SUB-ATTACHMENT C

DRILLING LOGS AND TEST DATA FROM ARLINGTON TERRACE STORM DRAINAGE STUDY, APRIL 1982 PRELIMINARY SOILS INVESTIGATION

APPENDIX D

Preliminary Soils Investigation
Cameron Run - Huntington Flood Control Project

FAIRFAX COUNTY, VIRGINIA

MEMORANDUM

TO: Bill Henry, Division of Utilities Planning and Design, Department of Public Works DATE January 21, 1982

FROM: Larry K. Johnson
Soil Scientist for Fairfax County

FILE NO:

SUBJECT: Cameron Run-Huntington Flood Control Project
Preliminary Soils Investigation

REFERENCE:

Enclosed with this memo are the soil boring profiles and test data for samples taken during the preliminary investigation for the Cameron Run-Huntington flood control project. Soil borings and samples were taken through a cooperative investigation with Ronald Chernik of Camp, Dresser and McKee, Inc. The flood control project includes dredging of alluvial sediments from the Cameron Run channel and utilizing the soil materials for construction of an earthen flood control levee below the lower part of the Huntington subdivision. The levee is to be approximately 2400 feet in length and lie along the south bank of Cameron Run.

Eleven (11) soil borings were taken with hand probe samplers along the proposed levee alignment. Boring depths ranged from 10-15.5 feet and were generally stopped at those depths by gravels or other obstacles. Seven of the eleven borings show an upper layer of poorly graded loose sands to depths of two to five feet. The other four borings have surface layers containing soft silty clay or soft organic silt. All borings show substantial subsurface strata of soft and very soft fibrous peat or organic silts. The total depth and thickness of the organic layers generally increased with distance downstream along the tranverse.

Soil borings were taken by Law Engineering Testing Company in 1972 for the Westgate Pumpower Project at points approximately 600 feet from B-11, our farthest downstream boring. Their borings show substantially the same strata as our borings B-1 to B-11, further, that soft organic layers increase to depths downstream of 30 feet or more. LETCO borings show sands and gravels below the organic layers, which in turn overly hard clays, probably of the Potomac Group. LETCO borings also show that deep soft organic layers underly the surface at least 300 feet south of the existing channel of Cameron Run. See boring location plans and LETCO boring profiles.

Nine (9) soil samples of the channel sediments proposed for dredging were analyzed for gradation by this office and for compaction characteristics and Atterberg Limits by the Department of Environmental Management Soils Lab. Results are shown on the grain size distribution charts. Stream bed soil materials at S-8 and above are generally poorly graded fine and medium sands. Stream bed materials at S-9 and below are silt and clay primarily. The particle size distribution pattern along the stream bed of Cameron Run determined by the gradation tests, is as expected with the present stream gradient, estuarial influence, and upstream source materials.

In summary, the underlying strata along the stream in the project area contain substantial beds of soft and very soft peat and organic silts that are variable and generally increase in thickness in a downstream direction. These materials will not perform satisfactorily as a foundation for the proposed earthen levee and would probably result in substantial long term total and differential settlement. Firm foundation soils may occur some distance south of the existing channel but would need to be verified by soil borings. It is likely that the area lying between the lower units of the Huntington subdivision and the present Cameron Run channel contains substantial quantities of uncontrolled fill material.

The stream bed materials can be used for the earthen levee if properly stabilized and compacted according to test data. The poorly graded fine and medium sands are subject to internal erosion or piping, slope instability under saturation and surface erosion. Accordingly stabilization procedures will be required.

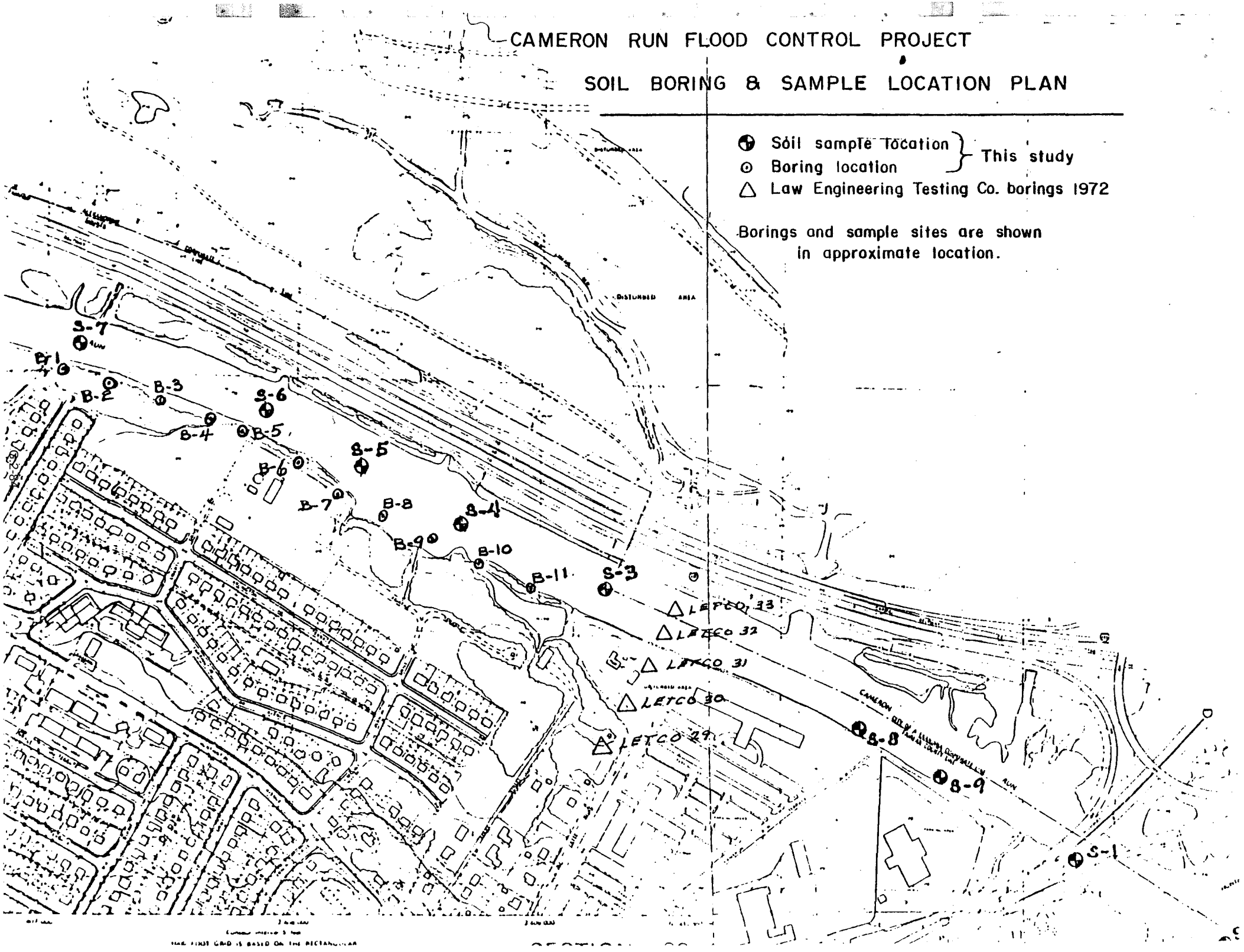
Silty and clayey downstream soil materials can be effectively used after spreading and drying to attain suitable moisture percentages.

Enclosures:
1. Soil boring and sample sites
2. Soil boring profiles
3. Stream bed gradation and compaction data.
4. Law Engineering boring data

cc: Ronald Chernick
Camp, Dresser and McKee, Inc.

CAMERON RUN FLOOD CONTROL PROJECT

SOIL BORING & SAMPLE LOCATION PLAN



CAMERON RUN FLOOD
CONTROL PROJECT
SOIL BORING PROFILES

Boring B-1

Depth	Description
0-5.0'	Sand, poorly graded, fine and medium, brownish gray, saturated, loose, stratified, alluvial sand.
5.0-6.5'	Gray silt, saturated, soft.
6.5-9.5'	Dark brown peat, fibrous, saturated, very soft.
9.5-10.0'	Gray silty sands, saturated, soft.
10.0'	Boring stopped on gravel or other obstacle

Boring B-2

0-3.5'	Sand, poorly graded, fine and medium, brownish gray, saturated, loose, stratified, alluvial sand.
3.5-6.0'	Gray clayey silt, saturated, soft.
6.0-6.5'	Gray silt, saturated, soft.
6.5-9.0'	Dark brown peat, fibrous, saturated, very soft.
9.0'	Boring stopped on gravel or other obstacle.

