ENGINEERING REPORT

for

Contract DACW-33-81-C0030

Work Order Number 8

Subsurface Investigation for the

East Boat Basin, Cape Cod Canal

Sandwich, Massachusetts

BRIGGS

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1.1 AUTHORIZATION

The work reported herein was performed under contract DACW 33-81-C-0030, Work Order No. 8 dated 9 July 1981.

1.2 PURPOSE

The purpose of the subsurface investigation was to determine the subsurface conditions at the East Boat Basin, Cape Cod Canal, Sandwich, Massachusetts.

1.3 SCOPE OF THE INVESTIGATION

Five test borings were drilled at the locations shown on Figure 1. Work was conducted between 13 July and 23 July 1981 by Briggs Engineering and Testing Company. The inspector's shift reports are included in Appendix A and the field boring logs are included in Appendix B.

1.4 SUBSURFACE CONDITIONS

Our knowledge of the subsurface conditions at the site is based on the results of the field investigations described in Section 1.3.

The site is underlain by heterogeneous deposits of cohesive and noncohesive soils. In Borings FD-1 and FD-4, located at the southern end of the site, there is a wide variation in soil type and strata thickness. In the upper 13 feet silty sand (SM), clayey silt (ML) and peat (Pt) containing roots and wood were encountered. This material is underlain by stiff to hard clayey silt to a depth of 42 ft, followed by a transition to silty sand and to gravelly sand at 48 ft.

In Borings FD-2, FD-3, and FD-5 which are located at the northern end of the site, the soil appears to be comprised predominately of compact to dense silty sand and gravelly sand. A stratum of hard clayey silt was encountered between 27 and 40.0 ft in boring FD-2.

Groundwater level readings were taken in all borings. The readings indicate that the groundwater level varies from el 2.3 ft MSL in Boring FD-5 to el 8.4 ft MSL in Boring FD-2.

1.5 QUALITY ASSURANCE

We hereby certify that the following equipment and procedures were used to perform the subsurface investigation described in this report.

1.5.1 General

All work was conducted in accordance with the procedures outlined in ASTM D-1586, Penetration Test and Split-Barrel Sampling of Soils, and D-1587, Thin-Walled Tube Sampling of Soils.

1.5.2 Records

NED Forms 58 and 58A, dated March 1971 entitled "Field Log of Test Boring" were used to record pertinent boring data. All boring logs include the following:

a. Hole number and location.

b. Make and model designation of equipment.

c. Type of drilling and sampling operation by depth.

d. Dates and time by depth when drilling and sampling operations were performed.

e. Depths at which samples were recovered or attempts were made to sample. Classification of the soil in accordance with ASTM D-2487 and D-2488. Indication of penetration resistance such as drive hammer blows given in blows per penetration depth for driving sample spoons.

f. Length of sample recovered per run.

g. Depth to bottom of hole.

1.5.3 Equipment

The equipment and type of tools used are described below.

a. Core Drills: The drills used were modern, hydraulically driven rotary head units manufactured by Acker Drill Co.

b. Samplers: The equipment employed to obtain soil samples was either a 1 3/8 inch I.D. by 24 inch split-barrel sampler with a ball check head and spring type retainers or a 3 inch I.D. by 30 inch thin wall tube sampler.

c. Drive Hammers: Drive hammers for advancing the split-barrel sampler weighed approximately 140 lbs.

d. Casing and Rods: HW flush joint casing was used to keep the boreholes open. AW drill rods were used for the borings.

1.5.4 Procedures

1.5.4.1 Split-Barrel Sampling

a. Boreholes were advanced by sampling in which a 1 3/8 inch by two foot split-barrel sampler was advanced below the bottom of the casing into undisturbed soil by the impact of a hammer weighing approximately 140 pounds falling 30 inches. Refusal was defined as 100 blows for one foot of penetration.

b. The sample spoon shoes were kept reasonably sharp at all times. Dull, bent, or otherwise damaged samplers were not used. In general, sampling was accomplished to a depth of not more than two feet below the bottom of the casing, after which the casing was advanced to the previously sampled depth and cleaned out using appropriately sized roller bits and side discharging chopping bits.

c. Samples were classified in the field immediately following the taking of the sample. Classification was in accordance with ASTM D-2487 and D-2488. Representative samples were taken from each sampling run and placed in 16 oz. glass jars with hermetically sealed lids. Jars were labeled with sample number, sampling interval, boring number, date, location, penetration resistance and soil description. A chain of custody log was maintained documenting custody of the samples between the field and transportation and delivery to the laboratory.

1.5.4.2 Undisturbed Sampling

Where fine-grained soils were encountered, the borehole was advanced by hydraulically pressing a 3" I.D. by 30" tube 24 " into undisturbed soil or to refusal. Due to the stiffness of the fine-grained soils and the presence of gravel and small cobbles, it was not possible to obtained undisturbed samples.

COMMONWEALTH OF MASSACHUSETTS
DAVID STETSON CAMPBELL
No. 29145
REGISTERED PROFESSIONAL ENGINEER

Certified 14 August 1981

David S. Campbell, P.E.
Massachusetts No. 29145

BRIGGS ENGINEERING CORPORATION

Chain of Custody Log

Project: Subsurface Investigation - East Boat Basin

Items: Tubes None

Bottles None

Jar Samples 50

Other None

Sampling Logs Borings FD-1, FD-2, FD-3, FD-3A, FD-4, & FD-5

Date & Time Received	Date & Time Transfered	Comments	Custodian
as sampled	8-3-81 1300 hrs.		Ronald F. Bukowski
8/3/81 1300			J P Razza

BRIGGS ENGINEERING CORPORATION

WEEKLY SAFETY MEETING

TO: Safety Office, NED

FROM: Field Engineer — Date held 13 July 1981

THRU: Project Engineer — Time 0800hrs

Weekly safety meeting was held this date for the following personnel:
Contract No. DACW 33-81-C-0030 Personnel present: C. Reil
Work Order No. 8 — J. Mullen
Conducted By: R. Bukoski — J. Shelkey

1. Subjects discussed (Note, delete, or add):

x Individual Protective Equipment -
Prevention of Falls -
x Safe Lifting Techniques -
Emergency Communications -
Fire Prevention -
Sanitation, First Aid -
x Tripping Hazards - trash, hose, nails in lumber -
Staging, Ladders, Concrete Forms -
Hand Tools -
Portable Power Tools -
Woodworking Machinery -
x Equipment Maintenance (Zero defects) -
x Hoisting Equipment -
x Ropes, Hooks, Chains and Slings -
Electrical Grounding, Temporary Wiring -
Lockouts for safe clearance procedures -
Electrical, pressure, moving parts -
Welding -
Excavations -
Loose Rock and Steep Slopes -
Explosives -
Water Safety -
Other -

Prepared by: Ron Bukoski /NK
Field Engineer

2. Exposure:
For the period of 13 July to 17 July 1981, covering 4 men for 42.5 man-hours per man for a total of 170 man-hours.

Signature:
Project Engineer

3. Forwarded: NED, Waltham, MA

BRIGGS ENGINEERING CORPORATION

WEEKLY SAFETY MEETING

TO: Safety Office, NED

FROM: Field Engineer — Date held 20 July 1981

THRU: Project Engineer — Time 0730hrs

Weekly safety meeting was held this date for the following personnel:
Contract No. DACW 33-81-C-0030 Personnel present: C. Reil
Work Order No. 8 — J. Mullen
Conducted By: R. Bukoski — J. Shelkey

1. Subjects discussed (Note, delete, or add):

x Individual Protective Equipment -
x Prevention of Falls -
x Safe Lifting Techniques -
Emergency Communications -
Fire Prevention -
Sanitation, First Aid -
x Tripping Hazards - trash, hose, nails in lumber -
Staging, Ladders, Concrete Forms -
Hand Tools -
Portable Power Tools -
Woodworking Machinery -
x Equipment Maintenance (Zero defects) -
x Hoisting Equipment -
x Ropes, Hooks, Chains and Slings -
Electrical Grounding, Temporary Wiring -
Lockouts for safe clearance procedures -
Electrical, pressure, moving parts -
Welding -
Excavations -
Loose Rock and Steep Slopes -
Explosives -
Water Safety -
x Other - Brush Clearing Equipment Safety

Prepared by: Ron Bukoski NSR
Field Engineer

2. Exposure:
For the period of 20 July to 23 July, 1981, covering 4 men for 35 man-hours per man for a total of 140 man-hours.

Signature:
Project Engineer

3. Forwarded: NED, Waltham, MA

APPENDIX A

Shift Reports

Briggs Engineering Co.

Shift Report

DATE: 7-13-81
SHIFT NO: [1]
PROJECT: East Boat Basin - Sandwich, MA
INSPECTOR: Ronald F. Bukoski

TIME: 0800 - 1600 COMMENTS

This report summarizes the work performed at the East Boat Basin, Sandwich, MA for 13 July 1981.

Arrived on site at 0715 hrs. to locate Boring FD-1. However, due to thick brush conditions and no tools to clear a path to the boring location, Boring FD-3 was located instead.

The drillers arrived on site at 0800 hrs. and a safety meeting was held. The drilling rig was positioned over FD-3 and drilling began. A boulder was encountered at 16.3'. A roller bit was used to attempt to drill through the boulder. This was not successful. To determine the size, the boulder was cored from 16.5' to 18.3' followed by a split-spoon sampling from 18.5' to 20.0'.

The following table summarizes the work performed today.

Arrived: 0800

Safety Meeting & positioning of drilling rig on FD-3	1 hr.-15 min.
Drilling	4 hrs.-55 min.
Rain Delay-thunderstorm	35 min.
Drilling	60 min.
Clean-up	15 min.

Summary:	Soil Sampling	20.0 ft
	Mob & Demob	90 min.
	Rain Delay	35 min.

Briggs Engineering Co.

Shift Report

DATE: 7-14-81
SHIFT NO: [1]
PROJECT: East Boat Basin - Sandwich, MA
INSPECTOR: Ronald F. Bukoski

TIME: 0730 - 1600 COMMENTS

Today was the second day of drilling at the East Boat Basin, Sandwich, MA. A 2' boulder was encountered at a depth of 16.3' in Boring FD-3 yesterday. The boulder could not be broken, and prevented the further advancement of the casing. The boring was relocated 6' closer to the service road, on a line perpendicular to the road. The 4" casing was driven to a depth of 20.0', the maximum sampling depth previously obtained, where sampling began. A small cobble was encountered at 20.0'. Split spoon sampling was accomplished at 20.5' with refusal at 22.0'. The boring was terminated and the rig moved to Boring FD-4.

