OHM Remediation Services Corp.
A Subsidiary of OHM Corporation

September 18, 1997

Mr. David Jesperson, Code 57CS1.DJ
Naval Facilities Engineering Command
Southwest Division
1220 Pacific Coast Highway
San Diego, California 92132
Attention: Ms. Lynn M. Hornecker, Code 56MC. LH

Subject: Geotechnical Soil Testing Results, IRP Sites 2 and 17, Marine Corps Air Station (MCAS) El Toro, California, DO75, Contract N68711-93-D-1459

Dear Ms. Hornecker:

It is our pleasure to submit the attached geotechnical soil testing results for IRP Sites 2 and 17, MCAS El Toro, California.

On August 21, 1997, ten (10) soil samples were collected from locations identified by Mr. Tim Latas of CLEAN II at the subject sites. The soil samples were sent to Environmental Geotechnology Laboratory, Santa Fe Springs, California for the testing of grain size, moisture content, compaction test, Atterberg limits, and permeability as specified by the CLEAN II.

We appreciate the opportunity to be of service to you on this project. If you have any questions, please contact me at (714)263-9124, extension 403.

Very truly yours,

Jay R. Nuckles for

William L. Sedlak

Sr. Project Manager

attachment: distribution list

2031 Main Street ■ Irvine, California 92614-6509 ■ 714-263-1146 ■ FAX: 714-263-1147

OHM Remediation Services Corp.
A Subsidiary of OHM Corporation

OHM TRANSMITTAL/DELIVERABLE RECEIPT

CONTRACT N68711-93-D-1459 **DOCUMENT CONTROL NO: SW4322**

TO: Contracting Officer
Naval Facilities Engineering Command
Southwest Division
Mr. Dave Jespersen, Code 57CS1.DJ
Building 131
1220 Pacific Highway
San Diego, California 92132-5187

Date: 18-Sep-97

D.O.: 75

Location: MCAS EL TORO

FROM: For Stewart Bornhoft, Program Manager

Ginger James, Contracts Manager

DESCRIPTION OF ENCLOSURE: **GeoTechnical Soil Testing Results, IRP Sites 2 and 17, dated Septmeber 18, 1997.**

TYPE: Contract Deliverable ( ) ($) D. O. Deliverable ( ) (Tech) Request for Change ( ) Other (X)

VERSION: FINAL **REVISION** 0

ADMIN RECORD: Yes ( ) No (X) Category ( ) Confidential ( )

SCHEDULED DELIVERY DATE: 26-Sep-97 **ACTUAL DELIVERY DATE:** 18-Sep-97

NUMBER OF COPIES SUBMITTED TO THE NAVY: 1/O, 4/C, 3/E
[AS REQUIRED/DIRECTED BY THE (SOW)]

COPIES TO:

SWDIV	OHM	OTHER
Name, Code	Name, Location	Name, Company, Location
J. Rogers, 57CS3.JR (1C/1E)	File (1C/1E)	P. Brooks, BNI (1C/1E)
L. Hornecker, 56MC.LH (1C/1E)	Chron (1C)	T. Latas, El Toro (1E)
B. Linsey, 56MC.BL (1C/1E)	W. Sedlak, Irv (1C/1E)	
G. Steinway, 56MC.GS (1C)	G. Hu, Irv (1C/1E)	

Date/Time Received: _____ / _____

Doc Class: B-06

Attachment: Distribution List

Name	Affiliation	No. of Copy
L. Hornecker	SWDIV	1
B. Lindsey	SWDIV	1
J. Rogers	SWDIV	1
P. Brooks	CLEAN II	1
T. Latas	CLEAN II	1
PMO	OHM	1

Environmental Geotechnology Laboratory

September 12, 1997

OHM Remediation Services Corp.
2031 Main Street
Irvine, CA 92714-6509

Attention: Mr. Guijun Hu

Reference: **LABORATORY TEST RESULTS/REPORT**
Project Name: Marine Corps Air Station, El Toro
Subcontract No.: N68711-93-D-1459
EGL Job No.: 97-046-002

Gentlemen:

This report presents a summary of the geotechnical engineering laboratory testing services provided by Environmental Geotechnology Laboratory, Inc. (EGL) of the subject site.

SOIL SAMPLING

The soil samples were collected by EGL's field representative under instructions of OHM's site engineer, Mr. Walid Naouchi. The soils were sampled on August 21, 1997 and numbered in accordance with the instructions of Mr. Naouchi.

LABORATORY TESTING

Moisture Content

The moisture content of the soil samples were determined according to ASTM D2216 standard. The moisture content test results are presented in the attached Table 1 – Summary of Index Properties Test Results.

Compaction Tests

The maximum density and optimum moisture content were determined for each of the collected soil samples. The laboratory standard used was ASTM D-1557-91. Moisture-Density Relations obtained are presented in the attached plates.

11823 Slauson Avenue, Unit 18, Santa Fe Springs, CA 90670 • Tel.: (562) 945-0689, Fax: (562) 945-0364

Atterberg Limits

Liquid Limit, Plastic Limit, and Plasticity Index tests were performed on each of the collected samples. The laboratory standard used was ASTM D-4318-93. The Atterberg Limits test results are presented in the attached Table 1 – Summary of Index Properties Test Results.

Particle Size Analyses

Particle size of each soil samples were determined according to ASTM D-422-63 standard. The results are presented in the attached Table 1 – Summary of Index Properties Test Results. The Grain Size Distribution Curves are also attached.

Triaxial Permeability

Permeability tests were performed in a triaxial cell. The samples were remolded to a relative dry density of 90 percent of the laboratory maximum density as determined by ASTM D1557-91 at optimum moisture content. The laboratory standard used was ASTM D5084. The triaxial permeability test results are presented in Table 2 – Summary of Triaxial Permeability Test Results.

We appreciate the opportunity to provide testing services to OHM Corp. Should you have any questions, please call us.

Sincerely yours,

Jack C. Lee

Jack C. Lee, PE, GE
Manager

Enclosure

Environmental Geotechnology Laboratory

TABLE 1

SUMMARY OF INDEX PROPERTIES TEST RESULTS

PROJECT NAME: MARINE CORPS AIR STATION, EL TORO

EGL JOB NO.: 97-046-002

PROJECT NO.: N/A

CLIENT: OHM Corp.

DATE: 9-12-97

SUMMARIZED BY: M. TAN

SAMPLE NO	MOISTURE CONTENT ASTM D2216 (%)	DRY DENSITY ASTM D2937 (PCF)	ATTERBERG LIMITS ASTM D4318 *(LL,PL,PI)	GRAIN SIZE DIST. ASTM D422 **(GR:SA:FI)	USCS
1	9.0	111.2	29,17,12	6:61:33	SC
2	9.0	111.2	26,19,7	3:65:32	SC-SM
3	8.0	114.6	29,19,10	6:62:32	SC
4	12.0	107.1	Non-plastic	4:63:33	SM
5	12.0	107.6	Non-plastic	4:60:36	SM
6	14.0	100.4	Non-plastic	2:55:43	SM
7	14.5	96.8	45,30,15	0:13:87	ML
8	12.5	94.5	Non-plastic	0:58:42	SM
9	15.0	93.2	Non-plastic	1:61:38	SM
10	14.5	97.2	Non-plastic	2:71:27	SM

NOTES: All samples were remolded at 90% maximum density.

11823 Slauson Avenue, Unit 18, Santa Fe Springs, CA 90670 • Tel.: (562) 945-0689, Fax: (562) 945-0364

Environmental
Geotechnology
Laboratory

TABLE 2

SUMMARY OF TRIAXIAL PERMEABILITY TEST RESULTS
(ASTM D5084)

PROJECT NAME: MARINE CORPS AIR STATION, EL TORO

EGL JOB NO.: 97-046-002

PROJECT NO.: N/A

CLIENT: OHM CORP.

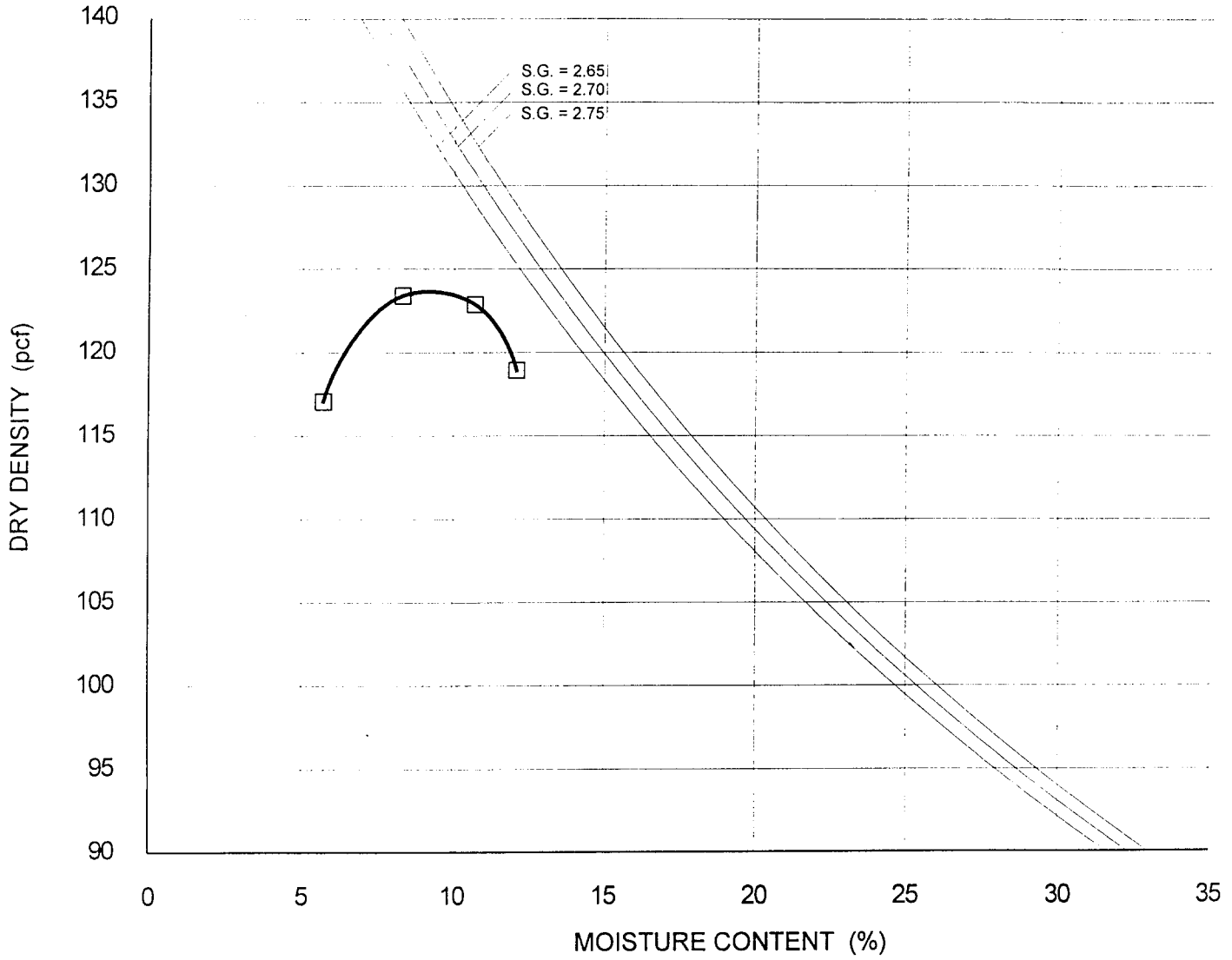
DATE: 9-12-97

SUMMARIZED BY: M. TAN

SAMPLE NO	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	EFFECTIVE CONFINING PRESSURE (PSI)	HYDRAULIC CONDUCTIVITY (CM/SEC)
1	9.0	111.2	5	9.3E-005
2	9.0	111.2	5	3.4E-005
3	8.0	114.6	5	3.8E-006
4	12.0	107.1	5	4.6E-005
5	12.0	107.6	5	4.2E-005
6	14.0	100.4	5	2.9E-005
7	14.5	96.8	5	7.0E-006
8	12.5	94.5	5	2.8E-004
9	15.0	93.2	5	2.2E-004
10	14.5	97.2	5	4.7E-004

NOTES: All samples were remolded at 90% maximum density.

