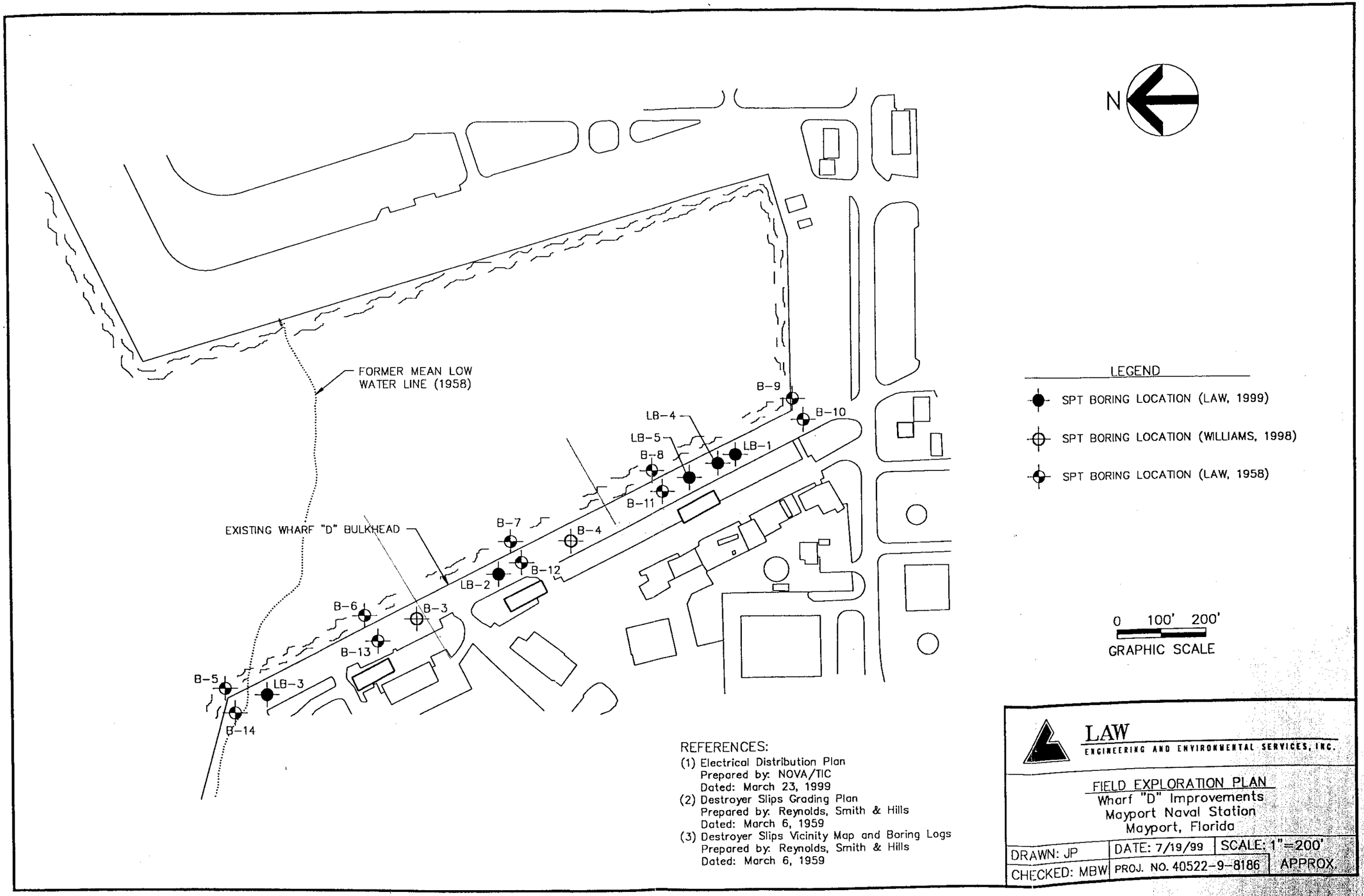

N
FORMER MEAN LOW WATER LINE (1958)
EXISTING WHARF "D" BULKHEAD
B-9
B-10
LB-4
LB-5
LB-1
B-8
B-11
B-7
B-4
B-12
LB-2
B-6
B-3
B-13
B-5
LB-3
B-14
LEGEND
SPT BORING LOCATION (LAW, 1999)
SPT BORING LOCATION (WILLIAMS, 1998)
SPT BORING LOCATION (LAW, 1958)
0 100' 200'
GRAPHIC SCALE
REFERENCES:
(1) Electrical Distribution Plan
Prepared by: NOVA/TIC
Dated: March 23, 1999
(2) Destroyer Slips Grading Plan
Prepared by: Reynolds, Smith & Hills
Dated: March 6, 1959
(3) Destroyer Slips Vicinity Map and Boring Logs
Prepared by: Reynolds, Smith & Hills
Dated: March 6, 1959
LAW
ENGINEERING AND ENVIRONMENTAL SERVICES, INC.
FIELD EXPLORATION PLAN
Wharf "D" Improvements
Mayport Naval Station
Mayport, Florida
DRAWN: JP
DATE: 7/19/99
SCALE: 1"=200'
CHECKED: MBW
PROJ. NO. 40522-9-8186
APPROX.

LEGEND FOR GENERALIZED SUBSURFACE PROFILE

W — Water

Asphaltic Concrete

Limerock Base Course

Fine SAND (SP); Slightly Silty Fine SAND (SP–SM); Slightly Clayey Fine SAND (SP–SC)

Fine SAND (SP) to Slightly Clayey Fine SAND (SP–SC) With Shells or Shell Fragments, or With Weakly Cemented Sand Fragments

Clayey Fine to Medium SAND (SC)

Clayey Fine SAND (SC) With Shell Fragments

Shell Fragments With Clayey Fine Sand Seams

CLAY (CH)

V — Void/Very Easy Drilling

Wood (Possible Timber Pile)

Peat; Sand With Muck

* Standard Penetration Resistance (Blows/ft.)

Groundwater Level @ Time of Drilling

B.T. Boring Terminated

95.0' Depth Terminated

A.H. Automatic Hammer System

M.H. Manual Hammer (Rope–Cathead System)

Fossiliferous LIMESTONE; Decomposed LIMESTONE With Sand; Sand With Decomposed LIMESTONE

Silty Fine SAND (SM); Clayey Silty Fine SAND (SM) With Some Phosphate Grains (MARL)

Calcareous Sandy Clayey SILT (MH) With a Trace of Phosphate Grains (MARL)

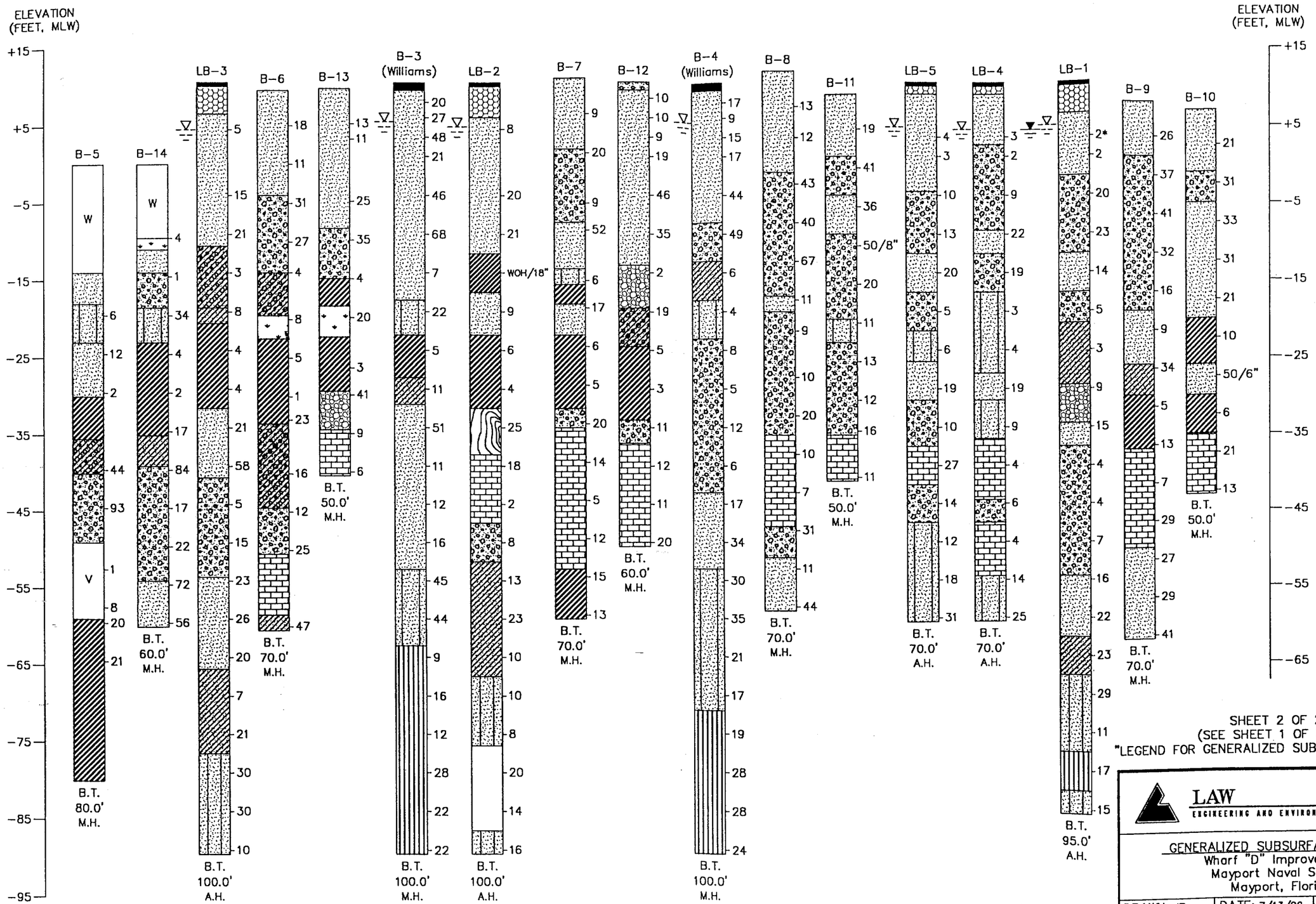
NOTE: Please refer to text of report for additional information relative to groundwater conditions and potential fluctuations which could occur.

