ATTACHMENT A

SELECTED WASH PROBES, CORE BORINGS, AND LABORATORY REPORTS

Table 1 – Geologic Formations of Manatee County

System	Series	Formation	Characteristics	Thickness (feet)
Quaternary	Recent		Soil, muck, alluvium, sand.	0–20
	Pleistocene	Pamlico sand	Sand, shells, limestone.	0–20
		Older terrace deposits	Sand.	0–60
Tertiary	Pliocene	Caloosahatchee marl?	Marl, sand and gravel of quartz and phosphate, shells, bone fragments.	0–10
		Bone Valley formation	Sand and gravel of quartz and phosphate; clay, bone fragments.	0–30?
	Miocene	Hawthorn formation	Clay and marl, gray, greenish and bluish gray, sandy, phosphatic, calcareous, interbedded with sandy limestone, silt, sand, and shells. The sand, shell, and limestone beds are the source of small water supplies. The water in the Hawthorn formation is under artesian pressure and is generally less mineralized than the water in the Tampa and older formations.	150–260
		Tampa formation	Limestone, white, gray and tan, generally hard, dense, sandy, phosphatic in part, silicified in part, fossiliferous. Porosity due primarily to solution cavities. Yields large quantities of artesian water.	125–235
	Oligocene	Suwannee limestone	Limestone, creamy white and tan, soft to hard, granular, porous, crystalline, and dolomitic in part, very fossiliferous. Generally a more productive source of artesian water than the Tampa, but water is somewhat more mineralized in the western part of the county.	150–300
	Eocene	Ocala group	Limestone, white, cream, tan, chalky, soft, granular, porous, coquinoid in part, with some hard, dense layers and some thick beds of brown, crystalline dolomite. Probably a productive source of artesian water but penetrated by only a few wells. Water is relatively high in mineral content in the coastal area.	300–325
		Avon Park limestone	Limestone, cream, tan, and brown, soft to hard, granular and coquinoid in part, crystalline and dolomitic in part, very porous. Probably a very productive source of water, but tapped by very few wells. Water is probably high in mineral content in the coastal area.	700
		Lake City limestone	Limestone, cream and tan, chalky to granular, dolomitic and gypsiferous in part, and very fossiliferous in part.	500
		Oldsmar limestone	Limestone, tan and brown, granular, porous; interbedded with chert, anhydrite, and tan to brown, crystalline, porous, dolomite.	950
	Paleocene	Cedar Keys formation	Limestone, cream to tan, fairly hard, granular, gypsiferous, interbedded with tan to brown, crystalline dolomite, fossiliferous in part.	2,000
Cretaceous	Gulf		Limestone, shale, anhydrite	

WASH PROBES

WIDENER CORE BORINGS

CB-MAN-4
CB-MAN-5
CB-MAN-6
CB-MAN-7
CB-MAN-8
CB-MAN-9
CB-MAN-10
CB-MAN-11

TURNING BASIN CORE BORINGS

CB-MTH97-8
CB-MTH97-8
CB-MTH97-9
CB-MTH97-10
CB-MTH97-11
CB-MAN-88-1
CB-MAN-88-2
CB-MAN-88-3
CB-MAN-90-1
CB-MAN-90-2
CB-MAN-90-3
CB-MTH91-1
CB-MTH91-2
CB-MTH00-1
CB-MTH00-2
CB-MTH00-3
CB-MTH00-4
CB-MTH00-5

LABORATORY ANALYSIS

CB-MTH00-1
CB-MTH00-2
CB-MTH00-3
CB-MTH00-4
CB-MTH00-5

WASH PROBES

WASH PROBES
MANATEE HARBOR
JUNE 2000

Probe No.	X	Y	Tide Stage	Bottom Elevation	Refusal Elevation
WP-MAN00-1*	304,286	1,207,682	+0.7	-25.8	-39.3
WP-MAN00-2*	305,133	1,207,974	+0.8	-21.8	-38.8
WP-MAN00-3	316,578	1,201,708	+1.3	-4.4	-12.8
WP-MAN00-4	317,031	1,201,672	+1.4	-3.4	-9.9
WP-MAN00-5	315,849	1,201,514	+1.0	-5.8	-8.7
WP-MAN00-6	316,440	1,201,472	+1.3	-4.7	-11.5
WP-MAN00-7	317,181	1,201,483	+0.7	-3.9	-7.9
WP-MAN00-8	316,357	1,201,260	+1.2	-4.8	-9.3
WP-MAN00-9	316,749	1,201,319	+1.5	-4.4	-8.6
WP-MAN00-10	317,102	1,201,205	+1.6	-3.5	-7.5
WP-MAN00-11	317,348	1,201,135	+0.6	-2.9	-9.6
WP-MAN00-12	316,909	1,200,918	+1.5	-3.6	-11.9
WP-MAN00-13	317,369	1,200,840	+0.4	-2.9	-5.8
WP-MAN00-14	317,090	1,198,638	+1.8	-1.7	-5.3
WP-MAN00-15	317,360	1,198,470	+1.8	-0.5	-3.6
WP-MAN00-16	317,255	1,198,318	+1.8	-1.0	-3.3
WP-MAN00-17	317,365	1,198,191	N/A	+7.1	-4.0
WP-MAN00-18	317,270	1,198,031	N/A	+7.4	-5.4
WP-MAN00-19	317,386	1,197,906	N/A	+10.7	-3.9
WP-MAN00-20	317,274	1,197,749	N/A	+6.3	-3.8
WP-MAN00-21	317,255	1,197,575	N/A	+6.4	-2.7

* Denotes wash probe taken in entrance channel widener

WIDENER CORE BORINGS

Hole No. CB-MAN—4

DRILLING LOG

DIVISION: South Atlantic

INSTALLATION: Jacksonville District

SHEET 1 OF 1 SHEETS

1. PROJECT: Manatee Harbor
2. LOCATION (Coordinates or Station): X = 306,741 Y = 1,208,576
3. DRILLING AGENCY: US Army Corps of Engineers
4. HOLE NO. (As shown on drawing title and file number): CB-MAN-4
5. NAME OF DRILLER: J. Horsley
6. DIRECTION OF HOLE: [X] VERTICAL [ ] INCLINED _____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN
8. DEPTH DRILLED INTO ROCK
9. TOTAL DEPTH OF HOLE: 25.0'
10. SIZE AND TYPE OF BIT: See Remarks
11. DATUM FOR ELEVATION SHOWN (TBM or MSL): MLW
12. MANUFACTURER'S DESIGNATION OF DRILL: Failing 1500
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED _____ UNDISTURBED _____
14. TOTAL NUMBER CORE BOXES: 1
15. ELEVATION GROUND WATER
16. DATE HOLE: STARTED 1/23/90 COMPLETED 1/23/90
17. ELEVATION TOP OF HOLE: -24.7
18. TOTAL CORE RECOVERY FOR BORING: 45 %
19. SIGNATURE OF INSPECTOR: Geologist, J. Gentile

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
-24.7	0.0					Bit or Barrel -24.7 Blows/Ft
-28.2	3.5		SAND, fine quartz, little clay, shelly, gray (SC)	66	1	2" Sampler 1 2 3 8 9 -29.7
-36.7	12.0		SAND, fine to medium, quartz, trace clay, some shell, gray (SP)	46	2	" 9 11 15 19 -34.7
-39.7	15.0		Fine quartz, clean from -36.7 to -39.7 Fine to medium quartz, trace clay, tan, isolated seams clay, trace shell from -39.7 to -44.7	40	3 4	" 5 6 7 16 -39.7
-44.7	20.0			34	5	" 5 10 17 17 21 -44.7
-49.7	25.0		SAND, fine to medium, quartz, dark brown, organic stain, some clay, (SC), seams shelly gray sand from -47.7 to -49.7	40	6	" 5 7 2 5 8 -49.7

Soils are field visually classified in accordance with the Unified Soils Classification System.

SAMPLE ELEVATION	LABORATORY ANALYSIS
-36.7 to -39.7	(SP)*
-44.7 to -49.7	(SP-SM)*

NOTE: *Visual Classification based on grain size curve. No Atterberg Limits.

300# hammer with 18" drop used on 2" sampler

Hole No. CB-MAN-5

DRILLING LOG | DIVISION: South Atlantic | INSTALLATION: Jacksonville District | SHEET 1 OF 1 SHEETS

1. PROJECT: Manatee Harbor
2. LOCATION (Coordinates or Stations): X = 306,363 Y = 1,208,973
3. DRILLING AGENCY: US Army Corps of Engineers
4. HOLE NO. (As shown on drawing title and file number): CB-MAN-5
5. NAME OF DRILLER: J. Horsley
6. DIRECTION OF HOLE: ☒ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN
8. DEPTH DRILLED INTO ROCK
9. TOTAL DEPTH OF HOLE: 25.0'
10. SIZE AND TYPE OF BIT: See Remarks
11. DATUM FOR ELEVATION SHOWN (TBM or MSL): MLW
12. MANUFACTURER'S DESIGNATION OF DRILL: Failing 1500
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED _____ UNDISTURBED _____
14. TOTAL NUMBER CORE BOXES: 1
15. ELEVATION GROUND WATER: Tidal
16. DATE HOLE: STARTED 1/23/90 COMPLETED 1/23/90
17. ELEVATION TOP OF HOLE: -24.2
18. TOTAL CORE RECOVERY FOR BORING: 53 %
19. SIGNATURE OF INSPECTOR: Geologist, J. Gentile

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g	Blows/Ft
-24.2	0.0					Bit or Barrel	
						-24.2	
			SAND, fine quartz, little clay, shelly, gray (SC)	62	1	2" Sampler	1 4 3 2 3
				68	2	"	5 9 12 15
-34.2	10.0					-34.2	8
-36.2	12.0		Very shelly, light gray from -34.2 to -36.2	54	3	"	3 5 4 5 7
-39.2	15.0					-39.2	
			SAND, fine to medium, quartz, clean, tan (SP)	60	5	"	3 4 6 10 22
				20	6	"	6 6 17 11 17
-49.2	25.0					-49.2	

Soils are field visually classified in accordance with the Unified Soils Classification System.

SAMPLE ELEVATION	LABORATORY ANALYSIS
-29.2 to -34.2	(SP-SM)*
-39.2 to -44.2	(SP-SM)*

NOTE:
*Visual Classification based on grain size curve. No Atterberg Limits.

300# hammer with 18" drop used on 2" sampler

Hole No. CB-MAN-6

DRILLING LOG

DIVISION: South Atlantic

INSTALLATION: Jacksonville District

SHEET 1 OF 1 SHEETS

1. PROJECT: Manatee Harbor
2. LOCATION (Coordinates or Station): x = 306,038 y = 1,209,326
3. DRILLING AGENCY: US Army Corps of Engineers
4. HOLE NO. (As shown on drawing title and file number): CB-MAN-6
5. NAME OF DRILLER: J. Horsley
6. DIRECTION OF HOLE: ☒ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN:
8. DEPTH DRILLED INTO ROCK:
9. TOTAL DEPTH OF HOLE: 25.0'
10. SIZE AND TYPE OF BIT: See Remarks
11. DATUM FOR ELEVATION SHOWN (TBM or MSL): MLW
12. MANUFACTURER'S DESIGNATION OF DRILL: Failing 1500
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED: UNDISTUR BED:
14. TOTAL NUMBER CORE BOXES: 1
15. ELEVATION GROUND WATER: Tidal
16. DATE HOLE: STARTED 1/24/90 COMPLETED 1/24/90
17. ELEVATION TOP OF HOLE: Tidal
18. TOTAL CORE RECOVERY FOR BORING: 39 %
19. SIGNATURE OF INSPECTOR: Geologist, J. Gentile

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
						Bit or Barrel
-24.5	0.0					-24.5 Blows/Ft
			SAND, fine to medium, quartz, trace silt, shelly, gray (SP)	58	1	2" Sampler 2 4 4 2 3 = 5
				24	2	" 6 8 11 19
-34.5	10.0		Trace shell, some seams gray clay and clayey sand from -34.5 to -46.5			-34.5
				34	3	" 5 11 11 13 = 35
				44	4	" 9 9 10 12 11 = 30
-46.5	22.0		CLAY, organic, dark brown-gray, slight plastic, silty (OH)	34	5	" 5 6 2 2 2 = 21
-49.5	25.0				6	-49.5

Soils are field visually classified in accordance with the Unified Soils Classification System

Sample Elevation	Laboratory Analysis
-24.5 to -29.5	(SP-SM)*
-39.5 to -44.5	(SP-SM)*

NOTE:
*Visual Classification based on grain size curve. No Atterberg Limits.

300# hammer with 18" drop used on 2" sampler

Hole No. CB-MAN-7

DRILLING LOG

DIVISION: South Atlantic

INSTALLATION: Jacksonville District

SHEET 1 OF 1 SHEETS

1. PROJECT: Manatee Harbor

2. LOCATION (Coordinates or Station): X = 306,346 Y = 1,208,092

3. DRILLING AGENCY: US Army Corps of Engineers

4. HOLE NO. (As shown on drawing title and file number): CB-MAN-7

5. NAME OF DRILLER: J. Horsley

6. DIRECTION OF HOLE: [X] VERTICAL [ ] INCLINED _____ DEG. FROM VERT.

7. THICKNESS OF OVERBURDEN

8. DEPTH DRILLED INTO ROCK

9. TOTAL DEPTH OF HOLE: 25.0'

10. SIZE AND TYPE OF BIT: See remarks

11. DATUM FOR ELEVATION SHOWN (TOP OF HOLE): MLW

12. MANUFACTURER'S DESIGNATION OF DRILL: Failing 1500

13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED: UNDISTURBED:

14. TOTAL NUMBER CORE BOXES: 1

15. ELEVATION GROUND WATER: Tidal

16. DATE HOLE: STARTED 1/24/90 COMPLETED 1/24/90

17. ELEVATION TOP OF HOLE: -27.6

18. TOTAL CORE RECOVERY FOR BORING: 48 %

19. SIGNATURE OF INSPECTOR: Geologist, J. Gentile

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g	Blows/Ft
						Bit or Barrel	
-27.6	0.0					-27.6	
			SAND, fine to medium, quartz, shelly, trace clay and silt, gray (SP)	46	1	2" Sampler	settled
-31.6	4.0						settled
							2
			SAND, fine quartz, shelly, gray, little clay, trace of silt (SC)				2
-35.1	7.5				2	"	1
				64			1
			SAND, fine to medium, quartz, clean, white (SP)				3
					3		9
							15
				40	4	"	11
							27
							30
							51
							58
				20	5	"	34
							32
							21
							11
-49.6	22.0						14
					6		5
			SAND, fine to medium, quartz, little clay, organic stain, dark brown, (SC) light gray, shelly from -51.6 to -52.6	72		"	7
							4
-52.6	25.0				7		3
						-52.6	8

Soils are field visually classified in accordance with the Unified Soils Classification System.

SAMPLE ELEVATION	LABORATORY ANALYSIS
-32.6 to -35.1	(SP-SM)*
-37.6 to -42.6	(SP-SM)*
-49.6 to -52.6	(SP-SM)*

NOTE: *Visual Classification based on grain size curve. No Atterberg Limits.

300# hammer with 18" drop used on 2" sampler

Hole No. CB-MAN-8

DRILLING LOG

DIVISION	South Atlantic
INSTALLATION	Jacksonville District
SHEET	1 OF 1 SHEETS
1. PROJECT	Manatee Harbor
2. LOCATION (Coordinates or Station)	x = 305,709 y = 1,208,596
3. DRILLING AGENCY	US Army Corps of Engineers
4. HOLE NO. (As shown on drawing title and file number)	CB-MAN-8
5. NAME OF DRILLER	J. Horsley
6. DIRECTION OF HOLE	XX VERTICAL ☐ INCLINED _____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN	
8. DEPTH DRILLED INTO ROCK	
9. TOTAL DEPTH OF HOLE	25.0'
10. SIZE AND TYPE OF BIT	See Remarks
11. DATUM FOR ELEVATION SHOWN (TBM or MSL)	MLW
12. MANUFACTURER'S DESIGNATION OF DRILL	Failing 1500
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN	DISTURBED: UNDISTURBED:
14. TOTAL NUMBER CORE BOXES	1
15. ELEVATION GROUND WATER	Tidal
16. DATE HOLE	STARTED 1/22/90 COMPLETED 1/22/90
17. ELEVATION TOP OF HOLE	-23.7
18. TOTAL CORE RECOVERY FOR BORING	68 %
19. SIGNATURE OF INSPECTOR	Geologist, J. Gentile

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
-23.7	0.0					Bit or Barrel -23.7 Blows/Ft
-27.7	4.0		SAND, fine to medium, quartz, trace to little silt, little shell, light gray (SP)	20	1	2" sampler 1 5 7 7 -28.7 5
-33.7	10.0		SAND, fine quartz, very shelly, little clay, gray (SC)	92	2	3 3 6 9 -33.7 11
-41.7	18.0		Very fine quartz, trace to little shell, light gray from -33.7 to -38.7 Tan, slight organic stain, little clay, trace shell from -38.7 to -41.7	80	3	2 2 1 6 -38.7 6
-48.7	25.0		SAND, fine quartz, clean, slight organic stain, tan (SP)	86	4	5 7 9 12 -43.7 14
				62	5	5 8 12 10 -48.7 11

Soils are field visually classified in accordance with the Unified Soils Classification System.

SAMPLE ELEVATION	LABORATORY ANALYSIS
-33.7 to -38.7	(SM)*
-43.7 to -48.7	(SP-SM)*

NOTE: *Visual Classification based on grain size curve. No Atterberg Limits.

300# hammer with 18" drop used on 2" sampler

Hole No. CB-MAN-9

DRILLING LOG

1. PROJECT	Manatee Harbor
2. LOCATION (Coordinates or Station)	X = 305,678 Y = 1,208,328
3. DRILLING AGENCY	US Army Corps of Engineers
4. HOLE NO. (As shown on drawing title and title number)	CB-MAN-9
5. NAME OF DRILLER	J. Horsley
6. DIRECTION OF HOLE	☒ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN	
8. DEPTH DRILLED INTO ROCK	
9. TOTAL DEPTH OF HOLE	29.0'
DIVISION	South Atlantic
INSTALLATION	Jacksonville District
SHEET	1 OF 1 SHEETS
10. SIZE AND TYPE OF BIT	See Remarks
11. DATUM FOR ELEVATION SHOWN (MSL or MLW)	MLW
12. MANUFACTURER'S DESIGNATION OF DRILL	Failing 1500
12. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN	DISTURBED: ____ UNDISTURBED: ____
14. TOTAL NUMBER CORE BOXES	1
15. ELEVATION GROUND WATER	Tidal
16. DATE HOLE	STARTED: ____ COMPLETED: ____
17. ELEVATION TOP OF HOLE	-21.6
18. TOTAL CORE RECOVERY FOR BORING	30 %
19. SIGNATURE OF INSPECTOR	Geologist, J. Gentile

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g	Blows/Ft
-21.6	0.0					Bit or Barrel	
						-21.6	
			SAND, fine to medium, quartz, little clay, some shell, gray (SC)	58	1	2" sampler	1 1 1 5 5
						-26.6	
				20	2	"	7 7 8 7
						-31.6	6
-36.6	15.0			22	3	"	3 3 2 3
			Fine quartz, trace shell, little clay, light gray from -36.6 to -39.6			-36.6	2
-39.6	18.0		SAND, fine to medium, quartz clean, tan (SP)	34	4	"	5 5 8 13
						-41.6	17
				26	5	"	5 4 4 7
						-46.6	13
-50.6	29.0			20	6	"	5 8 13
						-50.6	17

Soils are field visually classified in accordance with the Unified Soils Classification System.

SAMPLE ELEVATION	LABORATORY ANALYSIS
-41.6 to -46.6	(SP-SM)*

NOTE:
*Visual Classification based on grain size curve. No Atterberg Limits.

300# hammer with 18" drop used on 2" sampler

Hole No. CB-MAN-10

DRILLING LOG	DIVISION: South Atlantic	INSTALLATION: Jacksonville District	SHEET 1 OF 1 SHEETS

1. PROJECT	Manatee Harbor
2. LOCATION (Coordinates or Station)	x = 305,014 y = 1,208,511
3. DRILLING AGENCY	US Army Corps of Engineers
4. HOLE NO. (As shown on drawing title and file number)	CB-MAN-10
5. NAME OF DRILLER	J. Horsley
6. DIRECTION OF HOLE	[X] VERTICAL [ ] INCLINED _____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN	
8. DEPTH DRILLED INTO ROCK	
9. TOTAL DEPTH OF HOLE	25.0'
10. SIZE AND TYPE OF BIT	See Remarks
11. DATUM FOR ELEVATION SHOWN (TBM or MSL)	MLW
12. MANUFACTURER'S DESIGNATION OF DRILL	Failing 1500
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN	DISTURBED: UNDISTURBED:
14. TOTAL NUMBER CORE BOXES	1
15. ELEVATION GROUND WATER	Tidal
16. DATE HOLE	STARTED: 1/19/90 COMPLETED: 1/19/90
17. ELEVATION TOP OF HOLE	-25.5
18. TOTAL CORE RECOVERY FOR BORING	35 %
19. SIGNATURE OF INSPECTOR	Geologist, Joe Gentile

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX OR SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
						Bit or Barrel
-25.5	0.0					-25.5 Blows/Ft
			SAND, fine to medium, quartz, little clay, little shell, gray (SC)	42	1	2" Sampler 2 2 2 2 6
						-30.5
				48	2	" 3 6 8 8 9
-35.5	10.0		Fine quartz, trace shell, little clay, light gray, from -35.5 to -39.5			-35.5
				48	3	" 2 2 2 4 10
-39.5	14.0		SAND, fine to medium, quartz, clean, tan (SP)			-40.5
				38	4	" washed 1 2 14 26
						-45.5
				No Rec		" 12 25 33 42 41
-50.5	25.0					-50.5

Soils are field visually classified in accordance with the Unified Soils Classification System.

SAMPLE ELEVATION	LABORATORY ANALYSIS
-25.5 to -30.5	(SP-SM)*
-35.5 to -39.5	(SP-SM)*

NOTE:
*Visual Classification based on grain size curve. No Atterberg Limits.

300# hammer with 18" drop used on 2" sampler

Hole No. CB-MAN-11

DRILLING LOG	DIVISION: South Atlantic	INSTALLATION: Jacksonville District	SHEET 1 OF 1 SHEETS
1. PROJECT: Manatee Harbor		10. SIZE AND TYPE OF BIT: see remarks	
2. LOCATION (Coordinates or Station): x = 304,423 y = 1,208,157		11. DATUM FOR ELEVATION SHOWN (MSL or MLW): MLW	
3. DRILLING AGENCY: US Army Corps of Engineers		12. MANUFACTURER'S DESIGNATION OF DRILL: Failing 1500	
4. HOLE NO. (As shown on drawing title and file number): CB-MAN-11		13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED / UNDISTURBED	
5. NAME OF DRILLER: J. Horsley		14. TOTAL NUMBER CORE BOXES: 1	
6. DIRECTION OF HOLE: ☒ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.		15. ELEVATION GROUND WATER: Tidal	
7. THICKNESS OF OVERBURDEN		16. DATE HOLE: STARTED 1/25/90 COMPLETED 1/25/90	
8. DEPTH DRILLED INTO ROCK		17. ELEVATION TOP OF HOLE: -25.4	
9. TOTAL DEPTH OF HOLE: 25.0'		18. TOTAL CORE RECOVERY FOR BORING: 57	
		19. SIGNATURE OF INSPECTOR: Geologist, Joe Gentile	

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g	Blows /Ft
-25.4	0.0					Bit or Barrel	
						-25.4	
-28.4	3.0		SAND, fine to medium, quartz, trace clay, gray, shelly (SP)	38	1	2" Sampler	4 5 6 3 8
-35.4	8.0		SAND, fine to medium, quartz, little clay, shelly, gray (SC)	86	2	"	13 15 14
					3		32 24
-40.4	15.0		SAND, fine to medium, quartz, trace clay, little to some shell, gray (SP)	82	4	"	5 6 8 4 5
			fine to medium quartz, clean white from -40.4 to -44.4	44	5	"	2 6 11 16 31
-50.4	25.0		tan, clean from -44.4 to -50.4	34	6	"	20 27 35 32 27

SOILS ARE FIELD VISUALLY CLASSIFIED IN ACCORDANCE WITH THE UNIFIED SOILS CLASSIFICATION SYSTEM.

SAMPLE ELEVATION	LABORATORY ANALYSIS
-25.4 to -28.4	(SP-SM)*
-30.4 to -33.4	(SP)*
-35.4 to -40.4	(SP-SM)*

NOTE: *Visual Classification based on grain size curve. No Atterberg Limits.

300 # hammer with 18" drop used on 2" sampler

TURNING BASIN CORE BORINGS

Hole No. CB-MTH88-1

DRILLING LOG	DIVISION: South Atlantic	INSTALLATION: Jacksonville District	SHEET 1 OF 2 SHEETS
1. PROJECT: Manatee Harbor		10. SIZE AND TYPE OF BIT: See remarks	
2. LOCATION (Coordinates or Station): x=316,340 y=1,200,400		11. DATUM FOR ELEVATION SHOWN (MSL or MLW): MLW	
3. DRILLING AGENCY: Corps of Engineers		12. MANUFACTURER'S DESIGNATION OF DRILL: Failings 1500	
4. HOLE NO. (As shown on drawing title and file number): CB-MTH88-1		13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED / UNDISTURBED	
5. NAME OF DRILLER: R. Gordon		14. TOTAL NUMBER CORE BOXES: 1	
6. DIRECTION OF HOLE: ☒ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.		15. ELEVATION GROUND WATER: Tidal	
7. THICKNESS OF OVERBURDEN		16. DATE HOLE: STARTED 10 Aug 1988 / COMPLETED 10 Aug 1988	
8. DEPTH DRILLED INTO ROCK		17. ELEVATION TOP OF HOLE: -3.2	
9. TOTAL DEPTH OF HOLE: 39.2'		18. TOTAL CORE RECOVERY FOR BORING: 70 %	
		19. GEOLOGIST: J. Hand	

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
-3.2	0.0					Bit or Barrel
						-3.2 Blows/0.5Ft
-5.5	2.3		Sand, fine quartz, some fine shell, gray (SP) trace of silt, gravel and larger pieces of hard quartz sandstone from -4.7 to -5.5	30	1	Split Spoon 7 3 3
						-4.7
				50	2	Split Spoon 8 15
-8.1	4.9		Sandstone, hard, quartz, brown			-5.7
				0		4x5½ Diamond DT 37 min HP 50-75 psi
			Sand, fine, some silt, calcareous, layers, nodules and masses of very hard siltstone and hard sandstone gray and brown (SP-SM)			-10.7
				80	3	Split Spoon 19 14 22
						-12.2
				93	4	Split Spoon 17 16 12
-14.7	11.5					-13.7
				85	5	Split Spoon 6
			Sandstone, hard, silty, calcareous, some phosphate and a trace of quartz, gray nodules, layers and masses of very hard brown and gray siltstone.		6	17 30
						-14.9
				55		4x5½ Diamond DT 58 min HP 60-100 psi
						-19.9

Soils have been field visually classified in accordance with the Unified Soils Classification System.

Sample Elevation	Laboratory Classification
-3.2 to -4.7	(SP) *
-10.7 to -12.2	(SM) *

NOTE:
* Visual classification based on gradation curve. No Atterberg limits

140# hammer with 30" drop used on 2.0' split spoon (1 3/8" ID x 2" OD)

ENG FORM

DRILLING LOG (Cont Sheet) | ELEVATION TOP OF HOLE -3.2 | Hole No. CB-MTH88-1

PROJECT Manatee Harbor | INSTALLATION Jacksonville District | SHEET 2 OF 2 SHEETS

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant:) g
						Bit or Barrel -19.9
-20.9	17.7					
-26.1	22.9		Siltstone, soft, gray-green, layers and/or areas of silt, some semi-indurated silt	85		4x5½ Diamond DT 36 min HP 25-100 psi -24.9
-32.0	28.8		Sandstone, hard, phosphate, calcareous matrix, light gray, a few fossils and cavities	95		4x5½ Diamond DT 31 min HP 25-125 psi -29.9
-34.5	31.3		Soft, semi-indurated, from -32.0 to -34.9	98		4x5½ Diamond DT 22 Min HP 75-100 psi -34.9
-42.4	39.2		Sandstone, hard, calcareous, some phosphate, slightly fossiliferous, porous, permeable, some voids silt filled, gray Conglomeratic -34.5 to -37.5 -36.7 to -43.1 silty , area of (SM) and soft sandstone	55		4x5½ Diamond DT 24 min HP 75-125 psi -39.9
				100		4x5½ Diamond DT 20 min HP 100 psi -42.4

ENG FORM [illegible] (ER 1110-1-1801) | PROJECT | HOLE NO.