11823 Slauson Avenue, Unit 18, Santa Fe Springs, CA 90670 • Tel.: (562) 945-0689, Fax: (562) 945-0364



SYMBOL	SAMPLE ID	DEPTH (FT)	SAMPLE TYPE	VISUAL CLASSIFICATION	OPTIMUM MOISTURE (%)	MAX. DRY DENSITY (PCF)
□	#1	N/A	BULK	SC	9.0	123.5

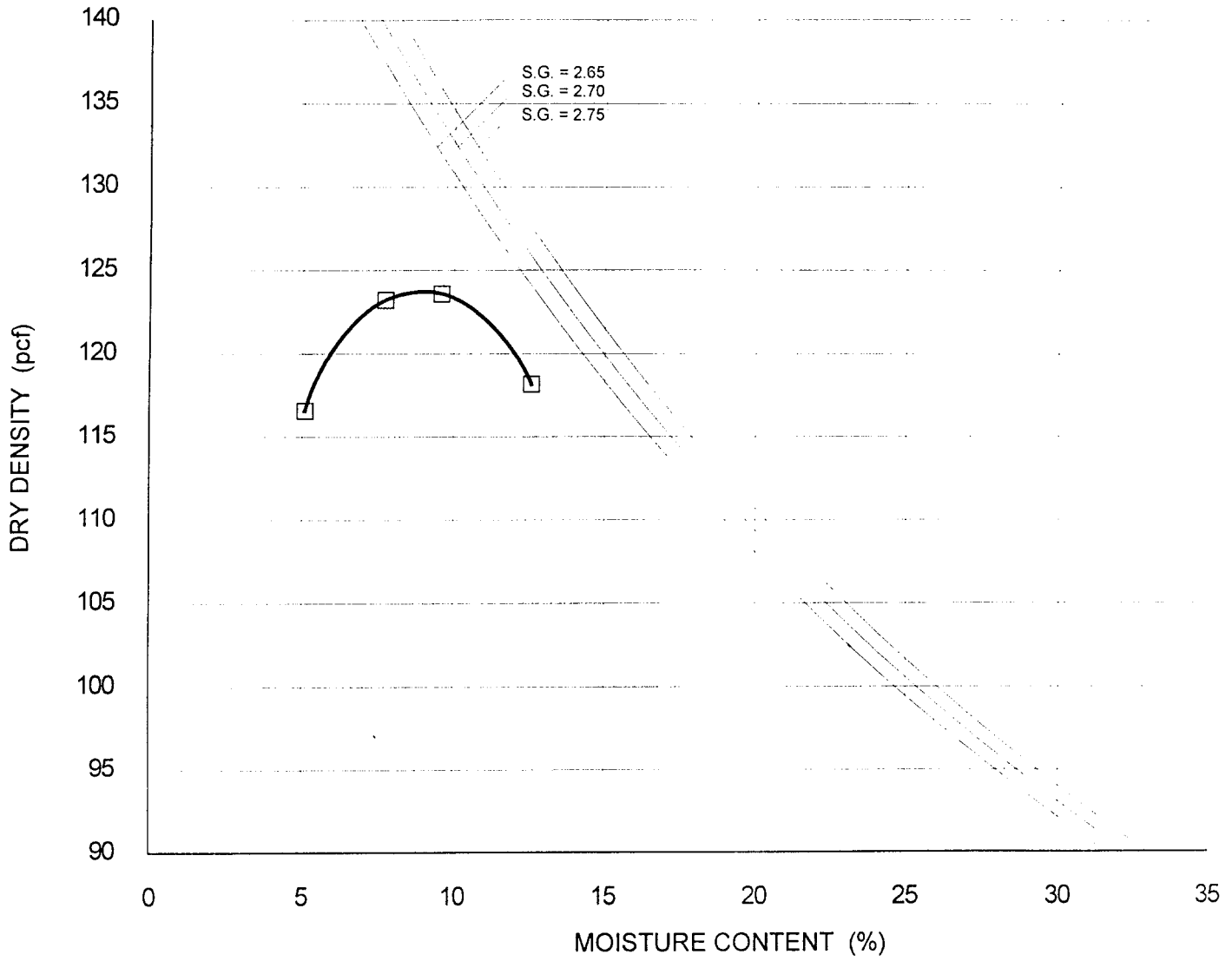
ENVIRONMENTAL GEOTECHNOLOGY LABORATORY

PROJECT NAME: Marine Corps Air Station, El Toro

MODIFIED PROCTOR
(ASTM D1557-A)

9/97

FIGURE



SYMBOL	SAMPLE ID	DEPTH (FT)	SAMPLE TYPE	VISUAL CLASSIFICATION	OPTIMUM MOISTURE (%)	MAX. DRY DENSITY (PCF)
□	#2	N/A	BULK	SC-SM	9.0	123.5

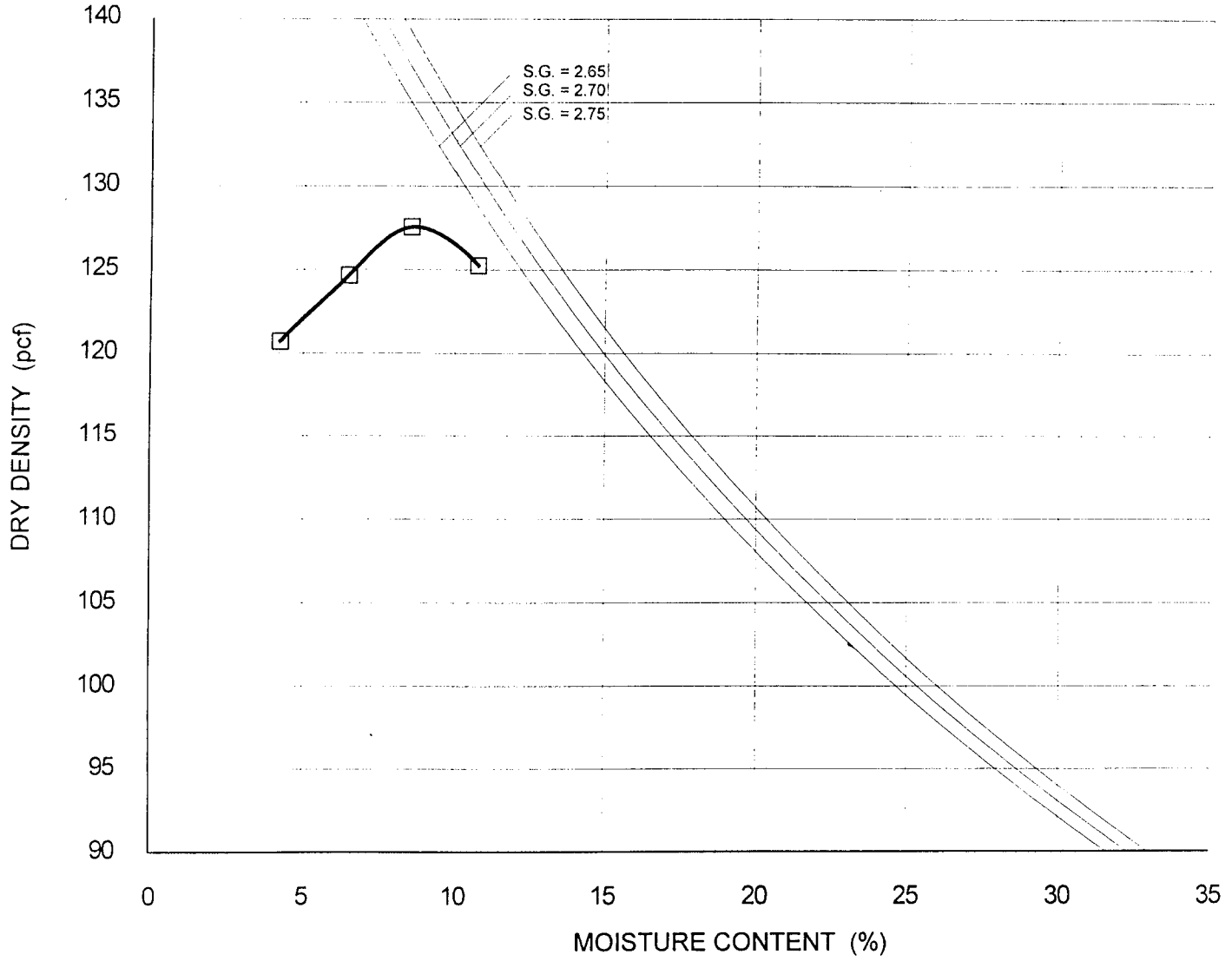
ENVIRONMENTAL GEOTECHNOLOGY LABORATORY

PROJECT NAME: Marine Corps Air Station, El Toro

MODIFIED PROCTOR
(ASTM D1557-A)

9/97

FIGURE



SYMBOL	SAMPLE ID	DEPTH (FT)	SAMPLE TYPE	VISUAL CLASSIFICATION	OPTIMUM MOISTURE (%)	MAX. DRY DENSITY (PCF)
□	#3	N/A	BULK	SC	8.0	127.5

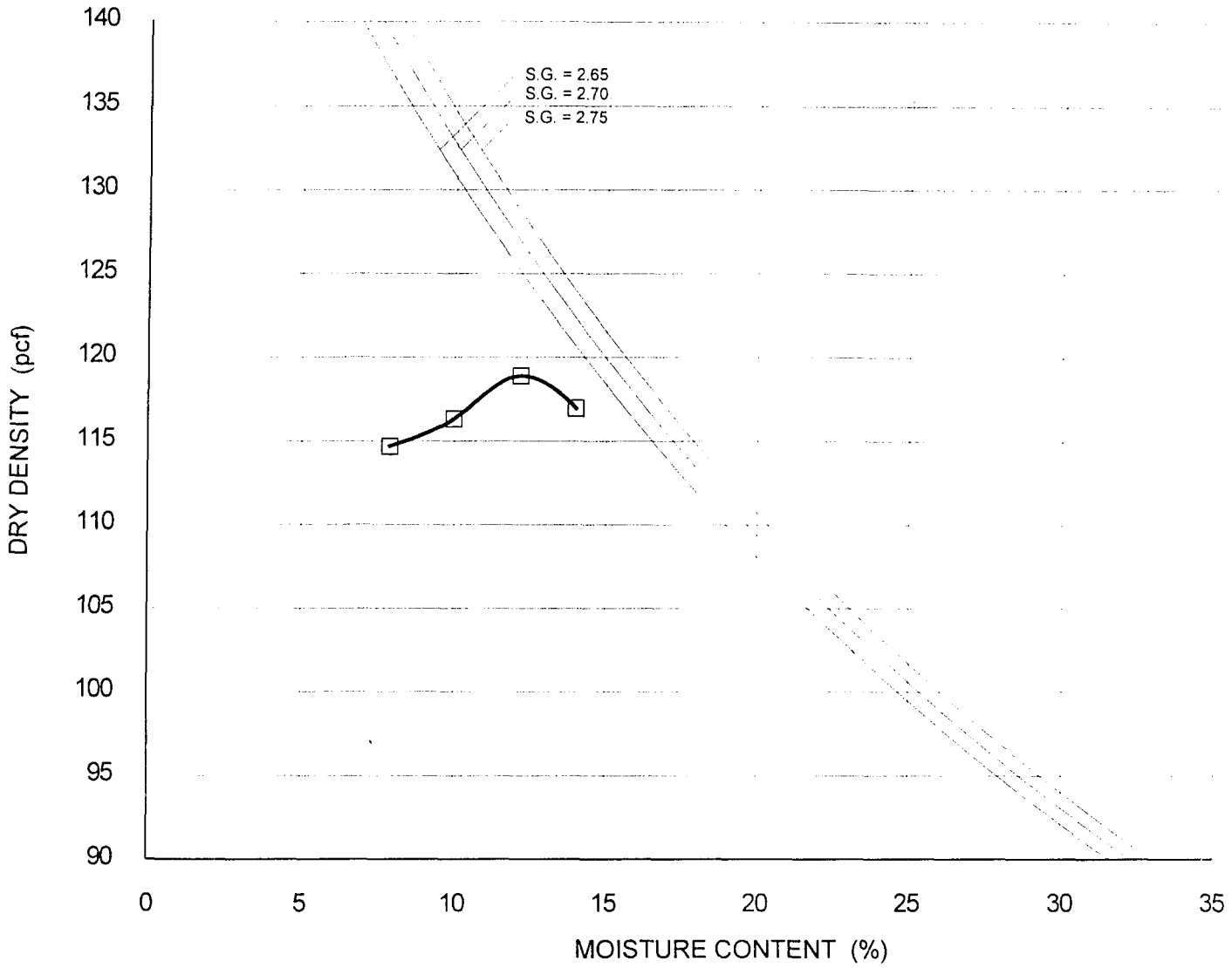
ENVIRONMENTAL GEOTECHNOLOGY LABORATORY

PROJECT NAME: Marine Corps Air Station, El Toro

MODIFIED PROCTOR
(ASTM D1557-A)