Boring B-3

0-6.0'	Gray silty clay, saturated, soft.
6.0-9.0'	Dark brown peat, fibrous, saturated, very soft.
9.0'	Boring stopped on gravel or other obstacle.

Boring B-4

0-2.0'	Sand, poorly graded, fine and medium, brownish gray, saturated, loose, stratified, alluvial sand.
2.0-6.0'	Very dark grayish brown organic clayey silt, saturated, soft.
6.0-8.0'	Very dark grayish brown highly organic silt (muck), saturated, very soft.
8.0-11.0'	Dark brown peat, fibrous, saturated, very soft.
11.0'	Boring stopped on gravel or other obstacle.

Boring B-5

Depth	Description
0-4.0'	Silty to clayey fill, soft.
4.0-8.0'	Very dark grayish brown silt, saturated, soft to very soft.
8.0-14.0'	Very dark brown clayey silt, saturated, soft to very soft.
14.0'	Boring stopped on gravel or other obstacle.

Boring B-6

0-9'	Very dark grayish brown organic silt, saturated, soft.
9.0-14'	Very dark grayish brown highly organic silt (muck), very soft.
14.0	Boring stopped on gravel or other obstacle.

Boring B-7

0-5.0'	Brownish gray sand and silty sand, stratified, sand poorly graded, saturated, loose.
5.0-8.0'	Gray silt, saturated, very soft.
8.0-14.0'	Very dark grayish brown highly organic silt (muck), very soft.
14.0'	Boring stopped on gravel or other obstacle.

Boring B-8

0-5.0'	Sand, poorly graded, fine and medium, brownish gray , saturated, loose, stratified, alluvial sand.
5.0-12.0'	Brownish gray sand and silty sand, stratified, sand poorly graded, saturated, loose.
12.0-15.0'	Very dark grayish brown highly organic silt (muck), very soft.
15'	Brownish gray sand, saturated, loose.

Boring B-9

0-5.0'	Sand, poorly graded, fine and medium, brownish gray , saturated, loose, stratified, alluvial sand.
5.0-12.0'	Brownish gray sand and silty sand, stratified, sand poorly graded, saturated, loose.
12-15'	Very dark grayish brown highly organic silt (muck), very soft.
15'	Brownish gray sand, saturated, loose.

Boring B-10

0-2'	Sand, poorly graded, fine and medium, brownish gray, saturated, loose, stratified, alluvial sand.
2-13.5'	Very dark grayish organic silt, saturated, soft.
13.5'	Boring stopped on gravel or other obstacle.

Boring B-11

0-11'	Very dark grayish brown organic silt, saturated, soft.
11-12.5'	Dark brown peat, fibrous, saturated, very soft.
12.5-15.5'	Very dark grayish brown highly organic silt (muck), very soft.
15.5'	Boring stopped on gravel or other obstacle.

Project Cameron Run Flood Control Project

Sample No. 1 Boring No. _____ Depth _____ Date Tested 12-16-81

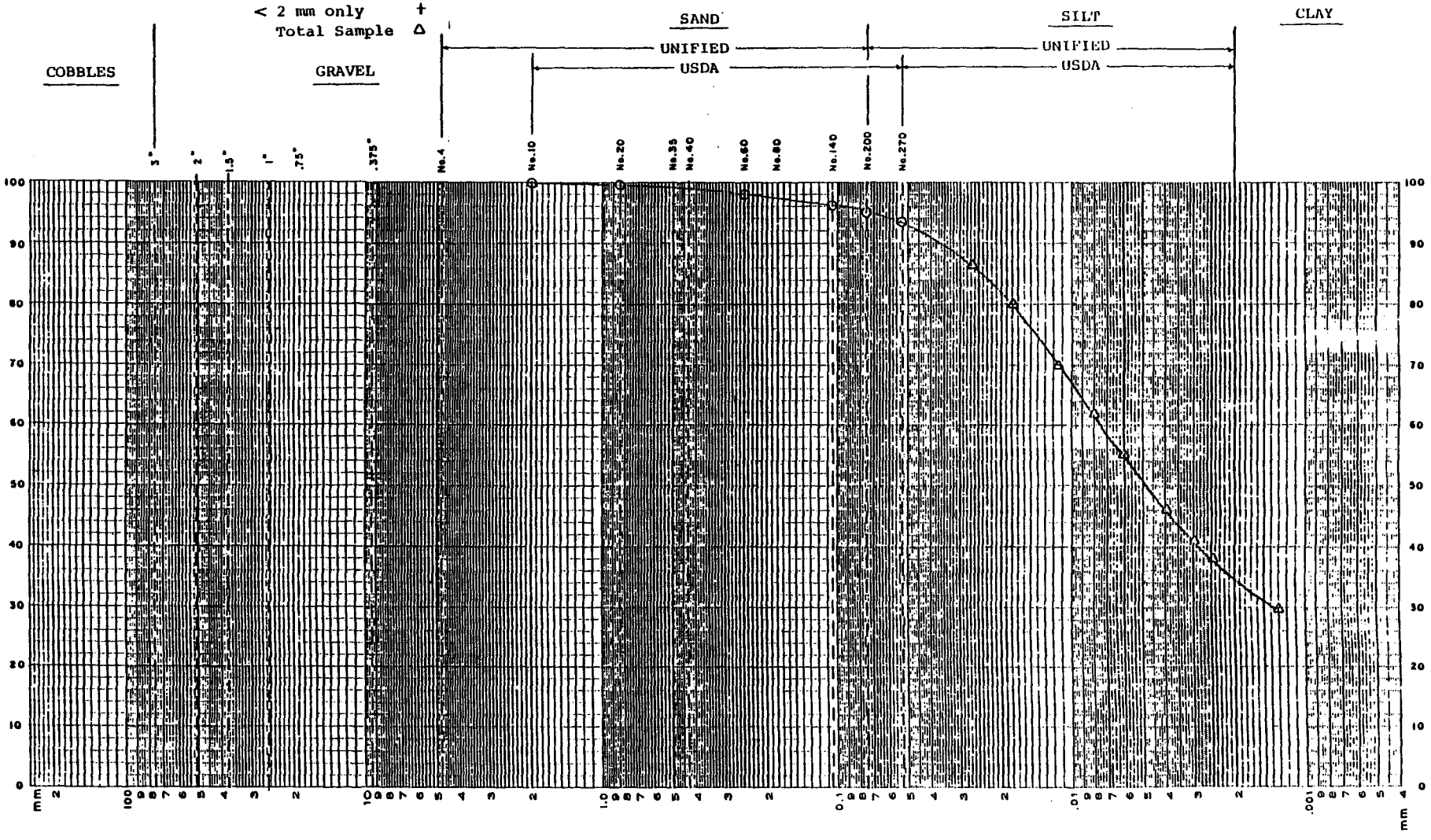
Soil Description A-4 (8) Tested By JEB

Maximum dry density lbs/cu. ft. 105.2 Liquid limit 31.1 %

Optimum moisture 17.5 % Plasticity index 10.4 %

GRAIN SIZE DISTRIBUTION

SIEVE o
HYDROMETER
< 2 mm only +
Total Sample Δ



Project [illegible]

