ENGINEERING REPORT

for

Contract DACW-33-81-C0030

Work Order Number 11

Subsurface Investigation for the

West Boat Basin, Cape Cod Canal

Bourne, Massachusetts

BRIGGS

TABLE OF CONTENTS

1.0 GENERAL

1.1 Authorization
1.2 Purpose
1.3 Scope of Investigation
1.4 Subsurface Materials
1.5 Quality Assurance
1.5.1 General
1.5.2 Records
1.5.3 Equipment
1.5.4 Procedures

Chain of custody log
Safety Reports
Figure 1: Boring Location Map-West Boat Basin
Appendix A: Shift Reports
Appendix B: Field Boring Logs

1.1 AUTHORIZATION

The work reported herein was performed under contract DACW 33-81-C-0030, Work Order No. 11 dated 5 June 1981.

1.2 PURPOSE

The purpose of the subsurface investigation was to determine the subsurface conditions in the West Boat Basin, Cape Cod Canal, Massachusetts.

1.3 SCOPE OF THE INVESTIGATION

Five test borings were drilled at the locations shown on Figure 1. Work was conducted between 22 June and 26 June, and 6 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 MATERIALS

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 relatively homogeneous deposits of noncohesive granular soils. The upper 25 to 30 feet consists predominantly of gravelly sands (SW-SM) with lesser amounts of sandy gravels (GP-GM) and silty sands (SM). Occasional cobbles were encountered during the drilling, but no boulders. The density of these deposits ranges from medium to compact. They are underlain by medium to fine sands (SP-SM). This material is very dense as indicated by the great difficulty in advancing both the casing and the solid barrel sampler.

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 except as noted below.

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 the solid barrel sampler type with a ball check head in sizes 2 inch and 1-1/2 inch ID x 5 ft with spring type retainers.

c. Drive Hammers: Drive hammers for advancing the solid barrel sampler weighed approximately 300 lbs.

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

e. Core Barrels : An AWX size core barrel was used. The core barrel was equipped with a diamond impregnated bit.

1.5.4 Procedures

a. Boreholes were advanced by continuous sampling in which either a 2 inch or a 1-1/2 inch ID x five foot solid sample spoon was advanced below the bottom of the casing

into undisturbed soil by the impact of a hammer weighing approximately 300 pounds falling 18 inches. Refusal was defined as 30 blows for one-tenth (0.1) of a foot of penetration.

b. The sample spoon shoes were kept reasonably sharp at all times. Dull, bent, or otherwise damaged samplers were not used. Sampling was accomplished to a depth of not more than five 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.

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

Certified 16 July 1981

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

BRIGGS ENGINEERING CORPORATION

Chain of Custody Log

Project: Subsurface Investigation - West Boat Basin

Items: Tubes None

Bottles None

Jar Samples 59

Other None

Sampling Logs Borings 1, 2, 3, 4 and 5

Date & Time Received	Date & Time Transfered	Comments	Custodian
as sampled	7/7/81 - 0900		R. Bukoski
7/7/81 - 0900	7/15/81 - 0820		[illegible]
7/15/81 - 0820			M. Burell

BRIGGS ENGINEERING CORPORATION

WEEKLY SAFETY MEETING

TO: Safety Office, NED

FROM: Field Engineer — Date held 22 June 1981

THRU: Project Engineer — Time 0745hrs

Weekly safety meeting was held this date for the following personnel:
Contract No. DACW 33-81-C-0030 Personnel present: J. Shelkey (Briggs)
Work Order No. 11 — C. Reil (Briggs)
Conducted By: R. Bukoski

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

x Individual Protective Equipment -
x Prevention of Falls -
x Safe Lifting Techniques -
Emergency Communications -
x Fire Prevention -
Sanitation, First Aid -
x Tripping Hazards - trash, hose, nails in lumber -
Staging, Ladders, Concrete Forms -
Hand Tools -
Portable Power Tools -
Woodworking Machinery -
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 -
x Water Safety -
Other -

Prepared by: Ron Bukoski
Field Engineer

2. Exposure:
For the period of 22 June to June 26 1981, covering 3 men for 51.5 man hours per man for a total of 154.5 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 06 July 1981

THRU: Project Engineer — Time 0520hrs

Weekly safety meeting was held this date for the following personnel:
Contract No. DACW 33-81-C-0030 Personnel present: J. Marks (Briggs)
Work Order No. 11 W. Souza (Briggs)
Conducted By: R. Bukoski

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

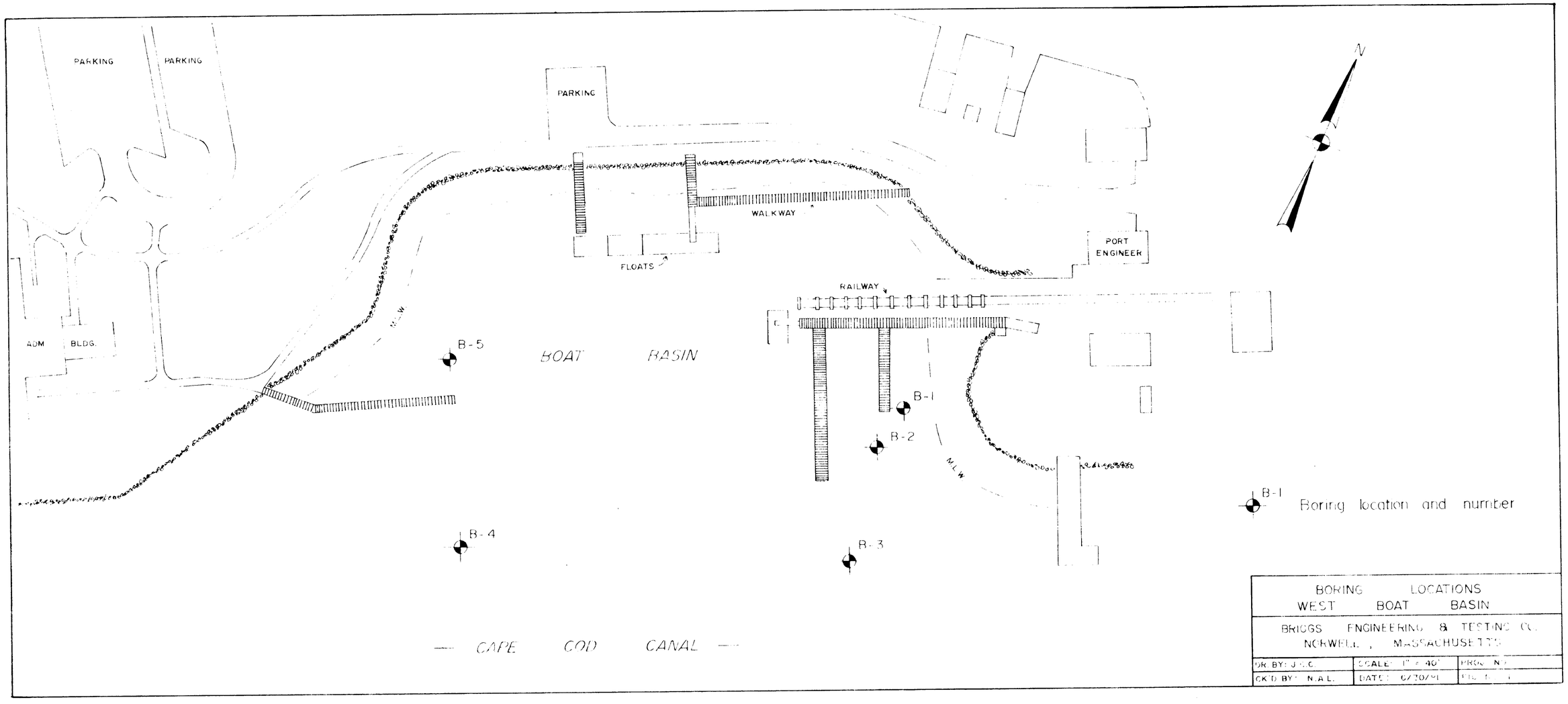
x Individual Protective Equipment -
x Prevention of Falls -
Safe Lifting Techniques -
Emergency Communications -
x Fire Prevention -
Sanitation, First Aid -
x Tripping Hazards - trash, hose, nails in lumber -
Staging, Ladders, Concrete Forms -
Hand Tools -
Portable Power Tools -
Woodworking Machinery -
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 -
x Water Safety -
Other -

Prepared by: Ron Bukoski /ne
Field Engineer

2. Exposure:
For 06 July, covering 3 men for 12.0 man hours per man for a total of 36.0 manhours.

Signature:
Project Engineer

3. Forwarded: NED, Waltham, MA


PARKING
PARKING
PARKING
WALKWAY
FLOATS
PORT ENGINEER
RAILWAY
ADM BLDG.
M.L.W.
B-5
BOAT BASIN
B-1
B-2
M.L.W.
B-4
B-3
CAPE COD CANAL
N
B-1 Boring location and number
BORING LOCATIONS
WEST BOAT BASIN
BRIGGS ENGINEERING & TESTING CO.
NORWELL, MASSACHUSETTS
DR. BY: J.C.
SCALE: 1" = 40'
PROJ. NO.
CK'D BY: N.A.L.
DATE: 6/20/91
FIG. NO.

APPENDIX A

Shift Reports

Briggs Engineering Co.

Shift Report

DATE: 6-22-81
SHIFT NO: [1]
PROJECT: West Boat Basin - Cape Cod Canal, Bourne, MA
INSPECTOR: Ronald F. Bukoski

TIME: 0800 - 1700 COMMENTS

This report summarizes the work performed for the subsurface investigation at the West Boat Basin, Bourne, MA, for June 22, 1981.

Arrived on site at 0800 hrs. and met Roger Poisson from the Army Corps office in Waltham. He directed us to the state pier where a cherry picker supplied by the Corps lifted the drilling rig onto the Army Corps Barge, Salem. The loading of the drill rig onto the cantilevered deck of the barge presented no major problems.

When the drilling rig was partially in place, a small ship passed at a moderate speed. The bow wake caused the drilling rig to move several inches on the deck. As a result of this, and in the interest of safety, it was decided to tie down the rig to the deck with two come-alongs.

Following loading, the barge Salem was moved approximately one third of a mile to the West Boat Basin. Because of adverse tidal currents, the barge could not be positioned on either of the shallow borings, B-1 or B-2. Therefore, the barge was positioned on B-5. The drilling operation began at this time. Sampling was completed to a depth of 20 ft. The following table summarizes the work for today.

Arrival Time 0800

Load of drilling rig onto barge	1 hr.-40 min.
Moving on to B-5	1 hr.-35 min.
Drilling	5 hrs.-30 min.
Demobilization	15 min.

Summary: Soil Sampling: 20.0 ft.
Moving Time 210 min.

Briggs Engineering Co.

Shift Report

DATE: 6-23-81
SHIFT NO: [1]
PROJECT: West Boat Basin - Cape Cod Canal
INSPECTOR: Ronald F. Bukoski

TIME: 0700 - 1700 hrs. COMMENTS

Today's work was a continuation of the subsurface investigation started on 22 June 1981 in the West Boat Basin, Cape Cod Canal.

Upon arrival at 0700 hrs., the barge/drilling platform was repositioned over Boring Number 5. The repositioning of the barge over the hole went smoothly.

Drilling on Boring 5 proceeded without any major difficulties from 20.0 ft. to 45.0 ft. The compactness of the soil made penetration with the solid spoon samplers difficult as evident by the high blow counts. Also, more frequent washing of the borehole was required to advance the casing. The sandy soil could be washed easily, but the casing, especially the final fifteen feet, could only be advanced in increments of one to two feet before washing.

The following table summarizes today's activities:

Arrival time 0700

Positioning of barge on B-5	40 min.
Drilling	9 hrs.-20 min.

Summary: Soil Sampling: 25.0 ft.
Moving Time: 40 min.

Briggs Engineering Co.

Shift Report

DATE: 6-24-81
SHIFT NO: [1]
PROJECT: West Boat Basin - Cape Cod Canal, Bourne, MA
INSPECTOR: Ronald F. Bukoski

TIME: 0630 - 1700 COMMENTS

Today's work was a continuation of the subsurface investigation started on 22 June 1981 in the West Boat Basin, Cape Cod Canal.

The drilling crew and boat crew arrived on site at 0630 hrs. The barge was repositioned on Boring B-5. The drilling operation began by 0700 hrs. On the previous day, the casing had been driven to 45.0'. The casing was washed out using a roller bit and sampling began. Because of the difficulty in advancing the solid barrel sampler, one sample was taken at 45.0' with 0.8' penetration and another at 48.0' with 1.5' penetration, following the advancement of the casing to 48.0' The boring was completed to a final depth of 49.5' below the harbor bottom.

The completion of Boring B-5 coincided with the forthcoming slack tide. The slight west current made positioning the barge on B-1 safe and easy. Boring B-1 was completed without any major difficulties to its planned depth of 30.0' below harbor bottom.

The following table summarizes today's activities:

Arrival Time 0630

Repositioning of barge on B-5	30 min.
Drilling B-5	1 hr.-25 min.
Positioning on B-1	25 min.
Drilling B-1	4 hrs.-55 min.
Demobilization	15 min.

Summary: Soil Sampling: 34.5 feet
Moving Time: 70 min.

Briggs Engineering Co.

Shift Report

DATE: 6-25-81
SHIFT NO: [1]
PROJECT: West Boat Basin - Cape Cod Canal
INSPECTOR: Ronald F. Bukoski

TIME: 0700 - 1500 hrs. COMMENTS

Today's work was a continuation of the subsurface soil investigation started on 22 June 1981 in the West Boat Basin, Cape Cod Canal.

The barge/drilling platform was positioned over the location of Boring B-2.

Drilling proceeded on B-2 without major difficulties. There were two short rain delays of approximately 20 min. each at mid-morning. The boring was completed to the planned depth of 30.0 ft. below harbor bottom. The following table summarizes today's activities:

Arrived 0700

Positioning of barge	1 hr.
Drilling	1 hr.-40 min.
Rain delay	20 min.
Drilling	20 min.
Rain delay	20 min.
Drilling	3 hrs.-20 min.
Demobilization	30 min.