9/97

FIGURE



SYMBOL	SAMPLE ID	DEPTH (FT)	SAMPLE TYPE	VISUAL CLASSIFICATION	OPTIMUM MOISTURE (%)	MAX. DRY DENSITY (PCF)
□	#4	N/A	BULK	SM	12.0	119.0

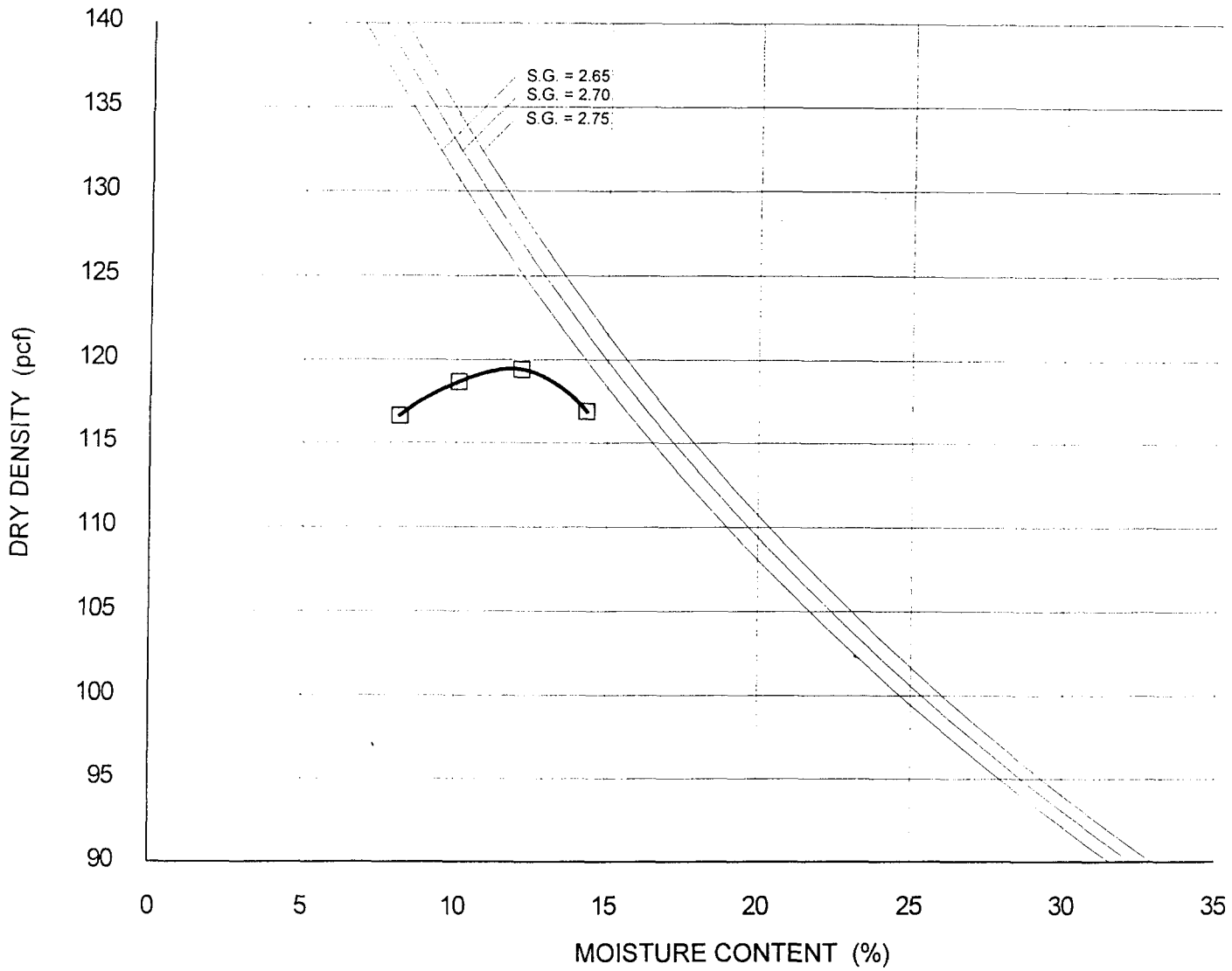
ENVIRONMENTAL GEOTECHNOLOGY LABORATORY

PROJECT NAME: Marine Corps Air Station, El Toro

MODIFIED PROCTOR
(ASTM D1557-A)

9/97

FIGURE



SYMBOL	SAMPLE ID	DEPTH (FT)	SAMPLE TYPE	VISUAL CLASSIFICATION	OPTIMUM MOISTURE (%)	MAX. DRY DENSITY (PCF)
□	#5	N/A	BULK	SM	12.0	119.5

ENVIRONMENTAL GEOTECHNOLOGY LABORATORY

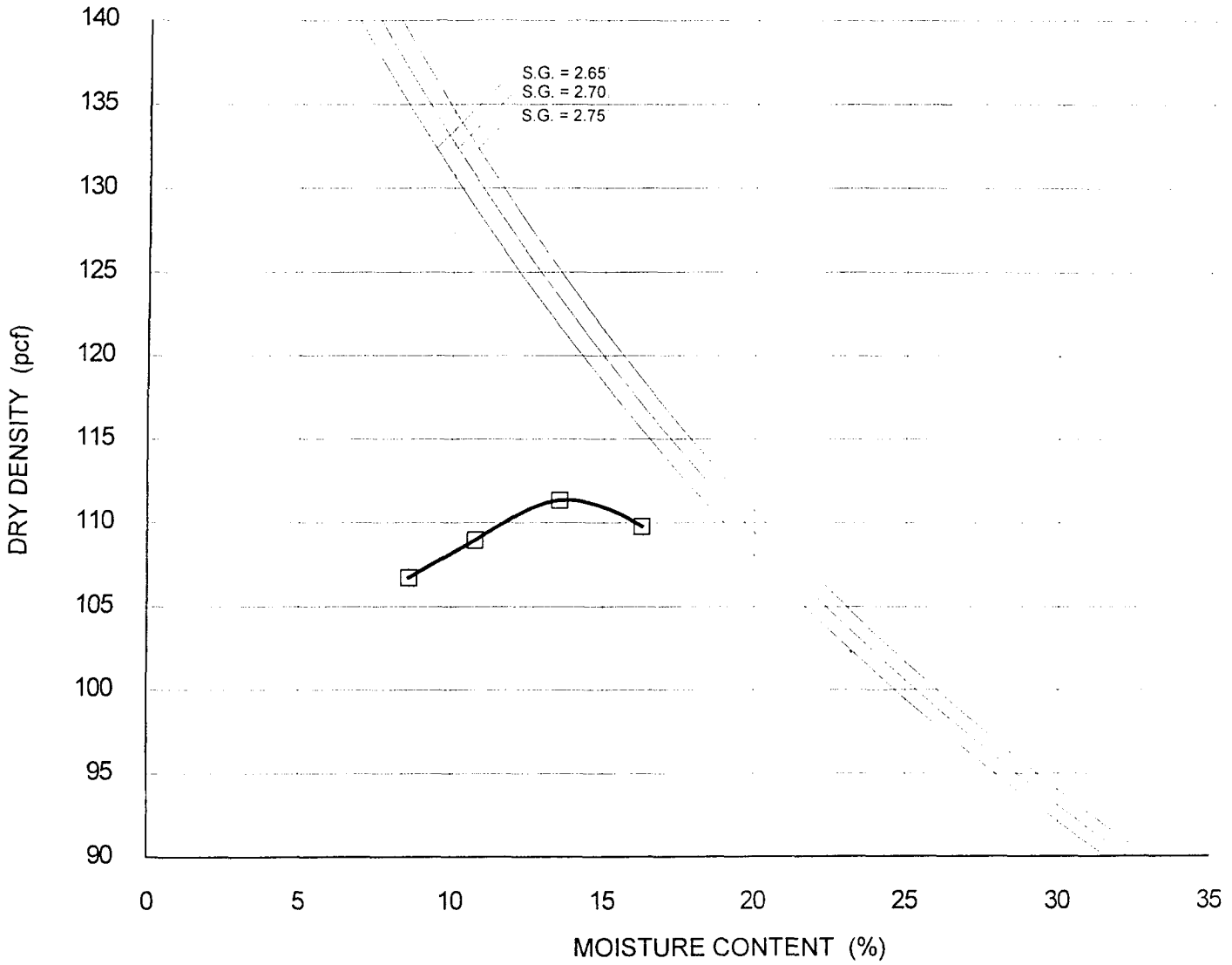
PROJECT NAME: Marine Corps Air Station, El Toro

MODIFIED PROCTOR

(ASTM D1557-A)

9/97

FIGURE



SYMBOL	SAMPLE ID	DEPTH (FT)	SAMPLE TYPE	VISUAL CLASSIFICATION	OPTIMUM MOISTURE (%)	MAX. DRY DENSITY (PCF)
□	#6	N/A	BULK	SM	14.0	111.5