The following table summarizes the work performed today.

Arrived: 0730

Mob & relocated on FD-3A	1 hr.-30 min.
Drilling	2 hrs.-00 min.
Rain Delay-thunderstorm	10 min.
Drilling	1 hr.-50 min.
Rain Delay-heavy shower	25 min.
Demob & set-up on FD-4	1 hr.-50 min.
Drilling	30 min.
Demob for the day	15 min.

Summary:	Soil Sampling	29.0 ft
	Casing Removed	20.0 ft
	Moving Time	215 min.
	Rain Delay	35 min.

Briggs Engineering Co.

Shift Report

DATE: 7-15-81
SHIFT NO: [1]
PROJECT: East Boat Basin - Sandwich, MA
INSPECTOR: Ronald F. Bukoski

TIME: 0745 - 1630 COMMENTS

Today was the third day of drilling at the East Boat Basin, Sandwich, MA. Sampling proceeded from a depth of 7.0' in Boring FD-4. Two attempts were made to obtain shelby tube samples, at depths of 7.0' and 9.0'. The first attempt resulted in only 0.3' recovery, because wood became wedged in the tip of the shelby tube. The recovery in the second attempt was 1.0'. However, the tube was badly dented and the soil (muck) disturbed. The samples from these tubes were placed in sample jars. Refusal was encountered at 13.5' and the boring was terminated. The drilling rig was then moved to Boring FD-5. Drilling proceeded smoothly on FD-5, with sampling to 21.5' today.

The following table summarizes the work performed today.

Arrived: 0745

Set-up equipment	45 min.
Drilling	1 hr.-55 min.
Moved from FD-4 to FD-5	2 hrs.-05 min.
Drilling	3 hrs.-40 min.
Clean-up	20 min.

Summary:	Soil Sampling	28.0 ft
	Casing Removed	12.0 ft
	Moving Time	190 min.
	Undisturbed Samples	2

Briggs Engineering Co.

Shift Report

DATE: 7-16-81
SHIFT NO: [1]
PROJECT: East Boat Basin - Sandwich, MA
INSPECTOR: Ronald F. Bukoski

TIME: 0735 - 1535 COMMENTS

Today was the fourth day of drilling at the East Boat Basin, Sandwich, MA. Drilling proceeded smoothly on Boring FD-5, from 21.5' to 50.0', the bottom of the boring. No fine grain soil strata were encountered in which shelby tubes could be pushed.

The following table summarizes the work performed today.

Arrived: 0735

Set-up equipment	25 min.
Drilling	7 hrs.-20 min.
Clean-up	15 min.

Summary:	Soil Sampling	28.5 ft
	Moving Time	40 min.

Briggs Engineering Co.

Shift Report

DATE: 7-17-81
SHIFT NO: [1]
PROJECT: East Boat Basin - Sandwich, MA
INSPECTOR: Ronald F. Bukoski

TIME: 0700 - 1600 COMMENTS

Today was the fifth day of drilling at the East Boat Basin, Sandwich, MA. Sampling in FD-5 was completed to a final depth of 50.0' yesterday. The casing was removed and the rig moved to Boring FD-1. The move to FD-1 was difficult because of brush and briars obstructing the route to the boring location. In addition, no water was readily available for drilling.

Once finally set-up at the boring location the drilling proceeded slowly because of frequent sampling and one attempt to push a shelby tube, which resulted in little recovery due to a change in soil. The subsurface strata near the surface were generally quite thin, generally less than several feet thick, and were quite variable in composition.

The following table summarizes the work performed today.

Arrived: 0700

Equipment preparation FD-5	15 min.
Removed Casing	1 hr.-20 min.
Move from FD-5 to FD-1	2 hrs.-15 min.
Drilling	1 hr.-30 min.
Obtained water	40 min.
Drilling	2 hrs.-45 min.
Clean-up	15 min.

Summary:	Soil Sampling	22.0 ft
	Casing Removed	48.0 ft
	Moving Time	205 min.
	Undisturbed Samples	1

Briggs Engineering Co.

Shift Report

DATE: 7-20-81
SHIFT NO: [1]
PROJECT: East Boat Basin - Sandwich, MA
INSPECTOR: Ronald F. Bukoski

TIME: 0730 - 1530 COMMENTS

Today was the sixth day of drilling at the East Boat Basin, Sandwich, MA. A weekly safety meeting was conducted following the arrival of the drillers at 0730 hrs. Drilling and soil sampling then continued in Boring FD-1 from 22.0' to 40.0'. Drilling proceeded rather slowly because of the length of time it took to wash out the 4" I.D. casing before sampling. In addition, a shelby tube was attempted at a depth of 33.0'. However, the tube could not be pushed due to the stiffness of the soil. A light rain began falling at 1330 and progressively became heavier as the afternoon wore on. This also caused the drilling rate to be slowed because of wet equipment.

The following table summarizes the work performed today.

Arrival Time 0730

Equipment preparation FD-5	35 min.
Drilling	7 hrs.-10 min.
Clean-up	15 min.

Summary:	Soil Sampling	18.0 ft.
	Moving Time	50 min.
	Undisturbed Samples	1

Briggs Engineering Co.

Shift Report

DATE: 7-21-81
SHIFT NO: [1]
PROJECT: East Boat Basin - Sandwich, MA
INSPECTOR: Ronald F. Bukoski

TIME: 0730 - 1530 COMMENTS

Today was the seventh day of drilling at the East Boat Basin, Sandwich, MA. Work began at 0730 with the completion of drilling and sampling Boring FD-1 from 40.0' to 50.0'. Upon the completion of drilling casing was removed. The process of removing the casing was difficult and progress was slow from 48.0' to 15.0' below the existing surface. Once the casing was removed the drilling rig was moved from FD-1 to FD-2.

While on route from FD-1 to FD-2 the drilling rig and truck became bogged down on a small pile of gravel. The truck and drilling rig were freed after leveling the pile of gravel and placing planks under the wheels of the drilling rig. Drilling then proceeded to a depth of 6.5' on Boring FD-2 without any problems.

The following table summarizes the work performed today.

Arrival Time 0730

Equipment preparation	15 min.
Drilling	3 hrs.-15 min.
Removed Casing	3 hrs.-00 min.
Moved from FD-1 to FD-2	1 hr.-50 min.
Drilling	25 min.
Clean-up	15 min.

Summary:	Soil Sampling	16.5 ft.
	Casing Removal	48.0 ft.
	Moving	140 min.

Briggs Engineering Co.

Shift Report

DATE: 7-22-81
SHIFT NO: [1]
PROJECT: East Boat Basin - Sandwich, MA
INSPECTOR: Ronald F. Bukoski

TIME: 0730 - 1630 COMMENTS

Today was the eighth day of drilling at the East Boat Basin, Sandwich, MA. The drilling crew arrived at 0730 to continue drilling of Boring FD-2. The drilling was continued from a depth of 6.5' to 33.0' for the day. No significant problems were encountered in drilling today. A stratum of saturated, medium to fine sand, from 15.0' to 25.0' did present a problem in recovering a sample. Following five attempts using various types of sampler traps, the hopes of obtaining a sample was abandoned. A sample of the sand from the casing wash-water was taken between 15.0' and 18.0'. No material suitable for shelby tube sampling was encountered.

The following table summarizes the work performed today.

Arrival Time 0730

Equipment preparation	15 min.
Drilling	8 hrs.-15 min.
Equipment clean-up & maintenance	30 min.

Summary:	Soil Sampling	26.5 ft.
	Moving Time	45 min.

Briggs Engineering Co.

Shift Report

DATE: 7-23-81
SHIFT NO: [1]
PROJECT: East Boat Basin - Sandwich, MA
INSPECTOR: Ronald F. Bukoski

TIME: 0730 - 1630 COMMENTS

Today was the ninth day of drilling at the East Boat Basin, Sandwich, MA. The drilling crew arrived at 0730 to complete Boring FD-2. The drilling proceeded from a depth of 33.0' to 50.0'.

The following table summarizes the work performed today.

Arrival Time 0730

Equipment preparation	30 min.
Drilling	1 hr.-50 min.
Equipment maintenance	1 hr.-00 min.
Drilling	3 hrs.-25 min.
Removed casing	1 hr.-45 min.
Demob rig & equipment	30 min.

Summary:	Soil Sampling	17.0 ft.
	Casing Removed	36.0 ft.
	Moving Time	120 min.

APPENDIX B

Field Boring Logs

East Boat Basin

U. S. ARMY
CORPS OF ENGINEERS
NEW ENGLAND DIVISION

FIELD LOG OF TEST BORING

Site: Fall Boat Basin — Page 1 of 7 Pages

Boring No. FD-1 Desig. 4 Diam. (Casing) 4 in. HW

Co-ordinates: N _____ E _____

Elevation Top of Boring: ≈ 19.6 Ft M.S.L.
Total Overburden Drilled: 50.0 Feet
Elevation Top of Rock: NONE ENCOUNTERED M.S.L.
Total Rock Drilled: NONE Feet
Elevation Bottom of Boring: −30.4 Ft M.S.L.
Total Depth of Boring: 50.0 Feet
Core Recovered: N/A % No. Boxes _____
Core Recovered: N/A Ft: ____ Diam. ____ In.
Soil Samples: 1 3/8 In. Diam. 12 No.
Soil Samples: 3 & 4 In. Diam. 2 No.