Summary: Soil Sampling: 30.0 feet
Moving time: 130 min.

Briggs Engineering Co.

Shift Report

DATE: 6-26-81
SHIFT NO: [1]
PROJECT: West Boat Basin - Cape Cod Canal
INSPECTOR: Ronald F. Bukoski

TIME: 0400 - 1200 hrs. COMMENTS

Today's work was a continuation of the subsurface investigation started on 22 June 1981 in the West Boat Basin, Cape Cod Canal. B-3 was drilled today. The boring was started at slack tide because of anticipated difficulties in vertically aligning the casing due to the swift tidal currents through the canal. Another job constraint was that the boring must be completed in one day and the barge off station by dark.

Work began at 0400 with the loading of "BW" casing onto the barge. All necessary equipment was loaded by 0430. The barge/drilling platform was positioned over B-3. The positioning of the barge was completed at 0520 and drilling began at 0530.

At 0545 the port stern anchor (barge facing west) lost its bottom hold due to the fast west current. Another anchor was set and it held.

The barge required realignment of the casing following the setting of the anchor. Drilling proceeded smoothly through the end of the first shift. The following table summarizes the activities of Shift Number 1.

Arrived 0400

Equipment loading	30 min.
Positioning of barge	50 min.
Equipment preparation	10 min.
Drilling	6 hrs.-30 min.

Summary: Soil Sampling: 32.0 feet
Moving Time: 90.0 min.

Briggs Engineering Co.

Shift Report

DATE: 6-26-81
SHIFT NO: [2]
PROJECT: West Boat Basin - Cape Cod Canal
INSPECTOR: Ronald F. Bukoski

TIME: 1200 - 2100 hrs. COMMENTS

Work continued on Boring B-3. By 1210 the tidal current had reversed direction and was now from the west. The resulting change in direction caused the port bow anchor to slip. Another anchor was set and it held. The barge was then repositioned so as to realign the casing vertically.

Drilling proceeded at a much slower rate from 30 ft because of the dense soil conditions. Often times the casing could not be advanced more than 2 to 3 ft. without washing ahead of the casing.

During the afternoon a 25 to 30 mph wind came up from the west. By 1420 sufficient slippage of the two port bow anchors had occured to warrant running of the barges engine to maintain position.

A cobble was encountered at 46 ft. which required 6 in. of coring to pass through. Following the coring the solid spoon sampler was reinserted into the hole and driven 3 in. to refusal. Because of the small quantity of soil recovered and dense soil state, we decided to core from 47.75 to 50.0 ft. During the removal of the drilling rods an accident occured, resulting in a fractured fourth finger on the drillers left hand. His finger had been caught between a wrench attached to the drilling rods and the top of the casing. The driller was taken to Tobey Hospital by an Army Corps ranger for medical treatment. Drilling for the day was terminated and the casing was removed. The barge was secured to the dock by 2100 hrs.

The following table summarizes the activities for shift number 2:

Drilling	10 hrs.-30 min.
Demobilization	30 min.

Summary:	Soil Sampling:	17.5 feet
	Moving:	30 min.

Briggs Engineering Co.

Shift Report

DATE: 7-06-81
SHIFT NO: [1]
PROJECT: West Boat Basin - Cape Cod Canal
INSPECTOR: Ronald F. Bukoski

TIME: 0530 - 1300 hrs. COMMENTS

The work performed today completed the five scheduled borings at the West Boat Basin, Cape Cod Canal, which were started on June 22, 1981. The drilling crew arrived on site at 0530 and loaded and prepared neccessary equipment. The barge captain arrived at 0630 and the barge/drilling platform was positioned over the location of Boring B-4 with no problems.

Drilling began on B-4 at 0715. The drilling proceed without any major difficulties. The barge needed to be repositioned several times to keep the hole's casing aligned vertically.

Roger Poisson, from the Army Corps Geotechnical Department and Irving Fistel, Army Corps Safety Office arrived around 1100 Hrs to inspect the work being performed. The Safety Survey disclosed that Briggs complied with the required safety items except for a deficient safety gasoline can.

The following table summarizes the activities for shift 1:

Arrived 0530

Equipment Loading/Preparation	1 hr. 00 min.
Positioning Barge	45 min.
Drilling	5 hrs.-45 min.

Summary: Soil Sampling: 30.0 feet
Moving Time: 105 min.

Briggs Engineering Co.

Shift Report

DATE: 7-06-81
SHIFT NO: [2]
PROJECT: West Boat Basin - Cape Cod Canal
INSPECTOR: Ronald F. Bukoski

TIME: 1300 - 1900 hrs. COMMENTS

The drilling continued fairly smoothly through shift 2, with one fifteen minute delay for a thunder shower to pass by around 1630. As in the other test borings, the subsoil became very dense and the rate of drilling slowed considerably in the final twenty feet.

The barge required some positioning assistance from a canal control boat following the reversal of the canal current from west to east, which caused the port bow anchor to slip on the bottom. The canal control boat pushed the barge toward the middle of the canal keeping the remaining lines pulled tight until the boring was completed.

The following table summarizes the activities for shift 2:

Drilling	5 hrs.-30 min.
Clean-up/moving	30 min.

Summary:	Soil Sampling:	17.2 feet
	Moving:	30 min.

APPENDIX B

Field Boring Logs

West Boat Basin

U. S. ARMY
CORPS OF ENGINEERS
NEW ENGLAND DIVISION

FIELD LOG OF TEST BORING

Site West Boat Basin, Cape Cod Canal Page 1 of 3 Pages

Boring No. 1 Desig. B-1 Diam. (Casing) 3.0 in.

Co-ordinates: N _____ E _____

Elevation Top of Boring -8.0 ft M.L.W. Hammer Wt. 300 lb Boring Started 6-24-81

Total Overburden Drilled 30.0 Feet Hammer Drop 18 in. Boring Completed 6-24-81

Elevation Top of Rock NONE ENCOUNTERED M.L.W. Casing Left NONE

Total Rock Drilled NONE Feet Subsurface Water Data _____ Page _____

Elevation Bottom of Boring -38.0 ft M.L.W. Obs. Well NONE Driller Charles Reil

Total Depth of Boring 30.0 Feet Drilled By Briggs Engineering & Testing Co., Inc.

Core Recovered N/A % No. Boxes _____ Mfg. Des. Drill Acker-Barge Mounted

Core Recovered N/A Ft: _____ Diam. _____ In. Inspected By: Ronald F. Bukoski

Soil Samples 2.0 In. Diam. 9 No. Classification By: _____

Soil Samples — In. Diam. — No. Classification By: _____

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
6-24-81 0855 hrs							
5	1	S-1 1 JAR	2.0"	0.0 TO 1.5'	3	DROVE 2" x 5' SOLID SPOON SAMPLER FROM HARBOR BOTTOM TO 5.0'	SAND, MEDIUM TO FINE SAND, PREDOMINATELY FINE, <10% NONPLASTIC FINES, <5% FINE GRAVEL, <5% SHELLS, LARGEST PARTICLE REC. 0.16 BY 0.10', BLACK AND BROWN, SATURATED, SP.
9	2				6	RECOVERED 1.5' SAMPLE	
5	3				6	DROVE 3.0" CASING FROM 0.0 TO 5.0' WASHED OUT CASING USING ROLLER BIT.	SAND BECAME SLIGHTLY COARSER BETWEEN 1.5 AND 4.5', GRADATION M→F.
6	4				5		
50					30	← POSSIBLE COBBLE	
0940 hrs	5	S-2 1 JAR	2.0"	4.5-5.0'			SILTY SAND, FINE SAND, 30-40% NONPLASTIC FINES TWO ROCK FRAGMENTS IN TIP OF SPOON MAX. DIMENSION 0.12' SATURATED, BROWN, SM.
15	6	S-3 1 JAR	2.0"	5.0 TO 6.0'	33	DROVE 2.0" BY 5' SOLID SPOON SAMPLER FROM 5.0 TO 10.0' RECOVERED 2.0 Ft.	
23	7	S-4 1 JAR	2.0"	6.0 TO 7.5'	41	NOTE: SAMPLER TIP CHIPPED WHILE DRIVING DROVE 3" CASING FROM 5.0 TO 10.0 AND WASHED HOLE USING ROLLER BIT.	SAND, COARSE TO FINE, PREDOMINATELY FINE, <10% NONPLASTIC FINES, <5% FINE GRAVEL, SATURATED, BROWN, SP-SM
55	8				42		SANDY GRAVEL, MEDIUM TO FINE GRAVEL, 25-35% COARSE TO FINE SAND, POCKETS OF NONPLASTIC FINES, SATURATED, BROWN, GP.
32	9	S-5 1 JAR	2.0"	7.5 TO 10.0'	21		
25	10				19		SAND, COARSE TO FINE SAND, 10-15% FINE GRAVEL <10% NONPLASTIC FINES, SATURATED, BROWN, SW-SM

GENERAL REMARKS: BORING DEPTHS ARE REFERENCED TO TO HARBOR BOTTOM. HARBOR BOTTOM -8.0' M.L.W.
REFUSAL 30 BLOWS < 0.1' PENETRATION

NED ... 55 (Test)

Boring No. B-1 1/3

Site: West Boat Basin, Cape Cod Canal	Boring No. B-1	Page 2 of 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
1027 hrs.	11	11	NO RECOVERY	2.0"	10.0 TO 15.0'	10	DROVE 2" x 5' SOLID SPOON SAMPLER FROM 10.0 TO 15.0'	WASH – FINE SAND, FEW FINES, ESTIMATE < 15%.
	14	12				10	NO RECOVERY	
	14	13				8	DROVE CASING FROM 10.0 TO 15.0' WASHED CASING OUT USING ROLLER BIT.	
	16	14				11		
	16	15				9		
1035	18	16	S-6 2 JARS	2.0"	15.0 TO 20.0'	7	DROVE 2.0" x 5.0' SOLID SPOON SAMPLER FROM 15.0 TO 20.0'	SAND, MEDIUM TO FINE SAND, PREDOMINATELY FINE SAND, < 10% NONPLASTIC FINES, SATURATED, BROWN, SP-SM
	22	17				27	RECOVERED 3.5' PROBABLY PUSHING SMALL COBBLE	ROCK FRAGMENTS IN TIP OF SAMPLER IN JAR 2 of 2
	35	18				23		
	24	19				10	DROVE CASING FROM 15.0 TO 20.0' AND WASHED OUT USING ROLLER BIT.	
	26	20				13		
	23	21	S-7 1 JAR	2.0"	20.0 TO 25.0'	10	DROVE 2.0" x 5' SOLID SPOON SAMPLER FROM 20.0 TO 25.0'	GRAVELLY SAND, COARSE TO FINE SAND, 15-20% FINE GRAVEL, 10-20% NONPLASTIC FINES, SATURATED, BROWN, SW-SM
	19	22				12	RECOVERED 1.5'	
	23	23				13	DROVE 2.0" CASING FROM 20.0 TO 25.0' AND WASHED OUT CASING USING A ROLLER BIT.	
	30	24				16		
	40	25				18		
		26				42		
		27				16		

NED 58A (Test)

Boring No. B-1 2/3

Site: West Boat Basin Cape Cod Canal	Boring No. B-1	Page 3 of 3

DEPTH 1" = 2'	CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER FT. / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
27	S-8 1 JAR	2.0"	25.0 TO 30.0'	24	DROVE 2.0" X 5.0' SOLID SPOON SAMPLER FROM 25.0 TO 30.0'	GRAVELLY SAND, COARSE TO FINE SAND, 15-25% FINE GRAVEL, 10-20% NON PLASTIC FINES, LESS AT BOTTOM OF SAMPLE, SATURATED, BROWN, SW-SM
28				14	RECOVERED 1.1'	
29				15		
30					BOTTOM OF BORING 30.0'	

NED 58A(Test)

Boring No. B-1 3/3

U. S. ARMY
CORPS OF ENGINEERS
NEW ENGLAND DIVISION

FIELD LOG OF TEST BORING

Site West Boat Basin, Cape Cod Canal Page 1 of 3 Pages

Boring No. 2 Desig. B-2 Diam. (Casing) 3.0 in.

Co-ordinates: N _____ E _____

Elevation Top of Boring -11.3 Ft M.L.W. Hammer Wt. 300 lb Boring Started 6-25-81

Total Overburden Drilled 30.0 Feet Hammer Drop 18 in.

Elevation Top of Rock None Encountered M.L.W. Casing Left None Boring Completed 6-25-81

Total Rock Drilled None Feet Subsurface Water Data _____ Page _____

Elevation Bottom of Boring -41.3 M.L.W. Obs. Well None Driller Charles Reil

Total Depth of Boring 30.0 Feet Drilled By Briggs Engineering & Testing Co., Inc.

Core Recovered N/A % No. Boxes _____ Mfg. Des. Drill Acker - Barge Mounted

Core Recovered N/A Ft: _____ Diam. _____ In. Inspected By: Ronald F. Bukoski

Soil Samples 2.0 In. Diam. 9 No. Classification By: _____

Soil Samples 1 1/2" In. Diam. 1 No. Classification By: _____

	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
0830 hrs	Weight of Casing	1	S-1 1 Jar	2.0"	0.0 to 1.5'	Weight of Rods	"AW" Rods and 2"x5' Solid Spoon Sampler settled 1' under own weight. Drove sampler from 1.0 to 5.0'.	Sandy Silt, nonplastic, 15-20% medium to fine sand, saturated, brown, mottled rusty brown, ML.
		2				16	Recovered 1.3'	Sandy Gravel, coarse to fine gravel, max. dimension 0.2', 25-35% coarse to fine sand, 15-25% nonplastic fines, saturated, brown, GP-GM
	11	3	S-2 1 Jar	2.0"	1.5 to 5.0'	12	Casing settled 2' under own wt. Drove 3.0" casing from 2.0' to 5.0' and washed out casing using roller bit.	
	17	4				15		
0937 hrs	35	5				44		Possible cobble at 4-5'
	20	6	S-3 1 Jar	2.0"	5.0 to 6.0'	17	Drove 2"x5' solid spoon sampler from 5.0 to 10.0' and took sample.	Sandy Gravel, coarse to fine gravel, max. dimension 0.13', 30-40% coarse to fine sand, <10% nonplastic fines, saturated, brown, GP-GM
	17	7	S-4 1 Jar	2.0"	6.0-6.5'	17	Recovered 1.6'	
	20	8				15	Drove 3.0" casing from 5.0 to 10.0' and washed out casing using roller bit.	Sand, coarse to fine sand, predominately medium to fine, <10% nonplastic fines, <5% fine gravel, saturated, brown, SP-SM
	26	9				16		
	23	10				16		

GENERAL REMARKS: Depth of borings are referenced to the Boat Basin bottom.