Sample No. 2 Boring No. _____ Depth _____ Date Tested 12/16/81

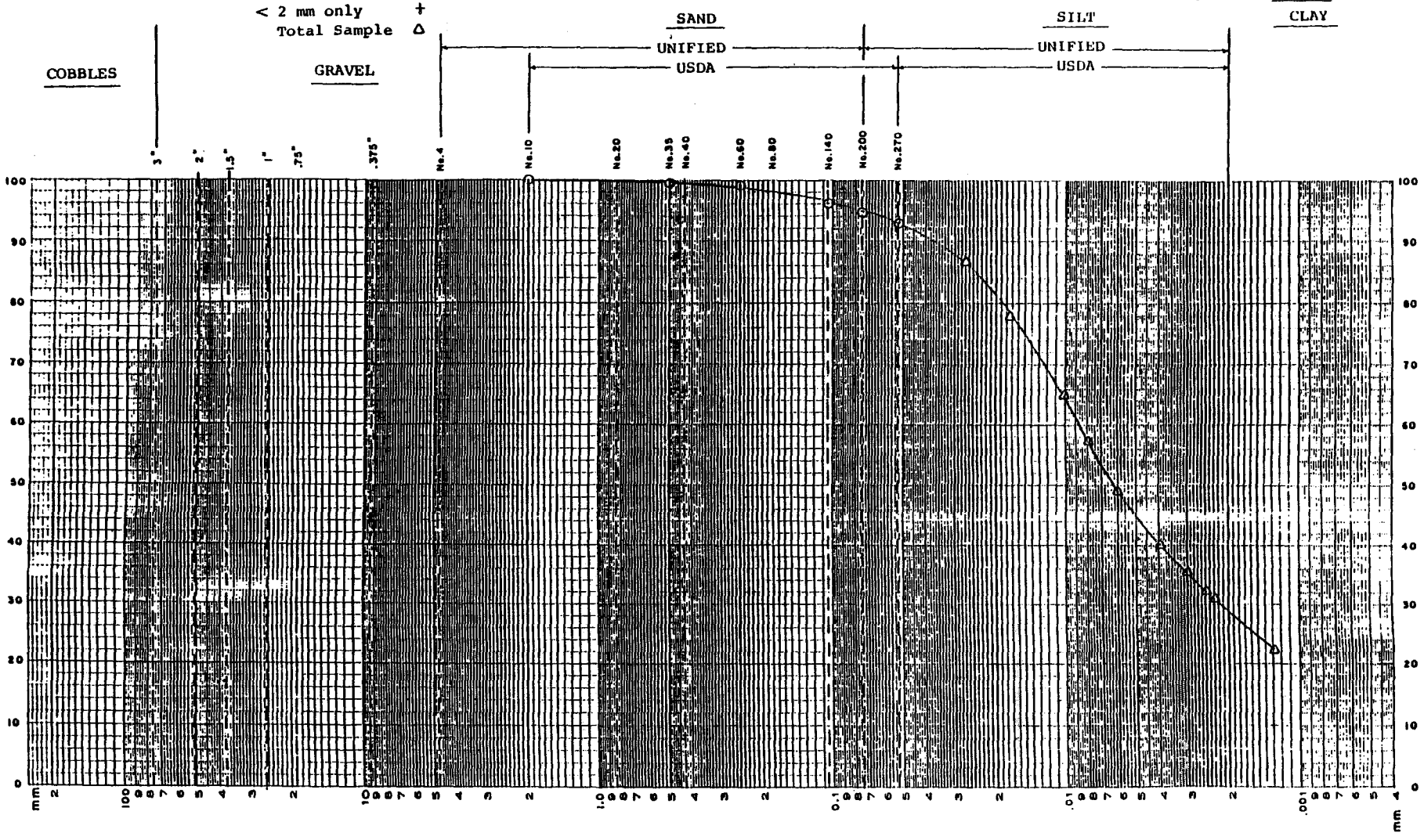
Soil Description A-7-5 (11) Tested By JEB

