ATLANTIC TESTING LABORATORIES, LIMITED

Box 29
Canton, N.Y. 13617
(315) 386-4578

Box 356
Cicero, N.Y. 13039
(315) 699-5281

April 20, 1988

U. S. Army Corps of Engineers
New England Division
424 Trapelo Road
Waltham, MA 02254-9194

Attn: Mr. Ron DeFilippo

Re: North Springfield Dam Piezometer Installation
North Springfield, Vermont
Contract No. DACW 33-87-D-0007
Delivery Order No. 0003
ATL Report No. CD030-1-3-88

Gentlemen:

In accordance with your Delivery Order No. 0003 dated 88, January 14, attached is one final copy of our Engineering Report for the subsurface investigation performed at North Springfield, Vermont.

By copy of this letter we are also transmitting two copies of the report to the Chief of the Geotechnical Engineering Branch.

Do not hesitate to contact our office should you have any questions or comments.

Respectfully submitted,

Gregory R. Hargrave

Gregory R. Hargrave
Geologist

GRH/dh

encs.

SECTION 1
North Springfield Dam Piezometer Installation
North Springfield, Vermont

Contract No. DACW 33-87-D-0007
Delivery Order No. 0003

Contracting Officer:

Stanley J. Murphy, Lt. Colonel, CE,
Deputy Division Engineer

PREPARED FOR: U. S. Army Corps of Engineers
New England Division
424 Trapelo Road
Waltham, MA 02254-9149

PREPARED BY: Atlantic Testing Laboratories, Limited
P. O. Box 29
Canton, New York 13617

ATL Report No. CD030-1-3-88

20 April 88

SECTION 2

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SECTION 2

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SECTION 3 - SCOPE OF INVESTIGATION

a. Delivery Order No. 0003

CHECKED BOX APPLIES

[X] ORDER FOR SUPPLIES OR SERVICES

[ ] REQUEST FOR QUOTATIONS NO.

RETURN COPY(IES) OF THIS QUOTE BY

(THIS IS NOT AN ORDER. See DD Form 1155)

5. CERTIFIED FOR NATIONAL DEFENSE UNDER DMS REG 1: DO

1. CONTRACT/PURCH ORDER NO.: DACW33-87-D-0007

2. DELIVERY ORDER NO.: 0003

3. DATE OF ORDER: 88 JAN 14

4. REQUISITION/PURCH REQUEST NO.: GEB 88-10

ISSUED BY: Dept. of the Army CODE
New England Division, Corps of Engineers
424 Trapelo Road
Waltham, MA 02254-9149
Buyer/Symbol: Apidianakis/CENED-CT-C

7. ADMINISTERED BY: (If other than 6) CODE
Phone: Area Code: 617-647-8207

8. DELIVERY FOB: [X] DEST [ ] OTHER (See Schedule if other)

CONTRACTOR/QUOTER CODE FACILITY CODE

NAME AND ADDRESS
Atlantic Testing Laboratories, Limited
P.O. Box 29
Canton, New York 13617

10. DELIVER TO FOB POINT BY: In accordance with Paragraph 6 of the Scope of Work

11. CHECK IF BUSINESS IS: [X] SMALL [ ] SMALL DISADVANTAGED [ ] WOMEN-OWNED

12. DISCOUNT TERMS: NET

13. MAIL INVOICES TO: Finance & Accounting Officer at issuing office

SHIP TO: Services for: CODE
U.S. Army Engineer Division, New England
ATTN: Geotechnical Engineering Branch
424 Trapelo Road
Waltham, Massachusetts 02254-9149

15. PAYMENT WILL BE MADE BY: CODE
Finance and Accounting Officer
U.S. Army Engineer Division, N.E.
424 Trapelo Road
Waltham, Massachusetts 02254-9149

MARK ALL PACKAGES AND PAPERS WITH CONTRACT OR ORDER NUMBER

DELIVERY [X] This delivery order is subject to instructions contained on this side of form only and is issued on another Government agency or in accordance with and subject to terms and conditions of above numbered contract.

PURCHASE [ ] Reference your ____ furnish the following on terms specified herein, including, for U.S. purchases.

General Provisions of Purchase Order on DD Form 1155: (EXCEPT CLAUSE NO. 12 APPLIES ONLY IF THIS BOX [ ] IS CHECKED, AND NO. 14 IF THIS BOX [ ] CHECKED); special provisions ____ ; and delivery as indicated. This purchase is negotiated under authority of USC 2304(a)(3) or as specified in the schedule if within U.S., its possessions or Puerto Rico; if otherwise under 2304(a)(6).

[ ] If checked, Additional General Provisions apply; Supplier shall sign "Acceptance" on DD Form 1155 and return ____ copies.

ACCOUNTING AND APPROPRIATION DATA/LOCAL USE
6X3123
C119[illegible]000 (MD) $43,164.00
CONTRACT LINE

Richard J Ewer 1/13/88

GEB
STATUS
AE/PS
EJA/at

ITEM NO.	19. SCHEDULE OF SUPPLIES/SERVICES	20. QUANTITY ORDERED/ACCEPTED *	21. UNIT	22. UNIT PRICE	23. AMOUNT
	Furnish the necessary personnel and equipment to make three borings and install Piezometers and reset one Piezometer at North Springfield Dam, Vermont, in accordance with Attachment No. 1.	APPROX.			ESTIMATED
1.1	Geologist	120	HR	$42.00	$5,040.00
1.3	Per Diem - Overnight Stay	15	DAY	50.00	750.00
1.4	Mileage from Waltham, MA and return	480	MI	.35	168.00

James R Buckley 1/14/88

ESTIMATED

* If quantity accepted by the Government is same as quantity ordered, indicate by ✓ mark. If different, enter actual quantity accepted below quantity ordered and encircle.

24. UNITED STATES OF AMERICA
STANLEY J. MURPHY, Lt. Colonel, CE, Deputy Division Engineer
BY: ____ 14 Jan 88
CONTRACTING/ORDERING OFFICER

25. TOTAL: $43,164.00

29. DIFFERENCES:

* QUANTITY IN COLUMN 20 HAS BEEN: [ ] INSPECTED [ ] RECEIVED [ ] ACCEPTED, AND CONFORMS TO THE CONTRACT EXCEPT AS NOTED

DATE ____ SIGNATURE OF AUTHORIZED GOVERNMENT REPRESENTATIVE

27. SHIP. NO.: [ ] PARTIAL [ ] FINAL

28. D.O. VOUCHER NO.

30. INITIALS

32. PAID BY

33. AMOUNT VERIFIED CORRECT FOR:

31. PAYMENT: [ ] COMPLETE [ ] PARTIAL [ ] FINAL

34. CHECK NUMBER

I certify this account is correct and proper for payment.

DATE ____ SIGNATURE AND TITLE OF CERTIFYING OFFICER

35. BILL OF LADING NO.

RECEIVED AT | 38. RECEIVED BY | 39. DATE RECEIVED | 40. TOTAL CONTAINERS | 41. S/R ACCOUNT NUMBER | 42. S/R VOUCHER NO

NAME OF OFFEROR OR CONTRACTOR

tract Line ATLANTIC TESTING LABORATORIES, LIMITED

NO	SUPPLIES/SERVICES	QUANTITY	UNIT	UNIT PRICE	AMOUNT
		APPROX.			ESTIMATED
.1	Geotechnical Report	1	Job	55% of Line Item 1.1	$2,772.00
.1	Mobilization and Demobilization	1	Job	$350.00	350.00
.3	Mileage (Manchester, NH and Return)	240	MI	.35	84.00
.4	Survey Crew and Equipment	1	Day	560.00	560.00
.6	Data Reduction	1	Job	100% of Line Item 3.4	560.00
.1	Mobilization & Demobilization	2	Job	1,100.00	2,200.00
.3	Mileage (Manchester, NH and Return)	240	MI	1.15	276.00
.5	Standby Time	50	HR	80.00	4,000.00
/1	0-50 Ft. Depth	50	FT	25.00	1,250.00
2	51-100 Ft. Depth	140	FT	40.00	5,600.00
.2	HX and 6-Inch Size	65	FT	30.00	1,950.00
.2	HX and 6-Inch Size	280	FT	30.00	8,400.00
.5	HX Size Casing	26	FT	25.00	650.00
.3	HX Casing	30	FT	27.00	810.00
.3	NWX Size	10	FT	55.00	550.00
.1	Casagrande Type 0-50 Ft.	246	FT	16.00	3,936.00
.2	Casagrande Type Over 50 Ft.	181	FT	18.00	3,258.00

ATTACHMENT NO. 1

GEB REQUISITION 88-10 DACW 33-87-C-0007

DELIVERY ORDER NO. 0003

INSPECTION AND EXPLORATION INSTRUCTIONS

PROJECT: North Springfield Dam Piezometer Installation

SITE: North Springfield Dam, No. Springfield, VT

PURPOSE: To monitor seepage at downstream right abutment area.

1. SCOPE OF INVESTIGATIONS.

a. Three vertical borings shall be completed at the locations shown on Attachment No. 2 according to the following schedule.

DEPTHS (below ground surface)

BORING:	WASH TO:	CONTINUOUS SAMPLING:
FD-A	10 ft	10 to 65 ft
FD-B	50 ft	50 to 120 ft
FD-C	60 ft	60 to 130 ft

*or bedrock

All three borings shall be cased with HX casing to within 2 feet of the bottom of the explorations. A 2-3/8-in. x 5 ft solid spoon sampler driven by a 300 lb hammer shall be used for all continuous sampling. In case of refusal, NX coring shall be employed for a depth of ten feet or breakthrough, whichever is less. If a breakthrough is made, the hole through the refusal shall be reamed with a rock bit to allow for the continuation of HX casing to the bottom of the exploration.

b. An existing boring, FD 85-1 (see Attachment 2) with an installed piezometer shall be cleaned out using a 6-inch rock bit for a depth of 65 ft below the ground surface. The existing 6-inch casing shall be left in place for the piezometer reinstallation.

c. Casagrande-type piezometers shall be installed as shown below and conform to cross sections shown in Attachments 3A and 3B.

BORING	RISER PIPE/CASING LEFT IN PLACE/SIZE	PZ/ID/TIP DEPTH
FD-A	10 ft/HX	#13/63 ft
FD-B	10 ft/HX	#14/118 ft
FD-C	10 ft/HX	#15/128 ft
FD 85-1	30 ft/6 in.	#10/63 ft and #11/43 ft

*below ground surface

d. The inspector shall provide telephone reports to Mr. Ron DeFilippo, Corps of Engineers, at tel. 617-647-8175 at least once every working day and upon encountering refusal or completion of each boring prior to piezometer or drain installation. The alternate point of contact is Mr. Tim Beauchemin at tel. 617-647-8365.

e. The installed piezometer standpipes and drains shall be located by the Contractor's surveyors. The top elevation of the piezometer standpipe cap shall be determined by a level survey and recorded using the stage elevation taken from the staff gauges located on the exterior of the control towers. Zero stage elevation corresponds with Elev. 452.0 at North Springfield Dam.

f. All samples shall be delivered by the Contractor to the Corps of Engineers Headquarters in Waltham, MA by the field inspector. Sample delivery shall be coordinated with the Director, NED Materials and Water Quality Laboratory at tel. 617-647-8367/8392.

2. SITE CONDITIONS.

All holes are located in the downstream right abutment area of North Springfield Dam. Holes FD-B and FD-C are of the top of a ridge which is accessible from a road just downstream of the dam crest. The other holes are on and in a berm accessible from a road to the downstream toe and a causeway across a drainage channel.

3. COORDINATION.

The Contractor shall contact Mr. Ron DeFilippo, Corps of Engineers at tel. (617) 647-8175 one week prior to the start of work. The field inspector shall give a daily telephone report on the progress of the work to Mr. DeFilippo. The Contractor shall also coordinate with Mr. Thomas Coen, Project Manager at North Springfield Dam, tel. (802) 886-7775.

4. EXPLORATIONS. (see exploration plan, attachment 2)

Borings FD-A through FD-C shall be redesignated FD-88-1 through FD-88-3 in order of their completion.

5. GOVERNMENT REVIEW.

The Government will review the draft submittal as well as the completed work. Subsequent to such review, the Contractor shall accomplish any corrections which may be directed as the result of the Government review.

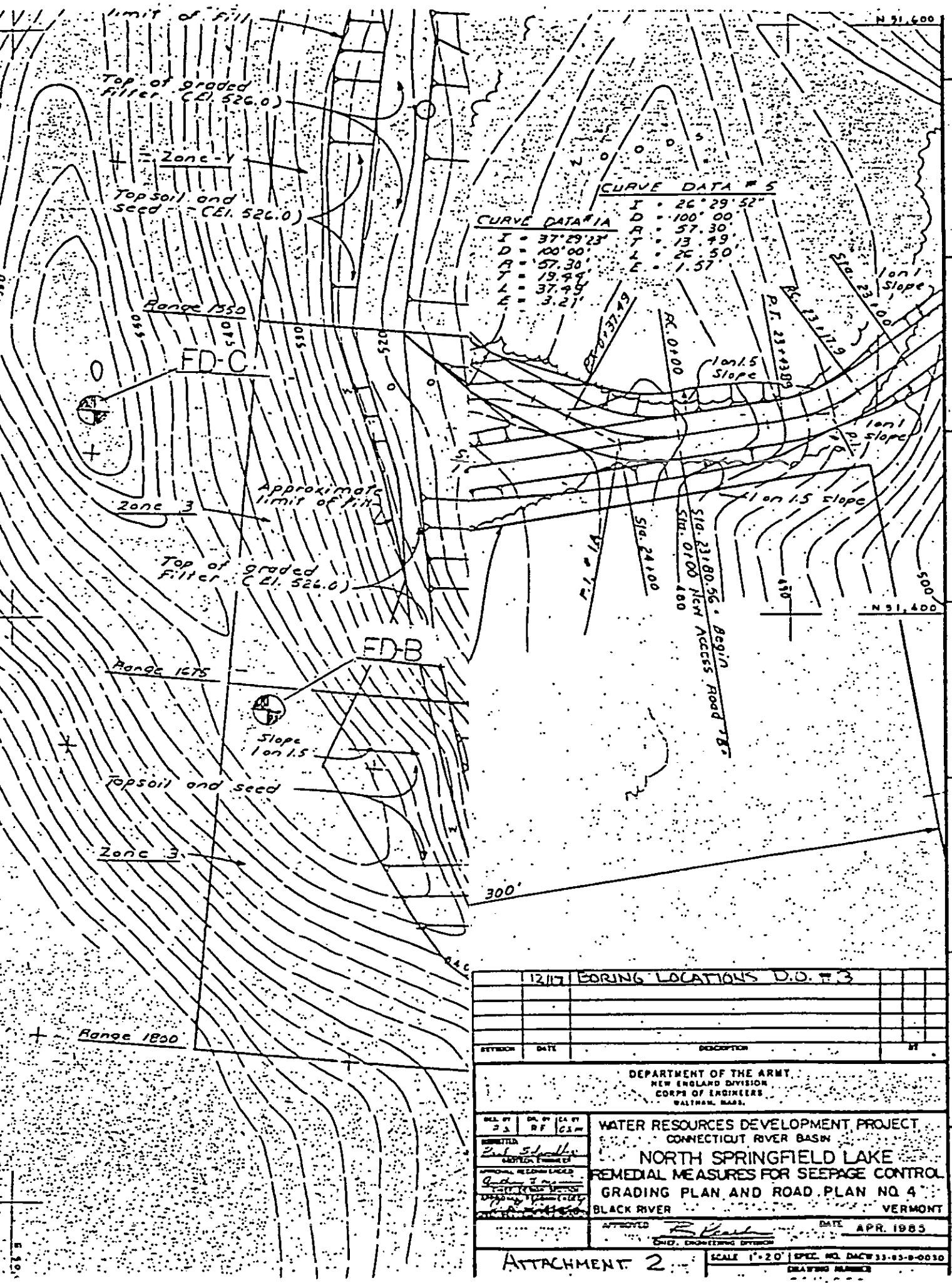
6. COMPLETION SCHEDULE.

Services under this delivery order shall start on or before 30 January 1988. Duration of the field work is estimated to be fifteen days. The geotechnical report shall be submitted in draft format for review (by the Government), postmarked no later than seven calendar days after the completion of field work. Government review will take approximately ten calendar days from the receipt of the draft report. The final geotechnical report shall be submitted postmarked no later than seven calendar days after the receipt of the draft report with Government comments.

7. QUALITY CONTROL.

You will be held responsible for the quality of the maps submitted and for all damages caused the Government as a result of your negligence in the performance of any services furnished under the contract.

Although submissions required by your contract are technically reviewed by the Government, it is emphasized that your work must be prosecuted using proper internal controls and review procedures. The letter of transmittal for each submission which you make shall include a certification that the submission has been subjected to your own review and coordination procedures to insure (a) completeness for each discipline commensurate with the level of effort required for that submission, (b) elimination of conflicts, errors and omissions, and (c) the overall professional and technical accuracy of the submission. Documents which are significantly deficient in any of these areas will be returned to you for correction and/or upgrading prior to our completing our review. Contract submission dates will not be extended if a resubmission of draft material is required for this reason.



REVISION	DATE	DESCRIPTION	BY
	12/17	BORING LOCATIONS D.O. #3	

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION
CORPS OF ENGINEERS
WALTHAM, MASS.

DES. BY J.S. | DR. BY R.F. | CK. BY C.S.M.

SUBMITTED: Chief, Engineering Division

APPROVAL RECOMMENDED: Chief, Planning Division

WATER RESOURCES DEVELOPMENT PROJECT
CONNECTICUT RIVER BASIN
NORTH SPRINGFIELD LAKE
REMEDIAL MEASURES FOR SEEPAGE CONTROL
GRADING PLAN AND ROAD PLAN NO. 4
BLACK RIVER VERMONT

APPROVED: Chief, Engineering Division | DATE APR. 1985

ATTACHMENT 2

SCALE 1" = 20' | SPEC. NO. DACW33-83-B-0030

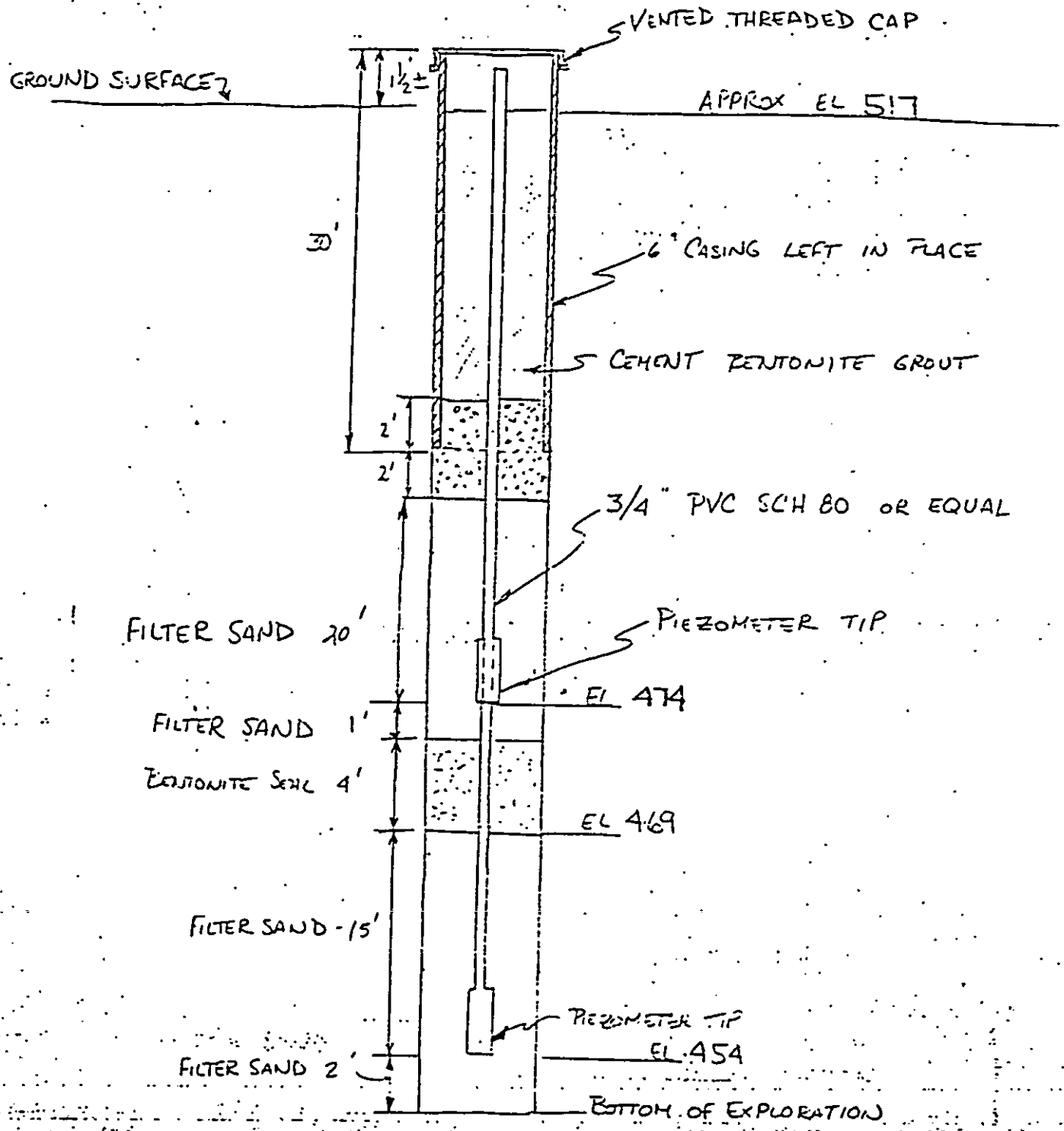
DRAWING NUMBER

NED FORM 223
27 Sept 49

NEW ENGLAND DIVISION
CORPS OF ENGINEERS, U S ARMY

SUBJECT No. SPRINGFIELD DAM - PIEZOMETER INSTALLATION
COMPUTATION TYPICAL CROSS-SECTION
COMPUTED BY R CHECKED BY DATE 1 OCT 84

TYPICAL SECTION FOR PZ 10 & 11



NOT TO SCALE
Attach 3A

NED. FORM 223
27 Sept 49

NEW ENGLAND DIVISION
CORPS OF ENGINEERS, U. S. ARMY

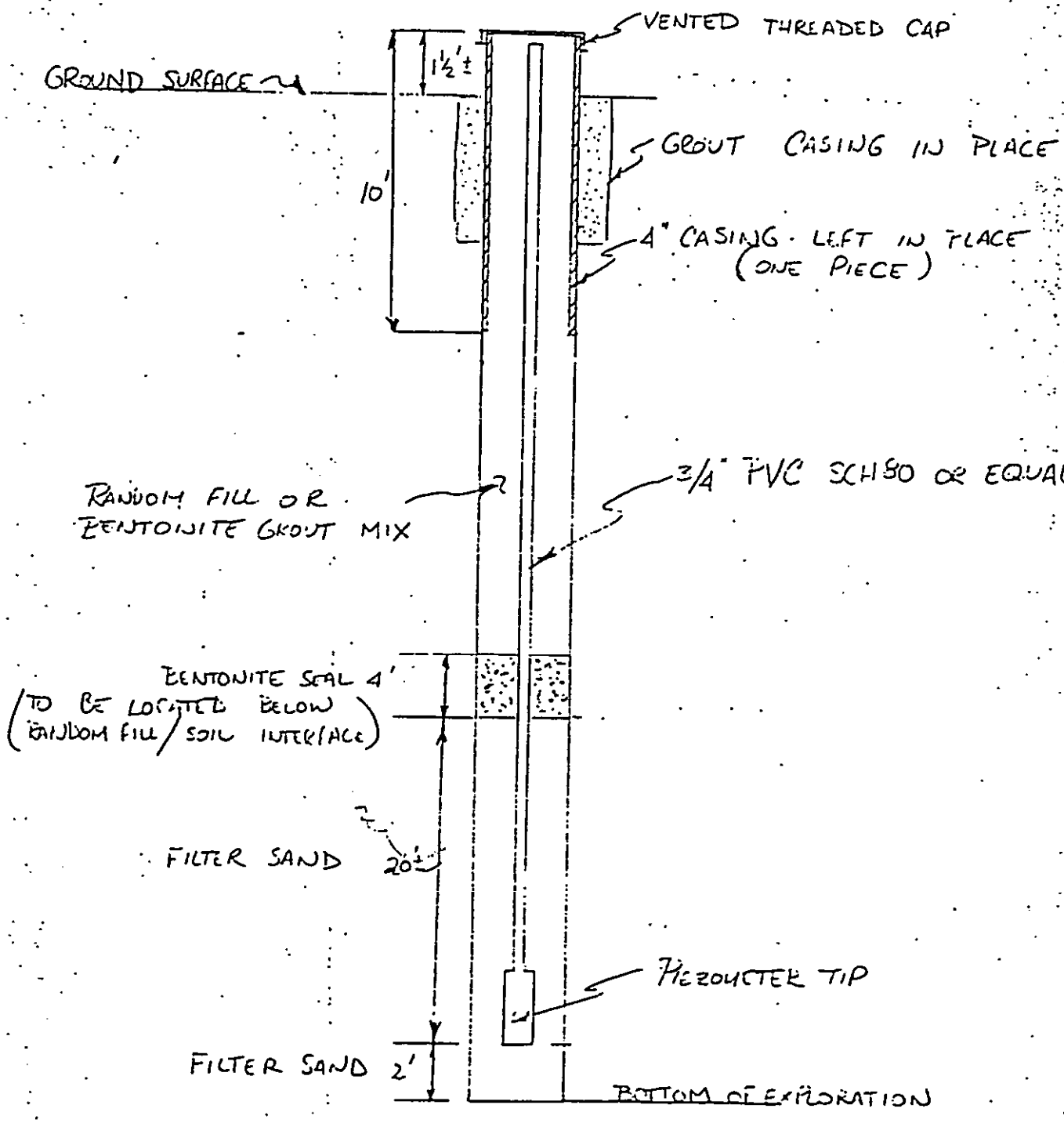
PAGE

SUBJECT: No SPRINGFIELD DAM -- PIEZOMETER INSTALLATION

COMPUTATION: PIEZOMETER CROSS-SECTION

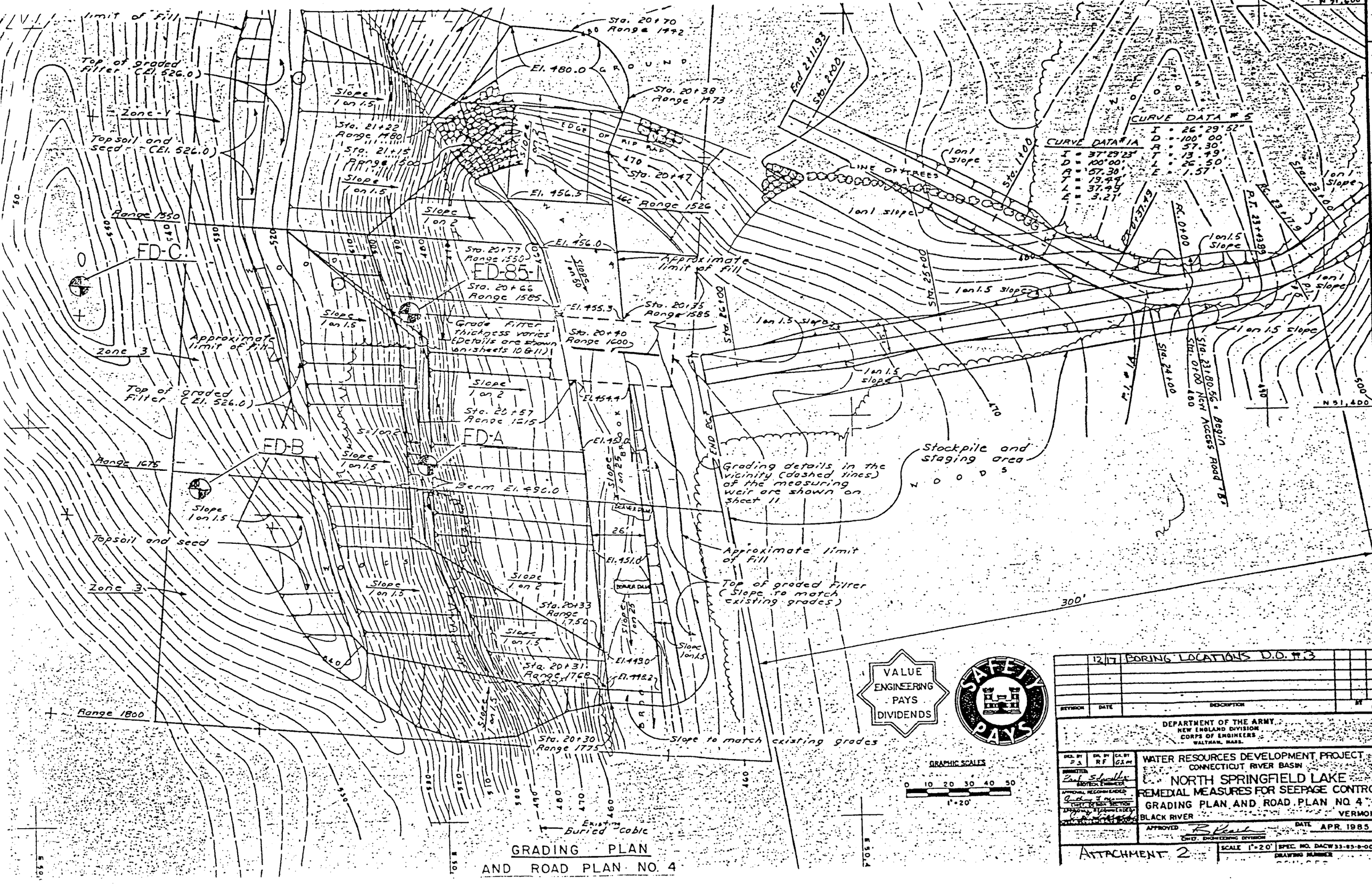
COMPUTED BY: PR CHECKED BY: DATE: 1 OCT 84

SECTION FOR PZ's #13, 14, 15



NOT TO SCALE

ATTACHMENT 2



GRADING PLAN AND ROAD PLAN NO. 4

REVISION	DATE	DESCRIPTION	BY
	12/17	BORING LOCATIONS D.O. #3	

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION
CORPS OF ENGINEERS
WALTHAM, MASS.

DES. BY F.S. | DR. BY R.F. | CK. BY G.A.M.

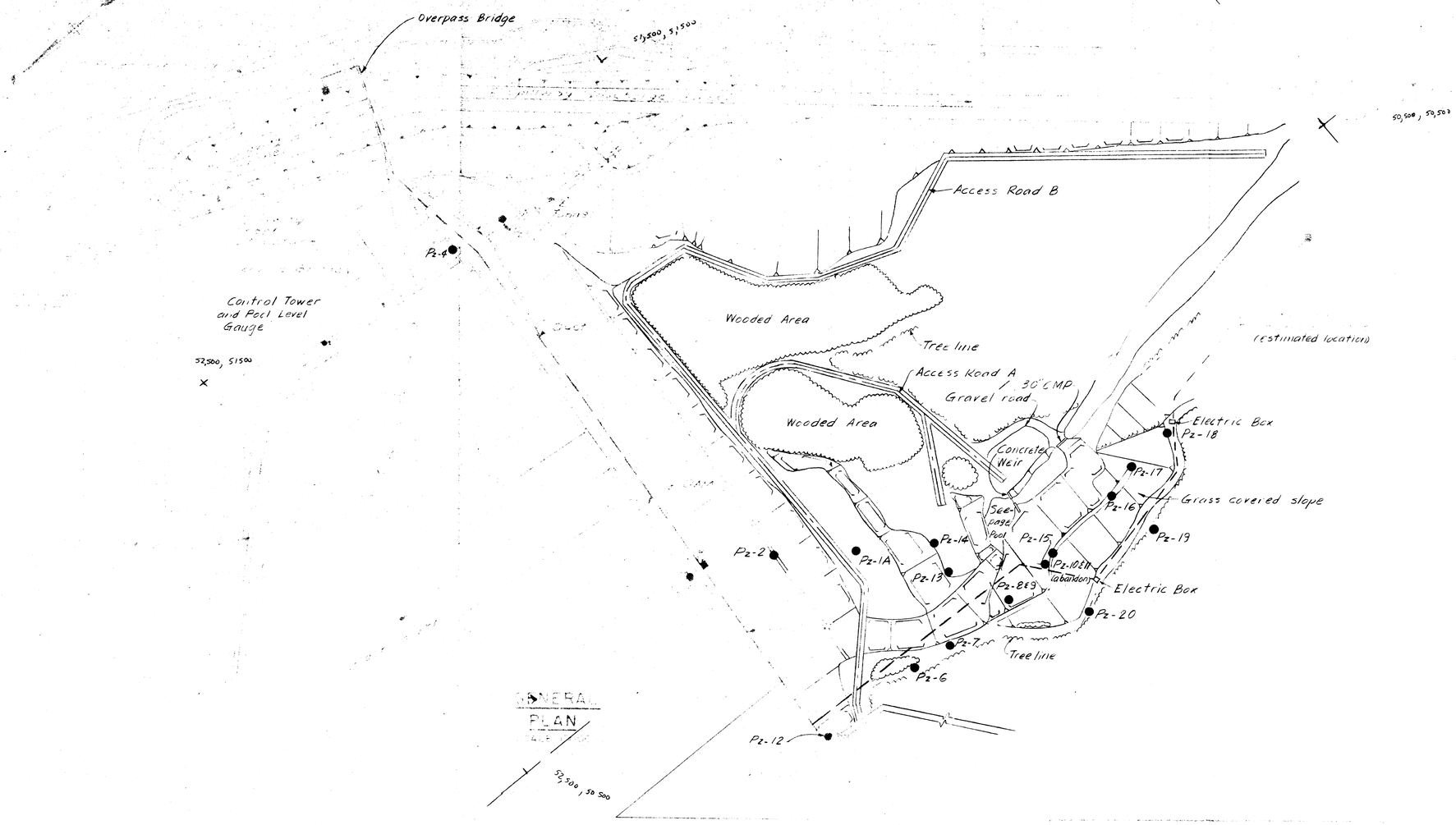
SUBMITTED: Chief, Geotech. Engineering Section
APPROVAL RECOMMENDED: Chief, Design Section
APPROVED: Chief, Engineering Division

WATER RESOURCES DEVELOPMENT PROJECT
CONNECTICUT RIVER BASIN
NORTH SPRINGFIELD LAKE
REMEDIAL MEASURES FOR SEEPAGE CONTROL
GRADING PLAN AND ROAD PLAN NO. 4
BLACK RIVER VERMONT

APPROVED: Chief, Engineering Division
DATE APR. 1985

ATTACHMENT 2

SCALE 1" = 20' | SPEC. NO. DACW33-85-B-0000 | DRAWING NUMBER



GENERAL PLAN

SYMBOL	DESCRIPTION
● Pz-7	Existing piezometer
■ B	Strong motion shelter
	Earth filled slope with stone protection
	Tree line

SAFETY PAYS

DRAFTING SCALES

WATER RESOURCES DEVELOPMENT

NORTH SPRINGFIELD LAKE

INSTRUMENTATION LAYOUT

BLACK RIVER

APPROVED

CHIEF ENGINEERING DIVISION

MARCH 1988

SCALE

SPEC. NO.

DRAWING NUMBER

SHEET 1

b. Project Site

The investigation took place on the downstream right abutment area of North Springfield Dam, Vermont. Borings FD88-2, FD88-5, FD88-6, and FD88-8 are located on the top of a ridge which is downstream, and running perpendicular to the dam crest. Boring FD88-1, FD88-3 and FD88-7 are located on the berm just below the ridge. Boring FD88-4 is located at the toe of the ridge, downstream of a causeway.

A General Project Map, Site Location Plan, and Boring Location Map are included in Section 8. A general plan of this site was provided to us in the Delivery Order, and is included in Section 3a.

c. Purpose

The purpose of the exploration was to recover soil and rock samples for classification and install piezometers in the Right Abutment area.

d. Scope of Work

Survey, inspection, exploration and piezometer installation instructions, which were provided by the Army Corps of Engineers, New England Division, in Delivery Order No. 0003, are included in Section 3a. General inspection, exploration, and piezometer installation instructions were provided by the Army Corps of Engineers, New England Division, through the contracted Geotechnical Exploratory Work Various Locations in New England. Specific instructions and changes during the course of the work were given verbally during on-site and telephone conversations with a USACE representative. All new instructions and changes can be found listed in Table II, Section 5 (Telephone Log).

Drilling, sampling and piezometer installation was performed by Atlantic Testing Laboratories' personnel using Atlantic Testing Laboratories' equipment. The test borings were advanced and sampled as indicated on Attachment No. 1 of the Delivery Order (Section 3a) and as outlined in the contract specifications and ammended in the conversations outlined in Table II, Section 5. Overburden sampling was performed using a 140 lb hammer driving a 2 ft split spoon sampler (1-3/8" I.D.) and a 300 lb hammer driving a 1.5 ft, 2 ft, and 5 ft split spoon sampler (2-3/8" I.D.).

SECTION 4 - QUALITY CONTROL

a. General Certification Statement

I hereby certify that the records, equipment and procedures mentioned herein were used to perform the subsurface exploration described herein. I also certify that the work was performed in a professional manner and meets the requirements set forth in the delivery order. This report has been subject to my review and is both complete and technically accurate.

CERTIFIED MARCH 3, 1988

Spencer F. Thew, P.E./L.S.

b. Records Taken

Pertinent drilling procedures, sampling operations, and soil classifications were noted on the following forms provided for use by the Corps of Engineers:

NED 121 - Field Log of Test Boring, Summary
NED 58 and 58a - Field Log of Test Boring
NED 59 - Subsurface Water Observations and Boring Location Sketch
NED 130 - Field Log of Test Boring In Rock

Information outlining the installed piezometer characteristics were noted on the Piezometer Installation Report and the Piezometer Installation Detail. A completed series of logs for each of the borings is included in Section 8. The Project Maps are included in Section 8.

Sample containers and and rock core were labeled using ENG Form 1742. Portions of the samples were delivered to the USACE NED Materials and Water Quality Laboratory on February 29, 1988. A USACE representative picked up the other samples on 1/29/88 and 2/11/88.

A Summary of Daily Activities and Telephone Logs are Tables I and II, respectively of Section 5. A chain of custody log is included in Section 6. The Safety Meeting Reports, NED Form 251, including exposure time for Atlantic Testing Laboratories', USACE, and subcontract personnel, is included in Section 7.

c. Equipment Used

All equipment and supplies were provided by Atlantic Testing Laboratories, Limited, with the exception of that provided by subcontractors. A listing of pertinent equipment follows:

1. <u>Drilling Equipment</u>

- CME 75 truck mounted drill rig
- CME 850 ATV drill rig
- HW casing with drive and spin shoes
- drill rod, NX taper threaded in 2 ft, 5 ft, and 10 ft lengths used for sampling and turning 3-7/8" roller bits
- two 3" centrifical pumps with 500 ft of fire hose
- 2.98" O.D by 5 ft diamond bit core barrel
- split spoon samplers, 1-3/8" I.D. by 2 ft in length, 2-3/8" I.D. by 1.5, 2 and 5 ft in lengths
- two 100 gallon stock tanks
- one 3700 gallon water truck

<u>Piezometer Supplies</u>

- Casagrande piezometer 1" I.D. by 2 ft in length
- threaded 3/4" I.D. schedule 80 PVC riser pipe in 2 ft, 5 ft and 10 ft lengths
- filter sand, #3, #4, in 100 lb bags
- all purpose sand
- Bentonite well seal, 3/8" diameter Peltonite Pellets
- backfill material was #3 and #4 filter sand and all purpose sand

<u>Piezometer Test Equipment</u>

- 200 ft electronic water level indicator (Roctest Model CPR4)
- standard watch with stopwatch function

Subcontracted Equipment

- D-3 caterpiller dozer with operator
- 977-H caterpiller traxcavator with operator
- Backhoe with operator

Survey Equipment

- Wild T1000 Theodolite with DI 1000 Distance Meter
- Wild T-1, 6-minute Theodolite
- Wild NARI, automatic level
- 25 ft expandable fiberglass stadia rod

d. Procedures

1. Survey Procedures

A survey crew from Atlantic Testing Laboratories, Limited was on site February 22, 1988 and February 23, 1988 to determine the actual position of each boring/piezometer.

Horizontal Control

The positions of the boring/piezometers were determined by angle distance measurements using a Wild T-1 Theodolite and a Electronic Distance Meter (EDM) from control point "I" and monument S-4 whose coordinates were provided by the USACE and areas follow:

Control Point "I"	N51187.936, E50116.132
Monument S-4	N52041.316, E50389.469

Vertical Control

The ground surface, top of riser pipe and top of casing elevations for each new piezometer were measured, as well as the ground elevation for the new borings. Monument S-4 which is found on the dam crest was used as a benchmark from which elevations of the boring/piezometer were determined by a level run. The U.S.A.C.E. provided the elevation of Monument S-4 (elevation 569.47).

2. Sampling and Drilling Procedures

Eight (8) borings were performed at North Springfield Dam, however, the Delivery Order had referenced three (3) borings, the additional borings were authorized by U.S.A.C.E. representative. Piezometers were installed in six (6) of the borings. The field exploration included drilling, soil sampling and rock coring followed by piezometer installation and testing.

Soil sampling techniques, as described in the Contract, Delivery Order, and as modified during the work period, involved retrieving material using the Standard Penetration Test. A 1-3/8" I.D. by 2 ft long or a 2-3/8" I.D. by 1.5 ft, 2 ft, or 5 ft long spoon was driven the length of the spoon or until refusal was encountered. The blow counts were recorded for each 0.5 ft of advancement. Samples were classified in the field in accordance with ASTM D-2488. Representative samples were taken from each soil sampling run and placed in 32 oz. jar with

hermetically sealed lids. Rock core was placed in 5 ft long core boxes as specified in the Contract. A Chain of Custody Log was maintained to document custody of samples between ATL and the USACE.

The CME 850 and CME 75 drill rigs were both equipped to handle several different methods of drilling. Different techniques for advancing each hole, in conjunction with sampling, were employed to best suit the situation. These systems are generally described as follows:

- HW drive casing preceeded by a 3-7/8" roller bit. This was the method most widely used to case the borings in spite of some difficulty advancing through material containing coarse gravel, cobbles and boulders
- HW spin casing preceeded by a 3-7/8" roller bit
- HW casing either spun or driven in upper portion of boring followed by 3-7/8" roller bit advanced through remainder of boring used "Clear Mud" drilling fluid to maintain an open hole
- NX diamond coring washed with water was used to penetrate bedrock

3. Piezometer Installation Procedures

After boring had been advanced to the required depth, the Clear Mud, if used was deactivated using Clorox. Either cement grout, tamped sand or bentonite pellets were placed in the bottom of the hole to the specifice depth. The 2 ft long porous plastic piezometer and 3/4" PVC riser pipe were connected and lowered to the determined depth as specified by the USACE. No. 3 or No. 4 filter sand was added, followed by a 5 ft bentonite seal (3/8" Peltonite pellets), at the specified depth. The remainder of the open hole was filled with either on site soils, all purpose sand or filter sand. A 4" diameter by 10 ft length of casing was left in place around the 3/4" riser pipe for protection. The piezometer riser pipe protectors have between a 1.5 ft and 3 ft stick up. This piezometer was secured with a screw-on pipe cap on the protective casing.

4. Piezometer Testing Procedures

A falling head test, as described in the contract, was performed on each well after installation. This required pouring water down the riser pipe until it completely fills and measuring the water level drop against time. The depth was measured using an electronic water level indicator at 1, 3, 5, 10, 15 and 30 minute increments.