Site: WEST BOAT BASIN
CAPE COD CANAL

Boring No. B-2

	DEPTH		CORE/SAMPLE			BLOWS PER FT.	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
	BLOWS ON CASING	1" = 2'	NO.	SIZE	DEPTH RANGE	CORE RECVY		
1010 hrs	7	11	S-5 1 JAR	2.0"	10.0 TO 11.0'	15	DROVE 2.0" x 5' SOLID SPOON SAMPLER FROM 10.0 TO 15.0'. RECOVERED 2.1'	SAND, MEDIUM TO FINE, <5% NONPLASTIC FINES, ROCK FRAGMENTS TO 0.10', SATURATED, BROWN, SP
	10	12	S-6 1 JAR	2.0"	11.0-11.5'	16	DROVE 3.0" CASING FROM 10.0 TO 15.0' WASHED OUT CASING USING ROLLER BIT.	SILTY SAND, MEDIUM TO FINE SAND, 15-25% NONPLASTIC FINES, 2 ROCK FRAGMENTS - LARGEST 0.15' SATURATED, BROWN, SM.
	11	13				15		
	11	14				23		
	12	15				15		
1130 hrs	20	16	S-7 1 JAR	1 1/2"	15.0-15.3'	20	DROVE 1 1/2" x 5' SOLID SPOON SAMPLER FROM 15.0 TO 20.0' RECOVERED 0.3' - ROCK IN TIP. DROVE 3.0" CASING FROM 15.0 TO 20.0' AND WASHED OUT USING ROLLER BIT.	SILTY SAND, MEDIUM TO FINE SAND, 15-25% NONPLASTIC FINES, ROCK FRAGMENTS IN TIP OF SAMPLER TO 0.10'. SM
	34	17				12		
	27	18				12		
	23	19				17		
	21	20				26		
1230 hrs	27	21	S-8 1 JAR	2.0"	20.0 TO 20.8'	23	DROVE 2.0" x 5' SOLID SPOON SAMPLER FROM 20.0 TO 25.0' RECOVERED 1.3'	GRAVELLY SAND, COARSE TO FINE SAND, PREDOMINATELY MEDIUM TO FINE, 15-20% FINE GRAVEL, <10% NONPLASTIC FINES, SATURATED, BROWN, SP-SM
	35	22	S-9 1 JAR	2.0"	20.8 TO 22.0'	21	DROVE CASING FROM 20.0 TO 25.0' WASHED CASING OUT USING ROLLER BIT.	GRAVELLY SAND, COARSE TO FINE SAND, 30 TO 90% FINE GRAVEL INCLUDING ROCK FRAGMENTS IN SAMPLER TIP TO 0.15', <10% NONPLASTIC FINES, SATURATED, BROWN, SW-SM
	48	23				40		
	56	24				18		
	50	25				20		
1310 hrs		26	S-10 1 JAR	2.0"	25.0 TO 26.0'	19	DROVE 2.0" x 5' SOLID SPOON SAMPLER FROM 25.0 TO 30.0' RECOVERED 1.8'	SAND, COARSE TO FINE SAND, <10% NONPLASTIC FINES, <10% FINE GRAVEL - GRAVEL TO 0.15', SATURATED, BROWN SW-SM
		27				12		

Site: WEST BOAT BASIN CAPE COD CANAL	Boring No. B-2	Page 3 of 3

DEPTH	CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER FT. / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATER ALS
1" = 2'						
				16		SAND, COARSE TO FINE SAND <10% NONPLASTIC FINES, <10% FINE GRAVEL, GRAVEL TO 0.15', SATURATED, BROWN SW-SM
28				25		
29				42	POSSIBLE COBBLE.	
30					BOTTOM OF BORING 30.0'	

NED 58A(Test)

Boring No. B-2

U. S. ARMY
CORPS OF ENGINEERS
NEW ENGLAND DIVISION

FIELD LOG OF TEST BORING

Site WEST BOAT BASIN, CAPE COD CANAL Page 1 of 4 Pages

Boring No. 3 Desig. B-3 Diam. (Casing) 2 1/2 in.

Co-ordinates: N _____ E _____

Elevation Top of Boring -22.8 ft M.L.W. Hammer Wt. 300 lb Boring Started 6-26-81

Total Overburden Drilled 50 Feet Hammer Drop 18 in. Boring Completed 6-26-81

Elevation Top of Rock COBBLE 46.0 M.L.W. Casing Left NONE

Total Rock Drilled 0.5' Feet Subsurface Water Data _____ Page _____

Elevation Bottom of Boring -72.8 M.L.W. Obs. Well NONE Driller Charles Reil

Total Depth of Boring 50 Feet Drilled By BRIGGS ENGINEERING & TESTING CO., INC.

Core Recovered 100 % No. Boxes — Mfg. Des. Drill ACKER - BARGE MOUNTED

Core Recovered 0.5 Ft : 1 3/8" Diam. ____ In. Inspected By: RONALD F. BUKOSKI

Soil Samples 2.0" In. Diam. 2 No. Classification By: _____

Soil Samples 1 1/2" In. Diam. 10 No. Classification By: _____

SAMPLING TIMES	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
0530 hrs			S-1	2.0"	0.0-0.3	WEIGHT OF RODS	DROVE 2.0" x 5' SOLID SPOON SAMPLER FROM HARBOR BOTTOM TO 5.0'. RECOVERED 1.9'	SAND, MEDIUM TO FINE, SHELLS, GRAVEL SIZE PARTICLES TO 0.10', SATURATED DARK BROWN SP.
	7	1	S-2 1 JAR	2.0"	0.3 TO 1.9'	3		
	9					8		GRAVELLY SAND, COARSE TO FINE SAND, 20-30% COARSE TO FINE GRAVEL - MAX. SIZE RECOVERED 0.18', 10-15% NONPLASTIC FINES, SATURATED MILKY BROWN, SW-SM
		2					DROVE 2 1/2" CASING FROM HARBOR BOTTOM TO 5.0' WASHED CASING OUT USING ROLLER BIT.	
	8					9		
		3						
	9					13		
		4						
	8					5		
0700 hrs.		5						
	11		S-3 1 JAR	1 1/2"	5.0 TO 6.3'	12	DROVE 1 1/2" x 5' SOLID SPOON SAMPLER FROM 5.0 TO 10.0' AND TOOK SAMPLE. RECOVERED 1.3'	GRAVELLY SAND, COARSE TO FINE SAND, 20-30% FINE GRAVEL - MAX. SIZE REC. 0.10', 10-15% NONPLASTIC FINES, SATURATED, MILKY BROWN, SW-SM
		6						
	10					13		
		7						
	12					26		
		8					DROVE 2 1/2" CASING FROM 5.0 TO 10.0' WASHED CASING OUT USING ROLLER BIT	8-9' POSSIBLE SMALL COBBLE
	17					52		
		9						
	32					27		
		10						

GENERAL REMARKS: BORING DEPTHS ARE REFERENCED TO HARBOR BOTTOM. REFUSAL IS DEFINED AS 30 BLOWS < 0.1' PENETRATION (300 lb HAMMER).

Site: WEST BOAT BASIN
CAPE COD CANAL

Boring No. B-3

Sampling Times	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
0800 hrs	12	11	S-4 1 JAR	1½"	10.0 TO 10.9'	42	DROVE 1½" x 5' SOLID SPOON SAMPLER FROM 10.0 TO 15.0' RECOVERED 0.9'	10-11' POSSIBLE SMALL COBBLE GRAVELLY SAND, COARSE TO FINE SAND, 20-30% FINE GRAVEL, 10-15% NONPLASTIC FINES, SATURATED, MILKY BROWN, SW.-SM
	18	12				23	DROVE 2½" CASING FROM 10.0 TO 15.0'	
	33	13				12	WASHED OUT CASING USING ROLLER BIT.	
	16	14				8		
	14	15				10		
0855 hrs	11	16	S-5 2 JARS	1½"	15.0 TO 17.6'	11	DROVE 1½" x 5' SOLID SPOON SAMPLER FROM 15.0 TO 20.0' RECOVERED 2.6'	GRAVELLY SAND, COARSE TO FINE SAND, 20-30% FINE GRAVEL, 10-15% NONPLASTIC FINES, SATURATED MILKY BROWN, SW.-SM
	17	17				16	DROVE 2½" CASING FROM 15.0 TO 20.0'	
	22	18				37	WASHED OUT CASING USING ROLLER BIT.	
	36	19				32		
	22	20				55		
0950 hrs	21	21	S-6 1 JAR	1½"	20.0 TO 22.5'	19	DROVE 1½" x 5' SOLID SPOON SAMPLER FROM 20.0 TO 24.9' REFUSAL AT 24.9'	GRAVELLY SAND, COARSE TO FINE SAND, 15-25% FINE GRAVEL, 5-10% NONPLASTIC FINES, SATURATED, BROWN SW-SM
	32	22				50	RECOVERED 2.5'	
	32	23				63	DROVE 2½" CASING FROM 20.0 TO 25.0'	
	35	24				79	WASHED OUT CASING USING ROLLER BIT.	
	55	25				80/0.9'		
1030 hrs.	34	26	S-7 1 JAR	1½"	25.0 TO 26.9'	56	DROVE 1½" x 5' SOLID SPOON SAMPLER FROM 25.0 TO 27.0' REFUSAL AT 27.0'	SAND, MEDIUM TO FINE SAND, <10% FINE GRAVEL, <10% NONPLASTIC FINES, 3 ROCK FRAGS. IN SPOON BELIEVED TO BE FROM 25', LARGEST DIM. 0.11' (S-7) SATURATED, BROWN, SP.-SM
	60	27				98	RECOVERED 1.9'	

Site: WEST BOAT BASIN, CAPE COD CANAL	Boring No. B-3	Page 3 of 4

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
100	28					DROVE 2 1/2" CASING FROM 25.0 TO 28'. WASHED OUT CASING TO 1' AHEAD OF CASING. DROVE CASING FROM 28.0' TO 30.0. WASHED OUT CASING USING ROLLER BIT.	
WASHED 40	29						
37	30						
1135 hrs. 41	31	S-8 1 JAR	1 1/2"	30.0 TO 31.2'	36	DROVE 1 1/2" x 5' SOLID SPOON SAMPLER FROM 30.0 TO 32.0' REFUSAL AT 32.0. RECOVERED 1.2'	SAND, COARSE TO FINE SAND PREDOMINATELY MEDIUM TO FINE, < 5% FINE GRAVEL, < 5% NONPLASTIC FINES, SATURATED, BROWN, SP.
64	32				86 REFUSAL	DROVE 2 1/2" CASING FROM 30.0 TO 33'. WASHED AHEAD OF CASING 1.5' AND DROVE CASING TO 35.0'. WASHED OUT CASING USING ROLLER BIT.	
166	33						
WASHED 39	34						
95	35						
1345 hrs. 60	36	S-9 1 JAR	1 1/2"	35.0 TO 36.0	30	INSERTED 1 1/2" x 5' SOLID SPOON INTO HOLE, WOULD NOT PENETRATE PAST 30'. ATTEMPTED TO WASH THROUGH SPOON — NOTHING WASHED UP. DROVE SAMPLER SEVERAL INCHES AND RETRIEVED — NO RECOVERY. REINSERTED ROLLER BIT AND WASHED OUT CASING TO 35'. REINSERTED 1 1/2" x 5' SAMPLER TO 35' AND DROVE. RECOVERED 1.0'. DROVE CASING FROM 35.0 TO 38.0'. WASHED AHEAD OF CASING USING ROLLER BIT TO 39'.	SAND, MEDIUM TO FINE SAND, 10-15% NONPLASTIC FINES, < 5% FINE GRAVEL, SATURATED, BROWN, SP-SM. WASH APPEARED TO HAVE COARSER SAND AND MORE FINE GRAVEL THAN WAS RECOVERED IN THE SOLID SPOON.
100	37				120 REFUSAL		
200	38						
WASHED 65	39						
100/0.5' WASHED	40						
110	41	S-10 1 JAR	1 1/2"	40.0 40.5'	58	DROVE CASING FROM 38 TO 40.0' WHEN SAMPLER WAS INSERTED IT ONLY PENETRATED TO 36.' REMOVED SAMPLER AND REWASHED CASING TO 40'. REINSERTED 1 1/2" x 5' SOLID SPOON SAMPLER TO 40.0' AND DROVE SAMPLER FROM 40.0 TO 41.5'. RECOVERED 0.5'	SAND, MEDIUM TO FINE SAND, 10-15% NONPLASTIC FINES, < 10% FINE GRAVEL, SATURATED BROWN, SP-SM
150	42				100/0.5		
WASHED 56	43						
126	44						

Site: West Boat Basin, Cape Cod Canal	Boring No. B-3	Page 4 of 4

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
WASHED 95	44					DROVE 2½" CASING FROM 40.0 TO 45.0' WITH INTERMITTENT WASHINGS AT 42 AND 44'.	
1700 hrs.	45	NO RECOVERY	1½"	45.0 TO 46.0'	54	DROVE 1½" x 5' SOLID SPOON SAMPLER FROM 45 TO 46.0'. REFUSAL AT 46'. NO RECOVERY.	C-1 FINE GRAINED GRANITE
	46	C-1	1⅜"	46.0 46.5'	0.5'	CORED THROUGH COBBLE FROM 46.0 TO 46.5'. RECOVERED 0.5' of CORE. CORED PAST COBBLE 1.0' WITH NO RECOVERY.	
	47						
1815 hrs.		S-11	1½"	47.5 47.75'	96/0.25	DROVE 1½" x 5' SOLID SPOON SAMPLER FROM 47.5 TO 47.75'.	S-11 RECOVERED - FINE GRAVEL, INCLUDING ROCK FRAGMENTS, SAND, COARSE TO FINE SAND, < 10% NONPLASTIC FINES INSUFFICIENT RECOVERY FOR GRADATION ESTIMATES OF SAND AND GRAVEL.
	48	1 JAR					
	49						
	50	BOTTOM OF BORING				RECOVERED 0.15' IN TIP OF SAMPLER. DECIDED TO CORE FROM 47.75 TO 50.0' IN HOPES OF ADDITIONAL SAMPLE RECOVERY. NONE RECOVERED. FINAL SAMPLING DEPTH 47.75'. BORING TERMINATED AT 50.0'	

U. S. ARMY
CORPS OF ENGINEERS
NEW ENGLAND DIVISION

FIELD LOG OF TEST BORING

Site West Boat Basin, Cape Cod Canal Page 1 of 4 Pages

Boring No. 4 Desig. B-4 Diam. (Casing) 2 1/2 in.

