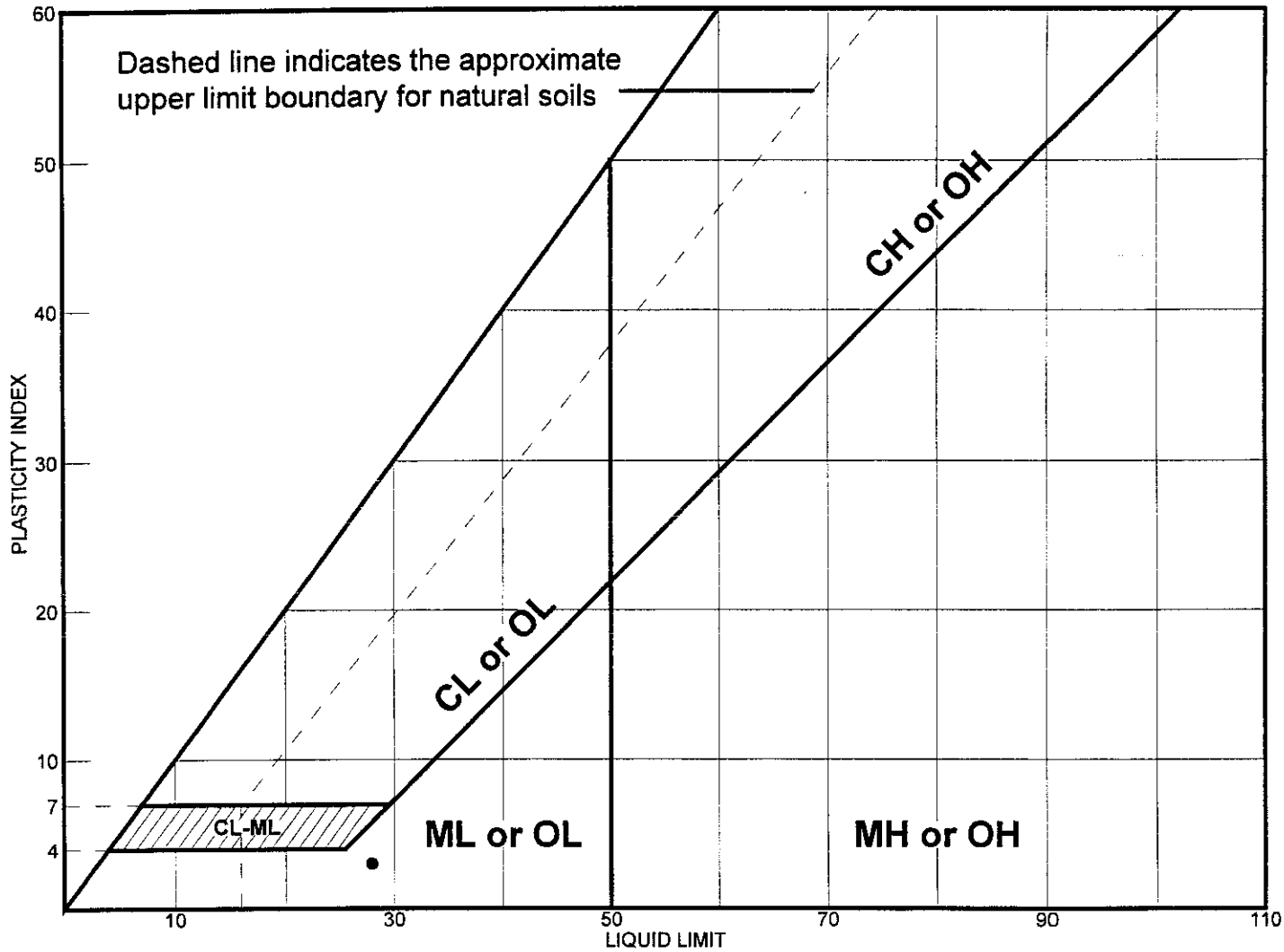
■ ASTM D4318, Sample Received on 12/10/01, Tech. Responsibility: T. Moline.

LIQUID AND PLASTIC LIMITS TEST REPORT

GEI Consultants, Inc.

Fig.

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Sandy Organic SILT	28	25	3	99.6	50.9	OL

Project No. 01282 **Client:** US Army Corps of Engineers Savannah District

Project: Design of Seismic Remediation for Clemson Diversion Dams

● **Source:** CUD-621A **Sample No.:** T2 **Elev./Depth:** 24-26 ft.

Remarks:

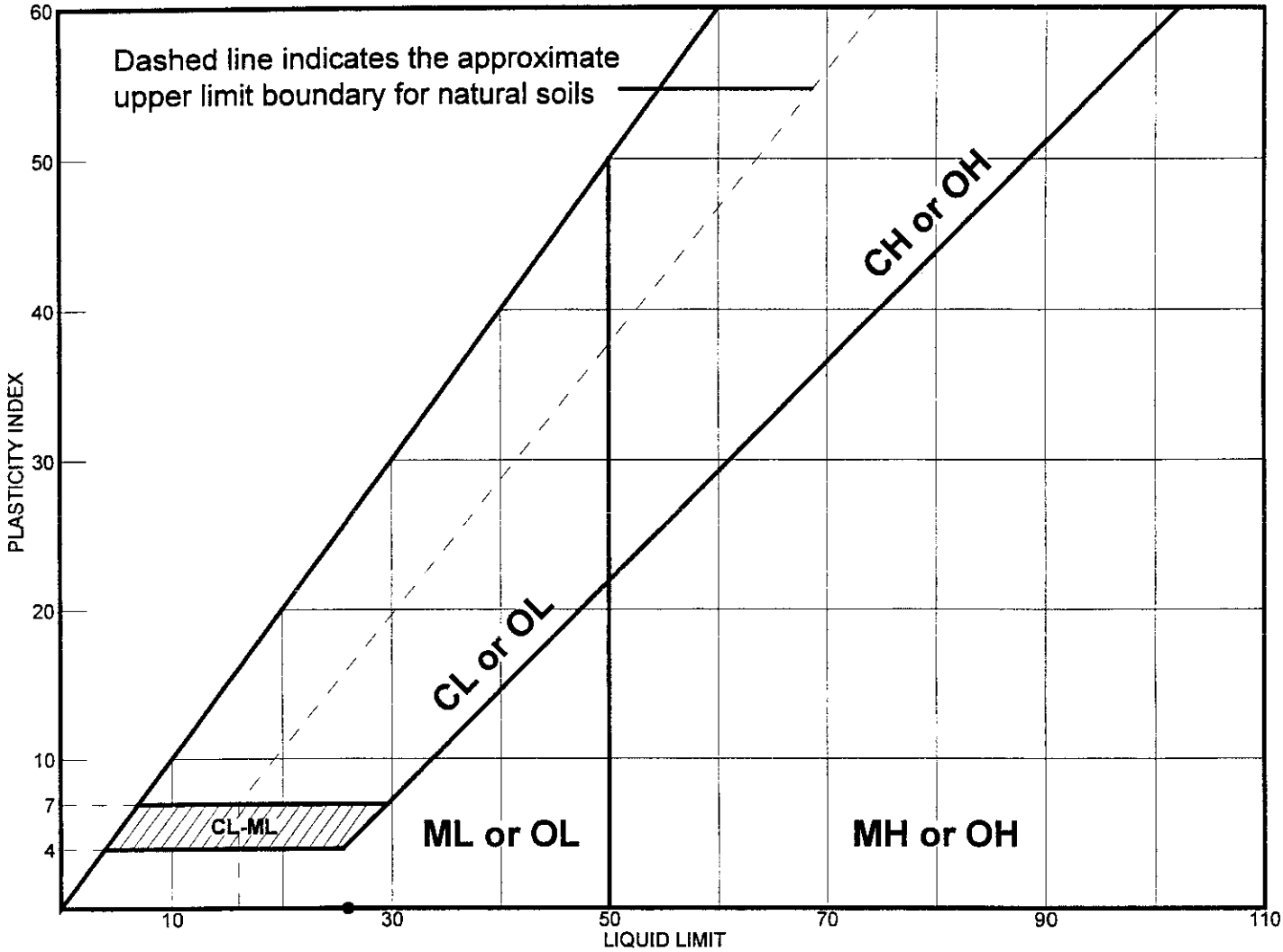
● ASTM D4318, Sample Received on 12/10/01, Tech. Responsibility: T. Moline. When Specimen was oven- dried, the liquid limit could not be run, therefore the sample was determined to be OL.

LIQUID AND PLASTIC LIMITS TEST REPORT

GEI Consultants, Inc.

Fig.

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Sandy SILT	26	29	NP		53.4	ML

Project No. 01282 **Client:** US Army Corps of Engineers Savannah District

Project: Design of Seismic Remediation for Clemson Diversion Dams

● **Source:** CUD-621B **Sample No.:** U1 **Elev./Depth:** 30-31.75 ft

Remarks:

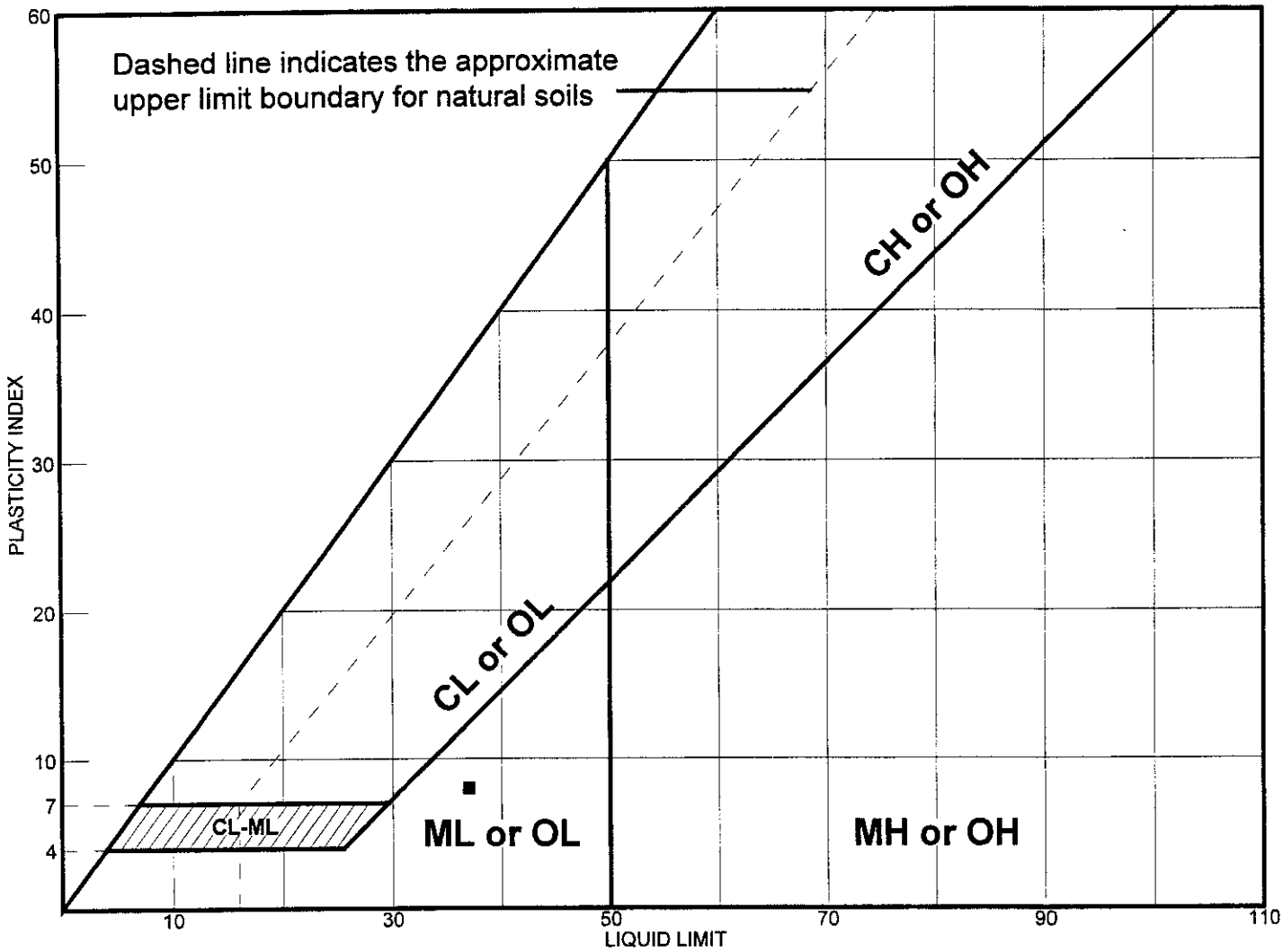
● ASTM D4318, Sample Received on 12/10/01, Tech. Responsibility: T. Moline.

LIQUID AND PLASTIC LIMITS TEST REPORT

GEI Consultants, Inc.

Fig.

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Silty SAND	NV	NP	NP	99.4	31.1	SM
■	Sandy Organic SILT	37	29	8	99.0	64.4	OL

Project No. 01282 **Client:** US Army Corps of Engineers Savannah District

Project: Design of Seismic Remediation for Clemson Diversion Dams

● **Source:** CUD-622A **Sample No.:** T4 **Elev./Depth:** 21-23 ft.

■ **Source:** CUD-622A **Sample No.:** T5(1 of 2) **Elev./Depth:** 23-25 ft.

Remarks:

● ASTM D4318, Sample Received on 12/10/01, Tech. Responsibility: T. Moline.