Hole No. CB-MTH88-2

DRILLING LOG | DIVISION: South Atlantic | INSTALLATION: Jacksonville District | SHEET 1 OF 1 SHEETS

1. PROJECT: Manatee Harbor	10. SIZE AND TYPE OF BIT: see remarks
2. LOCATION (Coordinates or Station): x=316,830 y=1,200,080	11. DATUM FOR ELEVATION SHOWN (MSL or MLW): MLW
3. DRILLING AGENCY: Corps of Engineers	12. MANUFACTURER'S DESIGNATION OF DRILL: Failing 1500
4. HOLE NO. (As shown on drawing title and file number): CB-MTH88-2	13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN: DISTURBED / UNDISTURBED
5. NAME OF DRILLER: R. Gordon	14. TOTAL NUMBER CORE BOXES: 1
6. DIRECTION OF HOLE: ☒ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	15. ELEVATION GROUND WATER: Tidal
7. THICKNESS OF OVERBURDEN	16. DATE HOLE: STARTED 15 August 88 / COMPLETED 15 August 88
8. DEPTH DRILLED INTO ROCK	17. ELEVATION TOP OF HOLE: -27.4
9. TOTAL DEPTH OF HOLE: 16.5'	18. TOTAL CORE RECOVERY FOR BORING
	19. SIGNATURE OF INSPECTOR: GEOLOGIST - J. Hand

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
-27.4	0.0					Bit or Barrel
						-27.4 Blows/0.5 Ft
-29.4	2.0		Silt, sandy, hard gravel size rock fragments, malodorous, gray (ML)	40	1	Split Spoon settled
						-29.4
			Sand, very fine, silty, hard gravel size rock fragments, gray (SM)	33	2	" settled
						-32.4
				15	3	" 2
					4	3
						-33.9 1
-35.4	8.0			50	5	" 3
						2
						-35.9 1 settled
			SAND, medium, shell, rock fragments, some phosphate, a little silt, (SP-SM) gray	40	6	" settled
						-39.4
-40.0	13.0			75	7	" 4
					8	1
						-40.9 2
-42.4	15.0		Silt, slightly sandy, calcareous, some phosphate layers, nodules and masses of hard sandstone and siltstone, gray (ML)	60	9	" 1
						2
						-42.4 12
-43.9	16.5		Sand, very fine, silty, calcareous, some phosphate, gray (SM)	100	10	" 6
						13
						-43.9 18

Sample Elevation	Laboratory Classification
-27.4 to -29.4	(SM-H)*
-35.9 to -39.4	(SM)*
-40.9 to -42.4	(SC-H)*
-42.4 to -43.9	(SC-H)*

* Visual Classification based on gradation curve. No Atterberg Limits.

140# hammer with 30" drop used on 2.0" split spoon (1-3/8" ID x 2"OD)

Soils have been field visually classified in accordance with the Unified Soils Classification System.

ENG FORM 1836

Hole No. CB-MTH88-3

DRILLING LOG	DIVISION: South Atlantic	INSTALLATION: Jacksonville District	SHEET: 1 OF 1 SHEETS

1. PROJECT: Manatee Harbor	10. SIZE AND TYPE OF BIT: see remarks
2. LOCATION (Coordinates or Station): x=316,970 y=1,199,585	11. DATUM FOR ELEVATION SHOWN (TBM or MSL): MLW
3. DRILLING AGENCY: Corps of Engineers	12. MANUFACTURER'S DESIGNATION OF DRILL: Failing 1500
4. HOLE NO. (As shown on drawing title and file number): CB-MTH88-3	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED / UNDISTURBED
5. NAME OF DRILLER: R. Gordon	14. TOTAL NUMBER CORE BOXES: 1
6. DIRECTION OF HOLE: ☒ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.	15. ELEVATION GROUND WATER: Tidal
	16. DATE HOLE: STARTED 16 August 88 / COMPLETED 16 August 88
7. THICKNESS OF OVERBURDEN	17. ELEVATION TOP OF HOLE: -26.4
8. DEPTH DRILLED INTO ROCK	18. TOTAL CORE RECOVERY FOR BORING: 45 %
9. TOTAL DEPTH OF HOLE: 18.5'	19. SIGNATURE OF INSPECTOR: GEOLOGIST - J. Hand

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
-26.4	0.0					Bit or Barrel -26.4 Blows/0.5Ft
			Silt, a trace of sand and shell, gray to olive green (ML)	70	1	Split Spoon settled -27.9
			-26.4 to -29.4, maloderous	80	2	" settled -29.4
			-30.9 to -43.3, slightly shelly	90	3	" settled -30.9
			SOILS HAVE BEEN FIELD VISUALLY CLASSIFIED IN ACCORDANCE WITH THE UNIFIED SOIL CLASSIFICATION SYSTEM.	30	4	" settled -34.4
			SAMPLE ELEVATION / LABORATORY CLASSIFICATION -29.4 to -30.9 (MH)*	50	5	" settled -38.4
			NOTE: * Visual classification based on gradation curve. No Atterberg Limits.	25	6 7	" settled -43.4
-43.3	16.9					
-44.9	18.5		Silt, semi-indurated, some soft siltstone, gray (ML)	66	8	" settled -44.9 10/42
						140# hammer with 18" drop used on 2.0' split spoon (1-3/8" ID x 2" OD)

ENG FORM 1836 PROJECT HOLE NO.

Hole No. CB-MAN90-1

DRILLING LOG

1. PROJECT: Manatee Harbor	DIVISION: South Atlantic
2. LOCATION (Coordinates or Station): x = 317,381 y = 1,200,560	INSTALLATION: Jacksonville District
3. DRILLING AGENCY: US Army Corps of Engineers	SHEET 1 OF 2 SHEETS
4. HOLE NO. (As shown on drawing title and file number): CB-MAN90-1	10. SIZE AND TYPE OF BIT: see remarks
5. NAME OF DRILLER: J. Horsley	11. DATUM FOR ELEVATION SHOWN (TBM or MSL): MLW
6. DIRECTION OF HOLE: ☒ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	12. MANUFACTURER'S DESIGNATION OF DRILL: Failing 1500
7. THICKNESS OF OVERBURDEN	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED ____ UNDISTURBED ____
8. DEPTH DRILLED INTO ROCK	14. TOTAL NUMBER CORE BOXES: 3
9. TOTAL DEPTH OF HOLE: 48.0'	15. ELEVATION GROUND WATER: Tidal
	16. DATE HOLE: STARTED 1/17/90 COMPLETED 1/18/90
	17. ELEVATION TOP OF HOLE
	18. TOTAL CORE RECOVERY FOR BORING: 77 %
	19. SIGNATURE OF INSPECTOR: Geologist, Joe Gentile

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
						Bit or Barrel
-1.8	0.0					-1.8 Blows/Ft
-3.0	1.2		SAND, fine to medium, quartz, some silt, little shell, gray (SM)			
-4.8	3.0		SAND, fine to medium, quartz, clayey, gray, trace of shell (SC); limy, silty, soft limestone fragments -4.8 to -5.8	74	1	2" Sampler with 180# hammer & 18" drop: 2, 1
-6.8	5.0				2	4, 7
						-6.8 6
-9.8	8.0		SILT, calcareous, clayey, tan, seams soft limestone, sand, semi-indurated, isolated (ML) lenses moderately hard limestone	50	3	" 21, 18, 30
			CLAY, plastic, gray, few seams sand, silty (CH)			23, 23 -11.8
				90	4	" 7, 8, 14, 17, 26 -16.8
				74	5	" 7, 17, 22, 31, 49 -21.8
-22.1	20.3		CLAYSTONE, moderately hard, light gray, hard limestone fragments, phosphate pebbles, clayey, sand beds from -20.8 to -21.3 and -21.8 to -22.3	66		Dia 4"x5½" D.T. 16 min H.P. 50 psi -24.8
-24.6	22.8		LIMESTONE, hard, porous, slightly permeable, light gray, massive bedded, slightly fossiliferous, seams loose sand	92		Dia 4"x5½" D.T. 23 min H.P. 50 psi -28.8
-27.8	26.0					
-28.8	27.0		SAND, fine to medium, quartz, clayey, semi-indurated, gray (SC); indurated clay moderately hard from -27.8 to -28.8	100		Dia 4"x5½" D.T. 16 min H.P. 50 psi -32.8
-31.8	30.0		LIMESTONE, hard, very fossiliferous, gray, solid; non-fossiliferous, sandy from -32.3 to -35.0	80		Dia 4"x5½" D.T. 25 min H.P. 50 psi -35.8
-35.0	33.2		SAND, fine to medium quartz, clayey, trace hard limestone fragments, phosphate pebbles (SC); bed hard limestone -39.1 to -39.8; claystone -39.8 to -40.1; clayey sand (SC) with claystone lenses from -41.1 to -42.2	63		Dia 4"x5½" D.T. 9 min H.P. 50 psi -39.8
-41.1	39.3					
-42.2	40.4			100		Dia 4"x5½" D.T. 29 min -42.2 H.P. 100 psi
						300# hammer with 18" drop used on 2" sampler

DRILLING LOG (Cont Sheet) | ELEVATION TOP OF HOLE | Hole No. CB-MAN90-1

PROJECT: Manatee Harbor | INSTALLATION: Jacksonville District | SHEET OF 2 SHF ?

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	SAMPLE NO. f	REMARKS (Drilling time, water loss, depth weathering, etc., if significant) g
						Bit or Barrel
-42.2	40.4					-42.2
-43.5	41.7		CLAYSTONE, moderately hard, porous, light gray, massive bedded, bed sandy clay (CL) from -43.5 to -44.9, indurated clay, sandy from -44.9 to -46.8; clayey sand (SC) from -46.8 to -47.2	80		Dia 4"x5½" D.T. 21 min H.P. 50 psi
-44.9	43.1					
-46.8	45.0					-46.8
-49.8	48.0		SAND, fine to medium, quartz, phosphate, clayey, seams semi-indurated clay, seams sandy clay, gray (SC)	53		Dia 4"x5½" D.T. 30 min H.P. 50 psi
						-49.8

Soils are field visually classified in accordance with the Unified Soils Classification System.

SAMPLE ELEVATION	LABORATORY ANALYSIS
-6.8 to -9.8	(CH)*
-11.8 to -16.8	(CH)*

NOTE: *Visual Classification based on grain size curve. No Atterberg Limits

ENG FORM

Hole No. CB-MAN90-2

DRILLING LOG	DIVISION: South Atlantic
1. PROJECT: Manatee Harbor	INSTALLATION: Jacksonville District
2. LOCATION (Coordinates or Station): X = 317,235 Y = 1,200,432	10. SIZE AND TYPE OF BIT: see remarks
3. DRILLING AGENCY: US Army Corps of Engineers	11. DATUM FOR ELEVATION SHOWN (TBM or MSL): MLW
4. HOLE NO. (As shown on drawing title and file number): CB-MAN90-2	12. MANUFACTURER'S DESIGNATION OF DRILL: Failing 1500
5. NAME OF DRILLER: J. Horsley	13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED / UNDISTURBED
6. DIRECTION OF HOLE: ☒ VERTICAL ☐ INCLINED ____ DEG. FROM VERT.	14. TOTAL NUMBER CORE BOXES: 2
7. THICKNESS OF OVERBURDEN	15. ELEVATION GROUND WATER: Tidal
8. DEPTH DRILLED INTO ROCK	16. DATE HOLE: STARTED 1/10/90 COMPLETED 1/16/90
9. TOTAL DEPTH OF HOLE: 33.8'	17. ELEVATION TOP OF HOLE: -16.2
	18. TOTAL CORE RECOVERY FOR BORING: 78 %
	19. SIGNATURE OF INSPECTOR: Geologist, J. Gentile

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	BOX SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
-16.2	0.0					Bit or Barrel
						-16.2 Blows/Ft
-19.2	3.0		SILT, black, sandy, little shell, some clay, organic stain (ML)	80	1	2" Sampler settled
			SAND, fine quartz, clayey, little shell, thin seams (SP) sand, dark gray (SC) seams, shell & isolated thin lenses limestone (cemented sand & shell) from -22.2 to -26.2		2	-21.2 settled
-26.2	10.0			50	3	" settled 4 1 -26.2 1
-30.7	14.5		CLAY, plastic, silty, gray, trace shell, isolated sand seams (CL)	60	4	" settled -31.2
-33.0	16.8		SAND, fine quartz, clayey, trace silt, trace to little shell, gray (SC)	80	5	-33.0 " 2 9
-33.6	17.4					
-34.2	18.0		LIMESTONE, hard, gray, very fossiliferous, fractured, fractures filled with clay, moderately hard limestone at -33.6 to -34.2, clay with hard limestone fragments from -34.2 to -34.5, hard dense with clay filled fractures from -34.5 to -36.4	100		-34.2 4"x5½" dia
-34.5	18.3					
-36.4	20.2			100		4"x5½" dia DT 22 min HP 75 psi -36.2
-39.3	23.1			100	6	4"x5½" dia DT 18 min HP 50 psi -39.3
-40.3	24.1					
-40.8	24.6					
-41.3	25.1		sand, fine to medium quartz, partly and poorly indurated clayey, gray, (SC) from -36.4 to -39.3; Limestone dense, large voids with clayey sand fill, light gray, moderately hard limestone -40.3 to -40.8 indurated clay from -40.8 to -41.3 clayey sand (SC) with hard limestone fragments, from -41.3 to -43.1	82		4"x5½" dia -43.3
-43.1	26.9					
-45.6	29.4			97		" -47.3
-46.8	30.6					
-47.9	31.7					
-50.0	33.8		CLAYSTONE, moderately hard, dense, solid, light gray, massive bedded, sandy moderately hard limestone clayey & sandy from -45.6 to -46.8; clayey sand compacted to semi-indurated, from -46.8 to -47.9; indurated clay moderately hard, gray, from -47.9 to -50.0	70		" -50.0

Soils are field visually classified in accordance with the Unified Soil Classification System.

300# hammer with 18" drop used on 2" sampler

SAMPLE ELEVATION	LABORATORY ANALYSIS
-16.2 to -19.2	(SC)*
-22.2 to -26.2	(SC)*
-26.2 to -30.7	(CH)*
-36.4 to -39.3	(SC)*

NOTE: *Visual Classification based on grain size curve. No Atterberg

Hole No. CB-MAN90-3

DRILLING LOG

DIVISION: South Atlantic

INSTALLATION: Jacksonville District

SHEET 1 OF 2 SHEETS

1. PROJECT: Manatee Harbor
2. LOCATION (Coordinates or Station): x = 317,019 y = 1,200,560
3. DRILLING AGENCY: US Army Corps of Engineers
4. HOLE NO. (As shown on drawing title and file number): CB-MAN90-3
5. NAME OF DRILLER: J. Horsley
6. DIRECTION OF HOLE: ☒ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN
8. DEPTH DRILLED INTO ROCK
9. TOTAL DEPTH OF HOLE: 47.5'
10. SIZE AND TYPE OF BIT: see remarks
11. DATUM FOR ELEVATION SHOWN (TBM or MSL): MLW
12. MANUFACTURER'S DESIGNATION OF DRILL: Failing 1500
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED _____ UNDISTURBED _____
14. TOTAL NUMBER CORE BOXES: 2
15. ELEVATION GROUND WATER: Tidal
16. DATE HOLE: STARTED 1/16/90 COMPLETED 1/16/90
17. ELEVATION TOP OF HOLE: -2.5'
18. TOTAL CORE RECOVERY FOR BORING: 66 %
19. SIGNATURE OF INSPECTOR: Geologist, Joe Gentile

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
-2.5	0.0					Bit or Barrel -2.5 Blows/Ft
-10.5	8.0		SAND, fine to medium, quartz, little shell, trace silt, light gray (SP)	66	1	2" sampler 8 7 7 13 24 -7.5
				36	2	" 1 3 3 2 -12.5
				32	3	" 2 4 3 4 6 -17.5
-18.5	16.0		SAND, fine to medium, quartz, little clay, little shell, seams sandy clay, gray (SC) Bed (CH) clay, organic stain, sandstone lenses, brown -18.5 to -19.0	60	4	" 1 2 2 1 -22.5 settled
-19.0	16.5					
-23.5	21.0		Bed plastic clay, (CH), gray from -23.5 to -25.5	74	5 6 7	settled " -27.5
-25.5	23.0		Clayey sand (SC), little shell, gray from -25.5 to -32.5, isolated limestone lenses -31.5 to -32.5			
-31.5	29.0			60	8	settled " -32.5 2
-32.5	30.0		LIMESTONE, hard, dense, fossiliferous, gray, solid from -32.5 to -33.3; fractured with voids filled with clay from -33.3 to -34.3; hard clayey & sandy from -34.3 to -35.5; moderately hard from -35.5 to -36.7	93		4"x5½" dia D.T. 38 Min H.P. 50 psi -36.5
-35.5	33.0					
-36.7	34.2			70	9	4"x5½" dia D.T. 6 min -39.5 H.P. 50 psi
-41.2	38.7		SAND, fine to medium, quartz, clayey, little silt, very compacted to semi-indurated (SC) gray, hard limestone fragments from -39.5 to -40.0			
			LIMESTONE, hard, dense, light gray, massive, clayey, large voids filled with clayey sand	93		4"x5½" dia D.T. 29 min H.P. 50 psi -43.5

DRILLING LOG (Cont Sheet) | ELEVATION TOP OF HOLE -2.5 | Hole No. CB-MANSO-3

PROJECT: Manatee Harbor | INSTALLATION: Jacksonville District | SHEET 2 OF 2 SHEETS

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
						Bit or Barrel
-44.1	41.6				-43.5	Blows/Ft
			CLAYSTONE, indurated clay, moderately hard, light gray, sandy seams loose sand; bed hard limestone from -48.8 to -49.1	90		4"x5½" dia D.T. 17 min H.P. 50 psi
-48.8	46.3				-47.5	
-49.1	46.6			76		4"x5½" dia D.T. 11 min H.P. 50 psi
-50.0	47.5				-50.0	

300# hammer with 18" drop used on 2" sampler

Soils are field visually classified in accordance with the Unified Soils Classification System.

SAMPLE ELEVATION	LABORATORY ANALYSIS
-2.5 to -7.5	(SP)*
-17.5 to -22.5	(SP-SM)*

NOTE: *Visual classification based on grain size curve. No Atterberg Limits.

ENG FORM 1836-A (EP 1110-1-1800)

Hole No. CB-MTH91-1

DRILLING LOG

DIVISION: South Atlantic

INSTALLATION: Jacksonville District

SHEET 1 OF 2 SHEETS

1. PROJECT: Manatee Harbor
2. LOCATION (Coordinates or Station): x=316455 y=1200210
3. DRILLING AGENCY: Army Corps of Engineers
4. HOLE NO. (As shown on drawing title and file number): CB-MTH91-1
5. NAME OF DRILLER: R. Gordon
6. DIRECTION OF HOLE: ☒ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN:
8. DEPTH DRILLED INTO ROCK:
9. TOTAL DEPTH OF HOLE: 41.3'
10. SIZE AND TYPE OF BIT: See Remarks
11. DATUM FOR ELEVATION SHOWN (TBM or MSL): MLW
12. MANUFACTURER'S DESIGNATION OF DRILL: S&H Skid Rig
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED: UNDISTURBED:
14. TOTAL NUMBER CORE BOXES: 2
15. ELEVATION GROUND WATER: Tidal
16. DATE HOLE: STARTED 2/20/91 COMPLETED 2/20/91
17. ELEVATION TOP OF HOLE: -2.7
18. TOTAL CORE RECOVERY FOR BORING: 75 %
19. SIGNATURE OF INSPECTOR: G. Holem and J. Gentile

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
-2.7	0.0					Bit or Barrel -2.7
-3.7	1.0		SAND, fine quartz, some medium to coarse shell, trace silt, brown (SP)	52	1	Split Spoon -3.2 settled 1
-5.0	2.3		SAND, fine quartz, silty, some clay, gray (SM)	40	2	" " 1 2
-5.7	3.0		CLAY, some silt and fine sand, brown (CL)		3	-5.7 2
-7.7	5.0		SAND, silty, calcareous, layers & nodules of hard quartz sandstone & phosphate, light gray (SM)	74	4	" " -6.2 33 22 13
-11.2	8.5		SANDSTONE, hard, fine grained quartz & phosphate, calcareous matrix, light gray	14	5	" " -8.7 washed 3 31
				33		Dia 4x5½ DT 10 min HP 25 psi -11.7
-12.7	10.0		CLAY, silty, sandy, layers of sand, buff (CL)	49	6	Split Spoon 5 10
-13.2	10.5		SILT, indurated, gray (ML)		7	-13.2 40
-14.7	12.0		SILT, sandy, some clay, phosphate pebbles and sand size grains, tan (ML)	100	8	" " -14.7 23 44 56
			CLAY, sandy, trace silt, fine to medium phosphate grains, gray (CL)	100	9	" " -16.2 20 15 19
				100	10	" " -17.7 8 12 15
			alternating layers of phosphate throughout with few fragments of chert, high concentration of phosphate from -15.5 to -16.5	100	11	" " -19.2 7 11 14
				100	12	" " -20.7 18 20 30
			NOTE: 10 feet of 6" steel casing was left in hole, between elevations -3.0 & -15.0	100	13	" " -22.2 18 32 45
				60	14	" " -23.7 15 24 59

DRILLING LOG (Cont Sheet) | ELEVATION TOP OF HOLE -2.7 | Hole No. CB-MTH91-1

PROJECT: Manatee Harbor | INSTALLATION: Jacksonville District | SHEET 2 OF 2 SHEETS

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
						-23.7
-25.2	22.5		thin lense of sandstone ,1' in thickness, lenses of quartz and phosphate sands, limestone fragments, -20.5 to -25.2	100	15	Split Spoon -25.2 63 66 95
-26.7	24.0		SAND, fine to medium quartz and phosphate, clayey, some silt, limestone fragments, light gray (SC)	100	16	" " -26.7 32 19 46
-27.5	24.8		SILT, little clay, sandy, with phosphate & quartz sand, limestone nodules & fragments, gray (ML)	100	17	-27.5 " " 20 60
-28.7	26.0		LIMESTONE, moderately hard, sandy, quartz & phosphate, clay, silt, sand seams, dark gray	100	18	NWM Dia Bit DT 9½ min HP wt of rods -30.5
			SAND, fine to medium grained quartz & phosphate, silty, little clay, limestone fragments, dark gray and green (SM)	73	19	Split Spoon -32.0 8 19 25
				93	20	" " -33.7 10 16 28
-35.3	32.6			100	21	" " -35.2 12 18 22
-36.7	34.0		LIMESTONE, hard, porous, sand sized phosphate, non-permeable, gray-tan	48	22	-35.3 47 NWM Dia Bit DT 8 min HP wt of rods -38.2
-39.0	36.3		SAND, fine to medium quartz & phosphate, silty, trace clay, limestone fragments, gray, seams gray compacted silt (SM); Siltstone, moderately hard, gray from -39.0 to -39.5	100	23	-39.0 Split Spoon 18 50+
-39.5	36.8		Dry isolated seams indurated silt from -39.5 to -42.5	25		NWM Dia Bit DT 5 min HP wt of tools -41.0
-42.5	39.8			100	24	Split Spoon -42.5 31 27 33
-44.0	41.3		SILT, gray, dry, little sand, isolated seams indurated silt (ML)	100	25	" " -44.0 13 45 49
			Soils are field visually classified in accordance with the Unified Soils Classification System.			140# hammer with 30" drop used on 2.0' split spoon. (1-3/8" ID x 2" OD)

ENG FORM 1836 (EB 1110-1-1601) PROJECT

Hole No. CB-MTH91-2

DRILLING LOG

DIVISION: South Atlantic

INSTALLATION: Jacksonville District

SHEET 1 OF 2 SHEETS

1. PROJECT: Manatee Harbor
2. LOCATION (Coordinates or Station): X=316,762 Y=1,199,944
3. DRILLING AGENCY: Corps of Engineers
4. HOLE NO. (As shown on drawing title and file number): CB-MTH91-2
5. NAME OF DRILLER: R. Gordon
6. DIRECTION OF HOLE: [X] VERTICAL [ ] INCLINED _____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN:
8. DEPTH DRILLED INTO ROCK:
9. TOTAL DEPTH OF HOLE: 42.0'
10. SIZE AND TYPE OF BIT: See remarks
11. DATUM FOR ELEVATION SHOWN (TBM or MSL): MLW
12. MANUFACTURER'S DESIGNATION OF DRILL: S&H Skid Rig
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED: UNDISTURBED:
14. TOTAL NUMBER CORE BOXES: 2
15. ELEVATION GROUND WATER: Tidal
16. DATE HOLE: STARTED 2/25/91 COMPLETED 3/8/91
17. ELEVATION TOP OF HOLE: -2.0
18. TOTAL CORE RECOVERY FOR BORING: 84 %
19. SIGNATURE OF INSPECTOR: Geologist, J. Gentile

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOVERY e	SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
-2.0	0.0					Bit or Barrel -2.0 Blows/0.5 Ft
			SAND, fine to medium, quartz, clean, light gray, trace to little shell (SP)	56	1	Split Spoon settled -3.5 5
-4.5	2.5		SANDSTONE, calcareous, riddled with voids, filled with silty sand, many seams loose sand, dark gray to tan, very fossiliferous, moderately hard	80	2	" -5.0 5 4 13
-6.5	4.5			66	3	" -6.5 10 13 5
-7.5	5.5		SAND, quartz and phosphate, fine to medium, tan, sandstone lenses, little silt (SM); bed moderately hard sandstone from -7.5 to -8.0, isolated seams indurated silt from -8.0 to -9.5	12	4	" -8.0 10 21 7
-8.0	6.0				5	
				66	6	" -9.5 16 32 13
-11.0	9.0			88	7	" -11.0 8 20 18
-12.5	10.5		SILT, buff-tan, dry (ML), many lenses of moderately hard indurated silt, bed of indurated silt from -12.5 to -13.0	100	8	" -12.0 21 56 10
-13.0	11.0			40	9	" -13.5 32 87 38
-13.5	11.5		gray, some sand size phosphate, damp from -13.5 to -21.0 (ML)	100	10	" -15.0 13 14 17
				88	11	" -16.5 7 14 16
				100	12	" -18.0 11 20 24
				100	13	" -19.5 12 12 19
-21.0	19.0		very dry, semi-indurated from -20.0 to -21.0	100	14	" -21.0 18 60 90
-22.5	20.5		SAND, fine to medium, quartz and sand size phosphate, silty, gray, damp from -21.0 to -22.5 (SM)	80	15	" -22.5 28 45 37

DRILLING LOG (Cont Sheet) | ELEVATION TOP OF HOLE -2.0 | Hole No. CB-MTHS1-2

PROJECT: Manatee Harbor | INSTALLATION: Jacksonville District | SHEET 2 OF 2 SHEETS

ELEVATION a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	% CORE RECOV. ERY e	SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
-22.5	20.5					Bit or Barrel -22.5 Blows/0.5 Ft
-23.3	21.3		many thin lenses moderately hard limestone from -23.3 to -24.0	100	16	Split Spoon -24.0 17 32 32
-24.0	22.0		SAND, fine to medium, quartz and sand size phosphate, silty with seams silt, gray, damp (SM)	100	17	" -25.5 19 20 30
-27.0	25.0		(seams indurated silt)	100	18	" -27.0 20 62 90
-28.5	26.5		silt with many sand seams from -27.0 to -28.5	100	19	" -28.5 20 30 27
			phosphate sand with some silt from -28.5 to -35.1	80	20	" -30.0 7 13 19
				93	21	" -31.5 11 19 25
				65	22	" -33.0 7 20 26
				88	23	" -34.5 6 15 34
-35.1	33.1		LIMESTONE, hard, non-permeable, silty and slightly sandy in composition, light gray	90	24	" -35.5 13 180
-36.3	34.3					
-38.3	36.3		SAND, fine to medium, quartz and phosphate, silty, many hard limestone lenses, semi-indurated (SM)	76		4x5½" Dia DT 4 min HP wt of tools -38.0
			SILT, little sand, seams of indurated silt, many sand seams (ML)	100	25	Split Spoon -39.5 12 20 89
			many seams indurated silt from -39.0 to -39.5	100	26	" -41.0 40 56 70
			many seams phosphate sand, gray	100	27	" -42.5 7 12 18
-44.0	42.0			100	28	" -44.0 6 7 10
			Soils are field visually classified in accordance with the Unified Soils Classification System.			140# hammer with 30" drop used on 2.0' split spoon. 1-3/8" ID x 2" OD)

ENG FORM 1836-A (ER 1110-1-1801) | PROJECT

Hole No.CB-MTH97-8

DRILLING LOG

DIVISION: South Atlantic
INSTALLATION: Jacksonville District
SHEET 1 OF 1

1. PROJECT: Manatee Harbor Deepening
2. LOCATION (Coordinates or Station): X=317,493 Y=1199,558
3. DRILLING AGENCY: Corps of Engineers
4. HOLE NO. (As shown on drawing title and file number): CB-MTH97-8
5. NAME OF DRILLER: C. Robbins
6. DIRECTION OF HOLE: ☒ VERTICAL ☐ INCLINED
7. THICKNESS OF BURDEN: 1.6 Ft.
8. DEPTH DRILLED INTO ROCK: 3.5 Ft.
9. TOTAL DEPTH OF HOLE: 5.1 Ft.
10. SIZE AND TYPE OF BIT: See Remarks
11. DATUM FOR ELEVATION SHOWN (TBM or MSL): MLW
12. MANUFACTURER'S DESIGNATION OF DRILL: Failings 314
13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN: disturbed: 1 undisturbed: 0
14. TOTAL NUMBER OF CORE BOXES: 1
15. ELEVATION GROUND WATER: Tidal
16. DATE HOLE STARTED: 4/15/97 COMPLETED: 4/15/97
17. ELEVATION TOP OF HOLE: -43.4 Ft.
18. TOTAL CORE RECOVERY FOR BORING: 84 %
19. SIGNATURE OF GEOLOGIST: J. Arthur

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	CORE REC %	SAMPLE NUMBER	REMARKS Bit or Barrel	BLOWS/.5'
-43.4	.0					-43.4	
			Silty SAND, fine to medium grained quartz and phosphate with some shell, trace of fine gravel size sandy limestone nodules, gray and light gray, (SM)	50	1	SETTLED Split Spoon	0
-45.0	1.6					-45.0	
-45.6	2.2		LIMESTONE, hard, sandy, moderately to highly weathered, fragmented, light gray	100 ROD 0 RUN #1	2	DIA 4" X 5 1/2" H.P. 110 PSI D.T. 43 MIN	2.5
-46.6	3.2						
-47.0	3.6		CLAY, fat, some fine to medium phosphate sand, gray, (CH)				
-47.9	4.5		Clayey SAND, fine to medium grained, shell and phosphate with a little shell, light gray, (SC)			-48.5	5
-48.5	5.1		CLAY, fat, some fine to medium phosphate sand, gray, (CH)			140# Hammer with 30" drop used on 2.0' split spoon (1 3/8" I.D. X 2" O.D.)	
			SILTSTONE, moderately hard, horizontal breaks: 4.5', 4.6', 4.7', 4.9', gray				7.5
							10
							12.5
							15
							17.5
							20
							22.5

NOTES:
1. Soils are field visually classified in accordance with the Unified Soils Classification System.