Co-ordinates: N _____ E _____

Elevation Top of Boring -17.1 Ft M.L.W. Hammer Wt. 300 lb Boring Started 7-6-81

Total Overburden Drilled 47.2 Feet Hammer Drop 18 in. Boring Completed 7-6-81

Elevation Top of Rock None Encountered M.L.W. Casing Left None

Total Rock Drilled None Feet Subsurface Water Data _____ Page _____

Elevation Bottom of Boring -64.3 M.L.W. Obs. Well None Driller. James Marks

Total Depth of Boring 47.2 Feet Drilled By Briggs Engineering & Testing Co., Inc.

Core Recovered N/A % No. Boxes _____ Mfg. Des. Drill Acker

Core Recovered N/A Ft: _____ Diam. _____ In. Inspected By: Ronald F. Bukoski

Soil Samples 2.0 In. Diam. 2 No. Classification By: _____

Soil Samples 1 1/2 In. Diam. 8 No. Classification By: _____

	DEPTH		CORE/SAMPLE			BLOWS PER FT. / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
	BLOWS ON CASING	1"=2'	NO.	SIZE	DEPTH RANGE			
0715 hrs	1 | 2 250 | 110	1	S-1 2 JARS	2.0"	0.0 TO 2.0'	52	DROVE 2.0" x 5' SOLID SPOON SAMPLER FROM 0.0 TO 5.0' RECOVERED 4.3'	GRAVELLY SAND, COARSE TO FINE SAND, PREDOMINATELY MEDIUM TO FINE SAND, 20-25% FINE GRAVEL, 10-15% NONPLASTIC FINES, SATURATED, BLACKISH BROWN, SP.
	195	2				60	FIRST ATTEMPT TO DRIVE CASING ENCOUNTERED OBSTRUCTION AT 1.0'	
	175	3	S-2 1 JAR	2.0"	2.0 TO 5.0'	56	RELOCATED CASING 2' EAST, PARALLEL TO SHORE, AND DROVE WITHOUT ENCOUNTERING OBSTRUCTION.	SILTY SAND, COARSE TO FINE SAND, 35-45% NONPLASTIC FINES, 10-15% FINE GRAVEL MOIST, BROWN, SM.
	165	4				52	WASHED OUT CASING USING ROLLER BIT.	
	WASHED 30	5				100		Possible Small Cobble near 5.0'
0850 hrs.	35	6	S-3 1 JAR	1 1/2"	5.0 TO 10.0'	83	DROVE 1 1/2" x 5' SOLID SPOON SAMPLER FROM 5 TO 10' RECOVERED 2.8'	GRAVELLY SAND, COARSE TO FINE SAND, 15-25% FINE GRAVEL, < 15% NONPLASTIC FINES, SATURATED, BROWN, SP.
	34	7				69	DROVE 2 1/2" I.D. CASING FROM 5.0 TO 10.0'	
	42	8				65	WASHED OUT CASING USING ROLLER BIT.	
	37	9				77		
	39	10				91		

GENERAL REMARKS: BORING DEPTHS ARE REFERENCED TO HARBOR BOTTOM. REFUSAL 30 BLOWS < 0.1 Ft PENETRATION.

Site: West Boat Basin	Boring No. B-4	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
0950	20	11	S-4 1 JAR	1½"	10.0 TO 15.0'	90	Following Roller Bit washing ≈ 3' of sand entered bottom of casing. Rewashed using Roller Bit.	Gravelly sand, coarse to fine sand, 15-20% fine gravel, 10-15% nonplastic fines, saturated, brown, SP.
	52	12				147	Drove 1½" x 5' solid spoon sampler from 10.0 to 12.5'	
	49	13				130/0.5'	Refusal at 12.5'	
	54	14					Recovered 0.8'	
	57	15					Drove casing from 10 to 15.0'. Washed out using Roller Bit. Following washing 2' of	
	Settled during washing	16					Sand entered bottom of casing. During rewashing using Roller Bit, casing settled to 18.0'	
		17					Drove 1½" x 5' solid spoon sampler from 18.0 to 23.0'	
		18					Recovered 1.2'	
1045	15	19	S-5 1 JAR	1½"	18.0 TO 23.0'	17	Drove casing from 18.0' to 25.0'.	Gravelly sand, coarse to fine sand, predominately medium to fine, 15-20% fine gravel, <10% nonplastic fines, saturated, brown, SP.
	27	20				24	Washed out casing using Roller Bit.	
	39	21				30		
	52	22				40		
	59	23				56		
	121	24						
	95	25						Gravelly sand, coarse to fine sand, predominately medium to fine, 10-20% fine gravel, <10% nonplastic fines, saturated, brown, SP.
1145	35	26	S-6 1 JAR	1½"	25.0 TO 28.0'	40	Drove 1½" x 5' solid spoon sampler from 25.0 to 28.0'.	
	34	27				70	Recovered 2.1'	

Site: West Boat Basin | Boring No. B-4 | Page 3 of 4

DEPTH: Blows on Casing	DEPTH: 1" = 2'	CORE/SAMPLE: NO.	SIZE	DEPTH RANGE	BLOWS PER FT. / CORE RECV'Y	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
42	28	S-6 1 JAR	1½"	25.0 TO 28.0'	140	REFUSAL AT 28.0'	GRAVELLY SAND, COARSE TO FINE SAND, PREDOMINATELY MEDIUM, 10-20% FINE GRAVEL, <10% NONPLASTIC FINES, SATURATED, BROWN, SP.
37	29					DROVE 2½" CASING FROM 25.0 TO 30.0', WASHED OUT CASING USING ROLLER BIT.	
39	30						
1300 hrs 44	31	S-7 1 JAR	1½"	30.0 TO 31.2	45	DROVE 1½" x 5.0' SOLID SPOON SAMPLER FROM 30.0 TO 32.5'	SAND, COARSE TO FINE, PREDOMINATELY MEDIUM, <10% NONPLASTIC FINES, <10%. FINE GRAVEL, SAT. BROWN, SP.
80	32				89	RECOVERED 1.2'	
194	33				150/0.5	DROVE 2½" CASING FROM 30 TO 33' WASHED OUT AND AHEAD OF CASING, DROVE CASING FROM 33 TO 35.0'.	
WASHED 49	34						
100	35						
1495 30	36	S-8 1 JAR	1½"	35.0 35.5'	97	DROVE 1½" x 5' SOLID SPOON SAMPLER FROM 35 TO 36.2'	SAME AS ABOVE
WASHED 66	37				70/0.2'	REFUSAL AT 36.2' RECOVERED 0.5'	
WASHED 45	38					DROVE CASING FROM 35.0 TO 40.0' WITH THREE INTERMEDIATE WASHINGS.	
140/0.8' WASHED	39						
150	40						
1550 55	41	NO RECOVERY			80	DROVE 1½" x 5' SOLID SPOON SAMPLER FROM 40.0 TO 41.3'	WASH APPEARED TO BE SAME AS ABOVE.
127	42				110/0.3'	NO RECOVERY	
WASHED 1630 TO 1645 hrs. 47	43					DROVE CASING FROM 40 TO 45.0' WITH ONE INTERMEDIATE WASHING.	
134	44						

Site: West Boat Basin | Boring No. B-4 | 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 REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
1540 hrs.		45					DROVE 1½" x 5' SOLID SPOON	SAND, MEDIUM TO FINE,
					95.0 TO	66	SAMPLER FROM 95 TO 97.2'	< 10 % NONPLASTIC FINES,
		46	S-9	1½"	97.2'		RECOVERED 0.8'	BROWN, SATURATED, SP.
						100		
Casing out @ 1825		47				90/0.2'	BOTTOM OF BORING 97.2'	

NED FORM 58A (Test) MAR 77

Boring No. B-4

U. S. ARMY
CORPS OF ENGINEERS
NEW ENGLAND DIVISION

FIELD LOG OF TEST BORING

Site WEST BOAT BASIN, CAPE COD CANAL Page 1 of 4 Pages

Boring No. 5 Desig. B-5 Diam. (Casing) 3.0 in.

Co-ordinates: N _____ E _____

Elevation Top of Boring -16.15 Ft M.L.W. Hammer Wt. 300 lb Boring Started 6-22-81

Total Overburden Drilled 49.5 Feet Hammer Drop 18 in. Boring Completed 6-24-81

Elevation Top of Rock NONE ENCOUNTERED M.L.W. Casing Left NONE

Total Rock Drilled NONE Feet Subsurface Water Data — Page _____

Elevation Bottom of Boring -65.65 Ft M.L.W. Obs. Well NONE Driller Charles Reil

Total Depth of Boring 49.5 Feet Drilled By BRIGGS ENGINEERING & TESTING CO., INC.

Core Recovered N/A % No. Boxes _____ Mfg. Des. Drill ACKER - BARGE MOUNTED

Core Recovered N/A Ft: ____ Diam. ____ In. Inspected By: RONALD F. BUKOSKI

Soil Samples 2.0 In. Diam. 11 No. Classification By: _____

Soil Samples 1 1/2 In. Diam. 4 No. Classification By: _____

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
1128 hrs. 48	1	S-1 1 JAR	2.0"	0.0 TO 3.0'	17	DROVE 2.0" x 5.0' SOLID SPOON SAMPLER FROM BOAT BASIN BOTTOM TO 5.0'. USING [illegible]	SILTY SAND, MEDIUM TO FINE SAND, 10-20 % NONPLASTIC FINES, 5-10 % SHELLS, SATURATED, BLACK NEAR BOTTOM SURFACE, BROWN BENEATH, SM-SP.
20	2				14	RECOVERED 2.0' SAMPLE	
95	3				65		
80	4	S-2 1 JAR	2.0"	3.0 TO 5.0'	160	DROVE 3.0" CASING FROM 0.0 TO 5.0'. THEN WASHED HOLE OUT USING A ROLLER BIT.	SILTY SAND, COARSE TO FINE SAND, PREDOMINATELY MEDIUM TO FINE, 15-25 % NONPLASTIC FINES, 10-15% FINE GRAVEL, ROCK FRAGMENT RECOVERED 0.2 x 0.14', SATURATED, BROWN SM.
68	5				165		
1143 hrs 18	6	S-3 2 JARS	2.0"	5.0 TO 10.0'	58	DROVE 2.0" x 5' SOLID SPOON SAMPLER FROM 5.0' TO 10.0' AND TOOK SAMPLE.	SILTY SAND, COARSE TO FINE SAND, 15-25 % NONPLASTIC FINES, 10-20 % MEDIUM TO FINE GRAVEL, ROCK FRAGMENT 0.15 x 0.13', SATURATED, BROWN, SM.
23	7				48	RECOVERED 2.1'	
25	8				39	DROVE 3.0" CASING FROM 5.0 TO 10.0'.	
33	9				54	CASING WAS WASHED OUT USING A ROLLER BIT.	
35	10				59		

GENERAL REMARKS: BORING DEPTHS ARE REFERENCED TO HARBOR BOTTOM. HARBOR BOTTOM -16.15 MLW. REFUSAL 30 BLOWS < 0.1' PENETRATION.