Maximum dry density lbs/cu. ft. 86.0 Liquid limit 46.4 %

Optimum moisture 32.1 % Plasticity index 13.5 %

GRAIN SIZE DISTRIBUTION

SIEVE o
HYDROMETER
< 2 mm only +
Total Sample Δ



11/81 Fairfax County Soil Survey

Project Cameron Run Flood Control Project

Sample No. 3 Boring No. ____ Depth ____ Date Tested 12/16/81

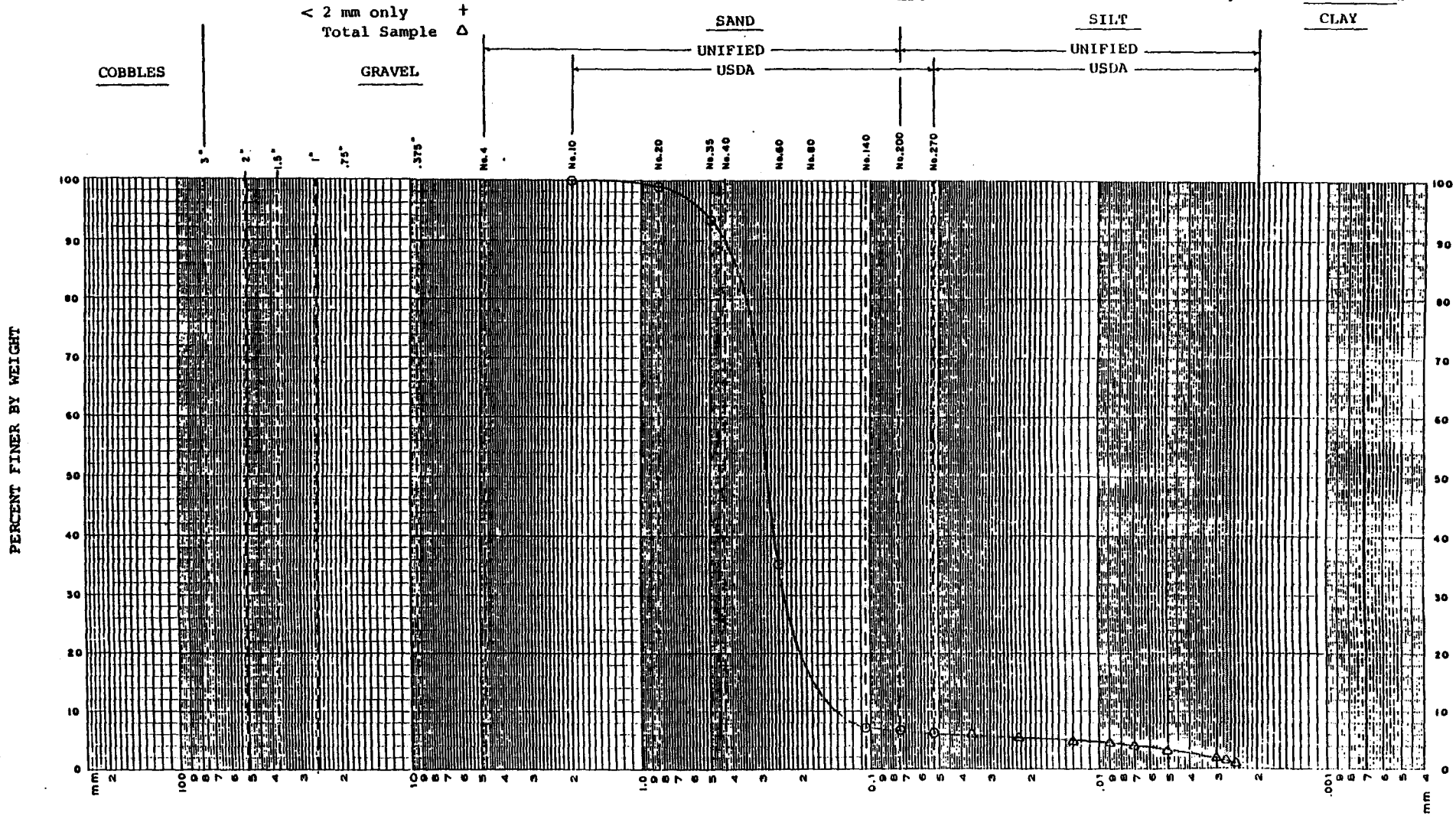
Soil Description A-3 (0) Tested By JEB

Maximum dry density lbs/c. ft. 96.0 Liquid limit 21.4 %

Optimum moisture 20.6 % Plasticity index NP %

GRAIN SIZE DISTRIBUTION

SIEVE o
HYDROMETER
< 2 mm only +
Total Sample Δ



11/81 Fairfax County Soil Survey

Project Cameron Run Flood Control Project

Sample No. 4 Boring No. _____ Depth _____ Date Tested 12/16/81

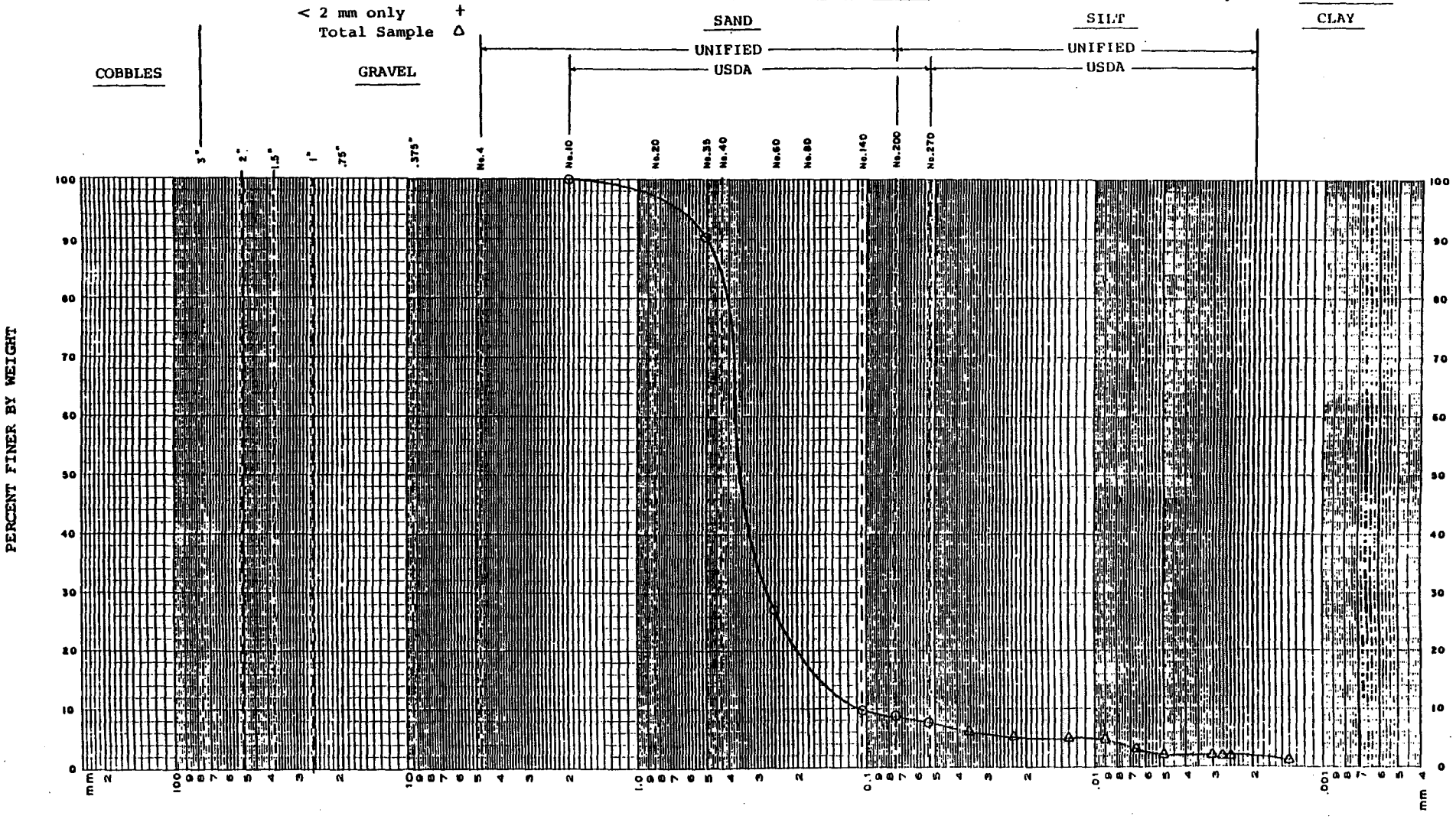
Soil Description SP-SM Tested By JEB

Maximum dry density lbs/cu. ft. 97.6 Liquid limit -- %

Optimum moisture 19.0 % Plasticity index -- %

GRAIN SIZE DISTRIBUTION

SIEVE o
HYDROMETER
< 2 mm only +
Total Sample Δ



11/81 Fairfax County Soil Survey

Project Cameron Run Flood Control Project

Location [illegible]