SHEET 1 OF 2

LAW
ENGINEERING AND ENVIRONMENTAL SERVICES, INC.

LEGEND FOR GENERALIZED SUBSURFACE PROFILE
Wharf "D" Improvements
Mayport Naval Station
Mayport, Florida

DRAWN: JP	DATE: 7/13/99	SCALE: NONE
CHECKED: ATB	PROJ. NO. 40522-9-8186	



SHEET 2 OF 2
(SEE SHEET 1 OF 2 FOR "LEGEND FOR GENERALIZED SUBSURFACE PROFILE")

LAW
ENGINEERING AND ENVIRONMENTAL SERVICES, INC.

GENERALIZED SUBSURFACE PROFILE
Wharf "D" Improvements
Mayport Naval Station
Mayport, Florida

DRAWN: JP	DATE: 7/13/99	SCALE: AS SHOWN
CHECKED: ATB	PROJ. NO. 40522-9-8186	

FIELD PROCEDURES

Soil Test Borings

The soil test borings were performed in general accordance with ASTM D-1586, "Penetration Test and Split-Barrel Sampling of Soils." The borings were initially advanced by augering. A rotary drilling process was subsequently used and bentonite drilling fluid was circulated in the boreholes to stabilize the sides and flush the cuttings. At regular intervals, the drilling tools were removed and soil samples were obtained with a standard 1.4-inch I.D., 2.0-inch O.D., split-tube sampler. The sampler was first seated 6 inches and then driven an additional foot with blows of a 140-pound automatically tripped hammer falling 30 inches. The number of hammer blows required to drive the sampler the final foot is designated the "Penetration Resistance." The penetration resistance, when properly interpreted, is an index to the soil strength and density.

Representative portions of the soil and rock samples, obtained from the sampler, were placed in glass jars and transported to our laboratory. The samples were then examined by a geotechnical engineer in order to confirm the field classifications.

TABLE A.1: GEOTECHNICAL PROPERTIES OF EXISTING MATERIALS (BORINGS LB-1 AND LB-4)

Wharf "D" Improvements
Mayport Naval Station
Mayport, Florida
LAW Project No. 40522-9-8186

Existing Material	Elevation Range (feet)	Unit Weight (pcf)			Angle of Internal Friction, ϕ (degrees)	Cohesion, c (psf)	Friction Ratio[1] (δ/ϕ)	Earth Pressure Coefficients[2]		
		Damp	Sat.	Sub.				Active[3] K_a	At-Rest[4] K_o	Passive[5] K_p
VERY LOOSE fine SAND (SP)	+10.0 to -2.0	104	110	48	30	0	0.6	0.33	0.50	5.3
FIRM to VERY FIRM fine SAND to fine SAND with shell fragments (SP to SP-SM)	-2.0 to -17.0	--	125	63	37	0	0.6	0.25	0.40	9.5
VERY LOOSE clayey fine SAND (SC); LOOSE fine SAND with shell fragments (SP); LOOSE SHELL	-17.0 to -34.0	--	114	51	29	0	0.7	0.35	0.52	5.3
VERY LOOSE to LOOSE fine SAND to slightly clayey fine SAND (SP to SP-SC) with some to many shell fragments	-34.0 to -54.0	--	111	49	32	0	0.7	0.31	0.47	6.8
FIRM to VERY FIRM slightly clayey fine to medium SAND (SP-SC)	-54.0 to -62.0	--	125	63	35	0	0.5	0.27	0.43	7.4
FIRM to VERY FIRM calcareous clayey to silty fine SAND (SC to SM); VERY STIFF calcareous sandy SILT (ML) (Marl Formation)	-62.0 to -90.0	--	130	68	30	1,500	0.4	0.33	0.50	4.5

Notes:

1. Friction Ratio assumes steel sheet piles against the various materials encountered.
2. The earth pressure coefficients presented in the above table are ultimate values.
3. K_a calculated using Rankine relationship assuming a level backfill condition: $k_a = \tan^2(45-\phi/2)$
4. K_0 calculated using Jaky equation: $k_0 = 1-\sin\phi$
5. K_p calculated using logarithmic spiral method assuming a level backfill condition.

TABLE A.2: GEOTECHNICAL PROPERTIES OF EXISTING MATERIALS (BORING LB-2)

Wharf "D" Improvements
Mayport Naval Station
Mayport, Florida
LAW Project No. 40522-9-8186

Existing Material	Elevation Range (feet)	Unit Weight (pcf)			Angle of Internal Friction, ϕ (degrees)	Cohesion, c (psf)	Friction Ratio[1] (δ/ϕ)	Earth Pressure Coefficients[2]		
		Damp	Sat.	Sub.				Active[3] K_a	At-Rest[4] K_o	Passive[5] K_p
LOOSE fine SAND (SP)	+10 to +4.5	105	110	48	36	0	0.6	0.26	0.41	8.9
LOOSE fine SAND (SP)	+4.5 to 0.0	--	110	48	35	0	0.5	0.27	0.43	7.4
FIRM to VERY FIRM fine SAND (SP)	0.0 to -12	--	125	63	36	0	0.5	0.26	0.41	7.8
VERY SOFT sandy clayey SILT (MH)	-12 to -17	--	90	28	0	100	N/A	1.00	1.00	1.0
LOOSE slightly clayey fine SAND (SP-SC)	-17 to -23	--	110	48	34	0	0.5	0.28	0.44	6.5
FIRM TO SOFT silty CLAY (CH)	-23 to -38	--	105	43	0	1,600	N/A	1.00	1.00	1.0
WEAKLY-CEMENTED LIMESTONE	-38 to -42	--	120	58	36	0	0.5	0.26	0.41	7.8
WEAKLY CEMENTED LIMESTONE	-42 to -47	--	105	43	28	0	0.7	0.36	0.53	4.9
LOOSE slightly clayey fine SAND (SP-SC) with some shell fragments	-47 to -52	--	110	48	33	0	0.5	0.29	0.46	5.9
LOOSE to VERY FIRM clayey fine to medium SAND (SC)	-52 to -67	--	120	58	31	0	0.45	0.32	0.48	4.9
LOOSE to FIRM calcareous clayey silty fine SAND (SM); STIFF to VERY STIFF calcareous sandy clayey SILTY (MH) (Marl Formation)	-67 to -90	--	130	68	30	1,500	0.4	0.33	0.50	4.5

Notes:

1. Friction Ratio assumes steel sheet piles against the various materials encountered.
2. The earth pressure coefficients presented in the above table are ultimate values.
3. K_a calculated using Rankine relationship assuming a level backfill condition: $K_a = \tan^2(45-\phi/2)$
4. K_o calculated using Jaky equation: $K_o = 1-\sin\phi$
5. K_p calculated using logarithmic spiral method assuming a level backfill condition.