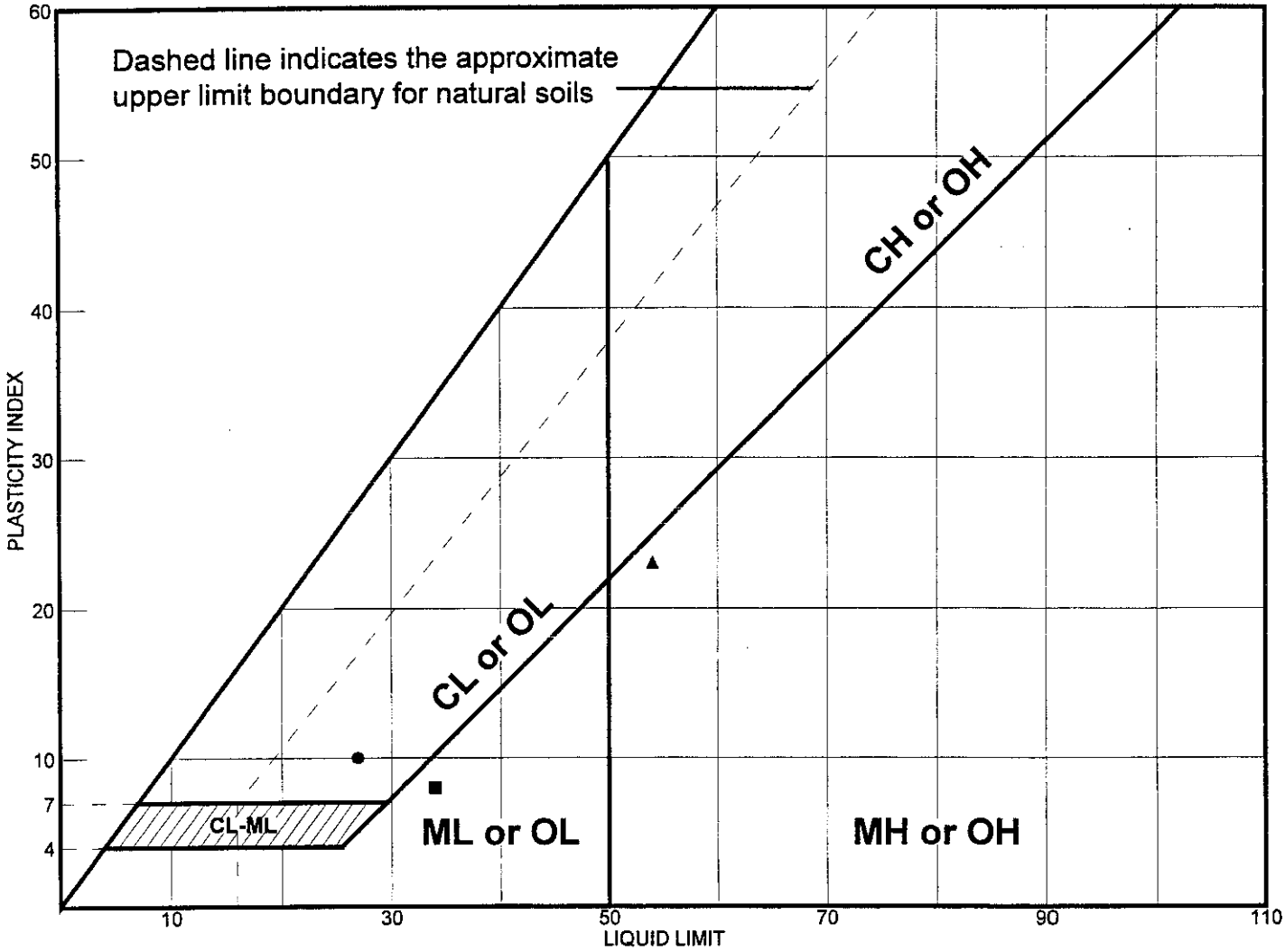
■ ASTM D4318, Sample Received on 12/10/01, Tech. Responsibility: T. Moline. When T5 (1of2) was oven- dried, the liquid limit could not be run, therefore the sample was determined to be OL.

LIQUID AND PLASTIC LIMITS TEST REPORT

GEI Consultants, Inc.

Fig.

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Clayey SAND	27	17	10	79.1	41.3	SC
■	Sandy SILT	34	26	8	91.1	64.8	ML
▲	Elastic SILT with sand	54	31	23	95.5	80.0	MH

Project No. 01282 **Client:** US Army Corps of Engineers Savannah District

Project: Design of Seismic Remediation for Clemson Diversion Dams

● **Source:** CUD-624A **Sample No.:** T1 **Elev./Depth:** 24-26 ft

■ **Source:** CUD-624A **Sample No.:** T2(1 of 2) **Elev./Depth:** 26-27 ft.

▲ **Source:** CUD-624A **Sample No.:** T2(2 of 2) **Elev./Depth:** 27-28 ft.

Remarks:

● ASTM D4318, Sample Received on 12/10/01, Tech. Responsibility: T. Moline.

■ ASTM D4318, Sample Received on 12/10/01, Tech. Responsibility: T. Moline.

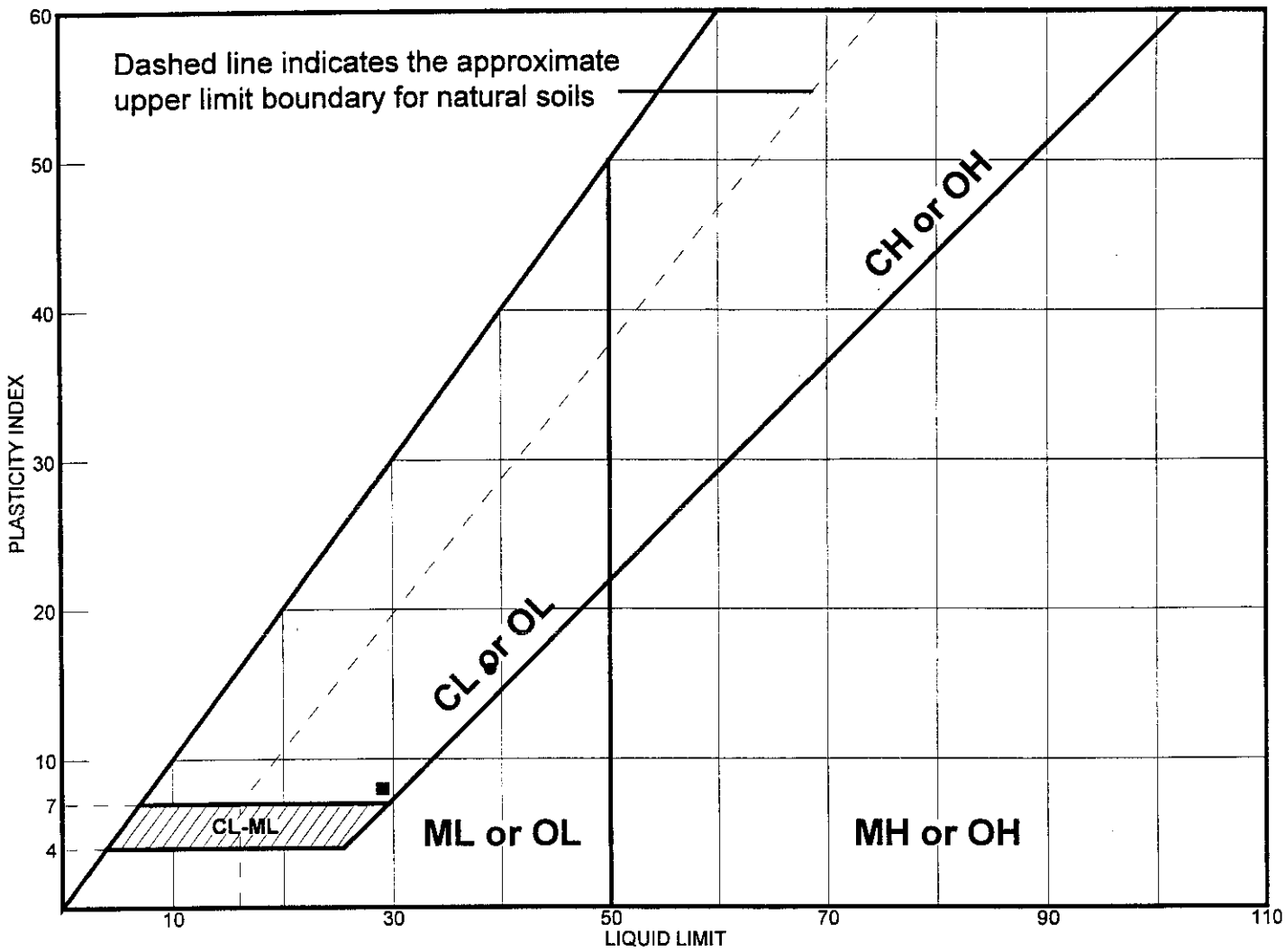
▲ ASTM D4318, Sample Received on 12/10/01, Tech. Responsibility: T. Moline.

LIQUID AND PLASTIC LIMITS TEST REPORT

GEI Consultants, Inc.

Fig.

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Lean CLAY with sand	39	23	16	97.5	72.5	CL
■	Sandy lean CLAY	29	21	8	96.8	57.3	CL

Project No. 01282 **Client:** US Army Corps of Engineers Savannah District

Project: Design of Seismic Remediation for Clemson Diversion Dams

● **Source:** CUD-624A **Sample No.:** T3(1 of 2) **Elev./Depth:** 28-29 ft.

■ **Source:** CUD-624A **Sample No.:** T3(2 of 2) **Elev./Depth:** 29-30 ft.

Remarks:

● ASTM D4318, Sample Received on 12/10/01, Tech. Responsibility: T. Moline.

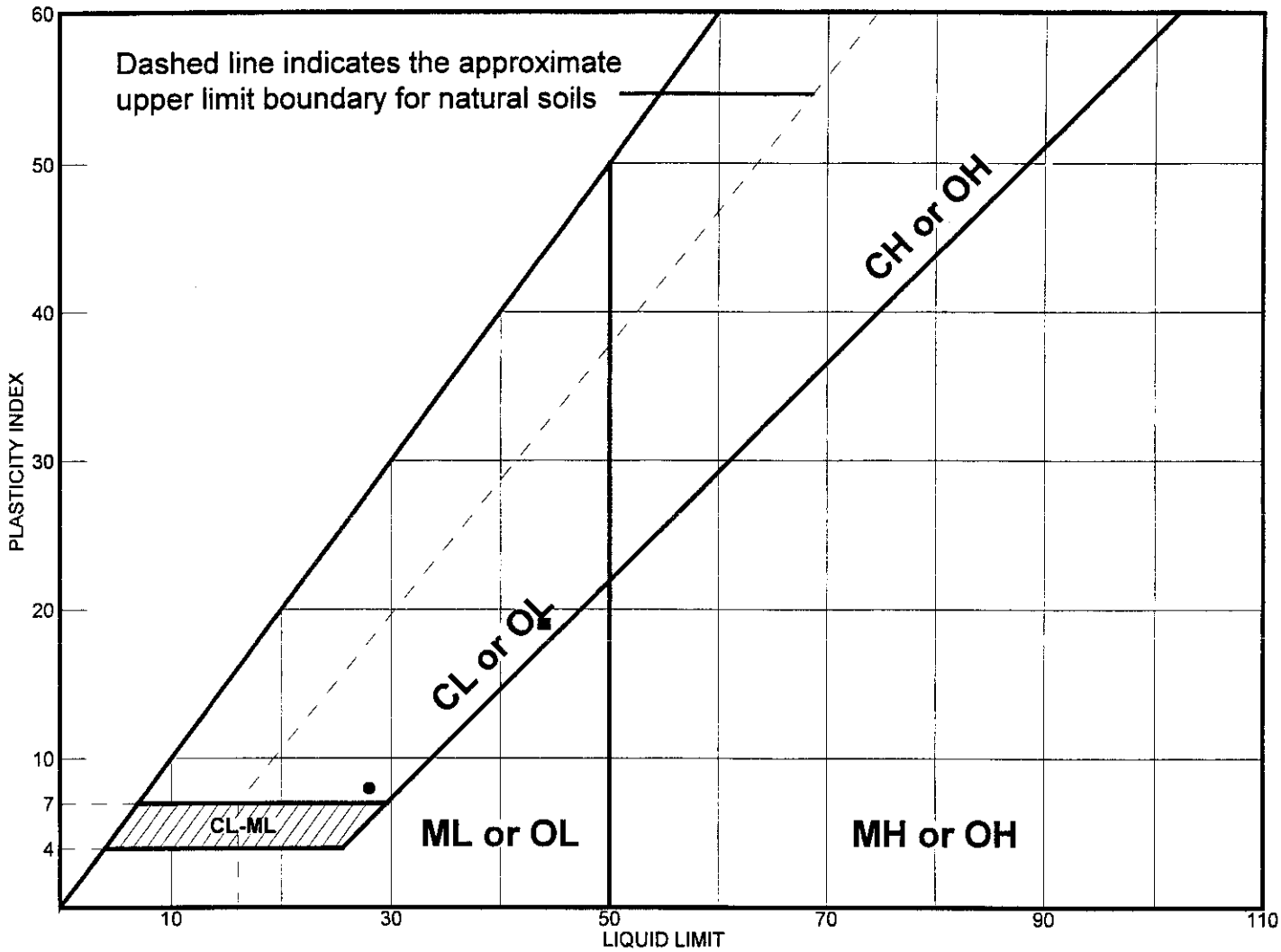
■ ASTM D4318, Sample Received on 12/10/01, Tech. Responsibility: T. Moline.

LIQUID AND PLASTIC LIMITS TEST REPORT

GEI Consultants, Inc.

Fig.

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Sandy lean CLAY	28	20	8	98.5	53.3	CL
■	Lean CLAY	44	25	19	99.3	87.3	CL

Project No. 01282 **Client:** US Army Corps of Engineers Savannah District

Project: Design of Seismic Remediation for Clemson Diversion Dams

● **Source:** CUD-624A **Sample No.:** T4(1 of 2) **Elev./Depth:** 30-31 ft.

■ **Source:** CUD-624A **Sample No.:** T4(2 of 2) **Elev./Depth:** 31-32 ft.

Remarks:

● ASTM D4318, Sample Received on 12/10/01, Tech. Responsibility: T. Moline.

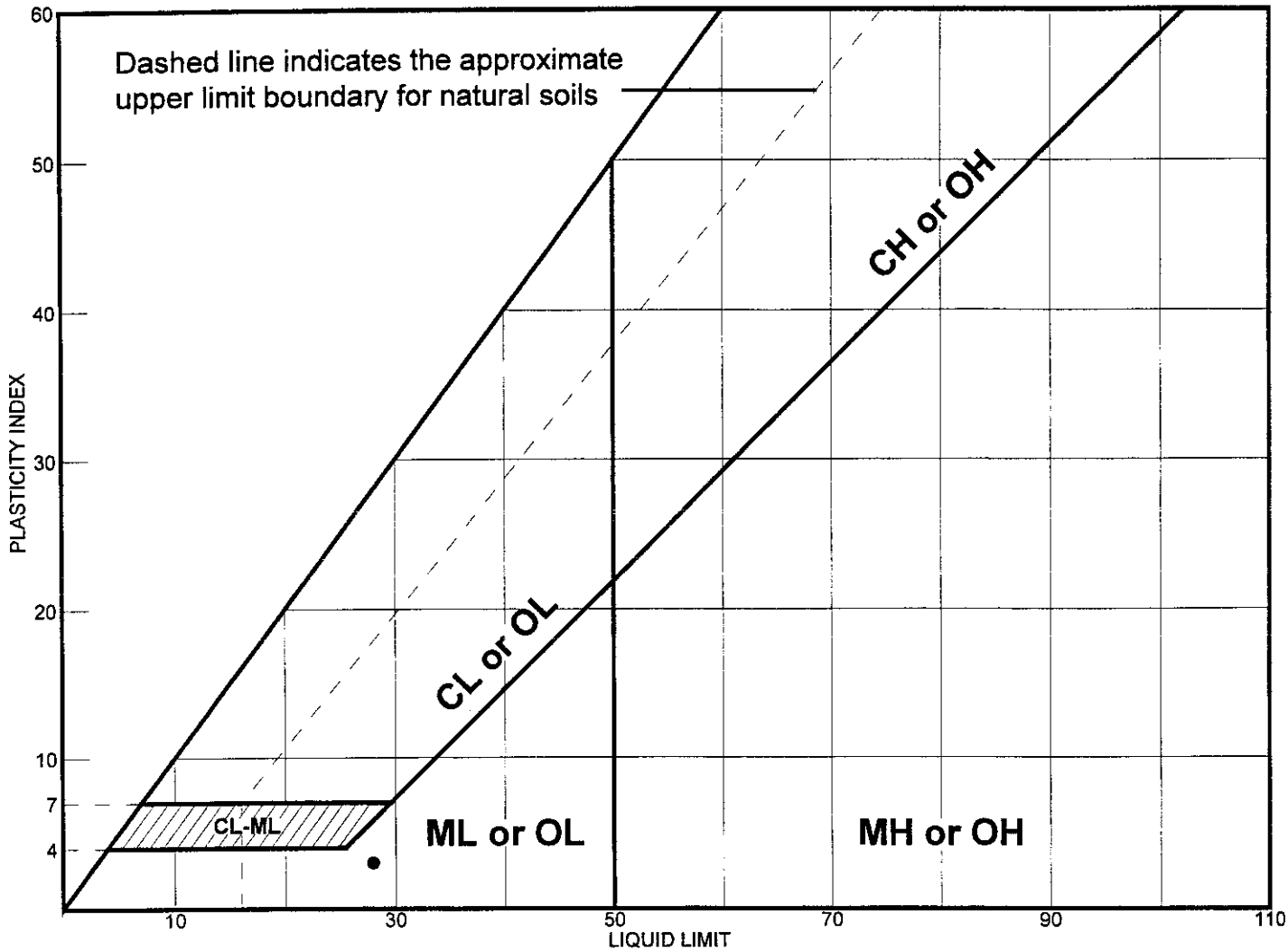
■ ASTM D4318, Sample Received on 12/10/01, Tech. Responsibility: T. Moline.