SECTION 5 - DAILY ACTIVITY AND TELEPHONE LOG

NORTH-SPRINGFIELD DAM

TABLE 1

CD030 - DAILY ACTIVITY LOG

Date	Activity
January 18, 1988 Monday	- Geologist and Drill Crew on site 3:00 p.m. to 5:00 p.m. - Geologist, Greg Hargrave - Drillers, Mike Hawkins, Scott Fox, Todd Burnham moved in CME75 drill rig and 3700 gallon water truck - 2 hours standby (site not accessible due to snow)
January 19, 1988 Tuesday	- Geologist, Drillers on site, 7:00 a.m. to 6:00 p.m. - Weather; temperature 40°F, light winds, partly cloudy - Arrived on site wait for Thomas Coen (USACE- Project Manager) who arrived on site at 7:30. Discussed project, he was not aware that project started this week, he had the last 2 weeks off. G. Hargrave told T. Coen that we received delivery order late last week and tried to contact him Monday (1/18/88) however he was not there due to holiday. - G. Hargrave asked if Corps had bulldozer on site, they did not, the only one they have is at another dam, and is not available - T. Coen questioned who pays for snow removal for access to drill site, he called Ron DeFilippo (USACE) and they agreed that the USACE pays for clearing access road. - T. Coen had a payloader come in and clear part of the roadway, from pavement to base of access road before it goes up the incline to boring FD88-2. Loader cleared access road to just short of where it goes down incline to existing piezometers (FD-85-1) - T. Coen and G. Hargrave inspected the site together and tried to locate the boring locations using control points and the existing piezometers - After payloader did all it could in the way of clearing the access road, the Drillers, Geologist and Project Manager discussed the following: 1. The ATV drill rig vehicle needs a safety line to hold it while it is accessing berm from top of slope 2. The truck rig will probably need a tow up incline to boring locations 3. The roadway will probably need sand to improve traction for trucks (drill rig & water truck) 4. Water truck will need snow removal and a tow if we are to obtain water at the base of the dam

Date	Activity
January 19, 1988 Tuesday (continued)	- In order to solve these problems heavy equipment will be required. T. Coen was not sure who's responsibility it was to obtain and pay for equipment - T. Coen directed us to Gurney Brothers - Gary (Gurney Brothers) made site inspection at 1:00 p.m. and thought we would probably need D-6 Dozer or 977 Loader to pull truck rig up incline, he also thought a excavator would be best to make cut in the slope at FD88-1 for CME 850 drill rig. - G. Hargrave asked Gary when he could get a dozer on site. He said a D-3 dozer was available and could be mobilized this afternoon. The dozer was moved in and spent 3 hours clearing roads. Gurney's mobilized a 977 loader which spent 1 hour pulling our truck rig into position - Gary (Gurney Brothers) and G. Hargrave tried to contact Don (Gurney Brothers) because he has answer to obtaining water from public water hydrant, he could not be found but he will be at Gurney Brothers headquarters at 6:45 a.m., we will meet him at that time in the morning - CME850 drill rig and Driller (Mark Hawkins) arrived on site at 5:00 to 6:00 p.m. - CME75 8 hrs. standby, waiting for snow clearance - CME850 1 hr. standby on site but could not access boring due to snow
January 20, 1988 Wednesday	- Geologist, Drillers on site 6:30 a.m. to 5:00 p.m. - Weather: temp 40°, cloudy, raining - G. Hargrave meeting with Sam Gurney regarding water source, he said we can get it at town barn; talk to Jeff Slade - ATL representative went to town barn to get water, talked to Jeff Slade, he said he will keep a running total of water used. He will probably charge us about $50.00 for all the water we need. - CME850 was put on FD-88-1 without making cut - CME75 standby 1 hour to move and set on FD88-2 - CME850 standby 2 hours to move and set up on FD88-1 with safety line - CME75 advanced FD88-2 approximately 43 ft with augers then pulled augers (could not advance further; advanced to approximately 40 ft with HW casing) - FD88-1 was advanced 28 ft with sampler, then lost shoe off split spoon sampler - Gurney Brothers had 2 hours with 977 loader, and 1 hour with D-3 as they attempted to pull water truck up hill for CME75 and helped CME850 down hill

Date	Activity
January 21, 1988 Thursday (continued)	- Geologist, Drillers on site 6:30 a.m. to 6:00 p.m. Weather: temp low to mid 30's, partly cloudy, light winds - Safety meeting for both Drill Crews - Driller on CME850 managed to get past the spoon shoe and advance his hole (FD88-1) - Driller (CME850 - FD88-1) advanced roller bit 1.2' into rock then switched over to core barrel and took 2 runs, one was 5 ft the other was 3.8 ft. Boring advanced to 47.8 ft. - Driller on CME75 advanced FD88-2 to 74 ft. - Gurney Brothers on site for one hour to transport tanks to site in bucket of 977 loader
January 22, 1988 Friday	- Geologist, Drillers on site 7:15 a.m. to 12:00 noon Weather: clear, cold, temp mid 20's light winds - Gurney's spent 1 hour with 977 loader moving supplies to FD88-1 and 1 hour sanding road - Drillers on CME850 continued drilling on FD88-1 - Ron DeFilippo and Tim Beauchemin from Corps arrived on site in morning. G. Hargrave had them examine the rock core from FD88-1 and logs, this took place at USACE Basin office - An inspection was made at the work site, Ron DeFilippo and Tim Beauchemin pointed out approximate locations of horizontal holes. - G. Hargrave took Tim Beauchemin and Ron DeFilippo to proposed boring location for FD88-5 and asked them if we could move it down trail (top of ridge) to a more level spot (~25 ft down trail) Tim Beauchemin and Ron DeFilippo agreed with it. G. Hargrave is to tape off distance of actual boring location and show it on Boring Location Plan that is submitted with boring logs - Tim Beauchemin and Ron DeFilippo do not agree with the use of "Clear Mud" and did not want it used on the next boring - Corps is concerned about having a gravel layer documented and need as much sample as possible (3" spoons are needed) - Quart sample jars are acceptable - G. Hargrave is to call Corps Monday morning before noon to find out at what depth we are to set piezometer tip, what we are to fill bottom of boring with (sand and or grout) and if we can leave cut next to FD85-1 after boring is completed - G. Hargrave stopped at Gurney Brothers Construction and told them that dozer will be needed Monday afternoon to make cut for CME850 at FD85-1 - Drillers picked up equipment etc., trucks are being stored behind Corps office/garage along with samples, riser pipe and pumps which are stored in garage at Corps office - G. Hargrave talked with T. Coen on site, and told him we will be back Monday morning

Date	Activity
January 25, 1988 Monday	- Geologist, Drillers on site 1:00 p.m. to 5:30 p.m. Weather: temp. 30's, cloudy, winds 0-5 mph - G. Hargrave took Mike Hawkins to Town Barn to show him where to fill water truck, personnel at Town Barn want us to leave valves at Town Barn so they can use them - Gurney spent 1 hour sanding access road Jeff King (ATL) is on site for training as Geotechnical Inspector - Drillers (CME850) core to 52.8 ft and grout hole to approximately 5 ft from bottom of FD88-1
January 26, 1988 Tuesday	- Geologist, Drillers on site 7:00 a.m. to 5:15 p.m. - Weather: temp. 30's, cloudy, winds 0-5 mph - CME850 FD88-1 piezometer installed with tip depth at 45.2 ft. - A D-3 from Gurney Brothers was plowing snow for approximately 4 hours, also 977 loader moved 300 lbs hammer and equipment down to FD88-1. - Mr. Gurney and one of his representatives came down to inspect (FD85-1 boring) site, they thought the best thing to do would be to bring in sand and push it downhill to make platform. He seemed to think it would take 3 hours with D-3 and 100-150 yd^3 of sand at $6.00/$yd^3$ - Drillers and Geologist performed falling head permeability test on FD88-1, then moved equipment up hill (including rig) - Received message from Ron DeFilippo (USACE) he wants new piezometer installed in FD88-3 approximately 10 ft down stream of FD85-1, installation will be the same as directions were given for piezometer installation on 1/25/88. We should not need dozer. - Drillers (CME75) advance FD88-2 to 108 ft; cored 101 ft to 106 ft; then sampled to 108 ft. - Drillers picked up equipment and winterized equipment - CME850 2 hrs. stand by waiting for answer regarding location of FD88-3
January 27, 1988 Wednesday	- Geologist, Drillers on site at 7:00 a.m. to 5:30 p.m. - Weather: temp 15°, clear, sunny, winds 0-5 mph - Drillers are trying to cope with extreme temp conditions, - G. Hargrave took water reading on FD88-1, level at 37.6 ft. - Drillers attempted to start drilling on FD88-2, broke main drive chain, also put slight bend in kelly bar, new parts were ordered and are coming directly from CME - CME850 2 hrs. standby for bore hole move from FD88-1 to FD88-3

Date	Activity
January 28, 1988 Thursday	- Geologist, Drillers on site at 7:15 a.m. to 5:30 p.m. - Weather ~0, clear, no wind - Having hard time starting equipment due to cold weather - G. Hargrave took groundwater reading at FD88-1, water level is 37.6 ft - CME75 advanced FD88-2 to 108 ft - CME850 advanced FD88-3 to 77.2 ft - CME75 7 hrs. standby due to extreme weather conditions - CME850 4.5 hrs. standby due to extreme weather conditions
January 29, 1988 Friday	- Geologist, Drillers on site from 6:30 a.m. to 10:30 a.m. - Weather: temp. 0°, no wind, clear - Set piezometer for FD88-3, Tip at 68.9 ft - G. Hargrave took water reading on FD88-1, level at 37.55 ft and FD88-3, level at 42.1 ft. - CME75 Drillers advanced FD88-2 to 110 ft. - G. Hargrave met with Ron DeFilippo of (USACE) discussed new boring locations, checked on site, Ron DeFilippo gave G. Hargrave map of new boring locations. G. Hargrave gave R. DeFilippo soil samples from FD88-1 and part of samples from FD88-2 - R. DeFilippo and G. Hargrave agreed that a dozer was needed to make access to boring location FD88-4 - G. Hargrave gave T. Coen key back for garage; informed T. Coen that ATL will be back on site Monday - Stopped by Gurney Brothers Construction, to inform them of the need for a dozer on Monday afternoon around 2:00 p.m. - Drill crews from CME75 and CME850 attend 1/2 hour safety meeting

Date	Activity
February 1, 1988 Monday	- Geologist, Drillers on site, 11:00 a.m. to 6:00 p.m. - CME75 advanced boring FD88-2, 15 ft into bedrock and grouted hole to designated depth. Also completed piezometer installation on Boring FD88-3 - CME850 2 hrs. standby for bore hole move between FD88-3 and FD88-4
February 2, 1988 Tuesday	- Geologist on site 1:00 to 5:30 p.m. - Drillers on site 6:30 a.m. to 5:30 p.m. - Installed piezometer in Boring FD88-2 - Advanced FD88-4 to 21.1 ft
February 3, 1988 Wednesday	- Geologist and Drillers on site 7:00 a.m. to 6:00 p.m. - Weather; Temp ~15°F, light winds, clear sky - Performed falling head test on FD88-2 - CME 850 pulled off FD88-4 and started FD88-5, entire crew spent approx. 2 hours trying to locate strong motion power cable that runs in the vicinity of the two remaining proposed boring sites. Tried a metal detector from Corps Basin office without success, also tried to contact Mr. Gurney of Gurney Brothers Construction; he installed cable. - G. Hargrave took water readings on existing piezometer and FD88-4 - Gurney Brothers Construction spent 1.5 hours plowing access to boring FD88-5 - CME850 2 hrs. stand by time spent trying to locate position of strong motion cable; also 2 hrs. for bore hole move between FD88-4 and FD88-5
February 4, 1988 Thursday	- On site, Geologist 7:00 a.m. to 5:15 p.m., Drillers on site 6:45 a.m. to 5:30 p.m. - Weather; Temperature ~24°F, snowing heavily, light winds, received 8" of fresh snow last night - G. Hargrave stopped in at Gurney Brothers Construction to see if Mr. Gurney knows location of strong motion cable, he was sure it runs down the centerline of the road. - G. Hargrave took water reading on FD88-4. - Advanced FD88-5 to 61.7 ft using air and water
February 5, 1988 Friday	- Geologist, Drillers on site, 6:30 a.m. to 9:00 a.m. - Weather; cold, temp. 0, clear no wind - G. Hargrave took water readings on FD88-4 and FD88-3, M Scope cable brought up sand on end of it on FD88-3, subsequent investigation showed piezometer riser apparently had sand introduced during installation

Date	Activity
February 5, 1988 Friday (continued)	- Drillers picked up site - FD88-1 and FD88-2 covers could not be opened because lock and cap were froze shut - Drill crew from CME850 attend 1/2 hr safety meeting
February 8, 1988 Monday	- On site 2:00 p.m. to 6:00 p.m. - Weather; clear, cold - Advanced FD88-5 to 64.5 ft.
February 9, 1988 Tuesday	- Geologist, Drillers on site, 6:45 a.m. to 7:00 p.m. - Weather; cold Temp. 0-5°F, light variable winds, clear sky - Driller having difficulty starting equipment, drill rig and pump - G. Hargrave took water readings - Finished coring FD88-5 - Installed piezometer, seal and backfilled with sand on FD88-5 - Performed falling head test on FD88-5 - CME850 2 hrs. standby time due to extreme weather
February 10, 1988 Wednesday	- On site 6:45 a.m. to 6:00 p.m. - Weather; Temp 20°, partly cloudy, light variable winds - G. Hargrave took water readings - Drillers picking up around FD88-5 - Gurney Brothers spent 1/2 hour plowing snow down to berm so drillers can set up on FD88-3 - Drillers set up on FD88-3 and get equipment to flush well, put together hoses, fittings, pump, etc. - Drillers flush well, let the well set then flushed well again - Ran falling head test on well - Geologist staked out FD-88-6 - Drillers moved 850 to FD88-6 - Waited for Tom Coen (Project Manager) to shut power off strong motion cable before drilling - Advanced FD88-6 to 15 ft - CME850 2 hrs. standby for bore hole move between FD88-5 and FD88-6
February 11, 1988 Thursday	- Geologist, Drillers on site 6:30 a.m. to 7:30 p.m. - Continued drilling on FD88-6 - Took water reading - Rusty from Hemingway Electric came out and pointed out position of power cable to strong motion detector - Ron DeFilippo from USACE was on site; G. Hargrave and R. DeFilippo inspected rock core from project. Ron is going to recommend that we pull the casing on FD88-4 without coring any more rock. He will give us a definite answer Tuesday. Ron observed drilling operations on FD88-6

Date	Activity
February 11, 1988 Thursday	- R. DeFilippo and G. Hargrave staked out FD-G and FD-E - G. Hargrave contacted Gurney Brothers Construction to have a bulldozer clear an area for the drill rig at FD-88-7, bulldozer took ~ one hour to clear site - G. Hargrave gave Ron DeFilippo 28 jar samples, from borings FD88-2, FD88-5, Ron also wants a copy of logs and water readings - G. Hargrave told T. Coen that it was OK to turn power back on power cable to strong motion detectors - Drill crew from CME850 attend 1/2 hour safety meeting. Stand by time 2 hrs. for bore hole move between FD88-6 and FD88-7
February 12, 1988 Friday	- Geologist, Drillers on site 6:00 a.m. to 7:00 a.m. - Weather; Blizzard conditions - Drillers and Geologist attempted to work but weather made it impossible - G. Hargrave took water readings - Standby 1 hr.
February 15, 1988 Monday	- Geologist, Drillers on site 1:00 p.m. to 6:00 p.m. - Weather; Temp. ~35°, cloudy, no wind, raining - Arrive on site and have to immediately obtain services of Gurney Brothers for 1 hour to plow access road - Drillers advanced FD88-7 to 30 ft; spin casing to 25 ft using water - Drill rig moved during drilling operations due to thawing conditions and soft fill under outriggers, drillers reblock the outriggers
February 16, 1988 Tuesday	- On site 6:45 a.m. to 6:30 p.m. - Weather; 35°, cloudy, no wind - G. Hargrave took water reading - Drillers advanced FD88-7 10 ft into bedrock placed piezometer tip depth approximately 4 ft below bedrock surface - performed falling head test - G. Hargrave spoke to Mr. Gurney, he is going to have someone on site tomorrow morning to plow access to final boring
February 17, 1988 Wednesday	- On site 6:45 a.m. to 6:45 p.m. - Weather; Temp. 32°, partly cloudy, light winds - G. Hargrave took water readings - Gary from Gurney Brothers on site with D-3 to clear access to FD88-8 (1 hr.) - Scott Fox and G. Hargrave (ATL) measured out boring locations - CME850 pulled casing in FD88-4 - Drillers advance FD88-8 to 25 ft - G. Hargrave sent boring logs to USACE office in MA. - CME850 4 hrs.standby for bore hole moves between FD88-7, FD88-4 and FD88-8

Date	Activity
February 18, 1988 Thursday	- 6:45 a.m. to 6:15 p.m. - G. Hargrave took water readings - Drillers continue drilling on FD88-8, advanced boring to 57.2 ft
February 19, 1988 Friday	- On site 6:45 to 1:00 p.m. - Weather; Temp. 25°, clear, no wind - Drillers from CME850 attended 1/2 hour safety meeting - G. Hargrave took water readings - Drillers continued drilling on FD88-8
February 22, 1988 Monday	- Geologist, Drillers on site 1:00 p.m. to 5:45 p.m. - Weather; Temp 25°, partly cloudy, windy - Survey crew on site to start survey - Drillers advance FD88-8 to 56 ft, encountered difficult drilling through boulders
February 23, 1988 Tuesday	- On site 6:30 a.m. to 6:30 p.m. - Weather; Temp 32°, clear, no wind - Gurney Brothers Construction sanded access road (2 hrs) - Drillers continue drilling FD88-8 - Survey crew finished survey of piezometer/boring locations and elevations. - G. Hargrave took water readings - Drill crew from CME850 attended 1/2 hr. safety meeting
February 24, 1988 Wednesday	- On site 6:45 a.m. to 7:00 p.m. - Weather; Temp 25°, clear, light winds - G. Hargrave took water readings - Drillers finished FD88-8 - Piezometer installed in well FD88-8 - Perform falling head test on FD88-3
February 25, 1988 Thursday	- On site 7:00 a.m. to 2:00 p.m. - Weather; Temp. 25°, clear, light winds - Take water reading on FD88-8 - Perform falling head tests on FD88-8 - Clean up site - pay Town of Springfield $50. for water - return key to garage at Corps Basin office to Tom Coen - Drillers and inspector clean up site and demobilize rig
February 29, 1988 Monday	- Remainder of soil samples and rock core delivered to USACE office in Waltham, MA by Jeff King (ATL)

NORTH SPRINGFIELD DAM

TABLE II

CD030 - TELEPHONE SUMMARY

Date	Conversation
November 2, 1987	- Yuri Yatsevitch (USACE) to Sharon Flint (ATL) Yuri would like an ATL representative to make a site inspection for two jobs they are considering; one is at Hopkinton Dam and the other is at North Springfield Dam. Both involve horizontal drilling. The job at North Springfield has 3 holes, one 50 feet and the other two are ± 100 feet. The job involves steep slopes and piezometer installation.
December 8, 1987 Tuesday	- S. Thew (ATL) to Yuri Yatsevitch (USACE) Re: Hopkinton: S. Thew told Yuri the budget for Hopkinton looked good. Should include about 10' of uncased slurry hole in case ATL needed it. Re: N. Springfield: S. Thew recommended that USACE include: a. M & D for second rig since we would need ATV and truck mounted rig b. total 28 days okay for 2, 200' horizontal holes; 10 days for each 200 ft hole c. 3 vertical holes at 4 day/hole - 12 days, clean existing piezometer 2 days (12 + 2 = 14 days) d. include timber for cribbing rig on slope
January 14, 1988 Thursday	- Ron DeFilippo (USACE) to G. Hargrave (ATL) Ron says we can use the 140 lbs hammer and 1-3/8" I.D. spoon until we hit gravel. At that point, we are to switch to the 2-3/8" I.D. spoon so that we retain as much sample as possible. He also said that the Delivery Order order will be signed this Friday. If there is a problem, he will contact us immediately.
January 15, 1988 Friday	- Ron DeFilippo (USACE) to G. Hargrave (ATL) G. Hargrave asked Ron if there was a problem using a 2-1/2" I.D. split spoon as opposed to a 2-1/2" I.D. solid spoon. He said he did not see a problem with it. His main concern was the diameter of the spoons in the gravel layer.

Date	Conversation
January 18, 1988 Monday	- G. Hargrave (ATL) to T. Coen, Project Manager (USACE), (802) 886-2775 and (802) 886-8111. Not in, did not leave message on answering machine
Janaury 19, 1988 Tuesday	- G. Hargrave (ATL) to S. Thew (ATL) re: access problems - S. Thew informed G. Hargrave that Corps should pay for access to site and to make cut next to FD85-1 so the 850 has a platform to sit on. S. Thew does want not to obtain water from pond at base of dam if it will require towing the water truck out with a dozer - G. Hargrave (ATL) to Ron DeFilippo (USACE) re: access problems; R. DeFilippo agrees to pay for payloader today, but he still has to work out other details, he will call back - R. DeFilippo (USACE) to G. Hargrave (ATL); re: above matters; R. DeFilippo agreed that the Corps will pay for payloader directly, the bulldozer and backhoe, sand truck will be paid for by the Corps through a modification in our Delivery Order, water for the drill job is ATL's concern. T. Coen directed us to Gurney Brothers for sand trucks and bulldozers, they are about 1/2 mile away. - G. Hargrave (ATL) to S. Thew (ATL) re: above conversation; ATL will handle Ron DeFilippo's request - G. Hargrave (ATL) to Gurney Brothers re: site inspection; Gary (representative of Gurney Brothers) will be over at 1:00 for site inspection
January 20, 1988 Wednesday	- G. Hargrave (ATL) to Ron DeFilippo, Yuri Yatsevitch, Tim Beauchemin (USACE), gave them update on job, Asked T. Beauchemin if we could move FD-B (FD88-5) 15 ft down trail, also to change elevations of FD88-1 and FD-B (FD88-5) accordingly; he agreed - G. Hargrave (ATL) to Ron DeFilippo (USACE) re: wanted to know which borings can have cuts made next to them, Ron DeFilippo said we can make cut next to either one FD88-1 or FD85-1 - asked if it was acceptable if we ran open hole; he agreed if: 1. we hit rock that caused problems 2. we use revert 3. we can keep hole open
January 21, 1988 Thursday	- G. Hargrave (ATL) to Ron DeFilippo (USACE); Greg gave Ron update of drilling progress, loosing spoon tip, Ron said that holes do not have to be grouted if moved, we can use quart jars for samples. Ron DeFilippo will be on site at 7:30 a.m. tomorrow and will either bring more sample tags or mail them

Date	Conversation
January 21, 1988 Thursday (continued)	- G. Hargrave (ATL) to Ron DeFilippo (USACE); requested that we advance the roller bit ahead of core barrel on FD88-1 because we have metal in hole and we do not want to destroy diamond bit or core barrel, he agreed.
January 22, 1988 Friday	- G. Hargrave (ATL) to Yuri Yatsevitch (USACE) re: Ron DeFilippo and Tom Beauchemin are on their way to the site and should be there around 10:00 a.m. - G. Hargrave informed Yuri of drillers progress, have cored 10 ft of rock on FD88-1 and would also like to know what the status of the boring is, gave Yuri the RQD of rock sample and lithology. Yuri was going to check previous exploration data and someone, either R. DeFilippo, T. Beauchemin was to call back around 9:30 or 10:00 a.m.
January 25, 1988 Monday	- G. Hargrave (ATL) to Ron DeFilippo (USACE) re: R. DeFilippo seems to think that seepage might be following rock surface; we are to core an additional 5 ft on FD88-1 to make a total of 15 ft. All holes are to go 15 ft into bedrock. On FD88-1 we are to place 6 ft of grout in the bottom of the hole, the piezometer tip is to be set 7 ft below the bedrock surface, we are to use 5 ft of bentonite to seal the top; PZ-10 and PZ-11 are to follow attachment 3A. Ron DeFilippo has approved time over 10 hours for last week. - G. Hargrave contacted Gurney Brothers, they agree to sand access roadway - G. Hargrave (ATL) to Tim Beauchemin (USACE) re: Tim's approval for use "clear mud" drilling fluid and no slope restoration at boring FD88-3 after piezometer is installed - Ron DeFilippo says that we are to place 5 ft seal beneath casing
Janaury 26, 1988 Tuesday	- G. Hargrave (ATL) to Ron DeFilippo (USACE) re: 1) obtaining more information on additonal holes or even if we are going to have additional holes 2) what are we to fill casing with, above bentonite seal? 3) Can we use HW casing rather than 6" casing if we make new hole for FD85-1. Ron DeFilippo answered #2 to fill casing with gravel or sand; he will call later with answers to #1 and #3.
January 27, 1988 Wednesday	- G. Hargrave (ATL) to Ron DeFilippo (USACE) re: Ron gave authorization to move boring location to level location on berm, we do not have to sample, but we are to monitor drilling operations to see any indications of cobbles, coarse gravel, loss of water. He approved standby for 1 drill crew yesterday (2 hrs. while we waited for answers to questions regarding FD88-3.

Date	Conversation-
January 28, 1988 Thursday	- G. Hargrave (ATL) to Ron DeFilippo (USACE); Greg asked Ron for standby due to weather conditions, he approved 7 hrs. for drill crew on CME75 and 4.5 hrs. for drill crew on CME850; also approved time in excess of 10 hrs. on Tuesday and Wednesday. Ron DeFilippo wants safety report with time on it for last week, if we are on site at end of week Ron wants to visit the site and mark out new boring locations and see how things are progressing - G. Hargrave to S. Thew (ATL); Ron DeFilippo has been informed that we are working more than 10 hours per day and does not see a problem since time is critical on this project - Wanda Hawkins (ATL) with Ron DeFilippo (USACE); Ron would like to add 2 additional holes to project because rock conditions are different from what they anticipated
January 29, 1988 Friday	- G. Hargrave (ATL) to Ron DeFilippo (USACE) re: drillers would be on site until ~11:00 a.m. tomorrow, Ron still plans of being on site tomorrow, he will pick up soil samples but not core boxes. G. Hargrave informed Ron DeFilippo that one rig is running but we are still working on the other rig
February 2, 1988 Tuesday	- G. Hargrave (ATL) to R. DeFilippo (USACE) - G. Hargrave requested piezometer installation detail for FD88-2, R. DeFilippo gave following piezometer installation detail over phone: Place 6 ft of grout in bottom of hole, place piezometer tip 7 ft below bedrock surface, place 20 ft of filter sand above bedrock surface, place 5 ft bentonite seal immediately on top of sand, the remainder of hole can be random fill - G. Hargrave told Ron that he was not site yesterday due to vehicle problems. - R. DeFilippo wants all piezometers to have screw on protectors for caps on casing not locking caps - R. DeFilippo also wants new piezometers to be consecutively numbered starting with the number "16" - G. Hargrave (ATL)gave following message to Mike (USACE) at the Basin office at N. Springfield dam; Mike Hawkins (ATL) is to set the piezometer tip 7 ft below the bedrock surface followed by 20 ft of sand measured from the bedrock surface, followed by a 5 ft bentonite seal the remainder of the hole can be back filled with random fill - G. Hargrave (ATL) to Yuri Yatsevitch (USACE) FD88-2 is almost finished, asked Yuri if he wanted cement grout or random fill around the outside of casing, Yuri said, "random fill" - G. Hargrave informed Yuri FD-B (FD88-5) would be started next

Date	Conversation
February 3, 1988 Wednesday	- G. Hargrave (ATL) to Tom Pahler, ATL office - Tom wants CME75 to mobilize to Monroe Bridge, MA to satisfy a committment which we made prior to the scope of the project being increased - CME850 advanced to 26.5 ft on FD88-4 and is encountering difficulty. The drive shoe on HW casing was damaged and it is leaking gravel into boring make coring difficult - Spencer wants Corps to contact him if there are any problems with moving one drill rig off site - G. Hargrave (ATL)to Yuri Yatsevitch (USACE) - G. Hargrave informed Yuri of problems encountered on FD88-4 with drive shoe leaking gravel, thus making coring operations difficult - Yuri requests the following: Yuri wants 15 ft of rock to confirm bedrock, Greg told him that we have 2 options 1) to move the boring ahead. 2) telescope casing to seal off leak, Yuri said we could move boring if we had to - Yuri wanted to know how the other rig was doing, G. Hargrave informed him that due to scheduling conflicts it had been moved off site to another job. Yuri is to relay this to R. DeFilippo - G. Hargrave (ATL) to Spencer Thew (ATL) - Greg informed Spencer what was discussed with Yuri Yatsevitch - Spencer spoke to Mark Hawkins and decided the best thing to do would be to pull off hole FD88-4 and finish it at a later date with NW casing telescoped through HW casing. - G. Hargrave (ATL) to Yuri Yatsevitch (USACE) - informed Yuri that we are going to complete FD88-4 when we have NW casing to telescope through existing HW casing - Greg asked Yuri if he knew position of strong motion cable, did not - Greg asked Yuri if it was OK to move boring FD88-5 into woods, Yuri said "OK", be sure to call Corps office first thing in morning to see if there is a problem
February 4, 1988 Thursday	- G. Hargrave (ATL) to R. DeFilippo and Tim B. (USACE) - Greg informed Tim on problem with FD88-4 and that we are going to telescope casing to seal boring - FD88-5 had been moved into wood because exact location of strong motion power cable was unknown - Greg informed R. DeFilippo that we were on site 11 hours yesterday and 2 hours were spent trying to find exact location of strong motion power supply cable therefore we would like 2 hours standby, R. DeFilippo agreed - also 2 hrs. standby for bore hole move - G. Hargrave asked R. DeFilippo if it would be "OK" if the drillers use air instead of water to clean the holes above the water table, Ron agreed.

Date	Conversation
February 4, 1988 Thursday	- Tim B. informed G. Hargrave that he will try to locate the "as built" plans for the motion power cable, Tim also wants the boring logs, Greg will make copy and mail them to Tim B. - G. Hargrave told R. DeFilippo that if weather was extremely cold, drillers would probably not even try to start rigs tomorrow.
February 5, 1988 Friday	- G. Hargrave (ATL) to R. DeFillippo (USACE) - G. Hargrave informed R. DeFilippo that there appears to be a problem with FD88-3, sand was spilled into the piezometer riser pipe during installation - Greg requested stand by for part of today, R. DeFilippo refused because discussed weather situation yesterday
February 8, 1988 Monday	- Yuri (USACE) to Spencer Thew (ATL) - Delivery order for Hopkinton will be mailed soon. - At N. Springfield they have added two (2) more holes at midslope. - Yuri was concerned about scheduleing at both Hopkinton and N. Springfield. S. Thew told Yuri scheduling for Hopkinton would be no problem - S. Thew told Yuri we had basically completed all work under the original Delivery Order for N. Springfield and had to temporarily pull out the CME 75 due to a previous commitment with N.E. Power, however would return to the site as soon as possible to finish the remaining deep hole at top of embankment. S. Thew does not want to put a smaller rig on the project, which we have available, since production on the deep hole would be much slower than with a larger rig. - We will put the CME 850 on hole at midslope FD-G (FD88-7) when they complete FD88-5 - G. Hargrave (ATL) to R. DeFilippo (USACE) Ron gave Greg the following information: 1. (FD88-4) can possible be terminated after R. DeFilippo looks at rock core 2. Two additional borings have been added FD-G (FD88-7) and FD-H (FD88-6); FD-G (FD88-7) will have continuous sampling starting at 10 ft below ground surface to bedrock, then core 10 ft of bedrock and install piezometer in the same manner as others have been installed FD-H (FD88-6) will be advanced to bedrock, then core 10 ft of rock, no piezometer is to be installed (located between FD-E (FD88-8) and FD-B (FD88-5)

Conversation

ary 9, 1988
ay

- G. Hargrave (ATL) to R. DeFilippo (USACE)
- Ron gave approval for 2 hrs of standby time due to extreme weather conditions
- R. DeFilippo put John Hart (USACE) on line to answer question regarding use of bentonite rather than cement grout to expidite job. John does not want us to use bentonite because he is afraid it might shrink, he says we can use sand rather than cement grout provided that we tamp the sand
- G. Hargrave (ATL) to S. Thew (ATL)
- Updated Spencer of job progress
- Spencer says Mike Hawkins might be back on site next week

ıry 10, 1988
day

- S. Thew (ATL) to Yuri Yatsevitch (USACE)
- Yuri wanted to know if we could work through the weekend to try and complete the project by Monday.
- S. Thew responded that we would check with the drillers and also get a long range weather forecast. He said we would not promise to work; however, we promised to try and make arrangements to work if the drillers have no personal committments and the weather looks favorable.
- S. Thew said he would call back Thursday a.m.
- G. Hargrave (ATL) to R. DeFilippo (USACE)
- Dicussed falling head test results from FD88-3, FD-H is to be located 30 ft due south of control point "I", half way between
  FD-B and FD-E, if we are to move it any we can move slightly to the west
- G. Hargrave (ATL) to S. Thew (ATL)
- Informed Spencer of project status
- Spencer wants to know if we can work this weekend
- Spencer wants Greg to contact airport and get weather report for Thursday and Friday

ry 11, 1988
ay

- G. Hargrave (ATL) to KEM Aviation for forecast

ry 12, 1988

- S. Thew (ATL) to Ron DeFilippo (USACE)
- we had finished a hole Thursday
- we worked late Thursday night and started another hole; hopefully we would get to bedrock Friday.
- that will leave a hole to core Monday and then Tuesday we will move the last hole and hopefully complete that by Tuesday afternoon
- then we have miscellaneous clean up work
- R. DeFillippo said with the bad weather safety was of great concern. Spencer said Drillers will certainly consider safety.
- G. Hargrave (ATL) to Ron DeFilippo (USACE) tried to contact at 2:00 p.m. but no one answered at USACE office; to inform them we tried to work for one hour and could not due to weather, and also request 1 hour standby time

Date	Conversation
February 16, 1988 Tuesday	- G. Hargrave (ATL) to S. Thew (ATL)and D. Sanford (ATL) office - discussed present status of drilling program - discussed permeability values of FD88-1, 2, and 3 - G. Hargrave (ATL) to Ron DeFilippo (USACE) - Greg informed Ron that the drillers have advanced FD88-7 5 ft into bedrock. The first run has vertical fractures - Greg told Ron on site times for Thursday & Friday; Ron agreeed to (1) hr. standby for Friday - R. DeFilippo wants the piezometer tip on FD88-7 set 4 ft below the bedrock surface
February 17, 1988 Wednesday	- G. Hargrave (ATL) to Ron DeFilippo (USACE) - Ron gave approval to pull casing on FD 88-4 - Drillers have finished FD88-7 - Ron wanted to know if Greg had heard anything in regards to Hopkinton Dam, NH job, no confirmation - Greg informed Ron that the covers to the electrical boxes for the strong motion power cables were broken by the bull dozer clearing an access, Ron indicated the Corps would take care of them
February 18, 1988 Thursday	- G. Hargrave (ATL) to Ron DeFilippo (USACE) - Greg informed Ron the hrs. Geologist and drill crew worked previous day, also gave Ron job status report.
February 19, 1988 Friday	- G. Hargrave (ATL) to Spencer Thew (ATL) - Discussed project status broken engine on rental pump from Gurney Brothers Construction, and permeability testing - G. Hargrave (ATL) to Ron DeFilippo (USACE) re: Project status, falling head test results and informed Ron that drill crew had been set back because of broken rental pump
February 22, 1988 Monday	- G. Hargrave(ATL) to Ron DeFilippo (USACE) requested survey data to control points on site, Ron is sending survey data to Canton office - Ron received preliminary boring logs
February 23, 1988 Tuesday	- G. Hargrave (ATL) to Spencer Thew (ATL) office - Spencer feels the piezometer installation on FD88-8 probably proper even though the permeability values are somewhat less than the permeability values on adjacent piezometers. If the Corps has any questions Spencer wants them to contact him. Spencer also suggested that a well be installed next to the piezometer in question with the piezometer above the bedrock and a seal approximately 1 ft above and below it. The piezometer is intended to obtain exact permeability data - G. Hargrave (ATL) to Ron DeFilippo (USACE) re: previous conversation with Spencer - Greg informed Ron of drillers progress, also told Ron that they should finish tomorrow

Conversation

ry 24, 1988
day

- G. Hargrave (ATL) to Spencer Thew (ATL) office
- Job progress; Spencer informed Greg that Hopkinton job is to begin Monday

- G. Hargrave (ATL) to Ron DeFilippo (USACE)
  Ron informed Greg that FD88-3 piezometer is acceptable
  Greg informed Ron the hours that ATL crew worked yesterday
  Greg asked Ron for piezometer installation detail for FD88-8, Ron instructed as follows:
  1) 10 ft of core is to be taken. 2) 4 ft of cement grout in bottom of core hole 3) 2 ft of tamped sand on top of cement grout. 4) Piezometer tip set 4 ft below bedrock surface 5) the same quantity of filter sand placed above the bedrock surface as used in the previous piezometer installations (20 ft) 6) A 5 ft bentonite pellet seal set on top of the filter sand
- Ron wants the surveyed coordinates of the piezometers as soon as reasonably possible
- G. Hargrave (ATL) to Tom Pahler (ATL) office
  Greg informed Tom about using cement grout in piezometer installation, it needs 12 hours to set. Tom suggests we use bentonite pellets instead of cement grout
- Greg Hargrave (ATL) to Ron DeFilippo (USACE) Greg asked Ron if bentonite pellets could be used rather than cement grout in bottom of boring because if would save some time; Ron agreed and gave approval for use of bentonite pellets

ry 25, 1988
ay

- G. Hargrave (ATL) to Ron DeFilippo (USACE)
  Greg informed Ron that falling head test had yet to be performed on FD88-8; Greg asked Ron if soil samples could be delivered early next week; Ron agreed

ry 29, 1988

- Ron DeFlippo (USACE) to Greg Hargrave (ATL)
- Greg told Ron that remainder of sample should arrive late today
- Ron asked about survey location and elevation of borings from N. Springfield. Greg told Ron that he would call them in tomorrow morning.
- Greg asked Ron if it would be "OK" to send boring logs to him separately from samples so that survey locations could be put on boring logs; Ron said technically they should be sent together but it was "OK" to send out with survey locations on them.

SECTION 6 - CHAIN OF CUSTODY LOG

ATLANTIC TESTING LABORATORIES, Limited

CHAIN OF CUSTODY LOG

PROJECT: North Springfield Dam
North Springfield, VT

ITEMS:

Tubes _____

Bottles _____

Jar Samples 32

Core Boxes _____

Sampling Logs _____

Date & Time Received	Date & Time Transferred	Comments	Custodian
As Sampled			Greg Hargrave (ATL)
1/29/99 AT N. SPRINGFIELD VT			[illegible]

ATLANTIC TESTING LABORATORIES, Limited

CHAIN OF CUSTODY LOG

PROJECT: North Springfield Dam

ITEMS:

Tubes _____

Bottles _____

Jar Samples 28

Core Boxes _____

Sampling Logs _____

Date & Time Received	Date & Time Transferred	Comments	Custodian
	2-11-88 2:30 pm	As Sampled	GFH (ATL)
2-11-88 2:30 PM	2		JC (USACE)

CUSTODY LOG N. SPRINGFIELD SAMPLES CD 030

Date	To	From
2/25/88	D. R. Ferris	G. D. Hargrove / DRF
2/29/88	J. S. King	D. R. Ferris
2/29/88	[illegible]	J. S. King

A record of transfer of boring samples appears in the Daily Activity Logs.

SECTION 7 - SAFETY REPORTS

WEEKLY SAFETY MEETING

NEDSO

Date held 1/21/88

THRU: Area Engineer, NED Area

Time 6:30 am - 7:00 am

TO: Safety Office, NED

Report No. -1-

1. Weekly safety meeting was held this date for the following personnel:

Contract No. /D.O.No. 0004 Contractor Atlantic Testing Laboratories, Ltd.

Conducted By Greg Hargrave

All personnel present (Contr) 5
(Sub) -0-
(Govt) -0-

Subjects discussed (Note, delete, or add):
EM 385-1-1, Section: _____

Accident Prevention Plan

✓ Individual Protective Equipment - hard hat, safety shoes

✓ Prevention of Falls - watch slippery surfaces, keep work area neat

✓ Back Injury, Safe Lifting Techniques - use legs

Fire Prevention -

Sanitation, First Aid, Waste Disposal -

✓ Tripping Hazards - trash, hose, nails in lumber - keep work area neat

✓ Staging, Ladders, Concrete Forms, Safety Nets - use safety line

Hand Tools, Portable Power Tools, Woodworking Machinery -

✓ Equipment Inspection & Maintenance (Zero Defects) -

✓ Hoisting Equipment -

✓ Ropes, Hooks, Chains and Slings -

Electrical Grounding, Temporary Wiring, GFCI -

Lockouts for safe clearance procedures - electrical, pressure, moving parts -

Welding, Cutting -

Excavations -

✓ Loose Rock and Steep Slopes -

Explosives -

Water Safety -

Toxic materials - hazards, MSDS, respiratory, ventilation -

Other -

Prepared by Greg Hargrave Title Geologist

2. Forwarded.

Signature Greg P. Hargrave
Resident Engineer

CF: EXPOSURE HOURS:
Work Date: 1/18, 1/19, 1/20, 1/21, 1/22
Non-work Date: _____

Man Hours:
Contr: 133.75
Subcontr: 12
Govt: 4
TOTAL: 149.75

NED APP FL 251

WEEKLY SAFETY MEETING

NEDSO

Date held 1/29/88

THRU: Area Engineer, _____ Area

Time 6:30-7:00 AM

TO: Safety Office, NED

Report No. D.O. 0007

1. Weekly safety meeting was held this date for the following personnel:

Contract No. /D.O.No. _____ Contractor Atlantic Testing Laboratories, Ltd.

Conducted By Greg Harrison

All personnel present (Contr) 5
(Sub) 0
(Govt) 0

Subjects discussed (Note, delete, or add):
EM 385-1-1, Section: _____

Accident Prevention Plan

✓ Individual Protective Equipment - hard hats, safety shoes

✓ Prevention of Falls - watch slippery slopes

✓ Back Injury, Safe Lifting Techniques - use legs

Fire Prevention -

✓ Sanitation, First Aid, Waste Disposal - keep work area neat

✓ Tripping Hazards - trash, hose, nails in lumber - " "

Staging, Ladders, Concrete Forms, Safety Nets -

Hand Tools, Portable Power Tools, Woodworking Machinery -

✓ Equipment Inspection & Maintenance (Zero Defects) -

✓ Hoisting Equipment - zero Defects

✓ Ropes, Hooks, Chains and Slings -

Electrical Grounding, Temporary Wiring, GFCI -

Lockouts for safe clearance procedures - electrical, pressure, moving parts -

Welding, Cutting -

Excavations -

✓ Loose Rock and Steep Slopes - watch step

Explosives -

Water Safety -

Toxic materials - hazards, MSDS, respiratory, ventilation -

Other -

Prepared by Greg Harrison Title Geologist

2. Forwarded.

Signature Greg P. Harrison
Resident Engineer

CF: EXPOSURE HOURS:
Work Date: 1/25, 1/26, 1/27, 1/28 1/29
Non-work Date: _____

Man Hours:
Contr: 170
Subcontr: 5
Govt: 2
TOTAL: 177

NED FL 251

WEEKLY SAFETY MEETING

NEDSO

Date held 2-5-88

THRU: Area Engineer, New England Area

Time 6:30 - 7:00

TO: Safety Office, NED

Report No. D.O. 0003

1. Weekly safety meeting was held this date for the following personnel:

Contract No. /D.O.No. 0003 Contractor Atlantic Testing Laboratories, Ltd.

Conducted By Greg Hargrave All personnel present (Contr) 3
(Sub) -0-
(Govt) -0-

Subjects discussed (Note, delete, or add):
EM 385-1-1, Section: _____

Accident Prevention Plan

✓ Individual Protective Equipment - safty shoes, hard hat

✓ Prevention of Falls - watch slipping surfaces

✓ Back Injury, Safe Lifting Techniques - use proper equipment & legs

Fire Prevention -

✓ Sanitation, First Aid, Waste Disposal - Keep workarea neat.

✓ Tripping Hazards - trash, hose, nails in lumber -

Staging, Ladders, Concrete Forms, Safety Nets -

✓ Hand Tools, Portable Power Tools, Woodworking Machinery -

✓ Equipment Inspection & Maintenance (Zero Defects) -

✓ Hoisting Equipment - Zero defects

✓ Ropes, Hooks, Chains and Slings - Zero defects

Electrical Grounding, Temporary Wiring, GFCI -

✓ Lockouts for safe clearance procedures - electrical, pressure, moving parts -

Welding, Cutting -

Excavations -

✓ Loose Rock and Steep Slopes - watch footing !!!

Explosives -

Water Safety -

Toxic materials - hazards, MSDS, respiratory, ventilation -

Other -

Prepared by G. Hargrave Title Geologist

2. Forwarded.

Signature Glenn P. Hargrave
Resident Engineer

CF: EXPOSURE HOURS:
Work Date: 2/1, 2/2, 2/3, 2/4, 2/5
Non-work Date: _____

Man Hours:
Contr: 150.75
Subcontr: 3
Govt: 0
TOTAL: 153.75

NED FL 251

WEEKLY SAFETY MEETING

NEDSO

Date held 2-11-88

THRU: Area Engineer, New England Area

Time 6:30-7:00

TO: Safety Office, NED

Report No. _____

1. Weekly safety meeting was held this date for the following personnel:

Contract No. /D.O.No. 0003 Contractor Atlantic Testing Laboratories, Ltd.

Conducted By Greg Hargraves

All personnel present (Contr) 3
(Sub) 0
(Govt) 0

Subjects discussed (Note, delete, or add):
EM 385-1-1, Section: _____

Accident Prevention Plan

✓ Individual Protective Equipment - hard hat, glasses, gloves, proper work clothing

✓ Prevention of Falls - watch slippery slopes

✓ Back Injury, Safe Lifting Techniques - use legs

Fire Prevention -

✓ Sanitation, First Aid, Waste Disposal - keep work area neat

✓ Tripping Hazards - trash, hose, nails in lumber -

Staging, Ladders, Concrete Forms, Safety Nets -

Hand Tools, Portable Power Tools, Woodworking Machinery -

✓ Equipment Inspection & Maintenance (Zero Defects) -

✓ Hoisting Equipment -

✓ Ropes, Hooks, Chains and Slings -

Electrical Grounding, Temporary Wiring, GFCI -

Lockouts for safe clearance procedures - electrical, pressure, moving parts -

Welding, Cutting -

Excavations -

✓ Loose Rock and Steep Slopes - watch footing

Explosives -

Water Safety -

Toxic materials - hazards, MSDS, respiratory, ventilation -

Other -

Prepared by Gregory P. Hargraves Title Geologist

2. Forwarded.

Signature Gregory P. Hargraves
Resident Engineer

CF: EXPOSURE HOURS:
Work Date: 2/8, 2/9, 2/10, 2/11, 2/12
Non-work Date: _____

Man Hours:
Contr: 133.5
Subcontr: - 3 -
Govt: - 5 -
TOTAL: 141.5

NED Form 251

WEEKLY SAFETY MEETING

NEDSO

Date held 2-19-88

THRU: Area Engineer, _____ Area

Time 6:45 - 7:15

TO: Safety Office, NED

Report No. _____

1. Weekly safety meeting was held this date for the following personnel:

Contract No. /D.O.No. 0003 Contractor Atlantic Testing Laboratories, Ltd.

Conducted By Greg Hargrave All personnel present (Contr) 3
(Sub) 0
(Govt) 0

Subjects discussed (Note, delete, or add):
EM 385-1-1, Section: _____

Accident Prevention Plan

✓Individual Protective Equipment - hard hat, safty shoes, gloves

✓Prevention of Falls - watch slippery slopes

✓Back Injury, Safe Lifting Techniques - use proper equipment

Fire Prevention -

✓Sanitation, First Aid, Waste Disposal - keep work area neat

✓Tripping Hazards - trash, hose, nails in lumber -

Staging, Ladders, Concrete Forms, Safety Nets -

Hand Tools, Portable Power Tools, Woodworking Machinery -

✓Equipment Inspection & Maintenance (Zero Defects) -

✓Hoisting Equipment -

✓Ropes, Hooks, Chains and Slings -

Electrical Grounding, Temporary Wiring, GFCI -

✓Lockouts for safe clearance procedures - electrical, pressure, moving parts -

Welding, Cutting -

Excavations -

✓Loose Rock and Steep Slopes -

Explosives -

Water Safety -

Toxic materials - hazards, MSDS, respiratory, ventilation -

Other -

Prepared by G. Hargrave Title Geologist

2. Forwarded.

Signature Gregory R. Hargrave
Resident Engineer

CF: EXPOSURE HOURS:
Work Date: 2/15, 2/16, 2/17, 2/18, 2/19
Non-work Date: _____

Man Hours:
Contr: 140
Subcontr: - 3 -
Govt: - 0 -
TOTAL: ~~140~~ 143

NED Form 251

WEEKLY SAFETY MEETING

NEDSO

Date held 2-23-88

THRU: Area Engineer, New England Area

Time 6:30-7:00

TO: Safety Office, NED

Report No. _____

1. Weekly safety meeting was held this date for the following personnel:

Contract No. /D.O.No. 0003 Contractor Atlantic Testing Laboratories, Ltd.

Conducted By Greg Hargrave All personnel present (Contr) - 3 -
(Sub) - 0 -
(Govt) - 0 -

Subjects discussed (Note, delete, or add):
EM 385-1-1, Section: _____

Accident Prevention Plan

✓ Individual Protective Equipment - Hard hat, safety shoes

✓ Prevention of Falls - watch footing on slippery slopes

✓ Back Injury, Safe Lifting Techniques - use legs, not back when lifting heavy objec

Fire Prevention -

✓ Sanitation, First Aid, Waste Disposal - keep work area neat

✓ Tripping Hazards - trash, hose, nails in lumber - " "

Staging, Ladders, Concrete Forms, Safety Nets -

Hand Tools, Portable Power Tools, Woodworking Machinery -

✓ Equipment Inspection & Maintenance (Zero Defects) - zero defects

✓ Hoisting Equipment - zero defects

✓ Ropes, Hooks, Chains and Slings -

Electrical Grounding, Temporary Wiring, GFCI -

Lockouts for safe clearance procedures - electrical, pressure, moving parts -

Welding, Cutting -

Excavations -

✓ Loose Rock and Steep Slopes - watch footing

Explosives -

Water Safety -

Toxic materials - hazards, MSDS, respiratory, ventilation -

Other -

Prepared by Greg Hargrave Title Geologist

2. Forwarded.

Signature Greg R. Hargrave
Resident Engineer

CF: EXPOSURE HOURS:
Work Date: 2-22, 2-23, 2-24, 2-25
Non-work Date: 2-21, 2-26

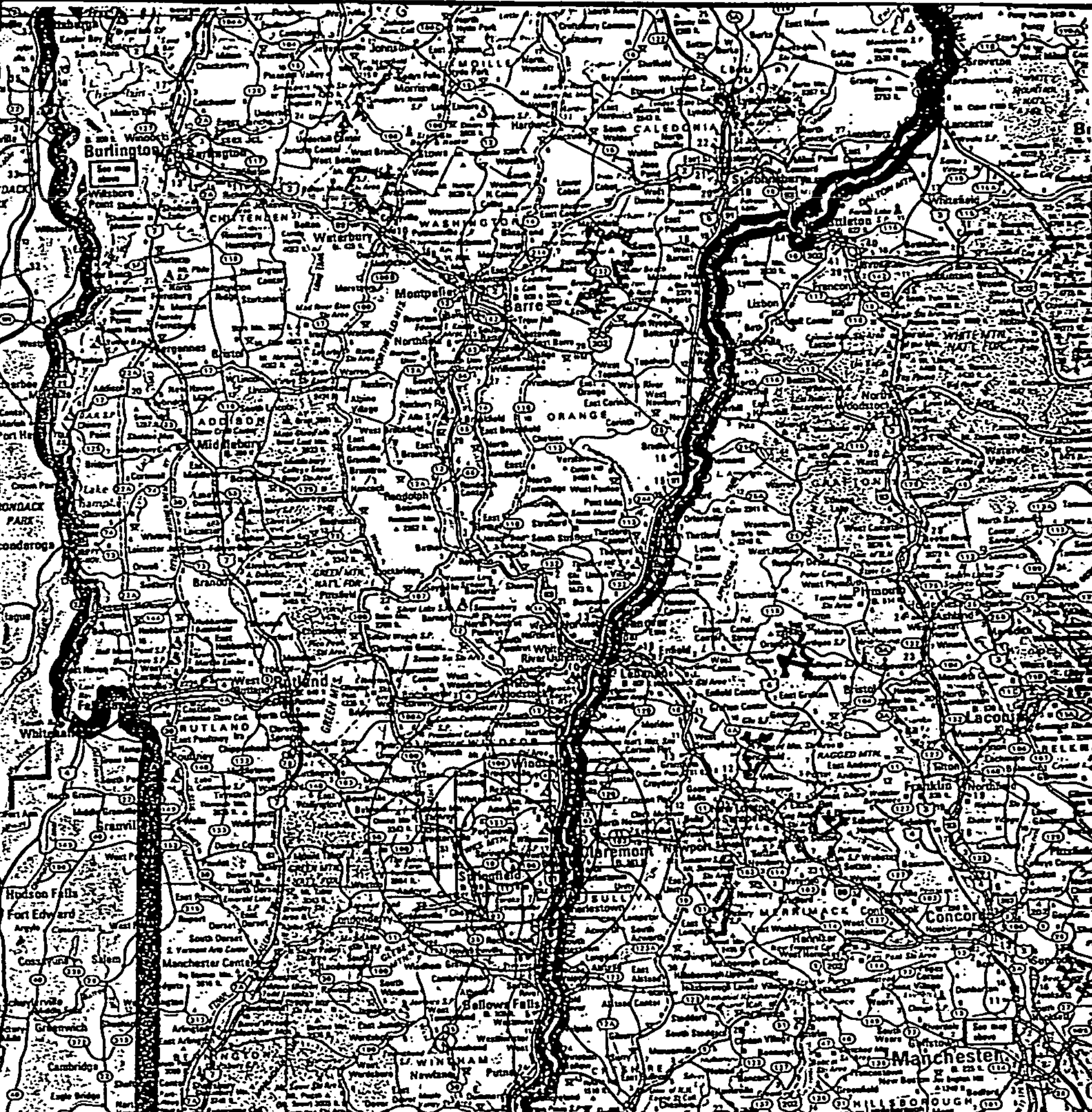
Man Hours:
Contr: 108
Subcontr: 3
Govt: 0
TOTAL: 111

NED APP FL 251

SECTOIN 8 - FIELD INSPECTORS' LOGS

a. Figure 1 - General Project Map

GENERAL PROJECT MAP



PROJECT No CD030	***SCALE:*** NONE	North Springfield, Vermont

b. Figure 2 - Site Location Map

SITE LOCATION MAP

PROJECT No. CD030	SCALE: 1:24000	U.S.G.S. QUADRANT: USGS Quadrant Chester, Vermont.

c. Figure 3 - Boring Location Map

LEGEND

STA 'H'	CONTROL POINT, U.S.A.C.E. SURVEY AS SHOWN ON DRAWING NO. SUR-425 OCTOBER, 1987
FD88-4	BORING LOCATION
PZ-14	PIEZOMETER LOCATION

BY	REVISION	DATE

PROJECT NUMBER

DRAWN

CHECKED

SCALE 1" = 100'

DATE 4/19/88

DRWNG.NO.