Sample No. 5 Boring No. ____ Depth ____

Date Tested 12/16/81

Soil Description SP-SM

Tested By JEB

Maximum dry density lbs/cu. ft. 101.8

Liquid limit -- %

Optimum moisture 17.5 %

Plasticity index -- %

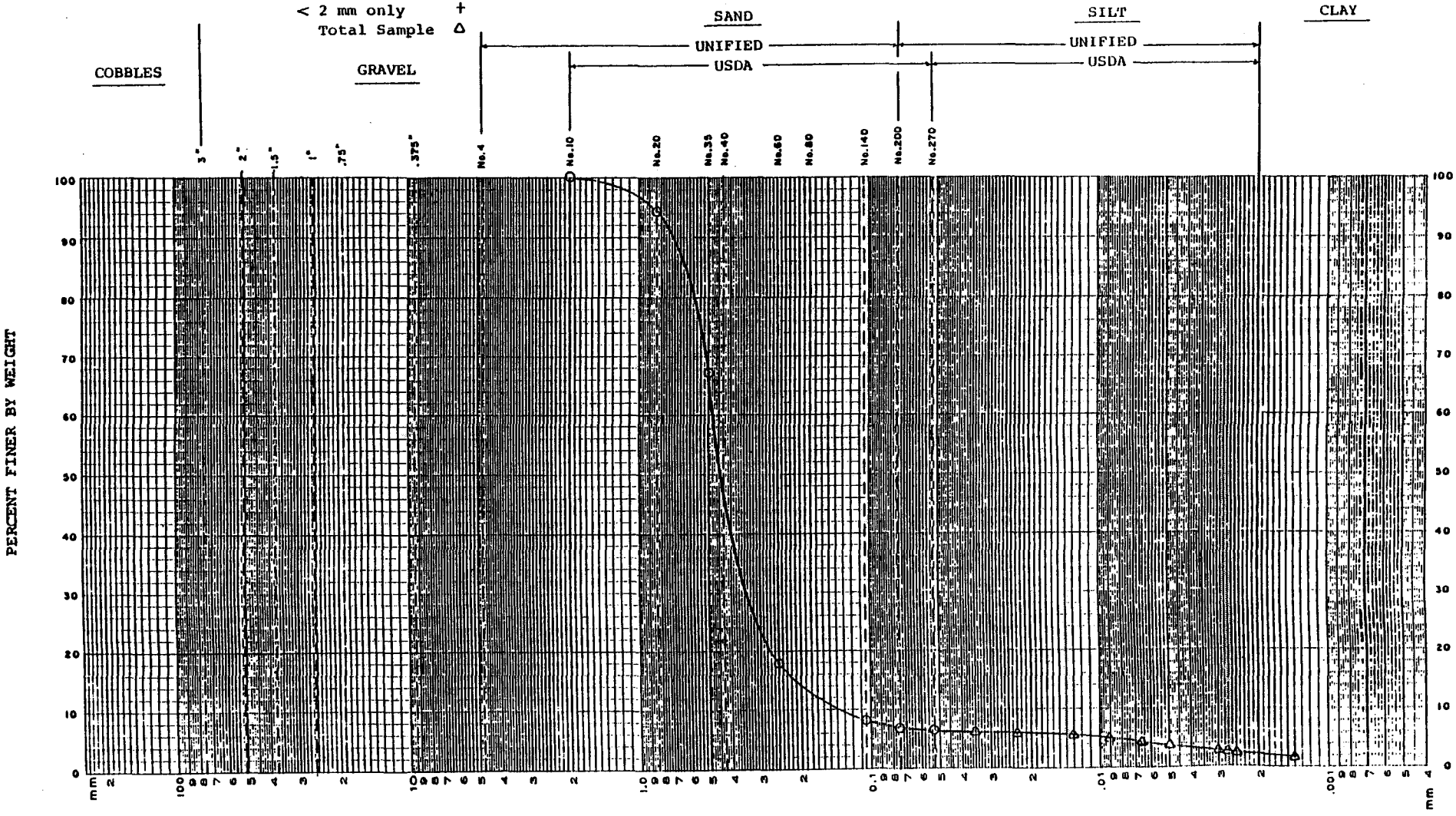
GRAIN SIZE DISTRIBUTION

SIEVE o

HYDROMETER

< 2 mm only +

Total Sample Δ



Project Cameron Run Flood Control Project

Sample No. 6 Boring No. ____ Depth ____ Date Tested 12/16/81

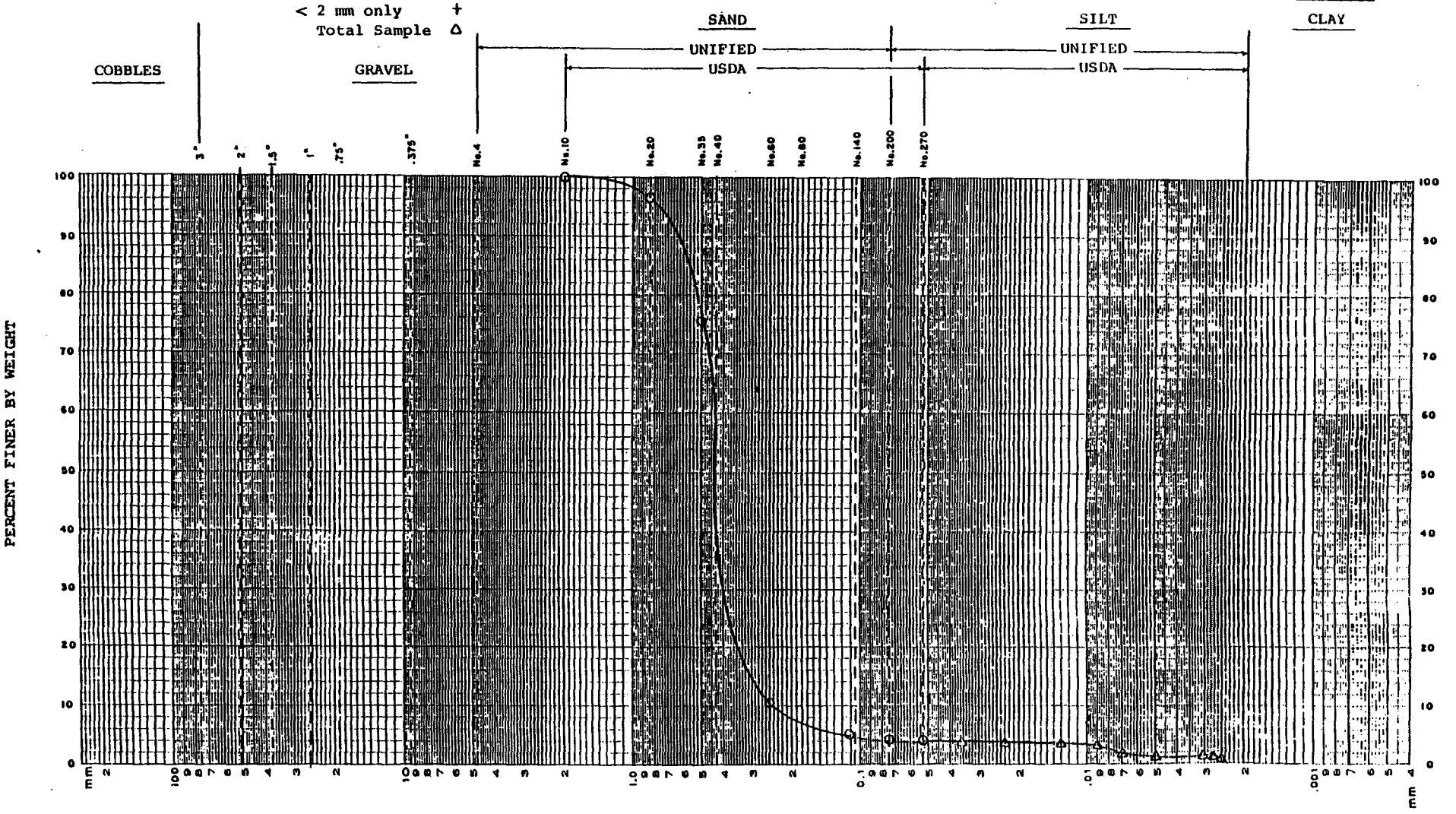
Soil Description SP Tested By JEB

Maximum dry density lbs/cu. ft. 97.2 Liquid limit -- %

Optimum moisture 17.4 % Plasticity index -- %

GRAIN SIZE DISTRIBUTION

SIEVE o
HYDROMETER
< 2 mm only +
Total Sample Δ



Project Cameron Run Flood Control Project