LIQUID AND PLASTIC LIMITS TEST REPORT

GEI Consultants, Inc.

Fig.

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Sandy SILT	28	25	3	99.8	50.2	ML
■	Silty SAND		NP	NP	99.5	47.5	SM
▲	Silty SAND		NP	NP	99.1	30.1	SM

Project No. 01282 **Client:** US Army Corps of Engineers Savannah District

Project: Design of Seismic Remediation for Clemson Diversion Dams

● **Source:** CUD-624A **Sample No.:** T6Top 8" **Elev./Depth:** 34.0-34.7 ft.

■ **Source:** CUD-624A **Sample No.:** T6Bot 16" **Elev./Depth:** 34.7-36.0 ft

▲ **Source:** CUD-624A **Sample No.:** T7 **Elev./Depth:** 36-38 ft.

Remarks:

● ASTM D4318, Sample Received on 12/10/01, Tech. Responsibility: T. Moline.

■ ASTM D4318, Sample Received on 12/10/01, Tech. Responsibility: T. Moline.

▲ ASTM D4318, Sample Received on 12/10/01, Tech. Responsibility: T. Moline.

LIQUID AND PLASTIC LIMITS TEST REPORT

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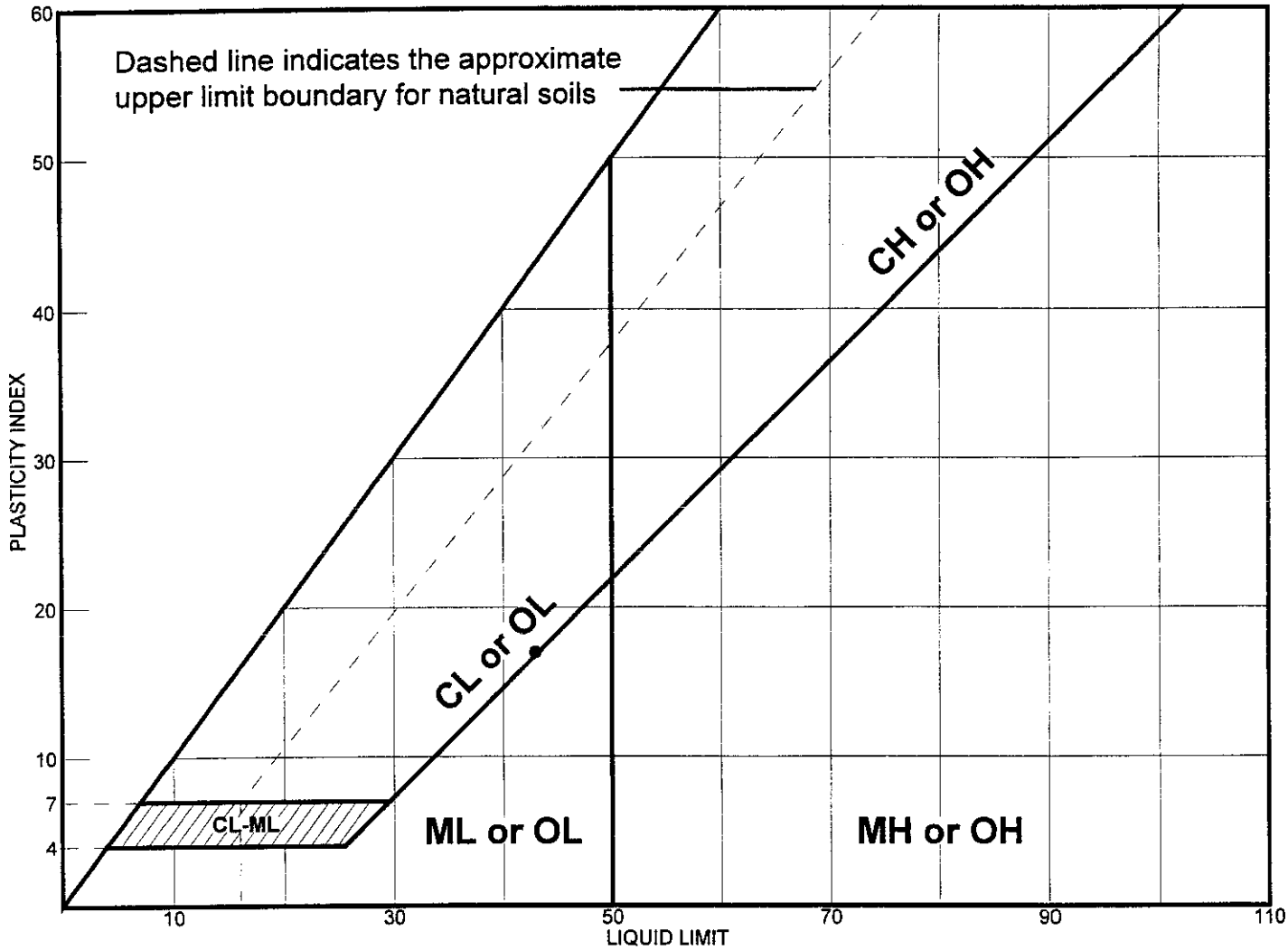
Fig.

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Lean CLAY with Sand	43	26	17	95.2	78.6	CL

Project No. 01282 **Client:** US Army Corps of Engineers Savannah District

Project: Design of Seismic Remediation for Clemson Diversion Dams

● **Source:** CUD-624B **Sample No.:** T1(2 of 2) **Elev./Depth:** 26-28 ft.

Remarks:

● ASTM D4318, Sample Received on 12/10/01, Tech. Responsibility: T. Moline.

LIQUID AND PLASTIC LIMITS TEST REPORT

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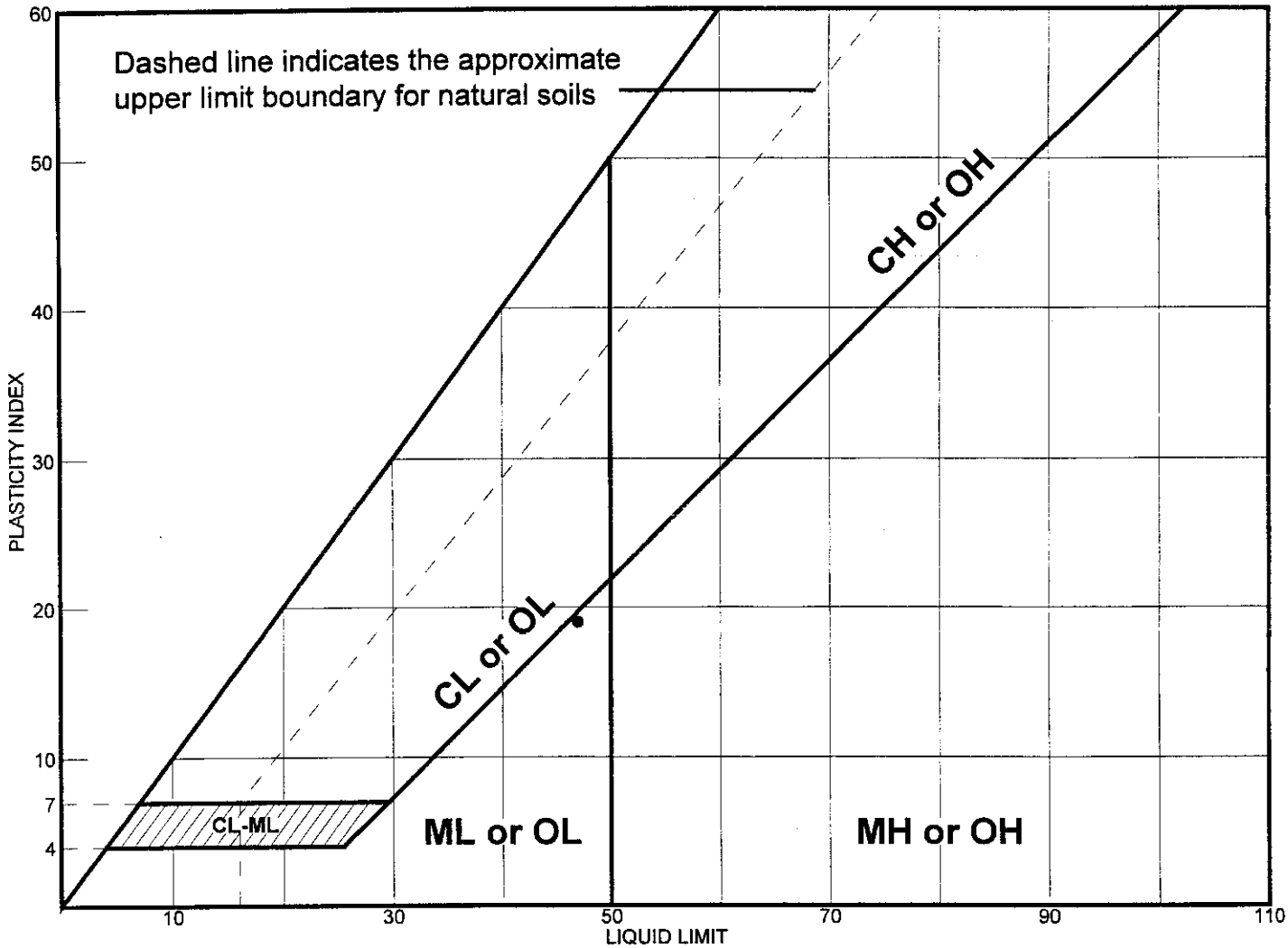
Fig.

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	SILT	47	28	19		87.4	ML

Project No. 01282 **Client:** US Army Corps of Engineers Savannah District

Project: Design of Seismic Remediation for Clemson Diversion Dams

● **Source:** CUD-624B **Sample No.:** UF2 **Elev./Depth:** 31-32.75 ft

Remarks:

● ASTM D4318, Sample Received on 12/10/01, Tech. Responsibility: T. Moline.

LIQUID AND PLASTIC LIMITS TEST REPORT

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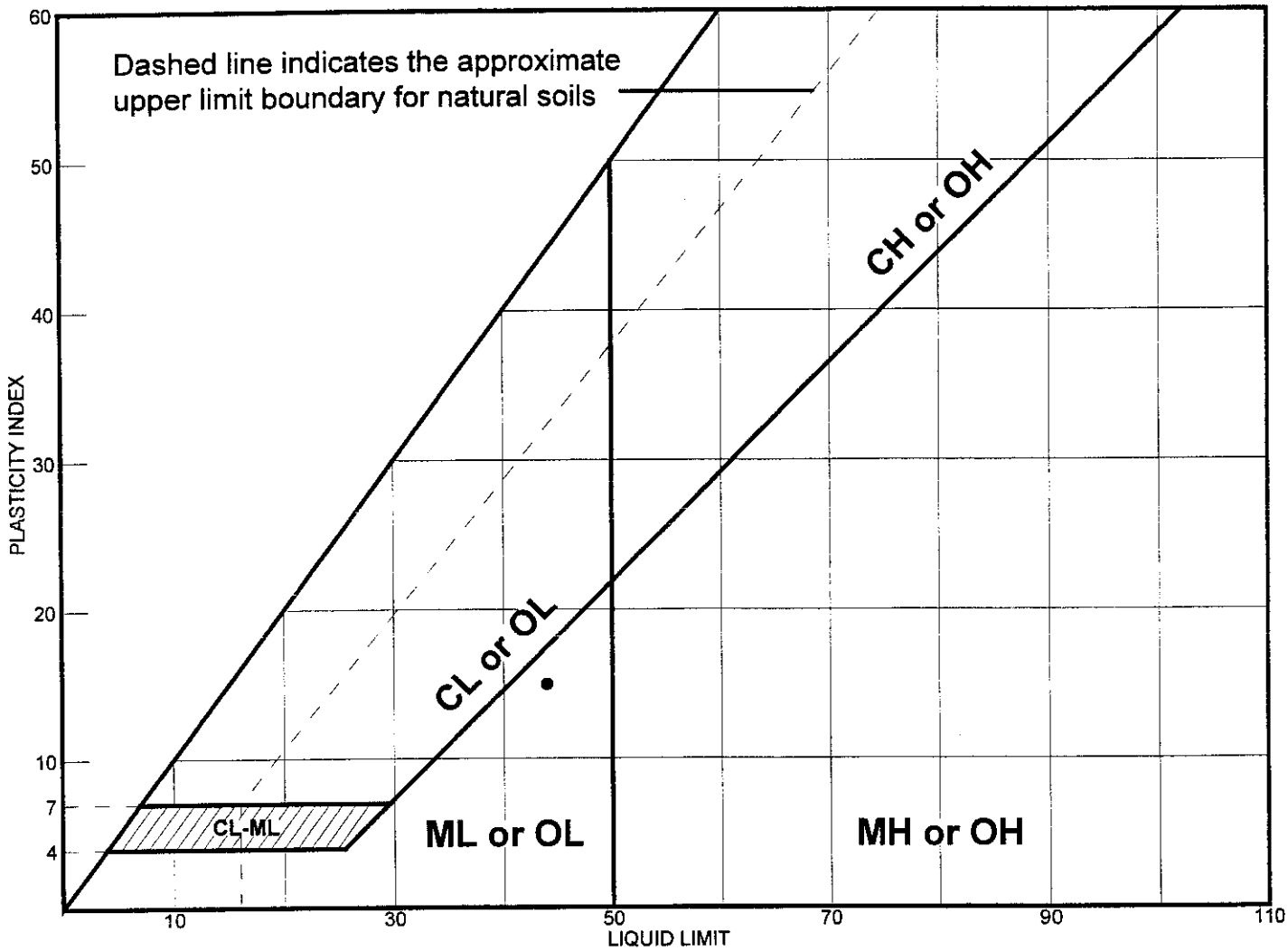
Fig.