PIEZOMETER AND BORING LOCATION PLAN
NORTH SPRINGFIELD DAM
NORTH SPRINGFIELD, VERMONT

PREPARED FOR:
U.S. ARMY CORPS OF ENGINEERS

ATLANTIC TESTING LABORATORIES, Limited
P.O. BOX 29, CANTON, NEW YORK (315) 386-4578
CICERO, N.Y. ENDICOTT, N.Y. BURLINGTON, VT. MANCHESTER, N.H.

d. Boring Logs

CORPS OF ENGINEERS, U. S. ARMY
NEW ENGLAND DIVISION
FOUNDATION AND MATERIALS BRANCH

FIELD LOG OF TEST BORING

PROJECT NO. D.O. 0003

Site North Springfield Dam, No Springfield Vt

Page 1 of 9 Pages

Hole No. FD-88-1 (PZ-16) Diam. (Casing) HW (4")

Boring Started January 20, 1988

Co-ordinates: N 51276 E 50169

Boring Completed January 25, 1988

Drilled by Hawkins + Burham

Report Submitted March 8, 1988

Purpose of Exploration To monitor seepage at downstream right abutment area

Elevation Top of Hole 500.1' M.S.L.

Total Overburden Drilled 37.8 Feet

Elevation Top of Rock 462.3' M.S.L.

Elevation Bottom of Hole 447.3 M.S.L.

Total Rock Drilled 15 Feet

Total Depth of Hole 52.8 Feet

Core Recovered 94 %

Core Recovered 13 Ft.: Diam. 2 1/8 In. NX

Soil Samples 2 3/8 In. Diam. 16 No.

Soil Samples In. Diam. No.

Casing Left in Place 10 Feet

Water Table Depth 37.6'

Depth From	Depth To	Method of Drilling and Type of Bit Used
0	37.8	Advanced HW casing with 300 lbs Hammer
0	39.0	Advanced 3 7/8 O.D. roller bit with water
39.0	52.8	NX diamond core
0	45.2	Casagrande piezometer installed with tip depth of 45.2'

INDEX

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Boring Location Sketch Back of Page 8
Overburden Record page 2 though Page 4
Rock Drilling Page 6
Piezometer Installation Report Page 7
Piezometer Installation Detail Page 9
Page

Prepared by Gregory R. Hargrave
Field Data Lab. Data

Submitted by Atlantic Testing Laboratories Limited

NED FORM DEC 63 121

REPLACES EDITION OF JUN 51 WHICH MAY BE USED UNTIL EXHAUSTED

U. S. ARMY
CORPS OF ENGINEERS
NEW ENGLAND DIVISION

FIELD LOG OF TEST BORING

Site North Springfield Vt — Page 2 of 9 Pages

Boring No. FD88-1 (FD 88-1, PZ-16) Desig: FD-A Diam. (Casing) HW

Co-ordinates: N 51276 E 50169

Elevation Top of Boring 500.1 M.S.L.
Total Overburden Drilled 37.8 Feet
Elevation Top of Rock 462.3 M.S.L.
Total Rock Drilled 15 Feet
Elevation Bottom of Boring 447.3 M.S.L.
Total Depth of Boring 52.8 Feet
Core Recovered 94 % No. Boxes
Core Recovered 13 Ft: NX Diam. 2 1/8 in.
Soil Samples in. Diam. No.
Soil Samples 2 3/8 in. Diam. 16 No.

Hammer Wt. 300 lbs
Hammer Drop 18"
Casing Left 10'
Subsurface Water Data: 0 Page 8
Obs. Well 9
Drilled By Hawkins + Burnham
Mfg. Des. Drill CME 850
Inspected By: Greg Hargrave
Classification By: Greg Hargrave
Classification By:

Boring Started 1/20/88
Boring Completed 1/25/88

DEPTH 1" = 2'	CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER FT. CORE RECV'Y	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
1' 2' 3' 4' 5' 6' 7' 8' 9' 10'					Advanced HW casing to 10' using 300 lbs hammer with 18" drop. Cleaned casing with 3 7/8" roller bit and water	A: Coarse granular material

GENERAL REMARKS:
Advanced casing to 10' then started sampling

NED FORM 58 (Test) MAR 71

Boring No. FD-88-1

Site	Boring No.	Page 3 of 9
North Springfield, Vt	FD-88-1	

DEPTH		CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER 6" OR CORE RECV	6" SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
10' 11.5'		S-1	2 3/8"		2 4 3	Sampled with 2 3/8" I.D. spoon advanced with 300 lbs. hammer	grey brown c m SAND some GRAVEL (wet, non plastic) SP
13'		S-2	2 3/8"		3 4 5	Sample	Similar Soils - SP
15'		S-3	2 3/8"		4 4 5 4	Sample Drive HW casing to 31.5' using 300 lbs. hammer Clean casing using 3 7/8" OD rotary bit and water	Similar Soils - SP
16.5		S-4	2 3/8"		8 7 6	Sample	Similar Soils - SP
18'		S-5	2 3/8"		3 6 7	Sample	Similar Soils - SP
20'		S-6	2 3/8"		10 15 13 15	Sample Drive casing to 20', clean casing to 20'	grey-brown cmf SAND, some GRAVEL, trace SILT (wet, non-plastic) SM
21.5		S-7	2 3/8"		20 21 5	Sample	Similar Soils - SM
22' 23'		S-8	2 3/8"		6 8 8	Sample	Grey-Brown GRAVEL, and cmf SAND, trace SILT GM
25'		S-9	2 3/8"		8 20 10 11	Sample Drive Casing to 25' Clean casing to 25'	Similar Soil GM
26.5'		S-10	2 3/8"		26 32 9	Sample [illegible]	Grey-Brown GRAVEL, some cmf SAND, trace SILT, trace CLAY (wet, very slightly plastic) GC
					32	Sample	

Site: North Springfield, Vt

Boring No. FD-88-1

DEPTH	1' 2'	CORE/SAMPLE NO	~~SIZE~~ I.D.	~~DEPTH~~ RQD	BLOWS PER FT. / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
27 / 28'		S-11	2 3/8"	Rec	29 / 34	Note: lost S.P.S. shoe down hole. End of exploration 1/20/88	Soil, Sample similar to Sample # 8 · GM
30'						Resume exploration 1/21/88. Advanced 3 7/8" roller bit to 30'. Advanced HW casing with 300 lbs hammer to 30'. Note: No sample taken from 28' to 30' as driller attempted to clear S.P.S. shoe out of boring	Grey-Brown cmf SAND, little GRAVEL, (wet non-plastic) SW
31.5'		S-12	2 3/8"	75%	5 / 12 / 23	Sampled	Similar soils- SW
33'		S-13	2 3/8"	100%	11 / 10 / 8	Sampled.	Similar soils- SW
35'		S-14	2 3/8"	80%	10 / 8 / 8 / 7	Sampled. Advanced HW casing to 35.0' using 300 lbs hammer, cleaned casing to 35' using 3 7/8" roller bit and water	Similar soils (trace SILT) SW
36.5		S-15	2 3/8"	30%	10 / 8 / 8	Sampled	
37.8		S-16	2 3/8"	80%	8 / 15 / 30/.3'	Sampled. Advanced casing to 37.8'. Advanced 3 7/8" roller bit to 39' with water	
25 / 39'						Note: advanced roller bit through 1.2' of rock, bed rock at 37.8'	Schist
39'	↓	↓	↓	↓	↓		
40' / 42'		R-1	NX	93%		NX Diamond Core using water 39' to 44'	13 pieces, some fragments. RQD = 65%

Site: North Springfield U4

Boring No: FD-88-1

DEPTH	CORE/SAMPLE No.	I.D.	Rec	CORE REC'V	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
44'						
45'					NX Diamond Core with water 44' to 47.8'	Similar Rock 3 pieces RQD = 90%
46'	R-2	NX	90%			
47						
47.8'					End of Exploration 1/21/88	
					Exploration Continued 1/25/88	
48'					NX Diamond Core with water 47.8 to 52.8	Similar Rock 3 pieces RQD = 96
50	R-3	NX	98%			
52.8'					Exploration Terminated 1/25/88	
					Bottom of Boring 52.8'	

FIELD LOG OF TEST BORING IN ROCK

SITE North Springfield Dam Vt HOLE NO. FD 88-1 PZ-16 PAGE 6 of 9

DATE	DEPTH FT. FROM	DEPTH FT. TO	RUN FT.	RUN REC'V'Y FT.	REC'V'Y %	DRILLING BEHAVIOR: FEED	DRILLING BEHAVIOR: WATER	DRILLING BEHAVIOR: REASON FOR PULL	ACTUAL DRILLING TIME	BIT NO. SIZE AND TYPE	ADDITIONAL REMARKS
1/21/88	39.0	44.0	5.0	4.7	93%	100psi	Slight loss at one point	5' run	≈ 90min	NX Diamond	Run #1; bit loosened up causing slight loss of water
1/21/88	44.0	47.8	3.8	3.4	90%	125psi	No loss	3.8' run	≈ 50min	NX Diamond	Run #2
1/25/88	47.8	52.8	5.0	4.9	98%	300psi	No loss	5' run	≈ 75min	NX Diamond	Run #3

TOTAL BED ROCK DRILLED 13.8 FEET

TOTAL BED-ROCK RECOVERED 13.0 FEET

BED ROCK RECOVERY 94% PERCENT

DRILLER Hawkins

INSPECTOR Greg Hargrave

NED FORM DEC 130

REPLACES EDITION OF APR 63 WHICH MAY BE USED UNTIL EXHAUSTED

PIEZOMETER INSTALLATION REPORT

PROJECT: North Springfield Dam | DATE. 1/26/88

LOCATION (~~STA~~ N): 51276 | OFFSET FROM CENTER LINE: E 50169 | PIEZ NO.: PZ-161 (FD88-1)

PIEZ TYPE: Casengrande | DEPTH OF PIEZ: 42.5' | RISER PIPE DIAM: 3/4"

PIEZ TIP SET IN (SOIL TYPE): Bed rock | SOIL SAMPLE NO.: | BORING DIAM.: 4" in over burden, 3" in bedrock

METHOD OF INSTALLATION:

TYPE OF PROTECTION FOR PIEZ: 4" casing | VENT: Screw on cap

GROUND ELEV.: 500.1 | ELEV. TOP OF RISER: 501.6 | ELEV PIEZ TIP: 454.9'

FILTER: #4 SAND | FROM ELEV: 452.4 | TO ELEV: 486.6

SEAL: Bentonit Pellets | FROM ELEV: 486.6 | TO ELEV: 491.4

INSTALLED BY: Hawkins | CONTRACT NO.: DO 0003 | FOREMAN: Hargrave

DATE OF INSTALLATION: 1/26/88 | DATE OF OBSERVATIONS: 1/26/88

METHOD OF TESTING PIEZ.: Falling Head Test

TIME	ELAPSED TIME MINUTES	DEPTH TO WATER FEET	TIME	ELAPSED TIME MINUTES	DEPTH TO WATER FEET	TIME	ELAPSED TIME MINUTES	DEPTH TO WATER FEET
	0	0.0'		0	0		2.5	38.15'
	1	36.0'		0.5	33.0'		3.0	38.15'
	3	38.15'		1.0	36.7'		3.5	38.2'
	5	38.2'		1.5	37.6'		4.0	38.2'
	10	38.3		2.0	38.0'		4.5	38.2'
							5.0	38.25

REMARKS:

We performed 2 falling head test the first test had following time intervals 0, 1, 3, 5, and 10 minutes

The second test we used the following time intervals 0, 0.5, 1, 1.5, 2, 2.5, 3, 3.5, 4, 4.5, 5 minutes

Gregory R. Hargrave
INSPECTOR

Site: North Springfield Vt.
Boring No: FD-88-1

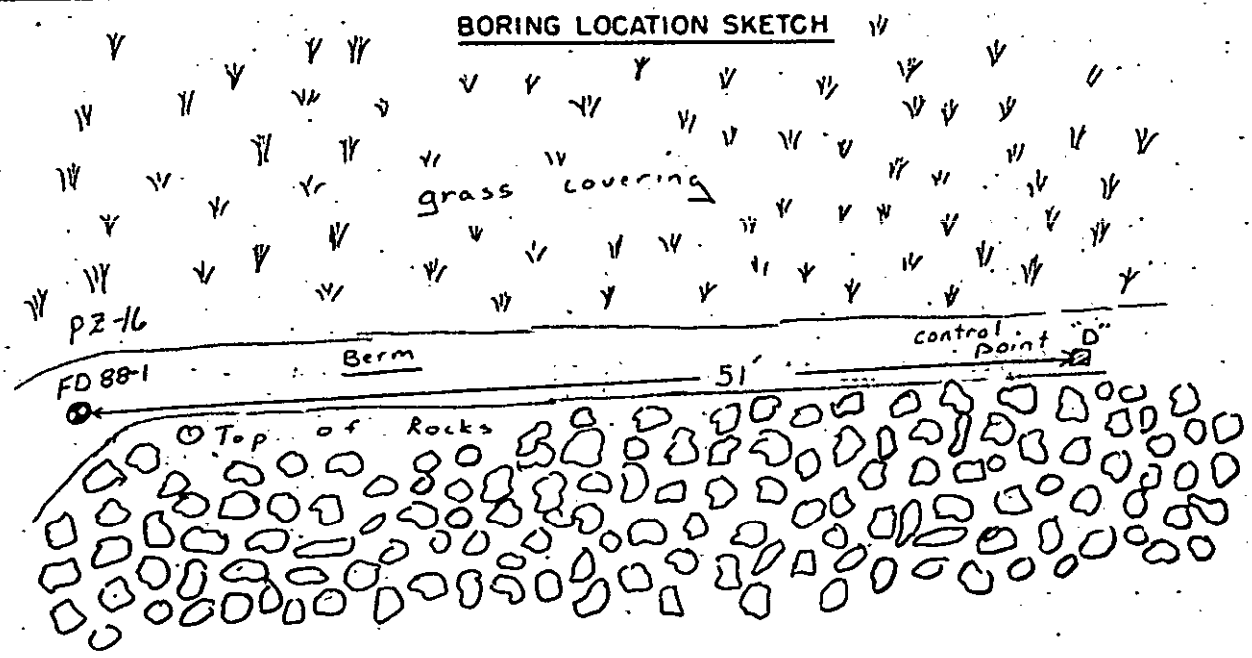
SUBSURFACE WATER OBSERVATIONS

DATE	TIME	DEPTH-BOT. OF CASING	DEPTH-BOT. OF BORING	DEPTH TO WATER	ELEVATION WATER	REMARKS
1/27/88	9:00am	8.5'	47.7	37.6	462.5'	
1/28/88	3:30pm	8.5'	47.7'	37.6'	462.5'	
2/3/88	5:00pm	8.5'	47.7	37.6'	462.5'	
2/4/88	12:15pm	8.5'	47.7	37.65	462.45	
2/9/88	3:30pm	8.5'	47.7	37.5'	462.6	
2/10/88	7:20am	8.5'	47.7	37.6'	462.5'	
2/12/88	6:30am	8.5'	47.7	37.6'	462.5'	
2/16/88	9:05am	8.5'	47.7	37.6'	462.5'	
2/17/88	7:15am	8.5	47.7	37.6'	462.5'	
2/19/88	8:05Am	8.5'	47.7	37.6	462.5'	
2/18/88	8:05Am	8.5	47.7	37.6'	462.5'	
2/24/88	8:35Am	8.5'	47.7'	37.6'	462.5'	

Note: Depths are in feet below original ground

39.1
1.5
37.6

BORING LOCATION SKETCH



Boring No. FD-88-1

TLANTIC TESTING LABORATORIES, LIMITED

MONITORING WELL INSTALLATION DETAIL

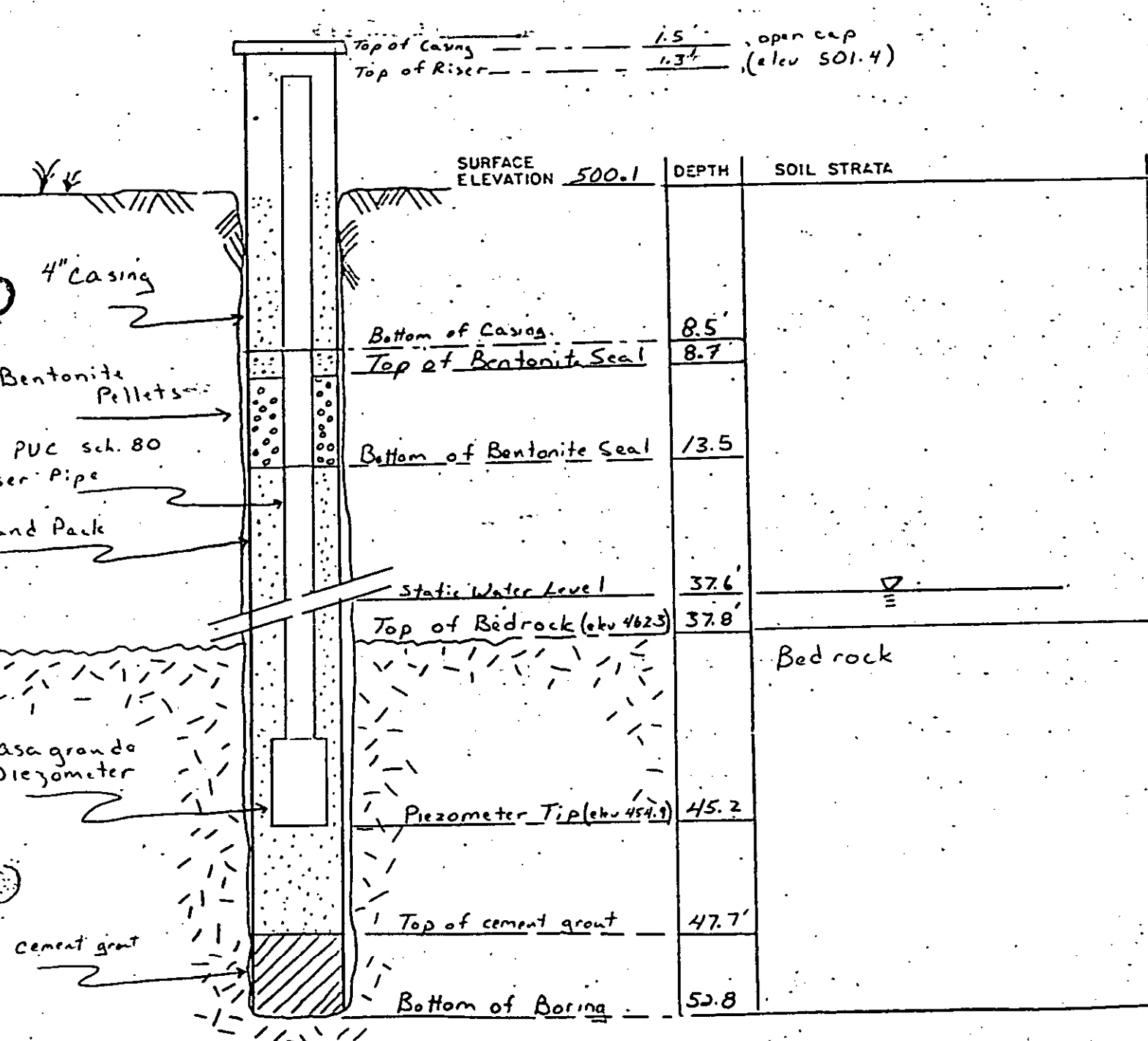
PROJECT: North Springfield Vt.

PROJECT NO. CD 030

CLIENT: USACE

WELL NO. FD 88-1

Piezometer No. PZ-16



CORPS OF ENGINEERS, U. S. ARMY
NEW ENGLAND DIVISION
FOUNDATION AND MATERIALS BRANCH

FIELD LOG OF TEST BORING

PROJECT NO. DD.000.3

Site North Springfield Dam, No Springfield Vt — Page 1 of 10 Pages

Hole No. FD-88-2 PZ-20 Diam. (Casing) HW (4") — Boring Started January 20, 1988

Co-ordinates: N 51460 E 50022 — Boring Completed 2/2/88

Drilled by Hawkins + Fox — Report Submitted March 8, 1988

Purpose of Exploration To monitor seepage at downstream right abutment area

Elevation Top of Hole 552.22 M.S.L.
Total Overburden Drilled 120' Feet
Elevation Top of Rock 432.22 M.S.L.
Elevation Bottom of Hole 416.72 M.S.L.
Total Rock Drilled 20.5 Feet
Total Depth of Hole 135.5 Feet
Core Recovered 89 %
Core Recovered 17.7 Ft.: NX Diam. 2 1/8 In.
Soil Samples 1 3/8 In. Diam. 12 No.
Soil Samples 2 3/8 In. Diam. 4 No.

Casing Left in Place 10 Feet

Water Table Depth 91.9'

Depth From	Depth To	Method of Drilling and Type of Bit Used
0	68	Advanced HW casing using 300 lb hammer
		cleaned casing with 3 7/8" O.D. roller bit
68'	120.5	Advanced 3 7/8" O.D. roller bit using
		"Clear Mud" Drilling fluid
101.5	106'	Cored with NX diamond bit
120.5	135.5	Cored with NX diamond bit
60.0	119.0	Sampled continuously with excavation
		at when encountered cobbles and gravel

INDEX

Ground Water — Back of Page 9
Boring Location Sketch — Back of Page 9
Overburden Record — page 2 thru — Page 6
Rock Drilling — Page 7
Piezometer Installion Detail — Page 11
Piezometer Installion Report — Page 8
— Page

Prepared by Gregory R. Hargrave — Field Data — Lab. Data

Submitted by Atlantic Testing Laboratories Limited

NED FORM DEC 63 121 — REPLACES EDITION OF JUN 51 WHICH MAY BE USED UNTIL EXHAUSTED

U. S. ARMY
CORPS OF ENGINEERS
NEW ENGLAND DIVISION

FIELD LOG OF TEST BORING

Site North Springfield, Vt — Page 2 of 10 Pages

Boring No. FD 88-2 PZ-20 Desig. FD-C Diam. (Casing) HW (4")

Co-ordinates: N 51460 E 50022

Elevation Top of Boring 552.22 M.S.L.
Total Overburden Drilled 120 Feet
Elevation Top of Rock 432.22 M.S.L.
Total Rock Drilled 20.5 Feet
Elevation Bottom of Boring 416.72 M.S.L.
Total Depth of Boring 135.5 Feet
Core Recovered 89 % No. Boxes
Core Recovered 17.7 Ft. NX Diam. 2 1/8 In.
Soil Samples 1 3/8 In. Diam. 12 No.
Soil Samples 2 3/8 In. Diam. 4 No.

Hammer Wt. 140 Boring Started 1/20/88
Hammer Drop 30" Boring Completed 2/2/88
Casing Left 10'
Subsurface Water Data Page
Obs. Well
Drilled By Hawkins + Fox
Mfg. Des. Drill CME 75
Inspected By: Greg Hargrave
Classification By: Greg Hargrave
Classification By:

DEPTH	1" = 2'	CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER 6" / CORE RECV'Y	6" SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
0						Advanced HW casing to 40' using 300 lbs hammer, Advanced 3 7/8" roller bit to 40'	Coarse granular material
40'						END OF EXPLORATION 1/20/88	
60'						Continued EXPLORATION 1/21/88 Advanced casing and roller bit to 60'	
62'		S-1	1 3/8"		45 62 61 54	Sampled with 1 3/8" ID split spoon sampler, advanced with 140 lbs hammer Advanced 3 7/8" roller-bit using clear Mud drilling fluid to 62' Advanced casing to 62'	Grey cmf SAND; some GRAVEL; trace SILT (wet, non-plastic) SW
64'		S-2	1 3/8"		40 49 59 62	Sampled	Similar soil, SW
65.5'		S-3	1 3/8"		42 50 175	Sampled Advanced roller bit to 66' using "Clear Mud" drilling fluid Advanced casing to 66'	Similar Soil, SW
66'							
68'		S-4	1 3/8"		21 38 26 18	Sampled	Similar Soil, SW

GENERAL REMARKS:
The first 60' was advanced without sampling

Site	Boring No.	Page 3 of 10
North Springfield Lt	FD 88-2	

DEPTH	1" 2"	CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER 6" / CORE RECVY	6" SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
68'		S-5	1 3/8"	Rec.	16 19 31 40	Sampled Advanced roller bit to 70' using "Clear Mud" drilling fluid. Advanced HW casing to 68'	Similar Soil, trace GRAVEL SW
70'							
71.5'		S-6	1 3/8"		38 83 100/6"	Sampled Advanced roller bit to 72' using "Clear Mud" drilling fluid	Soil Similar to Sample #1 SW
72'							
72.3'		S-7	1 3/8"		100/4"	Sampled Advanced roller bit to 74' using "clear mud" drilling fluid END OF EXPLORATION 1/21/88	Soil similar to sample #5, SW
74'							
74.2'		S-8	1 3/8"		100/3"	EXPLORATION CONTINUED 1/22/88 Sampled Advanced roller bit to 78' using "clear Mud" drilling fluid	Grey cm f SAND, some SILT, trace GRAVEL (wet, non-plastic) SM
76'							
78'		S-9				Did Not sampled due to gravel and possible cobbles	gravel and possible cobbles
80'		S-9	1 3/8"		20 19 35 17	Sampled	Soil similar to sample #1, SW
82'		S-10	1 3/8"		19 18 27 54	Sampled Advanced roller bit to 82' using "Clear Mud" drilling fluid	Similar Soil, SW
84'		S-11	1 3/8"		21 28 30 41	Sampled END OF EXPLORATION 1/22/88	Similar Soil, SW
		S-12	1 3/8"	83%	41 86	Exploration Continued 1/26/88 Sampled	Similar Soil, SW

Site: North Springfield Vt

Boring No. FD 88-2

DEPTH 1	DEPTH 2	CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER 6" / CORE REC'VY	6" SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
85.8'			1 3/8"	Rec	81 100/4"		
88'		S-1				No sample taken due to gravel and possible cobbles	possible gravel and cobbles
89						No Sample taken due to coarse material Advanced 3 7/8" roller bit to 89' with "Clear Mud" drilling fluid	
90'		S-13	2 3/8"	60%	150 163	Sample	Grey GRAVEL and cmf SAND; little SILT (wet, non-plastic) GW
92'		S				No sample taken due to coarse material Advanced 3 7/8" roller bit to 92' with "Clear Mud" drilling fluid	possible cobbles and gravel
94.2'		S-14	2 3/8"	50%	52 43 61 89 100/2"	Sample	Soil similar to sample # 13 GW
94.5'						No Sample due to coarse material Advanced roller bit to 94.5'	possible gravel and cobbles
95'			2 3/8"	0%	150/6"	Sampled	
97'						No Sample due to coarse material. Advanced 3 7/8" roller bit to 97.5' using "Clear Mud".	possible gravel and cobbles
99'		S-15	2 3/8"	100%	46 65 80 130	Sampled	Grey cmf SAND; and GRAVEL; little SILT, (wet, non plastic) SP
101'						No Sample due to coarse material Advanced 3 7/8" roller bit to 101'	possible gravel and cobbles
		R-1	NX	70%			cobbles and granular soils

Site	Boring No.	Page 5 of 10
North Springfield Dam VT	FD 88-2	

DEPTH	CORE/SAMPLE NO.	SIZE	DEPTH RAND / CORE REC'VY	BLOWS PER FT.	6" SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
100'	R-1	NX	Rec. 70%		NX Diamond core with water 101' to 106'	
106'						
106.5'	S-16	1 3/8"	25%	100/6"	Sample END of EXPLORATION 1/28/88	Grey cmf SAND, little SILT, trace GRAVEL (wet, non-plastic) SM
108'	S	1 3/8"	25%		Advanced 3 7/8" roller bit to 108' using "Clear Mud" drilling fluid. Note: Loss of water from 101.5'-105' End of Exploration 1/28/88	
110'	S-17	1 3/8"	67%	54 71 66 135	Exploration continued 2/2/88 Sampled	Grey cmf SAND; trace GRAVEL; trace SILT (wet, non-plastic) SP
110.2		1 3/8	0%	200/3"	Sampled Advanced 3 7/8" roller bit to 112' using "clear mud" drilling fluid	Possible coarse GRAVEL and COBBLES
112'						
112.8'	S-18	1 3/8	10%	94 200/3"	Sampled	Grey cmf SAND; some SILT; trace GRAVEL, wet, non-plastic SM
114'					Advanced 3 7/8" roller bit to 114' using "clear mud" drilling fluid	Possible coarse GRAVEL and COBBLES
114.8'	S-19	1 3/8	30%	94 200/1"	Sampled	Soils similar to Sample # 18 SM
116'						Possible coarse GRAVEL and COBBLES
116.8'	S-20	1 3/8	45%	99 200/3"	Sampled Advanced 3 7/8 roller bit to 118' using "Clear Mud" drilling fluid	Soil Similar to Sample # 18 SM
118'						Possible GRAVEL and Cobbles
	S-21	1 3/8	50%	86 150	Sampled Advanced 3 7/8" roller bit to 120.5' using "Clear Mud" drilling fluid	Soil Similar to Sample # 18 SM

Site	Boring No.	Page 6 of 10
North Springfield Dam	FD 88-2	

DEPTH	CORE/SAMPLE NO.	SIZE	DEPTH X RQD	BLOWS PER FT. / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
119'			Re			
120'						
120.5'						Bedrock
120	R-2	NX	100%		NX Diamond Core 120.5' to 125.5'	Grey Gneiss 10 pieces, some fragments RQD = 90% Note: vertical fractures
125.5						
125	R-3	NX	98%		NX Diamond Core 125.5' to 130.5'	Similar Rock 9 pieces, some fragments RQD = 78% Note: vertical fractures
130.5						
130	R-4	NX	86%		NX Diamond Core 130.5' to 135.5'	Similar Rock 12 pieces RQD = 64%
135.5'					Exploration Terminated 3/2/88	
					Bottom of Boring 135.5'	

FIELD LOG OF TEST BORING IN ROCK

SITE North Springfield Dam, VT HOLE NO. FD 88-2 PZ-20 PAGE 7 of 10

DATE	DEPTH PT. FROM	DEPTH PT. TO	RUN PT.	RUN REC'V'Y PT.	REC'V'Y %	DRILLING BEHAVIOR: PEED	DRILLING BEHAVIOR: WATER	DRILLING BEHAVIOR: REASON FOR PULL	ACTUAL DRILLING TIME	BIT NO. SIZE AND TYPE	ADDITIONAL REMARKS
1/26/88	101.0'	106.0'	5'	3.5'	70%	250psi	lost water @ 102.4'	5' run	≈ 80 min	NX Diamond	Run #1, Coulers was through cobbles and soil
2/1/88	120.5	125.5	5'	5'	100%	300psi	no loss of water	5' run		NX Diamond	Run #2 samples contains vertical fractures
2/1/88	125.5	130.5	5'	4.9'	98%	300psi	no loss of water	5' run		NX Diamond	Run #3, sample contains vertical fractures
2/1/88	130.5	135.5	5'	4.3	86%	400psi	no loss of water	5' run		NX Diamond	Run #4, sample contains vertical fractures

TOTAL BED ROCK DRILLED 20' FEET

TOTAL BED ROCK RECOVERED 17.7 FEET

BED ROCK RECOVERY 89 PERCENT

DRILLER Hawkins

INSPECTOR Hargrave

NED DEF FORM 130

REPLACES EDITION OF APR 63 WHICH MAY BE USED UNTIL EXHAUSTED

PIEZOMETER INSTALLATION REPORT

PROJECT: North Springfield Dam, North Springfield VT | DATE. 2/3/88

LOCATION (STA): N-51460 | OFFSET FROM CENTER LINE: E-50022 | PIEZ NO.: PZ-20 FD 88-2

PIEZ TYPE: Casagrande | DEPTH OF PIEZ: 120.5' | RISER PIPE DIAM: 3/4"

PIEZ TIP SET IN (SOIL TYPE): Filter Sand/Bedrock | SOIL SAMPLE NO.: | BORING DIAM: 3 3/8" in overburden, 3' in bedrock

METHOD OF INSTALLATION:

TYPE OF PROTECTION FOR PIEZ: 4" casing | VENT: screw on cap

GROUND ELEV.: 552.22' | ELEV. TOP OF RISER: 557.6' | ELEV PIEZ TIP: - 431.72'

FILTER: #4 filter sand (Q-rock) FROM ELEV: 426.22' TO ELEV: 449.22'

SEAL: Bentonite Pellets FROM ELEV: 449.22' TO ELEV: 460.72'

INSTALLED BY: Hawkins + Fox | CONTRACT NO.: D.O. 0003 | FOREMAN: Hargrave

DATE OF INSTALLATION: 2/2/88 | DATE OF OBSERVATIONS: 2/3/88

METHOD OF TESTING PIEZ.: Falling Head Test

TIME	ELAPSED TIME MINUTES	DEPTH TO WATER FEET	TIME	ELAPSED TIME MINUTES	DEPTH TO WATER FEET	TIME	ELAPSED TIME MINUTES	DEPTH TO WATER FEET
	1/2	38.9'	--	24	91.8			
	1	55.1'	-	34	91.8			
	5	77.5						
	10	89.2						
	15	91.4						

REMARKS:

24 hours prior to test drilling mud was deactivated with 2 gallons of bleach

Gregory R. Hargrave
INSPECTOR

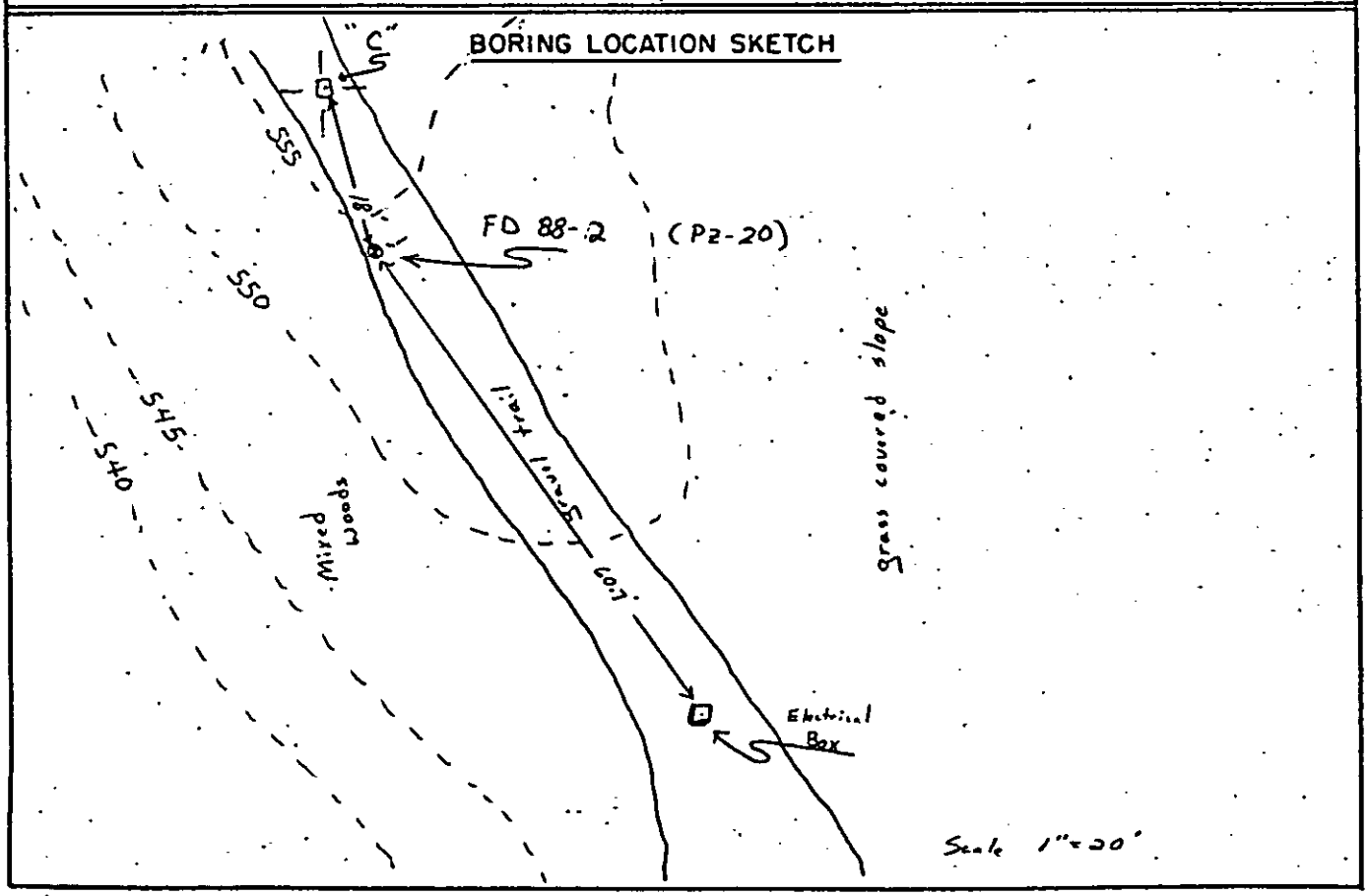
Site: North Springfield Dam, Vt
Boring No: FD 88-2

SUBSURFACE WATER OBSERVATIONS

DATE	TIME	DEPTH-BOT. OF CASING	DEPTH-BOT. OF BORING	DEPTH TO WATER	ELEVATION WATER	REMARKS
2/3/88	4:30pm	7.5'	126.0	91.9'	460.3	
2/4/88	11.15am	7.5	126.0	91.7'	460.5	
2/9/88	3:15pm	7.5	126.0	91.85'	460.37	
2/10/88	7:30am	7.5	126.0	91.8'	460.42	
2/16/88	9:15	7.5	126.0	92.0	460.22	
2/17/88	7:50	7.5	126.0	91.9'	460.3	
2/19/88	7:50	7.5	126.0	91.9'	460.3	
2/18/88	7:50	7.5	126.0	91.9	460.3	
2-24-88	8:15	7.5	126.0	91.9'	460.3	

Note: Depths are in feet below original ground

BORING LOCATION SKETCH

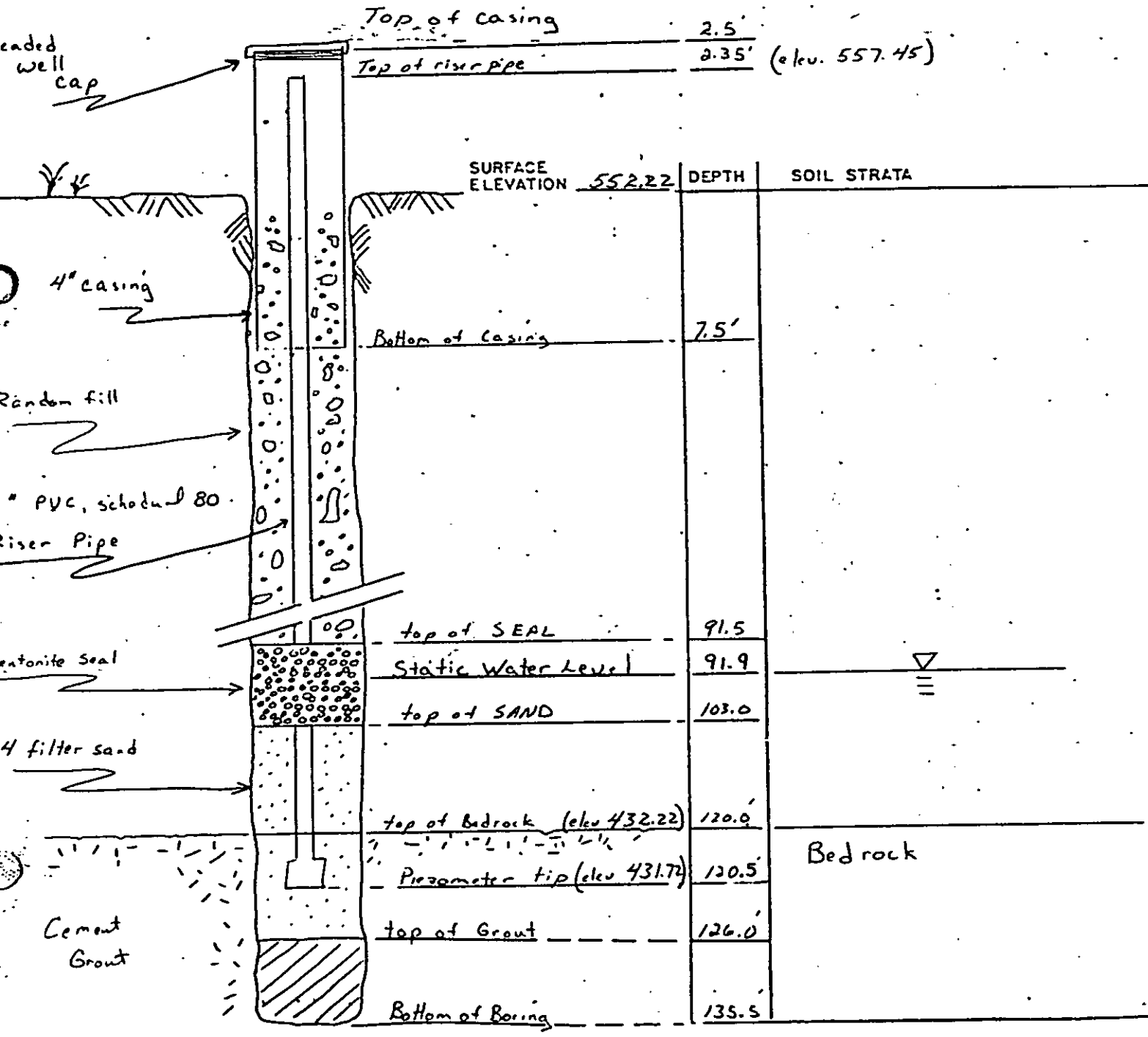


ATLANTIC TESTING LABORATORIES, LIMITED

PIEZOMETER INSTALLATION DETAIL

PROJECT: North Springfield Dam
North Springfield, Vt

PROJECT NO. D.O. 0003
ATL NO. CD 030
PIEZOMETER NO. FD 88-27
PZ-20



CORPS OF ENGINEERS, U. S. ARMY
NEW ENGLAND DIVISION
FOUNDATION AND MATERIALS BRANCH

FIELD LOG OF TEST BORING

PROJECT NO. D.O. 003

Site North Springfield Dam Vt — Page 1 of 9 Pages

Hole No. FD 88-3 PZ-15 Diam. (Casing) HW (4") — Boring Started 1/27/88

Co-ordinates: N 51448 E 50159 — Boring Completed 1/28/88

Drilled by Hawkins and Burnham — Report Submitted 3/8/88

Purpose of Exploration To monitor seepage at downstream right abutment area

Elevation Top of Hole 504.5 M.S.L.
Total Overburden Drilled 62.4 Feet
Elevation Top of Rock 442.1 M.S.L.
Elevation Bottom of Hole 427.3 M.S.L.
Total Rock Drilled 14.8 Feet
Total Depth of Hole 77.2 Feet
Core Recovered 100 %
Core Recovered 13.5 Ft.: NX Diam. 2 1/8 In.
Soil Samples ____ In. Diam. ____ No.
Soil Samples ____ In. Diam. ____ No.

Casing Left In Place 10 Feet

Water Table Depth 43.7'

Depth From	Depth To	Method of Drilling and Type of Bit Used
0	62.5	HW casing advanced with 300 lbs hammer
0	63.7	3 7/8" O.D. roller bit advanced
		with water
63.7	77.2	NX Diamond core

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Piezometer installation report	Page	7,8
Piezometer installation detail	Page	9
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Prepared by Gregory R. Horsegrove
Field Data — Lab. Data

Submitted by Atlantic Testing Laboratories, Limited

NED FORM DEC 63 121 — REPLACES EDITION OF JUN 51 WHICH MAY BE USED UNTIL EXHAUSTED

U. S. ARMY
CORPS OF ENGINEERS
NEW ENGLAND DIVISION

FIELD LOG OF TEST BORING

Site North Springfield Vt — Page 2 of 7 Pages

Boring No. FD 88-3 P245 Desig. FD 85-1 Diam. (Casing) HW (4")

Co-ordinates: N 51448 E 50159

Elevation Top of Boring 504.5 M.S.L.
Total Overburden Drilled 62.4' Feet
Elevation Top of Rock 442.1 M.S.L.
Total Rock Drilled 14.8 Feet
Elevation Bottom of Boring 427.3 M.S.L.
Total Depth of Boring 77.2 Feet
Core Recovered 100 % No. Boxes 1
Core Recovered 13.5 Ft. ____ Diam. ____ In.
Soil Samples ____ In. Diam. ____ No.
Soil Samples ____ In. Diam. ____ No.