Site: WEST BOAT BASIN, CAPE COD CANAL	Boring No. B-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
1505 hrs.	40	11	S-4 1 JAR	2.0"	10.0 TO 13.0'	79	DROVE 2.0" x 5.0' SOLID SPOON SAMPLER FROM 10.0 TO 15.0' AND TOOK SAMPLE	GRAVELLY SAND, COARSE TO FINE SAND, 15-20% FINE GRAVEL, <10% NONPLASTIC FINES, SATURATED, BROWN SW-SM
	38	12				94	RECOVERED 2.5'	
	63	13				89	DROVE 3.0" CASING FROM 10.0 TO 15.0'	
	56	14	S-5 1 JAR	2.0"	13.0 TO 15.0'	78	WASHED HOLE USING ROLLER BIT.	GRAVELLY SAND, COARSE TO FINE SAND, 15-20% FINE GRAVEL, <10% NONPLASTIC FINES, SATURATED, BROWN, SW-SM
	27	15				49	UNIFORM FINE GRAVEL IN WASH NEAR 15' WITH VERY LITTLE FINES.	
	36	16	S-6 1 JAR	2.0"	15.0 TO 16.0'	20	DROVE 2.0" x 5.0' SOLID SPOON SAMPLER FROM 15.0 TO 20.0'	GRAVELLY SAND, COARSE TO FINE SAND 20-30% FINE GRAVEL, 10-15% NONPLASTIC FINES, SATURATED, BROWN, SW-SM
	35	17	S-7 1 JAR	2.0"	16.0 TO 17.0'	27	RECOVERED 2.3'	SILTY SAND, COARSE TO FINE SAND, 10-20% NONPLASTIC FINES 5-15% FINE GRAVEL, SATURATED BROWN, SM-SW.
	35	18				20	DROVE 3.0" CASING FROM 15.0 TO 20.0'. WORK STOPPED FOR THE DAY	
	25	19				20		GRAVELLY SAND, COARSE TO FINE SAND, 15-25% FINE SUBANGULAR GRAVEL, 10-15% NONPLASTIC FINES, SATURATED, BROWN, SW-SM.
6-22 1650 hrs	33	20				20		
6-23 0910 hrs.	27	21	S-8 1 JAR	2.0"	20.0 TO 25.0'	18	HOLE WASHED 6-23-81 USING ROLLER BIT.	
	24	22				17	DROVE 2.0" x 5.0' SOLID SPOON SAMPLER FROM 20.0 TO 25.0' AND TOOK SAMPLE.	
	27	23				22	RECOVERED 1.5'	
	40	24				23	DROVE CASING FROM 20.0 TO 25.0' AND WASHED HOLE USING ROLLER BIT.	
	55	25				36		
	37	26	S-9 1 JAR	2.0"	25.0 TO 27.5'	40	DROVE 2.0" x 5' SOLID SPOON SAMPLER FROM 25.0 TO 27.5'.	SAND, COARSE TO FINE SAND, 10-15% NONPLASTIC FINES 10-15% FINE GRAVEL, SATURATED, BROWN, SW-SM
	45	27				110	REFUSAL AT 27.5' SOIL VERY COMPACT.	

Site: WEST BOAT BASIN
CAPE COD CANAL

Boring No. B-5

	DEPTH		CORE/SAMPLE			BLOWS PER FT. CORE RECVY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATER ALS
	BLOWS ON CASING	1" = 2'	NO.	SIZE	DEPTH RANGE			
6-23 1015 hrs.	55	28	S-9 1 JAR	2"	25.0 TO 27.5'	150/0.5'	RECOVERED 1.6' DROVE CASING FROM 25.0 TO 30.0' WASHED HOLE USING ROLLER BIT. HOLE WASHES EASILY, BUT SPOON DIFFICULT TO DRIVE DUE COMPACTNESS OF SOIL.	SAND, COARSE TO FINE SAND, 10-15 % NON PLASTIC FINES, 10-15 % FINE GRAVEL, SATURATED, BROWN, SW-SM
	140	29						
	260	30						
	WASHED 38	31	S-10 1 JAR	2"	30.0 TO 32.0'	16	DROVE 2.0" x 5.0' SOLID SPOON SAMPLER FROM 30.0 TO 32.0'. REFUSAL AT 32.0' RECOVERED 2.0'	SAND, COARSE TO FINE SAND, 10-15 % NONPLASTIC FINES <10 % FINE GRAVEL, SATURATED, BROWN, SW-SM
	68	32				123		0.25' SEAM OF GRAVELLY SAND AT APPROXIMATELY 31.2', COARSE TO FINE SAND 15-25 % FINE GRAVEL, <10 % NONPLASTIC FINES, SATURATED, BROWN, SW.
	130	33					DROVE 3.0" CASING FROM 30.0 TO 33.5'. WASHED AHEAD OF CASING 1.5' USING ROLLER BIT. DROVE CASING FROM 33.5 TO 35.0'.	
	200/0.5'	34						
	WASHED 17	35						
1355 hrs.	50	36	S-11 1 JAR	1 1/2"	35.0 TO 37.0'	14	DROVE 1 1/2" x 5.0' SOLID SPOON SAMPLER FROM 35.0 TO 37.0'. REFUSAL AT 37.0'	SAND, COARSE TO FINE, PREDOMINATELY MEDIUM TO FINE, 0.2' SEAM OF FINE GRAVEL AT 36.2', 10-15 % NONPLASTIC FINES, SATURATED, BROWN, SP-SM
	100	37				80		
	185	38					RECOVERED 2.0'. DROVE CASING TO 38'. WASHED AHEAD 1.0' AND DROVE CASING TO 40.0'.	
	WASHED 40	39						
	110	40						
	55	41	S-12 1 JAR	1 1/2"	40.0 TO 41.9'	40	DROVE 1 1/2" x 5' SOLID SPOON SAMPLER FROM 40.0 TO 41.9'. REFUSAL AT 41.9' RECOVERED 1.5'	SAND, COARSE TO FINE SAND, PREDOMINATELY, MEDIUM TO FINE, <10 % NONPLASTIC FINES, SATURATED, BROWN, SP-SM
	170	42				130/0.9'		
	100/0.5' WASHED 20/0.5'	43					DROVE 3.0" CASING FROM 40 TO 42.5' AND WASHED DROVE CASING FROM 42.5 TO 44.0' WASHED OUT HOLE USING ROLLER BIT	
1630 hrs.	135	44						

Site: WEST BOAT BASIN CAPE COD CANAL	Boring No. B-5	Page 4 of 4

	DEPTH		CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER FT. / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
6-23-81 1695 hrs	WASHED						6-23-81 DROVE CASING FROM 44.0 TO 45.0' FINISHED FOR THE DAY.	
	40							
6-24-81 0700 hrs		45					6-24-81 WASHED OUT CASING FROM 44.0' TO 45.0' USING ROLLER BIT	SAND, COARSE TO FINE, PREDOMINATELY MEDIUM TO FINE, < 5% FINE GRAVEL, < 5% NONPLASTIC FINES SATURATED, BROWN, SP.
	175		S-13 1 JAR	1 1/2"	45.0 TO 45.8	100/0.8'	DROVE 1 1/2" x 5' SOLID SPOON SAMPLER FROM 45 TO 45.8'	
		46						
	100/0.5'							
	53	47					RECOVERED 0.7'	
	185						DROVE 30" CASING TO 46.5' AND WASHED OUT CASING.	SAND, COARSE TO FINE, PREDOMINATELY MEDIUM TO FINE, < 5% FINE GRAVEL < 5% NONPLASTIC FINES SATURATED, BRINN, SP.
0750		48						
			S-14 1 JAR	1 1/2"	48.0 TO 49.5	55	DROVE CASING FROM 46.5 TO 48.0'.	
		49					DROVE 1 1/2" x 5' SOLID SPOON SAMPLER FROM 48.0 TO 49.5'	
						90/0.5'	REFUSAL AT 49.5', RECOVERED 0.5'	
		50					BOTTOM OF BORING 49.5'	

LABORATORY LOGUES

U. S. ARMY
CORPS OF ENGINEERS
NEW ENGLAND DIVISION

FIELD LOG OF TEST BORING

Site West Boat Basin, Cape Cod Canal Page 1 of 3 Pages
FD 81-1
Boring No. X Desig. B-1 Diam. (Casing) 3.0 in.
Co-ordinates. N _____ E _____

Elevation Top of Boring -8.0 ft M.L.W. Hammer Wt. 300 lb Boring Started 6-24-81
Total Overburden Drilled 30.0 Feet Hammer Drop 18 in. Boring Completed 6-24-81
Elevation Top of Rock NONE ENCOUNTERED M.L.W. Casing Left NONE
Total Rock Drilled NONE Feet Subsurface Water Data _____ Page _____
Elevation Bottom of Boring -38.0 ft M.L.W. Obs. Well NONE Driller Charles Reil
Total Depth of Boring 30.0 Feet Drilled By BRIGGS ENGINEERING & TESTING Co., INC.
Core Recovered N/A % No. Boxes _____ Mfg. Des. Drill ACKER-BARGE MOUNTED
Core Recovered N/A Ft: _____ Diam. _____ In. Inspected By: RONALD F. BUKOSKI
Soil Samples 2.0 In. Diam. 9 No. Classification By: _____
Soil Samples — In. Diam. — No. Lab Classification By: [illegible] 7/21/81

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
5	1	S-1 1 JAR	2.0"	0.0 to 1.5'	3	DROVE 2" x 5' SOLID SPOON SAMPLER FROM HARBOR BOTTOM TO 5.0'	~~SAND, MEDIUM TO FINE SAND, PREDOMINATELY FINE, <10% NONPLASTIC FINES, <5% FINE GRAVEL, <5%~~ SHELLS, ~~LARGEST PARTICLE VEC. 0.1' BY 0.10', BLACK AND BROWN,~~ Gr. br. - silty, f. sand (SM) w/mar. odor + tr. of gravel. SATURATED, ~~SP.~~
9	2				6	RECOVERED 1.5' SAMPLE	
5	3				6	DROVE 3.0" CASING FROM 0.0 TO 5.0' WASHED OUT CASING USING ROLLER BIT.	SAND BECAME SLIGHTLY COARSER BETWEEN 1.5 AND 4.5', GRADATION M→F.
6	4				5	← POSSIBLE COBBLE	
50	5	S-2 1 JAR	2.0"	4.5-5.0'	30		Lt. br. - silty, sandy grav. (GP-GM) ~~SILTY SAND, FINE SAND, 30-40% NONPLASTIC FINES~~ TWO ROCK FRAGMENTS IN TIP OF SPOON MAX. DIMENSION 0.12' SATURATED, ~~BROWN, SM.~~
15	6	S-3 1 JAR	2.0"	5.0 to 6.0'	33	DROVE 2.0" BY 5' SOLID SPOON SAMPLER FROM 5.0 TO 10.0' RECOVERED 2.0 Ft.	
23	7	S-4 1 JAR	2.0"	6.0 to 7.5'	41	NOTE: SAMPLER TIP CHIPPED WHILE DRIVING. DROVE 3" CASING FROM 5.0 TO 10.0 AND WASHED HOLE USING ROLLER BIT.	~~SAND~~ Med. br. - COARSE TO FINE, sand (SP) ~~PREDOMINATELY FINE, <10% NONPLASTIC FINES, <5% FINE GRAVEL,~~ SATURATED, ~~BROWN, SP.~~ SM
55	8				42		Med. br. SANDY GRAVEL, MEDIUM TO FINE GRAVEL, ~~25-35% COARSE TO FINE SAND, POCKETS OF NONPLASTIC FINES,~~ SATURATED, ~~BROWN,~~ GP.
32	9	S-5 1 JAR	2.0"	7.5 to 10.0'	21		
25	10				19		Med. br. ~~SAND~~, COARSE TO FINE SAND, (SP) ~~10-15%~~ FINE GRAVEL ~~<10% NONPLASTIC FINES,~~ SATURATED, ~~BROWN, SP~~ SM

GENERAL REMARKS: BORING DEPTHS ARE REFERENCED TO TO HARBOR BOTTOM. HARBOR BOTTOM -8.0' M.L.W.
REFUSAL 30 BLOWS < 0.1' PENETRATION
*Laboratory classification which amends field visual description.

NED 5S(Test) Boring No. B-1 1/3 FD-81-1

Site: West Boat Basin, Cape Cod Canal	Boring No. B-1	Page 2 of 3

	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
1027 hrs.	11	11	NO RECOVERY	2.0"	10.0 TO 15.0'	10	DROVE 2" x 5' SOLID SPOON SAMPLER FROM 10.0 TO 15.0'	WASH – FINE SAND, FEW FINES, ESTIMATE < 15%.
	14	12				10	NO RECOVERY	
	14	13				8	DROVE CASING FROM 10.0 TO 15.0'	
	16	14				11	WASHED CASING OUT USING ROLLER BIT.	
	16	15				9		
1035	18	16	S-6 2 JARS	2.0"	15.0 TO 20.0'	7	DROVE 2.0" x 5.0' SOLID SPOON SAMPLER FROM 15.0 TO 20.0'	Lt. br. – ~~SAND~~, MEDIUM TO FINE SAND, (SP) ~~PREDOMINATELY FINE SAND~~, ~~< 10% NONPLASTIC FINES~~, SATURATED, ~~BROWN, SP-SM~~
	22	17				27	RECOVERED 3.5' PROBABLY PUSHING SMALL COBBLE	
	35	18				23		ROCK FRAGMENTS IN TIP OF SAMPLER IN JAR 2 of 2
	24	19				10	DROVE CASING FROM 15.0 TO 20.0' AND WASHED OUT USING ROLLER BIT.	
	26	20				13		
	23	21	S-7 1 JAR	2.0"	20.0 TO 25.0'	10	DROVE 2.0" x 5' SOLID SPOON SAMPLER FROM 20.0 TO 25.0'	Br. gr. – GRAVELLY silty ~~SAND~~, COARSE TO FINE SAND, (SM) ~~15-20%~~ FINE SUBANGULAR GRAVEL, ~~10-20% NONPLASTIC FINES~~, SATURATED ~~BROWN, SW-SM~~
	19	22				12	RECOVERED 1.5'	
	23	23				13		
	30	24				16	DROVE 3.0" CASING FROM 20.0 TO 25.0' AND WASHED OUT CASING USING A ROLLER BIT.	
	40	25				18		
		26				42		
		27				16		

NED 58A(Test)

Boring No. B-1 2/3

FD-81-1

Site: West Boat Basin Cape Cod Canal	Boring No. B-1	Page 3 of 3

DEPTH 1" = 2'	CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER FT. / CORE RECVY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
27			25.0	24	DROVE 2.0" x 5.0' SOLID SPOON SAMPLER FROM 25.0 TO 30.0'	~~GRAVELLY SAND, COARSE TO FINE SAND, 15-25% FINE~~ Lt br. - silty, gravelly, m.f sand (SP-SM) ~~GRAVEL, [illegible] NON PLASTIC FINES, LESS AT BOTTOM OF SAMPLE~~ SATURATED, ~~BROWN, SW-SM~~
28	S-8 1 JAR	2.0"	TO 30.0'	14	RECOVERED 1.1'	
29				15		
30					BOTTOM OF BORING 30.0'	

NED 58A(Test)