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	SILT	44	29	15		82.8	ML

Project No. 01282 **Client:** US Army Corps of Engineers Savannah District

Project: Design of Seismic Remediation for Clemson Diversion Dams

● **Source:** CUD-624B **Sample No.:** U3 **Elev./Depth:** 33-34.75 ft

Remarks:

● ASTM D4318, Sample Received on 12/10/01, Tech. Responsibility: T. Moline.

LIQUID AND PLASTIC LIMITS TEST REPORT

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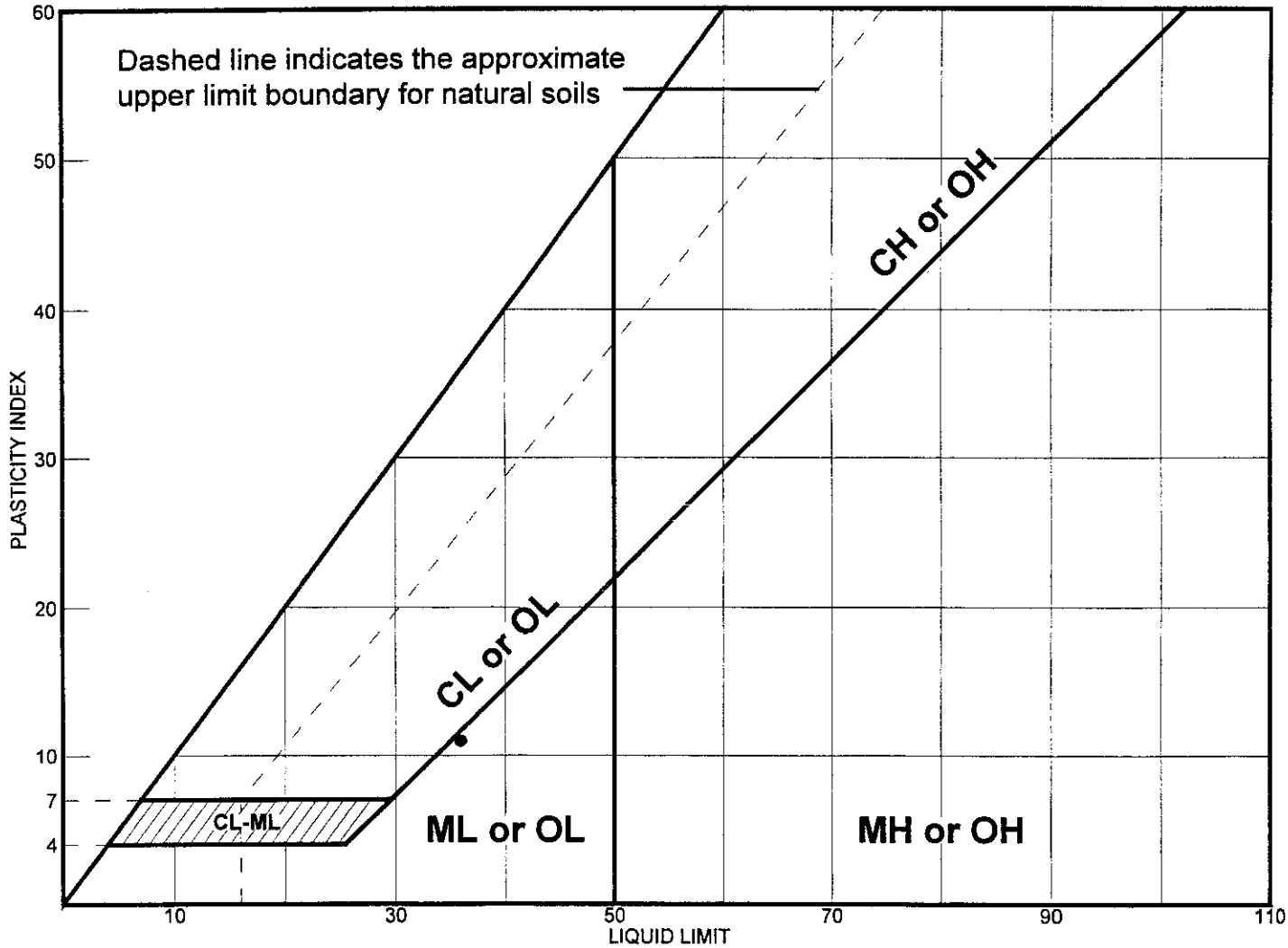
Fig.

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Sandy SILT	36	25	11	93.4	56.2	ML

Project No. 01282 **Client:** US Army Corps of Engineers Savannah District

Project: Design of Seismic Remediation for Clemson Diversion Dams

● **Source:** CUD-624C **Sample No.:** T1 **Elev./Depth:** 26-28 ft.

Remarks:

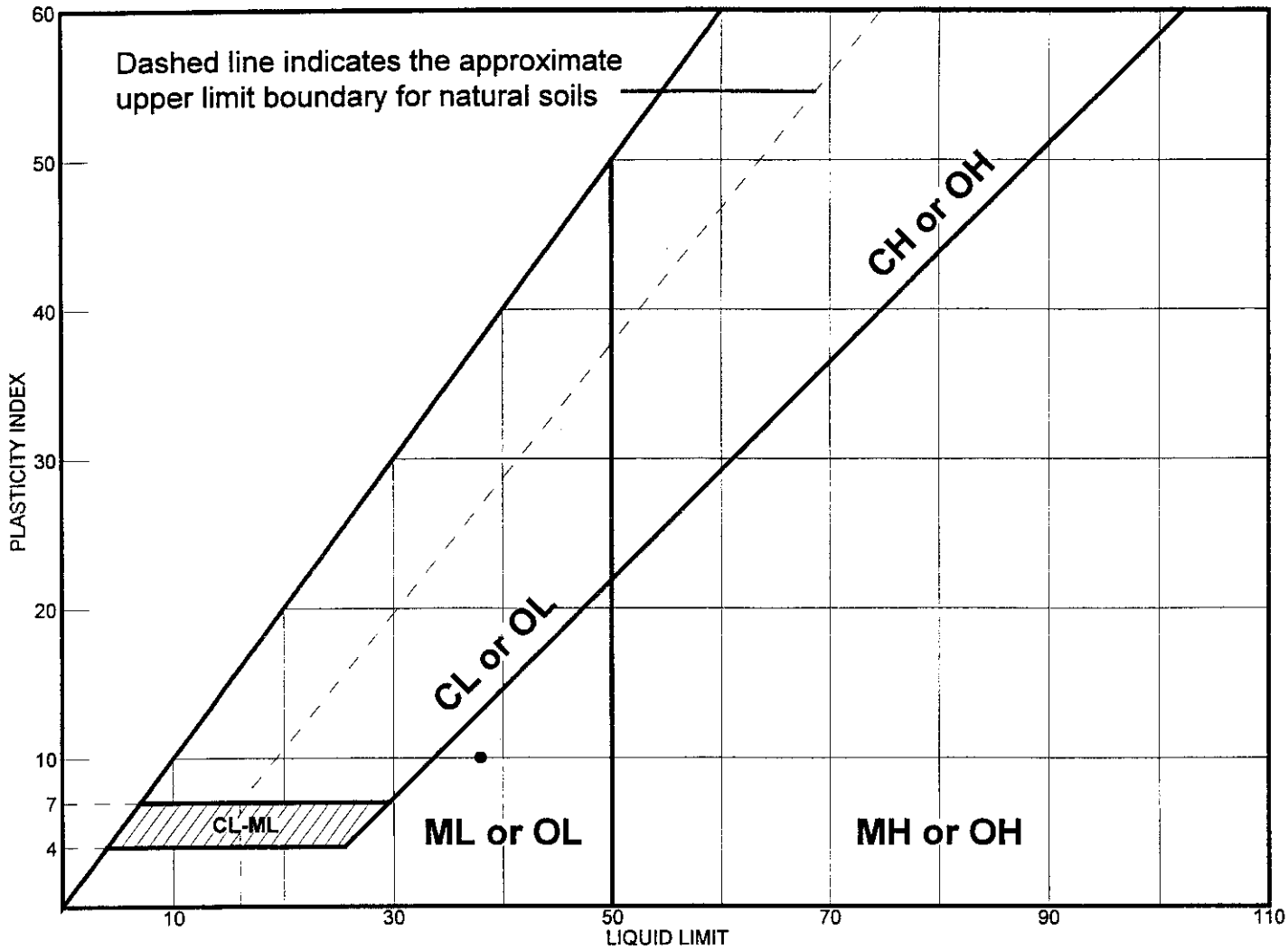
● ASTM D4318, Sample Received on 12/10/01, Tech. Responsibility: T. Moline.

LIQUID AND PLASTIC LIMITS TEST REPORT

GEI Consultants, Inc.

Fig.

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Sandy SILT	38	28	10			ML

Project No. 01282 **Client:** US Army Corps of Engineers Savannah District

Project: Design of Seismic Remediation for Clemson Diversion Dams

● **Source:** CUD-624C **Sample No.:** UF2 **Elev./Depth:** 32-33.75 ft

Remarks:

● ASTM D4318, Sample Received on 12/10/01, Tech. Responsibility: T. Moline.

LIQUID AND PLASTIC LIMITS TEST REPORT

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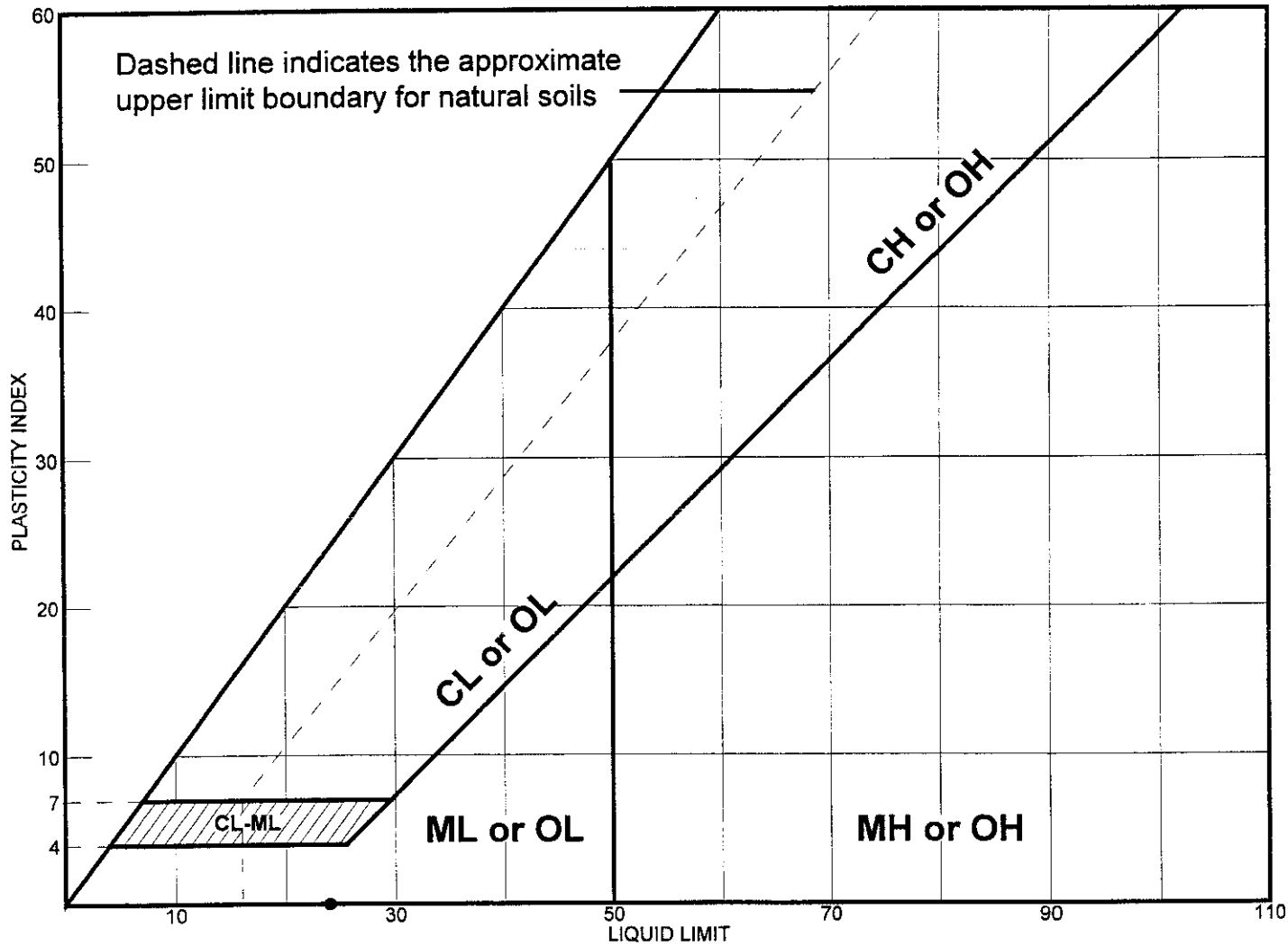
Fig.

B1.5 – Lower Dam Atterberg Limits Tests

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Silty SAND	24	NP	NP	98.0	29.8	SM

Project No. 01282 **Client:** US Army Corps of Engineers Savannah District

Project: Design of Seismic Remediation for Clemson Diversion Dams

● **Source:** CLD-605 **Sample No.:** S11 **Elev./Depth:** 35-36.5 ft.

Remarks:

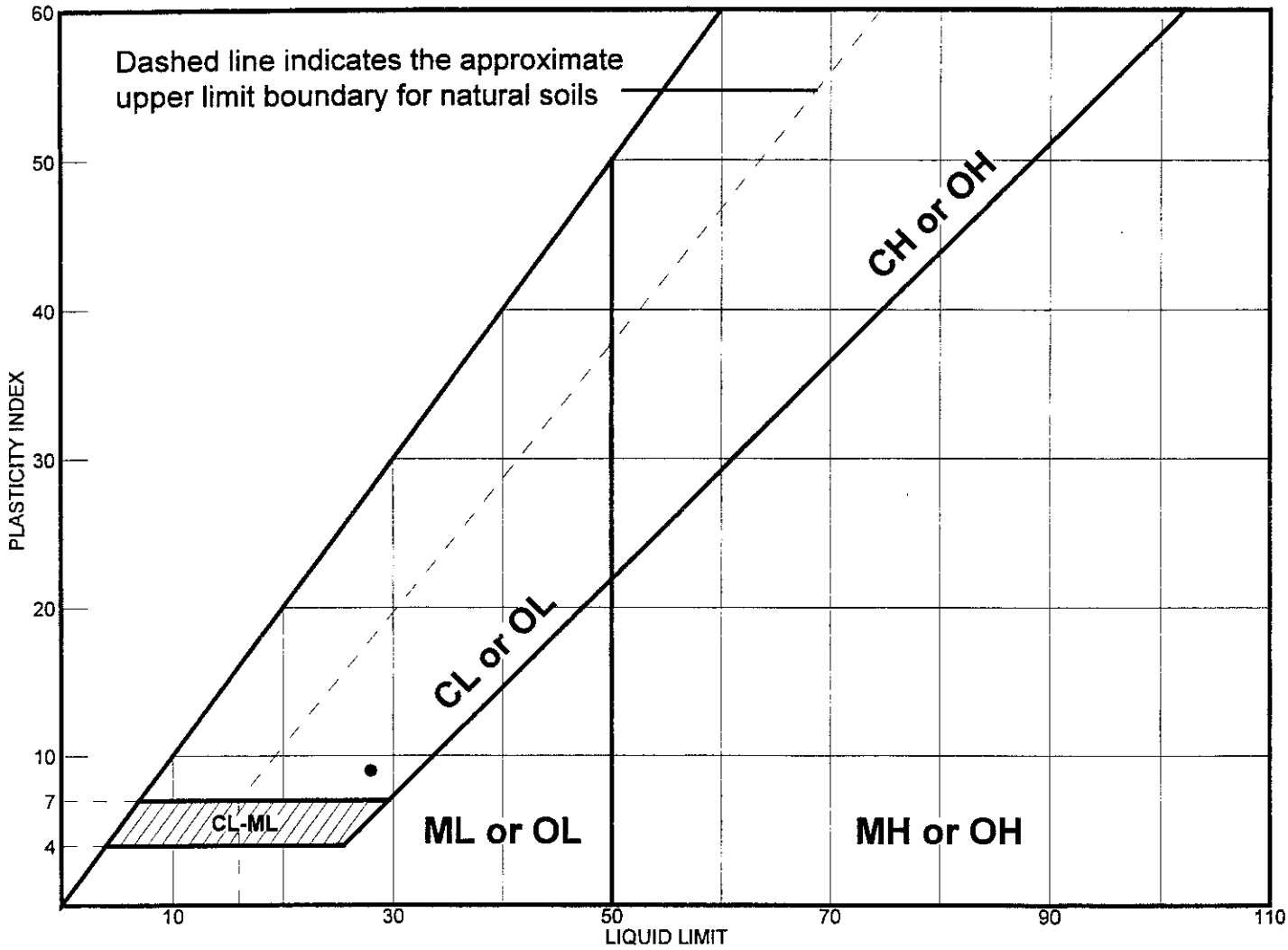
● ASTM D4318, Sample Received on 12/10/01, Tech. Responsibility: T. Moline.