Hammer Wt. 300 lbs Boring Started 1/27/88
Hammer Drop 18"
Casing Left 10' Boring Completed 1/28/88
Subsurface Water Data ____ Page ____
Obs. Well ____
Drilled By Hawkins and Burnham
Mfg. Des. Drill CME 850
Inspected By: Hargrave
Classification By: Hargrave
Classification By: ____

DEPTH		CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER FT. / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
	1" = 2'						
0'							
10'							
20'							
30'							
40'							
42'						Advanced HW casing with 300 lbs hammer to 55.5' Note: casing advanced relatively easy	
44'							
45'							

GENERAL REMARKS:
Note change in scale. 0-40': 1" = 20', 40-77.2': 1" = 2'

NED FORM 58 (Test) MAR 71

Boring No. FD 88-3

Site	Boring No.	Page 3 of 9
North Springfield Dam	FD 88-3	

DEPTH	CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER FT. / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
46						Coarse Granular material
48'						
50'						
52'					Advanced HW casing with 300 lbs hammer to 55.5' Note: casing advanced easily	
54'					Advanced 3 7/8" O.D. roller bit to 56.1' Note: loss of water @ 53.5' - 56.1'	
56'					Advanced casing to 58.1' with difficulty	Coarse Granular material possible cobbles and gravel
					Advanced roller bit to 60.1' no water loss	
58'					Note: roller bit cored through cobble from 58.2' to 58.7'	cobble
60'						
					Advanced casing to 62' with difficulty	
62'					Advanced roller bit to 63.7' Note: encountered bedrock at 62.4'	Bedrock

Site	Boring No.	Page 4 of 9
North Springfield Dam Vt	FD 88-3	

DEPTH		CORE/SAMPLE NO.	SIZE	DEPTH RAND / Rec	BLOWS PER FT. / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
63.7						END of EXPLORATION 1/27/88	
		R-1	NX	100%		EXPLORATION Continued 1/28/88 Note: hole filled in to ≈62.9' Advanced HW casing to 62.5' using 300 lbs hammer Cleaned casing with 3 7/8" roller bit and water to 63.7'	Rock 3 pieces RQD = 100%
67.2'						NX DIAMOND CORE with water to 77.2' 63.7 to 67.2 Note: No Loss of water during entire drilling sequence	
72.2'		R-2	NX	100%		NX DIAMOND CORE 67.2' to 72.2'	Similar Rock 9 pieces, some fragments RQD = 84%
77.2'		R-3	NX	100%		NX DIAMOND CORE 72.2 - 77.2 Exploration terminated 1/28/88	Similar Rock 12 pieces, some fragments RQD = 92%
						Bottom of Boring 77.2'	

8A(Test)

Boring No. FD 88-3

FIELD LOG OF TEST BORING IN ROCK

SITE North Springfield Vt. HOLE NO. FD 88-3 PAGE 5 of 9

P2-15

DATE	DEPTH PT. FROM	DEPTH PT. TO	RUN PT.	RUN REC'V'Y PT.	REC'V'Y %	DRILLING BEHAVIOR: FEED	DRILLING BEHAVIOR: WATER	DRILLING BEHAVIOR: REASON FOR PULL	ACTUAL DRILLING TIME	BIT NO. SIZE AND TYPE	ADDITIONAL REMARKS
1/28/88	63.7	67.2'	3.5'	3.5'	100%	200 psi	No loss of water	3.5' Run	≈50 min	NX	Run #1, coring started 1.3' into bedrock
1/28/88	67.2	72.2'	5'	5'	100%	200 psi	No loss of water	5' Run	≈70 min	NX	Run #2
1/28/88	72.2'	77.2'	5'	5'	100%	200 psi	No loss of water	5' Run	≈70 min	NX	Run #3

TOTAL BED ROCK DRILLED 14.8 FEET *

Total Bed Rock Cored 13.5 Feet

TOTAL BED-ROCK RECOVERED 13.5 FEET

BED ROCK RECOVERY 100 PERCENT

DRILLER Hawkins

INSPECTOR Hargrave

NED FORM DEC 130 * includes rock drilled with roller bit

REPLACES EDITION OF APR 63 WHICH MAY BE USED UNTIL EXHAUSTED

Site: North Springfield Dam Vt.
Boring No: FD 88-3, PZ-15

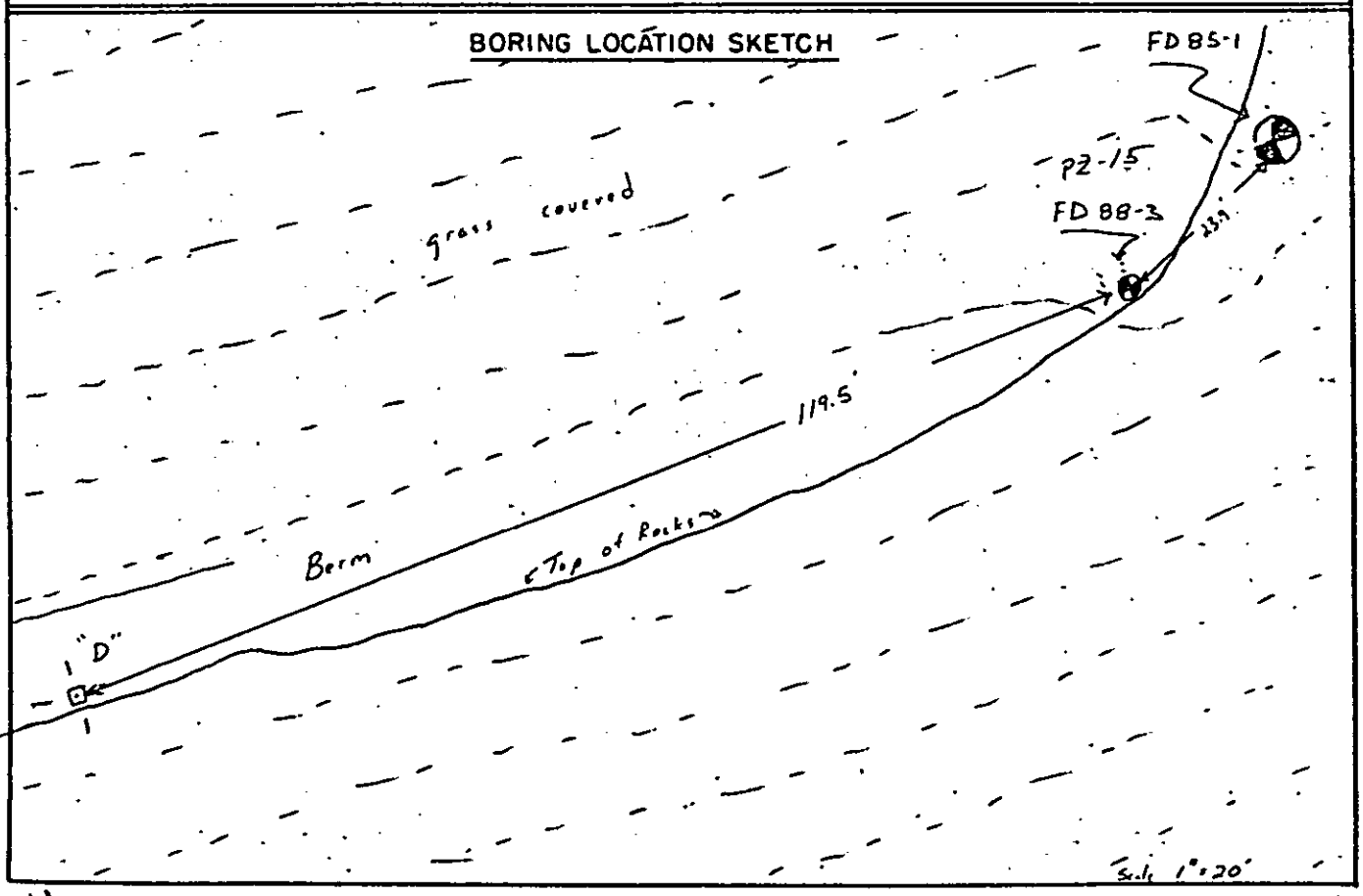
SUBSURFACE WATER OBSERVATIONS

DATE	TIME	DEPTH-BOT. OF CASING	DEPTH-BOT. OF BORING	DEPTH TO WATER	ELEVATION WATER	REMARKS
1/29/88	9:00	62.5'	69.0'	42.1'	462.4	water depth prior to piezometer installation
2/3/88	4:45pm	7.7	69.0	Dry		~~Depth to bottom of piezometer~~
2/11/88		7.7	69.0	44.0'	460.5	Recorded water level after
2/18/88	8:00	7.7	69.0	43.7'	460.8	piezometer was flushed
2/24/88	8:30	7.7	69.0	43.7'	460.8	out

Note: sand was accidently spilled down riser pipe during piezometer installation preventing water reading from being obtained/piezometer was flushed out and water readings were obtained

Note: Depths are in feet below original ground

BORING LOCATION SKETCH



10.0
1.7
8.3

page 7 of 9

PIEZOMETER INSTALLATION REPORT

PROJECT: North Springfield Dam, VT | DATE: 2-10-88

LOCATION (STA): N- 51448 | OFFSET FROM CENTER LINE: 50159 | PIEZ NO.: FD 08-3 P2-15

PIEZ TYPE: Casagrande | DEPTH OF PIEZ: 68.9 | RISER PIPE DIAM: 3/4"

PIEZ TIP SET IN (SOIL TYPE): | SOIL SAMPLE NO.: | BORING DIAM: 4"

METHOD OF INSTALLATION:

TYPE OF PROTECTION FOR PIEZ: 4" Casing | VENT: Screw on Cap

GROUND ELEV.: 504.5' | ELEV. TOP OF RISER: 505.61' | ELEV. PIEZ TIP: -435.6'

FILTER: #4 SAND | FROM ELEV: 435.5 | TO ELEV: 490

SEAL: Bentonite Pellets | FROM ELEV: 490 | TO ELEV: 495.2

INSTALLED BY: Hawkins | CONTRACT NO.: D.O. 0003 | FOREMAN: Hargrave

DATE OF INSTALLATION: 1/29/88 | DATE OF OBSERVATIONS: 2/10/88

METHOD OF TESTING PIEZ.: Falling Head Test

TIME	ELAPSED TIME MINUTES	DEPTH TO WATER FEET	TIME	ELAPSED TIME MINUTES	DEPTH TO WATER FEET	TIME	ELAPSED TIME MINUTES	DEPTH TO WATER FEET
	½	2.5		15	14.3			
	1	3.5		20	17.6			
	3	4.8		25	20.7			
	5	6.8		30	21.0			
	10	10.7						

REMARKS:

Filter sand was flushed out of piezometer and riser pipe prior to performing falling head test.

Static water level was measured 2/11/88, depth to water was 44.0'

Gregory P. Hargrave
INSPECTOR

PIEZOMETER INSTALLATION REPORT

PROJECT: North Springfield Dam, Vt | DATE: 2-24-88

LOCATION (STA): | OFFSET FROM CENTER LINE: | PIEZ NO.: FD 88-3 P2-15

PIEZ TYPE: | DEPTH OF PIEZ: | RISER PIPE DIAM:

PIEZ TIP SET IN (SOIL TYPE): | SOIL SAMPLE NO.: | BORING DIAM:

METHOD OF INSTALLATION:

TYPE OF PROTECTION FOR PIEZ: | VENT:

GROUND ELEV.: | ELEV. TOP OF RISER: | ELEV PIEZ TIP:

FILTER: | FROM ELEV: | TO ELEV:

SEAL: | FROM ELEV: | TO ELEV:

INSTALLED BY: Hawkins | CONTRACT NO.: D.O. 0003 | FOREMAN: Hargrave

DATE OF INSTALLATION: | DATE OF OBSERVATIONS: 2-24-88

METHOD OF TESTING PIEZ.: Falling Head Test

TIME	ELAPSED TIME MINUTES	DEPTH TO WATER FEET	TIME	ELAPSED TIME MINUTES	DEPTH TO WATER FEET	TIME	ELAPSED TIME MINUTES	DEPTH TO WATER FEET
	0.5	2.3		15	13.1			
	1	3.0		20	16.2			
	2	3.6		25	19			
	3	4.4						
	5	6						

REMARKS:

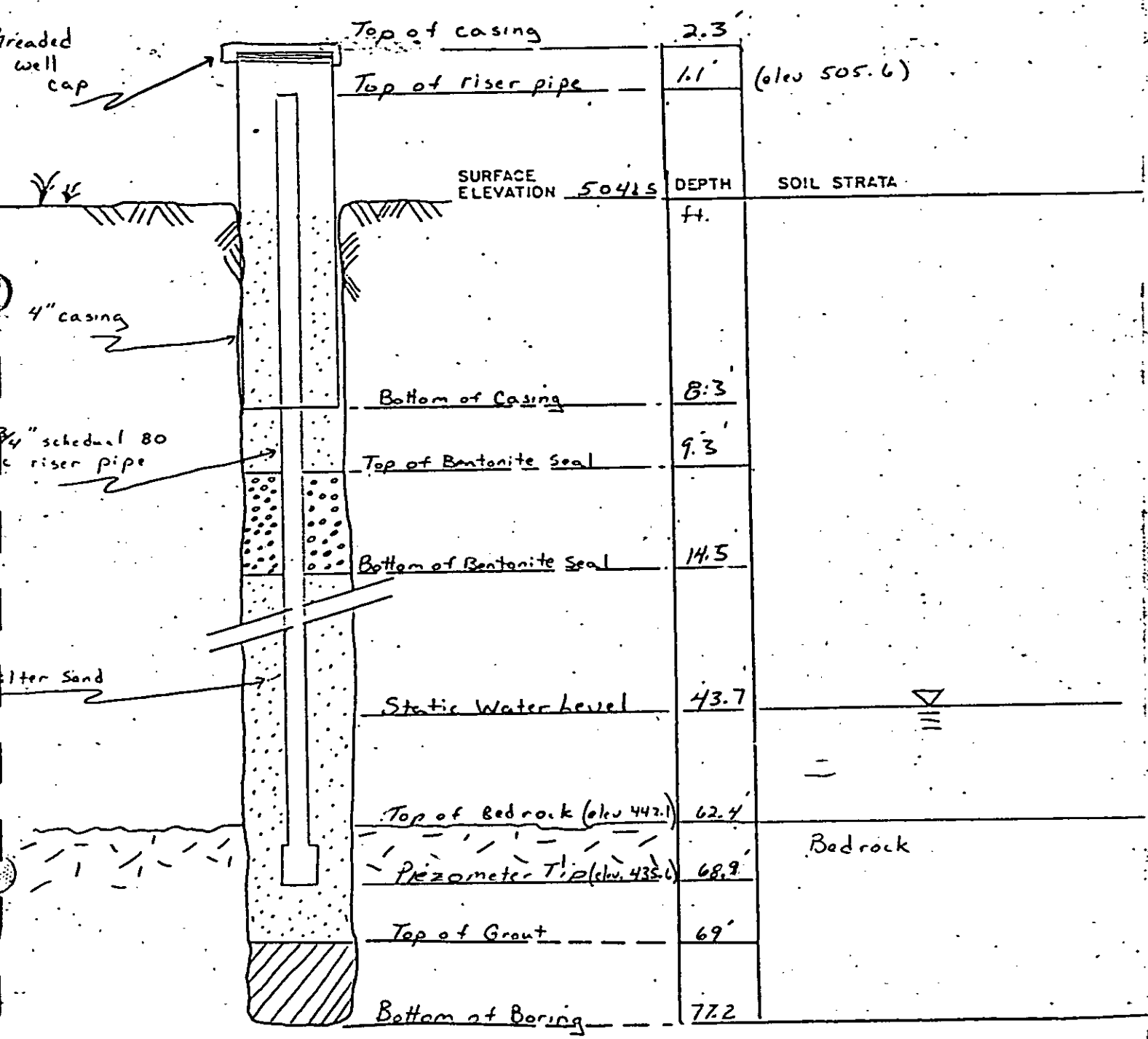
Gregg R. Hargrave
INSPECTOR

ATLANTIC TESTING LABORATORIES, LIMITED

PIEZOMETER INSTALLATION DETAIL

PROJECT: North Springfield Dam
North Springfield, VT

PROJECT NO. DO 0003
ATL NO. CD 030
PIEZOMETER NO. FD 88-3
PZ-15



CORPS OF ENGINEERS, U. S. ARMY
NEW ENGLAND DIVISION
FOUNDATION AND MATERIALS BRANCH

FIELD LOG OF TEST BORING

PROJECT NO. D.O 0003

Site North Springfield Dam — Page 1 of 6 Pages

Hole No. FD 88-4 Diam. (Casing) HW (4") — Boring Started 2/2/88

Co-ordinates: N 51194 E 50295 — Boring Completed 2/17/88

Drilled by Hawkins + Burnham — Report Submitted 3/5/88

Purpose of Exploration To monitor seepage at downstream right abutment area

Elevation Top of Hole 457.96 M.S.L. — Casing Left in Place NA Feet

Total Overburden Drilled 21.1 Feet

Elevation Top of Rock 436.86 M.S.L.

Elevation Bottom of Hole 431.46 M.S.L.

Total Rock Drilled 5.4 Feet; Total Rock cored 4.5'

Total Depth of Hole 26.5 Feet

Core Recovered 98 %

Core Recovered 4.5 Ft.: NX Diam. 2 1/8 In.

Soil Samples 2 3/8 In. Diam. 10 No.

Soil Samples ____ In. Diam. ____ No. — Water Table Depth 5.9

Depth From	Depth To	Method of Drilling and Type of Bit Used
0	21.1	Continuous split spoon sampling, hammer advanced with 300 lbs hammer
0	20.0	HW casing advanced to with 300 lbs hammer
20'	22'	3 7/8" roller bit, advanced using water
22	26.5	NX rock core

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Prepared by Greg Hargraves — Field Data — Lab. Data

Submitted by Atlantic Testing Laboratories, Ltd.

NED FORM DEC 63 121 — REPLACES EDITION OF JUN 51 WHICH MAY BE USED UNTIL EXHAUSTED

U. S. ARMY
CORPS OF ENGINEERS
NEW ENGLAND DIVISION

FIELD LOG OF TEST BORING

Site North Springfield Dam Page 2 of 6 Pages

Boring No. FD 88-4 Desig. FD 88-E Diam. (Casing) 4"

Co-ordinates: N 51194 E 50295

Elevation Top of Boring 457.96 M.S.L.
Total Overburden Drilled 21.1 Feet
Elevation Top of Rock 436.86 M.S.L.
Total Rock Drilled 5.4 Feet
Elevation Bottom of Boring 431.46 M.S.L.
Total Depth of Boring 26.5 Feet
Core Recovered 98 % No. Boxes 1
Core Recovered 4.5 Ft : NX Diam. 3 In.
Soil Samples 2 3/8 In. Diam. 10 No.
Soil Samples ____ In. Diam. ____ No.

Hammer Wt. 300 lbs Boring Started 2/2/88
Hammer Drop 18" Boring Completed 2/17/88
Casing Left 10
Subsurface Water Date: ____ Page 6
Obs. Well ____
Drilled By Hawkins + Burnham
Mfg. Des. Drill CME 850
Inspected By: Hargrave
Classification By: Hargrave
Classification By: ____

DEPTH		CORE/SAMPLE NO.	SIZE	DEPTH RANGE / CORE RECVY	BLOWS PER FT.	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
0	1" = 2'	S-1	2 3/8"	Rec 10%	1 / 1	Sampled with 2 3/8" x 2.5' Split Spoon Sampler advanced with 300 lbs hammer dropping 18"	Fill material
2.5'		S-2	2 3/8"	20%	1 2 2 1 3	Sampled Advanced HW casing to 5' using 300 lbs hammer, cleaned casing to 5' using 3 7/8 O.D. roller bit and water	Brown cmf SAND; little SILT; trace GRAVEL; trace organic material (wet, non-plastic) SM
5'		S-3	2 3/8"	30%	2 / 1 1	Sampled	Brown cmf SAND; and GRAVEL; trace SILT (wet, non-plastic) SW
7.5'		S-4	2 3/8"	90%	3 3	Sampled	Similar Soils, SW

GENERAL REMARKS:
≈ 4' of material at surface was fill material cut from bank

Site	Boring No.	Page 3 of 6
North Springfield Dam, Vt	FD 88-4	

DEPTH	1' 2'	CORE/SAMPLE NO	SIZE	DEPTH RANGE	BLOWS PER 6" / CORE RECVY	6" SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
				Rec	4	Advanced casing to 10', c	
					3	cleaned casing to 10'	
10'					7	Sampled with 2 3/8" x 5'	
		S-5A			7	solid spoon sampler advanced	Grey GRAVEL; and cmf
					8	with 300 lbs hammer	SAND; trace SILT
					10	Advanced casing to 15'	(wet, non-plastic) GP
			2 3/8	60%	10	then cleaned casing to	Similar Soils, GP
		S-5B			10	15'	
					13		
14'					18		Grey GRAVEL; and cmf
		S-5C			22		SAND, little SILT
		S-7			23		(wet, nonplastic) GM
15'					14	Sampled	
					21	Advanced roller bit to	Grey cmf SAND; and GRAVEL
15'		S-6A			19	20' with difficulty	little SILT, (wet, non-plastic)
			2 3/8		17	Advanced casing to 20',	SM
					35	cleaned casing to 20'	Sample similar to sample
		S-6B			32		# 5C, GM
18.25'					50/3"		
						No sample taken due to	No sample taken due to
						coarse gravel and possible	coarse gravel and
						cobbles	possible cobbles
20'					23	Sampled	Soils similar to sample #5C
		S-7	2 3/8		40		GM
21.1'					25/2"	END EXPLORATION 2/2/88.	
						Continued exploration 2/3/88	Bed rock
22'						Advanced roller bit to 22'	Gneiss
						NX Diamond Core	Grey to Pink in color
						22 to 26.5	
		R-1	NX	98%			4.4' Recovery or 98%
24'							RQD = 76%
						Note: Driller had difficult	9 pieces, some fragments
						time pulling core because	
						casing was leaking sand and	
						gravel into boring, apparently	
						drive shoe at casing was damaged	

Site	Boring No.	Page 4 of 6
North Springfield Dam Vt	FD 88-4	

DEPTH		CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER FT. / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
26.5'						END OF EXPLORATION 2/3/88	
						Casing pulled 2/17/88	
						Bottom of Boring 26.5	
28'							
30'							
32							
34							
36							
38							
40							
42							

FIELD LOG OF TEST BORING IN ROCK

SITE North Springfield Dam Vt HOLE NO. FD 88-4 PAGE 5 of 6

DATE	DEPTH PT. FROM	DEPTH PT. TO	RUN PT.	RUN REC'V'Y PT.	REC'V'Y %	DRILLING BEHAVIOR: FEED	DRILLING BEHAVIOR: WATER	DRILLING BEHAVIOR: REASON FOR PULL	ACTUAL DRILLING TIME	BIT NO. SIZE AND TYPE	ADDITIONAL REMARKS
2/3/88	22.0	26.5	4.5'	4.4'	98%	250psi	No loss of water	4.5' Run	≈ 90 min	NX	Run #1

TOTAL BED ROCK DRILLED 5.4 FEET
Total Bed Rock Cored 4.5 Feet
TOTAL BED-ROCK RECOVERED 4.4 FEET

BED ROCK RECOVERY 98 PERCENT

DRILLER Hawkins
INSPECTOR Greg Hargrave

NED FORM DCF 130

REPLACES EDITION OF APR 63 WHICH MAY BE USED UNTIL EXHAUSTED

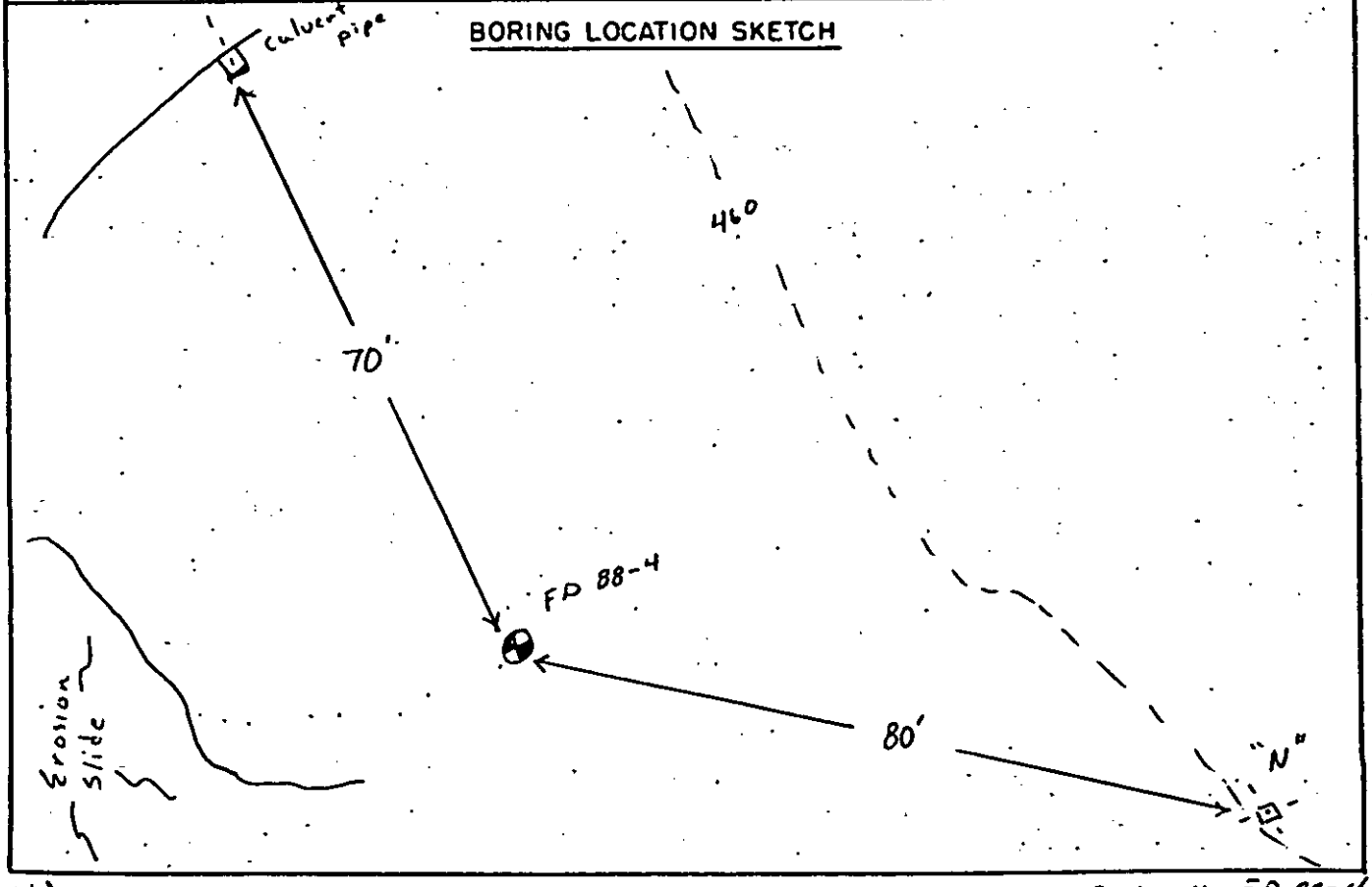
Site: North Springfield Dam
Boring No: FD 88-4

SUBSURFACE WATER OBSERVATIONS

DATE	TIME	DEPTH-BOT. OF CASING	DEPTH-BOT. OF BORING	DEPTH TO WATER	ELEVATION WATER	REMARKS
2/3/88	5:15pm	20'	26.5'	5.35'	452.61	Boring incomplete
2/4/88	2:00pm	20'	26.5'	5.65'	452.31	Boring incomplete
2/5/88	7:30am	20'	26.5'	5.8'	452.16	Boring incomplete
2/9/88	3:35pm	20'	26.5'	6.1'	451.86	Boring incomplete
2/10/88	7:45am	20'	26.5'	5.9'	452.06	
2/16/88	9:00am	20'	26.5	5.8	452.16	
2/17/88	7:30	20'	26.5	5.9	452.06	

Note: Depths are in feet below original ground

BORING LOCATION SKETCH



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NEW ENGLAND DIVISION
FOUNDATION AND MATERIALS BRANCH

FIELD LOG OF TEST BORING

PROJECT NO. D.O. 0003

Site North Springfield Dam — Page 1 of 8 Pages

Hole No. FD88-5 PZ-19 Diam. (Casing) HW (4") — Boring Started 2/3/88

Co-ordinates: N 51253 E 50069 — Boring Completed 2/9/88

Drilled by Hawkins & Burnham — Report Submitted 3/8/88

Purpose of Exploration To monitor seepage at downstream right abutment area

Elevation Top of Hole 520.88 M.S.L. — Casing Left in Place 10 Feet

Total Overburden Drilled 60.7 Feet

Elevation Top of Rock 460.18 M.S.L.

Elevation Bottom of Hole 445.18 M.S.L.

Total Rock Drilled 15 Feet; total Rock cored 11.5

Total Depth of Hole 75.7 Feet

Core Recovered 100 %

Core Recovered 11.5 Ft.: NX Diam. 2 1/8 In.

Soil Samples 2 3/8 In. Diam. 13 No.

Soil Samples ____ In. Diam. ____ No. — Water Table Depth 57.3'

Depth From	Depth To	Method of Drilling and Type of Bit Used
40'	62.9	Continuous split spoon Sampling
0	60'	HW casing advanced with 300 lbs hammer
60'	64.2	3 7/8" roller bit
64.2	75.7	NX rock coring

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Prepared by Greg Hargrave — Field Data — Lab. Data

Submitted by Atlantic Testing Laboratories Ltd.

NED FORM DEC 63 121 — REPLACES EDITION OF JUN 51 WHICH MAY BE USED UNTIL EXHAUSTED

U. S. ARMY
CORPS OF ENGINEERS
NEW ENGLAND DIVISION

FIELD LOG OF TEST BORING

Site North Springfield Dam — Page 2 of 8 Pages

Boring No. FD88-5 (P2-19) Desig. FD-B Diam. (Casing) HW (4")

Co-ordinates: N 51253 E 50069

Elevation Top of Boring 520.88 M.S.L.
Total Overburden Drilled 60.7 Feet
Elevation Top of Rock 460.18 M.S.L.
Total Rock Drilled 15 Feet
Elevation Bottom of Boring 445.18 M.S.L.
Total Depth of Boring 75.7 Feet
Core Recovered 100 % No. Boxes
Core Recovered 11.5 Ft. NX Diam. 3 In.
Soil Samples 2 3/8 In. Diam. 13 No.
Soil Samples In. Diam. No.

Hammer Wt. 300 lbs
Hammer Drop 18
Casing Left 10'
Subsurface Water Data Page 7
Obs. Well 8
Drilled By Hawkins + Burnham
Mfg. Des. Drill CME 850
Inspected By: Hargrave
Classification By: Hargrave
Classification By:

Boring Started 2/3/88
Boring Completed 2/9/88

DEPTH	CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER 6" / CORE RECV'Y	6" SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
10'			Rec		Advanced HW casing to 25' using a 300 lbs hammer	GRANULAR MATERIAL
25'					END of EXPLORATION 2/3/88	
					Exploration Continued 2/4/88 Advanced casing to 40' cleaned casing using 3 7/8" roller bit and air	
40'	S-1A			2 3 3 3	Sampled using 2 3/8" I.D. x 5' sampler advanced with 300 lbs hammer	Brown m f SAND; trace SILT. (moist, non-plastic) SP
	S1B	2 3/8	60%	3 7		Similar Soil (cm f SAND; trace GRAVEL) SP
				9 9	Advanced casing to 45' cleaned casing to 45'	
45'	S-1C S-1C			7 8		Brown GRAVEL; and cm f SAND trace SILT (moist, non-plastic) GW
	S-2A	2 3/8	80%	4 4	Sampled	Brown cm f SAND; and GRAVEL; trace SILT (moist, non-plastic) SW

GENERAL REMARKS:
Sampling began sooner than indicated on delivery order because elevation of actual boring location is lower than proposed boring location, also note change is depth scale after 40

Site	Boring No.	Page 3 of 8
North Springfield Dam	FD 88-5	

DEPTH 1"	DEPTH 2"	CORE/SAMPLE NO.	SIZE	RQD %	BLOWS PER 6" / CORE REC'VY	6" SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
46'				Rec.	4	Sampled	
		2B			4	Advanced casing to 50'	Similar Soil, (trace GRAVEL) SW
			2 3/8	80%	4	Cleaned casing to 50'	
					4		
					7		Similar Soil, SW
		2C			11		
					13		
50'					13		
		S-3A			5	Sampled	Similar Soil, SW
					4	Advanced casing to 54.5'	Brown SILT, some cmf SAND; trace GRAVEL (wet, non-plastic) ML
					4		
					9	Cleaned casing to 54.5'	Soil similar to Sample # 3A
		S-3B	2 3/8"	67%	8		
					10		
					11		
		S-3C			11		
54.5					9		
		S-4	2 3/8		7	Sampled Note: hammer was bouncing after 32 blows	Brown cmf SAND; and SILT; little GRAVEL; wet, non-plastic SM
55.2'					32	Advanced roller bit to 57.5 using "clear mud" Drilling Fluid Note: encounter cobble from 55.2' to 56.5', encountered coarse gravel and possible cobbles from 56.5 to 57.5'	Cobbles and coarse GRAVEL
57.5'							
58		S-5	2 3/8	50%	30	Sampled Note - hammer was bouncing after 30 blows	Grey-Brown GRAVEL, trace cmf SAND (wet, non-plastic) GP
58.5						Advanced roller bit to 58.5'	~~Possible cobbles and GRAVEL~~
		S-6A			3	Sampled. Note - hammer was bouncing after 30 blows	Grey Brown cmf SAND; and GRAVEL; little SILT (wet, non-plastic) SM
			2 3/8	80%	13	Advanced casing to 60'	
					10	Sampled. Note hammer was	Similar Soil, SM
		S-6B			10	Advanced roller bit to 60.7'	
60.7					30/3"	END of EXPLORATION 2/4/88	
						EXPLORATION CONTINUED 2/8/88	Bed rock @ 60.7. Note, driller encountered seam of soft rock @ 62.9-63'
						Advanced roller bit using "clear mud" drilling fluid to 62.9'	
62.9			2 3/8	0%	10	Attempted sampling, hammer was bouncing	
63'							

Site	Boring No.	Page 4 of 8
North Springfield Dam Vt	FD 88-5	

DEPTH		CORE/SAMPLE NO.	SIZE	DEPTH RQD	BLOWS PER FT. / CORE RECVY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
	1"-2'						
64.2				Lee		Advanced roller bit to 64.2' using "Clear Mud" drilling fluid END of Exploration 2/8/88	
65.7'		R-1	NX	100%		EXPLORATION CONTINUED 2/9/88 NX DIAMOND CORE 64.2 to 65.7'	Greenish schist to 64.5, remainder of run greyish pink gneiss 1 piece, RQD = 100%
70.7'		R-2	NX	100%		NX DIAMOND CORE 65.7' to 70.7' Note: slight loss of water @ 66.6'	greyish pink gneiss to 67.8', thin seam of quartz, remainder of run Greenish schist 4 pieces; few fragments RQD = 95%
75.7		R-3	NX	100%		NX DIAMOND CORE 70.7 to 75.7' EXPLORATION PROGRAM TERMINATED 2/9/88	greyish pink gneiss. 3 pieces RQD = 100%
						Bottom of Boring 75.7'	

FIELD LOG OF TEST BORING IN ROCK

SITE North Springfield Dam, VT HOLE NO. FD 88-5 PZ-19 PAGE 5 of 8

DATE	DEPTH FT. FROM	DEPTH FT. TO	RUN FT.	RUN REC'V'Y FT.	REC'V'Y %	DRILLING BEHAVIOR: FEED	DRILLING BEHAVIOR: WATER	DRILLING BEHAVIOR: REASON FOR PULL	ACTUAL DRILLING TIME	BIT NO. SIZE AND TYPE	ADDITIONAL REMARKS
2/9/88	64.2	65.7	1.5	1.5	100%	Medium	No loss of water noted	1.5' run	15 minutes	NX	Run #1
2/9/88	65.7	70.7	5	5	100%	Medium	slight loss of water noted @ 66.6'	5' run	25 min.	NX	Run #2
2/9/88	70.7	75.7	5	5	100%	Medium	No loss of water noted	5' run	35 min	NX	Run #3

TOTAL BED ROCK DRILLED 15 FEET*

Total Bed Rock cored 11.5 Feet

TOTAL BED-ROCK RECOVERED 11.5 FEET

BED ROCK RECOVERY 100 PERCENT!

DRILLER Hawkins

INSPECTOR Hargrave

NED FORM DER 130 * includes rock drilled with roller bit

! only includes bedrock cored

REPLACES EDITION OF APR 63 WHICH MAY BE USED UNTIL EXHAUSTED

PIEZOMETER INSTALLATION REPORT

PROJECT: North Springfield Dam, Vt | DATE. 2-9-88

LOCATION (STA): N-51253 | OFFSET FROM CENTER LINE: 50069 | PIEZ NO.: FD88-5 (PZ-19)

PIEZ TYPE: Casagrande | DEPTH OF PIEZ: 67.7' | RISER PIPE DIAM: 3/4

PIEZ TIP SET IN (SOIL TYPE): | SOIL SAMPLE NO.: | BORING DIAM: 4" - overburden, 3" - rock

METHOD OF INSTALLATION:

TYPE OF PROTECTION FOR PIEZ: 4" casing | VENT: screw on cap

GROUND ELEV.: 520.88 | ELEV. TOP OF RISER: 523.47 | ELEV PIEZ TIP: 453.18

FILTER: #4 SAND | FROM ELEV: 445.18 | TO ELEV: 480.88

SEAL: Bentonite Pellets | FROM ELEV: 480.88 | TO ELEV: 485.88

INSTALLED BY: Hawkins + Todd | CONTRACT NO.: DO.0003 | FOREMAN: Hargrave

DATE OF INSTALLATION: 2-9-88 | DATE OF OBSERVATIONS: 2-9-88

METHOD OF TESTING PIEZ.:

TIME	ELAPSED TIME MINUTES	DEPTH TO WATER FEET	TIME	ELAPSED TIME MINUTES	DEPTH TO WATER FEET	TIME	ELAPSED TIME MINUTES	DEPTH TO WATER FEET
	½	17.8		30	55.2			
	3	44.8						
	5	49.3						
	10	53.8						
	20	54.8						

REMARKS:

Gregory R. Hargrave
INSPECTOR

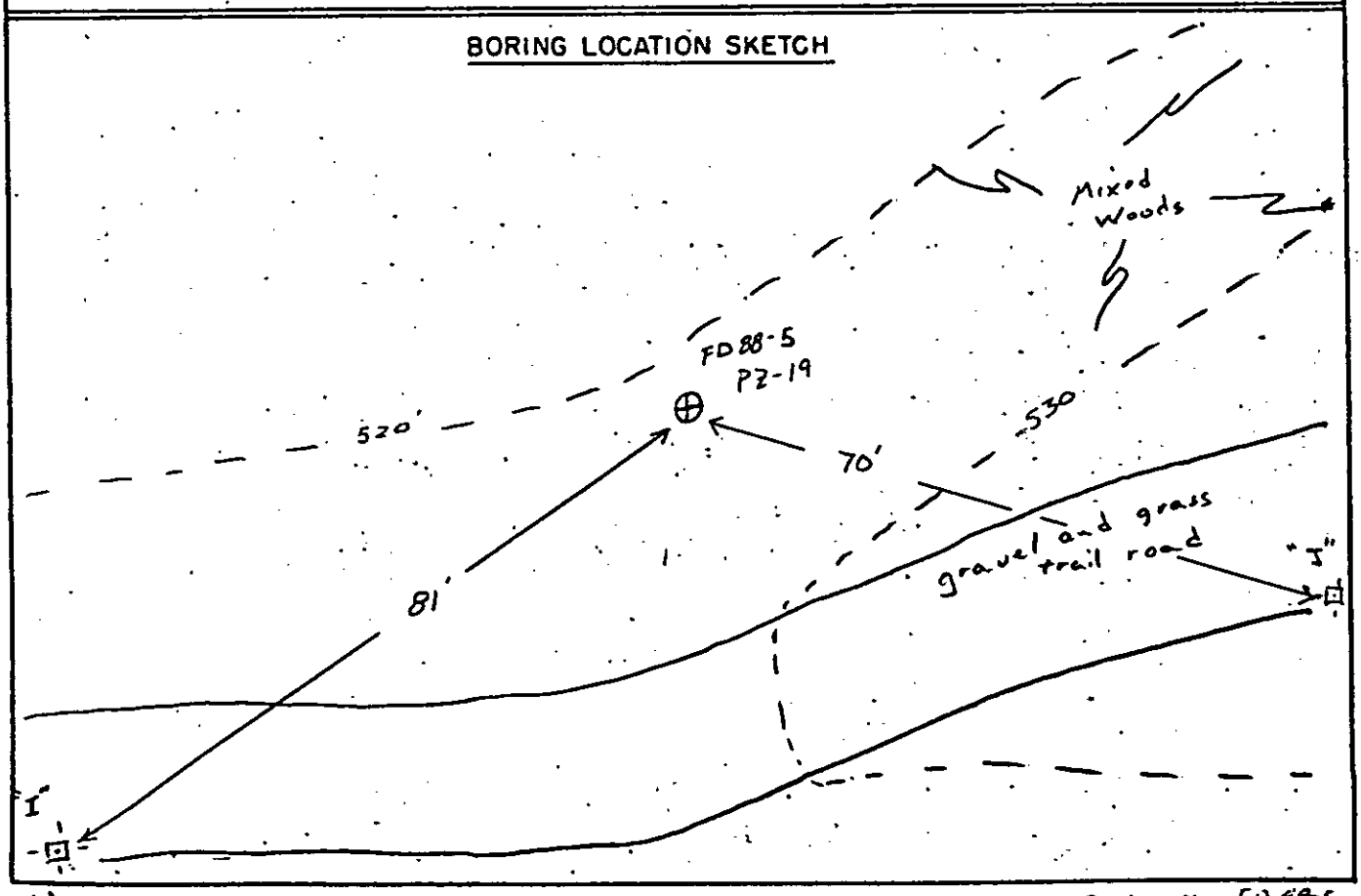
Site: North Springfield Dam, Vt
Boring No: FD 88-5

SUBSURFACE WATER OBSERVATIONS

DATE	TIME	DEPTH-BOT. OF CASING	DEPTH-BOT. OF BORING	DEPTH TO WATER	ELEVATION WATER	REMARKS
2/10/88	7:15am	6.95'	75.7	57.1'	463.78	
2/16/88	9:25	6.95'	75.7	57.2'	463.68	
2/17/88	7:45	6.95	75.7	57.3'	463.58	
2/18/88	7:40	6.95	75.7	57.3	463.58	
2/24/88	8:20	6.95	75.7	57.3'	463.58	

Note: Depths are in feet below original ground

BORING LOCATION SKETCH

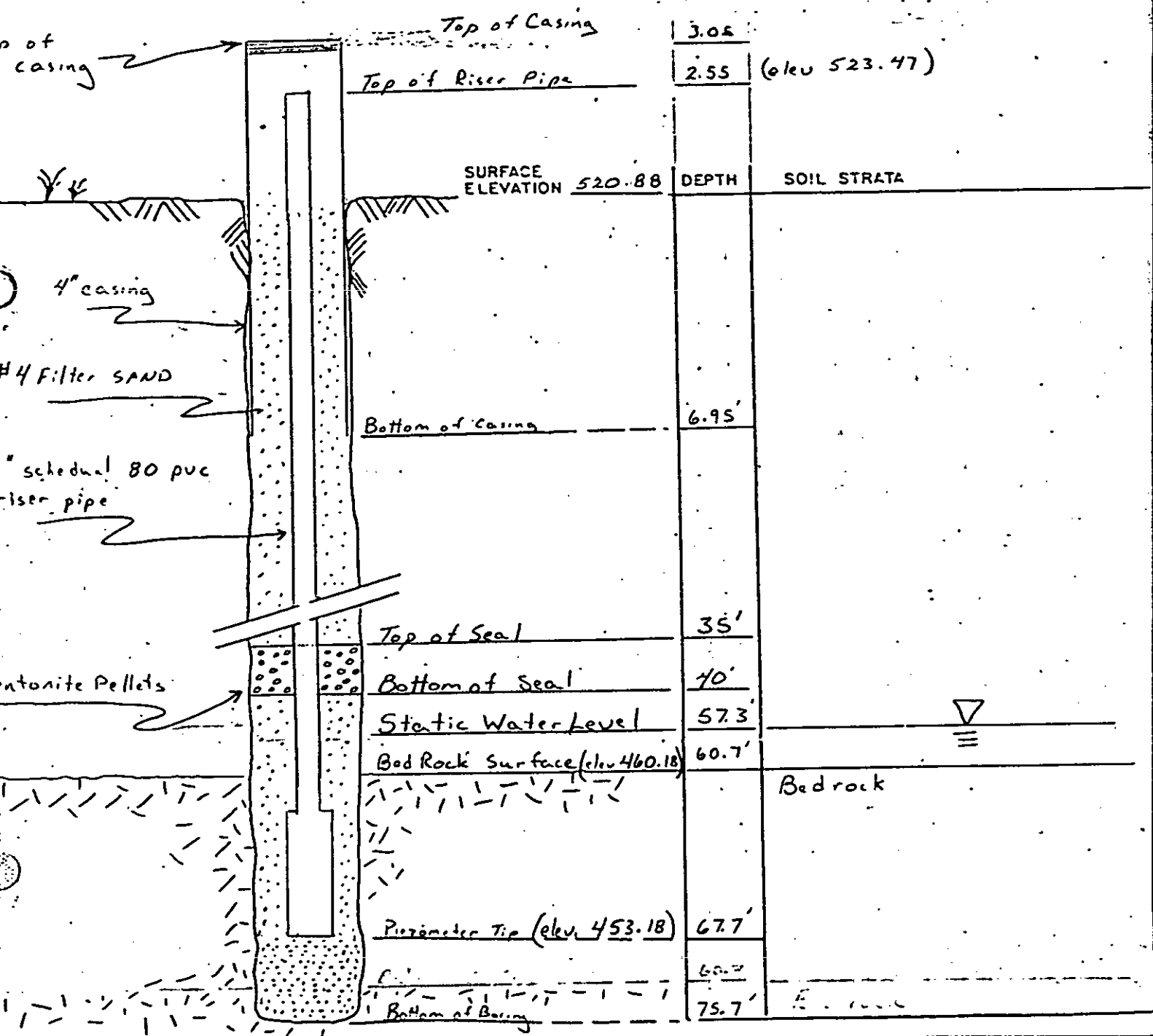


ATLANTIC TESTING LABORATORIES, LIMITED

PIEZOMETER INSTALLATION DETAIL

PROJECT: North Springfield Dam, VA
US ACE

PROJECT NO. D.O. 0003
ATL No. CD 030
PIEZOMETER No. FD 88-S PZ-19



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NEW ENGLAND DIVISION
FOUNDATION AND MATERIALS BRANCH

FIELD LOG OF TEST BORING

PROJECT NO: D.O. 0003

Site: North Springfield Dam VT

Page 1 of ___ Pages

Hole No. FD 88-6 PE Diam. (Casing) HW (4")

Boring Started: Feburary 10, 1988

Co-ordinates: N 51152 E 50092

Boring Completed: Feburary 11, 1988

Drilled by: Hawkins + Burnham

Report Submitted: March 8, 1988

Purpose of Exploration: To monitor seepage at downstream right abutment area

Elevation Top of Hole: 520.85 M.S.L.

Casing Left in Place: NA Feet

Total Overburden Drilled: 53.8 Feet

Elevation Top of Rock: 467.05 M.S.L.

Elevation Bottom of Hole: 456.85 M.S.L.

Total Rock Drilled: 10.2 Feet ; total rock cored 9

Total Depth of Hole: 64 Feet

Core Recovered: 100 %

Core Recovered: 9 Ft.: NX Diam. 2 1/8 In.

Soil Samples: ___ In. Diam. ___ No.

Soil Samples: ___ In. Diam. ___ No.

Water Table Depth: 54.5'

Depth From	Depth To	Method of Drilling and Type of Bit Used
0'	55'	3 7/8" roller bit
55	64	NX DIAMOND CORE

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Overburden Record	Page ___
Rock Drilling	Page ___
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	Page ___
	Page ___

Prepared by: Gregory R. Hargraw (Field Data) Lab. Data

Submitted by: Atlantic Testing Laboratories Ltd.

NED FORM DEC 63 121 REPLACES EDITION OF JUN 51 WHICH MAY BE USED UNTIL EXHAUSTED

U.S. ARMY
CORPS OF ENGINEERS
NEW ENGLAND DIVISION

FIELD LOG OF TEST BORING

Site North Springfield Dam — Page 1 of ___ Pages

Boring No. FD 88-6 Desig. FD-H Diam. (Casing) HW (4")

Co-ordinates: N 51152 E 50092

Elevation Top of Boring 520.85 M.S.L.
Total Overburden Drilled 53.8 Feet
Elevation Top of Rock 467.05 M.S.L.
Total Rock Drilled 10.2 Feet
Elevation Bottom of Boring 456.85 M.S.L.
Total Depth of Boring 64 Feet
Core Recovered 100 % No. Boxes ___
Core Recovered 9 Ft: NX Diam. 2 1/8 In.
Soil Samples ___ In. Diam. ___ No.
Soil Samples ___ In. Diam. ___ No.

Hammer Wt. 300 Boring Started 2-10-88
Hammer Drop 18
Boring Completed 2-11-88
Casing Left 0
Subsurface Water Data ___ Page ___
Obs. Well NA
Drilled By Hawkins + Burnham
Mfg. Des. Drill CME 850
Inspected By: Hargrove
Classification By: Hargrove
Classification By: ___

DEPTH		CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER FT. / CORE RECVY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
	1" = 20'						
				Rec		Advanced HW casing to 15' using 300 lbs hammer	
10						END of EXPLORATION 2/10/88	
						CONTINUED EXPLORATION 2/11/88	
20						Advanced 3 7/8" roller bit to 55 using Clear Mud drilling fluid	
30						Note: Encountered gravel from 41-45	
40						Bed rock encountered @ 53.8'	
50'							
55'							Bed rock
		R-1	NX	100%		NX DIAMOND CORE	Run #1 Grey Gneiss 6 pieces RQD = 86%
60							
64		R-2	NX	100%		NX DIAMOND CORE	Run #2 Similar Rx 8 pieces, few fragments RQD = 85%
						Bottom of Boring 64'	
70'							
80'							
100'							

GENERAL REMARKS:

NED FORM 58 (Test) MAR 71

Boring No. FD 88-6

FIELD LOG OF TEST BORING IN ROCK

SITE North Springfield Dam, Vt HOLE NO. FD 88-6 PAGE

DATE	DEPTH PT. FROM	DEPTH PT. TO	RUN PT.	RUN REC'V'Y PT.	REC'V'Y %	DRILLING BEHAVIOR: FEED	DRILLING BEHAVIOR: WATER	DRILLING BEHAVIOR: REASON FOR PULL	ACTUAL DRILLING TIME	BIT NO. SIZE AND TYPE	ADDITIONAL REMARKS
2/11/88	55	60	5'	15	100%	Medium	No loss Noted	5' run	35 min	NX	Run # 1
2/11/88	60	64	4'	4'	100%	Medium	No loss Noted	4' run	30 min	NX	Run # 2

TOTAL BED ROCK DRILLED _____ FEET
Total Bed Rock cored 9 Feet
TOTAL BED-ROCK RECOVERED 9 FEET

BED ROCK RECOVERY 100 PERCENT

DRILLER Hawkins

INSPECTOR Hargrave

NED FORM DEC 130

REPLACES EDITION OF APR 63 WHICH MAY BE USED UNTIL EXHAUSTED

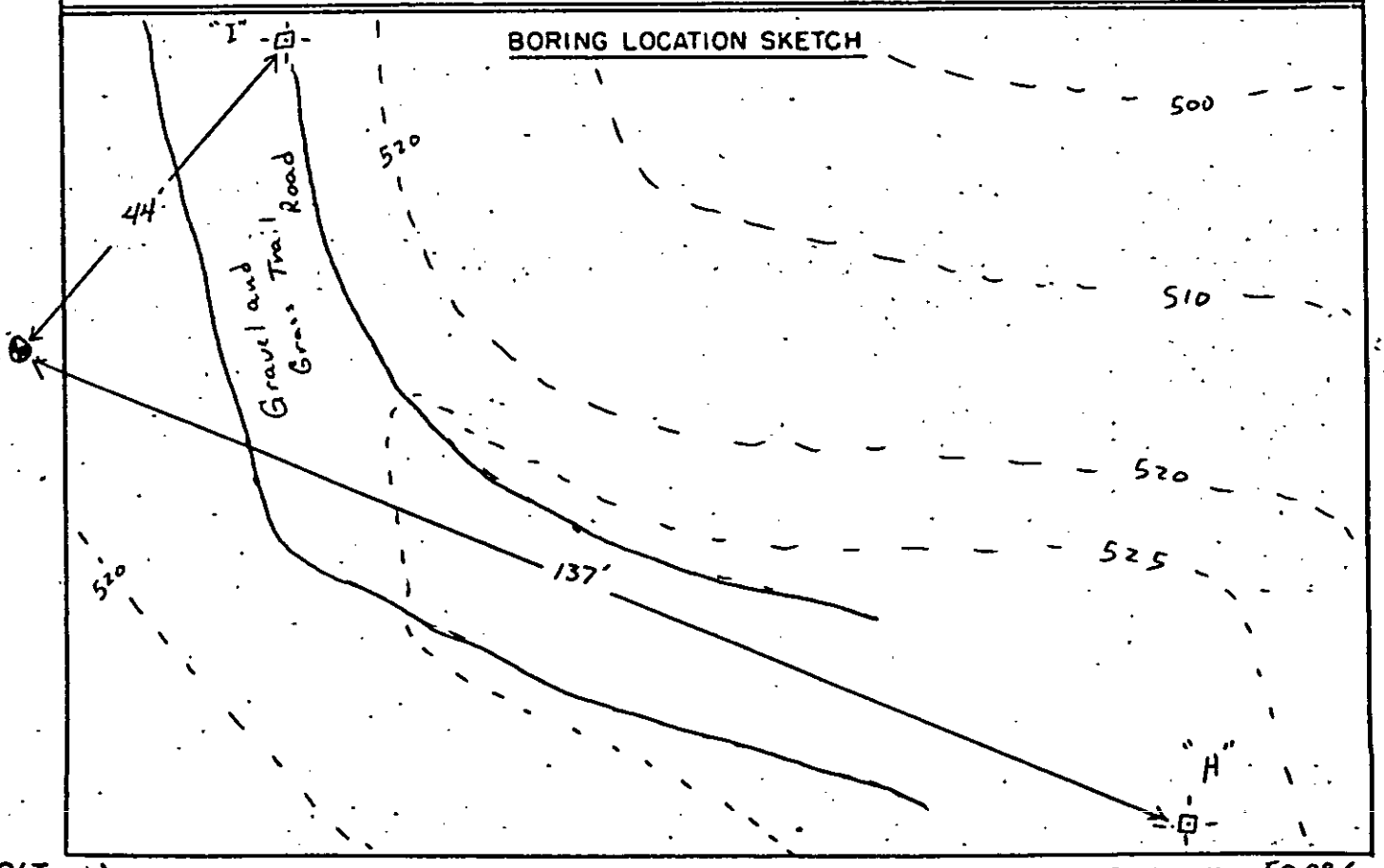
Site: North Springfield Dam, VT
Boring No: FD 88-6

SUBSURFACE WATER OBSERVATIONS

DATE	TIME	DEPTH-BOT. OF CASING	DEPTH-BOT. OF BORING	DEPTH TO WATER	ELEVATION WATER in ft.	REMARKS
2-16-88	12:30	NA	≈56'	54.5'	466.35'	open, uncased, hole
2-17-88	7:40	NA	≈56'	54.4'	466.45	open, uncased hole
2-18-88	7:30	NA	≈55'	54.5'	466.35'	

Note: Depths are in feet below original ground

BORING LOCATION SKETCH



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FIELD LOG OF TEST BORING

PROJECT NO. D.O. 0003

Site North Springfield Dam, Vt

Page 1 of 8 Pages

Hole No. FD88-7 P2-17 Diam. (Casing) HW (4")

Boring Started 2-11-88

Co-ordinates: N 51205 E 50189

Boring Completed 2-16-88

Drilled by Hawkins and Burnham

Report Submitted 3-8-88

Purpose of Exploration To monitor seepage in right abutment area

Elevation Top of Hole 491 M.S.L.