Boring No. B-1 3/3

FD-81-1

U. S. ARMY
CORPS OF ENGINEERS
NEW ENGLAND DIVISION

FIELD LOG OF TEST BORING

Site West Boat Basin, Cape Cod Canal FD 81-2 Page 1 of 3 Pages
Boring No. 2 Desig. B-2 Diam. (Casing) 3.0 in.
Co-ordinates: N _____ E _____

Elevation Top of Boring -11.3 Ft M.L.W. Hammer Wt. 300 lb Boring Started 6-25-81
Total Overburden Drilled 30.0 Feet Hammer Drop 18 in. Boring Completed 6-25-81
Elevation Top of Rock None Encountered M.L.W. Casing Left None
Total Rock Drilled None Feet Subsurface Water Data _____ Page _____
Elevation Bottom of Boring -41.3 M.L.W. Obs. Well None Driller Charles Reil
Total Depth of Boring 30.0 Feet Drilled By Briggs Engineering & Testing Co., Inc.
Core Recovered N/A % No. Boxes _____ Mfg. Des. Drill Acker - Barge Mounted
Core Recovered N/A Ft: _____ Diam. _____ In. Inspected By: Ronald F. Bukoski
Soil Samples 2.0 In. Diam. 9 No. Classification By: _____
Soil Samples 1 1/2" In. Diam. 1 No. Lab Classification By: J P Pagga 7/20/81

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
0830 hrs							Lt. br. - fine
Weight of Casing	1	S-1 1 Jar	2.0"	0.0 to 1.5'	Weight of Rods	"AW" Rods and 2"×5' Solid Spoon Sampler settled 1' under own weight. Drove sampler from 1.0 to 5.0'.	Sandy Silt, ~~Nonplastic, 15-20%~~ Medium to fine sand, saturated, ~~Brown~~, mottled ~~Rusty Brown~~, ML.
					16		
	2	S-2 1 Jar	2.0"	1.5 to 5.0'		Recovered 1.3' Casing settled 2' under own wt. Drove 3.0" casing from 2.0' to 5.0' and washed out casing using roller bit.	Sandy Gravel, coarse to fine gravel, max. dimension 0.2', 25-35% coarse to fine sand, 15-25% nonplastic fines, saturated, brown, GP-GM
11					12		
	3						
17					15		
	4						
35					44		Possible cobble at 4-5'
0937 hrs	5						
20		S-3 1 Jar	2.0"	5.0 to 6.0'	17	Drove 2"×5' Solid Spoon Sampler from 5.0 to 10.0' and took sample.	Med br. - silty Sandy Gravel, (GP-GM) coarse to fine gravel, ~~max. dimension 0.13', 30-40% coarse to fine sand, <10% nonplastic fines~~, saturated, ~~Brown, GP-GM~~
	6						
17		S-4 1 Jar	2.0"	6.0-6.5'	17	Recovered 1.6'	
	7					Drove 3.0" casing from 5.0 to 10.0' and washed out casing using roller bit.	Med. br. - silty, grav., m.f. Sand, ~~coarse to fine sand, predominately medium to fine, <10% nonplastic fines, <5%~~ (SP-SM)
20					15		
	8						
26					16		Fine gravel, saturated, ~~Brown, SP-SM~~
	9						
23					16		
	10						

GENERAL REMARKS: Depth of borings are referenced to the Boat Basin bottom.

*Laboratory classification which amends field visual description.

NED 55(Test) Boring No. B-2 FD-81-2

Site: WEST BOAT BASIN
CAPE COD CANAL

Boring No. B-2

	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
1010 hrs	7	11	S-5 1 JAR	2.0"	10.0 TO 11.0'	15	DROVE 2.0" x 5' SOLID SPOON SAMPLER FROM 10.0 TO 15.0'. RECOVERED 2.1'	med br-silty ~~SAND~~, MEDIUM TO FINE SAND (SP-SM) ~~NONPLASTIC FINES~~, ROCK FRAGMENTS ~~TO 0.10'~~, SATURATED, ~~BROWN, SP~~
	10	12	S-6 1 JAR	2.0"	11.0-11.5'	16		~~SILTY SAND, MEDIUM TO FINE~~ ~~Lt br-Sil tan, m.f. sand (SM)~~ ~~SATUR, 15-20% NONPLASTIC FINES~~ 2 ROCK FRAGMENTS ~~LARGEST 0.6'~~ SATURATED, ~~BROWN, SM.~~
	11	13				15	DROVE 3.0" CASING FROM 10.0 TO 15.0' WASHED OUT CASING USING ROLLER BIT.	
	11	14				23		
	12	15				15		
1130 hrs	20	16	S-7 1 JAR	1½"	15.0-15.3'	20	DROVE 1½" x 5' SOLID SPOON SAMPLER FROM 15.0 TO 20.0' RECOVERED 0.3' - ROCK IN TIP.	Lt br.- SILTY ~~SAND~~, MEDIUM TO FINE SAND, (SM) ~~15-25% NONPLASTIC FINES~~, ROCK FRAGMENTS IN TIP OF SAMPLER ~~TO 0.10'~~. ~~SM~~
	34	17				12	DROVE 3.0" CASING FROM 15.0 TO 20.0' AND WASHED OUT USING ROLLER BIT.	
	27	18				12		
	23	19				17		
	21	20				26		
1230 hrs	27	21	S-8 1 JAR	2.0"	20.0 TO 20.8'	23	DROVE 2.0" x 5' SOLID SPOON SAMPLER FROM 20.0 TO 25.0' RECOVERED 1.3'	Lt br-silty GRAVELLY ~~SAND~~, ~~COARSE~~ med TO FINE SAND (SP-SM) ~~PREDOMINATELY FINE~~, ~~15-20%~~ FINE GRAVEL, ~~<10% NONPLASTIC FINES~~, SATURATED, ~~BROWN~~, ~~SP-SM~~
	35	22	S-9 1 JAR	2.0"	20.8 TO 22.0'	21	DROVE CASING FROM 20.0 TO 25.0' WASHED CASING OUT USING ROLLER BIT.	Lt br-silty ~~GRAVELLY SAND~~, COARSE TO FINE (SP-SM) SAND, ~~30 TO 40% FINE GRAVEL~~ INCLUDING ROCK FRAGMENTS IN SAMPLER TIP ~~TO 0.15'~~, ~~<10% NONPLASTIC FINES~~, SATURATED, ~~BROWN, SP-SM~~
	48	23				40		
	56	24				18		
	50	25				20		
1340 hrs		26	S-10 1 JAR	2.0"	25.0 TO 26.0'	19	DROVE 2.0" x 5' SOLID SPOON SAMPLER FROM 25.0 TO 30.0' RECOVERED 1.8'	Lt br- med ~~SAND~~, ~~COARSE~~ TO FINE SAND, (SP-SM) ~~<10% NONPLASTIC FINES~~, ~~<10%~~ FINE GRAVEL - ~~GRAVEL TO 0.75'~~, SATURATED, ~~BROWN SP-SM~~
		27				12		

NED... 58A(Test)

Boring No. B-2

FD-81-2

Site: WEST BOAT BASIN CAPE COD CANAL	Boring No. B-2	Page 3 of 3

DEPTH 1" = 2'	CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER FT. / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATER ALS
				16		SAND, COARSE TO FINE SAND <10% NONPLASTIC FINES, <10% FINE GRAVEL-GRAVEL TO 0.15', SATURATED, BROWN SW-SM
28				25		
29				42	POSSIBLE COBBLE	
30					BOTTOM OF BORING 30.0'	

U. S. ARMY
CORPS OF ENGINEERS
NEW ENGLAND DIVISION

FIELD LOG OF TEST BORING

Site West Boat Basin, Cape Cod Canal Page 1 of 4 Pages
FD 81-3
Boring No. 3 Desig. B-3 Diam. (Casing) 2 1/2 in.
Co-ordinates: N _____ E _____

Elevation Top of Boring -22.8 ft M.L.W. Hammer Wt. 300 lb Boring Started 6-26-81
Total Overburden Drilled 50 Feet Hammer Drop 18 in. Boring Completed 6-26-81
Elevation Top of Rock Cobble 46.0 M.L.W. Casing Left NONE
Total Rock Drilled 0.5' Feet Subsurface Water Data _____ Page _____
Elevation Bottom of Boring -72.8 M.L.W. Obs. Well NONE Driller Charles Reil
Total Depth of Boring 50 Feet Drilled By Briggs Engineering & Testing Co., Inc.
Core Recovered 100 % No. Boxes — Mfg. Des. Drill Acker - Barge Mounted
Core Recovered 0.5 Ft: 1 3/8" Diam. ___ In. Inspected By: Ronald F. Bukoski
Soil Samples 2.0" In. Diam. 2 No. Classification By: _____
Soil Samples 1 1/2" In. Diam. 10 No. Lab. Classification By: [illegible] 7/21/81

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
		S-1	2.0"	0.0, 0.3'	WEIGHT OF RODS	DROVE 2.0" x 5' SOLID SPOON	Dk.br. Tabl. - org. ~~SAND~~, MEDIUM TO FINE, SHELLS, sand (SP)
7	1	S-2 1 JAR	2.0"	0.3 TO 1.9'	3	SAMPLER FROM HARBOR BOTTOM TO 5.0'.	GRAVEL SIZE PARTICLES ~~TO 0.10~~; SATURATED ~~DARK BROWN SP~~ w/foul mar. odor
9					8	RECOVERED 1.9'	Gr.br. - silty, grav, m.f. sand (SM) ~~GRAVELLY SAND, COARSE TO FINE SAND, 20-30%~~ COARSE TO FINE GRAVEL - ~~MAX. SIZE RECOVERED 0.18'; 10-15% NONPLASTIC FINES~~, SATURATED ~~MILKY BROWN, SW-SM~~
8	2				9	DROVE 2 1/2" CASING FROM HARBOR BOTTOM TO 5.0' WASHED CASING OUT USING ROLLER BIT.	
9	3				13		
8	4				5		
11	5	S-3 1 JAR	1 1/2"	5.0 TO 6.3'	12	DROVE 1 1/2" x 5' SOLID SPOON SAMPLER FROM 5.0 TO 10.0' AND TOOK SAMPLE.	Gr.br. - silty, gravelly, m.f. sand ~~GRAVELLY SAND, COARSE TO FINE SAND, 20-30%~~ FINE GRAVEL - (SM) ~~MAX. SIZE REC. 0.10'; 10-15% NONPLASTIC FINES~~, SATURATED, ~~MILKY BROWN, SW-SM~~
10	6				13	RECOVERED 1.3'	
12	7				26		
17	8				52	DROVE 2 1/2" CASING FROM 5.0 TO 10.0' WASHED CASING OUT USING ROLLER BIT	8-9' - POSSIBLE SMALL COBBLE
32	9				27		
	10						

GENERAL REMARKS: BORING DEPTHS ARE REFERENCED TO HARBOR BOTTOM. REFUSAL IS DEFINED AS 30 BLOWS < 0.1' PENETRATION (300 lb HAMMER).

* Laboratory classification which amends field visual description.

Site: WEST BOAT BASIN CAPE COD CANAL	Boring No. B-3	Page 2 of 4

Sampling Times	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
0800 hrs	12	11	S-4 1 JAR	1½"	10.0 TO 10.9'	42	DROVE 1½" x 5' SOLID SPOON SAMPLER FROM 10.0 TO 15.0' RECOVERED 0.9'	10-11' POSSIBLE SMALL COBBLE Lt.br.-silty GRAVELLY, ~~SAND~~, COARSE TO FINE SAND, (SM) ~~20-30%~~ FINE GRAVEL, ~~10-15% NONPLASTIC FINES~~, SATURATED, ~~MILKY BROWN, SW-SM~~
	18	12				23	DROVE 2½" CASING FROM 10.0 TO 15.0'	
	33	13				12	WASHED OUT CASING USING ROLLER BIT.	
	16	14				8		
	14	15				10		
0855 hrs	11	16	S-5 2 JARS	1½"	15.0 TO 17.6'	11	DROVE 1½" x 5' SOLID SPOON SAMPLER FROM 15.0 TO 20.0' RECOVERED 2.6'	Lt.br.-silty GRAVELLY ~~SAND, COARSE~~ med. TO FINE SAND, (SP-SM) ~~20-30%~~ FINE GRAVEL, ~~10-15% NONPLASTIC FINES~~, SATURATED ~~MILKY BROWN, SW-SM~~
	17	17				16		
	22	18				37	DROVE 2½" CASING FROM 15.0 TO 20.0' WASHED-OUT CASING USING ROLLER BIT.	
	36	19				32		
	22	20				55		
0950 hrs	21	21	S-6 1 JAR	1½"	20.0 TO 22.5'	19	DROVE 1½" x 5' SOLID SPOON SAMPLER FROM 20.0 TO 24.9' REFUSAL AT 24.9'	Lt.br.-silty GRAVELLY ~~SAND, COARSE~~ med. TO FINE SAND, (SP-SM) ~~15-25%~~ FINE GRAVEL, ~~5-10% NONPLASTIC FINES~~, SATURATED, ~~BROWN, SW-SM~~
	32	22				50	RECOVERED 2.5'	
	32	23				63	DROVE 2½" CASING FROM 20.0 TO 25.0'	
	35	24				79	WASHED OUT CASING USING ROLLER BIT.	
	55	25				80/0.9'		
1030 hrs	34	26	S-7 1 JAR	1½"	25.0 TO 26.9'	56	DROVE 1½" x 5' SOLID SPOON SAMPLER FROM 25.0 TO 27.0' REFUSAL AT 27.0'	Lt.br.-silty, ~~SAND~~, MEDIUM TO FINE SAND, (SM) ~~<10%~~ FINE GRAVEL, ~~<10% NONPLASTIC FINES~~, 3 ROCK FRAGS. IN SPOON BELIEVED TO BE FROM 25', LARGEST DIM. 0.11' (S-7) SATURATED, ~~BROWN, SP-SM~~
	60	27				98	RECOVERED 1.9'	