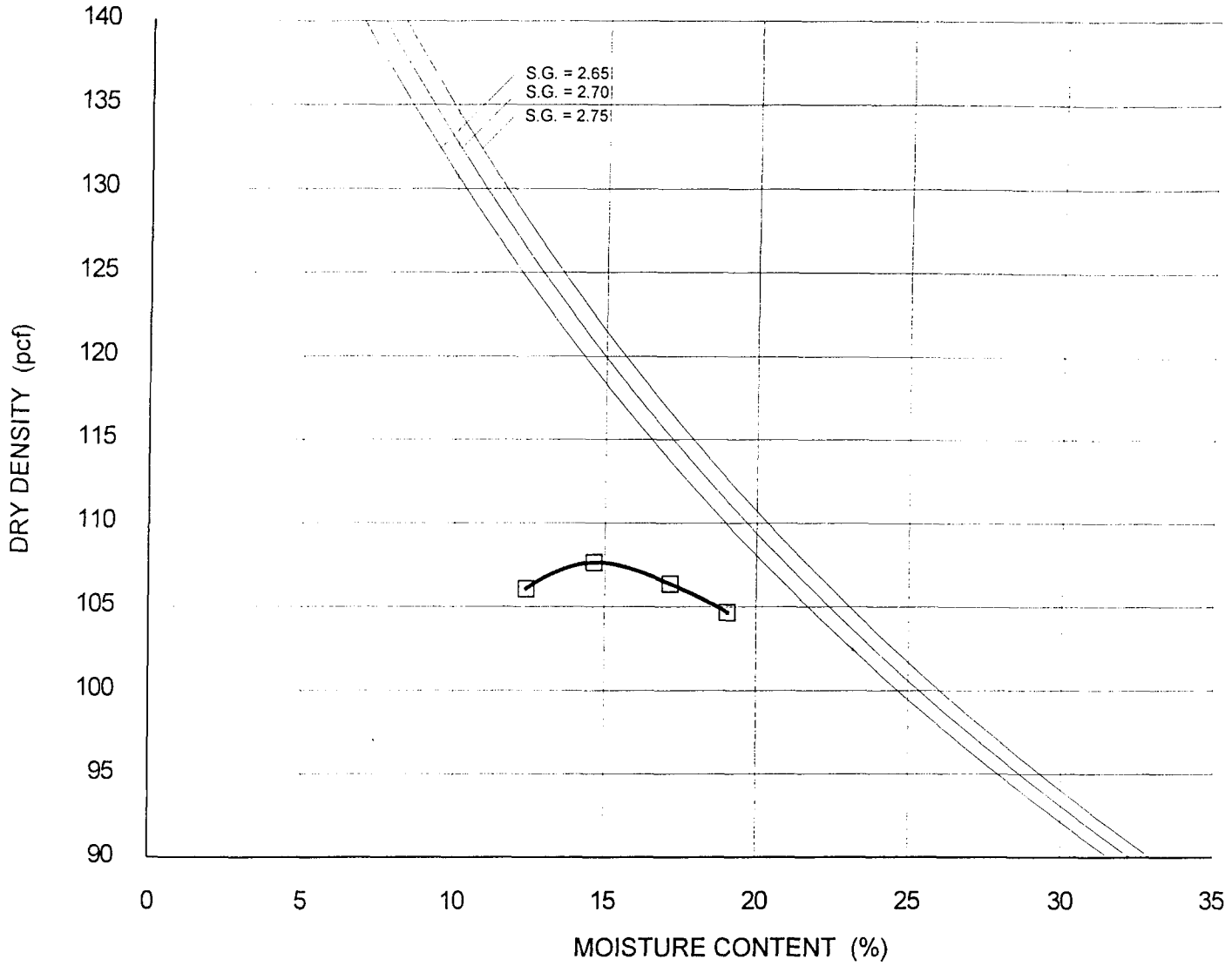
ENVIRONMENTAL GEOTECHNOLOGY LABORATORY

PROJECT NAME: Marine Corps Air Station, El Toro

MODIFIED PROCTOR
(ASTM D1557-A)

9/97

FIGURE



SYMBOL	SAMPLE ID	DEPTH (FT)	SAMPLE TYPE	VISUAL CLASSIFICATION	OPTIMUM MOISTURE (%)	MAX. DRY DENSITY (PCF)
□	#7	N/A	BULK	ML	14.5	107.5

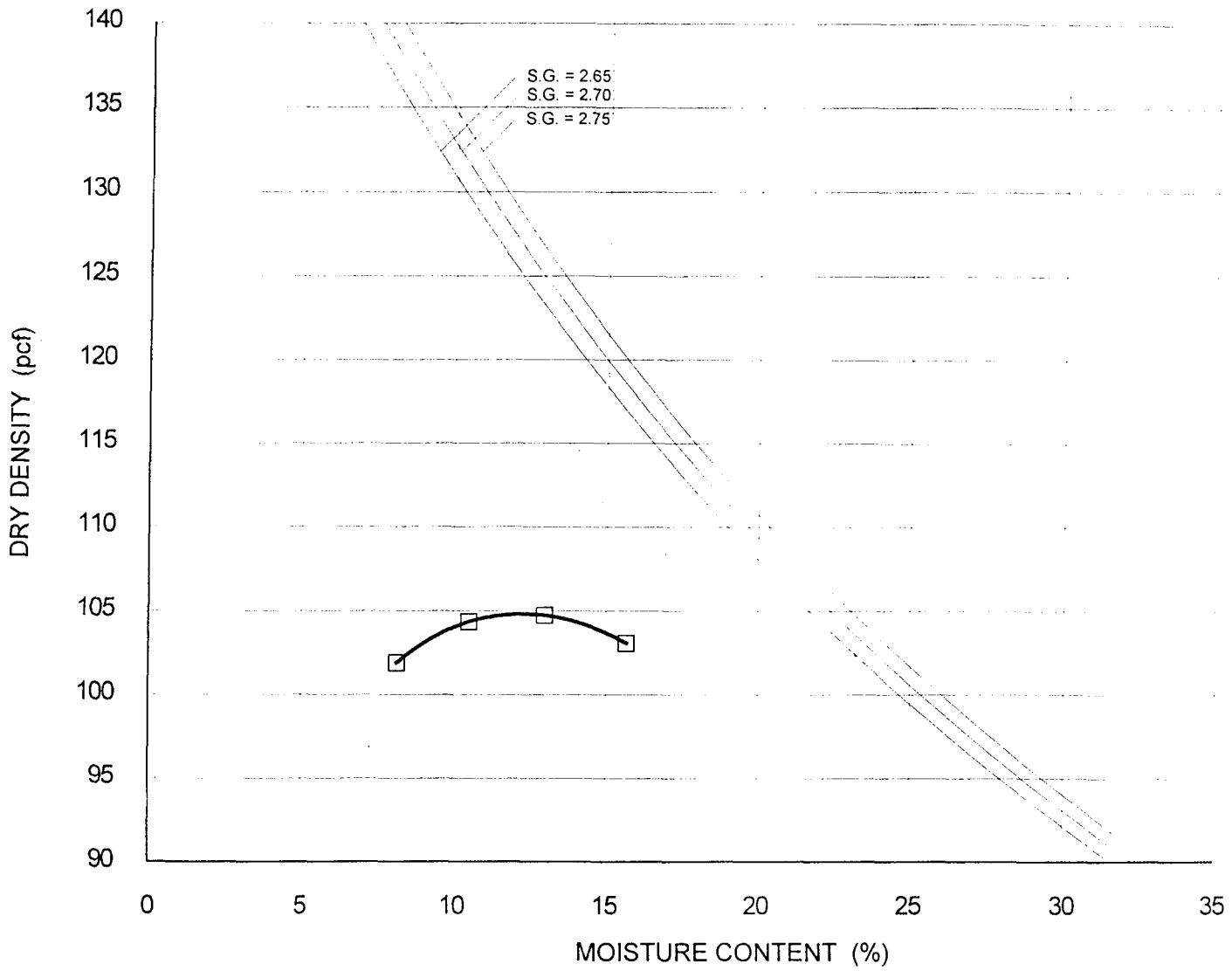
ENVIRONMENTAL GEOTECHNOLOGY LABORATORY

PROJECT NAME: Marine Corps Air Station, El Toro

MODIFIED PROCTOR
(ASTM D1557-A)

9/97

FIGURE



SYMBOL	SAMPLE ID	DEPTH (FT)	SAMPLE TYPE	VISUAL CLASSIFICATION	OPTIMUM MOISTURE (%)	MAX. DRY DENSITY (PCF)
□	#8	N/A	BULK	SM	12.5	105.0

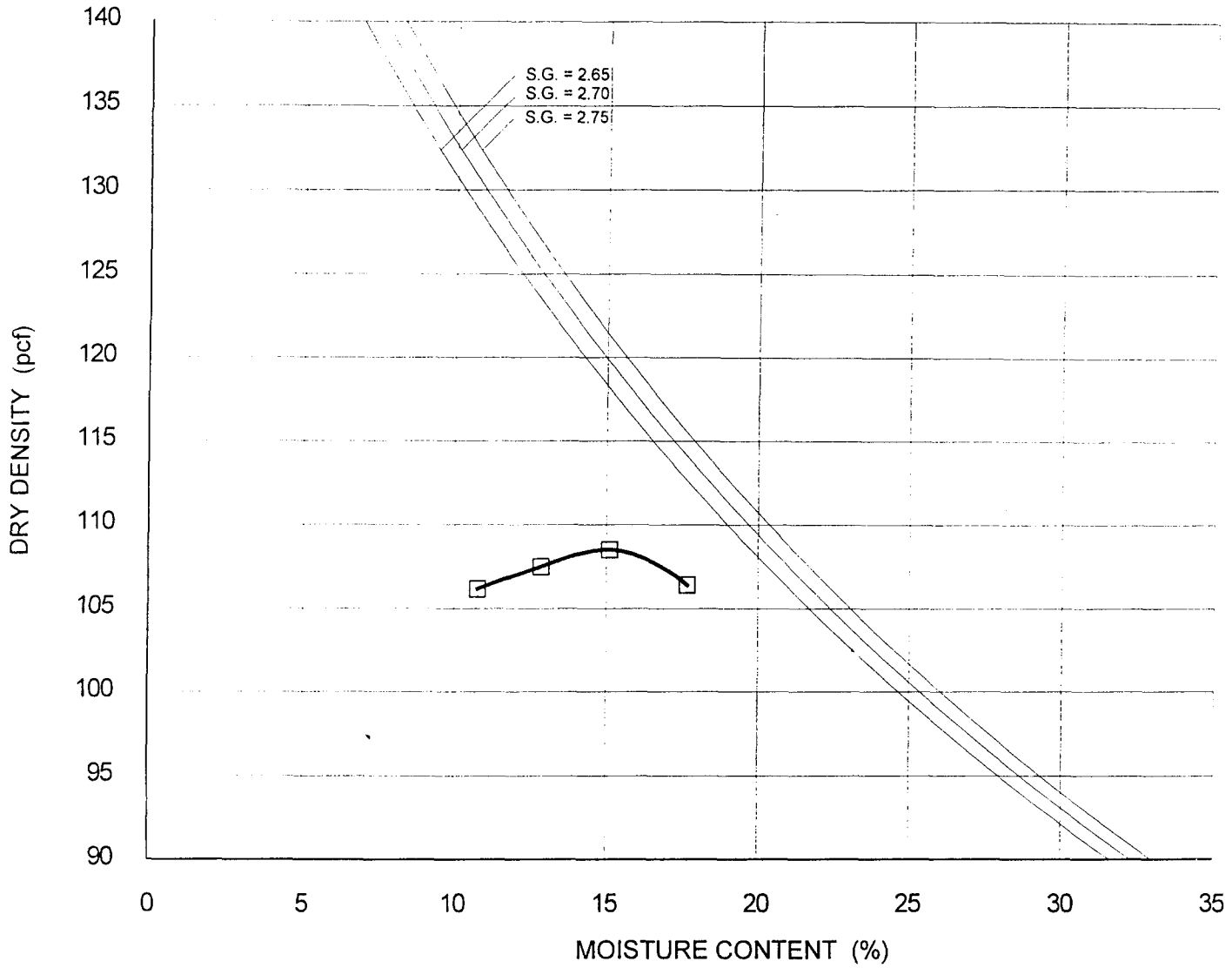
ENVIRONMENTAL GEOTECHNOLOGY LABORATORY

PROJECT NAME:
Marine Corps Air Station, El Toro

MODIFIED PROCTOR
(ASTM D1557-A)

9/97

FIGURE



SYMBOL	SAMPLE ID	DEPTH (FT)	SAMPLE TYPE	VISUAL CLASSIFICATION	OPTIMUM MOISTURE (%)	MAX. DRY DENSITY (PCF)
□	#9	N/A	BULK	SM	15.0	103.5