Hammer Wt.: 140 lb
Hammer Drop: 30 in.
Casing Left: NONE
Subsurface Water Data _____ Page _____
Obs. Well: NONE
Drilled By: BRIGGS ENGINEERING + TESTING CO.
Mfg. Des. Drill: ACKER
Inspected By: RONALD F. BUKACKI
Classification By: _____
Classification By: _____

Boring Started: 7-17-81
Boring Completed: 7-21-81

DEPTH: Blows on casing	DEPTH: 1" = 1'	CORE/SAMPLE: NO.	SIZE	DEPTH RANGE	BLOWS PER FT. / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
1050							
21		S-1 1 JAR	1 3/8"	0.0 TO 0.5'	12	DROVE 1 3/8 x 24" SPLIT-SPOON SAMPLER FROM 0.0 TO 2.0'	SURFACE: TALL GRASS + BRUSH TO 10' HIGH, FEW COBBLES TO 1.0' VISIBLE ON SURFACE.
	1	S-2 1 JAR	1 3/8"	0.5 TO 2.0'	19	RECOVERED 24"	TOPSOIL; SILTY SAND, COARSE TO FINE SAND, 30-35% NON-PLASTIC FINES, 25-30% ORGANIC MATERIAL SUCH AS LEAVES, ROOTS, GRASS AND WOOD CHIPS DAMP, DARK BROWN TO BROWN, SM.
22					14		
	2				18	DROVE 4" CASING FROM 0.0 TO 5.0'. REMOVED CASING AND HOLE REMAINDED OPEN. SAMPLE TAKEN FROM TIP OF CASING WHEN REMOVED. (S-3).	SILTY SAND, COARSE TO FINE SAND, PREDOMINATELY FINE SAND, 30-40% SLIGHTLY PLASTIC FINES, <10% FINE GRAVEL, MOIST, BROWN MOTTLED GRAY, SM.
14							
	3						
15							
	4						
16		S-3 1 JAR	4"	4.5 TO 5.0'			INTERBEDDED SILT, SAND AND PEAT. CLAYEY SILT, LOW PLASTICITY MOIST GRAY SAND, MEDIUM TO FINE, <5% GRAVEL, MOIST, BROWN PEAT, DECAYING WOOD, AND ROOTS, SLIGHT ORGANIC ODOR.
	5						

GENERAL REMARKS: BORING DEPTHS ARE REFERENCED TO EXISTING SURFACE. BLOWS ON CASING FROM 300 lb HAMMER UNLESS OTHER WISE NOTED, DROPPED FROM 18 in.

Site: East Boat Basin, Sandwich, MA	Boring No. FD-1	Page 2 of 7

DEPTH: Blows on Casing	DEPTH: Ft. / '	CORE/SAMPLE: NO.	SIZE	DEPTH RANGE	BLOWS PER FT. / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
10		S-4 1 JAR	1 3/8"	5.0 TO 6.5	2	DROVE 1 3/8 x 24" SPLIT-SPOON SAMPLER FROM 5.0 TO 6.5'	CLAYEY SILT, LOW PLASTICITY <5% FINE GRAVEL INTERSPERSED, MOIST GRAY MOTTLED RUSTY BROWN, ML.
	6	S-5 1 JAR	1 3/8"	5.5 TO 6.5'	5 / 6	RECOVERED 18" DROVE CASING FROM 5.0 TO 6.5'. PULLED CASING AND HOLE REMAINED OPEN.	INTERBEDDED PEAT, CLAYEY SILT, +SAND, THIN SEAMS OF MEDIUM TO FINE SAND, LOW PLASTICITY ORGANIC SILT AND POCKETS OF CLAYEY SILT, MOIST, BROWN TO DARK BROWN, MOTTLED GRAY.
15							
	7	S-6 1 JAR SHELBY TUBE	3.0"	6.5 TO 8.5'		PUSHED SHELBY TUBE FROM 6.5 TO 8.5' RECOVERED ONLY 4" - SAMPLE PLACED IN JAR S-6	
8							CLAYEY SAND, COARSE TO FINE SAND, PREDOMINATELY MEDIUM TO FINE SAND, ONE GRAVEL SIZE PARTICLE TO 0.13', LOW PLASTICITY, GRAY, SATURATED SOFT, SC.
	8					DROVE 4" CASING FROM 6.5' TO 10.0'. WASHED CASING OUT USING SIDE-DISCHARGE CHOPPING BIT.	
10							
	9						
40							
	10						
12		S-7 1 JAR	1 3/8"	10.0 TO 11.5'	3 / 5	DROVE 1 3/8" x 24" SPLIT-SPOON SAMPLER FROM 10.0 TO 11.5' RECOVERED 18"	SANDY PEAT, SMALL ROOTS, SLIGHT ORGANIC ODOR, 20-30% FINE SAND, SATURATED, DARK BROWN, Pt.
	11				8		
23						DROVE 4" CASING FROM 10.0 TO 13.0' WASHED CASING OUT USING SIDE-DISCHARGE CHOPPING BIT.	
	12						
32						DROVE 1 3/8" x 24" SPLIT-SPOON SAMPLER FROM 13.0 TO 14.5'	
	13					RECOVERED 12"	
72		S-8 1 JAR	1 3/8"	13.0 TO 13.5	17		SAND, COARSE TO FINE SAND, 10-15% FINE SUBANGULAR GRAVEL 10-15% PEAT, SLIGHT ORGANIC ODOR DARK BROWN, SATURATED, SP.

Site: EAST BOAT BASIN SANDWICH, MA	Boring No. FD-1	Page 3 of 7

DEPTH: Blows on Casing	DEPTH: 1" = 1'	CORE/SAMPLE: NO.	CORE/SAMPLE: SIZE	CORE/SAMPLE: DEPTH RANGE	BLOWS PER FT. / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
		S-8 1 JAR	1 3/8"	13.0 TO 14.5'	29		SAND, COARSE TO FINE SAND 10-15% FINE SUBANGULAR GRAVEL 10-15% PEAT, SLIGHT ORGANIC ODOR, DARK BROWN, SATURATED SP. TIP OF SAMPLER CLAYEY SILT
	14				37		
132 300 lb						DROVE 4" CASING FROM 13.0 TO 20.0' WASHED OUT CASING USING SIDE DISCHARGE CHOPPING BIT. NO SAMPLING WAS PERFORMED FROM 14.5 TO 20.0 Ft DUE TO AN ERROR. A 5Ft SECTION OF CASING WAS ADDED TO THE 2Ft OF CASING REMAINING ABOVE GROUND FOLLOWING THE SAMPLING AT 13.0Ft. THE FULL 7 Ft OF CASING REMAINING ABOVE GROUND WAS MISTAKENLY DRIVEN TO 20.0 Ft. BECAUSE OF THIS ERROR CAREFUL MONITORING OF THE WASH WATER WAS MADE TO DETECT ANY SIGNIFICANT CHANGE IN THE SUBSOIL. SINCE NO CHANGES WERE DETECTED BETWEEN THE WASH AND THE SAMPLE RECOVERED FROM 20.0 TO 22.0 Ft OR WITHIN THE RANGE FROM 14.5 TO 20.0 Ft. THE DECISION NOT TO RELOCATE THE BORING AND SAMPLE AT 15.0Ft WAS MADE.	WASH - CLAYEY SILT
69 440 lb	15						
89 440 lb	16						
124 440 lb	17						
162 440 lb	18						
83 440 lb	19						
97 300 lb	20	S-9 1 JAR	1 3/8"	20.0 TO 22.0'	10	DROVE 1 3/8" x 24" SPLIT-SPOON SAMPLER FROM 20.0 TO 22.0' RECOVERED 14"	CLAYEY SILT, LOW PLASTICITY 10-15% FINE SAND, <5% INTERSPERSED COARSE SAND, SATURATED GRAY, ML.
					11		
98 300 lb	21				14		
	22				26		

Site: EAST BOAT BASIN SANDWICH, MA	Boring No. FD-1	Page 4 of 7

DEPTH: Blows on Casing	DEPTH: 1"=1'	CORE/SAMPLE: NO.	SIZE	DEPTH RANGE	BLOWS PER FT. / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
100 300 lb							
36 440 lb	23						
129 440 lb							
	24					7-20-81 DROVE CASING FROM 20.0 TO 25.0' WASHED OUT CASING USING ROLLER BIT.	
181 440 lb							
	25					DROVE 1 3/8" x 24" SPLIT-SPOON SAMPLER FROM 25.0 TO 26.5,	CLAYEY SILT, LOW PLASTICITY, 10-15 % FINE SAND, 10% FINE GRAVEL AND COARSE SAND INTERSPERSED, SATURATED, GRAY ML.
158 440 lb		S-10 1 JAR	1 3/8"	25.0 TO 26.5	50 / 100		
	26						POSSIBLE SMALL COBBLE AT 25.5'
150 440 lb					17/300 lb		
	27					DROVE 4" CASING FROM 25.0 TO 30.0' WASHED OUT CASING USING ROLLER BIT. HOLE WAS WASHED TO 31' AND REMAINDED OPEN 1' BELOW BOTTOM OF CASING	
203 440 lb							
	28						
206 440 lb							
	29						
252 440 lb							
1230	30						
130 300 lb 30-31'							

Site: EAST BOAT BASIN SANDWICH, MA	Boring No. FD-1	Page 5 of 7

DEPTH: Blows on Casing	DEPTH: 1" = 1'	CORE/SAMPLE: No.	CORE/SAMPLE: Size	CORE/SAMPLE: Depth Range	BLOWS PER FT. / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
130 300 lb 30-31'							
126 440 lb	31	S-11 1 JAR	1 3/8"	31.0 TO 32.5	10 / 14	DROVE 1 3/8" x 24" SPLIT-SPOON SAMPLER FROM 31.0 TO 32.5' RECOVERED 10"	CLAYEY SILT, LOW PLASTICITY SATURATED, GRAY, ML.
100 440 lb	32				17	DROVE 4" CASING FROM 30.0 TO 33.0' WASHED OUT CASING USING ROLLER BIT	
1325 84 440 lb	33					ATTEMPTED TO PUSH SHELBY TUBE AT 33.0'. THE TUBE COULD NOT BE ADVANCED AT ALL, AND WHEN RETRIVED THE TIP OF THE TUBE WAS BENT, MOST PROBABLY DUE TO A PIECE OF FINE GRAVEL.	
104 440 lb	34						
201 440 lb	35					CASING DRIVEN FROM 33.0 TO 36.0' CASING WASHED OUT USING ROLLER BIT.	
134 440 lb	36	S-12 1 JAR	1 3/8"	36.0 TO 38.0'	21 / 22	DROVE 1 3/8" x 24" SPLIT SPOON SAMPLER FROM 36.0 TO 38.0' RECOVERED 2" IN TIP OF SAMPLER	CLAYEY SILT, LOW PLASTICITY SATURATED, GRAY, ML.
131 440 lb	37				19 / 25		
129 440 lb	38						
	39						

NED 58A(Test)