TABLE A.3: GEOTECHNICAL PROPERTIES OF EXISTING MATERIALS (BORING LB-3)

Wharf "D" Improvements
Mayport Naval Station
Mayport, Florida
LAW Project No. 40522-9-8186

Existing Material	Elevation Range (feet)	Unit Weight (pcf)			Angle of Internal Friction, ϕ (degrees)	Cohesion, c (psf)	Friction Ratio[1] (δ/ϕ)	Earth Pressure Coefficients[2]		
		Damp	Sat.	Sub.				Active[3] K_a	At-Rest[4] K_o	Passive[5] K_p
LOOSE fine SAND (SP)	+10 to +4	105	110	48	34	0	0.6	0.28	0.44	7.2
LOOSE fine SAND (SP)	+4 to 0	--	110	48	33	0	0.5	0.29	0.46	5.9
FIRM to VERY FIRM fine SAND (SP)	0 to -11	--	123	61	38	0	0.45	0.24	0.38	8.1
VERY LOOSE clayey fine SAND (SC) with a few shell fragments	-11 to -19	--	108	46	28	0	0.5	0.36	0.53	4.2
LOOSE clayey fine SAND (SC)	-19 to -21	--	112	50	30	0	0.45	0.33	0.50	4.8
SOFT silty CLAY (CH)	-21 to -32	--	105	43	0	1,300	N/A	1.0	1.0	1.0
VERY FIRM fine to medium SAND (SP)	-32 to -37	--	125	63	36	0	0.45	0.26	0.41	7.8
VERY DENSE slightly clayey fine SAND (SP-SC)	-37 to -41	--	127	65	39	0	0.45	0.23	0.37	8.8
LOOSE fine to coarse SAND (SP) with a few weakly cemented fragments	-41 to -47	--	110	48	31	0	0.65	0.32	0.48	5.9
FIRM fine to medium SAND (SP) with a few weakly cemented fragments	-47 to -54	--	120	58	34	0	0.6	0.28	0.44	7.2
VERY FIRM to FIRM slightly clayey to clayey fine SAND (SP-SC to SC)	-54 to -66	--	125	63	36	0	0.45	0.26	0.41	7.8
LOOSE clayey fine SAND (SC)	-66 to -72	--	112	50	29	0	0.5	0.35	0.52	4.5
VERY firm clayey fine SAND (SC)	-72 to -77	--	127	65	32	0	0.45	0.31	0.47	5.5
VERY FIRM to LOOSE calcareous clayey silty fine SAND (SM) (Marl Formation)	-77 to -90	--	130	68	30	1,500	0.4	0.33	0.50	4.5

Notes:

1. Friction Ratio assumes steel sheet piles against the various materials encountered.
2. The earth pressure coefficients presented in the above table are ultimate values.
3. K_a calculated using Rankine relationship assuming a level backfill condition: $K_a = \tan^2(45-\phi/2)$
4. K_o calculated using Jaky equation: $K_o = 1-\sin\phi$
5. K_p calculated using logarithmic spiral method assuming a level backfill condition.

TABLE A.4: GEOTECHNICAL PROPERTIES OF EXISTING MATERIALS (BORING LB-5)

Wharf "D" Improvements
Mayport Naval Station
Mayport, Florida
LAW Project No. 40522-9-8186

Existing Material	Elevation Range (feet)	Unit Weight (pcf)			Angle of Internal Friction, ϕ (degrees)	Cohesion, c (psf)	Friction Ratio[1] (δ/ϕ)	Earth Pressure Coefficients[2]		
		Damp	Sat.	Sub.				Active[3] K_a	At-Rest[4] K_o	Passive[5] K_p
VERY LOOSE SAND (SP)	+10 to -4	105	110	48	32	0	0.5	0.31	0.47	5.7
LOOSE to FIRM SAND (SP) with shell fragments	-4 to -17	--	115	53	35	0	0.6	0.27	0.43	7.9
LOOSE SAND (SP) with shell fragments	-17 to -22	--	110	48	32	0	0.6	0.31	0.47	6.3
LOOSE silty SAND (SM)	-22 to -26	--	115	53	29	0	0.5	0.35	0.52	4.6
FIRM SAND (SP) with shell fragments	-26 to -37	--	120	58	35	0	0.6	0.27	0.43	7.9
Weakly-cemented LIMESTONE/SAND with shell fragments	-37 to -47	--	110	48	32	0	0.5	0.31	0.47	5.7
FIRM to DENSE silty SAND (SM) (MARL)	-47 to -60	--	115	53	33	2100	0.4	0.29	0.46	5.5

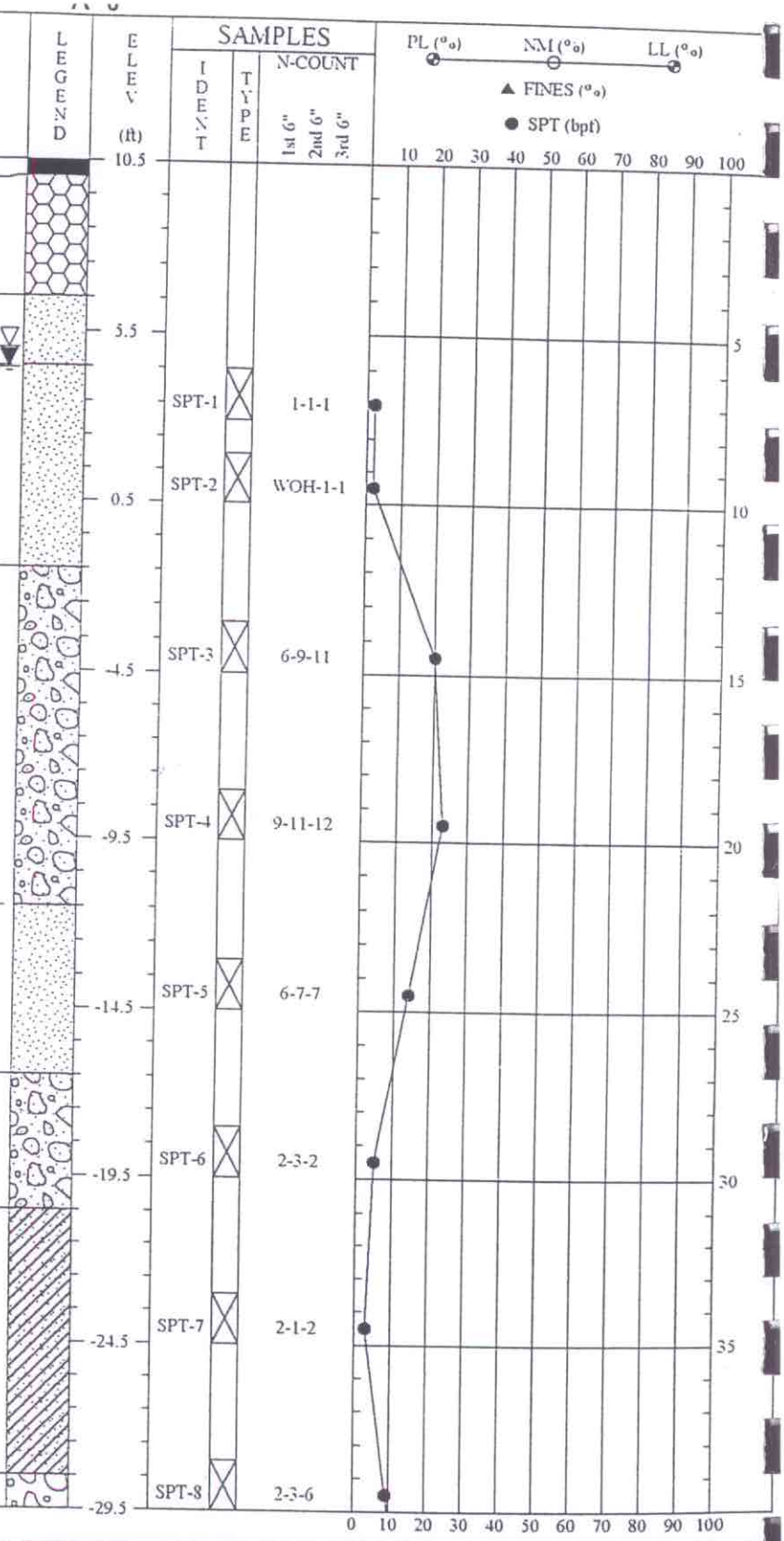
Notes:

1. Friction Ratio assumes steel sheet piles against the various materials encountered.
2. The earth pressure coefficients presented in the above table are ultimate values.
3. K_a calculated using Rankine relationship assuming a level backfill condition: $k_a = \tan^2(45-\phi/2)$
4. K_o calculated using Jaky equation: $k_o = 1-\sin\phi$
5. K_p calculated using logarithmic spiral method assuming a level backfill condition.

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS	ELEV (ft)	SAMPLES IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"
0	Asphaltic Concrete (6 inches thick)	10.5			
	Limerock Base Course				
5	Light brown fine SAND (SP) with a trace of limerock fragments	5.5			
	VERY LOOSE gray-brown fine SAND (SP) with traces of shell fragments and wood (slight petroleum odor noted in samples)		SPT-1	X	1-1-1
10		0.5	SPT-2	X	WOH-1-1
	FIRM to VERY FIRM gray fine SAND (SP) with some shell fragments				
15		-4.5	SPT-3	X	6-9-11
20		-9.5	SPT-4	X	9-11-12
	FIRM light gray-green fine SAND (SP) with a trace of clay				
25		-14.5	SPT-5	X	6-7-7
	LOOSE brown to green slightly silty fine SAND (SP-SM) with many shell fragments				
30		-19.5	SPT-6	X	2-3-2
	VERY LOOSE green clayey fine SAND (SC)				
35		-24.5	SPT-7	X	2-1-2
40		-29.5	SPT-8	X	2-3-6

SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.