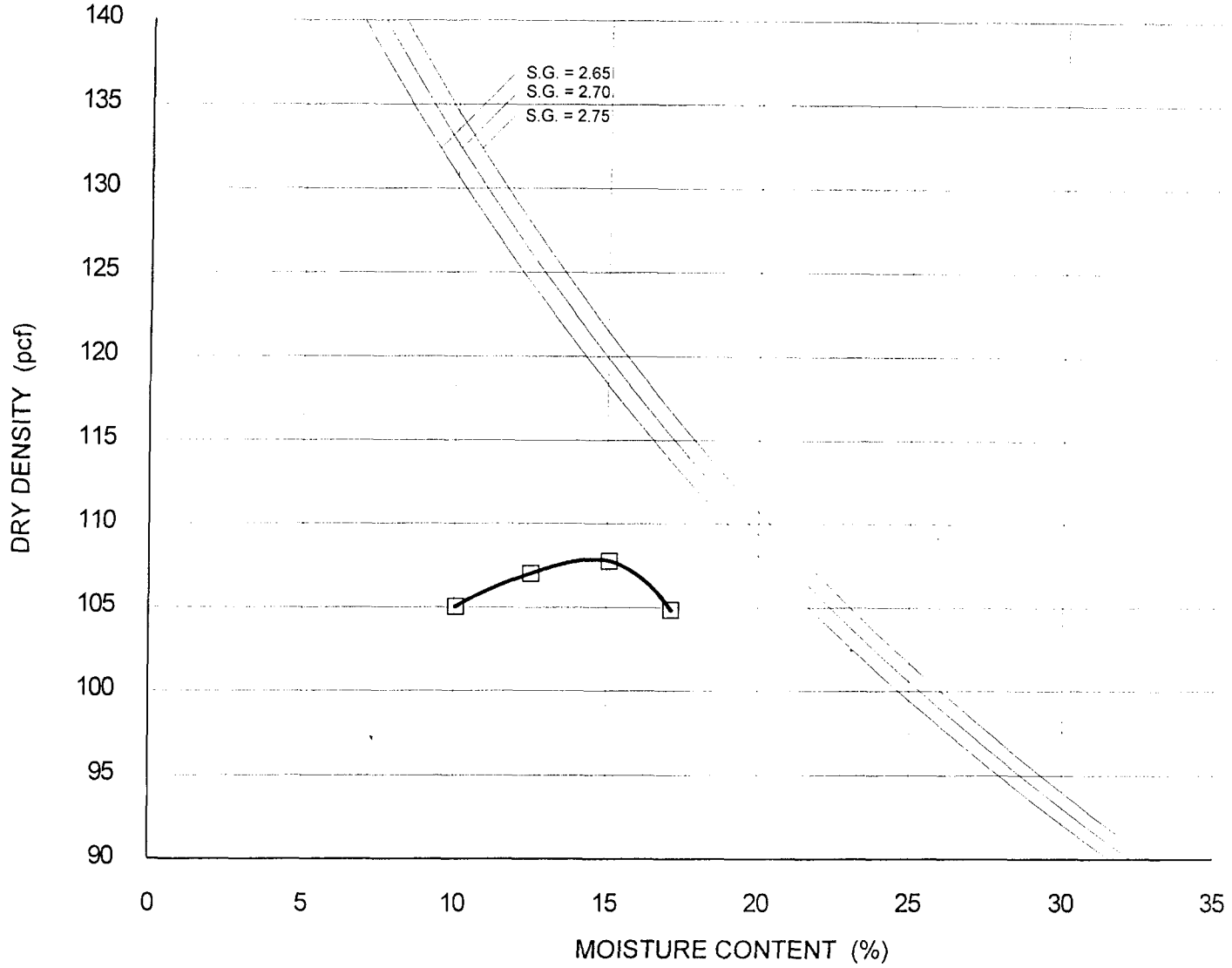
ENVIRONMENTAL GEOTECHNOLOGY LABORATORY

PROJECT NAME: Marine Corps Air Station, El Toro

MODIFIED PROCTOR
(ASTM D1557-A)

9/97

FIGURE



SYMBOL	SAMPLE ID	DEPTH (FT)	SAMPLE TYPE	VISUAL CLASSIFICATION	OPTIMUM MOISTURE (%)	MAX. DRY DENSITY (PCF)
□	#10	N/A	BULK	SM	14.5	108.0

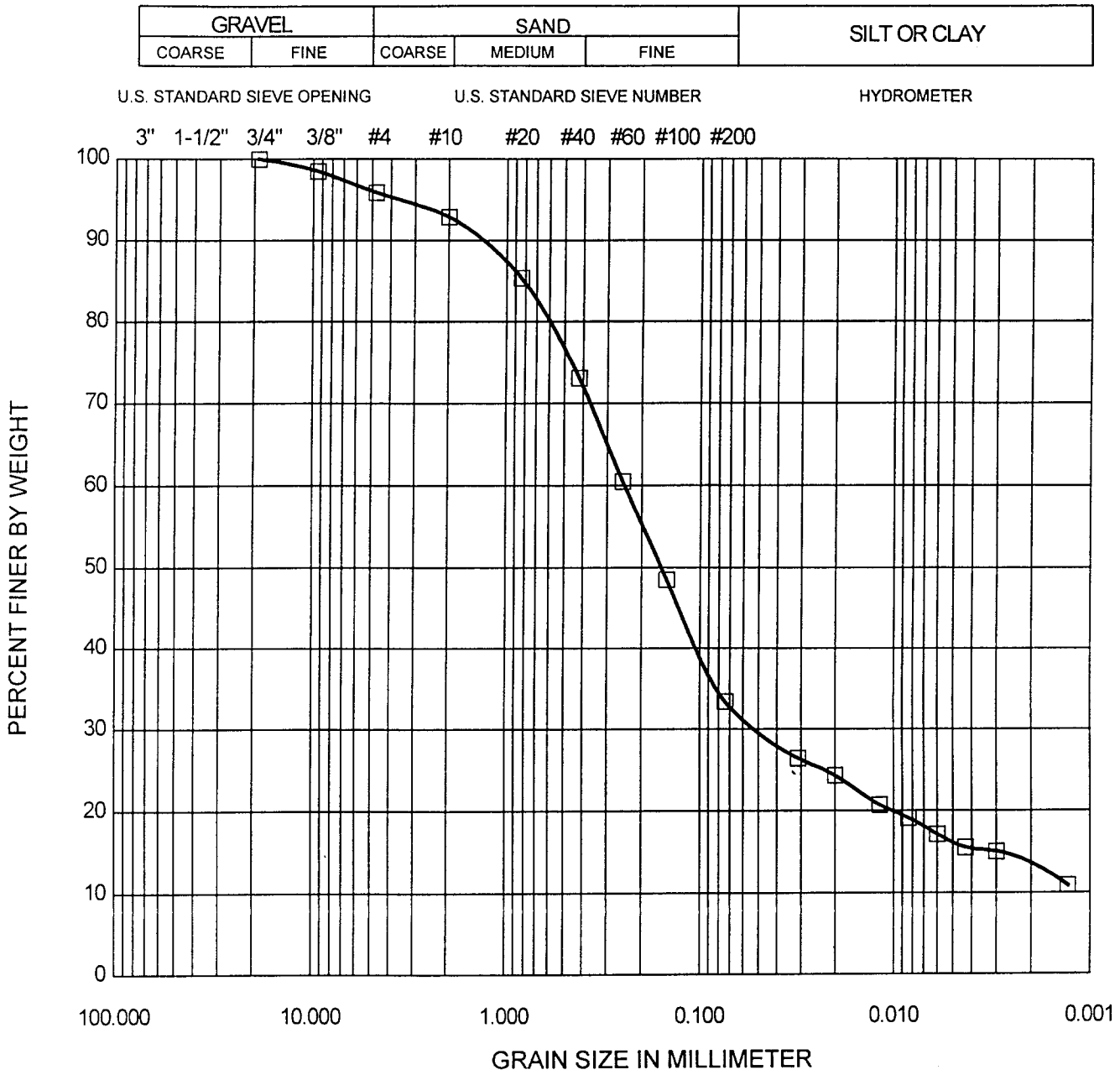
ENVIRONMENTAL GEOTECHNOLOGY LABORATORY

PROJECT NAME: Marine Corps Air Station. El Toro

MODIFIED PROCTOR
(ASTM D1557-A)

9/97

FIGURE



SYMBOL	SAMPLE ID	DEPTH (FT)	SAMPLE TYPE	SOIL TYPE	LIQUID LIMIT	PLASTICITY INDEX
□	#1	N/A	BULK	SC	29	12

ENVIRONMENTAL GEOTECHNOLOGY LABORATORY

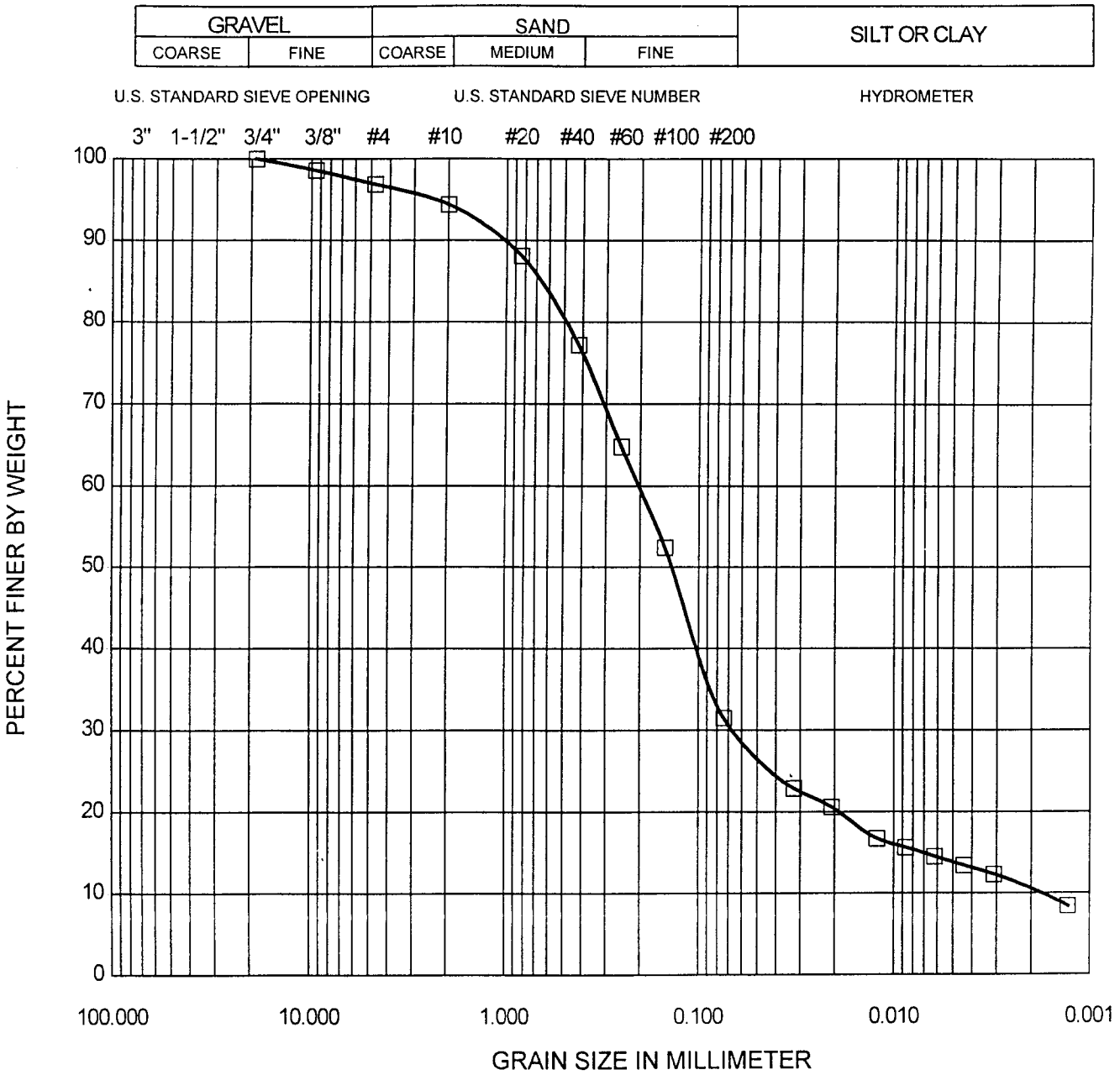
PROJECT NAME: Marine Corps Air Station, El Toro