Boring No. FD-1

Site: EAST BOAT BASIN ... SANDWICH, MA	Boring No. FD-1	Page 6 of 7

DEPTH: BLOWS ON CASING	DEPTH: 1" = 1'	CORE/SAMPLE: NO.	CORE/SAMPLE: SIZE	CORE/SAMPLE: DEPTH RANGE	BLOWS PER FT. / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
120						9-27-81 DROVE 4" CASING FROM 36.0 TO 41.0'	
440 lb						WASHED OUT CASING USING ROLLER BIT.	
	40					WASHED TO 42.0' HOLE REMAINED OPEN.	
106							
440 lb							
	41						
103							
440 lb							
	42						
111				42.0	28	DROVE 1 3/8" x 24" SPLIT-SPOON SAMPLER FROM 42.0 TO 43.5'	SILTY SAND, COARSE TO FINE SAND, 15-25% NONPLASTIC FINE - MAYBE SLIGHTLY PLASTIC SEVERAL GRAINS OF FINE GRAVEL SATURATED, GRAY SM.
440 lb		S-13 1 JAR	1 3/4"	TO 43.5'	37	RECOVERED 1.5" IN TIP OF SPOON.	
	43						
135					26	REDROVE SAMPLER TO 45.0 FOR RECOVERY, NO RECOVERY	
440 lb							
	44						
104							
440 lb							
	45						
113							
440 lb							
	46						
136							
440 lb							
	47						
149 440 lb 47-48'							

Site: East Boat Basin Sandwich, MA	Boring No. FD-1	Page 7 of 7

DEPTH Blows on Casing	DEPTH 1"	CORE/SAMPLE NO.	CORE/SAMPLE SIZE	CORE/SAMPLE DEPTH RANGE	BLOWS PER FT. / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
149 44016 47-48'						DROVE 4" CASING FROM 42.0 TO 47.0'	
	48						
				48.0 TO 50.0'	12	CASING WASHED OUT USING ROLLER BIT. CASING DRIVEN TO 48.0'	GRAVELLY SAND, COARSE TO FINE SAND, COARSE TO FINE GRAVEL to 0.12' max 10-20% non-plastic fines, sat. gray SP
		S-14 1 JAR	1 3/8"		10	DROVE 1 3/8" x 24" SPLIT-SPOON SAMPLER FROM 48 TO 50.0'	
	49						
					23	RECOVERED 3" IN TIP OF SAMPLER	
					25		
	50					BOTTOM OF BORING 50.0'	

Site: EAST BOAT BASIN, SANDWICH, MA

Boring No: FD-1

SUBSURFACE WATER OBSERVATIONS

DATE	TIME	DEPTH-BOT. OF CASING	DEPTH-BOT. OF BORING	DEPTH TO WATER	ELEVATION WATER	REMARKS
7-21-81	1240	15.6'	50.0	11.2'	8.9' M.S.L.	BECAUSE THE CASING WAS IN CLAYEY SILT AND REMAINDED FULL OF WATER THE WATER LEVEL COULD NOT BE MEASURED UNTIL THE CASING WAS PUMPED TO A LEVEL ABOVE THE IMPERVIOUS SOIL.

Note: Depths are in feet below original ground

BORING LOCATION SKETCH

FOR BORING LOCATION SEE SITE PLAN

FORM 59 (Test) MAR 74

Boring No. FD-1

U.S. ARMY
CORPS OF ENGINEERS
NEW ENGLAND DIVISION

FIELD LOG OF TEST BORING

Site: EAST BOAT BASIN — Page 1 of 4 Pages

Boring No. FD-2 Desig. 5 Diam. (Casing) HW 4"

Co-ordinates: N _____ E _____

Elevation Top of Boring: ≈ +18.0 Ft M.S.L.
Total Overburden Drilled: 50.0 Feet
Elevation Top of Rock: NONE ENCOUNTERED M.S.L.
Total Rock Drilled: NONE Feet
Elevation Bottom of Boring: -32.0 Ft M.S.L.
Total Depth of Boring: 50.0 Feet
Core Recovered: N/A % No. Boxes _____
Core Recovered: N/A Ft: ____ Diam. ____ In.
Soil Samples: 1 3/8 In. Diam. 10 No.
Soil Samples: 4" + WASH SAMP. In. Diam. 2 No.

Hammer Wt. 140 lb
Hammer Drop 30 in.
Casing Left: NONE
Subsurface Water Data _____ Page _____
Obs. Well: NONE
Drilled By: BRIGGS ENGINEERING & TESTING CO.
Mfg. Des. Drill: ACKER
Inspected By: RONALD F. BURASKI
Classification By: _____
Classification By: _____

Boring Started: 7-21-81
Boring Completed: 7-23-81

DEPTH: Blows on Casing	DEPTH: 1" = 2'	CORE/SAMPLE: No.	Size	Depth Range	Blows per Ft. / Core Rec'vy	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
4		S-1 1 JAR	1 3/8"	0.0 0.5'	3	DROVE 1 3/8" x 24" SPLIT-SPOON SAMPLER FROM 0.0 TO 1.5'	SURFACE: TALL MARSH GRASS AND BROWN, COBBLES VISIBLE ON SURFACE TO 2' DIA. EST. 5% TOPSOIL: TOP 1-2" ORGANIC MATERIAL, WOOD, DECAYING LEAVES, etc. SILTY SAND, COARSE TO FINE SAND, PREDOMINATELY MEDIUM TO FINE, 10-20% NONPLASTIC FINES, 10-20% COARSE TO FINE GRAVEL, MOIST, BROWN, SM.
		S-2 1 JAR	1 3/8"	0.5 TO 1.5'	5	RECOVERED 18"	
8	1				6	DROVE 4" CASING FROM 0.0 TO 5.0'. REMOVED AND EMPTIED	
19	2					PLACED SAMPLE FROM 4.7 TO 5.0' IN SAMPLE JAR S-3. HOLE REMAINDED OPEN.	
23	3						SILTY SAND, COARSE TO FINE SAND, PREDOMINATELY M+F, 15-25% NONPLASTIC FINES 10-20% COARSE TO FINE SUBANGULAR GRAVEL, MOIST, BROWN, SM.
29	4						
	5	S-3	4"	4.7 5.0'			INTERBEDDED ORGANIC SILT, SILTY SAND, AND SILT, MOIST
27		S-4	1 3/8"	5.0 TO 5.8'	10 / 11	DROVE 1 3/8" x 24" SPLIT-SPOON SAMPLER FROM 5.0 TO 6.5'	
32	6	S-5	1 3/8"	5.8 TO 6.5'	12	RECOVERED 18" 7-22-81 DROVE 4" CASING FROM 5.0 TO 10.0' WASHED OUT CASING USING ROLLER BIT.	GRAVELLY SAND, COARSE TO FINE SAND, 20-25% FINE SUBANGULAR GRAVEL, 10-15% NONPLASTIC FINES, SATURATED, BROWN, SP
44	7						S-5 SILTY SAND, MEDIUM TO FINE SAND, 10-20% NONPLASTIC FINES, <5% FINE GRAVEL PARTICLES INTERSPERSED, MOIST, DARK GRAYISH BROWN, SM.
48	8						
97	9						
	10						

GENERAL REMARKS: BORING DEPTHS ARE REFERENCED FROM EXISTING SURFACE ELEVATION. BLOWS ON CASING FROM 300 lb HAMMER, UNLESS OTHERWISE NOTED, DROPPED 18 in.

Site: EAST BOAT BASIN SANDWICH, MA	Boring No. FD-2	Page 2 of 4

DEPTH: Blows on Casing	DEPTH: 1' = 2'	CORE/SAMPLE: NO.	CORE/SAMPLE: SIZE	CORE/SAMPLE: DEPTH RANGE	BLOWS PER FT. / CORE RECVY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATER ALS
48	11	S-6 1 JAR	1 3/8"	10.0 TO 11.5'	4	DROVE 1 3/8" x 24" SPLIT-SPOON SAMPLER FROM 10.0 TO 11.5' RECOVERED 10"	GRAVELLY SAND, COARSE TO FINE SAND, 20-25% FINE GRAVEL, 10-20% NONPLASTIC FINES, SATURATED, BROWN, SP.
77					12		
					27		
67	12					DROVE 4" CASING FROM 10.0 TO 15.0' WASHED OUT CASING USING ROLLER BIT.	
71	13						
73	14						
32	15	S-7 1 JAR	—	15.0 TO 18.0'	8	DROVE 1 3/8" x 24" SPLIT-SPOON SAMPLER FROM 15.0 TO 16.5'	WASH FROM CASING: SAND, MEDIUM TO FINE ESTIMATE < 10% FINES BROWN, SP.
42	16	SAMPLE TAKEN FROM WASH WATER			11	RECOVERED ONE COARSE GRAVEL SIZE PARTICLE.	
45	17				15	REDROVE SAMPLER FOR RECOVERY FROM 15.0 TO 18.0'. NO RECOVERY	
53	18					SAMPLE TAKEN FROM WASH WATER, INCLUDES GRAVEL PARTICLE FROM FIRST SAMPLING ATTEMPT.	
48	19						
1200 46	20	20% RECOVERY			11	DROVE 4" CASING FROM 15.0 TO 20.0' AND WASHED OUT CASING USING ROLLER BIT	
52	21				11		
53	22					DROVE 1 3/8" x 24" SPLIT-SPOON SAMPLER FROM 20.0 TO 21.5'. NO RECOVERY TWO MORE ATTEMPTS FOR RECOVERY WERE MADE WITHOUT SUCCESS.	
64	23						
90 4/0	24					DROVE 4" CASING FROM 20.0 TO 25.0'	SMALL COBBLE PUSHED BY CASING AT 24.5'
83	25	S-8	1 3/8"	26.0 TO 27.5	Cobble Cobble	WASHED CASING OUT USING ROLLER BIT. SMALL COBBLE AT TIP OF CASING. BROKE THROUGH WITH SPLIT-SPOON AT 26.0'.	SILTY SAND, MEDIUM TO FINE SAND, 15-20% SLIGHTLY PLASTIC FINES, SATURATED, GRAY SM. (SOIL POSSIBLY CLAYEY SAND)
86	26				23		
	27				26		