Casing Left in Place 10 Feet

Total Overburden Drilled 36.75 Feet

Elevation Top of Rock 454.25 M.S.L.

Elevation Bottom of Hole 444.25 M.S.L.

Total Rock Drilled 10 Feet; total rock cored 8.75

Total Depth of Hole 46.75 Feet

Core Recovered 79 %

Core Recovered 6.9 Ft.: NX Diam. 2 1/8 In.

Soil Samples 2 3/8 In. Diam. 8 No.

Soil Samples ____ In. Diam. ____ No.

Water Table Depth 34.6

Depth From	Depth To	Method of Drilling and Type of Bit Used
0	35'	HW casing advanced using 300 lbs hammer
10'	35'	continuous split spoon sampling
35'	38'	3 7/8" roller bit
38	46.75	NX DIAMOND CORE

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Piezometer installation report — Page 6
Piezometer installation detail — Page 8
— Page

Prepared by Gregory R. Hargrave
Field Data — Lab. Data

Submitted by Atlantic Testing Laboratories Ltd.

NED FORM DEC 63 121

REPLACES EDITION OF JUN 51 WHICH MAY BE USED UNTIL EXHAUSTED

U. S. ARMY
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NEW ENGLAND DIVISION.

FIELD LOG OF TEST BORING

Site North Springfield Dam, VT Page 2 of 8 Pages

Boring No. FD88-7 PZ-17 Desig. FD-6 Diam. (Casing) HW(4")

Co-ordinates: N 51205 E 50189

Elevation Top of Boring 491 M.S.L.
Total Overburden Drilled 36.75 Feet
Elevation Top of Rock 454.25 M.S.L.
Total Rock Drilled 10 Feet
Elevation Bottom of Boring 444.25 M.S.L.
Total Depth of Boring 46.75 Feet
Core Recovered 79 % No. Boxes
Core Recovered 6.9 Ft. NX Diam. 2⅛ In.
Soil Samples 2⅜ In. Diam. 8 No.
Soil Samples In. Diam. No.

Hammer Wt. 300lbs
Hammer Drop 18"
Casing Left 10'
Subsurface Water Data Page
Obs. Well
Drilled By Hawkins + Burnham
Mfg. Des. Drill CME 850
Inspected By: Greg Hargrave
Classification By: Greg Hargrave
Classification By:

Boring Started 2-11-88
Boring Completed 2-16-88

DEPTH		CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER FT. / CORE RECVY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
				Rec		Advanced HW casing to 10' using spin bit	GRANULAR SOILS
5'						Cleaned casing to 10' using a 3⅞" roller bit, and water as a drilling fluid	
10'							
		S-1A	2⅜"	60%	4 5 17 8 8 7 11 7	Sampled using a 5'x2⅜" ID sampling spoon advanced with a 300lbs hammer Note: only obtained 4" sample because "wash" T" was in way of hammer Advanced 3⅞" roller bit to 15' using "clear mud" drilling fluid	Brownish cmf SAND; and GRAVEL, (wet, non plastic) SW Similar soil
14'		S-1B					
15'							Coarse gravel and possible cobbles
16		S-2	2⅜"	50%	4 13.	Sampled	Soil similar to sample #1, with trace SILT (SW)

GENERAL REMARKS:

NED FORM 58 (Test) MAR 71

Boring No. FD88-7

Site	Boring No.	Page 3 of 8
North Springfield Vt	FD 88-7	

DEPTH	1'-2'	CORE/SAMPLE NO.	SIZE	DEPTH RANGE / CORE RECVY	BLOWS PER 6"	6" SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
16'		S-2	2 3/8"		14 11 13 15	Advance 3 7/8" rollerbit to 20' using "clear mud" drilling fluid. Note: lost water @ 19-19.1	
18.2'				bouncing refusal	34		
						Note: No sample due to coarse gravel and possible cobbles.	Coarse gravel and possible cobbles
20'							
22		S-3	2 3/8"	60%	8 4 6 6 6 9 11 11	Sampled	Brown mf SAND; trace SILT (wet, nonplastic) SP
24					13		
25'					12	END OF EXPLORATION 2-11-88	
26'		S-4	2 3/8"	30%	10 17 11 7 9 8 6 7 6 10	EXPLORATION CONTINUED 2-15-88 Advanced HW casing with spin bit to 25' using water, cleaned casing with water and a 3 7/8" roller bit to 25' Sampled from 25'-30'	Soil similar to sample # 3
28'							
30'						END OF EXPLORATION 2-15-88	
32'		S-5	2 3/8"	70%	7 6 10 11 13	EXPLORATION CONTINUED 2-16-88 Spun HW casing to 30, cleaned casing with 3 7/8" roller bit to 30', sampled from 30' to 32.8'	Brownish GRAVEL; and cmf SAND; little SILT; (wet, non-plastic) GM
32.8'				bouncing refusal	4		

Site	Boring No.	Page 4 of 8
North Springfield Dam, Vt	FD 88-7	

DEPTH		CORE/SAMPLE NO	SIZE	DEPTH MADE / CORE RECV'Y	BLOWS PER 6" / CORE RECV'Y	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
	1:2'						
34'				Rec		Advanced casing to 34.9'. cleaned casing to 34.9'	Coarse gravel and possible cobbles
34.8'		S-6	2 3/8	bouncing return	10	Sampled Advanced casing to 35' Advanced roller bit to 38' Note: Bedrock @ 36.75'	GRAVEL, GP
36'							coarse gravel and possible cobbles
38'							Bedrock
40'		R-1	NX	88%		NX DIAMOND CORE 38' to 43'	Grey Gneiss with seams of schist 6 pieces, some fragments RQD = 78% Note: verticals fractures from 39.3' to 43'
42'							
43'							
44'		R-2	NX	67%		NX DIAMOND CORE 43' to 46.75'	Grey Gneiss 2 pieces, RQD = 58%
46'							
46.75						EXPLORATION TERMINATED 2-16-88	

FIELD LOG OF TEST BORING IN ROCK

SITE North Springfield Dam, Vt ROLE NO. FD 88-7 PAGE 5 of 8

P2-17

DATE	DEPTH FT. FROM	DEPTH FT. TO	RUN PT.	RUN REC'V'Y PT.	REC'V'Y %	DRILLING BEHAVIOR: PEED	DRILLING BEHAVIOR: WATER	DRILLING BEHAVIOR: REASON FOR PULL	ACTUAL DRILLING TIME	BIT NO. SIZE AND TYPE	ADDITIONAL REMARKS
2/16/88	38	43	5'	4.4"	88%	Medium	No loss of water noted	5' run	20 min.	NX	Run #1
2/16/88	43	46.75	3.75'	2.5	67%	Medium	slight loss of water noted	3.75' run	27 min.	NX	Run # 2

TOTAL BED ROCK ~~DRILLED~~ Cored 8.75' FEET

TOTAL BED-ROCK RECOVERED 6.9 FEET

BED ROCK RECOVERY 79% PERCENT

DRILLER Burham

INSPECTOR Hargrave

NED FORM DEC 130

PREVIOUS EDITION OF APR 63 WHICH MAY BE USED UNTIL EXHAUSTED

PIEZOMETER INSTALLATION REPORT

PROJECT: North Springfield Dam, Vt | DATE: 2-16-88

LOCATION (STA): N-51205 | OFFSET FROM CENTER LINE: E-50189 | PIEZ NO.: FD88-7 (PZ-17)

PIEZ TYPE: Casagrande | DEPTH OF PIEZ: 40.35 | RISER PIPE DIAM: 3/4"

PIEZ TIP SET IN (SOIL TYPE): | SOIL SAMPLE NO.: | BORING DIAM: 4" overburden, 3" rock

METHOD OF INSTALLATION:

TYPE OF PROTECTION FOR PIEZ: 4" casing | VENT: screw on cap

GROUND ELEV.: 491' | ELEV. TOP OF RISER: 494.07' | ELEV PIEZ TIP: 450.65'

FILTER: #4 filter sand | FROM ELEV: 444.25' | TO ELEV: 474'

SEAL: Bentonite Pellets | FROM ELEV: 474' | TO ELEV: 479

INSTALLED BY: Burnham | CONTRACT NO.: DO.0003 | FOREMAN: Hargrave

DATE OF INSTALLATION: 2-16-88 | DATE OF OBSERVATIONS: 2-16-88

METHOD OF TESTING PIEZ.: Falling Head Test

TIME	ELAPSED TIME MINUTES	DEPTH TO WATER FEET	TIME	ELAPSED TIME MINUTES	DEPTH TO WATER FEET	TIME	ELAPSED TIME MINUTES	DEPTH TO WATER FEET
	0	0		10.0	33.4			
	0.5	28.6'		15.0	33.4			
	1.0	32.6		20.0	33.4			
	3.0	32.9						
	5.0	33.2						

REMARKS:

Gregory R. Hargrave
INSPECTOR

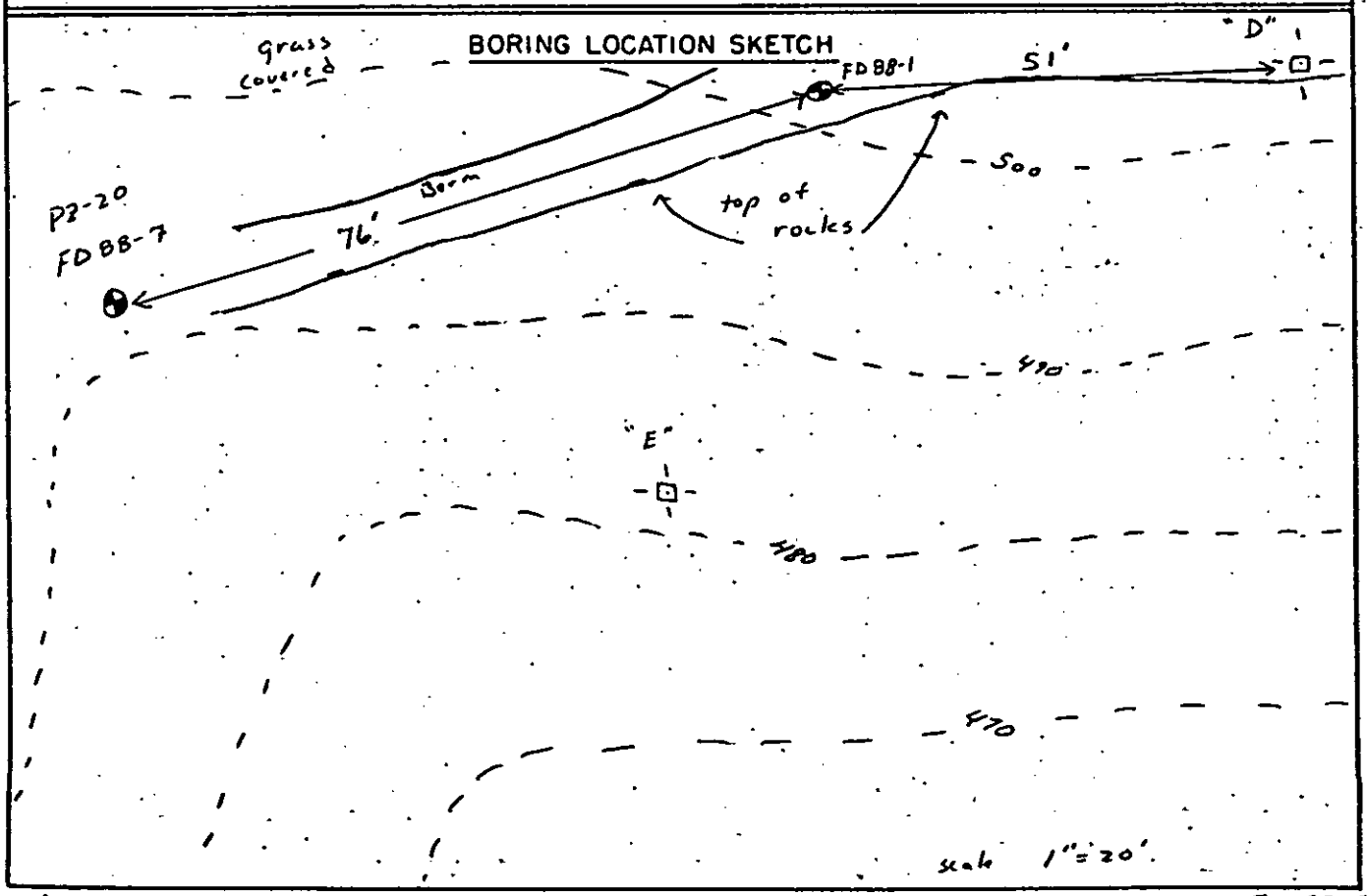
Site: North Springfield Dam Vt
Boring No: FD 88-7 ; PZ-17

SUBSURFACE WATER OBSERVATIONS

DATE	TIME	DEPTH-BOT. OF CASING	DEPTH-BOT. OF BORING	DEPTH TO WATER	ELEVATION WATER	REMARKS
2-17-88	7:25	6.9	46.75'	34.0	457.0	
2-18-88		6.9	46.75	34.4	456.6	
2-19-88	8:15	6.9	46.75	34.6	456.4	
2-24-88	8:45	6.9	46.75	34.7	456.3	

Note: Depths are in feet below original ground

BORING LOCATION SKETCH



ATLANTIC TESTING LABORATORIES, LIMITED

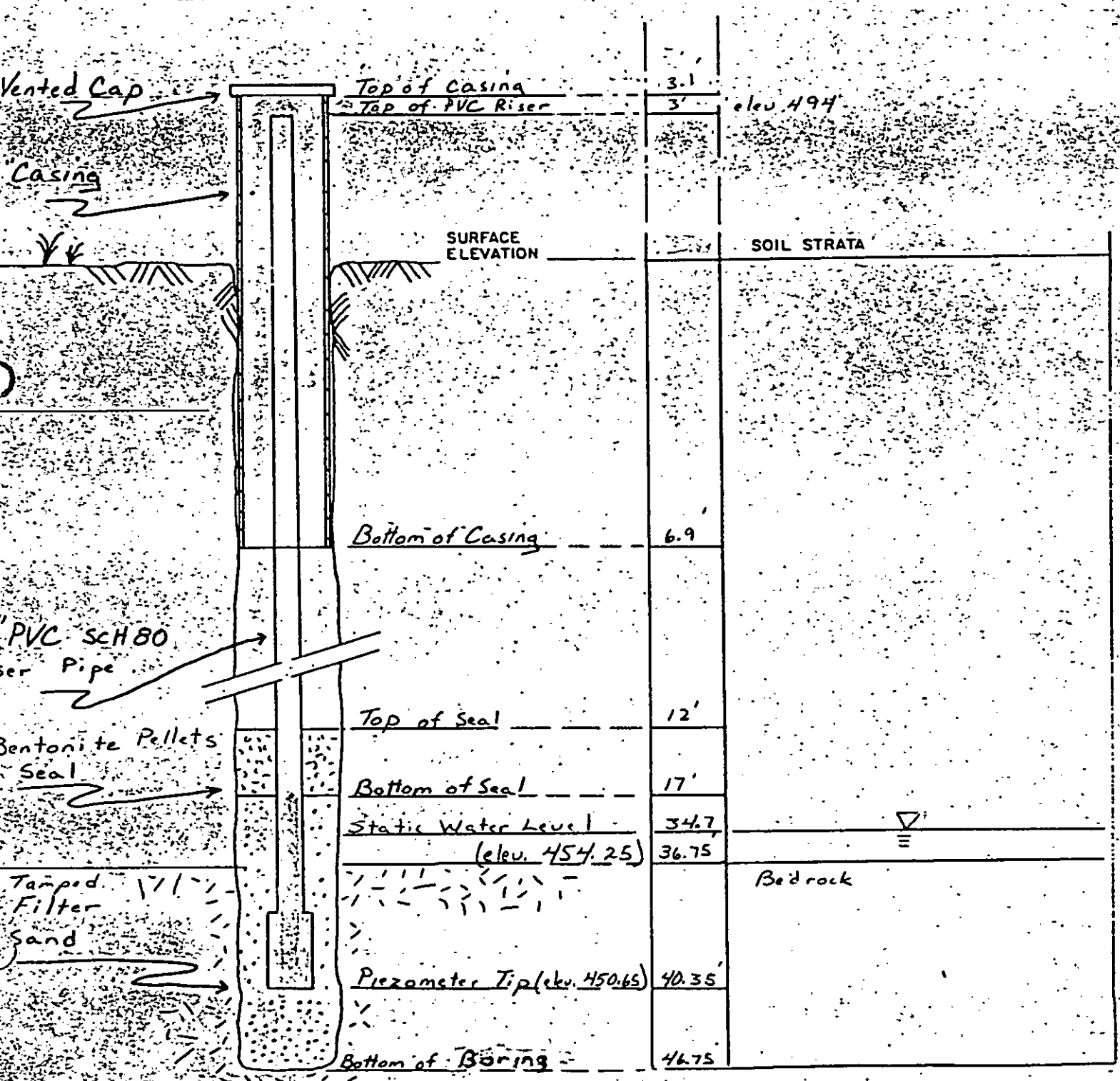
PIEZOMETER INSTALLATION DETAIL

PROJECT: North Springfield Dam Piezometer Installation

PROJECT NO: CD 030

CLIENT: USACE, NED

WELL NO. FD 88-7 PZ-17



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FIELD LOG OF TEST BORING

PROJECT NO. D.O. 0005

Site North Springfield Dam — Page 1 of 11 Pages

Hole No. FD 88-8 PZ-18 — Diam. (Casing) HW (4") — Boring Started February 17, 1988

Co-ordinates: N 51109 E 50146 — Boring Completed February 24, 1988

Drilled by Burnham + Fox — Report Submitted March 8, 1988

Purpose of Exploration To investigate seepage in right abutment area

Elevation Top of Hole 530.6 M.S.L.
Total Overburden Drilled 81.7 Feet
Elevation Top of Rock 448.9' M.S.L.
Elevation Bottom of Hole 439.1 M.S.L.
Total Rock Drilled 9.8 Feet
Total Depth of Hole 91.5 Feet
Core Recovered 91 %
Core Recovered 8 Ft.: NX Diam. 2 1/8 In.
Soil Samples 2 3/8 In. Diam. 19 No.
Soil Samples ____ In. Diam. ____ No.

Casing Left In Place 10 Feet

Water Table Depth 72.2'

Depth From	Depth To	Method of Drilling and Type of Bit Used
0	74.5	Continuous split spoon sampling
0	55'	HW casing advanced with 300lbs hammer
57.2	59.2	NX DIAMOND CORE
77.7	81.5	NX DIAMOND CORE
82.7	91.5	NX DIAMOND CORE

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Prepared by Gregory R. Hargrave — Field Data — Lab. Data

Submitted by Atlantic Testing Laboratories Ltd.

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U. S. ARMY
CORPS OF ENGINEERS
NEW ENGLAND DIVISION

FIELD LOG OF TEST BORING

Site North Springfield Dam — Page 2 of 11 Pages

Boring No. FD88-8 PZ-18 Desig. FD-E Diam. (Casing) HW(4")

Co-ordinates: N 51109 E 50146

Elevation Top of Boring 530.6 M.S.L.
Total Overburden Drilled 81.7 Feet
Elevation Top of Rock 448.9 M.S.L.
Total Rock Drilled 9.8 Feet
Elevation Bottom of Boring 439.1 M.S.L.
Total Depth of Boring 91.5 Feet
Core Recovered ____ % No. Boxes ____
Core Recovered ____ Ft. NX Diam. 2 1/8 In.
Soil Samples 2 3/8 In. Diam. 19 No.
Soil Samples ____ In. Diam. ____ No.

Hammer Wt. 300lbs Boring Started 2-17-88
Hammer Drop 18" Boring Completed 2-24-88
Casing Left 10'
Subsurface Water Data ____ Page ____
Obs. Well ____
Drilled By Burnham & Fox
Mfg. Des. Drill CME 850
Inspected By: Greg Hargraves
Classification By: Hargraves
Classification By: ____

DEPTH		CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER FT. / CORE REC'Y	6" SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
	1"=2'						
				Rec.	4 2	Sampled using a 2 3/8" I.D. x 5' sampling spoon advanced with a 300lbs hammer dropping 18" Spun HW casing to 5', cleaned casing with a 3 7/8" roller bit and water to 5'	Brown mf SAND (moist, nonplastic) SP
2		S-1	2 3/8"	54%	2 2 5 Rec 3 2 3 4 3		
5'							
					2 1 1 2	Sampled spun casing to 10', cleaned casing to 10'	Brown cm f SAND; trace GRAVEL (wet, nonplastic) SP
		S-2	2 3/8"	62%	1 2 2 2 3 3		
10'							

GENERAL REMARKS:

NED FORM 58 (Test) MAR 71

Boring No. FD 88-8

Site	Boring No.	Page 3 of 11
North Springfield Dam	FD 88-8	

DEPTH	1' = 2'	CORE/SAMPLE NO.	SIZE	DEPTH/RQD	BLOWS PER 6" / CORE REC'VY	6" SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
10'				Rec	2	Sampled to 13.6', advanced roller bit to 15' using water as drilling fluid, advanced HW casing, cleaned casing to 15'	Brown cmf SAND; some GRAVEL (wet, nonplastic) SW
					2		
					2		
		S-3	2 3/8"		3		
					3		
					3		
					6	Note: encountered cobbles from 13.8' to 14.9'	
13.6'		bouncing refusal					
							Cobbles
15'							
					2	Sampled to 20'	Grey GRAVEL and cmf SAND; trace SILT (wet, non-plastic) GP
					6		
		S-4A			5	Spun casing to 20'	
					5	cleaned casing to 20'	
		S-4	2 3/8"	26%	4		
					5		Brown cmf SAND; little GRAVEL; trace SILT (wet, nonplastic) SP
					4		
		S-4B			5		
					6		
20'					6		
					3	Sampled to 25'	Grey mf SAND; trace SILT (wet, non plastic) SP
					3		
					3	Spun casing to 25'	
					3	cleaned casing to 25'	
		S-5	2 3/8"	50%	4		
					4		
					5		
					5		
					4		
25'					5	END OF EXPLORATION 2-17-88	
					4	EXPLORATION CONTINUED 2-18-88	Grey cmf SAND; trace GRAVEL SP
		S-6	2 3/8"	50%	4	Sampled	

Site	Boring No.	Page 4 of 11
North Springfield Dam, Vt	FD 88-8	

DEPTH	CORE/SAMPLE NO.	SIZE	DEPTH/CORE RECV'Y	BLOWS PER FT. 6"	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
26'			Rec	4	Sampled to 30' advanced roller bit to 30.5', advanced casing to 30.5', cleaned casing to 30.5' Note: cobble encountered from 30' to 30.5'	
	S-6	2 3/8"		2		
				3		
				3		
				3		
				5		
				5		
30'				8		
30.5'						COBBLE
	S-7A			5	Sampled to 35', advanced roller bit to 35', advanced casing to 35', cleaned casing to 35'	Grey GRAVEL; some cmf SAND; little SILT (wet, nonplastic) GM
				7		
				6		
				8		Grey GRAVEL; trace SAND; trace SILT (wet, nonplastic) GP
	S-7B	2 3/8"	40%	9		
				8		
				8		Grey cmf SAND; trace GRAVEL; trace SILT (wet, nonplastic) SP
	S-7C			7		
35'				7		
				3	Sampled to 40', advanced roller bit to 40', advanced casing to 40', cleaned casing to 40'	-Similar Soil, (little GRAVEL) SP
				4		
				4		
				5		
	S-8	2 3/8"	60%	7		
				7		
				7		
				5		
				7		
40'				13		
				5	Sampled to 45', advanced roller bit to 45', advanced casing to 45', cleaned casing to 45'	Grey cmf SAND; little GRAVEL (wet, nonplastic) SP
				5		
				4		
	S-9	2 3/8"	50%	4		
				5		
				5		

Site	Boring No.	Page 5 of 11
North Springfield Dam Vt	FD 88-8	

DEPTH		CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER FT. / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
				Rec	7 7 8 8		SP
45'							
41'		S10A			8 8 9 9	Sampled, advanced roller bit to 50', advanced casing to 50', cleaned casing to 50'	Grey GRAVEL, and cmf SAND; trace SILT; (wet, non-plastic) GW
		S-10B		60%			Grey cmf SAND little SILT; trace GRAVEL (wet, nonplastic) SM
43'			2 3/8"		12 11 15 15		
50'		S-10C			8 10		Grey GRAVEL; and cmf SAND, trace SILT, (wet, nonplastic) GW
52'		S-11	2 3/8"	60%	7 5 5 6 6 8 8 9 10 13	Sampled, advanced roller bit to 55', advanced casing to 55', cleaned casing to 55'	Grey mf SAND; trace SILT (wet, nonplastic) SP
54'							
55'							Grey mf SAND; some SILT (wet, nonplastic) SM
56.2'		S-12A S-12B S-12C	2 3/8"	80%	3 11 13	Sampled to 56.2' advanced roller bit to 57.2'	Brown cmf SAND; and GRAVEL; trace SILT (wet, nonplastic) SW
57 57.2				boulder refusal		Note: encountered boulder from 56.2' to 59.2' END OF EXPLORATION 2-18-88	GREY GRAVEL; and cmf SAND; little SILT (wet, nonplastic) GM
55' 59.2'		R-1	NX	45%		CONTINUED EXPLORATION 2-19-88 NX DIAMOND CORE 57.2 to 59.2' END of EXPLORATION 2-19-88	Boulder
60						EXPLORATION CONTINUED 2-22-88 Advanced 3 7/8" roller bit to	coarse gravel and cobbles

Site	Boring No.	Page 6 of 11
North Springfield Dam, Vt	FD 88-8	

DEPTH	1' 2'	CORE/SAMPLE NO.	SIZE	DEPTH RANGE / CORE RECV'Y	BLOWS PER 6" / CORE RECV'Y	6" SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
60' 60.8'				Rec		54.2' using Clear mud drilling fluid. Advance casing to 56'. END OF EXPLORATION 2-22-88	
61.8'		S-13	2 3/8"	80%	3 5- beginning refusal	EXPLORATION CONTINUED 2-23-88. Sample to 61.8' [illegible]	Grey cmf SAND; trace SILT; trace GRAVEL (wet, non plastic) SW
65.5'						[illegible] coarse gravel [illegible] 63.5'. Advanced roller bit to 65.5' using "Clear mud" drilling fluid. Note: encountered coarse gravel and cobbles from 61.8' to 65.5'	Coarse gravel and cobbles
65.6' 68'			2 3/8"	0%	5 beginning refusal	Sample 65.6'. Advanced roller bit to 68'. Note: encountered possible boulder from 65.6' to 68'	Possible Boulder
68.6'		S-14	2 3/8"	50%	3 2- beginning refusal	Sample to 68.6'. Advanced roller bit to 73.5'. Note: encountered coarse gravel and cobbles from 68.6' to 71.9', encountered a large cobble from 71.9' to 72.7', encountered coarse gravel and cobbles from 72.7' to 73.5	Soil similar to sample #13 SW
							coarse gravel and cobbles
							cobble
73.5'							coarse gravel and cobbles
74.5'			2 3/8"	30%	10 17- beginning refusal	Sample to 74.5'. Advanced roller bit to 77.7'. Note: encountered coarse gravel and cobbles from 74.5' to 77.7'. [illegible] 75.7'	grey-brown cmf SAND; some GRAVEL; some SILT (wet, non-plastic) SM
							coarse gravel and cobbles

Site	Boring No.	Page 7 of 11
North Springfield Dam, Vt	FD 88-8	

DEPTH		CORE/SAMPLE NO.	SIZE	DEPTH	BLOWS PER 6" / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
77.7'							
79'		R-2	NX	76%		NX DIAMOND CORE, 3.8' run 77.7 to 81.5'	Cobbles with seams of crs SAND, little GRAVEL little SILT.
80'							
81.5						END OF EXPLORATION 2-23-88	
82'						EXPLORATION CONTINUED 2-24-88 Advanced 3 7/8" roller bit to 82.7' Refusal bedrock @ 81.7	Bedrock
82.7							
84'		R-3	NX	79%		NX DIAMOND CORE; 3.8' run 82.7 to 86.5	Greyish-Pink Gneiss 3' recovery 8 pieces, few fragments RQD = 57%
86.5						EXPLORATION TERMINATED 2-24-88	
88'		R-4	NX	100%		NX DIAMOND CORE; 5' run 86.5 to 91.5	Similar Rock 100% recovery 4 pieces RQD = 100%
91.5'						EXPLORATION TERMINATED 2-24-88	
						Bottom of Boring 91.5'	

FIELD LOG OF TEST BORING IN ROCK

SITE North Springfield Dam, VT HOLE NO. FD88-8 PAGE 8 of 11

P2-18

DATE	DEPTH PT. FROM	DEPTH PT. TO	RUN PT.	RUN REC'V'Y PT.	REC'V'Y %	DRILLING BEHAVIOR: FEED	DRILLING BEHAVIOR: WATER	DRILLING BEHAVIOR: REASON FOR PULL	ACTUAL DRILLING TIME	BIT NO. SIZE AND TYPE	ADDITIONAL REMARKS
2-19-88	57.2'	59.2'	2'	0.9	45%	Medium	No loss of water noted	2' run	25 min	NX	Run #1, broke through boulder @ 59.2'
2-23-88	77.7	81.5	3.8'	2.9'	76%	Medium	loss of water noted from 80.4' to 80.5'	3.8' run	35 min	NX	Run #2
2-24-88	82.7	86.5	3.8'	3'	79%	Medium	No loss noted	3.5' run	40 min.	NX	Run #3
2-24-88	86.5	91.5	5'	15'	100%	Medium	No loss noted	5' run	50 min	NX	Run #4

TOTAL BED ROCK DRILLED 9.8 FEET; total rock cored - 14.6 ; total bedrock cored 8.8

TOTAL BED-ROCK RECOVERED 8 FEET

BED ROCK RECOVERY 91 PERCENT

DRILLER Burnham

INSPECTOR Hargrave

NED FORM 130 DEC

REPLACES EDITION OF APR 63 WHICH MAY BE USED UNTIL EXHAUSTED

PIEZOMETER INSTALLATION REPORT

PROJECT: North Springfield Dam, Vt | DATE: 2-25-88

LOCATION (STA): | OFFSET FROM CENTER LINE: | PIEZ NO.: PZ-18 FD88-8

PIEZ TYPE: Casagrande | DEPTH OF PIEZ: 87.0 | RISER PIPE DIAM: 3/4"

PIEZ TIP SET IN (SOIL TYPE): Bedrock | SOIL SAMPLE NO.: | BORING DIAM: 4" overburden 3" in bedrock

METHOD OF INSTALLATION:

TYPE OF PROTECTION FOR PIEZ: 4" casing | VENT: screw on cap

GROUND ELEV.: 530.6' | ELEV. TOP OF RISER: 533. | ELEV PIEZ TIP: 443.6'

FILTER: #3 graded Q-rock SAND | FROM ELEV: 443.1' | TO ELEV: 469.6'

SEAL: Bentonite Pellets | FROM ELEV: 469.6' | TO ELEV: 474.6'

INSTALLED BY: Burnham | CONTRACT NO.: D0.0003 | FOREMAN: Hargrave

DATE OF INSTALLATION: 2-24-88 | DATE OF OBSERVATIONS: 2-25-88

METHOD OF TESTING PIEZ.: Falling Head Test

TIME	ELAPSED TIME MINUTES	DEPTH TO WATER FEET	TIME	ELAPSED TIME MINUTES	DEPTH TO WATER FEET	TIME	ELAPSED TIME MINUTES	DEPTH TO WATER FEET
	0.5	19.1		10.0	37.9			
	1.0	21.0		15.0	43.1			
	2.0	23.6		20.0	47.2			
	3.0	26.0		25.0	50.7			
	5.0	30.3		30.0	53.3			

REMARKS:

Static water level was recorded prior to performing falling head test, level was 72.2'

Gregory P. Hargrave
INSPECTOR

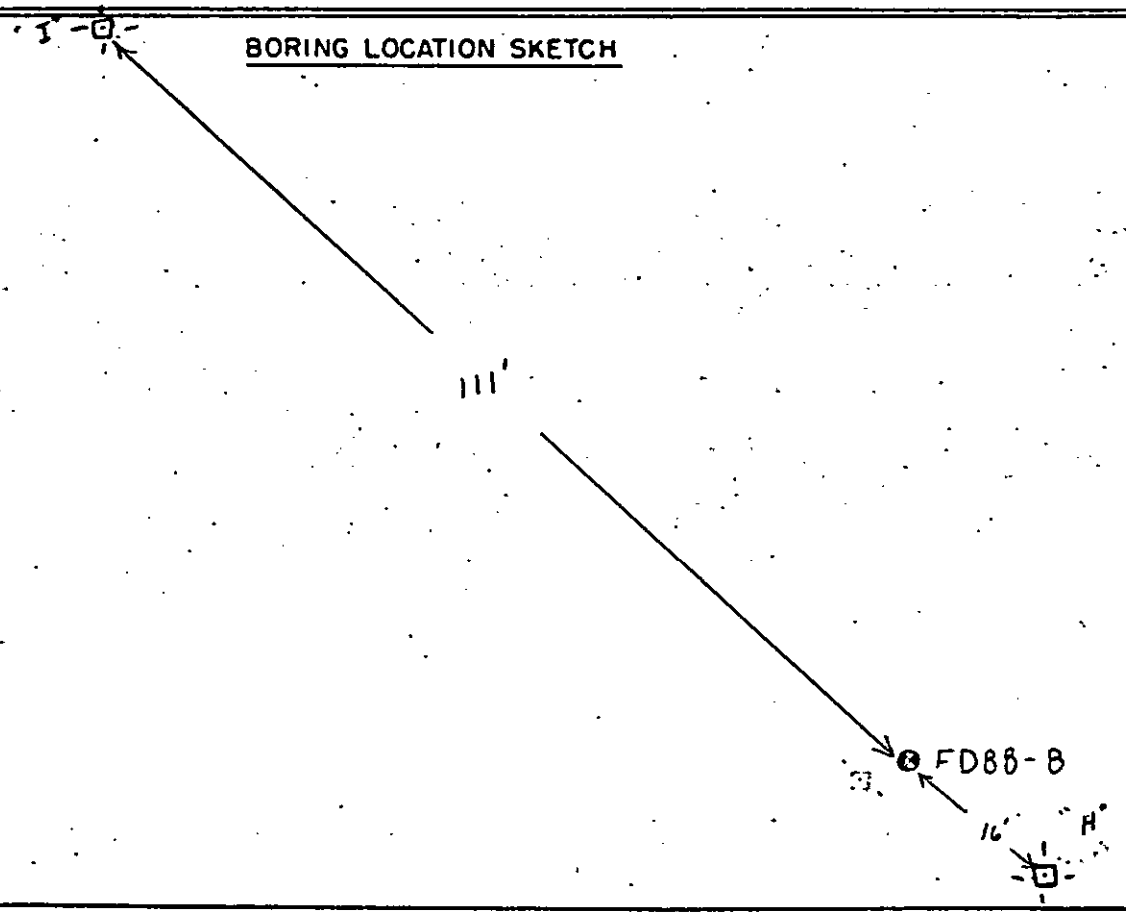
Site: North Springfield Dam, VA
Boring No: FD 88-B, PZ-18 --

SUBSURFACE WATER OBSERVATIONS

DATE	TIME	DEPTH-BOT. OF CASING	DEPTH-BOT. OF BORING	DEPTH TO WATER	ELEVATION WATER	REMARKS
2-24-88	11:00Am	7'	87.7	72.2	458.4	water level before falling head test performed

Note: Depths are in feet below original ground

BORING LOCATION SKETCH

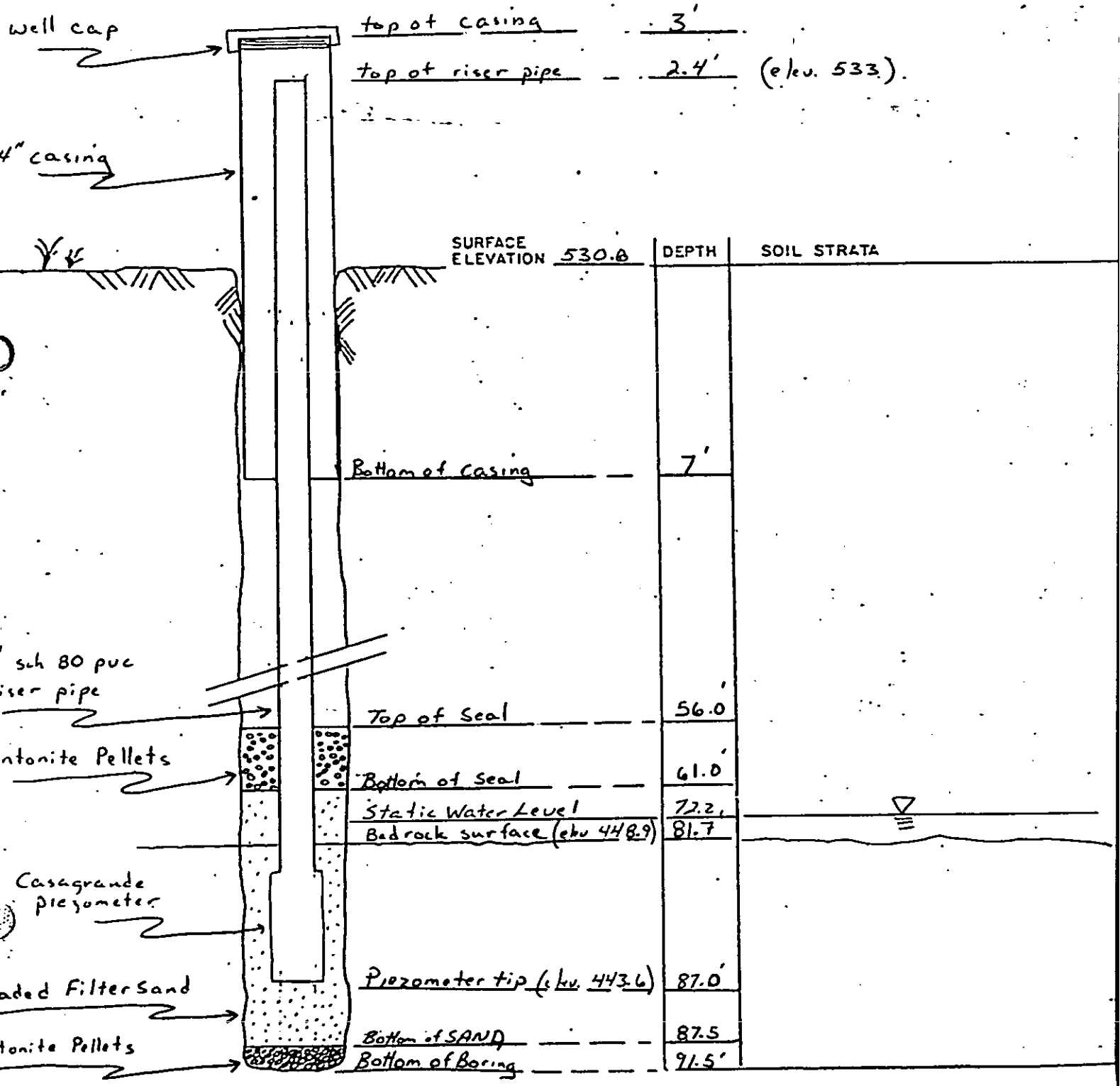


ATLANTIC TESTING LABORATORIES, LIMITED

PIEZOMETER INSTALLATION DETAIL

PROJECT: North Springfield Dam
Vt

PROJECT NO. D.O. 0003
ATL No. CD 030
PIEZOMETER No. FD 88-8
PZ- 18-



SECTION 9 - OTHER RECORDS TAKEN

a. Survey Data

CD030 - AS SURVEYED FEBRUARY, 1988

BORING/PIEZOMETER NUMBER		COORDINATES NORTH	EAST	GROUND	RISER	CASING
	PZ-1	51,733.10	50,414.02	505.33	NO PVC	508.50
	PZ-2	51,870.91	50,519.37	532.49	NO PVC	536.22
	PZ-3	*52,024.28	50,605.98	569.27	NO PVC	571.89
	PZ-4	*51,958.38	51,394.08	569.27	NO PVC	572.97
	PZ-5	*51,868.46	51,373.22	556.87	NO PVC	557.54
	PZ-6	51,797.69	50,155.55	538.04		542.61
	PZ-7	51,701.67	50,145.79	ABANDONDED		
	PZ-8	51,570.74	50,140.59	504.60	507.88	508.77
	PZ-9	51,570.74	50,140.59	504.60		508.77
	PZ-10	*51,470.53	50,147.44	512.11	NO PVC	512.67
	PZ-11	Same as PZ-10				
	PZ-12	*52,030.87	50,200.13	569.77		572.93
	PZ-13	51,627.97	50,251.99	481.26	483.98	484.02
	PZ-14	51,619.27	50,319.36	480.52	484.71	484.76 (top)
FD88-1	PZ-16	51276	50,169.20	500.1	501.37	501.60
FD88-2	PZ-20	51,460.82	50,022.08	552.22	557.60	557.72
FD88-3	PZ-15	51,448.19	50,159.34	504.5	505.61	506.80
FD88-4	--	51,194.48	50,295.40	457.96	NA	NA
FD88-5	PZ-19	51,253.69	50,069.35	520.88	523.47	523.93
FD88-6	--	51,152.16	50,092.00	520.85	NA	NA
FD88-7	PZ-17	51,205.27	50,189.75	491.0	494.07	494.10
FD88-8	PZ-18	51,109.33	50,196.08	530.60	533.0	533.6

*Surveyed on September 3, 1987 and November 12, 1987. Not resurveyed February, 1988.

NOTES:

PZ-1 through PZ-12 installed by others

PZ-13, PZ-14 were by installed by Atlantic Testing Laboratories during the period of August 23, 1987 through August 29, 1987.

PZ-15 through PZ-20 were installed by Atlantic Testing Laboratories during the period of January 20, 1988 through February 24, 1988.