GRAIN SIZE DISTRIBUTION CURVE

(ASTM D422)

9/97

FIGURE



SYMBOL	SAMPLE ID	DEPTH (FT)	SAMPLE TYPE	SOIL TYPE	LIQUID LIMIT	PLASTICITY INDEX
□	#2	N/A	BULK	SC-SM	26	7

ENVIRONMENTAL GEOTECHNOLOGY LABORATORY

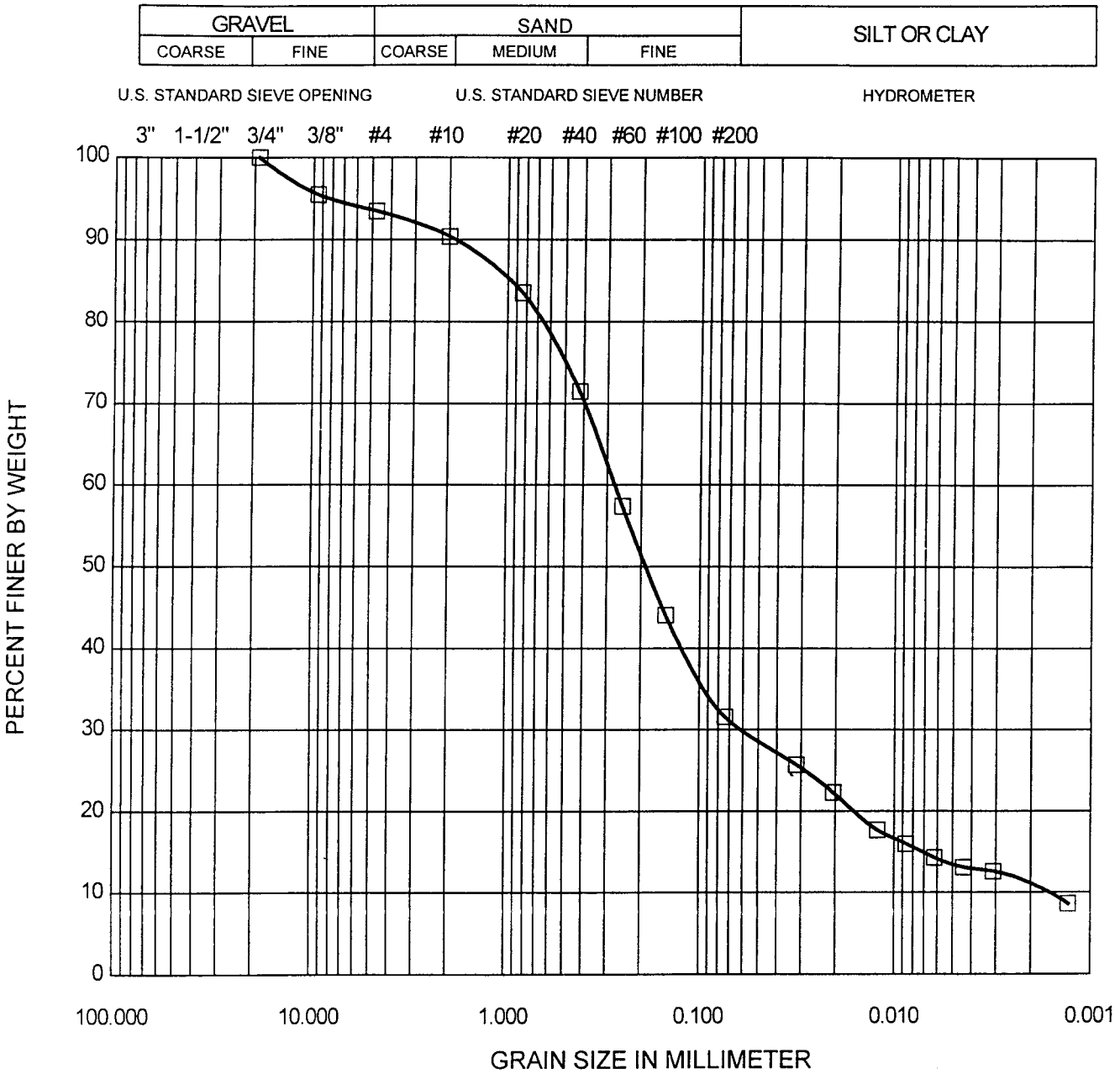
PROJECT NAME: Marine Corps Air Station, El Toro

GRAIN SIZE DISTRIBUTION CURVE

(ASTM D422)

9/97

FIGURE



SYMBOL	SAMPLE ID	DEPTH (FT)	SAMPLE TYPE	SOIL TYPE	LIQUID LIMIT	PLASTICITY INDEX
□	#3	N/A	BULK	SC	29	10

ENVIRONMENTAL GEOTECHNOLOGY LABORATORY

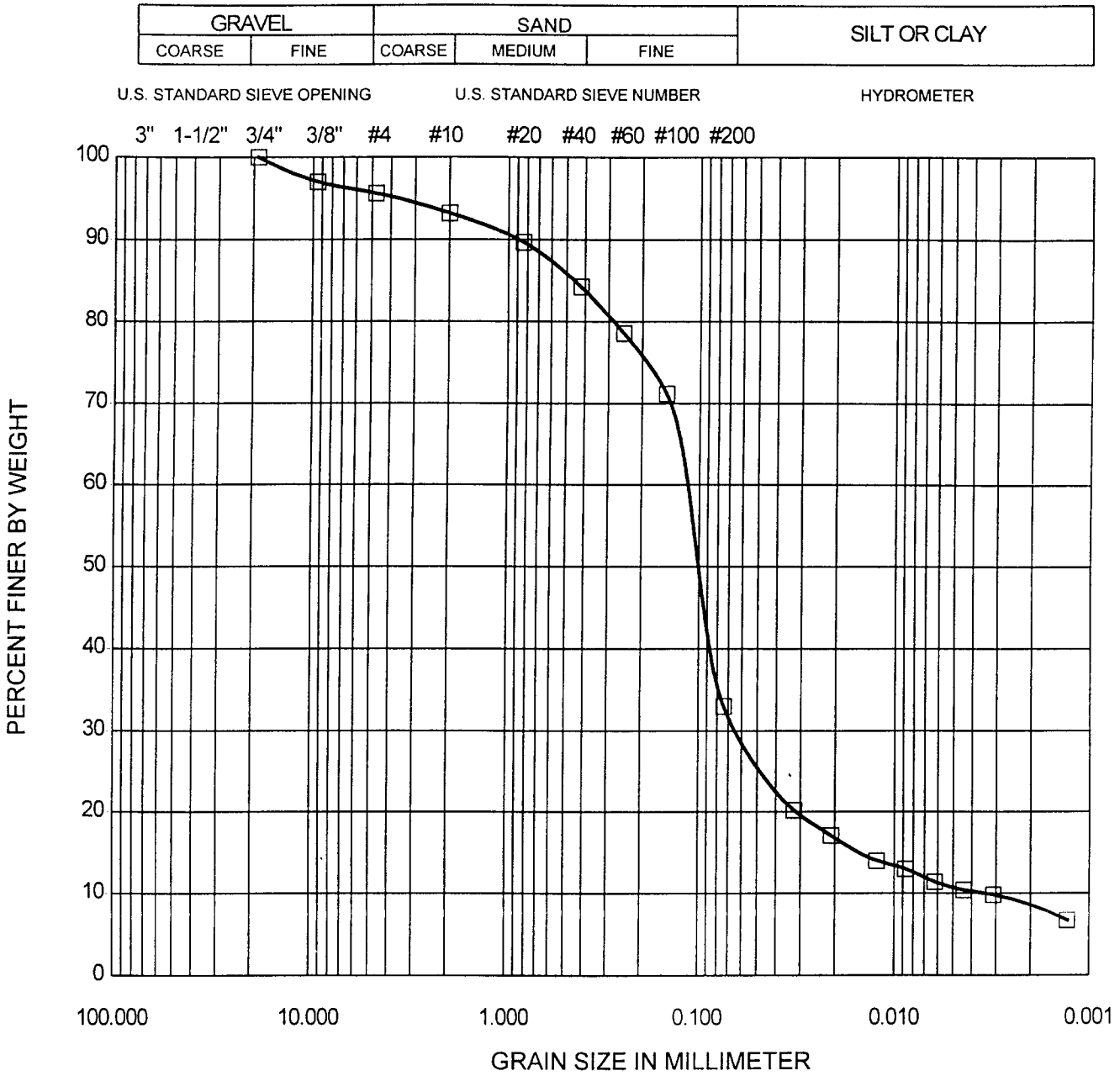
PROJECT NAME: Marine Corps Air Station, El Toro

GRAIN SIZE DISTRIBUTION CURVE

(ASTM D422)

9/97

FIGURE



SYMBOL	SAMPLE ID	DEPTH (FT)	SAMPLE TYPE	SOIL TYPE	LIQUID LIMIT	PLASTICITY INDEX
□	#4	N/A	BULK	SM		NP

ENVIRONMENTAL GEOTECHNOLOGY LABORATORY

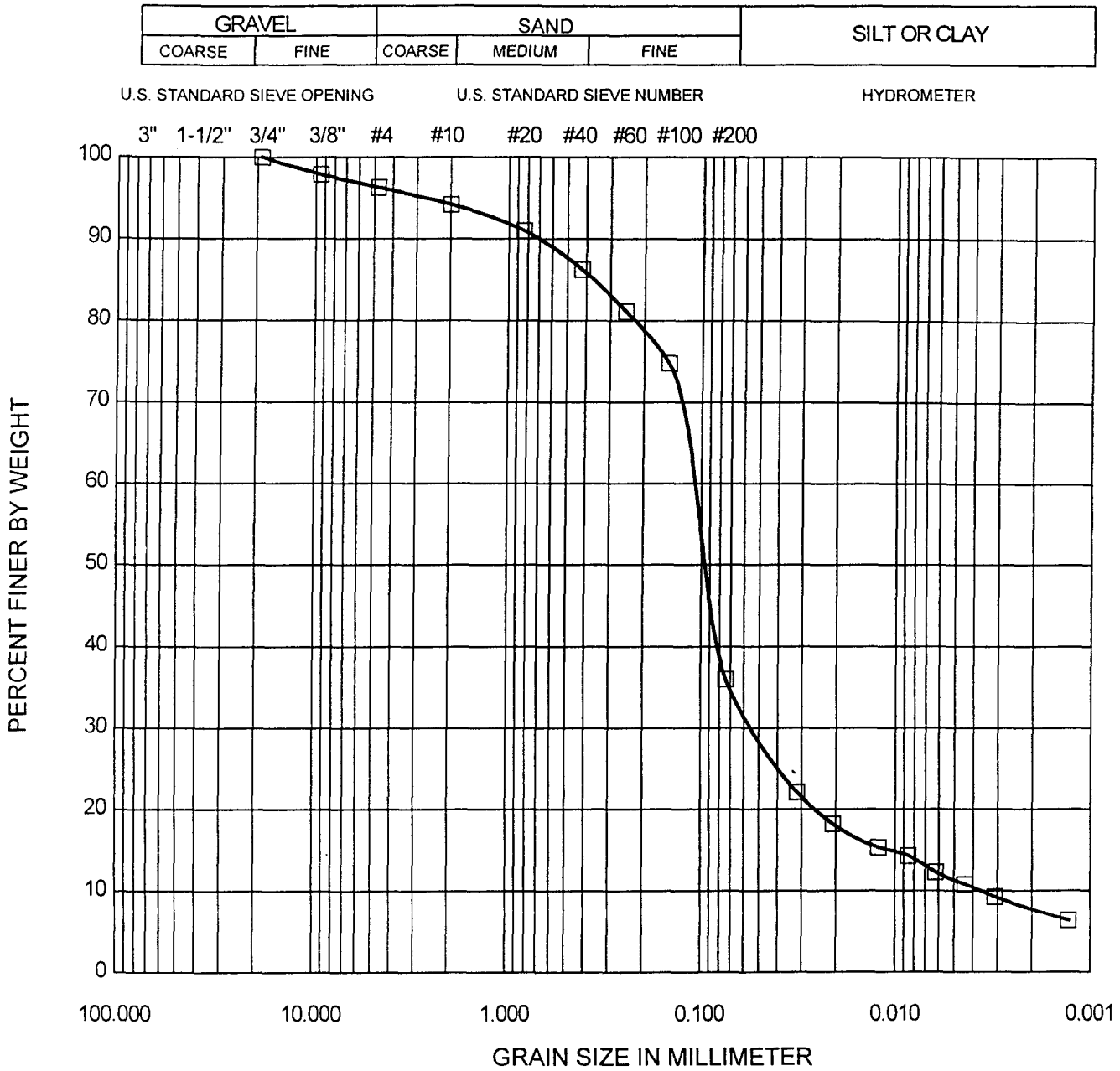
PROJECT NAME: Marine Corps Air Station, El Toro