Site: EAST BOAT BASIN SANDWICH, MA	Boring No. FD-2	Page 3 of 4

DEPTH: Blows on Casing	DEPTH: 1' = 2'	CORE/SAMPLE: No.	CORE/SAMPLE: Size	CORE/SAMPLE: Depth Range	Blows per ft. / Core Recvy	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
66					30	RECOVERED 10"	
73	28					DROVE 4" CASING FROM 25.0 TO 30.0 WASHED OUT CASING USING ROLLER BIT,	
100	29					SMALL COBBLE ENCOUNTERED AT TIP OF CASING. 300 lb	
77	30	S-9 1 JAR	1 3/8"	30.0 TO 32.0'	20 300 lb	HAMMER USED TO BREAK.	SMALL COBBLE AT 30'
91	31				35	DROVE 1 3/8 x 24" SPLIT-SPOON SAMPLER FROM 30 TO 32.0'	CLAYEY SILT, LOW PLASTICITY MOIST, <5% COARSE SAND INTERSPERSED, GRAY, ML.
	32				37 / 54	DROVE CASING FROM 30.0 TO 33.0 FT.	
93 440 lb	33					7-23-81	
500 440 lb						DROVE CASING 33.0 TO 34.0' WASHED OUT CASING USING ROLLER BIT TO 34.0' COBBLE ENCOUNTERED AT 34.0'. DROVE BOULDER BUSTER TO CLEAR PATH USING 300 lb HAMMER. REINSERTED ROLLER BIT AND DRILLED FROM 34 TO 35.0'	
372 440 lb	34	BOULDER BUSTER 300 lb HAMMER 18" DROP			27 / 31		COBBLE ENCOUNTERED AT 34'
479 440 lb	35	S-10 1 JAR	1 3/8"	35.0 TO 36.5'	24 / 27 / 43	DROVE 1 3/8" x 24" SPLIT-SPOON SAMPLER FROM 35.0 TO 36.5' RECOVERED 16"	CLAYEY SILT WITH HORIZONTAL SEAMS TO 1/2" OF MEDIUM SAND AT 4 TO 6" INTERVALS, LOW PLASTICITY, MOIST, GRAY, ML.
	36					DROVE 4" CASING FROM 34 TO 36' AND WASHED OUT AND AHEAD OF CASING USING ROLLER BIT, TO 40.0 FT. HOLE REMAINED OPEN	SMALL COBBLE IN CASING AT 36'
	37						
	38						
	39						
1215	40	S-11 1 JAR	1 3/8"	40.0 TO 41.5'	33 / 56 / 40	DROVE 1 3/8" x 24" SPLIT-SPOON SAMPLER FROM 40.0 TO 41.5'. RECOVERED 8."	SILTY SAND, COARSE TO FINE SAND, PREDOMINATELY MEDIUM TO FINE SAND, 10-20% NONPLASTIC FINES, <10% FINE GRAVEL INTERSPERSED, ROCK FRAGMENTS ALSO RECOVERED, SATURATED, GRAY, SM.
	41					WASHED OUT HOLE FROM 40.0 TO 45.0' USING ROLLER BIT. HOLE REMAINED OPEN. WHEN SAMPLER WAS PLACED DOWN THE HOLE THE TIP CAME TO 44'.	
	42						
	43						
	44						

Site: EAST BOAT BASIN SANDWICH, MA	Boring No. FD-2	Page 4 of 4

DEPTH: Blows on Casing	DEPTH: 1" = 2'	CORE/SAMPLE: No.	CORE/SAMPLE: Size	CORE/SAMPLE: Depth Range	Blows per ft. / Core Recvy	Sampling and Coring Operations	Classification of Materials
	45					THE SAMPLER WAS REMOVED AND THE HOLE REWASHED USING THE ROLLER BIT. THE OBSTRUCTING MATERIAL WAS WASHED CLEAR, HOWEVER THE ROLLER BIT QUICKLY PENETRATED TO 47'. SAMPLING WAS ACCOMPLISHED AT 47.0'.	
	46						
	47				39	DROVE 1 3/8" x 24" SPLIT-SPOON SAMPLER FROM 47.0 TO 48.5 WITH NO RECOVERY. REDROVE SPLIT-SPOON SAMPLER FROM 48.5 TO 50.0' RECOVERED 10".	SAND, MEDIUM TO FINE SAND, <10 % NONPLASTIC FINES, <5 % FINE GRAVEL, SATURATED, BROWN AND RUSTY BROWN, SP.
	48	S-12 1 JAR	1 3/8"	47.0 TO 50.0'	34		
					47		
	49				40		
					45		
	50				50	BOTTOM OF BORING AT	50'

Site: EAST BOAT BASIN, SANDWICH
Boring No: FD-2

SUBSURFACE WATER OBSERVATIONS

DATE	TIME	DEPTH-BOT. OF CASING	DEPTH-BOT. OF BORING	DEPTH TO WATER	ELEVATION WATER	REMARKS
7-23-81	1545	10.0' *	50.0'	9.7'	8.3 Ft M.S.L.	

Note: Depths are in feet below original ground
* Because the casing was seated in clayey silt, it remained full of water
The water level could not be measured until the casing was removed above this impervious soil.

BORING LOCATION SKETCH

SEE SITE PLAN WITH BORING LOCATIONS

FORM 59 (Test)
MAR 71

Boring No. FD-2

U. S. ARMY
CORPS OF ENGINEERS
NEW ENGLAND DIVISION

FIELD LOG OF TEST BORING

Site EAST BOAT BASIN — Page 1 of 2 Pages

Boring No. FD-3 Desig. 1 Diam. (Casing) 4.0", HW

Co-ordinates: N _____ E _____

Elevation Top of Boring 17.1 Ft M.S.L.
Total Overburden Drilled 20.0 Feet
Elevation Top of Rock _____ M.S.L.
Total Rock Drilled _____ Feet
Elevation Bottom of Boring -2.9' M.S.L.
Total Depth of Boring 20.0 Feet
Core Recovered 45 % No. Boxes JAR C-1
Core Recovered 0.8 Ft : 1 3/8" Diam. ____ In.
Soil Samples 1 3/8 In. Diam. 6 No.
Soil Samples _____ In. Diam. ____ No.

Hammer Wt. 140 lb
Hammer Drop 30 in.
Casing Left NONE
Subsurface Water Data _____ Page _____
Obs. Well NONE
Drilled By BRIGGS ENGINEERING & TESTING CO.
Mfg. Des. Drill ACKER
Inspected By: RONALD F. BUKOSKI
Classification By: _____
Classification By: _____

Boring Started 7-13-81
Boring Completed 7-14-81

DEPTH: Blows on Casing	DEPTH: 1" = 2'	CORE/SAMPLE: NO.	SIZE	DEPTH RANGE	BLOWS PER FT. / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
0915							
42		S-1 1 JAR	1 3/8"	0.0 TO 0.8	6 / 19	DROVE 1 3/8" x 24" SPLIT-SPOON SAMPLER FROM 0.0 TO 1.5'	GROUND SURFACE: <10 % COBBLES TO 1.0' DIA.
	1	S-2 1 JAR	1 3/8"	0.8 TO 1.5'	19	RECOVERED 1.5'	TOPSOIL: SILTY SAND, FINE SAND, 35 TO 45 % NONPLASTIC FINES, <15 % FINE GRAVEL DAMP, DARK BROWN, SM.
38						DROVE 4" CASING 0.0 TO 5.0' REMOVED, HOLE REMAINDED OPEN.	
	2						
38							SILTY SAND, COARSE TO FINE SAND, PREDOMINATELY FINE SAND, 25-35 % NONPLASTIC FINES, <15 % SUBANGULAR FINE GRAVEL, DAMP, BROWN, SM.
	3						
30							
	4						
43							
0 1000	5						
13		S-3 1 JAR	1 3/8"	5.0 TO 6.5'	6 / 8 / 18	DROVE 1 3/8" x 24" SPLIT-SPOON SAMPLER FROM 5.0 TO 6.5' RECOVERED 0.6'	SILTY SAND, COARSE TO FINE SAND, PREDOMINATELY MEDIUM TO FINE SAND, 15-20 % NONPLASTIC FINES, <15 % FINE SUBANGULAR GRAVEL, MOIST TO VERY MOIST, BROWN, SM.
	6						
18							
	7					DROVE 4" CASING FROM 5 TO 10' WASHED OUT CASING USING ROLLER BIT.	
16							
	8						
18							
	9						WASH BECAME GRAYISH BROWN AT APPROXIMATELY 9.0'
34							
	10						

GENERAL REMARKS: REFUSAL: 100 BLOWS < 1.0' PENETRATION FOR FINAL 1.0' OF SPLIT-SPOON PENETRATION. CASING DRIVEN USING 300 lb HAMMER DROPPED 18 in. BLOWS ON CASING FROM 300 lb HAMMER, DROPPED 18 in.

NED FORM 58 (Test)

Boring No. FD-3

Site:	Boring No.	Page 2 of 2
EAST BOAT BASIN, SANDWICH, MA	FD-3	

	DEPTH: Blows on Casing	DEPTH: 1" = 2'	CORE/SAMPLE: No.	CORE/SAMPLE: Size	CORE/SAMPLE: Depth Range	Blows per ft. / Core Recvy	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
1130	40	11	S-4 1 JAR	1 3/8"	10 TO 11.5'	4 19 30	DROVE 1 3/8 x 24" SPLIT-SPOON SAMPLER FROM 10 TO 11.5'. RECOVERED 0.8'	SILTY SAND, MEDIUM TO FINE SAND, 15-25% NONPLASTIC FINES, INTERBEDDED SEAMS OF FINES TO 0.1' THICK, < 15% SUBANGULAR FINE GRAVEL, MOIST TO VERY MOIST, GRAYISH BROWN, SM.
	50	12					DROVE 4" CASING FROM 10-15'. WASHED OUT CASING USING ROLLER BIT.	
	64	13						
	67	14						
	73	15						
1245	117	16	S-5 1 JAR	1 3/8"	15 TO 16.5'	10 29 118	DROVE 1 3/8 x 24" SPLIT-SPOON SAMPLER FROM 15 TO 16.5'. RECOVERED 0.3', ROCK FRAGMENTS IN TIP OF SPOON.	GRAVELLY SAND, COARSE TO FINE SAND; 15-20% FINE SUBANGULAR GRAVEL, 10-15% NONPLASTIC FINES, ROCK FRAGMENTS RECOVERED IN TIP OF SPOON, SATURATED, GRAYISH BROWN, SP.
1405 1410 - RAN TO 1445		17	C-1 1 JAR	1 3/8"	16.5 TO 18.3'		DROVE CASING FROM 15.0 TO 16.3', ENCOUNTERED OBSTRUCTION. USED ROLLER BIT TO ATTEMPT TO GET BY OBSTRUCTING ROCK. NO SUCCESS.	BOULDER 16.3 TO 18.3'
		18						
1530		19	S-6 1 JAR	1 3/8"	18.5 TO 20.0'	55 58 70	CORED FROM 16.5 TO 16.8' THEN CORE TIP BECAME PLUGGED AND NO WATER WOULD FLOW. REMOVED 5' CLEANED. REINSERTED AND CORED FROM 16.8 TO 18.3'. RECOVERED 0.8' OF 1 3/8" CORE. DROVE 18" x 1 3/8 SPLIT-SPOON SAMPLER FROM 18.5 TO 20.0'. RECOVERED 18". ATTEMPTED TO BREAK BOULDER USING BOULDER BUSTER. THE ATTEMPT WAS UNSUCCESSFUL.	SILTY SAND, COARSE TO FINE SAND, PREDOMINATELY MEDIUM TO FINE SAND, 15-25% NONPLASTIC FINES < 10% FINE SUBANGULAR GRAVEL, SATURATED, GRAYISH BROWN, SM.
7-14-81 1300 hrs.		20						BOTTOM OF BORING 20.0 ft.
		21						
		22						
		23						
		24						
		25						
		26						
		27						

Site: EAST BOAT BASIN
Boring No: FD-3

SUBSURFACE WATER OBSERVATIONS

DATE	TIME	DEPTH-BOT. OF CASING	DEPTH-BOT. OF BORING	DEPTH TO WATER	ELEVATION WATER	REMARKS
7-14-81	0810	16.3'	20.0'	8.8'	8.3' M.S.L	TIDE + 6.3' M.L.W.