LIQUID AND PLASTIC LIMITS TEST REPORT

GEI Consultants, Inc.

Fig.

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Lean CLAY with Sand	28	19	9			

Project No. 01282 **Client:** US Army Corps of Engineers Savannah District

Project: Design of Seismic Remediation for Clemson Diversion Dams

● **Source:** CLD-608 **Sample No.:** S8 **Elev./Depth:** 25.5-27.0 ft.

Remarks:

● ASTM D4318, Sample Received on 12/10/01, Tech. Responsibility: T. Moline.

LIQUID AND PLASTIC LIMITS TEST REPORT

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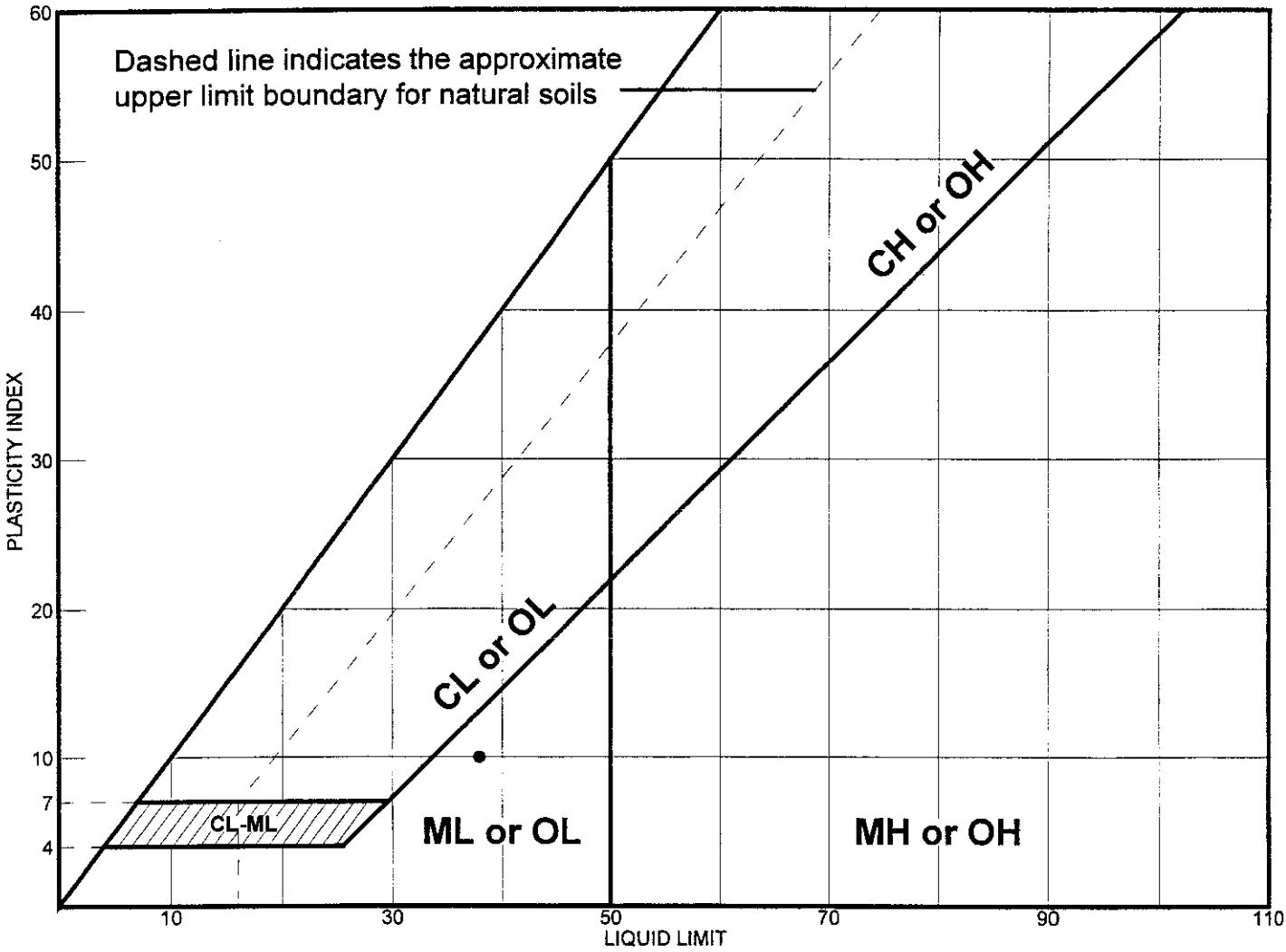
Fig.

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	SILT with sand	38	28	10	98.7	83.6	ML

Project No. 01282 **Client:** US Army Corps of Engineers Savannah District

Project: Design of Seismic Remediation for Clemson Diversion Dams

● **Source:** CLD-609 **Sample No.:** S11 **Elev./Depth:** 30-31.5 ft.

Remarks:

● ASTM D4318, Sample Received on 12/10/01, Tech. Responsibility: T. Moline.

LIQUID AND PLASTIC LIMITS TEST REPORT

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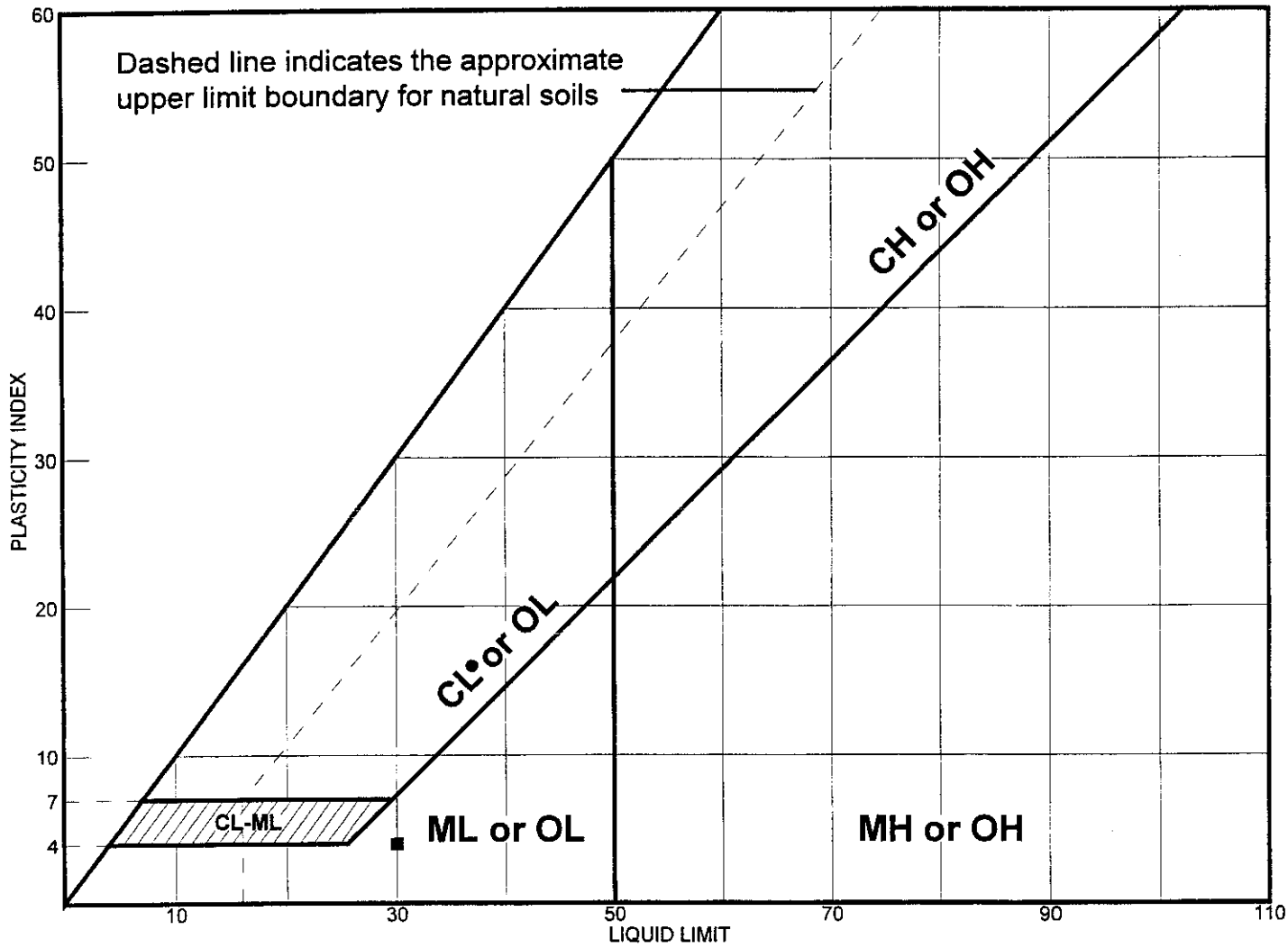
Fig.

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Lean CLAY with sand	37	21	16	99.5	76.1	CL
■	Sandy SILT	30	26	4	96.1	60.3	ML

Project No. 01282 **Client:** US Army Corps of Engineers Savannah District

Project: Design of Seismic Remediation for Clemson Diversion Dams

● **Source:** CLD-610 **Sample No.:** S6 **Elev./Depth:** 22.5-24.0 ft.

■ **Source:** CLD-610 **Sample No.:** S10 **Elev./Depth:** 28.5-30.0 ft.

Remarks:

● ASTM D4318, Sample Received on 12/10/01, Tech. Responsibility: T. Moline.

■ ASTM D4318, Sample Received on 12/10/01, Tech. Responsibility: T. Moline.

LIQUID AND PLASTIC LIMITS TEST REPORT

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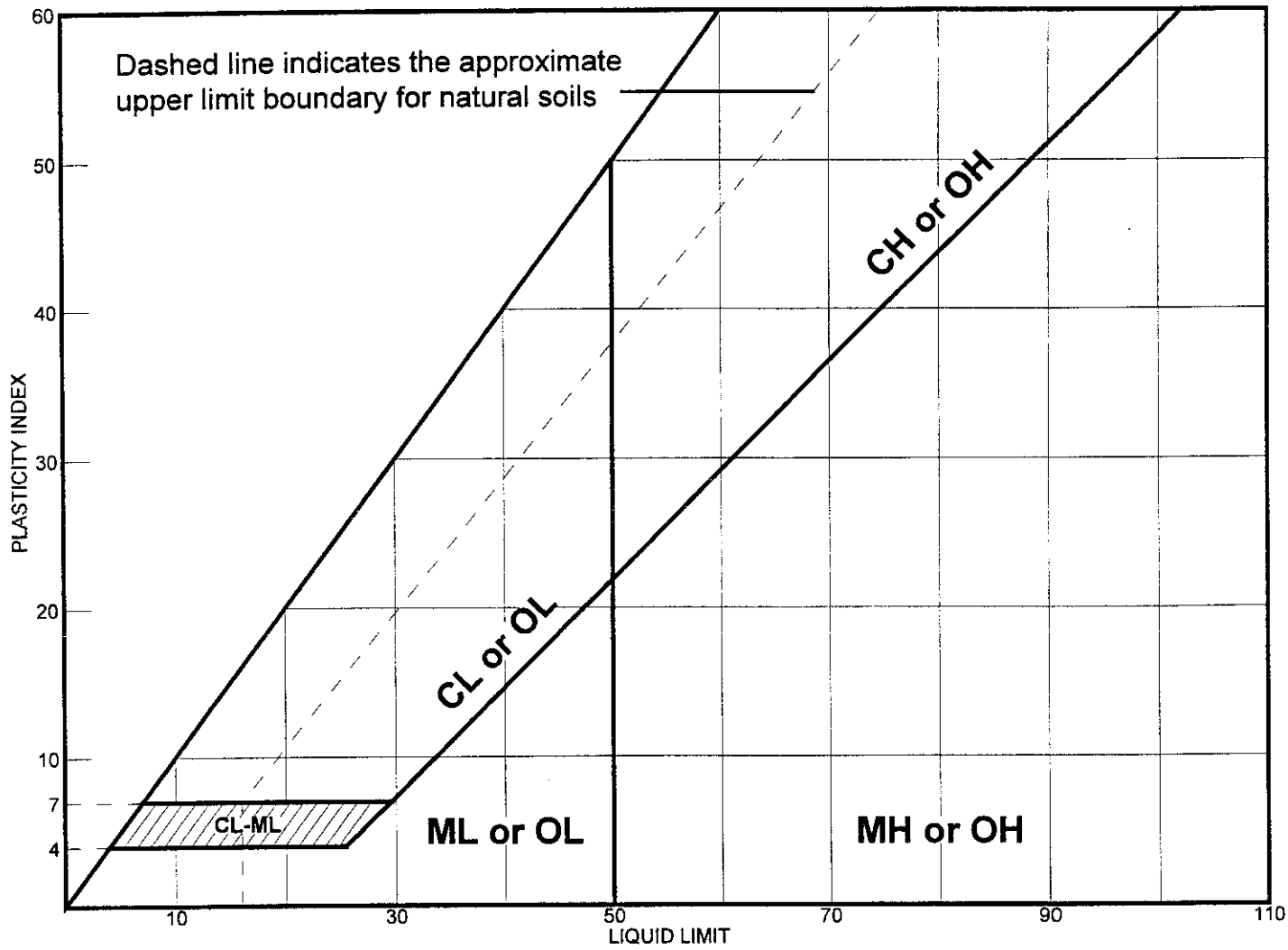
Fig.