Sample No. 7 Boring No. _____ Depth _____ Date Tested 12/16/81

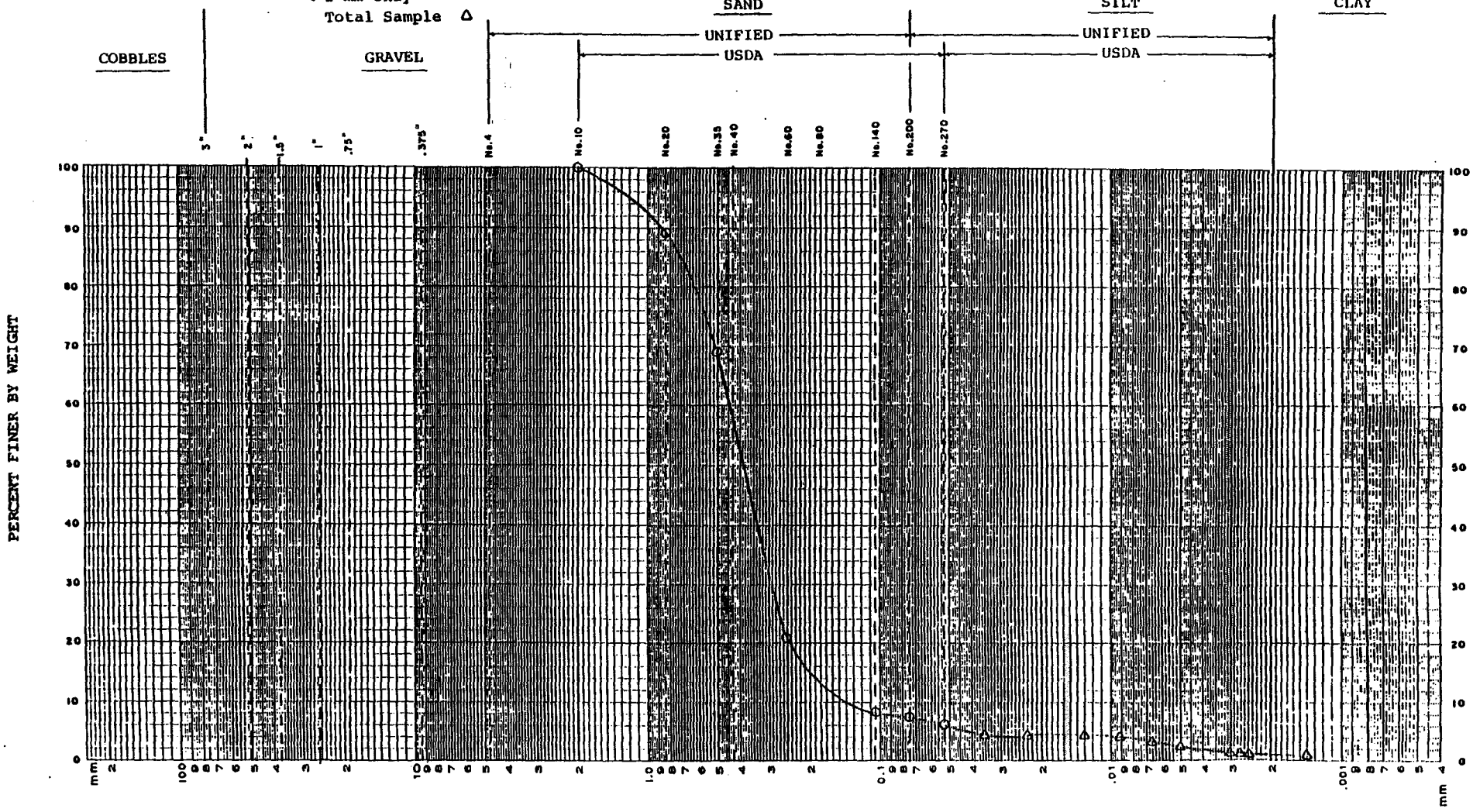
Soil Description SP-SM Tested By JEB

Maximum dry density lbs/cu. ft. 102.7 Liquid limit -- %

Optimum moisture 17.2 % Plasticity index -- %

GRAIN SIZE DISTRIBUTION

SIEVE o
HYDROMETER
< 2 mm only +
Total Sample Δ



Project Cameron Run Flood Control Project

Sample No. 8 Boring No. _____ Depth _____ Date Tested 12/16/81

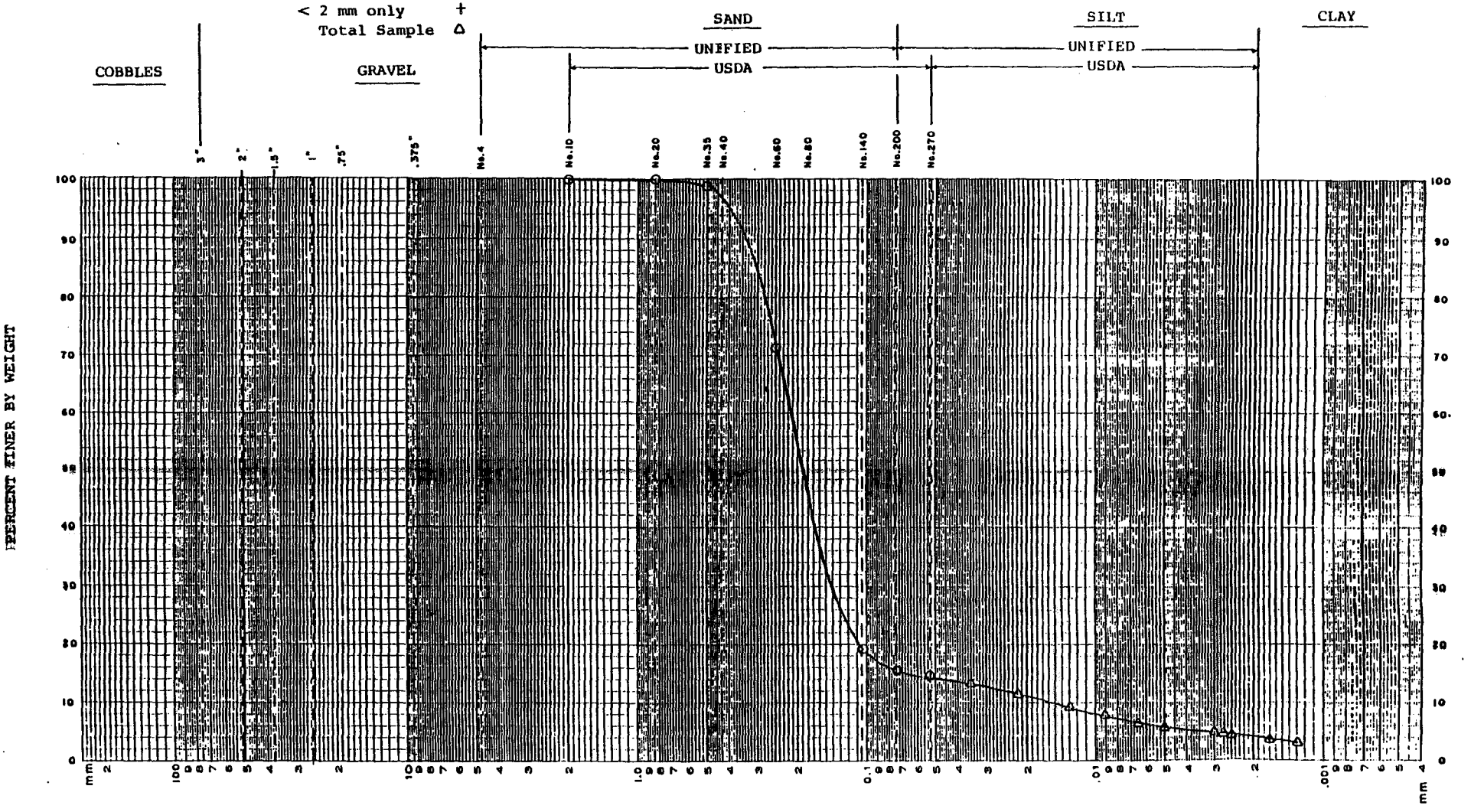
Soil Description A-24 (0) Tested By JEB

Maximum dry density lbs/cu. ft. 99.0 Liquid limit 16.1 %

Optimum moisture 18.1 % Plasticity index NP %

GRAIN SIZE DISTRIBUTION

SIEVE o
HYDROMETER
< 2 mm only +
Total Sample Δ



11, ... Fairf... ount... 1 S...

Pr... Ca... Ru... od C... 1 Pr...