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE.

PROJECT: Manatee Harbor Deepening
HOLE NUMBER: CB-MTH97-8

Hole No.CB-MTH97-8

DRILLING LOG

DIVISION: South Atlantic

INSTALLATION: Jacksonville District

SHEET 1 OF 1

1. PROJECT: Manatee Harbor Deepening	10. SIZE AND TYPE OF BIT: See Remarks
2. LOCATION (Coordinates or Station): X=317,493 Y=1199,559	11. DATUM FOR ELEVATION SHOWN (TBM or MSL): MLW
3. DRILLING AGENCY: Corps of Engineers	12. MANUFACTURER'S DESIGNATION OF DRILL: Failings 314
4. HOLE NO. (As shown on drawing title and file number): CB-MTH97-8	13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN: disturbed: 1 undisturbed: 0
5. NAME OF DRILLER: C. Robbins	14. TOTAL NUMBER OF CORE BOXES: 1
6. DIRECTION OF HOLE: ☒ VERTICAL ☐ INCLINED	15. ELEVATION GROUND WATER: Tidal
7. THICKNESS OF BURDEN: 1.6 Ft.	16. DATE HOLE STARTED: 4/15/97 COMPLETED: 4/15/97
8. DEPTH DRILLED INTO ROCK: 3.5 Ft.	17. ELEVATION TOP OF HOLE: -43.4 Ft.
9. TOTAL DEPTH OF HOLE: 5.1 Ft.	18. TOTAL CORE RECOVERY FOR BORING: 84 %
	19. SIGNATURE OF GEOLOGIST: J. Arthur

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	CORE REC %	SAMPLE NUMBER	REMARKS Bit or Barrel	BLOWS/.5'
-43.4	.0					-43.4	
-45.0	1.6		Silty SAND, fine to medium grained quartz and phosphate with some shell, trace of fine gravel size sandy limestone nodules, gray and light gray, (SM)	50	1	Split Spoon	SETTLED
-45.6	2.2					-45.0	
-46.6	3.2		LIMESTONE, hard, sandy, moderately to highly weathered, fragmented, light gray	100 RQD 0 RUN #1	2	4"X5.5" DIAMOND BIT O.T. = 43 min H.P. = 110 psi W.R. = 100%	
-47.0	3.6		CLAY, fat, some fine to medium phosphate sand, gray, (CH)				
-47.9	4.5		Clayey SAND, fine to medium grained, shell and phosphate with a little shell, light gray, (SC)				
-48.5	5.1		CLAY, fat, some fine to medium phosphate sand, gray, (CH)			-48.5	
			SILTSTONE, moderately hard, horizontal breaks: 4.5', 4.6', 4.7', 4.9', gray			140# Hammer with 30" drop used on 2.0" split spoon (1 3/8" I.D. X 2" O.D.)	

NOTES:
1. Soils are field visually classified in accordance with the Unified Soils Classification System.

0 2.5 5 7.5 10 12.5 15 17.5 20 22.5

EM8 FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE.

PROJECT: Manatee Harbor Deepening

HOLE NUMBER: CB-MTH97-8

Hole No.CB-MTH97-9

DRILLING LOG | DIVISION: South Atlantic | INSTALLATION: Jacksonville District | SHEET 1 OF 1

1. PROJECT: Manatee Harbor Deepening	10. SIZE AND TYPE OF BIT: See Remarks
2. LOCATION (Coordinates or Station): X=317,096 Y=1198,830	11. DATUM FOR ELEVATION SHOWN (TBM or MSL): MLW
3. DRILLING AGENCY: Corps of Engineers	12. MANUFACTURER'S DESIGNATION OF DRILL: Failings 314
4. HOLE NO. (As shown on drawing title and file number): CB-MTH97-9	13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN: disturbed: 2 undisturbed: 0
5. NAME OF DRILLER: C. Robbins	14. TOTAL NUMBER OF CORE BOXES
6. DIRECTION OF HOLE: ☒ VERTICAL ☐ INCLINED	15. ELEVATION GROUND WATER: Tidal
7. THICKNESS OF BURDEN: 8.0 Ft.	16. DATE HOLE STARTED: 4/16/97 COMPLETED: 4/16/97
8. DEPTH DRILLED INTO ROCK: 0 Ft.	17. ELEVATION TOP OF HOLE: -37.2 Ft.
9. TOTAL DEPTH OF HOLE: 8.0 Ft.	18. TOTAL CORE RECOVERY FOR BORING: 26 %
	19. SIGNATURE OF GEOLOGIST: J. Arthur

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	CORE REC %	SAMPLE NUMBER	REMARKS Bit or Barrel	BLOWS/.5'
-37.2	.0					-37.2 SETTLED	0
			SILT, fat, trace of fine grained quartz sand, very dark gray, (MH)	26	1	Split Spoon	2.5 / 5
-44.8	7.6						7.5
-45.2	8.0		Clayey SAND, fine grained quartz, trace of coarse gravel size limestone nodules and fine phosphate sand and shell fragments, light gray to gray, (SC)		2	-45.2 140# Hammer with 30" drop used 2.0' split spoon (1 3/8" I.D. X 2" O.D.)	10 / 12.5 / 15 / 17.5 / 20 / 22.5

NOTES:
1. Soils are field visually classified in accordance with the Unified Soils Classification System.

ENG FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE.

PROJECT: Manatee Harbor Deepening | HOLE NUMBER: CB-MTH97-9

Hole No.CB-MTH97-10

DRILLING LOG

DIVISION: South Atlantic

INSTALLATION: Jacksonville District

SHEET 1 OF 1

1. PROJECT: Manatee Harbor Deepening	10. SIZE AND TYPE OF BIT: See Remarks
2. LOCATION (Coordinates or Station): X=317,045 Y=1199,245	11. DATUM FOR ELEVATION SHOWN (TBM or MSL): MLW
3. DRILLING AGENCY: Corps of Engineers	12. MANUFACTURER'S DESIGNATION OF DRILL: Failings 314
4. HOLE NO. (As shown on drawing title and file number): CB-MTH97-10	13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN: disturbed: 2 undisturbed: 0
5. NAME OF DRILLER: C. Robbins	14. TOTAL NUMBER OF CORE BOXES:
6. DIRECTION OF HOLE: ☒ VERTICAL ☐ INCLINED	15. ELEVATION GROUND WATER: Tidal
7. THICKNESS OF BURDEN: 6.1 Ft.	16. DATE HOLE STARTED: 4/16/97 COMPLETED: 4/16/97
8. DEPTH DRILLED INTO ROCK: 0 Ft.	17. ELEVATION TOP OF HOLE: -39.0 Ft.
9. TOTAL DEPTH OF HOLE: 6.1 Ft.	18. TOTAL CORE RECOVERY FOR BORING: 34 %
	19. SIGNATURE OF GEOLOGIST: J. Arthur

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	CORE REC %	SAMPLE NUMBER	REMARKS Bit or Barrel	BLOWS/.5'
-39.0	.0					-39.0	
			SILT, lean, dark gray (MH)			SETTLED	0
				34	1	Split Spoon	2.5
-44.8	5.8						5
-45.1	6.1		CLAY, silty, lean (CL)		2	-45.1	
							7.5
							10
							12.5
							15
							17.5
							20
							22.5

NOTES:
1. Soils are field visually classified in accordance with the Unified Soils Classification System.

140# Hammer with 30" drop used 2.0' split spoon (1 3/8" I.D. X 2" O.D.)

Hole No.CB-MANOO-1

DRILLING LOG

DIVISION: South Atlantic

INSTALLATION: Jacksonville District

1. PROJECT: Manatee Harbor
2. LOCATION (Coordinates or Station): X=316,105 Y=1201,435
3. DRILLING AGENCY: ARDAMAN & ASSOCIATES, INC.
4. HOLE NO. (As shown on drawing title and file number): CB-MANOO-1
5. NAME OF DRILLER: T. Midgette
6. DIRECTION OF HOLE: ☒ VERTICAL ☐ INCLINED
7. THICKNESS OF BURDEN: 35.5 Ft.
8. DEPTH DRILLED INTO ROCK: 2.0 Ft.
9. TOTAL DEPTH OF HOLE: 42.0 Ft.
10. SIZE AND TYPE OF BIT: 2 15/16 Tricone + NW Casing
11. DATUM FOR ELEVATION SHOWN (TBM or MSL): MLLW; NAD 27, FL West
12. MANUFACTURER'S DESIGNATION OF DRILL: CME 45 on Barge
13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN: disturbed: 28 undisturbed: 0
14. TOTAL NUMBER OF CORE BOXES: 1
15. ELEVATION GROUND WATER: Tide +1.4
16. DATE HOLE STARTED: 06/27/00 COMPLETED: 06/28/00
17. ELEVATION TOP OF HOLE: -5.0 Ft.
18. TOTAL CORE RECOVERY FOR BORING: 100 %
19. SIGNATURE OF GEOLOGIST: ROCKLAND B. BURR, P.G.

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	CORE REC %	SAMPLE NUMBER	REMARKS	BLOWS/.5'
-5.0	.0					-5.0	
			SAND, fine to coarse grained quartz, little shell, trace silt, gray (SP)	100	1	Splitspoon	1 3 4
-6.5	1.5					-6.5	
			CLAY, soft, gray (CH)	100	2	Splitspoon	6 5 4
						-8.0	
				100	3	Splitspoon	6 7 14
						-9.5	
				100	4	Splitspoon	6 16 16
-11.0	6.0					-11.0	
			CLAY, laminations of fine grained phosphatic sand, laminations of fine grained brown sandstone, hard, gray/brown (CH)	100	5	Splitspoon	30 27 27
						-12.5	
-13.5	8.5			100	6	Splitspoon	41 30 100
			CLAY, laminations of sandstone and sand, hard, brown (CL)			-14.0	
				100	7	Splitspoon	100 100 48
-15.5	10.5					-15.5	
			CLAY, trace gravelsize sandstone, laminations fine grained gray sand, soft, gray (CH)	100	8	Splitspoon	32 29 37
						-17.0	
				100	9	Splitspoon	29 32 24
-18.5	13.5					-18.5	
			SAND, fine grained, trace silt, dark gray (SP-SM)	100	10	Splitspoon	8 9 13
						-20.0	
				100	11	Splitspoon	7 9 9
						-21.5	
				100	12	Splitspoon	8 12 15
						-23.0	
			Laminations of gray CL clay	100	13	Splitspoon	18 26 25
						-24.5	
				100	14	Splitspoon	7 10 27
			Lens CL clay			-26.0	
				100	15	Splitspoon	11 17 18
						-27.5	
						(continued)	

0 2.5 5 7.5 10 12.5 15 17.5 20 22.5

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. MAR 71

PROJECT: Manatee Harbor | HOLE NUMBER: CB-MANOO-1

Hole No. CB-MAN00-1

DRILLING LOG (Cont. Sheet) | ELEVATION TOP OF HOLE -5.0 Ft. | SHEET 2 OF 3

PROJECT: Manatee Harbor | INSTALLATION: Jacksonville District

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	CORE REC %	SAMPLE NUMBER	REMARKS	BLOWS/.5'
-27.5	22.5					-27.5	
			Lens of CL clay	100	16	Splitspoon	8, 14, 17
						-29.0	
				100	17	Splitspoon	10, 16, 30
			Lens of CL clay			-30.5	
				100	18	Splitspoon	10, 21, 22
-32.5	27.5					-32.0	
			CLAY, little fine grained sand, hard, gray (CL)	100	19	Splitspoon	33, 100/4, 43
-33.5	28.5					-33.5	
			CLAY, laminations of coarse gained sand, and fine grained sandstone, hard, gray (CL)	100	20	Splitspoon	32, 33, 43
						-35.0	
-36.0	31.0			100	21	Splitspoon	25, 48, 100/3
			CLAY, little sand, laminations of sandstone, hard, gray (CL)			-36.5	
				100	22	Splitspoon	100/3, 55, 100/4
						-38.0	
				100	23	Splitspoon	21, 15, 23
-39.5	34.5					-39.5	
-40.5	35.5		CLAY, little sand, laminations of sandstone, medium, gray/green (CH)	100	24	Splitspoon	7, 10, 100/4
			SANDSTONE, fine grained, gray, lenses of clay (SS)			-41.0	
				100	25	Splitspoon	100/3, 54, 100/3
-42.5	37.5					-42.5	
			SAND, fine to coarse grained, trace silt, dark gray (SP)	100	26	Splitspoon	24, 16, 20
						-44.0	
				100	27	Splitspoon	11, 16, 100/5
-45.5	40.5		Lens of sandstone			-45.5	
			CLAY, some coarse grained sand, thin sandstone layer, hard, gray (CL)	100	28	Splitspoon	100/3, 36, 105
-47.0	42.0					-47.0	
			End of Boring at 42.0'				

NOTES:

1. Soils are field visually classified in accordance with the Unified Soils Classification System.

2. Laboratory Analysis Results

Sample Elevation	Classification
-8.0 to -9.5	CH, Gs=2.81
-11.0 to -12.5	SC
-20.0 to -21.5	SP-SM
-27.5 to -29.0	SP-SM, NP
-35.0 to -36.5	SC
-42.5 to -44.0	SP-SM
-45.5 to -47.0	SC

3. 140# hammer with 30" drop used on 2.0' splitspoon (1 3/8" I.D. x x 2" O.D.)

4. X, Y coordinates provided by a Trimble DGPS Model Pro XR (Continued) provided by a tide

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. MAR 71

PROJECT: Manatee Harbor | HOLE NUMBER: CB-MAN00-1

Hole No.CB-MANOO-1

DRILLING LOG (Cont. Sheet)

ELEVATION TOP OF HOLE -5.0 Ft.

SHEET 3 OF 3

PROJECT: Manatee Harbor

INSTALLATION: Jacksonville District

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	CORE REC %	SAMPLE NUMBER	REMARKS	BLOWS/.5'

50

52.5

55

57.5

60

62.5

65

67.5

70

72.5

75

77.5

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. MAR 71

PROJECT: Manatee Harbor

HOLE NUMBER: CB-MANOO-1

Hole No. CB-MAN00-2

DRILLING LOG | DIVISION: South Atlantic | INSTALLATION: Jacksonville District | SHEET 1 OF 3

1. PROJECT: Manatee Harbor	10. SIZE AND TYPE OF BIT: 2 15/16 Tricone + NW Casing
2. LOCATION (Coordinates or Station): X=316,822 Y=1201,557	11. DATUM FOR ELEVATION SHOWN (TBM or MSL): MLLW; NAD 27, FL West
3. DRILLING AGENCY: ARDAMAN & ASSOCIATES, INC.	12. MANUFACTURER'S DESIGNATION OF DRILL: CME 45 on Barge
4. HOLE NO. (As shown on drawing title and file number): CB-MAN00-2	13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN: disturbed: 28 undisturbed: 0
5. NAME OF DRILLER: T. Midgette	14. TOTAL NUMBER OF CORE BOXES: 1
6. DIRECTION OF HOLE: ☒ VERTICAL ☐ INCLINED	15. ELEVATION GROUND WATER: Tide +1.0
7. THICKNESS OF BURDEN: 42.0 Ft.	16. DATE HOLE STARTED: 06/26/00 COMPLETED: 06/27/00
8. DEPTH DRILLED INTO ROCK: 0 Ft.	17. ELEVATION TOP OF HOLE: -5.5 Ft.
9. TOTAL DEPTH OF HOLE: 42.0 Ft.	18. TOTAL CORE RECOVERY FOR BORING: 99.8 %
	19. SIGNATURE OF GEOLOGIST: ROCKLAND B. BURR, P.G.

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	CORE REC %	SAMPLE NUMBER	REMARKS	BLOWS/.5'
-5.5	0					-5.5	
			SAND, fine to coarse grained quartz, little shell, trace shell gravel, trace silt, gray (SP)	75	1	Splitspoon	1, 3, 3
						-7.0	
				100	2	Splitspoon	3, 2, 5
-9.0	3.5					-8.5	
			CLAY, trace sand, trace gravel-size sandstone, stiff, gray (CL)	100	3	Splitspoon	17, 8, 26
						-10.0	
				100	4	Splitspoon	7, 35, 6
-11.5	6.0		Lens of sand			-11.5	
			CLAY, laminations of fine grained phosphatic sand, stiff, gray/brown (CL)	100	5	Splitspoon	34, 36, 23
-13.0	7.5					-13.0	
			CLAY, medium gray/brown (CH)	100	6	Splitspoon	4, 3, 6
-14.5	9.0					-14.5	
			CLAY, laminations of fine grained phosphatic sand, trace of gravel-size sandstone, medium, gray/brown (CH)	100	7	Splitspoon	9, 9, 20
-16.5	11.0					-16.0	
			SAND, fine grained phosphate and quartz, little silt, brown (SP-SM)	100	8	Splitspoon	9, 12, 16
						-17.5	
				100	9	Splitspoon	9, 12, 13
						-19.0	
				100	10	Splitspoon	4, 6, 10
-20.5	15.0					-20.5	
			SAND, fine grained, laminations of gray clay, trace silt, dark gray (SP-SM)	100	11	Splitspoon	52, 22, 26
						-22.0	
				100	12	Splitspoon	10, 11, 18
						-23.5	
				100	13	Splitspoon	11, 9, 26
						-25.0	
				100	14	Splitspoon	15, 19, 15
						-26.5	
				100	15	Splitspoon	13, 14, 15
						-28.0	
						(continued)	

0 | 2.5 | 5 | 7.5 | 10 | 12.5 | 15 | 17.5 | 20 | 22.5

Hole No.CB-MAN00-2

DRILLING LOG (Cont. Sheet)

ELEVATION TOP OF HOLE -5.5 Ft.

PROJECT: Manatee Harbor

INSTALLATION: Jacksonville District

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	CORE REC %	SAMPLE NUMBER	REMARKS	BLOWS/.5"
-28.0	22.5					-28.0	
-28.5	23.0						10
			CLAY, trace gravel-size sandstone, laminations of gray fine to medium sand, stiff, gray (CL)	100	16	Splitspoon	17
						-29.5	27
				100	17	Splitspoon	22
							34
-31.0	25.5					-31.0	30
			CLAY, laminations of dark gray, fine grained sand, stiff, gray (CH)	100	18	Splitspoon	12
							22
						-32.5	33
-33.5	28.0			100	19	Splitspoon	12
			CLAY, little sand, trace gravel-sized sandstone, gray (CL)				13
						-34.0	54
-35.0	29.5			100	20	Splitspoon	37
			SAND, fine to medium grained, clayey, gray (SC)				14
						-35.5	55
				100	21	Splitspoon	13
			Thin layers of sandstone and dense clayey sand				40
						-37.0	100/4
-37.5	32.0						100/2
			CLAY, hard, gray (CH)	100	22	Splitspoon	90
						-38.5	48
				100	23	Splitspoon	10
-39.5	34.0						12
			CLAY, little sand, medium grained, dark green (CL)			-40.0	16
				100	24	Splitspoon	55
-41.0	35.5						23
-41.5	36.0		CLAY, little sand, thin layers of sandstone, hard, gray (CL)			-41.5	68
			SAND, fine to coarse grained quartz phosphate, trace silt, dark gray, thin layers of sandstone (SP-SM)	100	25	Splitspoon	55
							16
						-43.0	16
				100	26	Splitspoon	100/5
-44.5	39.0						97
			CLAY, little sand, gray (CL)			-44.5	45
				100	27	Splitspoon	100
							100
						-46.0	100/5
				100	28	Splitspoon	44
-47.5	42.0						29
			End of Boring at 42.0'			-47.5	50

NOTES:

1. Soils are field visually classified in accordance with the Unified Soils Classification System.

2. Laboratory Analysis Results

Sample Elevation	Classification
-7.0 to -8.5	SP-SM
-11.5 to -13.0	SC
-19.0 to -20.5	SM
-22.0 to -23.5	SC
-26.5 to -28.0	SC
-31.0 to -32.5	CH
-35.5 to -37.0	SC
-46.0 to -47.5	SC

3. 140# hammer with 30" drop used on 2.0" splitspoon (1 3/8" I.D. x x 2" O.D.)

4. X, Y coordinates provided by a Trimble DGPS Model Pro XR not (continued) by a Registered Land Surveyor. Elevations provided by a tide staff.

Hole No.CB-MANOO-2

DRILLING LOG (Cont. Sheet)

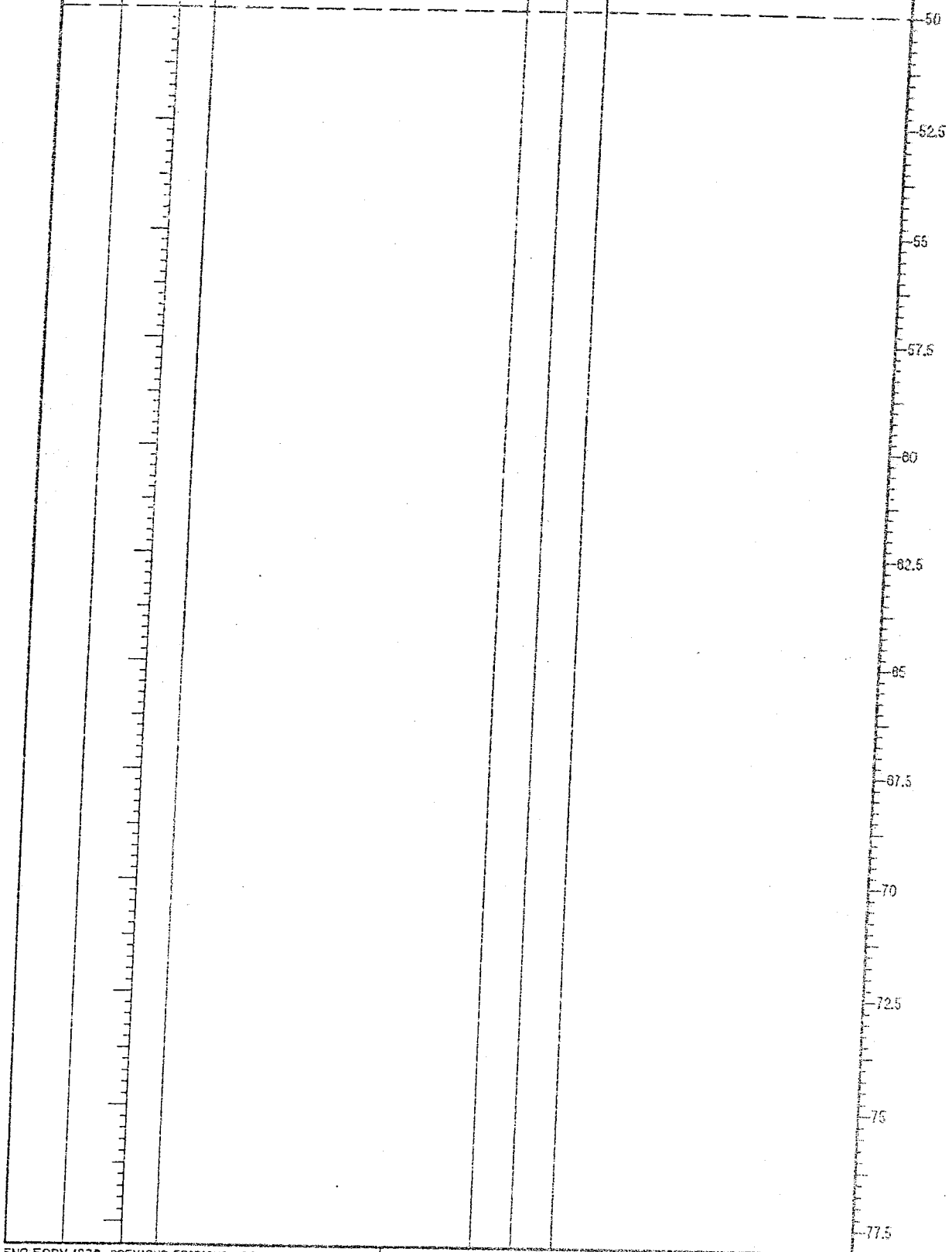
ELEVATION TOP OF HOLE -5.5 Ft.

SHEET 3 OF 3

PROJECT: Manatee Harbor

INSTALLATION: Jacksonville District

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	CORE REC %	SAMPLE NUMBER	REMARKS	BLOWS/6"



ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. MAR 71

PROJECT: Manatee Harbor

HOLE NUMBER: CB-MANOO-2

Hole No.CB-MANOO-3

DRILLING LOG | DIVISION: South Atlantic | INSTALLATION: Jacksonville District | SHEET 1 OF 2

1. PROJECT: Manatee Harbor	10. SIZE AND TYPE OF BIT: 2 15/16 Tricone + NW Casing
2. LOCATION (Coordinates or Station): X=317,536 Y=1201,413	11. DATUM FOR ELEVATION SHOWN (TBM or MSL): MLLW; NAD 27, FL West
3. DRILLING AGENCY: ARDAMAN & ASSOCIATES, INC.	12. MANUFACTURER'S DESIGNATION OF DRILL: CME 45 on Barge
4. HOLE NO. (As shown on drawing title and file number): CB-MANOO-3	13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN: disturbed: 29 undisturbed: 0
5. NAME OF DRILLER: M. Lane	14. TOTAL NUMBER OF CORE BOXES: 0
6. DIRECTION OF HOLE: ☒ VERTICAL ☐ INCLINED	15. ELEVATION GROUND WATER: Tide +0.8
7. THICKNESS OF BURDEN: 43.5 Ft.	16. DATE HOLE STARTED COMPLETED: 06/08/00 06/09/00
8. DEPTH DRILLED INTO ROCK: 0 Ft.	17. ELEVATION TOP OF HOLE: -3.8 Ft.
9. TOTAL DEPTH OF HOLE: 43.5 Ft.	18. TOTAL CORE RECOVERY FOR BORING: 91 %
	19. SIGNATURE OF GEOLOGIST: ROCKLAND B. BURR, P.G.