COORDINATE FILE-K0020 LENGTH - 112 POINTS. TIME ON FILE: 3 50 19
TOWNSEND/STATHOFIELD ROAD ***** JOB 80

********** C000 **********

FROM	TYPE	BEARING	DISTANCE	TO	NORTHING	EASTING		
LIST								
				50	51,187.34	50,116.13	525.23	STA I
				51	51,276.05	50,169.26	T000-1	
				52	51,400.35	50,022.84	525.01	T000-2
				53	51,410.13	50,159.34	T000-3	
				54	51,151.10	50,235.10	T000-4	
				55	51,253.69	50,069.35	T000-5	
				56	51,152.16	50,032.00	T000-6	
				57	51,205.27	50,169.75	T000-7	
				58	51,109.33	50,136.88	T000-8	
START				1	52,011.32	50,389.17	569.17	S1
1	INV	SW	17 15 38	836.00	50	51,187.34	50,116.13	525.23	STA I
50	INV	NE	17 15 38	836.00	1	52,011.32	50,389.17	569.17	S1
1	INV	SW	11 10 31	951.68	58	51,109.33	50,136.88	T000-8	
58	INV	NE	11 10 31	951.68	1	52,011.32	50,389.17	569.17	S1
1	INV	NW	15 16 10	113.57	58	52,120.53	50,388.03	T000-8	
58	INV	SE	15 16 10	113.57	1	52,011.32	50,389.17	569.17	S1
1	INV	SW	17 15 38	836.00	50	51,187.34	50,116.13	525.23	STA I
50	INV	NE	11 37 53	552.15	58	52,120.53	50,388.03	T000-8	
58	INV	SW	11 37 53	552.15	50	51,187.34	50,116.13	525.23	STA I
50	INV	SE	15 16 10	113.57	58	51,188.72	50,137.50	T000-8	

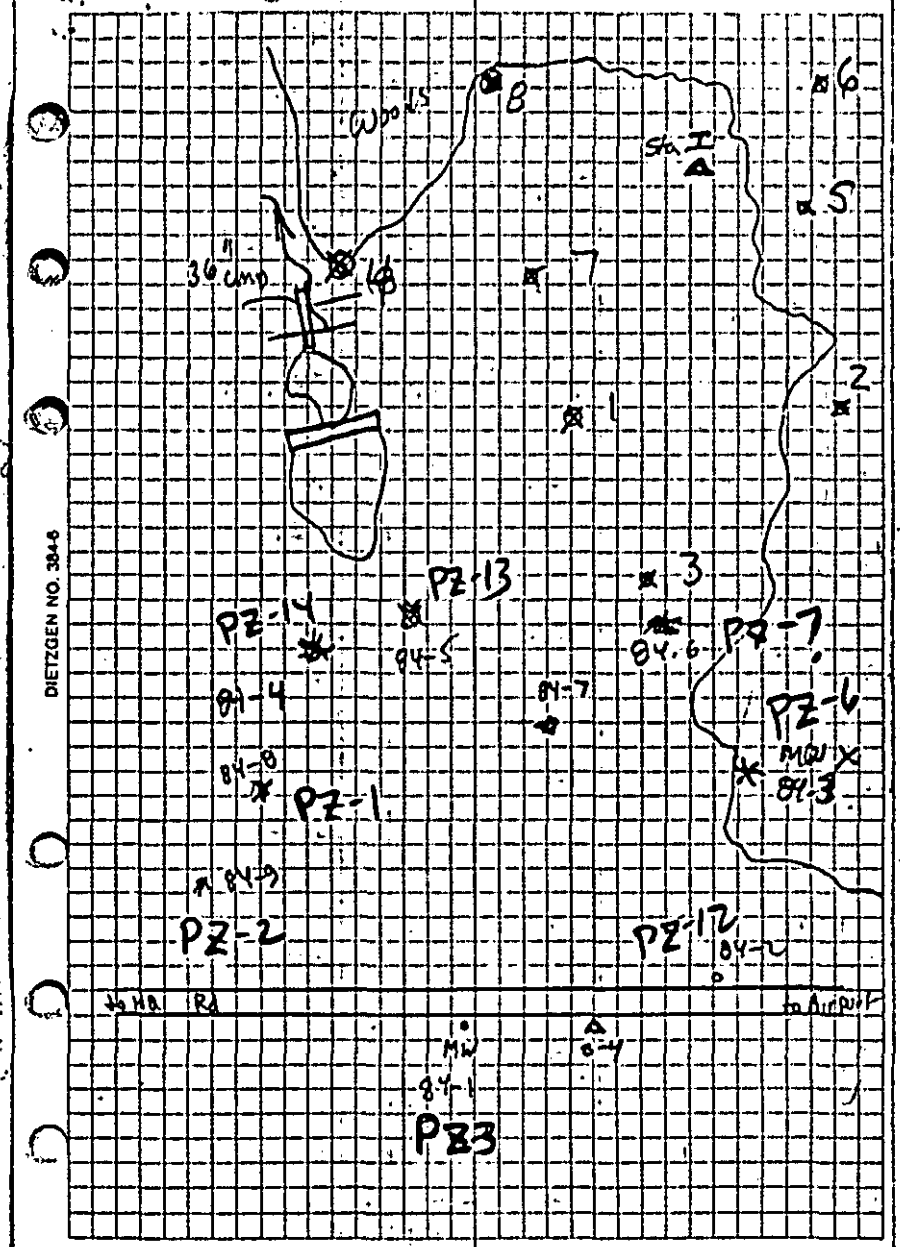
North Springfield Dam

Piezometers & Borings

Locations & Elevations

2/22/88 –

2/23/88



wier Top conc	3.52	465.24		461.72	
BB-4			7.28	457.96	
BBB-4	6.53				
wier top concrete			2.78 ~~7.28~~	461.71	0.01error
outlet			11.20	453.29	53.28
wier Top concrete	10.27	471.99		461.72	
TP 1			1.49	470.50	
TP 1	14.32	484.82			
MW 84-4			4.30	480.52	
MW 84-4 top			0.06	484.76	
84-5 mid			3.56	481.26	
84-5 top			0.80	484.02	
84-5 top	1.14	485.16			
tp 2 ~~TP-2~~			14.95	470.21	
~~[illegible]~~	1.00	471.21			
			9.48	461.73	0.01error
	(water level)		(26.72)		

BB-3	6.75	513.55		506.80	outer casing out of [illegible]
84-6 abandoned			1.25	512.30	
BB top	8.21	515.01		506.80	
84-7			6.06	508.95	
~~BB~~					
84-7	5.51	514.49		508.95	
			7.69	506.80	
well 84-3	1.63	544.29		542.66	
TP 1			0.78	543.51	
TP 1	13.37	556.88			
TP2			0.57	556.32	
TP 2	4.80	561.12			
BB-2 casing			3.40	557.72	
PVC			3.51	557.60	
BB-2 casing	0.57	558.29			
TP 3			13.62	544.67	

TP-3	1.35	546.01 ~~22~~			
TP-4			13.05	532.97	
TP-1	0.48	533.45			
BB-5 cas			9.51	523.93	
BB-5 m			9.98	~~543.93~~	523.47
BB-5 cas	6.33	530.26 ~~549.76~~	5.03 ~~5~~	525.23 ~~544.73~~	✓
Sta I					
Sta I	9.69	534.92 ~~554.42~~			
BB-6 original			14.07	520.85 ~~540.35~~	
BB-9 ground			4.32	~~550.70~~ 530.60	
BB-8	0.49	531.90 ~~551.09~~			
TP-5			18.66	~~532.43~~ 512.93	
TP5	0.97	513.90 ~~533.40~~			
MW ~~4-7~~ Casing			19.75	~~513.65~~ 493.93	
BB-7	(~~40.16~~) 40.16		100.69 ~~106.69~~ 88.49	43.01	.05 error

	BS ~~HI~~	HI	FS	EL	
TP7	16.~~76~~ 78	569.07			
TP8			0.76	568.31	
TP8	6.55	574.86			
S-4			5.38	569.48	0.01 error
	(85.000)		(84.99)		
BB-3	0.83	507.63		506.80	
Riser			2.02	505.61	
BB-1 BS			6.03	501.60	4.1, 60
BB-1 Riser			6.26	501.37	
BB-7 Casing ~~Riser~~			13.53 ~~13.53~~	494.10	
BB-7 Casing ~~R~~	14.24	508.34			
BB-7 Riser			14.27		
BB-3 ~~Riser~~			1.52	506.82	0.02 error
	(15.07)		15.05 (~~15.05~~)		

BBB-4	3483442	859.49 ~~829~~.57	973242		
BB4-7					
X at S-4	100648	53637	970142	0.5	RZ-8,9
BS I					
			4.99		
84-9	124754	793.15	893206	0.5	PZ-2
TB8B-5-	3064936	8091	941408	0.05	S5
84-6	3453236	514.59	894124	0.5	PZ-7
84-3	3455618	611.16	884736	0.5	PZ-6
84-8	105336	621.60	915736	0.5	PZ-1
84-4	072806	478.98	952706	0.5	PZ-14
84-5	3592354	462.83	954306	0.5	PZ13
TB88-3	3514000	264.79	945606	0.5	S3
TB-88-1	1131948	109.46	1045219		S1
TB88-7	58.5936	83.09	1142724		S7
TB 88-8	1162812	113.87	85.4842		S8
TB 88-6	1961418	43.40	960200		S6
X at Stu I					
BS S-4	14= 4.92				

FD-88-1 (A)

CORPS OF ENGINEERS, U. S. ARMY
NEW ENGLAND DIVISION
FOUNDATION AND MATERIALS BRANCH

FIELD LOG OF TEST BORING

PROJECT NO. D.O. 0003

Site North Springfield Dam, No. Springfield Vt — Page 1 of 9 Pages

Hole No. FD-88-1 Diam. (Casing) HW — Boring Started January 20, 1988

Co-ordinates: N 51276 E 50169 — Boring Completed January 25, 1988

Drilled by Hawkins + Burham — Report Submitted March 3, 1988

Purpose of Exploration To monitor seepage at downstream right abutment area

Elevation Top of Hole 500.1' M.S.L.
Total Overburden Drilled 37.8 Feet
Elevation Top of Rock 462.3' M.S.L.
Elevation Bottom of Hole 447.3 M.S.L.
Total Rock Drilled 15 Feet
Total Depth of Hole 52.8 Feet
Core Recovered 94 %
Core Recovered 13 Ft.; ____ Diam. 2 1/8 in. NX
Soil Samples ____ in. Diam. ____ No.
Soil Samples ____ in. Diam. ____ No.

Casing Left in Place 10 Feet

Water Table Depth 37.6'

Depth From	Depth To	Method of Drilling and Type of Bit Used
0	37.8	Advanced HW casing with 300 lbs
		Hammer
0	39.0	Advanced 3 7/8 O.D. roller bit with water
39.0	52.8	NX diamond core
0	45.2	Casagrande piezometer installed with
		tip depth of 45.3'

INDEX

Ground Water Observations — Back of Page 8
Boring Location Sketch — Back of Page 8
Overburden Record page 2 through — Page 4
Rock Drilling — Page 6
Piezometer Installation Report — Page 7
Piezometer Installation Detail — Page 9
— Page

Prepared by Gregory R. Hargrave
Field Data — Lab. Data

Submitted by Atlantic Testing Laboratories Limited

NED FORM DEC 63 121 — REPLACES EDITION OF JUN 51 WHICH MAY BE USED UNTIL EXHAUSTED

U. S. ARMY
CORPS OF ENGINEERS
NEW ENGLAND DIVISION

FIELD LOG OF TEST BORING

Site North Springfield Vt — Page 2 of 9 Pages

Boring No. FD88-1 Desig. FD-A Diam. (Casing) HW

Co-ordinates: N 51276 E 50169

Elevation Top of Boring 500.1 M.S.L.
Total Overburden Drilled 37.8 Feet
Elevation Top of Rock 462.3 M.S.L.
Total Rock Drilled 15 Feet
Elevation Bottom of Boring 447.3 M.S.L.
Total Depth of Boring 52.8 Feet
Core Recovered 94 % No. Boxes
Core Recovered 13 Ft. Diam. In.
Soil Samples In. Diam. No.
Soil Samples In. Diam. No.

Hammer Wt. 300 lbs
Hammer Drop 18"
Casing Left 10'
Subsurface Water Data: Page 8
Obs. Well 9
Drilled By Hawkins + Fox
Mfg. Des. Drill CME 850
Inspected By: Greg Hargrave
Classification By: Greg Hargrave
Classification By: T.L. Beauchemin

Boring Started 1/20/88
Boring Completed 1/25/88

DEPTH 1" = 2'	CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER FT. / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
1' 2' 3' 4' 5' 6' 7' 8' 9' 10'					Advanced HW casing to 10' using 300 lbs hammer with 18" drop Cleaned casing with 3 7/8" roller bit and water	A Coarse granular material

GENERAL REMARKS:
Advanced casing to 10' then started sampling

NED FORM 58 (Test) MAR 71

Boring No. FD 88-1

Site: North Springfield, Vt

Boring No. FD - 88-1

DEPTH		CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER 6" / CORE REC'Y	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
10' 11.5'		S-1	2 3/8"		2 4 3	Sampled with 2 3/8" I.D. casing advanced with 300 lbs. hammer	grey brown c m SAND some GRAVEL (wet, non plastic) SP
12' 13'		S-2	2 3/8"		3 4 5	Sample	Similar Soils - SP
14' 15'		S-3	2 3/8"		4 4 5 4	Sample Drive HW casing to 15' using 300 lbs. hammer Clean casing using 3 7/8" OD rotary bit and water ✓	Similar Soils - SP Grey, poorly graded ~~Similar Soils SP~~ Gravel with Sand GP
16' 16.5		S-4	2 3/8"		8 7 6	Sample	~~Similar Soils~~ SAND SP
18'		S-5	2 3/8"		3 6 7	Sample	
20'		S-6	2 3/8"		10 15 13 15	Sample Drive casing to 20', clean casing to 20'	grey-brown cmf SAND, with ~~some~~ GRAVEL, and ~~trace~~ SILT (wet, non-plastic) ~~SM~~ SP-SM
21.5		S-7	2 3/8"		20 21 5	Sample	Similar Soils - ~~SM~~ SP-SM
22' 23'		S-8	2 3/8"		6 8 8	Sample ✓	Grey ~~Brown~~ poorly graded GRAVEL with and cmf SAND, ~~trace~~ and SILT ~~GM~~ GW - GM
24 25'		S-9	2 3/8"		8 20 10 11	Sample Drive casing to 25' ✓ Clean casing to 25'	~~Similar Soil~~ GM ~~Grey Soil~~ Grey, well graded Gravel with sand GW
26' 26.5'		S-10	2 3/8"		26 32 9	Sample	Grey - Brown silty GRAVEL, with ~~some~~ cmf SAND, ~~trace SILT~~, ~~trace CLAY~~ (wet, very slightly plastic) ~~GC~~ GM
					32	Sample	

Site	Boring No.	Page 4 of 9
North Springfield, Vt	FD-88-1	

DEPTH		CORE/SAMPLE NO.	~~SIZE~~ I.D.	~~DEPTH~~ RUN	BLOWS PER FT. / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
27'		S-11	2 3/8"	Rec	29	Note: lost S.P.S. shoe downhole	Soil, Sample similar to Sample # 8 ~~GM~~ GW-GM
28'					34	End of exploration 1/20/88	
30'						Resume exploration 1/21/88 Advanced 3 7/8" roller bit to 30' Advanced HX casing with 300 lbs hammer to 30', Note: No sample taken from 28' to 30' as driller attempted to clear S.P.S. shoe out boring	Grey-Brown poorly graded ~~coarse~~ SAND, ~~little~~ trace GRAVEL, (wet non-plastic) ~~Sod~~ SP
31.5'		S-12	2 3/8"	75%	5 12 23	Sampled	
33'		S-13	2 3/8"	100%	11 10 8	Sampled	Similar soils ~~Sod~~ SP w/ trace silt
35'		S-14	2 3/8"	80%	10 8 8 7	Sampled Advanced HX casing to 35.0' using 300 lbs hammer, cleaned casing to 35' using 3 7/8" roller bit and water	Similar soils ~~SW~~ SP w/trace silt
36.5		S-15	2 3/8"	30%	10 8 8	Sampled ✓	~~Similar soils (trace SILT)~~ ~~Sand~~ Brown well graded gravel with silt GW-GM
37.8		S-16	2 3/8"	80%	8 15 30/[illegible]	Sampled Advanced casing to 37.8' ✓ Advanced 3 7/8" roller bit to 39' with water	Similar soils GW-GM
38' 39'						Note: advanced roller bit through 2.2' of rock, bed rock at 37.8'	Schist
40' 42'		R-1	NX	93%		NX Diamond Core using water to 44'	13 pieces, some fragments RQD = 65%

58A(Test)

Boring No. FD-88-1

Site: North Springfield U4

Boring No: FD-88-1

DEPTH	CORE/SAMPLE NO	I.D.	DEPTH RANGE	BLOWS PER 6" / CORE REC'V	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
44'						
45'					NX Diamond Core with water to 47.8'	Similar Rock 3 pieces RQD = 90%
46'	R-2	NX				
47'						
47.8'					End of Exploration 1/21/88	
					Exploration Continued 1/25/88	
48'					NX Diamond Core with water to 52.8'	Similar Rock 3 pieces RQD = 96
50'	R-3	NX				
52'						
52.8'					Exploration Terminated 1/25/88	

FIELD LOG OF TEST BORING IN ROCK

SITE North Springfield Dam Vt ROLE NO. FD 88-1 PAGE 6 of 9

DATE	DEPTH PT. FROM	DEPTH PT. TO	RUN PT.	RUN REC'V'Y PT.	REC'V'Y %	DRILLING BEHAVIOR: PEED	DRILLING BEHAVIOR: WATER	DRILLING BEHAVIOR: REASON FOR PULL	ACTUAL DRILLING TIME	BIT NO. SIZE AND TYPE	ADDITIONAL REMARKS
1/21/88	39.0	44.0	5.0	4.7	93%	100psi	Slight loss at one point	5' run	≈ 90min	NX Diamond	Run #1; bit loosened up causing slight loss of water
1/21/88	44.0	47.8	3.8	3.4	90%	125psi	No loss	3.8' run	≈ 50min	NX Diamond	Run #2
1/25/88	47.8	52.8	5.0	4.9	98%	300psi	No loss	5' run	≈ 75min	NX Diamond	Run #3

TOTAL BED ROCK DRILLED 13.8 FEET

TOTAL BED-ROCK RECOVERED 13.0 FEET

BED ROCK RECOVERY 94% PERCENT

DRILLER Hawkins

INSPECTOR Greg Hargrave

NED FORM OEF 130

REPLACES EDITION OF APR 63 WHICH MAY BE USED UNTIL EXHAUSTED

PIEZOMETER INSTALLATION REPORT

PROJECT: North Springfield Dam | DATE: 1/26/88

LOCATION (~~STA~~ N): 51276 | OFFSET FROM CENTER LINE: E 50169 | FD88-1 PIEZ NO.: PZ-16

PIEZ TYPE: Casengrande | DEPTH OF PIEZ: 42.5' | RISER PIPE DIAM: 3/4"

PIEZ TIP SET IN (SOIL TYPE): Bed rock | SOIL SAMPLE NO.: | 4" in over burden BORING DIAM: 3" in bedrock

METHOD OF INSTALLATION:

TYPE OF PROTECTION FOR PIEZ: 4" casing | VENT: Screw on cap

GROUND ELEV.: 500.1 | ELEV. TOP OF RISER: 501.6 | ELEV PIEZ TIP: 454.9'

FILTER: #4 SAND | FROM ELEV: 452.4 | TO ELEV: 486.6

SEAL: Bentonite Pellets | FROM ELEV: 486.6 | TO ELEV: 491.4

INSTALLED BY: Hawkins | CONTRACT NO.: D.O 0003 | FOREMAN: Hargrave

DATE OF INSTALLATION: 1/26/88 | DATE OF OBSERVATIONS: 1/26/88

METHOD OF TESTING PIEZ.: Falling Head Test

TIME	ELAPSED TIME MINUTES	DEPTH TO WATER FEET	TIME	ELAPSED TIME MINUTES	DEPTH TO WATER FEET	TIME	ELAPSED TIME MINUTES	DEPTH TO WATER FEET
	0	0.0'		0	0		2.5	38.15'
	1	36.0'		0.5	33.0'		3.0	38.15'
	3	38.15'		1.0	36.7'		3.5	38.2'
	5	38.2'		1.5	37.6'		4.0	38.2'
	10	38.3		2.0	38.0'		4.5	38.2'
							5.0	38.25

REMARKS:

We performed 2 falling head test the first test had following time intervals 0, 1, 3, 5 and 10 minutes

The second test we used the following time intervals

0, 0.5, 1, 1.5, 2, 2.5, 3, 3.5, 4, 4.5, 5 minutes

Gregory P. Hargrave
INSPECTOR

Site: North Springfield Pit
Boring No: FD-88-1

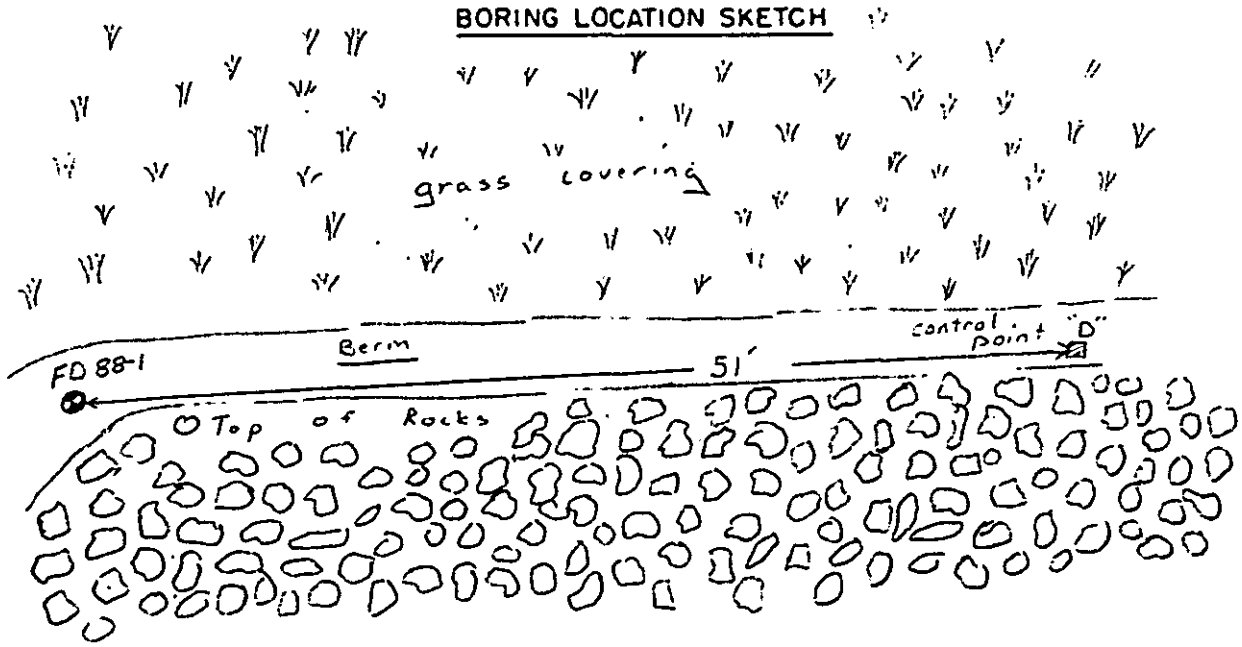
SUBSURFACE WATER OBSERVATIONS

DATE	TIME	DEPTH-BOT. OF CASING	DEPTH-BOT. OF BORING	DEPTH TO WATER	ELEVATION WATER	REMARKS
1/27/88	9:00am	8.5'	47.7	37.6	462.5'	
1/28/88	3:30pm	8.5'	47.7	37.6'	462.5'	
2/3/88	5:00pm	8.5'	47.7	37.6'	462.5'	
2/4/88	12:15pm	8.5'	47.7	37.65	462.'	
2/9/88	2:30pm	8.5'	47.7	37.5'	462.6	
2/10/88	7:20am	8.5'	47.7	37.6'	462.5'	
2/12/88	4:30pm	8.5'	47.7	37.6'	462.5'	
2/16/88	9:05am	8.5'	47.7	37.6'	462.5'	
2/17/88	7:15am	8.5	47.7	37.6'	462.5'	
2/19/88	8:05Am	8.5'	47.7	37.6	462.5'	
2/18/88	8:05Am	8.5	47.7	37.6'	462.5'	
2/24/88	8:35Am	8.5'	47.7'	37.6'	462.5'	

Note: Depths are in feet below original ground

39.1
1.5
37.6

BORING LOCATION SKETCH



ATLANTIC TESTING LABORATORIES, LIMITED

MONITORING WELL INSTALLATION DETAIL

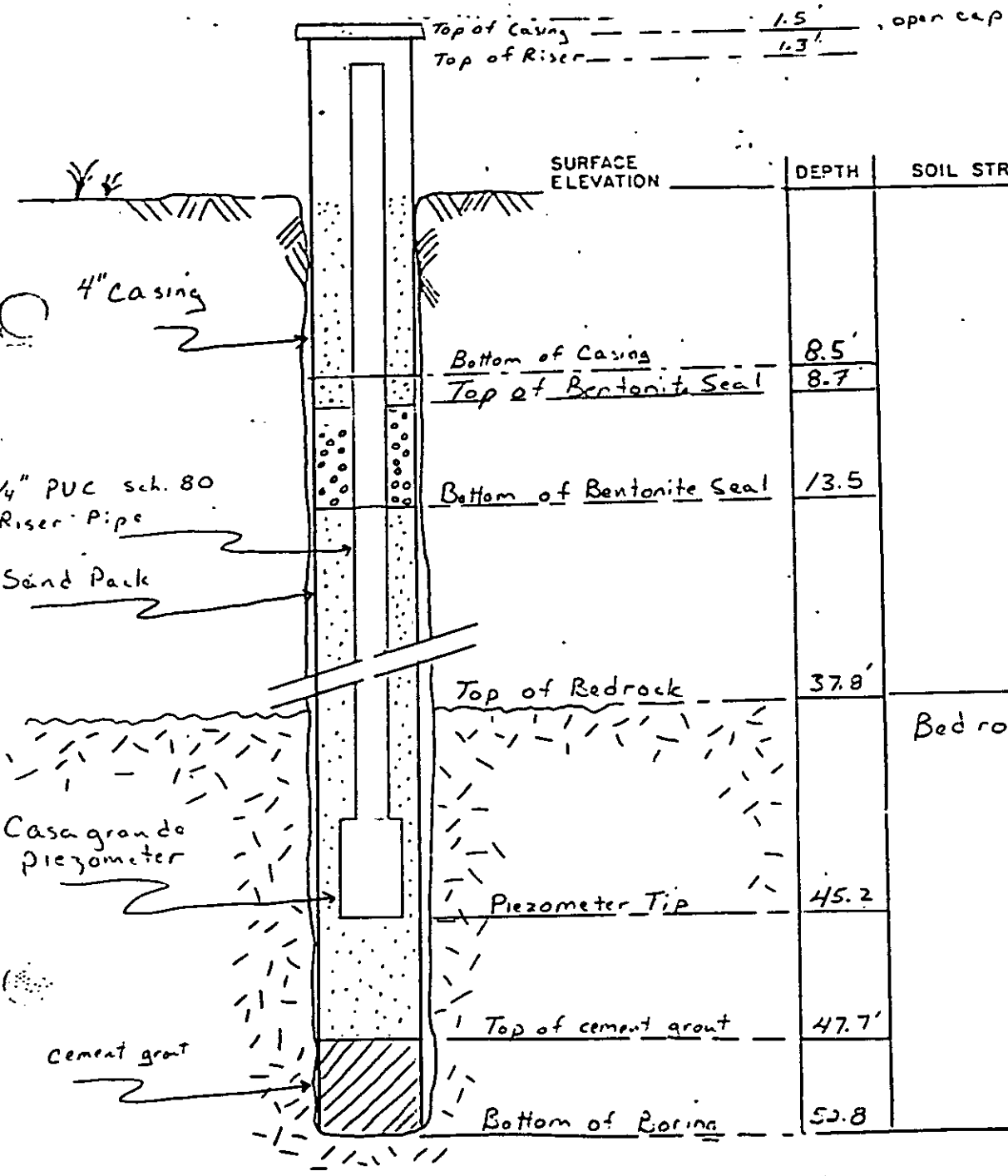
PROJECT: North Springfield Vt.

PROJECT NO. CD 030

CLIENT: USACE

WELL NO. FD 88-1

Piezometer No. PZ-16.



FD-88-2 (C)

CORPS OF ENGINEERS, U. S. ARMY
NEW ENGLAND DIVISION
FOUNDATION AND MATERIALS BRANCH

FIELD LOG OF TEST BORING

PROJECT NO. D.O. 0004

Site North Springfield Dam, No Springfield Vt — Page 1 of 11 Pages

Hole No. FD-88-2 Diam. (Casing) HX — Boring Started January 20, 1988

Co-ordinates: N 51460 E 50022 — Boring Completed 2/2/88

Drilled by Hawkins + Fox — Report Submitted March 3, 1988

Purpose of Exploration To monitor seepage at downstream right abutment area

Elevation Top of Hole 552.22 M.S.L.
Total Overburden Drilled 120' Feet
Elevation Top of Rock 432.22 M.S.L.
Elevation Bottom of Hole 416.72 M.S.L.
Total Rock Drilled 20.5 Feet
Total Depth of Hole 135.5 Feet
Core Recovered 89 %
Core Recovered 17.7 Ft.: ____ Diam. ____ In. NX
Soil Samples ____ In. Diam. ____ No.
Soil Samples ____ In. Diam. ____ No.

Casing Left in Place 10 Feet

Water Table Depth 91.9'

Depth From	Depth To	Method of Drilling and Type of Bit Used
0	68'	Advanced HX casing using 300 lbs hammer
		cleaned casing with 3⅞" O.D. roller bit
68'	120.5'	Advanced 3⅞" O.D. roller bit using
		"Clear Mud" Drilling fluid
101.5'	106'	Cored with NX diamond bit
110.5	135.5	Cored with NX diamond bit
60.0	119.0	Sampled continuously with exception
		at when encountered cobbles and gravel

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— Page

Prepared by Gregory R. Hargreave — Field Data — Lab Data

Submitted by Atlantic Testing Laboratories Limited

NED FORM DEC 63 121 — REPLACES EDITION OF JUN 51 WHICH MAY BE USED UNTIL EXHAUSTED

U. S. ARMY
CORPS OF ENGINEERS
NEW ENGLAND DIVISION

FIELD LOG OF TEST BORING

Site North Springfield, Vt — Page 2 of 11 Pages

Boring No. FD 88-2 Desig. FD-C Diam. (Casing) HX

Co-ordinates: N 51460 E 50022

Elevation Top of Boring 552.22 M.S.L.
Total Overburden Drilled 120 Feet
Elevation Top of Rock 432.22 M.S.L.
Total Rock Drilled 20.5 Feet
Elevation Bottom of Boring 416.72 M.S.L.
Total Depth of Boring 135.5 Feet
Core Recovered 89 % No. Boxes
Core Recovered 17.7 Ft. Diam. in.
Soil Samples in. Diam. No.
Soil Samples in. Diam. No.

Hammer Wt. 140 Boring Started 1/20/88
Hammer Drop 30" Boring Completed 2/2/88
Casing Left 10'
[Subsurface Water Data] Page
Obs. Well
Drilled By Hawkins + Fox
Mfg. Des. Drill CME 75
Inspected By: Greg Hargrove
Classification By: Greg Hargrove
Classification By: T.L. Beauchemin

DEPTH	1" = 2'	CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER 6" / CORE RECV'Y	6" SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
0						Advanced HX casing to 40' using 300 lbs. hammer, Advanced 3 7/8" roller bit to 40'	Coarse granular material
40'						END OF EXPLORATION 1/20/88	
						Continued EXPLORATION 1/21/88	
60'						Advanced casing and roller bit to 60'	
62'		S-1	1 3/8"		45 62 61 54	Sampled with 1 3/8" ID split spoon sampler, advanced with 140 lbs hammer. Advanced 3 7/8" roller-bit using clear Mud drilling fluid to 62'. Advanced casing to 62'	✓ Grey cmf well graded SAND; ~~some~~ with GRAVEL; ~~some~~ and SILT (wet, non-plastic) SW-SM
64'		S-2	1 3/8"		40 49 59 62	Sampled	Similar soil, SW-SM
65.5'		S-3	1 3/8"		42 50 175	Sampled. Advanced roller bit to 66' using "clear mud" drilling fluid. Advanced casing to 66'	Similar soil, SW-SM
66'							
68'		S-4			21 38 26 18	Sampled	Similar soil, SW-SM

GENERAL REMARKS:
The first 60' was advanced without sampling

NED FORM 58 (Test) MAR 71

Boring No. FD 88-2

Site	Boring No.	Page 3 of 11
North Springfield Lt	FD 88-2	

DEPTH		CORE/SAMPLE NO	SIZE	DEPTH ~~RQD~~	BLOWS ~~PER FT~~ CORE REC'VY	6" SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
68'		S-5	1 3/8"	Rec.	16 19 31 40	Sampled Advanced roller bit to 70' using "Clear Mud" drilling fluid. Advanced HX casing to 68'	Similar Soil, ~~trace GRAVEL~~ ~~SW~~ poorly graded SAND w/silt SP-SM
70'							
71.5'		S-6	1 3/8"		38 83 100/6"	Sampled Advanced roller bit to 72' using "Clear Mud" drilling fluid ✓	~~Soil Similar to Sample #1~~ ~~SW~~ Grey, poorly graded sand w/ silt and gravel SP-SM
72'							
72.3'		S-7	1 3/8"		100/4"	Sampled Advanced roller bit to 74' using "clear mud" drilling fluid	Soil similar to sample #5, ~~SW~~ silty sand w/ gravel SM
74'						END OF EXPLORATION 1/21/88	
74.2'		S-8	1 3/8"		100/3"	EXPLORATION CONTINUED 1/22/88 Sampled Advanced roller bit to 78' using "clear Mud" drilling fluid	Grey cm f SAND, some SILT, trace GRAVEL (wet, non-plastic) SM
76'							
78'						No sampled due to gravel and possible cobbles	gravel and possible cobbles
80'		S-9	1 3/8"		20 19 35 17	Sampled ✓	Brown, well graded sand with ~~Soil similar to sample #1, SW~~ silt and gravel (SW-SM)
82'		S-10	1 3/8"		19 18 27 54	Sampled Advanced roller bit to 82' using "Clear Mud" drilling fluid	Similar Soil, SW-SM
84'		S-11	1 3/8"		21 28 30 41	Sampled	Similar Soil, SW-SM
						END OF EXPLORATION 1/23/88	
		S-12	1 3/8"	83%	41 86	Exploration Continued 1/26/88 Sampled	Similar Soil, SW-SM

Site: North Springfield Lit

Boring No. FD 88-2

DEPTH	1 : 2	CORE/SAMPLE NO.	SIZE	DEPTH/RUN	BLOWS PER FT. / CORE REC'VY	6" SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
85.8'			1 3/8"	Rec	81 100/4"		
88'						No sample taken due to gravel and possible cobbles	possible gravel and cobbles
89						No Sample taken due to coarse material Advanced 3 7/8" roller bit to 89' with "Clear Mud" drilling fluid	
90'		S-13	2 3/8"	60%	150 163	Sample ✓	poorly graded Grey GRAVEL ~~and crse~~ with SAND; ~~little~~ and SILT (wet, non-plastic) ~~Gsd~~ GP-GM
92'		S				No sample taken due to coarse material Advanced 3 7/8" roller bit to 92' with "Clear Mud" drilling fluid	possible cobbles and gravel
94.2'		S-14	2 3/8"	50%	52 43 61 89 100/2"	Sample ✓	Soil similar to sample # 13 well-graded gravel with silt and sand GW-GM
94.5'						No Sample due to coarse material Advanced roller bit to 94.5'	possible gravel and cobbles
95'			2 3/8"	0%	150/6"	Sampled	
97'						No Sample due to coarse material. Advanced 3 7/8" roller bit to 97' using "Clear Mud"	possible gravel and cobbles
99'		S-15	2 3/8"	100%	46 65 80 130	Sampled	Grey cm f SAND; and GRAVEL, little SILT, (wet, non plastic) SP-SM
101'						No Sample due to coarse material Advanced 3 7/8" roller bit to 101'	possible gravel and cobbles
		R-1	NX	70%			cobbles and granular soils

Site	Boring No.	Page 5 of 11
North Springfield Dam VT	FD 88-2	

DEPTH 1'	DEPTH 2'	CORE/SAMPLE NO.	SIZE	DEPTH RANGE / CORE REC'VY	BLOWS PER FT.	6" SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
102 104' 106'		R-1	NX	Rec. 70%		NX Diamond core with water to 106'	
106.5'		S-16	1 7/8"	25%	100/6"	Sample END of EXPLORATION 1/26/88	Grey cmf SAND, little SILT, trace GRAVEL (wet, non-plastic) SM
108'			3/8"	25%		Advanced 3 7/8" roller bit to 108' using "Clear Mud" drilling fluid. Notes Loss of water from 101.5'-105' End of Exploration 1/28/88	
110'		S-17	1 3/8"	67%	54 71 66 135	Exploration Continued 2/2/88 Sampled	Grey cmf SAND; trace GRAVEL; trace SILT (wet, non-plastic) SP
110.2 112'			1 3/8	0%	200/3"	Sampled Advanced 3 7/8" roller bit to 112' using "clear mud" drilling fluid	Possible coarse GRAVEL and COBBLES
112.8'		S-18	1 3/8	10%	94 200/3"	Sampled	Grey silty cmf SAND; ~~some SILTY~~ ~~trace~~ with GRAVEL, wet, non-plastic SM
114'						Advanced 3 7/8" roller bit to 114' using "clear mud" drilling fluid	Possible coarse GRAVEL and COBBLES
114.8'		S-19	1 3/8	30%	94 200/1"	Sampled ✓	Soils similar to Sample # 18 SM
116'							Possible coarse GRAVEL and COBBLES
116.8'		S-20	1 3/8	45%	99 200/3"	Sampled Advanced 3 7/8 roller bit to 118' using "Clear Mud" drilling fluid	Soil similar to Sample # 18 SM
118'							Possible GRAVEL and Cobbles
		S-21	1 3/8	50%	86 150	Sampled Advanced 3 7/8" roller bit to 120.5' using "Clear Mud" drilling fluid	Soil Similar to Sample # 18 SM

Site	Boring No.	Page 6 of 11
North Springfield Dam	FD 88-2	

DEPTH		CORE/SAMPLE NO.	SIZE	DEPTH RQD	BLOWS PER FT. / CORE RECV'Y	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
119'				Re.			
120'							
120.5'							Bedrock
122		R-1	NX			NX Diamond Core	Grey Gneiss 10 pieces, some fragments RQD = 90% Note: vertical fractures
124							
125.5							
126		R-2	NX			NX Diamond Core	Similar Rock 9 pieces, some fragments RQD = 78% Note: vertical fractures
128							
130							
130.5							
132		R-4	NX			NX Diamond Core	Similar Rock 12 pieces RQD = 64%
134							
135.5'						Exploration Terminated 2/2/88	

FIELD LOG OF TEST BORING IN ROCK

SITE North Springfield Dam, VT HOLE NO. FD 88-2 PAGE 7 of 11

DATE	DEPTH PT. FROM	DEPTH PT. TO	RUN PT.	RUN REC'V'Y PT.	REC'V'Y %	DRILLING BEHAVIOR: FEED	DRILLING BEHAVIOR: WATER	DRILLING BEHAVIOR: REASON FOR PULL	ACTUAL DRILLING TIME	BIT NO. SIZE AND TYPE	ADDITIONAL REMARKS
1/26/88	101.0'	106.0'	5'	3.5'	70%	250psi	lost water @ 102.4'	5' run	≈ 80 min	NX Diamond	Run #1, [illegible] was through cobbles and soil
2/1/88	120.5	125.5	5'	5'	100%	300psi	no loss of water	5' run		NX Diamond	Run #2 samples contains vertical fractures
2/1/88	125.5	130.5	5'	4.9'	98%	300psi	no loss of water	5' run		NX Diamond	Run #3, sample contains vertical fractures
2/1/88	130.5	135.5	5'	4.3	86%	400psi	no loss of water	5' run		NX Diamond	Run #4, sample contains vertical fractures

TOTAL BED ROCK DRILLED 20' FEET

TOTAL BED-ROCK RECOVERED 17.7 FEET

BED ROCK RECOVERY 89 PERCENT

DRILLER Hawkins

INSPECTOR Hargrave

NED FORM DEC 130

REPLACES EDITION OF APR 63 WHICH MAY BE USED UNTIL EXHAUSTED

PIEZOMETER INSTALLATION REPORT

PROJECT: North Springfield Dam, North Springfield VT | DATE. 2/3/88

LOCATION (STA): N-51460 | OFFSET FROM CENTER LINE: E-50022 | PIEZ NO.: FD 88-17 (FD 88-2 Q21 9/14/88)

PIEZ TYPE: Casagrande | DEPTH OF PIEZ: 120.5' | RISER PIPE DIAM: 3/4"

PIEZ TIP SET IN (SOIL TYPE): Filter Sand/Bedrock | SOIL SAMPLE NO.: | BORING DIAM: 3 7/8" in overburden, 3' in bedrock

METHOD OF INSTALLATION:

TYPE OF PROTECTION FOR PIEZ: 4" casing | VENT: screw on cap

GROUND ELEV.: 552.22' | ELEV. TOP OF RISER: 557.6' | ELEV PIEZ TIP: 431.72'

FILTER: #4 filter sand (Q-rock) FROM ELEV: 426.22' TO ELEV: 449.22'

SEAL: Bentonite Pellets FROM ELEV: 449.22' TO ELEV: 460.72'

INSTALLED BY: Hopkins + Fox | CONTRACT NO.: D.O. 0003 | FOREMAN: Hargrave

DATE OF INSTALLATION: 2/2/88 | DATE OF OBSERVATIONS: 2/3/88

METHOD OF TESTING PIEZ.: Falling Head Test

TIME	ELAPSED TIME MINUTES	DEPTH TO WATER FEET	TIME	ELAPSED TIME MINUTES	DEPTH TO WATER FEET	TIME	ELAPSED TIME MINUTES	DEPTH TO WATER FEET
	1/2	38.9'		24	91.8			
	1	55.1'		34	91.8			
	5	77.5						
	10	89.2						
	15	91.4						

REMARKS:

24 hours prior to test drilling mud was deactivated with 2 gallons of bleach

Gregory P. Hargrave
INSPECTOR

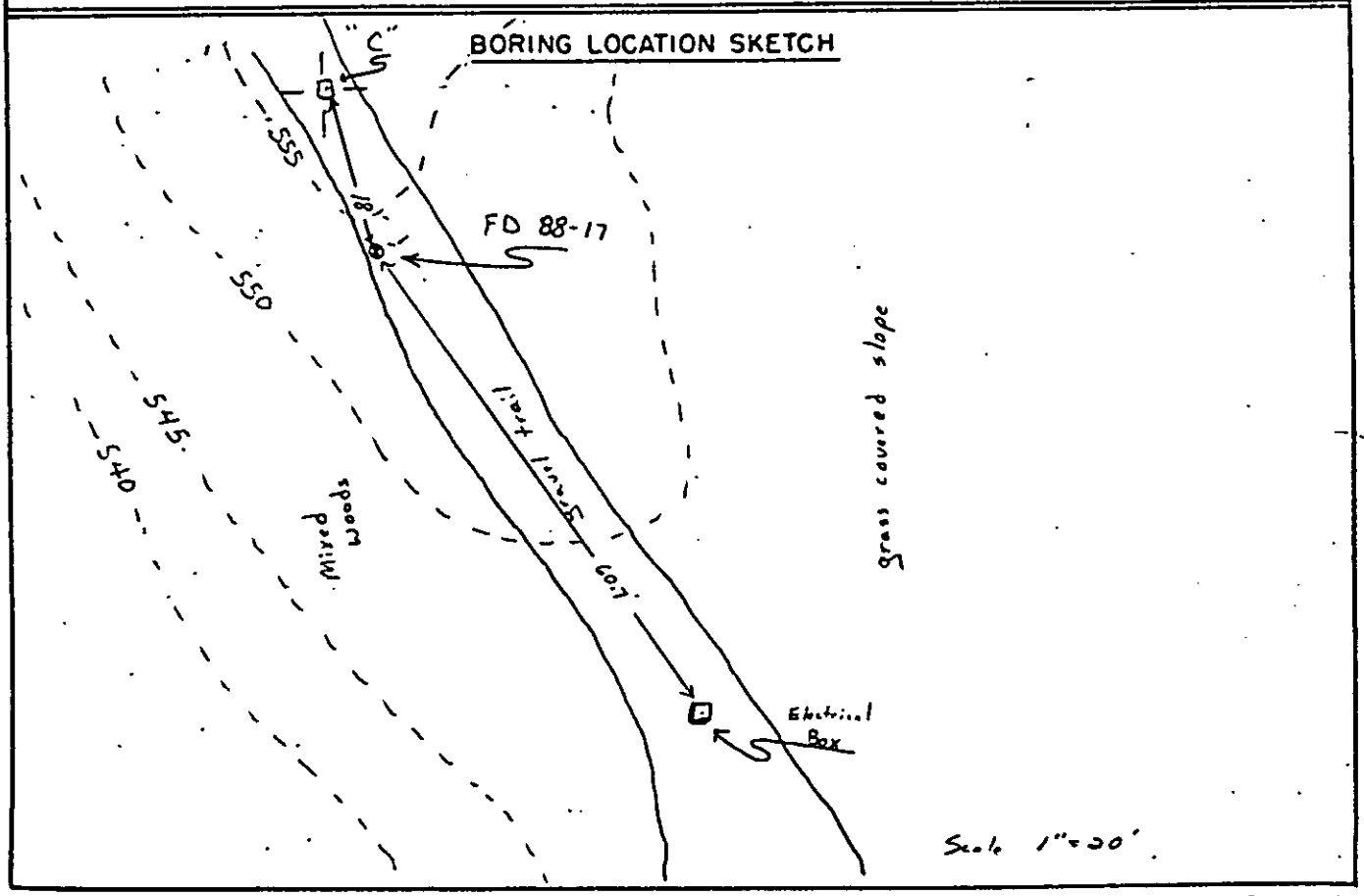
Site: North Springfield Dam, Vt
Boring No: FD 88-2

SUBSURFACE WATER OBSERVATIONS

DATE	TIME	DEPTH-BOT. OF CASING	DEPTH-BOT. OF BORING	DEPTH TO WATER	ELEVATION WATER	REMARKS
2/3/88	4:30pm	7.5'	126.0	91.9'	460.3	
2/4/88	11.15am	7.5	126.0	91.7'	430.5	
2/9/88	3:15pm	7.5	126.0	91.85'	430.37	
2/10/88	7:30am	7.5	126.0	91.8'	430.42	
2/16/88	9:15	7.5	126.0	92.0	430.22	
2/17/88	7:50	7.5	126.0	91.9'	460.3	
2/19/88	7:50	7.5	126.0	91.9'	460.3	
2/18/88	7:50	7.5	126.0	91.9	460.3	
2-24-88	8:15	7.5	126.0	91.9'	460.3	

Note: Depths are in feet below original ground

BORING LOCATION SKETCH



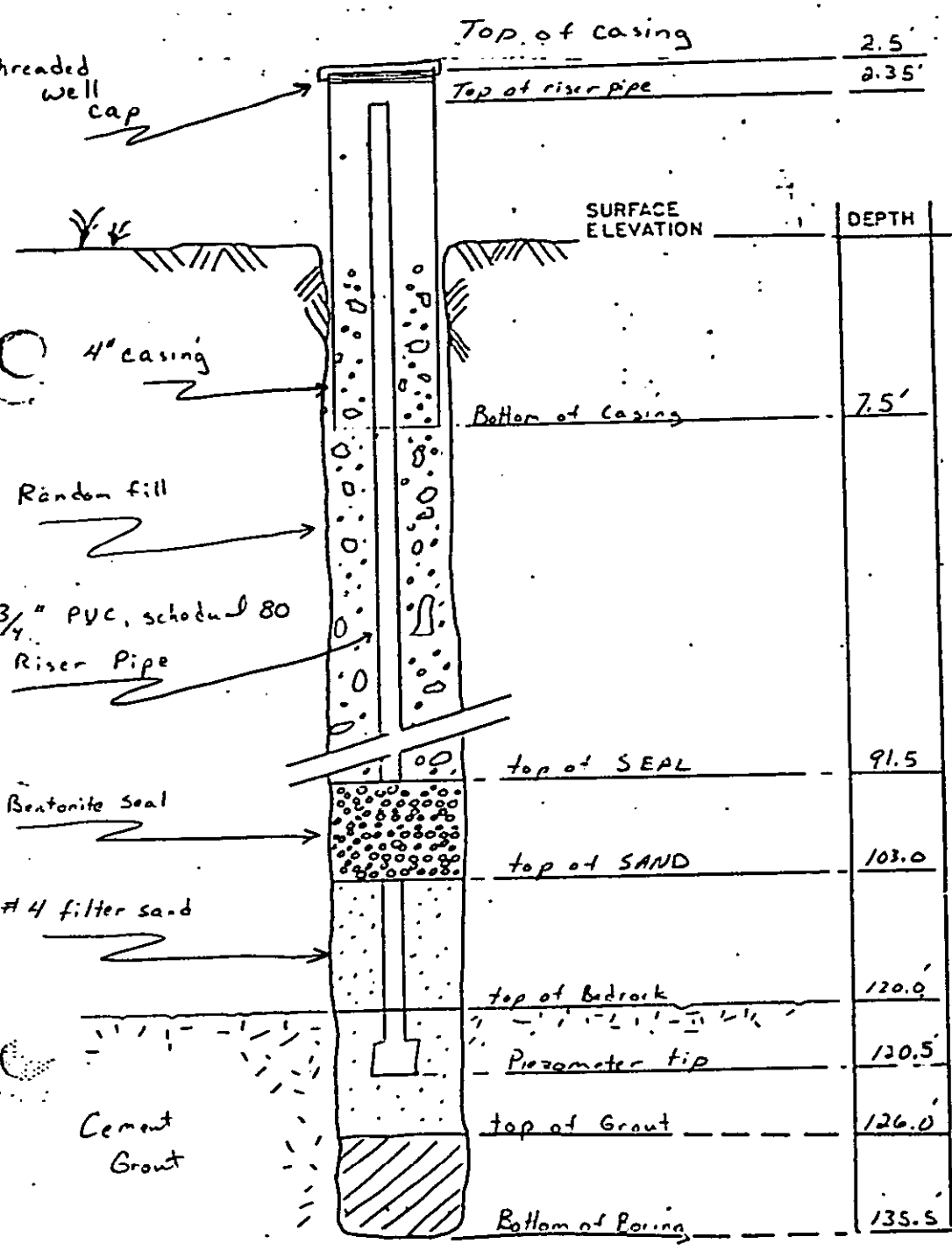
Boring No. FD 88-17

ATLANTIC TESTING LABORATORIES, LIMITED

PIEZOMETER INSTALLATION DETAIL

PROJECT: North Springfield Dam
North Springfield, Ut

PROJECT NO. D.O. 0003
ATL No. CD 030
PIEZOMETER No. FD 88-27



FD-88-3(D)

CORPS OF ENGINEERS, U. S. ARMY
NEW ENGLAND DIVISION
FOUNDATION AND MATERIALS BRANCH

FIELD LOG OF TEST BORING

PROJECT NO. D.O. 003

Site North Springfield Dam Vt — Page 1 of 9 Pages

Hole No. FD 88-3 Diam. (Casing) HW — Boring Started 1/27/88

Co-ordinates: N 51448 E 50159 — Boring Completed 1/28/88

Drilled by Hawkins and Todd — Report Submitted 3/3/88

Purpose of Exploration To monitor seepage at downstream right abutment area

Elevation Top of Hole 504.5 M.S.L.
Total Overburden Drilled 62.4 Feet
Elevation Top of Rock 442.1 M.S.L.
Elevation Bottom of Hole 427.3 M.S.L.
Total Rock Drilled 14.8 Feet
Total Depth of Hole 77.2 Feet
Core Recovered 100 %
Core Recovered 13.5 Ft.: NX Diam. ____ In.
Soil Samples ____ In. Diam. ____ No.
Soil Samples ____ In. Diam. ____ No.

Casing Left in Place 10 Feet

Water Table Depth 43.7'

Depth From	Depth To	Method of Drilling and Type of Bit Used
0	62.5	HW casing advanced with 300 lbs hammer
0	63.7	3 7/8" O.D. roller bit advanced
		with water
63.7	77.2	NX Diamond core

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Piezometer installation report	Page	7
Piezometer installation detail	Page	9
	Page	

Prepared by Gregory R. Horsegive — Field Data — Lab. Data

Submitted by Atlantic Testing Laboratories, Limited

NED FORM DEC 63 121 REPLACES EDITION OF JUN 51 WHICH MAY BE USED UNTIL EXHAUSTED

U. S. ARMY
CORPS OF ENGINEERS
NEW ENGLAND DIVISION

FIELD LOG OF TEST BORING

Site North Springfield Vt — Page 2 of 7 Pages

Boring No. FD 88-3 Desig. FD 85-1 Diam. (Casing) HW

Co-ordinates: N 51448 E 50159

Elevation Top of Boring _____ M.S.L.
Total Overburden Drilled 62.4' Feet
Elevation Top of Rock _____ M.S.L.
Total Rock Drilled 14.8 Feet
Elevation Bottom of Boring _____ M.S.L.
Total Depth of Boring 77.2 Feet
Core Recovered 100 % No. Boxes 1
Core Recovered 13.5 Ft ; ____ Diam. ____ In.
Soil Samples ____ In. Diam. ____ No.
Soil Samples ____ In. Diam. ____ No.