LEGEND



SOIL 8186-01 OPI LAW GIBB.GDT 8/12/99

DRILLER: JACT
EQUIPMENT: CME-55
METHOD: Augered: 0-6'/Mud Rotary: 6'-93.5'
HOLE DIA.: 4"
REMARKS: Automatic Hammer System

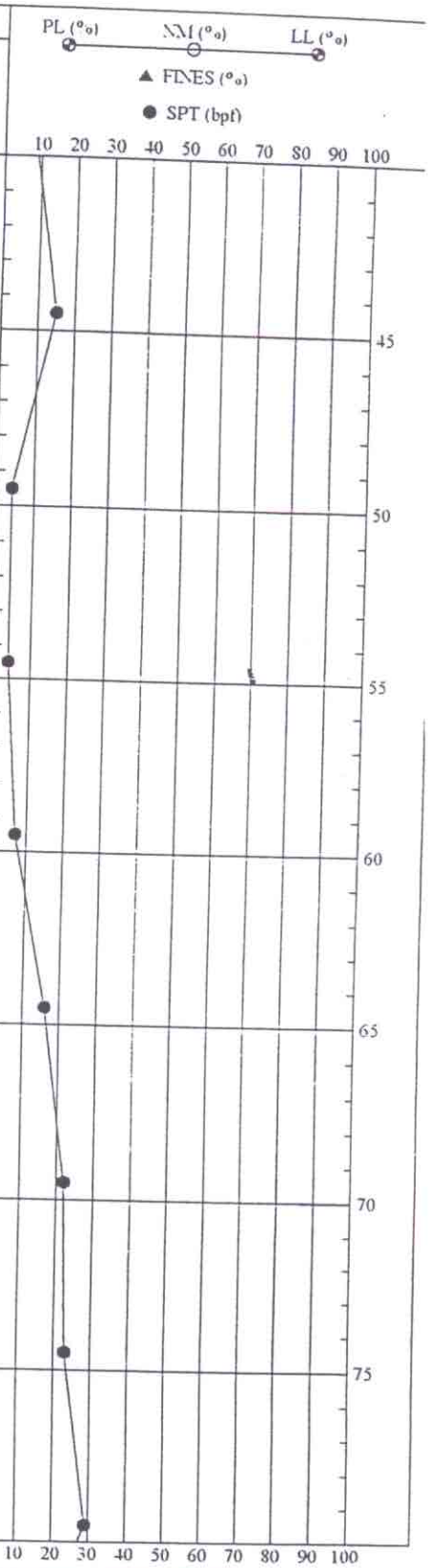
THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BEWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

SOIL TEST BORING RECORD

PROJECT: Mayport - Wharf "D" **BORING NO.:** LB-1
COORD N:
COORD E:
DRILLED: July 8, 1999
PROJ. NO.: 40522-9-8186 **PAGE 1 OF 3**

LAW
LAWGIBB Group Member

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	ELEV (ft)	SAMPLES IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"
40	LOOSE gray fine to coarse gravel-sized shell fragments with some clayey fine sand seams	-29.5			
45	FIRM gray slightly clayey fine SAND (SP-SC) with some thin clay seams	-34.5	SPT-9		4-6-9
	VERY LOOSE orange-brown fine SAND (SP) with many shell fragments	-39.5	SPT-10		2-2-2
50	VERY LOOSE orange-brown slightly clayey fine SAND (SP-SC) with some shell fragments	-44.5	SPT-11		2-2-2
55	LOOSE brown slightly clayey fine SAND (SP-SC) with a few shell fragments	-49.5	SPT-12		2-3-4
60	FIRM to VERY FIRM dark gray-green slightly clayey fine to medium SAND (SP-SC) with some phosphate grains	-54.5	SPT-13		4-6-10
65		-59.5	SPT-14		6-10-12
70	VERY FIRM gray-green clayey fine SAND (SC)	-64.5	SPT-15		5-8-15
75	VERY FIRM light gray-green calcareous silty fine SAND (SM) with a few phosphate grains (Marl)	-69.5	SPT-16		6-11-18
80					



SOIL 8186-01.GPJ LAW GIBB.GDT 8/12/99

DRILLER: JACT
EQUIPMENT: CME-55
METHOD: Augered: 0-6'/Mud Rotary: 6'-93.5'
HOLE DIA.: 4"
REMARKS: Automatic Hammer System

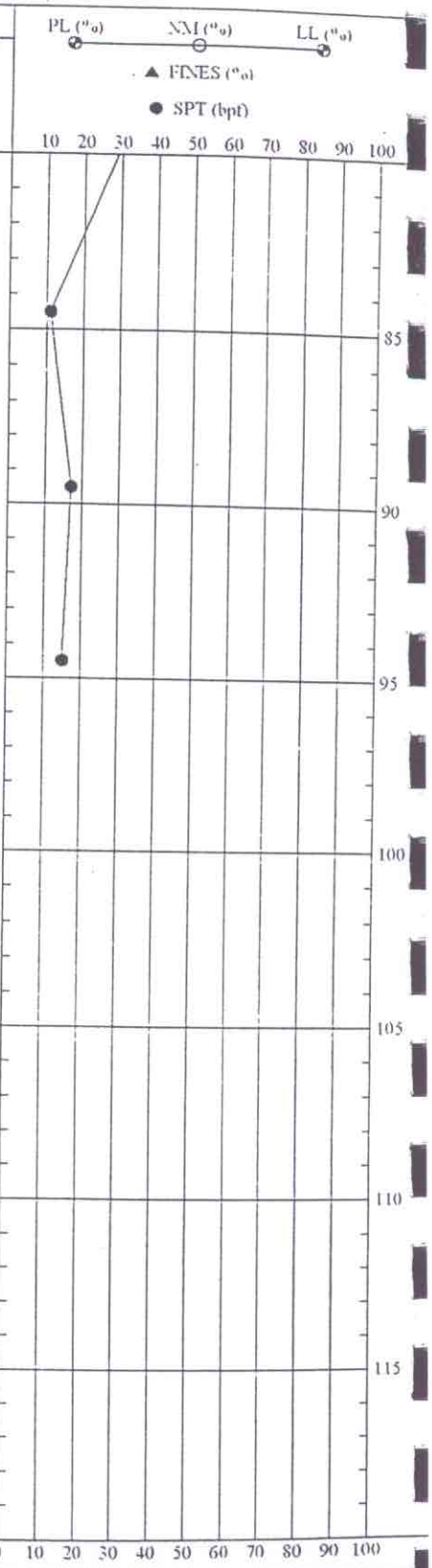
THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BEWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL

SOIL TEST BORING RECORD

PROJECT: Mayport - Wharf "D" **BORING NO.:** LB-1
COORD N:
COORD E:
DRILLED: July 8, 1999
PROJ. NO.: 40522-9-8186 **PAGE 2 OF 3**

LAW
LAWGIBB Group Member

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"
80	VERY FIRM light gray-green calcareous silty fine SAND (SM) with a few phosphate grains (Marl)		-69.5			
	FIRM gray-green calcareous clayey silty fine SAND (SM) with some phosphate grains (Marl)			SPT-17	X	4-5-6
85			-74.5			
	VERY STIFF light gray-green calcareous sandy clayey SILT (MH) with a trace of phosphate grains (Marl)			SPT-18	X	5-7-10
90			-79.5			
	FIRM light gray-green calcareous clayey silty fine SAND (SM) with a few phosphate grains (Marl)			SPT-19	X	5-6-9
95	BORING TERMINATED		-84.5			
100			-89.5			
105			-94.5			
110			-99.5			
115			-104.5			
120			-109.5			



SOIL 8186-01 GPJ LAW GIBBS.GDT 8/12/99

DRILLER: JA CT
EQUIPMENT: CME-55
METHOD: Augered: 0-6'.Mud Rotary: 6'-93.5'
HOLE DIA.: 4"
REMARKS: Automatic Hammer System

THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BEWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

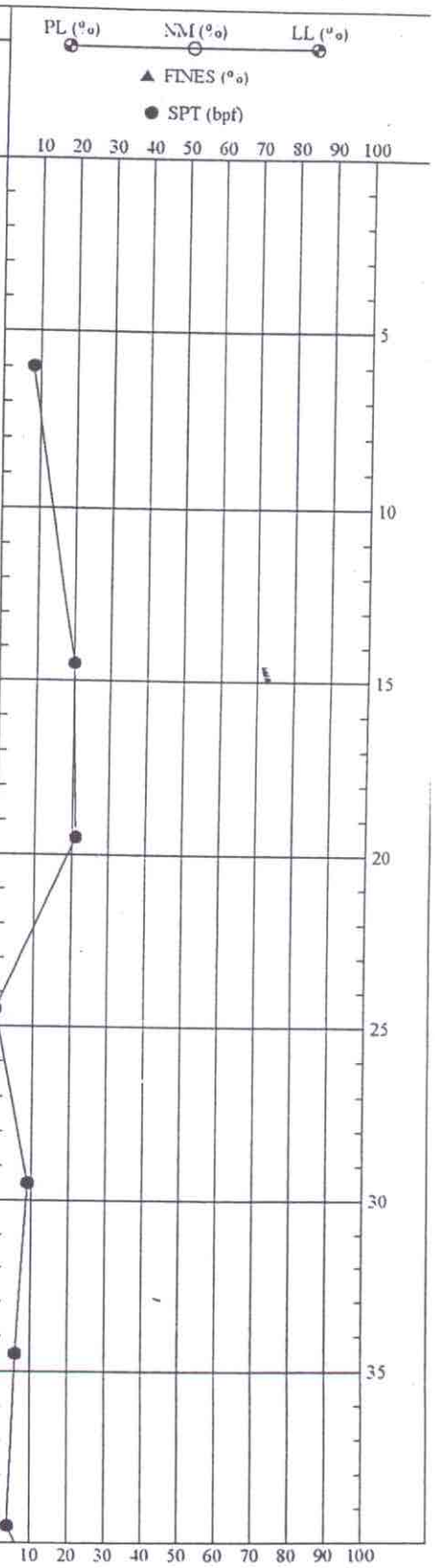
SOIL TEST BORING RECORD

PROJECT: Mayport - Wharf "D" **BORING NO.:** LB-1
COORD N:
COORD E:
DRILLED: July 8, 1999
PROJ. NO.: 40522-9-8186 **PAGE 3 OF 3**