GRAIN SIZE DISTRIBUTION CURVE

(ASTM D422)

9/97

FIGURE



SYMBOL	SAMPLE ID	DEPTH (FT)	SAMPLE TYPE	SOIL TYPE	LIQUID LIMIT	PLASTICITY INDEX
□	#5	N/A	BULK	SM		NP

ENVIRONMENTAL GEOTECHNOLOGY LABORATORY

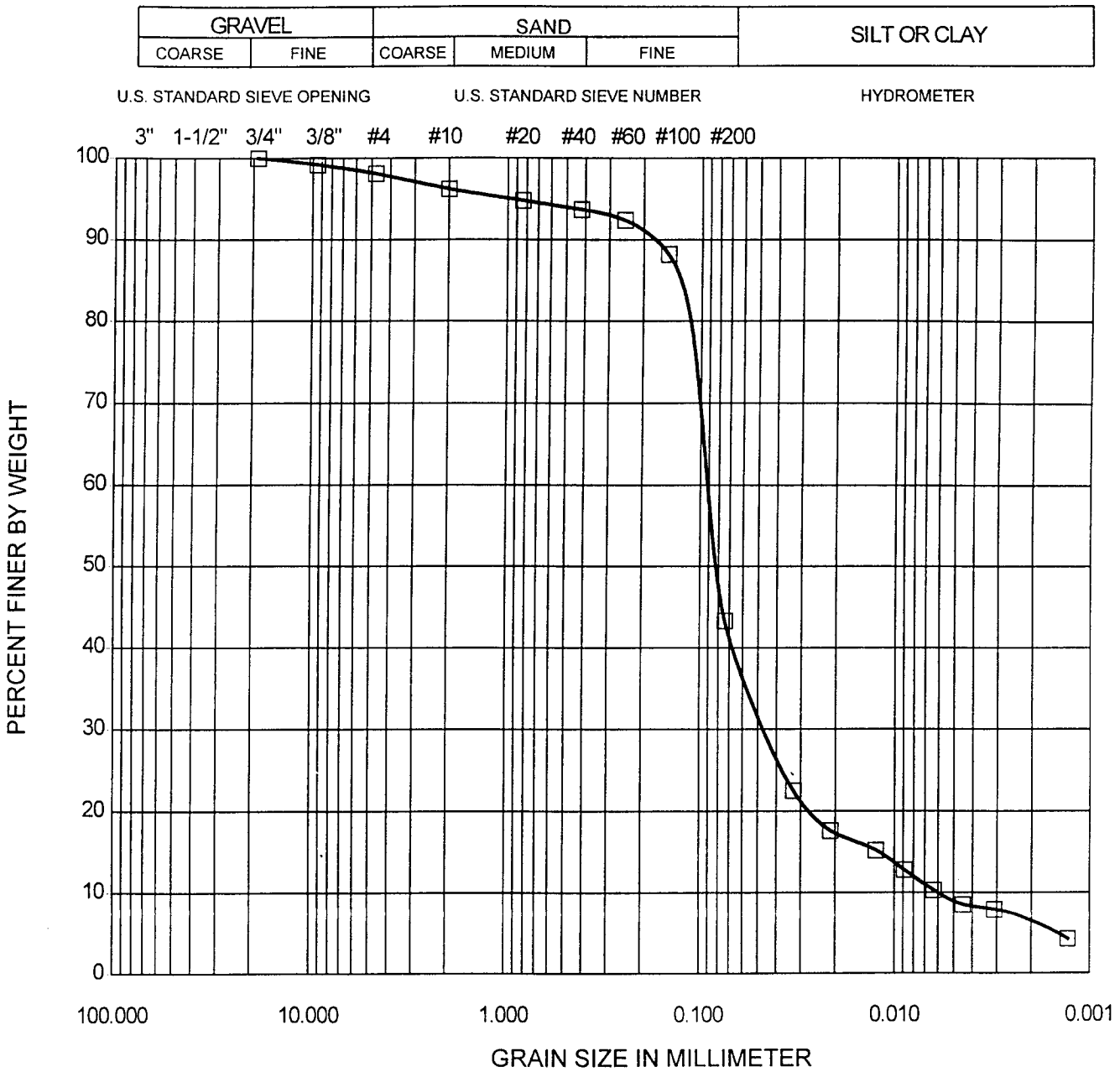
PROJECT NAME: Marine Corps Air Station, El Toro

GRAIN SIZE DISTRIBUTION CURVE

(ASTM D422)

9/97

FIGURE



SYMBOL	SAMPLE ID	DEPTH (FT)	SAMPLE TYPE	SOIL TYPE	LIQUID LIMIT	PLASTICITY INDEX
□	#6	N/A	BULK	SM		NP

ENVIRONMENTAL GEOTECHNOLOGY LABORATORY

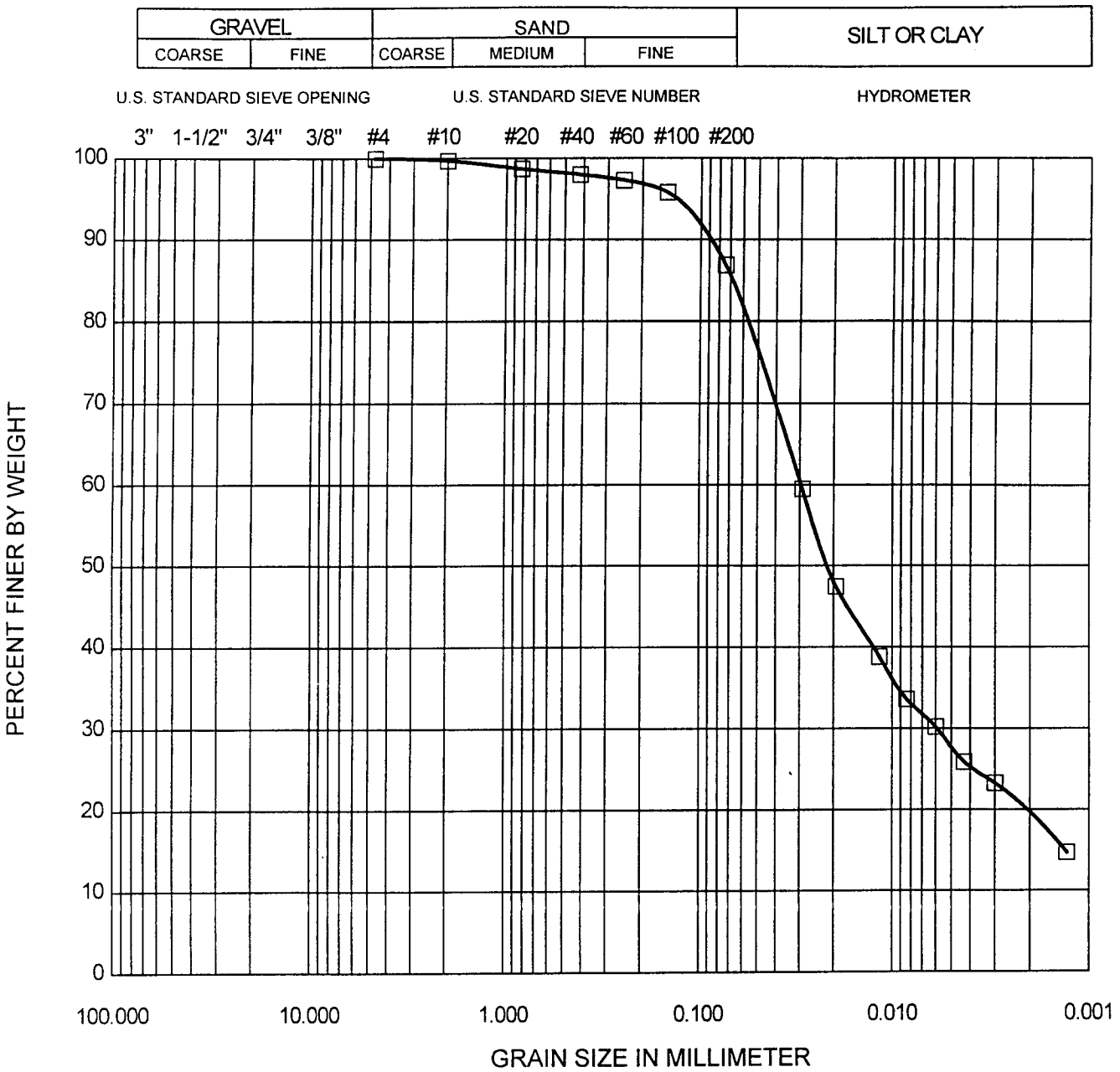
PROJECT NAME: Marine Corps Air Station, El Toro

GRAIN SIZE DISTRIBUTION CURVE

(ASTM D422)