Site: West Boat Basin, Cape Cod Canal	Boring No. B-3	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
100						Drove 2 1/2" casing from 25.0 to 28'. Washed out casing to 1' ahead of casing. Drove casing from 28.0' to 30.0. Washed out casing using Roller Bit.	
Washed 40	28						
37	29						
1135 hrs.	30						
41		S-8 1 Jar	1 1/2"	30.0 to 31.2'	36	Drove 1 1/2" x 5' solid spoon sampler from 30.0 to 32.0' Refusal at 32.0.	Lbr.-silty ~~Sand, coarse~~ med. to fine sand (SP-SM) ~~Predominantly medium to fine, < 5% fine gravel, < 5% nonplastic fines,~~ saturated, ~~Brown, SP.~~
64	31				86 Refusal	Recovered 1.2'	
166	32					Drove 2 1/2" casing from 30.0 to 33'. Washed ahead of casing 1.5' and drove casing to 35.0'. Washed out casing using Roller Bit.	
Washed 39	33						
95	34						
12 45 hrs.	35						
60		S-9 1 Jar	1 1/2"	35.0 to 36.0	30	Inserted 1 1/2" x 5' solid spoon into hole, would not penetrate past 30'. Attempted to wash through spoon - nothing washed up. Drove sampler several inches and retrived - no recovery.	Lbr. - ~~Sand,~~ medium to fine sand, (SP-SM) ~~10-15% nonplastic fines, < 5% fine gravel,~~ saturated, ~~Brown, SP-SM.~~
100	36				120 Refusal	Reinserted Roller Bit and washed out casing to 35'.	Wash appeared to have coarser sand and more fine gravel than was recovered in the solid spoon.
200	37					Reinserted 1 1/2" x 5' sampler to 35' and drove.	
Washed 65	38					Recovered 1.0'.	
100/0.5' Washed	39					Drove casing from 35.0 to 38.0'. Washed ahead of casing using Roller Bit to 39'.	
110	40	S-10 1 Jar	1 1/2"	40.0 40.5'	58	Drove casing from 38 to 40.0' when sampler was inserted it only penetrated to 36'.	Lbr.-silty, grav., Sand, medium to fine sand, (SP-SM) ~~10-15% nonplastic fines, < 10% fine gravel,~~ saturated ~~Brown, SP-SM~~
150	41				100/0.5	Removed sampler and rewashed casing to 40'.	
Washed 56	42					Reinserted 1 1/2" x 5' solid spoon sampler to 40.0' and drove sampler from 40.0 to 41.5'.	
126	43					Recovered 0.5'	
	44						

NED 58A(Test)

Boring No. B-3

FD-81-3

Site: West Boat Basin, Cape Cod Canal	Boring No. B-3	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 REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
WASHED 95	44					DROVE 2½" CASING FROM 40.0 TO 45.0' WITH INTERMEDIATE WASHINGS AT 42 AND 44'.	
1700 hrs.	45	NO RECOVERY	1½"	45.0 TO 46.0'	54	DROVE 1½" x 5' SOLID SPOON SAMPLER FROM 45 TO 46.0'.	C-1 FINE GRAINED GRANITE
	46	C-1	1⅜"	46.0 46.5'	0.5'	REFUSAL AT 46' NO RECOVERY.	
	47					CORED THROUGH COBBLE FROM 46.0 TO 46.5'. RECOVERED 0.5' of CORE. CORED PAST COBBLE 1.0' WITH NO RECOVERY.	Lt.br.-silty, m.f sand (SP-SM) S-11 RECOVERED - FINE GRAVEL, INCLUDING ROCK FRAGMENTS, ~~SAND, COARSE TO FINE SAND, <10% NONPLASTIC FINES~~ INSUFFICIENT RECOVERY FOR GRADATION ESTIMATES OF SAND AND GRAVEL.
1815 hrs.		S-11	1½"	47.5 47.75'	96/0.25'		
	48	1 JAR				DROVE 1½" x 5' SOLID SPOON SAMPLER FROM 47.5 TO 47.75'.	
	49						
	50	BOTTOM OF BORING				RECOVERED 0.15' IN TIP OF SAMPLER. DECIDED TO CORE FROM 47.75 TO 50.0' IN HOPES OF ADDITIONAL SAMPLE RECOVERY. NONE RECOVERED. FINAL SAMPLING DEPTH 47.75' BORING TERMINATED AT 50.0'	

NED 58A(Test)

Boring No. B-3

FD-81-3

U. S. ARMY
CORPS OF ENGINEERS
NEW ENGLAND DIVISION

FIELD LOG OF TEST BORING

Site West Boat Basin, Cape Cod Canal Page 1 of 4 Pages
FD 81-4
Boring No. A Desig. B-4 Diam. (Casing) 2 1/2 in.
Co-ordinates: N _____ E _____

Elevation Top of Boring -17.1 ft M.L.W. Hammer Wt. 300 lb Boring Started 7-6-81
Total Overburden Drilled 47.2 Feet Hammer Drop 18 in.
Elevation Top of Rock None Encountered M.L.W. Casing Left None Boring Completed 7-6-81
Total Rock Drilled None Feet Subsurface Water Data _____ Page _____
Elevation Bottom of Boring -64.3 M.L.W. Obs. Well None Driller James Marks
Total Depth of Boring 47.2 Feet Drilled By Briggs Engineering & Testing Co., Inc.
Core Recovered N/A % No. Boxes _____ Mfg. Des. Drill Acker
Core Recovered N/A Ft: _____ Diam. _____ In. Inspected By: Ronald F. Bukoski
Soil Samples 2.0 In. Diam. 2 No. Classification By: _____
Soil Samples 1 1/2 In. Diam. 8 No. Lab Classification By: JP Rizzo 7/21/81

DEPTH: Blows at 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
0715 hrs 1 2 250 110	1	S-1 2 JARS	2.0"	0.0 TO 2.0'	52	DROVE 2.0" x 5' SOLID SPOON SAMPLER FROM 0.0 TO 5.0' RECOVERED 4.3'	Dk gr. to bl. - silty GRAVELLY ~~SAND~~, COARSE TO FINE (SM) (1 of 2) ~~SAND, PREDOMINATELY MEDIUM TO FINE SAND; 20-25%~~ FINE GRAVEL, ~~10-15% NONPLASTIC FINES~~, SATURATED, ~~BLACKISH BROWN, SP.~~
195	2				60	FIRST ATTEMPT TO DRIVE CASING ENCOUNTERED OBSTRUCTION AT 1.0'	Br. to dk br. - silty, grav., c f sand (SP-SM) (2 of 2)
175	3	S-2 1 JAR	2.0"	2.0 TO 5.0'	56	RELOCATED CASING 2' EAST, PARALLEL TO SHORE, AND DROVE WITHOUT ENCOUNTERING OBSTRUCTION.	~~SILTY SAND, COARSE TO FINE SAND, 35-45% NONPLASTIC FINES, 10-15%~~ FINE GRAVEL MOIST, ~~BROWN, SM.~~
165	4				52	WASHED OUT CASING USING ROLLER BIT.	Br. gr. - grav., silty, c. f sand (SM)
WASHED 30	5				100		Possible Small Cobble near 5.0'
0850 hrs. 35	6	S-3 1 JAR	1 1/2"	5.0 TO 10.0'	83	DROVE 1 1/2" x 5' SOLID SPOON SAMPLER FROM 5 TO 10' RECOVERED 2.8'	Lt. br. - silty GRAVELLY ~~SAND~~, COARSE TO FINE SAND, (SP-SM) ~~15-25%~~ FINE GRAVEL, ~~< 15% NONPLASTIC FINES~~, SATURATED, ~~BROWN, SP.~~
34	7				69		
42	8				65	DROVE 2 1/2" I.D. CASING FROM 5.0 TO 10.0'	
37	9				77	WASHED OUT CASING USING ROLLER BIT,	
39	10				91		

GENERAL REMARKS: BORING DEPTHS ARE REFERENCED TO HARBOR BOTTOM. REFUSAL 30 BLOWS < 0.1 Ft PENETRATION.

* Laboratory classification which amends field visual description.

Site: West Bank Basin	Boring No. B-4	Page 2 of 4

	DEPTH: Blows on Casing	DEPTH: 1" = 2'	CORE/SAMPLE: NO.	SIZE	DEPTH RANGE	BLOWS PER FT. / CORE RECVY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
0950	20	11				90	FOLLOWING ROLLER BIT WASHING ≈ 3' of SAND ENTERED BOTTOM OF CASING. REWASHED USING ROLLER BIT.	Gn-silty ~~GRAVELLY SAND~~, ~~COARSE~~ med TO FINE SAND, ~~15-20%~~ FINE GRAVEL, ~~10-15% NONPLASTIC FINES~~, SATURATED, ~~GRAVEL, SP.~~ (SP-SM)
	52	12	S-4 1 JAR	1½"	10.0 TO 15.0'	147	DROVE 1½" x 5' SOLID SPOON SAMPLER FROM 10.0 TO 12.5' REFUSAL AT 12.5'	
	49	13				130/0.5'	RECOVERED 0.8'	
	54	14					DROVE CASING FROM 10 TO 15.0'. WASHED OUT USING ROLLER BIT. FOLLOWING WASHING 2' OF	
	57	15						
	SETTLED DURING WASHING	16					SAND ENTERED BOTTOM OF CASING. DURING REWASHING USING ROLLER BIT, CASING SETTLED TO 18.0'	
		17					DROVE 1½" x 5' SOLID SPOON SAMPLER FROM 18.0 TO 23.0'	
		18					RECOVERED 1.2'	
1045	15	19	S-5 1 JAR	1½"	18.0 TO 23.0'	17	DROVE CASING FROM 18.0' TO 25.0'.	Med.br.-silty, ~~GRAVELLY SAND~~ ~~COARSE~~ med TO FINE SAND, ~~PREDOMINATELY MEDIUM TO FINE~~, w/ trace of ~~FINE GRAVEL~~ gravel, ~~<10% NONPLASTIC FINES~~, SATURATED, ~~BROWN, SP.~~ (SP-SM)
	27	20				24	WASHED OUT CASING USING ROLLER BIT.	
	39	21				30		
	52	22				40		
	59	23				56		
	121	24						
	95	25						
1145	35	26	S-6 1 JAR	1½"	25.0 TO 28.0'	40	DROVE 1½" x 5' SOLID SPOON SAMPLER FROM 25.0 TO 28.0'.	Med.br.-silty ~~GRAVELLY SAND~~, ~~COARSE~~ med TO FINE SAND, ~~PREDOMINATELY MEDIUM TO FINE~~, tr. of ~~10-20%~~ FINE GRAVEL, <10% ~~NONPLASTIC FINES~~, SATURATED, ~~BROWN, SP.~~ (SP-SM)
	34	27				70	RECOVERED 2.1'	

NED 58A(Test)

Boring No. B-4

FD-81-4

Site: West Boat Basin	Boring No. B-4	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
42	28	S-6 1 JAR	1½"	25.0 TO 28.0	140	REFUSAL AT 28.0'	Med. br. - silty med. GRAVELLY SAND, ~~COARSE~~ TO FINE SAND, (SP-SM) ~~PREDOMINATELY MEDIUM, 10-20%~~ w/tr. of FINE GRAVEL, ~~<10% NONPLASTIC FINES,~~ SATURATED, ~~BROWN, SP.~~
37	29					DROVE 2½" CASING FROM 25.0 TO 30.0', WASHED OUT CASING USING ROLLER BIT.	
39	30						
1300 hr 44	31	S-7 1 JAR	1½"	30.0 TO 31.2	45	DROVE 1½" x 5.0' SOLID SPOON SAMPLER FROM 30.0 TO 32.5'.	Med. br. - silty - med. ~~SAND, COARSE~~ TO FINE sand (SP-SM) ~~PREDOMINATELY MEDIUM,~~ ~~<10% NONPLASTIC FINES,~~ w/tr. of ~~<10%~~ FINE GRAVEL, SAT. ~~BROWN, SP.~~
80	32				89	RECOVERED 1.2'	
194	33				150/0.5'	DROVE 2½" CASING FROM 30 TO 33' WASHED OUT AND AHEAD OF CASING. DROVE CASING FROM 33 TO 35.0'.	
WASHED 49	34						
100	35						
1495 30	36	S-8 1 JAR	1½"	35.0 35.5'	97	DROVE 1½" x 5' SOLID SPOON SAMPLER FROM 35 TO 36.2'	~~SAME AS ABOVE.~~ Br. - c.f sand (SP) w/tr. of grav.
WASHED 66	37				70/0.2'	REFUSAL AT 36.2' RECOVERED 0.5'	
WASHED 45	38					DROVE CASING FROM 35.0 TO 40.0' WITH THREE INTERMEDIATE WASHINGS.	
140/0.8' WASHED	39						
150	40						
1550 55	41	NO RECOVERY			80	DROVE 1½" x 5' SOLID SPOON SAMPLER FROM 40.0 TO 41.3'	WASH APPEARED TO BE SAME AS ABOVE.
127	42				110/0.3'	NO RECOVERY	
WASHED 47	43					DROVE CASING FROM 40 TO 45.0' WITH ONE INTERMEDIATE WASHING.	
134	44						

NED 58A(Test) Boring No. B-4 FD-81-4

Site: West Boat Basin	Boring No. B-4	Page 4 of 4

	DEPTH		CORE/SAMPLE			BLOWS PER FT. / CORE RECVY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
	Blows on Casing	1" = 2'	NO.	SIZE	DEPTH RANGE			
1540 hrs.		45					DROVE 1½" x 5' SOLID SPOON	Br.-silty ~~SAND~~, MEDIUM TO FINE, Sand (SP-SM) ~~< 10% NONPLASTIC FINES~~, ~~BROWN~~, SATURATED, ~~SP.~~
		46	S-9	1½"	95.0 TO 97.2'	66	SAMPLER FROM 95 TO 97.2' RECOVERED 0.8'	
						100		
Casing out @ 1035		47				90/0.2'	BOTTOM OF BORING 97.2'	

U. S. ARMY
CORPS OF ENGINEERS
NEW ENGLAND DIVISION

FIELD LOG OF TEST BORING

Site West Boat Basin, Cape Cod Canal Page 1 of 4 Pages
FD 81-5
Boring No. 5 Desig. B-5 Diam. (Casing) 3.0 in.
Co-ordinates: N _____ E _____

Elevation Top of Boring -16.15 Ft M.L.W.
Total Overburden Drilled 49.5 Feet
Elevation Top of Rock NONE ENCOUNTERED M.L.W.
Total Rock Drilled NONE Feet
Elevation Bottom of Boring -65.65 Ft M.L.W.
Total Depth of Boring 49.5 Feet
Core Recovered N/A % No. Boxes _____
Core Recovered N/A Ft: _____ Diam. _____ In.
Soil Samples 2.0 In. Diam. 11 No.
Soil Samples 1 1/2 In. Diam. 4 No. Lab.