Hammer Wt. 300 lbs Boring Started 1/27/88
Hammer Drop 18" Boring Completed 1/28/88
Casing Left _____
Subsurface Water Data _____ Page _____
Obs. Well _____
Drilled By Hawkins and Todd
Mfg. Des. Drill CME 850
Inspected By: Hargrave
Classification By: Hargrave
Classification By: T.L. Beauchemin

DEPTH 1" = 2'	CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER FT. / CORE RECV'Y	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
0'						
10'						
20'						
30'						
40'						
42'					Advanced HW casing with 300 lbs hammer to 55.5' Note: casing advanced easily	
44'						
45'						

GENERAL REMARKS:
Note change in scale. 0-40': 1" = 20', 40- ': 1" = 2'

NED FORM MAR 71 58 (Test)

Boring No. FD 88-3

Site: North Springfield Dam

Boring No. FD 88-3

DEPTH	CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER FT. / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
46						Coarse Granular material
48'						
50'						
52'					Advanced HW casing with 300 lbs hammer to 55.5' Note: casing advanced easily	
54'					Advanced 3 7/8" O.D. roller bit to 56.1' Note: loss of water @ 55.5' - 56.1'	
56'					Advanced casing to 58.1' with difficulty	Coarse Granular material possible cobbles and gravel
58'					Advanced roller bit to 60' no water loss Note: roller bit cored through cobble from 58.2' to 58.7'	Cobble
60'						
62'					Advanced casing to 62' with difficulty Advanced roller bit to 63.7' Note: encountered bedrock at 62.4'	Bedrock

Site: North Springfield Dam Vt

Boring No. FD 88-3

DEPTH	CORE/SAMPLE NO.	SIZE	DEPTH RANGE / CORE RECVY	BLOWS PER FT.	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
63.7			Rec		END of EXPLORATION 1/27/88	
66' 67.2'	R-1	NX	100%		EXPLORATION Continued 1/28/88 Note: hole filled in to ≈62.9' Advanced HW casing to 62.5' using 300 lbs hammer Cleaned casing with 3 7/8" roller bit and water to 63.7'	Rock 3 pieces RQD = 100%
68' 70' 72' 72.2'	R-2	NX	100%		NX DIAMOND CORE with water to 77.2' Note: No Loss of water during entire drilling sequence	Similar Rock 9 pieces, some fragments RQD = 84%
74' 76' 77.2'	R-3	NX	100%		Exploration Terminated 1/28/88	Similar Rock 12 pieces, some fragments RQD = 92%

FIELD LOG OF TEST BORING IN ROCK

SITE North Springfield Vt. ROLE NO. FD 88-3 PAGE 5 of 9

DATE	DEPTH FT. FROM	DEPTH FT. TO	RUN FT.	RUN REC'V'Y FT.	REC'V'Y %	DRILLING BEHAVIOR: FEED	DRILLING BEHAVIOR: WATER	DRILLING BEHAVIOR: REASON FOR PULL	ACTUAL DRILLING TIME	BIT NO. SIZE AND TYPE	ADDITIONAL REMARKS
1/28/88	63.7	67.2'	3.5'	3.5'	100%	200 psi	No loss of water	3.5' Run.	≈50 min	NX	Run #1, coring started 1.3' into bedrock
1/28/88	67.2	72.2'	5'	5'	100%	200 psi	No loss of water	5' Run	≈ 70 min	NX	Run #2
1/28/88	72.2'	77.2'	5'	5'	100%	200 psi	No loss of water	5' Run	≈ 70 min	NX	Run #3

TOTAL BED ROCK DRILLED 14.8 FEET *
Total Bed Rock Cored 13.5 Feet
TOTAL BED-ROCK RECOVERED 13.5 FEET

BED ROCK RECOVERY 100 PERCENT

DRILLER Hawkins

INSPECTOR Hargrave

NED FORM DEC 130 * includes rock drilled with roller bit

PREVIOUS EDITION OF APR 63 WHICH MAY BE USED UNTIL EXHAUSTED

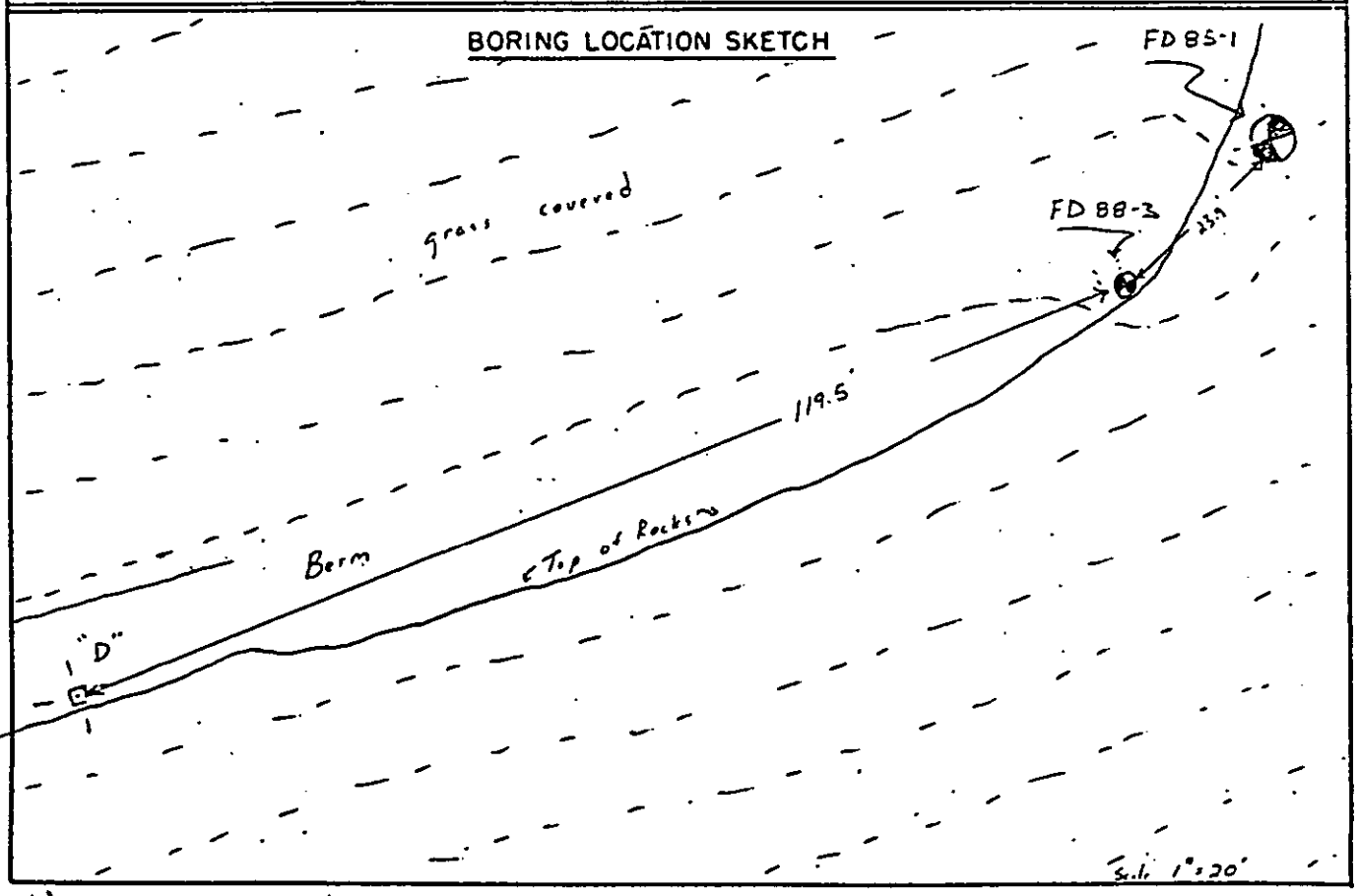
Site: North Springfield Dam Vt.
Boring No: FD 88-1

SUBSURFACE WATER OBSERVATIONS

DATE	TIME	DEPTH-BOT. OF CASING	DEPTH-BOT. OF BORING	DEPTH TO WATER	ELEVATION WATER	REMARKS
1/29/88	9:00	62.5'	69.0'	42.1'	462.4	water depth prior to piezometer installation
2/3/88	4:45pm	7.7	69.0	Dry		~~Depth to water at piezometer~~
2/11/88		7.7	69.0	44.0'	460.5	Recorded water level after
2/18/88	8:00	7.7	69.0	43.7'	460.8	piezometer was flushed
2/24/88	8:30	7.7	69.0	43.7'	460.8	out
					Note:	
					sand was	accidently spilled
					down riser	pipe during piezometer
					installation	preventing water reading
					from being	obtained/piezometer was
					flushed out	and water readings were
					obtained	

Note: Depths are in feet below original ground

BORING LOCATION SKETCH



PIEZOMETER INSTALLATION REPORT

PROJECT: North Springfield Dam VA | DATE: 2-10-88

LOCATION (STA): N- 51448 | OFFSET FROM CENTER LINE: 50159 | PIEZ NO.: FD 88-3 P2-18

PIEZ TYPE: Casagrande | DEPTH OF PIEZ: 68.9 | RISER PIPE DIAM: 3/4"

PIEZ TIP SET IN (SOIL TYPE): | SOIL SAMPLE NO.: | BORING DIAM: 4"

METHOD OF INSTALLATION:

TYPE OF PROTECTION FOR PIEZ: 4" Casing | VENT: Screw on Cap

GROUND ELEV.: 504.5' | ELEV. TOP OF RISER: 505.61' | ELEV PIEZ TIP: 435.6'

FILTER: #4 SAND | FROM ELEV: 435.5 | TO ELEV: 490

SEAL: Bentonite Pellets | FROM ELEV: 490' | TO ELEV: 495.2'

INSTALLED BY: Hawkins | CONTRACT NO.: D.O. 0003 | FOREMAN: Hargrave

DATE OF INSTALLATION: 1/29/88 | DATE OF OBSERVATIONS: 2/10/88

METHOD OF TESTING PIEZ.: Falling Head Test

TIME	ELAPSED TIME MINUTES	DEPTH TO WATER FEET	TIME	ELAPSED TIME MINUTES	DEPTH TO WATER FEET	TIME	ELAPSED TIME MINUTES	DEPTH TO WATER FEET
	½	2.5		15	14.3			
	1	3.5		20	17.6			
	3	4.8		25	20.7			
	5	6.8		30	21.0			
	10	10.7						

REMARKS:

Filter sand was flushed out of piezometer and riser pipe prior to performing falling head test

Static water level was measured 2/11/88 depth to water was 44.0

Gregory P. Hargrave
INSPECTOR

PIEZOMETER INSTALLATION REPORT

PROJECT: North Springfield Dam, Vt | DATE: 2-24-88

LOCATION (STA): | OFFSET FROM CENTER LINE: | PIEZ NO.: FD 88-3 P2-18

PIEZ TYPE: | DEPTH OF PIEZ: | RISER PIPE DIAM:

PIEZ TIP SET IN (SOIL TYPE): | SOIL SAMPLE NO.: | BORING DIAM:

METHOD OF INSTALLATION:

TYPE OF PROTECTION FOR PIEZ: | VENT:

GROUND ELEV.: | ELEV. TOP OF RISER: | ELEV PIEZ TIP:

FILTER: | FROM ELEV: | TO ELEV:

SEAL: | FROM ELEV: | TO ELEV:

INSTALLED BY: Hawkins | CONTRACT NO.: D.O. 0003 | FOREMAN: Hargrave

DATE OF INSTALLATION: | DATE OF OBSERVATIONS: 2-24-88

METHOD OF TESTING PIEZ.: Falling Head Test

TIME	ELAPSED TIME MINUTES	DEPTH TO WATER FEET	TIME	ELAPSED TIME MINUTES	DEPTH TO WATER FEET	TIME	ELAPSED TIME MINUTES	DEPTH TO WATER FEET
	0.5	2.3		15	13.1			
	1	3.0		20	16.2			
	2	3.6		25	19			
	3	4.4						
	5	6						

REMARKS:

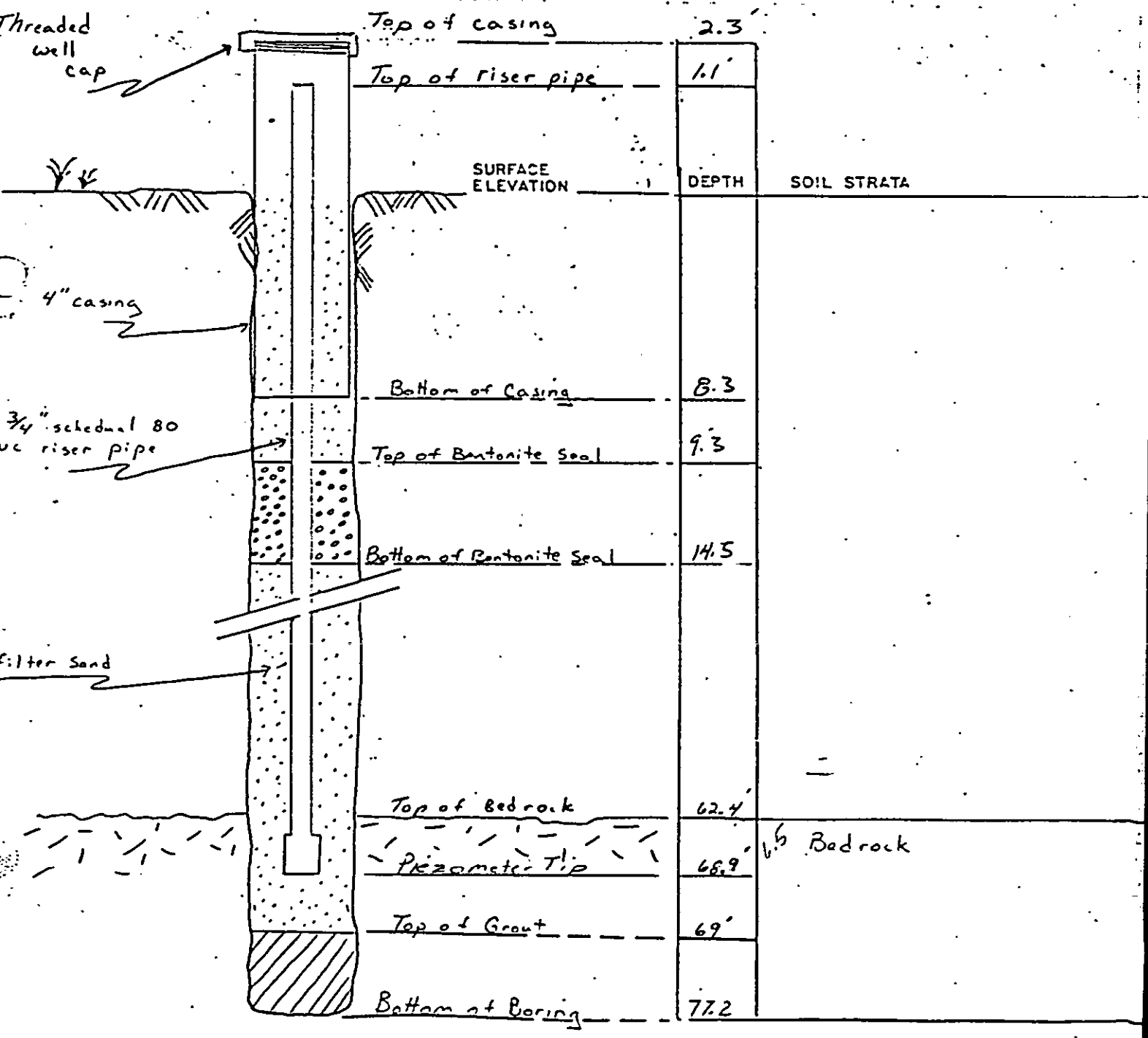
Gregory R. Hargrave
INSPECTOR

ATLANTIC TESTING LABORATORIES, LIMITED

PIEZOMETER INSTALLATION DETAIL

PROJECT: North Springfield Dam
North Springfield, VT

PROJECT NO. D.O. 0003
ATL No. CD 030
PIEZOMETER No. FD 88-3



FD-88-4 (F)

CORPS OF ENGINEERS, U. S. ARMY
NEW ENGLAND DIVISION
FOUNDATION AND MATERIALS BRANCH

FIELD LOG OF TEST BORING

PROJECT NO. D.O 0003

Site North Springfield Dam — Page 1 of 6 Pages

Hole No. FD 88-4 Diam. (Casing) HW — Boring Started 2/2/88

Co-ordinates: N 51194 E 50295 — Boring Completed 2/17/88

Drilled by Hawkins — Report Submitted 3/3/88

Purpose of Exploration To monitor seepage at downstream right abutment area

Elevation Top of Hole 457.96 M.S.L. — Casing Left in Place NA Feet

Total Overburden Drilled 21.1 Feet

Elevation Top of Rock 436.86 M.S.L.

Elevation Bottom of Hole 431.46 M.S.L.

Total Rock Drilled 5.4 Feet; Total Rock cored 4.5'

Total Depth of Hole 26.5 Feet

Core Recovered 98 %

Core Recovered 4.5 Ft: NX Diam. 3 In.

Soil Samples ____ In. Diam. ____ No.

Soil Samples ____ In. Diam. ____ No. — Water Table Depth 5.9

Depth From	Depth To	Method of Drilling and Type of Bit Used
0	21.1	Continuous split spoon sampling, hammer advanced with 300 lbs hammer
0	20.0	HW casing advanced to with 300 lbs hammer
20'	22'	3 7/8" roller bit, advanced using water
22	26.5	NX rock core

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	Page	
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Prepared by Greg Hargraves — Field Data — Lab. Data

Submitted by Atlantic Testing Laboratories, Ltd

NED FORM DEC 63 121 — REPLACES EDITION OF JUN 51 WHICH MAY BE USED UNTIL EXHAUSTED

U. S. ARMY
CORPS OF ENGINEERS
NEW ENGLAND DIVISION

FIELD LOG OF TEST BORING

Site North Springfield Dam Page 2 of 6 Pages

Boring No. FD 88-4 Desig. FD 88-E Diam. (Casing) 4"

Co-ordinates: N 51194 E 50295

Elevation Top of Boring 457.96 M.S.L.
Total Overburden Drilled 21.1 Feet
Elevation Top of Rock 436.86 M.S.L.
Total Rock Drilled 5.4 Feet
Elevation Bottom of Boring 431.46 M.S.L.
Total Depth of Boring 26.5 Feet
Core Recovered 98 % No. Boxes 1
Core Recovered 4.5 Ft: NX Diam. 3 In.
Soil Samples _____ In. Diam. ____ No.
Soil Samples _____ In. Diam. ____ No.

Hammer Wt. 300 lbs Boring Started 2/2/88
Hammer Drop 18"
Casing Left 10 Boring Completed 2/17/88
Subsurface Water Data: _____ Page 6
Obs. Well _____
Drilled By Hawkins
Mfg. Des. Drill CME 850
Inspected By: Hargrave
Classification By: Hargrave
Classification By: T.L. Beauchemin

DEPTH		CORE/SAMPLE NO.	SIZE	~~DEPTH RANGE~~	BLOWS PER FT. / CORE RECVY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
0	1" = 2'	S-1	2 3/8"	Rec 10%	1 / 1	Sampled with 2 3/8" x 2.5' Split Spoon Sampler advanced with 300 lbs hammer dropping 18"	Fill material silty SAND w/ organics SM
2' 2.5'							
		S-2	2 3/8"	20%	1 2 2 1 3	Sampled Advanced HW casing to 5' using 300 lbs hammer, cleaned casing to 5' using 3 7/8 O.D. roller bit and water	Brown cmf SAND; little SILT; trace GRAVEL; trace organic material (wet, non-plastic) SM
4' 5'							
6'		S-3	2 3/8"	30%	2 / 1 1	Sampled ✓	Brown ~~cmf SAND and~~ poorly graded with GRAVEL; ~~brown~~ SILT and sand (wet, non-plastic) GP-GM ~~SW~~
7.5'							
8'		S-4	2 3/8"	90%	3 3	Sampled	Similar soils, ~~SW~~ poorly graded SAND with silt SP-SM

GENERAL REMARKS:
≈ 4' of material at surface was fill material cut from bank

Site	Boring No.	Page 3 of 6
North Springfield Dam, Vt	FD 88-4	

DEPTH	CORE/SAMPLE NO.	SIZE	DEPTH/RUN	BLOWS PER 6" / CORE RECVY	6" SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
			Rec	4 3	Advanced casing to 10', cleaned casing to 10'	
10'						
	S-5A			7 7 8	Sampled with 2 3/8" x 5' solid spoon sampler advanced with 300 lbs hammer ✓	poorly graded Grey ~~GRAVEL, and cmt~~ SAND; ~~trace~~ with SILT and (wet, non-plastic) ~~GP~~ Gravel SP-SM
12'		2 3/8	60%	10 10	Advanced casing to 15' then cleaned casing to 15'	~~Similar Soils, GP~~ Grey, gravelly, silty SAND SM
	S-5B			10 13		
14'				18		poorly graded Grey ~~GRAVEL, and cmt~~ SAND with ~~little~~ SILT and gravel (wet, nonplastic) ~~GM~~ SP-SM ✓
	S-5C S-7			22		
15'				23		
				14	Sampled	Grey cmt SAND; and GRAVEL little SILT, (wet, non-plastic) ~~SM~~ SP-SM
16'	S-6A	2 3/8		21 19 17	Advanced roller bit to 20' with difficulty. Advanced casing to 20', cleaned casing to 20'	
				35		~~Sample Similar to Sample #5C~~, GM - Grey, silty GRAVEL w/ sand
18' 18.25'	S-6B			32 50/3"		
20'					No sample taken due to coarse gravel and possible cobbles	No sample taken due to coarse gravel and possible cobbles
21.1'	S-7	2 3/8		23 40 25/3"	Sampled END EXPLORATION 2/2/88	~~Soils Similar to Sample #5C~~ ~~GM~~ silty SAND w/ gravel SM
22'					Continued exploration 2/3/88. Advanced roller bit to 22'	Bed rock Gneiss Grey to Pink in color
24'	R-1	NX	98%		NX Diamond Core	4.4' Recovery or 98% RQD = 76% 9 pieces, some fragments
26'					Note: Driller had difficult time pulling core because casing was leaking sand and gravel into boring, apparently drive shoe at casing was damaged	

Site	Boring No.	Page 4 of 6
North Springfield Dam Vt	FD 88-4	

DEPTH	1"=2'	CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER FT. / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
26'							
26.5'						END OF EXPLORATION 2/3/88	
						Casing pulled 2/17/88	
28'							
30'							
32							
34							
36							
38							
40							
42							

FIELD LOG OF TEST BORING IN ROCK

SITE North Springfield Dam Vt HOLE NO. FD 88-4 PAGE 5 of 6

DATE	DEPTH FT. FROM	DEPTH FT. TO	RUN FT.	RUN REC'V'Y FT.	REC'V'Y %	DRILLING BEHAVIOR: FEED	DRILLING BEHAVIOR: WATER	DRILLING BEHAVIOR: REASON FOR PULL	ACTUAL DRILLING TIME	BIT NO. SIZE AND TYPE	ADDITIONAL REMARKS
2/3/88	22.0	26.5	4.5'	4.4'	98%	250psi	No loss of water	4.5' Run	≈ 90 min	NX	Run #1

TOTAL BED ROCK DRILLED 5.4 FEET
Total Bed Rock Cored 4.5 Feet
TOTAL BED-ROCK RECOVERED 4.4 FEET

BED ROCK RECOVERY 98 PERCENT

DRILLER Hawkins
INSPECTOR Greg Hargrave

NED FORM 130 DEC

REPLACES EDITION OF APR 62 WHICH MAY BE USED UNTIL EXHAUSTED

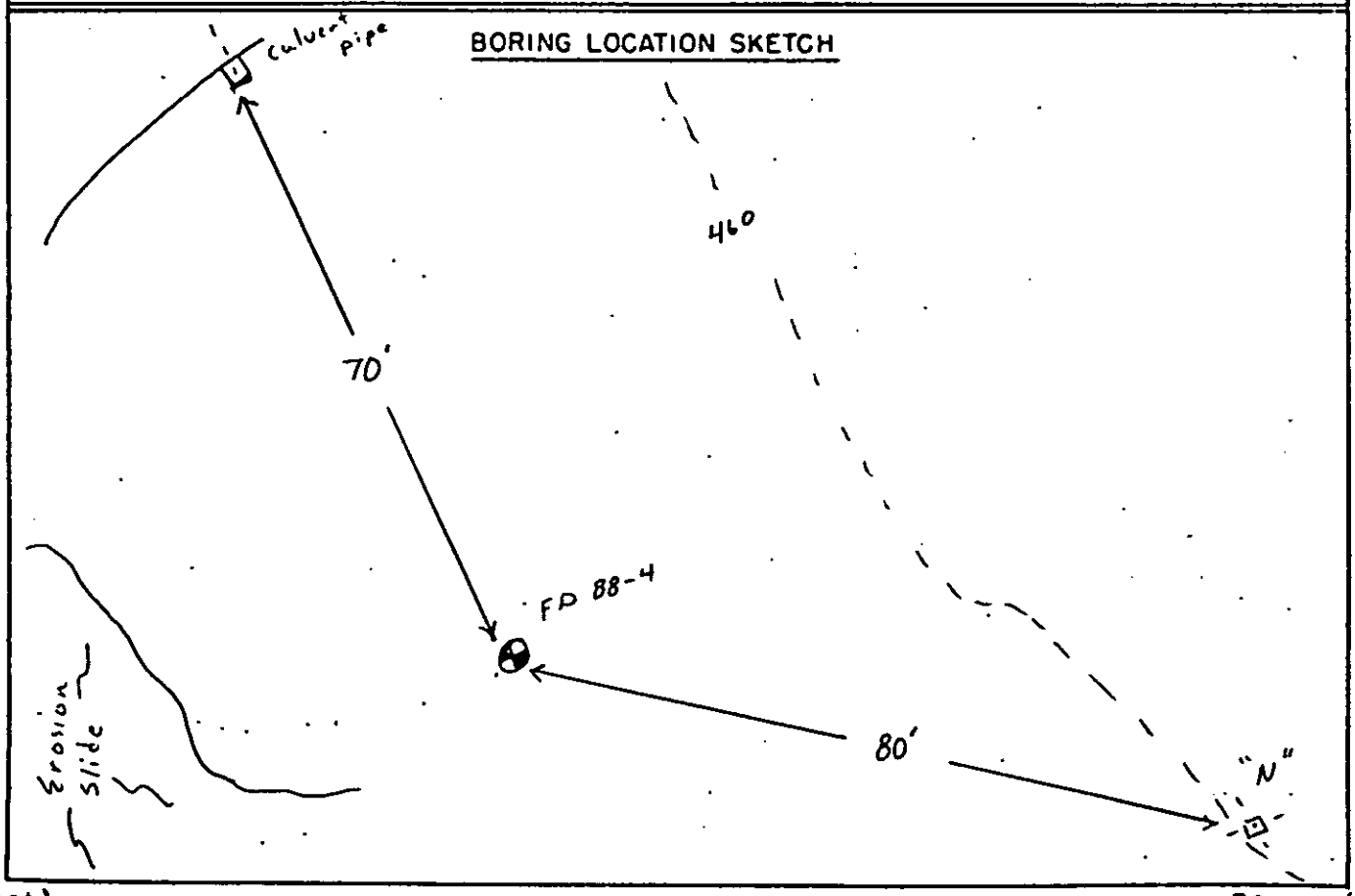
Site: North Springfield Dam
Boring No: FD 88-4

SUBSURFACE WATER OBSERVATIONS

DATE	TIME	DEPTH-BOT. OF CASING	DEPTH-BOT. OF BORING	DEPTH TO WATER	ELEVATION WATER	REMARKS
2/3/88	5:15 PM	20'	26.5'	5.35'	452.61	Boring incomplete
2/4/88	2:00 PM	20'	26.5'	5.65'	452.31	Boring incomplete
2/5/88	7:30 AM	20'	26.5'	5.8'	452.16	Boring incomplete
2/9/88	3:35 pm	20'	26.5'	6.1'	451.86	Boring incomplete
2/10/88	7:45 am	20'	26.5'	5.9'	452.06	
2/16/88	9:00 am	20'	26.5	5.8	452.16	
2/17/88	7:30	20'	26.5	5.9	452.06	

Note: Depths are in feet below original ground

BORING LOCATION SKETCH



FD-88-5 (B)

CORPS OF ENGINEERS, U. S. ARMY
NEW ENGLAND DIVISION
FOUNDATION AND MATERIALS BRANCH

FIELD LOG OF TEST BORING

PROJECT NO. D.O. 0003

Site North Springfield Dam — Page 1 of 8 Pages

Hole No. FD88-5 Diam. (Casing) _____ — Boring Started 2/3/88

Co-ordinates: N 51253 E 50069 — Boring Completed 2/9/88

Drilled by Hawkins — Report Submitted 3/3/88

Purpose of Exploration To monitor seepage at downstream right abutment area

Elevation Top of Hole 520.88 M.S.L. — Casing Left in Place 10 Feet

Total Overburden Drilled 60.7 Feet

Elevation Top of Rock 460.18 M.S.L.

Elevation Bottom of Hole 445.18 M.S.L.

Total Rock Drilled 15 Feet; total Rock cored 11.5

Total Depth of Hole 75.7 Feet

Core Recovered 100 %

Core Recovered 11.5 Ft.: NX Diam. 3 In.

Soil Samples _____ In. Diam. _____ No.

Soil Samples _____ In. Diam. _____ No. — Water Table Depth 57.3'

Depth From	Depth To	Method of Drilling and Type of Bit Used
40'	62.9	Continuous split spoon Sampling
0	60'	HW casing advanced with 300lbs hammer
60'	64.2	3 7/8" roller bit
64.2	75.7	NX rock coring

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Piezometer Installation Detail — Page 8
_____ — Page ____

Prepared by Greg Hargraves — Field Data — Lab. Data

Submitted by Atlantic Testing Laboratories Ltd.

NED FORM DEC 63 121 — REPLACES EDITION OF JUN 51 WHICH MAY BE USED UNTIL EXHAUSTED

U. S. ARMY
CORPS OF ENGINEERS
NEW ENGLAND DIVISION

FIELD LOG OF TEST BORING

Site North Springfield Dam — Page 2 of 8 Pages

Boring No. FD88-5 Desig. FD-B Diam. (Casing) HW

Co-ordinates: N 51253 E 50069

Elevation Top of Boring 520.88 M.S.L.
Total Overburden Drilled 60.7 Feet
Elevation Top of Rock 460.18 M.S.L.
Total Rock Drilled 15 Feet
Elevation Bottom of Boring 445.18 M.S.L.
Total Depth of Boring 75.7 Feet
Core Recovered 100 % No. Boxes
Core Recovered 11.5 Ft. NX Diam. 3 In.
Soil Samples In. Diam. No.
Soil Samples In. Diam. No.

Hammer Wt. 300 lbs Boring Started 2/3/88
Hammer Drop 18
Boring Completed 2/9/88
Casing Left 10'
Subsurface Water Data Page 7
Obs. Well 8
Drilled By Hawkins
Mfg. Des. Drill CME 850
Inspected By: Hargrave
Classification By: Hargrave
Classification By: T.L. Beauchamin

DEPTH		CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER 6" / CORE REC'VY	6" SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
				Rec.		Advanced HW casing to 25' using a 300 lbs hammer	GRANULAR MATERIAL
10'							
20'							
25'						END of EXPLORATION 2/3/88	
						Exploration Continued 2/4/88 Advanced casing to 40' cleaned casing using 3 7/8" roller bit and air	
40'					2	Sampled using 2 3/8" I.D. x 5' sampler advanced ✓ with 300 lbs hammer	Brown ~~med~~ poorly graded SAND; trace SILT. (moist, non-plastic) SP
		S-1A			3		
41					3		
					3		Similar Soil (cmf SAND; trace GRAVEL) SP
42		S1B	2 3/8	60%	3		
					7	Advanced casing to 45' cleaned casing to 45'	
43					9		
					9		
44'					7		
		S-1C			8	✓	Brown ~~GRAVEL; and cmf~~ poorly graded SAND ~~trace~~ with SILT (moist, non-plastic) ~~GW~~ and gravel SP-SM
45'		S-1C					
		S-2A	2 3/8	80%	4	Sampled	Brown ~~med~~ poorly graded SAND; and GRAVEL; ~~trace SILT~~ (moist, non-plastic) ~~SW~~ SP
					4		

GENERAL REMARKS:
Sampling began sooner than indicated on delivery order because elevation of actual boring location is lower than proposed boring location, also note change in depth scale after 40'

NED FORM 58 (Test) MAR 71

Boring No. FD 88-5

Site: North Springfield Dam

Boring No.: FD 88-5

DEPTH	1"	2"	CORE/SAMPLE NO.	SIZE	DEPTH RUN	BLOWS PER 6" / CORE REC'VY	6" SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
46'					Rec	4	Sampled ✓	Brown, poorly graded sand
						4		~~Similar Soil, (trace GRAVEL)~~
47'			2B				Advanced casing to 50'	~~SW~~ with silt SP-SM
				2 3/8	80%	4	Cleaned casing to 50'	
						4		
48'								
						7		
						11		Similar Soil, ~~SW~~ SP-SM
49'			2C					
						13		
						13		
50'								Br. poorly graded SAND w/gravel and silt
						5	Sampled	~~Similar Soil, SW~~ SP-SM
			S-3A			4		
51'							Advanced casing to 54.5'	Brown SILTY, ~~some~~ SAND, trace GRAVEL w/layers of SILT NL (wet, non-plastic) ~~ML~~ SM
						4		
						9		
52'			S-3B	2 3/8"	67%	8	Cleaned casing to 54.5'	Soil similar to Sample #3A SM
						10		
53'								
						11		
			S-3C			11		
54'								
54.5'						9		
55'			S-4	2 3/8"	—	7	Sampled Note: hammer was bouncing after 32 blows	Brown silty sm f SAND; ~~and SILT, little~~ trace GRAVEL, wet, non-plastic SM
55.2'						32	Advanced roller bit to 57.5 using "clear mud" Drilling fluid	
56'							Note: encounter cobble from 55.2' to 56.5', encountered coarse gravel and possible cobbles from 56.5 to 57.5'	Cobbles and coarse GRAVEL
57'								
57.5'								poorly graded
58			S-5	2 3/8	50%	30	Sampled Note - hammer was bouncing after 30 blows ✓	Grey-Brown GRAVEL, ~~trace~~ with cmf SAND (wet, non-plastic) GP
58.5							Advanced roller bit to 58.5'	~~Possible cobbles and gravel~~
			S-6A			3	Sampled, Note - hammer was bouncing after 30 blows ✓	Grey Brown poorly graded with ~~cmf SAND and~~ GRAVEL ~~little~~ SILT (wet, non-plastic) and SAND ~~SM~~ GP-GM
				2 3/8	80%	13		
						10	Advanced casing to 60'	
60			S-6B			10	Advanced roller bit to 60.7'	Similar Soil, ~~SM~~ GP-GM
60.7						30/3"	END of EXPLORATION 2/4/88	
							EXPLORATION CONTINUED 2/8/88	Bed rock @ 60.7 Note driller encountered seam of soft rock @ 62.9'-63'
62							Advanced roller bit using "clear mud" drilling fluid to 62.9'	
62.9				2 3/8	0%	10	Attempted sampling, hammer was bouncing	
63								

Site	Boring No.	Page 4 of 8
North Springfield Dam Vt	FD 88-5	

DEPTH		CORE/SAMPLE NO.	SIZE	DEPTH/MUDDY	BLOWS PER FT. / CORE RECVY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
63				lec		Advanced roller bit to 64.2' using "Clear Mud" drilling fluid	
64.2						END of Exploration 2/8/88	
						EXPLORATION CONTINUED 2/9/88	
		R-1	NX	100%		NX DIAMOND CORE	Greenish schist to 64.5, remainder of run greyish pink gneiss 1 piece, RQD = 100%
65.7'							
66'						NX DIAMOND CORE	greyish pink gneiss to 67.8', thin seam of quartz, remainder of run Greenish schist 4 pieces; few fragments RQD = 95%
						Note: slight loss of water @ 66.6'	
68'		R-2	NX	100%			
70'							
70.7'							
						NX DIAMOND CORE	greyish pink gneiss
72'		R-3	NX	100%			3 pieces RQD = 100%
74'							
75.7'						EXPLORATION PROGRAM TERMINATED 2/9/88 @ 75.7'	

FIELD LOG OF TEST BORING IN ROCK

SITE North Springfield Dam Vt HOLE NO. FD 88-5 PAGE 5 of 8

DATE	DEPTH PT. FROM	DEPTH PT. TO	RUN PT.	RUN REC'V'Y PT.	REC'V'Y %	DRILLING BEHAVIOR: FEED	DRILLING BEHAVIOR: WATER	DRILLING BEHAVIOR: REASON FOR PULL	ACTUAL DRILLING TIME	BIT NO. SIZE AND TYPE	ADDITIONAL REMARKS
2/9/88	64.2	65.7	1.5	1.5'	100%	Medium	No loss of water noted	1.5' run	15 minutes	NX	Run #1
2/9/88	65.7	70.7	5	5	100%	Medium	slight loss of water noted @ 66.6'	5' run	25 min.	NX	Run #2
2/9/88	70.7	75.7	5	5	100%	Medium	No loss of water noted	5' run	35 min	NX	Run #3

TOTAL BED ROCK DRILLED 15 FEET*

Total Bed Rock cored 11.5 Feet

TOTAL BED-ROCK RECOVERED 11.5 FEET

BED ROCK RECOVERY 100 PERCENT!

DRILLER Hawkins

INSPECTOR Hargrave

NED FORM DEC 130 * includes rock drilled with roller bit

! only includes bedrock cored

REPLACES EDITION OF APR 61 WHICH MAY BE USED UNTIL EXHAUSTED

PIEZOMETER INSTALLATION REPORT

PROJECT: North Springfield Dam Vt | DATE. 2-9-88

LOCATION (STA): N-51253 | OFFSET FROM CENTER LINE: 50069 | PIEZ NO.: FD88-5 PZ-19

PIEZ TYPE: Casagrande | DEPTH OF PIEZ: 67.7' | RISER PIPE DIAM: 3/4

PIEZ TIP SET IN (SOIL TYPE): | SOIL SAMPLE NO.: | BORING DIAM: 4" - overburden 3" - rock

METHOD OF INSTALLATION:

TYPE OF PROTECTION FOR PIEZ: 4" casing | VENT: screw on cap

GROUND ELEV.: 520.88 | ELEV. TOP OF RISER: 523.47 | ELEV PIEZ TIP: 453.18

FILTER: #4 SAND | FROM ELEV: 445.18 | TO ELEV: 480.88

SEAL: Bentonite Pellets | FROM ELEV: 480.88 | TO ELEV: 485.88

INSTALLED BY: Hawkins + Todd | CONTRACT NO.: DO.0003 | FOREMAN: Hargrave

DATE OF INSTALLATION: 2-9-88 | DATE OF OBSERVATIONS: 2-9-88

METHOD OF TESTING PIEZ.:

TIME	ELAPSED TIME MINUTES	DEPTH TO WATER FEET	TIME	ELAPSED TIME MINUTES	DEPTH TO WATER FEET	TIME	ELAPSED TIME MINUTES	DEPTH TO WATER FEET
	½	17.8		30	55.2			
	3	44.8						
	5	49.3						
	10	53.8						
	20	54.8						

REMARKS:

Gregory R. Hargrave
INSPECTOR

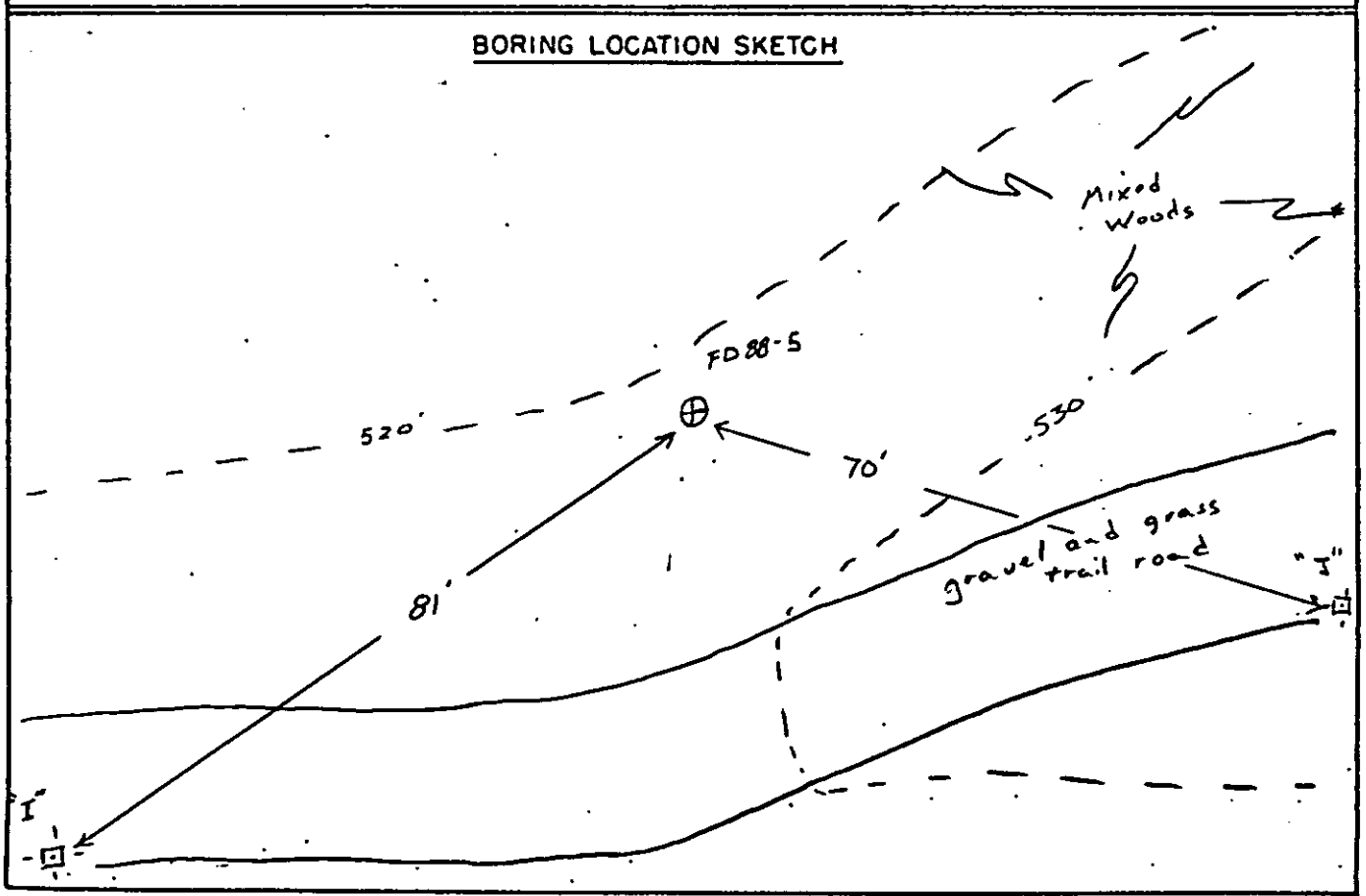
Site: North Springfield Dam, VT
Boring No: FD 88-5

SUBSURFACE WATER OBSERVATIONS

DATE	TIME	DEPTH-BOT. OF CASING	DEPTH-BOT. OF BORING	DEPTH TO WATER	ELEVATION WATER	REMARKS
2/10/88	7:15AM	6.95'	75.7	57.1'	463.78	
2/16/88	9:25	6.95'	75.7	57.2'	463.68	
2/17/88	7:45	6.95	75.7	57.3'	463.58	
2/18/88	7:40	6.95	75.7	57.3'	463.58	
2/24/88	8:20	6.95	75.7	57.3'	463.58	

Note: Depths are in feet below original ground

BORING LOCATION SKETCH

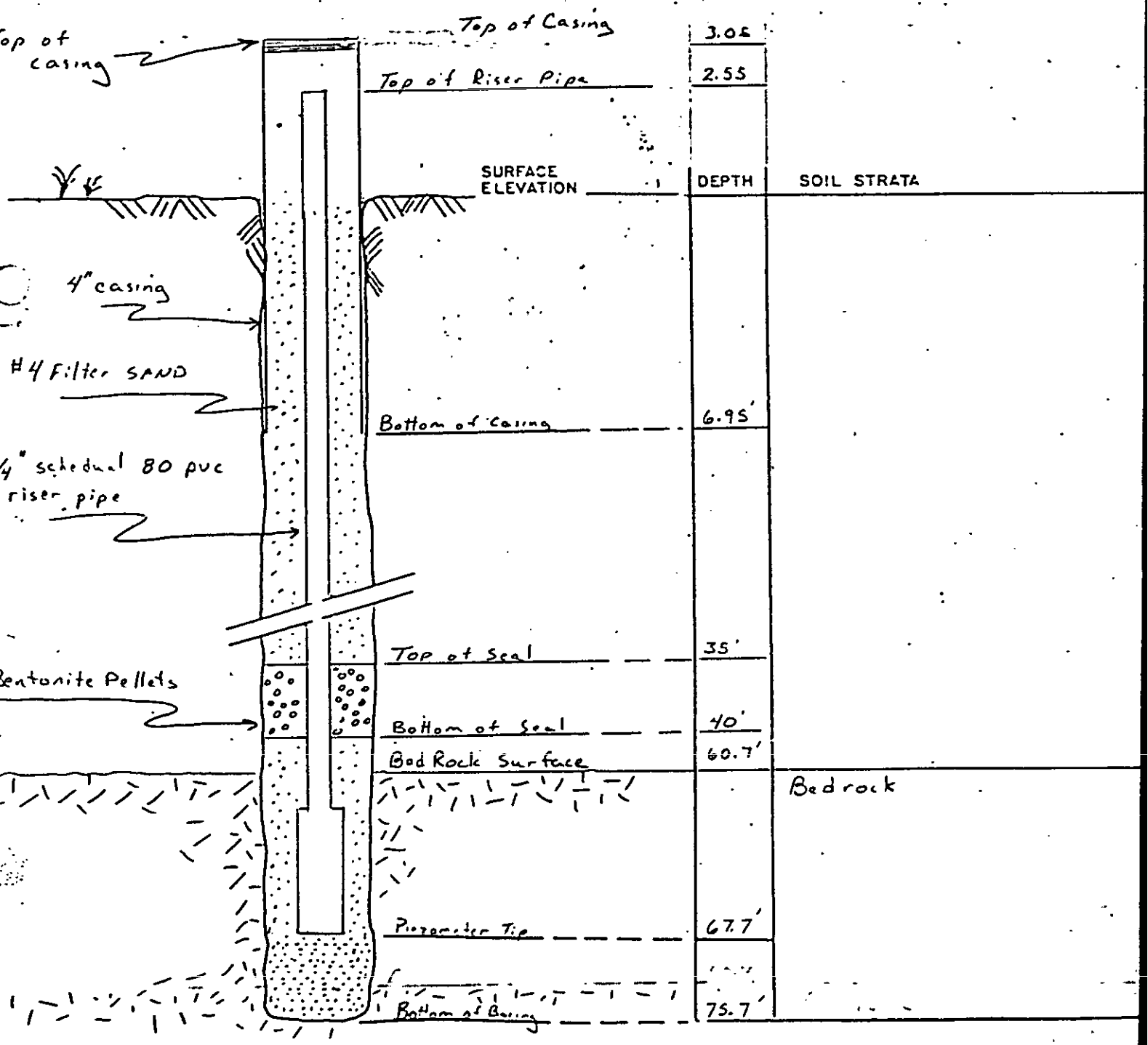


ATLANTIC TESTING LABORATORIES, LIMITED

PIEZOMETER INSTALLATION DETAIL

PROJECT: North Springfield Dam 14
USACE

PROJECT NO. D.O. 0003
ATL No. CD 030
PIEZOMETER No. FD 88-5 PZ-



F.D-88-6 (H)

CORPS OF ENGINEERS, U. S. ARMY
NEW ENGLAND DIVISION
FOUNDATION AND MATERIALS BRANCH

FIELD LOG OF TEST BORING

PROJECT NO. D.O. 0003

Site North Springfield Dam VT — Page 1 of ___ Pages

Hole No. FD 88-6 Diam. (Casing) ___ — Boring Started Feburary 10, 1988

Co-ordinates: N 51152 E 50092 — Boring Completed Feburary 11, 1988

Drilled by Hawkins — Report Submitted March 3, 1988

Purpose of Exploration: To monitor seepage at downstream right abutment area

Elevation Top of Hole 520.85 M.S.L. — Casing Left in Place NA Feet

Total Overburden Drilled 53.8 Feet

Elevation Top of Rock 467.05 M.S.L.

Elevation Bottom of Hole 456.85 M.S.L.

Total Rock Drilled 10.2 Feet ; total rock cored 9

Total Depth of Hole 64 Feet

Core Recovered 100 %

Core Recovered 9 Ft.: NX Diam. 3 In.

Soil Samples ___ In. Diam. ___ No.

Soil Samples ___ In. Diam. ___ No. — Water Table Depth 54.5'

Depth From	Depth To	Method of Drilling and Type of Bit Used
0'	55'	3 7/8" roller bit
55	64	NX DIAMOND CORE

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Ground Water	Back of Page
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Overburden Record	Page
Rock Drilling	Page
	Page
	Page
	Page

Prepared by Gregory R. Hargraves
Field Data — Lab. Data

Submitted by Atlantic Testing Laboratories Ltd.