LAW
LAWGIBB Group Member

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	ELEV (ft)
0	Asphaltic Concrete (6 inches thick)	10.5
	Limerock Base Course	
5	Tan fine SAND (SP) with a trace of shell fragments	5.5
	LOOSE gray-brown fine SAND (SP) with a trace of shell fragments	
10		0.5
	FIRM into VERY FIRM gray-brown fine SAND (SP) with a trace of shell fragments	
15		-4.5
20		-9.5
	VERY SOFT gray sandy silty CLAY (CH)	
25		-14.5
	LOOSE gray-green slightly clayey fine SAND (SP-SC)	
30		-19.5
	FIRM into SOFT gray-green silty CLAY (CH)	
35		-24.5
40		-29.5

SAMPLES IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"
SPT-1		4-4-4
SPT-2		4-8-12
SPT-3		5-8-13
SPT-4		WOH-0-0
SPT-5		2-4-5
SPT-6		2-2-4
SPT-7		1-2-2



8-9L 8186-01.GPJ LAW GIBB.GDT 8/12/99

DRILLER: CT/AR/FS
EQUIPMENT: CME-55
METHOD: Augered: 0-8.5'/Mud Rotary: 8.5'-98.5'
HOLE DIA.: 4"
REMARKS: Automatic Hammer System

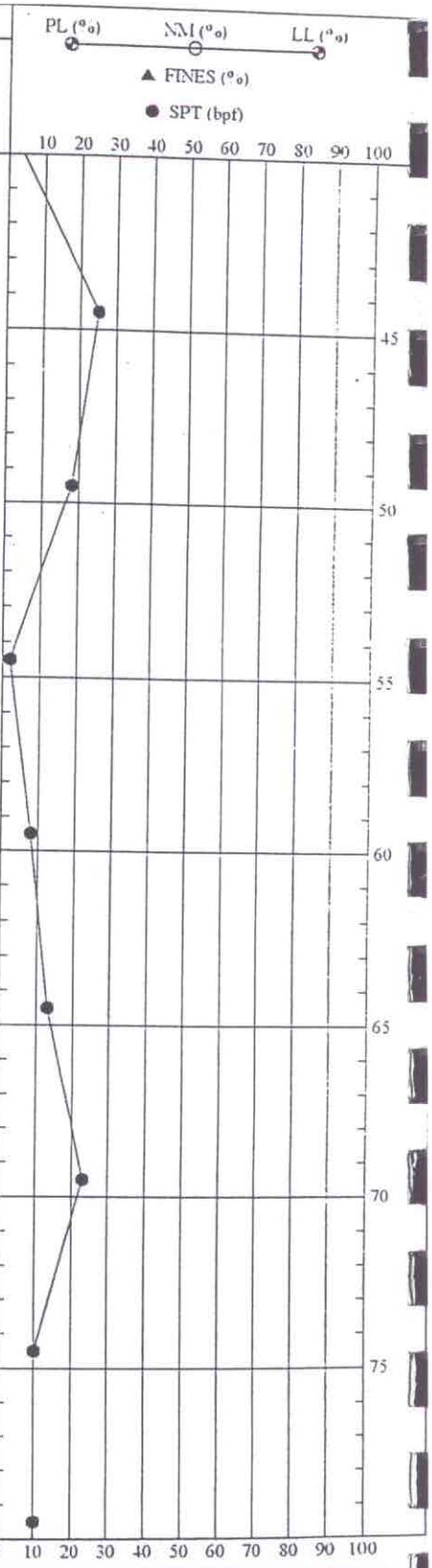
THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BEWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

SOIL TEST BORING RECORD

PROJECT: Mayport - Wharf "D" **BORING NO.:** LB-2
COORD N:
COORD E:
DRILLED: July 9, 1999
PROJ. NO.: 40522-9-8186 **PAGE 1 OF 3**

LAW
LAWGIBB Group Member

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"
40	FIRM into SOFT gray-green silty CLAY (CH)		-29.5			
	Wood (Possible timber pile)					
45			-34.5	SPT-8	X	8-12-13
	Weakly cemented tan fossiliferous LIMESTONE					
50			-39.5	SPT-9	X	3-7-11
55			-44.5	SPT-10	X	3-1-1
	LOOSE yellow-brown slightly clayey fine SAND (SP-SC) with some shell fragments					
60			-49.5	SPT-11	X	3-4-4
	FIRM to VERY FIRM dark green clayey fine to medium SAND (SC)					
65			-54.5	SPT-12	X	4-6-7
70			-59.5	SPT-13	X	6-10-13
	LOOSE dark green clayey fine to medium SAND (SC)					
75			-64.5	SPT-14	X	4-5-5
	LOOSE light gray-green calcareous clayey silty fine SAND (SM) with a trace of phosphate grains (Marl)					
80			-69.5	SPT-15	X	2-4-6



SOIL 8186-01.GPJ LAW GIBB.GDT 8/12/99

DRILLER: CT/AR/FS
EQUIPMENT: CME-55
METHOD: Augered: 0-8.5'/Mud Rotary: 8.5'-98.5'
HOLE DIA.: 4"
REMARKS: Automatic Hammer System

THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BEWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

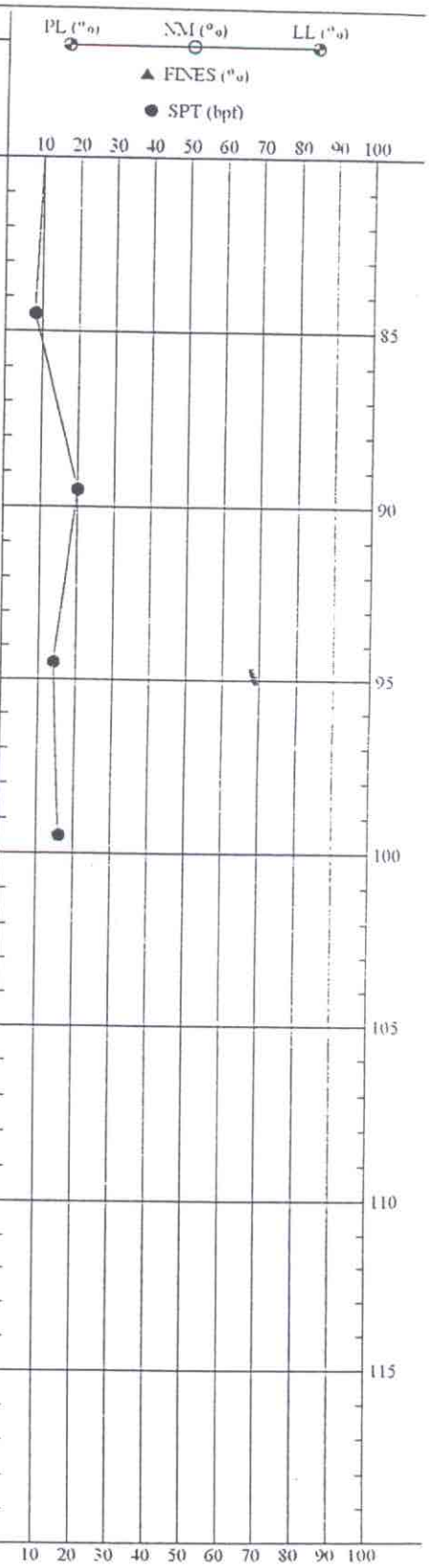
SOIL TEST BORING RECORD

PROJECT: Mayport - Wharf "D" **BORING NO.:** LB-2
COORD N:
COORD E:
DRILLED: July 9, 1999
PROJ. NO.: 40522-9-8186 **PAGE 2 OF 3**

LAW
LAWGIBB Group Member

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS	ELEV (ft)	SAMPLES IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"
80	LOOSE light gray-green calcareous clayey silty fine SAND (SM) with a trace of phosphate grains (Marl)	-69.5			
85		-74.5	SPT-16	X	3-4-4
	STIFF to VERY STIFF light green calcareous sandy clayey SILT (MH) with a trace of phosphate grains (Marl)				
90		-79.5	SPT-17	X	3-9-11
95		-84.5	SPT-18	X	4-5-9
	FIRM gray-green calcareous clayey silty fine SAND (SM) with some phosphate grains (Marl)				
100	BORING TERMINATED	-89.5	SPT-19	X	3-5-11
105		-94.5			
110		-99.5			
115		-104.5			
120		-109.5			