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	CORE REC %	SAMPLE NUMBER	REMARKS	BLOWS/.5'
-3.8	.0					-3.8	
			SAND, fine grained quartz, trace shell, trace shell gravel, trace silt, gray (SP)	50	1	Splitspoon	2, 3, 4
-5.3	1.5					-5.3	
			SAND, fine grained quartz, trace silt, gray (SP-SM)	50	2	Splitspoon	3, 3, 2
			Little shell			-6.8	
				50	3	Splitspoon	3, 10, 12
-8.3	4.5					-8.3	
			CLAY, some gravel-sized sandstone, little sand, trace shell, gray, moderately soft (CL)	50	4	Splitspoon	10, 8, 5
-9.8	6.0					-9.8	
			CLAY, little sand, trace shell, green-gray, moderately soft (CL)	100	5	Splitspoon	20, 5, 3
						-11.3	
				100	6	Splitspoon	4, 6, 16
-12.6	8.8					-12.8	
			SAND, fine to medium grained sand and fine grained phosphatic sand, little clay, trace gravel-sized sandstone, brown (SC)	100	7	Splitspoon	39, 15, 30
-14.3	10.5					-14.3	
			SAND, fine grained quartz and phosphatic sand, trace clay laminations and little gravel-sized sandstone, brown (SP)	100	8	Splitspoon	47, 32, 31
-15.8	12.0					-15.8	
			Thin layers of sandstone	75	9	Splitspoon	8, 10, 43
			SAND, fine grained quartz and phosphatic sand, little sandstone laminations, trace clay, brown (SP)			-17.3	
				100	10	Splitspoon	28, 18, 22
-18.8	15.0					-18.8	
			CLAY, laminations of sand, thin layer of gray sandstone at 15.5' (CL)	100	11	Splitspoon	15, 100/6, TC
						-20.3	
				100	12	Splitspoon	15, 15, 16
						-21.8	
				100	13	Splitspoon	9, 12, 18
						-23.3	
				100	14	Splitspoon	5, 8, 13
						-24.8	
				100	15	Splitspoon	7, 16, 17
			Lens of gray phosphatic sand			-26.3	
						(continued)	

0 | 2.5 | 5 | 7.5 | 10 | 12.5 | 15 | 17.5 | 20 | 22.5

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. MAR 71

PROJECT: Manatee Harbor | HOLE NUMBER: CB-MANOO-3

Hole No. CB-MAN00-3

DRILLING LOG (Cont. Sheet)

ELEVATION TOP OF HOLE: -3.8 Ft.

SHEET 2 OF 2

PROJECT: Manatee Harbor

INSTALLATION: Jacksonville District

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	CORE REC %	SAMPLE NUMBER	REMARKS	BLOWS/ 5"
-26.3	22.5					-26.3	
				100	16	Splitspoon	6, 10, 22
						-27.6	
				100	17	Splitspoon	5, 13, 22
						-29.3	
				100	18	Splitspoon	8, 16, 21
-30.6	27.0					-30.8	
			SAND, fine grained phosphate and quartz, laminations of clay (SP-SM)	100	19	Splitspoon	8, 8, 19
-32.3	28.5					-32.3	
-32.8	29.0		CLAY, little phosphatic sand, trace shell, dark gray, firm (CL)	100	20	Splitspoon	3, 19, 37
			CLAY, phosphatic sand laminations, trace gravel-sized sandstone, gray, firm (CL)			-33.8	
			Trace phosphatic sand.	100	21	Splitspoon	6, 12, 19
-35.3	31.5					-35.3	
			CLAY, little phosphatic sand, trace shell gravel, gray, moderately soft (CL)	100	22	Splitspoon	6, 7, 8
-36.8	33.0					-36.8	
			CLAY, some phosphatic sand, trace gravel-sized sandstone, light gray, firm (CL)	100	23	Splitspoon	3, 7, 24
						-38.3	
				100	24	Splitspoon	16, 41, 60
-40.3	36.5					-39.8	
			CLAY, little phosphatic sand with sandstone layers, gray, firm (CL)	100	25	Splitspoon	15, 100/2
						-41.3	75
				100	26	Splitspoon	26, 30, 27
-42.5	38.7					-42.8	
			SAND, fine grained quartz, phosphatic sand, thin layer of sandstone at 39.5', gray (SP)	100	27	Splitspoon	12, 33, 22
-44.3	40.5					-44.3	
			SAND, fine grained quartz and phosphatic sand, thin layers of stiff clay, gray (SP)	100	28	Splitspoon	8, 90, 50/2
-45.8	42.0					-45.8	
			CLAY, some phosphatic sand, gray, moderately soft (CL)	100	29	Splitspoon	13, 17, 18
-47.3	43.5					-47.3	
			End of Boring at 43.5'				

NOTES:

1. Soils are field visually classified in accordance with the Unified Soils Classification System.

2. Laboratory Analysis Results

Sample Elevation	Classification
-5.3 to -6.3	SP-SM
-8.3 to -9.8	SC
-15.8 to -17.3	SM
-21.8 to -23.3	CL
-27.8 to -29.3	SC
-36.3 to -39.8	CL
-42.8 to -44.3	SM
-45.8 to -47.3	SC

3. 140# hammer with 30" drop used on 2.0' splitspoon (1 3/8" I.D. x x 2" O.D.)

4. X, Y coordinates provided by Trimble DGPS Model Pro XR, not verified by a Registered Land Surveyor. Elevations provided

END FORM 1836 MAR 71 PREVIOUS EDITIONS ARE OBSOLETE.

PROJECT: Manatee Harbor

HOLE NUMBER: CB-MAN00-3

Hole No.CB-MAN00-4

DRILLING LOG

DIVISION: South Atlantic

INSTALLATION: Jacksonville District

1. PROJECT: Manatee Harbor
2. LOCATION (Coordinates or Station): X=316,626 Y=1201,027
3. DRILLING AGENCY: ARDAMAN & ASSOCIATES, INC.
4. HOLE NO. (As shown on drawing title and file number): CB-MAN00-4
6. NAME OF DRILLER: A. Singleton
8. DIRECTION OF HOLE: ☒ VERTICAL ☐ INCLINED
7. THICKNESS OF BURDEN: 43.5 Ft.
8. DEPTH DRILLED INTO ROCK: 0 Ft.
9. TOTAL DEPTH OF HOLE: 43.5 Ft.
10. SIZE AND TYPE OF BIT: 2 15/16 Tricone + NW Casing
11. DATUM FOR ELEVATION SHOWN (TBM or MSL): MLLW; NAD 27, FL West
12. MANUFACTURER'S DESIGNATION OF DRILL: CME 45 on Barge
13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN: disturbed: 29 undisturbed: 0
14. TOTAL NUMBER OF CORE BOXES: 0
15. ELEVATION GROUND WATER: Tide +0.8
16. DATE HOLE STARTED / COMPLETED: 06/12/00 06/12/00
17. ELEVATION TOP OF HOLE: -4.2 Ft.
18. TOTAL CORE RECOVERY FOR BORING: 95 %
19. SIGNATURE OF GEOLOGIST: ROCKLAND B. BURR, P.G.

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	CORE REC %	SAMPLE NUMBER	REMARKS	BLOWS/.5'
-4.2	.0					-4.2	
			SAND, fine to coarse grained quartz, little shell, trace silt, gray (SP)	75	1	Splitspoon	1, 2, 3
-6.2	2.0					-5.7	
			SAND, fine grained quartz, trace silt (SP)	75	2	Splitspoon	2, 4, 8
-7.2	3.0					-7.2	
-7.7	3.5		SANDSTONE, fine grained, hard, dark gray (SS)	100	3	Splitspoon	32, 52, 25
			SAND, fine to medium grained, silty, gray (SM)			-8.7	
				100	4	Splitspoon	8, 47, 8
-10.2	6.0					-10.2	
			SAND, fine grained, silty, a little gravel-sized sandstone, brown (SM)	100	5	Splitspoon	5, 12, 9
						-11.7	
				100	6	Splitspoon	18, 13, 20
-13.2	9.0					-13.2	
			Lenses of CLAY, SAND, SILT and sandstone, brown (CL)	100	7	Splitspoon	17, 22, 16
						-14.7	
-15.7	11.5			100	8	Splitspoon	2, 12, 9
			SAND, fine grained quartz and phosphate, trace silt, brown (SP-SM)			-16.2	
				100	9	Splitspoon	6, 5, 6
						-17.7	
			Laminations of clay	100	10	Splitspoon	12, 19, 18
						-19.2	
				100	11	Splitspoon	4, 6, 6
						-20.7	
-21.2	17.0			100	12	Splitspoon	8, 72, 23
			CLAY, lenses and laminations of sand, soft to medium (CH)			-22.2	
				100	13	Splitspoon	5, 5, 10
						-23.7	
				100	14	Splitspoon	6, 10, 12
						-25.2	
				100	15	Splitspoon	8, 9, 12
						-26.7	
						(continued)	

0 2.5 5 7.5 10 12.5 15 17.5 20 22.5

Hole No. CB-MAN00-4

DRILLING LOG (Cont. Sheet)

ELEVATION TOP OF HOLE -4.2 Ft.

SHEET 2 OF 2

PROJECT: Manatee Harbor

INSTALLATION: Jacksonville District

ELEV.	DEPTH	CLASSIFICATION OF MATERIALS (Description)	CORE REC %	SAMPLE NUMBER	REMARKS	BLOWS/6"
-26.7	22.5				-26.7	13
-28.2	24.0	1/2" seam of sandstone	100	16	Splitspoon	30
		CLAY, lenses and laminatiosn of sand, trace of gravel-sized sandstone, medium to hard (CL)			-28.2	24
			100	17	Splitspoon	9
					-29.7	11
						25
			100	18	Splitspoon	100/3
		Lens of sandstone from 25.7' to 26.5'			-31.2	TC
						TC
-32.7	28.5		100	19	Splitspoon	33
		CLAY, laminations of sandstone and sand, hard, gray (CL)			-32.7	30
						31
			100	20	Splitspoon	16
					-34.2	29
						42
			100	21	Splitspoon	86
					-35.7	89
						43
			100	22	Splitspoon	13
-37.2	33.0				-37.2	97
		SAND, some clay, lenses to clay and coarse sand, gray (SC)				100/3
			100	23	Splitspoon	22
					-38.7	20
						30
			100	24	Splitspoon	100/2
					-40.2	27
						41
-41.2	37.0		100	25	Splitspoon	13
-41.7	37.5	SAND, fine to coarse grained quartz and phosphate, trace silt, gray (SP)			-41.7	35
		CLAY, little sand, gray, hard (CL)				53
			100	26	Splitspoon	16
					-43.2	18
						19
		SANDSTONE, fine grained quartz, trace phosphatic sand, hard, gray (SS)	100	27		51
					-44.7	100/2
		CLAY, little sand, gray (CL)				100/5
				28	4 x 5.5 Core 39.5' to 43.5' DT = 35 min. WL = 10% WP = 20 psi	
					-46.2	
				29		
-47.7	43.5				-47.7	
		End of Boring at 43.5'				

NOTES:

1. Soils are field visually classified in accordance with the Unified Soils Classification System.

2. Laboratory Analysis Results

Sample Elevation	Classification
-5.7 to -7.2	SP-SM
-11.7 to -13.2	SM, Gs=2.84
-16.2 to -17.7	SM
-22.2 to -23.7	CH, LL=103, PL=41, PI=62
-31.2 to -32.7	CL
-34.2 to -35.7	SM
-37.2 to -38.7	SC
-44.7 to -46.2	SC

3. 140# hammer with 30" drop used [illegible] Splitspoon [illegible] x 2" O.D.)

4. X, Y coordinates provided by a Trimble DGPS Model Pro XR.

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. MAR 71

PROJECT: Manatee Harbor

HOLE NUMBER: CB-MAN00-4

Hole No.CB-MANOO-5

DRILLING LOG | DIVISION: South Atlantic | INSTALLATION: Jacksonville District | SHEET 1 OF 2

1. PROJECT: Manatee Harbor
2. LOCATION (Coordinates or Station): X=317,140 Y=1200,784
3. DRILLING AGENCY: ARDAMAN & ASSOCIATES, INC.
4. HOLE NO. (As shown on drawing title and file number): CB-MANOO-5
5. NAME OF DRILLER: T. Midgette
6. DIRECTION OF HOLE: ☒ VERTICAL ☐ INCLINED
7. THICKNESS OF BURDEN: 45.0 Ft.
8. DEPTH DRILLED INTO ROCK: 0 Ft.
9. TOTAL DEPTH OF HOLE: 45.0 Ft.
10. SIZE AND TYPE OF BIT: 2 15/16 Tricone + NW Casing
11. DATUM FOR ELEVATION SHOWN (TBM or MSL): MLLW; NAD 27, FL West
12. MANUFACTURER'S DESIGNATION OF DRILL: CME 45 on Barge
13. TOTAL NO. OF OVERBURDEN SAMPLES TAKEN: disturbed: 30 undisturbed: 0
14. TOTAL NUMBER OF CORE BOXES: 1
15. ELEVATION GROUND WATER: Tide = +0.8
16. DATE HOLE STARTED COMPLETED: 06/20/00 06/20/00
17. ELEVATION TOP OF HOLE: -3.2 Ft.
18. TOTAL CORE RECOVERY FOR BORING: 99 %
19. SIGNATURE OF GEOLOGIST: ROCKLAND B. BURR, P.G.

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	CORE REC %	SAMPLE NUMBER	REMARKS	BLOWS/.5'
-3.2	0					-3.2	
			SAND, fine to coarse grained quartz, little shell, little silt, dark brown (SM)	50	1	Splitspoon	1, 2, 4
-4.7							
-5.7	2.5			100	2	Splitspoon	5, 4, 15
-6.2			CLAY, little gravel-size sandstone, medium grained, gray (CL)				
				100	3	Splitspoon	14, 9, 16
-7.7							
-8.2	5.0			100	4	Splitspoon	10, 4, 8
-9.2			CLAY, laminations of fine grained phosphatic sand, medium grained, gray/brown (CH)				
				100	5	Splitspoon	3, 4, 7
-10.7							
				100	6	Splitspoon	5, 5, 8
-12.2							
				100	7	Splitspoon	4, 5, 11
-13.7							
				100	8	Splitspoon	5, 8, 12
-15.2							
			Lens of fine grained phosphatic sand @ 12.0'	100	9	Splitspoon	6, 11, 13
-16.7							
-17.2	14.0			100	10	Splitspoon	6, 11, 17
-18.2			CLAY, laminations of fine grained, dark gray sand, medium to stiff, gray (CH)				
				100	11	Splitspoon	8, 9, 13
-19.7							
-20.2	17.0			100	12	Splitspoon	9, 13, 18
-21.2			CLAY, laminations of fine grained, dark gray sand, medium grained, dark green (CH)				
				100	13	Splitspoon	6, 14, 50
-22.2	19.0					-22.7	
-22.7			SANDSTONE, fine grained quartz, laminations of clay, gray (SS)	100	14	Splitspoon	100, 50/3
-23.7	20.5					-24.2	72
-24.2			CLAY, thin layers of sandstone, laminations of green CH clay, hard, gray (CL)	100	15	Splitspoon	7, 49, 100/4
-25.7						-25.7	
						(continued)	

0 | 2.5 | 5 | 7.5 | 10 | 12.5 | 15 | 17.5 | 20 | 22.5

Hole No. CB-MANOO-5

DRILLING LOG (Cont. Sheet)

ELEVATION TOP OF ROCK -3.2 Ft.

SHEET 2 OF 2

PROJECT: Manatee Harbor

INSTALLATION: Jacksonville District

ELEV.	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	CORE REC %	SAMPLE NUMBER	REMARKS	BLOWS/.5'
-25.7	22.5					-25.7	
-26.2	23.0		CLAY, laminations of fine grained, gray sand, stiff, green/gray (CH)	100	16	Splitspoon -27.2	100/3, 27, 19
				100	17	Splitspoon -28.7	9, 11, 12
-29.2	26.0		SAND, fine grained with clay, dark gray (SC)	100	18	Splitspoon -30.2	7, 52, 35
-31.7	28.5		Thin layer of sandstone	100	19	Splitspoon -31.7	9, 32, 100/5
			CLAY, thin layers of sandstone, hard, gray, laminations of sand (CL)	100	20	Splitspoon -33.2	48, 35, 88
-34.7	31.5			100	21	Splitspoon -34.7	9, 28, 26
			SAND, fine grained, clayey, gray (SC)	100	22	Splitspoon -36.2	14, 18, 28
				100	23	Splitspoon -37.7	6, 8, 13
-38.7	35.5			100	24	Splitspoon -39.2	6, 26, 100
			CLAY, thin layers of sandstone, little sand, hard, gray (CL)	100	25	Splitspoon -40.7	47, 100, 55
-42.2	39.0			100	26	Splitspoon -42.2	40, 77, 36
			CLAY, some sand, gray (CL)	100	27	Splitspoon -43.7	5, 9, 16
-44.7	41.5			100	28	Splitspoon -45.2	6, 12, 37
			CLAY, laminations of fine grained sand, gray (CH)	100	29	Splitspoon -46.7	25, 29, 30
-48.2	45.0			100	30	Splitspoon -48.2	15, 18, 50/3
			End of Boring at 45.0'				

NOTES:

1. Soils are field visually classified in accordance with the Unified Soils Classification System.

2. Laboratory Analysis Results

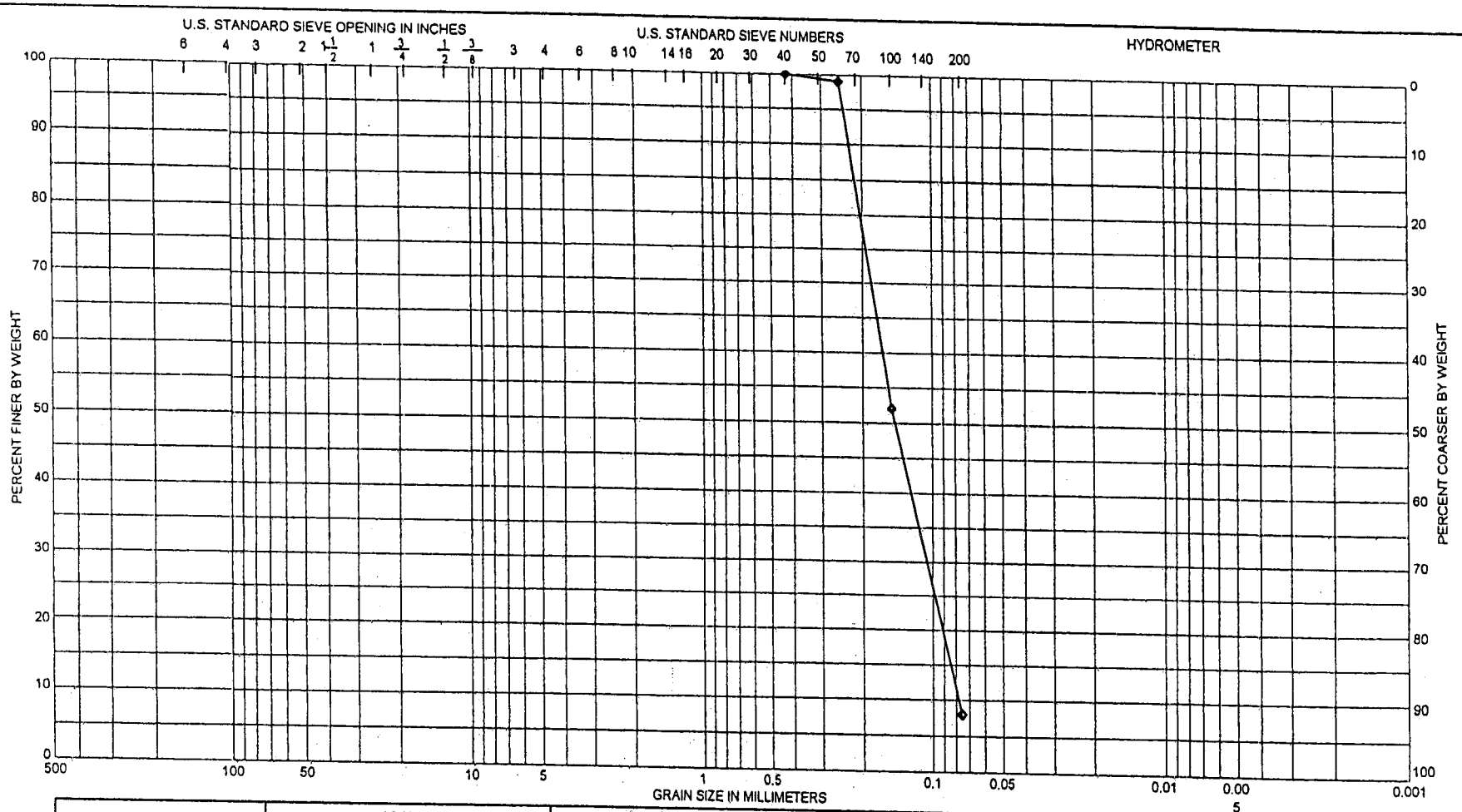
Sample Elevation	Classification
-3.2 to -4.7	SP-SM
-10.7 to -12.2	SC
-27.2 to -28.7	SC
-30.2 to -31.7	SC
-36.2 to -37.7	SC, LL=36, PL=25,
-39.2 to -40.7	SC
-42.2 to -43.7	SC; Gs=2.63

ENG FORM 1836 PREVIOUS EDITIONS ARE OBSOLETE. MAR 71

PROJECT: Manatee Harbor

HOLE NUMBER: CB-MANOO-5

LABORATORY ANALYSIS



Sample No.	Elev or Depth	Classification	Nat w %	LL	PL	PI
16	-27.5 to -29.0	SP - SM		NP	NP	NP