Note: Depths are in feet below original ground

BORING LOCATION SKETCH

SEE BORING PLAN.

FORM 59 (Test)
MAR 71

Boring No. FD-3

U. S. ARMY
CORPS OF ENGINEERS
NEW ENGLAND DIVISION

FIELD LOG OF TEST BORING

Site EAST BOAT BASIN — Page 1 of 2 Pages

Boring No. FD3A Desig. 1A Diam. (Casing) HW, 4"

Co-ordinates: N _____ E _____

Elevation Top of Boring 17.1 M.S.L.
Total Overburden Drilled 22.0 Feet
Elevation Top of Rock NONE ENCOUNTERED M.S.L.
Total Rock Drilled NONE Feet
Elevation Bottom of Boring -4.9' M.S.L.
Total Depth of Boring 22.0' Feet
Core Recovered N/A % No. Boxes _____
Core Recovered N/A Ft: ____ Diam. ____ in.
Soil Samples 1 3/8 in. Diam. 0 No.
Soil Samples _____ in. Diam. ____ No.

Hammer Wt. 140 Boring Started 7-14-81
Hammer Drop 30 in Boring Completed 7-14-81
Casing Left NONE
Subsurface Water Data _____ Page _____
Obs. Well NONE
Drilled By BRIGGS ENGINEERING & TESTING CO.
Mfg. Des. Drill ACKER
Inspected By: RONALD F. BUKOSKI
Classification By: _____
Classification By: _____

DEPTH: Blows on Casing	DEPTH: 1" = 2'	CORE/SAMPLE: NO.	SIZE	DEPTH RANGE	BLOWS PER FT. / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
	1					BORING FD-3A RELOCATED 6 ft CLOSER TO THE SERVICE ROAD, ON A LINE PERPENDICULAR TO THE ROAD DUE TO AN OBSTRUCTING BOULDER IN FD-3	
	2						
	3					CASING DRIVEN TO 20.0', WITH INTERMEDIATE WASHING OUT AS NECESSARY.	
	4						
	5						
	6						
	7						
	8						
	9						
	10						

GENERAL REMARKS: REFUSAL: 100 BLOWS < 1 ft PENETRATION FOR FINAL 1.0 ft OF SPLIT-SPOON PENETRATION.
BLOWS ON CASING: 300 16 HAMMER DROPPED 18 in..

NED FORM 58 (Test)

Boring No. FD-3A

Site: EAST BOAT BASIN SANDWICH, MA	Boring No. FD-3A	Page 2 of 2

DEPTH: Blows on Casing	DEPTH: 1" = 2'	CORE/SAMPLE: NO.	CORE/SAMPLE: SIZE	CORE/SAMPLE: DEPTH RANGE	BLOWS PER FT. / CORE RECVY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
	11						
	12						
	13						
	14						
	15						
	16						
133							
	17						
230							
	18						
200 440 lb							
	19						
182 440 lb						SMALL COBBLE ENCOUNTERED AT 20.0'	WASH APPEARED TO BE SAME AS S-6 FROM FD-3
	20						SILTY SAND, COARSE TO FINE SAND, PREDOMINATELY MEDIUM TO FINE, 15-25% NONPLASTIC FINES, <10% FINE SUBANGULAR GRAVEL, SATURATED, GRAYISH BROWN, SM.
	21	NO RECOVERY			13	DRIVE SPLIT-SPOON SAMPLER FROM 20.5 TO 22.0'. REFUSAL AT 22.0' NO RECOVERY	
					40		
	22				68	BOTTOM OF BORING 22.0'	

U. S. ARMY
CORPS OF ENGINEERS
NEW ENGLAND DIVISION

FIELD LOG OF TEST BORING

Site EAST BOAT BASIN, SANDWICH, MA Page 1 of 2 Pages

Boring No. FD-4 Desig. 2 Diam. (Casing) 4.0" HW

Co-ordinates: N _____ E _____

Elevation Top of Boring ≈ +17.2 ft M.S.L.
Total Overburden Drilled 13.5 Feet
Elevation Top of Rock NONE ENCOUNTERED M.S.L.
Total Rock Drilled NONE Feet
Elevation Bottom of Boring +3.7 ft M.S.L.
Total Depth of Boring 13.5 Feet
Core Recovered N/A % No. Boxes _____
Core Recovered N/A Ft: _____ Diam. _____ In.
Soil Samples 1 3/8 In. Diam. 5 No.
Soil Samples 3.0 In. Diam. 3 No.

Hammer Wt. 140 lb
Hammer Drop 30 in.
Casing Left NONE
Subsurface Water Data _____ Page _____
Obs. Well NONE
Drilled By BRIGGS ENGINEERING & TESTING CO.
Mfg. Des. Drill ACKER
Inspected By: RONALD F. BURASKI
Classification By: _____
Classification By: _____

Boring Started 7-14-81
Boring Completed 7-15-81

Time	Blows on Casing	Depth 1" = 2'	Core/Sample No.	Size	Depth Range	Blows per ft. / Core Rec'vy	Sampling and Coring Operations	Classification of Materials
1515	17	1	S-1 1 JAR	1 3/8"	0.0 TO 1.3	3 5 5	DROVE 29" x 1 3/8" SPLIT SPOON SAMPLER FROM 0.0 TO 1.5'	SURFACE: SMALL BUSHES + TALL GRASS TOPSOIL: SILTY SAND, FINE SAND, 20-35% NONPLASTIC FINES & ORGANIC FINES, 5-10% ROOTS TO 1/4", DAMP, DARK BROWN, SM.
	18	2	S-2 1 JAR	1 3/8"	1.3 TO 5.0'		RECOVERED 18" DROVE CASING FROM 0.0 TO 5.0' REMOVED AND HOLE REMAINDED OPEN.	SAND, FINE SAND, 5-15% NONPLASTIC FINES, DAMP, SANDY BROWN WITH STREAKS OF RUSTY BROWN, SP.
	22	3						
	23	4						
	20							
1535	12	5	S-3 1 JAR	1 3/8"	5.0 TO 5.5'	4	DROVE SPLIT-SPOON SAMPLER FROM 5.0 TO 6.5'	SANDY SILT, LOW PLASTICITY, 10-20% FINE SAND, DAMP, BROWN, ML.
	11	6	S-4 1 JAR	1 3/8"	5.5 TO 6.5'	6 6	RECOVERED 18" CASING DRIVEN TO 7.0' AND WASHED OUT	CLAYEY SILT, LOW PLASTICITY, MOIST, GRAY MOTTLED RUSTY BROWN, ML.
7-15-81 0825		7	S-5	3.0"	7.0-7.2'		3" x 30" SHELBY TUBE PUSHED	
	2	8	S-6	3.0"	7.2' TO 10.6'		FROM 7.0 TO 9.0', TUBE TIP BENT WOOD CHIPS & PEAT IN TIP. RECOVERED 0.3', RECOVERED SOIL PLACED IN S-5 & S-6 CASING DRIVEN TO 9.0' AND WASHED OUT USING SIDE-DISCHARGE CHOPPING BIT. AT 9.0' COULD NOT FILL CASING WITH WATER - FLOWED OUT BOTTOM.	MUCK, WOOD CHIPS, ROOTS, PEAT MEDIUM TO FINE SAND, SATURATED SLIGHT ORGANIC ODOR, DARK BROWN.
	4	9						
	3	10						

GENERAL REMARKS: DEPTHS ARE REFERENCED TO EXISTING GROUND SURFACE.
REFUSAL: 100 BLOWS < 1.0' PENETRATION.
BLOWS ON CASING: 300 lb HAMMER DROPPED 18 in.

Site: EAST BOAT BASIN SANDWICH, MA	Boring No. FD-4	Page 2 of ___

DEPTH: Blows on Casing	DEPTH: 1" = 2'	CORE/SAMPLE: No.	CORE/SAMPLE: Size	CORE/SAMPLE: Depth Range	Blows per Ft. / Core Recvy	Sampling and Coring Operations	Classification of Materials
11		S-6	3.0"	7.2 to 10.6'		PUSHED SECOND TUBE FROM 9.0 TO 11.0' REMOVED TUBE -	
44	11	S-7	3.0"	10.6 to 12.0'		BADLY DENTED FOR 1.2' FROM TIP SAMPLE DISTURBED. RECOVERED 1.0' DROVE CASING TO 12.0' AND WASHED OUT USING SIDE-DISCHARGE CHOPPING BIT.	TRANSITION ZONE FROM MUCK TO CLAYEY SAND AND SAND
	12	S-8	1 3/8"	12.0 to 13.5	23	DROVE 24" x 1 3/8" SPLIT SPOON FROM 12.0 TO 13.5 FT. RECOVERED 6"	GRAVELLY SAND, COARSE TO FINE SAND, 20 - 30% COARSE TO FINE GRAVEL, < 15% NONPLASTIC FINES, SATURATED GRAYISH BROWN, SP.
	13				58		
					56	BOTTOM OF BORING 13.5'	
						BORING TERMINATED AT REFUSAL, N > 100	

0945

WATER 7.1' 10.20

FORM MAR 71 BBA(Test) Boring No. FD-4

Site: EAST BOAT BASIN

Boring No: FD-4

SUBSURFACE WATER OBSERVATIONS

DATE	TIME	DEPTH-BOT. OF CASING	DEPTH-BOT. OF BORING	DEPTH TO WATER	ELEVATION WATER	REMARKS
7-15-81	1020	12.0'	13.5'	7.1'	10.1' M.S.L.	

Note: Depths are in feet below original ground

BORING LOCATION SKETCH

SEE SITE PLAN FOR BORING LOCATION.