LEGEND



S-41, 8186-01 GPJ LAW GIBB GDT 8/12/99

DRILLER: CT ARFS
EQUIPMENT: CME-55
METHOD: Augered: 0-8.5' Mud Rotary: 8.5'-98.5'
HOLE DIA.: 4"
REMARKS: Automatic Hammer System

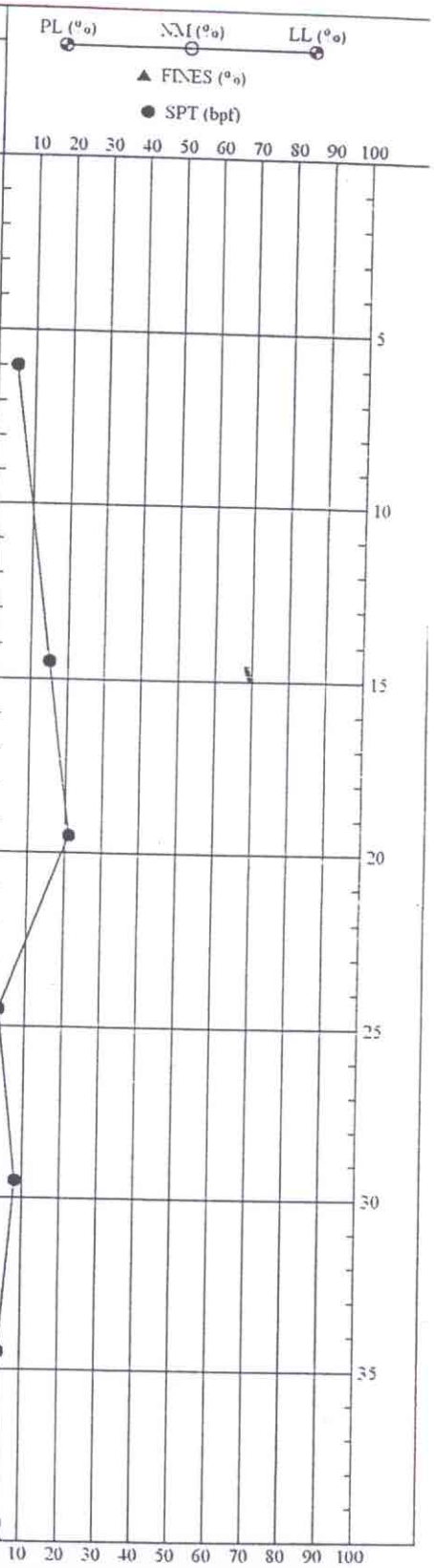
THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BEWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

SOIL TEST BORING RECORD

PROJECT: Mayport - Wharf "D" **BORING NO.:** LB-2
COORD N:
COORD E:
DRILLED: July 9, 1999
PROJ. NO.: 40522-9-8186 **PAGE 3 OF 3**

LAW
LAWGIBB Group Member

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS (SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.)	ELEV (ft)	SAMPLE IDENT	TYPE	N-COUNT (1st 6" 2nd 6" 3rd 6")
0	Asphaltic Concrete (6 inches thick)	10.5			
	Limerock Base Course				
5	LOOSE light gray-brown fine SAND (SP)	5.5	SPT-1		2-3-2
10	FIRM gray-brown slightly silty fine SAND (SP-SM)	0.5			
15		-4.5	SPT-2		5-6-9
20	VERY FIRM light gray fine SAND (SP)	-9.5	SPT-3		7-10-11
	VERY LOOSE gray clayey fine SAND (SC) with a few shell fragments				
25		-14.5	SPT-4		1-1-2
30	LOOSE gray-green clayey fine SAND (SC)	-19.5	SPT-5		2-3-5
	SOFT gray-green silty CLAY (CH)				
35		-24.5	SPT-6		2-2-2
40		-29.5	SPT-7		1-2-2



SOIL 8186-01 GPJ LAW GIBB GDT 8/12/99

DRILLER: JACT
EQUIPMENT: CME-55
METHOD: Augered: 0-6'/Mud Rotary: 6'-98.5'
HOLE DIA.: 4"
REMARKS: Automatic Hammer System

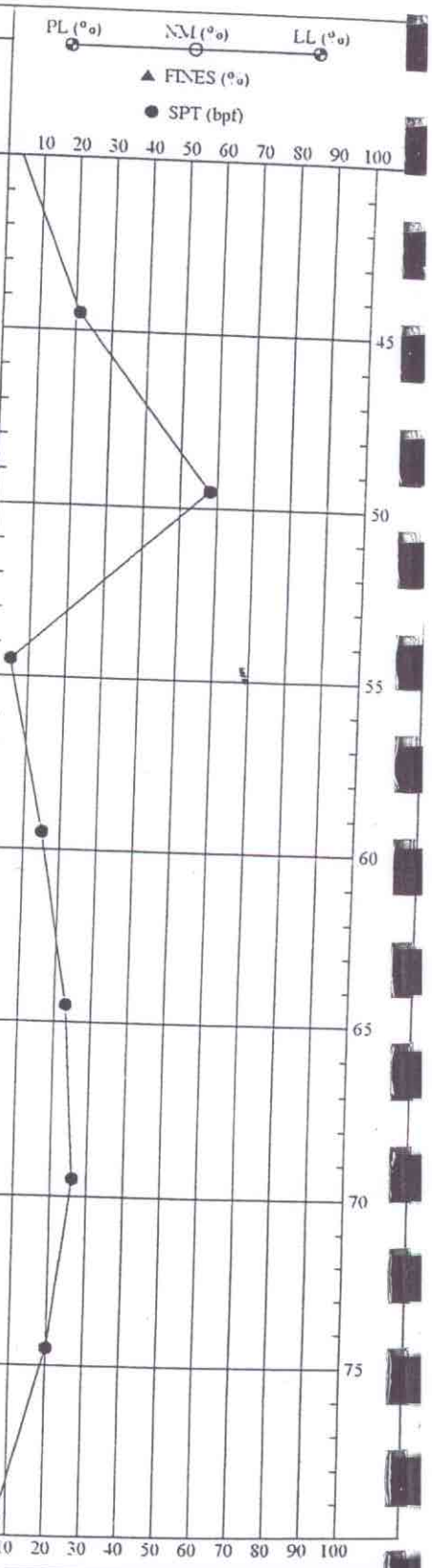
THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BEWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL

SOIL TEST BORING RECORD

PROJECT: Mayport - Wharf "D" **BORING NO.:** LB-3
COORD N:
COORD E:
DRILLED: July 12, 1999
PROJ. NO.: 40522-9-8186 **PAGE 1 OF 3**

LAW
LAWGIBB Group Member

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS	ELEV (ft)	SAMPLE IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"
40	SOFT gray-green silty CLAY (CH)	-29.5			
	VERY FIRM brown fine to medium SAND (SP)				
45		-34.5	SPT-8	X	9-11-10
	VERY DENSE gray slightly clayey fine SAND (SP-SC)				
50		-39.5	SPT-9	X	19-27-31
	LOOSE gray fine to coarse SAND (SP) with a few weakly cemented fragments				
55		-44.5	SPT-10	X	2-2-3
	FIRM brown fine to medium SAND (SP) with a few weakly cemented fragments				
60		-49.5	SPT-11	X	5-7-8
	VERY FIRM into FIRM dark gray slightly clayey fine SAND (SP-SC)				
65		-54.5	SPT-12	X	6-9-14
70		-59.5	SPT-13	X	9-11-15
75		-64.5	SPT-14	X	6-7-13
	LOOSE gray-green clayey fine SAND (SC)				
80		-69.5	SPT-15	X	2-3-4



SOIL 8186-01.GPJ LAW GIBB.GDT 8/12/99

DRILLER: JA/CT
EQUIPMENT: CME-55
METHOD: Augered: 0-6'/Mud Rotary: 6'-98.5'
HOLE DIA.: 4"
REMARKS: Automatic Hammer System