GRADATION CURVES

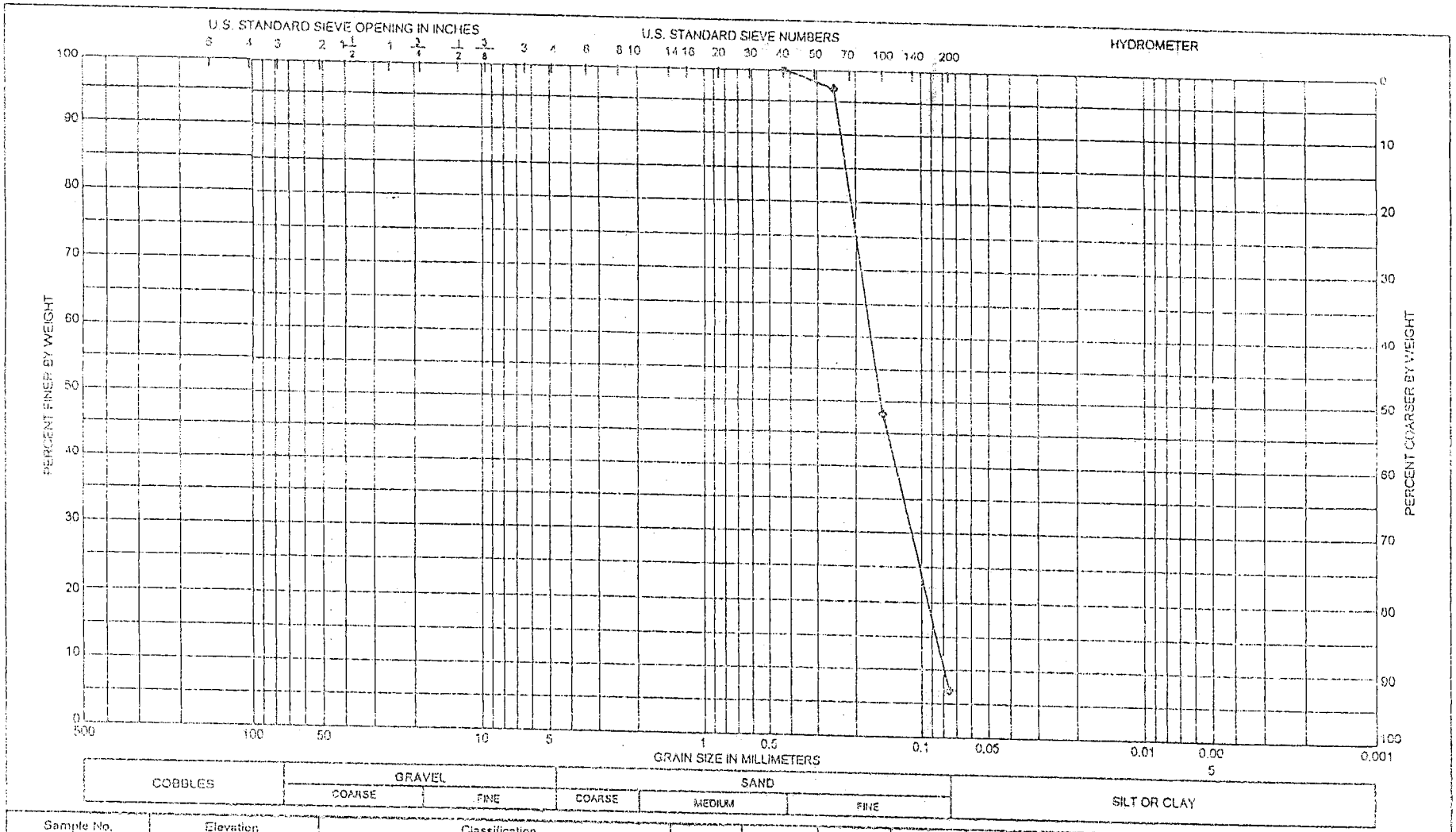
Project MANATEE HARBOR

Area MANATEE COUNTY

Boring No. CB-MAN00-1

Date JUNE 2000

EN FORM 1 MAY 63 2087



Sample No.	Elevation	Classification	Nat w %	LL	PL	PI
11	-20.0 to -21.5	SP - SM				

GRADATION CURVES

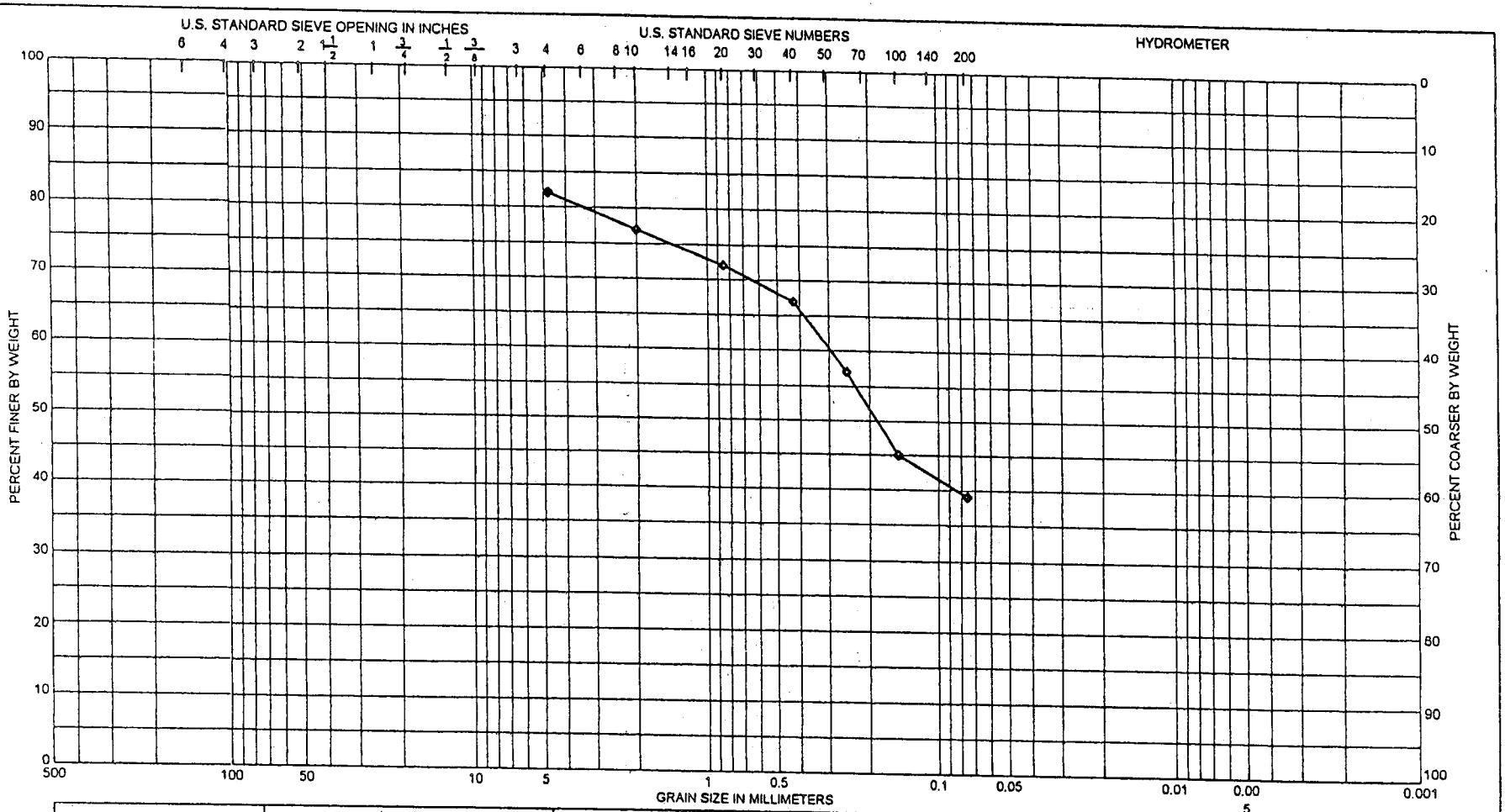
Project: MANATEE HARBOR

Area: MANATEE COUNTY

Boring No.: CB-MAN00-1

Date: JUNE 2000

EN FORM 1 MAY 63 2087



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

Sample No.	Elevation	Classification	Nat w %	LL	PL	PI
5	-11.0 to -12.5	SC				

GRADATION CURVES

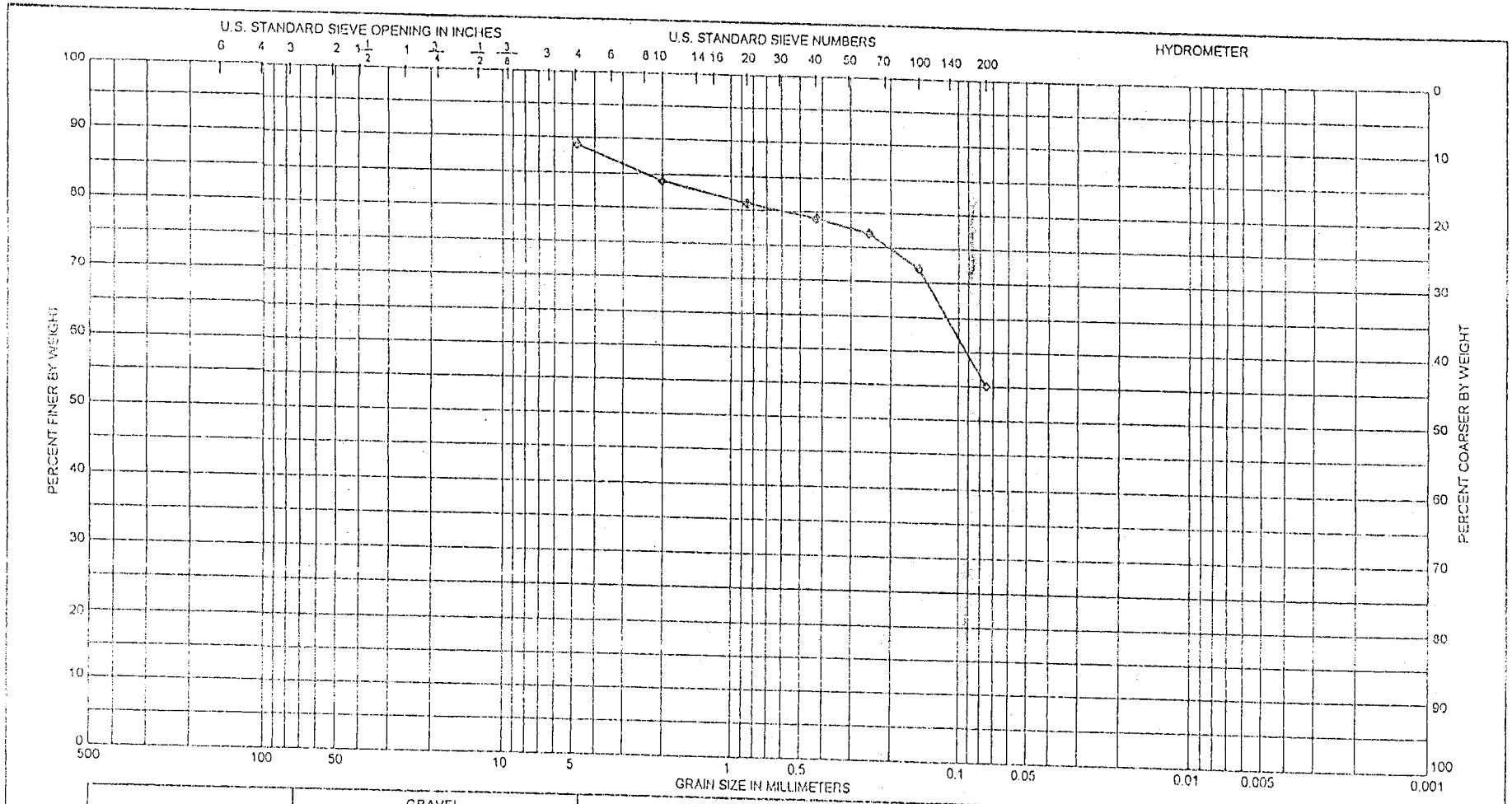
Project: MANATEE HARBOR

Area: MANATEE COUNTY

Boring No.: CB-MAN00-1

Date: JUNE 2000

EN FORM 1 MAY 63 2087



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

Sample No.	Elevation	Classification	Gs	LL	PL	PI
3	-8.0 to -9.5	CH	2.81			

GRADATION CURVES

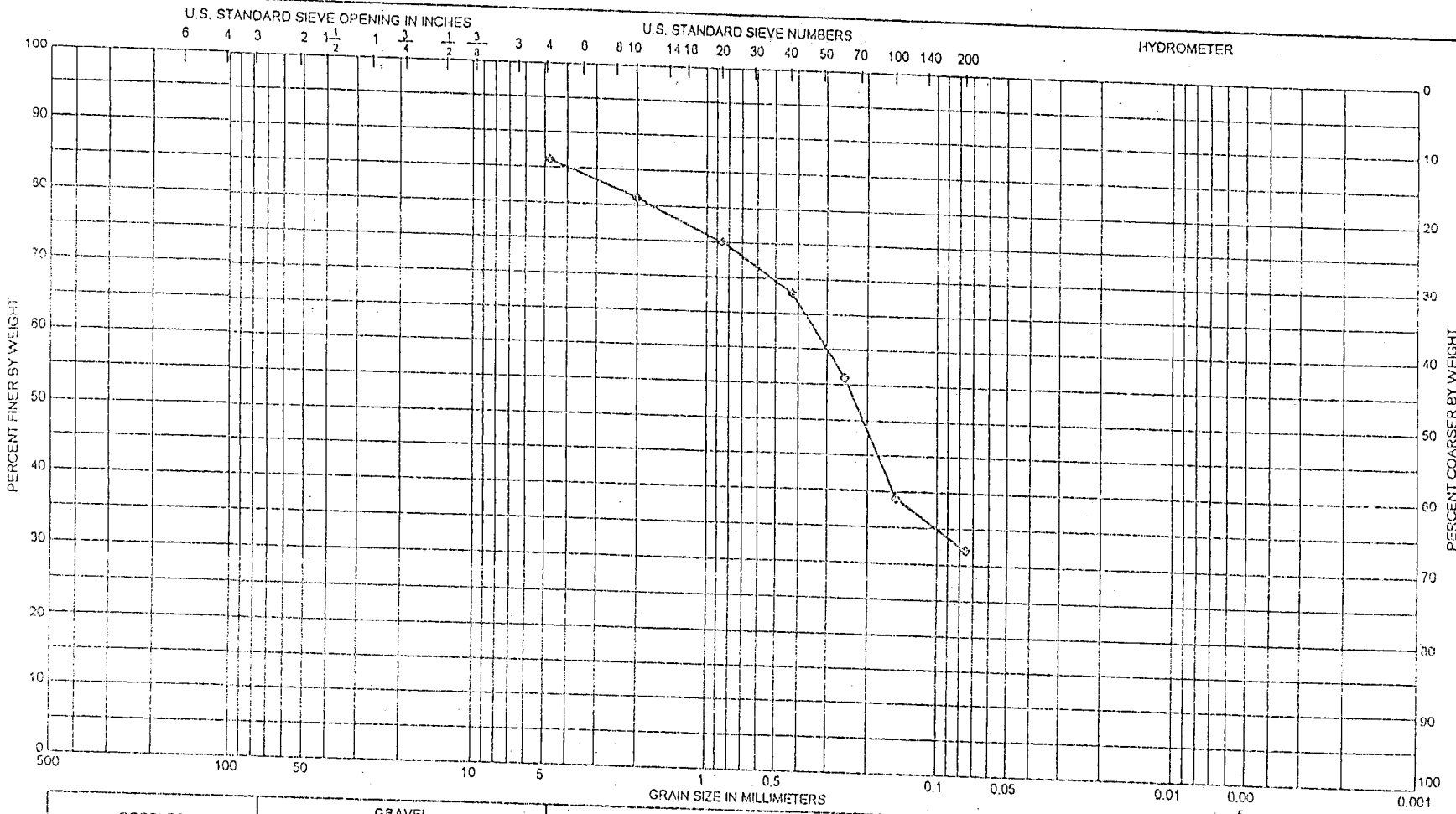
Project: MANATEE HARBOR

Area: MANATEE COUNTY

Boring No.: CB-MAN00-1

Date: JUNE 2000

EN FORM 1 MAY 63 2087



Sample No.	Elev or Depth	Classification	Nat w %	LL	PL	PI
21	-35.0 to -36.5	SC				

GRADATION CURVES

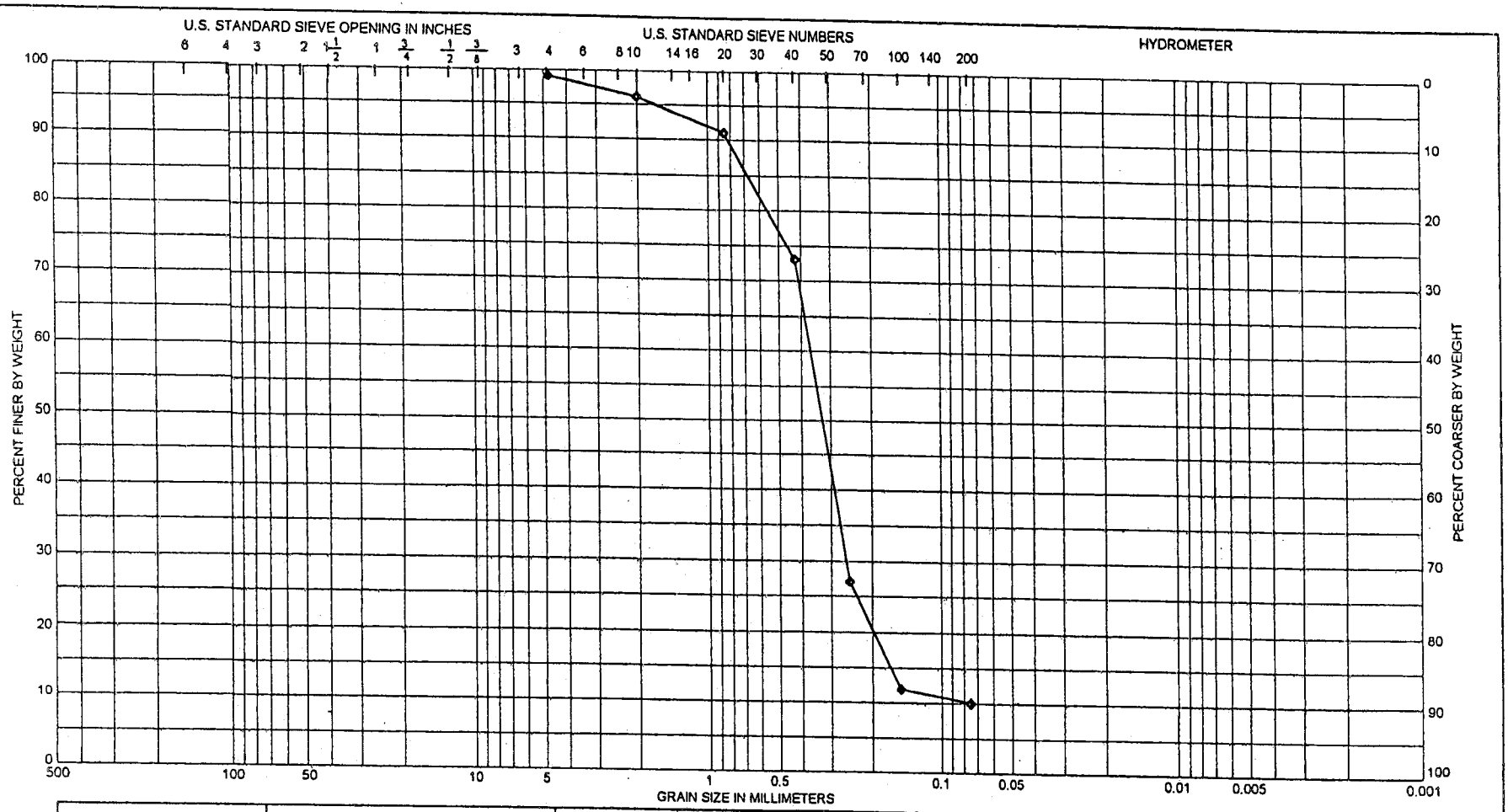
Project: MANATEE HARBOR

Area: MANATEE COUNTY

Boring No.: CB-MAN00-1

Date: JUNE 2000

EN FORM 1 MAY 63 2087



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

Sample No.	Elevation	Classification	Gs	LL	PL	PI
26	-42.5 to -44	SP-SM				

GRADATION CURVES

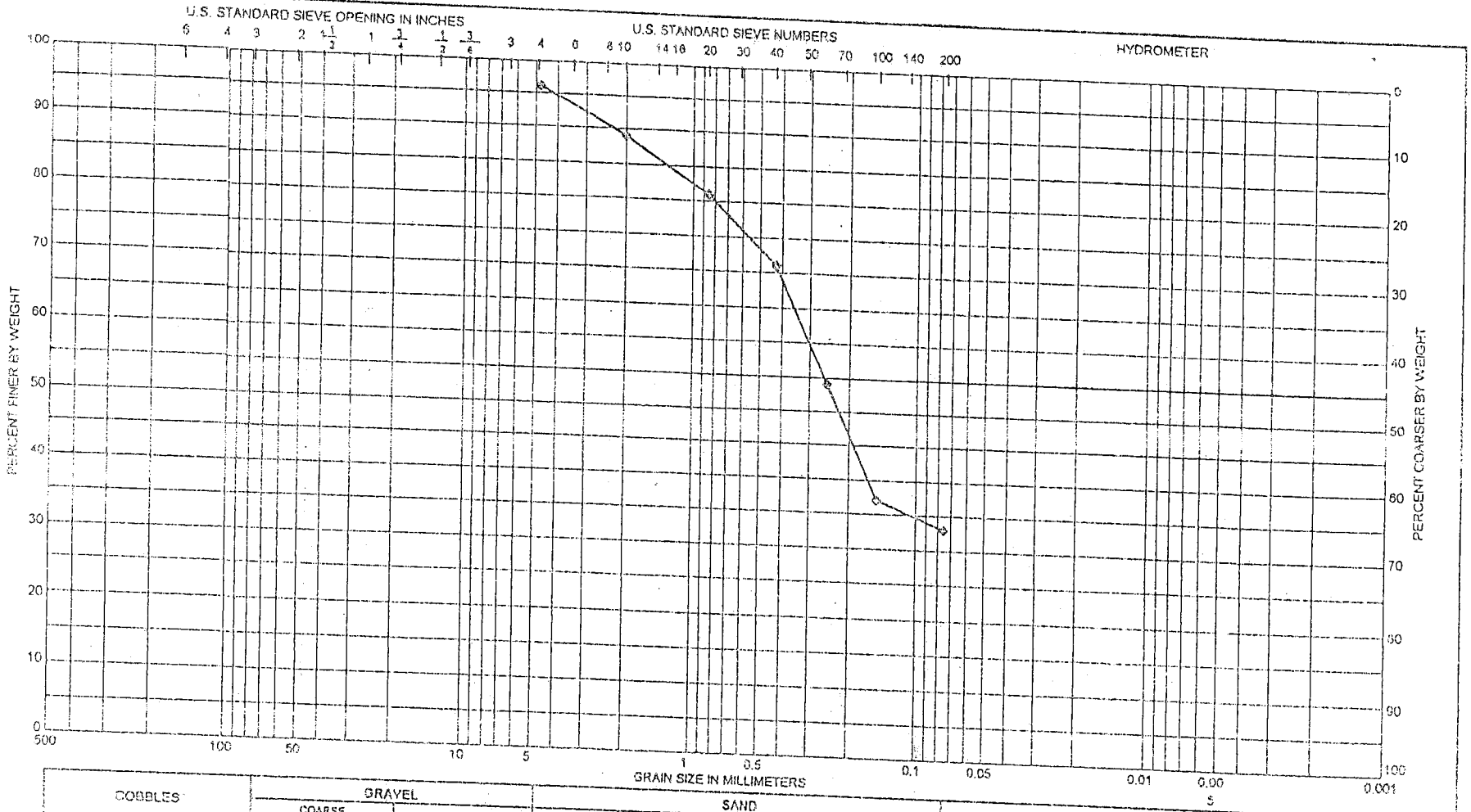
Project MANATEE HARBOR

Area MANATEE COUNTY

Boring No. CB-MAN00-1

Date JUNE 2000

EN FORM 1 MAY 63 2087



Sample No.	Elevation	Classification	Nat w %	LL	PL	PI
28	-45.5 to -47.0	SC				

GRADATION CURVES

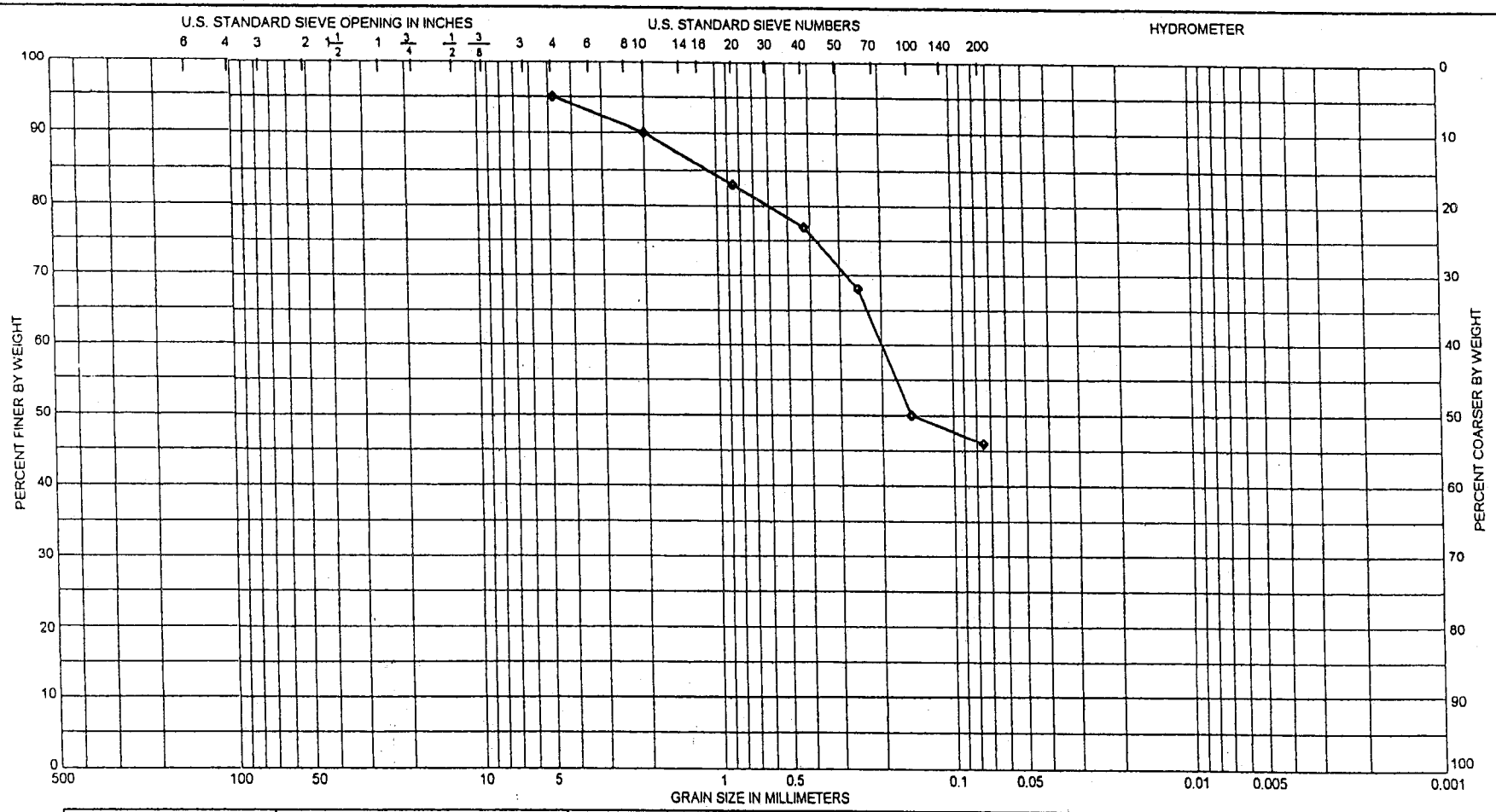
Project MANATEE HARBOR

Area MANATEE COUNTY

Boring No. CB-MAN00-1

Date JUNE 2000

EN FORM 1 MAY 63 2087