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Sandy SILT	NV	NP	NP	99.5	55.8	ML

Project No. 01282 **Client:** US Army Corps of Engineers Savannah District

Project: Design of Seismic Remediation for Clemson Diversion Dams

● **Source:** CLD-613 **Sample No.:** T7 **Elev./Depth:** 27-29 ft.

Remarks:

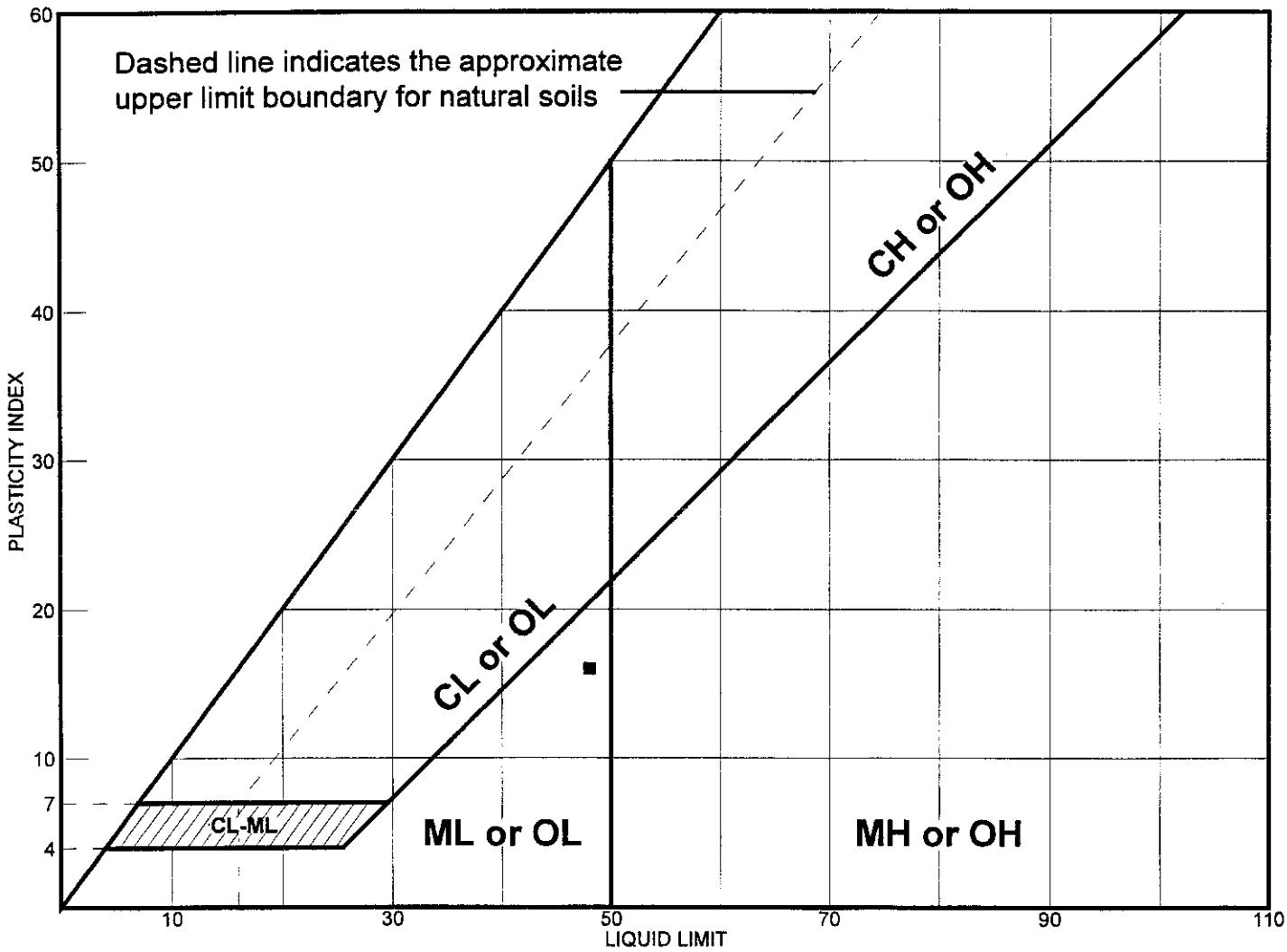
● ASTM D4318, Sample Received on 12/10/01, Tech. Responsibility: T. Moline.

LIQUID AND PLASTIC LIMITS TEST REPORT

GEI Consultants, Inc.

Fig.

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Sandy SILT	NV	NP	NP	95.3	51.5	ML
■	SILT with Sand	48	32	16	97.2	83.1	ML
▲	Silty SAND	NV	NP	NP	97.0	38.9	SM

Project No. 01282 **Client:** US Army Corps of Engineers Savannah District

Project: Design of Seismic Remediation for Clemson Diversion Dams

● **Source:** CLD-621A **Sample No.:** S1Bot12"&S2 **Elev./Depth:** 25.7-29.0 ft.

■ **Source:** CLD-621A **Sample No.:** T3(2 of 2) **Elev./Depth:** 30-31.3 ft.

▲ **Source:** CLD-621A **Sample No.:** U2 & T5 **Elev./Depth:** 32-36 ft.

Remarks:

● ASTM D4318, Sample Received on 12/10/01, Tech. Responsibility: T. Moline.

■ ASTM D4318, Sample Received on 12/10/01, Tech. Responsibility: T. Moline.

▲ ASTM D4318, Sample Received on 12/10/01, Tech. Responsibility: T. Moline..

LIQUID AND PLASTIC LIMITS TEST REPORT

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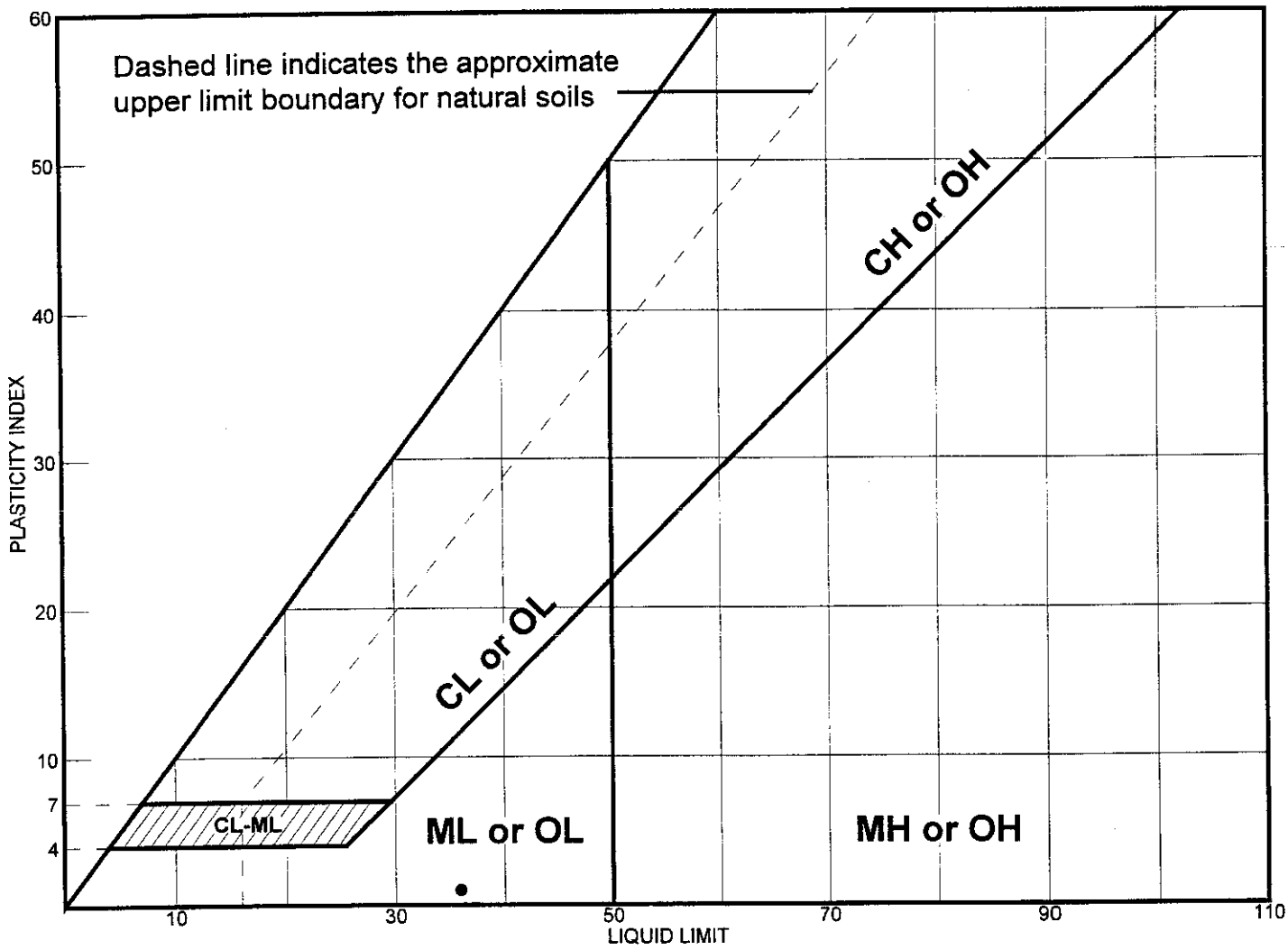
Fig.

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Sandy SILT	36	35	1		60.7	ML

Project No. 01282 **Client:** US Army Corps of Engineers Savannah District

Project: Design of Seismic Remediation for Clemson Diversion Dams

● **Source:** CLD-621A **Sample No.:** U1 **Elev./Depth:** 32-34 ft

Remarks:

● ASTM D4318, Sample Received on 12/10/01, Tech. Responsibility: T. Moline.

LIQUID AND PLASTIC LIMITS TEST REPORT

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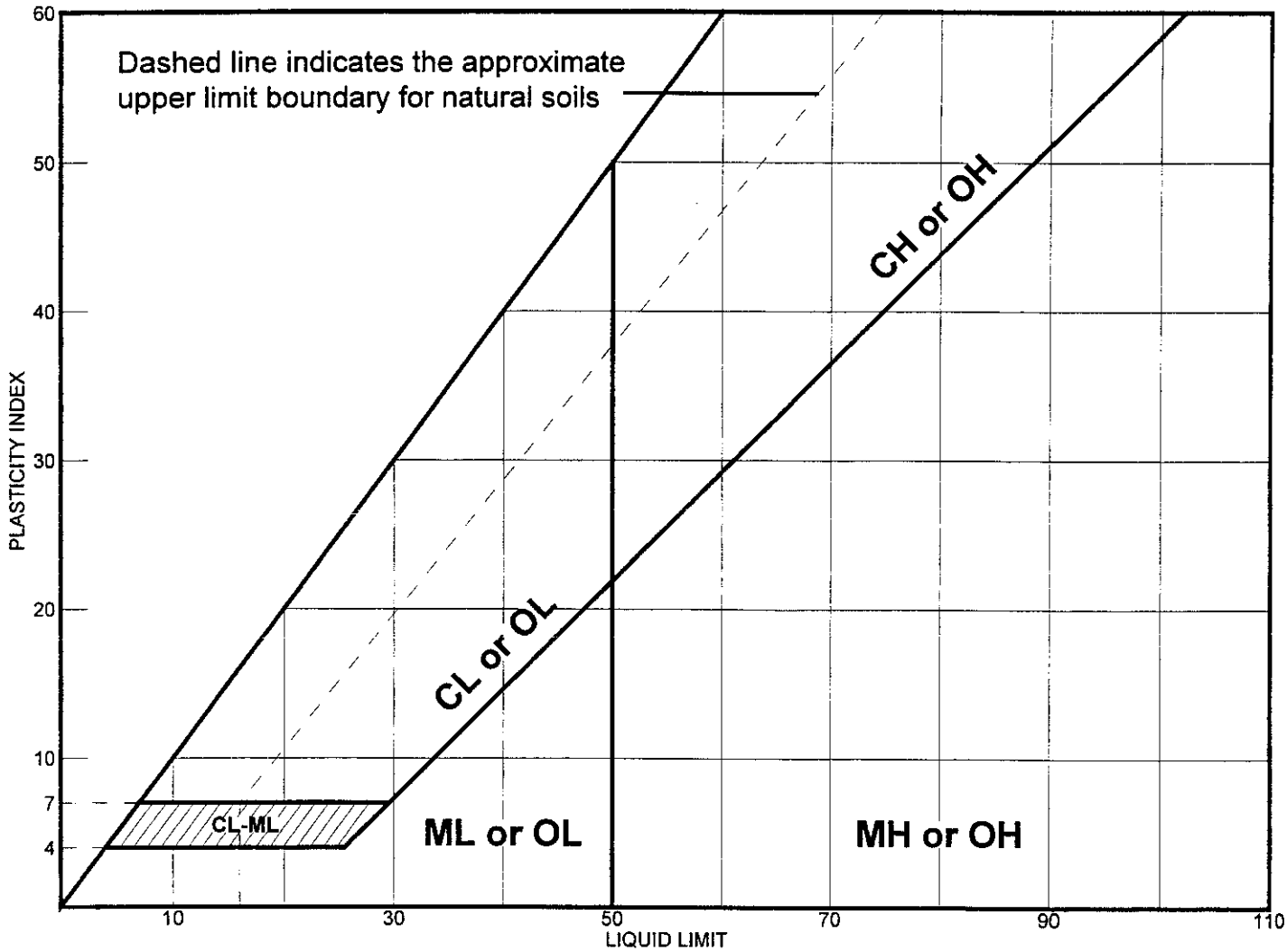
Fig.

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Silty SAND	NV	NP	NP		41.9	SM

Project No. 01282 **Client:** US Army Corps of Engineers Savannah District

Project: Design of Seismic Remediation for Clemson Diversion Dams

● **Source:** CLD-621A **Sample No.:** U2 **Elev./Depth:** 34-36 ft

Remarks:

● ASTM D4318, Sample Received on 12/10/01, Tech. Responsibility: T. Moline.

LIQUID AND PLASTIC LIMITS TEST REPORT

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Fig.