NED FORM DEC 63 121 — REPLACES EDITION OF JUN 51 WHICH MAY BE USED UNTIL EXHAUSTED

U. S. ARMY
CORPS OF ENGINEERS
NEW ENGLAND DIVISION

FIELD LOG OF TEST BORING

Site: North Springfield D.A. Page 1 of 2 Pages

Boring No. FD 88-6 Desig. FD-H Diam. (Casing) HW

Co-ordinates: N 51152 E 50092

Elevation Top of Boring 520.85 M.S.L.
Total Overburden Drilled 53.8 Feet
Elevation Top of Rock 467.05 M.S.L.
Total Rock Drilled 10.2 Feet
Elevation Bottom of Boring 456.85 M.S.L.
Total Depth of Boring 64 Feet
Core Recovered 100 % No. Boxes
Core Recovered 9 Ft. NX Diam. 3 In.
Soil Samples In. Diam. No.
Soil Samples In. Diam. No.

Hammer Wt. 300 Boring Started 2-10-88
Hammer Drop 18 Boring Completed 2-11-88
Casing Left 0
Subsurface Water Data Page
Obs. Well NA
Drilled By Hawkins
Mfg. Des. Drill CME 850
Inspected By: Hargrave
Classification By: Hargrave
Classification By:

DEPTH		CORE/SAMPLE NO.	SIZE	DEPTH RANGE	BLOWS PER FT. / CORE RECV'Y	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
	1" = 20'						
				Rec		Advanced HW casing to 15' using 300lbs hammer	
10						END OF EXPLORATION 2/10/88	
						CONTINUED EXPLORATION 2/11/88	
20						Advanced 3 7/8" roller bit to 55' using "Clear-Mud" drilling fluid.	
30						Note: Encountered gravel from 41'-45'	
40						Bed rock encountered @ 53.8'	
50'							
55'							Bed rock
60		R-1	NX	100%		NX DIAMOND CORE	Run #1 Grey Gneiss 6 pieces RQD = 86%
64		R-2	NX	100%		NX DIAMOND CORE	Run #2 Similar Rx 8 pieces, few fragments RQD = 85%
70'							
80'							
100'							

GENERAL REMARKS:

NED FORM 58 (Test) MAR 71

Boring No. FD 88-6

FIELD LOG OF TEST BORING IN ROCK

SITE North Springfield Dam, Vt HOLE NO. FD 88-6 PAGE

DATE	DEPTH FT. FROM	DEPTH FT. TO	RUN FT.	RUN REC'V'Y FT.	REC'V'Y %	DRILLING BEHAVIOR: SPEED	DRILLING BEHAVIOR: WATER	DRILLING BEHAVIOR: REASON FOR PULL	ACTUAL DRILLING TIME	BIT NO. SIZE AND TYPE	ADDITIONAL REMARKS
2/11/88	55	60	5'	15	100%	Medium	No loss Noted	5' run	35 min	NX	Run #1
2/11/88	60	64	4'	4'	100%	Medium	No loss Noted	4' run	30 min	NX	Run #2

TOTAL BED ROCK DRILLED _____ FEET
Total Bed Rock Cored 9 Feet
TOTAL BED ROCK RECOVERED 9 FEET

DRILLER Hawkins

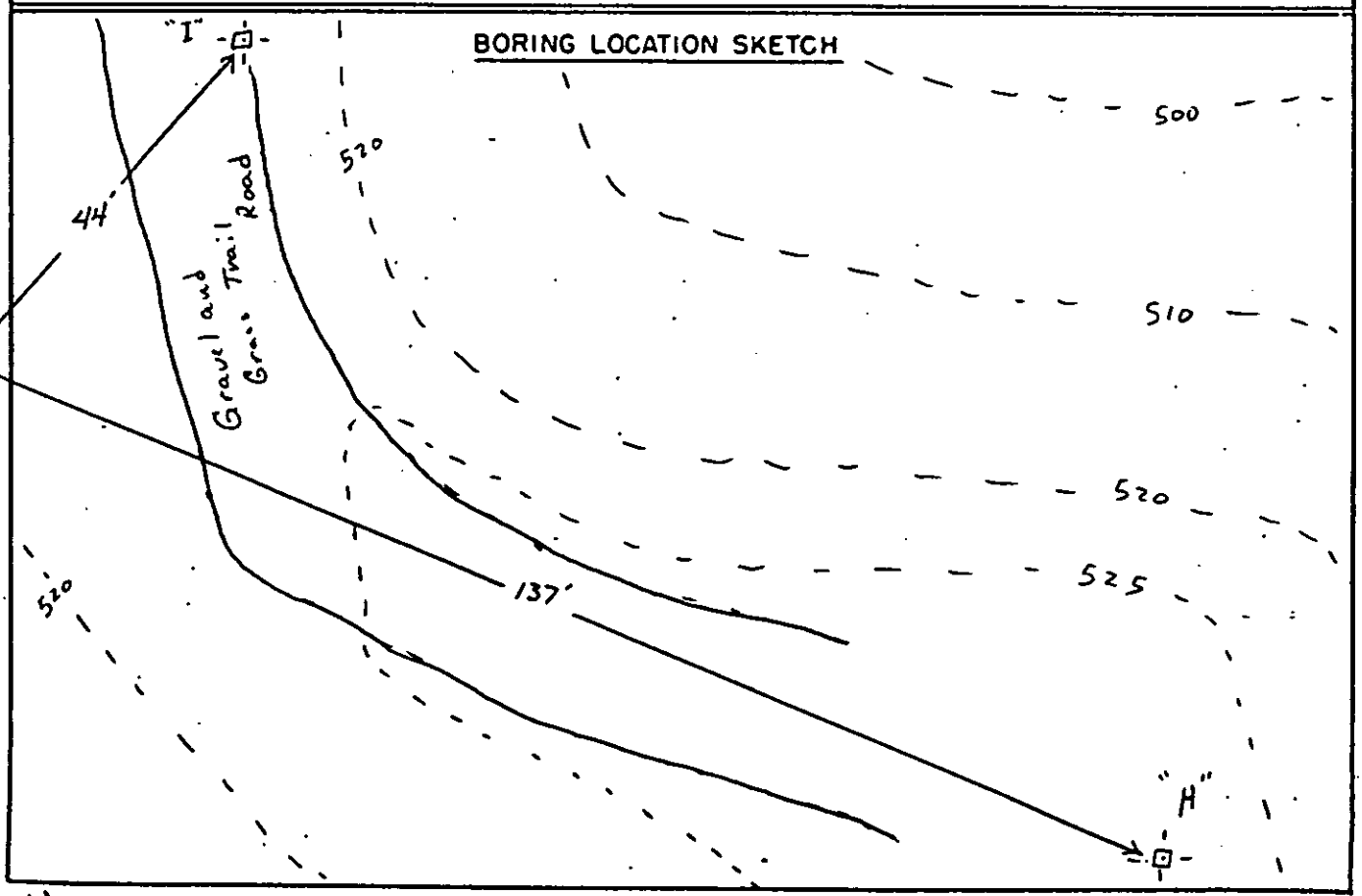
Site: North Springfield Dam, VT
Boring No: FD 88-6

SUBSURFACE WATER OBSERVATIONS

DATE	TIME	DEPTH-BOT. OF CASING	DEPTH-BOT. OF BORING	DEPTH TO WATER	ELEVATION WATER in ft.	REMARKS
2-16-88	12:30	NA	≈56'	54.5'	466.35'	open, uncased hole
2-17-88	7:40	NA	≈56'	54.4'	466.45	open, uncased hole
2-18-88	7:30	NA	≈55'	54.5'	466.35'	

Note: Depths are in feet below original ground

BORING LOCATION SKETCH



FORM 59 (Test)
AR 71-

Boring No. FD 88-6

FD-88-7 (G)

CORPS OF ENGINEERS, U. S. ARMY
NEW ENGLAND DIVISION
FOUNDATION AND MATERIALS BRANCH

FIELD LOG OF TEST BORING

PROJECT NO. D.O. 0003

Site North Springfield Dam, Vt. — Page 1 of 8 Pages

Hole No. FD88-7 Diam. (Casing) HW — Boring Started 2-11-88

Co-ordinates: N 51205 E 50189 — Boring Completed 2-16-88

Drilled by Hawkins and Burnham — Report Submitted

Purpose of Exploration To monitor seepage in right abutment area

Elevation Top of Hole 491 M.S.L. — Casing Left in Place 10 Feet

Total Overburden Drilled 36.75 Feet

Elevation Top of Rock 454.25 M.S.L.

Elevation Bottom of Hole 444.25 M.S.L.

Total Rock Drilled 10 Feet; total rock cored 8.75

Total Depth of Hole 46.75 Feet

Core Recovered 79 %

Core Recovered 6.9 Ft.; NX Diam. ____ In.

Soil Samples ____ In. Diam. ____ No.

Soil Samples ____ In. Diam. ____ No. — Water Table Depth 34.6

Depth From	Depth To	Method of Drilling and Type of Bit Used
0	35'	HW casing advanced using 300 lbs hammer
10'	35'	continuous split spoon sampling
35'	38'	3 7/8" roller bit
38	46.75	NX DIAMOND CORE

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Boring Location Sketch — Back of Page 7
Overburden Record — page 2 through — Page 4
Rock Drilling — Page 5
Piezometer installation report — Page 6
Piezometer installation detail — Page 8
— Page

Prepared by Gregory R. Hargrave — Field Data — Lab. Data

Submitted by Atlantic Testing Laboratories Ltd.

NED FORM DEC 63 121 — REPLACES EDITION OF JUN 51 WHICH MAY BE USED UNTIL EXHAUSTED

U. S. ARMY
CORPS OF ENGINEERS
NEW ENGLAND DIVISION

FIELD LOG OF TEST BORING

Site North Springfield Dam VT — Page 2 of 8 Pages

Boring No. FD88-7 Desig. FD-G Diam. (Casing) HW

Co-ordinates: N 51205 E 50189

Elevation Top of Boring 491 M.S.L.
Total Overburden Drilled 36.75 Feet
Elevation Top of Rock 454.25 M.S.L.
Total Rock Drilled 10 Feet
Elevation Bottom of Boring 444.25 M.S.L.
Total Depth of Boring 46.75 Feet
Core Recovered 79 % No. Boxes
Core Recovered 6.9 Ft. NX Diam. In.
Soil Samples In. Diam. No.
Soil Samples In. Diam. No.

Hammer Wt. 300lbs
Hammer Drop 18"
Casing Left 10
Subsurface Water Data Page
Obs. Well
Drilled By Hawkins + Todd
Mfg. Des. Drill CME 850
Inspected By: Greg Hargrave
Classification By: Greg Hargrave
Classification By: T.L. Benvcheimin

Boring Started 2-11-88
Boring Completed 2-16-88

DEPTH		CORE/SAMPLE NO.	SIZE	DEPTH RANGE / CORE REC'VY	BLOWS PER FT.	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
				Rec		Advanced HW casing to 10' using spin bit. Cleaned casing to 10' using a 3 7/8" roller bit and water as a drilling fluid	GRANULAR SOILS
5'							
10'							
		S-1A	2 3/8"	60%	4 5 17 8 8 7 11 7	Sampled using a 5'x2 3/8"-20 sampling spoon advanced with a 300lbs hammer. Note: only obtained 4' sample because wack "T" was in way of hammer. Advanced 3 7/8" roller bit to 15' using "clear mud" drilling fluid	Brownish ~~and~~ poorly graded SAND, with ~~and~~ GRAVEL, and silt (wet, non plastic) ~~Sw~~ SP-SM.
		S-1B					Similar soil SP-SM
14'							
15'							Coarse gravel and possible cobbles
16		S-2	2 3/8"	50%	4 13.	Sampled	~~Soil similar to Sample #1, with trace SILT (SW)~~ Gray, poorly graded GRAVEL with SILT and SAND GP-GM

GENERAL REMARKS:

NED FORM 58 (Test) MAR 71

Boring No. FD 88-7

Site	Boring No.	Page 3 of 8
North Springfield Vt	FD 88-7	

DEPTH		CORE/SAMPLE NO.	SIZE	DEPTH RAND	BLOWS PER 6" / CORE RECVY	6" SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
16'		S-2	2 7/8"		14 11 13 15	Advance 3 7/8" rollerbit to 20' using "clear mud" drilling fluid. Note: lost water @ 19-19.1'	
18.2'				bouncing refusal	4		
20'							Coarse gravel and possible cobbles
22		S-3	2 3/8"	60%	8 4 6 6 6 9 11 11 13 12	Sampled ✓	Brown ~~cmt~~ poorly graded SAND; trace SILT (wet, nonplastic) SP
24							
25'						END OF EXPLORATION 2-11-88	
26'		S-4	2 3/8"	30%	10 17 11 7 9 8 6 7 6 10	EXPLORATION CONTINUED 2-15-88 Advanced HW casing with spin bit to 25' using water, cleaned casing with water and a 3 7/8" roller bit to 25' Sampled from 25'-30'	Soil similar to sample # 3 SP
28'							
30'						END OF EXPLORATION 2-15-88	
32'		S-5	2 3/8"	70%	7 6 10 11 13	EXPLORATION CONTINUED 2-16-88 Spun HW casing to 30, cleaned casing with 3 7/8" roller bit to 30', sampled from 30' to 32.8'	Brownish ~~GRAVEL; and~~ poorly graded sand w/ gravel and ~~cmt SAND; little~~ SILT; (wet, non-plastic) ~~GM~~ SP-SM
32.8'				bouncing refusal	4		

58A (Test)

Boring No. FD 88-7

Site	Boring No.	Page 4 of 8
North Springfield Dam, Vt	FD 88-7	

DEPTH	1" : 2'	CORE/SAMPLE NO	SIZE	DEPTH RUN / RQD	BLOWS PER FT. / CORE REC'VY	6" SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
34'				Rec		Advanced casing to 34.9' cleaned casing to 34.9'	Coarse gravel and possible cobbles
34.8'		S-6	2 3/8	bouncing refusal	10	Sampled Advanced casing to 35' Advanced rollerbit to 38' Note: Bedrock @ 36.75'	~~GRAVEL, GP~~ piece broken cobble
36'							Coarse gravel and possible cobbles
38'							Bedrock
40'		R-1	NX	88%		NX DIAMOND CORE	Grey Gneiss with seams of schist 6 pieces, some fragments RQD = 78% Note: verticals fractures from 39.3' to 43'
42'							
43'							
44'		R-2	NX	67%		NX DIAMOND CORE	Grey Gneiss 2 pieces, RQD = 58%
46'							
46.75						EXPLORATION TERMINATED 2-16-88	

FIELD LOG OF TEST BORING IN ROCK

SITE North Springfield Dam, Vt HOLE NO. FD 88-7 PAGE 5 of 8

DATE	DEPTH PT. FROM	DEPTH PT. TO	RUN PT.	RUN REC'V'Y PT.	REC'V'Y %	DRILLING BEHAVIOR: FEED	DRILLING BEHAVIOR: WATER	DRILLING BEHAVIOR: REASON FOR PULL	ACTUAL DRILLING TIME	BIT NO. SIZE AND TYPE	ADDITIONAL REMARKS
2/16/88	38	43	5'	4.4'	88%	Medium	No loss of water noted	5' run	20 min.	NX	Run #1
2/16/88	43	46.75	3.75'	2.5	67%	Medium	slight loss of water noted	3.75' run	27 min.	NX	Run # 2

TOTAL BED ROCK ~~DRILLED~~ Cored 8.75' FEET

TOTAL BED-ROCK RECOVERED 6.9 FEET

BED ROCK RECOVERY 79% PERCENT

DRILLER Burham

INSPECTOR Hargrave

NED FORM DEF 130

REPLACES EDITION OF APR 63 WHICH MAY BE USED UNTIL EXHAUSTED

PIEZOMETER INSTALLATION REPORT

PROJECT: North Springfield Dam, VT | DATE: 2-16-88

LOCATION (STA): N-51205 | OFFSET FROM CENTER LINE: E-50189 | PIEZ NO.: PZ-20 FD88-7

PIEZ TYPE: Casagrande | DEPTH OF PIEZ: 40.35 | RISER PIPE DIAM: 3/4"

PIEZ TIP SET IN (SOIL TYPE): | SOIL SAMPLE NO.: | BORING DIAM: 4" overburden 3" rock

METHOD OF INSTALLATION:

TYPE OF PROTECTION FOR PIEZ: 4" casing | VENT: screw on cap

GROUND ELEV.: 491' | ELEV. TOP OF RISER: 494.07' | ELEV PIEZ TIP: 450.65'

FILTER: #4 filter sand | FROM ELEV: 444.25' | TO ELEV: 474'

SEAL: Bentonite Pellets | FROM ELEV: 474' | TO ELEV: 479

INSTALLED BY: Burnham | CONTRACT NO.: DO. 0003 | FOREMAN: Hargrave

DATE OF INSTALLATION: 2-16-88 | DATE OF OBSERVATIONS: 2-16-88

METHOD OF TESTING PIEZ.: Falling Head Test

TIME	ELAPSED TIME MINUTES	DEPTH TO WATER FEET	TIME	ELAPSED TIME MINUTES	DEPTH TO WATER FEET	TIME	ELAPSED TIME MINUTES	DEPTH TO WATER FEET
	0	0		10.0	33.4			
	0.5	28.6'		15.0	33.4			
	1.0	32.6		20.0	33.4			
	3.0	32.9						
	5.0	33.2						

REMARKS:

Gregory R. Hargrave
INSPECTOR

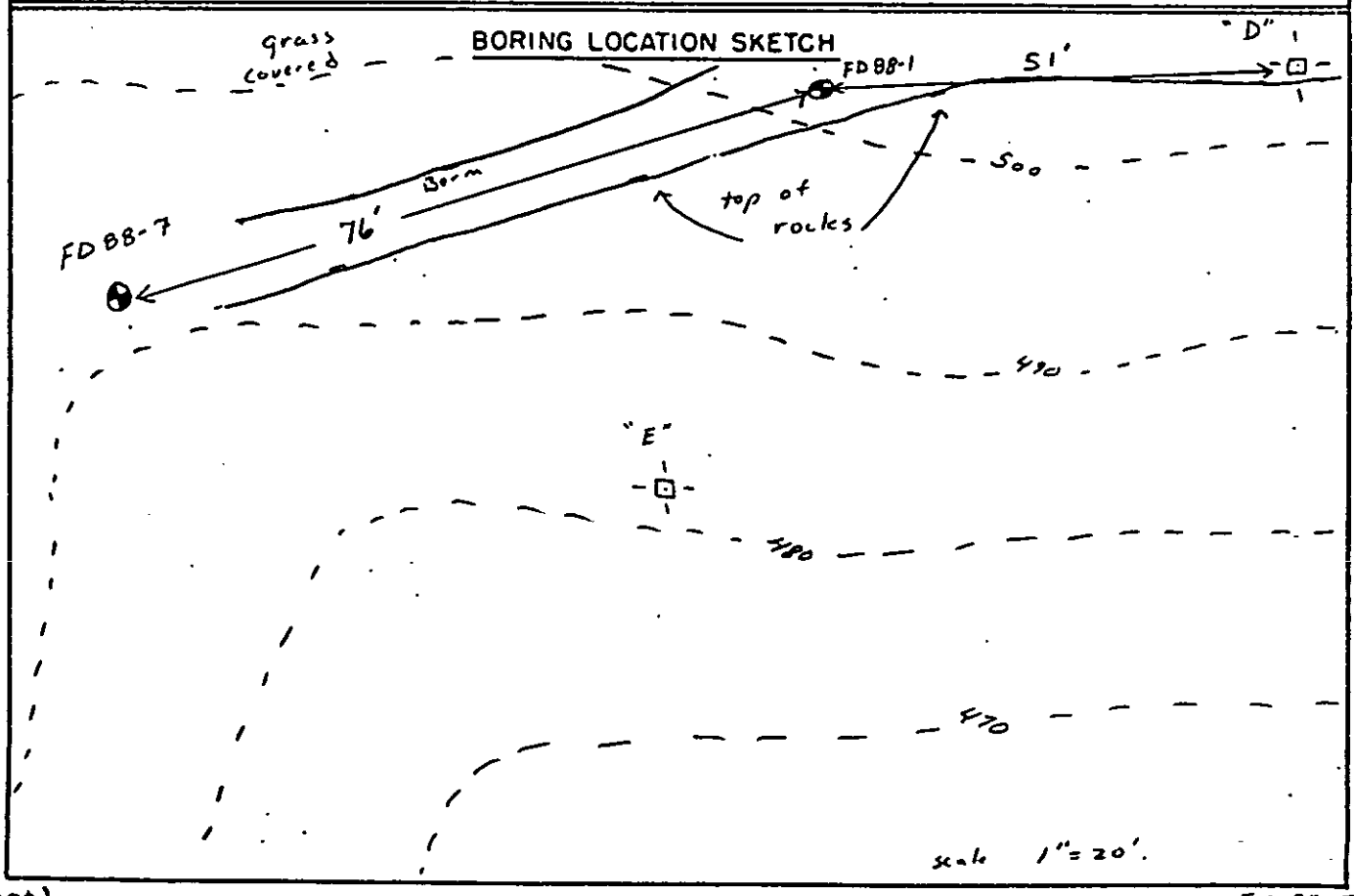
Site: North Springfield Dam VT
Boring No: FD 88-7

SUBSURFACE WATER OBSERVATIONS

DATE	TIME	DEPTH-BOT. OF CASING	DEPTH-BOT. OF BORING	DEPTH TO WATER	ELEVATION WATER	REMARKS
2-17-88	7:25	6.9	46.75'	34.0	457.0	
2-18-88		6.9	46.75	34.4	456.6	
2-19-88	8:15	6.9	46.75	34.6	456.4	
2-24-88	8:45	6.9	46.75	34.7	456.3	

Note: Depths are in feet below original ground

BORING LOCATION SKETCH



ATLANTIC TESTING LABORATORIES, LIMITED

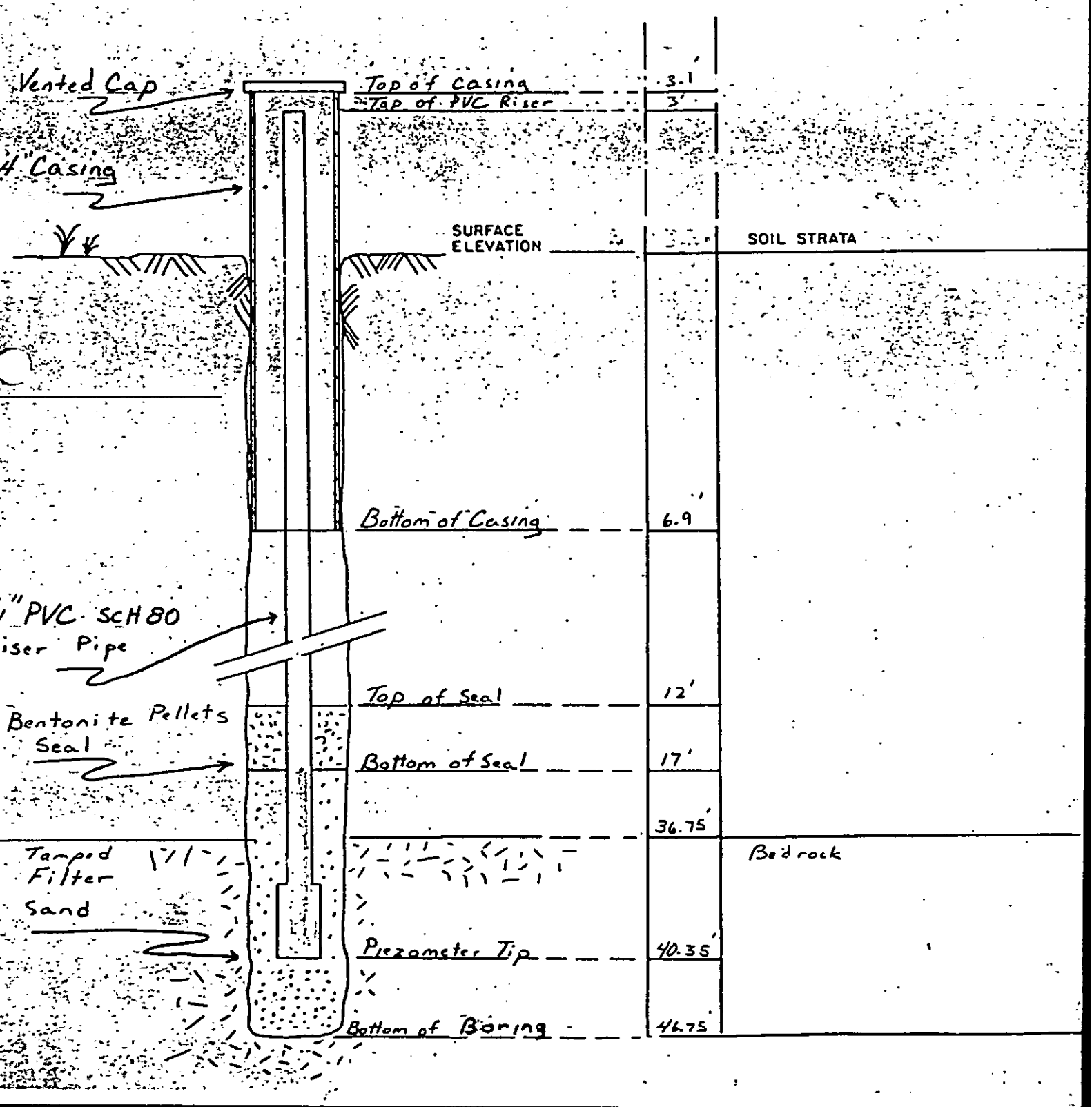
PIEZOMETER INSTALLATION DETAIL

PROJECT: North Springfield Dam Piezometer Installation

PROJECT NO. CD 030

CLIENT: USACE, NED

WELL NO. FD 88-7



FD-88-8 (E)

CORPS OF ENGINEERS, U. S. ARMY
NEW ENGLAND DIVISION
FOUNDATION AND MATERIALS BRANCH

FIELD LOG OF TEST BORING

PROJECT NO. D.O. 0003

Site North Springfield Dam — Page 1 of 11 Pages

Hole No. FD 88-8 Diam. (Casing) HW — Boring Started February 17, 1988

Co-ordinates: N 51109 E 50146 — Boring Completed February 24, 1988

Drilled by Burnham — Report Submitted March 3, 1988

Purpose of Exploration To investigate seepage in right abutment area

Elevation Top of Hole 530.6 M.S.L. — Casing Left In Place 10 Ft.

Total Overburden Drilled 81.7 Feet

Elevation Top of Rock 448.9' M.S.L.

Elevation Bottom of Hole 439.1 M.S.L.

Total Rock Drilled 9.8 Feet; Total Rock Cored ____

Total Depth of Hole 91.5 Feet

Core Recovered 91 %

Core Recovered 8 Ft.; NX Diam. ____ In.

Soil Samples ____ In. Diam. ____ No.

Soil Samples ____ In. Diam. ____ No. — Water Table Depth 72.2'

Depth From	Depth To	Method of Drilling and Type of Bit Used
0	74.5	Continuous split spoon sampling
0	55'	HW casing advanced with 300lbs hammer
57.2	59.2	NX DIAMOND CORE
77.7	81.5	NX DIAMOND CORE
82.7	91.5	NX DIAMOND CORE

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Prepared by Gregory R. Hargrave
Field Data — Lab. Data

Submitted by Atlantic Testing Laboratories Ltd.

NED FORM DEC 63 121

REPLACES EDITION OF JUN 51 WHICH MAY BE USED UNTIL EXHAUSTED

U. S. ARMY
CORPS OF ENGINEERS
NEW ENGLAND DIVISION

FIELD LOG OF TEST BORING

Site North Springfield Dam — Page 2 of 11 Pages

Boring No. FD 88-8 Desig. _____ Diam. (Casing) HW

Co-ordinates: N 51109 E 50146

Elevation Top of Boring 530.6 M.S.L. — Hammer Wt. 300 lbs — Boring Started 2-17-88

Total Overburden Drilled 81.7 Feet — Hammer Drop 18" — Boring Completed 2-24-88

Elevation Top of Rock 448.9 M.S.L. — Casing Left 10' — Subsurface Water Data _____ Page _____

Total Rock Drilled _____ Feet

Elevation Bottom of Boring 439.1 M.S.L. — Obs. Well _____

Total Depth of Boring 91.5 Feet — Drilled By Burnham

Core Recovered _____ % No. Boxes _____ — Mfg. Des. Drill CME 850

Core Recovered _____ Ft. _____ Diam. _____ In. — Inspected By: Greg Hargrave

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

Soil Samples _____ In. Diam. _____ No. — Classification By: T.L. Romanchemin

DEPTH 1" = 2'	CORE/SAMPLE NO.	SIZE	DEPTH RANGE	CORE RECVY	BLOWS PER 6"	6" SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
			Rec		4 2	Sampled using a 2 3/8" I.D. x 5' sampling spoon advanced with a 300 lbs hammer dropping 18"	Brown mf SAND trace fine gravel (moist, nonplastic) SP
2'	S-1	2 3/8"	54%		2 2 1 3	Spun HW casing to 5', cleaned casing with a 3 7/8" roller bit and water to 5'	
4'					2 3 4 3		
5'							Brown cmf SAND; trace f. GRAVEL (wet, nonplastic) SP
6'					2 1 1 2	Sampled spun casing to 10', cleaned casing to 10'	
	S-2	2 3/8"	62%		1 2		
8'					2 2 3 3		
10'							

GENERAL REMARKS:

Boring No. FD 88-8

NED FORM 58 (Test) MAR 71

Boring No. FD 88-8

...ith Springfield Dam

DEPTH	CORE/SAMPLE NO.	SIZE	DEPTH/RQD	BLOWS PER 6" / CORE REC'VY	6" SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
10'			Rec	2 2 2 3 3 3 6	Sampled to 13.6', advanced roller bit to 15' using water as drilling fluid, advanced HW casing, cleaned casing to 15'. Note: encountered cobbles from 13.8' to 14.9'	Brown well graded ~~cmf~~ SAND; with silt and ~~some~~ GRAVEL (wet, nonplastic) SW-SM
12'	S-3	2 3/8"				
13.6'		boring refusal				
14'						Cobbles
15'						
16'	S-4A			2 6 5 5	Sampled to 20' Spun casing to 20' cleaned casing to 20'	Grey GRAVEL, and with silt and ~~cmf~~ SAND; ~~trace~~ ~~SILT~~ (wet, non-plastic) GP-GM
		2 3/8"	26%	4		
18'	S-4B			5 4 5 6 6		Brown poorly graded ~~cmf~~ SAND; with ~~little~~ GRAVEL; ~~trace~~ and SILT (wet, nonplastic) SP-SM
20'						
22'	S-5	2 3/8"	50%	3 3 3 3 4 4 5 5 4 5	Sampled to 25' Spun casing to 25' cleaned casing to 25'	Grey mf SAND; with ~~trace~~ SILT (wet, nonplastic) SP-SM
24'						
25'					END OF EXPLORATION 2-17-88	
26'	S-6	2 3/8"	50%	4 4	EXPLORATION CONTINUED 2-18-88 Sampled	Grey cmf SAND; with ~~trace~~ GRAVEL SP

Springfield Dam, Ut

Boring No. FD 88-8

DEPTH	1'=2'	CORE/SAMPLE NO.	SIZE	DEPTH ~~BLOW~~	BLOWS PER 6" / CORE REC'VY	6" SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
26'				Rec	4	Sampled to 30'	
					2	advanced roller bit to	
					3	30.5', advanced	
28'		S-6	2 3/8"		3	casing to 30.5', cleaned	
					3	casing to 30.5'.	
					5	Note: cobble encountered	
					5	from 30' to 30.5'	
30'					8		
30.5'							COBBLE
					5	Sampled to 35', ✓	Well graded Grey GRAVEL; ~~some~~ with trace ~~cmf~~ SAND; ~~little~~ SILT GW (wet, non plastic) ~~GM~~
		S-7A			7	advanced roller bit to	
					6	35', advanced casing	
32'					8	to 35', cleaned casing	
		S-7B	2 3/8"	40%	9	to 35'	~~Grey GRAVEL; trace SAND;~~ Similar ~~trace SILT (wet, nonplastic)~~ ~~GP~~ GW
					8		
					8		
34'		S-7C			7		Grey cmf SAND; trace GRAVEL; trace SILT (wet, nonplastic) SP
35'					7		
					3	Sampled to 40',	
36'					4	advanced roller bit to ✓	~~Similar soil, (little Gravel)~~ Grey poorly graded SAND SP
					4	40', advanced casing	
					5	to 40', cleaned casing	
		S-8	2 3/8"	60%	7	to 40'	
38'					7		
					7		
					5		
					7		
40'					13		
					5	Sampled to 45',	~~Grey cmf SAND;~~ Similar except trace ~~little~~ GRAVEL (wet, non plastic) SP
					5	advanced roller bit to	
					4	45', advanced casing	
42'		S-9	2 3/8"	50%	4	to 45', cleaned casing	
					5	to 45'	
					5		

North Springfield Dam Vt

Boring No. FD 88-9

DEPTH	1'=2'	CORE/SAMPLE NO.	SIZE	DEPTH RUN	BLOWS PER FT. / CORE REC'VY	SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
44'				Rec	7 7 8		SP
45'					8		
46'		S10A			8 8 9 9	Sampled, advanced roller bit to 50', advanced casing to 50', cleaned casing to 50'	Grey SAND ~~with~~ ~~GRAVEL~~, ~~and~~ with ~~cmf SAND; trace~~ SILT and gravel (cobble frags) (wet, non-plastic) ~~GW~~ SP-SM
		S-10B		60%	12		Grey silty ~~cmf~~ SAND ~~little SILT~~; ~~trace GRAVEL~~ (wet, nonplastic) ~~SM~~ SM
48'			2 3/8"		11 15 15		
50'		S-10C			8 10		Grey SAND ~~GRAVEL, and cmf SAND, trace~~ with SILT, and gravel (wet, nonplastic) ~~GW~~ ~~SP~~ SM
52'		S-11	2 3/8"	60%	7 5 5 6 6 8	Sampled, advanced roller bit to 55', advanced casing to 55', cleaned casing to 55'	Grey mf SAND; ~~trace~~ with SILT (wet, nonplastic) ~~SP~~ SP-SM
54'					8 9 10		
55'					13		Grey ~~m~~f SAND; ~~some~~ with SILT (wet, nonplastic) SM
56.2'		S-12A S-12B S-12C	2 3/8"	80%	3 11 13	Sampled to 56.2' advanced roller bit to 57.2'	Brown cmf SAND; ~~and~~ with GRAVEL; ~~trace~~ and SILT (wet, nonplastic) ~~SW~~ SP-SM
57' 57.2				boring refusal		Note: END OF EXPLORATION 2-18-88	GREY GRAVEL; ~~and cmf~~ poorly ~~graded~~ with silt and sand ~~SAND; little SILT~~ GP-GM (wet, nonplastic) ~~GW~~
58' 59.2'		R-1	NX			CONTINUED EXPLORATION 2-19-88 NX DIAMOND CORE END OF EXPLORATION 2-19-88	Boulder
60						EXPLORATION CONTINUED 2-22-88 Advanced 3 7/8" roller bit to	coarse gravel and cobbles

North Springfield Dam, Vt

Boring No. FD 88-8

DEPTH 1" = 2'	CORE/SAMPLE NO.	SIZE	DEPTH RQD / CORE RECVY	BLOWS PER 6"	6" SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
60' 60.8'			Rec		56.2' using Clear mud drilling fluid. Advance casing to 56'. END OF EXPLORATION 2-23-88	
61.8'	S-13	2 3/8"	80%	3 5- bouncing refusal	EXPLORATION CONTINUED 2-23-88. Sample to 61.8'.	poorly graded SP. Grey ~~mf~~ SAND; ~~trace GRAVEL~~; ~~trace GRAVEL~~ (wet, non plastic) w/clumps of Br. silty mf SAND ~~SW~~ SM
62' 64' 65.5					Advanced roller bit to 65.5' using "Clear mud" drilling fluid. Note: encountered coarse gravel and cobbles from 61.8' to 65.5'	Coarse gravel and cobbles
65.6' 68'		2 3/8"	0%	5- bouncing refusal	Sample 65.6'. Advanced roller bit to 68'. Note: encountered possible boulder from 65.6' to 68'	Possible Boulder
68.6'	S-14	2 3/8"	50%	3 2- bouncing refusal	Sample to 68.6'. Advanced roller bit to 73.5'. Note: encountered coarse gravel and cobbles from 68.6' to 71.9', encountered a large cobble from 71.9' to 72.7'; encountered coarse gravel and cobbles from 72.7' to 73.5	~~Soil similar to sample #13 SW~~ Dk brown c-m SAND trace silt - SP w/ clumps Lr. silty m-f SAND SM
70'						coarse gravel and cobbles
72'						cobble
73.5						coarse gravel and cobbles
74.5	S-15	2 3/8"	30%	10 17- bouncing refusal	Sample to 74.5'. Advanced roller bit to 77.7'. Note: encountered coarse gravel and cobbles from 74.5' to 77.7';	poorly graded grey-brown ~~coarse~~ SAND; ~~some~~ with GRAVEL; ~~some~~ and SILT (wet, non-plastic) ~~SM~~ SP-SM
76'						coarse gravel and cobbles

Boring No. FD 88-8

North Springfield Dam Vt

DEPTH	CORE/SAMPLE NO.	SIZE	DEPTH / CORE REC'VY	BLOWS PER 6"	6" SAMPLING AND CORING OPERATIONS	CLASSIFICATION OF MATERIALS
77.7'			Lec			
78'	R-2	NX	76%		NX DIAMOND CORE, 3.8' run	Cobbles with seams of cm + SAND, LiHG GRAVEL LiHG SILT,
80'						
81.5'					END OF EXPLORATION 2-23-88	
82'					EXPLORATION CONTINUED 2-24-88 Advanced 3 7/8" roller bit to 82.7' Auger bedrock @ 81.7	Bedrock
82.7'						
84'	R-3	NX	79%		NX DIAMOND CORE; 3.8' run	Greyish-Pink Gneiss 3' recovery 8 pieces, few fragments RQD = 57%
86'						
86.5'						
88'	R-4	NX	100%		NX DIAMOND CORE; 5' run	Similar Rock 100% recovery 4 pieces RQD = 100%
90'						
91.5'					EXPLORATION TERMINATED 2-24-88	

FIELD LOG OF TEST BORING IN ROCK

SITE North Springfield Dam VT ROLE NO. FD 88-8 PAGE 8 of 11

DATE	DEPTH PT. FROM	DEPTH PT. TO	RUN PT.	RUN REC'V'Y PT.	REC'V'Y %	DRILLING BEHAVIOR: FEED	DRILLING BEHAVIOR: WATER	DRILLING BEHAVIOR: REASON FOR PULL	ACTUAL DRILLING TIME	BIT NO. SIZE AND TYPE	ADDITIONAL REMARKS
2-19-88	57.2'	59.2'	2'	0.9	45%	Medium	No loss of water noted	2' run	25 min	NX	Run #1, broke through boulder @ 59.2'
2-23-88	77.7	81.5	3.8'	2.9'	76%	Medium	loss of water noted from 80.4' to 80.5'	3.8' run	35 min	NX	Run #2
2-24-88	82.7	86.5	3.8'	3'	79 %	Medium	No loss noted	3.5' run	40 min.	NX	Run #3
2-24-88	86.5	91.5	5'	5'	100%	Medium	No loss noted	5' run	50 min	NX	Run #4

TOTAL BED ROCK DRILLED 9.8 FEET; total rock cored – 14.6 ; total bedrock cored 8.8

TOTAL BED-ROCK RECOVERED 8 FEET

BED ROCK RECOVERY 91 PERCENT

DRILLER Burnham

INSPECTOR Hargrave

NED FORM 130

REPLACES EDITION OF APR 63 WHICH MAY BE USED UNTIL EXHAUSTED

PIEZOMETER INSTALLATION REPORT

PROJECT: North Springfield Dam, Vt | DATE: 2-25-88

LOCATION (STA): | OFFSET FROM CENTER LINE: | PIEZ NO.: PZ-21 FD88-8

PIEZ TYPE: Casagrande | DEPTH OF PIEZ: 87.0 | RISER PIPE DIAM: 3/4"

PIEZ TIP SET IN (SOIL TYPE): Bedrock | SOIL SAMPLE NO.: | BORING DIAM: 4" overburden 3" in bedrock

METHOD OF INSTALLATION:

TYPE OF PROTECTION FOR PIEZ: 4" casing | VENT: screw on cap

GROUND ELEV.: 530.6' | ELEV. TOP OF RISER: 533' | ELEV PIEZ TIP: 443.6'

FILTER: #3 graded Q-rock SAND | FROM ELEV: 443.1' | TO ELEV: 469.6'

SEAL: Bentonite Pellets | FROM ELEV: 469.6' | TO ELEV: 474.6'

INSTALLED BY: Burnham | CONTRACT NO.: D0.0003 | FOREMAN: Hargrave

DATE OF INSTALLATION: 2-24-88 | DATE OF OBSERVATIONS: 2-25-88

METHOD OF TESTING PIEZ.: Falling Head Test

TIME	ELAPSED TIME MINUTES	DEPTH TO WATER FEET	TIME	ELAPSED TIME MINUTES	DEPTH TO WATER FEET	TIME	ELAPSED TIME MINUTES	DEPTH TO WATER FEET
	0.5	19.1		10.0	37.9			
	1.0	21.0		15.0	43.1			
	2.0	23.6		20.0	47.2			
	3.0	26.0		25.0	50.7			
	5.0	30.3		30.0	53.3			

REMARKS:

Static water level was recorded prior to performing falling head test, level was 72.2'

Gregory P. Hargrave
INSPECTOR

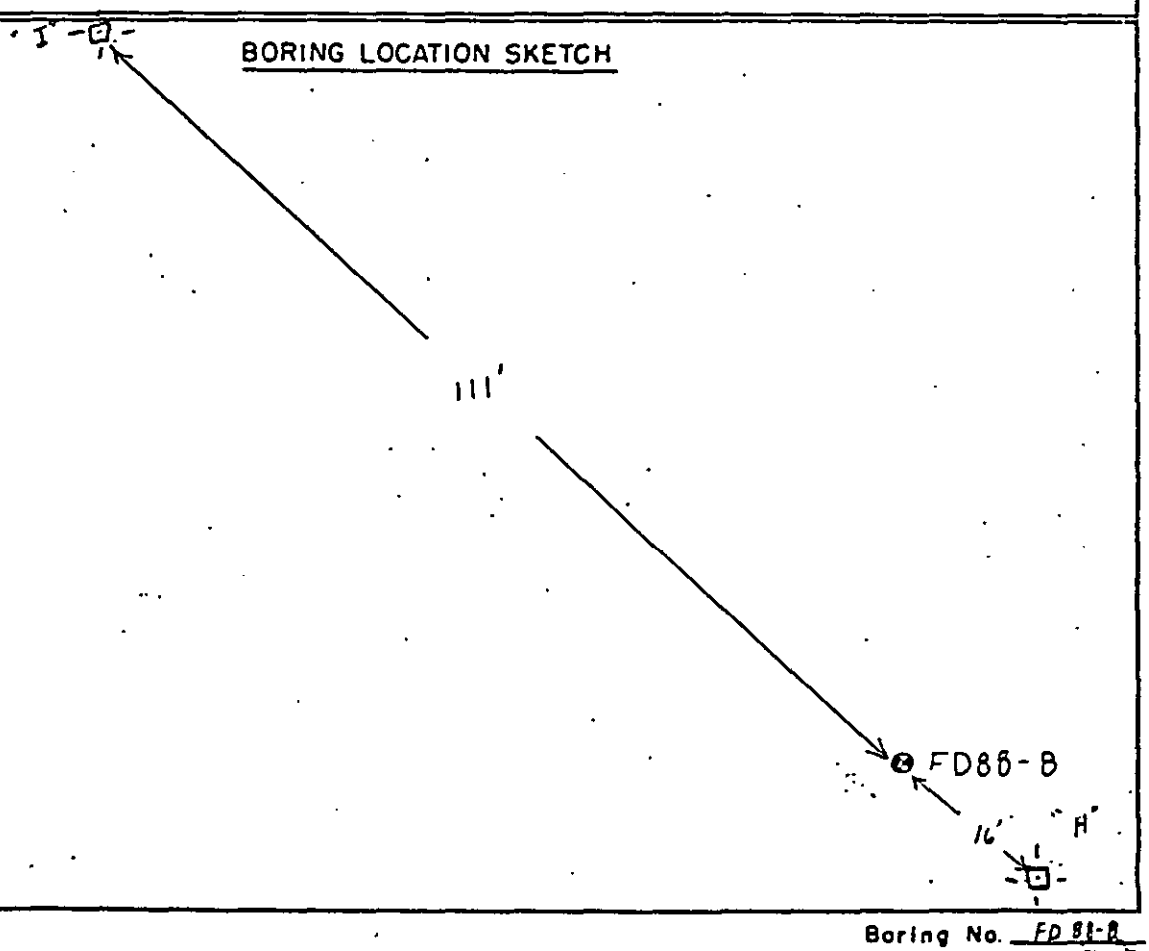
Site: North Springfield Dam, VT
Boring No: FD 88-B

SUBSURFACE WATER OBSERVATIONS

DATE	TIME	DEPTH-BOT. OF CASING	DEPTH-BOT. OF BORING	DEPTH TO WATER	ELEVATION WATER	REMARKS
2-24-88	11:00Am	7'	87.7	72.2	458.4	water level before rolling head test performed

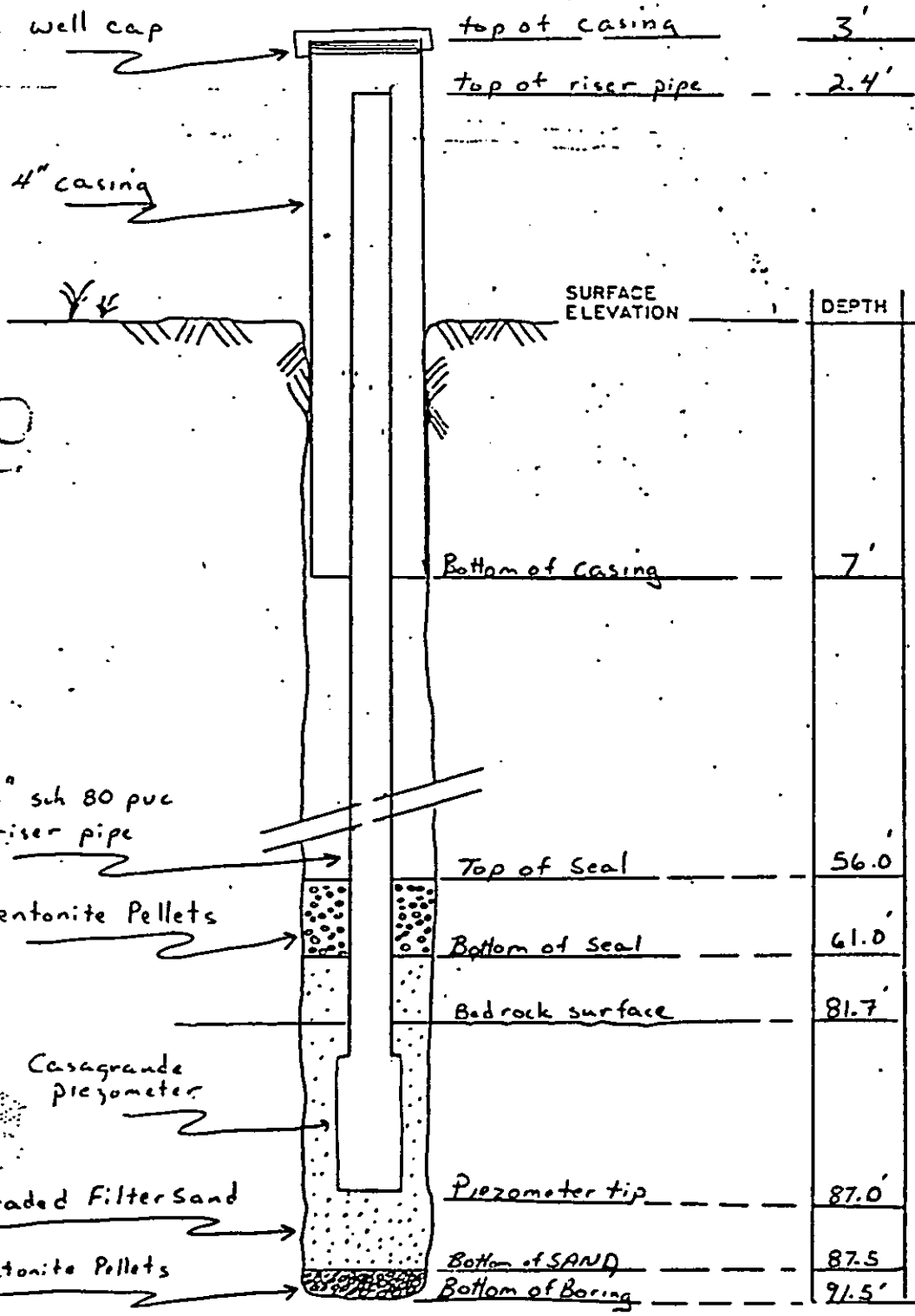
Note: Depths are in feet below original ground

BORING LOCATION SKETCH



ATLANTIC TESTING LABORATORIES, LIMITED

PIEZOMETER INSTALLATION DETAIL

PROJECT: North Springfield Dam
Vt

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ATL No. CD 030
PIEZOMETER No. FD 88-8