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

Sample No.	Elevation	Classification	Gs	LL	PL	PI
5	-11.5 to -13.0	SP - SM				

GRADATION CURVES

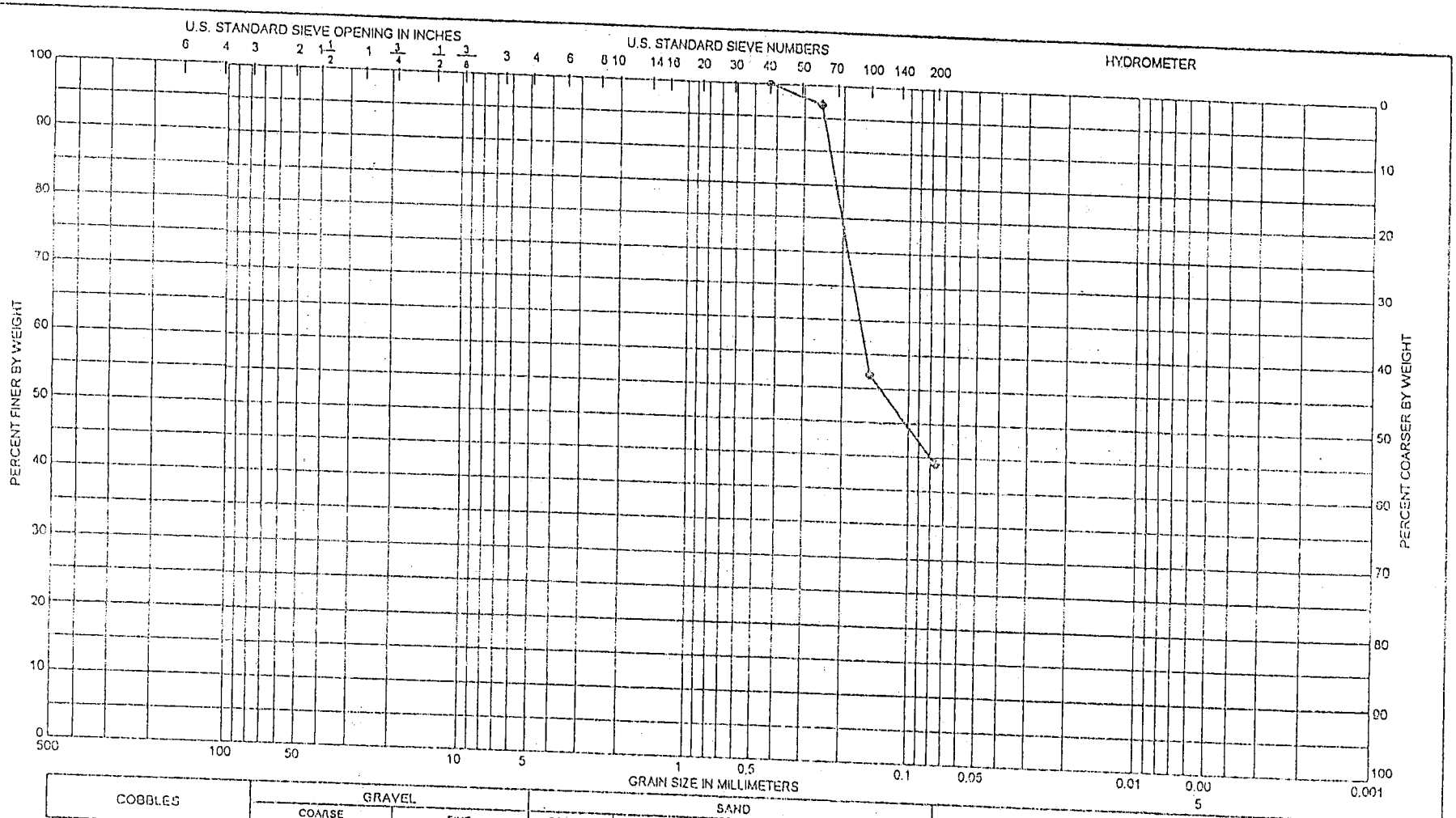
Project MANATEE HARBOR

Area MANATEE COUNTY

Boring No. CB-MAN00-2

Date JUNE 2000

EN FORM 1 MAY 63 208



Sample No.	Elevation	Classification	Nat w %	LL	PL	PI
12	-22.0 to -23.5	SC				

GRADATION CURVES

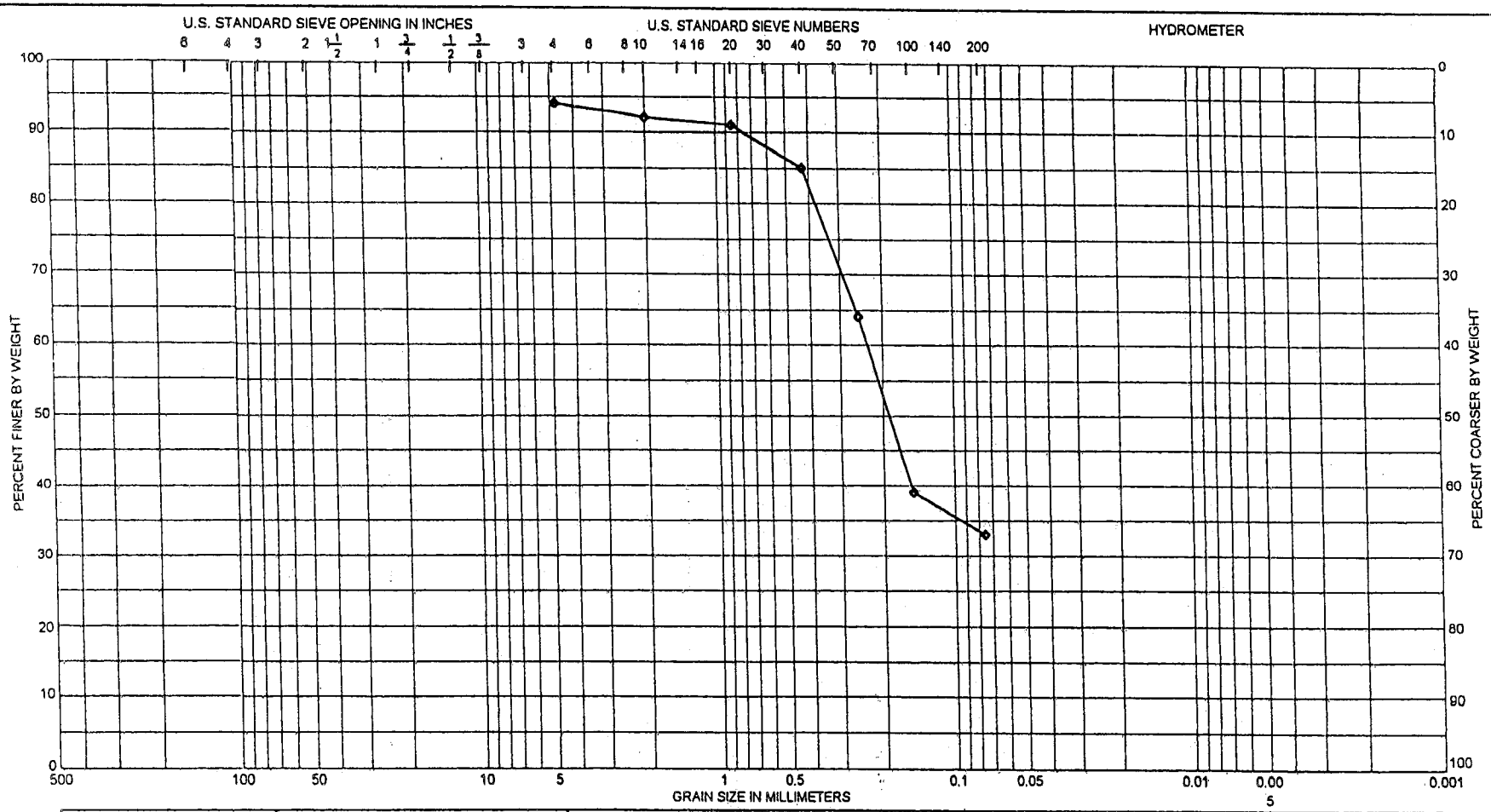
Project MANATEE HARBOR

Area MANATEE COUNTY

Boring No. CB-MAN00-2

Date JUNE 2000

EN FORM 1 MAY 63 2087



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

Sample No.	Elevation	Classification	Nat w %	LL	PL	PI
15	-26.5 to -28.0	SC				

GRADATION CURVES

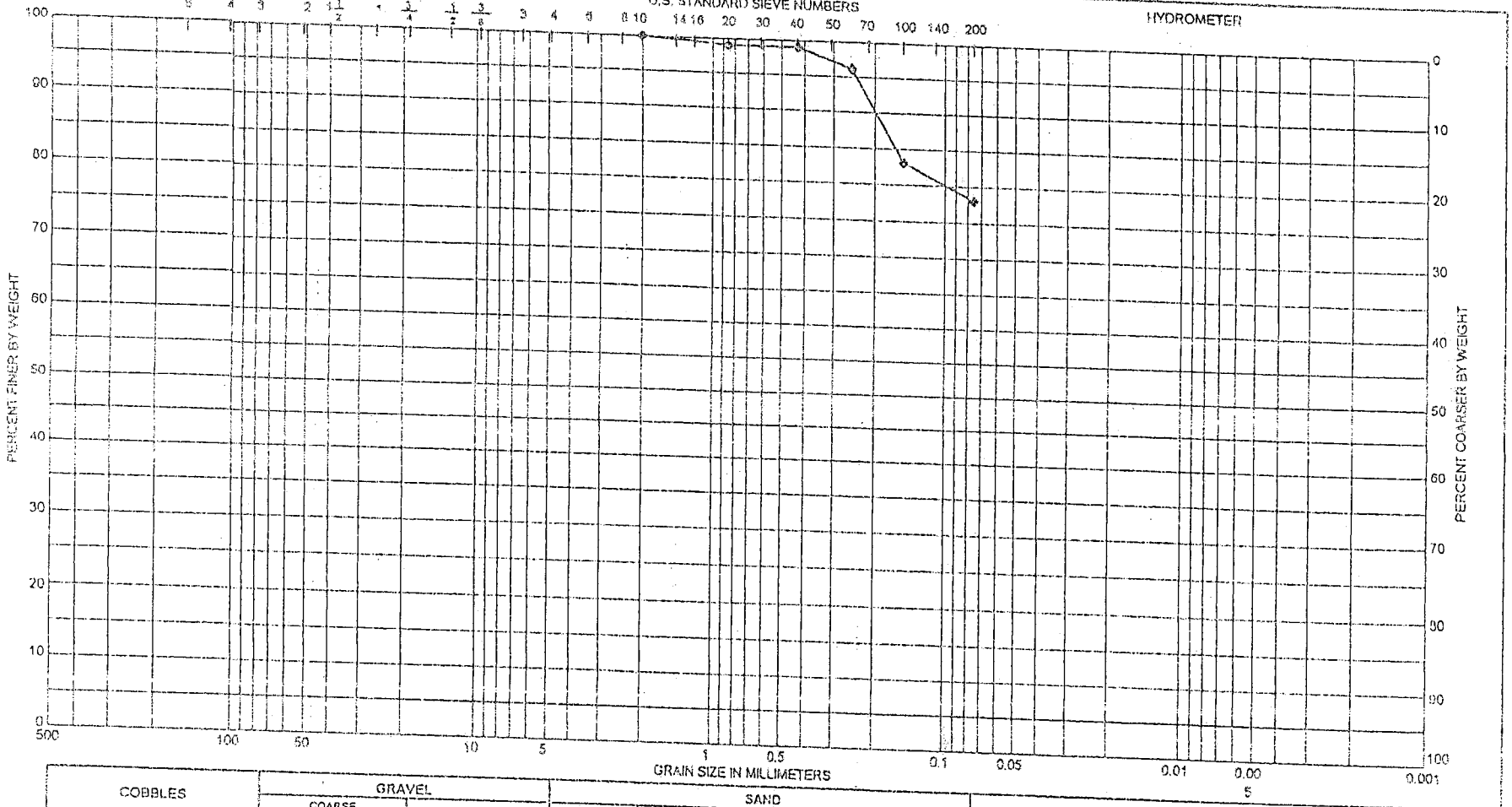
Project MANATEE HARBOR

Area MANATEE COUNTY

Boring No. CB-MAN00-2

Date JUNE 2000

EN FORM 1 MAY 63 2087



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

Sample No.	Elev or Depth	Classification	Nat w %	LL	PL	PI
18	-31.0 to -32.5	CH				

GRADATION CURVES

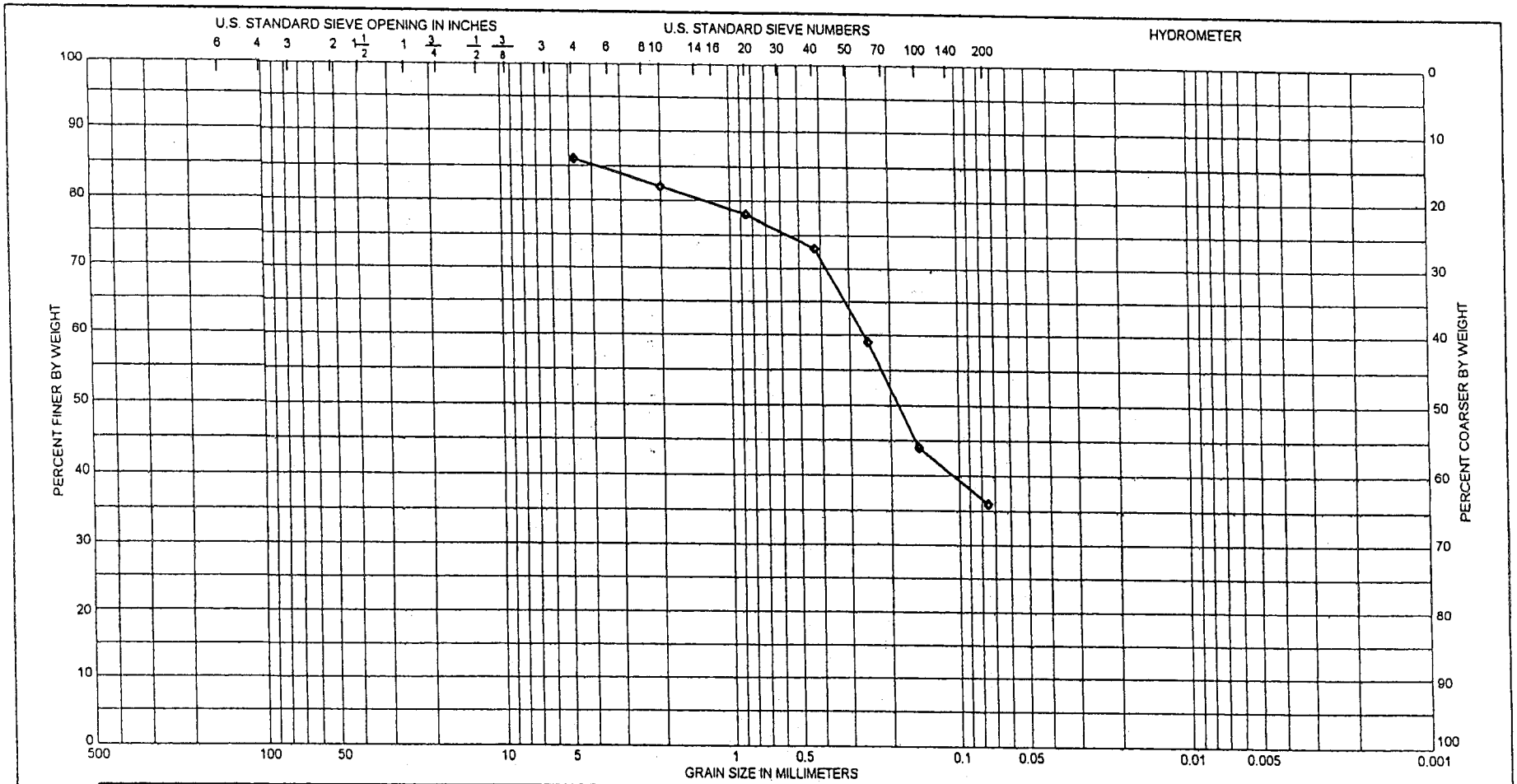
Project: MANATEE HARBOR

Area: MANATEE COUNTY

Boring No.: CB-MAN00-2

Date: JUNE 2000

EN FORM 1 MAY 63 2087



Sample No.	Elevation	Classification	Gs	LL	PL	PI
21	-35.5 to -37.0	SC				

GRADATION CURVES

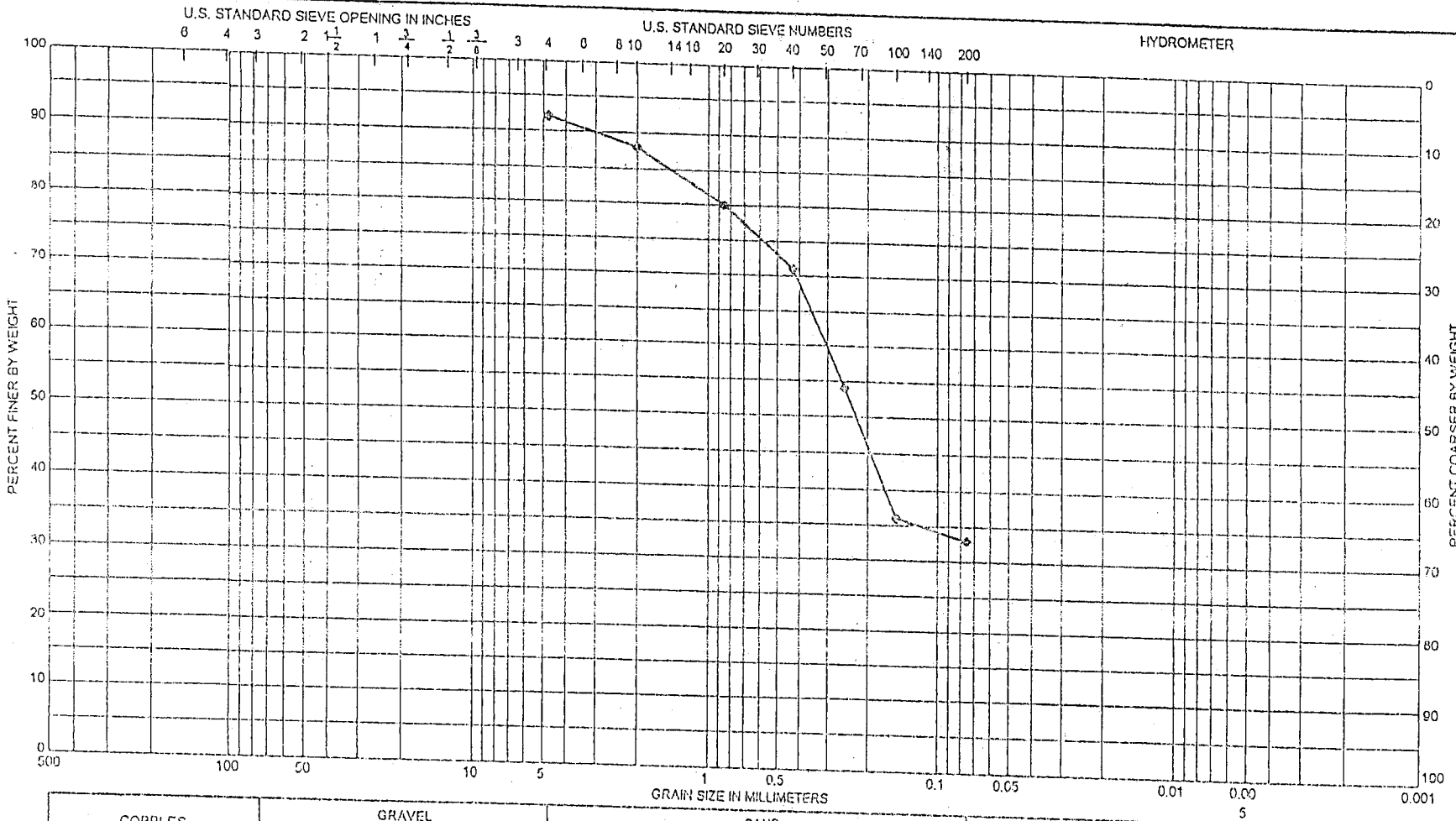
Project: MANATEE HARBOR

Area: MANATEE COUNTY

Boring No.: CB-MAN00-2

Date: JUNE 2000

EN FORM 1 MAY 63 2087



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

Sample No.	Elevation	Classification	Nat w %	LL	PL	PI
28	-46.0 to -47.5	SC				

GRADATION CURVES

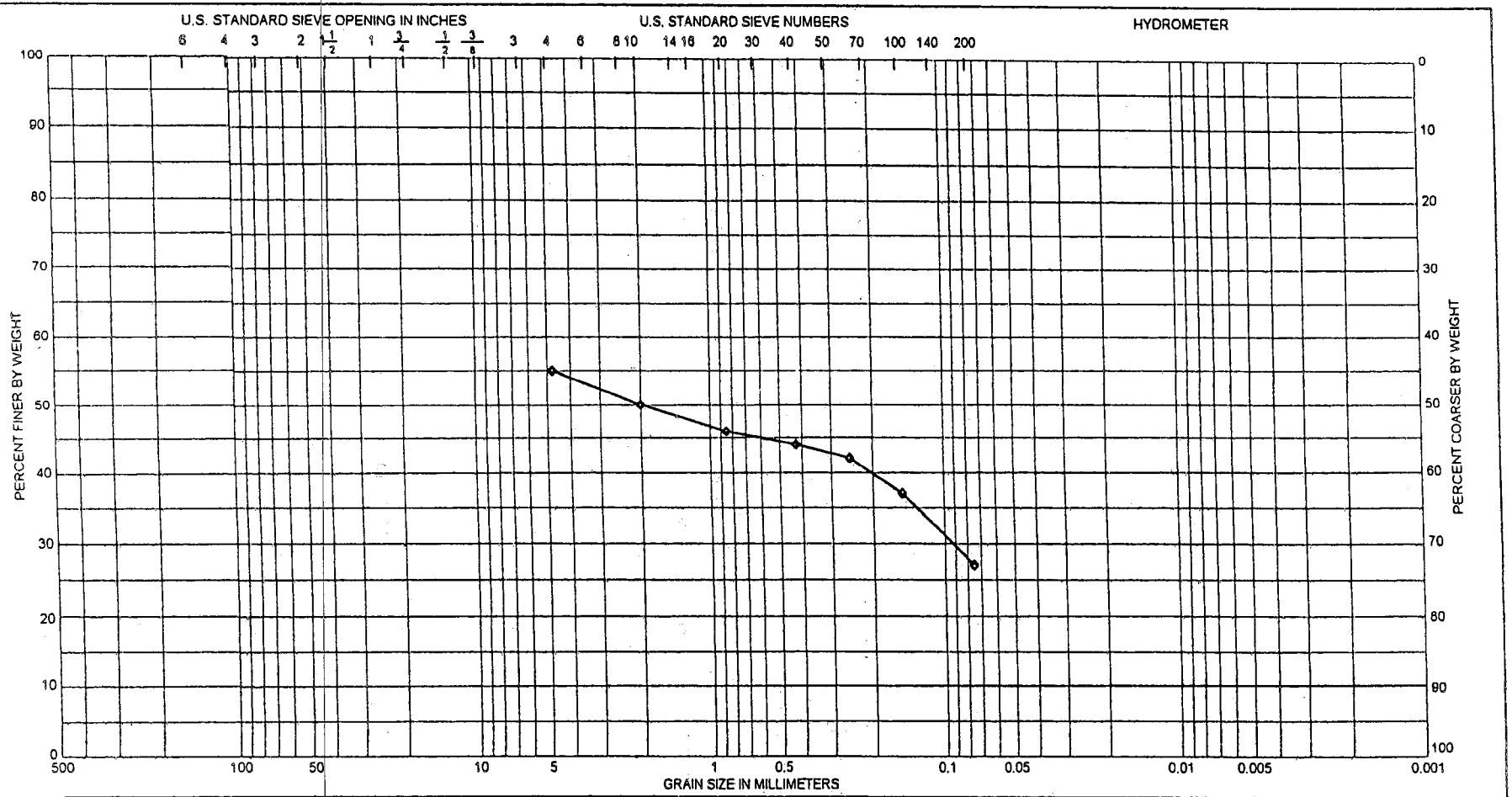
Project: MANATEE HARBOR

Area: MANATEE COUNTY

Boring No.: CB-MAN00-2

Date: JUNE 2000

EN FORM 1 MAY 63 2087



Sample No.	Elevation	Classification	Gs	LL	PL	PI
4	-8.3 to -9.8	SC				

GRADATION CURVES

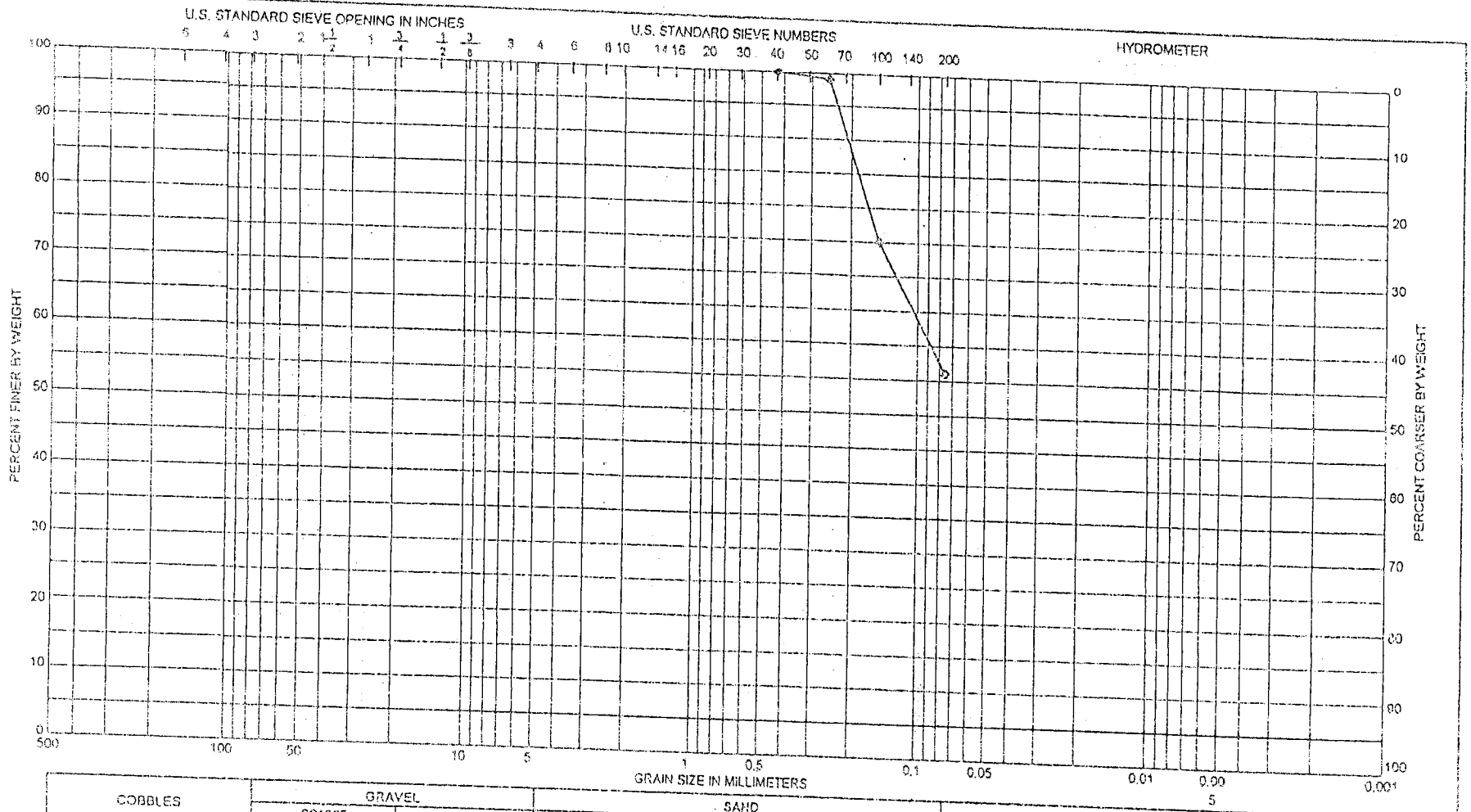