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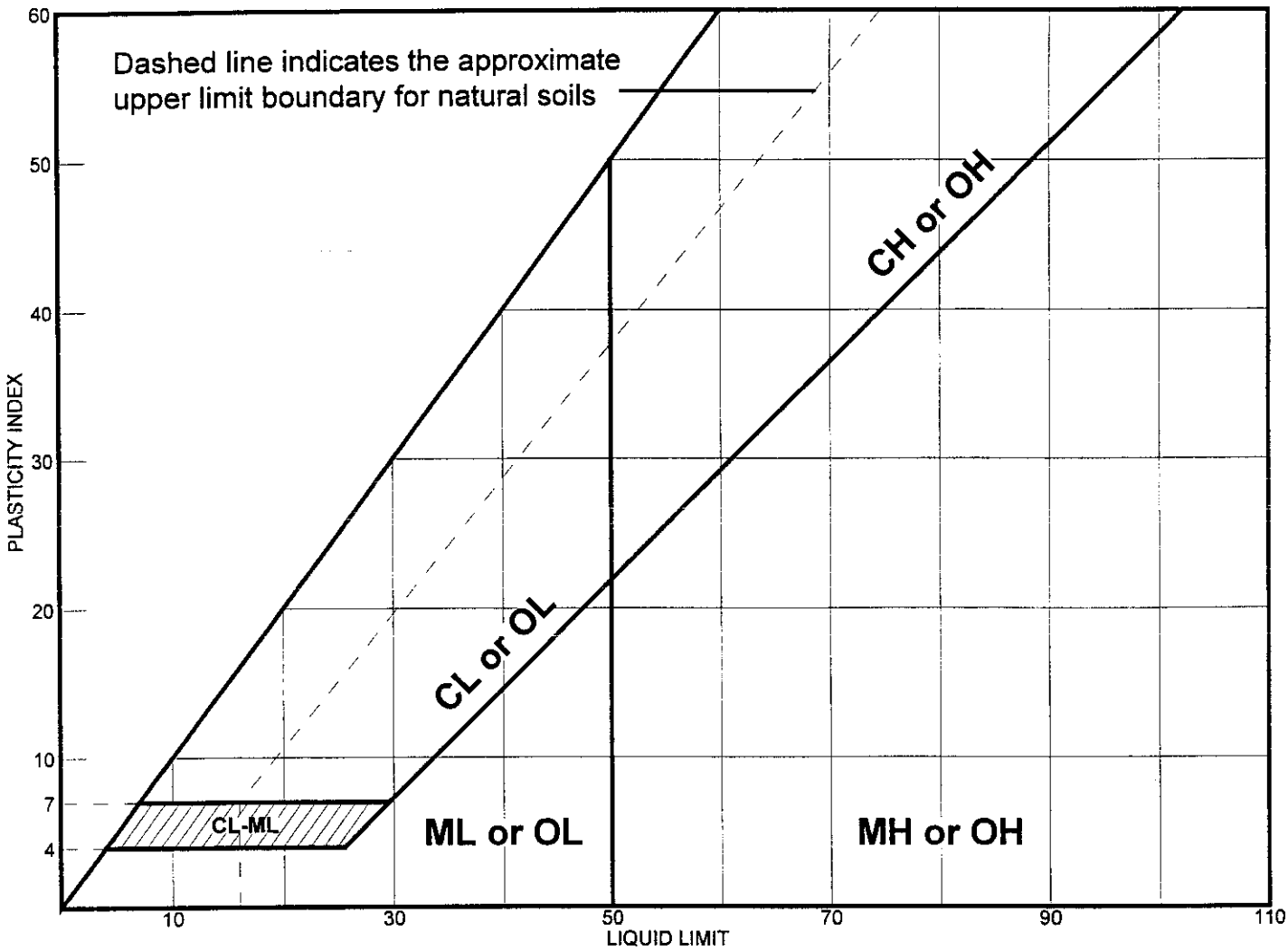

	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Silty SAND	NV	NP	NP	97.1	39.5	SM

Project No. 01282 **Client:** US Army Corps of Engineers Savannah District

Project: Design of Seismic Remediation for Clemson Diversion Dams

● **Source:** CLD-622A **Sample No.:** S1-S3 **Elev./Depth:** 27-33 ft.

Remarks:

● ASTM D4318, Sample Received on 12/10/01, Tech. Responsibility: T. Moline.

LIQUID AND PLASTIC LIMITS TEST REPORT

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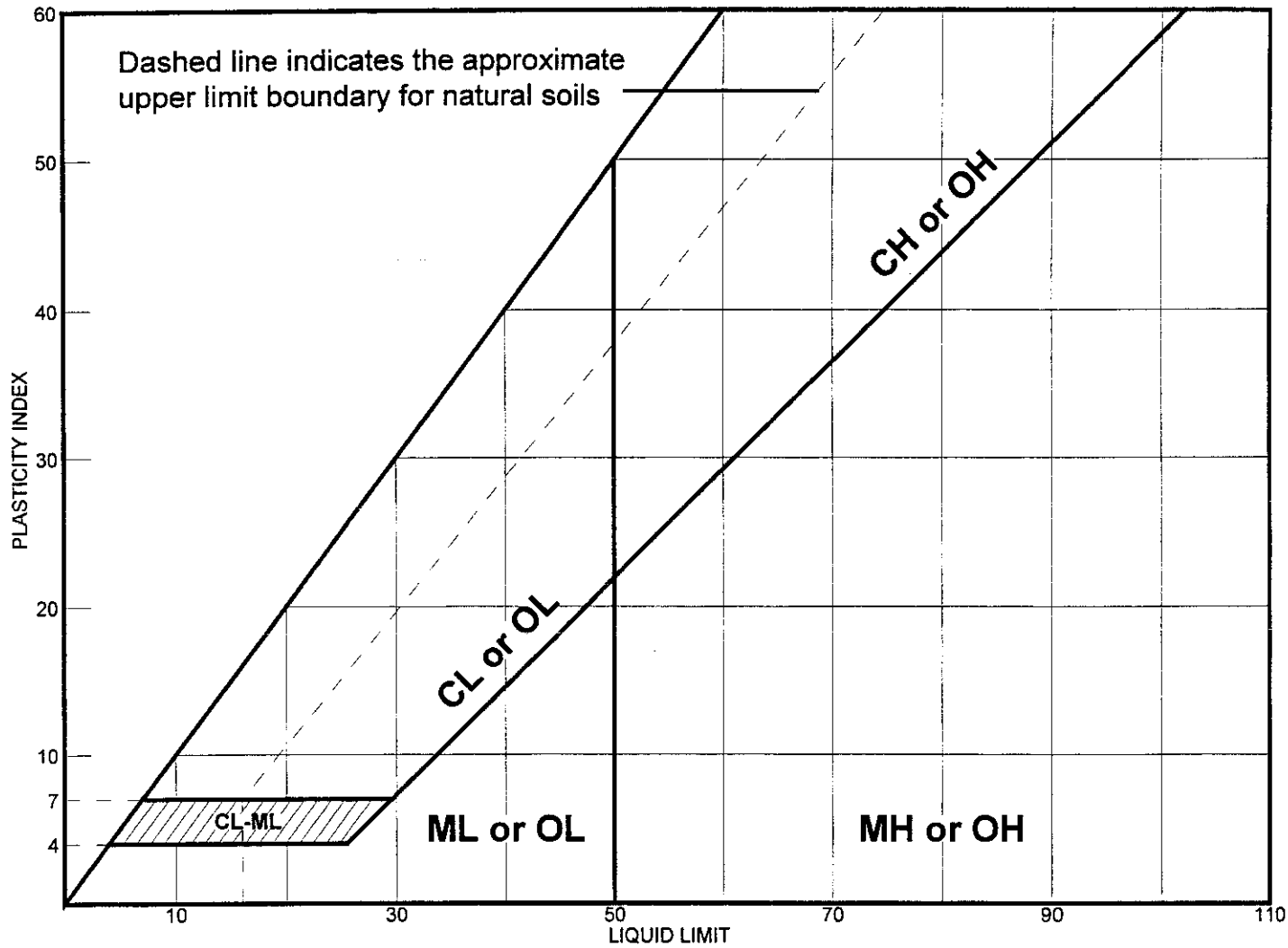
Fig.

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Silty SAND	NV	NP	NP	98.0	37.6	SM

Project No. 01282 **Client:** US Army Corps of Engineers Savannah District

Project: Design of Seismic Remediation for Clemson Diversion Dams

● **Source:** CLD-622B **Sample No.:** S1-S3 **Elev./Depth:** 27-33 ft.

Remarks:

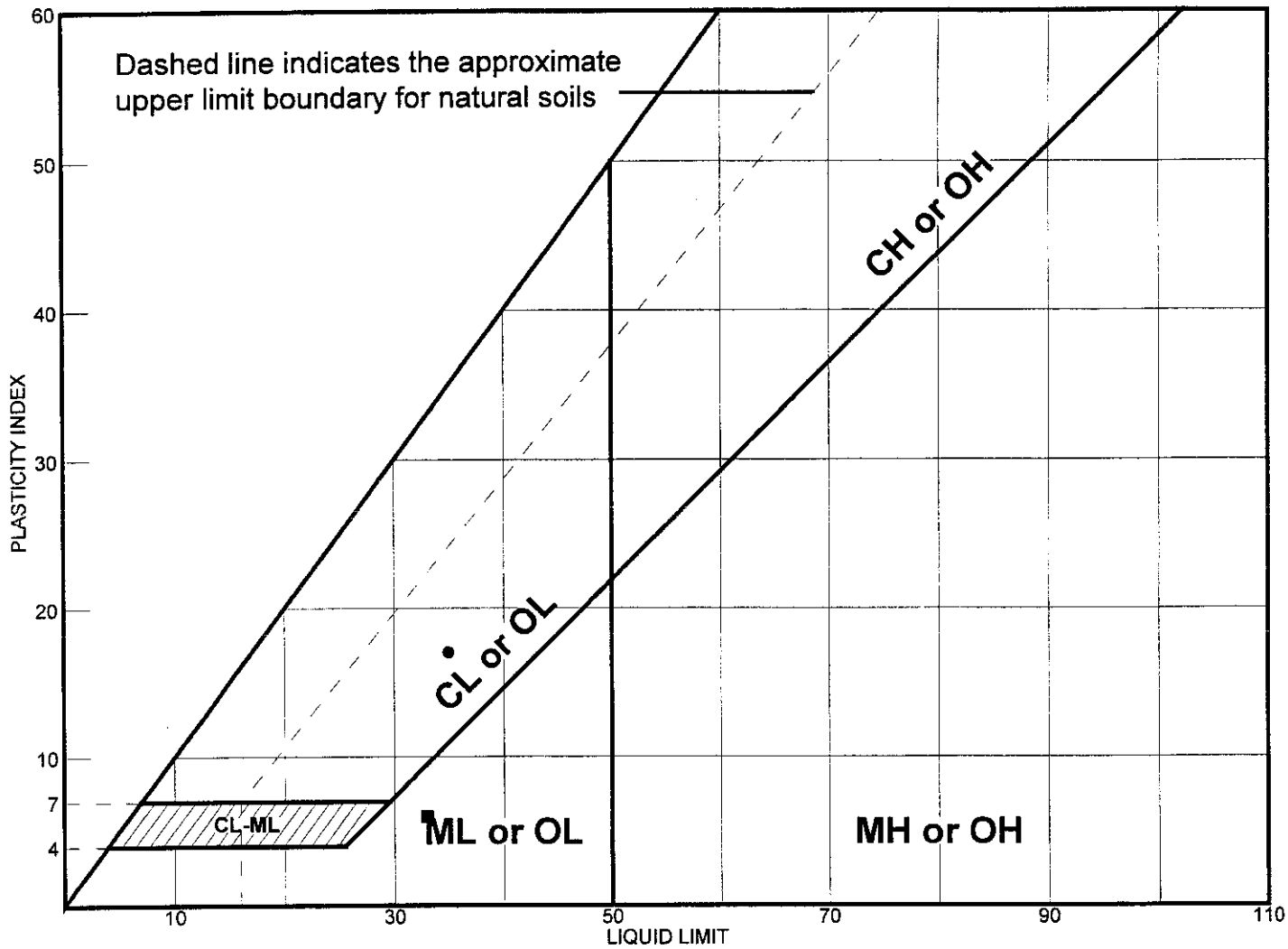
● ASTM D4318, Sample Received on 12/10/01, Tech. Responsibility: T. Moline.

LIQUID AND PLASTIC LIMITS TEST REPORT

GEI Consultants, Inc.

Fig.

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Sandy lean CLAY	35	18	17	99.7	68.1	CL
■	Sandy SILT	33	27	6	99.4	61.8	ML

Project No. 01282 **Client:** US Army Corps of Engineers Savannah District

Project: Design of Seismic Remediation for Clemson Diversion Dams

● **Source:** CLD-623A **Sample No.:** S3 & T4 **Elev./Depth:** 24-27 ft.

■ **Source:** CLD-623A **Sample No.:** S5 & S6 **Elev./Depth:** 29-33 ft.

Remarks:

● ASTM D4318, Sample Received on 12/10/01, Tech. Responsibility: T. Moline.

■ ASTM D4318, Sample Received on 12/10/01, Tech. Responsibility: T. Moline.

LIQUID AND PLASTIC LIMITS TEST REPORT

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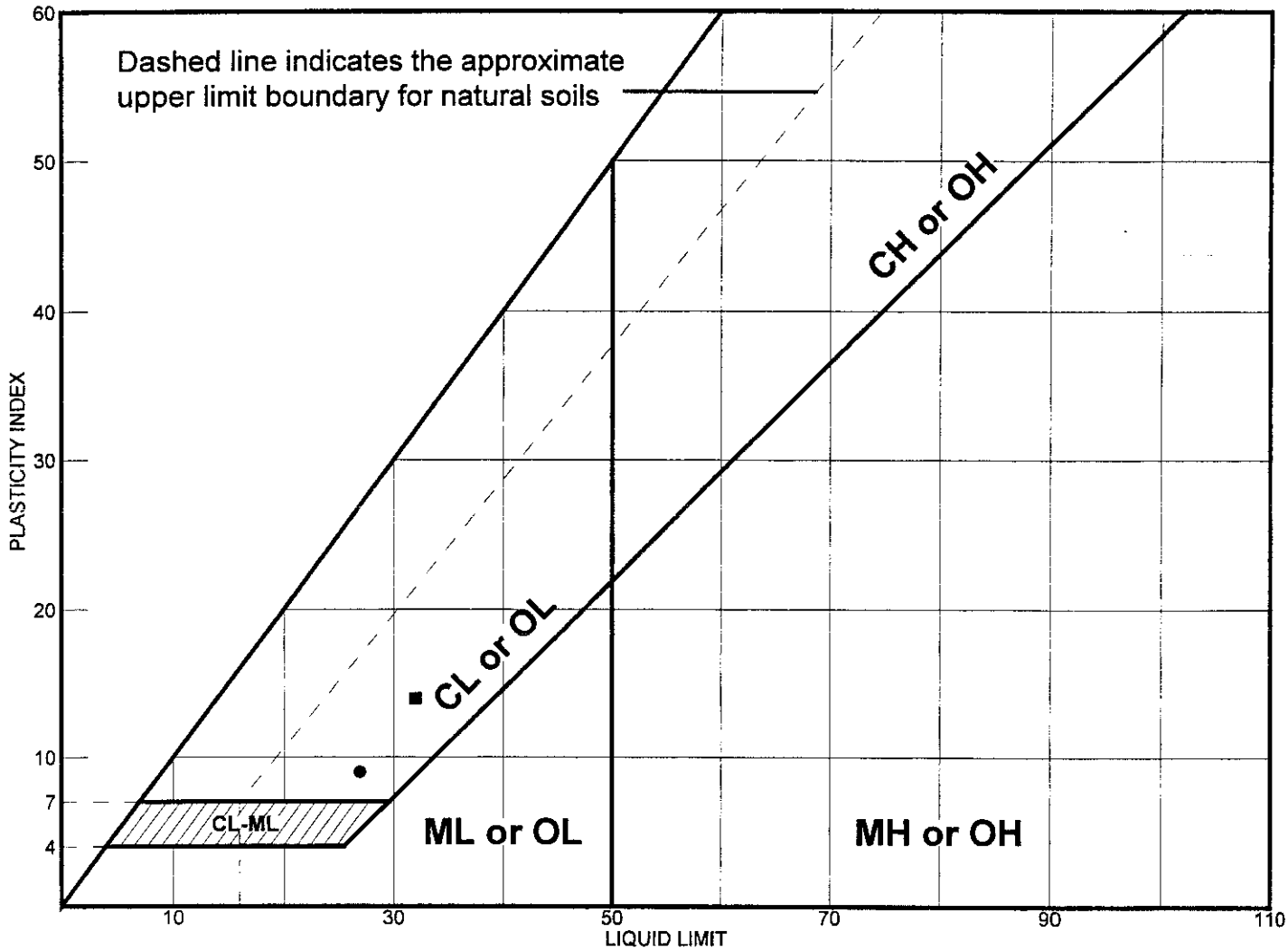
Fig.