Sample No. 9 Boring No. ____ Depth ____ Date Tested 12/16/81

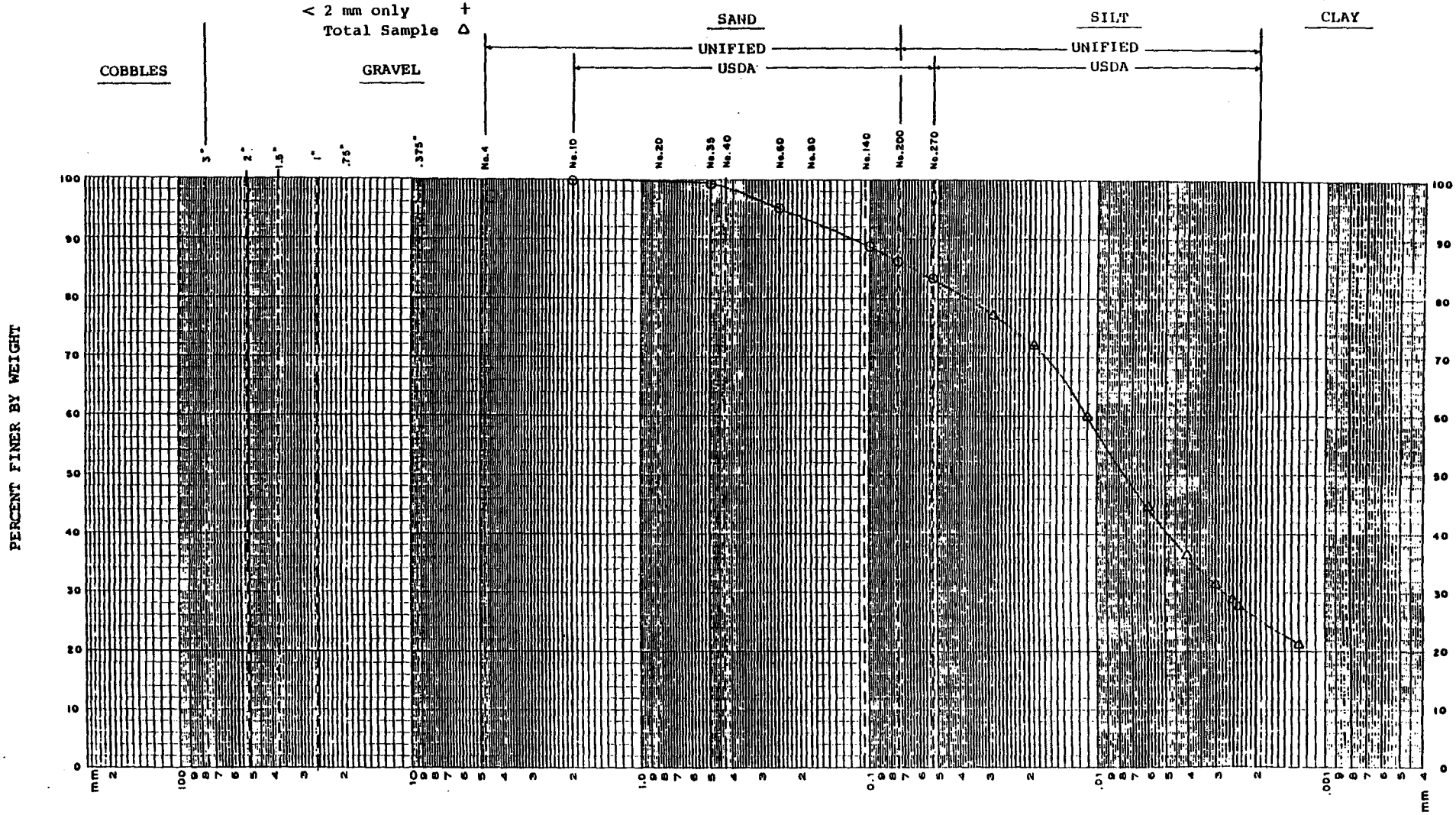
Soil Description A-6 (8) Tested By JEB

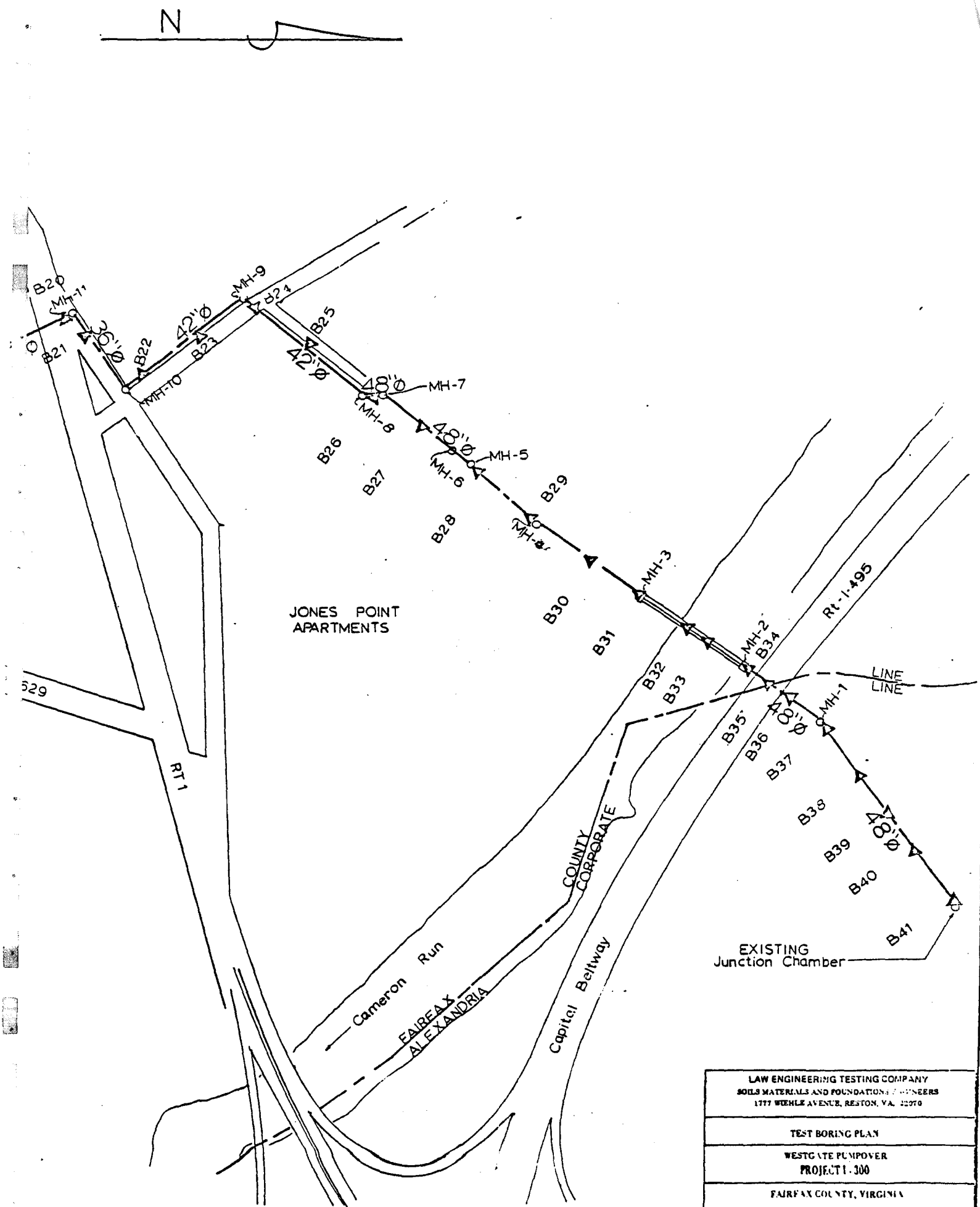
Maximum dry density lbs/cu. ft. 95.1 Liquid limit 38.5 %

Optimum moisture 23.0 % Plasticity index 10.6 %

GRAIN SIZE DISTRIBUTION

SIEVE o
HYDROMETER
< 2 mm only +
Total Sample Δ




N
B20
MH-11
B21
30"Ø
B22
42"Ø
B23
MH-10
MH-9
B24
B25
42"Ø
48"Ø
MH-7
MH-8
48"Ø
MH-5
MH-6
B26
B27
B28
B29
MH-4
MH-3
JONES POINT
APARTMENTS
B30
B31
B32
B33
MH-2
B34
Rt-1-495
LINE
LINE
MH-1
B35
B36
B37
B38
B39
B40
B41
EXISTING
Junction Chamber
529
RT 1
COUNTY
CORPORATE
Cameron Run
FAIRFAX
ALEXANDRIA
Capital Beltway
LAW ENGINEERING TESTING COMPANY
SOILS MATERIALS AND FOUNDATIONS ENGINEERS
1777 WIEHLE AVENUE, RESTON, VA. 22070
TEST BORING PLAN
WESTGATE PUMPOVER
PROJECT 1-300
FAIRFAX COUNTY, VIRGINIA
DRAWING NO. 2
JOB NO WS-2 206
DRAWN JPK
CHECKED REB
DATE May, 1972
SCALES
H 1" = 400'
V

TEST BORING RECORD

ELEV.	STRATUM DEPTH	VISUAL SOIL DESCRIPTION	D	SR	K	N or CR	S	REMARKS
	0.0							
	0.2	TOPSOIL						
		FILL, firm to very dense brown silty SAND with trace gravel & debris (SM)	2	12		13		1.0', 3-23-72, 9:00 A.M. 1.5', 3-24-72, 9:00 A.M. Casing Blows per foot of depth
5.0			6	14		21		1 1 2 4 3 20 4 29 5 32
-10.0			11	8		35		6 30 7 29 8 38 9 48 10 56
-15.0			16	5		79		11 33 12 40 13 41 14 37 15 43 16 57
	22.1		22	4		39		17 73
	22.5	Hard gray & brown silty CLAY (CL)						18 36
-20.0		Boring Terminated						19 48 Notes: Boring drilled with 4" casing Installed 20' of plastic tubing as observation well. Boring offset 23 feet southwest due to terrain

K - Soil Symbols

D - Sample Depths

N - Penetration in blows per foot (ASTM D-1586)

CR - % Core Recovery, NX or BX designates bit size (ASTM D-2113)

N or CR: 5, 18, 22, 70 NX, 100 BX

SR - Sample Spoon Recovery in inches: 18, 12, 14, 18

S - Symbols Described Below

- Undisturbed Sample (ASTM D-1587)
- Water Level, time of boring
- Water Level
- Loss of Water
- C Caved Depth of Boring