FORM 59 (Test)

Boring No. FD-4

U.S. ARMY
CORPS OF ENGINEERS
NEW ENGLAND DIVISION

FIELD LOG OF TEST BORING

Site EAST BOAT BASIN — Page 1 of 4 Pages

Boring No. FD-5 Desig. 3 Diam. (Casing) HW, 4"

Co-ordinates: N _____ E _____

11.2'
TIDE + 3.3'

Elevation Top of Boring ≈ +15.0 ft M.S.L.
Total Overburden Drilled 50.0 Feet
Elevation Top of Rock NONE ENCOUNTERED M.S.L.
Total Rock Drilled NONE Feet
Elevation Bottom of Boring -35.0 ft M.S.L.
Total Depth of Boring 50.0 Feet
Core Recovered N/A % No. Boxes _____
Core Recovered N/A Ft: ____ Diam. ____ In.
Soil Samples 1 3/8 In. Diam. 9 No.
Soil Samples _____ In. Diam. ____ No.

Hammer Wt. 140 lb
Hammer Drop 30 in.
Casing Left NONE
Subsurface Water Data _____ Page _____
Obs. Well NONE
Drilled By BRIGGS ENGINEERING & TESTING CO.
Mfg. Des. Drill ACKER
Inspected By: RONALD F. BUSKEKI
Classification By: _____
Classification By: _____

Boring Started 7-15-81
Boring Completed 7-16-81

1230

DEPTH: Blows on Casing	DEPTH: 1" = 2'	CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER FT. / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
11	1	S-1 1 JAR	1 3/8"	0.0 TO 1.5'	4 / 18	DROVE SPLIT-SPOON SAMPLER FROM 0.0 TO 1.5' RECOVERED 18".	SURFACE: BORING LOCATED NEAR OLD CONCRETE FLOOR SLAB. (12') GRAVELLY WITH GRASS.
24	2				18	DROVE 4" CASING FROM 0.0 TO 5.0'. ENCOUNTERED SOME DIFFICULTIES IN VERTICALLY ALIGNING CASING DUE TO COBBLES WITHIN FIRST 5'.	SILTY SAND, COARSE TO FINE SAND, PREDOMINATELY MEDIUM TO FINE, 25-35% NONPLASTIC FINES, 5% SLIGHTLY PLASTIC CLAYEY SILT, 10-15% FRACTURED ROCK AND FINE GRAVEL, DAMP, BROWN, SM.
27	3					WASHED OUT CASING USING ROLLER BIT.	
16	4						
18	5						
12	6	S-2 1 JAR	1 3/8"	5.0 TO 6.5'	5 / 7 / 14	DROVE SPLIT-SPOON SAMPLER FROM 5.0 TO 6.5'. RECOVERED 9".	SILTY SAND, COARSE TO FINE SAND, 30-40% SLIGHTLY PLASTIC FINES, <10% FINE GRAVEL, <2% WOOD FRAGMENTS, MOIST, DARK GRAYISH BROWN, SM.
15	7					DROVE CASING FROM 5.0 TO 10.0'.	
18	8					WASHED OUT CASING USING ROLLER BIT. CASING SETTLED TO 11.0'	
14	9						
23	10						

GENERAL REMARKS: DEPTHS ARE REFERENCED TO EXISTING GROUND SURFACE. REFUSAL: 100 BLOWS < 1.0' PENETRATION. BLOWS ON CASING: 300 lb HAMMER 18 in. DROP HEIGHT.

Site: EAST BOAT BASIN	Boring No. FD-5	Page 2 of 4

DEPTH: Blows on Casing	DEPTH: 1" = 2'	CORE/SAMPLE: No.	CORE/SAMPLE: Size	CORE/SAMPLE: Depth Range	BLOWS PER FT. / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
19							
	11						
41		S-3 1 JAR	1 3/8"	11.0 TO 12.5'	12 / 14 / 17	DROVE SPLIT-SPOON SAMPLER FROM 11.0 TO 12.5'. RECOVERED 13".	SILTY SAND, MEDIUM TO FINE SAND, 25-35% SLIGHTLY PLASTIC FINES, <5% FINE GRAVEL, DAMP, GRAYISH BROWN MOTTLED DARK BROWN AND RUSTY BROWN, SM.
	12						
62							
	13					DROVE 4" CASING FROM 11.0 TO 15.0'. WASHED CASING OUT USING ROLLER BIT. CASING SETTLED 0.5'	
73							
	14						
82							
	15						
54							
	16	S-4 1 JAR	1 3/8"	15.5 TO 17.0'	22 / 19 / 12	DROVE SPLIT-SPOON SAMPLER FROM 15.5 TO 17.0'. RECOVERED 12."	SILTY SAND COARSE TO FINE SAND, 15-25% NONPLASTIC TO SLIGHTLY PLASTIC FINES, <10% FINE SUBANGULAR GRAVEL, SATURATED BROWN, SM.
46							
	17						
47							
	18					DROVE CASING FROM 15.5' TO 20.0'. WASHED CASING OUT USING ROLLER BIT	
46							
	19						
51							
	20						
74		S-5 1 JAR	1 3/8"	20.0 TO 21.5'	26 / 37 / 39	DROVE SPLIT-SPOON SAMPLER FROM 20.0 TO 21.5'. RECOVERED 6". (7-15-81)	SILTY SAND, COARSE TO FINE SAND, 10-15% NONPLASTIC FINES, 10-15% GRAVEL TO 0.12', SATURATED BROWN, TO DARK BROWN, SM.
	21						
68							
	22					(7-16-81) DROVE 4" CASING FROM 20.0 TO 25.0'. WASHED OUT CASING WITH SIDE-DISCHARGE CHOPPING BIT	
70							
	23						
60							
	24						
222							
	25						
91		S-6 1 JAR	1 3/8"	25.0 TO 26.5'	33 / 53 / 32	DROVE SPLIT-SPOON SAMPLER FROM 25 TO 26.5'. RECOVERED 6".	SILTY SAND, COARSE TO FINE SAND, 10-15% NONPLASTIC FINES, 10-15% FINE GRAVEL, SATURATED, BROWN, SM.
	26						
190							
	27						

1600

11
31
39

7-16-81
0920

140 440 15
71
71

Site: East Boat Basin	Boring No. FD-5	Page 3 of 4

DEPTH: Blows on Casing	DEPTH: 1" = 2'	CORE/SAMPLE: No.	CORE/SAMPLE: Size	CORE/SAMPLE: Depth Range	BLOWS PER FT. / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
140 440#	28					DROVE 4" CASING FROM 25.0 TO 30.0'. WASHED OUT USING SIDE-DISCHARGE CHOPPING BIT.	
71 440#	29						
71 440#	30						
78 440#	31	S-7	1 3/8	30.0 TO 31.5	11 / 31 / 39	DROVE SPLIT-SPOON SAMPLER FROM 30.0 TO 31.5' RECOVERED 2".	SILTY SAND, COARSE TO FINE SAND, 10-20% NONPLASTIC FINES, SATURATED, BROWN, SM.
86 440#	32						
57 440#	33					DROVE 4" CASING FROM 30.0 TO 35.0'. WASHED OUT CASING USING SIDE DISCHARGE CHOPPING BIT.	
60 440#	34						
67 440#	35	NO RECOVERY			19 / 18 / 15	DROVE SPLIT-SPOON SAMPLER FROM 35.0 TO 36.5'. FIRST ATTEMPT NO RECOVERY SECOND ATTEMPT NO RECOVERY, OVERDROVE SAMPLER TO 39'.	WASH APPEARED SAME AS ABOVE
71 300#	36						
60 300#	37						
54 300#	38						
65 300#	39					DROVE 4" CASING FROM 35 TO 40.0'. WASHED OUT USING SIDE-DISCHARGE CHOPPING BIT.	
78 300#	40						
71 440#	41	S-8	1 3/8	40 TO 41.5	28 / 22 / 14	DROVE SPLIT SPOON SAMPLER FROM 40 TO 41.5' RECOVERED 2"	SILTY SAND, MEDIUM TO FINE SAND, 10-20% NONPLASTIC FINES, GRAVEL PARTICLE TO 0.12', SATURATED, BROWN, SM.
55 440#	42						
61 440#	43					DROVE 4" CASING FROM 40.0 TO 45.0' WASHED OUT CASING USING SIDE-DISCHARGE CHOPPING BIT.	
59 440#	44						

1315

Site: EAST BOAT BASIN	Boring No. FD-5	Page 4 of 4

DEPTH: Blows on Casing	DEPTH: 1" = 2'	CORE/SAMPLE: No.	CORE/SAMPLE: Size	CORE/SAMPLE: Depth Range	Blows per ft. / Core Recvy	Sampling and Coring Operations	Classification of Materials
61						DROVE SPLIT-SPOON SAMPLER	
440#						FROM 45.0 TO 46.5'. NO	
	45				29	RECOVERY	
52					64	REDROVE SPOON TO	SMALL COBBLE AT 46.5'
	46				91	48.0 FT, NO RECOVERY	
59							
	47					DROVE CASING FROM 45.0	
69						TO 48.0' WASHED OUT CASING	
	48					USING SIDE DISCHARGE CHOPPING	
		S-9	1 7/8	48.0	20	BIT.	SANDY GRAVEL, FINE SUBANGULAR
				TO	46	DROVE SPLIT-SPOON SAMPLER	GRAVEL, 30-40% COARSE TO FINE
	49			50.0'		FROM 48.0 TO 50.0	SAND, 5-10% NONPLASTIC FINES,
					36	RECOVERED 4"	SATURATED, BROWN, GP.
					54		
	50					BOTTOM OF BORING 50.0'	

Site: EAST BOAT BASIN, SANDWICH, MA
Boring No: FD-5

SUBSURFACE WATER OBSERVATIONS

DATE	TIME	DEPTH-BOT. OF CASING	DEPTH-BOT. OF BORING	DEPTH TO WATER	ELEVATION WATER	REMARKS
7-16-81	0745	20.0'	21.5'	11.2'	3.8' M.S.L.	TIDE +3.3'
7-17-81	0715	48.0	50.0'	12.7'	2.3' M.S.L.	TIDE +1.0'