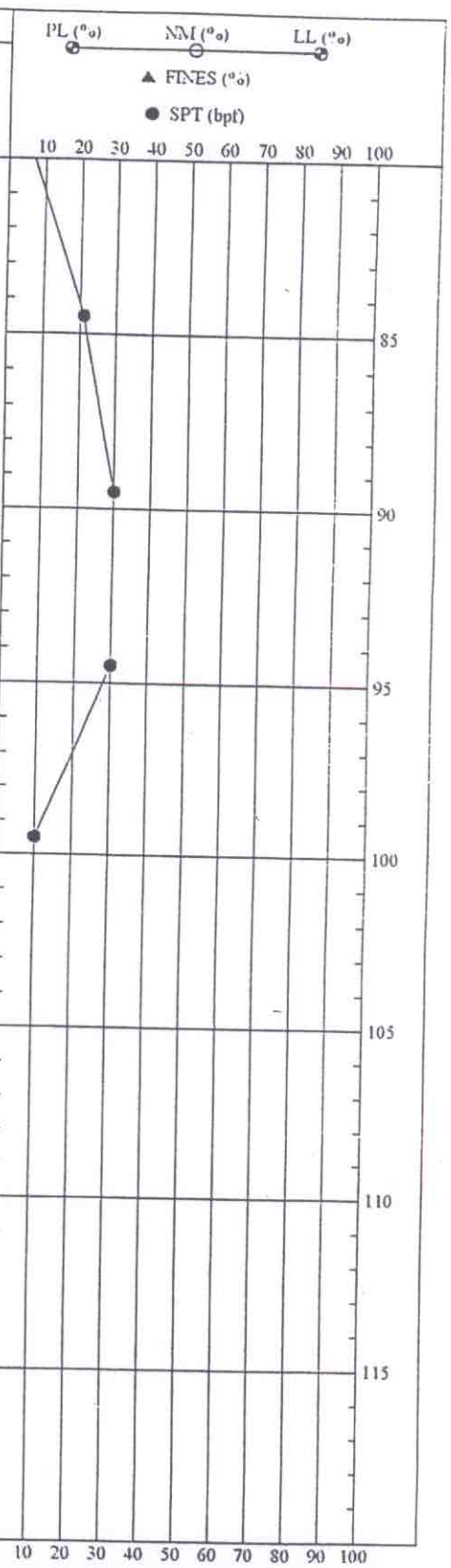
THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BEWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

SOIL TEST BORING RECORD

PROJECT: Mayport - Wharf "D" **BORING NO.:** LB-3
COORD N:
COORD E:
DRILLED: July 12, 1999
PROJ. NO.: 40522-9-8186 **PAGE 2 OF 3**

LAW
LAWGIBB Group Member

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	LEGEND	ELEV (ft)	SAMPLES IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"
80	LOOSE gray-green clayey fine SAND (SC)		-69.5			
	VERY FIRM green clayey fine SAND (SC)			SPT-16		4-9-12
85			-74.5			
	VERY FIRM light gray-green calcareous clayey silty fine SAND (SM) with some phosphate grains (Marl)			SPT-17		8-14-16
90			-79.5			
95			-84.5	SPT-18		10-12-18
	LOOSE green clayey silty fine SAND (SM) (Marl)					
100	BORING TERMINATED		-89.5	SPT-19		3-4-6
105			-94.5			
110			-99.5			
115			-104.5			
120			-109.5			



LER: JACT
QUIPMENT: CME-55
ETHOD: Augered: 0-6'/Mud Rotary: 6'-98.5'
E DIA.: 4"
MARKS: Automatic Hammer System

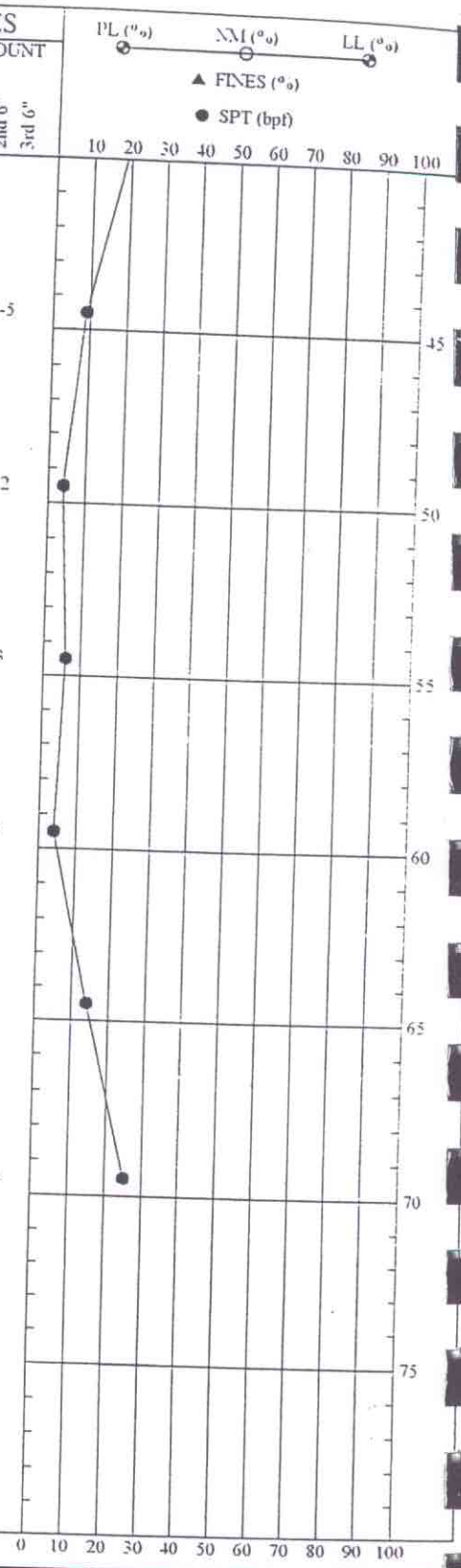
RECORD IS A REASONABLE INTERPRETATION OF BSURFACE CONDITIONS AT THE EXPLORATION CATION. SUBSURFACE CONDITIONS AT OTHER CATIONS AND AT OTHER TIMES MAY DIFFER. RFACES BEWEEN STRATA ARE APPROXIMATE. NSITIONS BETWEEN STRATA MAY BE GRADUAL.

SOIL TEST BORING RECORD

PROJECT: Mayport - Wharf "D" **BORING NO.:** LB-3
COORD N:
COORD E:
DRILLED: July 12, 1999
PROJ. NO.: 40522-9-8186 **PAGE 3 OF 3**

LAW
LAWGIBB Group Member

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS (SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.)	ELEV (ft)	SAMPLES IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"
40	FIRM gray fine SAND (SP)	-29.5			
	LOOSE blue-gray silty fine SAND (SM) with seams of gray clayey silt and light gray fine sand				
45		-34.5	SPT-9	X	2-4-5
	WEAKLY CEMENTED tan shelly LIMESTONE with uncemented shelly sand seams				
50		-39.5	SPT-10	X	1-2-2
	LOOSE tan fine SAND (SP) with many shell fragments				
55		-44.5	SPT-11	X	2-3-3
	VERY LOOSE tan slightly silty fine SAND (SP-SM) with fossiliferous sandy limestone fragments (Dissollutioned Limestone)				
60		-49.5	SPT-12	X	3-2-2
	FIRM to VERY FIRM dark green-gray slightly clayey silty fine to medium SAND (SM) (Marl)				
65		-54.5	SPT-13	X	3-6-8
70	BORING TERMINATED	-59.5	SPT-14	X	6-11-14
75		-64.5			
80		-69.5			



SOIL 8186-01.GPJ LAW GIBBGDT 8/12/99

DRILLER: JA CT
EQUIPMENT: CME-55
METHOD: Augered: 0-6' Mud Rotary: 6'-68.5'
HOLE DIA.: 4"
REMARKS: Automatic Hammer System

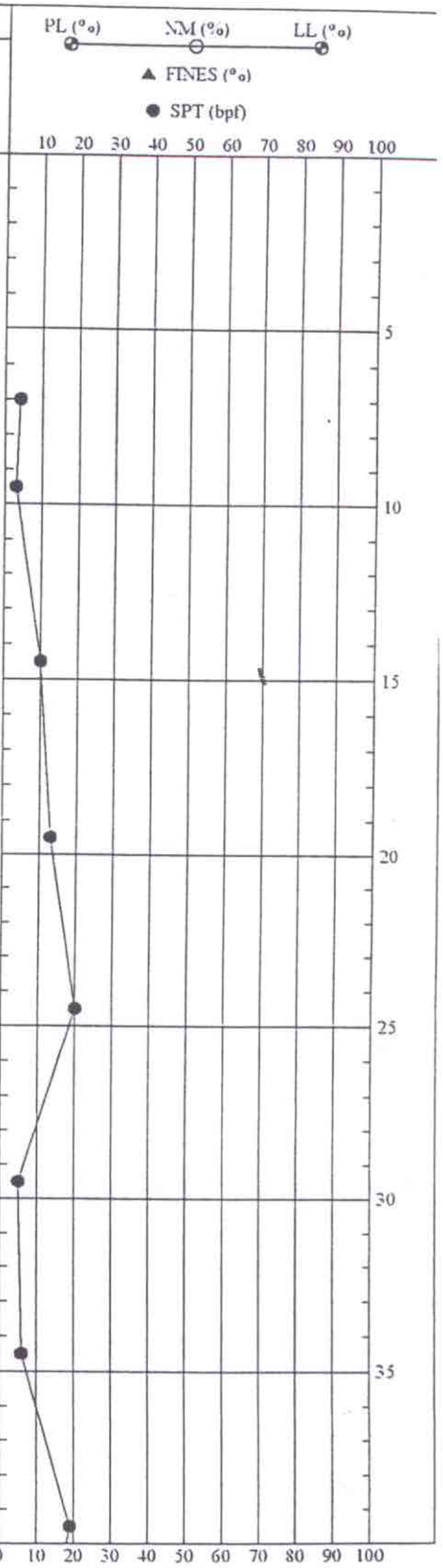
THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BEWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL

SOIL TEST BORING RECORD

PROJECT: Mayport - Wharf "D" **BORING NO.:** LB-4
COORD N:
COORD E:
DRILLED: July 21, 1999
PROJ. NO.: 40522-9-8186 **PAGE 2 OF 2**

LAW
LAWGIBB Group Member

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	ELEV (ft)	SAMPLE IDENT	TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"
0	Asphaltic Concrete (6 inches thick)	10.5			
	Limerock Base Course				
	Light brown fine SAND (SP)				
5		5.5			
	VERY LOOSE brown fine SAND (SP) with a trace of shell fragments		SPT-1		1-2-2
			SPT-2		WOH-2-1
10		0.5			
	LOOSE gray fine SAND (SP) with a few shell fragments		SPT-3		3-4-6
15		-4.5			
	FIRM gray fine SAND (SP) with many shell fragments		SPT-4		7-8-5
20		-9.5			
	FIRM gray slightly silty fine SAND (SP-SM)		SPT-5		7-9-11
25		-14.5			
	LOOSE gray slightly silty fine SAND (SP-SM) with many shell fragments		SPT-6		4-3-2
30		-19.5			
	LOOSE blue-gray silty fine SAND (SM)		SPT-7		3-3-3
35		-24.5			
	FIRM gray fine SAND (SP)		SPT-8		6-9-10
40		-29.5			



SOIL 8186-01 GIB LAW GIBB.GDT 8/12/99

DRILLER: JA/CT
EQUIPMENT: CME-55
METHOD: Augered: 0-6'/Mud Rotary: 6'-68.5'
HOLE DIA.: 4"
REMARKS: Automatic Hammer System

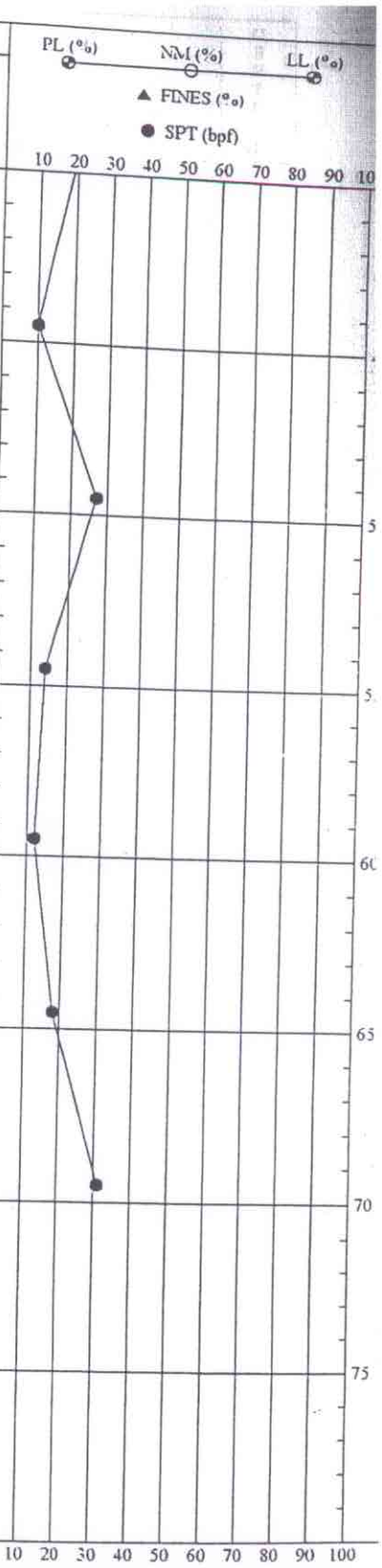
THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BEWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

SOIL TEST BORING RECORD

PROJECT: Mayport - Wharf "D" **BORING NO.:** LB-5
COORD N:
COORD E:
DRILLED: July 23, 1999
PROJ. NO.: 40522-9-8186 **PAGE 1 OF 2**

LAW
LAWGIBB Group Member

DEPTH (ft)	SOIL CLASSIFICATION AND REMARKS SEE KEY SYMBOL SHEET FOR EXPLANATION OF SYMBOLS AND ABBREVIATIONS BELOW.	ELEV (ft)	SAMPLE IDENT	SAMPLE TYPE	N-COUNT 1st 6" 2nd 6" 3rd 6"
40	FIRM gray fine SAND (SP)	-29.5			
	LOOSE gray slightly silty fine SAND (SP-SM) with many shell fragments				
45		-34.5	SPT-9	X	5-5-5
	WEAKLY CEMENTED tan fossiliferous LIMESTONE with fine sand seams				
50		-39.5	SPT-10	X	11-17-10
	FIRM light brown fine to medium SAND (SP) with some shell fragments				
55		-44.5	SPT-11	X	5-7-7
	FIRM dark green-gray slightly clayey silty fine SAND (SM) with a trace of shell fragments (Marl)				
60		-49.5	SPT-12	X	7-7-5
	FIRM to DENSE dark green-gray slightly clayey silty fine to medium SAND (SM) (Marl)				
65		-54.5	SPT-13	X	5-7-11
70	BORING TERMINATED	-59.5	SPT-14	X	8-14-17
75		-64.5			
80		-69.5			



SOIL 8186-01.GPJ LAW GIBB.GDT 8/12/99

DRILLER: JA/CT
EQUIPMENT: CME-55
METHOD: Augered: 0-6'/Mud Rotary: 6'-68.5'
HOLE DIA.: 4"
REMARKS: Automatic Hammer System

THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BEWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

SOIL TEST BORING RECORD

PROJECT: Mayport - Wharf "D" **BORING NO.:** LB-5
COORD N:
COORD E:
DRILLED: July 23, 1999
PROJ. NO.: 40522-9-8186 **PAGE 2 OF 2**

LAW
LAWGIBB Group Member

MAJOR DIVISIONS			GROUP SYMBOLS	TYPICAL NAMES
COARSE GRAINED SOILS (More than 50% of material is LARGER than No. 200 sieve size)	GRAVELS (More than 50% of coarse fraction is LARGER than the No. 4 sieve size)	CLEAN GRAVELS (Little or no fines)	GW	Well graded gravels, gravel - sand mixtures, little or no fines.
			GP	Poorly graded gravels or gravel- sand mixtures, little or no fines.
		GRAVELS WITH FINES (Appreciable amount of fines)	GM	Silty gravels, gravel - sand - silt mixtures.
			GC	Clayey gravels, gravel - sand - clay mixtures.
	SANDS (More than 50% of coarse fraction is SMALLER than the No. 4 Sieve Size)	CLEAN SANDS (Little or no fines)	SW	Well graded sands, gravelly sands, little or no fines.
			SP	Poorly graded sands or gravelly sands, little or no fines.
		SANDS WITH FINES (Appreciable amount of fines)	SM	Silty sands, sand - silt mixtures
			SC	Clayey sands, sand - clay mixtures.
FINE GRAINED SOILS (More than 50% of material is SMALLER than No. 200 sieve size)	SILTS AND CLAYS (Liquid limit LESS than 50)		ML	Inorganic silts and very fine sands, rock flour, silty of clayey fine sands or clayey silts and with slight plasticity.
			CL	Inorganic lays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays.
			OL	Organic silts and organic silty clays of low plasticity.
	SILTS AND CLAYS (Liquid limit GREATER than 50)		MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts.
			CH	Inorganic clays of high plasticity, fat clays
			OH	Organic clays of medium to high plasticity, organic silts.
HIGHLY ORGANIC SOILS			PT	Peat and other highly organic soils.

BOUNDARY CLASSIFICATIONS: Soils possessing characteristics of two groups are designated by combinations of group symbols.

SILT OR CLAY	SAND			GRAVEL		Cobbles	Boulders
	Fine	Medium	Coarse	Fine	Coarse		

No.200 No.40 No.10 No.4 3/4" 3" 12"

U.S. STANDARD SIEVE SIZE

Reference: The Unified Soil Classification System, Corps of Engineers, U.S. Army Technical Memorandum No. 3-357, Vol. 1, March, 1953 (Revised April, 1960)

Undisturbed Sample	Auger Cuttings
Split Spoon Sample	Bulk Sample
Rock Core	Crandall Sampler
Dilatometer	Pressure Meter
Packer	No Recovery
Water Table at time of drilling	Water Table after 24 hours

◀100% Percent Loss of Drilling Fluid

Correlation of Penetration Resistance with Relative Density and Consistency

SAND & GRAVEL		SILT & CLAY	
No. of Blows	Relative Density	No. of Blows	Consistency
0-4	Very Loose	0-2	Very Soft
5-10	Loose	3-4	Soft
11-20	Firm	5-8	Firm
21-30	Very Firm	9-15	Stiff
31-50	Dense	16-30	Very Stiff
Over 50	Very Dense	31-50	Hard
		Over 50	Very Hard

KEY TO SYMBOLS AND DESCRIPTIONS

LAW

LAWGIBB Group Member