Page 1 of 1

BORING NUMBER: B-29

DATE DRILLED: 3-23-72

JOB NUMBER: WS-2-206

WESTGATE PUMPOVER
FAIRFAX COUNTY, VIRGINIA

LAW ENGINEERING TESTING COMPANY

TEST BORING RECORD

ELEV.	STRATUM DEPTH	VISUAL SOIL DESCRIPTION	D	SR	K	N or CR	S	REMARKS
15	0.0							
10			2	8		19		No topsoil-filled area
			6	6		8		
5.0		FILL, firm brown sandy, gravelly silty CLAY with debris (CL)						
			11	11		5		12.0' 3-30-72, 7:30 A.M.
0								12.5', 3-29-72, 9:00 A.M.
							C	13.1', 3-30-72, 7:30 A.M.
			16	8		3		
-5.0		18.3-19.0 Boulder						
	19.0							
		Soft dark gray fine sandy organic SILT (OL)	21	6		4		
-10.0								23.0'
				16				Push 24"
	25.0							25.0'
		Firm gray SAND & GRAVEL (SP)	26	16		22		
-15.0								Note: Boring offset 39' north due to possible 4" water line to bath house
	31.1		31	13		27		
-20.0		Very stiff red silty CLAY (CL)						
	33.0							
		Hard brown fine sandy silty CLAY (CL)	36	18		56		
	36.5							
-25.0		Boring Terminated						

K - Soil Symbols

D - Sample Depths

N - Penetration in blows per foot (ASTM D-1586)

CR - % Core Recovery, NX or BX designates bit size (ASTM D-2113)

N or CR: 5, 18, 22, 70 NX, 100 BX

SR - Sample Spoon Recovery in inches: 18, 12, 14, 18

S - Symbols Described Below

- Undisturbed Sample (ASTM D-1587)
- Water Level, time of boring
- Water Level
- Loss of Water
- C Caved Depth of Boring

Page 1 of 1

BORING NUMBER: B-30

DATE DRILLED: 3-28-72 to 3-29-72

JOB NUMBER: WS-2-206

WESTGATE PUMPOVER
FAIRFAX COUNTY, VIRGINIA

LAW ENGINEERING TESTING COMPANY

TEST BORING RECORD

ELEV.	STRATUM DEPTH	VISUAL SOIL DESCRIPTION	D	SR	K	N or CR	S	REMARKS
15.1	0.0							
		FILL-firm brown clayey SAND & GRAVEL with debris (SC)	2	12		23		Casing Blows per foot of depth
10.0			6	4		17		1 6 2 26 3 21 4 18
5.0							**	5 19 6 12
			11	3		13		7 13 8 17 9 20
	13.5							10 31
0		Soft dark gray organic SILT with trace fine sand, thin peat layers (OL)	16	6		4		11 61 12 18 13 23 14 14 15 12
-5.0								16 14 17 11 18 19
			23	18		2		19 14 20 15
-10.0			26	18		8		21 19 22 20 23 19 24 21 25 22
-15.0	30.2							26 33
		Very dense tan fine to coarse SAND & GRAVEL (SW)	31	4		77		27 27 28 37 24 60 30 94
-20.0								31 78 32 118
	36.6							33 96 34 100
-25.0		Hard to very hard brown and gray silty CLAY (CL)	39	15		100+	*	35 40 36 56
			41	18		31		37 64
-30.0		*** Installed 20' plastic tubing for observation well Boring plowed over, 4-10-72	47	18		40		* Redrove sampler @ 39' to obtain sample ** 10.1', 3-30-72, 7:30 AM Note: Boring drilled by driving a 4" diameter casing with 300 lb hammer dropped 18"
-35.0	50.5	Boring Terminated	50	18		54		

K - Soil Symbols

D - Sample Depths

N - Penetration in blows per foot (ASTM D-1586)

CR - % Core Recovery, NX or BX designates bit size (ASTM D-2113)

N or CR: 5, 18, 22, 70 NX, 100 BX

SR - Sample Spoon Recovery in inches: 18, 12, 14, 18

S - Symbols Described Below

- Undisturbed Sample (ASTM D-1587)
- Water Level, time of boring
- Water Level
- Loss of Water
- C Caved Depth of Boring

Page 1 of 1

BORING NUMBER: B-31

DATE DRILLED: 3-27-72 to 3-28-72

JOB NUMBER: WS-2-206

WESTGATE PUMPOVER
FAIRFAX COUNTY, VIRGINIA

LAW ENGINEERING TESTING COMPANY

TEST BORING RECORD

ELEV.	STRATUM DEPTH	VISUAL SOIL DESCRIPTION	D	SR	K	N or CR	S	REMARKS
	0.0							
	2.0	Very loose clean fine SAND (SP)	1					Elevation taken from bottom of cameron run
		Very soft dark gray organic SILT, trace fine sand (OL)		24			4.0' 6.0'	Push 24"
-10.0			7					
			10					
-15.0				24			14.0' 16.0'	Push 24"
-20.0			17					
	19.0	Very loose gray silty fine SAND (SM)	20			1		Casing Blows per foot of depth
-25.0	23.0	Firm gray slightly silty fine to coarse SAND & GRAVEL (SW)	25			20		
-30.0	29.0	Hard to very hard red, brown & green silty CLAY with trace fine sand (CL)	30			33		
-35.0			35			95		
-40.0			40			31		
-45.0			45			59		
	45.5	Boring Terminated						
-50.0								

Casing Blows per foot of depth

0-23	------ Hammer not dropped 18" due to soft material.
23	13
24	27
25	34
26	28
27	21
28	43
29	63
30	80
31	72

Note: Boring offset 5' east.

Boring drilled by by driving a 3½" casing with a 300 lb. hammer falling 18" and chopping and washing.

K - Soil Symbols

D - Sample Depths

N - Penetration in blows per foot (ASTM D-1586)

CR - % Core Recovery, NX or BX designates bit size (ASTM D-2113)

N or CR: 5, 18, 22, 70 NX, 100 BX

SR - Sample Spoon Recovery in inches: 18, 12, 14, 18

S - Symbols Described Below

- Undisturbed Sample (ASTM D-1587)
- Water Level, time of boring
- Water Level
- Loss of Water
- C Caved Depth of Boring

Page 1 of 1

BORING NUMBER: B-32

DATE DRILLED: 3-27-72 to 3-28-72

JOB NUMBER: WS-2-206

WESTGATE PUMPOVER
FAIRFAX COUNTY, VIRGINIA

LAW ENGINEERING TESTING COMPANY

TEST BORING RECORD

ELEV.	STRATUM DEPTH	VISUAL SOIL DESCRIPTION	D	SR	K	N or CR	S	REMARKS
	0.0							
	2.0	Very loose gray & brown slightly silty fine SAND with trace organics (SP)	1					Marine boring-elevation taken @ bottom of Cameron run
		Very soft dark gray organic SILT with fine sand seams						4.0
							☒	Push 24"
								6.0' No recovery
			7	24				
								9.0'
							☒	Push 24" *
								11.0'
			12	24				
	13.5							
-15.0		PEAT very soft black organic matter & silt (Pt)	15					Casing Blows per foot of depth
	18.5							0-23' hammer not dropped 18" due to soft material
-20.0		Very soft gray fine sandy SILT (MH)	20					23 14
								24 27
								25 24
	23.0							26 29
								27 21
-25.0		Firm gray SAND & GRAVEL (SW)	25			10		28 43
								29 63
								30 80
	28.5							31 72
-30.0		Hard red, brown & green silty CLAY with trace fine sand (CL)	30			35		Notes: Boring offset 5' south
-35.0			35			47		Boring drilled by driving a 3½" casing with a 300 lb hammer 18" and chopping and washing
-40.0			40			44		
								W=55.1%
								* γ=89.7%
								e =1.838
-45.0	45.5		45			47		
		Boring Terminated						
-50.0								

K - Soil Symbols

D - Sample Depths

N - Penetration in blows per foot (ASTM D-1586)

CR - % Core Recovery, NX or BX designates bit size (ASTM D-2113)

N or CR: 5, 18, 22, 70 NX, 100 BX

SR - Sample Spoon Recovery in inches: 18, 12, 14, 18

S - Symbols Described Below

- ☒ Undisturbed Sample (ASTM D-1587)
- Water Level, time of boring
- Water Level
- Loss of Water
- C Caved Depth of Boring

Page 1 of 1

BORING NUMBER: B-33

DATE DRILLED: 3-28-72

JOB NUMBER: WS-2-206

WESTGATE PUMPOVER
FAIRFAX COUNTY, VIRGINIA

LAW ENGINEERING TESTING COMPANY