Project MANATEE HARBOR

Area MANATEE COUNTY

Boring No. CB-MAN00-3

Date JUNE 2000

EN FORM 1 MAY 63 2087



Sample No.	Elevation	Classification	Nat w %	LL	PL	PI
13	-21.8 to -23.3	CL				

GRADATION CURVES

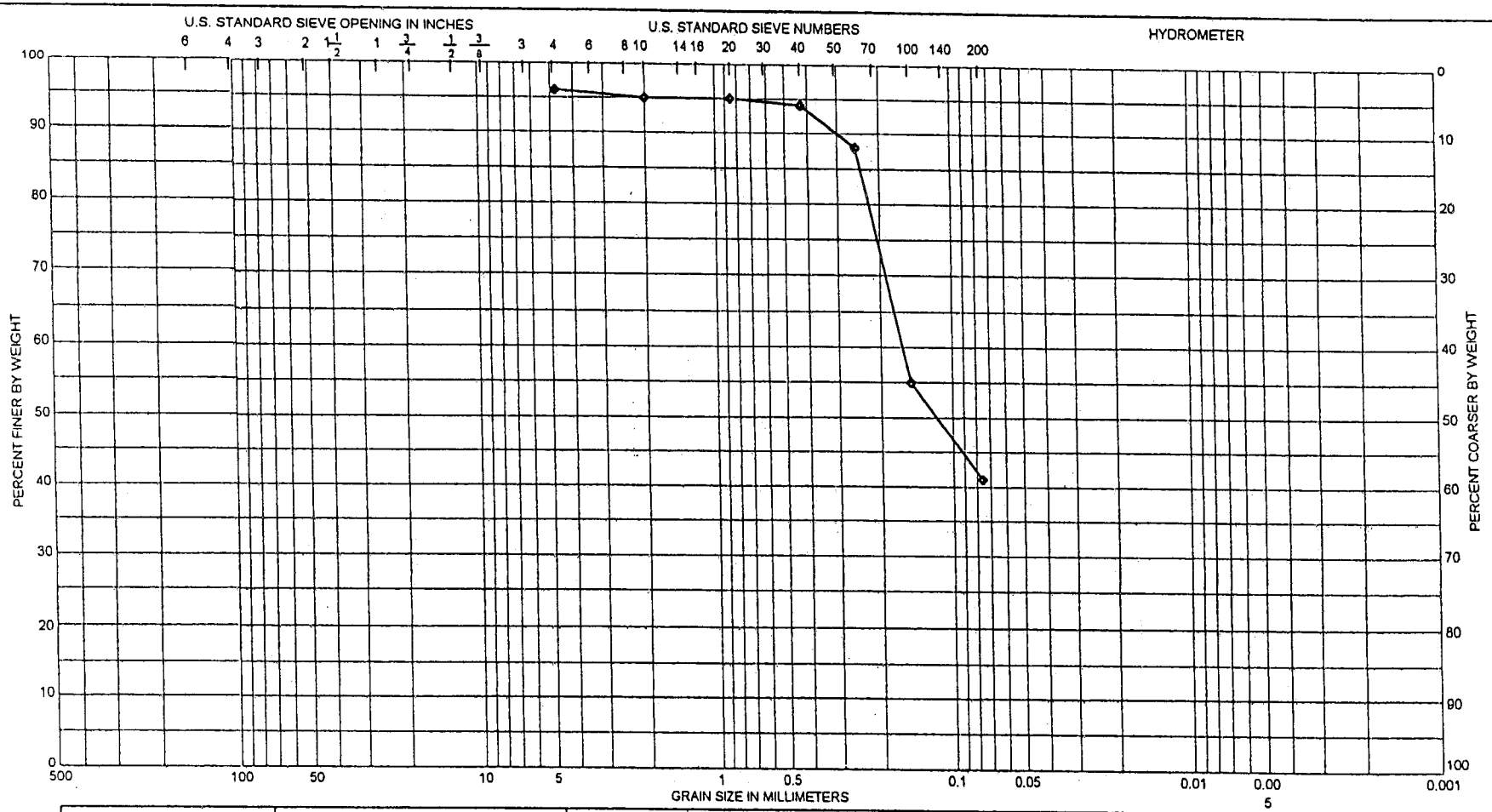
Project MANATEE HARBOR

Area MANATEE COUNTY

Boring No. CB-MAN00-3

Date JUNE 2000

EN FORM 1 MAY 63 2087



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

Sample No.	Elevation	Classification	Nat w %	LL	PL	PI
17	-27.8 to -29.3	SC				

GRADATION CURVES

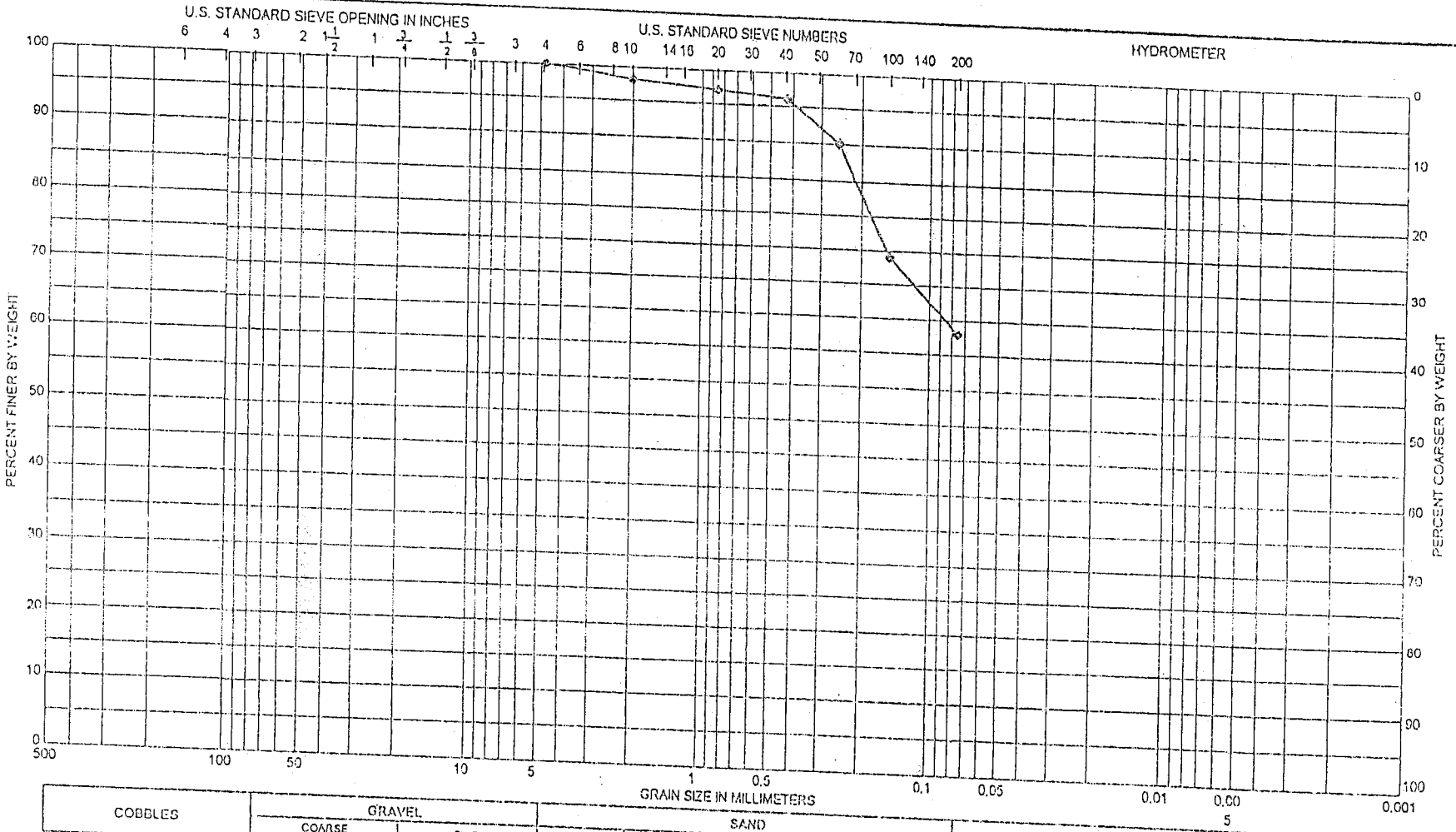
Project: MANATEE HARBOR

Area: MANATEE COUNTY

Boring No.: CB-MAN00-3

Date: JUNE 2000

EN FORM 1 MAY 63 2087



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

Sample No.	Elev or Depth	Classification	Nat w %	LL	PL	PI
24	-38.3 to -39.8	CL				

GRADATION CURVES

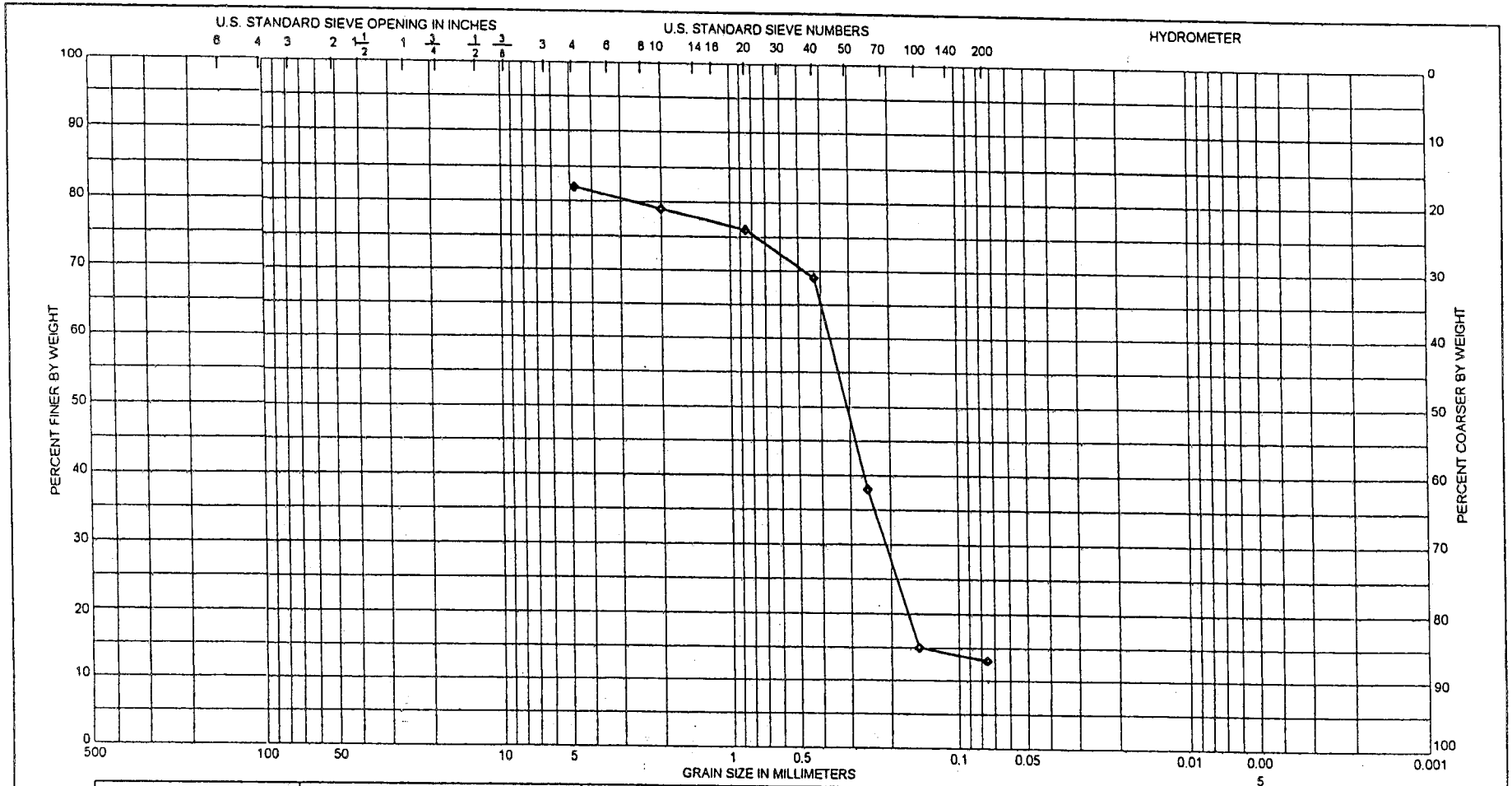
Project MANATEE HARBOR

Area MANATEE COUNTY

Boring No. CB-MAN00-3

Date JUNE 2000

EN FORM 1 MAY 63 2087



Sample No.	Elev or Depth	Classification	Nat w %	LL	PL	PI
27	-42.8 to -44.3	SM				

GRADATION CURVES

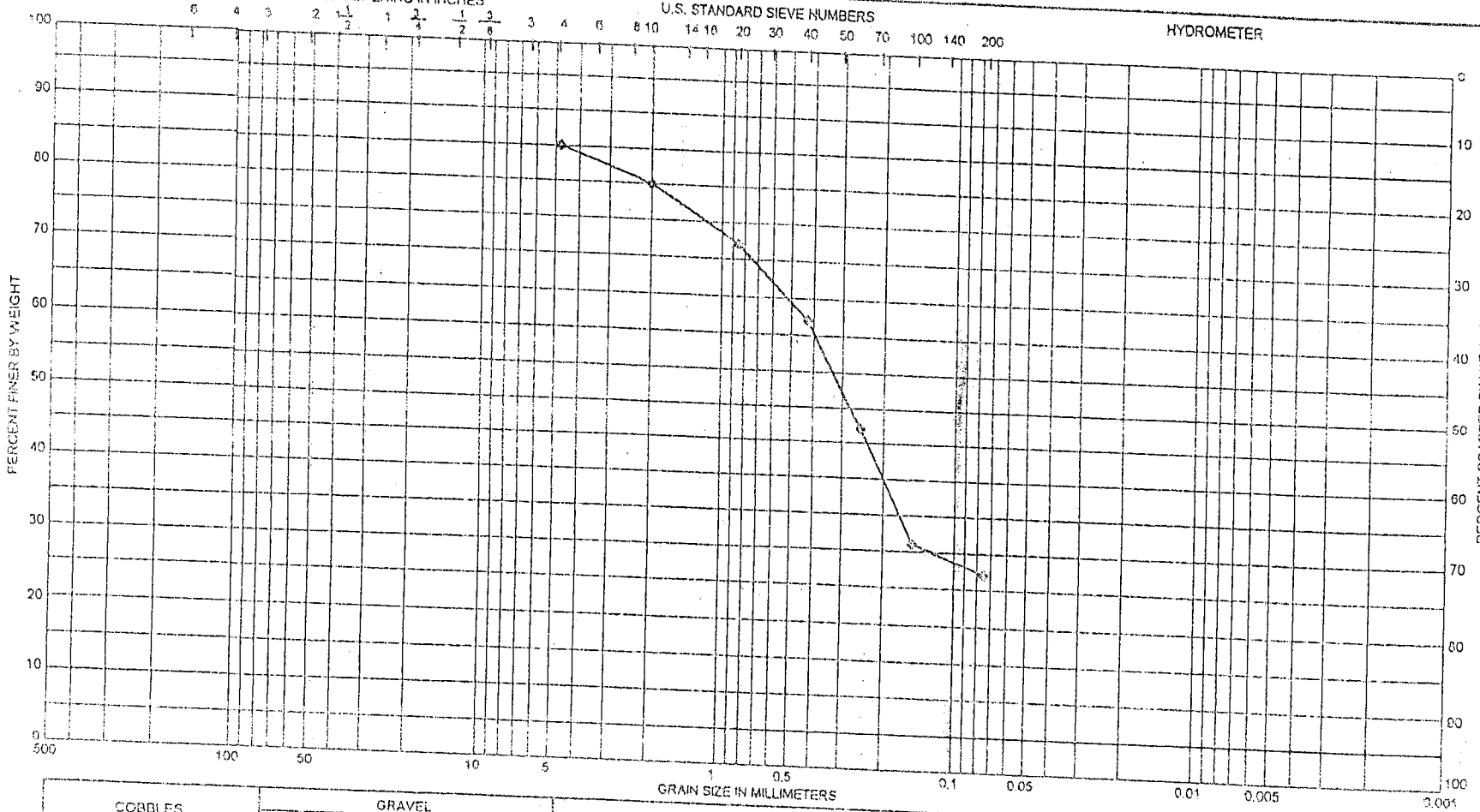
Project MANATEE HARBOR

Area MANATEE COUNTY

Boring No. CB-MAN00-3

Date JUNE 2000

EN FORM 1 MAY 63 2087



Sample No.	Elevation	Classification	Gs	LL	PL	PI
29	-45.8 to -47.3	SC				

GRADATION CURVES

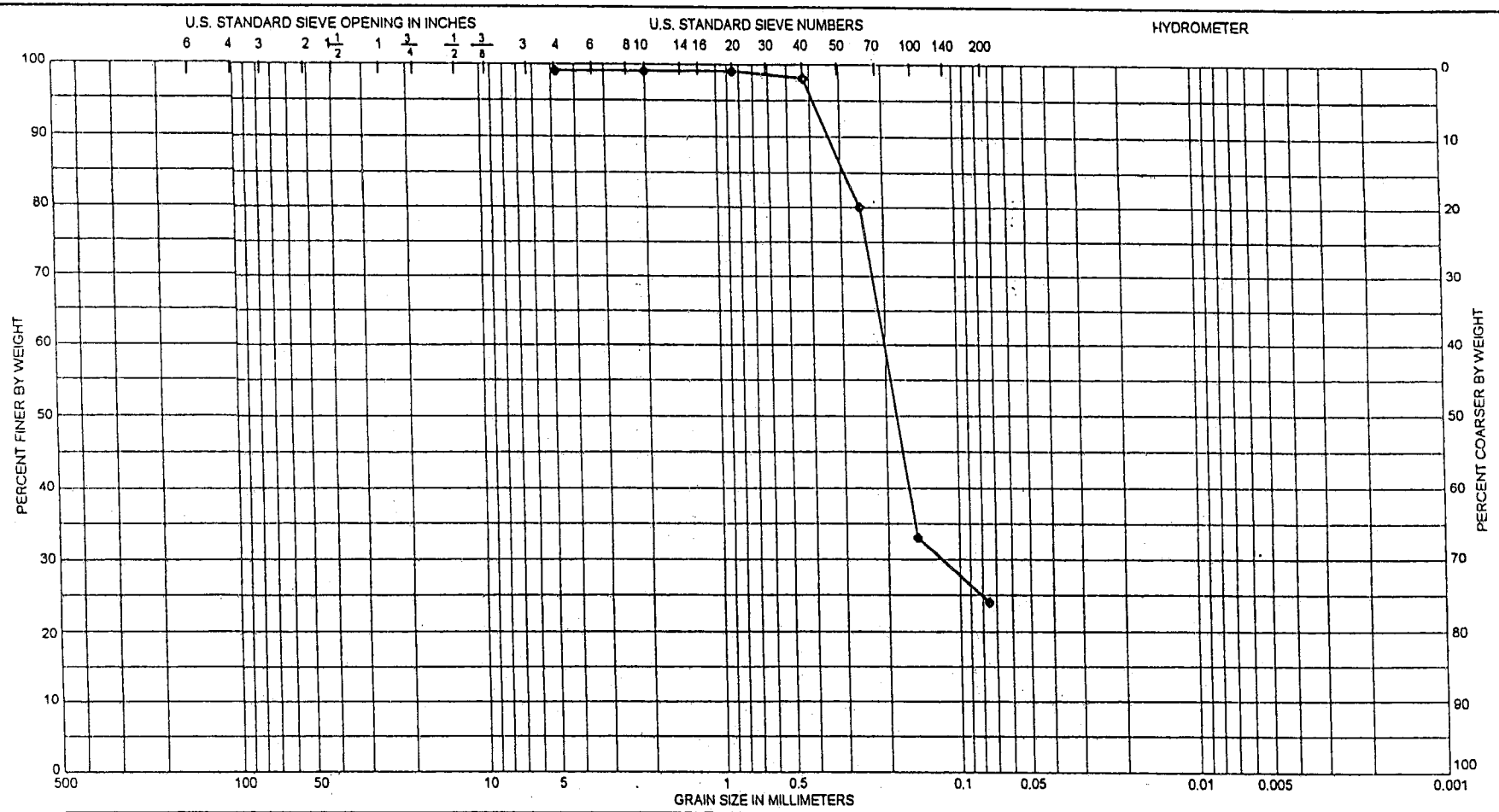
Project MANATEE HARBOR

Area MANATEE COUNTY

Boring No. CB-MAN00-3

Date JUNE 2000

EN FORM 1 MAY 63 2087



Sample No.	Elevation	Classification	Gs	LL	PL	PI
9	-16.2 to -17.7	SC				

GRADATION CURVES

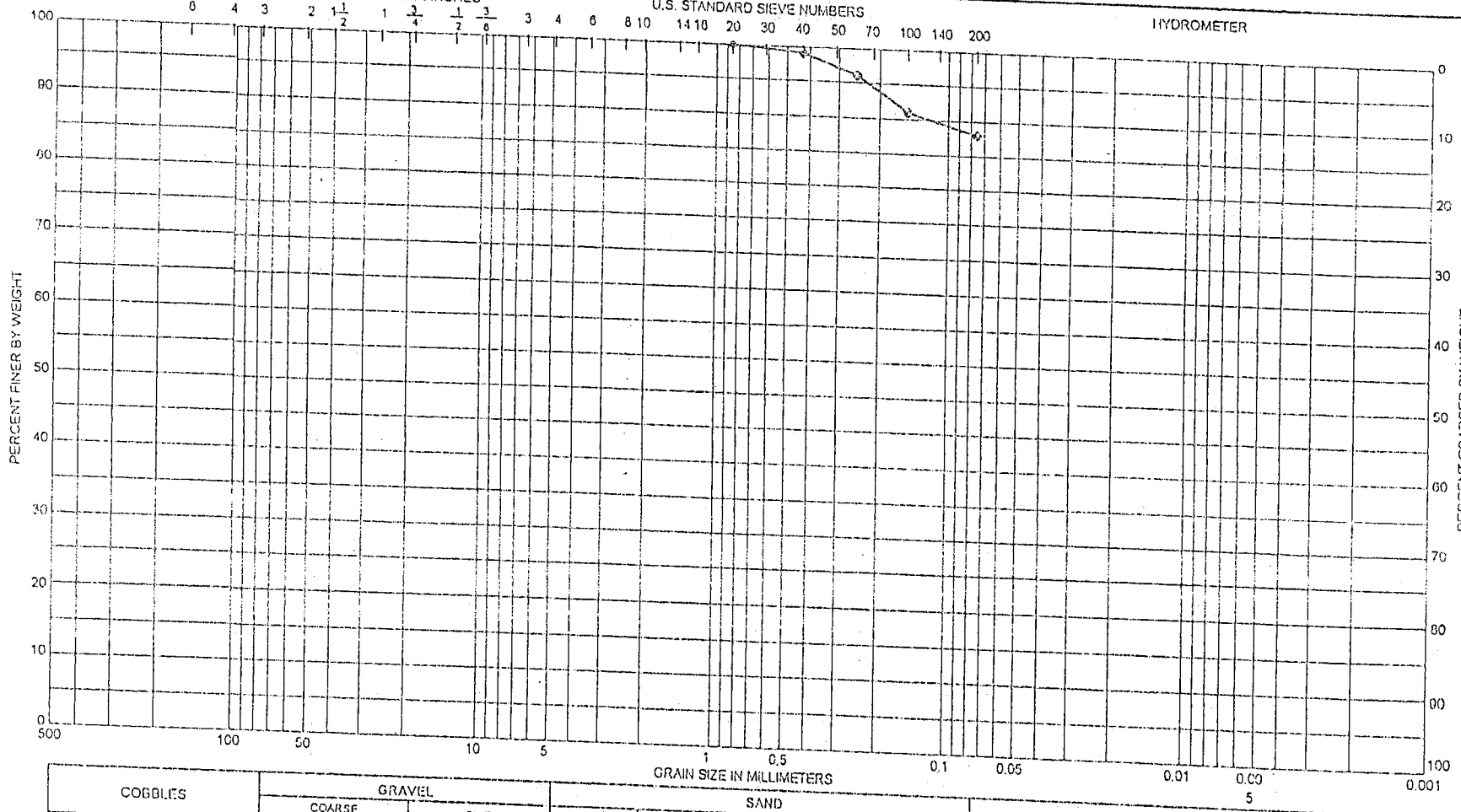
Project: MANATEE HARBOR

Area: MANATEE COUNTY

Boring No.: CB-MAN00-4

Date: JUNE 2000

EN FORM 1 MAY 63 2087



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

Sample No.	Elevation	Classification	Nat w %	LL	PL	PI
13	-22.2 to -23.7	CH		103	41	62