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Sandy lean CLAY	27	18	9	98.8	60.1	CL
■	Sandy lean CLAY	32	18	14	99.9	68.4	CL

Project No. 01282 **Client:** US Army Corps of Engineers Savannah District

Project: Design of Seismic Remediation for Clemson Diversion Dams

● **Source:** CLD-623B **Sample No.:** S2Top 16" **Elev./Depth:** 22.0-23.5 ft.

■ **Source:** CLD-623B **Sample No.:** S2Bot&S3 **Elev./Depth:** 23.5-26.0 ft.

Remarks:

● ASTM D4318, Sample Received on 12/10/01, Tech. Responsibility: T. Moline.

■ ASTM D4318, Sample Received on 12/10/01, Tech. Responsibility: T. Moline.

LIQUID AND PLASTIC LIMITS TEST REPORT

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Fig.

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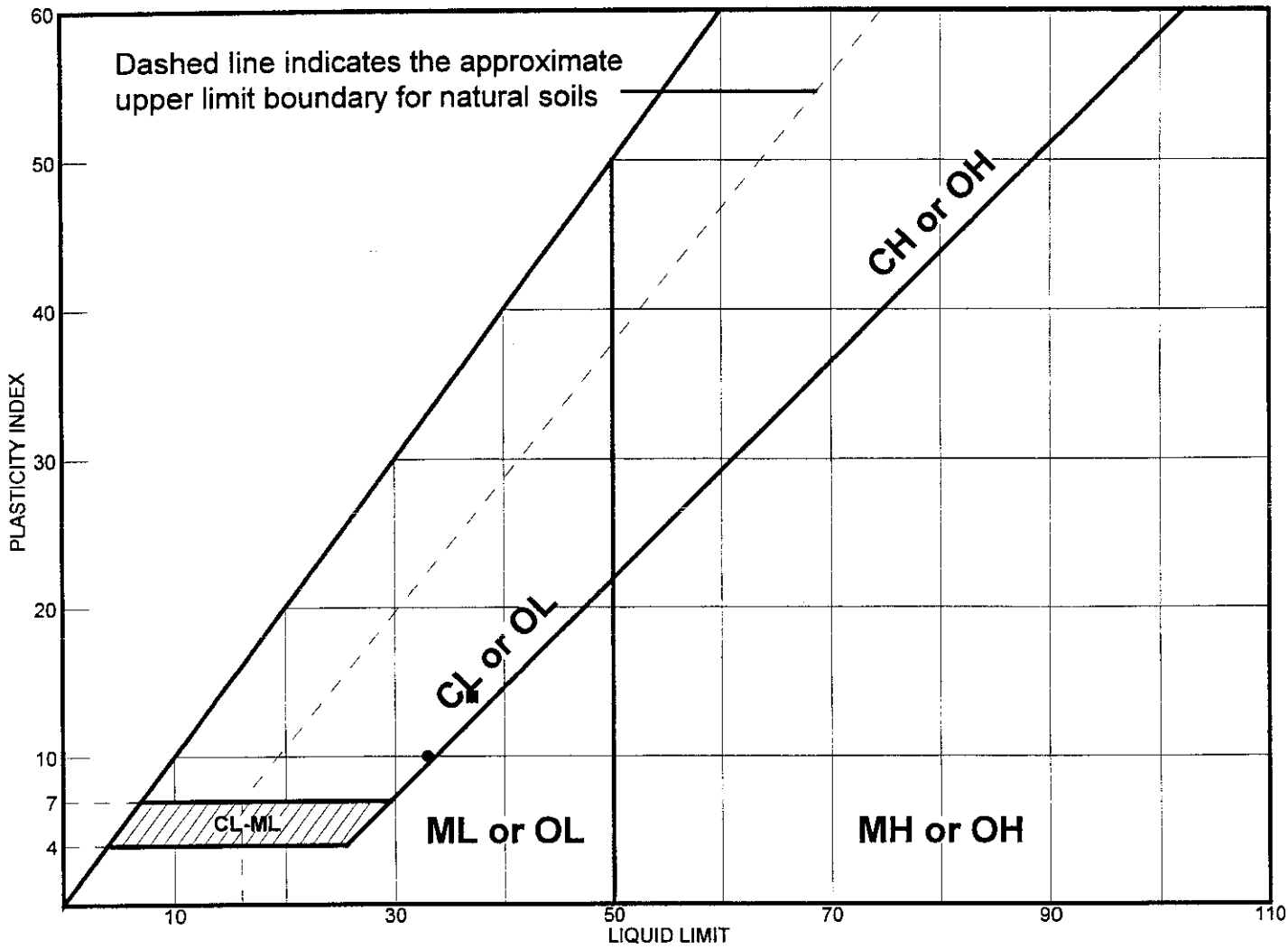

	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Sandy lean CLAY	33	23	10	99.5	58.9	CL
■	Lean clay with SAND	37	23	14	96.4	70.5	CL

Project No. 01282 **Client:** US Army Corps of Engineers Savannah District

Project: Design of Seismic Remediation for Clemson Diversion Dams

● **Source:** CLD-623B **Sample No.:** S5 & S6 **Elev./Depth:** 28-32 ft.

■ **Source:** CLD-623B **Sample No.:** S7 & S8 **Elev./Depth:** 32-36 ft.

Remarks:

● ASTM D4318, Sample Received on 12/10/01, Tech. Responsibility: T. Moline.

■ ASTM D4318, Sample Received on 12/10/01, Tech. Responsibility: T. Moline.

LIQUID AND PLASTIC LIMITS TEST REPORT

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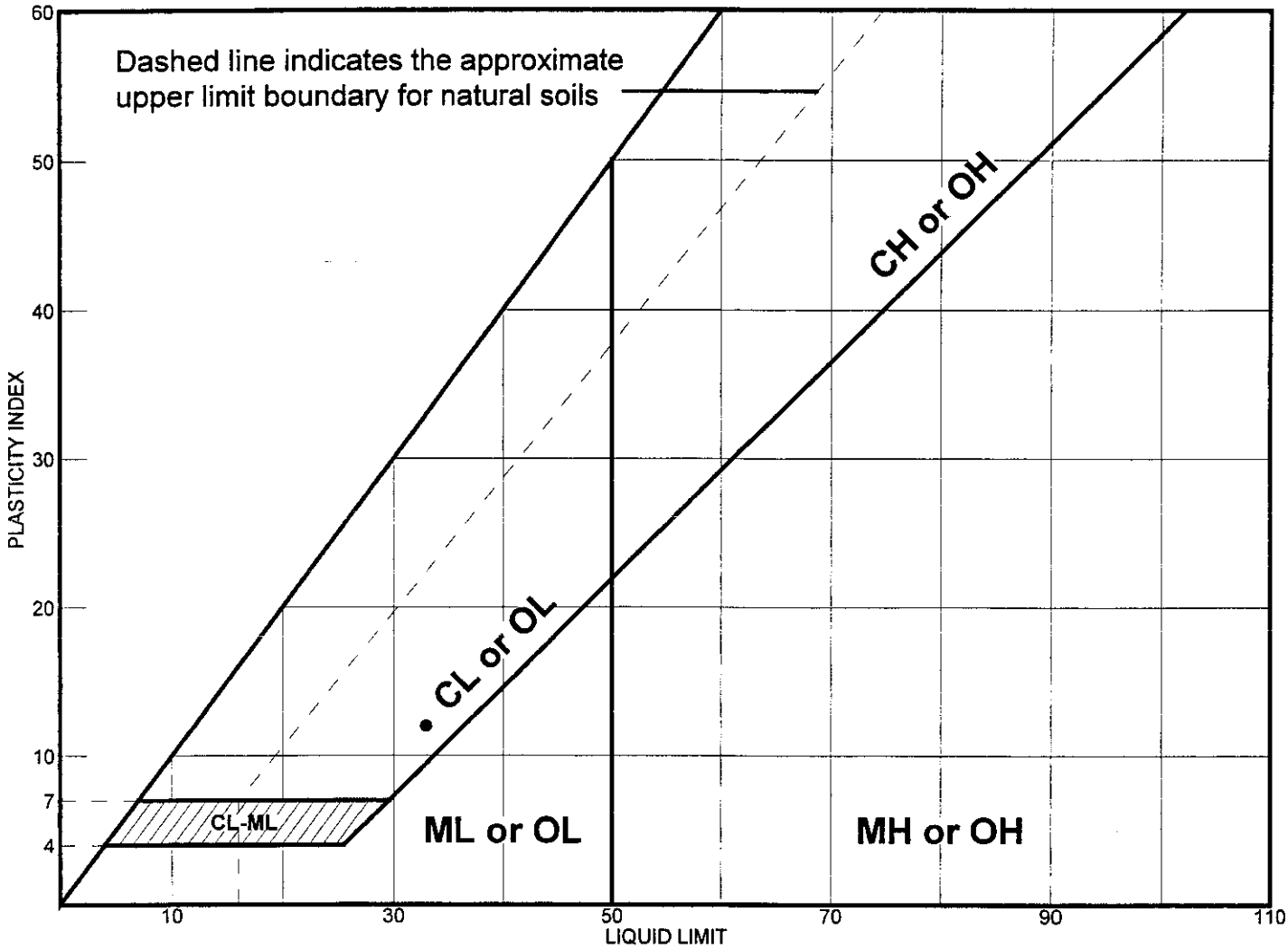


	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Lean CLAY with Sand	33	21	12		74.8	CL

Project No. 01282 **Client:** US Army Corps of Engineers Savannah District

Project: Design of Seismic Remediation for Clemson Diversion Dams

● **Source:** CLD-623C **Sample No.:** U1 **Elev./Depth:** 25-27 ft

Remarks:

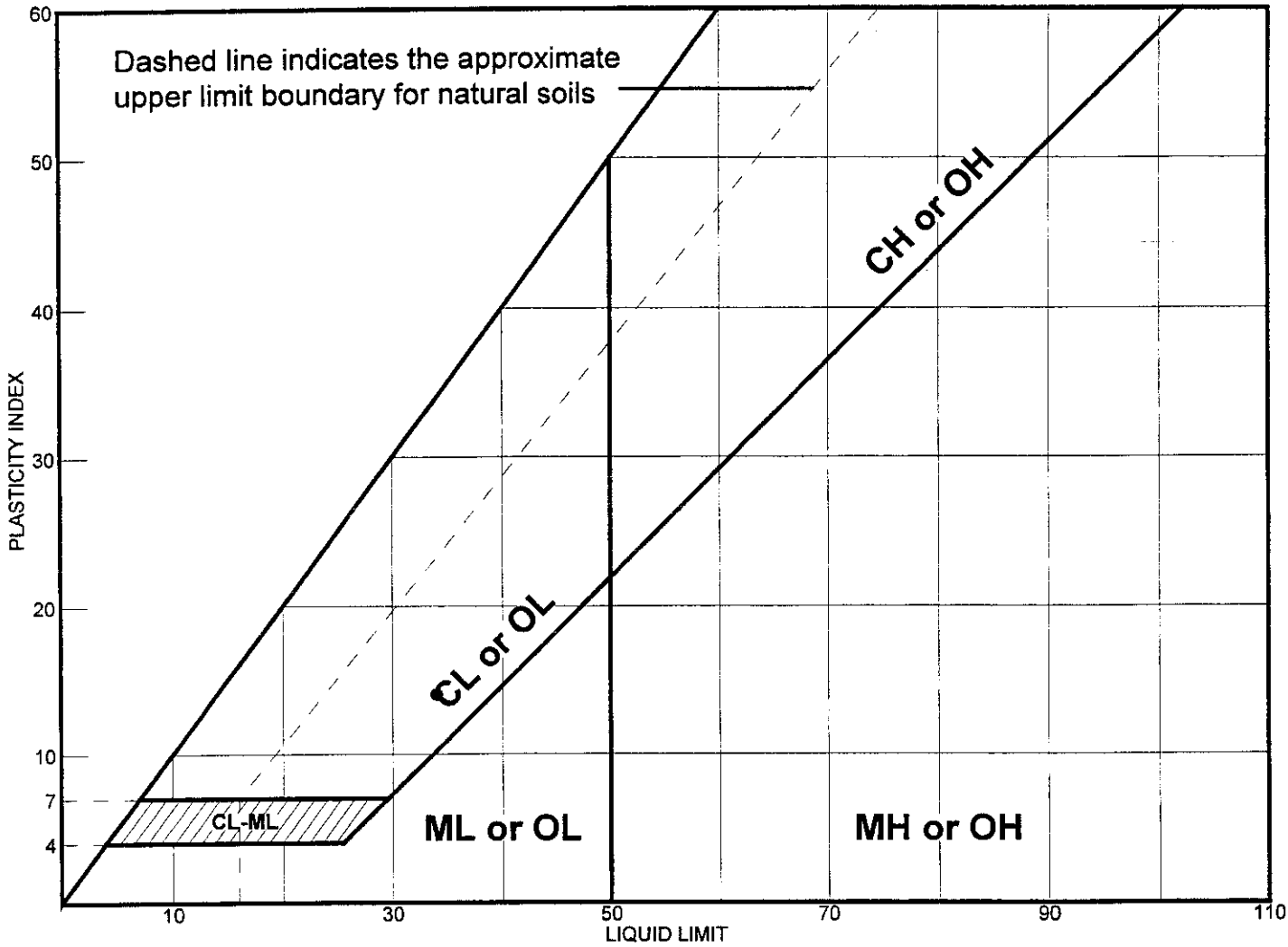
● ASTM D4318, Sample Received on 12/10/01, Tech. Responsibility: T. Moline.

LIQUID AND PLASTIC LIMITS TEST REPORT

GEI Consultants, Inc.

Fig.

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Sandy Lean CLAY	34	20	14		63.6	CL

Project No. 01282 **Client:** US Army Corps of Engineers Savannah District

Project: Design of Seismic Remediation for Clemson Diversion Dams

● **Source:** CLD-623D **Sample No.:** UF1 **Elev./Depth:** 26-28 ft

Remarks:

● ASTM D4318, Sample Received on 12/10/01, Tech. Responsibility: T. Moline.

LIQUID AND PLASTIC LIMITS TEST REPORT

GEI Consultants, Inc.

Fig.