Hammer Wt. 300 lb
Hammer Drop 18 in.
Casing Left NONE
Subsurface Water Data — Page _____
Obs. Well NONE Driller Charles Reil
Drilled By Briggs Engineering & Testing Co., Inc.
Mfg. Des. Drill Acker - Barge Mounted
Inspected By: Ronald F. Bukoski
Classification By: _____
Classification By: TP Rogers 7/21/81

Boring Started 6-22-81
Boring Completed 6-24-81

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
1128 hrs. 48	1	S-1 1 JAR	2.0"	0.0 to 3.0'	17	DROVE 2.0" x 5.0' SOLID SPOON SAMPLER FROM BOAT BASIN BOTTOM TO 5.0'.	Fabc- SILTY ~~SAND~~, MEDIUM TO FINE (SP-SM) SAND, ~~10-20% NONPLASTIC FINES, 5-10%~~ SHELLS, SATURATED, BLACK NEAR BOTTOM SURFACE, BROWN BENEATH, ~~SM-SP~~ w/tr. of gravel
20	2				14	RECOVERED 2.0' SAMPLE	
95	3				65		
80	4	S-2 1 JAR	2.0"	3.0 to 5.0'	160	DROVE 3.0" CASING FROM 0.0 TO 5.0'. THEN WASHED HOLE OUT USING A ROLLER BIT.	Fabc- silty, gran. ~~SILTY SAND~~, COARSE TO FINE (SM) SAND, ~~PREDOMINATELY MEDIUM TO FINE, 15-25% NONPLASTIC FINES, 10-15%~~ FINE GRAVEL, ROCK FRAGMENT RECOVERED ~~0.3 x 0.14'~~, SATURATED, ~~BROWN SM.~~
68	5				165		
1143 hrs 18	6	S-3 2 JARS	2.0"	5.0 to 10.0'	58	DROVE 2.0" x 5' SOLID SPOON SAMPLER FROM 5.0' TO 10.0' AND TOOK SAMPLE.	~~SILTY SAND, COARSE TO FINE SAND, 15-25% NONPLASTIC FINES, 10-20% MEDIUM TO FINE GRAVEL, ROCK FRAGMENT 0.75 x 0.13', SATURATED, BROWN, SM.~~
23	7				48	RECOVERED 2.1'	
25	8				39	DROVE 3.0" CASING FROM 5.0 TO 10.0'.	Same as S-2
33	9				54	CASING WAS WASHED OUT USING A ROLLER BIT.	
35	10				59		

GENERAL REMARKS: BORING DEPTHS ARE REFERENCED TO HARBOR BOTTOM. HARBOR BOTTOM -16.15 MLW.
REFUSAL 30 BLOWS < 0.1' PENETRATION.
* Laboratory classification which amends field visual description.

NED 1110-1-55 (Test) Boring No. B-5

FD-81-5

Site: WEST BOAT BASIN
CAPE COD CANAL

Boring No. B-5

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
1505 hrs. 40	11	S-4 1 JAR	2.0"	10.0 TO 13.0'	79	DROVE 2.0" x 5.0' SOLID SPOON SAMPLER FROM 10.0 TO 15.0' AND TOOK SAMPLE	Br.-silty, med ~~GRAVELLY SAND, COARSE TO~~ FINE SAND, ~~15-20%~~ FINE GRAVEL, ~~<10% NONPLASTIC FINES, SATURATED, BROWN SW-SM~~ (SP-SM)
38	12				94	RECOVERED 2.5'	
63	13				89	DROVE 3.0" CASING FROM 10.0 TO 15.0'	
56	14	S-5 1 JAR	2.0"	13.0 TO 15.0'	78	WASHED HOLE USING ROLLER BIT.	Br.-silty, gravel, ~~GRAVELLY SAND,~~ COARSE TO FINE SAND, ~~15-20%~~ FINE GRAVEL, ~~<10% NONPLASTIC FINES,~~ SATURATED, ~~BROWN, SW-SM~~ (SM)
27	15				49	UNIFORM FINE GRAVEL IN WASH NEAR 15' WITH VERY LITTLE FINES.	
36	16	S-6 1 JAR	2.0"	15.0 TO 16.0'	20	DROVE 2.0" x 5.0' SOLID SPOON SAMPLER FROM 15.0 TO 20.0'	Lt.br.-silty, gray, ~~GRAVELLY SAND,~~ COARSE TO FINE SAND ~~20-30%~~ FINE GRAVEL, ~~10-15% NONPLASTIC FINES,~~ SATURATED, ~~BROWN, SW-SM~~ (SP-SM)
35	17	S-7 1 JAR	2.0"	16.0 TO 17.0'	27	RECOVERED 2.3'	~~Lt.br.-gray, SILTY SAND, COARSE~~ TO FINE SAND, ~~10-20% NONPLASTIC FINES~~ ~~5-15%~~ FINE GRAVEL, SATURATED ~~BROWN, SM-SW,~~ (SM)
35	18				20	DROVE 3.0" CASING FROM 15.0 TO 20.0' WORK STOPPED FOR THE DAY	
25	19				20		Lt.br.-silty, gray, med, ~~GRAVELLY SAND,~~ ~~COARSE~~ TO FINE SAND, ~~15-20%~~ FINE SUBANGULAR GRAVEL, ~~10-15% NONPLASTIC FINES,~~ SATURATED, ~~BROWN, SW-SM.~~ (SM)
6-22 16:50 hrs 33	20				20		
6-23 0910 hrs 27	21	S-8 1 JAR	2.0"	20.0 TO 25.0'	18	HOLE WASHED 6-23-81 USING ROLLER BIT.	
24	22				17	DROVE 2.0" x 5.0' SOLID SPOON SAMPLER FROM 20.0 TO 25.0' AND TOOK SAMPLE.	
27	23				22	RECOVERED 1.5'	
40	24				23	DROVE CASING FROM 20.0 TO 25.0' AND WASHED HOLE USING ROLLER BIT.	
55	25				36		
37	26	S-9 1 JAR	2.0"	25.0 TO 27.5'	40	DROVE 2.0" x 5' SOLID SPOON SAMPLER FROM 25.0 TO 27.5'.	Lt.br.-silty, gray, med, ~~SAND,~~ ~~COARSE~~ TO FINE SAND, ~~10-15% NONPLASTIC FINES~~ ~~10-15%~~ FINE GRAVEL, SATURATED, ~~BROWN, SW-SM~~ (SM)
45	27				110	REFUSAL AT 27.5' SOIL VERY COMPACT.	

NED ... 58A(Test)

Boring No. B-5

FD-81-5

Site: WEST BOAT BASIN CAPE COD CANAL	Boring No. B-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
6-23 1015 hrs.	55		S-9 1 JAR	2"	25.0 TO 27.5'	150/0.5'	RECOVERED 1.6'	~~SAND, COARSE TO FINE SAND,~~ Lt.br.-silty, grav, m.f. sand (SM) ~~10-15% NONPLASTIC FINES,~~ ~~10-15%~~ FINE GRAVEL, SATURATED, ~~BROWN, SW-SM~~
	140	28					DROVE CASING FROM 25.0 TO 30.0' WASHED HOLE USING ROLLER BIT. HOLE WASHES EASILY, BUT SPOON DIFFICULT TO DRIVE DUE COMPACTNESS OF SOIL.	
	260	29						
	WASHED 38	30	S-10 1 JAR	2"	30.0 TO 32.0'	16	DROVE 2.0" x 5.0' SOLID SPOON SAMPLER FROM 30.0 TO 32.0'. REFUSAL AT 32.0'	Lt.br.- med- ~~SAND, COARSE~~ (SP) TO FINE SAND, ~~10-15% NONPLASTIC FINES~~ ~~<10% FINE GRAVEL,~~ SATURATED, ~~BROWN, SW-SM~~
	68	31				123	RECOVERED 2.0'	0.25' SEAM OF GRAVELLY SAND AT APPROXIMATELLY 31.2', COARSE TO FINE SAND 15-25% FINE GRAVEL, ~~<10% NONPLASTIC FINES~~, SATURATED, BROWN, SW.
	130	32					DROVE 3.0" CASING FROM 30.0 TO 33.5'. WASHED AHEAD OF CASING 1.5' USING ROLLER BIT. DROVE CASING FROM 33.5 TO 35.0'.	
	200/0.5'	33						
	WASHED 17	34						
1355 hrs	50	35	S-11 1 JAR	1 1/2"	35.0 TO 37.0'	14	DROVE 1 1/2" x 5.0' SOLID SPOON SAMPLER FROM 35.0 TO 37.0'.	Lt.br.- ~~SAND,~~ med ~~COARSE~~ (SP) TO FINE, sand ~~PREDOMINATELY MEDIUM TO FINE,~~ 0.2' SEAM OF FINE GRAVEL AT 36.2', ~~10-15% NONPLASTIC FINES~~, SATURATED, ~~BROWN, SP-SM~~ w/tr. of grav.
	100	36				80	REFUSAL AT 37.0'	
	185	37					RECOVERED 2.0'.	
	WASHED 40	38					DROVE CASING TO 38'. WASHED AHEAD 1.0' AND DROVE CASING TO 40.0'.	
	110	39						
	55	40	S-12 1 JAR	1 1/2"	40.0 TO 41.9'	40	DROVE 1 1/2" x 5' SOLID SPOON SAMPLER FROM 40.0 TO 41.9'.	Lt.br.- med. SAND, ~~COARSE~~ (SP) TO FINE SAND, ~~PREDOMINATELY, MEDIUM TO FINE, <10% NONPLASTIC FINES,~~ SATURATED, ~~BROWN, SP-SM~~ w/traces of gravel.
	170	41				130/0.9'	REFUSAL AT 41.9'	
	100/0.5' WASHED 20/0.5'	42					RECOVERED 1.5'	
		43					DROVE 3.0" CASING FROM 40 TO 42.5' AND WASHED DROVE CASING FROM 42.5 TO 44.0' WASHED OUT HOLE USING ROLLER BIT	
16 30 hrs	135	44						

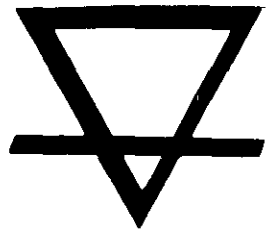
NED 58A(Test)

Boring No. B-5

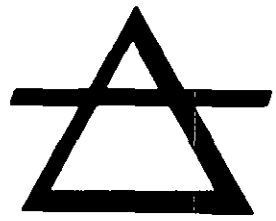
FD-81-5

Site: WEST BOAT BASIN CAPE COD CANAL	Boring No. B-5	Page 4 of 4

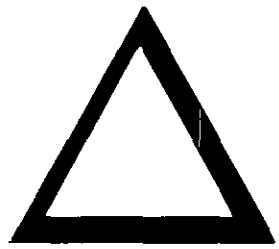
	DEPTH		CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER FT. / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATER ALS
6-23-81 1645 hrs	WASHED 40						6-23-81 DROVE CASING FROM 44.0 TO 45.0' FINISHED FOR THE DAY.	
6-24-81 0700 hrs	175	45	S-13 1 JAR	1 1/2"	45.0 TO 45.8	100/0.8'	6-24-81 WASHED OUT CASING FROM 44.0 TO 45.0' USING ROLLER BIT DROVE 1 1/2" x 5' SOLID SPOON SAMPLER FROM 45 TO 45.8'	Lt.br. - med. ~~SAND, COARSE~~ TO FINE, sand (SP) ~~PREDOMINANTLY, MEDIUM TO FINE, < 5% FINE GRAVEL, < 5% UNIDENTIFIED FINES~~ SATURATED, ~~[illegible], [illegible]~~
	100/0.5' 53	46					RECOVERED 0.7'	
	185	47					DROVE 2.0" CASING TO 46.5' AND WASHED OUT CASING.	Lt.br. - med. SAND, ~~COARSE~~ TO FINE, sand (SP) ~~PREDOMINANTLY, MEDIUM TO FINE, < 5% FINE GRAVEL, < 5% UNIDENTIFIED FINES~~ SATURATED, ~~[illegible], [illegible]~~
0750		48	S-14 1 JAR	1 1/2"	48.0 TO 49.5	55	DROVE CASING FROM 46.5 TO 48.0'.	
		49				90/0.5'	DROVE 1 1/2" x 5' SOLID SPOON SAMPLER FROM 48.0 TO 49.5' REFUSAL AT 49.5' RECOVERED 0.5'	
		50					BOTTOM OF BORING 49.5'	



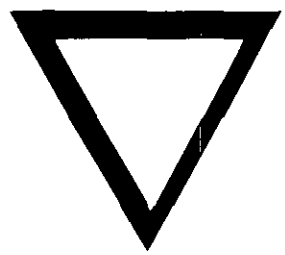
EARTH



AIR



FIRE



WATER

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
Briggs Engineering & Testing Company.

BRIGGS

Engineering and Testing

164 Washington Street, Norwell, Massachusetts 02061 Telephone (617) 773-2780