GRADATION CURVES

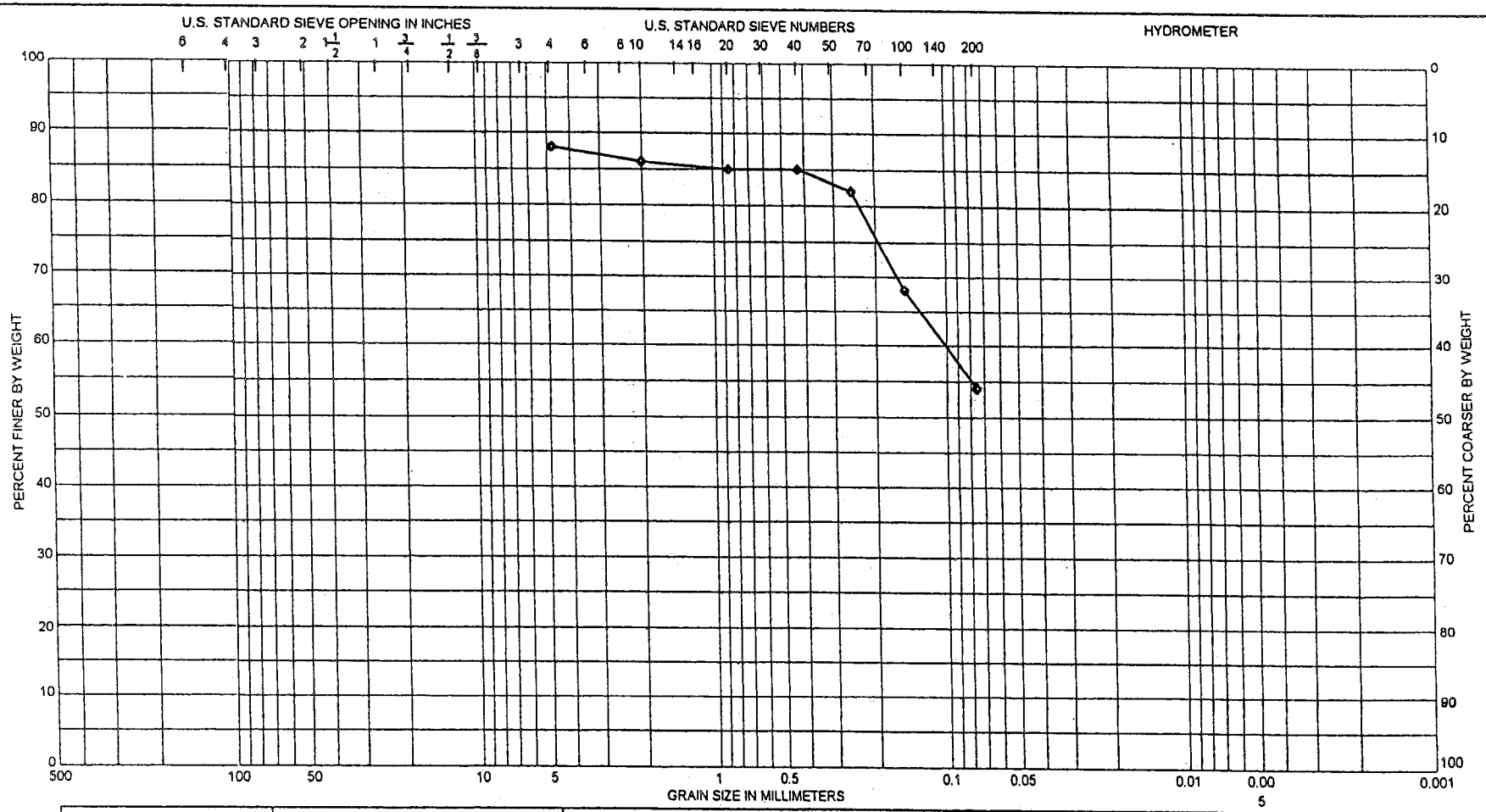
Project: MANATEE HARBOR

Area: MANATEE COUNTY

Boring No.: CB-MAN00-4

Date: JUNE 2000

EN FORM 1 MAY 03 2087



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

Sample No.	Elevation	Classification	Nat w %	LL	PL	PI
19	-31.2 to -32.7	CL				

GRADATION CURVES

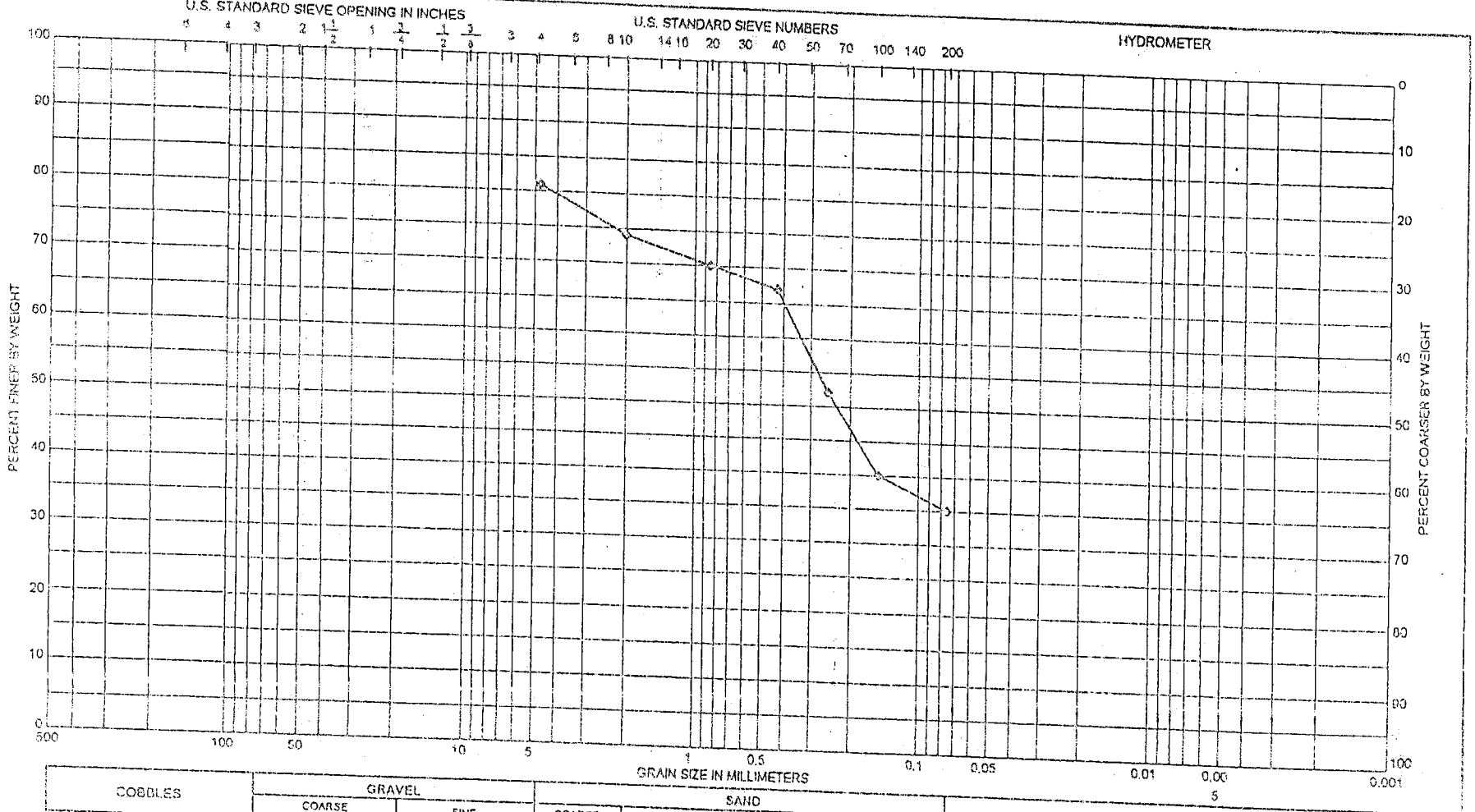
Project: MANATEE HARBOR

Area: MANATEE COUNTY

Boring No.: CB-MAN00-4

Date: JUNE 2000

EN FORM 1 MAY 63 2087



Sample No.	Elev or Depth	Classification	Nat w %	LL	PL	PI
21	-34.2 to -35.7	SC				

GRADATION CURVES

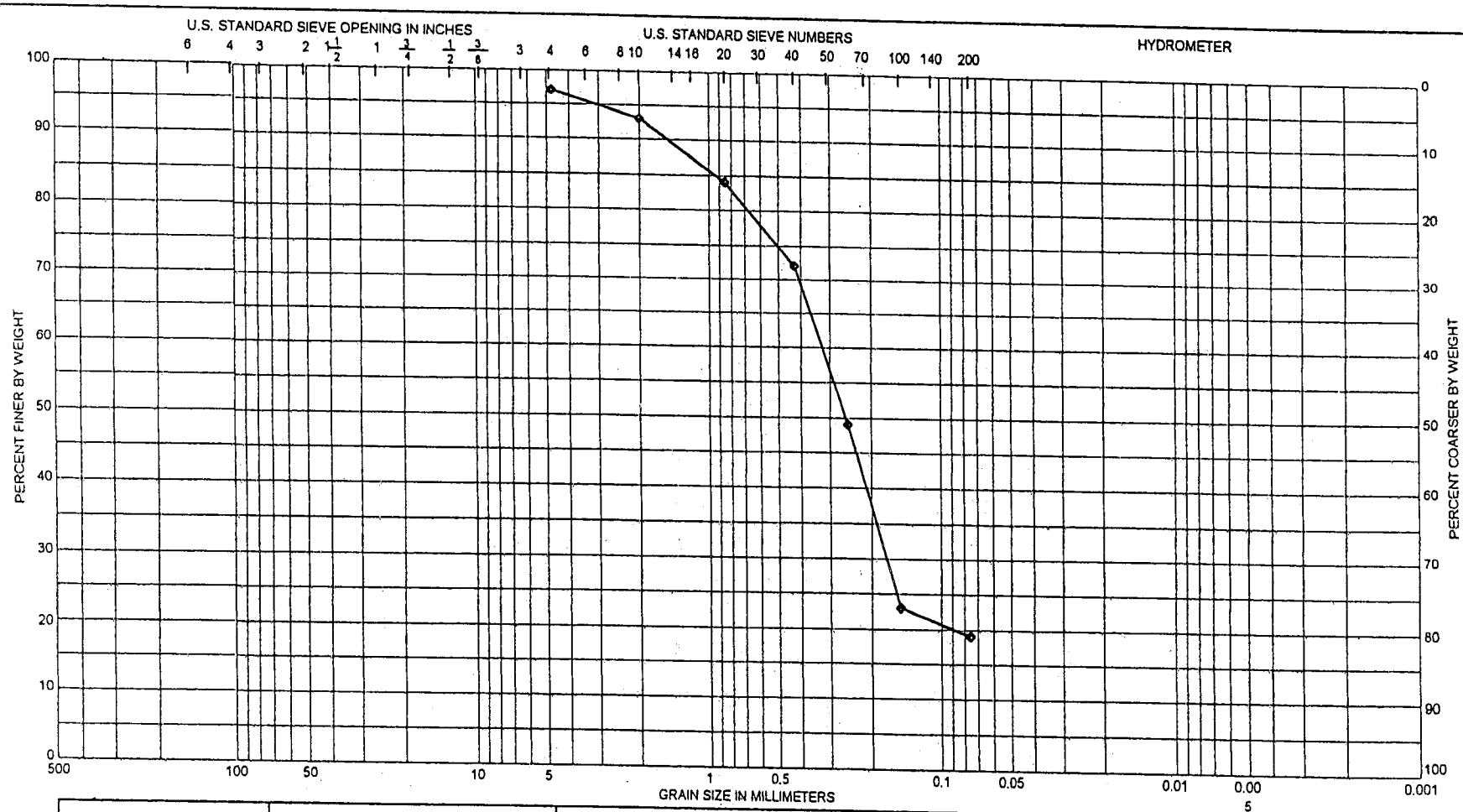
Project MANATEE HARBOR

Area MANATEE COUNTY

Boring No. CB-MAN00-4

Data JUNE 2000

EN FORM 1 MAY 63 2087



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

Sample No.	Elev or Depth	Classification	Nat w %	LL	PL	PI
23	-37.2 to -38.7	SC				

GRADATION CURVES

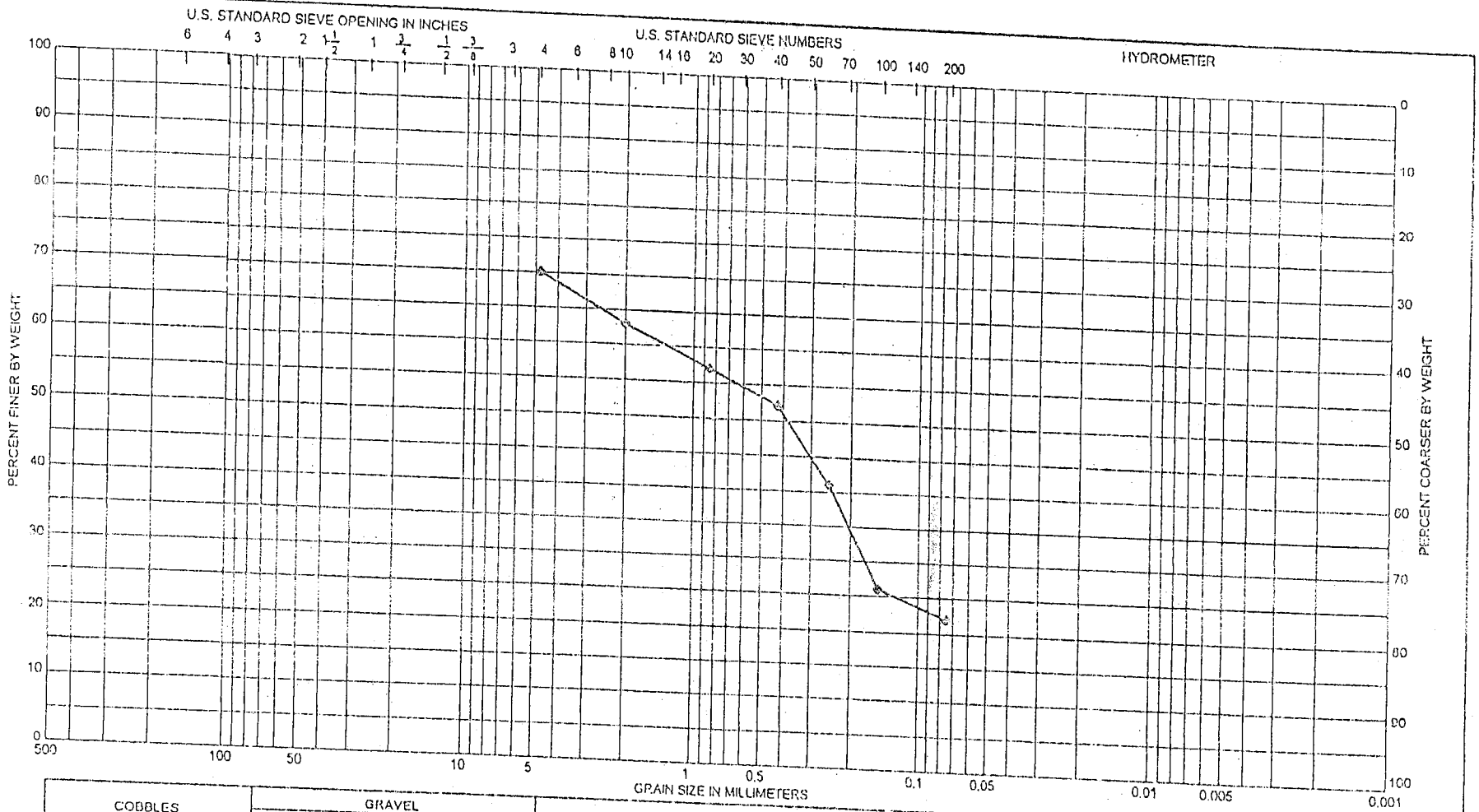
Project: MANATEE HARBOR

Area: MANATEE COUNTY

Boring No.: CB-MAN00-4

Date: JUNE 2000

EN FORM 1 MAY 63 2087



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

Sample No.	Elevation	Classification	Gs	LL	PL	PI
28	-44.7 to -46.2	SC				

GRADATION CURVES

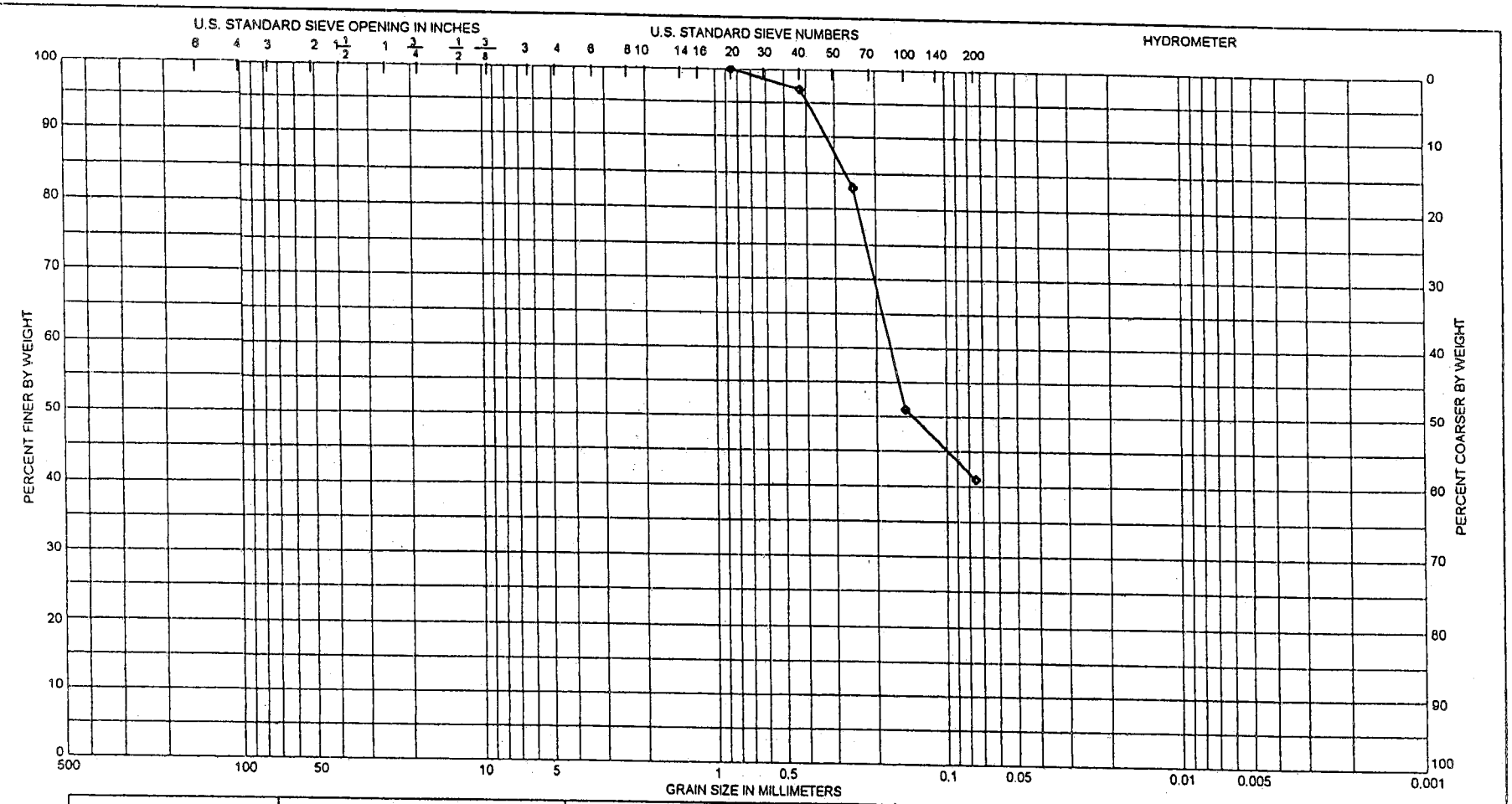
Project MANATEE HARBOR

Area MANATEE COUNTY

Boring No. CB-MAN00-4

Date JUNE 2000

EN FORM 1 MAY 63 2087



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

Sample No.	Elevation	Classification	Gs	LL	PL	PI
6	-10.7 to -12.2	SC				

GRADATION CURVES

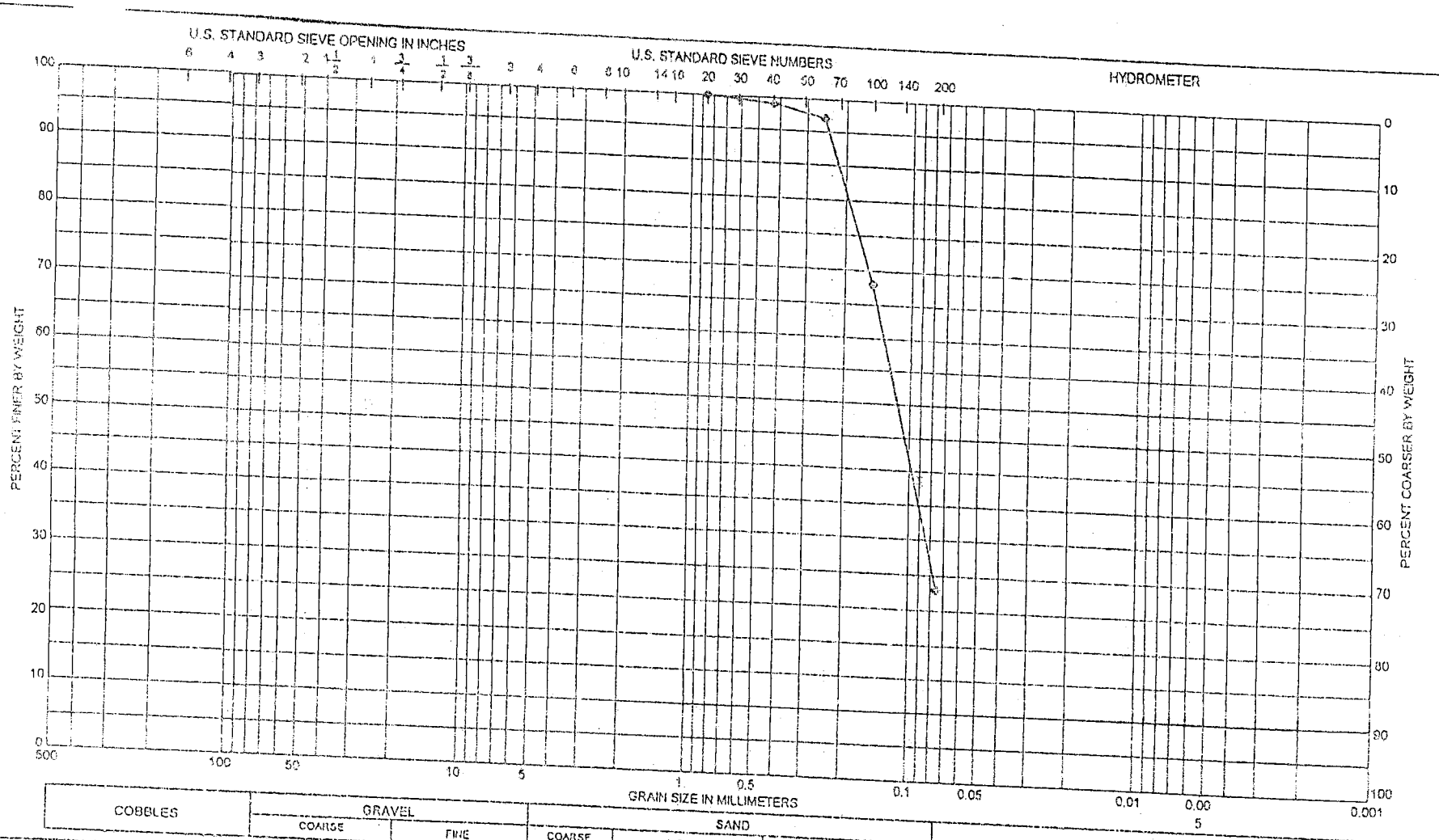
Project MANATEE HARBOR

Area MANATEE COUNTY

Boring No. CB-MAN00-5

Date JUNE 2000

EN FORM 1 MAY 63 2087



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

Sample No.	Elevation	Classification	Nat w %	LL	PL	PI
17	-27.2 to -28.3	SC				

GRADATION CURVES

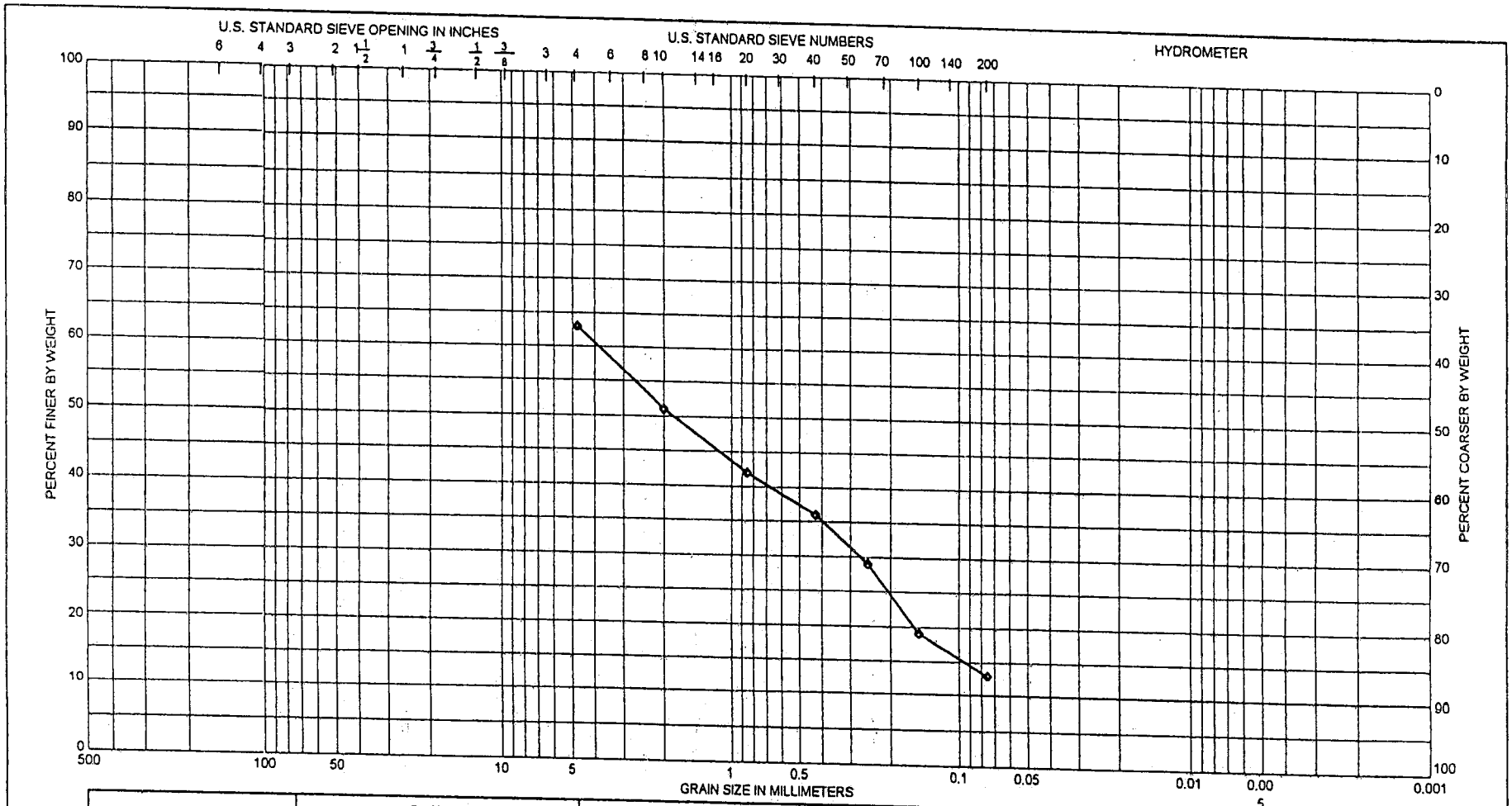
Project: MANATEE HARBOR

Area: MANATEE COUNTY

Boring No.: CB-MAN00-5

Date: JUNE 2000

EN FORM 1 MAY 83 2087



Sample No.	Elevation	Classification	Nat w %	LL	PL	PI
19	-30.2 to -31.7	SC				

GRADATION CURVES

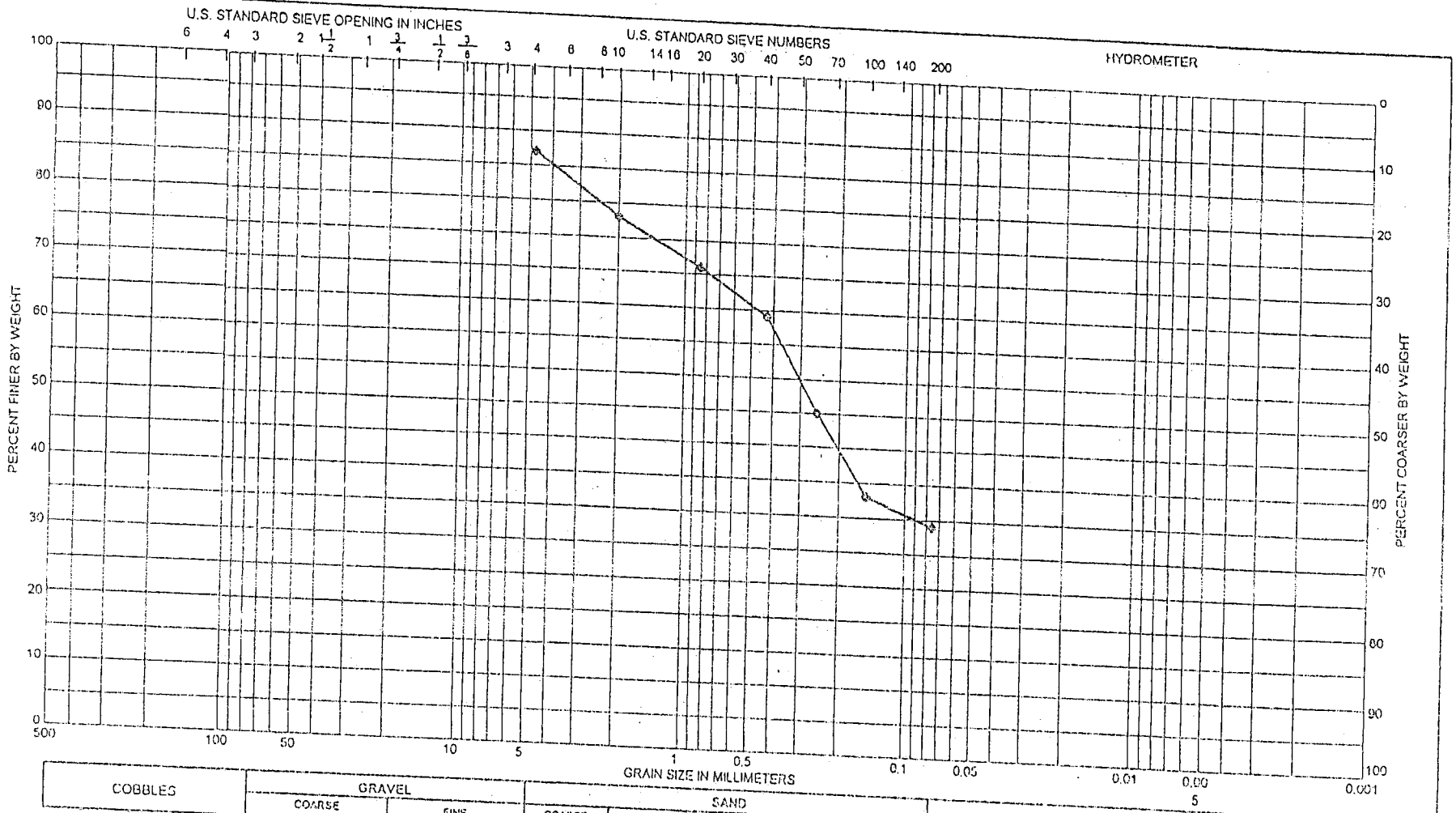
Project MANATEE HARBOR

Area MANATEE COUNTY

Boring No. CB-MAN00-5

Date JUNE 2000

EN FORM 1 MAY 63 2087



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

Sample No.	Elev or Depth	Classification	Nat w %	LL	PL	PI
25	-39.2 to -40.7	SC				

GRADATION CURVES

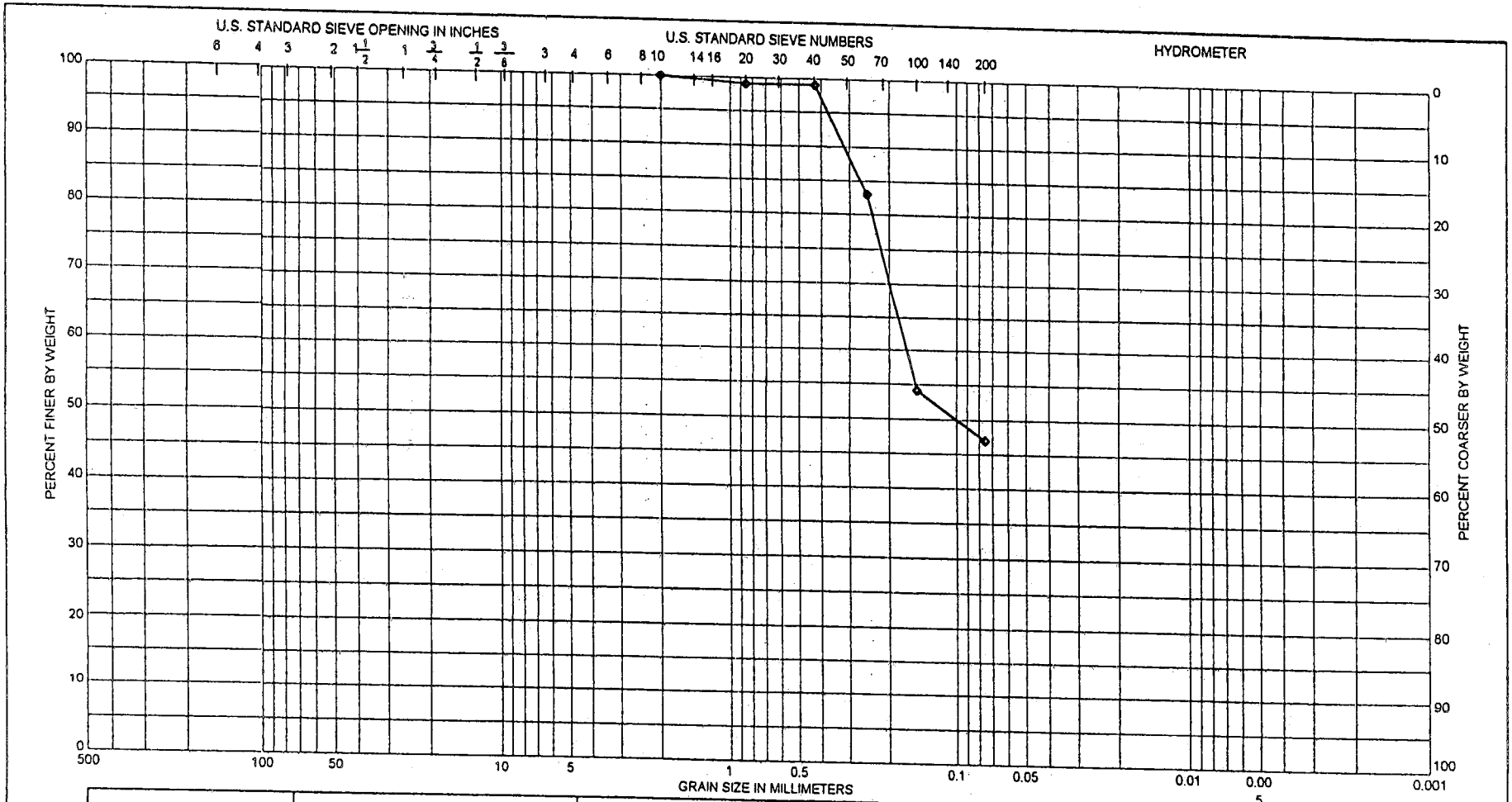
Project: MANATEE HARBOR

Area: MANATEE COUNTY

Boring No.: CB-MAN00-5

Date: JUNE 2000

EN FORM 1 MAY 63 2087



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

Sample No.	Elev or Depth	Classification	Nat w %	LL	PL	PI
27	-42.2 to -43.7	SC				

GRADATION CURVES

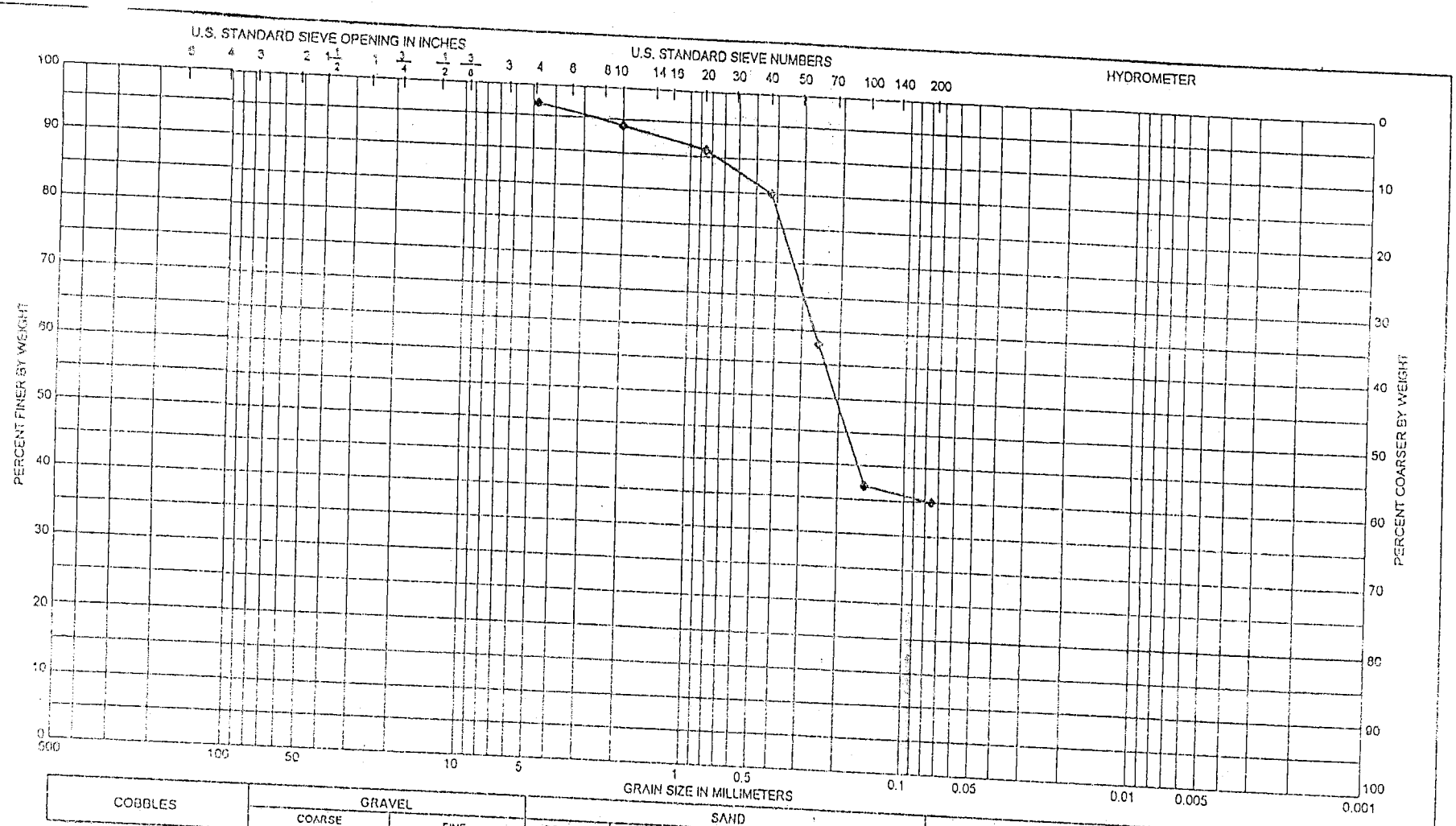
Project: MANATEE HARBOR

Area: MANATEE COUNTY

Boring No.: CB-MAN00-5

Date: JUNE 2000

EN FORM 1 MAY 63 2087



Sample No.	Elevation	Classification	Gs	LL	PL	PI
29	-45.2 to -46.7	SC	2.83			

GRADATION CURVES

Project MANATEE HARBOR

Area MANATEE COUNTY

Boring No. CB-MAN00-5

Date JUNE 2000

EN FORM 1 MAY 63 2087