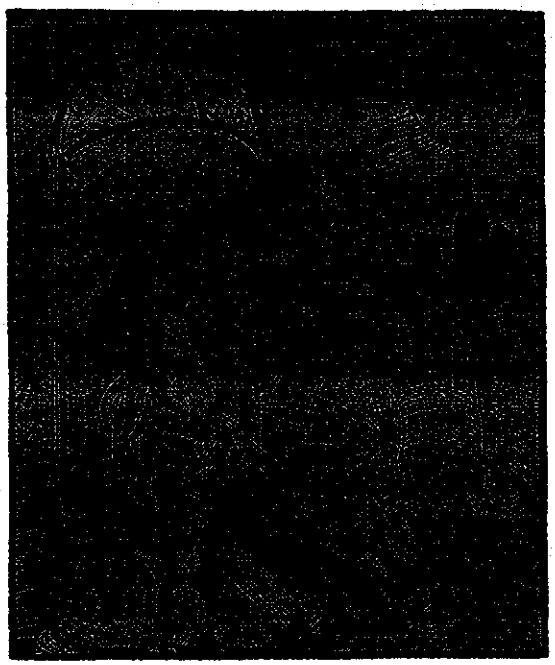
Note: Depths are in feet below original ground

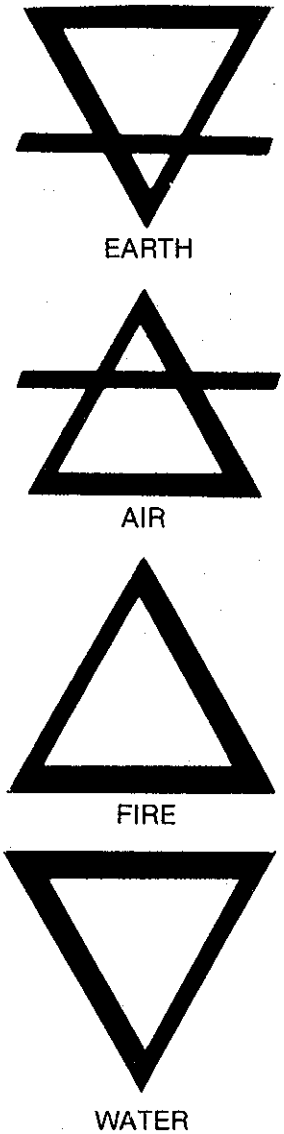
BORING LOCATION SKETCH

SEE BORING PLAN

FORM 59 (Test)
MAR 71

Boring No. FD-5





In ancient times
Greek and Hindu philosophers
believed that there were
four elements in the material universe
— EARTH, AIR, FIRE and WATER.
Over the years
man's knowledge has expanded
and the world of materials
is now known to be extremely complex.
The unravelling of these complexities
is the continuing goal of
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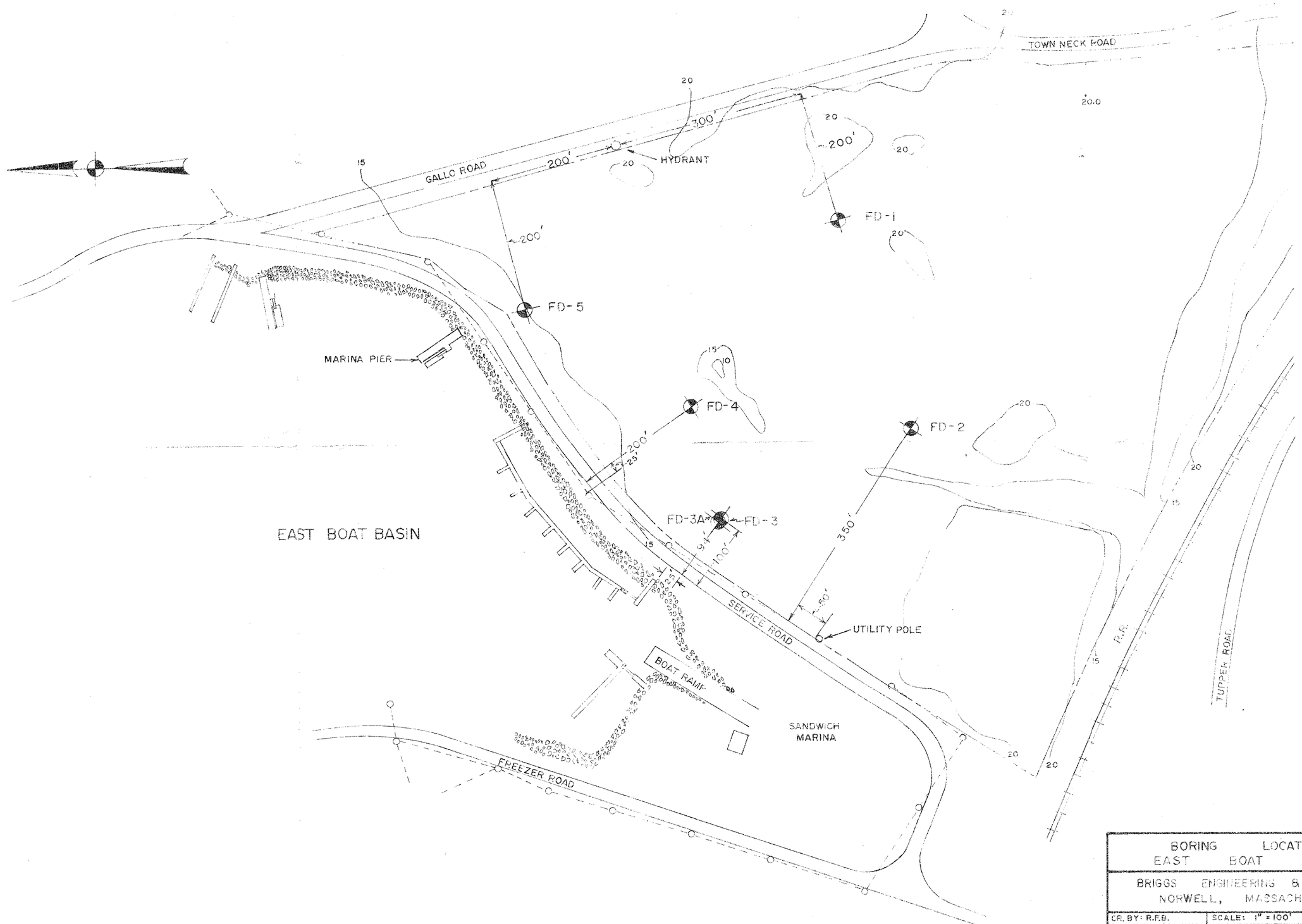
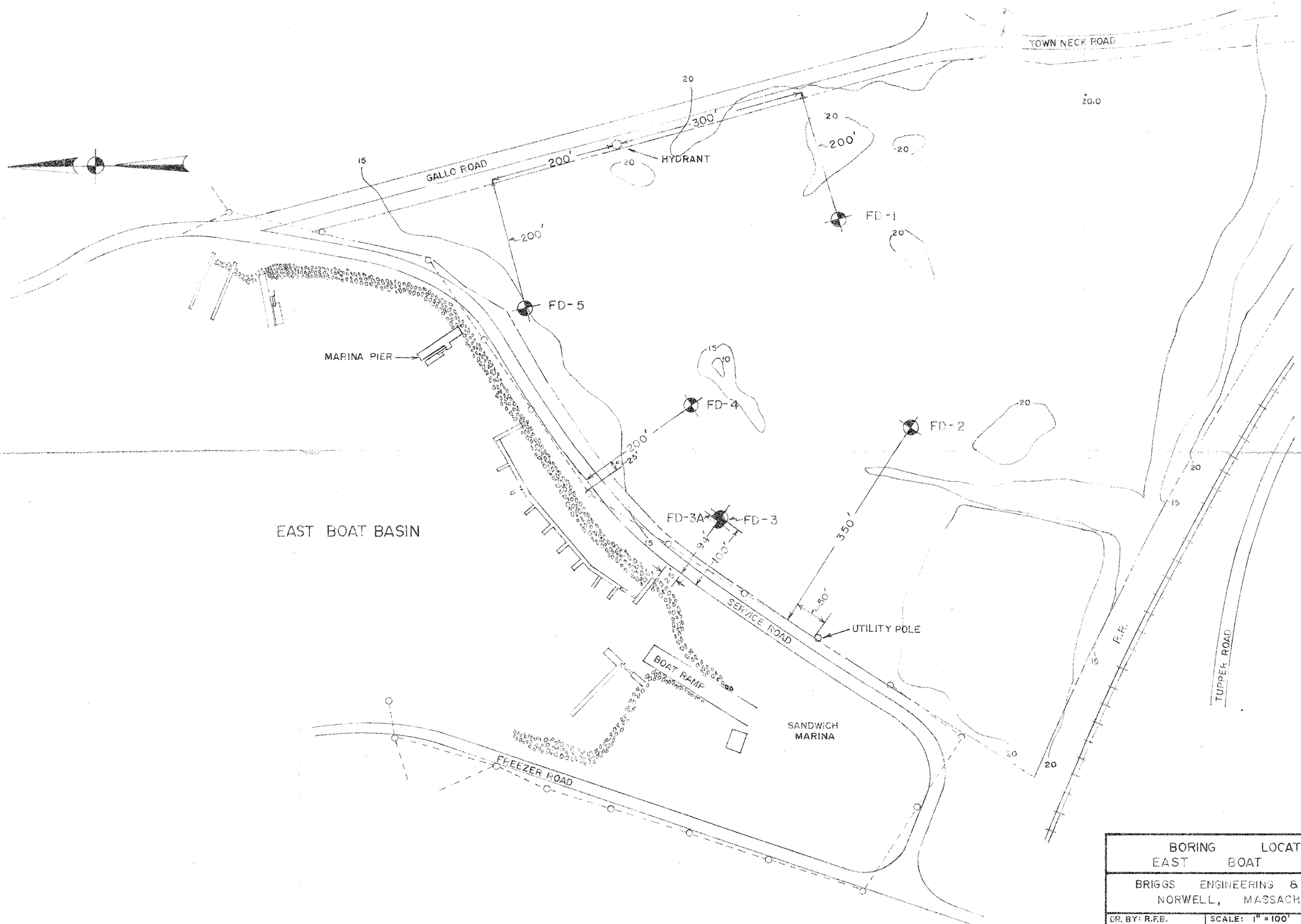


BORING LOCATIONS
EAST BOAT BASIN

BRIGGS ENGINEERING & TESTING CO.
NORWELL, MASSACHUSETTS

CR. BY: R.F.B.	SCALE: 1" = 100'	PROJ. NO. 12,452
CK'D BY: N.A.L.	DATE: 7/30/81	FIG. NO. 1



BORING LOCATIONS EAST BOAT BASIN		
BRIGGS ENGINEERING & TESTING CO. NORWELL, MASSACHUSETTS		
DR. BY: R.F.B.	SCALE: 1" = 100'	PROJ. NO. 12,452
CK'D BY: N.A.L.	DATE: 7/30/81	FIG. NO. 1