9/97

FIGURE



SYMBOL	SAMPLE ID	DEPTH (FT)	SAMPLE TYPE	SOIL TYPE	LIQUID LIMIT	PLASTICITY INDEX
□	#7	N/A	BULK	ML	45	15

ENVIRONMENTAL GEOTECHNOLOGY LABORATORY

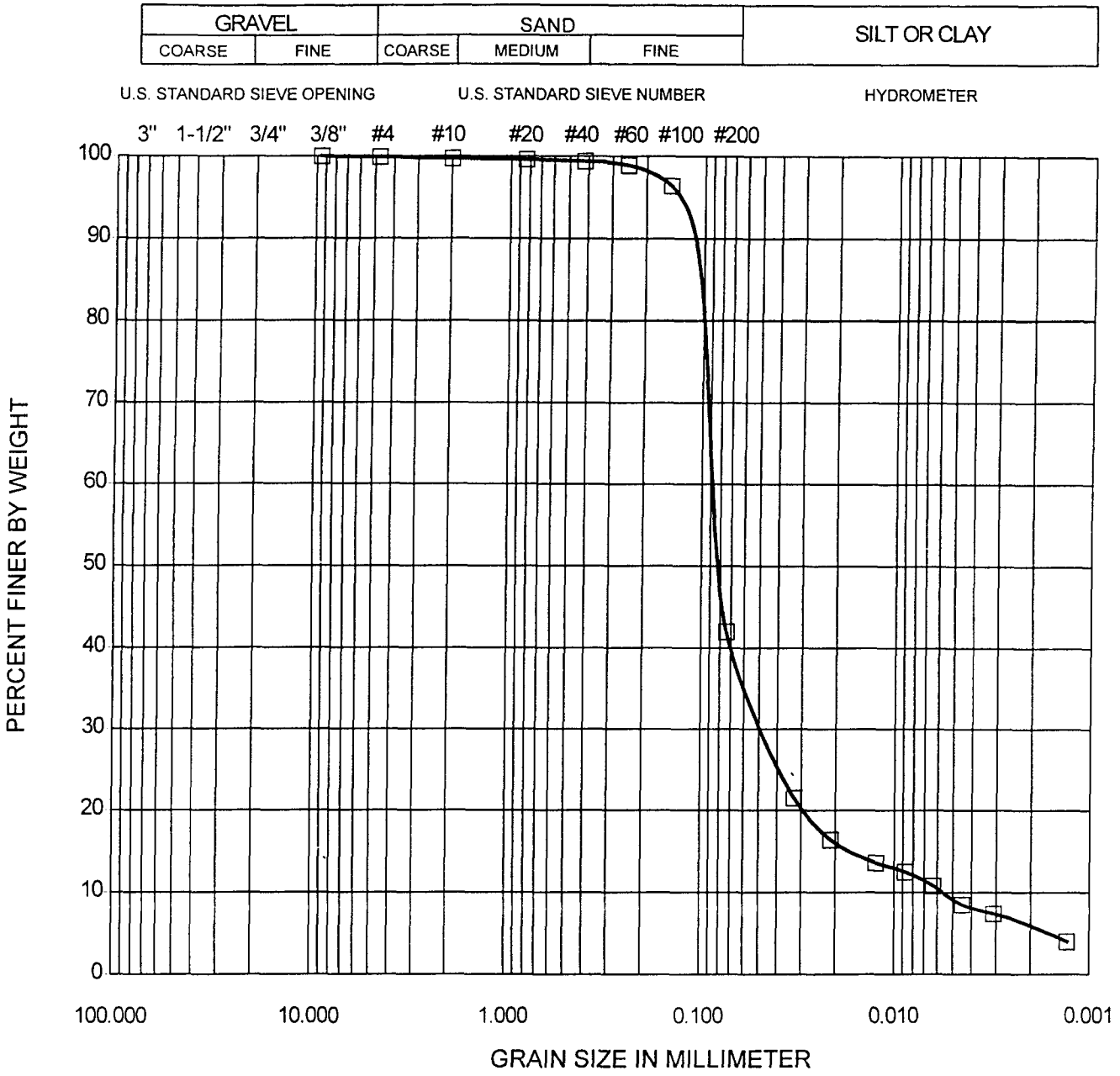
PROJECT NAME: Marine Corps Air Station, El Toro

GRAIN SIZE DISTRIBUTION CURVE

(ASTM D422)

9/97

FIGURE



SYMBOL	SAMPLE ID	DEPTH (FT)	SAMPLE TYPE	SOIL TYPE	LIQUID LIMIT	PLASTICITY INDEX
□	#8	N/A	BULK	SM		NP

ENVIRONMENTAL GEOTECHNOLOGY LABORATORY

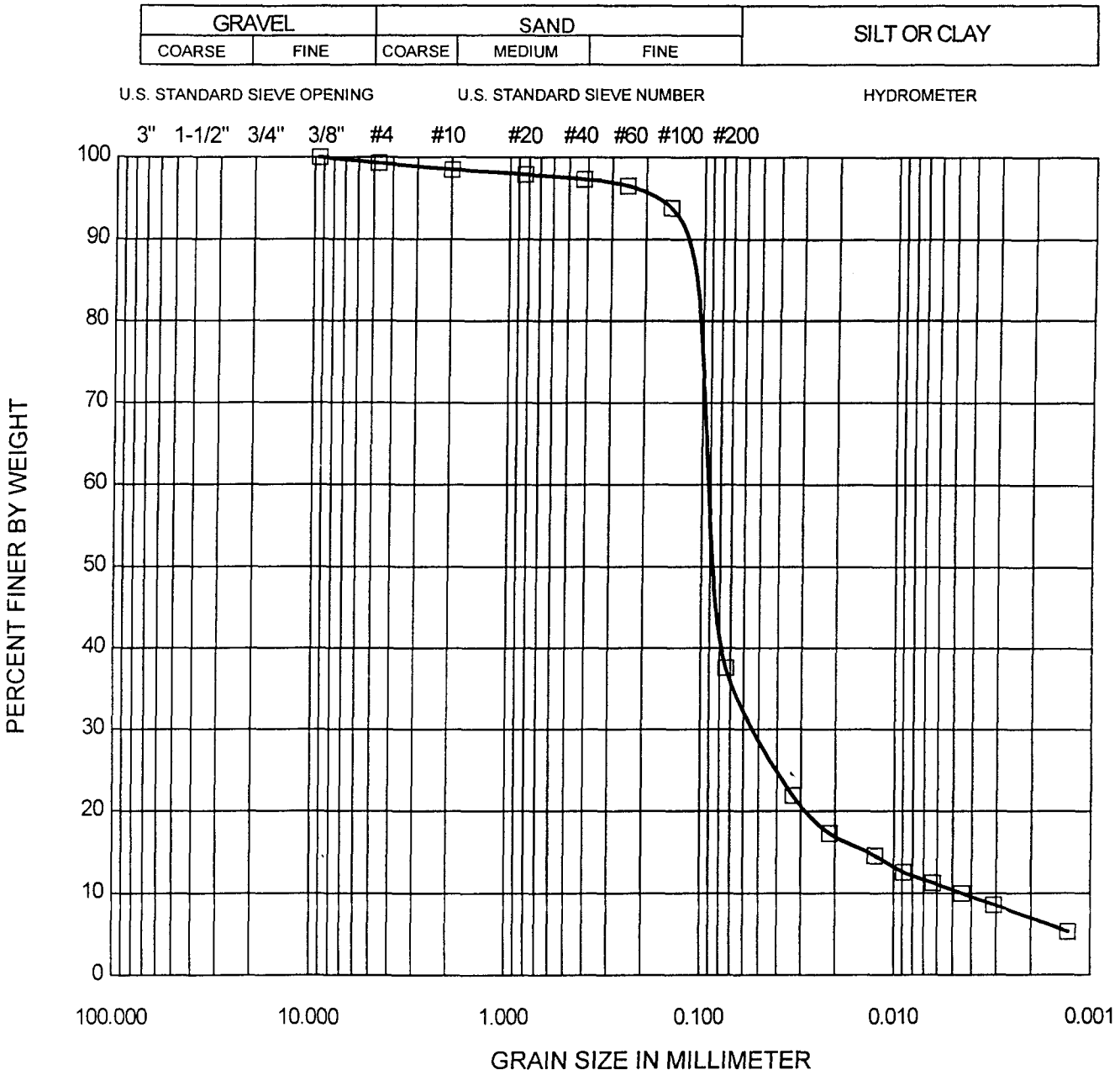
PROJECT NAME: Marine Corps Air Station, El Toro

GRAIN SIZE DISTRIBUTION CURVE

(ASTM D422)

9/97

FIGURE



SYMBOL	SAMPLE ID	DEPTH (FT)	SAMPLE TYPE	SOIL TYPE	LIQUID LIMIT	PLASTICITY INDEX
□	#9	N/A	BULK	SM		NP

ENVIRONMENTAL GEOTECHNOLOGY LABORATORY

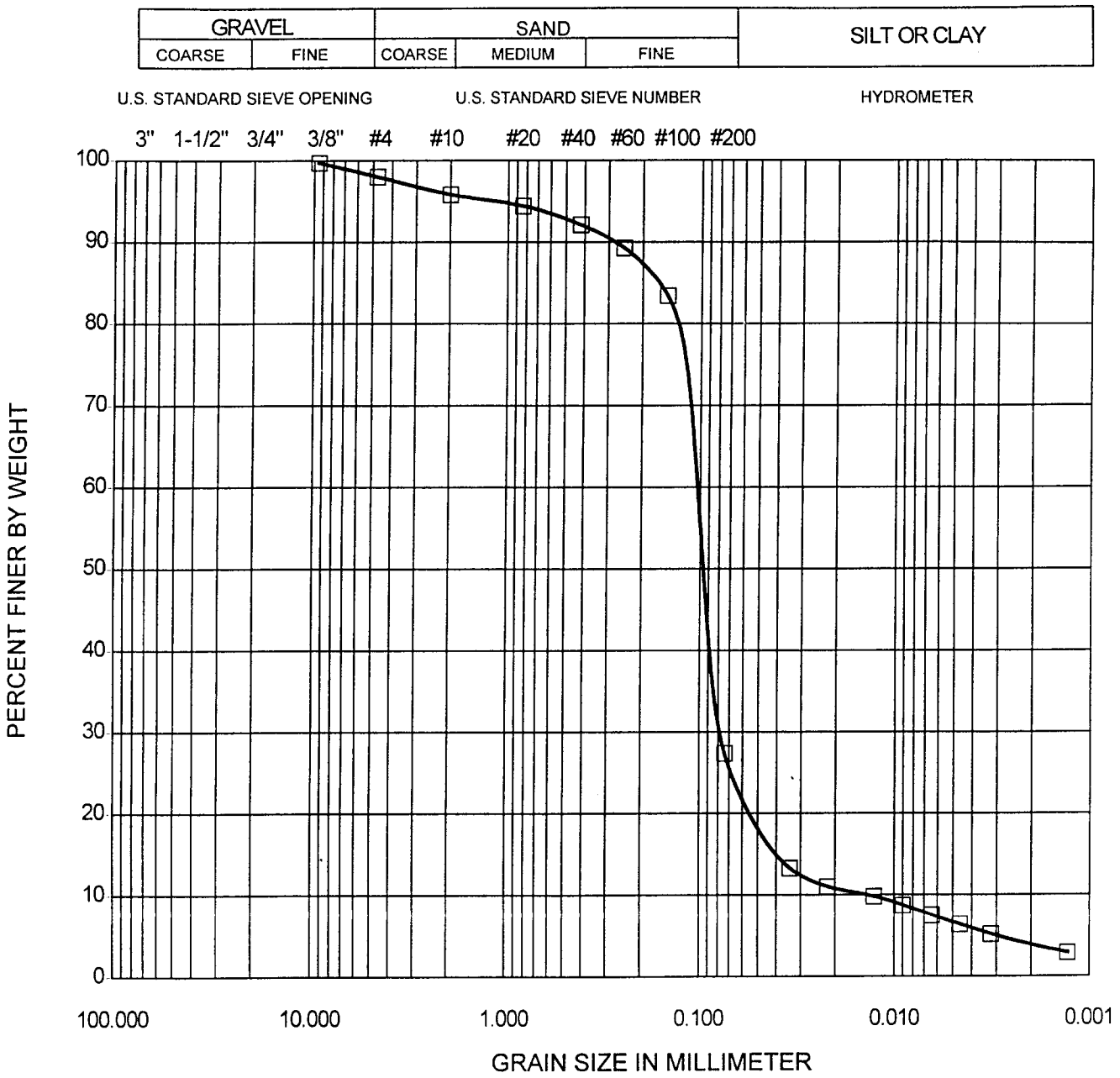
PROJECT NAME: Marine Corps Air Station, El Toro

GRAIN SIZE DISTRIBUTION CURVE

(ASTM D422)

9/97

FIGURE



SYMBOL	SAMPLE ID	DEPTH (FT)	SAMPLE TYPE	SOIL TYPE	LIQUID LIMIT	PLASTICITY INDEX
□	#10	N/A	BULK	SM		NP

ENVIRONMENTAL GEOTECHNOLOGY LABORATORY

PROJECT NAME: Marine Corps Air Station, El Toro

GRAIN SIZE DISTRIBUTION CURVE

(ASTM D422)

9/97

FIGURE